



SPEEDIE
AND ASSOCIATES

Geotechnical ■ Environmental ■ Materials Engineers

April 25, 2006

Mr. John P. Fyie
Jacobs Civil, Inc.
875 West Elliot Road
Suite 201
Tempe, AZ 85284

RE: Addendum No. 2
Project No. 040825SA
83rd Ave. Drainage Improvements
83rd Ave & Pinnacle Peak Rd
Peoria, Arizona

Dear Mr. Fyie:

It is our understanding that Cielo Grande and Avenida Del Sol are to be paved in accordance with MCDOT standards. As these are residential streets it is assumed that the daily ESAL count will be less than 10. Using the data from the nearby borings drilled for the culverts, we estimated the soil parameters for the subgrade soils for these roadways.

The section capacity is reported as daily ESALs, Equivalent 18 kip Single Axle Loads. Typical heavy trucks impart 1.0 to 2.5 ESALs per truck depending on load. It takes approximately 1200 passenger cars to impart 1 ESAL. The correlated R-Value and Resilient modulus were calculated in accordance with MCDOT requirements using the data obtained during the original soil investigation. The following design parameters comply with MCDOT specifications for residential streets.

Pavement Design Parameters:

Assume:	One 18 kip Equivalent Single Axle Load(ESAL)/Truck
Life:	20 years
Initial Serviceability:	4.2
Terminal Serviceability:	2.0
Reliability Level:	80%
Overall Standard Deviation:	0.45

Subgrade Soil Profile:

R value:	25 (average correlated per MCDOT design)
M _R :	15,350 (per MCDOT design)

Utilizing the above design parameters, the MCDOT minimum pavement section of 2.5 inches AC over 6 inches of ABC provides a section capacity of 16 ESALs/day, or a lifetime capacity of 120,200 ESAL's. It is our opinion that the minimum section required by MCDOT is sufficient.

If there are any further questions please call. This addendum should be attached to the original report and made a part thereof.

Respectfully submitted,
SPEEDIE & ASSOCIATES



for Brian J. Amos



Gregg A. Creaser, P.E.



Gregg A. Creaser, P.E.
Brett P. Creaser, P.E.
Donald L. Cornelison, P.E.
Steven A. Griess, P.E.
Keith R. Gravel, P.E.
Jason C. Wells, P.E.
Brian E. Lingnau, Ph.D., P.E.
Timothy J. Rheinschmidt, R.G.
Richard A. Schooler, R.G.
Jesse W. Laurie, R.G.

February 10, 2006

Mr. John Pat Fyie
Jacobs Civil, Inc.
875 West Elliot Road, Suite 201
Tempe, AZ 85284

**RE: Addendum No. 1 - Project No. 040825SA
83rd Avenue Drainage Improvements
83rd Avenue and Pinnacle Peak Road
Peoria, Arizona
Additional Borings**

Dear Mr. Fyie:

Since the completion of our original investigation and report the depths of the facilities have been finalized and several of our original borings were advanced to the depth required. As requested, we returned to the above referenced site and drilled three additional borings to confirm subsoil conditions and review our recommendations.

The subsoil at the site comprise of clayey sands and silty clayey sands, with subordinate amounts of gravel and cobble with varying degrees of calcareous cementation. The borings were terminated within these deposits at depths of 15.5 to 20.3 feet. Standard penetration resistance test (SPT) values range from 12 to 50+ blows per foot. Groundwater was not encountered. Based on these findings, the conditions are consistent with the original investigation. Namely very dense soil conditions at depth which will require "hard dig" conditions. Note that in the Pinnacle Peak Basin, the boring penetrated through the highly cemented layer into medium dense sand. This may result in better percolation and easier excavation if this condition is consistent across the basin.

It is our professional opinion that the comments and recommendations contained in the original report remain applicable. This addendum should be attached to the original report and made a part thereof.

Respectfully submitted,
SPEEDIE & ASSOCIATES



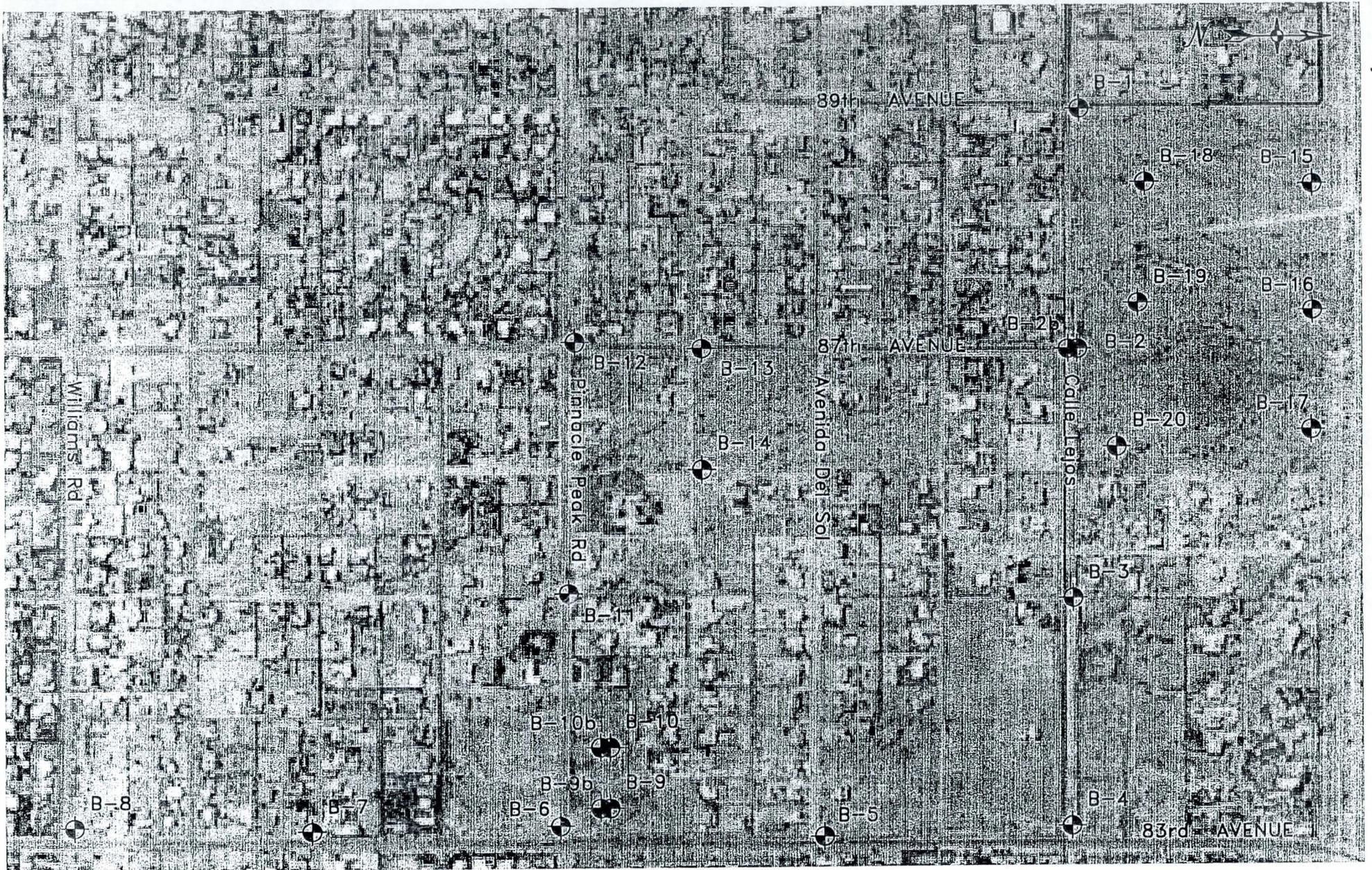
Todd B. Hanke, P.E.



Gregg A. Creaser, P.E.



Attachments: Boring Logs and Revised Boring Location Plan



⊕ - APPROXIMATE SOIL BORING LOCATIONS

SOIL BORING LOCATION PLAN

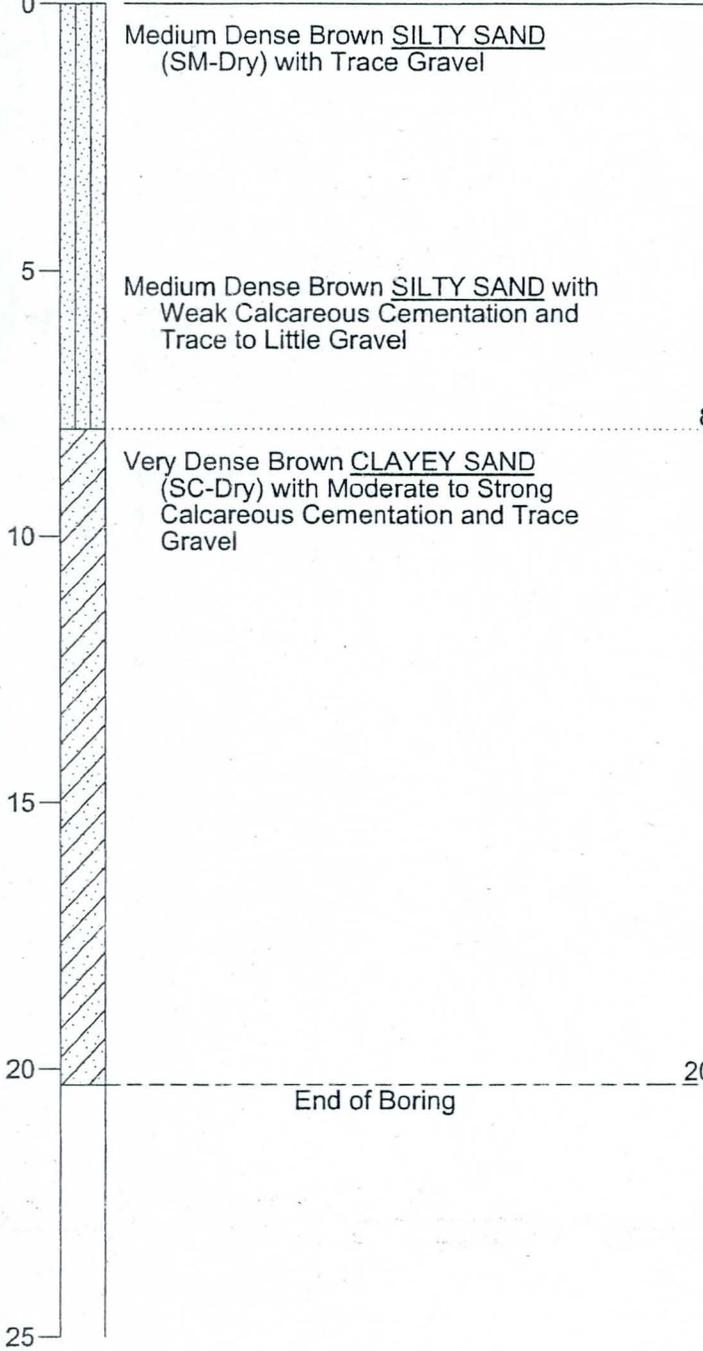
83RD AVE DRAINAGE IMPROVEMENTS
 83RD AVE & PINNACLE PEAK RD.
 PEORIA, ARIZONA

**SPEEDIE
 AND ASSOCIATES**
 GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
 3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

DR:	SES	CHK:	REV:	DATE:	2-10-06	PROJECT NO.	040825SA
-----	-----	------	------	-------	---------	-------------	----------

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	
S-3	11.0	NT	NT	50/6"
S-4	16.5	NT	NT	85/12"
S-5	20.3	NT	NT	50/4"

Boring Date: **2-3-06**
 Field Engineer/Technician: **T. Hanke**
 Driller: **D. Arwood**
 Contractor: **Boart Longyear**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

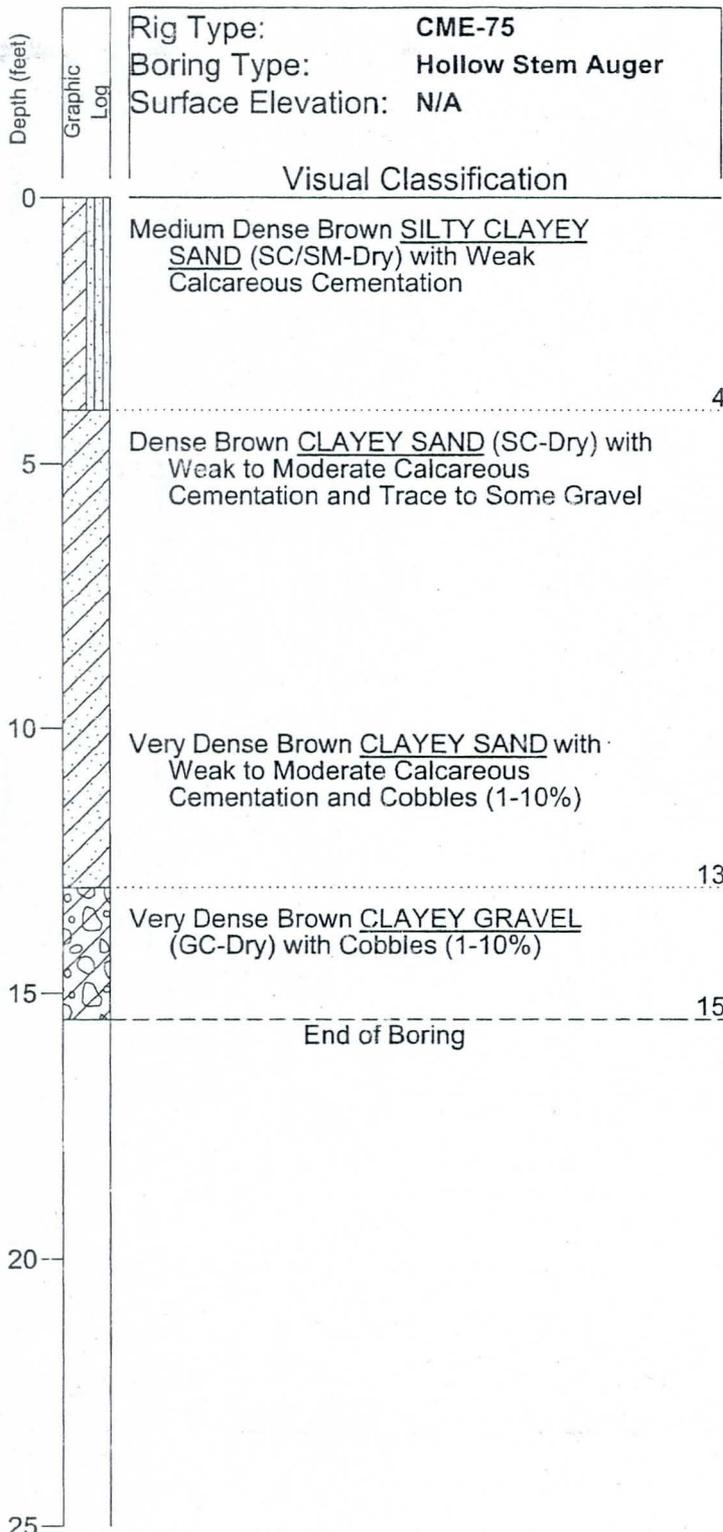
SPEEDIE AND ASSOCIATES

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

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: **040825SA**

- SPEEDIE 040825SA.GPJ GENGEO.GDT 2/10/06



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	
S-3	11.5	NT	NT	51/12"
S-4	15.5	NT	NT	50/6"

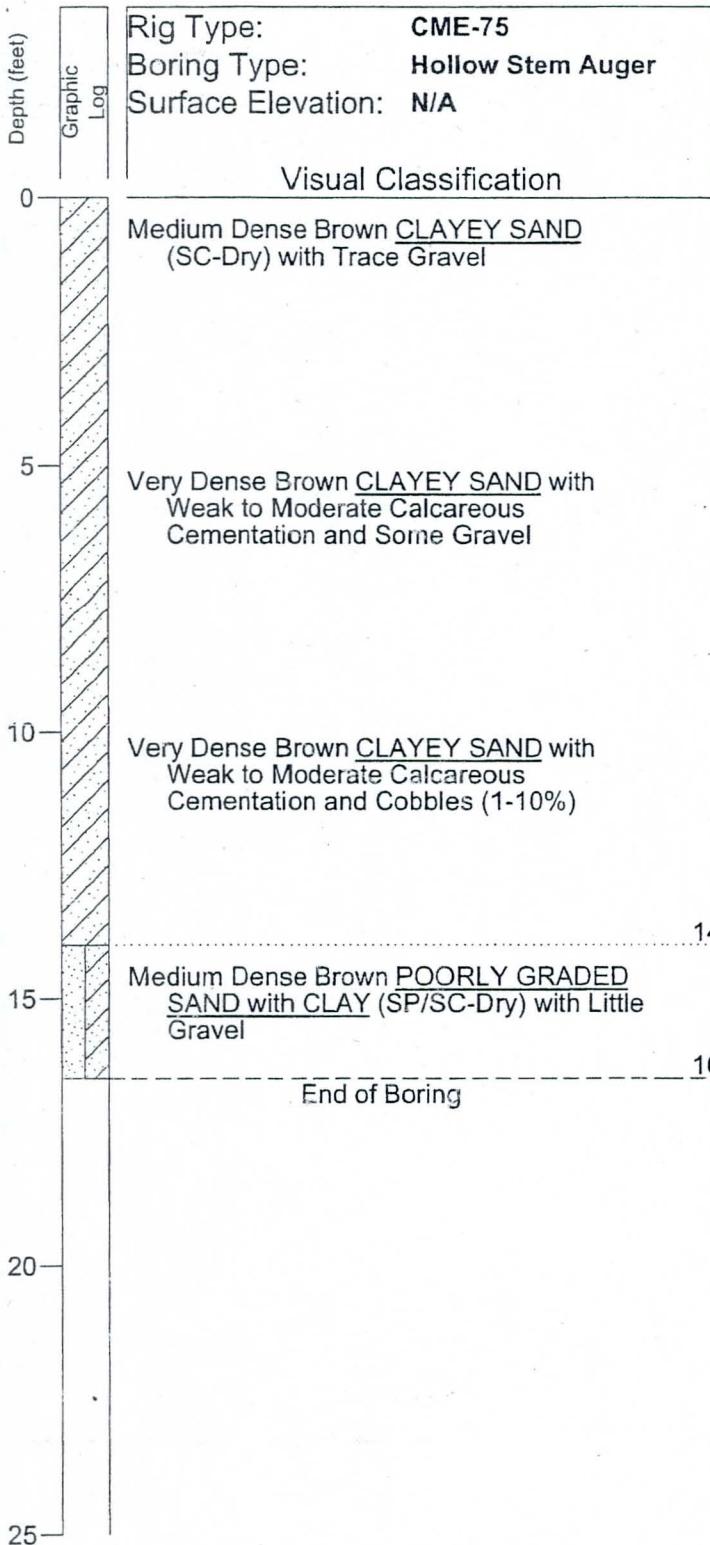
Boring Date: 2-3-06
 Field Engineer/Technician: T. Hanke
 Driller: D. Arwood
 Contractor: Boart Longyear

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-9B
 83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona
 Project No.: 040825SA

SPEEDIE 040825SA.GPJ GEN GEO.GDT 2/10/06



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	51/12"
S-3	11.0	NT	NT	50/6"
S-4	16.5	NT	NT	

Boring Date: **2-3-06**
 Field Engineer/Technician: **T. Hanke**
 Driller: **D. Arwood**
 Contractor: **Boart Longyear**

Water Level

Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-10B**

83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGE0.GDT 2/10/06

Gregg A. Creaser, P.E.
Brett P. Creaser, P.E.
Donald L. Cornelison, P.E.
Steven A. Griess, P.E.
Keith R. Gravel, P.E.
Jason C. Wells, P.E.
Brian E. Lingnau, Ph.D., P.E.
Timothy J. Rheinschmidt, R.G.
Richard A. Schooler, R.G.
Jesse W. Laurie, R.G.

**REPORT ON GEOTECHNICAL
EVALUATION - FINAL**

DESIGNATION: 83rd Ave Drainage Improvements
2003C060

LOCATION: 83rd Avenue & Pinnacle Peak Rd.
Phoenix, Arizona

CLIENT: Jacobs Civil, Inc.

PROJECT NO: 040825SA

DATE: January 6, 2006



TABLE OF CONTENTS

1.0 INTRODUCTION.....1

2.0 GENERAL SITE AND SUBSURFACE CONDITIONS.....1

 2.1 General Site Conditions.....1

 2.2 General Subsurface Conditions.....1

3.0 FIELD AND LABORATORY INVESTIGATION2

 3.1 Drilling2

 3.2 Laboratory Data.....2

4.0 ANALYSIS AND RECOMMENDATIONS.....3

 4.1 Analysis3

 4.2 Bedding, Backfill and Fill (Non-Building Areas)3

 4.3 Soil Corrosion5

 4.4 Excavations5

 4.5 Foundation Design6

 4.6 Lateral Pressures.....7

5.0 GENERAL.....7

APPENDIX



1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out along the route of a proposed drainage improvement project, which will provide 100-year storm protection for the area between Hatfield Road and Deer Valley Road, between 83rd and 91st Avenues. The new drainage system will consist of new detention basins, channels, and storm drains to manage storm runoff. Preliminary design calls for storm water runoff to be collected in two major detention basins. The 87th Avenue Basin will be located at the southeast corner of Avenida Del Sol and 87th Avenue. This basin replaces the proposed Calle Lejos basin which had been investigated in the earlier investigation. The Pinnacle Peak Basin is planned for an area at the northwest corner of 83rd Avenue and Pinnacle Peak. The runoff will be conveyed down a storm drain system which will be located along 83rd Avenue (FCDMC Project No. 2003C060 and Jacobs Project No. W7X74300), 87th Avenue from Calle Lejos to Pinnacle Peak, Calle Lejos from 87th Avenue to 85th Avenue, Cielo Grande and Avenida del Sol from 91st Avenue to 87th Avenue and Pinnacle Peak Road from 91st Avenue to 83rd Avenue. The storm drain line is expected to be installed with a variable cover below existing grade.

2.0 GENERAL SITE AND SUBSURFACE CONDITIONS

2.1 General Site Conditions

The proposed detention basins are located in undeveloped areas with moderate to thick native desert vegetation. The 87th Avenue basin, which has more pristine desert vegetation, is located at the southeast corner of 87th Avenue and Avenida del Sol. The site is a block of vacant land surrounded by residential homes. The land is relatively flat; washes cross the land in a south easterly direction. The 83rd Avenue & Pinnacle Peak basin is located within several undeveloped lots, surrounded by residential neighborhoods and streets. The area appears to be relatively flat with a slight slope to the south. Several minor washes were noted at the site. The drainage legs are generally located adjacent to existing streets and residential areas.

2.2 General Subsurface Conditions

Subsoil conditions generally consist of clayey sand and sandy clay with occasional zones of silty sand, poorly graded sand, and clayey gravel. These soils generally become harder with depth and are comprised of moderate to strong calcareously cemented silty sand and clayey sand. Occasional layers with varying amounts of gravel were encountered. Borings placed in the 87th Avenue Basin area indicate similar conditions with some loose soils in the upper 4± feet.

No groundwater was encountered during this investigation. Depending on time of year, groundwater and floodwaters may be an issue near washes. Based on visual and tactile observation, the soils were in a 'dry' 'dry to moist' state at the time of investigation.

3.0 FIELD AND LABORATORY INVESTIGATION

3.1 Drilling

A total of 20 borings were drilled from July 15 to July 23, 2004 in order to ascertain area soil characteristics, this includes 12 borings along the drainage legs and 8 in proposed detention basins. After the project scope was extended and the Calle Lejos basin re-located, 7 additional borings were drilled on August 18, 2005. 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 borings were advanced by Heber Mining & Exploration utilizing a CME-55 and 75, setup with 7½-inch Hollow Stem Augers. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location included in the Appendix of this report.

3.2 Laboratory Data

Laboratory testing consisted of moisture content, dry density, moisture-density relationships, consolidation tests, grain-size distribution and plasticity (Atterberg Limits) tests for classification purposes. Laboratory minimum resistivity, soluble sulfate and pH tests were conducted for corrosivity analysis, and several agronomic analyses were performed in order to ascertain the suitability of the basins for landscaping vegetation.

Laboratory testing indicates in-situ dry densities of the upper soils on the order of 90 to 123 pcf with a range of 3 to 12 percent moisture at the time of investigation. Liquid limits ranged from "non-plastic" to 42 percent. Plasticity indices range from "non-plastic" to 25 percent. The fraction finer than the No. 200 sieve ranges from 12 to 69 percent. Laboratory minimum resistivity tests indicated results ranging from 403 to 8,723 ohm-cm in the saturated state and pH values of 7.2 to 8.9. Sulfate contents ranged from 0.0005% to 0.042%. Chloride contents ranged from 0.0007% to 0.0219%. All field and laboratory data are presented in the appendix.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 Analysis

Drilling conditions for this project were sometimes very difficult due to the presence of cobbles and a strong degree of calcareous cementation. The soils and cementation resulted in very dense conditions at lower depths as indicated by the high standard penetration values. These soil conditions are expected to impede deeper excavations. The fact that a boring was drilled to a specific depth does not mean the soil is readily excavatable using standard techniques. The excavating contractor must make their own assessment as to the type of equipment required to excavate the soils.

It appears that the soil conditions are not suitable for the installation of Cast in Place Concrete Pipe. Due to the very hard and rocky conditions, especially in the north legs, neat trenches will not be possible.

As noted in the final design, some of the boring did not penetrate to the full depth of the required excavation for the pipeline or basin in part due to the borings being drilled prior to the final design. At borings B-2, the depth of the pipe will be on the order of 19 feet where the boring was terminated at 16.4 feet. It should be expected that the soil profile will be as very dense and cemented as it was from below 13 feet. At boring B-6, the depth of the pipe will be similar yet the boring was only advanced to 12 feet due to the presence of cobbles which could not be penetrated with standard drilling equipment. The Pinnacle Peak Basin will be as deep as 15± feet with the boring terminating at 9 to 11 feet again due to very tough conditions below about 5 feet. Again, expect very tough excavating at these locations.

Select samples were tested for minimum resistivity and pH. These results indicate a potential mild to moderate degree of corrosiveness for direct buried steel pipe. See Section 4.3 for additional discussion on the meaning of these results. Type of piping materials should be selected accordingly. Bedding should be selected per the requirements of the pipe materials used and the trench loading conditions. Groundwater is not expected to be a factor in pipeline design or construction.

4.2 Bedding, Backfill and Fill (Non-Building Areas)

Pipe bedding should meet the project specifications by Jacobs Civil, Inc. Special granular pipe bedding or cementitious slurry meeting MAG Standard Specifications Section 728 for Controlled Low Strength Material (CLSM) may be required depending on the pipe materials and trench loading conditions.

Under any roadways, the backfill above the top of the pipe shall meet the requirements of MAG Standard Specification Section 601, type I backfill. As modified by the City of Phoenix, all fill under roadways will be compacted to 95 percent full depth to reduce settlement potential.

The trench backfill should be moisture conditioned, placed in suitable lifts and mechanically compacted as specified. Water settling is not recommended. Cobbles and/or rock like cemented materials encountered at depth may result in the need to require bedding under the pipe, to prevent cobbles/rock from inflicting point loads and injury to the pipe.

Accurate prediction of the amount of construction water necessary for compaction is not possible due to the varying factors. These include variable natural soil moisture, seasonal changes in moisture content, air temperature and wind speed that impact evaporation. The optimum moisture contents reported on the moisture-density relations data is based on the minus #4 materials. It will be corrected downward depending on the percentage of rock (plus #4 fraction) in the matrix. For ADOT highway projects, a range of 80 to 100 gallons per cubic yard for winter to summer months respectively is typically recommended.

Some settlement of the trench backfill can be expected. Assuming 8 feet of cover over the top of the pipe, settlement on the order of 3 to 6 inches may occur for backfill not compacted as recommended above. Due to repetitive traffic loading, similar settlement may occur at trench locations that cross access roads and rural roads. Design road grades should take this settlement into account.

The value for the Modulus of Soil Reaction Value (E') is dependent on the pipe backfill material utilized, the laying conditions and pipe backfill compaction. Based on the soil test data and field observations, the Modulus of Soil Reaction Value (E') values may be used.

Modulus of Soil Reaction (E')			
Pipe Backfill Material	Compaction (%)	E' (psi)	Comments
Native Fill	90	1,000	1,2
Native Fill	95	2,000	1,2
Granular Fill	90	2,000	1,3
Granular Fill	95	3,000	1,3
Undisturbed Cemented Soils	N/A	2,000	4

Note:

1. Standard Proctor maximum dry density (ASTM D-698).
2. Must meet fill and backfill specifications. Assumes well mixed 3-inch minus native soils obtained from pipe trench/excavation. Must meet the following Unified Soil classification: (1) fine-grained soils with Liquid limit < 50% and medium to no plasticity (CL, ML, ML-CL) and more than 25% retained on #200 sieve; or (2) coarse-grained soils with fines (GM, GC, SM, SC) containing more than 12% fines.
3. Must meet fill and backfill specifications. Assumes 3-inch minus coarse-grained soils with little or no fines (GW, GP, SW, SP) containing less than 12% fines or soils meeting the requirements of M.A.G. section 702 Table 702-1 Type A or Type B select.
4. Assumes dense to very dense cemented native soils.

4.3 Soil Corrosion

Minimum resistivity tests were conducted in accordance with ADOT Test method 236_b. The test results indicate values ranging from 403 ohm-cm to 8,723 ohm-cm. The lower values were found on the western side of the project. The minimum laboratory resistivity test is conducted by saturating the soils until a minimum reading is determined. In the field, saturation of the bedding soils should not be expected, except possibly seasonally in wash crossings. Accordingly, under normal soil moisture conditions, the resistivity values would be greater. These saturated values reflect a potential mild to moderate degree of corrosiveness. Accordingly, suitable pipe wall thickness and corrosion protection should be selected per the trench/traffic load, moisture condition and lifetime requirements of the project. Laboratory pH values ranged from 7.2 to 8.9. Soluble sulfates in soil are on the order of 0.0005 to 0.042 percent and Chlorides in the soil are on the order of 0.0007 to 0.0219 percent. If required, Type I or II cement, readily available and used in the area, may be utilized in concrete in contact with the ground.

4.4 Excavations

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

1½:1 (horizontal to vertical) in the upper loose soils. Steeper slopes (¾: 1) may be possible in the deeper cemented soils when examined by a responsible party that is capable of evaluating soil classifications for slope stability and the effects of traffic vibration. 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 one-third the slope height, whichever is greater, from the top of slope. The Soils Engineer and/or the contractor's responsible party should observe all cut slopes during excavation. Adjustments to the recommended slopes may be necessary due to wet zones, loose strata and other 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, existing elements may require shoring, bracing or underpinning to provide structural stability and protect personnel working in the excavation.

For the northern leg pipeline/channels, it would appear that more aggressive excavation means maybe required for cuts deeper than 10± feet deep. The fact that a boring was advanced to a particular depth does not necessarily imply it is excavatable by conventional means. Very dense, hard, and/or cemented conditions may require more aggressive (rock) removal techniques. The excavating contractor should make his or her own assessment as to the excavatability of the soils and the equipment required.

4.5 Foundation Design

It is recommended that surface structures be founded on shallow spread footings bearing on undisturbed native soil, or on properly compacted fill, at a minimum depth of 18 inches below lowest finished exterior grade within 5 feet of the structure. If site preparation is carried out as set forth herein, a recommended allowable bearing capacity of 2,000 psf can be utilized for design. For below grade structures such as box culverts, an allowable bearing capacity of 8,000 psf may be used for foundations bearing on dense soils at a depth of at least 8 feet below existing grade. The upstream and downstream edges should have turndown cut-off walls that extend below the design scour and/or stream bed degradation elevation.

These bearing capacities refer to the total of all loads, dead and live, and are net pressures. They 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.

Although borings were not advanced to 100 feet, based on the nature of the subsoils encountered in the borings and geology in the area, Soil Profile Type, S_C, (Table 16-J, 1997 UBC) may be used for design of the structures.

Continuous wall footings and isolated rectangular footings should be designed with minimum widths of 16 and 24 inches respectively, regardless of the resultant bearing pressure. Lightly loaded interior partitions (less than 800 plf) may be supported on reinforced thickened slab sections (minimum 12 inches of bearing width).

Estimated settlements under design loads are on the order of 0.5 to 1-inch, virtually all of which will occur during construction. Post-construction differential settlements will be negligible, under existing and compacted moisture contents. Additional localized settlements of the same magnitude or more could occur when the native supporting soils experience a significant increase in moisture content.

Continuous footings and stem walls should be reinforced to distribute stresses arising from small differential movements, and long walls should be provided with control joints to accommodate these movements.

4.6 Lateral Pressures

The following equivalent fluid lateral pressure values may be utilized for the proposed design of restraints or temporary bracing:

Active Pressures	
Unrestrained Walls	35 pcf
Restrained Walls	60 pcf
Passive Pressure	350 pcf
Coefficient of Friction (w/ passive pressure)	0.35
Coefficient of Friction (w/out passive pressure)	0.45

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

5.0 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, or 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/rock 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.

Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.


Keith R. Gravel, P.E.


Gregg A. Creaser, P.E.



APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLANS

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST

MOISTURE-DENSITY RELATIONS

SWELL TEST DATA

AGRONOMIC TEST RESULTS

FIELD AND LABORATORY INVESTIGATION

From July 15 to July 23, 2004, and again on August 18, 2005, 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 and CME-75 drill rigs 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. 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 LOCATIONS

SOIL BORING LOCATION PLAN

83RD AVE DRAINAGE IMPROVEMENTS
 83RD AVE & PINNACLE PEAK RD.
 PEORIA, ARIZONA

**SPEEDIE
 AND ASSOCIATES**
 GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
 3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

DR: SES	CHK:	REV:	DATE: 7-27-04	PROJECT NO. 040825SA
---------	------	------	---------------	----------------------



⊕ - APPROXIMATE SOIL BORING LOCATIONS

SOIL BORING LOCATION PLAN

83RD AVE DRAINAGE IMPROVEMENTS
 83RD AVE & PINNACLE PEAK RD.
 PEORIA, ARIZONA

**SPEEDIE
 AND ASSOCIATES**
 GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
 3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

DR: SES	CHK:	REV:	DATE: 8-22-05	PROJECT NO. 040825SA
---------	------	------	---------------	----------------------

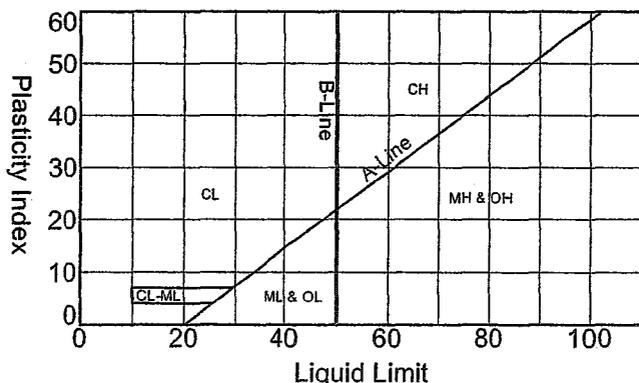
SOIL LEGEND

SAMPLE DESIGNATION	DESCRIPTION	
AS	Auger Sample	A grab sample taken directly from auger flights.
BS	Large Bulk Sample	A grab sample taken from auger spoils or from bucket of backhoe.
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.
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, 3/8-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 the 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 (tons/sq ft)	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		

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT 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	
	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	
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
HIGHLY ORGANIC SOILS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		

MATERIAL SIZE	PARTICLE SIZE				
	Lower Limit		Upper Limit		
	mm	Sieve Size *	mm	Sieve Size *	
SANDS	Fine	0.075	#200	0.42	#40
	Medium	0.420	#40	2.00	#10
	Coarse	2.000	#10	4.75	#4
GRAVELS	Fine	4.75	#4	19	0.75" x
	Coarse	19	0.75" x	75	3" x
COBBLES	75	3" x	300	12" x	
BOULDERS	300	12" x	900	36" x	
*U.S. Standard		xClear Square Openings			



NOTE: DUAL OR MODIFIED SYMBOLS MAY BE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS OR TO PROVIDE A BETTER GRAPHICAL PRESENTATION OF THE SOIL

Depth (feet)

Graphic Log

0

5

10

15

20

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification

Medium Dense Brown to Light Brown CLAYEY SAND (SC-Dry) with Little Gravel and Weak Calcareous Cementation

3.0

Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate to Strong Calcareous Cementation

End of Boring

11.4

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	6.5	101.7	
BS-2	5.0	NT	NT	
S-3	6.5	NT	NT	
S-4	11.4	NT	NT	85/11"

Boring Date: **7-15-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

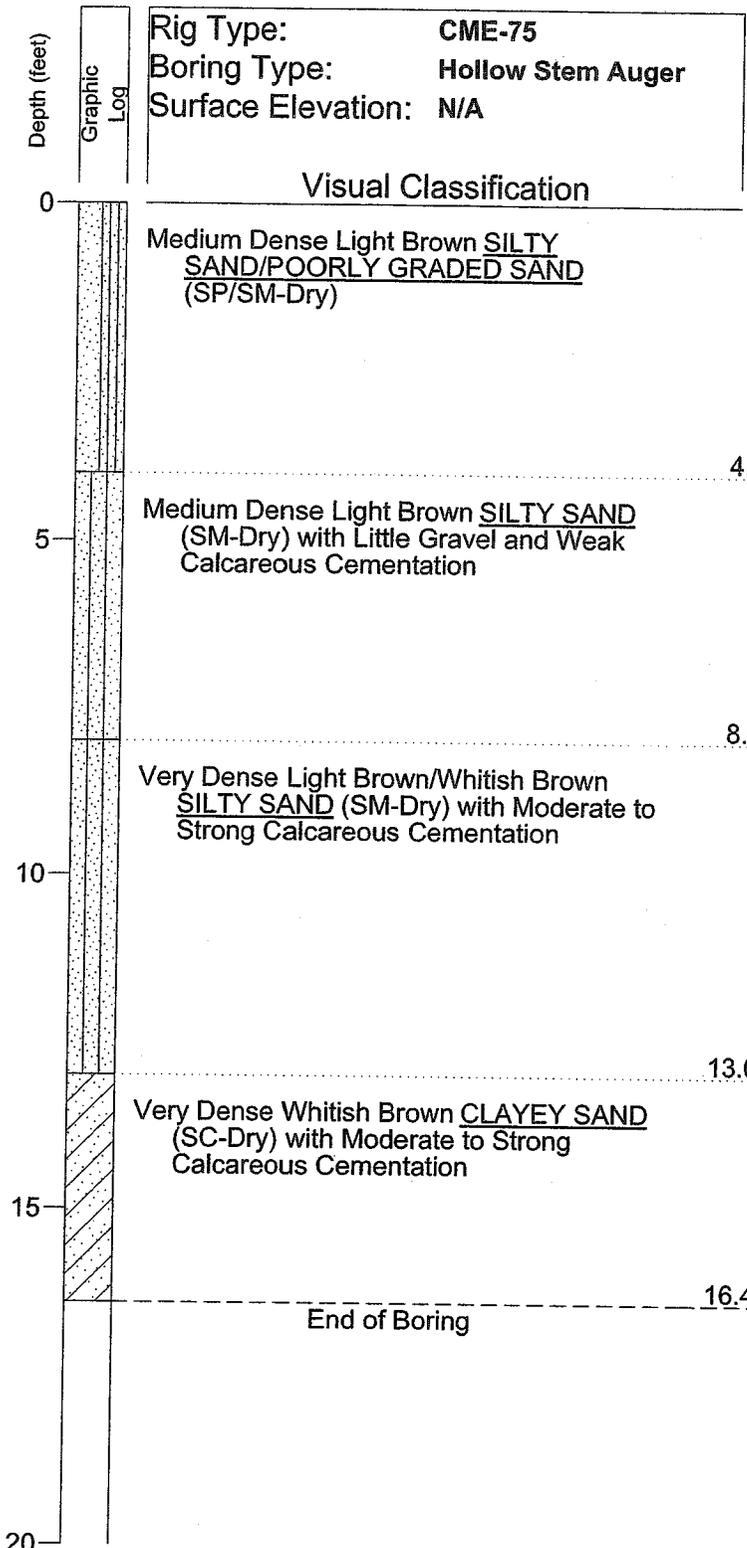
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	
BS-3	10.0	NT	NT	
S-4	10.5	NT	NT	50/6"
S-5	16.4	NT	NT	90/11"

Boring Date: 7-15-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

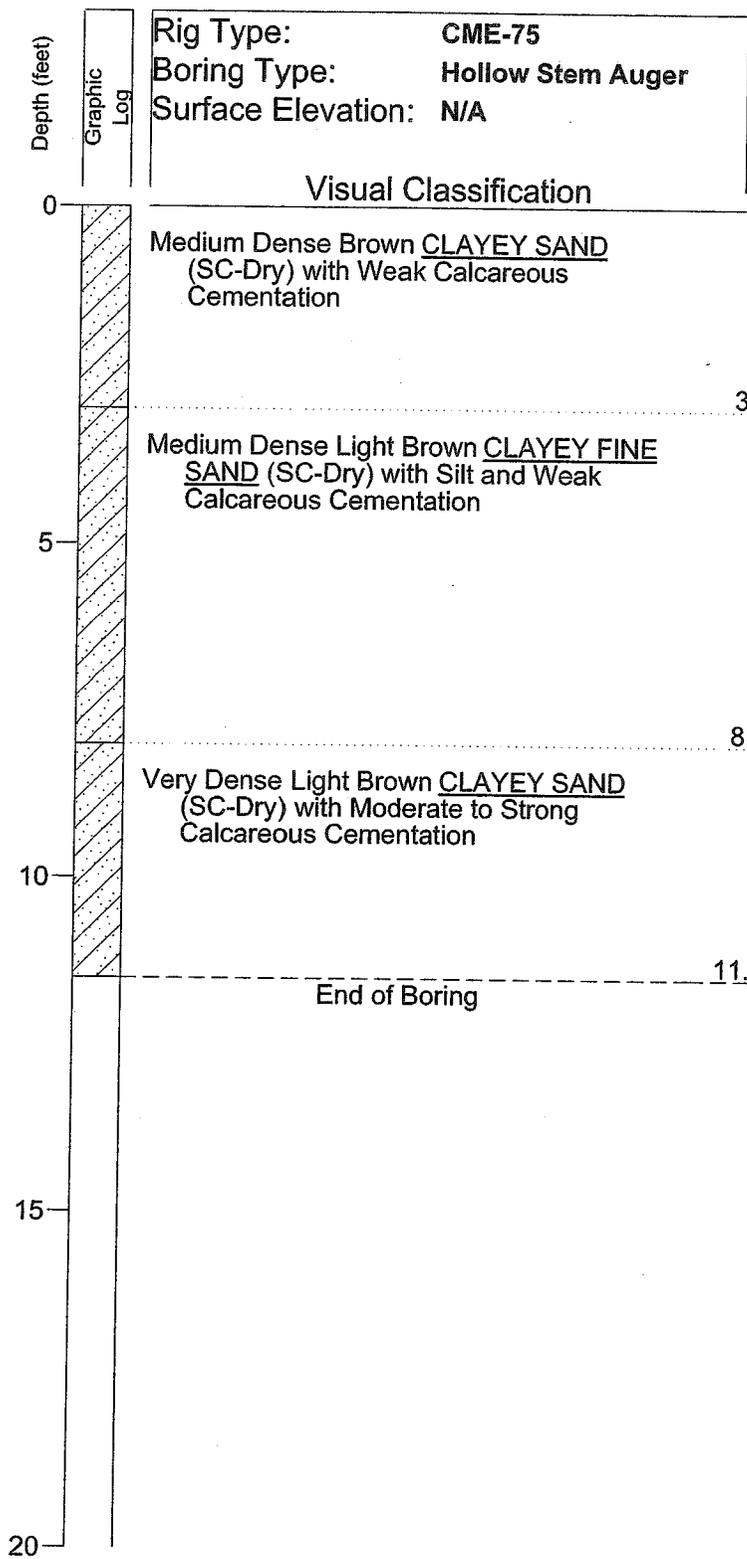
SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-2

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
BS-2	5.0	NT	NT	
S-3	6.5	NT	NT	
S-4	11.5	NT	NT	90/12"

Boring Date: 7-15-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

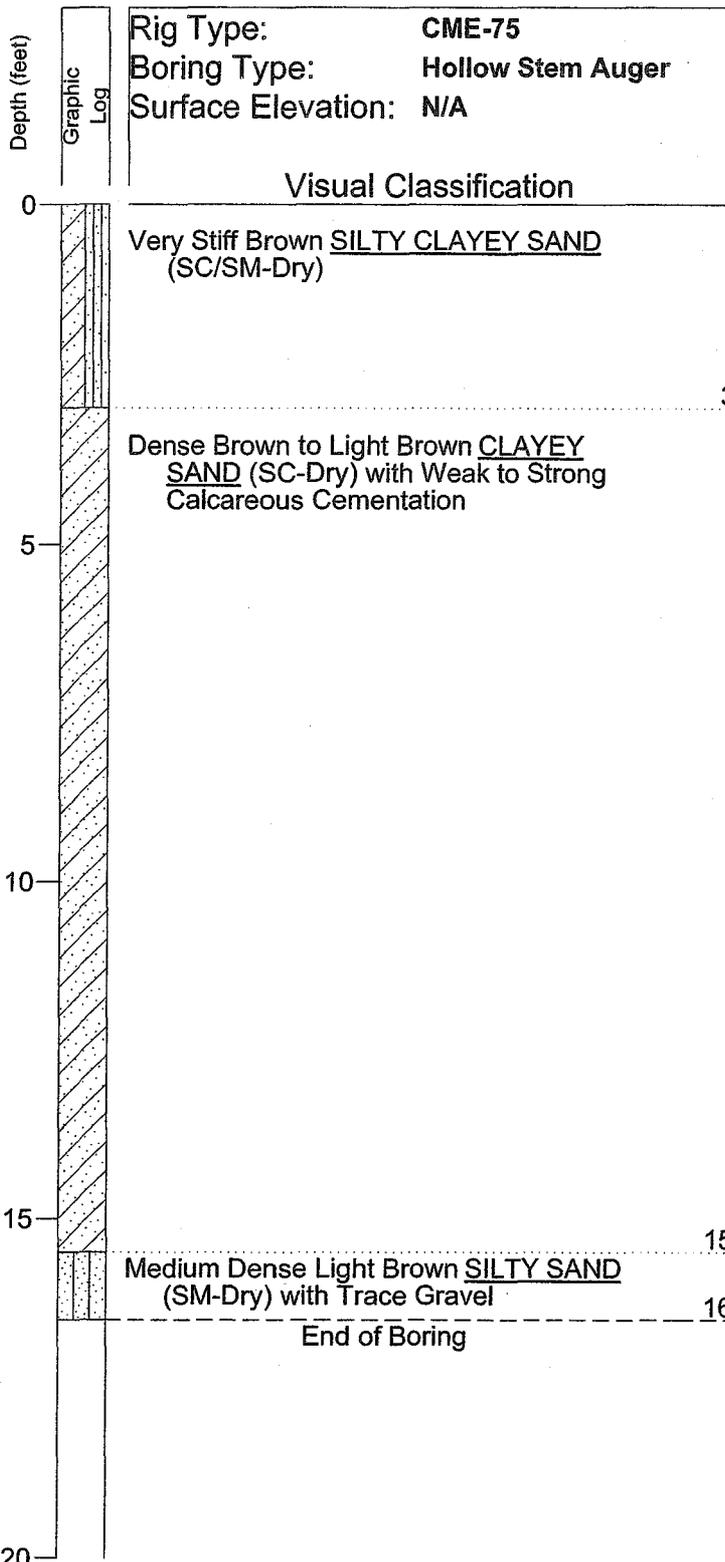
SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-3

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GEN GEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	3.8	106.8	
S-2	6.5	NT	NT	
BS-3	10.0	NT	NT	
S-4	11.5	NT	NT	
S-5	16.5	NT	NT	

Boring Date: 7-15-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

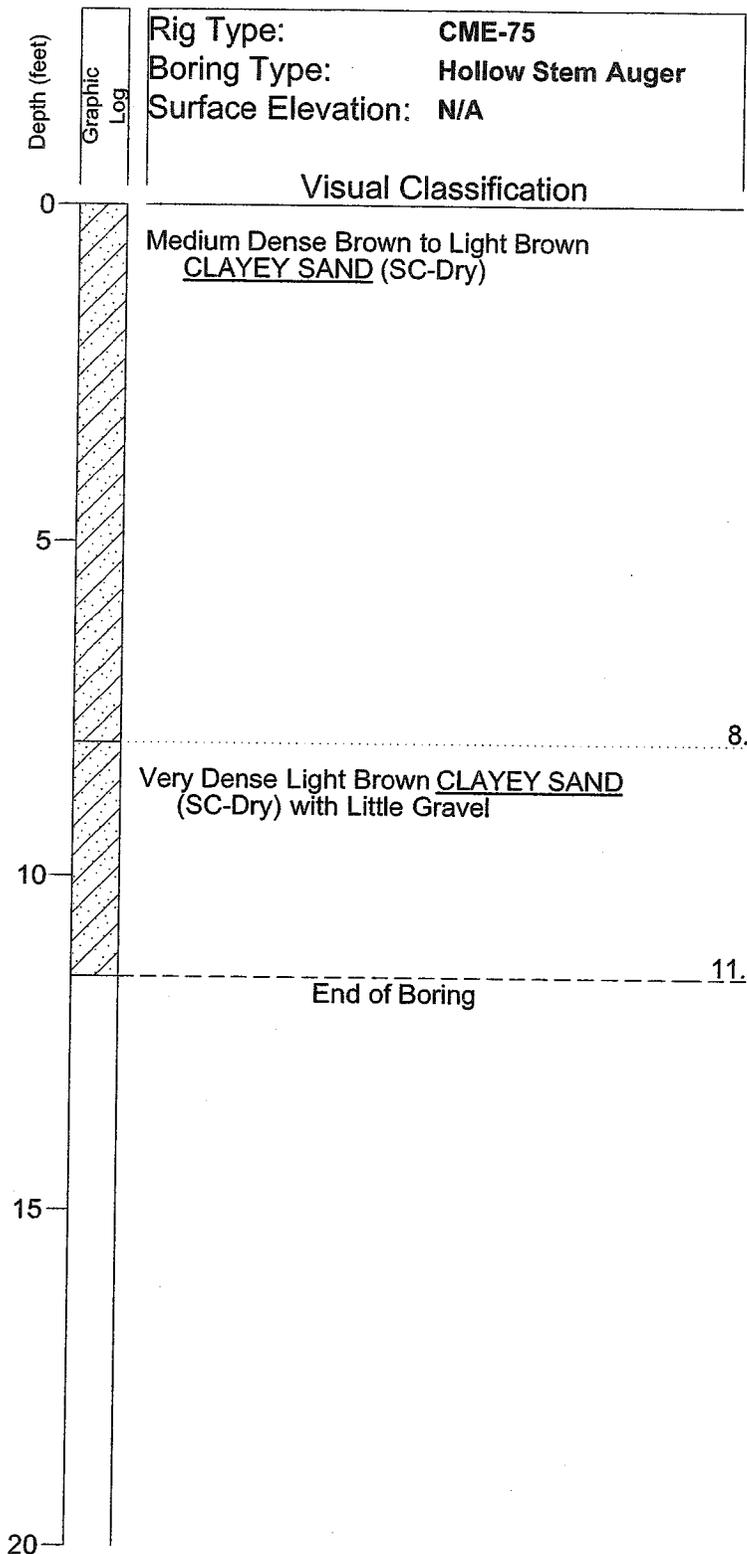
SPEEDIE AND ASSOCIATES

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

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: **040825SA**

_SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Rig Type: CME-75
 Boring Type: Hollow Stem Auger
 Surface Elevation: N/A

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	
BS-3	10.0	NT	NT	
S-4	11.5	NT	NT	50/12"

Boring Date: 7-16-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level

Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

▽
▽

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-5

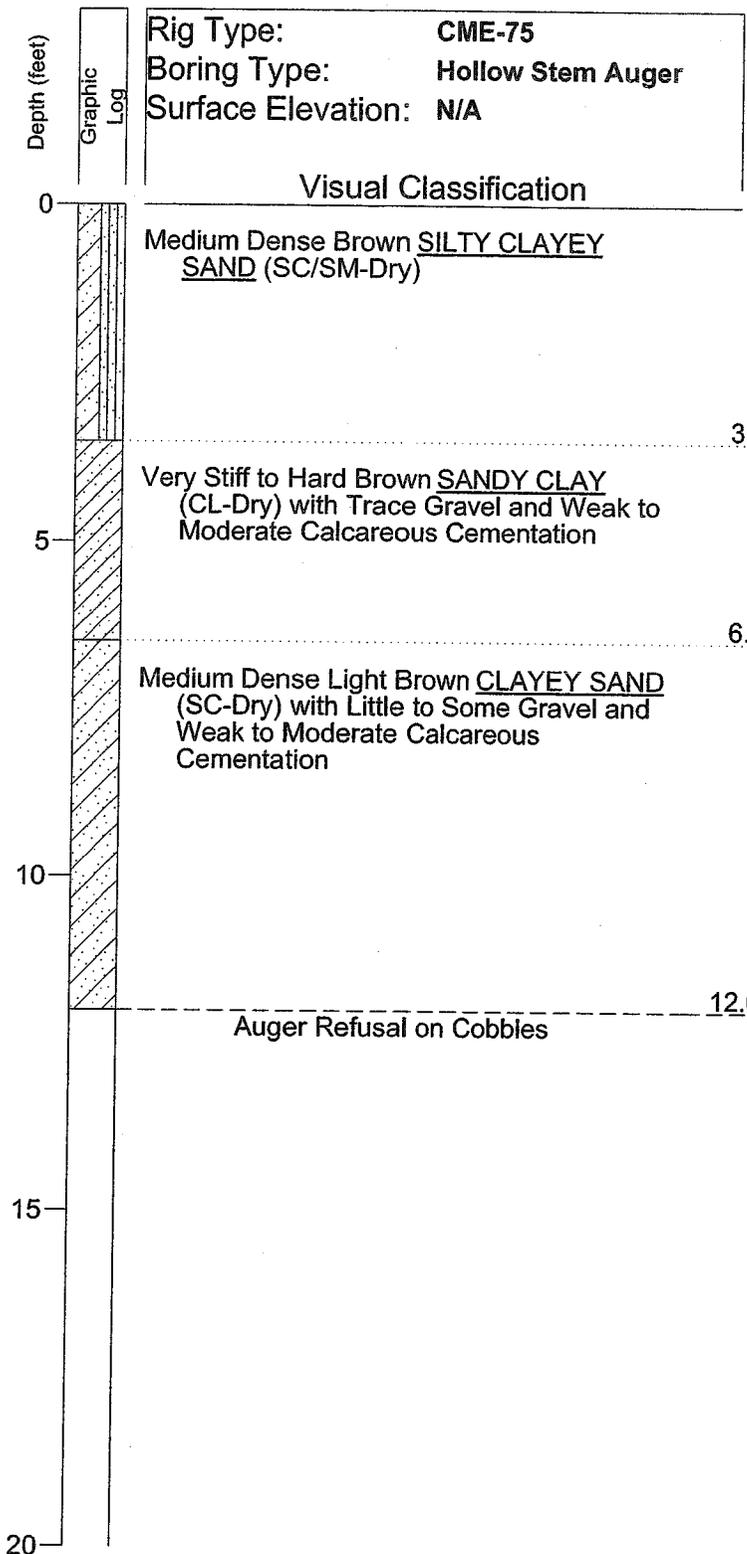
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	7.0	122.7	
S-2	6.3	NT	NT	61/10"
BS-3	10.0	NT	NT	
S-4	11.4	NT	NT	70/11"

Boring Date: 7-16-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level

Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

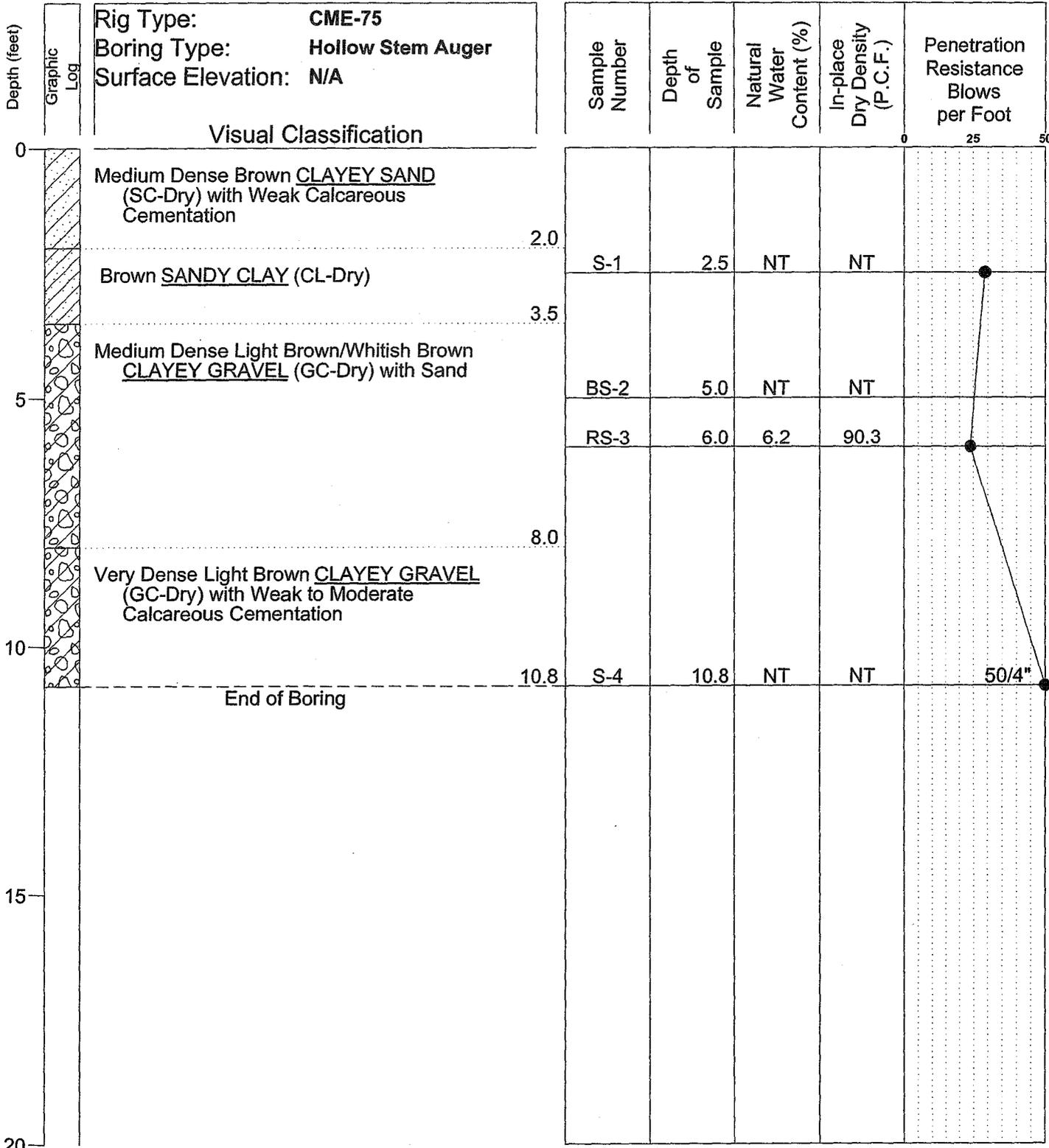
SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-6

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Rig Type: CME-75
 Boring Type: Hollow Stem Auger
 Surface Elevation: N/A

Visual Classification

0
 Medium Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation
 2.0
 Brown SANDY CLAY (CL-Dry)
 3.5
 Medium Dense Light Brown/Whitish Brown CLAYEY GRAVEL (GC-Dry) with Sand
 5
 8.0
 Very Dense Light Brown CLAYEY GRAVEL (GC-Dry) with Weak to Moderate Calcareous Cementation
 10
 10.8
 End of Boring

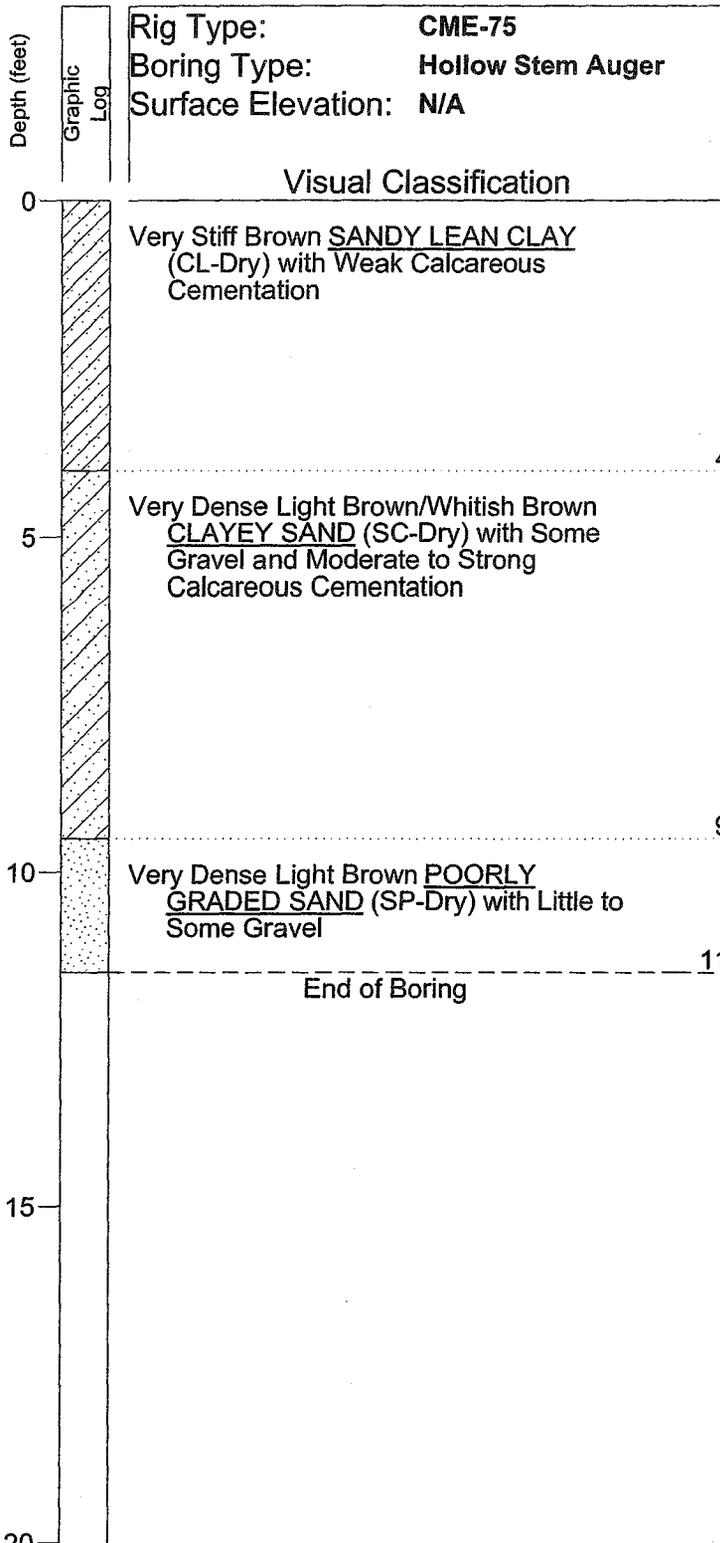
Boring Date: 7-16-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-7
 83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona
 Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEQ.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	50/6"
BS-3	10.0	NT	NT	
S-4	11.5	NT	NT	59/12"

Boring Date: 7-15-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-8

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification

Depth (feet) Graphic Log
 0
 Medium Dense Light Brown SILTY CLAYEY SAND (SC/SM-Dry) with Weak Calcareous Cementation
 Light Gravel at 4' 4.0
 5
 Very Dense Light Brown/Whitish Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation
 7.5
 Very Dense Light Brown/Whitish Brown CLAYEY SAND (SC-Dry) with Some Gravel and Moderate to Strong Calcareous Cementation
 10
 11.3
 End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	3.6	102.2	
BS-2	5.0	NT	NT	
S-3	6.5	NT	NT	52/12"
S-4	11.3	NT	NT	91/9"

Boring Date: **7-15-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-9**

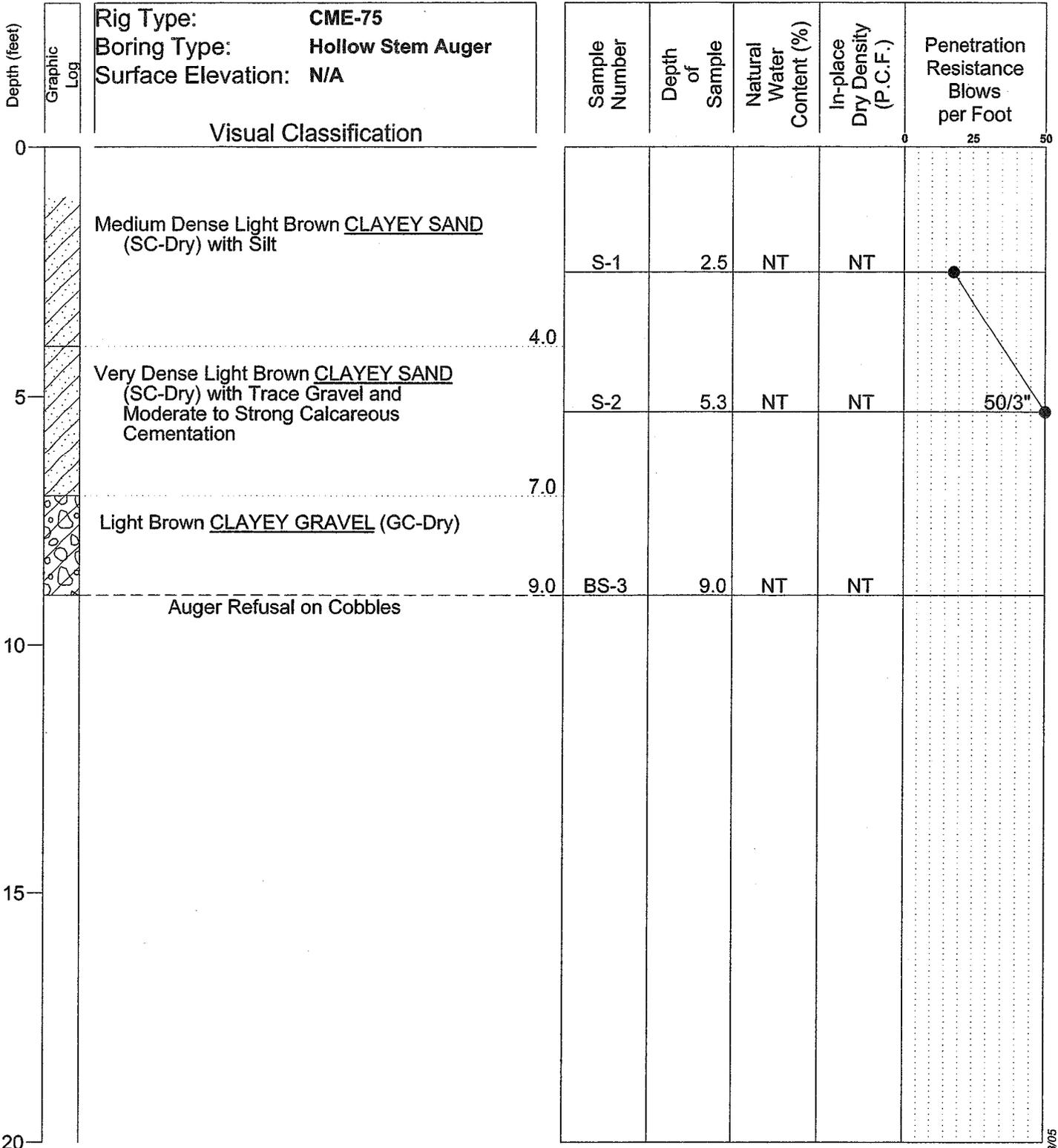
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Rig Type: CME-75
 Boring Type: Hollow Stem Auger
 Surface Elevation: N/A

Visual Classification

Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Silt

Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Moderate to Strong Calcareous Cementation

Light Brown CLAYEY GRAVEL (GC-Dry)

Auger Refusal on Cobbles

Boring Date: 7-15-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

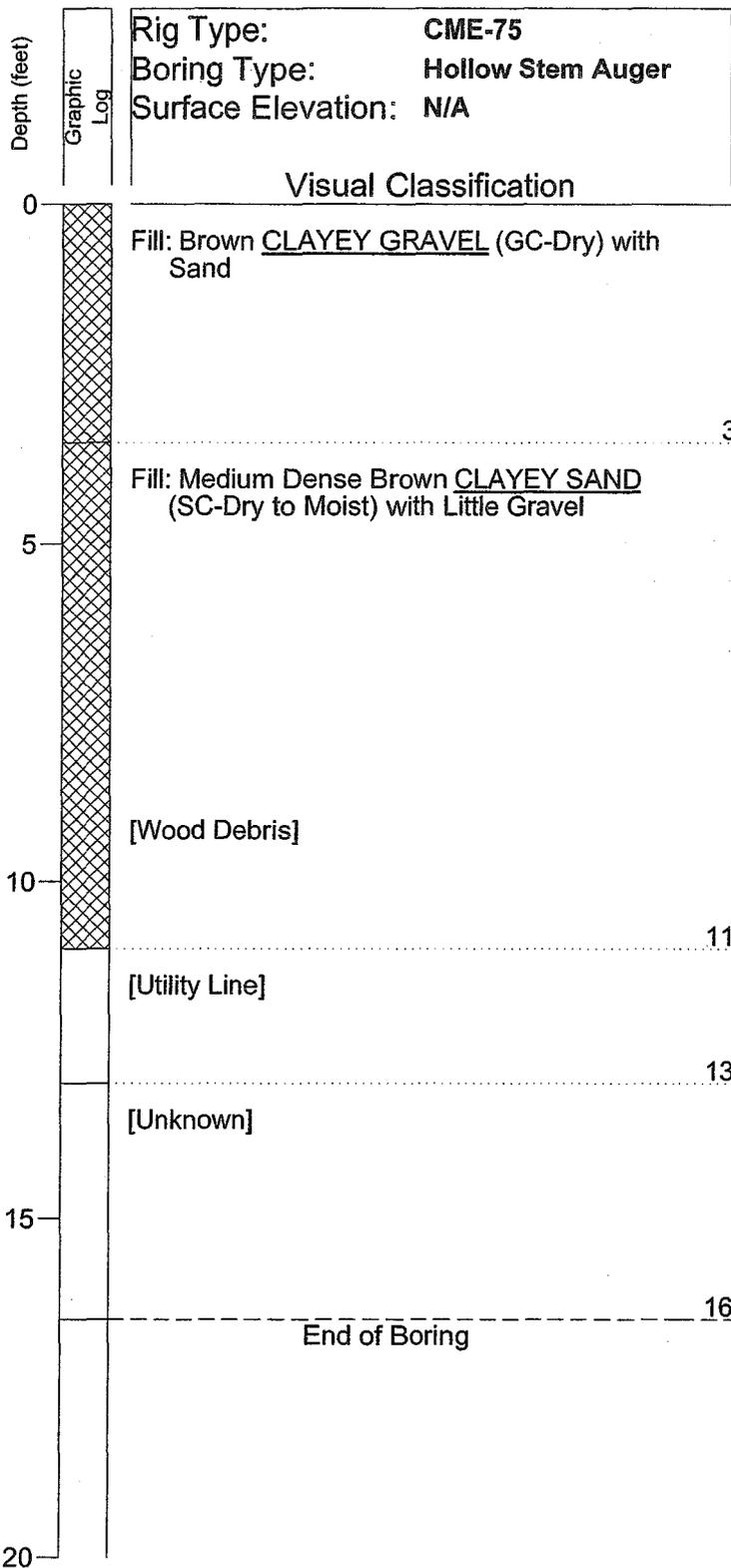
Log of Test Boring Number: B-10

83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: 040825SA



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	6.5	NT	NT	
S-2	11.5	NT	NT	
S-3	16.5	NT	NT	

Boring Date: 7-23-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

▽

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-11

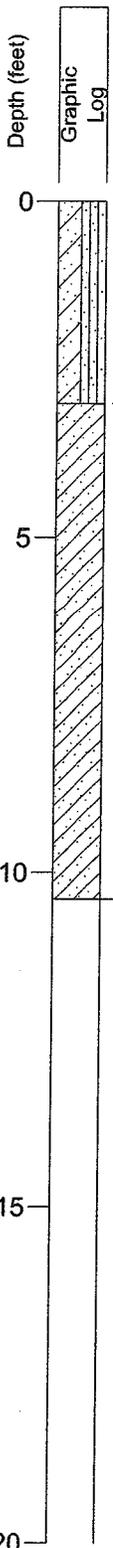
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGE0.GDT 9/28/05



Rig Type: CME-75
 Boring Type: Hollow Stem Auger
 Surface Elevation: N/A

Visual Classification

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	4.2	105.8	
S-2	6.5	NT	NT	71/12"
BS-3	10.0	NT	NT	
S-4	10.4	NT	NT	50/5"

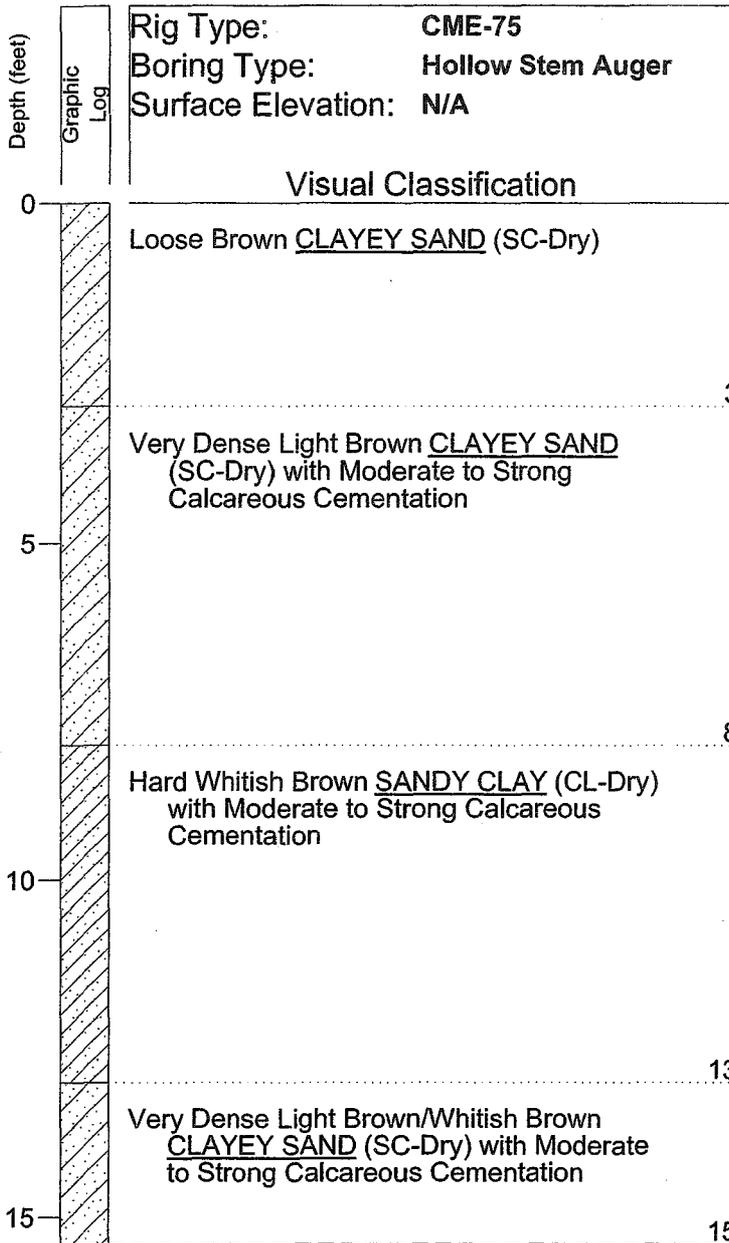
Boring Date: 7-23-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-12
 83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona
 Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.0	NT	NT	50/6"
BS-3	10.0	NT	NT	
S-4	10.3	NT	NT	50/4"
S-5	15.4	NT	NT	50/5"

Boring Date: **7-16-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-13**

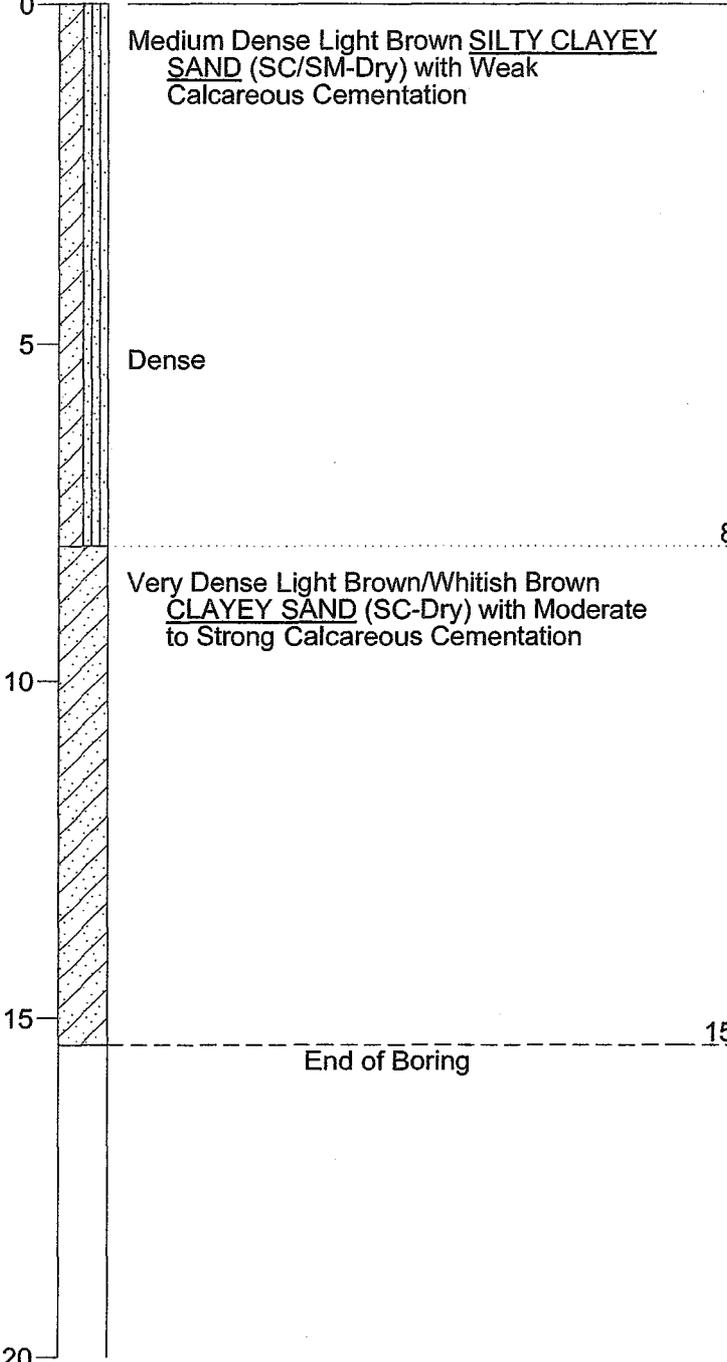
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: **040825SA**

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
BS-2	5.0	NT	NT	
S-3	6.0	5.0	103.5	
S-4	10.4	NT	NT	50/5"
S-5	15.4	NT	NT	50/5"

Boring Date: **7-16-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: **B-14**
83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
 Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEQ.GDT 9/28/05

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification
 0
 Very Dense Light Brown SILTY CLAYEY SAND (SC/SM-Dry) with Trace Gravel and Weak to Moderate Calcareous Cementation
 5
 [No Gravel]
 8.0
 Very Dense Light Brown/Whitish Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation
 10
 11.5
 Auger Refusal on Cobbles
 15
 20

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	1.9	NT	NT	50/5"
BS-2	5.0	NT	NT	
S-3	5.7	NT	NT	50/2"
S-4	10.4	NT	NT	50/5"

Boring Date: **7-23-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-15**

83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification
 0
 Very Dense Brown/Whitish Brown **SILTY SAND** (SM-Dry) with Moderate to Strong Calcareous Cementation
 3.0
 Very Dense Light Brown/Whitish Brown **SILTY SAND** (SM-Dry) with Little Gravel and Clay and Moderate to Strong Calcareous Cementation
 5
 6.0

Auger Refusal on Cobbles
 10
 15
 20

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	1.7	3.7	107.9	50/8"
S-3	5.2	NT	NT	50/2"
BS-2	6.0	NT	NT	

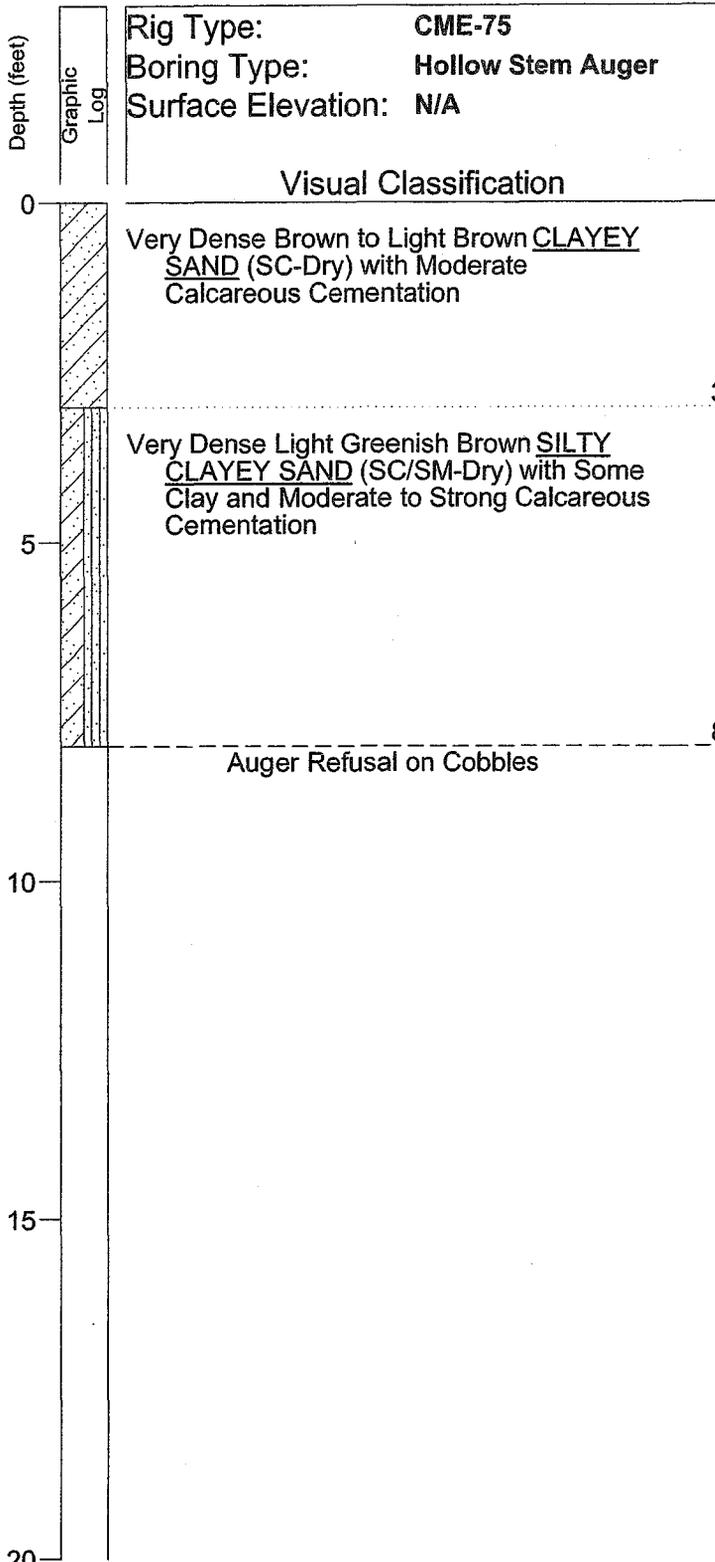
Boring Date: **7-23-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: **B-16**
83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
 Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GEN GEO. GDT 9/28/05



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	2.5	NT	NT	50/12"
BS-2	5.0	NT	NT	
S-3	5.8	NT	NT	50/4"

Boring Date: 7-23-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-17

83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

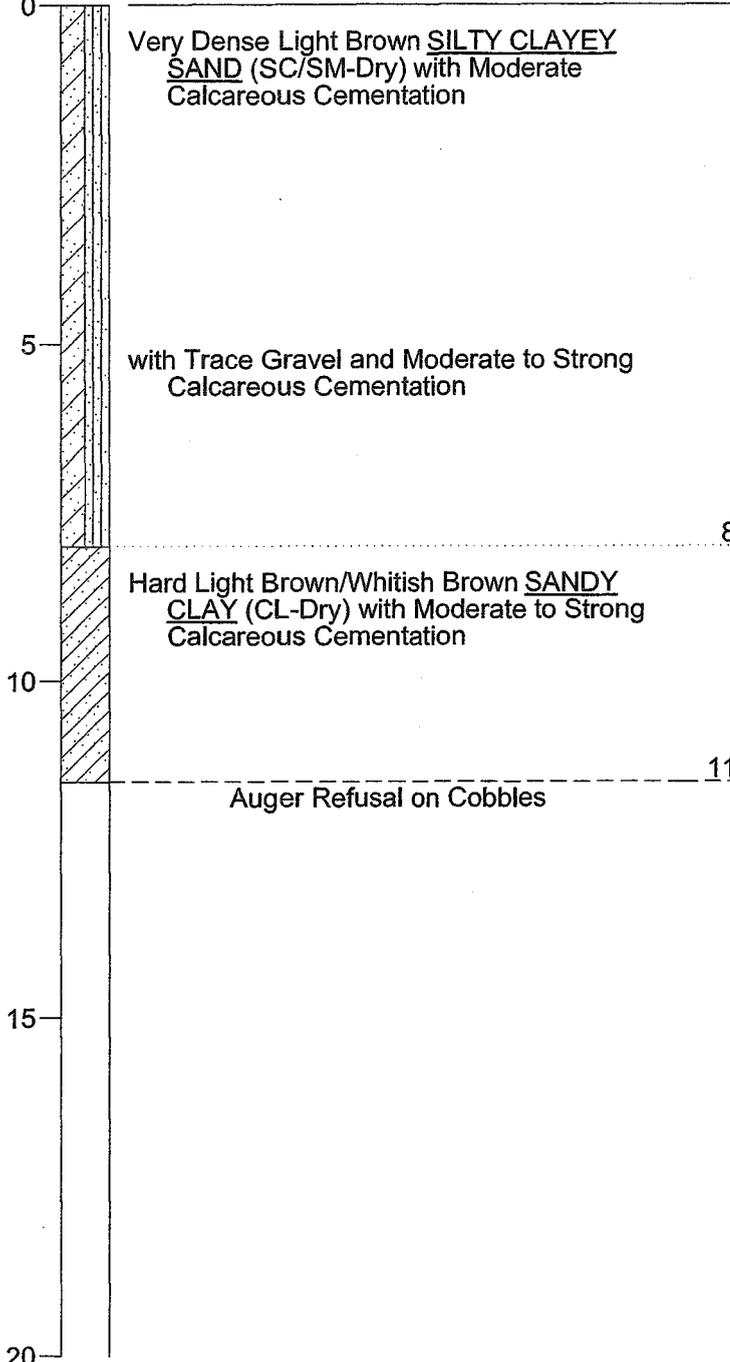
Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GEN GEO.GDT 9/28/05

Rig Type: **CME-75**
 Boring Type: **Hollow Stem Auger**
 Surface Elevation: **N/A**

Visual Classification



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	52/12"
BS-2	5.0	NT	NT	
S-3	6.5	NT	NT	63/12"
S-4	11.5	NT	NT	62/12"

Boring Date: **7-23-04**
 Field Engineer/Technician: **D. DeDen**
 Driller: **J. Warner**
 Contractor: **Heber Mining**

Water Level

Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

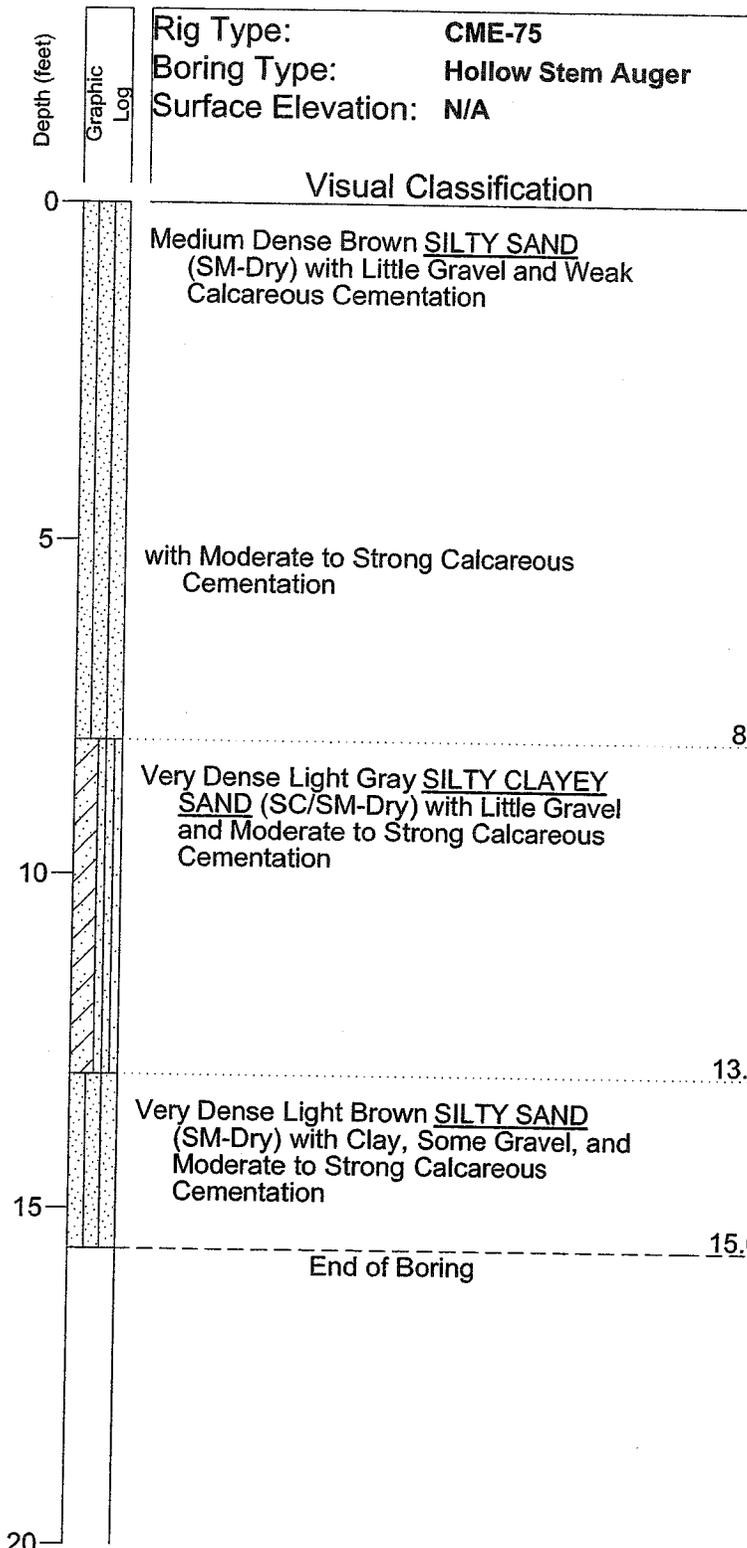
SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-18**

83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGE0.GDT 9/28/05



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	2.5	NT	NT	
RS-2	5.8	NT	NT	50/10"
BS-3	10.0	NT	NT	
S-4	10.2	NT	NT	50/2"
S-5	15.6	NT	NT	50/1"

Boring Date: 7-23-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

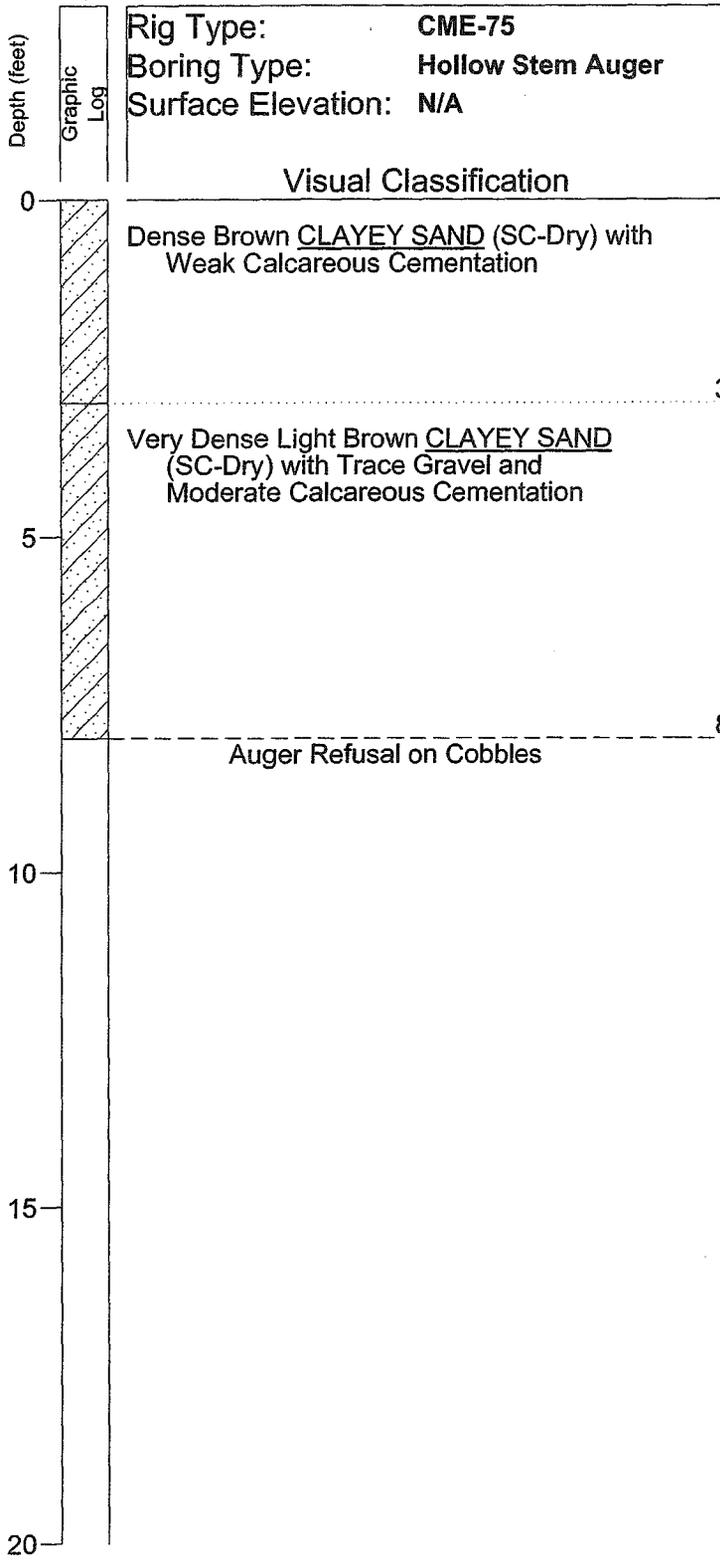
SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-19**

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	4.9	120.2	
BS-2	5.0	NT	NT	
S-3	5.9	NT	NT	50/5"

Boring Date: 7-23-04
 Field Engineer/Technician: D. DeDen
 Driller: J. Warner
 Contractor: Heber Mining

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-20

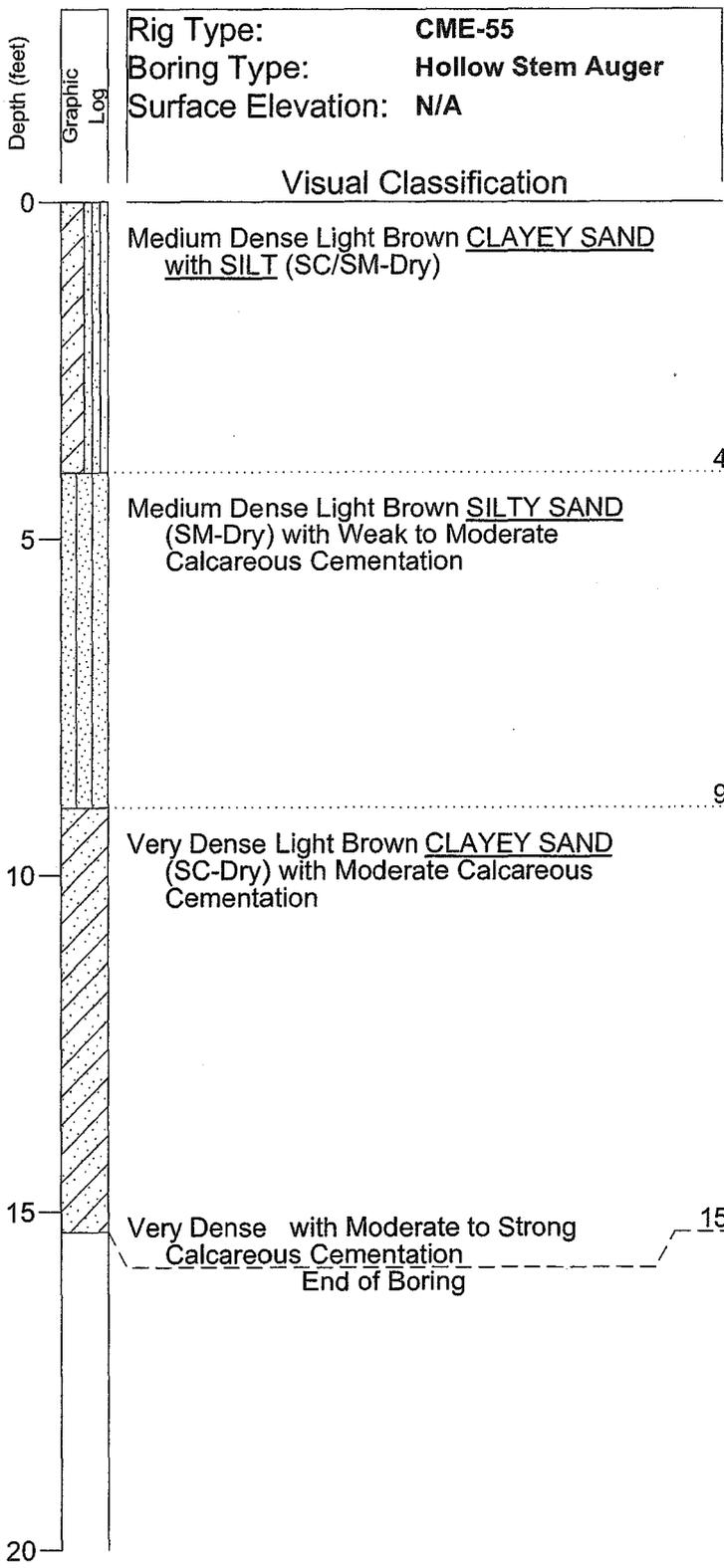
83rd Ave Drainage Improvements

83rd Ave & Pinnacle Peak Rd.

Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GEN GEO.GDT 9/28/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
BS-2	5.0	NT	NT	
S-3	6.0	4.7	108.3	
S-4	11.3	NT	NT	92/10"
S-5	15.3	NT	NT	50/4"

Boring Date: 8-18-05
 Field Engineer/Technician: D. DeDen
 Driller: R. Thayne
 Contractor: Boart Longyear

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-21

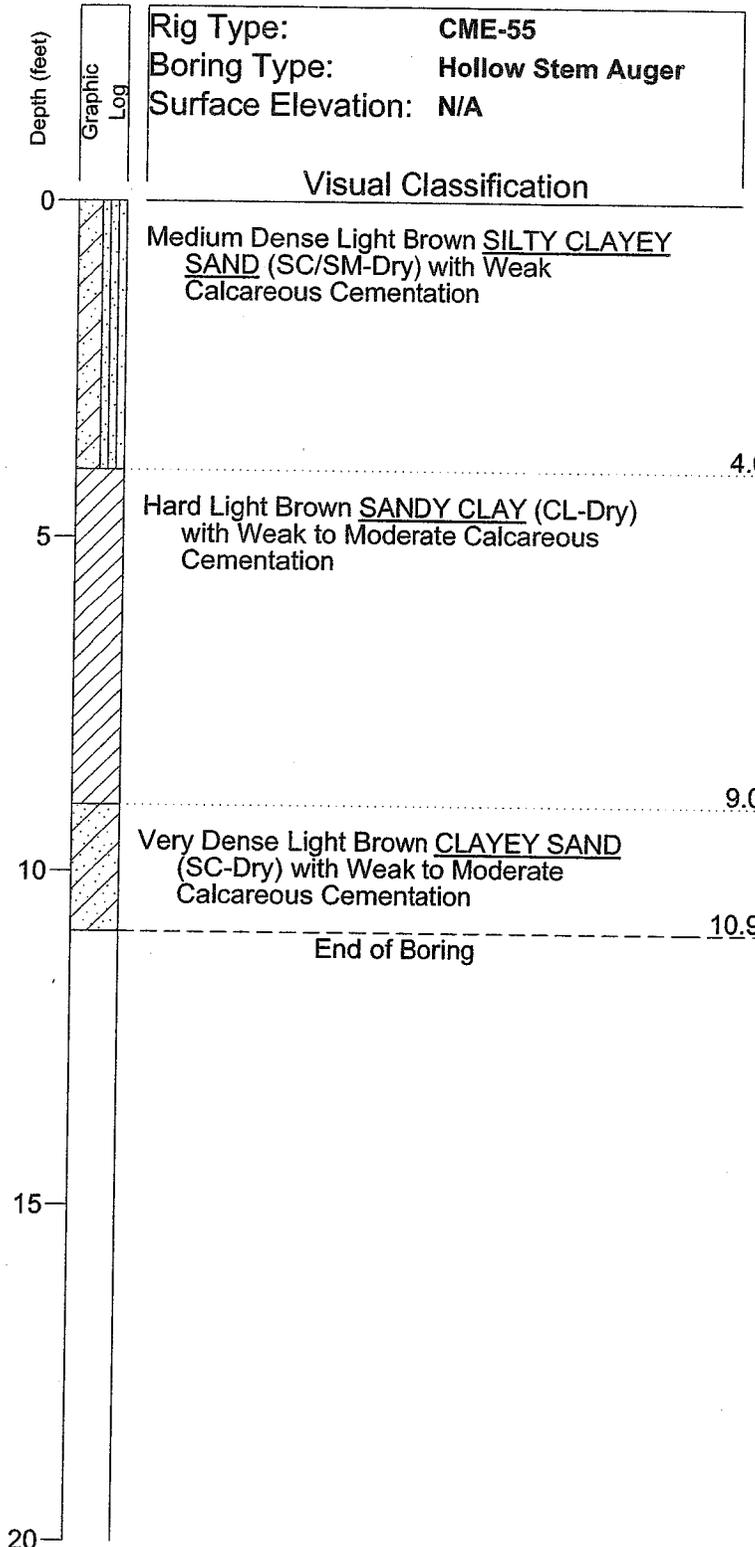
83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEOD.T 9/29/05

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

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	NT	NT	
S-2	6.5	NT	NT	71/12"
S-3	10.9	NT	NT	50/5"



Boring Date: 8-18-05
 Field Engineer/Technician: D. DeDen
 Driller: R. Thayne
 Contractor: Boart Longyear

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-22
 83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona
 Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGEO.GDT 8/22/05

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

Visual Classification

Depth (feet) Graphic Log
 0
 Very Loose Brown SILTY SAND (SM-Dry to Moist) with Trace Clay
 4.0
 Dense Brown to Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation
 5
 10
 Medium Dense with Weak Calcareous Cementation
 11.5
 End of Boring
 15
 20

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	~10
RS-2	6.0	NT	NT	~45
S-3	11.5	NT	NT	~15

Boring Date: **8-18-05**
 Field Engineer/Technician: **D. DeDen**
 Driller: **R. Thayne**
 Contractor: **Boart Longyear**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

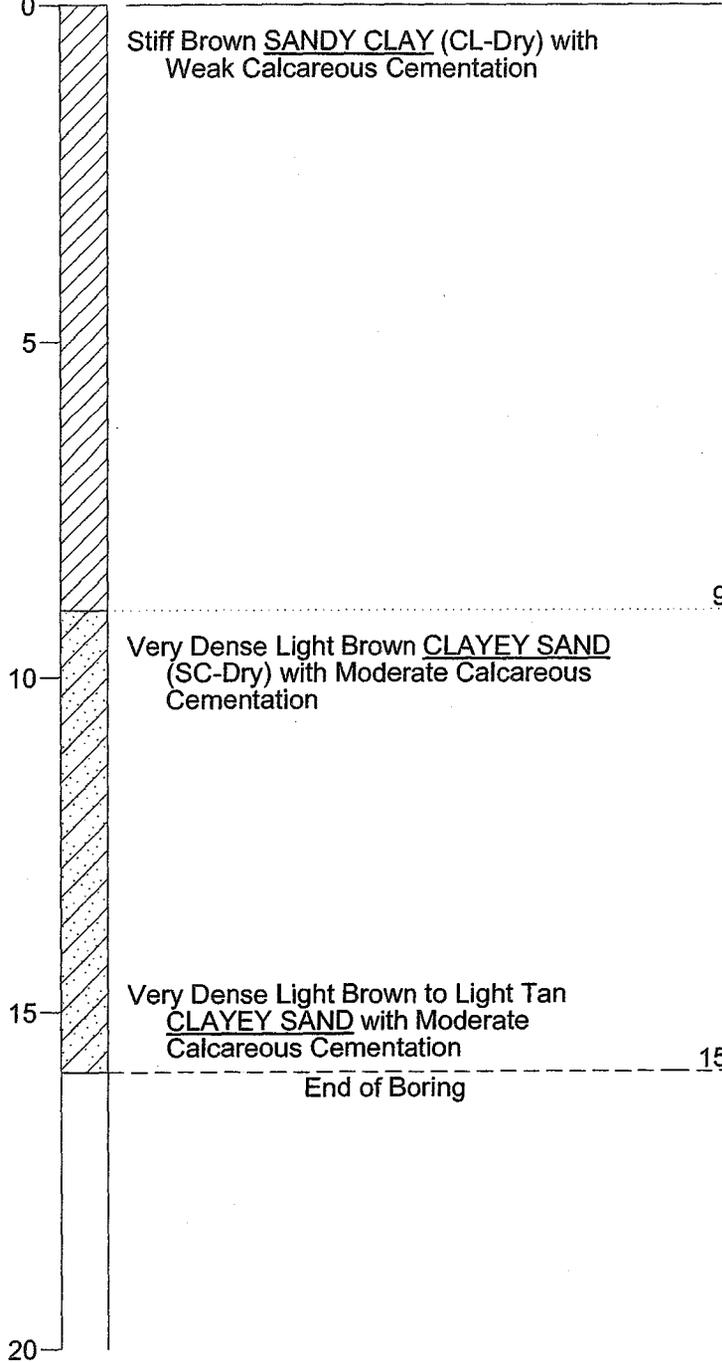
Log of Test Boring Number: **B-23**

83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona

Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 8/22/05

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



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
S-2	6.5	NT	NT	
BS-3	10.0	NT	NT	
RS-4	10.3	NT	NT	50/4"
S-5	15.9	NT	NT	50/5"

Boring Date: **8-18-05**
 Field Engineer/Technician: **D. DeDen**
 Driller: **R. Thayne**
 Contractor: **Boart Longyear**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: **B-24**
83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
 Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 8/22/05

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

Depth (feet) Graphic Log
 0
 Very Stiff Light Brown SANDY CLAY
 (CL-Dry)
 5
 Hard SANDY CLAY with Moderate to
 Strong Calcareous Cementation
 10
 End of Boring 10.3

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
RS-2	6.0	NT	NT	
S-3	10.3	NT	NT	50/3"

Boring Date: **8-18-05**
 Field Engineer/Technician: **D. DeDen**
 Driller: **R. Thayne**
 Contractor: **Boart Longyear**

Water Level		
Depth	Hour	Date
<i>Free Water was Not Encountered</i>		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: **B-25**
83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
 Project No.: **040825SA**

SPEEDIE 040825SA.GPJ GENGEO.GDT 8/22/05

Depth (feet)
 0
 5
 10
 15
 20

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

Visual Classification

Loose Brown CLAYEY SAND (SC-Dry to Moist)

4.0

Very Stiff Light Brown to Whitish Brown SANDY CLAY (CL-Dry) with Weak Calcareous Cementation

9.0

Very Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation

11.5

End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
RS-1	2.0	NT	NT	
S-2	6.5	NT	NT	
S-3	11.5	NT	NT	76/12"

Boring Date: 8-18-05
 Field Engineer/Technician: D. DeDen
 Driller: R. Thayne
 Contractor: Boart Longyear

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

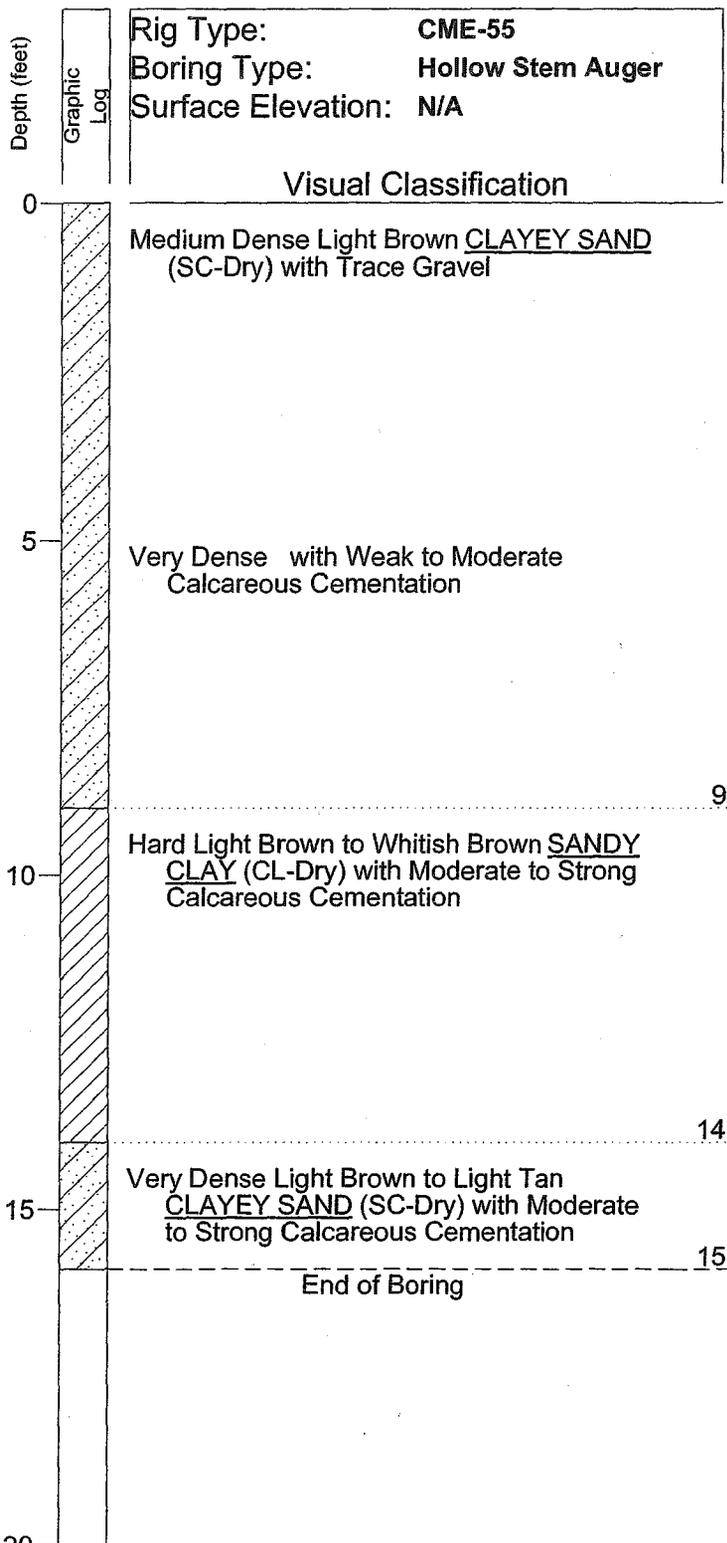
NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-26

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GENGE0.GDT 8/22/05



Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-1	2.5	NT	NT	
RS-2	6.0	NT	NT	50/12"
BS-3	10.0	NT	NT	
S-4	10.9	NT	NT	50/5"
S-5	15.9	NT	NT	50/5"

Boring Date: 8-18-05
 Field Engineer/Technician: D. DeDen
 Driller: R. Thayne
 Contractor: Boart Longyear

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
 Log of Test Boring Number: B-27

83rd Ave Drainage Improvements
 83rd Ave & Pinnacle Peak Rd.
 Peoria, Arizona

Project No.: 040825SA

SPEEDIE 040825SA.GPJ GEN GEO. GDT 8/22/05

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHOLRIDE (CL)	UNIFIED SOIL CLASSIFICATION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
						B-1	BS-2	BULK	0.0 - 5.0	NT	NT	25	46							
B-1	RS-1	RING	1.0 - 2.0	6.5	101.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
B-2	BS-3	BULK	5.5 - 10.0	NT	NT	12	41	74	87	100	NP	NP	NP	NT	85	7.2	8723	0.0014	0.0009	SM
B-3	BS-2	BULK	0.0 - 5.0	NT	NT	40	65	84	91	100	33	17	16	NT	31	8.5	2080	NT	NT	SC
B-4	RS-1	RING	1.0 - 2.0	3.8	106.8	45	80	98	99	100	22	18	4	NT	45	NT	NT	NT	NT	SC-SM
B-4	BS-3	BULK	5.5 - 10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		8.4	1074	0.0064	0.0084	
B-5	BS-3	BULK	5.5 - 10.0	NT	NT	46	71	89	94	100	42	17	25	NT	20	8	1074	NT	NT	SC
B-6	RS-1	RING	1.0 - 2.0	7.0	122.7	34	67	92	97	100	22	16	6	NT	50	NT	NT	NT	NT	SC-SM
B-6	BS-3	BULK	5.5 - 10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		7.8	2080	NT	NT	
B-7	BS-2	BULK	0.0 - 5.0	NT	NT	25	34	47	60	100	34	16	18	NT	35	7.7	1879	NT	NT	GC
B-7	RS-3	RING	5.0 - 6.0	6.2	90.3	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-8	S-1	SS	1.0 - 2.5	NT	NT	69	86	98	100	100	42	19	23	NT	15	NT	NT	NT	NT	CL
B-8	BS-3	BULK	5.5 - 10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		8	1678	NT	NT	
B-9	BS-2	BULK	0.0 - 5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		8	1678	0.0026	NT	
B-9	RS-1	RING	1.0 - 2.0	3.6	102.2	39	73	94	99	100	20	16	4	NT	50	NT	NT	NT	NT	SC-SM
B-10	BS-3	BULK	5.5 - 9.0	NT	NT	44	71	90	97	100	29	14	15	NT	31	7.9	1678	NT	NT	SC

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.

NT=Not Tested
Sheet 1 of 3

83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
Project No. 040825SA

**SPEEDIE
AND ASSOCIATES**

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			R VALUE at 300 PSI	CORRELATED R VALUE	pH	RESISTIVITY (Ohm-Centimeters)	% SULFATE (SO4)	% CHLORIDE (CL)	UNIFIED SOIL CLASSIFICATION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX							
B-11	S-1	SS	5.0 - 6.5	NT	NT	25	41	64	75	100	39	19	20	NT	33	NT	NT	NT	NT	SC
B-12	RS-1	RING	1.0 - 2.0	4.2	105.8	31	68	92	98	100	22	16	6	NT	51	NT	NT	NT	NT	SC-SM
B-12			-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	7.6	1409	NT	NT		
B-13	BS-3	BULK	5.5 - 10.0	NT	NT	38	62	84	96	100	40	20	20	NT	27	8.2	1074	0.0015	0.0219	SC
B-14	BS-2	BULK	0.0 - 5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	8.3	3150	NT	NT		
B-14	S-1	SS	1.0 - 2.5	NT	NT	39	75	94	99	100	21	16	5	NT	49	NT	NT	NT	NT	SC-SM
B-14	S-3	RING	5.0 - 6.0	5.0	103.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
B-15	BS-2	BULK	0.0 - 5.0	NT	NT	32	58	80	89	100	25	20	5	NT	54	8.3	3020	NT	NT	SC-SM
B-16	BS-2	BULK	0.0 - 6.0	NT	NT	21	45	72	88	100	22	20	2	NT	69	8.4	2080	NT	NT	SM
B-16	RS-1	RING	1.0 - 1.7	3.7	107.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	
B-17	BS-2	BULK	0.0 - 5.0	NT	NT	22	44	65	78	100	22	16	6	NT	60	8.3	2214	0.0019	NT	SC-SM
B-18	BS-2	BULK	0.0 - 5.0	NT	NT	35	63	86	94	100	27	20	7	NT	47	7.4	2080	0.0013	NT	SC-SM
B-19			-	NT	NT	26	51	73	85	100	23	20	3	NT	63	7.3	1610	0.0018	NT	SM
B-20	BS-2	BULK	0.0 - 5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	8.3	1476	NT	NT		
B-20	RS-1	RING	1.0 - 2.0	4.9	120.2	34	66	88	95	100	28	18	10	NT	42	NT	NT	NT	NT	SC
B-21	BS-2	BULK	0.0 - 5.0	NT	NT	29	62	87	97	100	20	15	5	NT	56	8.56	403	0.0005	0.001	SC-SM

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.

NT=Not Tested
Sheet 2 of 3

83rd Ave Drainage Improvements
83rd Ave & Pinnacle Peak Rd.
Peoria, Arizona
Project No. 040825SA

**SPEEDIE
AND ASSOCIATES**

CONSOLIDATION TEST

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/15/04

BORING NO.: B-1

SAMPLE NO.: RS-1

SAMPLE DEPTH: 1 to 2

LABORATORY NO.: P9443

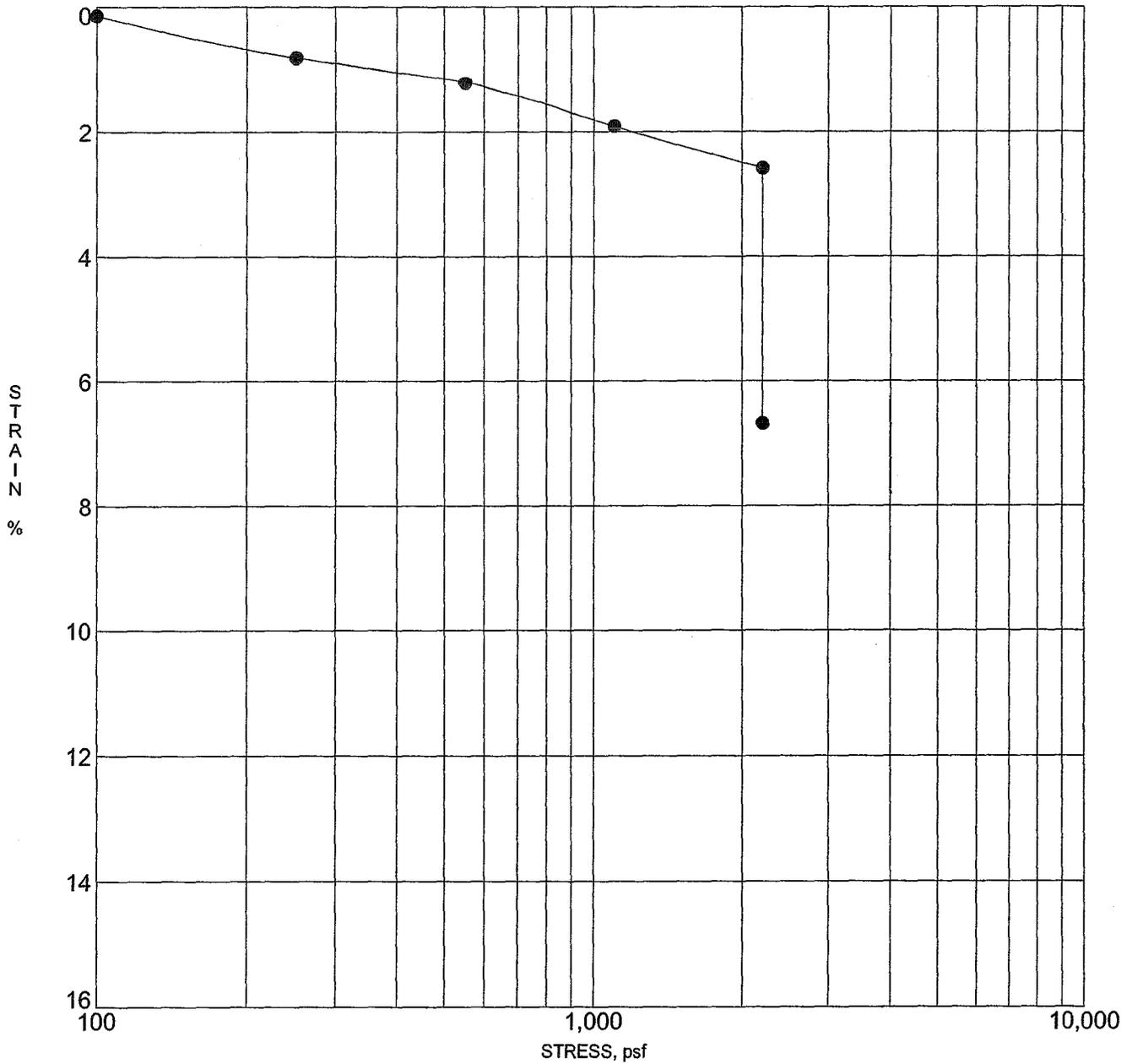
LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

CLASSIFICATION:

ASTM SOIL DESCRIPTION:



Sample inundated at end of test at 2200 psf

**SPEEDIE
AND ASSOCIATES**

CONSOLIDATION TEST

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/16/04

BORING NO.: B-7

SAMPLE NO.: RS-3

SAMPLE DEPTH: 5 to 6

LABORATORY NO.: P9453

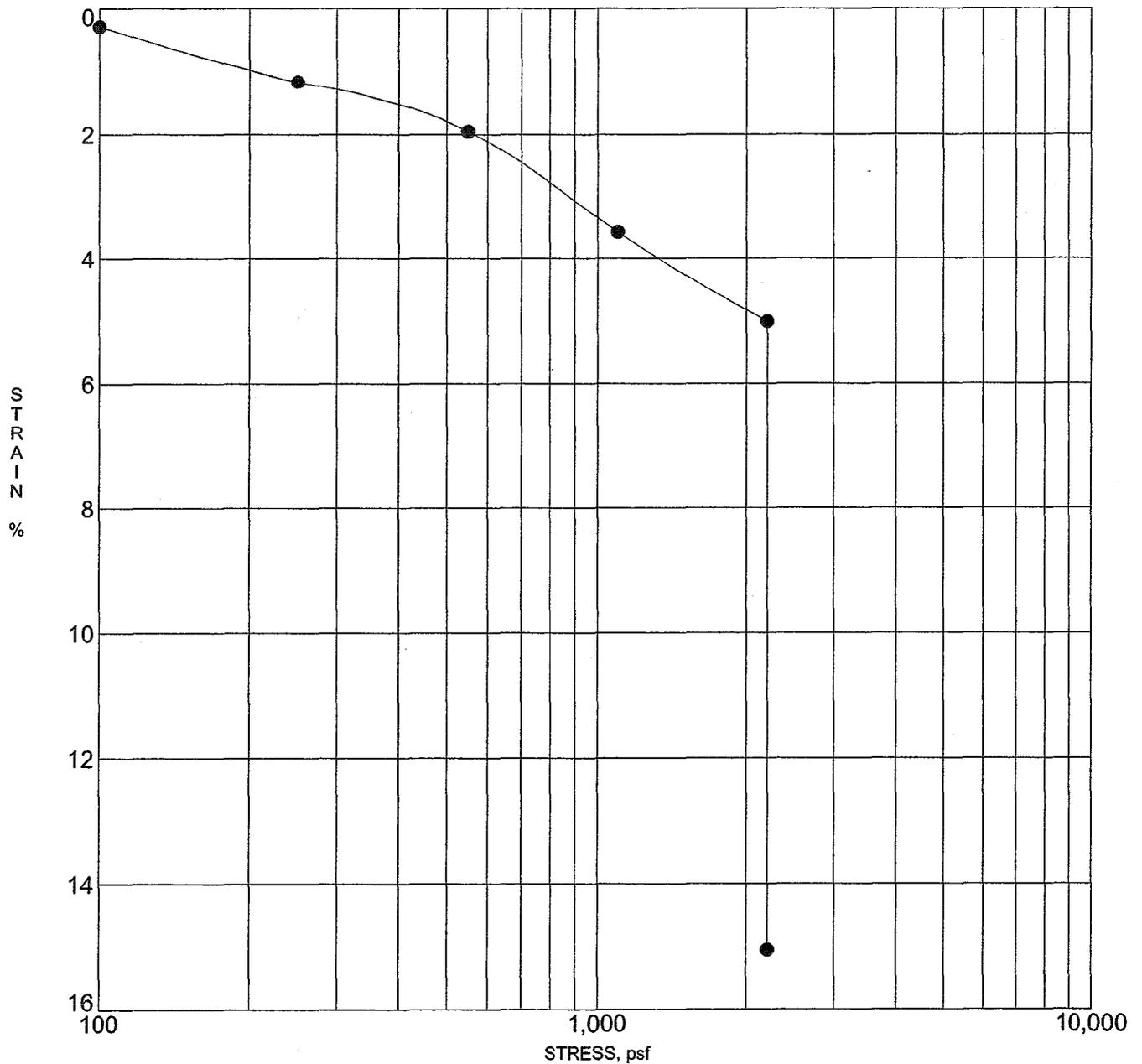
LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

CLASSIFICATION:

ASTM SOIL DESCRIPTION:



Sample inundated at end of test at 2200 psf

**SPEEDIE
AND ASSOCIATES**

CONSOLIDATION TEST

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/15/04

BORING NO.: B-9

SAMPLE NO.: RS-1

SAMPLE DEPTH: 1 to 2

LABORATORY NO.: P9456

LIQUID LIMIT: 20

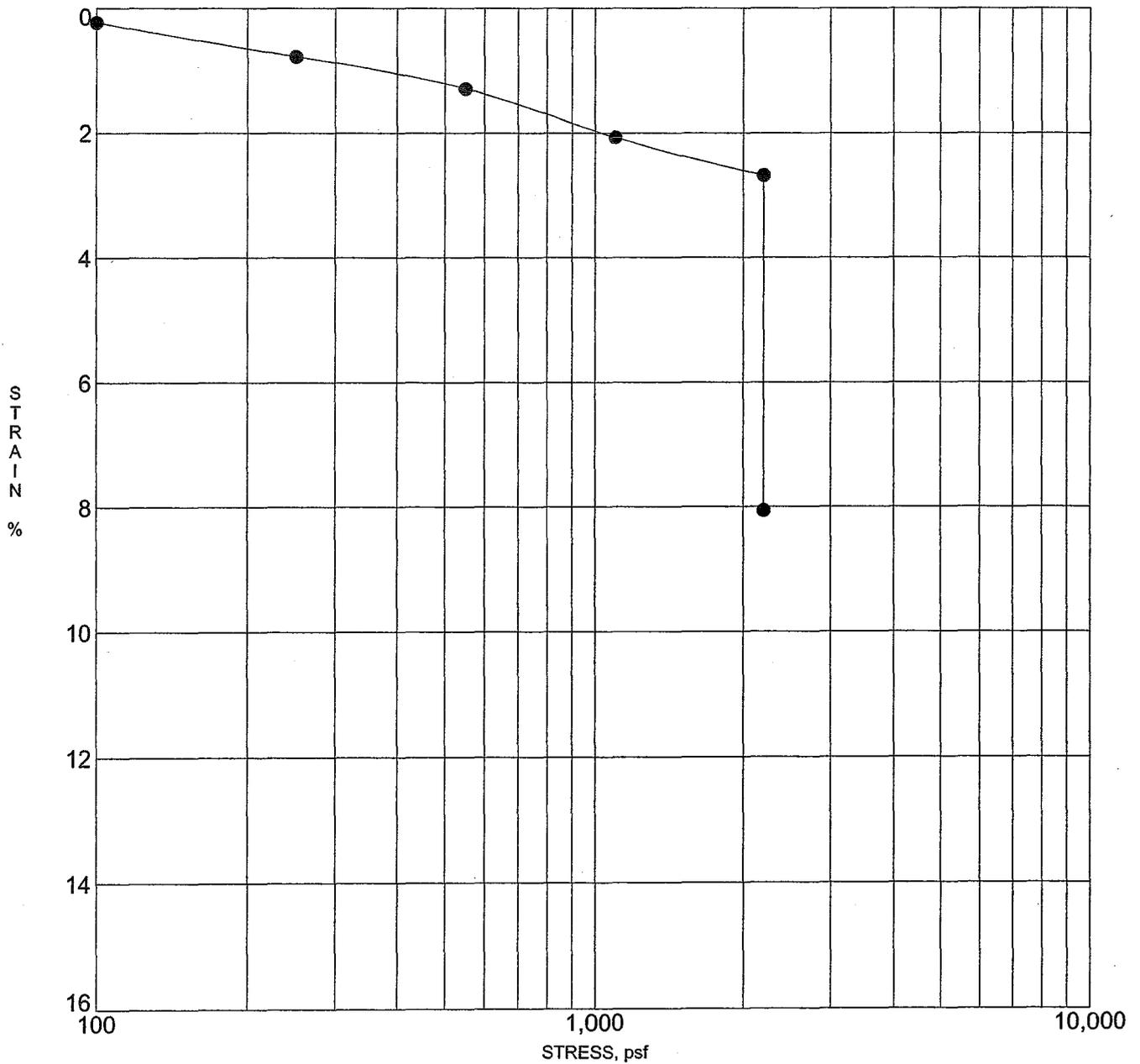
PLASTIC LIMIT: 16

PLASTICITY INDEX: 4

CLASSIFICATION:

ASTM SOIL DESCRIPTION:

SILTY, CLAYEY SAND



Sample inundated at end of test at 2200 psf

**SPEEDIE
AND ASSOCIATES**

CONSOLIDATION TEST

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/23/04

BORING NO.: B-12

SAMPLE NO.: RS-1

SAMPLE DEPTH: 1 to 2

LABORATORY NO.: P9900

LIQUID LIMIT: 22

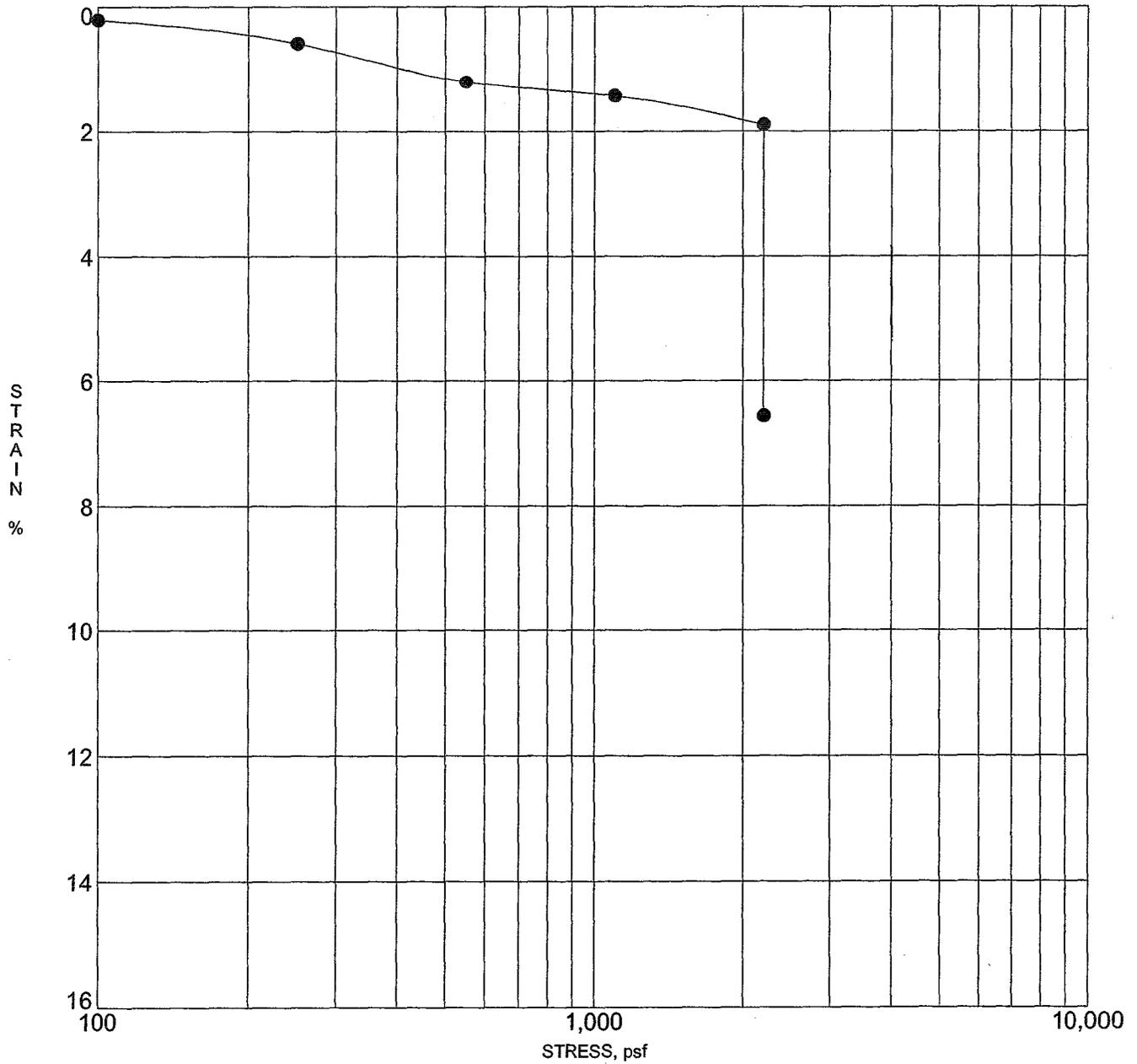
PLASTIC LIMIT: 16

PLASTICITY INDEX: 6

CLASSIFICATION:

ASTM SOIL DESCRIPTION:

SILTY, CLAYEY SAND



Sample inundated at end of test at 2200 psf

**SPEEDIE
AND ASSOCIATES**

MOISTURE-DENSITY RELATIONS

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/15/04

BORING NO.: B-3

SAMPLE NO.: BS-2

SAMPLE DEPTH: 0 to 5

LABORATORY NO.: P9446

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 33

PLASTIC LIMIT: 17

PLASTICITY INDEX: 16

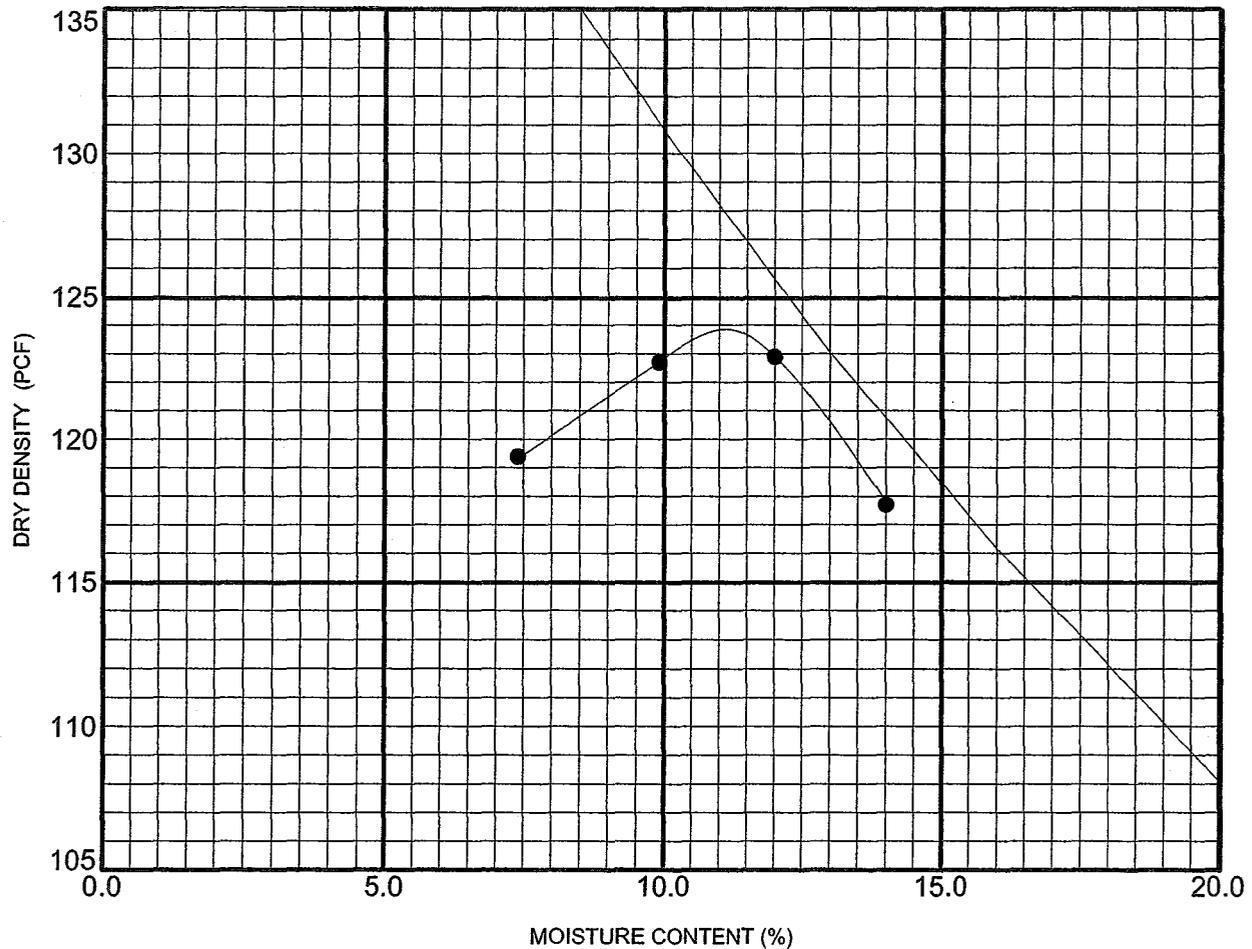
CLASSIFICATION: SC

ASTM SOIL DESCRIPTION:

CLAYEY SAND

MAXIMUM DRY DENSITY: 123.9 PCF

OPTIMUM MOISTURE CONTENT: 11.3%



**SPEEDIE
AND ASSOCIATES**

MOISTURE-DENSITY RELATIONS

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 7/16/04

BORING NO.: B-7

SAMPLE NO.: BS-2

SAMPLE DEPTH: 0 to 5

LABORATORY NO.: P9452

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 34

PLASTIC LIMIT: 16

PLASTICITY INDEX: 18

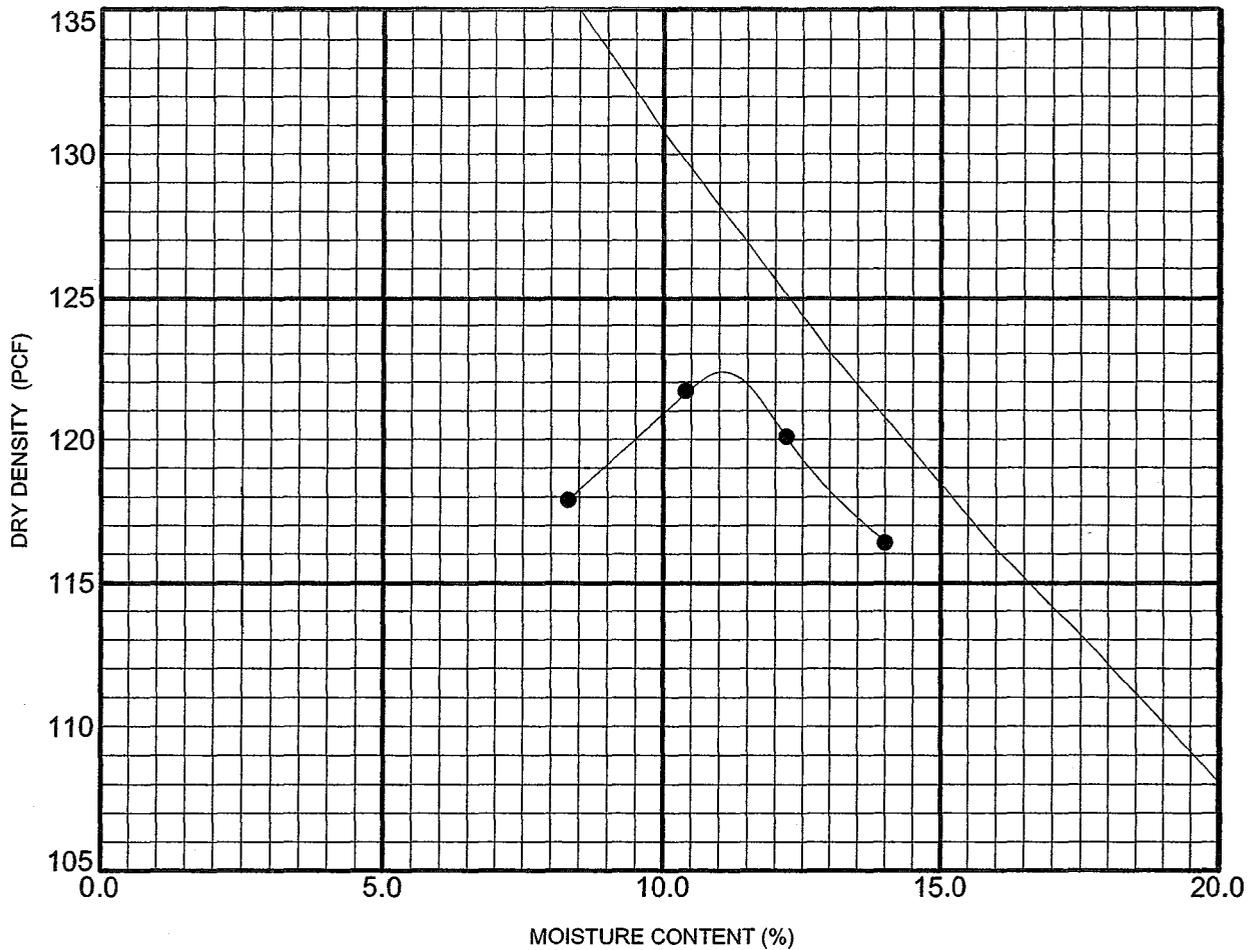
CLASSIFICATION: GC

ASTM SOIL DESCRIPTION:

CLAYEY GRAVEL with SAND

MAXIMUM DRY DENSITY: 122.2 PCF

OPTIMUM MOISTURE CONTENT: 10.9%



**SPEEDIE
AND ASSOCIATES**

MOISTURE-DENSITY RELATIONS

PROJECT: 83rd Ave Drainage Improvements

PROJECT NO.: 040825SA

LOCATION: 83rd Ave & Pinnacle Peak Rd.

DATE: 8/18/05

BORING NO.: B-21 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0 to 5

LABORATORY NO.: U7520

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 20

PLASTIC LIMIT: 15

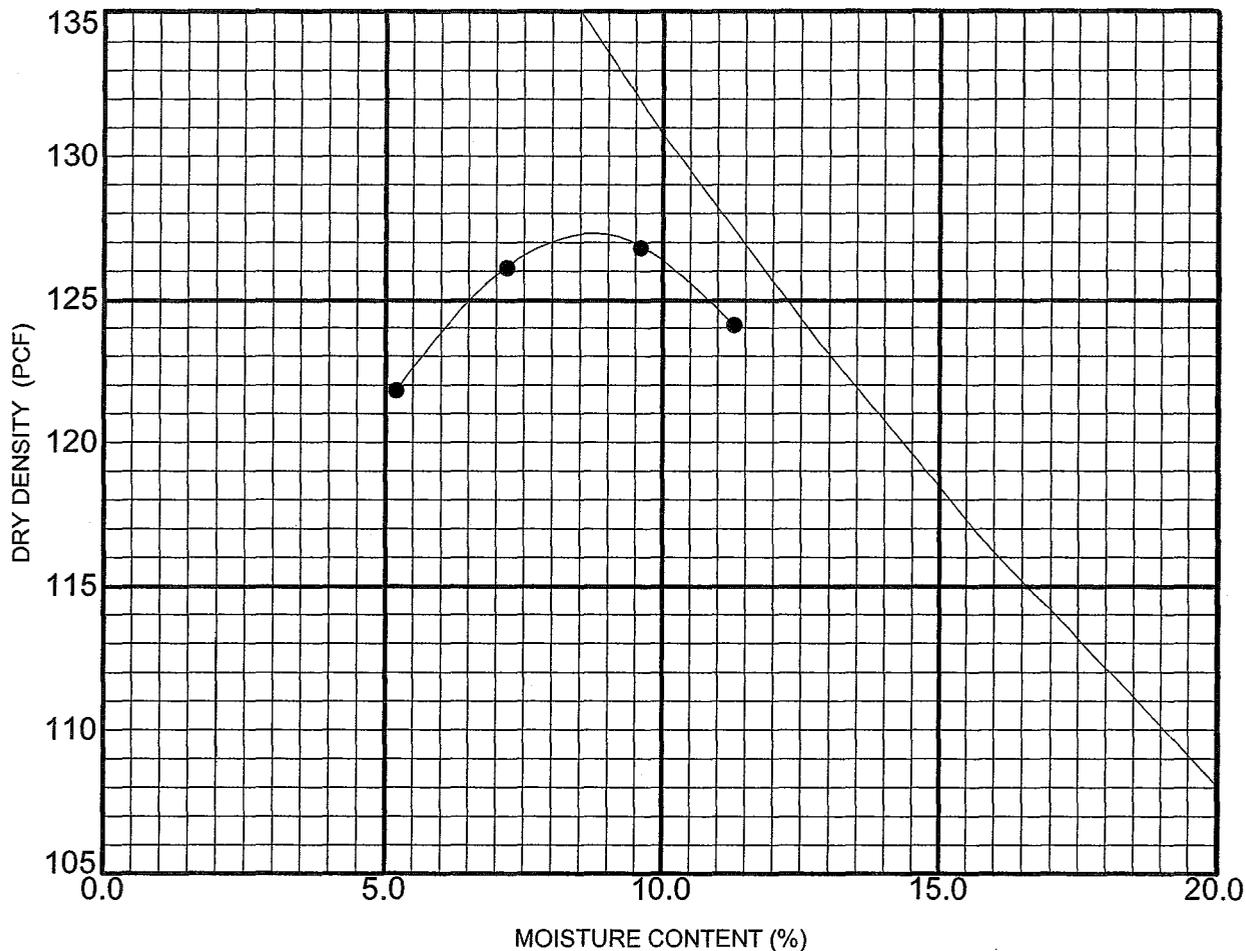
PLASTICITY INDEX: 5

CLASSIFICATION: SC-SM

ASTM SOIL DESCRIPTION: SILTY, CLAYEY SAND

MAXIMUM DRY DENSITY: 126.9 PCF

OPTIMUM MOISTURE CONTENT: 8.0%



**SPEEDIE
AND ASSOCIATES**

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLEDDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
B-3, BS-2	5.0	123.9	11.3	117.2	9.8	94.6	16.1	100	2.2
B-7, BS-2	5.0	122.2	10.9	115.9	9.3	94.8	16.5	100	4.3

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
B-21, BS-2	5.0	126.9	8.0	113.6	12.7	89.5	12.7	100	0.2

AGRONOMIC LABORATORY RESULTS

Date 08/17/2004
Project 040825SA
Location 83rd Ave. Drainage Improvements

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL (ft)	pH	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potash (K)	Iron (Fe)	Zinc (Zn)	Manganese (Mn)	Copper (Cu)	Salinity (EC x K) dS/m	Nitrate Nitrogen (NO3-N) PPM	Phosphorus (Bicarb - Soluble P) PPM	Computed % Sodium (ESP)	Sulfur (SO4-S)	Boron (B)	Free Lime Level
B-9	BS-2	0-5	8.1	7500 VH	320 VH	130 M	200 H	4.6 M	8.5 VH	10.0 VH	.47 M	.6 L	12.0 M	8.2 L	1.4	26 VH	.55 L	High
B-17	BS-2	0-5	8.5	7900 VH	200 H	220 H	100 M	14.0 VH	.51 L	7.7 VH	.54 M	.9 L	2.5 VL	4.4 VL	2.3	19 H	.10 VL	High
B-18	BS-2	0-5	8.5	8200 VH	150 H	240 H	100 M	6.2 H	.20 VL	3.3 H	.42 M	.8 L	3.8 VL	4.0 VL	2.4	13 M	.13 VL	High
B-19	BS-3	5-10	8.1	8300 VH	180 H	92 L	120 M	6.8 H	.18 VL	4.5 VH	.62 H	1.0 L	35.0 H	4.4 VL	0.9	18 H	.49 L	High

VL = Very Low
L = Low
M = Medium
H = High
VH = Very High

Testing was performed by:
IAS Laboratories
2515 East University Drive, Phoenix, Arizona
Sheet 1 of 1



AGRONOMIC LABORATORY RECOMMENDATIONS (Lb/1000 Sq Ft)

Date 07/15/2004
Project 040694SA
Location Myrtle Park

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL (ft)	Nitrogen (N)	Phosphate P2O5	Potash K2O	Magnesium Mg	Sulfur S	Iron Fe	Zinc Zn	AMENDMENTS			Leaching of Excess Salts
										Elemental Sulfur	Gypsum	Lime	
B-9	BS-2	0-5	1 a	2 b	1 c	2 d				5*			
B-17	BS-2	0-5	2.5 a	2.5 b	1 c	9 d				10*			
B-18	BS-2	0-5	2.5 a	2.5 b	1 c	12 d			.1 g	10*			
B-19	BS-3	5-10		2.5 b	1 c	10 d			.1 g	5*			

- * Till sulfur into the soil to reduce pH. Leach to remove sodium after a week or two incubation period.
- a. Broadcast.
 - b. Broadcast phosphate and till into soil where possible.
 - g. Broadcast as zinc sulfate and till into the soil.
 - h. The irrigation water normally contains some B and landscape plants have a small requirement for B.

Testing was performed by:
IAS Laboratories
 2515 East University Drive, Phoenix, Arizona
 Sheet 1 of 1