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REPORT ON <u>PRELIMINARY</u> GEOTECHNICAL INVESTIGATION

DESIGNATION: 85-Acre Development - Preliminary

LOCATION: SWC 40th Street and McDowell Road
Phoenix, Arizona

CLIENT: V3 Companies of Arizona

PROJECT NO: 062247SA

DATE: January 18, 2007

Registered Professional Engineer (Civil)
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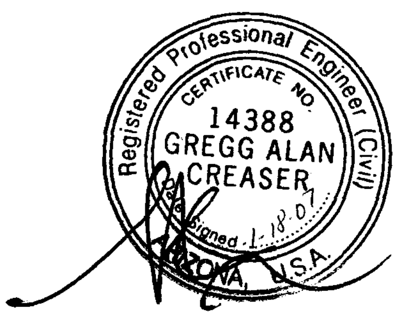
TABLE OF CONTENTS



1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of the proposed residential/commercial subdivision located southwest corner of 40th Street & McDowell Road in Phoenix, Arizona.

Preliminary information calls for the construction of a residential subdivision development with some commercial development along McDowell Road. Buildings are expected to be single story with wood frame and/or masonry wall and slab-on-grade construction. Structural loads are expected to be light to moderate and no special considerations regarding settlement tolerances are known at this time. Adjacent areas will be landscaped or paved to support moderate passenger and light commercial truck traffic. Landscaped areas will be utilized for storm water retention and disposal.

Due to the lack of information, it is recommended to consider this report for property assessment and preliminary design only. Once the site and grading plans have been established, this office should review the new data to determine what additional data is necessary (if any) for final design.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

The 85 acre property is bound on the north by McDowell Road and Residential properties, on the south by Loop 202, on the east by 40th Street and on the west by residential developments. The site is generally clear with a large retention basin in the southwest corner of the lot and some sparse vegetation. A few old concrete slabs were also found in the southeast corner of the lot. Two chain link fences divide the property up with one on the northern half and one around the retention area at the southwest corner. There was no evidence of mass fill placement on the site.

An environmental Phase I Site Assessment report should also be reviewed in conjunction with this report. Also important would be archeological investigations. These investigations tend to excavate a large number of pits that are not backfilled and compacted. There could be issues with past site uses/actions which were not observed during this investigation.

2.2 Geologic Conditions

The site is **located well outside known areas** that have undergone considerable subsidence due to groundwater removal. Areas of subsidence are known to produce earth fissuring, which has affected areas within several miles of the site. Subsidence is a basin wide phenomenon that would result in differential elevation changes over long distances, which would not affect the type of buildings proposed for this site. No evidence of earth fissures was observed on the site. Fissure gullies form over subsurface irregularities such as bedrock highs, which cause tensional stresses and differential subsidence. Where such anomalies are not present, subsidence tends to be uniform over a wide area, this having minimal effect on surficial structures. The closest known earth fissures are located near Luke Air Force Base and in East Mesa, many miles from this site. Based on local experience, subsidence and earth fissures historically have **not** been a problem in this area.

2.3 Seismic Design Parameters

The project area is located in a seismic zone that is considered to have low historical seismicity. The seismicity of the Phoenix area has had only two magnitude 3.0 events in over 100 years. The site is located within the Uniform Building Code (UBC) earthquake Region 1. Liquefaction is not considered a concern as groundwater exceeds 15 meters below ground surface.

Although borings were not advanced to 100 feet, based on the nature of the subsoils encountered in the borings and geology in the area, Site Class Definition, Class C (Table 1615.1.1, 2000 & 2003 IBC) may be used for design of the structures. In addition, the following seismic parameters may be used for design (based on 2002 USGS data accepted by 2006 IBC edition):

Table 2.3.1 Seismic Parameters

MCE[1] spectral response acceleration for 0.2 second period, S_S:	0.184g
MCE[1] spectral response acceleration for 1.0 second period, S_1:	0.062g
Site coefficient, Fa:	1.2
Site coefficient, Fv:	1.7
MCE[1] spectral response acceleration adjusted for site class, S_{MS}:	0.221g
MCE[1] spectral response acceleration adjusted for site class, S_{M1}:	0.105g
5% Damped spectral response acceleration, S_{DS}:	0.147g
5% Damped spectral response acceleration, S_{D1}:	0.070g
NOTES: 1. MCE = maximum considered earthquake	

2.4 General Subsurface Conditions

Shallow subsoils on the site consist primarily of sandy lean clay, silty clayey sand, and clayey sand. In a few of the borings, there were also small interbedded layers of poorly-graded sand. The borings were terminated within these deposits at depths of 11.5 to 21.5 feet. The soils contained subordinate amounts of gravel and exhibited varying degrees of calcareous cementation. Standard Penetration Test values range from 10 to 50+ blows per foot. No groundwater was encountered during this investigation. Based on visual and tactile observation, the soils were in a 'dry' state at the time of investigation.

Laboratory testing indicates in-situ dry densities of the upper soils on the order of 87 to 106 pcf and water contents around 2 to 6 percent at the time of investigation. Liquid limits range from 24 to 29 percent. Plasticity indices vary from 5 to 12 percent. The upper clay soils exhibit volume increase due to wetting of approximately 1.2 percent when compacted to moisture and density levels normally expected during construction. Undisturbed samples displayed **significant** additional compression due to inundation under a maximum confining load of 2,200 psf.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

Analysis of the field and laboratory data indicates that subsoils at the site are generally favorable for the support of the proposed low rise structures on shallow foundations and for slab-on-grade construction subject to remedial earthwork. If taller, heavier structure's are planned, deep foundation may be required depending on loads.

Groundwater is not expected to be a factor in the design or construction of shallow foundations and underground utilities. Excavation operations should be relatively straightforward using conventional equipment, although dense cemented soils may impede progress.

Laboratory and field testing indicates that the upper soils are of low density and are susceptible to additional compression due to inundation. This could cause excessive settlement resulting in cracking problems. Accordingly, recommendations are made to over-excavate and re-compact the bearing soils to increase density and reduce the potential for collapse. Attention must be paid to provide proper drainage to limit the potential for water infiltration of deeper soils. Landscaped areas requiring irrigation should be kept away from the building. **Unpaved areas should be sloped at least 5 percent for a distance of at least 10 feet away from the building.** Roof drainage should also be directed away from the building in paved scuppers. They should not be allowed to discharge into planters adjacent to the structure. Irrigated planters adjacent to the structures should be kept at a minimum and/or the use of low water use plants (xeriscape).

We anticipate that moderate grading will be required to layout the proposed streets and lots. In addition the existing retention basin will require fill. In mass grading operations, it is very important to consider planned footing depths in the individual lots. **Lots should be graded to ensure that building footings (traditional spread) will be founded entirely on a uniform bearing media.** In this case, since over-excavation and re-compaction is recommend, this uniform layer should consist of at least 2 feet of engineered fill. Failure to ensure this can result in differential settlement of the buildings leading to cracking problems. Also, if retaining walls are required between lots, house foundations should be set back or deepened so that the zone of influence below the footing will not intersect the wall. This zone is defined as a 1:1 slope below the bottom of footing.

Another option would be to support the structures on a post-tension slab on grade foundations. This raft type foundation would be allowed to move with the expanding subsoils. This type of foundation system is more flexible and may require special design and construction of the superstructure to allow for this flexibility.

For exterior slabs on grade, frequent jointing is recommended to control cracking and reduce tripping hazards should differential movement occur. It is also recommended to pin the landing slab to the building floor/stem wall. This will reduce the potential for the exterior slab lifting and blocking the operation of out-swinging doors. Pinning typically consists of 24 inch long No. 4 reinforcing steel dowels placed at 12-inch centers.

3.2 Site Preparation

The entire area to be occupied by the proposed construction should be stripped of all vegetation, debris, rubble and obviously loose surface soils. In the southwestern corner where previous slabs existed, it is recommended to remove at least the top 1.0 feet of topsoil to aid in detection of deleterious materials. (Note: If it is determined that past uses and/or archeological investigations have disturbed larger areas, the extent of excavation may have to be increased.) Fill placed into the existing basin should be placed in level benches cut into the existing slope. These benches should be cut at least 2 feet into the medium dense native soils, wider to accommodate compaction equipment, to completely remove the loose surface soils.

For the standard spread foundation alternate, the subsoils directly beneath shallow foundation elements should be further over-excavated to a depth of at least 2.0 feet below proposed footing bottom elevation, **or existing grade, whichever is deeper**, extending at least 5 feet beyond footing edges and re-compacted as set forth herein. Due to the relatively small size of the structures, the entire building pads should be excavated. Or another option is to raise the final grades of the lot to ensure the 2 feet of engineered fill below footings.

For preliminary estimation of earthwork quantities, earthwork shrinkage is estimated to be on the order of 15 to 20%, while ground compaction will be on the order of 0.2 to 0.3 feet. This does not include ground loss due to stripping.

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

All cut areas and areas above footing bottom elevation that are to receive floor slab only fill should be scarified 8 inches, moisture conditioned to at least optimum to 3 percent above and uniformly compacted to at least 95 percent of maximum dry density as determined by ASTM D-698. It is not uncommon that building pads be allowed to dry out and/or subjected to densification due to construction traffic. Prior to constructing a house, the top 8 inches of the building pad should be re-worked to increase the moisture content to the required level and re-compacted to the recommended level.

3.3 Foundation Design – Standard Spread Footing

It is recommended that shallow spread footings bear on at least 2.0 feet of properly compacted fill, at a minimum 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 safe allowable bearing capacity of **2,500 psf** can be utilized for design. Minor structures such as masonry screen walls can bear directly on native soils with an allowable bearing capacity of 1,250 psf. 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. Positive drainage away from the proposed building must be maintained at all times.

Continuous masonry 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 ½ 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 could occur if native supporting soils were to experience a significant increase in moisture content. Positive drainage away from structures, and controlled routing of roof runoff **must** be provided to prevent ponding adjacent to perimeter walls. Planters requiring heavy watering should be considered with caution. Care should be taken in design and construction to insure that domestic and interior storm drain water is contained to prevent seepage.

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. Reinforcement and frequent control joints are suggested to allow slight movement and prevent minor floor slab cracking especially in floor areas to be covered with hard tile.

3.4 Foundation Design - Post Tensioned Slab on Grade

Based on the local geology, the field investigation performed, and the laboratory data, we have a negligible swelling condition and a moderate to high consolidation potential. Therefore, we have assumed the following design parameters based on a settlement potential of 1/2-inch for the design of post tension slab on grade foundations.

Differential Movement, y_m
Edge Lift 0.5 in. (since $\delta = 0.5$ in.)

A Modulus of Subgrade Reaction, k, of 150 pci may be used for the design of slabs-on-grade. Special site preparation would not be required beyond clearing and grubbing, moisture conditioning and pre-compaction of the surface. The PT Slab should be designed with 12 inch minimum turndowns that have a minimum embedment depth of 6 inches below lowest finished exterior grade within 5 feet of the structure. With this embedment depth, an allowable bearing capacity of 1,250 psf may be utilized for design of PT Slabs. If the turndown is increased to 18 inches and the embedment dept is increased to 12 inches an allowable bearing capacity of 1,500 psf may be used.

Post-tensioned slabs-on-grade should be designed in accordance with the Post-Tensioning Institute guidelines "Design and Construction of Post-Tensioned Slabs-on-Grade", Third Edition. This type of foundation system is more flexible and may require special design and construction of the super-structure to allow for this flexibility. Use of a PT slab foundation system does not preclude the need for proper site preparation and positive drainage. The reinforced slab can bend without cracking when subject to edge drop.

However, if the bend approaches or exceeds the design limits, the less flexible walls which are supported on the slab will crack. All backfill around the perimeter must be compacted up against the turndowns, and graded to drain away from the house. If this is not properly completed and maintained, erosion and poor drainage can result in excessive slab movement.

The P-T Slab can be cast directly on the prepared subgrade. If a base material is used, such as sand, or other granular material, or other membrane, such as polyethylene sheeting, the structural design should take into account a proper slab-subgrade coefficient of friction value for the selected material. Most contractors prefer to have a granular material to aid in fine grading or concrete curing. Typically a minimum 4-inch layer of crushed rock is sufficient.

Since we do not determine the slab thickness or if base material is to be used, our only requirement is that the specified 6 to 12 inches of embedment depth from final grade, for exterior turndowns, is met. This can be accomplished by either cutting into the native soils, or by backfilling up against the turndowns, or a combination thereof.

3.5 Lateral Pressures

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

Active Pressures	
Unrestrained Walls	35 pcf
At-Rest Pressures	
Restrained Walls	60 pcf
Passive Pressures	
Continuous Footings	350 pcf
Spread Footings or Drilled Piers	400 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. Expansive soils should not be used as retaining wall backfill, except as a surface seal to limit infiltration of storm/irrigation water. The expansive pressures could greatly increase active pressures.

3.6 Fill and Backfill

Native soils are considered suitable for use in general grading, pad, and retaining wall fills. The silty fine sand soils may be sensitive to excessive moisture content and will become unstable at elevated moisture content. Accordingly, it may be necessary to compact soils on the dry side of optimum, especially in asphalt pavement areas. The reduced moisture content under slabs-on-grade should only be used upon approval of the engineer in the field.

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

Fill should be placed on subgrade, which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent (optimum to +3 percent for underslab fill). Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to the percent of maximum dry density per ASTM D-698 set forth as follows:

A.	Building Areas		
	1.	Below footing level	95
	2.	Below slabs-on-grade (non-expansive soils)	95
	3.	Below slabs-on-grade (expansive soils)	90-95 max
B.	Pavement Subgrade or Fill		95
C.	Utility Trench Backfill		
	1.	More than 2.0' below finish subgrade	95
	2.	Within 2.0' of finish subgrade (non-granular)	95
	3.	Within 2.0' of finish subgrade (granular)	100
D.	Aggregate Base Course		
	1.	Below floor slabs	95
	2.	Below asphalt paving	100

E. Landscape Areas

1.	Miscellaneous fill	90
2.	Utility trench - more than 1.0' below finish grade	85
3.	Utility trench - within 1.0' of finish grade	90

3.7 Utilities Installation

Trench excavations for utilities can be accomplished by conventional trenching equipment although cemented soils may impede progress and possibly require the use of heavier equipment. It should be noted that the fact that a boring was advanced to a particular depth should not lead to the assumption that it is necessarily excavatable by conventional means. Very dense and/or cemented conditions may require rock removal techniques. Trench walls should stand near-vertical for the short periods of time required to install shallow utilities although some sloughing may occur in looser and/or sandier soils requiring laying back of side slopes and/or temporary shoring. Adequate precautions must be taken to protect workmen in accordance with all current governmental regulations.

Backfill of trenches may be carried out with native excavated material. This material should be moisture-conditioned, placed in 8-inch lifts and mechanically compacted. Water settling is not recommended. Compaction requirements are summarized in the "Fill And Backfill" section of this report.

3.8 Slabs-on-Grade

To facilitate fine grading operations and aid in concrete curing, a 4-inch thick layer of granular material conforming to the gradation for Aggregate Base (A.B.) as per M.A.G. Specification Section 702 should be utilized beneath the slab. Dried subgrade soils must be re-moistened prior to placing the A.B. if allowed to dry out.

3.9 Soil Corrosion

Results of sulfate testing indicate a sulfate content of 17 ppm which is a negligible degree of exposure. Accordingly, either Type I or Type II cement, readily available and used in the area, may be used on this project.

3.10 Asphalt/Concrete Pavement

If earthwork in paved areas is carried out to finish subgrade elevation as set forth herein, the subgrade will provide adequate support for pavements. The location designation is for reference only. The designer/owner should choose the appropriate sections to meet the anticipated traffic volume and life expectancy. If the roadways will not be private they may need to follow City of Phoenix guidelines. 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.

Table 3.10.1 Pavement Sections

Area	Daily 18-kip ESALs		Flexible		Rigid
	AC	PCCP	AC (0.39)	ABC (0.12)	PCCP
Auto Parking	3	9	2.0"	4.0"	5.0"
Truck Parking/Driveways	31	23	3.0"	6.0"	6.0"
	65	51	3.0"	8.0"	7.0"
Residential Streets	8	--	2.0"	6.0" (4)	N/A
	14	--	3.0"	4.0"	N/A
Local Commercial	12	--	2.0"	7.0" (4)	N/A
	31	--	3.0"	6.0"	N/A

Notes:
1. Designs are based on AASHTO design equations and ADOT correlated R-values.
2. The PCCP thickness is increased to provide better load transfer, and reduce potential for joint and edge failures. Design PCCP per ACI 330R-87.
3. Full depth asphalt or increased asphalt thickness can be increased by adding 1.0-inch asphalt for each 3 inches of base course replaced.
4. Minimum sections required by City of Phoenix detail P-1102 and P-1103.

Pavement Design Parameters:

Assume:	One 18 kip Equivalent Single Axle Load(ESAL)/Truck
Life:	20 years
Subgrade Soil Profile:	
% Passing #200 sieve:	57%
Plasticity Index:	8%
k:	150 pci (assumed)
R value:	33 (per ADOT tables)
M_R:	20,000 (per AASHTO design)

These designs assume that all subgrades are prepared in accordance with the recommendations contained in the "Site Preparation" and "Fill and Backfill" sections of this report, and paving operations carried out in a proper manner. If pavement subgrade preparation is not carried out immediately prior to paving, the entire area should be proof-rolled at that time with a heavy pneumatic-tired roller to identify locally unstable areas for repair.

Pavement base course material should be aggregate base per M.A.G. Section 702 Specifications. Asphalt concrete materials and mix design should conform to M.A.G. 710. It is recommended that a 12.5mm or 19.0mm mix designation be used for the pavements. While a 19.0mm mix may have a somewhat rougher texture, it offers more stability and resistance to scuffing, particularly in truck turning areas. Pavement installation should be carried out under applicable portions of M.A.G. Section 321 and municipality standards. The asphalt supplier should be informed of the pavement use and required to provide a mix that will provide stability and be aesthetically acceptable. Some of the newer M.A.G. mixes are very coarse and could cause placing and finish problems. A mix design should be submitted for review to determine if it will be acceptable for the intended use.

For sidewalks and other areas not subjective to vehicular traffic a 4-inch section of concrete will be sufficient. For trash and dumpster enclosures a thicker section of 6 inches of concrete is recommended.

Portland Cement Concrete Pavement must have a minimum 28-day flexural strength 550 psi (compressive strength of approximately 3,700 psi). It may be cast directly on the prepared subgrade with proper compaction (reduced) and the elevated moisture content as recommended in the report. Lacking an aggregate base course, attention must be paid to using low slump concrete and proper curing, especially on the thinner sections. No reinforcing is necessary. Joint design and spacing should be in accordance with ACI recommendations. Construction joints should contain dowels or be tongue and grooved to provide load transfer. Tie bars are recommended on the joints adjacent to unsupported edges. Maximum joint spacing in feet should not exceed 2 to 3 times the thickness in inches. Joint sealing with a quality silicone sealer is recommended to prevent water from entering the subgrade allowing pumping and loss of support.

Proper subgrade preparation and joint sealing will reduce (but not eliminate) the potential for slab movements (thus cracking) on the expansive native soils. Frequent jointing will reduce uncontrolled cracking and increase the efficiency of aggregate interlock joint transfer.

4.0 GENERAL

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

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

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

Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.

Jesse Graham, E.I.T.

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APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST

MOISTURE-DENSITY RELATIONS

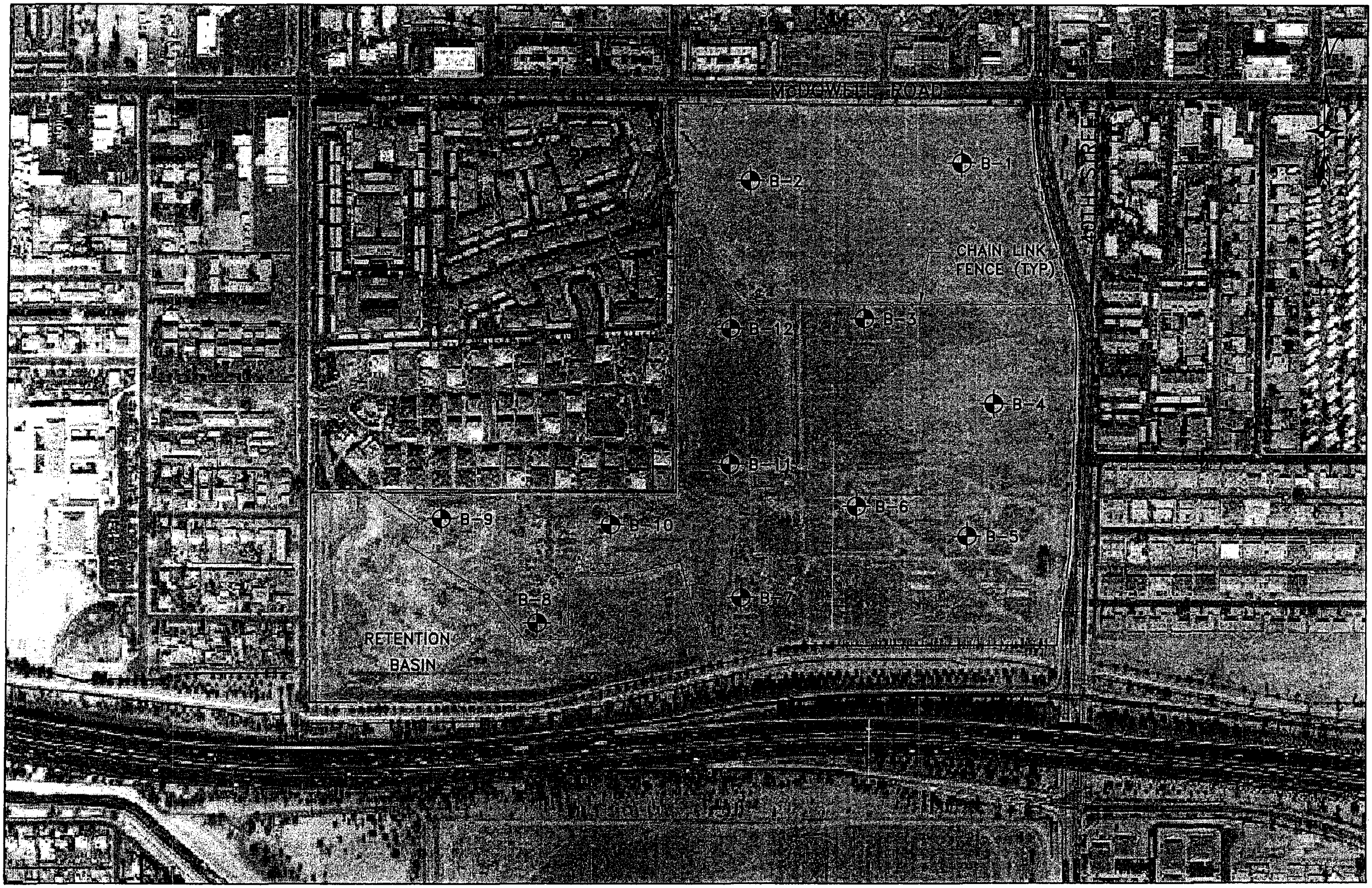
SWELL TEST DATA

IAS LABORATORY RESULTS

FIELD AND LABORATORY INVESTIGATION

On December 13, 2006, 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-75 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 pavement design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Compression tests were performed on a selected ring sample in order to estimate settlements and determine effects of inundation. Also sulfate tests were performed for corrosivity purposes. All field and laboratory data is presented in this appendix.



⊕ - APPROXIMATE SOIL BORING LOCATIONS

SOIL BORING LOCATION PLAN				85 ACRE DEVELOPMENT SWC 40TH ST. & MCDOWELL RD. PHOENIX, ARIZONA	SPEEDIE AND ASSOCIATES GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS 3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391
DR: SES	CHK:	REV:	DATE: 12-28-06	PROJECT NO. 062247SA	

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.

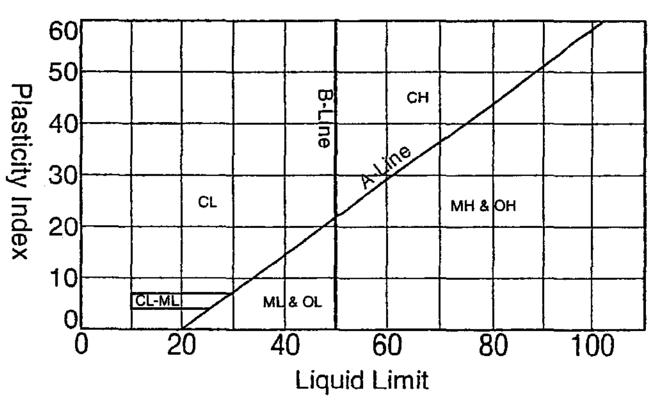
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard	> 30	> 4		

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS; MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS; MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS; MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS; MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	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

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

MATERIAL SIZE	PARTICLE SIZE Lower Limit mm	Lower Limit Sieve Size ♦	Upper Limit mm	Upper Limit 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" ×
Coarse	19	0.75" ×	75	3" ×
COBBLES	75	3" ×	300	12" ×
BOULDERS	300	12" ×	900	36" ×

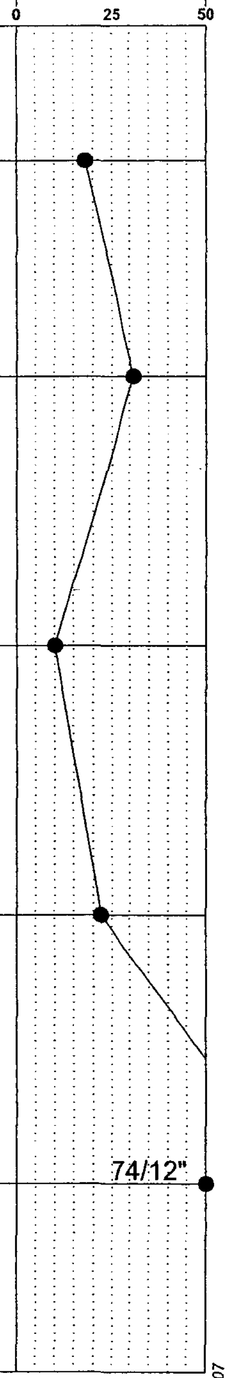
♦U.S. Standard ×Clear Square Openings



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

Visual Classification

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0 – 3.0	Medium Dense Brown SILTY CLAYEY SAND (SC/SM-Dry) with Weak Calcareous Cementation and Trace Roots	RS-1	2.5	4.0	92.5	
3.0 – 17.0	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation	S-2	6.5	NT	NT	
		S-3	11.5	NT	NT	
	Little Gravel					
	Increasing Sand	S-4	16.5	NT	NT	
17.0 – 19.0	Brown COARSE, POORLY GRADED SAND with GRAVEL (SP-Dry)					
19.0 – 21.5	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak to Moderate Calcareous Cementation	S-5	21.5	NT	NT	74/12"
21.5	End of Boring					



Boring Date:	**12-13-06**
Field Engineer/Technician:	**B. Amos**
Driller:	**B. Anderson**
Contractor:	**Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

SPEEDIE 062247SA.GPJ GENGEO.GDT 1/5/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0 – 3.0	Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel	RS-1	2.0	2.3	105.6	
3.0 – 11.5	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation	S-2	6.5	NT	NT	70/12"
		S-3	11.5	NT	NT	
11.5	End of Boring					

Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

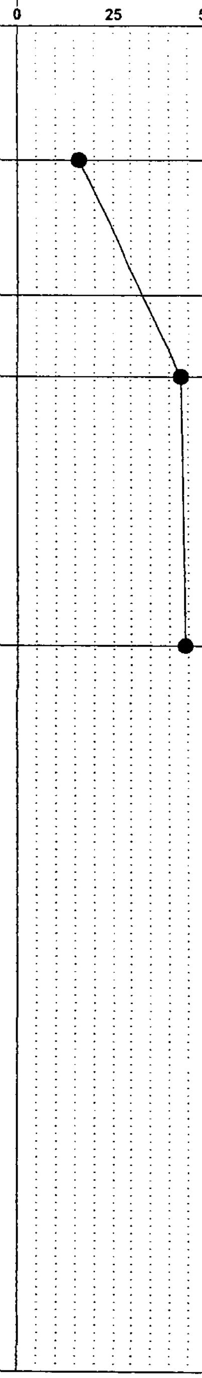
Phoenix, Arizona

Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0–25–50)
0 – 3.0	Very Stiff Brown SANDY SILTY CLAY (CL/ML-Dry) with Trace Gravel	S-1	2.5	NT	NT	
3.0 – 11.5	Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation	BS-2	5.0	NT	NT	
		S-3	6.5	NT	NT	
11.5	End of Boring	S-4	11.5	NT	NT	



Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0 – 2.0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel					
2.0 – 11.5	Dense to Very Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation	S-1	2.5	NT	NT	
		S-2	6.5	NT	NT	78/12"
11.5	End of Boring	S-3	11.5	NT	NT	

Depth scale: 0, 5, 10, 15, 20, 25

Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

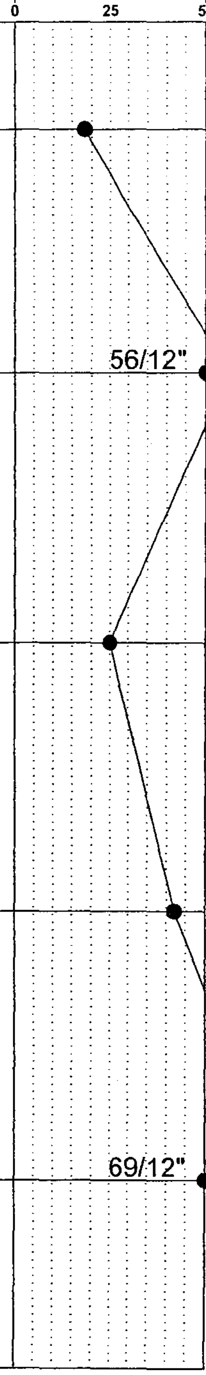
Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0 – 4.0	Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation	RS-1	2.0	4.2	97.6
4.0 – 12.0	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation	S-2	6.5	NT	NT
	Trace Gravel				
	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel	S-3	11.5	NT	NT
12.0 – 17.0	Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel	S-4	16.5	NT	NT
17.0 – 19.0	Brown COARSE, POORLY GRADED SAND with GRAVEL (SP-Dry)				
19.0 – 21.5	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak to Moderate Calcareous Cementation	S-5	21.5	NT	NT
21.5	End of Boring				

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



Boring Date:	**12-13-06**
Field Engineer/Technician:	**B. Amos**
Driller:	**B. Anderson**
Contractor:	**Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

SPEEDIE 062247SA.GPJ GENGEO.GDT 1/5/07

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

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 to Hard Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel and Weak Calcareous Cementation					
			S-1	2.5	NT	NT	
5							
			S-2	6.5	NT	NT	80/12"
10							
11.5		End of Boring	S-3	11.5	NT	NT	
15							
20							
25							

Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

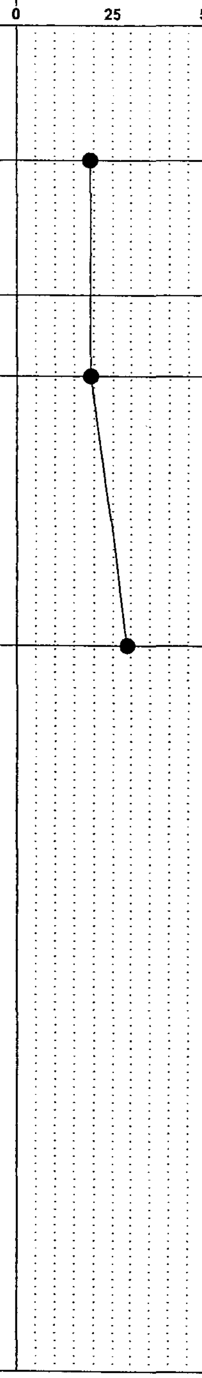
Phoenix, Arizona

Project No.: **062247SA**

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel and Weak Calcareous Cementation	S-1	2.5	NT	NT
3.0	Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation	BS-2	5.0	NT	NT
		S-3	6.5	NT	NT
11.5	End of Boring	S-4	11.5	NT	NT

Penetration Resistance Blows per Foot



Depth scale: 0, 5, 10, 15, 20, 25

Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 7**

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 / 25 / 50)
0	Medium Dense to Very Dense Brown <u>CLAYEY SAND</u> (SC-Dry) with Trace Gravel and Weak Calcareous Cementation					
		S-1	2.5	NT	NT	
5						
		S-2	6.5	NT	NT	52/12"
10						
11.5	End of Boring	S-3	11.5	NT	NT	
15						
20						
25						

Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B- 8**

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

Rig Type: **CME-75**

Boring Type: **Hollow Stem Auger**

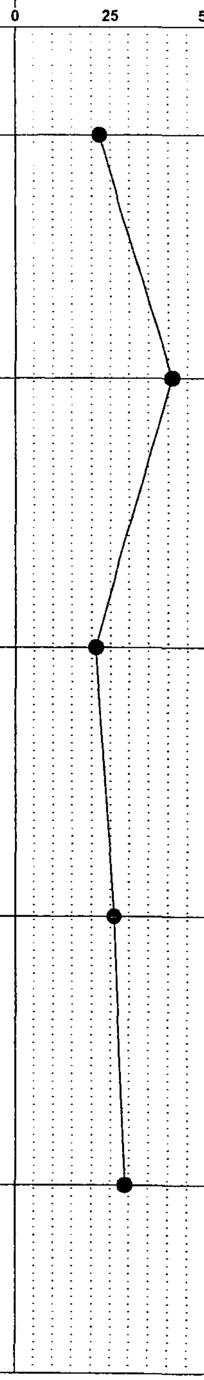
Surface Elevation: **N/A**

Visual Classification

Depth (feet)	Visual Classification
0 – 3.0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel
3.0 – 21.5	Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation
10	Medium Dense
21.5	End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
RS-1	2.0	5.5	94.5
S-2	6.5	NT	NT
S-3	11.5	NT	NT
S-4	16.5	NT	NT
S-5	21.5	NT	NT

Penetration Resistance Blows per Foot



Boring Date: **12-13-06**

Field Engineer/Technician: **B. Amos**

Driller: **B. Anderson**

Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

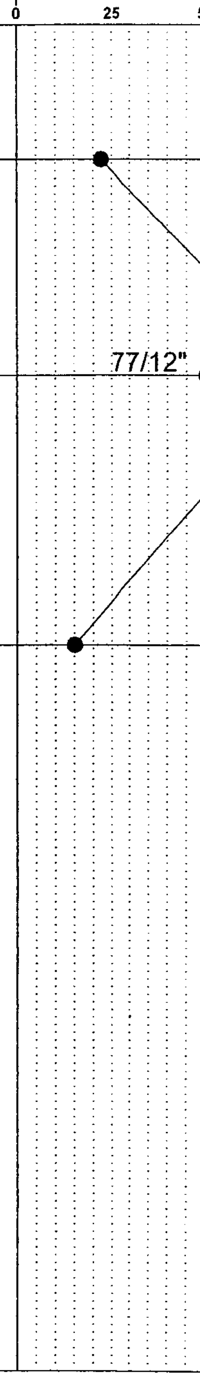
Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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

Visual Classification

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation					
		S-1	2.5	NT	NT	
5	Very Dense with Weak to Moderate Calcareous Cementation					
		S-2	6.5	NT	NT	77/12"
10	Medium Dense with Trace to Little Gravel					
11.5	End of Boring	S-3	11.5	NT	NT	



Boring Date: **12-13-06**
Field Engineer/Technician: **B. Amos**
Driller: **B. Anderson**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

85 Acre Development

SWC 40th St. & McDowell Rd.

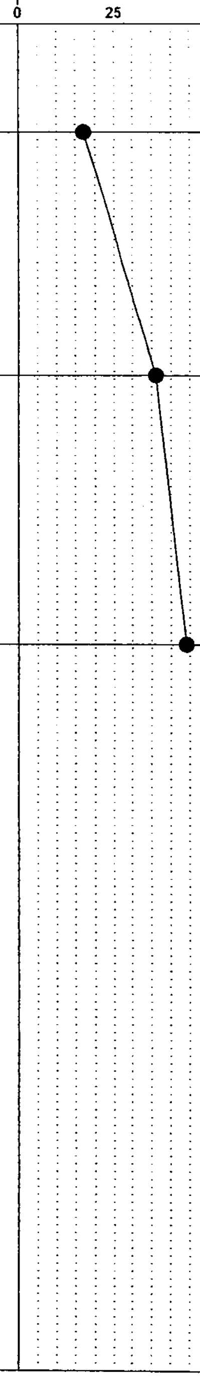
Phoenix, Arizona

Project No.: **062247SA**

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)
0 – 4.0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel	RS-1	2.0	6.3	87.2
4.0 – 11.5	Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel Dense with Trace Gravel and Weak Calcareous Cementation	S-2	6.5	NT	NT
11.5	End of Boring	S-3	11.5	NT	NT

Penetration Resistance Blows per Foot



Boring Date:	**12-13-06**
Field Engineer/Technician:	**B. Amos**
Driller:	**B. Anderson**
Contractor:	**Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-11**

85 Acre Development

SWC 40th St. & McDowell Rd.

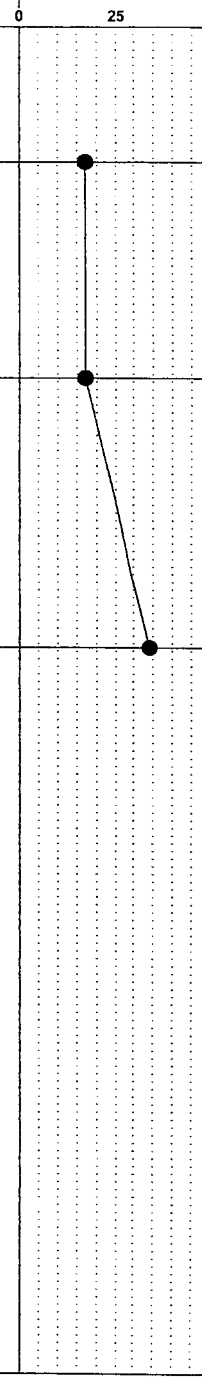
Phoenix, Arizona

Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/5/07

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
0	Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Trace Gravel					
		S-1	2.5	NT	NT	
5.0	Very Stiff Brown SANDY SILTY CLAY (CL/ML-Dry) with Weak Calcareous Cementation					
		S-2	6.5	NT	NT	
8.0	Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation					
11.5	End of Boring	S-3	11.5	NT	NT	



Boring Date:	**12-13-06**
Field Engineer/Technician:	**B. Amos**
Driller:	**B. Anderson**
Contractor:	**Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-12**

85 Acre Development

SWC 40th St. & McDowell Rd.

Phoenix, Arizona

Project No.: **062247SA**

_SPEEDIE 062247SA.GPJ GENGEO.GDT 1/3/07

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) #200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
B- 1	RS-1	RING	1.0 - 2.5	4.0	92.5	48	72	87	96	100	22	17	5	SC-SM	SILTY, CLAYEY SAND
B- 2	RS-1	RING	1.0 - 2.0	2.3	105.6	NT	NT	NT	NT	NT	NT	NT	NT		
B- 3	BS-2	BULK	0.0 - 5.0	NT	NT	51	74	89	97	100	24	17	7	CL-ML	SANDY SILTY CLAY
B- 5	RS-1	RING	1.0 - 2.0	4.2	97.6	NT	NT	NT	NT	NT	NT	NT	NT		
B- 7	BS-2	BULK	0.0 - 5.0	NT	NT	52	74	86	95	100	29	17	12	CL	SANDY LEAN CLAY
B- 9	RS-1	RING	1.0 - 2.0	5.5	94.5	66	86	95	98	100	24	15	9	CL	SANDY LEAN CLAY
B-11	RS-1	RING	1.0 - 2.0	6.3	87.2	67	91	97	99	100	26	17	9	CL	SANDY LEAN CLAY

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.

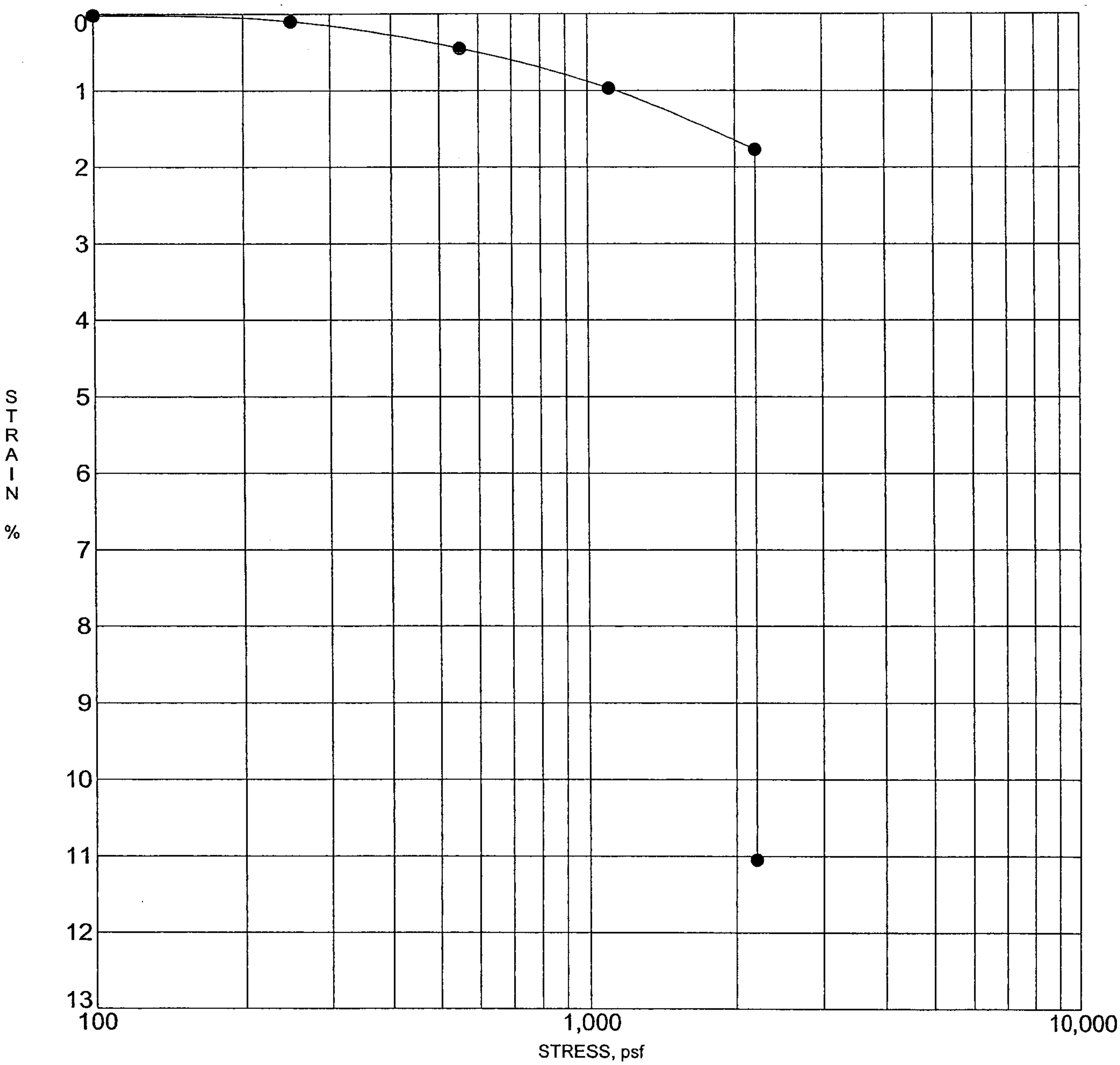
NT=Not Tested

85 Acre Development
SWC 40th St. & McDowell Rd.
Phoenix, Arizona
Project No. 062247SA

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST

PROJECT:	85 Acre Development			PROJECT NO.:	062247SA
LOCATION:	SWC 40th St. & McDowell Rd.			DATE:	12/13/06
BORING NO.: B-1	SAMPLE NO.: RS-1	SAMPLE DEPTH:	1 to 2.5	LABORATORY NO.:	Y7884
LIQUID LIMIT:	22	PLASTIC LIMIT:	17	PLASTICITY INDEX:	5
CLASSIFICATION:		ASTM SOIL DESCRIPTION:	SILTY, CLAYEY SAND		

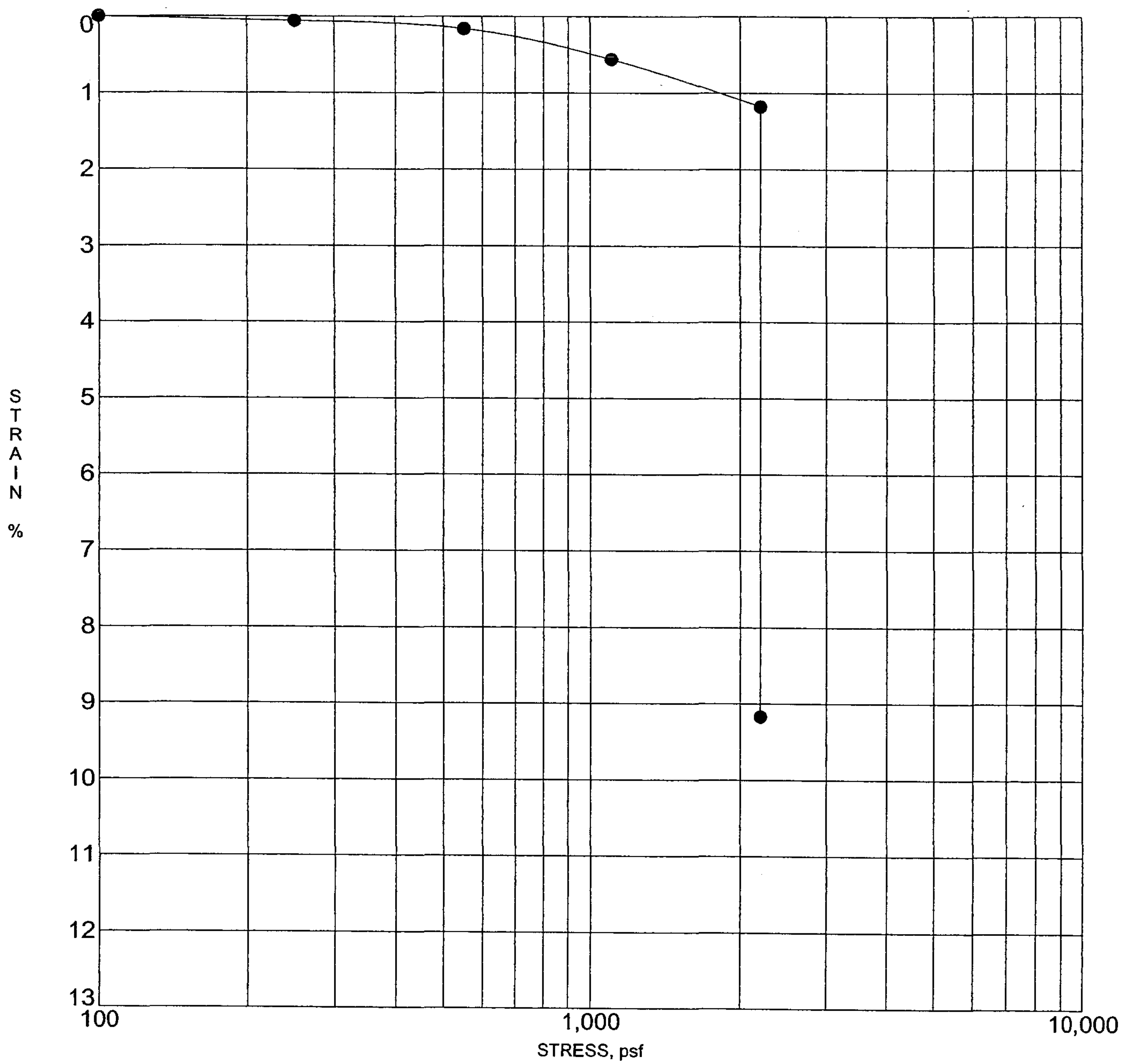


Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST

PROJECT: 85 Acre Development | PROJECT NO.: 062247SA
LOCATION: SWC 40th St. & McDowell Rd. | DATE: 12/13/06
BORING NO.: B- 9 | SAMPLE NO.: RS-1 | SAMPLE DEPTH: 1 to 2 | LABORATORY NO.: Y7889
LIQUID LIMIT: 24 | PLASTIC LIMIT: 15 | PLASTICITY INDEX: 9
CLASSIFICATION: | ASTM SOIL DESCRIPTION: SANDY LEAN CLAY



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 062247SA.GPJ GENGEO.GDT 1/3/07

CONSOLIDATION TEST

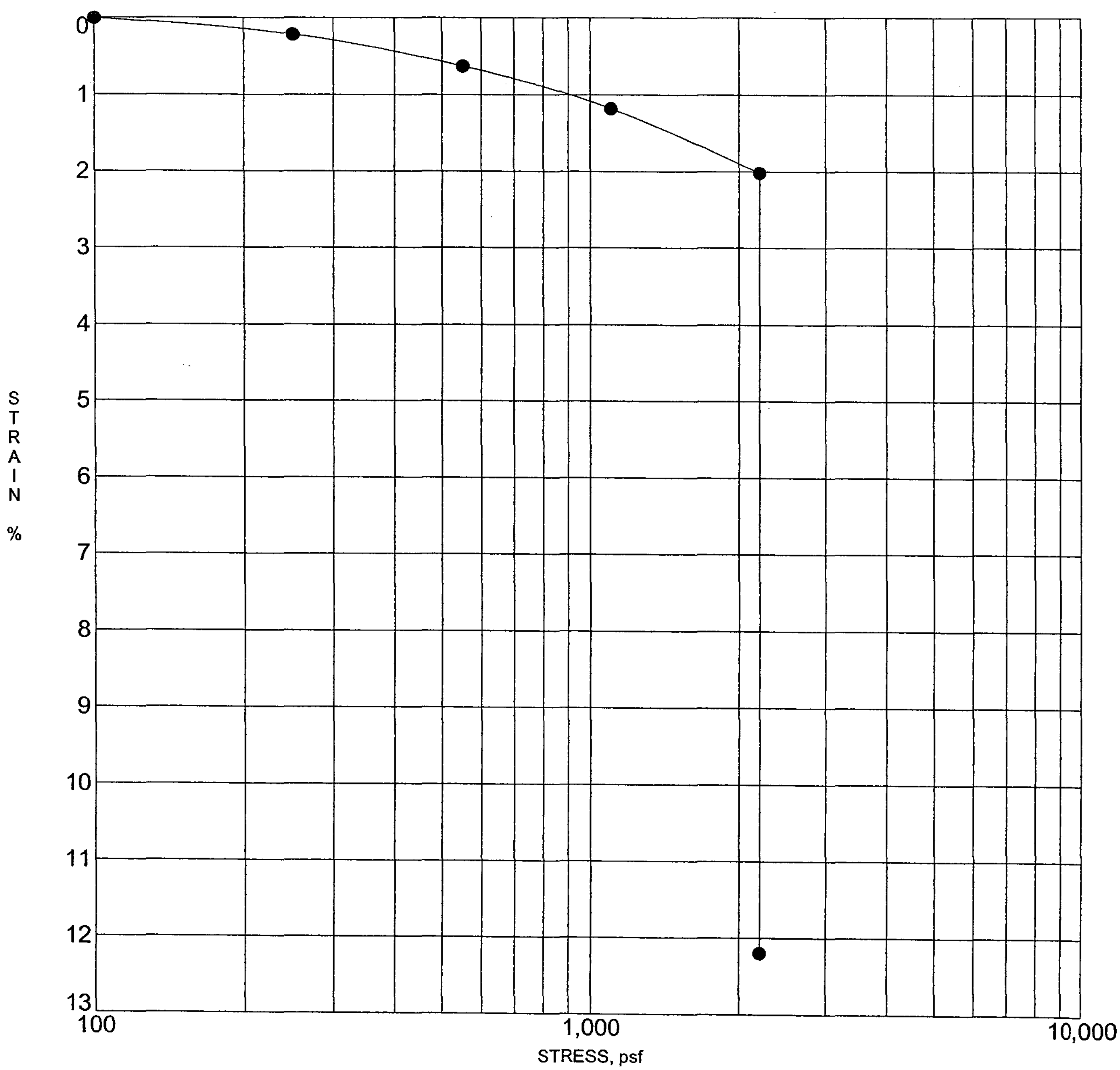
PROJECT: 85 Acre Development — PROJECT NO.: 062247SA

LOCATION: SWC 40th St. & McDowell Rd. — DATE: 12/13/06

BORING NO.: B-11 SAMPLE NO.: RS-1 SAMPLE DEPTH: 1 to 2 LABORATORY NO.: Y7890

LIQUID LIMIT: 26 PLASTIC LIMIT: 17 PLASTICITY INDEX: 9

CLASSIFICATION: ASTM SOIL DESCRIPTION: SANDY LEAN CLAY



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: 85 Acre Development

PROJECT NO.: 062247SA

LOCATION: SWC 40th St. & McDowell Rd.

DATE: 12/13/06

BORING NO.: B- 3 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0 to 5

LABORATORY NO.: Y7886

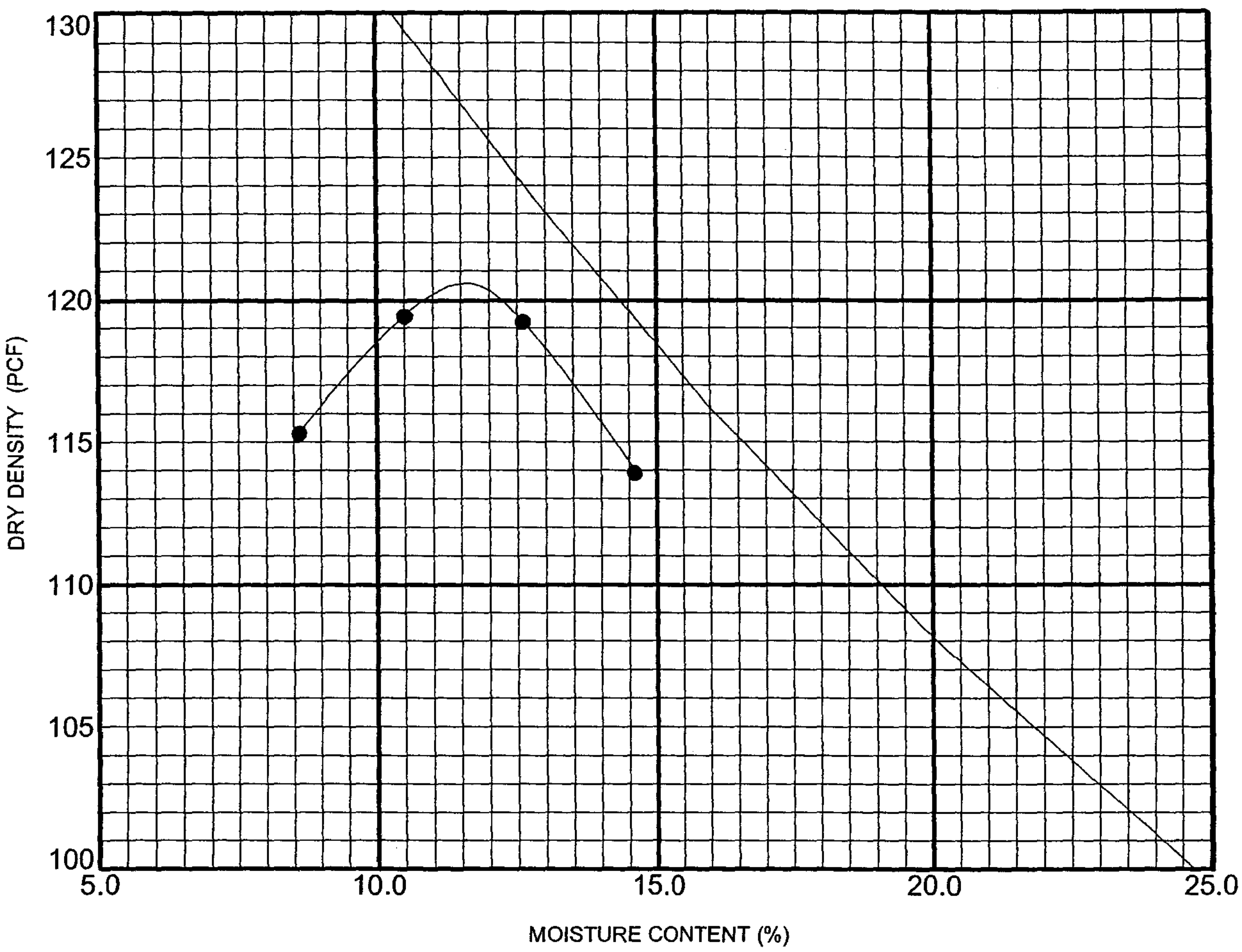
METHOD OF COMPACTION: D698A

LIQUID LIMIT: 24 PLASTIC LIMIT: 17 PLASTICITY INDEX: 7

CLASSIFICATION: CL-ML ASTM SOIL DESCRIPTION: SANDY SILTY CLAY

MAXIMUM DRY DENSITY: **120.5 PCF**

OPTIMUM MOISTURE CONTENT: **11.7%**

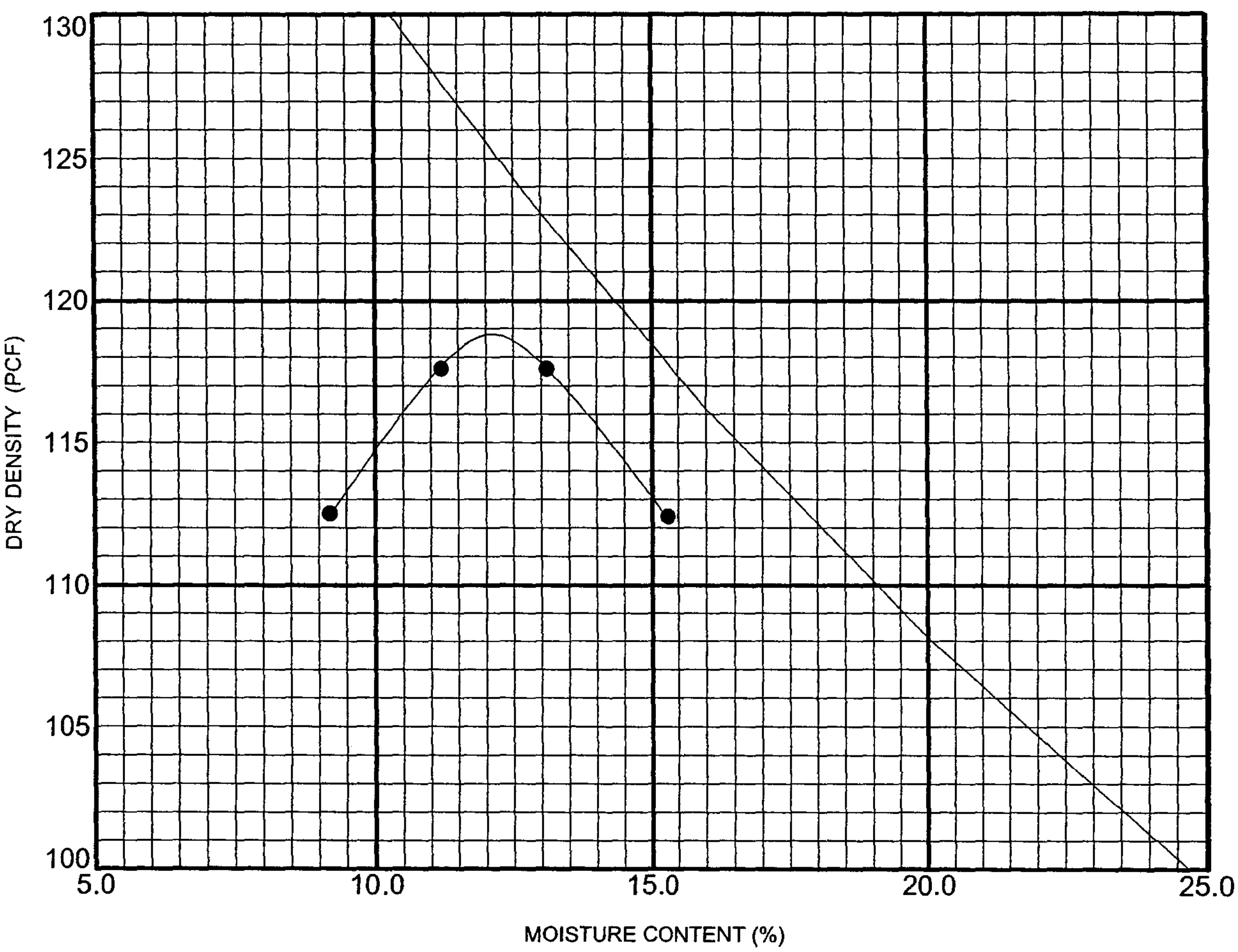


SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: 85 Acre Development			PROJECT NO.: 062247SA
LOCATION: SWC 40th St. & McDowell Rd.			DATE: 12/13/06
BORING NO.: B- 7	SAMPLE NO.: BS-2	SAMPLE DEPTH: 0 to 5	LABORATORY NO.: Y7888
METHOD OF COMPACTION: D698A			
LIQUID LIMIT: 29	PLASTIC LIMIT: 17		PLASTICITY INDEX: 12
CLASSIFICATION: CL	ASTM SOIL DESCRIPTION: SANDY LEAN CLAY		

MAXIMUM DRY DENSITY: **118.8 PCF** OPTIMUM MOISTURE CONTENT: **12.1%**



SPEEDIE AND ASSOCIATES

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- 3, BS-2	5.0	120.5	11.7	114.2	10.2	94.8	16.3	100	1.1
B- 7, BS-2	5.0	118.8	12.1	112.7	10.5	94.8	17.2	100	1.2

85 Acre Development
SWC 40th St. & McDowell Rd.
Phoenix, Arizona
Project No. 062247SA

SPEEDIE AND ASSOCIATES

SWELL TEST 062247SA.GPJ GENGEO.GDT 1/3/07

IAS Laboratories

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Phoenix, Arizona 85034
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Today's Date: 12/22/2006
Project #: 06247SA
Submitted By: Doug Laquey / Jamal Abuseif
Send Report To: Speedie & Associates
Report Number: 6629425
Date Received: 12/20/2006

Soil Analysis Report

Sender Sample ID	Depth	Lab #	[1] Sulfate ppm	[2] Chloride ppm	[3] Soluble Salts ppm	[3] pH	Other
Y7886		851	17				
Y7888		852	17				

Comments:

Reference:

[1] ADOT Method ARIZ 733
[2] ADOT Method ARIZ 736
[3] ADOT Method ARIZ 237b