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REPORT ON GEOTECHNICAL INVESTIGATION

DESIGNATION: Guadalupe Drainage Improvement Project

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd.
Guadalupe, Arizona

CLIENT: Sverdrup Civil, Inc.

PROJECT NO: 990906SB

DATE: October 31, 2001

Registered Professional Engineer (Civil)
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SPEEDIE ANDASSOCIATES

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1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of the proposed Guadalupe Drainage Improvement Project, which extends from the Highline Canal at Avenida del Yaqui to Elliot Road, in Guadalupe, Arizona.

Preliminary information calls for the construction of three new storm water retention basins and a system of storm drain pipeline and catch basins throughout town. Each basin will be equipped with dry well(s) for disposal. Additionally, recreational improvements are proposed for each basin. The proposed improvements range from a small practice field to baseball fields, volleyball and basketball courts, ramadas and restroom facilities.

The original design called for a conveyance system to be located adjacent to Highline Canal. That planned system has been abandoned. Speedie & Associates conducted an investigation for the original plan, issuing a draft report under project number 990606SA. The field and laboratory data from that original report, as well as a supplementary investigation conducted for the Flood Control District in the north basin, is included as Appendix B of this report. The recommendations made in this report are based on the field and laboratory data obtained from both investigations.

Supplementary to this investigation was an additional investigation to sample soils from the proposed retention basins and perform agronomy tests. This information from this investigation is included in Appendix C.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

As indicated, the project consists of four retention basins with connecting pipelines and catch basins. The basins are identified as the North, Tempe, Central and South basins. They are located at Avenida Del Yaqui and Calle Cerrito, Oxford Drive and Beck Avenue, Guadalupe Road and the Highline Canal, and Calle Vauo Nawi south of Calle Jimenez, respectively. All four basin locations are relatively flat and contain sparse vegetation ranging from low lying grasses to small trees. The Tempe Basin has a considerable amount of dumped soil on the east side of the basin.

The connecting pipeline/catch basins are generally located within the residential community. The roadways are typically paved with asphalt concrete. Along the south and west sides of the Highline Canal there is a graded dirt service road.

2.2 General Subsurface Conditions

Subsoil conditions are variable along the alignments. The subsoils in general consist of medium dense to very dense silty sands and clayey sands to very stiff to hard sandy clays. Subordinate amounts of gravel and calcareous cementation were reported, generally increasing with depth. Locally, this cementation may result in rock-like conditions. Two deeper borings conducted in the north retention basin did encounter auger refusal on cobbles/small boulders between 26 and 30 feet deep. This is most likely attributed to a colluvial fan from the nearby South Mountains. Shallow bedrock was present in the additional borings drilled in the south end of the north basin.

Standard Penetration Test values generally range from 5 to 50+ blows per foot (bpf), with the majority ranging from 15 to 50+ bpf. No groundwater was encountered during this investigation, and there was no indication of leakage from the adjacent canal at the locations drilled. Laboratory testing indicates in-situ dry densities of the upper soils on the order of 96 to 110 pcf at about 3 to 15 percent moisture at the time of investigation. Liquid limits are in the 22 to 52 percent range with plasticity indices ranging from 1 to 29 percent. The upper clayey soils exhibit volume increase due to wetting of up to 4 percent when recompacted to moistures and densities normally expected during construction. Undisturbed samples displayed additional compression due to inundation under a maximum load of 2,200 psf

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

In general, construction of this project should be relatively straightforward. Excavation of the basins and/or pipeline may be accomplished with conventional excavation equipment. The cemented soils may require use of heavier equipment on a localized basis. The more heavily cemented soils and shallow rock in the north basin may require rock removal techniques depending on depth. The fact that a boring was advanced to a particular depth does not mean it can be readily excavated. The contractor(s) must make their own evaluation based on the type of equipment they intend to use and the geometry of the excavation.

The presence of cobbles/boulders and possible shallow bedrock in the north basin may impede excavation progress and functionality of the proposed dry well. Regional ground water is not expected to be a factor in the design or construction of shallow foundations and underground utilities.

Two samples from the south basin were submitted for pesticide analysis due the past use of the site. Both samples indicated 'non-detect' values for common pesticides. Samples were also submitted for agronomy analysis. The results of that analysis are attached in Appendix B. A supplementary

investigation was conducted to collect additional soil samples from the proposed retention basins and perform agronomy/fertility tests. This information from this investigation is included in Appendix C.

There are some locations along the canal where there are structure encroachments that may affect pipeline installation. In some instances, these encroachments consist of temporary or minor structures such as trailers, shed and/or patios. It may be possible to relocate and/or remove and replace these interferences at a cost less than providing temporary support. Typically, temporary support will likely be required for any excavation that encroaches on a zone defined by a 45 degree line drawn down and away from the ground surface of a building wall. Secondly, the soils are relatively loose in the area along the canal, possibly requiring unbraced slopes as flat as 1½:1. Slopes this flat would undermine these structures. Temporary building support can include standard underpinning, helical piers, or top down excavation such as Soil Nail walls. It is recommended that the contractor be required to submit a plan for building support for these identified areas, since the underpinning detail will depend on the contractors means and methods of excavating. The contractor should also be required to provide a pre-construction survey of any structure that may be affected by proposed construction to avoid damage claims. For the canal, it may be possible to install temporary piping that will allow the required irrigation water to flow past the area being excavated or tunneled under thereby reducing the risk for embankment failure and flooded trenches.

The swell potential of the upper clayey soils is a concern. The potential is usually strong enough to cause differential movements of slabs-on-grade such as floors and sidewalks but not enough to cause damage to structures. Accordingly, attention must be paid to provide proper drainage to limit the potential for water infiltrating under slabs. A minimum slope of at least 5 percent for a distance of 10 feet is recommended for unpaved landscaped areas. Typical recommendations to reduce the swell potential include reducing the compaction requirements and requiring higher moisture contents during pad preparation and requiring at least one foot of non-expansive material to be placed directly beneath the building slabs and slabs contiguous to the structure such as sidewalks.

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 outswinging 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.

If grading plans require placing structural fill for small surface structures (restrooms, ramadas, etc.), the existing (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. Cut areas and pavement areas should be treated in a similar manner.

For below grade structures such as box culverts, excavations should be cut to grade, carefully removing any remaining loose soils, similar to any other foundation excavation. Inadvertent over-excavation should be filled with lean grout or concrete.

3.3 Excavation And Temporary Cut Slopes

All excavations must comply with current governmental regulations including the current OSHA Excavation and Trench Safety Standards. Side slopes for open-cut excavation in fill material should be cut back at 1.5:1 (horizontal to vertical). Excavation in the native, dense clayey soils maybe cut back at 1:1 or as steep as ¾:1 in cemented soils. Slopes need to be evaluated by the contractors qualified person(s) on a case by case basis along the trench alignment. 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 a distance equal to the slope height, whichever is greater, from the top of slope. All cut slopes should be observed by the qualified person during excavation. Adjustments to the recommended slopes may be necessary due to wet zones, loose strata and conditions not observed in the borings. Localized shoring may also be required. Shotcrete or soil stabilizer on the slope face may be useful in preventing erosion due to run-off and/or drying of the slope. Of considerable concern would be excavations against/under the Canal where trench backfill is encountered. This could create a preferred drainage path that may pipe or "blowout", flooding the excavation.

3.4 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 10,000 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 turn-down 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. Reinforcement and control joints are suggested to allow slight movement and prevent minor uncontrolled floor slab cracking.

3.5 Lateral Pressures

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

Active Pressure	
Unrestrained Walls	35 pcf
Restrained Walls	60 pcf
Passive Pressure	
Continuous Footings or Drilled Piers	300 pcf
Spread Footings or Drilled Piers	350 pcf
Coefficient of Friction *(With Passive Pressure)*	0.35
Coefficient of Friction *(Without 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 fills depending on location and classification. Expansion tests were conducted on selected upper soils. These samples indicate that the upper clayey soils possess a swell potential that could be detrimental to slabs on grade. Tests on the sandier soils indicate that they are suitable for use directly beneath concrete slabs. Accordingly, it is recommended to place at least 12 inches of native soil from the excavations with a silty sand (SM) classification (or SC with plasticity index less than 15) directly under slabs on grade in addition to the prescribed aggregate base. In lieu of selectively stockpiling soils cut from the basins for this use, an approved import may be used.

If imported common fill for use in site grading is used, 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.

No mater how well compacted, post construction settlement of fine grained soil fill can occur behind retaining walls including box culvert walls. Typical values on the order of several percent of the fill height are possible if the fill is subjected to saturation. Accordingly, if there are any critical areas where this settlement cannot be tolerated, well graded granular fill or lean grout fills should be considered.

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 moisture content to +3 percent underslabs). 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) (not recommended within 12 inches of slabs on grade)	90 to 95(max)
B.	Pavement Subgrade or Fill		95
C.	Utility Trench Backfill		
	1.	More than 2.0' below finish S/G	90
	2.	Within 2.0' of finish S/G	95
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 F/G	85
	3.	Utility trench - within 1.0' of F/G	90

3.7 Utilities Installation

Excavation operations should be relatively straightforward although the presence of very dense soils and calcareous cementation 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 more aggressive/rock removal techniques. The responsible contractors should review the boring logs and make their own assessment as to methods and means of excavation.

Waist-high 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 outside of the pipe bedding zone. Pipe bedding should be selected based on materials and trench loading conditions. 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 Corrosion Protection

Resistivity and pH tests were conducted for corrosion potential evaluation. The pH values range from 8.1 to 9.4 (7.8 to 9.1 in the original investigation), while the resistivity values are on the order of 480 to 3,600 ohm-cm (138 to 5,368 ohm-cm in the original). These values indicate that the subsoils are severe to moderately corrosive and will require appropriate protection depending on pipe materials and life expectancy.

3.9 Asphalt Pavement

If earthwork and backfill in paved areas is carried out to finish subgrade elevation as set forth herein, the subgrade will provide adequate support for pavements.

In general, it is recommended to replace the pavement cut for trenches with an equivalent section. For new pavement areas to be used primarily for low volume passenger traffic and parking, our experience in the area indicates that a minimum of 2.0 inches of asphalt over 4.0 inches of aggregate base course will provide satisfactory service. An equivalent full depth asphalt pavement section would be 3.5 inches thick. This basically matches the pavement section encountered in the residential streets. Heavy-duty areas subject to occasional, low volume truck traffic should be 3.0 inches of asphalt over 6.0 inches of base.

This assumes 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.

3.10 Percolation Tests

Percolation tests were performed in three of the proposed retention basins in 12-inch diameter borings. The bottoms of the borings were located at an approximate depth equivalent to the proposed depth of the retention basins. The depth below ground surface (bgs) is indicated in the table. Each of the borings was presoaked at least 18 hours prior to conducting the test. Table 3.10 presents stabilized percolation rates that were achieved.

TABLE 3.10 – PERCOLATION TESTS

Location/Depth	Stabilized Percolation Rate	
	minutes/inch	cu ft/hour/sq ft of drainage area
North Basin B-7/14 ft. bgs	18	0.3
Central Basin B-4/14.5 ft. bgs	10	0.5
South Basin B-6/14 ft. bgs	10	0.5
Tempe Basin P-1/9 ft. bgs	2	2.5
Tempe Basin P-2/4 ft. bgs	3	1.6

The rates were achieved with an 10-inch to 12-inch head of water. Based on the soil classifications, these rates will deteriorate over time.

4.0 GENERAL

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

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

We recommend that a representative of the Soils Engineer observe and test the earthwork and foundation portions of this project to ensure compliance to project specifications and the field applicability of

subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.

Keith R. Gravel, E.I.T.

Registered Professional Engineer (Civil)
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ARIZONA, U.S.A.

Gregg A. Creaser, P.E.

APPENDIX A

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLANS

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TEST

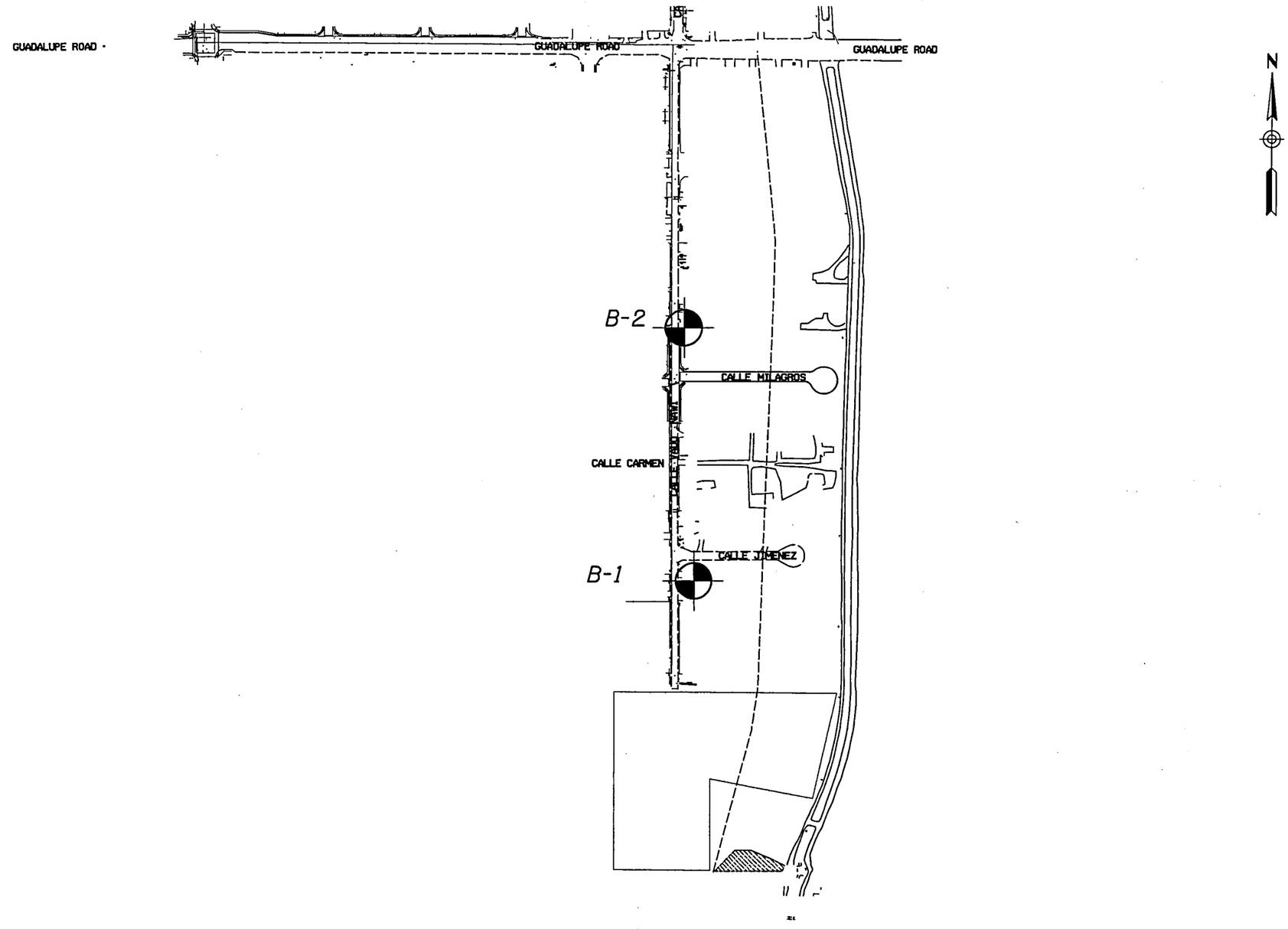
MOISTURE-DENSITY RELATIONS

SWELL TEST DATA

FIELD AND LABORATORY INVESTIGATION

From March 8 and 9, 2001 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with 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. Shallow percolation tests were conducted for storm water retention basin design parameters.

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. All field and laboratory data is presented in this appendix.



- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

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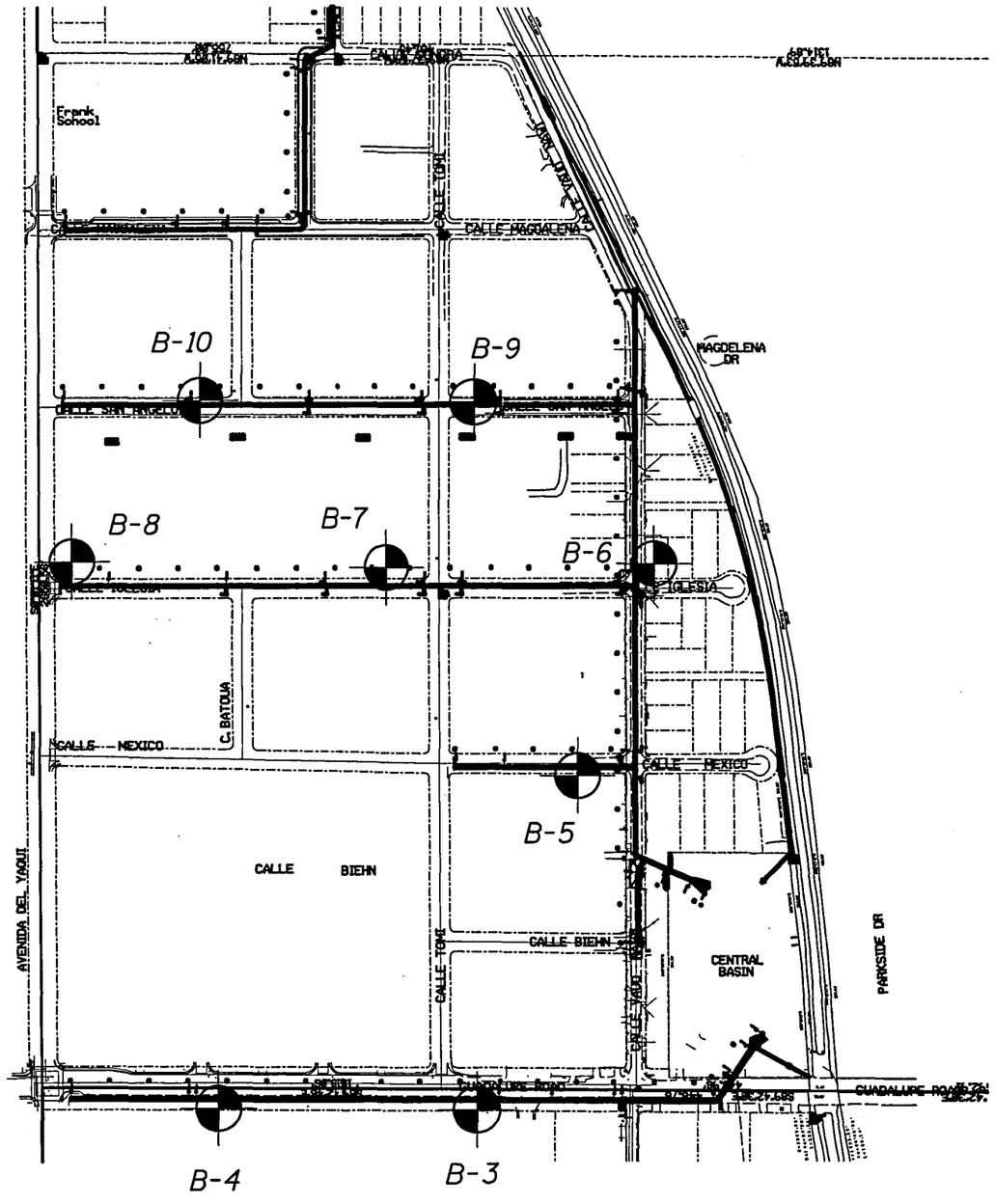
DES:	DR: CMW	CHK: GC	DATE: 03-28-01	PROJ. NO.: 990906SB



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- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

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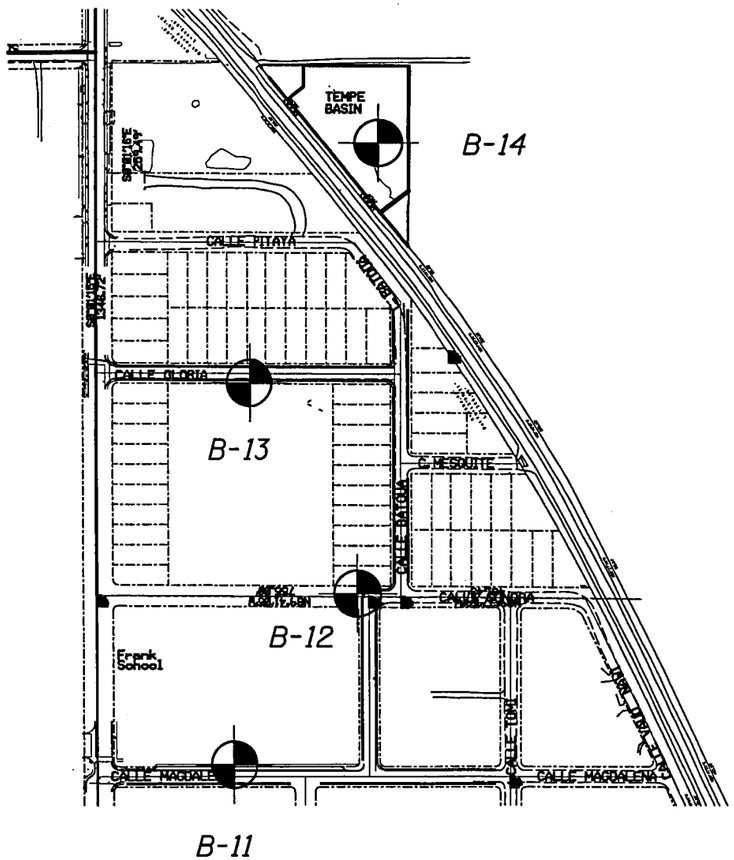

N

⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
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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.

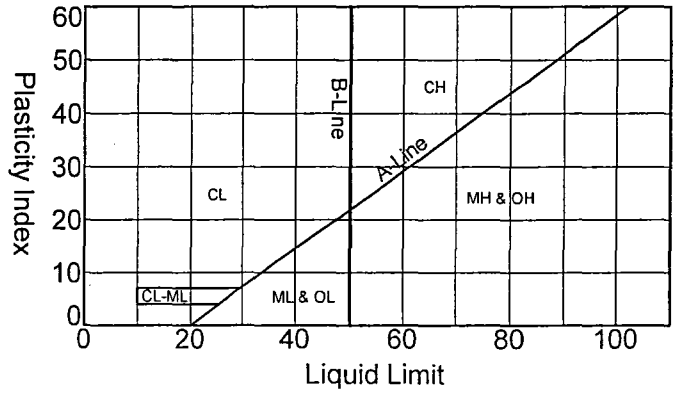
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard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

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

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	Very Loose Brown SILTY SAND (SM-Moist) With Roots					
2.0		S-1	2.5	NT	NT	
	Medium Dense to Dense Brown CLAYEY SAND (SC-Moist) with Weak Calcareous Cementation					
5		RS-2	6.0	7.8	101.6	
8.5						
	Medium Dense to Very Dense Light Brown SILTY SAND (SM-Dry) with Moderate to Strong Calcareous Cementation					
10		S-3	11.5	NT	NT	69/12"
15						
16.5		S-4	16.5	NT	NT	
	End of Boring					
20						
25						
30						

Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
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- 1**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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" Asphalt on 2" to 3" Aggregate Base					
0.5	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	with Weak to Moderate Calcareous Cementation	S-3	6.5	NT	NT	
9.0	Very Dense Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation	S-4	11.5	NT	NT	74/12"
10						
15						
16.5	End of Boring	S-5	16.5	NT	NT	81/12"
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3" Asphalt on 4" Aggregate Base — 0.6				
	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	2.5	NT	NT
5		S-2	6.5	NT	NT
	8.0				
	Dense Light Brown SILTY SAND (SM-Dry) with Weak to Moderate Calcareous Cementation	S-3	11.5	NT	NT
10					
	12.5				
	Hard Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation				
15		S-4	16.5	NT	NT
	16.5 — End of Boring				
20					
25					
30					

Penetration Resistance Blows per Foot: 0 — 25 — 50

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
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- 3**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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" Asphalt on 8" Aggregate Base				
1.0	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry)	S-1	3.0	NT	NT
		BS-2	5.0	NT	NT
5		RS-3	6.0	NT	NT
8.0	Dense Light Brown SILTY SAND (SM-Dry) With Clay and Weak Calcareous Cementation				
10		S-4	11.5	NT	NT
12.5	Hard Light Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation				
15					
16.5	End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot: 0 25 50

Boring Date: 3-9-01
Field Engineer/Technician: M. Polsky
Driller: H. Usery
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- 4

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3.5" Asphalt				
	0.3 Medium Dense Brown CLAYEY FINE SAND (SP/SC-Dry to Moist) with Weak Calcareous Cementation	S-1	2.5	NT	NT
5		RS-2	6.0	14.6	102.3
	8.5 Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	BS-3	10.0	NT	NT
10		S-4	11.5	NT	NT
	13.5 Medium Dense Brown SILTY SAND (SM-Dry)				
15		S-5	16.5	NT	NT
	18.0 Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
20	21.5 End of Boring	S-6	21.5	NT	NT
25					
30					

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

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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- 5**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	Loose Brown CLAYEY SAND (SC/SM-Dry) with Silt	S-1	2.5	NT	NT	
4.0	Very Stiff Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation	BS-2	5.0	NT	NT	
5		RS-3	6.0	10.6	97.5	
8.5	Very Stiff to Hard Light Brown SANDY LEAN CLAY (CL-Dry) with Weak to Moderate Calcareous Cementation	S-4	11.5	NT	NT	59/12"
10						
15		S-5	16.5	NT	NT	
20						
21.5	End of Boring	S-6	21.5	NT	NT	
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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- 6**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3" Asphalt				
	0.2 Medium Dense Brown SILTY SAND (SC/SM-Dry to Moist) With Clay	S-1	2.5	NT	NT
	4.0 Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-2	6.5	NT	NT
5	8.5 Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation	BS-3	10.0	NT	NT
10		S-4	11.5	NT	NT
15	16.5 End of Boring	S-5	16.5	NT	NT
20					
25					
30					

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

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

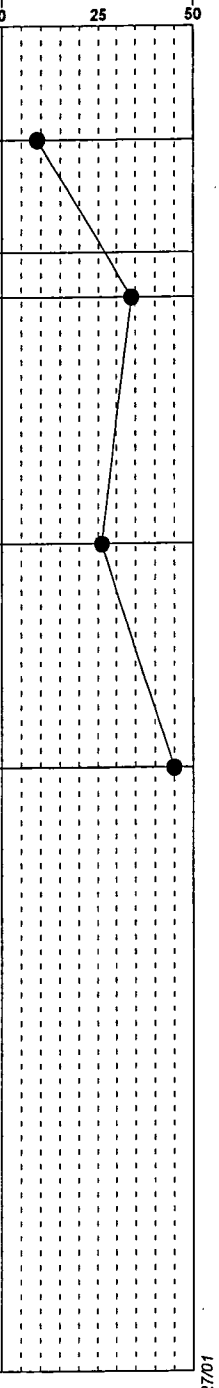
Project No.: **990906SB**

SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3" Asphalt				
	0.2 Loose Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT
	4.0 Dense Reddish Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	BS-2	5.0	NT	NT
5		RS-3	6.0	10.7	104.1
	8.5 Very Stiff Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
10		S-4	11.5	NT	NT
	13.5 Dense Light Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation				
15	16.5 End of Boring	S-5	16.5	NT	NT
20					
25					
30					

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



Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3" Asphalt				
0.2	Medium Dense to Dense Brown CLAYEY SAND (SC-Dry to Moist) with Weak Calcareous Cementation	S-1	2.5	NT	NT
		BS-2	5.0	NT	NT
		RS-3	6.0	6.6	98.7
8.0	Dense Light Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation				
		S-4	11.5	NT	NT
		S-5	16.5	NT	NT
21.5	End of Boring	S-6	21.5	NT	NT

Penetration Resistance Blows per Foot: 0, 25, 50

Boring Date: 3-8-01
Field Engineer/Technician: M. Polsky
Driller: B. Freeman
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- 9

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

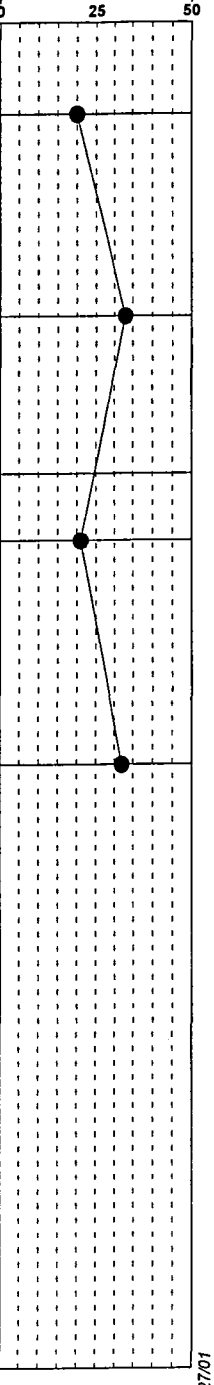
Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3" Asphalt on 3" Aggregate Base (0.5)				
	Very Stiff Brown SANDY CLAY (CL-Dry)	RS-1	2.0	13.5	95.9
	(4.0)				
5	Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation	S-2	6.5	NT	NT
	(9.0)				
10	Medium Dense Brown CLAYEY SAND (SC/SM-Dry) With Silt and Weak Calcareous Cementation	BS-3	10.0	NT	NT
		S-4	11.5	NT	NT
	(13.0)				
15	Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
	(16.5) End of Boring	S-5	16.5	NT	NT
20					
25					
30					

Penetration Resistance Blows per Foot: 0 — 25 — 50



Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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" Asphalt					
	Loose to Medium Dense Brown SILTY SAND (SC/SM-Moist) With Clay (0.2)	S-1	2.5	NT	NT	
5		RS-2	6.0	NT	NT	
	Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation (6.5)	BS-3	10.0	NT	NT	
10		S-4	11.5	NT	NT	
	Very Stiff Brown SANDY SILT (ML-Dry) with Weak Calcareous Cementation (13.5)					
15		S-5	16.5	NT	NT	
	End of Boring (16.5)					
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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" Asphalt				
	0.3 Loose Brown SILTY SAND (SC/SM-Dry to Moist) With Clay	S-1	2.5	NT	NT
5		BS-2	5.0	NT	NT
		RS-3	6.0	13.2	98.5
	8.0 Dense Brown CLAYEY SAND (SC-Dry) with Weak to Moderate Calcareous Cementation				
10		S-4	11.5	NT	NT
	13.5 Hard Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation				
15		S-5	16.5	NT	NT
	18.0 Medium Dense Brown CLAYEY SAND (SC-Dry) with Trace Gravel				
20		S-6	21.5	NT	NT
	21.5 End of Boring				
25					
30					

Penetration Resistance Blows per Foot: 0 25 50

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	3.5" Asphalt on 2" Aggregate Base (0.5)					
	Loose to Dense Brown to Light Brown CLAYEY SAND (SC-Dry to Moist)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	Moderate Calcareous Cementation	S-3	6.5	NT	NT	
10		S-4	11.5	NT	NT	
15	(16.5)	S-5	16.5	NT	NT	
	End of Boring					
20						
25						
30						

Boring Date: **3-8-01**
Field Engineer/Technician: **M. Polsky**
Driller: **B. Freeman**
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-13**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	Fill: Stiff Brown SANDY SILT (ML-Dry)					
1.0	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	2.5	NT	NT	
		BS-2	5.0	NT	NT	
5	Weak Calcareous Cementation	S-3	6.5	NT	NT	
8.0	Dense Light Brown SILTY SAND (SC/SM-Dry) With Clay and Moderate Calcareous Cementation	S-4	11.5	NT	NT	59/12"
10						
13.0	Medium Dense to Dense Brown SILTY SAND (SM-Dry) with Weak Calcareous Cementation	S-5	16.5	NT	NT	
15						
20		S-6	21.5	NT	NT	
23.0	Hard Brown SANDY SILT (CL/ML-Dry) With Clay and Weak Calcareous Cementation					
25		S-7	26.5	NT	NT	
28.5	Dense to Very Dense Light Brown CLAYEY					
30						

Continued on Next Page

Boring Date: 3-9-01
Field Engineer/Technician: M. Polsky
Driller: H. Usery
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-14**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: 990906SB

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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)
30	SAND (SC-Dry) with Trace Gravel and Moderate Calcareous Cementation	S-8	31.5	NT	NT	55/12"
35		S-9	36.5	NT	NT	
	38.5					
40	Very Dense Brown SILTY SAND (SM-Dry) with Trace Clay and Trace Gravel	S-10	41.5	NT	NT	58/12"
	43.0					
45	Very Dense Light Brown SILTY SAND (SM-Dry) with Little Gravel and Weak Calcareous Cementation	S-11	46.0	NT	NT	50/6"
	48.5					
50	Hard Brown SANDY CLAY (CL-Dry) With Silt	S-12	51.0	NT	NT	50/6"
	53.5					
55	Very Dense Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Little to Some Gravel	S-13	55.3	NT	NT	50/4"
60	South Mountain Fanglomerate Sediments from 54 Feet to 75.1 Feet					

Continued on Next Page

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
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-14**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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)
60	Very Dense Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Little to Some Gravel	S-14	60.3	NT	NT	50/4"
65		S-15	65.1	NT	NT	50/1"
70		BS-16	70.0	NT	NT	50/1"
		S-17	70.1	NT	NT	
75	75.1 End of Boring	S-18	75.1	NT	NT	50/1"
80						
85						
90						

Boring Date: **3-9-01**
Field Engineer/Technician: **M. Polsky**
Driller: **H. Usery**
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-14**

Guadalupe Drainage Improvements

Baseline to Elliot Roads

Guadalupe, Arizona

Project No.: **990906SB**

_SPEEDIE 990906SB.GPJ GENGEO.GDT 3/27/01

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	RS-2	RING	5.0 - 6.0	7.8	101.6	38	58	83	96	100	39	21	18	NT	30	NT	NT	NT	NT	SC
B- 2	BS-2	BULK	0.5 - 5.0	NT	NT	36	53	78	88	100	43	21	22	NT	25	8.1	1150	NT	NT	SC
B- 4	BS-2	BULK	0.5 - 5.0	NT	NT	41	56	81	91	100	39	17	22	NT	24	NT	NT	NT	NT	SC
B- 5	RS-2	RING	5.0 - 6.0	14.6	102.3	47	70	90	97	100	40	23	17	NT	28	NT	NT	NT	NT	SC
B- 5	BS-3	BULK	5.1 - 10.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		9.4	2640	NT	NT	
B- 6	BS-2	BULK	0.5 - 5.0	NT	NT	36	56	84	96	100	25	18	7	NT	46	8.6	900	NT	NT	SC-SM
B- 6	RS-3	RING	5.0 - 6.0	10.6	97.5	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B- 7	BS-3	BULK	5.1 - 10.0	NT	NT	45	61	85	93	100	42	19	23	NT	22	8.2	480	NT	NT	SC
B- 8	BS-2	BULK	0.5 - 5.0	NT	NT	31	48	74	87	100	28	15	13	NT	40	8.4	1150	NT	NT	SC
B- 8	RS-3	RING	5.0 - 6.0	10.7	104.1	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B- 9	BS-2	BULK	0.5 - 5.0	NT	NT	38	55	80	89	100	39	19	20	NT	28	NT	NT	NT	NT	SC
B- 9	RS-3	RING	5.0 - 6.0	6.6	98.7	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-10	RS-1	RING	1.0 - 2.0	13.5	95.9	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT	
B-10	BS-3	BULK	5.1 - 10.0	NT	NT	30	41	67	85	100	45	22	23	NT	26	9	948	NT	NT	SC
B-11	BS-3	BULK	5.1 - 10.0	NT	NT	37	52	81	93	100	45	21	24	NT	23	8.5	580	NT	NT	SC
B-12	BS-2	BULK	0.5 - 5.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		8.6	3600	NT	NT	

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 2

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

TABOFLAB R-VALUE 990906SB.GPJ GENGEO.GDT 3/20/01

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-12	RS-3	RING	5.0 - 6.0	13.2	98.5	25	40	69	87	100	47	28	19	NT	33	NT	NT	NT	NT	SM
B-13	BS-2	BULK	0.5 - 5.0	NT	NT	32	47	74	87	100	35	18	17	NT	33	8.8	1440	NT	NT	SC
B-14	BS-2	BULK	0.0 - 5.0	NT	NT	40	58	81	92	100	32	19	13	NT	34	NT	NT	NT	NT	SC
B-14	BS-16	BULK	65.2 - 70.0	NT	NT	37	53	74	85	100	36	20	16	NT	31	NT	NT	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 2 of 2

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

TABOFLAB R-VALUE 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

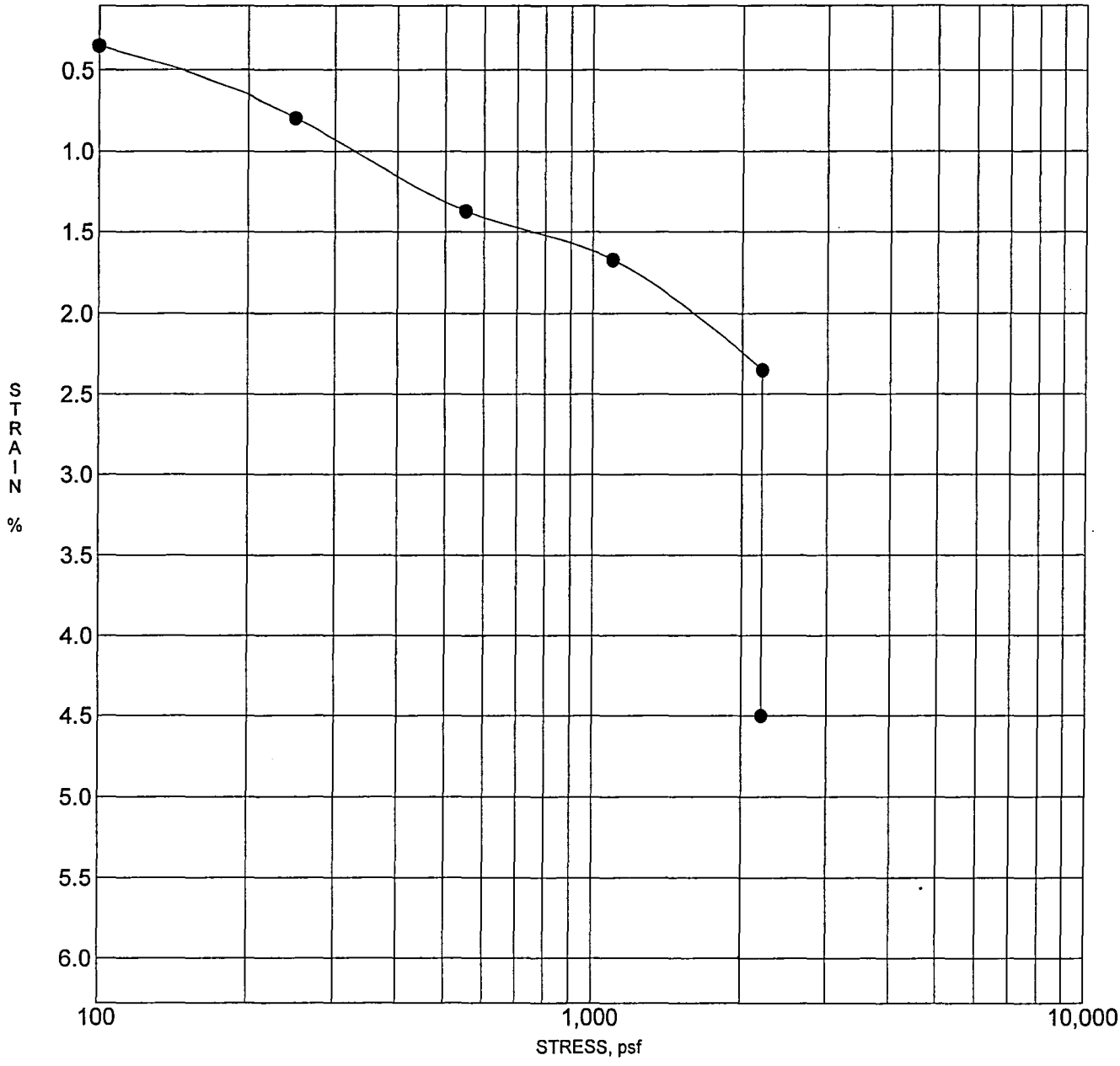
PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/8/01

BORING NO.: B- 1 SAMPLE NO.: RS-2 SAMPLE DEPTH: 5 to 6 LABORATORY NO.: E9405

LIQUID LIMIT: 39 PLASTIC LIMIT: 21 PLASTICITY INDEX: 17

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

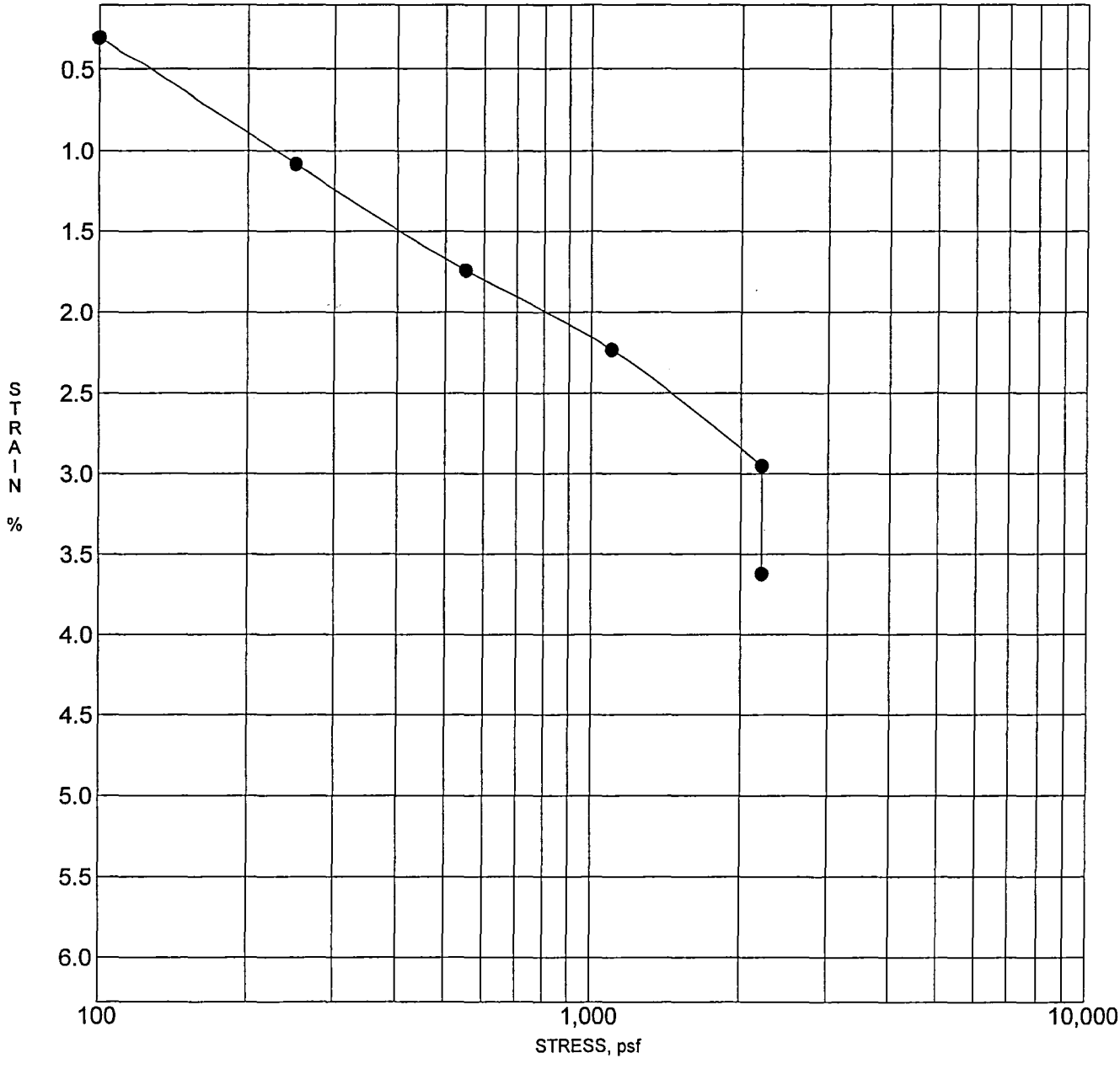
PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/8/01

BORING NO.: B- 5 SAMPLE NO.: RS-2 SAMPLE DEPTH: 5 to 6 LABORATORY NO.: E9414

LIQUID LIMIT: 40 PLASTIC LIMIT: 23 PLASTICITY INDEX: 16

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

CONSOLIDATION TEST

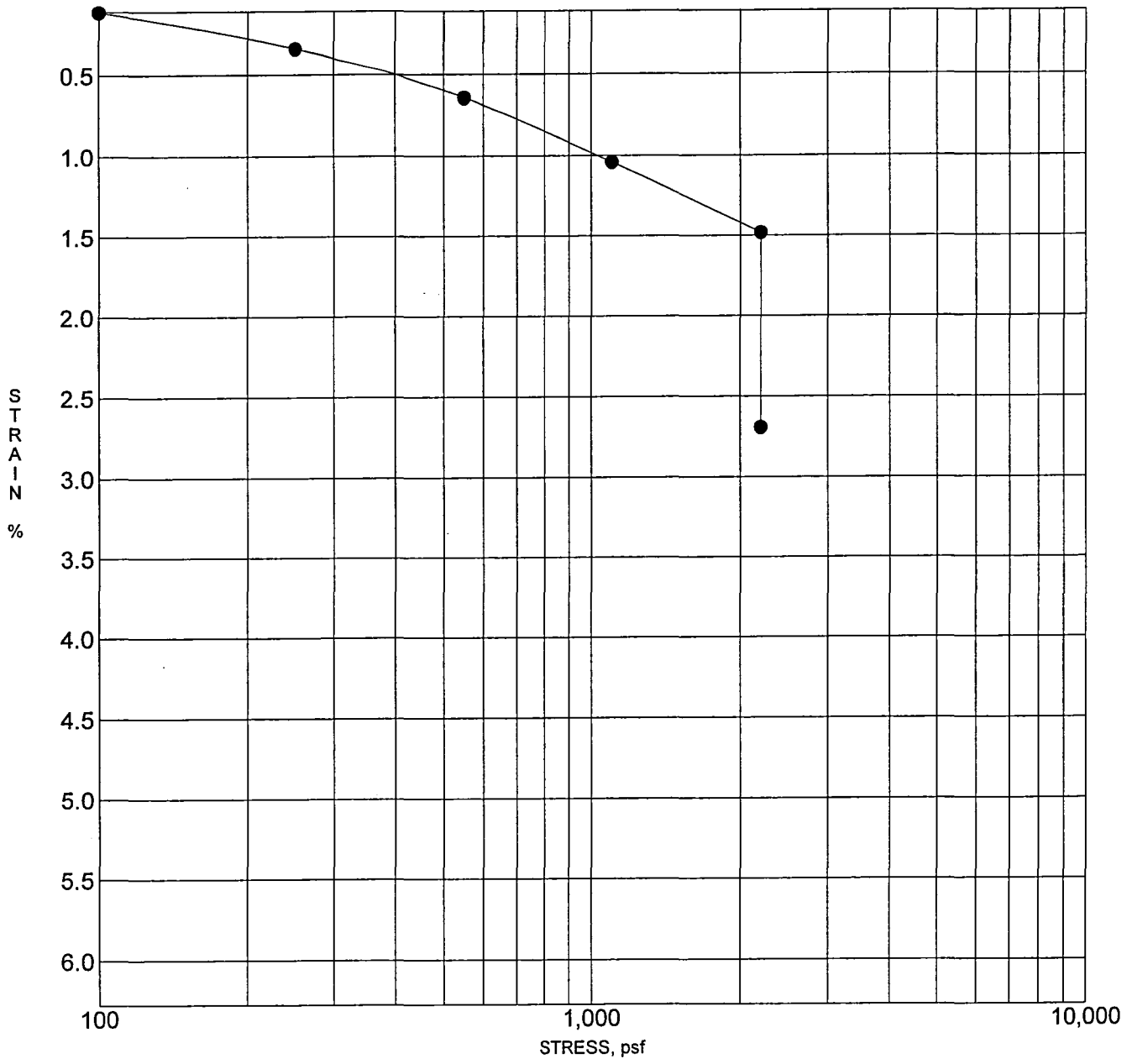
PROJECT: Guadalupe Drainage Improvements | PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads | DATE: 3/8/01

BORING NO.: B-12 | SAMPLE NO.: RS-3 | SAMPLE DEPTH: 5 to 6 | LABORATORY NO.: E9456

LIQUID LIMIT: 47 | PLASTIC LIMIT: 28 | PLASTICITY INDEX: 19

CLASSIFICATION: SM | ASTM SOIL DESCRIPTION: SILTY SAND



Sample inundated at end of test at 2200 psf

SPEEDIE AND ASSOCIATES

GEOTECH CONSOLIDATION 990906SB.GPJ GENGEO.GDT 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/9/01

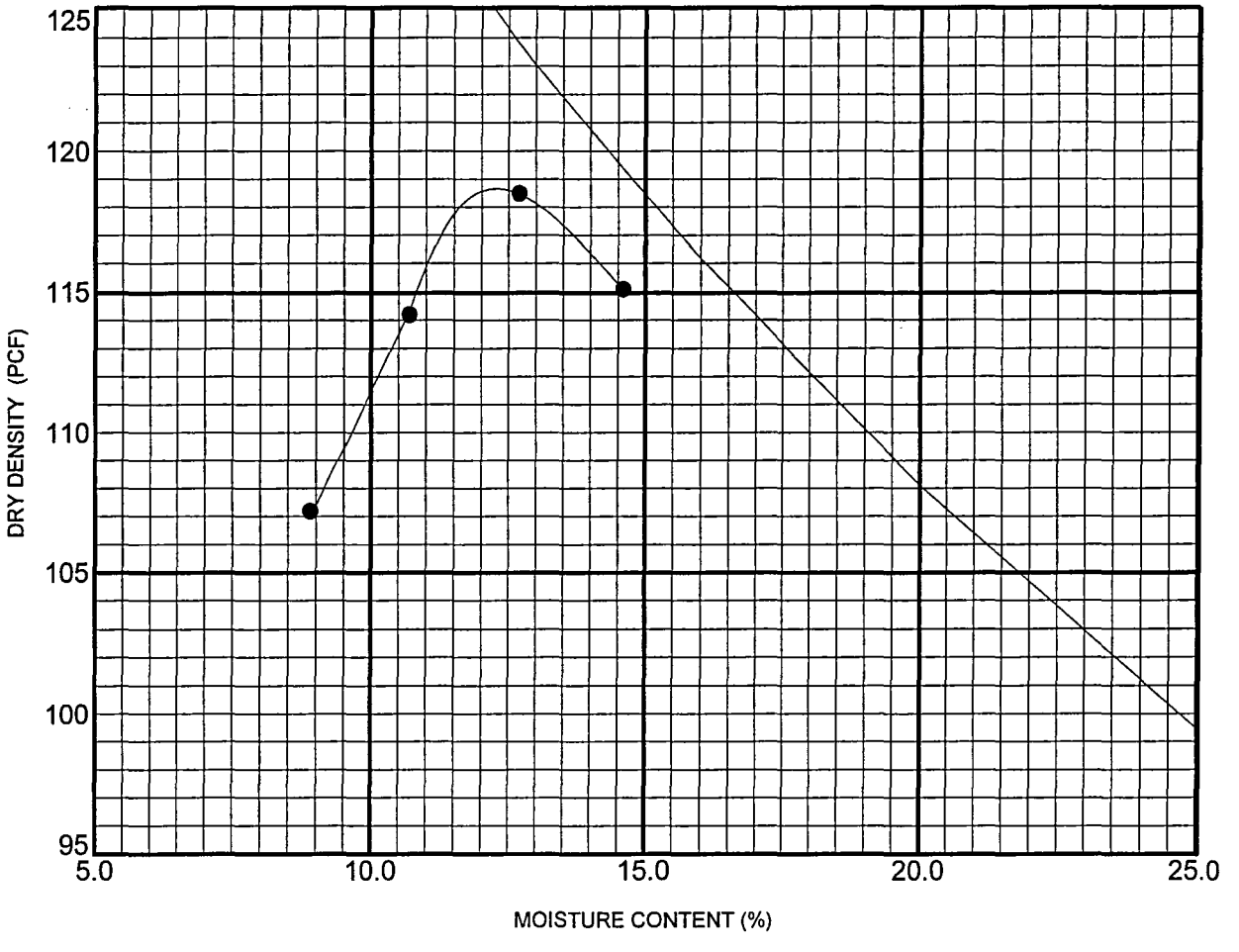
BORING NO.: B- 4 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0.5 to 5 LABORATORY NO.: E9492

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 39 PLASTIC LIMIT: 17 PLASTICITY INDEX: 23

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 118.5 PCF OPTIMUM MOISTURE CONTENT: 12.2%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/8/01

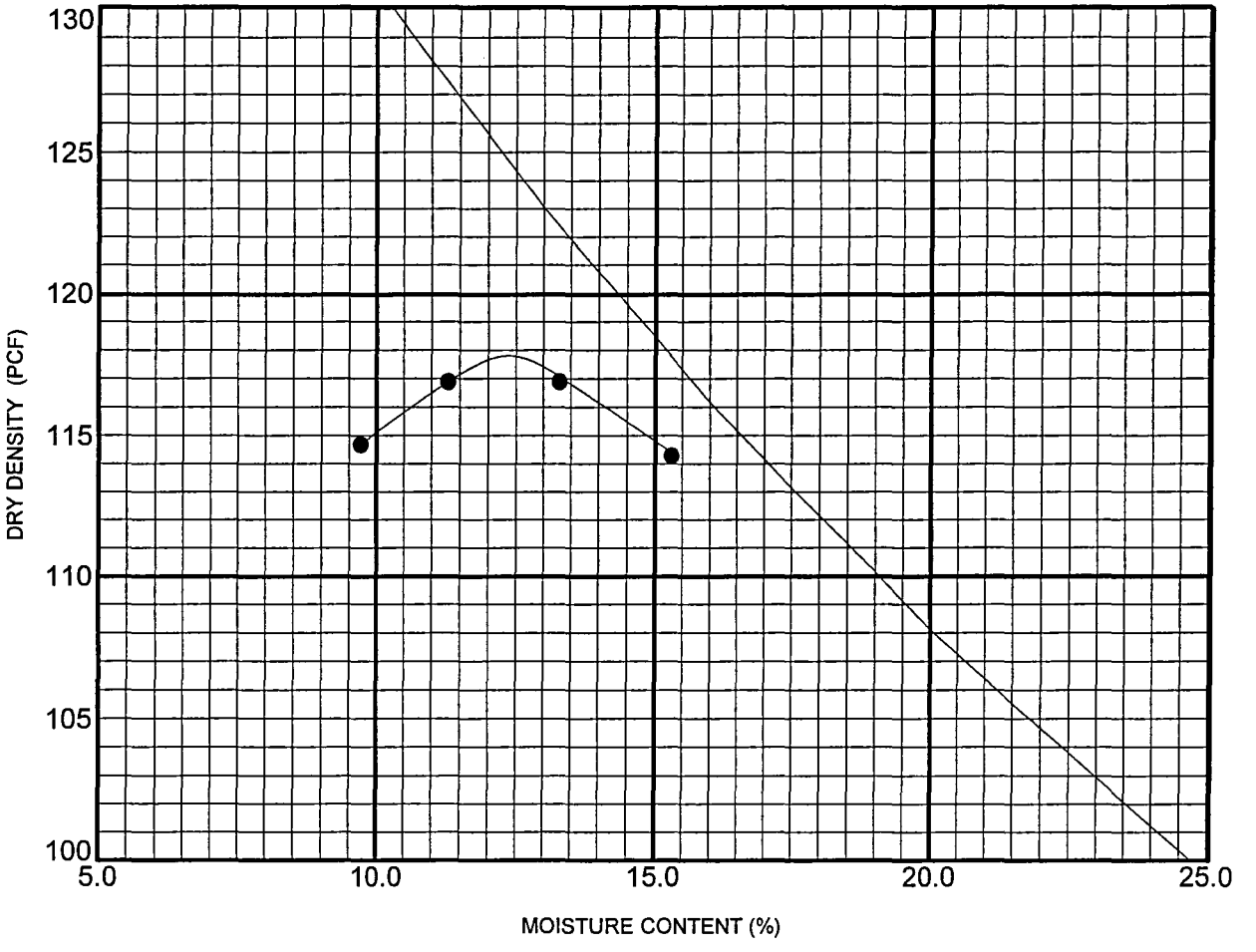
BORING NO.: B- 9 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0.5 to 5 LABORATORY NO.: E9436

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 39 PLASTIC LIMIT: 19 PLASTICITY INDEX: 19

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 117.8 PCF OPTIMUM MOISTURE CONTENT: 12.3%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvements PROJECT NO.: 990906SB

LOCATION: Baseline to Elliot Roads DATE: 3/9/01

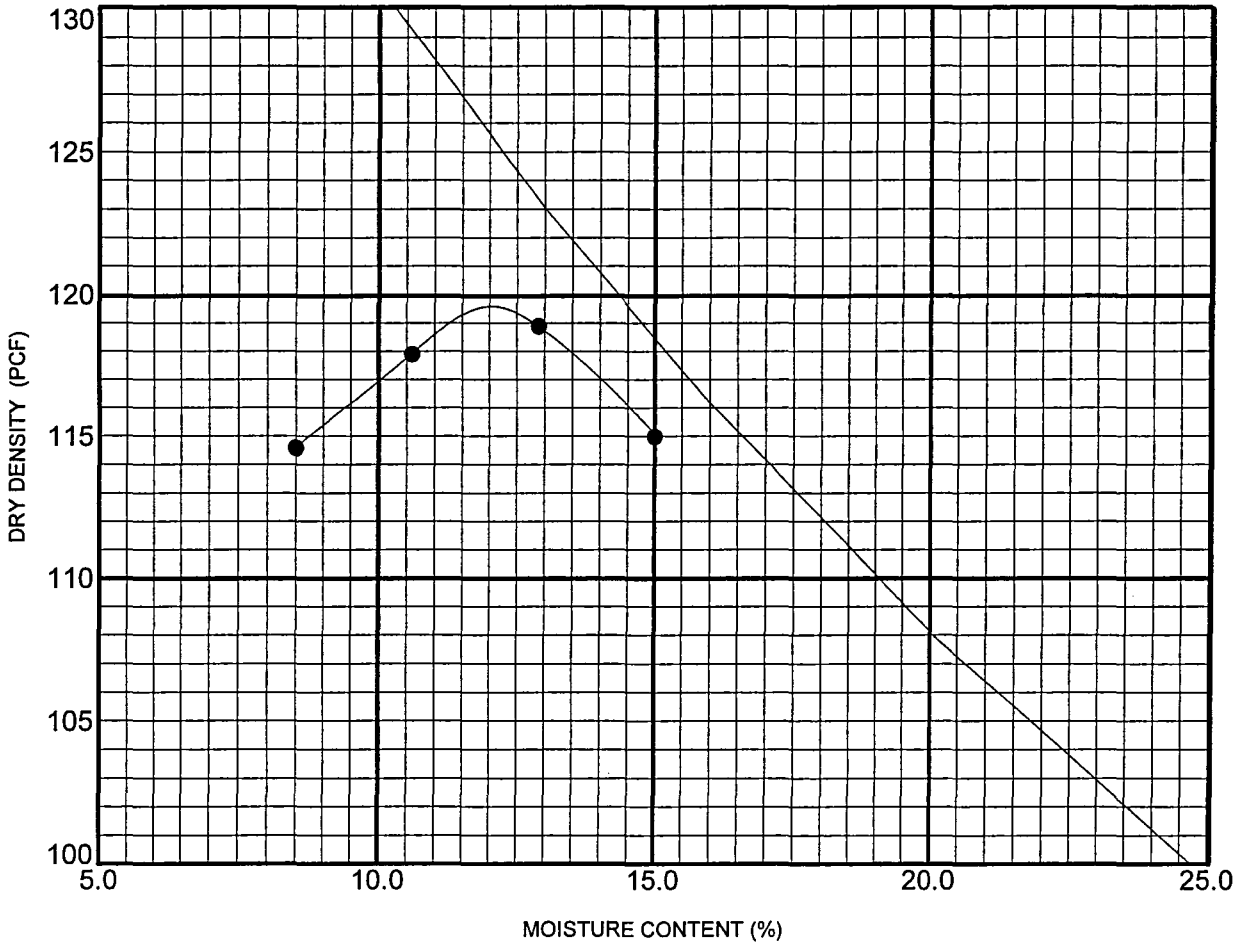
BORING NO.: B-14 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0 to 5 LABORATORY NO.: E9497

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 32 PLASTIC LIMIT: 19 PLASTICITY INDEX: 13

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 119.6 PCF OPTIMUM MOISTURE CONTENT: 12.2%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 990906SB.GPJ 3/20/01

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- 4, BS-2	5.0	118.5	12.2	112.8	10.3	95.2	17.8	100	3.0
B- 9, BS-2	5.0	117.8	12.3	112.0	10.8	95.1	18	100	3.8
B-14, BS-2	5.0	119.6	12.2	114.3	10.1	95.6	15.5	100	1.4

Guadalupe Drainage Improvements
Baseline to Elliot Roads
Guadalupe, Arizona
Project No. 990906SB

SPEEDIE AND ASSOCIATES

SWELL TEST 990906SB.GPJ GENGEO.GDT 3/20/01

APPENDIX B

PROJECT NO. 990906SA APPENDIX

FIELD AND LABORATORY INVESTIGATION

From November 16, 1999 to November 18, 1999, 27 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with truck-mounted CME 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. Shallow percolation tests were conducted for storm water retention basin design parameters.

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. All field and laboratory data is presented in this appendix.

SOIL LEGEND

SAMPLE DESIGNATION	DESCRIPTION	
AS	Auger Sample–	A grab sample taken directly from auger flights.
BS	Large Bulk Sample–	A grab sample taken directly from auger flights.
S	Spoon Sample–	Standard Penetration Test (ASTM D–1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6–inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance (N).
RS	Ring Sample–	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42 inside diameter, 1 inch long brass rings, into undisturbed soil for one 12 inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
LS	Liner Sample–	Standard Penetration Test driving a 2.0 inch outside diameter split spoon equipped with two 3 inch long, 5/8 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 2.0 inch outside diameter thin–walled tube continuously pushed into undisturbed soil by a rapid motion, without impact or twisting (ASTM D–1587).
–	Continuous Penetration Resistance–	Driving a 2.0 inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12 inch increment are recorded.

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

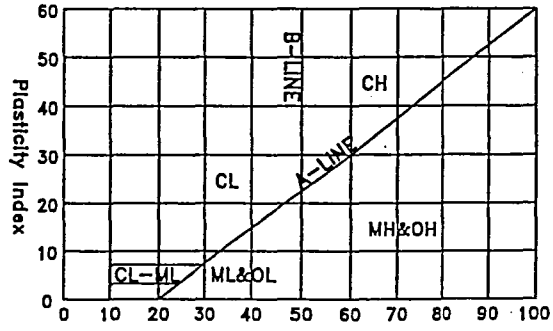
* Number of blows of a 140 lb hammer free falling 30 inches to drive a 2 inch O.D. split spoon sampler (ASTM D–1586)

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

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
Coarse Grained Soils More than 50% of material is larger than #200 sieve size	Gravel and Gravelly Soils 50% Coarse Fraction is > #4 Sieve Size	Clean Gravels		GW	Well Graded Gravels
				GP	Poorly Graded Gravels
		Gravels w/ Fines		GM	Silty Gravels
				GC	Clayey Gravels
	Sand and Sandy Soils 50% Coarse Fraction is < #4 Sieve Size	Clean Sands		SW	Well Graded Sands
				SP	Poorly Graded Sands
		Sands w/ Fines		SM	Silty Sand
				SC	Clayey Sand
Fine Grained Soils More than 50% of material is smaller than #200 sieve size	Silts and Clays Liquid Limit is less than 50%			ML	Inorganic Silts, Low P.I.
				CL	Inorganic Clays, Low P.I.
				OL	Organic Silts, High P.I.
	Silts and Clays Liquid Limit is greater than 50%			MH	Inorganic Silts, High P.I.
				CH	Inorganic Clays, High P.I.
				OH	Organic Clays, High P.I.
Highly Organic Soils				PT	Peat and Humus, Highly Organic

MATERIAL SIZE	PARTICLE SIZE			
	Lower Limit		Upper Limit	
	mm	Sieve Size †	mm	Sieve Size †
Sands				
Fine	.075	#200	0.42	#40
Medium	0.42	#40	2.00	#10
Coarse	2.00	#10	4.76	#4
Gravels				
Fine	4.76	#4	191	3/4" ∘
Coarse	191	3/4" ∘	762	3" ∘
Cobbles	762	3" ∘	304.8	12" ∘
Boulders	304.8	12" ∘	914.4	36" ∘

† U.S. Standard ∘ Clear Square Openings



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		Medium Dense to Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation					
5			S-1	6.0	--	--	
10			S-2	11.0	--	--	
15			S-3	16.0	--	--	
20			S-4	21.0	--	--	
25			S-5	26.0	--	--	
28.5							
30							

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

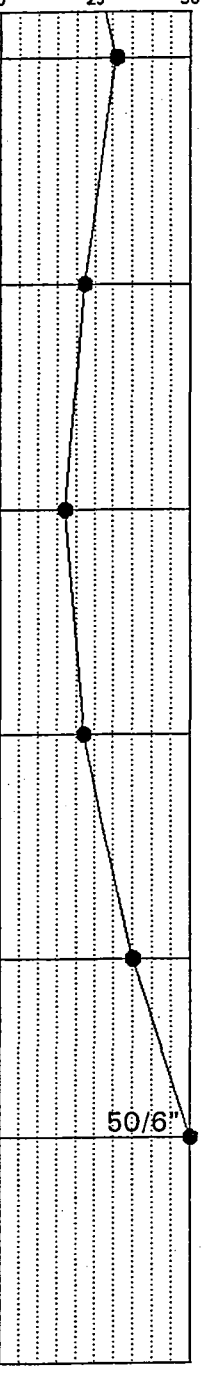
Guadlaupe, Arizona

Project No.: 990906SA

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

Depth (feet)	Visual Classification
30	Dense Brown SILTY CLAYEY SAND (SM/SC-Dry)
33.0	
35	Medium Dense to Very Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation
40	
45	
50	
55	
60	

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-6	31.0	--	--	
S-7	36.0	--	--	
S-8	41.0	--	--	
S-9	46.0	--	--	
S-10	51.0	--	--	
S-11	55.0	--	--	50/6"



Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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)
60		S-12	61.0	--	--	70/12"
	63.0					
65	Very Dense Brown SILTY CLAYEY SAND (SM/SC-Dry) with Weak Calcareous Cementation	S-13	66.0	--	--	58/12"
	67.5					
70	Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-14	71.0	--	--	
75		S-15	76.0	--	--	52/12"
	78.0					
80	Hard Brown SANDY CLAY (CL-Dry) with Moderate Calcareous Cementation	S-16	80.5	--	--	50/6"
85		S-17	86.0	--	--	61/12"
	86.0 End of Boring					
90						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 1

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Very Dense Brown SILTY SAND (SM-Dry) with Trace Gravel					
		BS-1	4.5	--	--	
5	Moderate Calcareous Cementation	RS-2	5.5	--	--	53/12"
		S-3	10.0	--	--	50/6"
10						
	13.0					
15	Medium Dense to Very Dense Brown to Light Brown SILTY SAND (SM-Dry) with Weak to Moderate Calcareous Cementation	S-4	16.0	--	--	60/12"
20	21.0	S-5	21.0	--	--	25
	End of Boring					
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 2

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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)				
5		RS-1	5.5	8.1	99.6
9.5		BS-2	9.5	--	--
10	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-3	11.0	--	--
13.5					
15	Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry)	S-4	16.0	--	--
18.0					
20	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-5	21.0	--	--
21.0	End of Boring				
25					
30					

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

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 3

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 to Light Brown SILTY SAND (SM-Dry)					
5		S-1	6.0	--	--	
10	Moderate Calcareous Cementation	S-2	11.0	--	--	66/12"
12.5	Dense Brown CLAYEY SAND (SC-Dry)	BS-3	14.5	--	--	
15		S-4	16.0	--	--	
16.0	End of Boring					
20						
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 4

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Medium Dense Brown CLAYEY SAND (SC-Dry)				
5		RS-1	5.5	9.5	99.5
7.5	Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation				
10		S-2	11.0	--	--
13.0	Medium Dense Brown SILTY CLAYEY SAND (SC/SM-Dry)				
15		S-3	16.0	--	--
20		S-4	21.0	--	--
21.0	End of Boring				
25					
30					

Penetration Resistance Blows per Foot: 0, 25, 50

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 5

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Dense Light Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
8.0						
10	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--	52/12"
15		BS-3	15.0	--	--	
16.0		S-4	16.0	--	--	
20	End of Boring					
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 6

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Brown SILTY SAND (SM-Dry)					
1.5						
	Dense Brown CLAYEY SILTY SAND (SC/SM-Dry)					
5		S-1	6.0	--	--	
8.0						
	Very Dense Light Brown SILTY SAND (SM-Dry) with Little Gravel	BS-2	9.5	--	--	
10						
15						
16.0	End of Boring	S-3	16.0	--	--	
20						
25						
30						

Boring Date: 11-16-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 7

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 Dense Light Brown SILTY SAND (SM-Dry) with Trace Gravel					
5		S-1	6.0	--	--	
10		S-2	11.0	--	--	
13.0						
15	Dense to Very Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry)	S-3	15.5	--	--	50/6"
		BS-4	19.5	--	--	
20	Trace Gravel	S-5	21.0	--	--	
22.5						
25	Very Dense Light Brown SILTY SAND (SM-Dry) And Gravel	S-6	24.7	--	--	50/2"
	Cobbles Present					
27.0	Auger Refusal on Cobbles					
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 8

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel					
5		S-1	6.0	--	--	82/12"
10		S-2	10.5	--	--	50/6"
15		S-3	15.0	--	--	50/6"
	Gravel and Cobbles Present					
	18.0					
	Very Dense Gray SILTY GRAVEL (GM-Dry) With Cobbles	S-4	19.6	--	--	50/1"
19.6	End of Boring					
20						
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B- 9

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 Light Brown SILTY SAND (SM-Dry) with Trace Gravel to 9.5 Feet	RS-1	2.0	3.3	109.8	
5		S-2	6.0	--	--	
10		S-3	11.0	--	--	60/12"
15		S-4	15.0	--	--	50/6"
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-10

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace to Little Gravel					
5		RS-1	5.3	4.3	97.3	50/10"
8.0						
10	Very Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry)	S-2	11.0	--	--	51/12"
15		S-3	16.0	--	--	
17.0						
20	Very Dense Light Gray SILTY SAND (SM-Dry) with Trace to Little Gravel					
21.0	End of Boring	S-4	21.0	--	--	90/12"
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-11

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Dense Brown CLAYEY SILTY SAND (SC/SM-Dry)					
5		S-1	6.0	--	--	
7.5						
10	Medium Dense to Very Dense Light Brown to Grayish Brown CLAYEY SAND (SC-Dry) with Trace to Little Gravel	S-2	11.0	--	--	60/12"
15		S-3	16.0	--	--	
20	Cobbles Present	S-4	21.0	--	--	
25		S-5	26.0	--	--	
29.0	Auger Refusal on Cobbles					
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-12

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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

Depth (feet)	Graphic Log	Visual Classification
0		Medium Dense to Dense Brown to Light Brown CLAYEY SAND (SC-Dry)
5		
10		Moderate Calcareous Cementation
15		Weak Calcareous Cementation
20		
25		
30		

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	6.0	--	--	
S-2	11.0	--	--	
S-3	16.0	--	--	
BS-4	19.5	--	--	
S-5	21.0	--	--	
S-6	26.0	--	--	

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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)
30		S-7	31.0	--	--	
35		S-8	36.0	--	--	
	38.0					
40	Very Stiff Light Brown SANDY LEAN CLAY (CL-Dry) with Weak Calcareous Cementation	S-9	41.0	--	--	
	43.0					
45	Dense Light Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation	S-10	46.0	--	--	
50		S-11	51.0	--	--	
	53.0					
55	Very Dense Light Brown SILTY SAND (SM-Dry)	S-12	55.5	--	--	506/"
	58.0					
60	Hard Light Brown SANDY SILT (ML-Dry)					

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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

Visual Classification

Very Dense Brown SILTY CLAYEY SAND (SC/SM-Dry)

End of Boring

Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot
S-13	61.0	--	--	86/12"
S-14	66.0	--	--	
S-15	71.0	--	--	55/12"
S-16	76.0	--	--	56/12"

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-13

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Dense to Very Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel					
5		RS-1	5.5	5.1	97.3	
7.5	Very Stiff Light Brown SANDY SILT (ML-Dry)					
10		S-2	11.0	--	--	
15		S-3	16.0	--	--	55/12"
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-14

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 Light Brown SILTY SAND (SM-Dry) with Trace Gravel					
5		S-1	6.0	--	--	55/12"
10		S-2	11.0	--	--	
12.5	Very Dense Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
15		S-3	16.0	--	--	77/12"
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-17-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-15

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
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	Loose to Medium Dense Brown SILTY FINE SAND (SM-Dry)	RS-1	2.0	--	--	
5		S-2	6.0	--	--	
8.5						
10	Stiff Light Brown SANDY SILT (ML-Dry) with Strong Calcareous Cementation	S-3	11.0	--	--	
13.5						
15	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-16

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
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	Loose to Dense Brown SILTY FINE SAND (SM-Dry)					
5	with Strong Calcareous Cementation	BS-1	5.0	--	--	
		S-2	6.0	--	--	51/12"
8.5						
10	Very Stiff Brown to Light Gray FINE SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-3	11.0	--	--	
13.5						
15	Medium Dense Brown to Light Brown VERY FINE SANDY SILT/SILTY SAND (ML/SM-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-17

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
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 Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
5		RS-1	5.5	11.6	99.8	
8.5						
10	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--	
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-18

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
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	Hard Brown CLAYEY SAND (SC-Dry) with Moderate Calcareous Cementation					
5		RS-1	5.5	--	--	
10		BS-2	10.0	--	--	
		S-3	11.0	--	--	
13.5						
15	Hard Brown to Light Brown FINE SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-4	16.0	--	--	59/12"
18.5						
20	Medium Dense Brown SILTY FINE SAND (SM-Dry) with Moderate Calcareous Cementation	S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-19

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

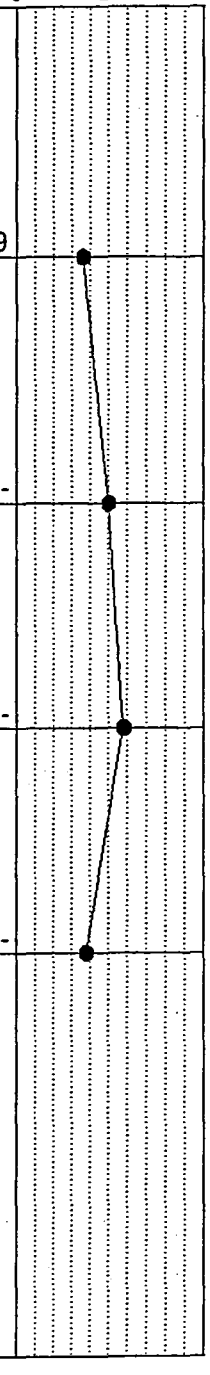
Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-60
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	Medium Dense Brown CLAYEY SAND (SC-Dry) with Weak Calcareous Cementation				
5		RS-1	5.5	12.2	102.9
8.5					
10	Medium Dense Brown SILTY SAND (SM-Dry) with Moderate Calcareous Cementation	S-2	11.0	--	--
13.5					
15	Very Stiff Brown SANDY SILT (ML-Dry) with Moderate Calcareous Cementation	S-3	16.0	--	--
20					
21.0	End of Boring	S-4	21.0	--	--
25					
30					

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



Boring Date: 11-18-99
Field Engineer/Technician: T. Rheinschmidt
Driller: B. Freeman
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-20

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 Dense Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
10	with Moderate Calcareous Cementation	BS-2	10.0	--	--	
		S-3	11.0	--	--	
15		S-4	16.0	--	--	
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-21

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 Brown CLAYEY SAND (SC-Dry)					
5		S-1	6.0	--	--	
10		S-2	11.0	--	--	
15	Trace Gravel	S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-22

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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		Medium Dense Brown SILTY SAND (SM-Dry)					
			BS-1	4.5	--	--	
5			S-2	6.0	--	--	
10		9.5 to 14.5 Feet: Trace Gravel	S-3	11.0	--	--	
15			S-4	16.0	--	--	
20			S-5	21.0	--	--	
21.0		End of Boring					
25							
30							

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-23

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Dense to Very Dense Light Brown SILTY SAND (SM-Dry)					
5		S-1	6.0	--	--	
10	Moderate Calcareous Cementation	S-2	11.0	--	--	77/12"
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	53/12"
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-24

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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 to Light Brown CLAYEY SAND (SC-Dry)					
		BS-1	4.5	--	--	
5		S-2	6.0	--	--	
10		S-3	11.0	--	--	
15	Weak to Moderate Calcareous Cementation	S-4	16.0	--	--	76/12"
20		S-5	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-25

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Brown SANDY SILT (ML-Dry)					
3.0						
5	Medium Dense Brown CLAYEY SAND (SC-Dry)	S-1	6.0	--	--	
10		S-2	11.0	--	--	
15		S-3	16.0	--	--	
20		S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-26

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

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	Brown SANDY SILT (ML-Dry)					
3.0						
5	Medium Dense Light Brown CLAYEY SAND (SC-Dry)	S-1	6.0	--	--	
7.5						
10	Dense Light Brown CLAYEY SILTY SAND (SC/SM-Dry) with Weak Calcareous Cementation	S-2	11.0	--	--	
15		S-3	16.0	--	--	
17.0						
20	Medium Dense Brown SILTY SAND (SM-Dry)	S-4	21.0	--	--	
21.0	End of Boring					
25						
30						

Boring Date: 11-18-99
Field Engineer/Technician: M. Polsky
Driller: M. Stroud
Contractor: Heber Mining Co.

Water Level

Depth	Hour	Date
No Water		

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: B-27

Guadalupe Drainage Improvement Project

Highline Canal, Baseline Rd. to Elliot Rd.

Guadlaupe, Arizona

Project No.: 990906SA

Rig Type: CME-55
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	Loose Brown SILTY SAND (SM-Moist) with Trace Gravel	RS-1	2.0	NT	NT	
4.5						
5	Very Dense Brown SILTY SAND (SM-Dry) with Some Gravel	RS-2	6.0	NT	NT	52/12"
7.5						
	Very Dense Gray GNEISS Probable weathered bedrock from hill					
9.0	Auger Refusal on Bedrock					
10						
15						
20						

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-1

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
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	Loose Brown SILTY SAND (SM-Dry) with Trace Gravel	RS-1	2.0	NT	NT	
5	5.0 Very Dense Brown SILTY SAND (SM-Dry) with Some Gravel	S-2	5.5	NT	NT	50/6"
10	7.5 Medium Dense Light Brown CLAYEY SAND (SC-Dry) with Trace Gravel and Weak Calcareous Cementation	S-3	11.5	NT	NT	
15	14.5 Probable Bedrock: Gray SILTY GRAVEL (GM-Dry) 15.1 End of Boring	S-4	15.1	NT	NT	50/1"
20						

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-2

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
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	Loose Brown SILTY SAND (SM-Dry)					
1.5	Medium Dense Brown CLAYEY, SILTY SAND (SC/SM-Moist) with Trace Gravel	S-1	2.5	NT	NT	
4.0	Medium Dense Light Brown SILTY SAND (SM-Dry) with Little to Some Gravel and Weak Calcareous Cementation	RS-2	6.0	NT	NT	
9.0	Very Dense Light Brown CLAYEY SAND (SC-Dry) with Little Gravel and Moderate Calcareous Cementation					
11.0	End of Boring	S-3	11.0	NT	NT	64/12"

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-3

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

Rig Type: CME-55
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	Firm Brown SANDY SILT (ML-Dry)					
		S-1	2.5	NT	NT	
4.0						
	Very Dense Light Brown SILTY SAND (SM-Dry) with Trace to Some Gravel and Moderate Calcareous Cementation	BS-2	4.5	NT	NT	
5		S-3	6.5	NT	NT	66/12"
10		S-4	10.5	NT	NT	50/6"
15.0		S-5	15.1	NT	NT	50/1"
15	Possible Bedrock: Gray GRAVEL					
15.1	End of Boring					
20						

Boring Date: 3-22-00
Field Engineer/Technician: M. Polsky
Driller: D. Arwood
Contractor: Heber Mining

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: CB-4

Guadalupe Storm Drain - Assignment #8

NWC Avenida del Yaqui and Calle Cerritos

Guadalupe, Arizona

Project No.: 000256SA

_SPEEDIE 000256SA.GPJ GENGEO.GDT 3/23/00

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			pH	RESISTIVITY (Ohm-Centimeters)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
B- 1	S-4	SPT	21.0	--	--	33.1	52	78	90	100	46	19	27	--	--	SC	CLAYEY SAND
B- 1	S-15	SPT	76.0	--	--	18.9	39	70	87	100	36	19	17	--	--	SC	CLAYEY SAND
B- 2	BS-1	BULK	4.5	--	--	27.7	47	78	92	100	27	23	4	7.8	537	SM	SILTY SAND
B- 3	RS-1	RS	5.5	8.1	99.6	52.1	76	94	99	100	34	22	12	--	--	CL	SANDY LEAN CLAY
B- 3	BS-2	BS	9.5	--	--	56.7	73	90	98	100	44	23	21	8.8	138	CL	SANDY LEAN CLAY
B- 4	BS-3	BS	14.5	--	--	34.8	54	78	92	100	41	23	18	--	--	SC	CLAYEY SAND
B- 5	RS-1	RS	5.5	9.5	99.5	30.6	44	70	86	100	38	23	15	--	--	SC	CLAYEY SAND
B- 6	BS-3	BS	15.0	--	--	34.1	50	75	90	100	38	22	16	--	--	SC	CLAYEY SAND
B- 7	BS-2	BS	9.5	--	--	28.3	42	64	80	100	31	23	8	8.3	826	SM	SILTY SAND with GRAVEL
B- 8	BS-4	BS	19.5	--	--	20.5	34	62	77	100	36	25	11	9.1	5368	SM	SILTY SAND with GRAVEL
B- 9	S-1	SPT	6.0	--	--	23.1	41	76	94	100	40	22	18	--	--	SC	CLAYEY SAND
B-10	RS-1	RS	2.0	3.3	109.8	40.2	64	84	94	100	22	21	1	--	--	SM	SILTY SAND
B-11	RS-1	RS	5.3	4.3	97.3	14.5	34	66	90	100	33	22	11	--	--	SC	CLAYEY SAND
B-12	S-2	SPT	11.0	--	--	40.0	58	82	93	100	43	25	18	--	--	SC	CLAYEY SAND
B-13	S-2	SPT	11.0	--	--	37.1	56	82	94	100	36	21	15	--	--	SC	CLAYEY SAND
B-13	BS-4	BS	19.5	--	--	38.2	59	86	96	100	34	20	14	8.4	4026	SC	CLAYEY SAND

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.

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

TABULATION OF TEST DATA

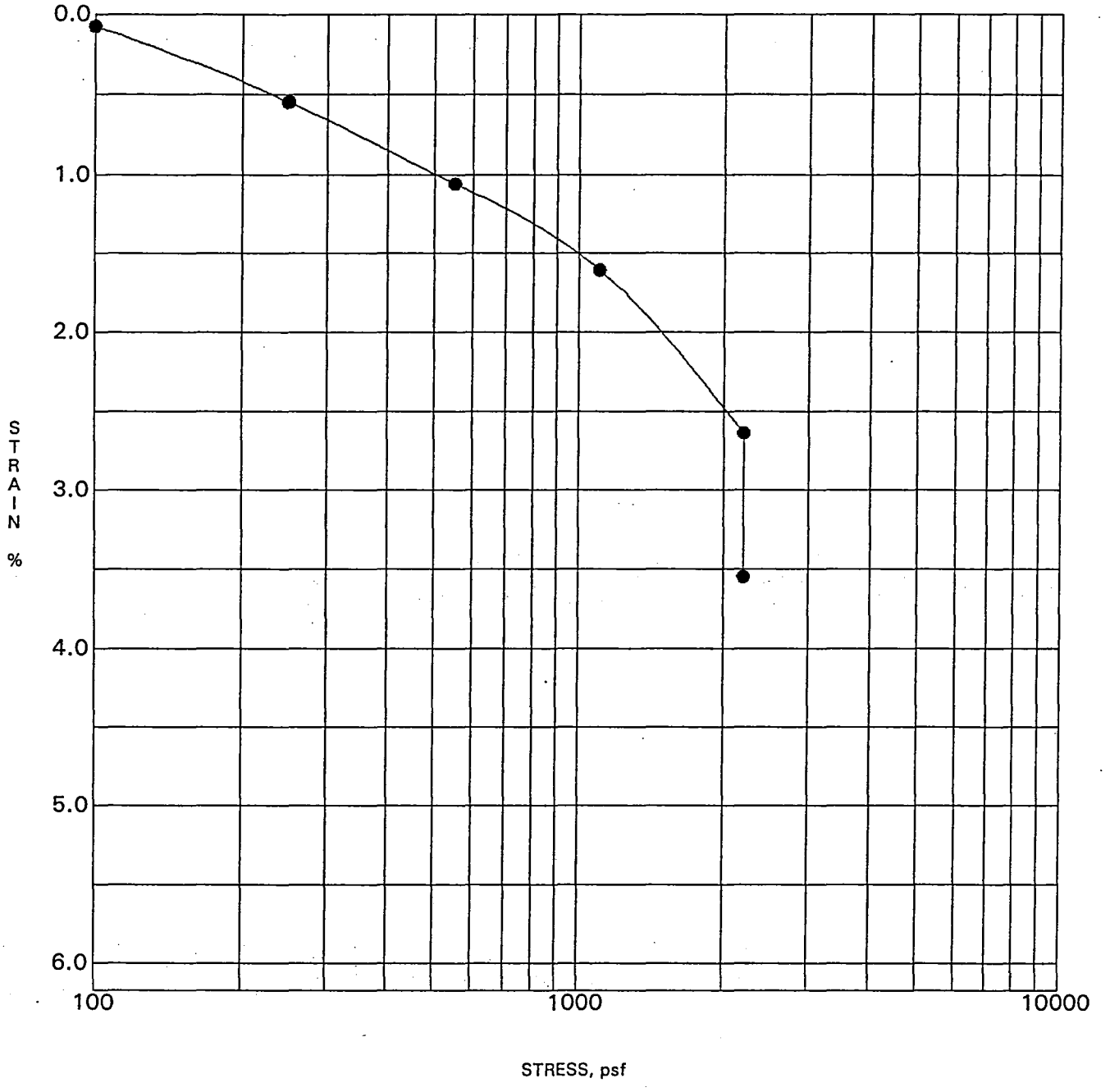
SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	DEPTH OF SAMPLE TIP	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			pH	RESISTIVITY (Ohm-Centimeters)	UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
B-13	S-15	SPT	71.0	--	--	23.8	42	77	94	100	27	21	6	--	--	SC-SM	SILTY, CLAYEY SAND
B-14	RS-1	RS	5.5	5.1	97.3	25.5	41	68	87	100	40	20	20	--	--	SC	CLAYEY SAND
B-15	S-3	SPT	16.0	--	--	46.3	69	90	99	100	52	23	29	--	--	SC	CLAYEY SAND
B-17	BS-1	BS	5.0	--	--	36.1	39	66	94	100	22	21	1	8.2	537	SM	SILTY SAND
B-18	RS-1	RS	5.5	11.6	99.8	35.3	55	85	95	100	44	22	22	--	--	SC	CLAYEY SAND
B-19	BS-2	BS	10.0	--	--	38.9	58	82	94	100	41	24	17	8.7	5368	SC	CLAYEY SAND
B-20	RS-1	RS	5.5	12.2	102.9	33.6	51	78	92	100	37	22	15	--	--	SC	CLAYEY SAND
B-21	BS-2	BS	10.0	--	--	41.6	61	85	96	100	38	22	16	8.6	1255	SC	CLAYEY SAND
B-22	S-2	SPT	11.0	--	--	46.6	69	90	98	100	40	23	17	--	--	SC	CLAYEY SAND
B-23	BS-1	BS	4.5	--	--	38.4	67	87	96	100	22	20	2	8.1	403	SM	SILTY SAND
B-25	BS-1	BS	4.5	--	--	43.4	69	90	97	100	27	19	8	8.3	660	SC	CLAYEY SAND

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.

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B- 5

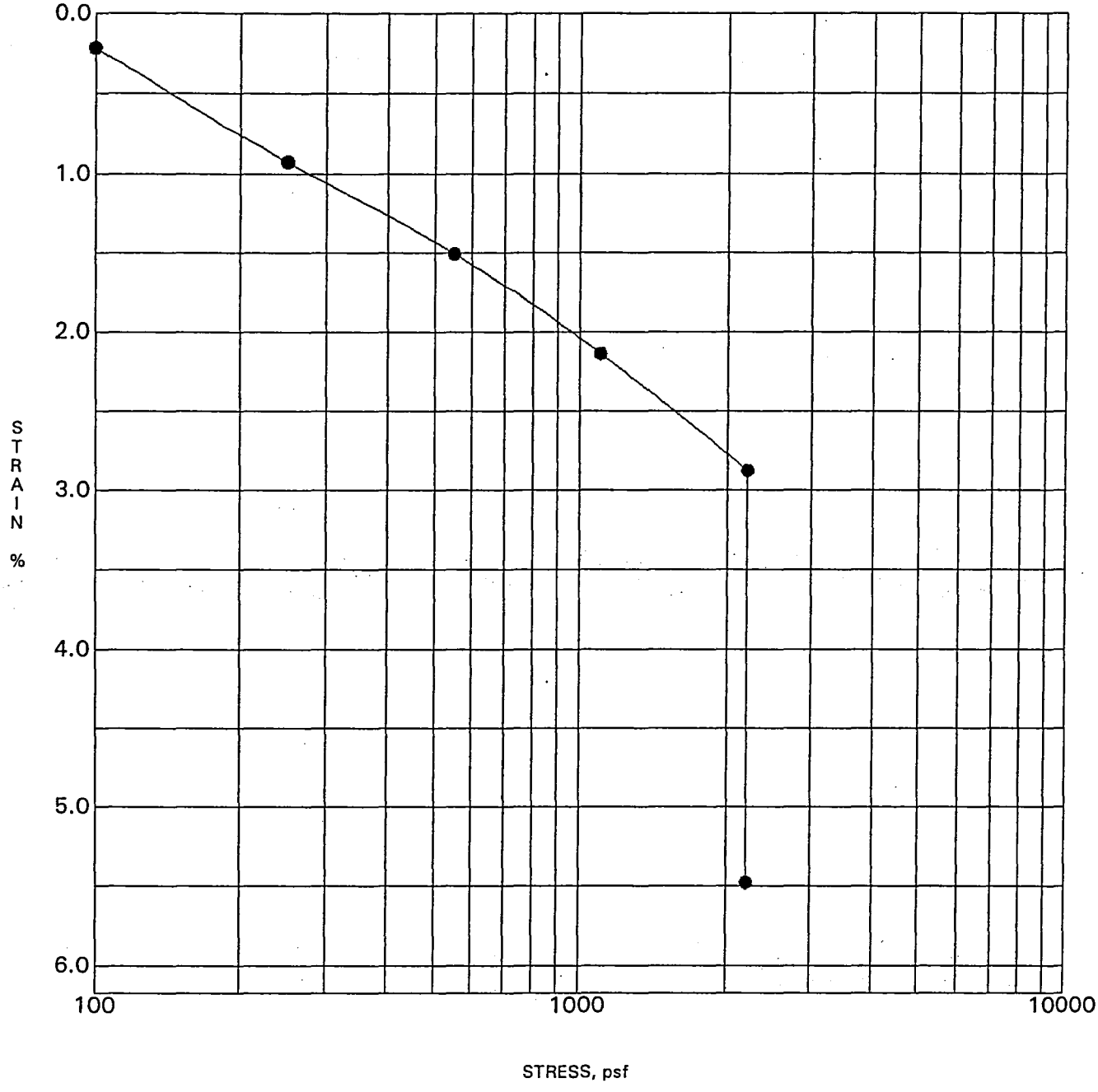
SAMPLE No. RS-1

Sample inundated at end of test at 2200 psf

PROJECT	Guadalupe Drainage Improvement Project - Highline Canal, Baseline Rd. to Elliot Rd.	JOB NO.	990906SA
		DATE	11/16/99

SPEEDIE AND ASSOCIATES

CONSOLIDATION TEST



BORING B-10

SAMPLE No. RS-1

Sample inundated at end of test at 2200 psf

PROJECT	Guadalupe Drainage Improvement Project - Highline Canal, Baseline Rd. to Elliot Rd.	JOB NO.	990906SA
		DATE	11/17/99

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 2 BS-1	4.5	117.9	8.4	95.0	55.5	84.9	1.0

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 123.8 pcf @ 10.2 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B- 7 BS-2	9.5	116.5	8.8	95.1	55.6	85.0	1.1

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 122.2 pcf @ 10.5 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE (%)	PERCENT COMPACTION	INITIAL DEGREE of SATURATION (%)	FINAL DEGREE of SATURATION (%)	TOTAL SWELL (%)
B-25 BS-1	4.5	114.4	9.7	94.7	57.6	82.9	1.1

PERCENT COMPACTION BASED ON A MAXIMUM DRY DENSITY OF 120.4 pcf @ 11.1 % MOISTURE

Guadalupe Drainage Improvement Project
Highline Canal, Baseline Rd. to Elliot Rd.
Guadlaupe, Arizona
Project No. 990906SA

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvement Project PROJECT NO.: 990906SA

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd. DATE: 11/16/99

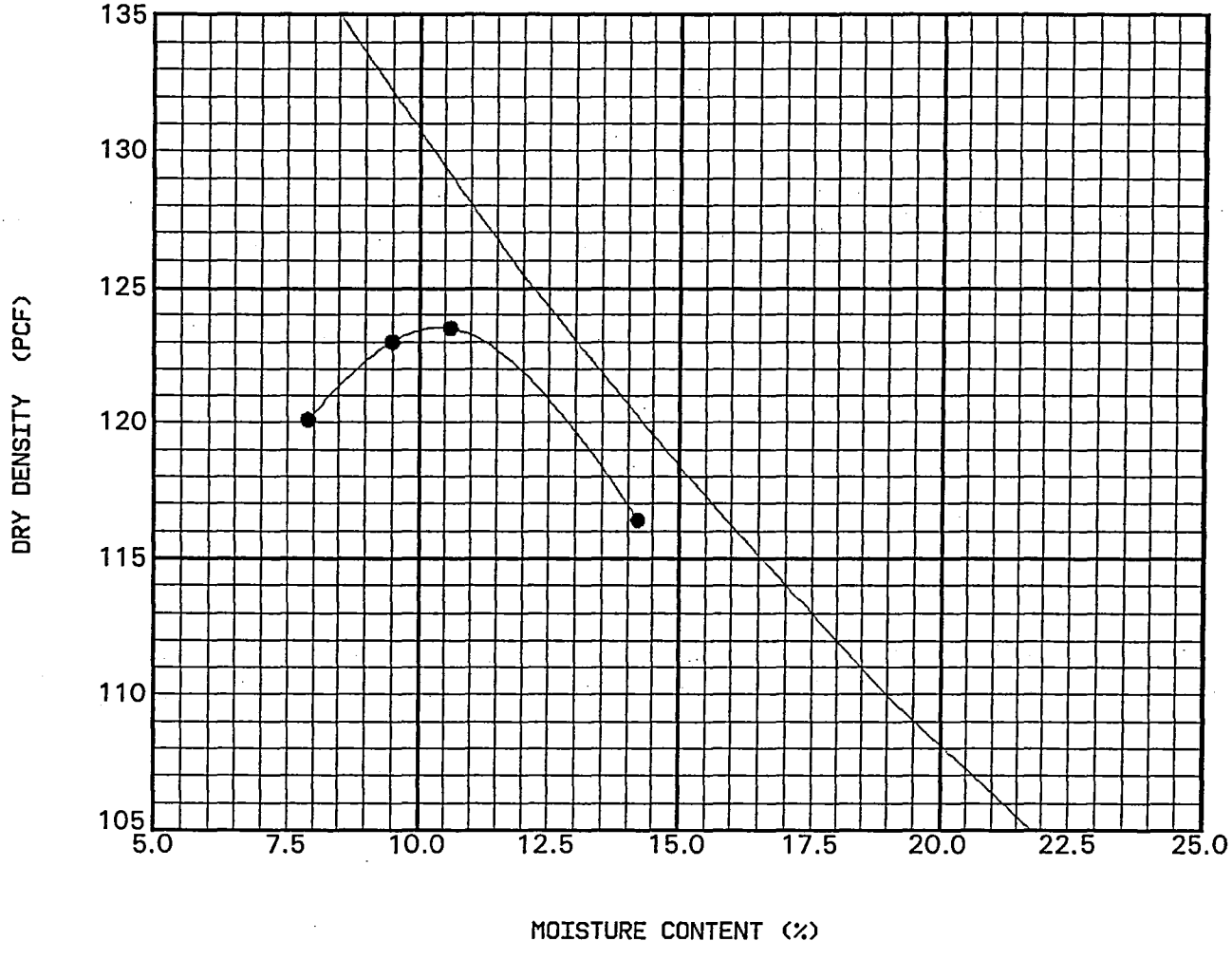
BORING NO.: B- 2 SAMPLE NO.: BS-1' SAMPLE DEPTH: 4.50

METHOD OF COMPACTION: ASTM D698A

LIQUID LIMIT: 27 PLASTIC LIMIT: 23 PLASTICITY INDEX: 4

CLASSIFICATION: SM ASTM SOIL DESCRIPTION: SILTY SAND

MAXIMUM DRY DENSITY: 123.8 PCF OPTIMUM MOISTURE CONTENT: 10.2 %



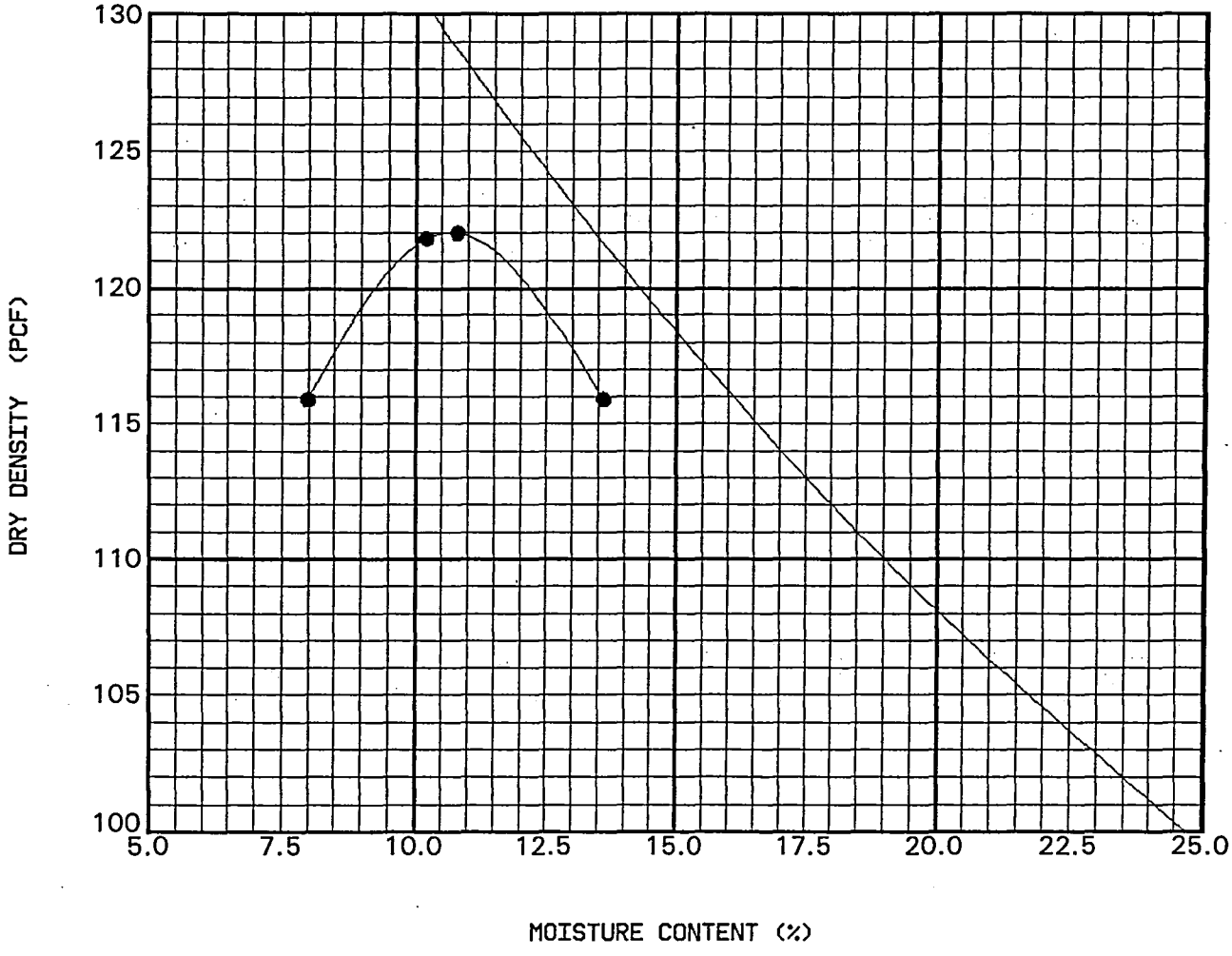
SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT:	Guadalupe Drainage Improvement Project			PROJECT NO.:	990906SA
LOCATION:	Highline Canal, Baseline Rd. to Elliot Rd.			DATE:	11/16/99
BORING NO.:	B- 7	SAMPLE NO.:	BS-2'	SAMPLE DEPTH:	9.50
METHOD OF COMPACTION:	ASTM D698A				
LIQUID LIMIT:	31	PLASTIC LIMIT:	23	PLASTICITY INDEX:	7
CLASSIFICATION:	SM	ASTM SOIL DESCRIPTION:	SILTY SAND with GRAVEL		

MAXIMUM DRY DENSITY: 122.2 PCF

OPTIMUM MOISTURE CONTENT: 10.5 %



SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Guadalupe Drainage Improvement Project PROJECT NO.: 990906SA

LOCATION: Highline Canal, Baseline Rd. to Elliot Rd. DATE: 11/18/99

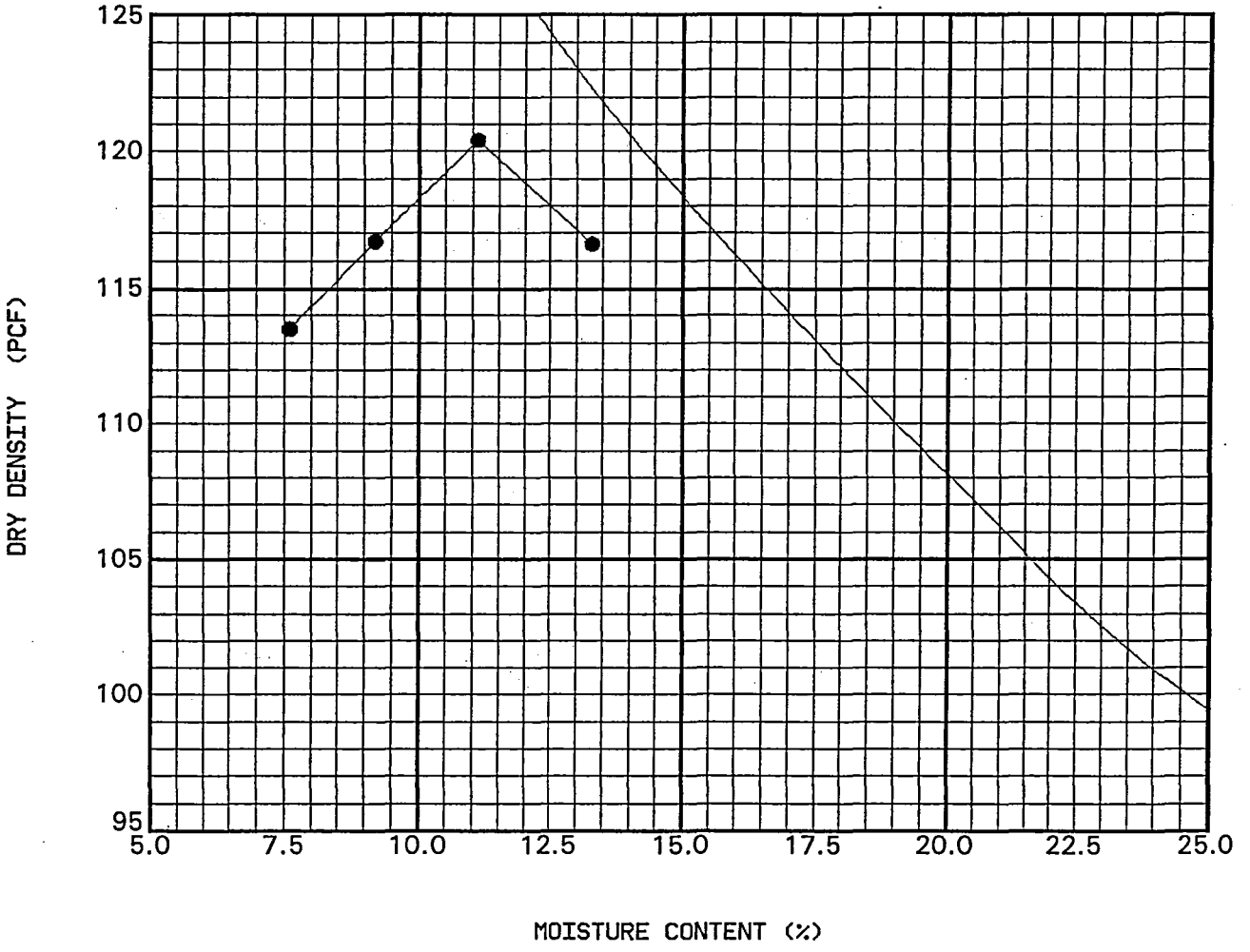
BORING NO.: B-25 SAMPLE NO.: BS-1' SAMPLE DEPTH: 4.50

METHOD OF COMPACTION: ASTM D698A

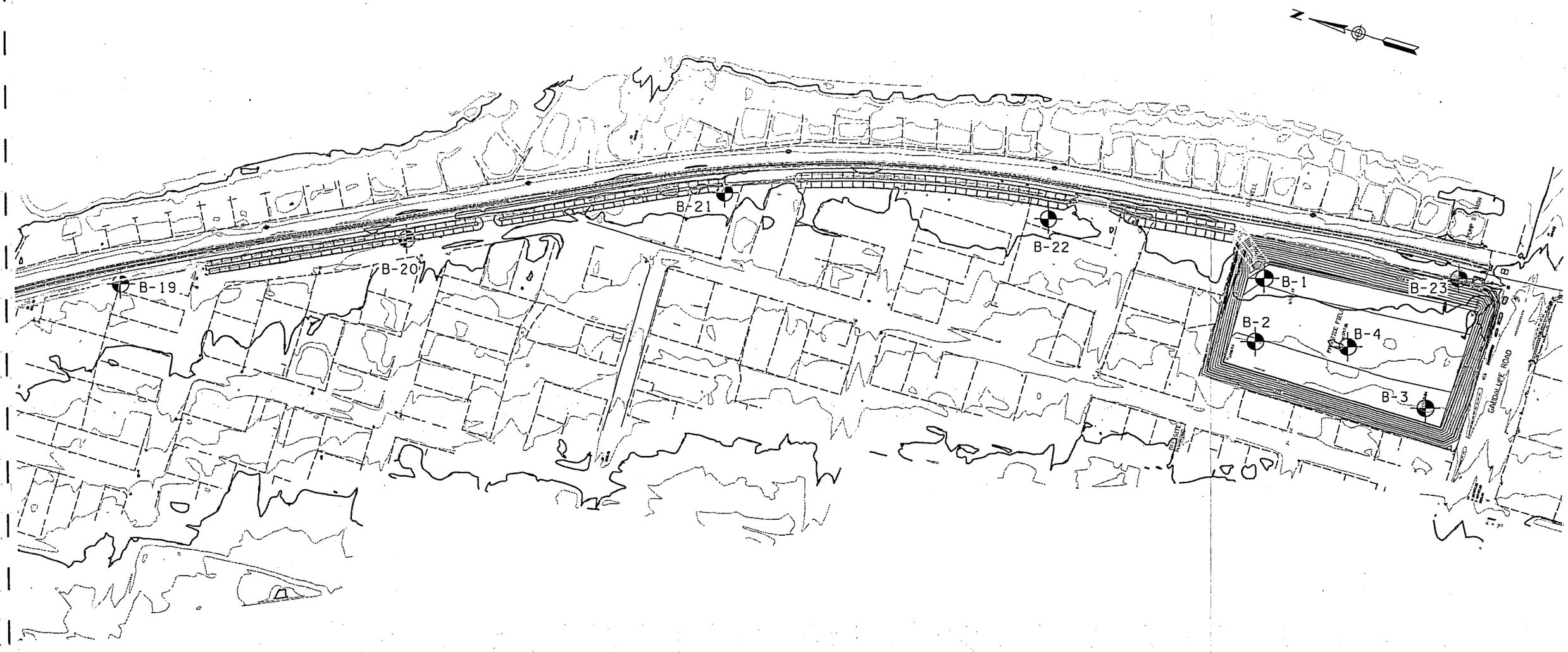
LIQUID LIMIT: 27 PLASTIC LIMIT: 19 PLASTICITY INDEX: 8

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 120.4 PCF OPTIMUM MOISTURE CONTENT: 11.1 %



SPEEDIE AND ASSOCIATES



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

B-# - SOIL BORINGS PROVIDED FOR SVERDRUP

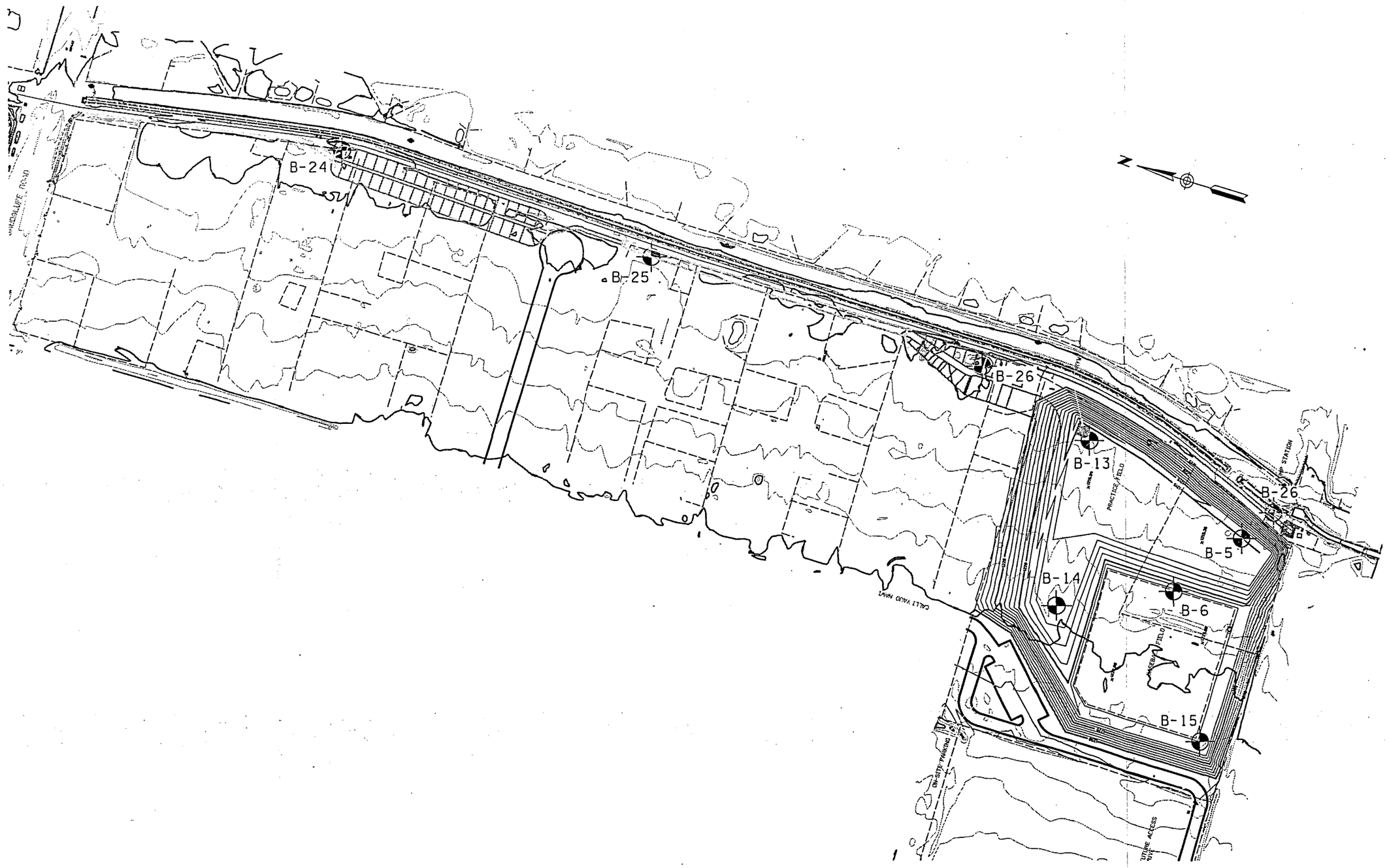
⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

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

DES:	DR: JMM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

B-# - SOIL BORINGS PROVIDED FOR SVERDRUP

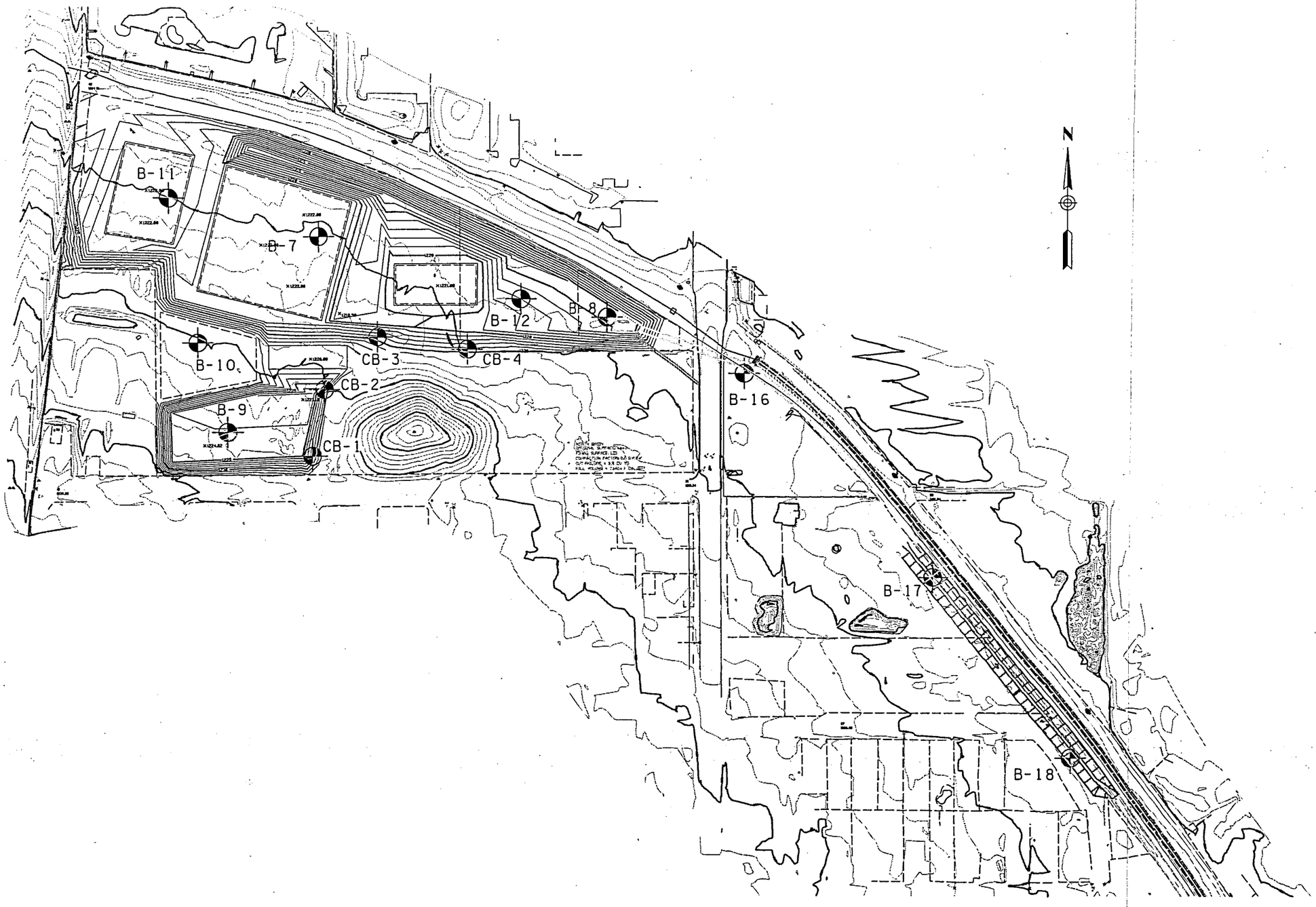
⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

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

DES:	DR: JMM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA



CB-# - SOIL BORINGS PROVIDED FOR THE COUNTY

B-# - SOIL BORINGS PROVIDED FOR SVERDRUP

⊕ - APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE STORM DRAIN
NWC AVENIDA DEL YAQUI & CALLE CERRITO
GUADALUPE, ARIZONA

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

DES:	DR: JMM	CHK: GAC	DATE: 3-23-00	PROJ. NO.: 990906SA

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

Speedie and Associates
11029 N. 24th Ave.
Suite 805
Phoenix, AZ 85029
Attn: Clay Spencer

Received: 11/19/99
Reported: 12/10/99
Invoice No: 059920

Project Name: Guadalupe Storm Drain (990906SA)

PARAMETER	METHOD	RESULTS	UNITS	PQL	DATE ANALYZED
Matrix: Soil					
Sample No: 9911-10582-001			Time Sampled: 14:30		
Sample ID: B-5, S-4, 21'			Date Sampled: 11/16/1999		
4,4'-DDD	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDE	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDT	EPA 8081	ND	ug/kg	10	12/07/99
Aldrin	EPA 8081	ND	ug/kg	10	12/07/99
alpha-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Chlordane	EPA 8081	ND	ug/kg	10	12/07/99
delta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Dieldrin	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan I	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan II	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan Sulfate	EPA 8081	ND	ug/kg	10	12/07/99
Endrin	EPA 8081	ND	ug/kg	10	12/07/99
Endrin Aldehyde	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor Epoxide	EPA 8081	ND	ug/kg	10	12/07/99
Lindane (gamma BHC)	EPA 8081	ND	ug/kg	10	12/07/99
Methoxychlor	EPA 8081	ND	ug/kg	10	12/07/99
Toxaphene	EPA 8081	ND	ug/kg	10	12/07/99
beta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Extraction	EPA 3550				11/24/99
Surrogate:	EPA 8081				12/07/99
***Dibutylchlorendate	EPA 8081	72	% Recovery		12/07/99
Matrix: Soil					
Sample No: 9911-10582-002			Time Sampled: 14:30		
Sample ID: B-14, S-4, 21'			Date Sampled: 11/16/1999		
4,4'-DDD	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDE	EPA 8081	ND	ug/kg	10	12/07/99
4,4'-DDT	EPA 8081	ND	ug/kg	10	12/07/99
Aldrin	EPA 8081	ND	ug/kg	10	12/07/99

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

Matrix: Soil
Sample No: 9911-10582-002
Sample ID: B-14, S-4, 21'

Time Sampled: 14:30
Date Sampled: 11/16/1999

PARAMETER	METHOD	RESULTS	UNITS	PQL	DATE ANALYZED
alpha-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Chlordane	EPA 8081	ND	ug/kg	10	12/07/99
delta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Dieldrin	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan I	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan II	EPA 8081	ND	ug/kg	10	12/07/99
Endosulfan Sulfate	EPA 8081	ND	ug/kg	10	12/07/99
Endrin	EPA 8081	ND	ug/kg	10	12/07/99
Endrin Aldehyde	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor	EPA 8081	ND	ug/kg	10	12/07/99
Heptachlor Epoxide	EPA 8081	ND	ug/kg	10	12/07/99
Lindane (gamma BHC)	EPA 8081	ND	ug/kg	10	12/07/99
Methoxychlor	EPA 8081	ND	ug/kg	10	12/07/99
Toxaphene	EPA 8081	ND	ug/kg	10	12/07/99
beta-BHC	EPA 8081	ND	ug/kg	10	12/07/99
Extraction	EPA 3550				11/24/99
Surrogate:	EPA 8081				12/07/99
***Dibutylchlorendate	EPA 8081	74	% Recovery		12/07/99

Authorized Signatory
ADHS License No.: AZ0004

Bolin Laboratories Inc.

17631 N. 25th Avenue • Phoenix, Arizona 85023
(602) 942 8220 • FAX (602) 942 1050

EPA Method 8081 (Solid)
Quality Control Data Report

Bolin Sample ID: 9911-10582-001; 9911-10582-002; 9911-10583-002; 9911-10583-004

Date Analyzed: 12/7/99
Spike Concentration: 250 ug/Kg

Analyte	BLK (ppb)	LFB/MS Control Limits(%)	LFB Conc. (ppb)	LFB % Rec	LFBD Conc. (ppb)	LFBD % Rec	RPD	Sample Conc. (ppb)	MS Conc. (ppb)	MS % Rec	CCV % Rec
Alpha-BHC	< 1.0	70-130	253	101	263	105	4	< 1.0	270	108	105
Gamma-BHC (Lindane)	< 1.0	70-130	250	100	258	103	3	< 1.0	260	104	104
Beta- BHC	< 1.0	70-130	270	108	276	110	2	< 1.0	282	113	105
Delta-BHC	< 1.0	70-130	278	111	282	113	1	< 1.0	288	115	105
Heptachlor	< 1.0	70-130	243	97	244	98	1	< 1.0	247	99	101
Aldrin	< 1.0	70-130	253	101	262	105	4	< 1.0	265	106	104
Heptachlor Epoxide	< 1.0	70-130	261	104	266	106	2	< 1.0	270	108	104
Endosulfan I	< 1.0	70-130	265	106	271	108	2	< 1.0	276	110	104
4,4'-DDE	< 1.0	70-130	264	106	272	109	3	< 1.0	263	105	103
Dieldrin	< 1.0	70-130	262	105	269	107	3	< 1.0	272	109	104
Endrin	< 1.0	70-130	273	109	280	112	3	< 1.0	290	116	98
,4'-DDD	< 1.0	70-130	270	108	276	110	2	< 1.0	278	111	104
Endosulfan II	< 1.0	70-130	268	107	276	110	3	< 1.0	277	111	108
4,4'-DDT	< 1.0	70-130	255	102	258	103	1	< 1.0	235	94	99
Endrin Aldehyde	< 1.0	70-130	238	95	242	97	1	< 1.0	212	85	107
Methoxychlor	< 1.0	70-130	279	112	279	111	0	< 1.0	294	118	102
Endosulfan Sulfate	< 1.0	70-130	263	105	270	108	3	< 1.0	270	108	105

Note:
BLK = Blank
LFB = Laboratory Fortified Blank
LFBD = Laboratory Fortified Blank Duplicate
RPD = Relative Percent Deviation
MS = Matrix Spike
CCV = Continuing Calibration Verification

Laboratory Consultants, Ltd.

January 11, 2000

Speedie & Associates
Mr. John Kelley
11029 North 24th Avenue
Phoenix, Arizona 85029

RE: Soil sample, Laboratory #991662
Project: 990906SA

Dear Mr. Kelley:

Transmitted with this letter is a Herbicide Bioassay report by Agri-Services for the above referenced samples. Laboratory numbers correspond to the following sample markings.

Laboratory Number	Sample Marking
991652-01	A1918
991652-01	A1920
991652-01	A1922
991652-01	A1925
991652-01	A1951

Respectfully submitted,

Harry Owens
Laboratory Director

Speedie991652.doc

RECEIVED
JAN 13 2000

947 South 48th Street, Suite 127 Tempe, Arizona 85281 Phone (480) 858-1841 Fax (480) 858-0752

MEMBER ACIL

APPENDIX C

FIELD AND LABORATORY INVESTIGATION

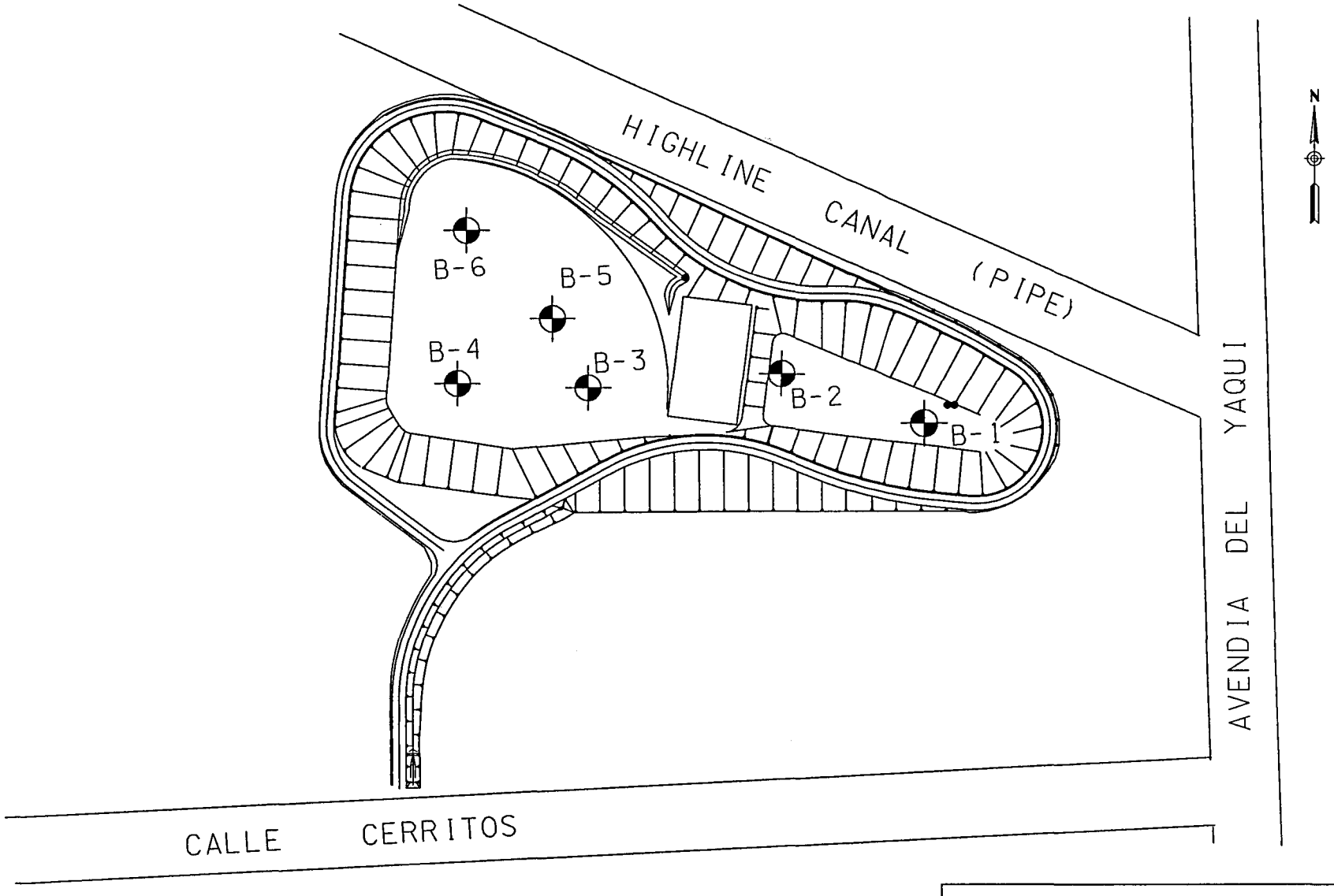
AGRONOMY LAB TESTS

FIELD AND LABORATORY INVESTIGATION

Only July 20, 2001 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plans. All exploration work was carried out under the full-time supervision of our staff geologist, who recorded subsurface conditions and obtained bulk samples for agronomy laboratory testing. The soil borings were advanced with truck-mounted CME-75 drill rig utilizing 7-inch diameter hollow stem flight augers.

Bulk samples were submitted to Laboratory Consultants for determining the soil fertility conditions and for recommendations for planting. All laboratory data is presented in this Appendix C.

Lab Sample No.	Boring	Sample Number	Depth, ft.
F9317	B-1	BS-1	0
F9318	B-1	BS-2	6
F9319	B-2	BS-1	0
F9320	B-2	BS-2	6
F9321	B-3	BS-1	0
F9322	B-3	BS-2	4
F9323	B-4	BS-1	0
F9324	B-4	BS-2	4.5
F9325	B-5	BS-1	0
F9326	B-5	BS-2	3
F9327	B-6	BS-1	0
F9328	B-6	BS-2	2.5
F9329	B-7	BS-1	0
F9330	B-7	BS-2	8.5
F9331	B-8	BS-1	0
F9332	B-8	BS-2	10
F9333	B-9	BS-1	0
F9334	B-9	BS-2	0
F9335	B-9	BS-3	8
F9336	B-10	BS-1	0
F9337	B-10	BS-2	0
F9338	B-10	BS-3	4.5



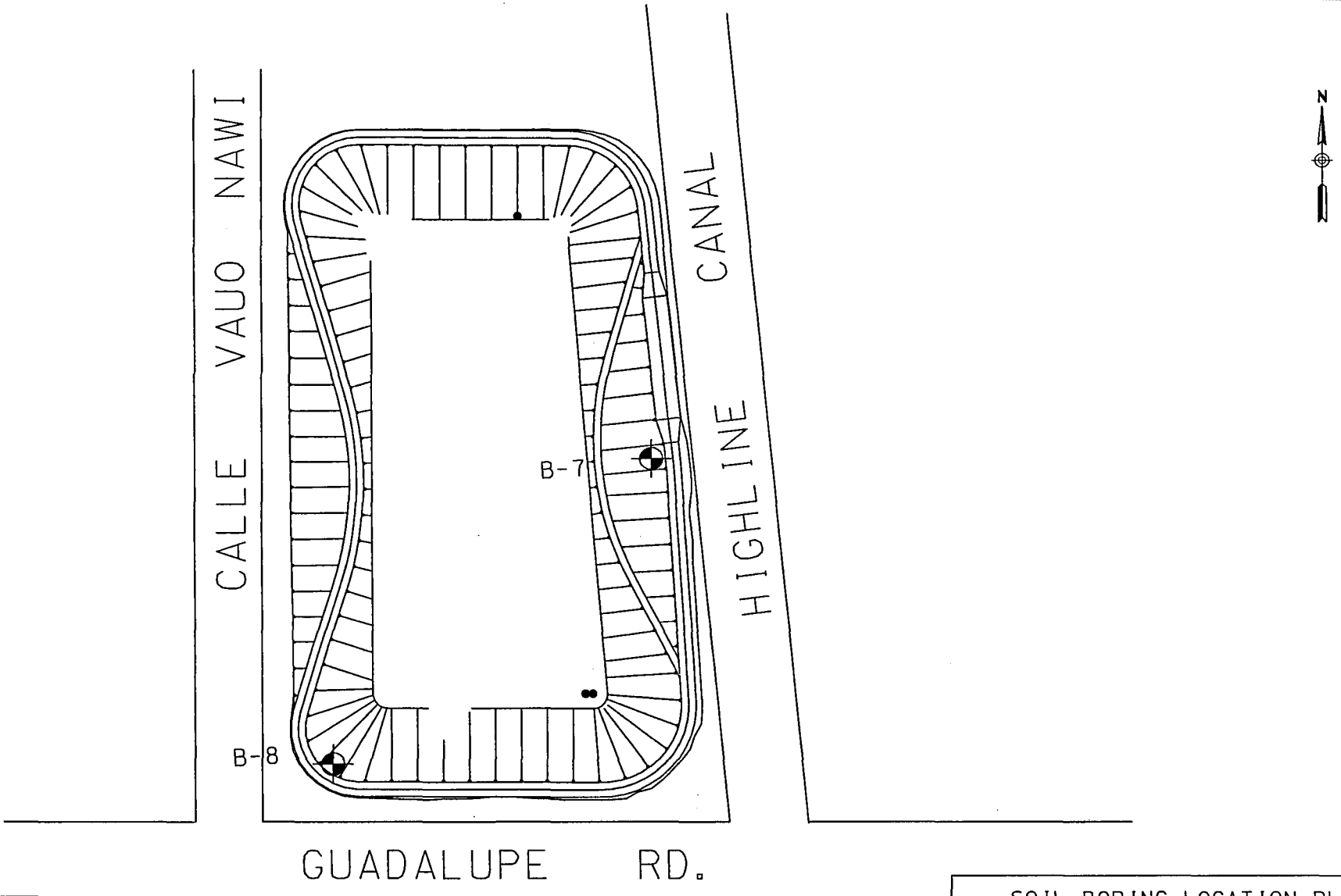
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 990906SB



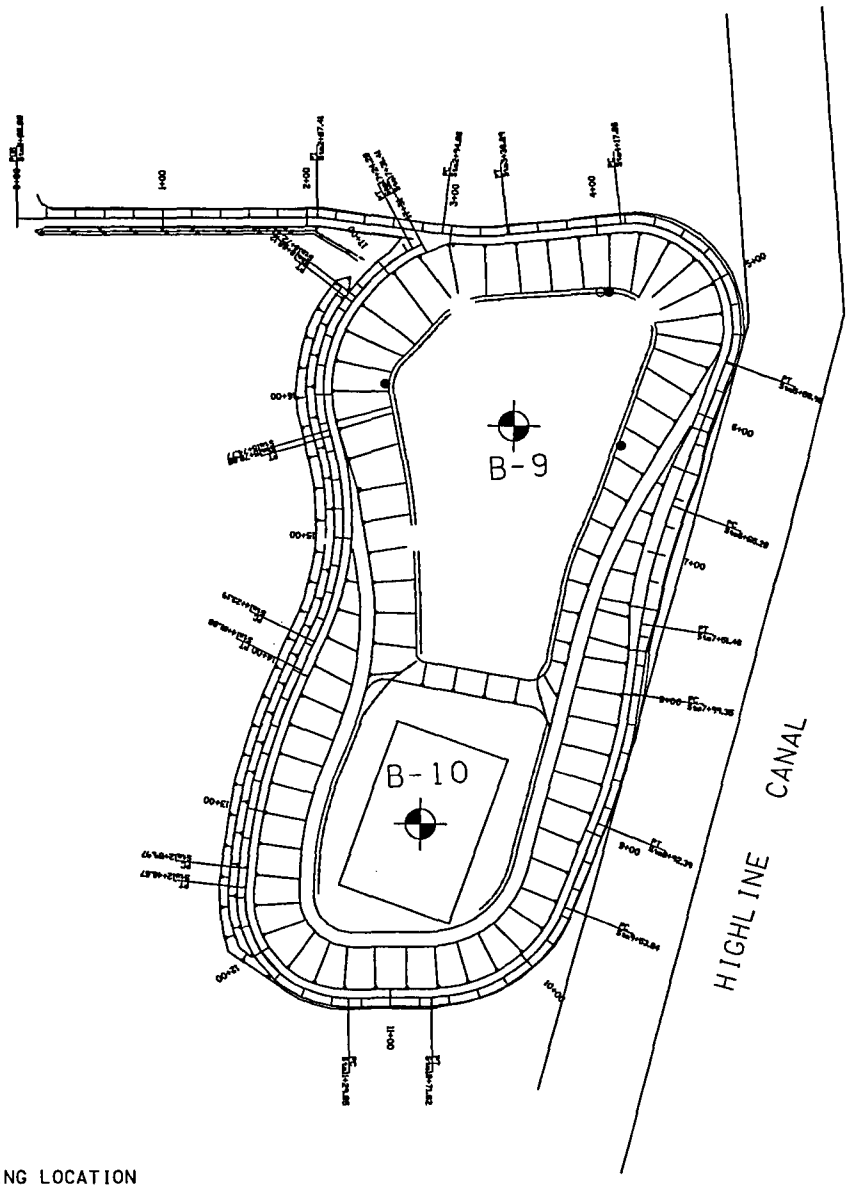
- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 990906SB



- APPROXIMATE SOIL BORING LOCATION

SOIL BORING LOCATION PLAN

GUADALUPE DRAINAGE IMPROVEMENTS
GUADALUPE & AVENDIA DEL YAQUI
GUADALUPE, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
1005 N. 24TH AVE., SUITE 806 PHOENIX, ARIZONA 85015 (602) 997-6378

DES:	DR: CMW	CHK: GC	DATE: 8/3/01	PROJ. NO.: 99090658

Laboratory Consultants, Ltd.

August 3, 2001

Speedie & Associates
Mr. Dave Rath
3331 E. Wood Street
Phoenix, Arizona 85040

RE: Soil samples, Laboratory #20010657
Project: 990906SB

Dear Mr. Rath:

Based on the enclosed soil fertility reports, pH is slightly to strongly alkaline. Normally, a preplant sulfur application is advisable to lower soil pH and improve nutrient availability. However, these soils have high boron levels. Acid amendments such as sulfur release bound boron form the soil, compounding the existing boron problem. Desert adapted species will tolerate alkaline pH better than high boron concentrations.

Salinity (electrical conductivity) is low in samples F9317, F9319, F9321, F9323, F9324, F9327, F9331, F9333, F9338, and F9336. No adverse effects due to salinity would be expected at these levels.

Salinity is high to very high in samples F9318, F9320, F9322, F9325, F9326, F9328, F9329, F9330, F9332, and F9335. Salinity in this range will have a negative effect on plant material in the form of slow growth, leaf burn and possibly plant mortality. It is imperative to reduce salinity in these areas before or at planting.

To correct the salinity problem, first determine if any soil physical problems such as compaction or abrupt textural change are present at the surface or in the subsoils. These conditions will restrict water movement into and through the root zone. If present, restrictive layers must be resolved to establish good drainage and reclaim the growing medium.

After drainage is established, apply a heavy irrigation to leach excess salts down and out of the root zone. Allow the soil to dry then apply another heavy irrigation. Repeat the irrigation and drying cycle 3 to 4 times.

Exchangeable sodium percentages are within the acceptable range. Water permeability problems and/or foliar burn due to excess sodium will not occur.

The organic matter content of these soils is low. An application of nitrogen stabilized mulch will increase water and nutrient holding capacity of the native soil.

Of the nutrients tested, only phosphorus is in the low to deficient range. Supplemental phosphorus should be applied preplant.

Boron is at potentially toxic levels in samples F9318, F9319, F9320, F9321, F9322, F9323, F9325, F9327, F9328, F9329, F9330, F9331, F9332, F9333, F9335, F9336, and F9338. Boron must be reduced by leaching as described above to reduce salinity. Because boron is released by acid amendment, soil sulfur should not be applied on this project.

Soil texture ranges from sandy loam to loam. Given the high salinity and boron levels present on this project, the light soil texture is quite desirable. While sandy loam soil has moderate water and nutrient holding capacity, this texture does have relatively high water permeability. As stated above, a porous, well-drained soil is necessary to leach salts and boron out of the root zone.

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Speedie & Associates
Project: 990906SB
Laboratory #20010657

Calcium carbonate content of these soils varies from a low of 1.2 percent to a high of 14.3 percent. These levels are typical for Southwest soils and suitable for growth of desert adapted species. In addition, excess calcium is desirable in this soil because calcium will mitigate the toxicity of boron.

On turf areas, apply 10 pounds ammonium phosphate (11-52-0) per 1000 square feet, preplant. Incorporate this material into the top 2 to 3 inches of soil. Organic matter is not cost effective on new turf. As the turf matures, organic matter will increase.

In planters, apply 15 pounds ammonium phosphate (11-52-0) and 5 cubic yards nitrogen stabilized mulch per 1000 square feet preplant. Incorporate these materials into the top 6 to 8 inches of soil.

For trees or shrubs under drip or bubbler irrigation, use a backfill mix consisting of 4 parts soil and 1 part nitrogen stabilized organic material. To this mix, add 0.5-pound ammonium phosphate (11-52-0) per cubic yard of backfill.

After plants are established maintain adequate available nitrogen levels. Apply fertilizer spikes or tablets to trees, shrubs or ground covers under drip or bubbler irrigation, according to label directions. To annuals and ground covers in beds, apply 1 pound actual nitrogen per 1000 square feet every 6 to 8 weeks during the active growing season. In turf areas, apply 1 pound nitrogen per 1000 square feet per month during active growing seasons. Water in nitrogen applications to incorporate.

Develop an irrigation schedule that applies heavy, infrequent waterings. This type of schedule promotes deep rooting, leaches salts, and allows root aeration.

If I can be of further assistance regarding this report, please call at your convenience.

Respectfully submitted,

Harry Owens
Laboratory Director
Certified Crop Advisor

SPEEDIE20010657.doc

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-01

SAMPLE MARKING	F9317	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	1.3	L	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	19		
AVAILABLE NITROGEN, lbs/A	89		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	7	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	125	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	240	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4901	VH	
EXCHANGEABLE SODIUM, PPM	170	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.7		
COPPER, PPM	1.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.1	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.5	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	1.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.0	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	30		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-01

SAMPLE MARKING	F9317	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	60.4		
SILT, %	26.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	2.0		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-02

SAMPLE MARKING	F9318	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.5	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	48		
AVAILABLE NITROGEN, lbs/A	194		1 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	5	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	439	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	194	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	2503	H	
EXCHANGEABLE SODIUM, PPM	65	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.8		
COPPER, PPM	4.3	H	0 Oz/1000 Sq.Ft.
IRON, PPM	12.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	4.6	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	2.4	H	0 Oz/1000 Sq.Ft.
BORON, PPM	8.9	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	240		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-02

SAMPLE MARKING	F9318	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	42.4		
SILT, %	34.8		
CLAY, %	22.8		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	14.3		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-03

SAMPLE MARKING	F9319	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	0.2		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	64		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	139	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	170	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	1823	M	
EXCHANGEABLE SODIUM, PPM	98	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.8		
COPPER, PPM	1.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	1.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	30		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-03

SAMPLE MARKING	F9319	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	22.8		
CLAY, %	10.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.2		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-04

SAMPLE MARKING	F9320	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.0		
ELECTRICAL CONDUCTIVITY, mmhos/CM	4.2	VH	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	82		
AVAILABLE NITROGEN, lbs/A	327		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	322	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	182	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	3937	H	
EXCHANGEABLE SODIUM, PPM	89	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.7		
COPPER, PPM	7.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	5.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.8	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.1	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	189		0 Lbs/1000 Sq.Ft.

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MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-04

SAMPLE MARKING	F9320	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	24.8		
CLAY, %	8.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	7.4		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-05

SAMPLE MARKING	F9321	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.7	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	1.0		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	106		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	11	M	2 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	192	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	378	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4512	VH	
EXCHANGEABLE SODIUM, PPM	78	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.3		
COPPER, PPM	1.3	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	10.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	2.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.3	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	32		0 Lbs/1000 Sq.Ft.

211 Shakespeare Lordsburg, New Mexico 88045 Phone (505) 542-3331 Fax (505) 542-3334
Toll Free (866) 452-2266 Email: labconsultants@yahoo.com www.laboratoryconsultantsltd.com

MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-05

SAMPLE MARKING	F9321	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	62.4		
SILT, %	24.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.7		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-06

SAMPLE MARKING	F9322	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.2	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	48		
AVAILABLE NITROGEN, lbs/A	204		.5 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	329	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	181	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	2759	H	
EXCHANGEABLE SODIUM, PPM	77	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.0		
COPPER, PPM	13.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.4	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	13.7	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	269		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-06

SAMPLE MARKING	F9322	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	58.4		
SILT, %	26.8		
CLAY, %	14.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	11.3		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-07

SAMPLE MARKING	F9323	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.3		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	1.8		
NITRATE-N, PPM	9		
AVAILABLE NITROGEN, lbs/A	126		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	19	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	199	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	369	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4676	VH	
EXCHANGEABLE SODIUM, PPM	66	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.1		
COPPER, PPM	2.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	18.7	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	20.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	9.5	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	25		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-07

SAMPLE MARKING	F9323	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	54.4		
SILT, %	32.8		
CLAY, %	12.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.6		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-08

SAMPLE MARKING	F9324	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.2		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.0		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	54		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	2	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	227	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	150	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4676	VH	
EXCHANGEABLE SODIUM, PPM	221	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.7		
COPPER, PPM	4.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	5.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.7	H	0 Oz/1000 Sq.Ft.
BORON, PPM	0.7	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	73		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-08

SAMPLE MARKING	F9324	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	62.4		
SILT, %	22.8		
CLAY, %	14.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	6.4		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-09

SAMPLE MARKING	F9325	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.5		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.9	H	
FREE LIME, --	No		
ORGANIC MATTER, %	0.5		
NITRATE-N, PPM	10		
AVAILABLE NITROGEN, lbs/A	62		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	360	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	335	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4875	VH	
EXCHANGEABLE SODIUM, PPM	496	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	7.2		
COPPER, PPM	1.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	19.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	11.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	10.0	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	24		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-09

SAMPLE MARKING	F9325	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	56.4		
SILT, %	32.8		
CLAY, %	10.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.5		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-10

SAMPLE MARKING	F9326	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.2		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.5	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.3		
NITRATE-N, PPM	13		
AVAILABLE NITROGEN, lbs/A	62		4 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	6	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	156	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	198	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5336	VH	
EXCHANGEABLE SODIUM, PPM	206	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.0		
COPPER, PPM	6.4	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.1	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.0	M	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	47		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-10

SAMPLE MARKING	F9326	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	66.4		
SILT, %	22.8		
CLAY, %	10.8		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	3.0		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-11

SAMPLE MARKING	F9327	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.5		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	21		
AVAILABLE NITROGEN, lbs/A	112		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	19	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	557	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	271	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4732	VH	
EXCHANGEABLE SODIUM, PPM	93	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.5		
COPPER, PPM	3.0	H	0 Oz/1000 Sq.Ft.
IRON, PPM	20.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	15.9	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	8.2	H	0 Oz/1000 Sq.Ft.
BORON, PPM	4.2	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	50		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-11

SAMPLE MARKING	F9327	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	53.6		
SILT, %	34.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	2.0		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-12

SAMPLE MARKING	F9328	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.8		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.7	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.8		
NITRATE-N, PPM	24		
AVAILABLE NITROGEN, lbs/A	128		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	124	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	184	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5412	VH	
EXCHANGEABLE SODIUM, PPM	81	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.2		
COPPER, PPM	6.7	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.7	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	6.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	3.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	2.5	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	119		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-12

SAMPLE MARKING	F9328	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	71.6		
SILT, %	16.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	14.3		

Soil Depth = 12 Inches

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

Analyst

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-13

SAMPLE MARKING	F9329	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.6		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.9	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	56		
AVAILABLE NITROGEN, lbs/A	222		.5 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	21	H	1 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	601	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	342	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4546	VH	
EXCHANGEABLE SODIUM, PPM	280	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	4.3		
COPPER, PPM	9.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	12.1	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	9.4	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	8.6	H	0 Oz/1000 Sq.Ft.
BORON, PPM	8.2	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	505		0 Lbs/1000 Sq.Ft.

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ADDRESS: Dave Rath
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Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-13

SAMPLE MARKING	F9329	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	55.6		
SILT, %	30.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.2		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-14

SAMPLE MARKING	F9330	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.0		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.0	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	136		
AVAILABLE NITROGEN, lbs/A	526		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	158	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	548	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5254	VH	
EXCHANGEABLE SODIUM, PPM	630	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	8.1		
COPPER, PPM	3.2	H	0 Oz/1000 Sq.Ft.
IRON, PPM	8.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	3.1	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	80		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

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ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-14

SAMPLE MARKING	F9330	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	47.6		
SILT, %	34.8		
CLAY, %	17.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	7.4		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-15

SAMPLE MARKING	F9331	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.9		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	34		
AVAILABLE NITROGEN, lbs/A	143		2 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	360	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	260	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4947	VH	
EXCHANGEABLE SODIUM, PPM	116	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.8		
COPPER, PPM	2.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	7.0	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	7.5	H	0 Oz/1000 Sq.Ft.
BORON, PPM	4.3	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	38		0 Lbs/1000 Sq.Ft.

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Toll Free (866) 452-2266 Email: labconsultants@yahoo.com www.laboratoryconsultantsltd.com

MEMBER ACIL

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-15

SAMPLE MARKING	F9331	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	65.6		
SILT, %	22.8		
CLAY, %	11.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.7		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-16

SAMPLE MARKING	F9332	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	3.4	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.6		
NITRATE-N, PPM	71		
AVAILABLE NITROGEN, lbs/A	287		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	4	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	165	M	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	644	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5082	VH	
EXCHANGEABLE SODIUM, PPM	1420	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	16.6		
COPPER, PPM	3.9	H	0 Oz/1000 Sq.Ft.
IRON, PPM	9.8	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	2.7	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.3	H	0 Oz/1000 Sq.Ft.
BORON, PPM	6.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	142		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-16

SAMPLE MARKING	F9332	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	49.6		
SILT, %	30.8		
CLAY, %	19.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	11.3		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-17

SAMPLE MARKING	F9333	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.6	VL	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.7		
NITRATE-N, PPM	15		
AVAILABLE NITROGEN, lbs/A	91		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	9	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	459	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	333	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	4156	VH	
EXCHANGEABLE SODIUM, PPM	114	M	
EXCHANGEABLE SODIUM PERCENTAGE, %	2.0		
COPPER, PPM	2.1	H	0 Oz/1000 Sq.Ft.
IRON, PPM	13.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	12.2	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	5.4	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	29		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-17

SAMPLE MARKING	F9333	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	61.6		
SILT, %	24.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	1.6		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-18

SAMPLE MARKING	F9338	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.7		
ELECTRICAL CONDUCTIVITY, mmhos/CM	1.4	L	
FREE LIME, --	Yes		
ORGANIC MATTER, %	1.0		
NITRATE-N, PPM	82		
AVAILABLE NITROGEN, lbs/A	347		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	8	L	3 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	234	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	458	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5914	VH	
EXCHANGEABLE SODIUM, PPM	310	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	3.8		
COPPER, PPM	5.6	H	0 Oz/1000 Sq.Ft.
IRON, PPM	17.5	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	9.2	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	7.1	H	0 Oz/1000 Sq.Ft.
BORON, PPM	1.4	H	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	139		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-18

SAMPLE MARKING	F9338	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	45.6		
SILT, %	34.8		
CLAY, %	19.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	6.4		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-19

SAMPLE MARKING	F9335	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	8.1		
ELECTRICAL CONDUCTIVITY, mmhos/CM	2.8	H	
FREE LIME, --	Yes		
ORGANIC MATTER, %	0.4		
NITRATE-N, PPM	67		
AVAILABLE NITROGEN, lbs/A	262		0 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	2	VL	5 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	183	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	544	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	5754	VH	
EXCHANGEABLE SODIUM, PPM	768	H	
EXCHANGEABLE SODIUM PERCENTAGE, %	9.0		
COPPER, PPM	2.9	H	0 Oz/1000 Sq.Ft.
IRON, PPM	10.9	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	3.3	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	4.9	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.5	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	100		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-19

SAMPLE MARKING	F9335	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	51.6		
SILT, %	34.8		
CLAY, %	13.6		
CLASSIFICATION, --	Loam		
CALCIUM CARBONATE, %	1.5		

Soil Depth = 12 Inches

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

Analyst

Laboratory Consultants, Ltd.

SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-20

SAMPLE MARKING	F9336	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
pH, S.U.	7.4		
ELECTRICAL CONDUCTIVITY, mmhos/CM	0.5	VL	
FREE LIME, --	No		
ORGANIC MATTER, %	1.1		
NITRATE-N, PPM	11		
AVAILABLE NITROGEN, lbs/A	97		3 Lbs/1000 Sq.Ft.
BICARBONATE PHOSPHORUS, PPM	15	M	2 Lbs/1000 Sq.Ft.
EXCHANGEABLE POTASSIUM, PPM	698	VH	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE MAGNESIUM, PPM	371	H	0 Lbs/1000 Sq.Ft.
EXCHANGEABLE CALCIUM, PPM	3388	H	
EXCHANGEABLE SODIUM, PPM	85	L	
EXCHANGEABLE SODIUM PERCENTAGE, %	1.7		
COPPER, PPM	1.8	H	0 Oz/1000 Sq.Ft.
IRON, PPM	14.6	H	0 Oz/1000 Sq.Ft.
MANGANESE, PPM	13.8	H	0 Oz/1000 Sq.Ft.
ZINC, PPM	5.0	H	0 Oz/1000 Sq.Ft.
BORON, PPM	3.8	VH	0 Oz/1000 Sq.Ft.
SULFATE-SULFUR, PPM	48		0 Lbs/1000 Sq.Ft.

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SOIL FERTILITY REPORT

SUBMITTED BY: Speedie & Associates
ADDRESS: Dave Rath
3331 East Wood Street
Phoenix, Arizona 85040

GROWER: 990906SB
LAB NUMBER: 20010657
SAMPLE NUMBER: 20010657-20

SAMPLE MARKING	F9336	CROP	Ornamental	DATE RECEIVED	7/27/01
		YIELD GOAL		DATE REPORTED	8/3/01

Lab Tests	Result	Level	Suggested Recommendations
SAND, %	57.6		
SILT, %	28.8		
CLAY, %	13.6		
CLASSIFICATION, --	Sandy Loam		
CALCIUM CARBONATE, %	3.0		

Soil Depth = 12 Inches

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

Analyst

AGRI
SERVICES

January 10, 2000

Mr. Harry Owens
Laboratory Consultants
947 South 48th Street
Suite 127
Tempe, Arizona 85281

Dear Harry,

This report is in regard to samples 99165201-99165205 which you had submitted for bioassay analyses. There are no detectable levels of herbicides noted via a bioassay technique in any of the above samples submitted.

As always, caution needs to be exercised when interpreting these results because of problems associated with obtaining samples. Often, the results are only as good as the sampling technique.

Should you or others have any questions in regard to this matter, please feel free to contact me.

Best regards,

Dr. Michael Pfeiffer
Plant Pathologist

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