



City of Kingman

310 NORTH FOURTH STREET • KINGMAN • ARIZONA • 86401 • 928.753.5561
WWW.CITYOFKINGMAN.GOV

CITY OF KINGMAN EASTERN STREET IMPROVEMENTS, PHASE 1

ADDENDUM NO. 1
(Total of 1 Page with Attachments)
Prepared: November 30, 2023
ENG21-0001

The following information is provided to supplement the project Bid Documents for EASTERN STREET IMPROVEMENTS, PHASE 1. This Addendum #1 is being issued to address the following comments. Receipt of this Addendum No. 1 shall be acknowledged on the Proposal Form.

COMMENT RESOLUTION:

1. What is the anticipated Notice To Proceed date?
We anticipate awarding the contract in mid-January.
2. Can Eastern be shut down between Calumet and Lomalai?
The contractor should sequence the work in a way that minimizes the amount of time that Eastern and Kenwood are shut down.
3. Are cross sections or contours available to assist with estimating earthwork quantities?
No. The only information available is what is on the plans.
4. Do the cut and fill quantities listed on Sheet GN01 include the volume of asphalt to be removed?
Yes. The cut and fill quantities go from existing grade to finished grade. The asphalt is included.
5. What is the depth of the existing asphalt?
See attached geotechnical report.
6. Where is the driveway located that is referred to in Bid Item 20?
See Sheet PV05, Note 6.
7. What areas are available for contractor laydown?
See attached Figure 1.
8. Does the contractor need to dispose of the millings?
Yes. The millings should be taken to our Public Works facility at 3700 Andy Devine Avenue.
9. What is the source of construction water?
This is addressed on page 19 of the Bid Document, in the Information for Bidders.

END OF ADDENDUM NO. 1
Total of 1 Page with Attachments

Addendum #1 Prepared by:
Mike Garmon, P.E.
Assistant City Engineer
Attachments: Geotechnical report
Figure 1 Laydown Areas

Rugged, Adventurous & Unafraid.



**REPORT ON GEOTECHNICAL
INVESTIGATION**

DESIGNATION: Eastern Street Design

LOCATION: Eastern Street
Kingman, Arizona

CLIENT: Ritoch-Powell & Associates

PROJECT NO: 151408SF

DATE: December 29, 2015



1.0	INTRODUCTION.....	1
2.0	GENERAL SITE AND SOIL CONDITIONS.....	1
2.1	Site Conditions.....	1
2.2	General Subsurface Conditions.....	2
3.0	ANALYSIS AND RECOMMENDATIONS.....	3
3.1	Analysis.....	3
3.2	Site Preparation.....	3
3.3	Fill and Backfill	4
3.4	Utilities Installation.....	5
3.5	New/Completely Reconstructed Asphalt Pavement	6
4.0	GENERAL.....	8

APPENDIX



1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of a proposed partial realignment and reconstruction of approximately 1.5 miles of Eastern Street, in Kingman, Arizona.

Preliminary information calls for the realignment of Eastern Street/Kenwood Avenue near Airway Avenue and repaving of Eastern Street for approximately 1.5 miles from Pasadena Avenue north to Airway Avenue. It is assumed that the entire roadway surface will be reconstructed as part of this project. Traffic volumes are based on an existing (2015) one-way ADT of 3454 vehicles per day projected over 20 years with a 4% growth rate and a 2% Truck factor. For design purposes, each truck is assumed to impart 1.5 ESALs. The total expected ESAL's over a 20 year lifespan is approximately 1.2 million. Eastern Street is classified by the City of Kingman as a "minor arterial". The purpose of this investigation was to determine the existing asphalt sections, subsurface conditions, and to provide pavement replacement design information. Borings were conducted at the start and end of the project and each quarter mile in between. Two borings were located at possible box culvert locations. If lower quality soils are encountered during construction in this area, this office should be contacted to ensure the pavement design will provide satisfactory service.

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 hereafter are to apply.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

The proposed improvement area includes Eastern Street and Kenwood Avenue extending from the intersection with Pasadena Avenue at the south to Airway Avenue on the North. These roadways service both residential and commercial properties. Water, sanitary sewer, storm drain, and natural gas utilities run within the roadway alignment. The site passes beneath Interstate 40 and runs parallel to the BNSF Railway for a portion of the project. The realignment portion of the project at the northern end, near Airway Avenue, will involve new roadway construction in an undeveloped lot. This undeveloped lot is currently lightly vegetated and has considerable surficial trash and litter present. However, there was no indication of buried trash on this site.

2.2 General Subsurface Conditions

The existing asphalt section ranges from 2.5 to 4 inches in thickness. The asphalt was observed to be in moderate to poor condition with block and alligator cracking throughout. Based on the borings, it appears that the asphalt was placed directly on the native soils, with no aggregate base observed at any of the boring locations. The upper subgrade soils typically consist of silty sand and clayey sand with subordinate amounts of gravel. Standard Penetration Resistance Tests (SPT) values range from 2 to 39 blows per foot (bpf) in the upper soils. Based on visual and tactile observation, the upper soils were generally in a dry to moist state at the time of investigation, typically below the plastic limit of the soil.

Laboratory testing indicates liquid limits in the range of 22 to 35 percent with plasticity indices ranging from 1 to 14 percent. Percent passing the #200 sieve ranged from 17 to 52 percent. In-place densities of the upper soils is on the order of 99.6 to 112.4 pcf with moisture contents ranging from 10.4 to 10.7 percent. Volume increase due to wetting of the upper soils is on the order of 2.0 percent when re-compacted to moistures and densities normally expected during construction and confined to 100 psf. A selected undisturbed sample of the upper soils displayed a moderate volume decrease on the order of 3.3 percent when subjected to 3,200 psf. An additional 6.1 percent consolidation was observed due to inundation under the same load for a total of 9.4 percent.

The existing pavement conditions are presented in the table below:

TABLE 2.2.1

<u>Boring</u>	<u>Asphalt Thickness</u>	<u>Aggregate Base Thickness</u>	<u>Sub Grade Soil Type</u>
B-1	0.0"	0.0"	Clayey Sand
B-2	2.75"	0.0"	Silty/Clayey Sand
B-3	2.5"	0.0"	Silty Sand
B-4	3.0"	0.0"	Silty Sand
B-5	2.5"	0.0"	Clayey Sand
B-6	4.0"	0.0"	Clayey Sand
B-7	4.0"	0.0"	Sandy Lean Clay
B-8	4.0"	0.0"	Clayey Sand
Sub-grade soils contain subordinate amounts of gravel. Please refer to boring logs.			

No groundwater was encountered at the time of our investigation to the depths investigated of 5 feet. However, it is not uncommon to have seasonally perched water that may be encountered at the soil/bedrock interface. Dry to moist soils were encountered in the borings.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

Analysis of the field and laboratory data indicates that subsoils at the site are suitable for support of the proposed paving. Some special site preparation will be required with respect to the existing pavement, related elements, and underground utilities. Depending on final grades and the pavement section selected, it may be possible to salvage the existing pavement by cold-milling and blending to create a subbase for a new layer of asphalt and aggregate base. The millings should be mixed with the existing base (if any) in a gradation similar to that of ABC in accordance with MAG 702 specifications for aggregate base course.

Laboratory and field testing indicate that some of the upper soils are dry to moist and relatively soft. As noted, blow counts as low as 2 bpf were encountered with most locations in the range of 15 to 35 bpf. Based on the blow counts obtained within the subgrade soils and the clayey/silty nature of soils, it is possible that soft, wet soils will be encountered at some locations and subgrade stabilization will be an issue. Successful performance of the new pavement is dependent on a stable subgrade.

The clayey and silty soils may be sensitive to excessive moisture content and may become unstable at elevated moisture contents. Accordingly, it may be necessary to compact soils on the dry side of optimum. The reduced moisture content under pavements should only be used upon approval of the engineer in the field.

Based on the current conditions of the pavement, our primary recommendations are to remove and replace the asphalt surface. A complete removal and replacement will provide the longest life and present the opportunity to improve any poor drainage or subgrade issues. Section 3.5 presents several structural sections with associated capacities for consideration depending on anticipated traffic volumes. These sections assume using new imported aggregate base meeting the MAG/City of Kingman Standard Specifications. When transitioning from existing roadways to new roadways, all new pavement sections should meet or exceed the thickness of the existing pavement or be graded accordingly to maintain drainage within the aggregate base.

3.2 Site Preparation

The area for new pavement reconstruction will require the complete removal of the existing asphalt surface to be replaced with a new structural section of asphalt surface on new aggregate base. This process will likely disturb the underlying subgrade. After removal of the existing asphalt the subgrade will require fine grading and compaction prior to the placement of new ABC and asphalt. Prior to placing new base course, the exposed grade should be scarified to a depth of 12 inches, moisture conditioned to optimum (± 2 percent) and compacted to at least 95 percent of maximum dry density as determined by ASTM D-698.

The subgrade should be proof rolled with a heavy rubber tired vehicle, such as a loaded water truck, to locate unstable areas per MAG 301. Anytime existing subgrade that has been covered with asphalt is opened up, it is not uncommon to find soft or loose, wet subgrade that will not stabilize or achieve the compaction required. Therefore, if the option to completely remove the existing pavement section is selected, there is a possibility to uncover soft, moist, unstable zones. These areas may need some remediation or additional time to dry prior to placing any new aggregate base or asphalt pavement.

An option to possibly reduce costs by minimizing the amount of export or import, would be to consider full depth reclamation (FDR) if grades allow. This process consists of pulverizing the existing roadway pavement section (asphalt) in place. The resulting material is a mixture of pulverized asphalt and subgrade mixed together. This material can then be graded as necessary to improve drainage or the crown of the road. Once the material has been graded it is mixed with Portland cement to create a cement treated base (CTB). Typically about 3 to 5 percent cement is added to the material. A CTB mix design would be required if this option is selected. Once the material has been mixed with cement and compacted a new asphalt surface can be placed. This option would eliminate the need to stabilize the subgrade and/or import new ABC. Typically at least 4 inches of asphalt concrete would be placed on top. The primary concerns with this option are reflective cracking from the more rigid CTB. Additional recommendations for this option can be provided if the design team would like to explore this option further. The city should determine which option best meets their desires and budget.

3.3 Fill and Backfill

Native soils and milled asphalt are suitable for use in roadway subgrade. Oversized material (> 3 inches) should be removed or reduced in size. Imported fill, if required, shall meet the following requirements:

<u>Specification</u>	<u>Common</u>	<u>Pavement</u>
Passing 3"/75mm	100%	100%
Passing #200/.075mm	≤60%	15-60%
Liquid Limit	<30%	<30%
Plasticity Index	<10%	<10%
Swell ¹	<1.5	<1.5
Notes: 1. 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.		

Imported common fill for use in site grading should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material.

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. Granular fill (ASTM Classification GW, GP, SW, SP) can be placed on the dry side of optimum at the discretion of the geotechnical engineer on record.

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 as set forth below. **Frozen material shall not be placed, nor shall fill be placed upon frozen grade.**

A.	Sidewalk Subgrade or Fill	95
B.	Pavement Subgrade or Fill	95
C.	Utility Trench Backfill	
1.	More than 2.0' below finish subgrade	95
2.	Within 2.0' of finish subgrade (non-granular)	95
3.	Within 2.0' of finish subgrade (granular)	100
D.	Aggregate Base Course	
1.	Below concrete slabs	95
2.	Below asphalt paving	100
E.	Landscape Areas	
1.	Miscellaneous fill	90
2.	Utility trench - more than 1.0' below finish grade	85
3.	Utility trench - within 1.0' of finish grade	90

3.4 Utilities Installation

In general, trench excavations for shallow utilities (3 to 4 feet) should be accomplished by conventional trenching equipment. It is possible that shallow basalt or volcanic tuff bedrock or large boulders may be present throughout the roadway. For deeper utility trenches (greater than 4 feet), it is possible that basalt or volcanic tuff boulders and bedrock may impede progress and require rock removal techniques such as pneumatic hammering, although no rock was encountered in the 5 foot borings conducted for this investigation. Due to the clayey nature and moisture content of the soils, it is anticipated that trench walls will stand near-vertically for the short periods of time required to install utilities. Trench walls may experience some premature sloughing due to the relatively low density and moisture conditions. As the trench walls dry out, additional sloughing should be anticipated. Appropriate lay back or shoring of the trenches should be provided to protect workers entering the trenches.

Backfill of trenches above the bedding/shading zone may be carried out with native excavated material provided material greater than 8 inches is broken down or removed. Material used for backfill of trenches 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.

3.5 New/Completely Reconstructed Asphalt Pavement

It must be noted that all new asphalt pavements will eventually crack. Cracking in asphalt pavement is typical and should be expected over the life of the pavement. In fact, it has been our experience that we are seeing the onset of earlier aging and block shrinkage cracking in the new asphalt binders that are available. These require routine maintenance to prevent accelerated deterioration. Accordingly, it is highly recommended to establish a maintenance program where the cracks are routinely filled as they appear beginning at about the second year of life. It is also recommended that surface fog seal coats be considered beginning at year 5 and every 5 years after. This will help preserve the pavement and extend the service life.

If earthwork in paved areas is carried out to finish subgrade elevations as set forth herein, the subgrade will provide adequate support for pavements. The section capacity is reported as daily ESALs, Equivalent 18 kip Single Axle Loads. Typical heavy trucks impart 1.0 to 2.5 ESALs per truck depending on load. It takes approximately 1200 passenger cars to impart 1 ESAL. In residential subdivisions, the worst offender, construction traffic, is often overlooked. Eastern Street is classified by the City of Kingman as a "minor arterial". Option A presents the results of the originally anticipated structural section prior to this investigation. The traffic capacity for this section greatly exceeds the estimated 1.2 million need as discussed above. For economic reasons, the other Options B through D should be considered. The designer/owner is ultimately responsible for choosing the appropriate section to meet the anticipated traffic volume and life expectancy.

Table 3.5.1 – Asphalt Pavement

Options	Daily/Total 18 kip ESALs	Flexible Pavement	
		AC	AB
A	410 / 2,992,500	5.0"	8.0"
B	160 / 1,173,500	4.0"	8.0"
C	212 / 1,553,000	4.0"	9.0"
D	243 / 1,779,500	5.0"	6.0"

Notes: Per Frank Marbury's email received 12/23/15, Section B should be used to minimize cost.
"P:\Projects\2015\215053 - Eastern Street Design\Project Files\Geotechnical\Speedie Geotechnical Report.pdf"

1. Designs are based on AASHTO design equations and Arizona Department of Transportation (ADOT) correlated R-values.

Pavement Design Parameters:

Assume:	1.5 18 kip Equivalent Single Axle Load (ESAL)/Truck
Life:	20 years
Subgrade Soil Profile:	
% Passing No. 200 Sieve:	41% (avg)
Plasticity Index:	10 (avg)
R-value:	38.7 (per ADOT Tables)
M _R :	17,100 (per AASHTO formula)
Serviceability	
Initial	4.5
Final	2.5
Reliability:	95%
Structural Coefficients:	
Asphalt <4”:	0.39
Asphalt >4”:	0.42
Aggregate Base:	0.12

These structural sections assume that all subgrades are prepared in accordance with the recommendations contained in the “Site Preparation” and “Fill and Backfill” sections of this report, and paving operations are 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. Site drainage should be designed to ensure positive drainage of the base and sub base materials. Improper grading of sub base materials will drastically reduce the overall life of the pavement.

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 (and any City of Kingman/Mohave County modifications) using the Marshall mix design criteria for low volume traffic and PG 70-10 for the asphalt grade. **Reducing the air void content to 3 percent** will aid in reducing thermal cracking typical in the area. 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.

As noted the subgrade soils were dry to moist and relatively soft. It is possible that some areas of existing roadway subgrade will require stabilization during construction. Traditional stabilization methods (i.e. aeration/recompaction) of the subgrade may not be successful due to depth of unstable soils, perched water and/or shallow utility interference. Additional means of stabilizing the subgrade may be necessary.

For driveways supporting only passenger vehicle traffic, a minimum section of 5.0 inches of PCCP over 4 inches of aggregate subbase is recommended. Portland Cement Concrete Pavement must have a minimum 28-day flexural strength 550 psi (compressive strength of approximately 3,700 psi). No reinforcing is necessary. Joint design and spacing should be in accordance with ACI recommendations. Construction joints should contain dowels or be tongue and grooved to provide load transfer. Tie bars are recommended on the joints adjacent to unsupported edges. Maximum joint spacing in feet should not exceed 2 to 3 times the thickness in inches. Joint sealing with a quality silicone sealer is recommended to prevent water from entering the subgrade allowing pumping and loss of support.

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

4.0 GENERAL

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

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

We recommend that a representative of the Geotechnical Engineer observe and test the earthwork and grading 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.

J.D.S.A.

Jeremy DeGeyter, E.I.T.



Gregg A. Creaser, P.E.

APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

CONSOLIDATION TESTS

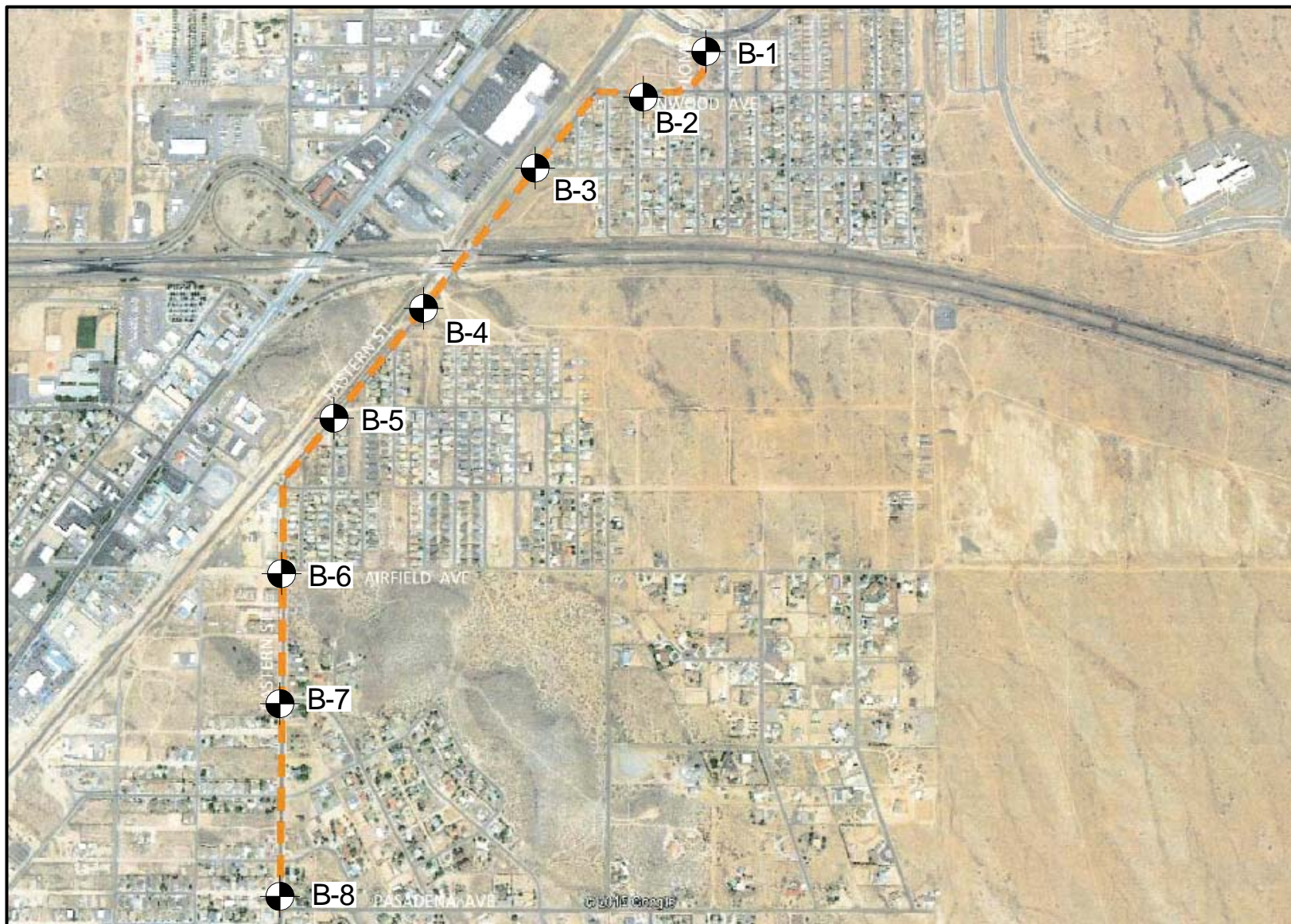
MOISTURE-DENSITY RELATIONS

SWELL TEST DATA

FIELD AND LABORATORY INVESTIGATION

On November 13, 2015, eight structural soil borings were excavated at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our staff engineer, who recorded subsurface conditions and obtained samples for laboratory testing. The borings were excavated with a CME-75 drill rig utilizing 8-inch diameter hollow stem augers. Detailed information regarding the soil borings and samples obtained can be found on an individual Log of Test Boring prepared for each location.

Laboratory testing consisted of moisture content, dry density, grain-size distribution and plasticity (Atterberg Limits) tests for classification and pavement design parameters. Remolded swell tests were performed on samples compacted to densities and moisture contents expected during construction. Compression tests were performed on a selected ring samples in order to estimate settlements and determine effects of inundation. All field and laboratory data are presented in this appendix.



— APPROXIMATE SOIL BORING LOCATIONS

Drawing Courtesy of Ritoch-Powell & Associates

SOIL BORING LOCATION PLAN

Eastern Street Design
Eastern Street
Kingman, Arizona

**SPEEDIE
AND ASSOCIATES**
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
4025 E. HUNTINGTON, SUITE 140
FLAGSTAFF, ARIZONA 86004

DR: JMD | CHK: AAR | REV: | DATE: 12-15-15 | PROJECT NO. 151408SF

SOIL LEGEND

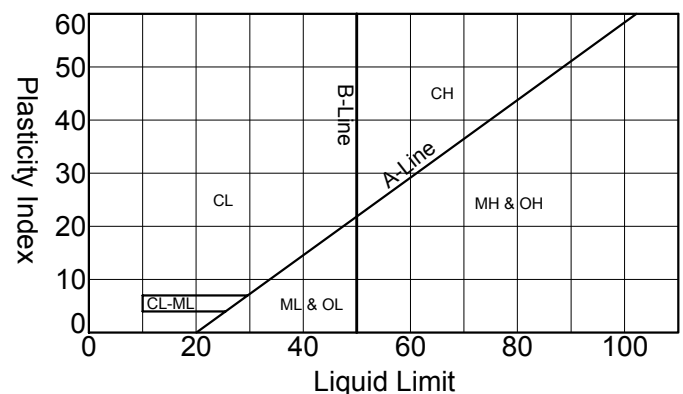
SAMPLE DESIGNATION		DESCRIPTION	
	AS	Auger Sample	A grab sample taken directly from auger flights.
	BS	Large Bulk Sample	A grab sample taken from auger spoils or from bucket of backhoe.
	S	Spoon Sample	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into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

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

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
		CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
FINE GRAINED SOILS	SILTS AND CLAYS	CLEAN SANDS (LITTLE OR NO FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
	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
		Liquid Limit LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		Liquid Limit LESS THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
HIGHLY ORGANIC SOILS	SILTS AND CLAYS	Liquid Limit GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
		Liquid Limit GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		Liquid Limit GREATER THAN 50		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	SILTS AND CLAYS	Liquid Limit GREATER THAN 50		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" x
Coarse	19	0.75" x	75	3" x
COBBLES	75	3" x	300	12" x
BOULDERS	300	12" x	900	36" x
♦U.S. Standard		xClear Square Openings		



Graphic
Log

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

Visual Classification

Medium Dense Brown CLAYEY SAND
(SC-Dry to Moist) with Little Gravel

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

3.5

NT

NT

5.0

BS-2

5.0

NT

NT

End of Boring

Boring Date: 11-13-15
Field Engineer/Technician: J. DeGeyter
Driller: C. Garcia
Contractor: Geomechanics SW

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

NT = Not Tested

SPEEDIE AND ASSOCIATES

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

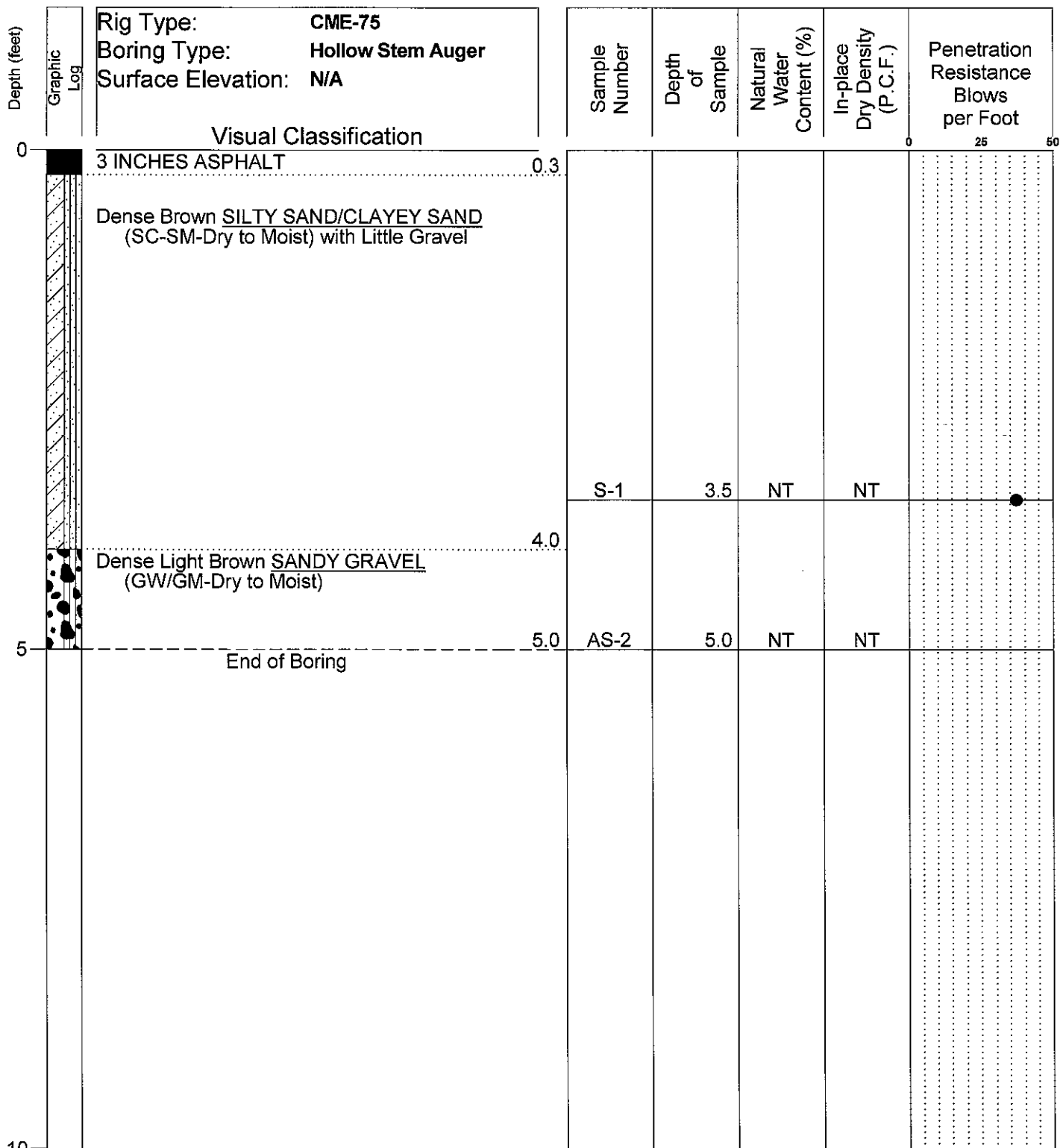
Eastern Street Design

Eastern Street

Kingman, Arizona

Project No.: 151408SF

SPEEDIE 151408SF GP.1 GENGE0 GDT 12/28/15

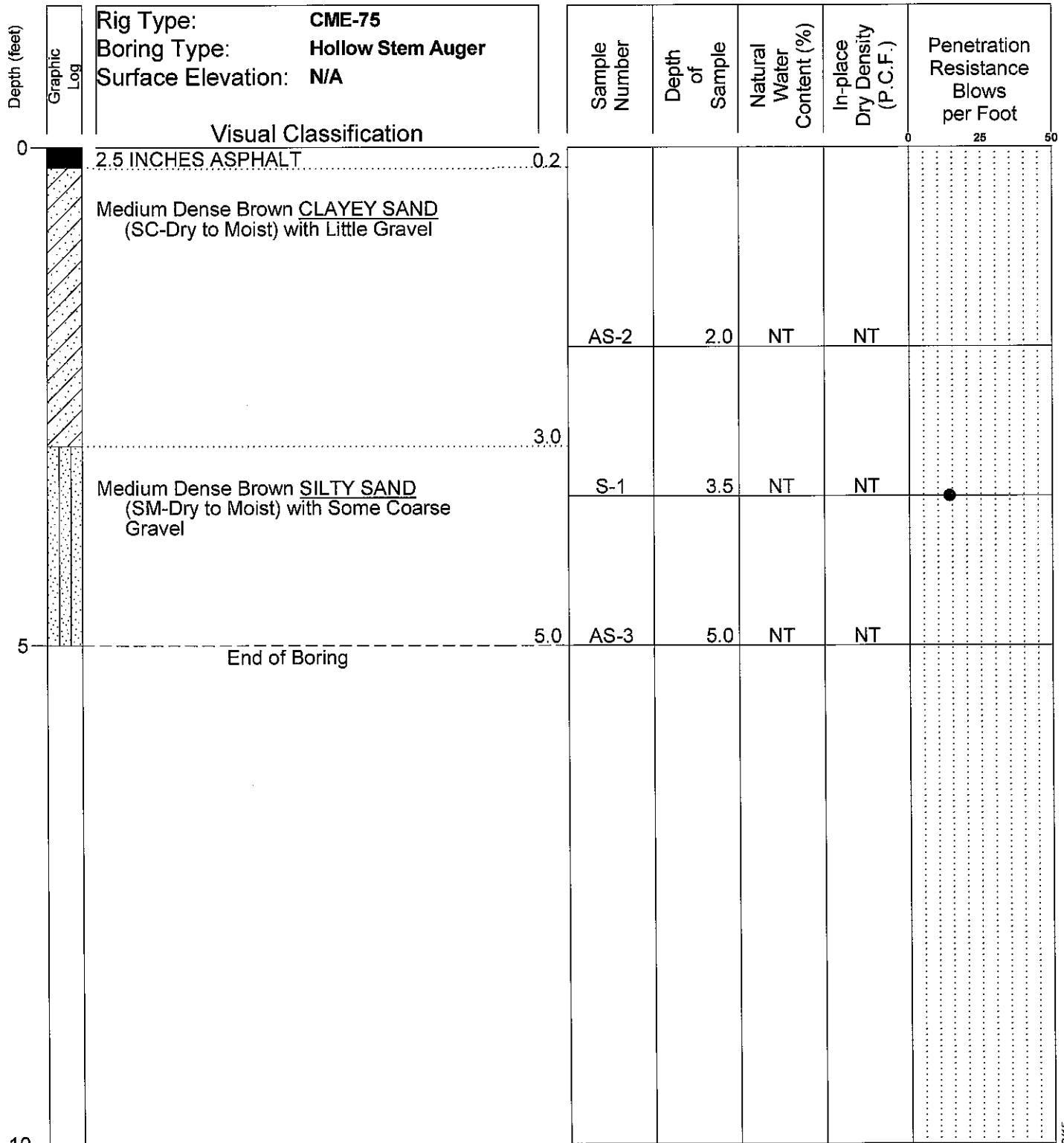


Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B- 2	
Eastern Street Design Eastern Street Kingman, Arizona	
Project No.: 151408SF	



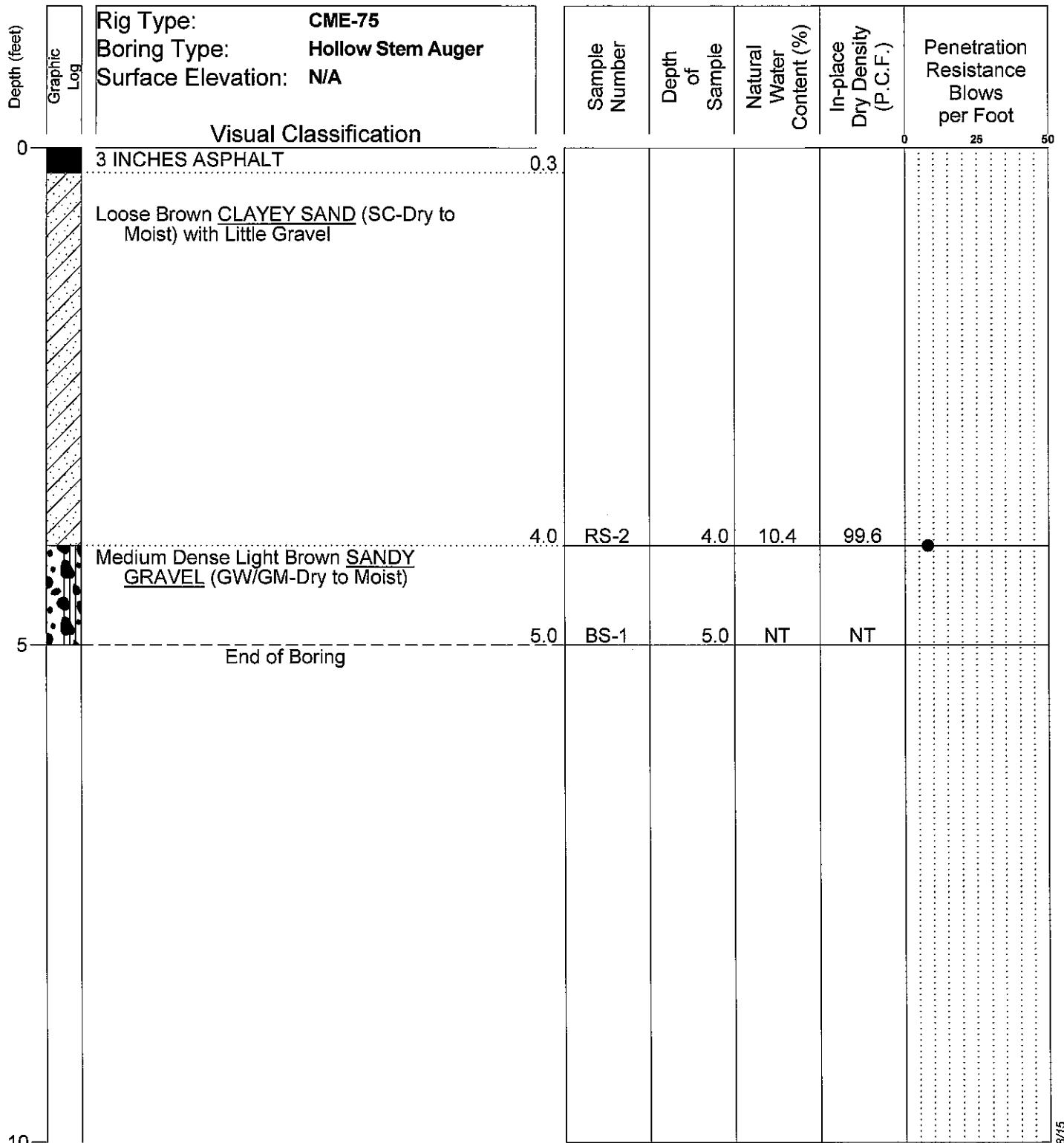
Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
Log of Test Boring Number: B- 3
Eastern Street Design Eastern Street Kingman, Arizona
Project No.: 151408SF

SPEEDIE 151408SF.GPJ GENOEO.GDT 12/28/15

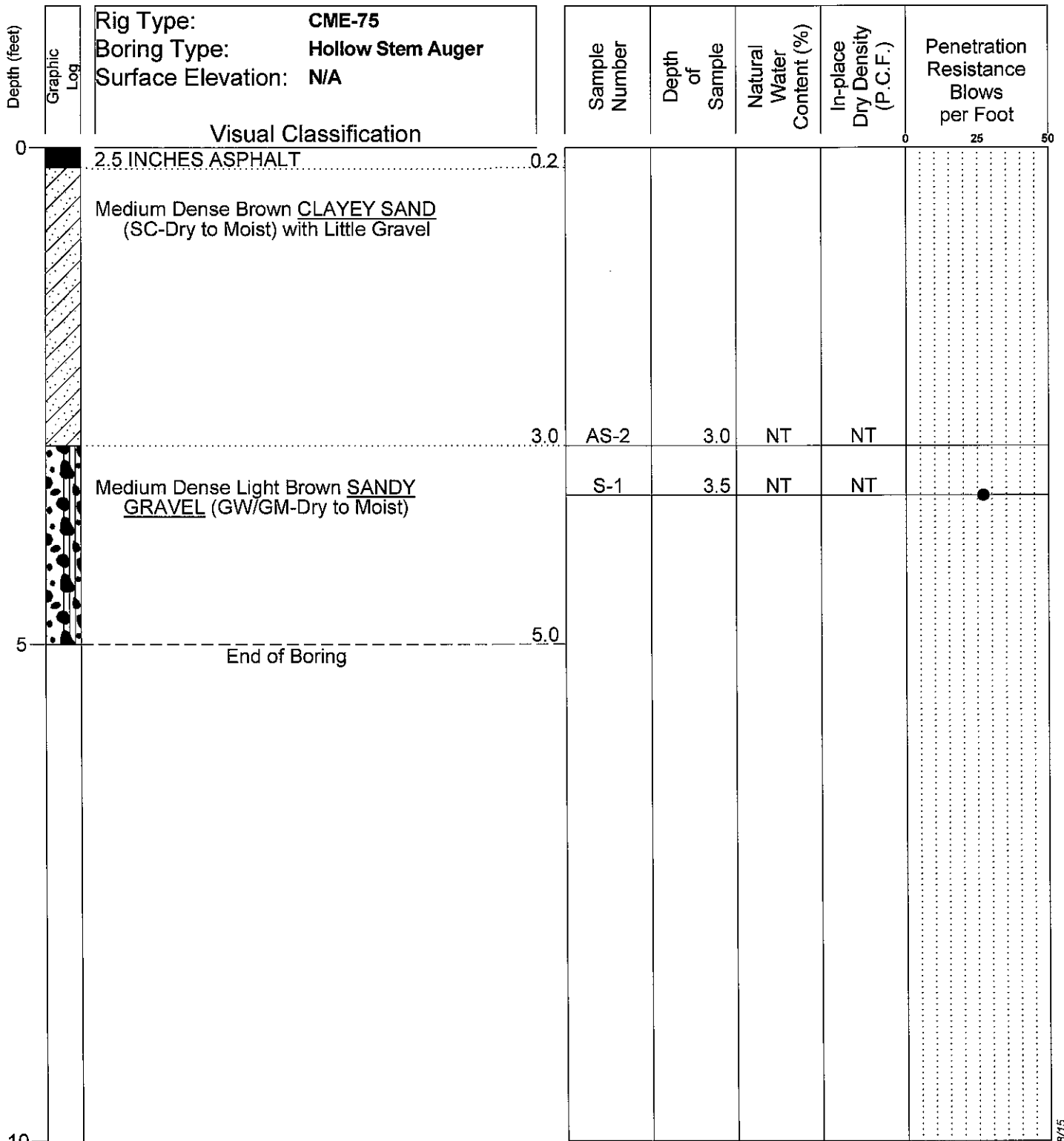


Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B- 4	
Eastern Street Design Eastern Street Kingman, Arizona	
Project No.: 151408SF	

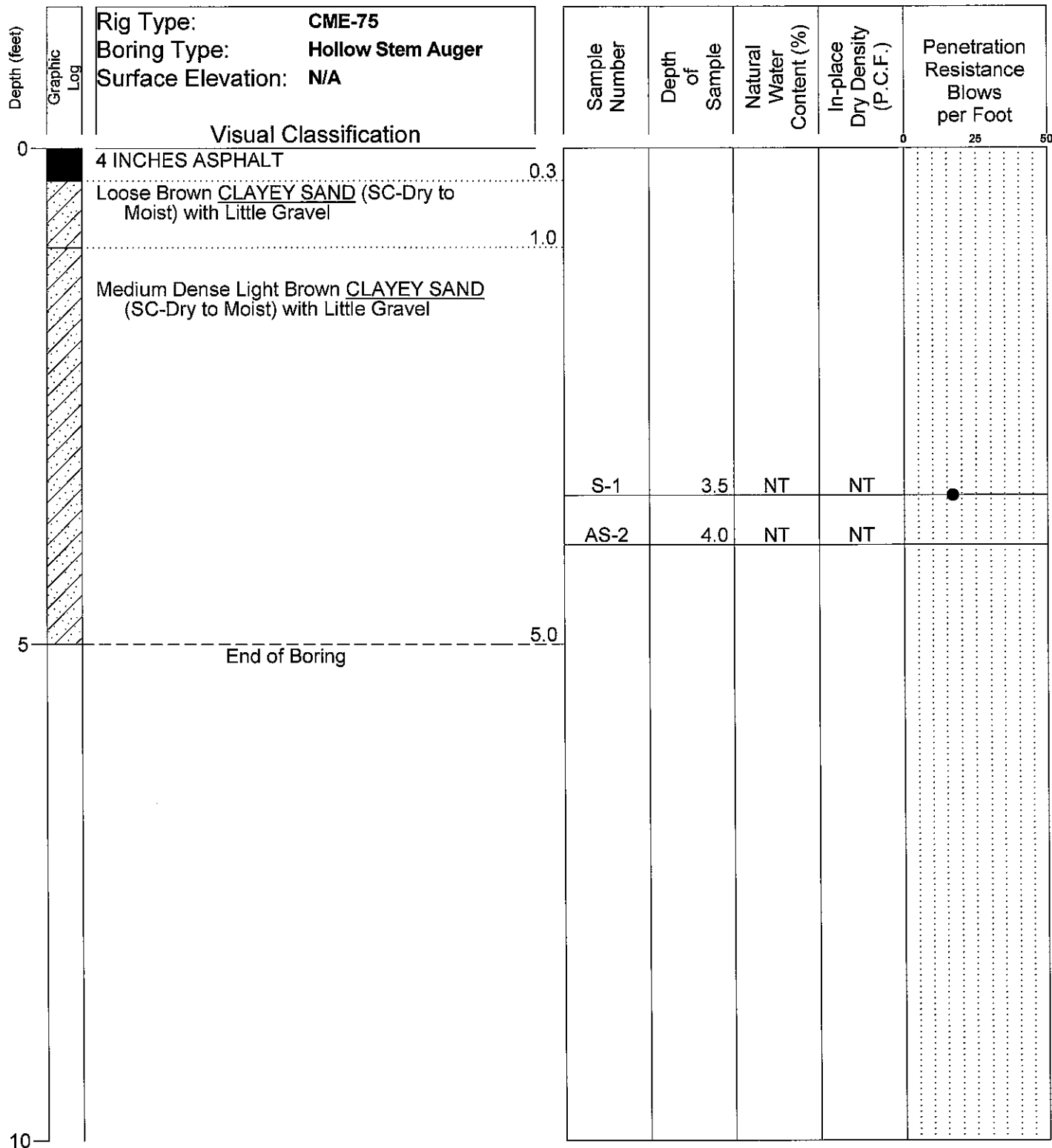


Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
Log of Test Boring Number: B- 5
Eastern Street Design Eastern Street Kingman, Arizona
Project No.: 151408SF

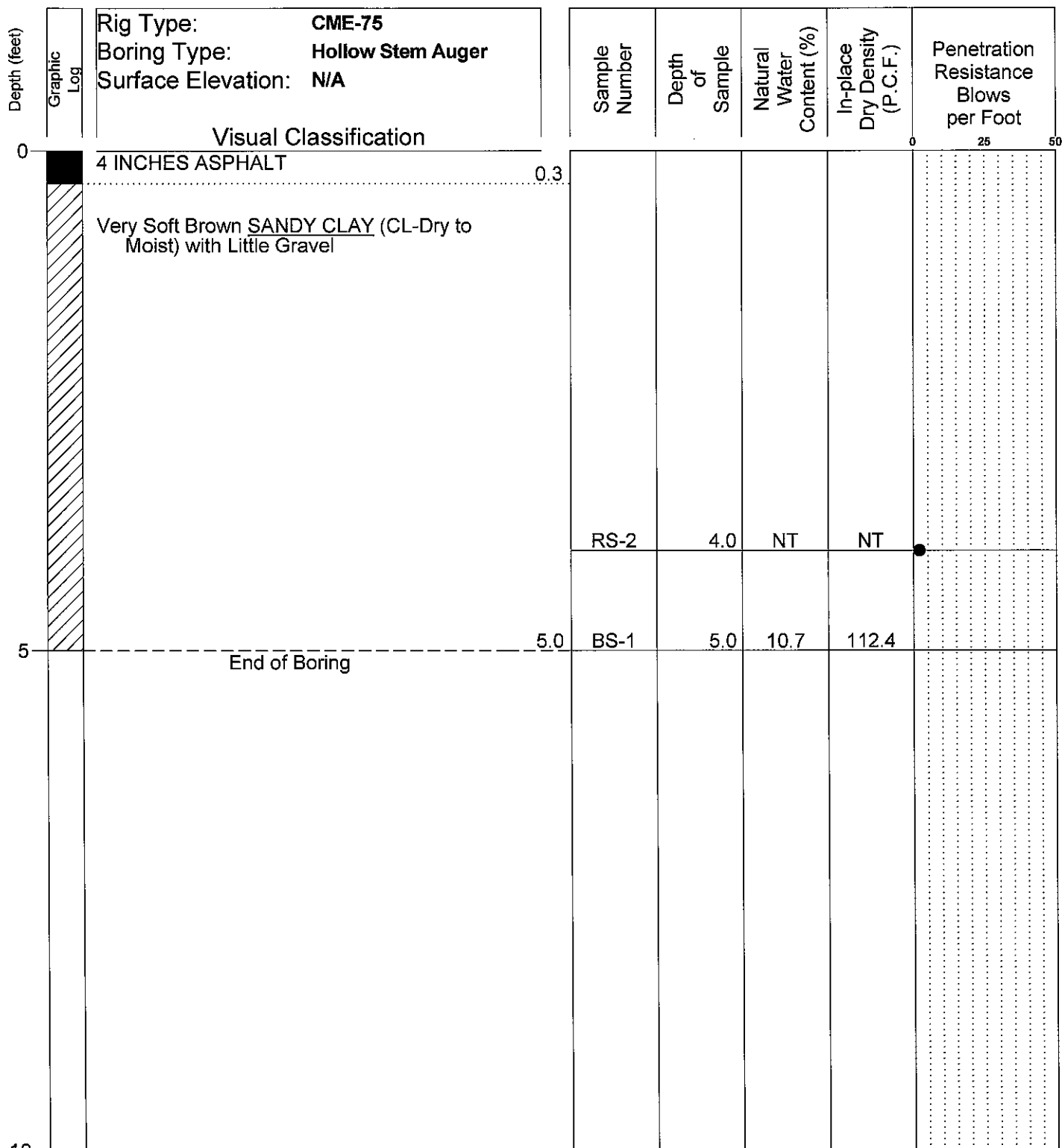


Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B-6	
Eastern Street Design Eastern Street Kingman, Arizona	
Project No.: 151408SF	

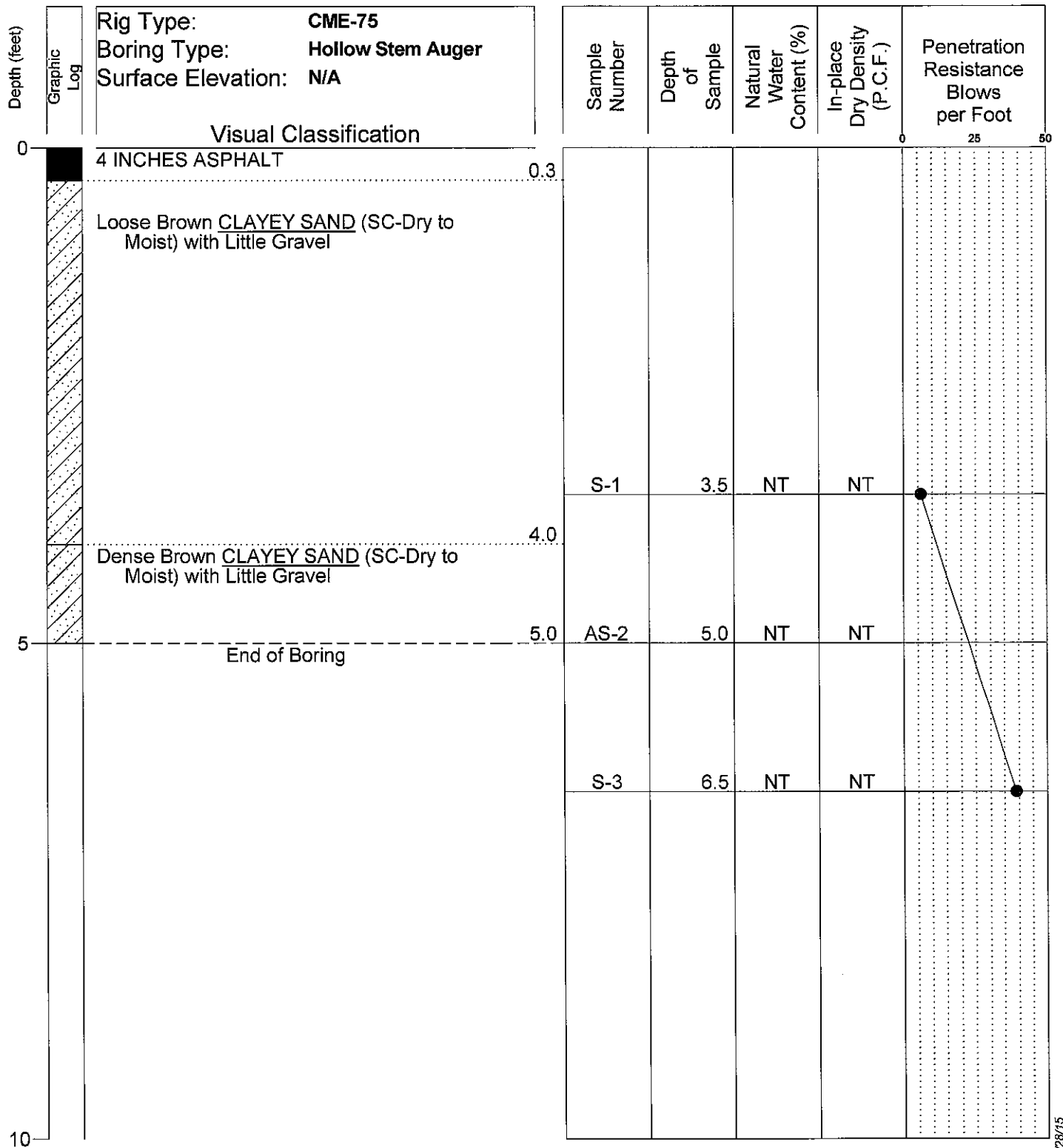


Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES
Log of Test Boring Number: B-7
Eastern Street Design Eastern Street Kingman, Arizona
Project No.: 151408SF



Boring Date: 11-13-15
 Field Engineer/Technician: J. DeGeyter
 Driller: C. Garcia
 Contractor: Geomechanics SW

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B- 8	
Eastern Street Design Eastern Street Kingman, Arizona	
Project No.: 151408SF	

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			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B- 1	BS-2	BULK	0.0 - 5.0	NT	NT	33	50	70	88	100	26	17	9	SC	CLAYEY SAND
B- 2	S-1	SPT	2.0 - 3.5	NT	NT	44	62	80	94	100	24	18	6	SC-SM	SILTY, CLAYEY SAND
B- 3	AS-3	AUGER	3.0 - 5.0	NT	NT	17	27	48	69	100	22	21	1	SM	SILTY SAND with GRAVEL
B- 4	BS-1	BULK	1.0 - 5.0	NT	NT	33	49	69	88	100	27	22	5	SM	SILTY SAND
B- 4	RS-2	RING	3.0 - 4.0	10.4	99.6	42	58	75	90	100	31	17	14	SC	CLAYEY SAND
B- 5	AS-2	AUGER	1.0 - 3.0	NT	NT	40	58	75	90	100	32	23	9	SC	CLAYEY SAND
B- 6	S-1	SPT	2.0 - 3.5	NT	NT	36	50	67	86	100	35	21	14	SC	CLAYEY SAND
B- 7	BS-1	BULK	1.0 - 5.0	10.7	112.4	52	66	80	90	100	29	17	12	CL	SANDY LEAN CLAY
B- 8	AS-2	AUGER	3.0 - 5.0	NT	NT	45	58	76	92	100	32	18	14	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.

NT=Not Tested

Sheet 1 of 1

Eastern Street Design
Eastern Street
Kingman, Arizona
Project No. 151408SF

**SPEEDIE
AND ASSOCIATES**

CONSOLIDATION TEST

PROJECT: Eastern Street Design

PROJECT NO.: 151408SF

LOCATION: Eastern Street

DATE: 11/13/15

BORING NO.: B-4

SAMPLE NO.: RS-2

SAMPLE DEPTH: 3 to 4

LABORATORY NO.: RV042

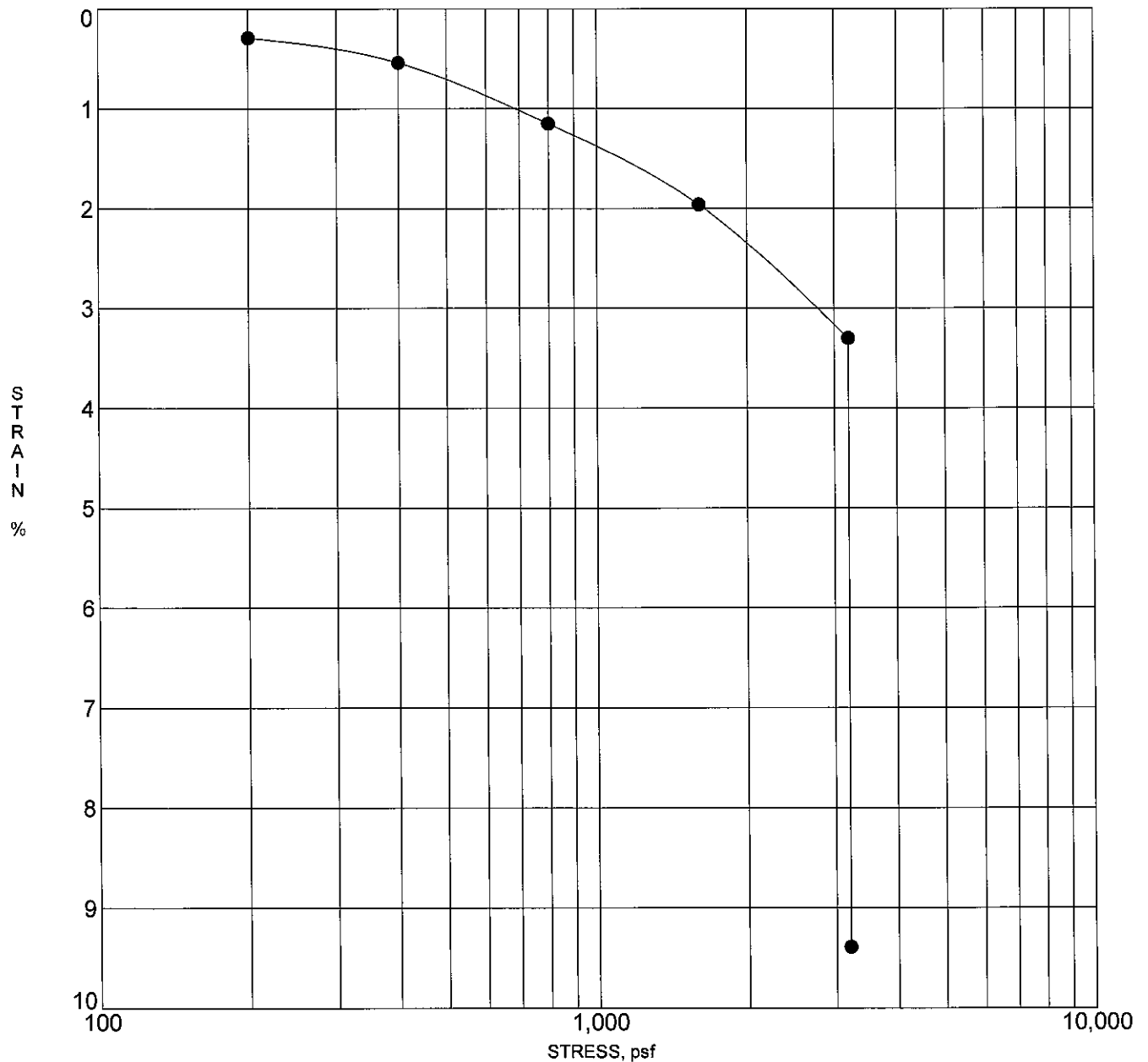
LIQUID LIMIT: 31

PLASTIC LIMIT: 17

PLASTICITY INDEX: 14

CLASSIFICATION: SC

ASTM SOIL DESCRIPTION: CLAYEY SAND



SPEEDIE
AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Eastern Street Design

PROJECT NO.: 151408SF

LOCATION: Eastern Street

DATE: 11/13/15

BORING NO.: B-7

SAMPLE NO.: BS-1

SAMPLE DEPTH: 1 to 5

LABORATORY NO.: RV043

METHOD OF COMPACTION: D698A

LIQUID LIMIT: 29

PLASTIC LIMIT: 17

PLASTICITY INDEX: 12

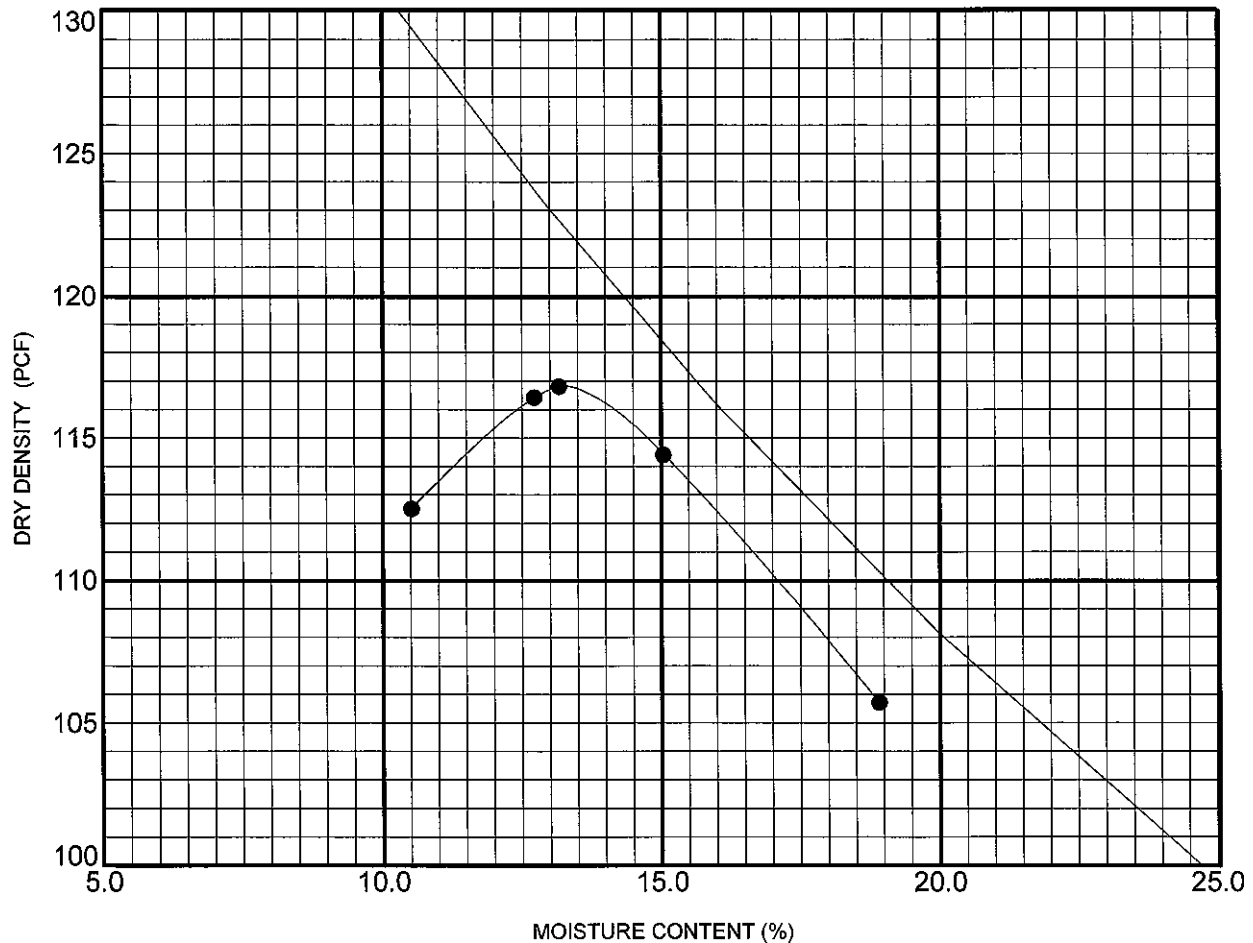
CLASSIFICATION: CL

ASTM SOIL DESCRIPTION:

SANDY LEAN CLAY

MAXIMUM DRY DENSITY: 116.9 PCF

OPTIMUM MOISTURE CONTENT: 13.3%



SPEEDIE
AND ASSOCIATES

SWELL TEST DATA

BORING or TEST PIT No.	SAMPLE DEPTH, ft	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	REMOLDED DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	PERCENT COMPACTION	FINAL MOISTURE CONTENT (%)	CONFINING LOAD (psf)	TOTAL SWELL (%)
---------------------------	---------------------	---------------------------------	------------------------------------	----------------------------------	------------------------------------	-----------------------	----------------------------------	----------------------------	--------------------

B-7, BS-1	5.0	116.9	13.3	112.4	10.7	96.2	17.1	100	2.0
-----------	-----	-------	------	-------	------	------	------	-----	-----