

PAVEMENT DESIGN SUMMARY

Pavement Design Summary

Tangerine Road Corridor Project
Interstate 10 to La Canada Drive
Pima County, Arizona

December 30, 2011

Terracon Project No. 63105079, Revision 3

Prepared for:
Psomas, Inc.
Tucson, Arizona

Prepared by:
Terracon Consultants, Inc.
Tucson, Arizona



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Geotechnical ■ Environmental ■ Construction Materials ■ Facilities



December 30, 2011

Psomas, Inc.
800 East Wetmore Road
Suite 110
Tucson, AZ 85719

Attn: Alejandro Angel, P.E.
P: 520.690.7866
F: 520.690.1290
E: aangel@psomas.com

Re: Pavement Design Summary
Tangerine Road Corridor Project
Interstate 10 to La Canada Drive
Pima County, Arizona
Terracon Project No. 63105079, Revision 3

Terracon Consultants, Inc. (Terracon) has completed the pavement design services for the above referenced project. This report is specific to the roadway portion of the project. These services were performed in general accordance with our proposal, number P63100026 Revision 1, dated February 26, 2010. A roadway geotechnical report has also been provided under a separate cover. This pavement design report provides geotechnical recommendations concerning earthwork and the design and construction of pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Bryan W. Reed, P.E.
Project Manager
bwreed@terracon.com

Oleg B. Lysyj, P.E.
Principal
obllysj@terracon.com

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Copies to: Addressee (1 via email, 1 via mail)



Terracon Consultants, Inc. 355 S. Euclid, Suite 107 Tucson, Arizona 85719
P [520] 770 1789 F [520] 792 2539 terracon.com

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APPENDIX A – FIELD EXPLORATION

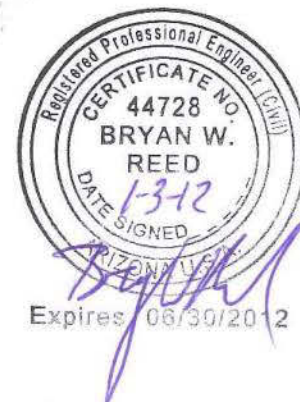
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| Exhibit A-1 to A-27 | Site Plan and Boring Locations Diagram |
| Exhibit A-28 to A-30 | Laboratory Test Data Summary |

APPENDIX B – FLEXIBLE PAVEMENT DESIGN

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| Exhibit B-1 to B-3 | Design Lane ESAL's |
| Exhibit B-4 to B-18 | Flexible Pavement Design Analysis Worksheets |

APPENDIX C – SUPPORTING DOCUMENTS

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| Exhibit C-1 | Response to Comments |
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**PAVEMENT DESIGN SUMMARY
TANGERINE ROAD CORRIDOR PROJECT
INTERSTATE 10 TO LA CANADA DRIVE
PIMA COUNTY, ARIZONA**

Terracon Project No. 63105079, Revision 3

1.0 INTRODUCTION

This report presents the results of our pavement design services performed for the Tangerine Road Corridor Project, extending from Interstate 10 to La Canada Drive, in Pima County, Arizona. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- pavement subgrade soil conditions
- recommended pavement sections

The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and experience with similar geotechnical conditions, pavement structures and our understanding of the proposed project.

1.1 Project Location and Limits

We understand the project will consist of improvements to Tangerine Road. The project alignment extends from the approximate location of the eastern limits of a proposed traffic interchange on the east side of Interstate 10 to the west side of the La Canada Drive intersection (approximately 9.9 miles). The project also incorporates roadway sections 1,500 feet north and south of each of the intersections of Tangerine Road with La Cholla Boulevard and Thornydale Road. We understand the improvements will include reconstructing and widening the existing 2-lane road to a total of 4 lanes, construction of new CMP and RCB culvert crossings, the extension of existing drainage structures at wash crossings, and the possible construction of new multi-purpose culvert or bridge structures for pedestrian and wildlife crossing/access. New traffic signal lights will be installed at intersections. We also understand that no large retaining walls (greater than 6-feet tall) are anticipated as part of the design and construction.

At this time we expect that final grades will be within 1 to 5 feet from the existing surface elevations. A combination of cut and fill is expected along the project alignment. The new pavement surface will generally follow the existing roadway alignment.

1.2 Scope of Work

The scope of work for the pavement engineering services in the project consist of analyzing the boring and laboratory data of our subsurface explorations, and determining pavement design sections for the project. The pavement thickness designs for the project have been based on utilizing the geotechnical data from the Terracon Geotechnical Engineering Report, traffic data (as provided by others), and American Association of State Highway Transportation Officials (AASHTO)¹, design procedures, as modified by the Arizona Department of Transportation (ADOT)² and Pima County Department of Transportation (PCDOT)³.

2.0 TEST DATA

A total of 119 borings, designated as boring numbers B-001 through B-119, were drilled between October 25, 2010 and January 5, 2011 for the specific purpose of pavement thickness design. The borings were drilled to approximate depths between 6 feet to 31½ feet at the locations shown on the Site Plan and boring locations diagram (Appendix A, Exhibits A-1 to A-27). Borings were advanced with a truck-mounted drilling rig, utilizing 8-inch diameter hollow-stem auger.

Continuous lithologic logs of each boring were recorded by our geotechnical engineer during the drilling operations. Logs of the borings have been provided in the appendix of the Roadway Geotechnical Engineering Report dated September 21, 2011. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were obtained from borings in pavement areas.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel into the subsurface materials with a 140-pound hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency, relative density or hardness of the materials encountered.

Groundwater conditions were evaluated in each boring at the time of site exploration.

¹**AASHTO Guide for Design of Pavement Structures**, American Association of State Highway and Transportation Officials, Washington D.C. (1993)

²**Materials Preliminary Engineering and Design Manual**, Third Edition, State of Arizona Department of Transportation, Phoenix, Arizona, (1992)

³**Pima County Roadway Design Manual**, Third Edition, Pima County Department of Transportation, Pima County, Arizona, (2010)

For pavement evaluation, the following laboratory tests were performed on subgrade samples obtained from our borings:

- Percent Fines
- Plasticity Index
- R-Values

Sieve analysis of soil samples tested indicates the fines (material passing the No. 200 sieve) range from 7.7 to 68 percent. Atterberg Limits tests show the plasticity indices of the soils tested range from non-plastic to 20. Results of the laboratory R-value tests range from 25 to 86.

The previous discussion of test data is intended to be a summary of the exploration and laboratory testing relevant to the pavement thickness design. Please refer to our Roadway Geotechnical Engineering Report (Terracon Project No. 63105079 dated August 21, 2011) for further details on exploration procedures, detailed boring logs and other geotechnical data.

3.0 PAVEMENT THICKNESS DESIGN

3.1 General

The subgrade soils along the project alignment at pavement subgrade elevation generally consist of silty sand. Overall, the site soils are considered to have good pavement subgrade support characteristics.

Because the soils encountered and projected traffic volumes vary along the alignment we have provided 6 separate pavement sections for the project. The design analysis for each of these sections is discussed in the following paragraphs:

3.2 Pavement Subgrade Parameters

The resilient modulus for pavement design was determined by analysis of the correlated and laboratory tested R-value data in accordance with the procedures according to Pima County. The resilient modulus analysis was based on the data contained in Appendix A; summarized in the table Laboratory Test Data Summary, Exhibits A-28 through A-30.

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Based on our analysis the following table summarizes the design subgrade values for each section of the roadway:

Project Section		Correlated R-Values	Laboratory R-Values	Mean R-Value	Calculated Resilient Modulus* (M _r)
Tangerine Soil Section 1 (B-001 to B-010)	Mean	39.9	30.5	36	15,656
	Standard Deviation	15.5	7.8		
Tangerine Soil Section 2 (B-011 to B-052)	Mean	77.8	68.5	76	26,000
	Standard Deviation	8.0	8.4		
Tangerine Soil Section 3 (B-053 to B-095)	Mean	70.6	62.2	67	26,000
	Standard Deviation	12.1	6.5		
Tangerine Soil Section 4 (B-096 to B-106)	Mean	51.7	42.5	44	19,774
	Standard Deviation	19.6	3.5		
La Cholla (Borings B-107 to B-113)	Mean	50.9	55.5	53	24,559
	Standard Deviation	20.9	16.3		
Thornydale (Borings B-114 to B-119)	Mean	65.5	65.5	66	26,000
	Standard Deviation	17.7	19.1		

*ADOT recommends the Design Resilient Modulus be limited to no more than 26,000

Based on our understanding of the anticipated traffic patterns, the soil in the middle section of Tangerine Road described in Section 3.0 was analyzed as two sections, divided by Dove Mountain Road in the table above, they are identified as Tangerine Soil Section 2 and Tangerine Soil Section 3.

In addition to the design R-value for each roadway section, a construction control R-value was also calculated. The construction control R-value is used to determine the lower bounds of the resilient modulus that existing on-site soils need to meet in order to provide adequate subgrade support for the proposed pavement sections. On-site soils that have a correlated R-value below the construction control R-value should be removed from the roadway prism and replaced with material that meets or exceeds the design R-value. ADOT recommends limiting the construction control R-value to 5 below the design R-value, this is to reduce future maintenance and increase pavement reliability in poor subgrade locations. However, in order to reduce the

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amount of earthwork required, we recommend lowering both the construction control R-value and the design R-value so all existing on-site soils can remain in place. We have used the lowered R-values for this pavement design, but have also provided alternative pavement design sections for the removal and replacement, or treatment of subgrade soils, along the portions of the project where subgrade soils do not meet the construction control R-value.

Lowering the design R-value will generally increase the total designed pavement section thickness, however for most of the project this increase is minimal, and along some Sections there is no change to the design pavement thickness. The exception is along Tangerine Road within Section 1 and Section 4. Within Section 1; of the 10 boring locations, 3 borings encountered soils with a correlated R-value less than the calculated construction control R-value. Within Section 4; of the 11 boring locations, 4 borings encountered soils with a correlated R-value less than the calculated construction control R-value.

The soils with correlated R-values less than the construction control R-value would need to be removed to a depth of 3 feet below the pavement surface and replaced with materials meeting the equation provided for imported soil material for each of the respective section on pages 17 and 18 of this report. As an alternative to removal and replacement we have provided a pavement section that includes using 6-inches of cement treated subgrade in the areas where soils along Tangerine Section 1 and Section 4 do not meet the calculated construction control R-value. The locations where treatment will be required are summarized in the following tables:

Estimated Area of Subgrade Soils Outside the Construction Control R-Value For Tangerine Road Section 1		Correlated R-Value
Boring Location	Approximate Station Range	
B-001	444+00 to 449+45	25
B-003	454+30 to 463+95	26
B-004		27

Estimated Area of Subgrade Soils Outside the Construction Control R-Value For Tangerine Road Section 4		Correlated R-Value
Boring Location	Approximate Station Range	
B-096	907+12 to 912+60	27
B-099	921+25 to 932+50	37
B-100		36
B-104	942+90 to 948+03	32

The following table provides the recommended design and construction control R-values for each section of the roadway:

Soil Section ¹	Recommended Design R-Value	Construction Control R-Value	Recommended Design Resilient Modulus (M _r)
Tangerine Soil Section 1 (B-001 to B-010) (Sta 444+00 to 494+00)	30	25	13,001
Tangerine Soil Section 2 (B-011 to B-052) (Sta 494+00 to 700+00)	54	49	25,412
Tangerine Soil Section 3 (B-053 to B-095) (Sta 700+00 to 907+50)	52	47	24,250
Tangerine Soil Section 4 (B-096 to B-106) (Sta 907+50 to 960+00)	32	27	13,907
La Cholla Soil Section 5 (Borings B-107 to B-113)	39	34	17,262
Thornycroft Soil Section 6 (Borings B-114 to B-119)	52	47	24,250

Note 1: Stationing is approximate. No stationing was provided for La Cholla Boulevard or Thornycroft Road

3.3 Traffic Analysis

We were provided 20-year design equivalent single axle loads (ESALs) for Tangerine Road, La Cholla Boulevard south of Tangerine Road, and Thornycroft Road south of Tangerine Road. The information provided by Psomas is provided in Appendix B (Exhibits B-1 to B-3).

The design lane ESALs provided are summarized as follows:

Location	Design Lane ESALs
Tangerine West (Interstate 10 to Dove Mountain)	9,231,214
Tangerine East (Dove Mountain to La Canada)	8,113,113
La Cholla Boulevard (south of Tangerine Road)	2,163,711
La Cholla Boulevard (north of Tangerine Road)*	2,163,711

Location	Design Lane ESALs
Thornycastle Road (south of Tangerine Road)	2,890,411
Thornycastle Road (north of Tangerine Road)*	2,890,411

*No design ESALs were provided for these sections. The values provided are assumed based on the values for the sections that extend south of Tangerine Road.

3.4 Pavement Design Parameters

The following is a summary of all parameters utilized for pavement thickness design for each section on this project:

Tangerine Road Pavement Section 1 – Station 445+00 to 494+00

Parameter	Value
Design ESAL's	
Tangerine West (Interstate 10 to Dove Mountain)	9,231,214
Design Subgrade Resilient Modulus (psi)	13,001 ¹
Tangerine Soil Section 1 (B-001 to B-010)	15,656 ²
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Cement Treated Subgrade (CTS)	0.23 ³
Drainage Coefficient	0.92

Note 1: Subgrade Modulus if the Design R-value and Construction Control R-value are lowered so that all on-site soils can remain in place without improvement

Note 2: Subgrade Modulus if the calculated Design R-value is used and soils that do not meet the Construction Control R-value are removed and replaced, or the on-site soils are improved as cement treated subgrade. Locations where soils do not meet the construction control value are presented on Page 5 of this report.

Note 3: Pavement Layer Coefficient prescribed by Pima County reference (Table 3.15). CTS must have a 7-day unconfined compressive strength of 800psi in order to provide this Pavement Layer Coefficient (Per Figure 2.02.02-4 of the ADOT reference).

Tangerine Road Pavement Section 2 – Station 494+00 to 700+00

Parameter	Value
Design ESAL's Tangerine West (Interstate 10 to Dove Mountain)	9,231,214
Design Subgrade Resilient Modulus (psi) Tangerine Soil Section 2 (B-011 to B-052)	25,412
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Drainage Coefficient	0.92

Tangerine Road Pavement Section 3 – Station 700+00 to 907+50

Parameter	Value
Design ESAL's Tangerine East (Dove Mountain to La Canada)	8,113,113
Design Subgrade Resilient Modulus (psi) Tangerine Soil Section 3 (B-053 to B-095)	24,250
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Drainage Coefficient	0.92

Tangerine Road Pavement Section 4 – Station 907+50 to 960+00

Parameter	Value
Design ESAL's	
Tangerine East (Dove Mountain to La Canada)	8,113,113
Design Subgrade Resilient Modulus (psi)	13,907 ¹
Tangerine Soil Section 4 (B-096 to B-0106)	19,834 ²
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Cement Treated Subgrade (CTS)	0.23 ³
Drainage Coefficient	0.92

Note 1: Subgrade Modulus if the Design R-value and Construction Control R-value are lowered so that all on-site soils can remain in place without improvement

Note 2: Subgrade Modulus if the calculated Design R-value is used and soils that do not meet the Construction Control R-value are removed and replaced, or the on-site soils are improved as cement treated subgrade. Locations where soils do not meet the construction control value are presented on Page 5 of this report.

Note 3: Pavement Layer Coefficient prescribed by Pima County reference (Table 3.15). CTS must have a 7-day unconfined compressive strength of 800psi in order to provide this Pavement Layer Coefficient (Per Figure 2.02.02-4 of the ADOT reference).

La Cholla Boulevard Pavement Section 5

Parameter	Value
Design ESAL's	2,163,711
Design Subgrade Resilient Modulus (psi) La Cholla Soil Section 5 (B-107 to B-113)	17,262
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Drainage Coefficient	0.92

Thornydale Road Pavement Section 6

Parameter	Value
Design ESAL's	2,890,411
Design Subgrade Resilient Modulus (psi) Thornydale Soil Section 6 (B-114 to B-119)	24,250
Seasonal Variation Factor	1.7
Level of Reliability	95%
Combined Standard Error (S _o)	0.35
Initial PSI	4.2
Terminal PSI	2.8
Pavement Layer Coefficient	
Asphalt Rubber Asphaltic Concrete (ARAC)	0.55
Asphalt Concrete (AC)	0.44
Aggregate Base Course (AB)	0.12
Drainage Coefficient	0.92

3.5 Design Thickness Calculations and Recommended Pavement Sections

Flexible pavement thickness designs for the project have been performed in accordance with the AASHTO procedures, as modified by ADOT and PCDOT. Design calculations incorporating

the parameters outlined above, are shown on the Flexible Pavement Design Worksheets included in Appendix B (Exhibits B-4 to B-10).

Results of the design calculations to determine the minimum required structural number (SN) for each roadway section are summarized below:

Pavement Area	Calculated SN ¹	Recommended SN ²	Minimum Required SN
Tangerine Section 1	3.96	4.27	2.64
Tangerine Section 1 with CTS	3.96	4.27	4.13 ³
Tangerine Section 2	3.23	3.26	2.64
Tangerine Section 3	3.15	3.25	2.64
Tangerine Section 4	3.53	4.07	2.64
Tangerine Section 4 with CTS	3.53	4.07	4.13 ³
La Cholla Section 5	2.55	2.95	2.64
Thornydale Section 6	2.63	2.70	2.64

Note 1: SN if removal and replacement, or cement treatment, of the subgrade soils is performed at areas within the Section where the on-site soils do not meet the Construction Control R-value.

Note 2: Based on using a lowered design R-value to allow all on-site soils to remain in place.

Note 3: Although the minimum structural number for pavements supported by CTS is not specifically prescribed in the Pima County Roadway Design Manual this is the implied minimum required structural based on the minimum requirements of the Arterial Roadway Section using AC, or ARAC, as a surface course, and a minimum of 6-inches of CTS.

Pima County recommends a minimum structural number of 2.64 and minimum asphalt pavement section of 5-inches for Arterial Roads. The controlling structural number that governs the pavement thickness design for each section is the larger of the Recommended SN or Minimum Required SN from the previous table, except where noted.

Based upon the determination of the required minimum structural number and other considerations previously discussed in this report, the following alternative pavement sections should be considered for design:

Pavement Area	Alternative	ARAC (in)	AC (in)	ABC (in)	CTS (in)	SN	Control SN
Tangerine Section 1	A ¹	--	7.5	9	--	4.29	4.27
	B ¹	--	8.0	8	--	4.40	
	C ¹	2.0	5.5	8	--	4.40	
	D ¹	1.5	6.0	8	--	4.35	
	E ²		5.0	5	6	4.13	4.13
	F ²	2.0	2.5	5	6	4.13	
	G ²	1.5	3.5	5	6	4.30	
	H ²		7.0	8	--	3.96	3.96
	I ²	2.0	4.5	8	--	3.96	
	J ²	1.5	5.5	7	--	4.02	
Tangerine Section 2	A	--	5.5	8	--	3.30	3.26
	B	--	6.0	6	--	3.30	
	C	2.0	3.0	8	--	3.30	
	D	1.5	4.0	8	--	3.47	
Tangerine Section 3	A	--	5.5	8	--	3.30	3.25
	B	--	6.0	6	--	3.30	
	C	2.0	3.0	8	--	3.30	
	D	1.5	3.5	8	--	3.25	
Tangerine Section 4	A ³	--	7.5	8	--	4.18	4.07
	B ³	--	7.0	9	--	4.07	
	C ³	2.0	4.5	10	--	4.18	
	D ³	1.5	5.0	10	--	4.13	
	E ⁴		5.0	5	6	4.13	4.13
	F ⁴	2.0	2.5	5	6	4.13	
	G ⁴	1.5	3.5	5	6	4.30	
	H ⁴		6.5	7	--	3.63	3.53
	I ⁴	2.0	4.0	7	--	3.63	
	J ⁴	1.5	4.5	7	--	3.58	
La Cholla Section 5	A	--	5.0	7	--	2.97	2.95
	B	--	5.5	6	--	3.08	

Pavement Area	Alternative	ARAC (in)	AC (in)	ABC (in)	CTS (in)	SN	Control SN
	C	2.0	3.0	5	--	2.97	
	D	1.5	3.5	6	--	3.03	
Thornydale Section 6	A	--	5.0	5	--	2.75	2.70
	B	2.0	2.5	5	--	2.75	
	C	1.5	3.0	5	--	2.70	

Note 1: Alternatives A, B, C, and D for Tangerine Section 1 have been provided to generally allow all on-site soils to remain in place, and support the proposed pavement section. These four alternatives include a thicker pavement section reflecting the fact that subgrade soils with relatively poor subgrade support will remain in place.

Note 2: Alternatives E through J for Tangerine Road Section 1 provide thinner pavement section alternatives with understanding that Cement Treated Subgrade (CTS) will be required at locations within Tangerine Road Section 1 where the on-site subgrade soils do not meet the construction control value provided on page 15 for Alternatives E through J. At locations where the on-site soils exceed the construction control value the CTS may be omitted and alternatives H, I, and J should be used.

Note 3: Alternatives A, B, C, and D for Tangerine Section 4 have been provided to generally allow all on-site soils to remain in place, and support the proposed pavement section. These four alternatives include a thicker pavement section reflecting the fact that subgrade soils with relatively poor subgrade support will remain in place.

Note 4: Alternatives E through J for Tangerine Road Section 4 provide thinner pavement section alternatives with understanding that Cement Treated Subgrade (CTS) will be required at locations within Tangerine Road Section 1 where the on-site subgrade soils do not meet the construction control value provided on page 17 for Alternatives E through J. At locations where the on-site soils exceed the construction control value the CTS may be omitted and alternatives H, I, and J should be used.

Additional pavement section alternatives may be provided if requested.

4.0 PAVEMENT MATERIALS AND CONSTRUCTION

Earthwork and roadway grading shall be performed in conformance with the requirements of Sections 203 and 205 of the standards and specifications of the City of Tucson/Pima County (PAG)⁴ unless provided otherwise on the Plans or in the Special Provisions.

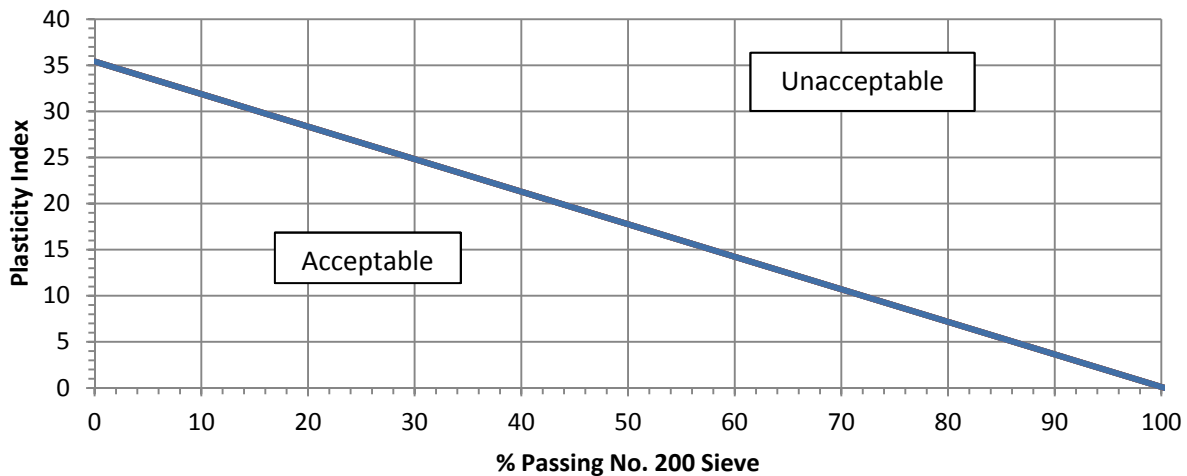
A ground compaction factor of 0.2 feet is estimated for existing subgrade soils. A shrinkage factor of 10% is estimated for most on-site soils on the alignment compacted to a minimum of

⁴ Pima County/City of Tucson, 2003, *Standard Specifications for Public Improvements*, Tucson, Arizona.

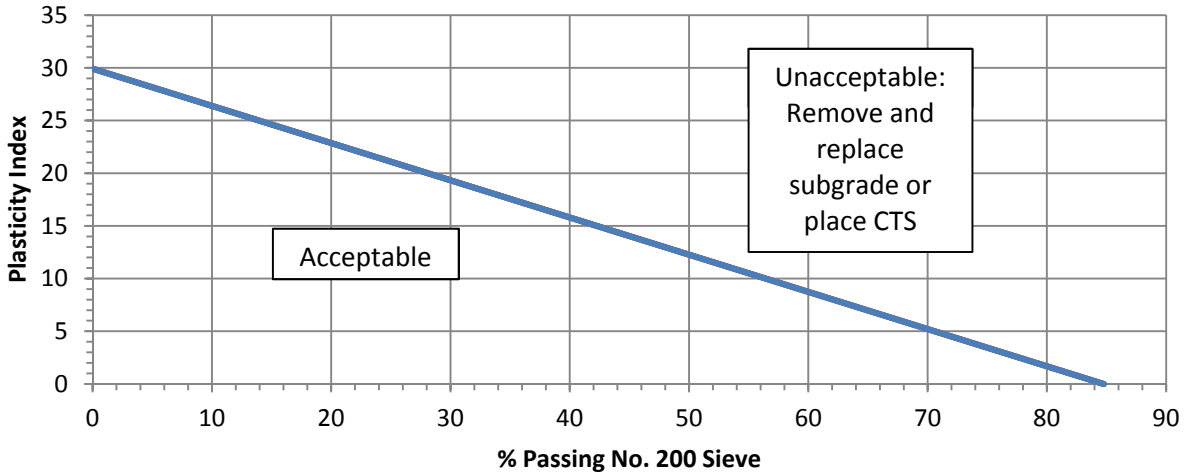
95% of the material's maximum Standard Proctor dry density. The soils in Section 1 of Tangerine Road are estimated have a maximum shrinkage factor of 20% when compacted to a minimum of 95% of the material's maximum Standard Proctor dry density. These estimates do not include any material lost in transit or oversized material or material unsuitable for use, or compaction greater than 95%.

The following on-site subgrade acceptance charts are provided to assist in determining the acceptability of existing on-site soils use as subgrade material within 3-feet of finished pavement subgrade. Each chart is based upon using the construction control R-values for each section as provided in this report:

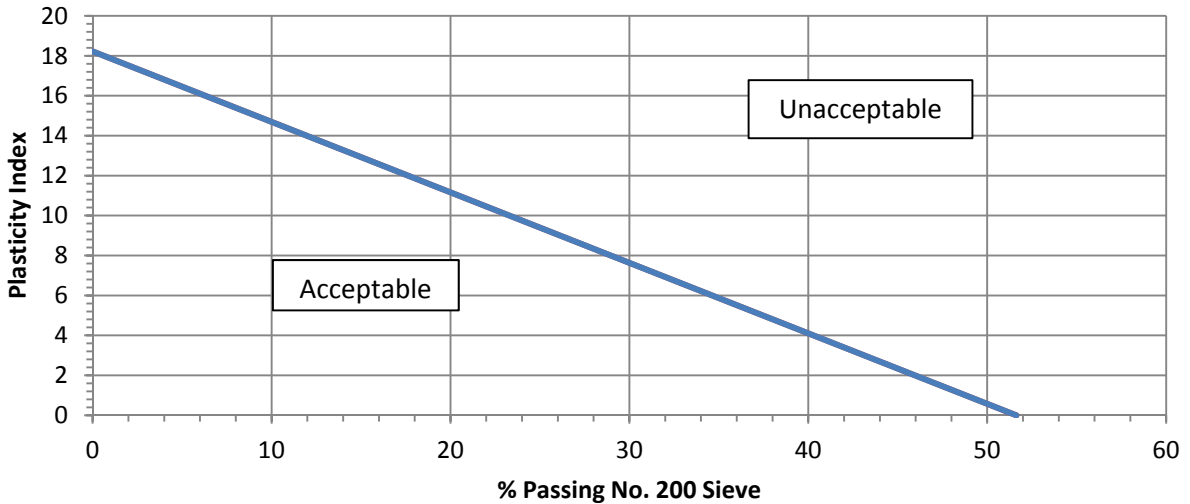
On-Site Materials Subgrade Acceptance Chart
Tangerine Road - Section 1
For use with Pavement Design Alternatives A, B, C, and D



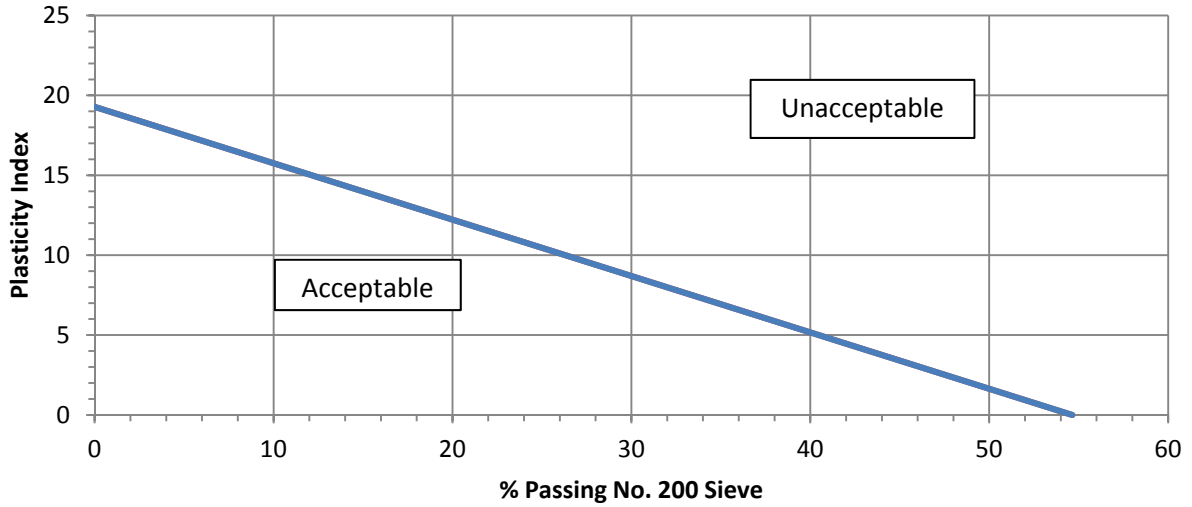
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 1
 For use with Pavement Design Alternatives E, through J**



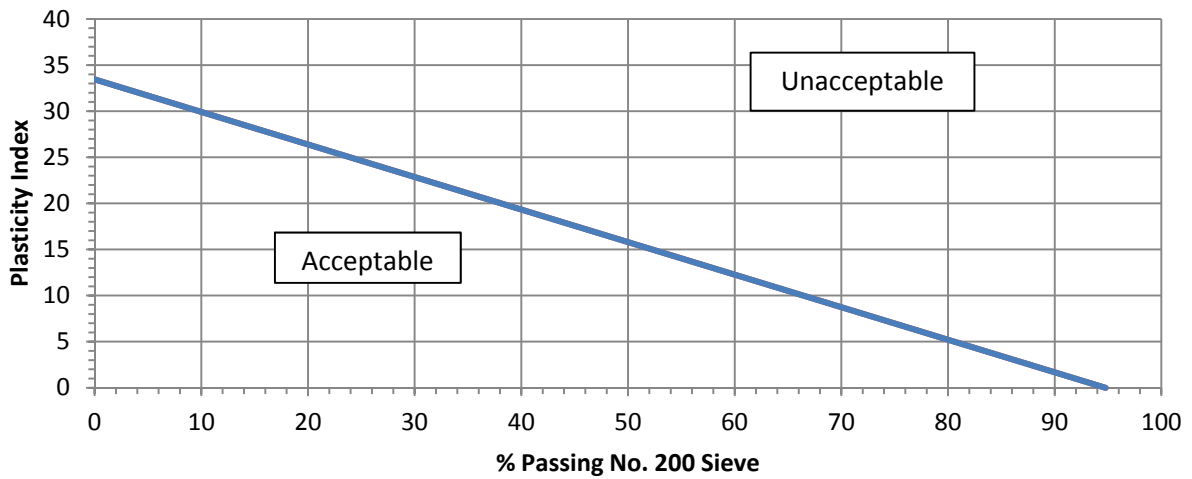
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 2**



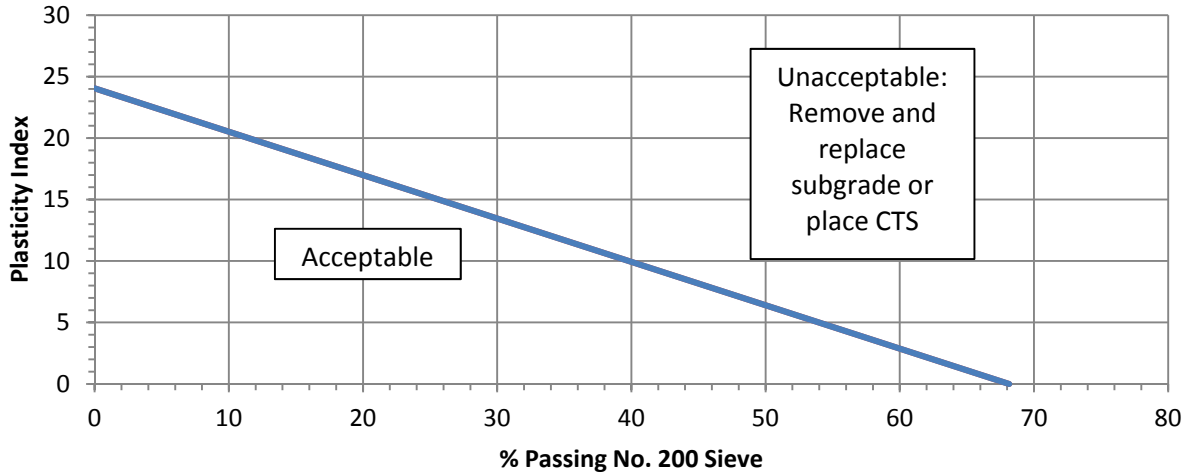
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 3**



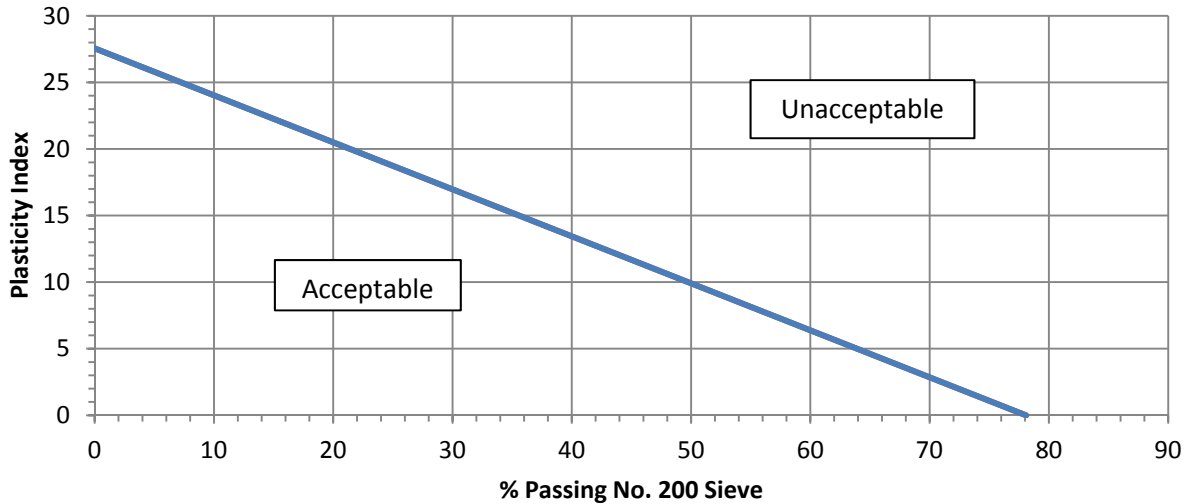
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 4
 For use with Pavement Design Alternatives A, B, C, and D**



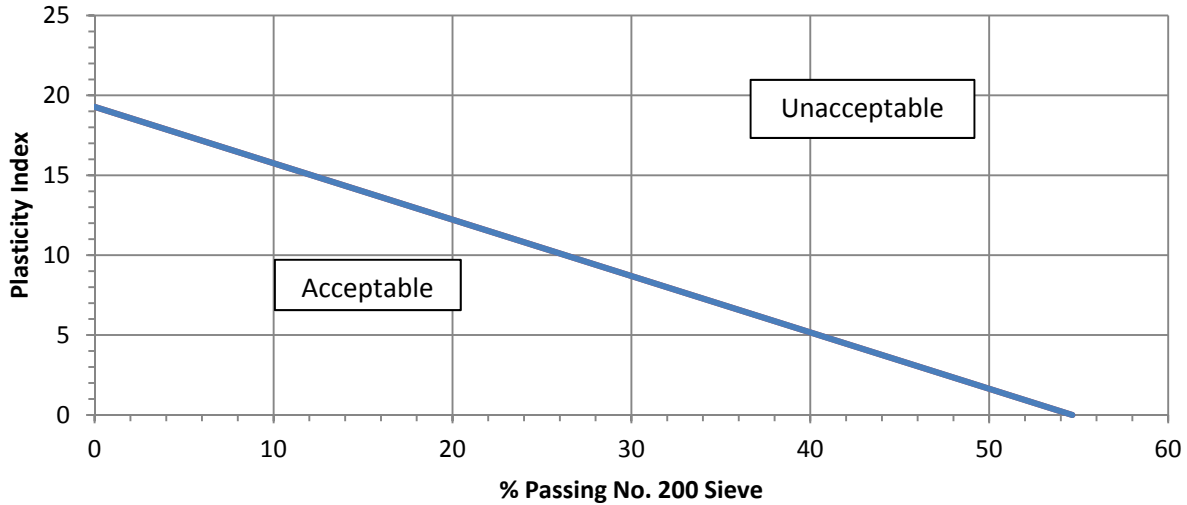
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 4
 For use with Pavement Design Alternatives E through J**



**On-Site Materials Subgrade Acceptance Chart
 La Cholla Boulevard- Section 5**



**On-Site Materials Subgrade Acceptance Chart
 Thornydale Road - Section 6**



If the existing subgrade soils do not meet these criteria, the unsuitable soils should be removed to a minimum depth of 3 feet below finished pavement subgrade and be replaced with suitable fill meeting the criteria outlined below. Close observation will be required during construction to identify areas of unsuitable existing subgrade soils.

All off-site, or imported fill materials placed for pavement support should meet the following minimum requirements to satisfy the recommended design resilient modulus:

Tangerine Road - Section 1

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 87 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 1 if CTS is used

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 74 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 2

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 45 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 3

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 47 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 4

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 82 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 4 if CTS is used

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 59 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

La Cholla Boulevard

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 68 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Thornsdale Road

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 47 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Aggregate base course (ABC) should consist of a blend of sand and gravel which meets strict specifications for quality and gradation. Aggregate base course should meet the specifications outlined in Section 303 (PAG).

The asphalt concrete should meet the specification outlined in Section 406 (PAG). Asphalt concrete used in the upper 2 to 3.5 inches of the design section should consist of a Mix No. 2, as outlined in Table 406-2 of the Standard Specifications (PAG). The lower lifts of the asphalt pavement section should meet the requirements of a Mix No. 1 asphaltic concrete mixture. Minimum and maximum recommended AC lift thicknesses are 2 and 3.5 inches, respectively.

Tack coat should be applied to the asphalt surface between successive lifts.

5.0 PAVEMENT MAINTENANCE

Future performance of pavements constructed on the site will be dependent upon several factors, including:

- maintaining stable moisture content of the subgrade soils; and
- providing for a planned program of preventative maintenance.

The performance of all pavements can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be considered at minimum:

- Site grading at a minimum 2% grade away from pavements;
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade;
- Sealing all landscaped areas in, or adjacent to pavements to minimize or prevent moisture migration to subgrade soils;
- Placing compacted backfill against the exterior side of curb and gutter; and,
- Placing curb, gutter and/or sidewalk directly on subgrade soils without the use of base course materials

Preventative maintenance should be planned and provided as an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provided the highest return on investment for pavements.

6.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and

Pavement Design Summary

Tangerine Road Corridor Project ■ Pima County, Arizona

Terracon Project No. 63105079



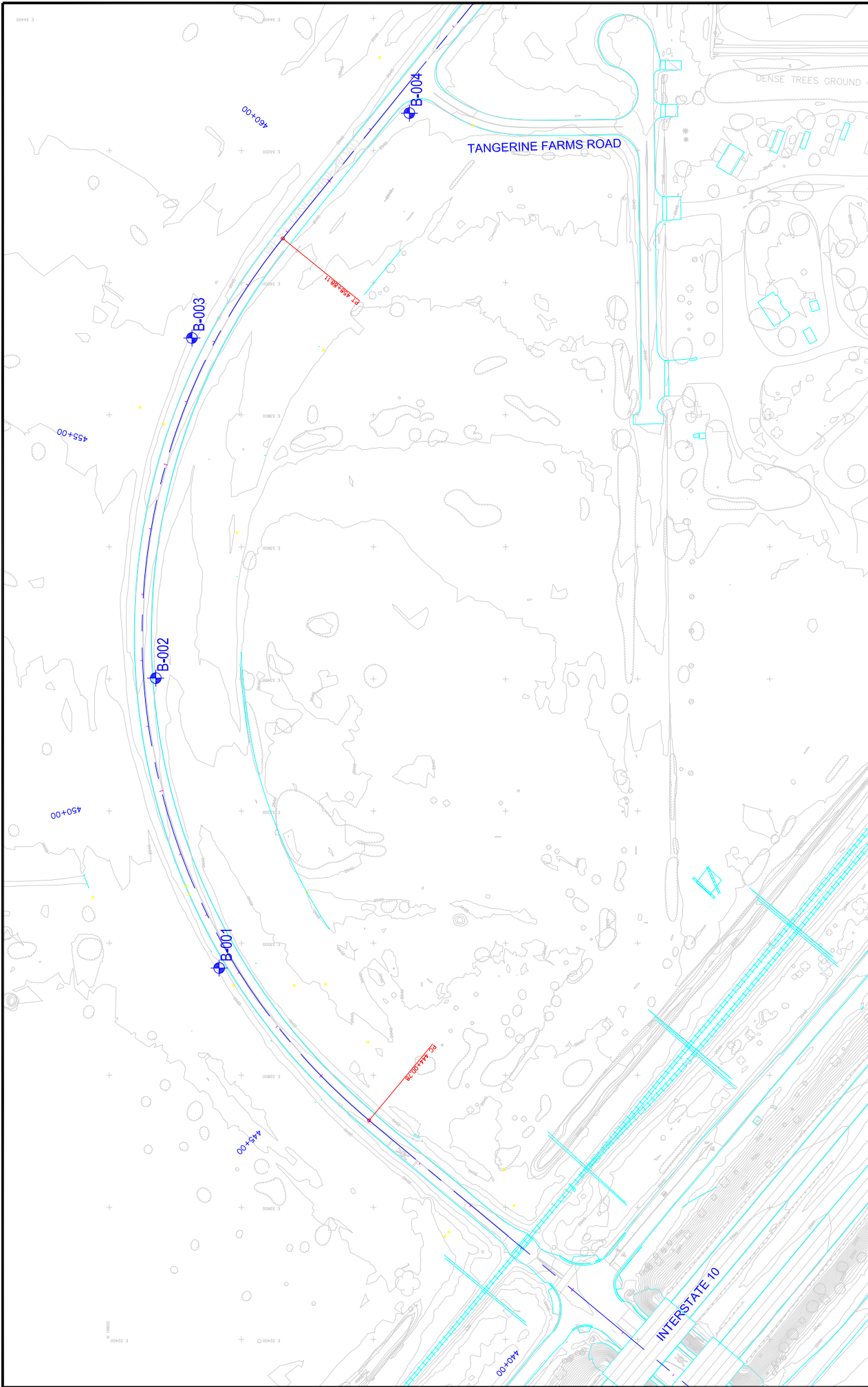
testing services during grading, excavation, pavement construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical and pavement engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
Field Exploration



EXHIBIT

A-1

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon
Consulting Engineers and Scientists

355 S EUCLID, SUITE 107
TUCSON, AZ 85719

PH: (520) 770-1788
FAX: (520) 792-3549

Project No. 63105079

Scale: 1" = 200'

File No. 63105079.DWG

Date: 01/2011

Project Mgr: BWR

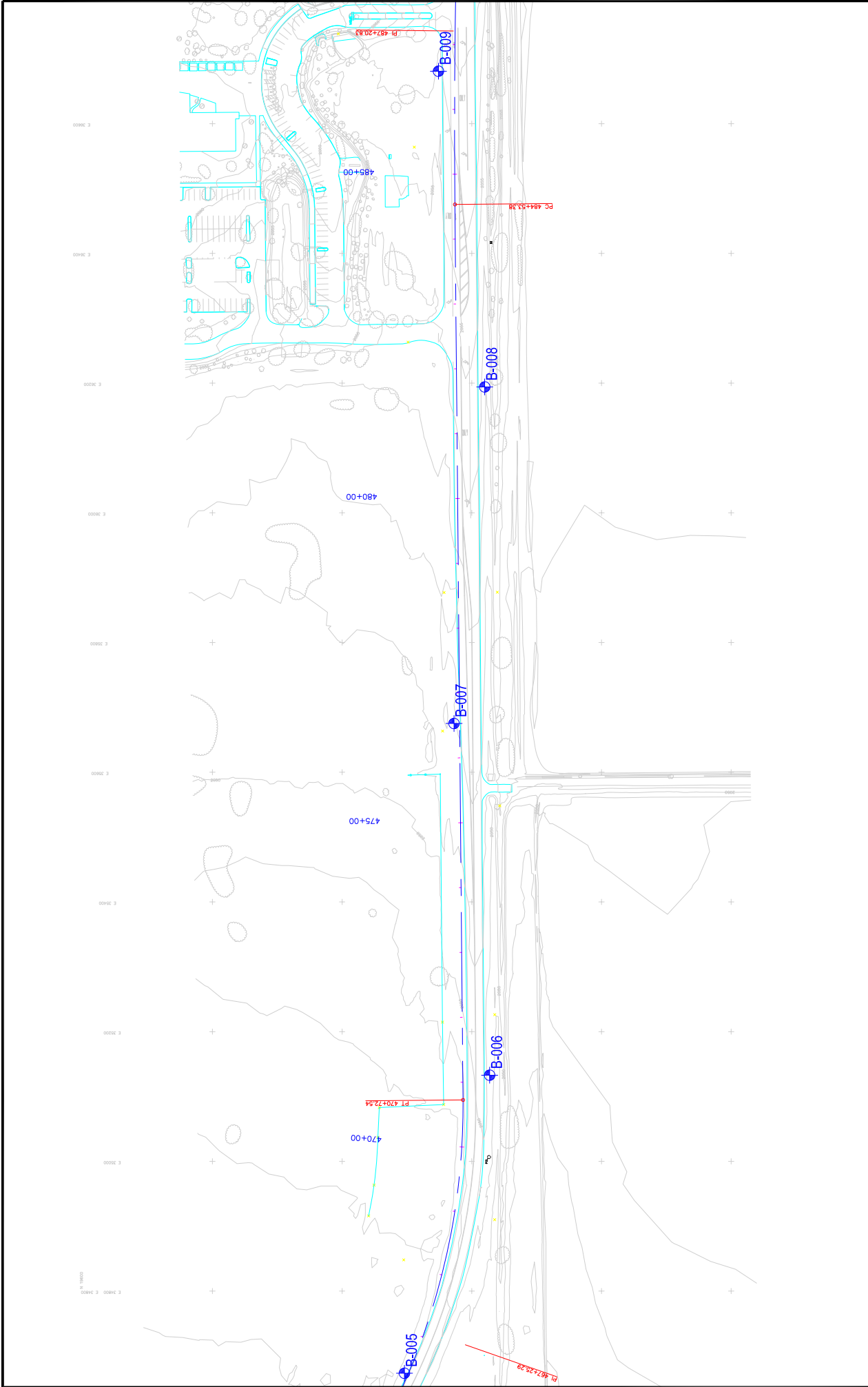
Drawn By: JJP

Checked By: OBL

Approved By: OBL

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SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-2

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE


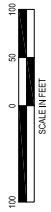
ARIZONA

PIMA COUNTY

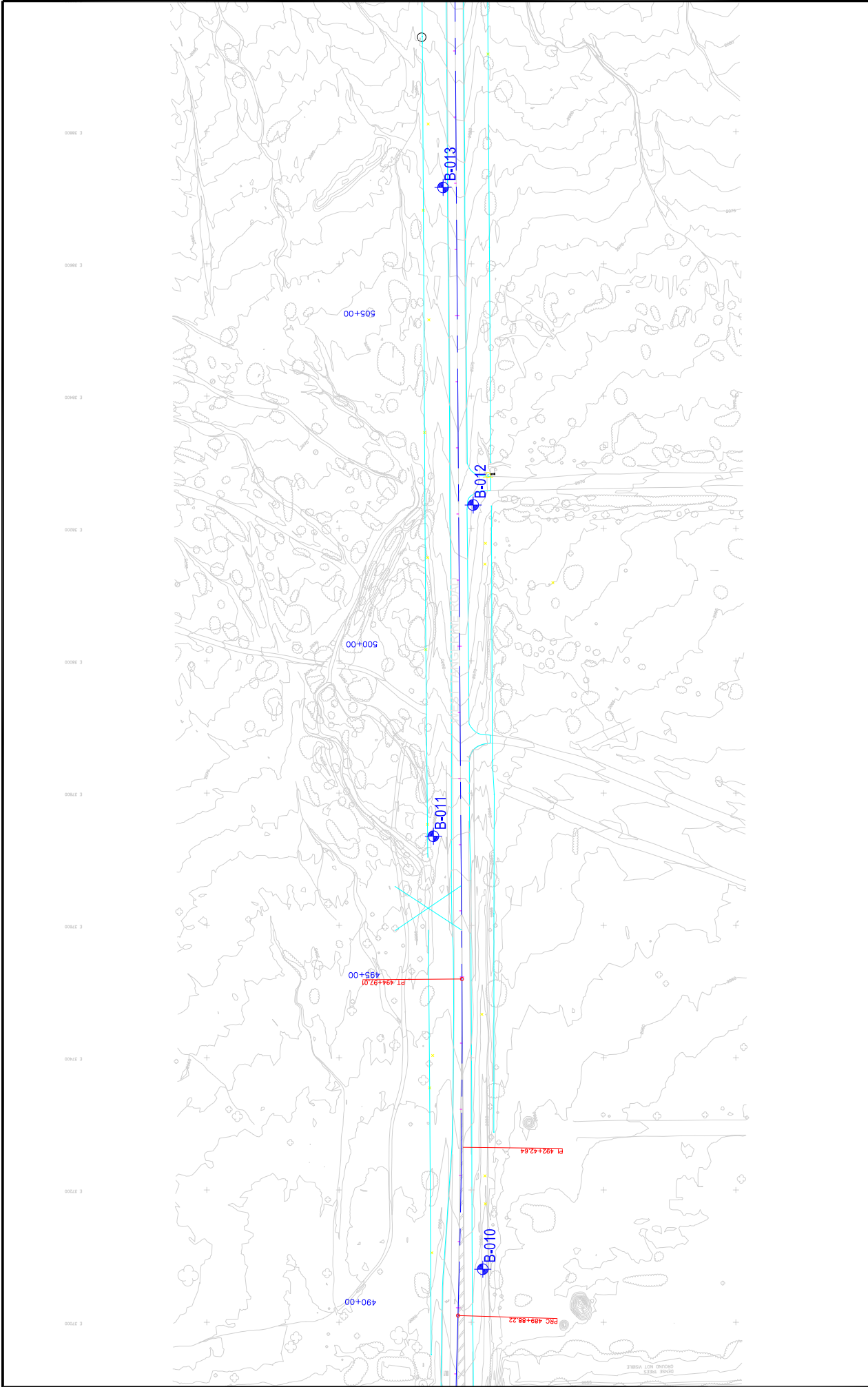
Terracon
 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-1789
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Project No.	63105079
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File No.	63105079.DWG
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Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

 APPROXIMATE BORING LOCATION



EXHIBIT

A-3

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

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Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

SCALE IN FEET

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APPROXIMATE BORING LOCATION

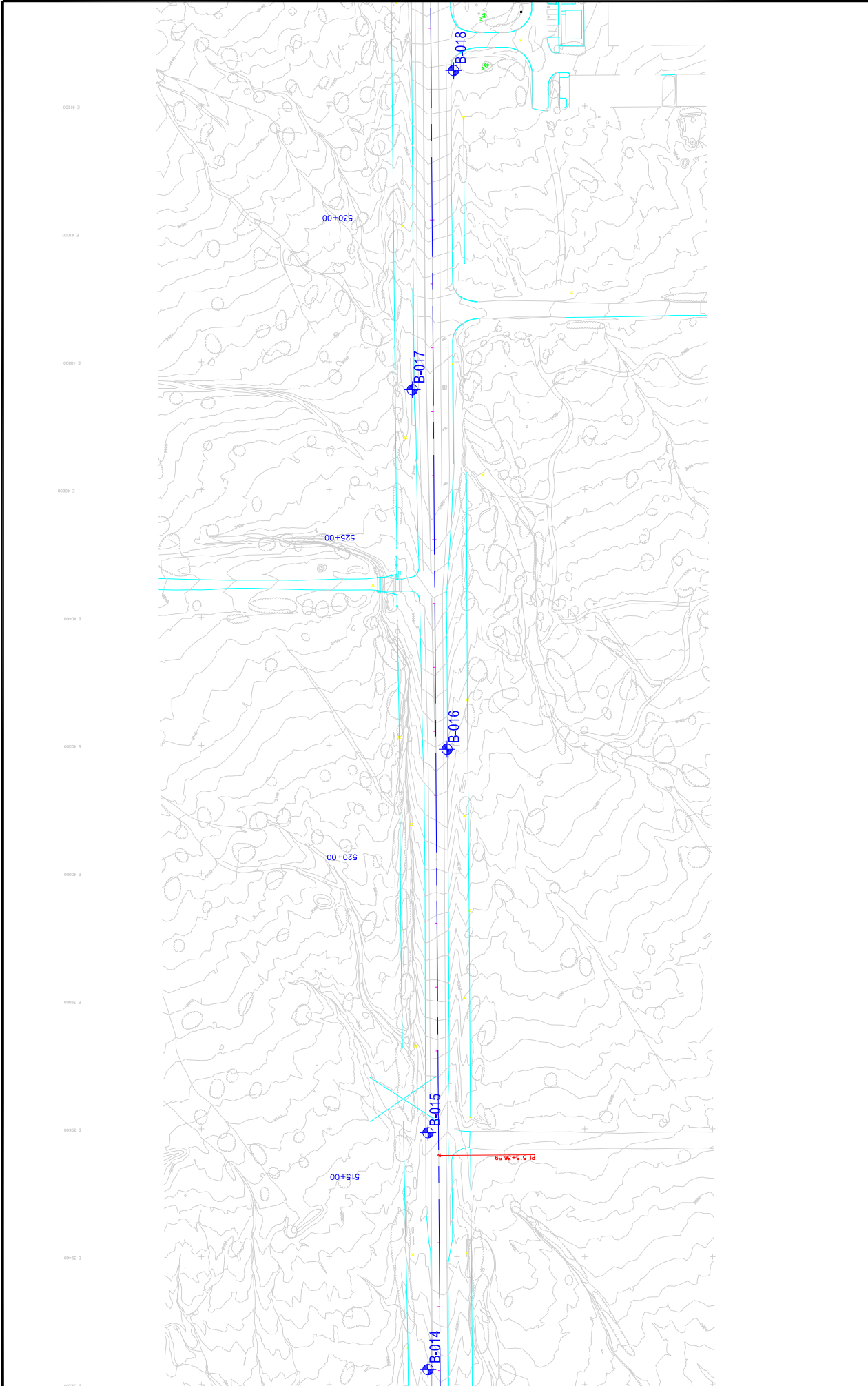


EXHIBIT	A-4
SITE PLAN & BORING LOCATIONS DIAGRAM PSOMAS TANGERINE ROAD CORRIDOR PROJECT I-10 TO LA CANADA DRIVE PIMA COUNTY ARIZONA	
 Consulting Engineers and Scientists <small>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</small>	
Project No.:	63105079
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File No.:	63105079.DWG
Date:	01/2011
Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL
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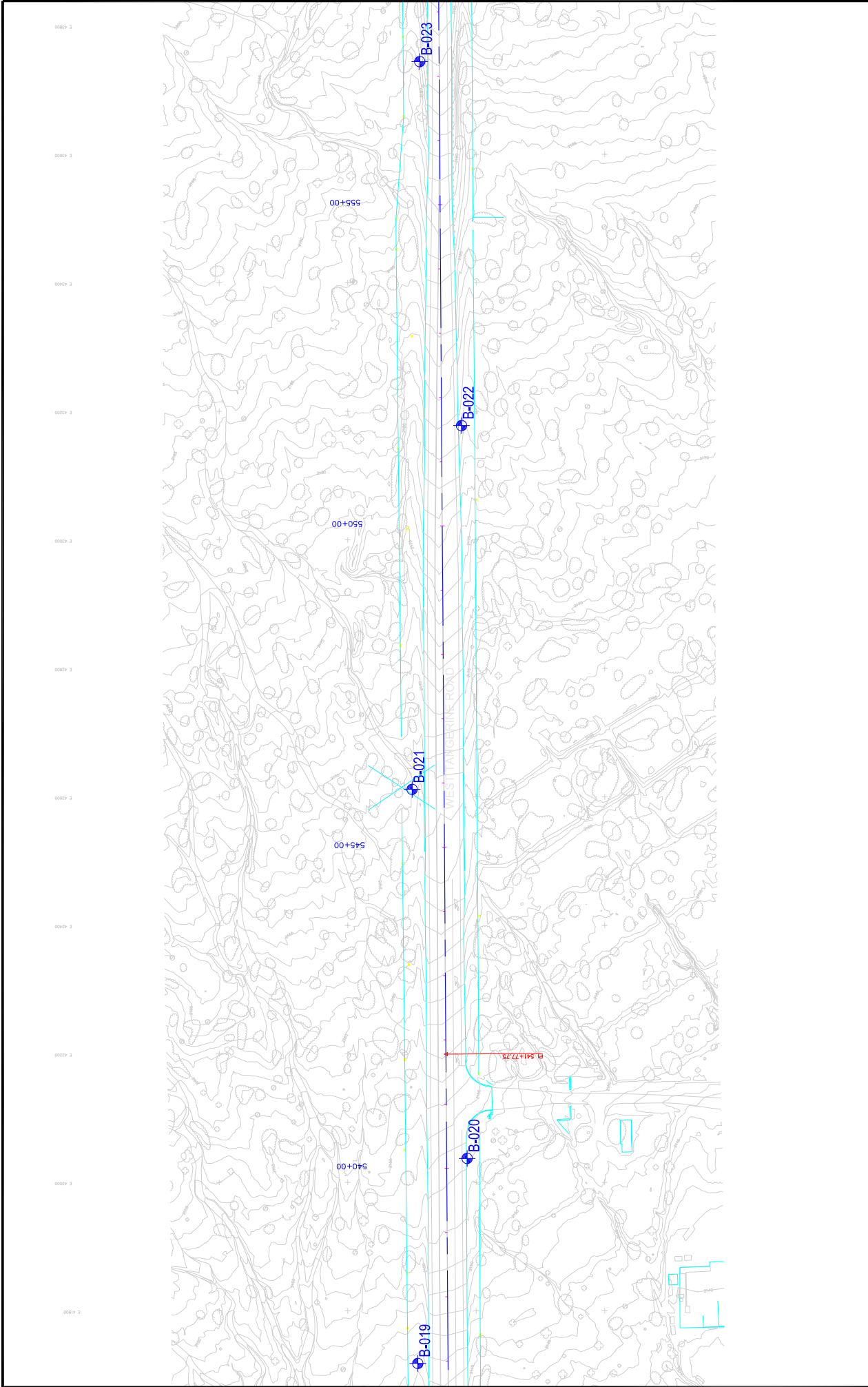


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SITE PLAN & BORING LOCATIONS DIAGRAM PSOMAS TANGERINE ROAD CORRIDOR PROJECT I-10 TO LA CANADA DRIVE PIMA COUNTY ARIZONA	
Terracon Consulting Engineers and Scientists <small>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</small>	
Project No.:	63105079
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Date:	01/2011
Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL
APPROXIMATE BORING LOCATION	

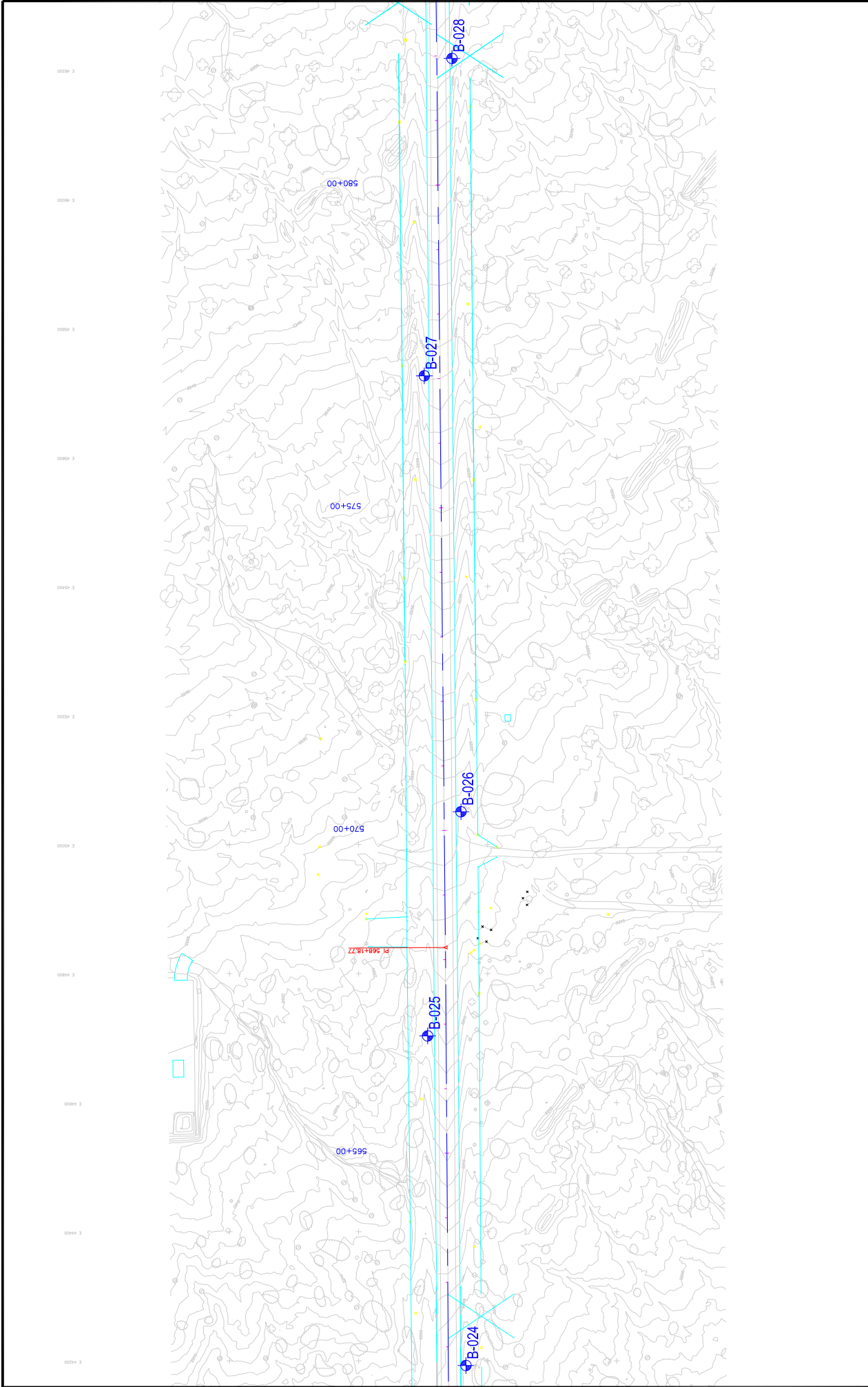
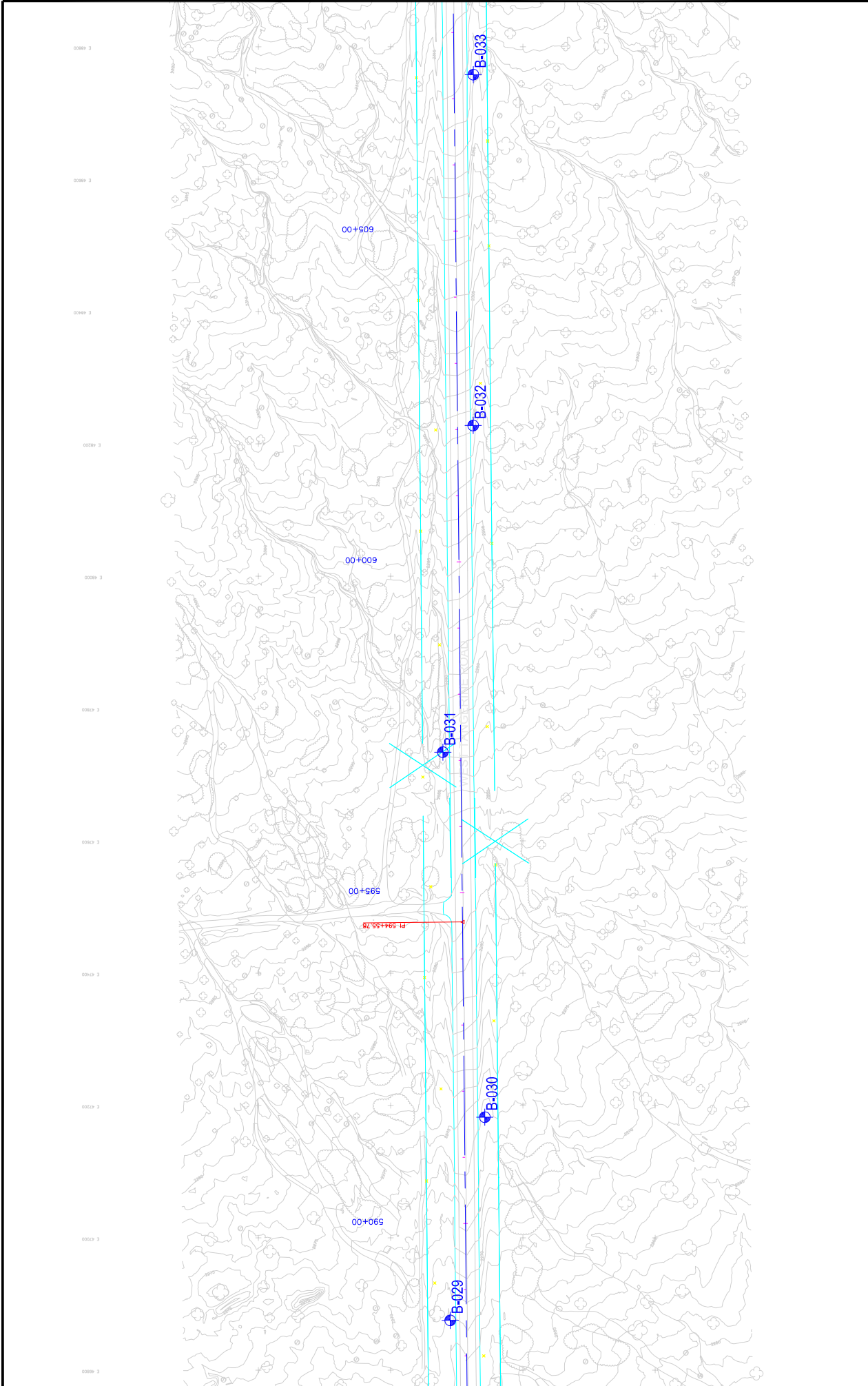
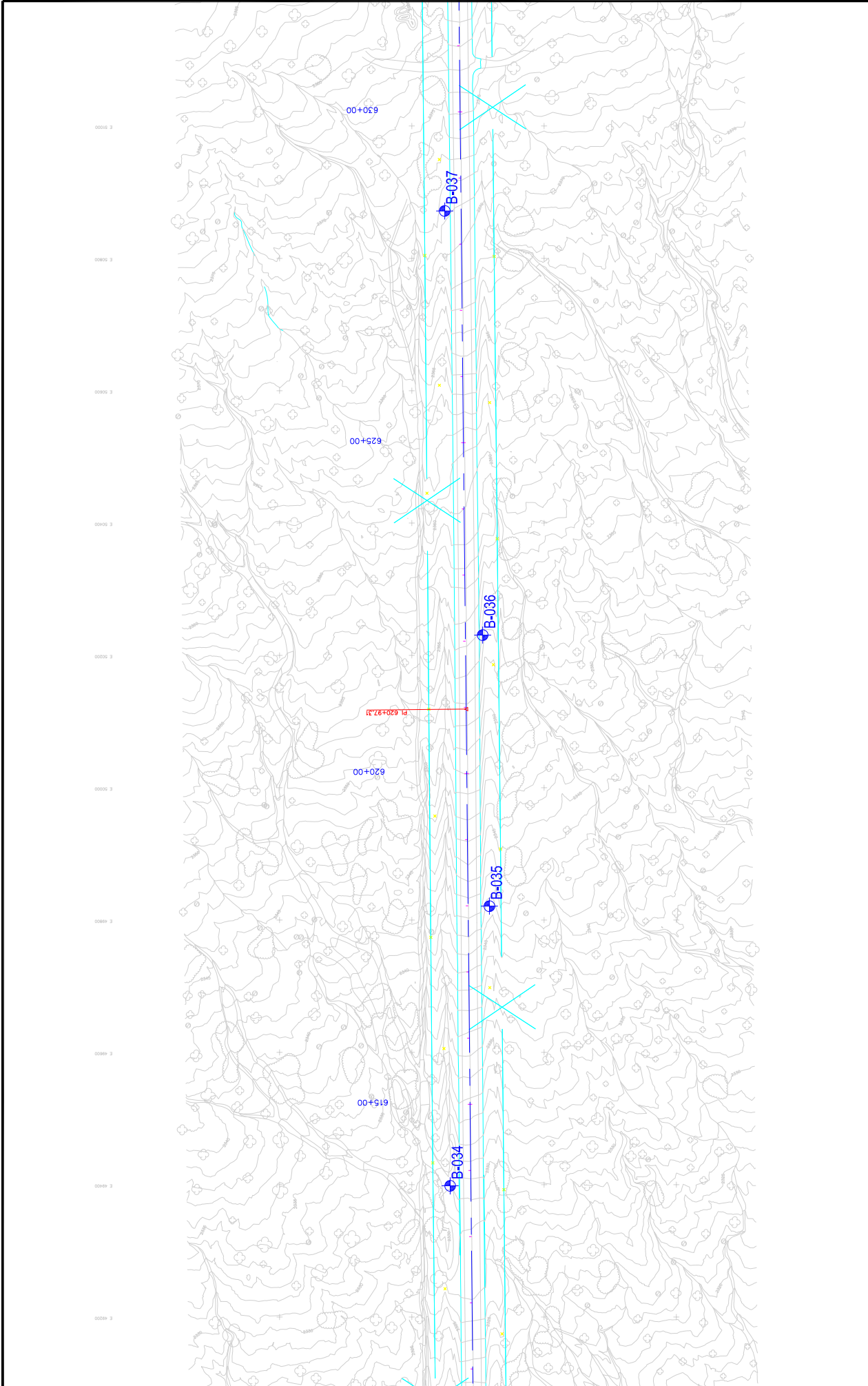


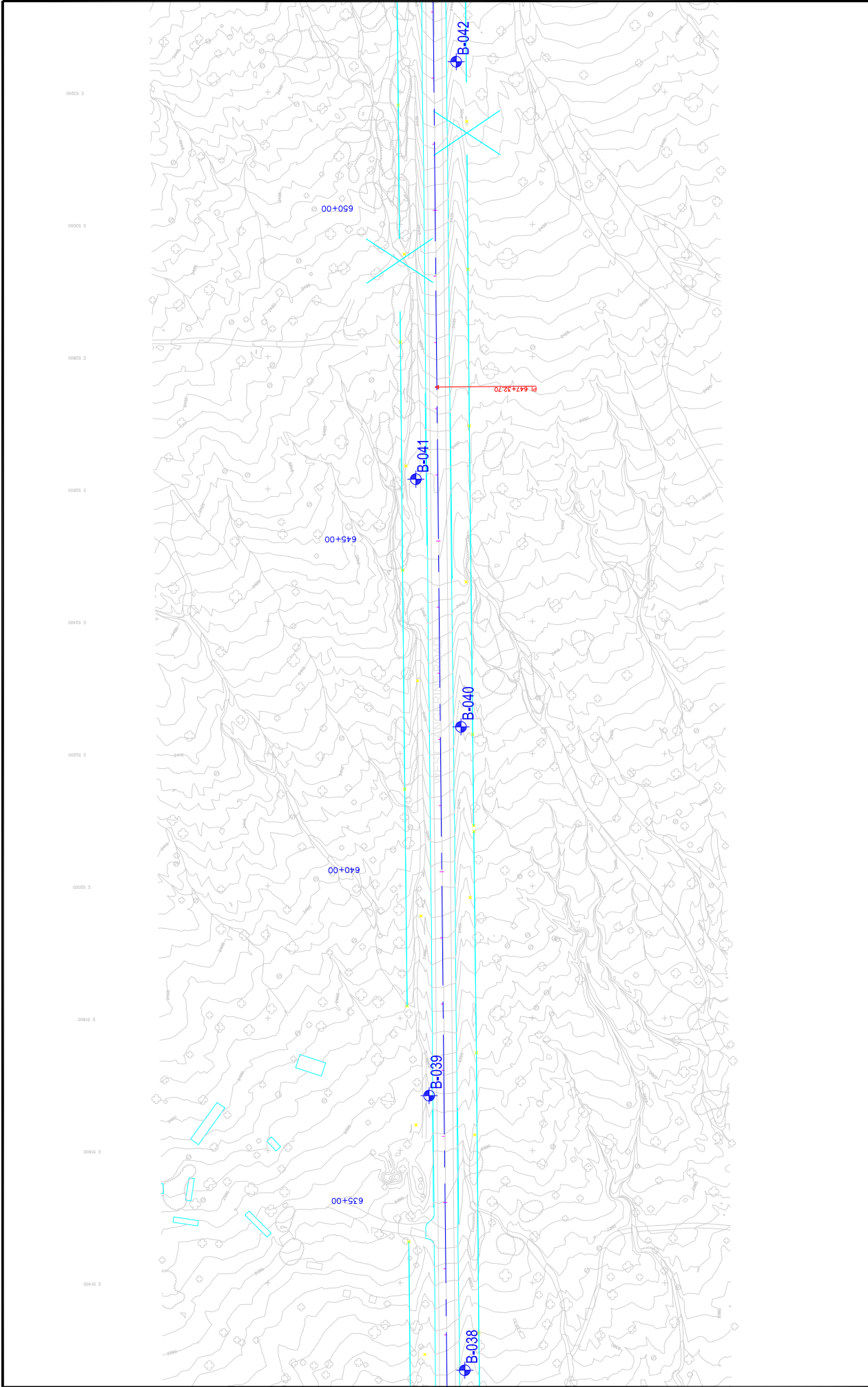
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SITE PLAN & BORING LOCATIONS DIAGRAM PSOMAS TANGERINE ROAD CORRIDOR PROJECT I-10 TO LA CANADA DRIVE PIMA COUNTY ARIZONA	
Terracon Consulting Engineers and Scientists <small>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</small>	
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Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL
APPROXIMATE BORING LOCATION	



		<p>APPROXIMATE BORING LOCATION</p>	<p>EXHIBIT</p> <p>A-7</p>
<p>SITE PLAN & BORING LOCATIONS DIAGRAM</p> <p>PSOMAS</p> <p>TANGERINE ROAD CORRIDOR PROJECT</p> <p>I-10 TO LA CANADA DRIVE</p> <p>PIMA COUNTY</p> <p>ARIZONA</p>			
<p>Terracon</p> <p>Consulting Engineers and Scientists</p> <p>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</p>			
Project Mgr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011



		<p>APPROXIMATE BORING LOCATION</p>																								
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Checked By:	OBL	OBL																								
Approved By:	OBL	OBL																								
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<p>PIMA COUNTY</p>		<p>ARIZONA</p>																								
<p>EXHIBIT A-8</p>																										



EXHIBIT

A-9

SITE PLAN & BORING LOCATIONS DIAGRAM
 PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

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Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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APPROXIMATE BORING LOCATION

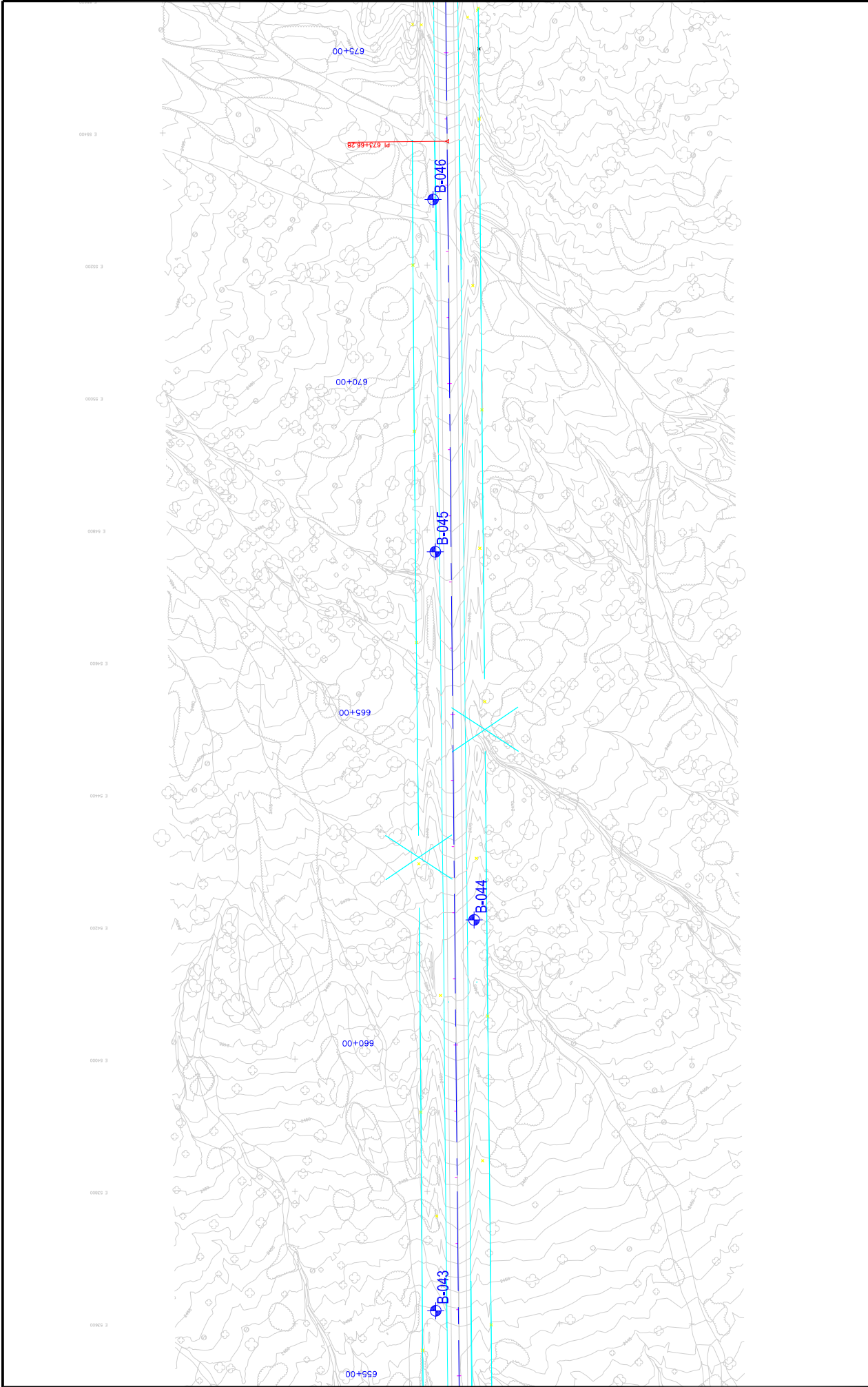


EXHIBIT
A-10

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
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Checked By:	OBL
Approved By:	OBL

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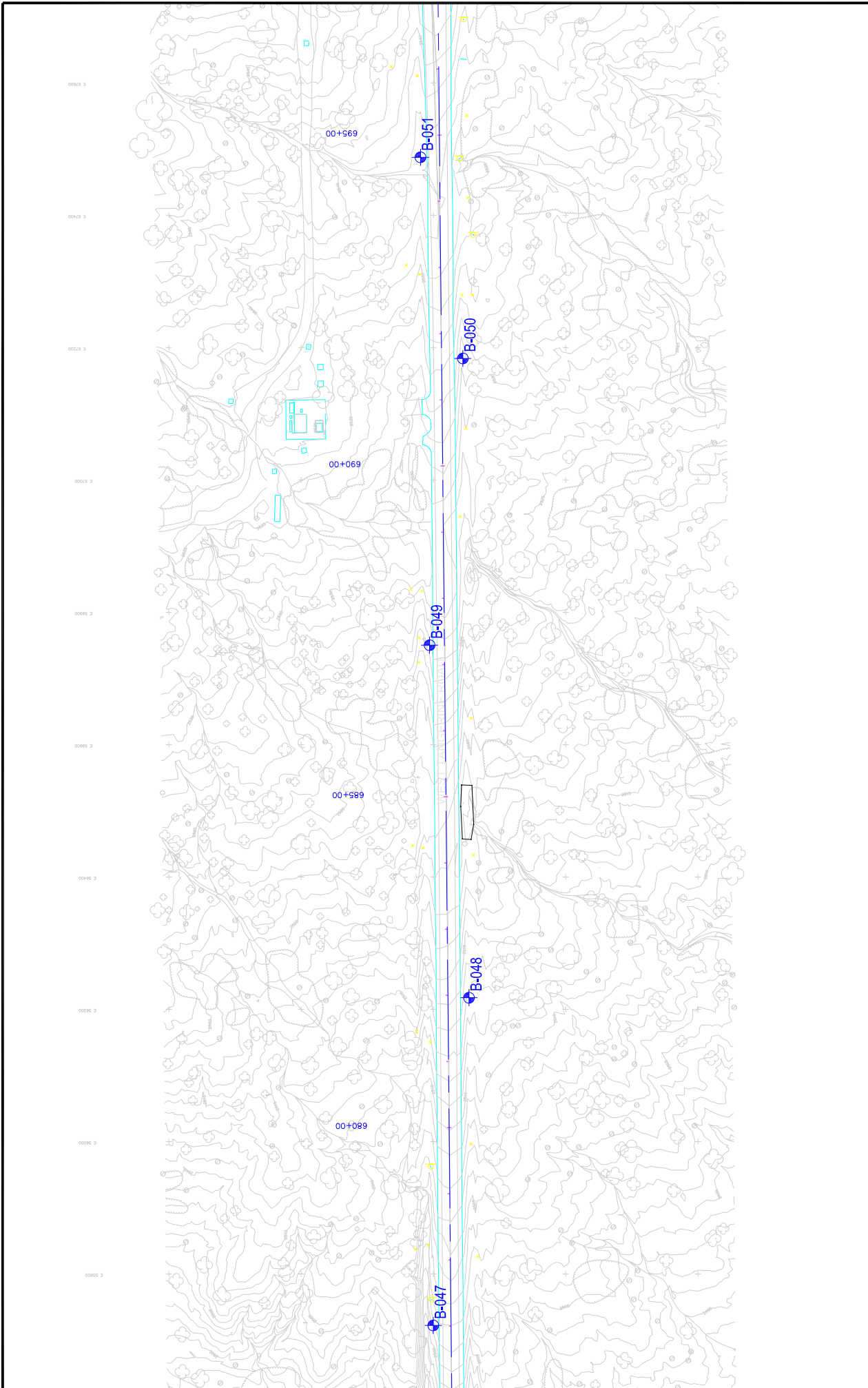


EXHIBIT
A-11

SITE PLAN & BORING LOCATIONS DIAGRAM
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TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

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Project No. 63105079
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File No. 63105079.DWG
Date: 01/2011

Project Mgr: BWR
Drawn By: JJP
Checked By: OBL
Approved By: OBL

APPROXIMATE BORING LOCATION

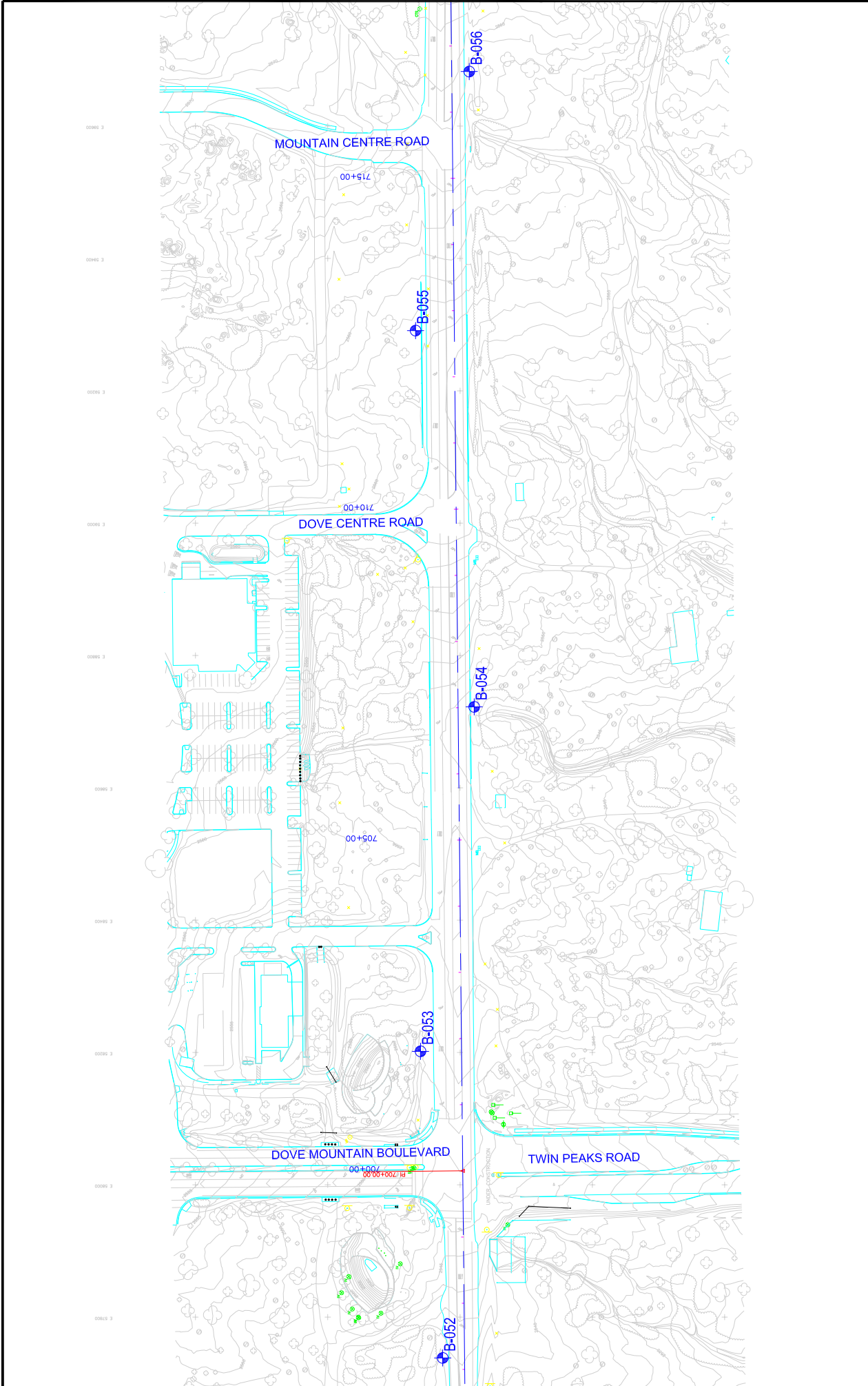


EXHIBIT
A-12

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TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

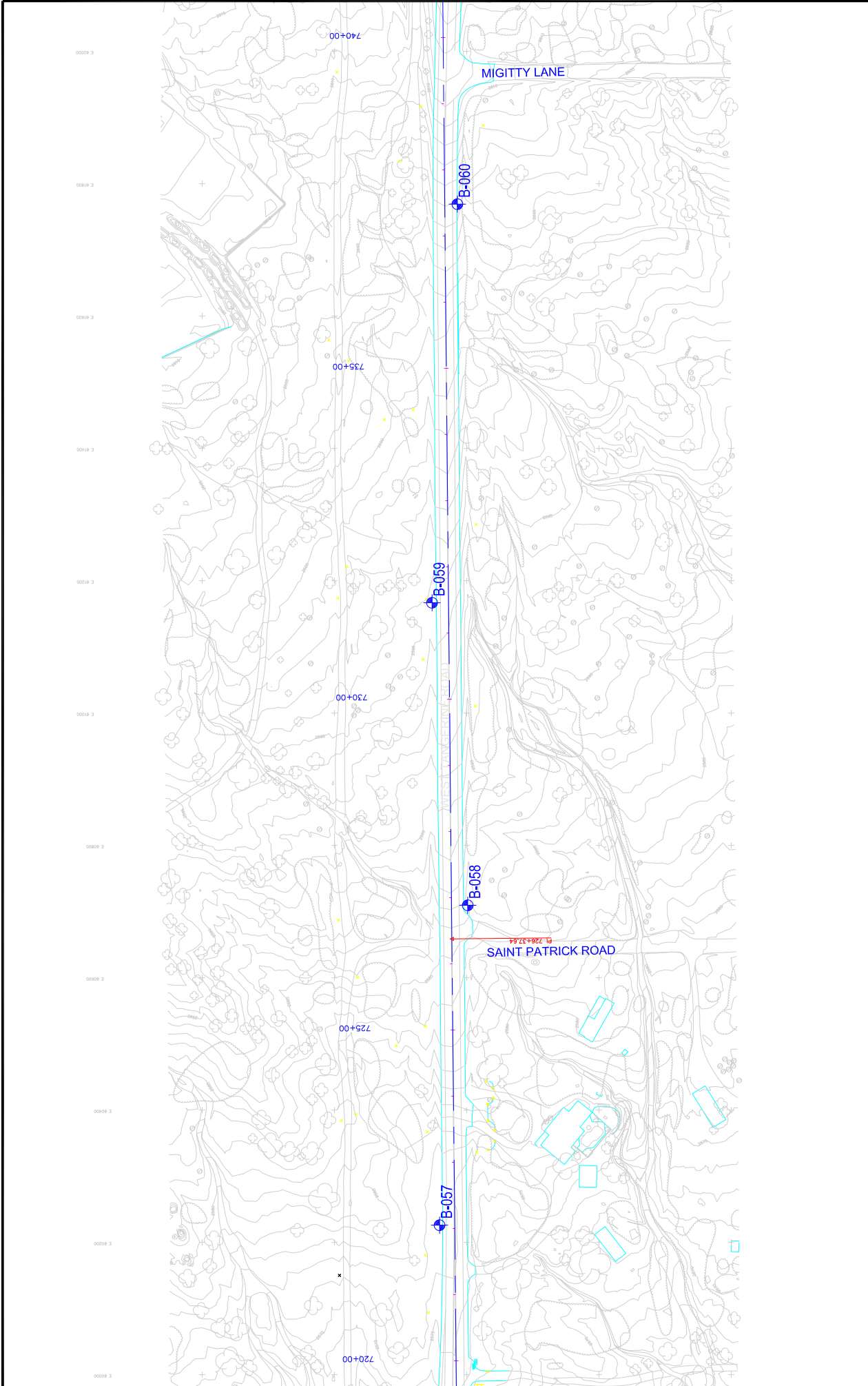
Terracon
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355 S EUCLID, SUITE 107 TUCSON, AZ 85719
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Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

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SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-13

SITE PLAN & BORING LOCATIONS DIAGRAM
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TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

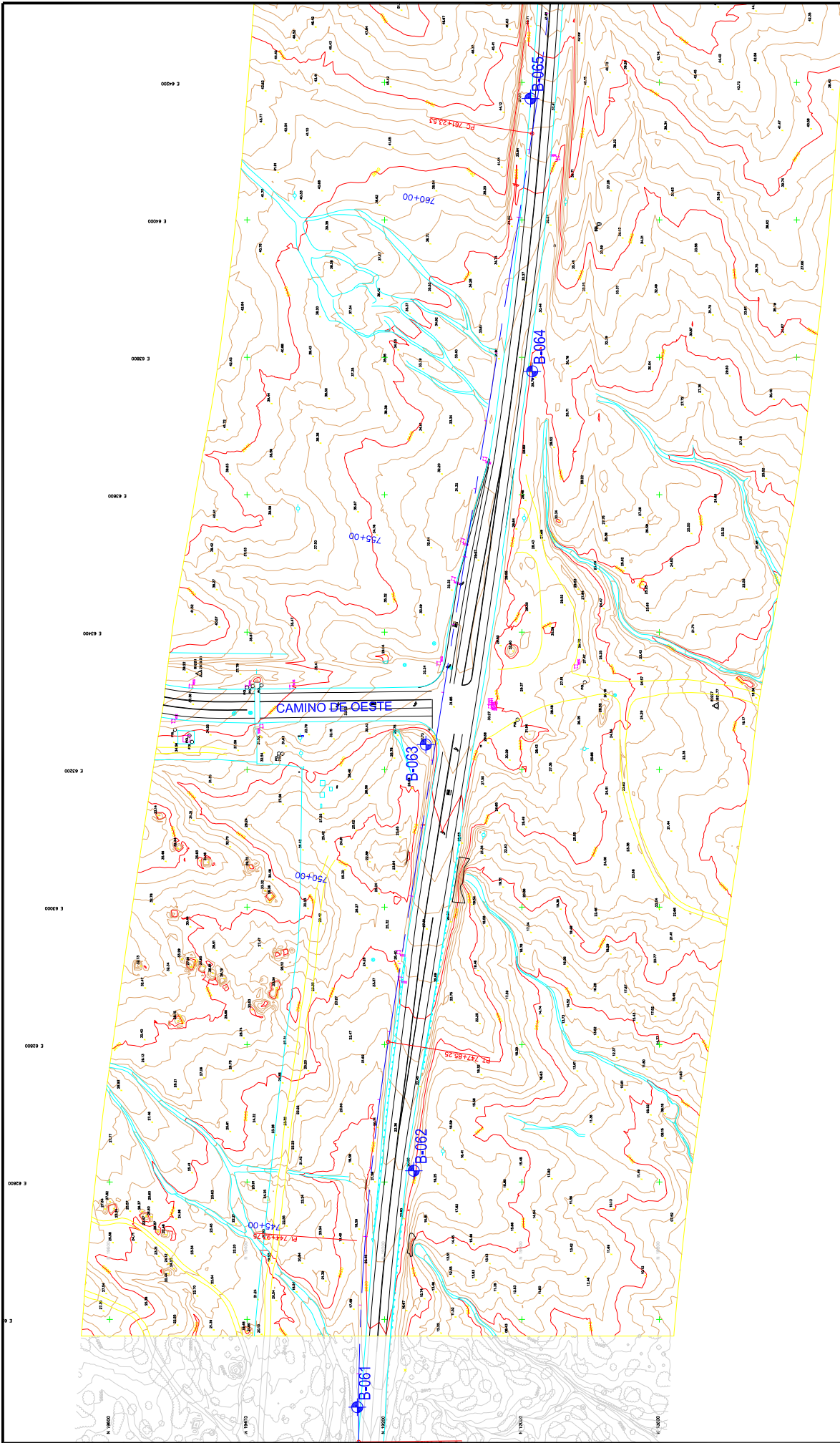
Terracon
 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107 TUCSON, AZ 85719
 PH: (520) 770-1789 FAX: (520) 792-3549

Project No. 63105079
 Scale: 1" = 200'
 File No. 63105079.DWG
 Date: 01/2011

Project Mgr: BWR
 Drawn By: JJP
 Checked By: OBL
 Approved By: OBL

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 SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-14

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon
 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-1789
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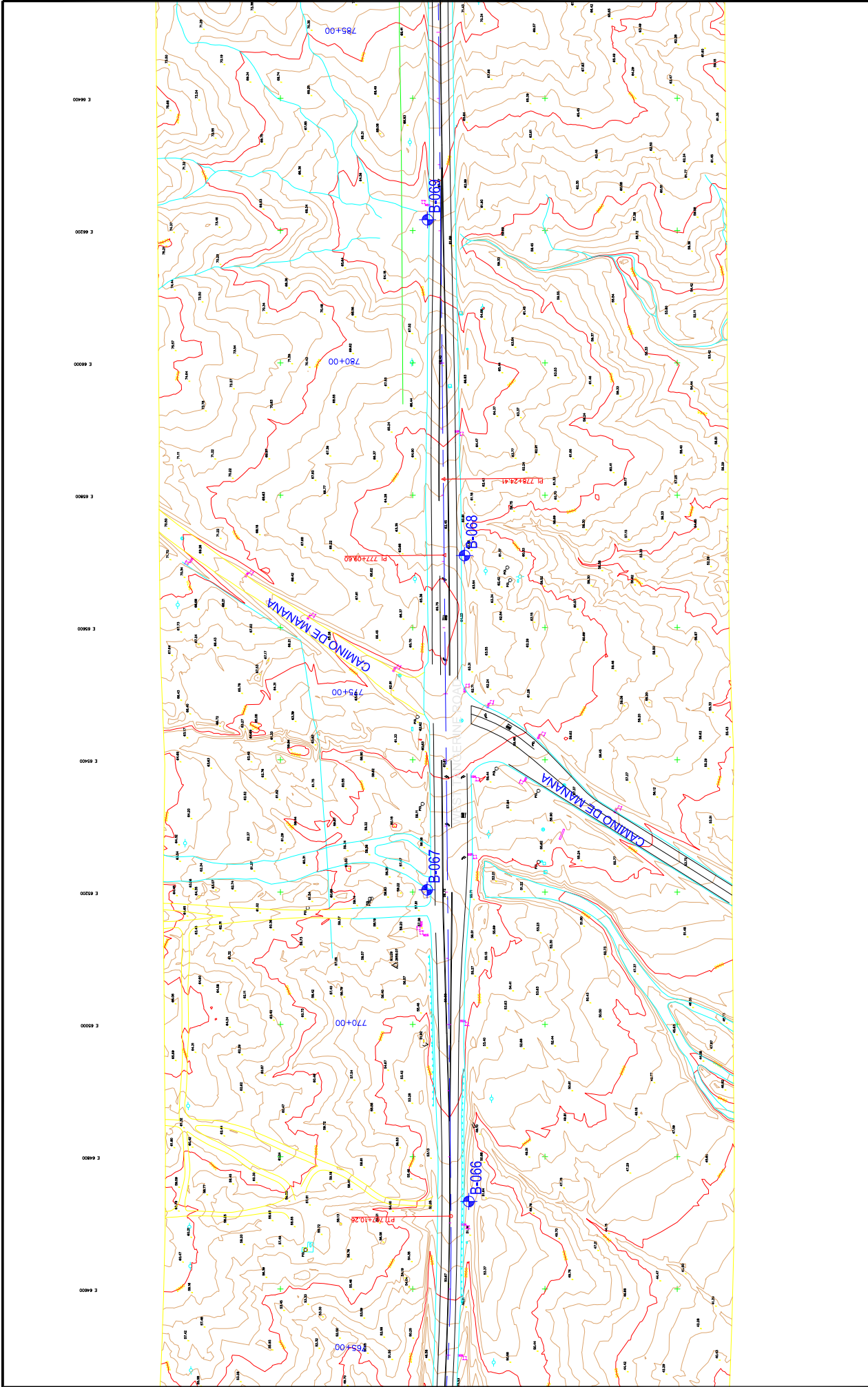
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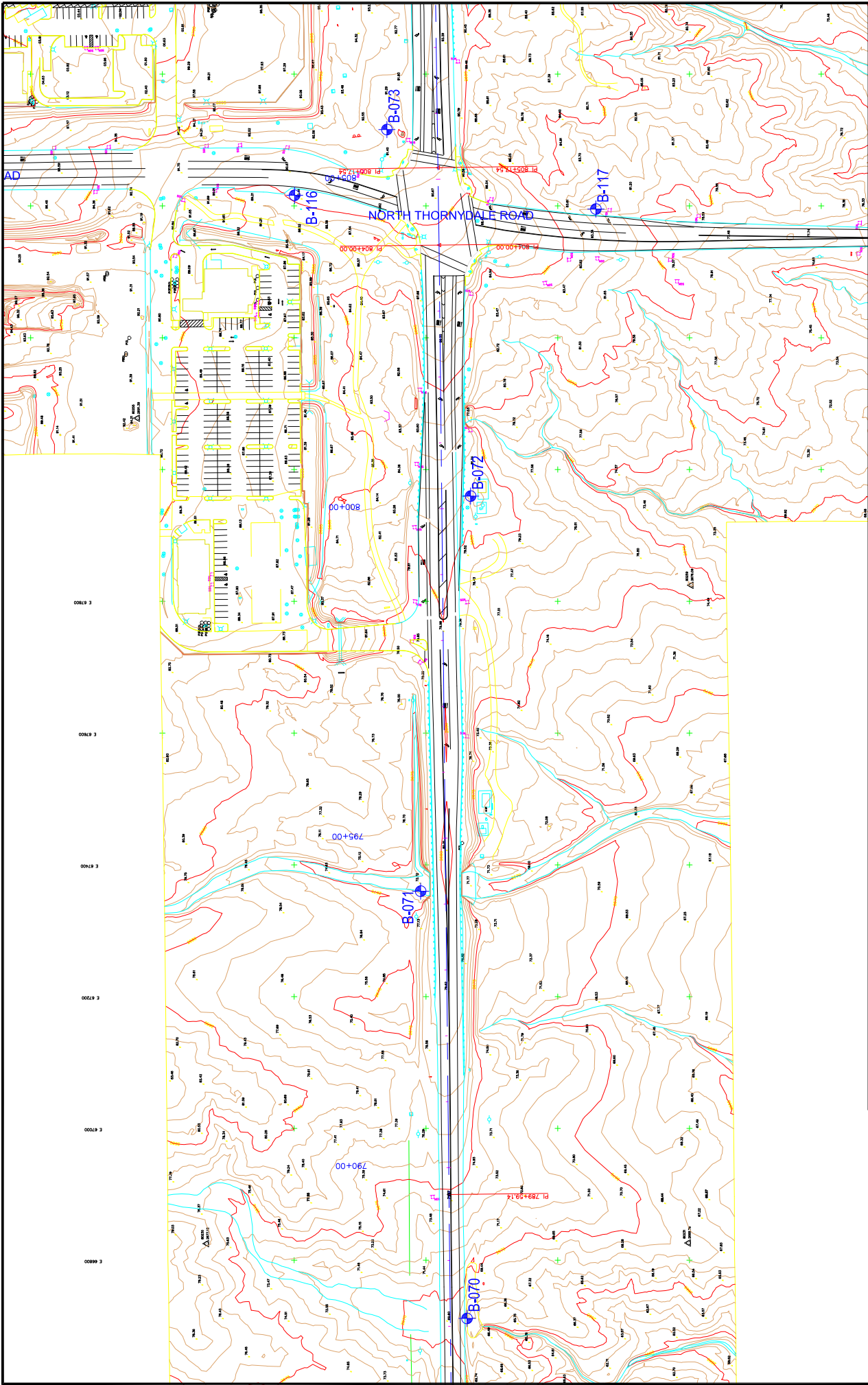
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SCALE IN FEET

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APPROXIMATE BORING LOCATION



<p>EXHIBIT</p> <p>A-15</p>	
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<p>Terracon Consulting Engineers and Scientists</p> <p>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</p>	
<p>Project Migr: BWR</p> <p>Drawn By: JJP</p> <p>Checked By: OBL</p> <p>Approved By: OBL</p>	<p>Project No. 63105079</p> <p>Scale: 1" = 200'</p> <p>File No. 63105079.DWG</p> <p>Date: 01/2011</p>
<p>100 0 50 100 SCALE IN FEET</p> <p>APPROXIMATE BORING LOCATION</p>	



EXHIBIT

A-16

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

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Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
 SCALE IN FEET

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APPROXIMATE BORING LOCATION

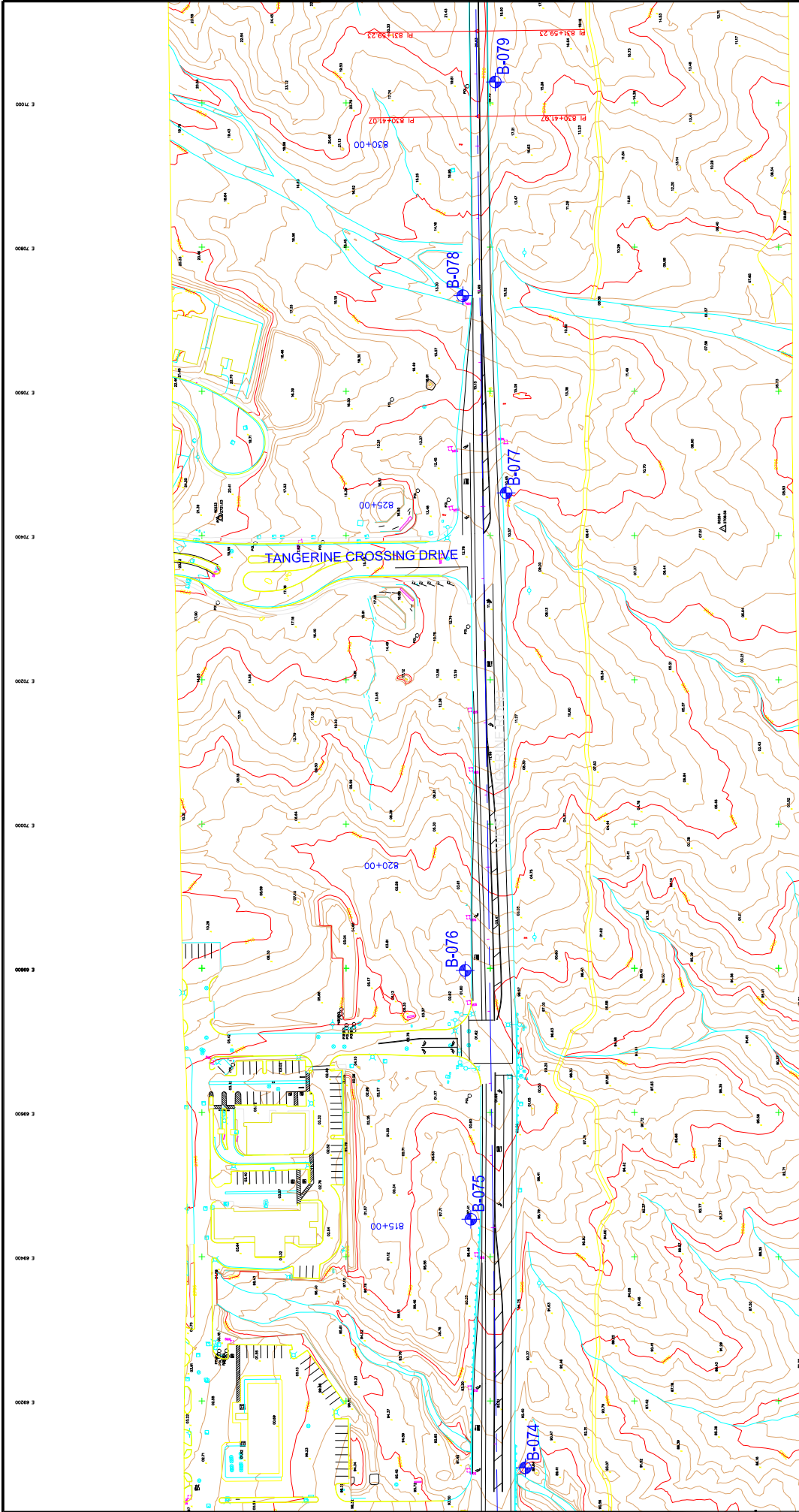


EXHIBIT
A-17

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

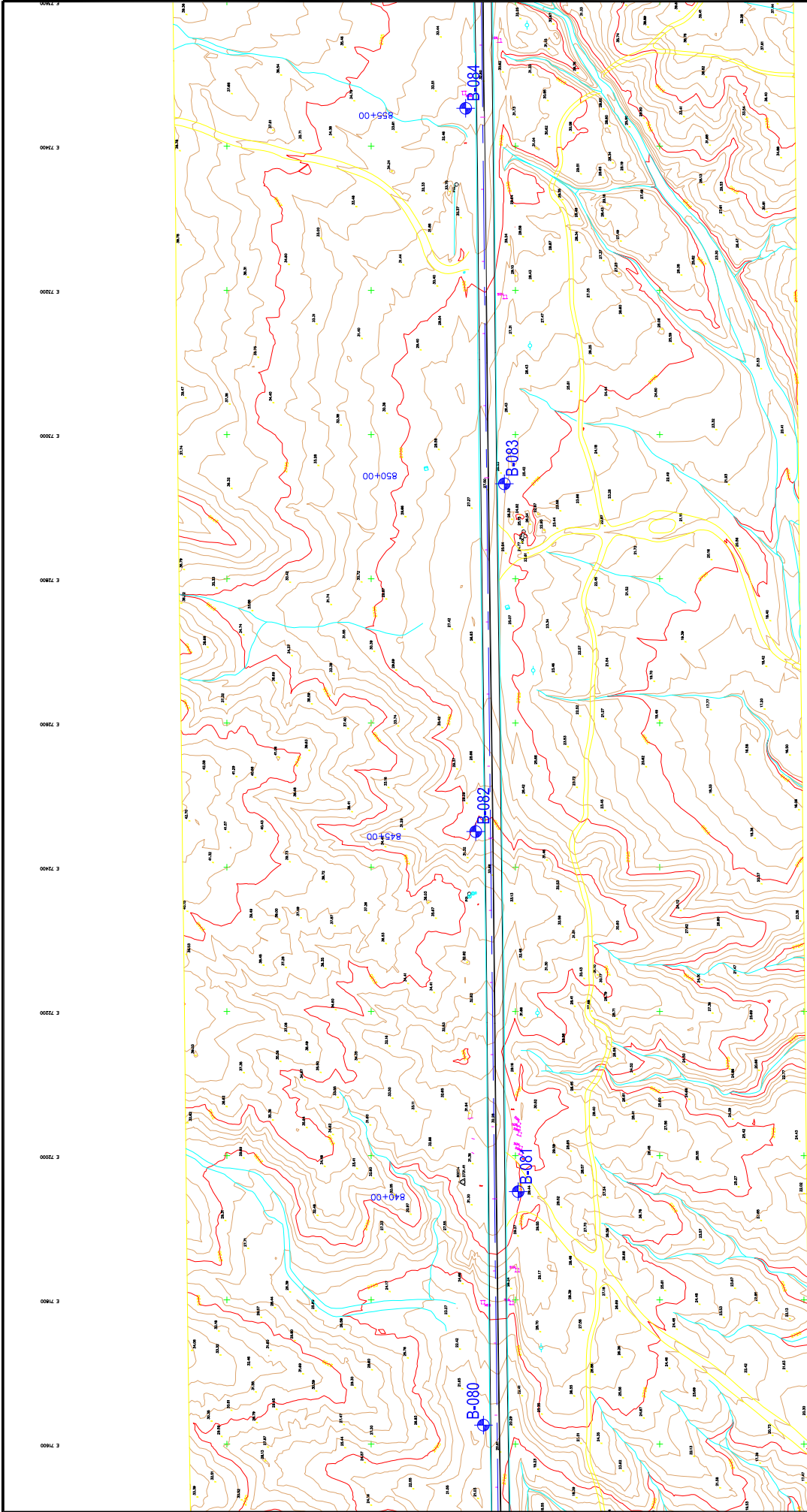
Terracon
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355 S EUCLID, SUITE 107
TUCSON, AZ 85719
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Project No.	63105079
Scale:	1" = 200'
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Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

100
0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE

PIMA COUNTY ARIZONA

Terracon
 Consulting Engineers and Scientists

355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-1789 FAX: (520) 792-3549

Project Migr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011

100 0 50 100
 SCALE IN FEET

APPROXIMATE BORING LOCATION

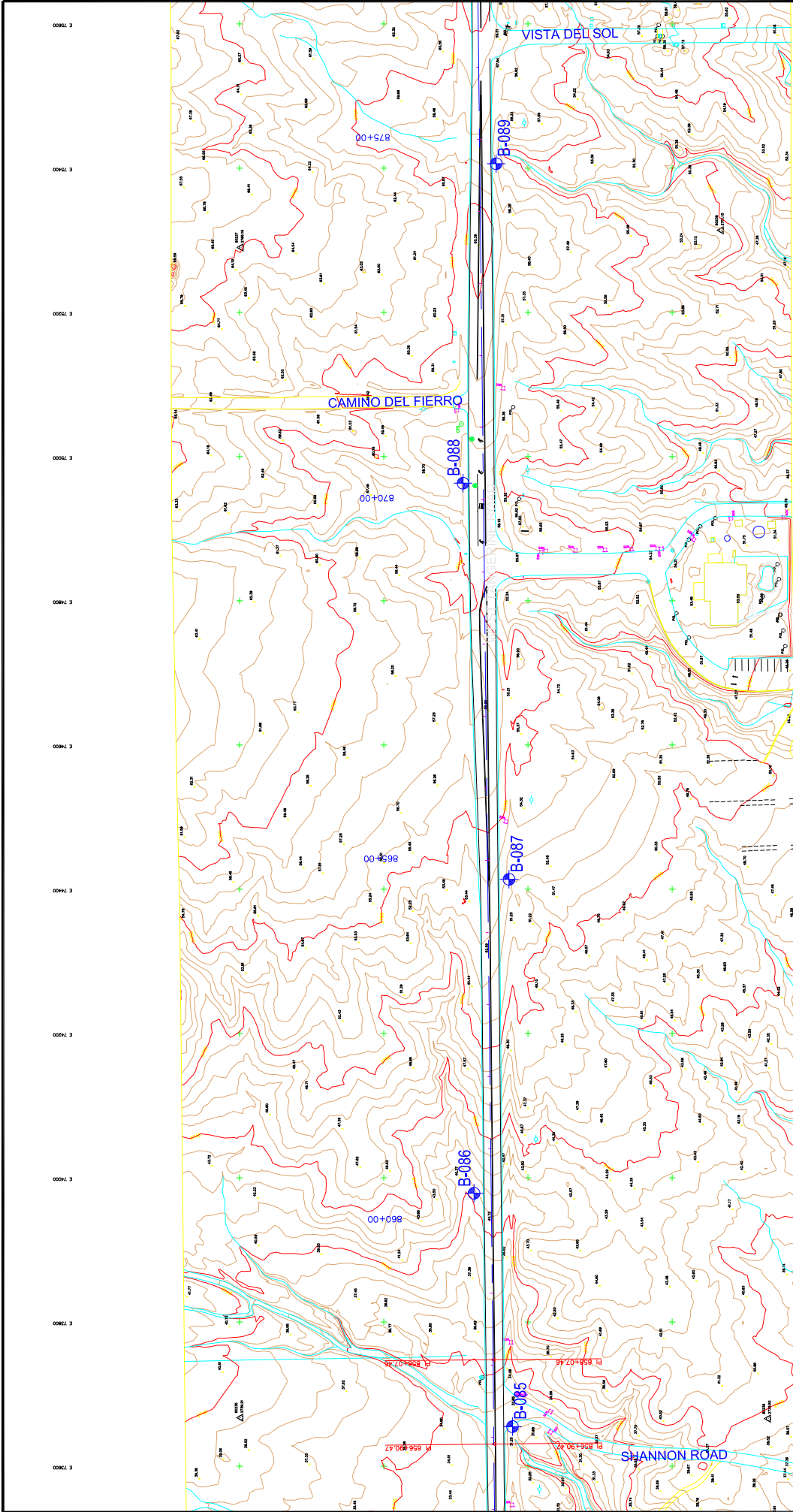


EXHIBIT
A-19

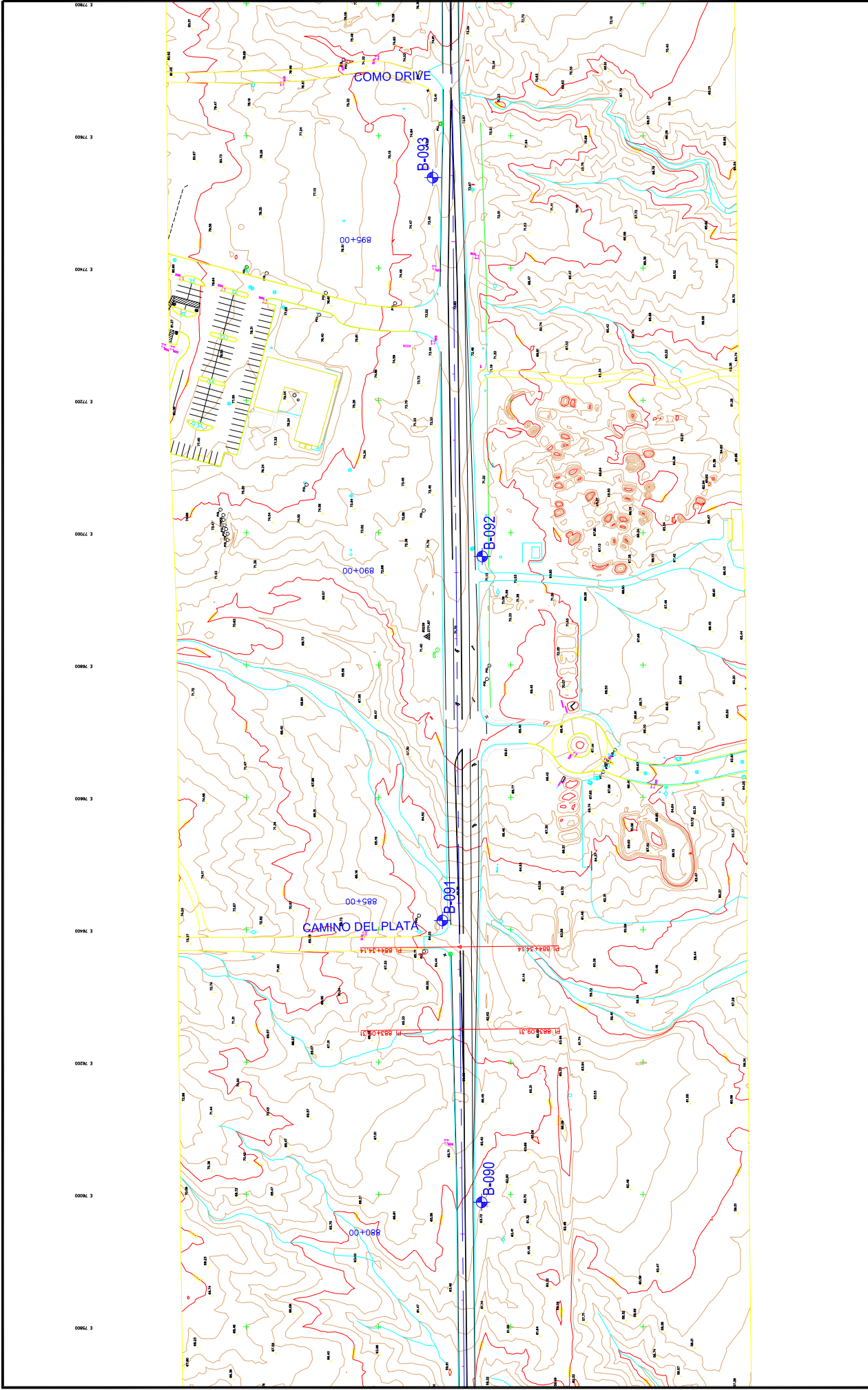
SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

Terracon
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355 S EUCLID, SUITE 107
PH: (520) 770-1789
TUCSON, AZ 85719
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Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
SCALE IN FEET
N
APPROXIMATE BORING LOCATION



EXHIBIT

A-20

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE

ARIZONA

PIMA COUNTY

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355 S EUCLID, SUITE 107
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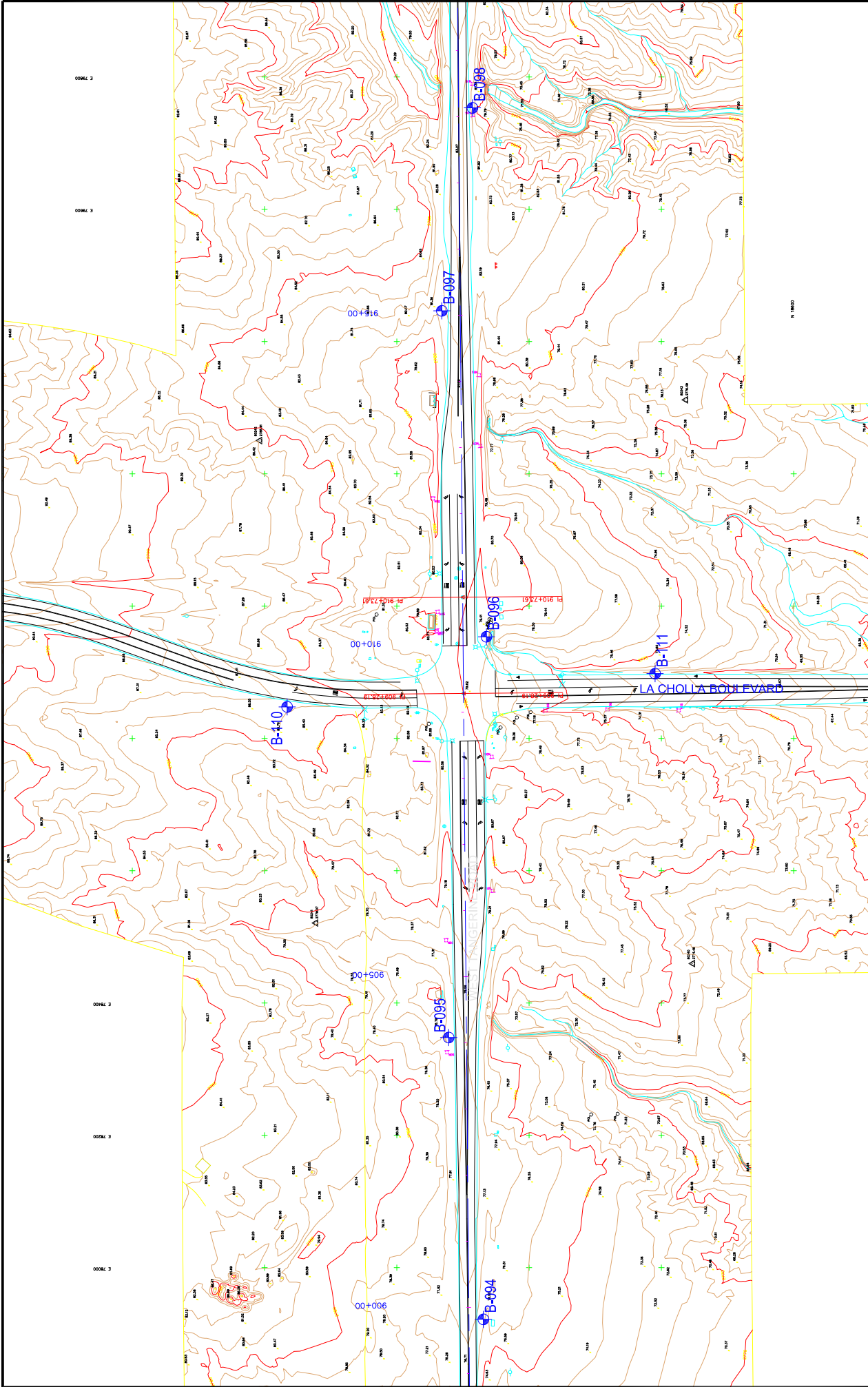
Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

100 0 50 100
SCALE IN FEET

N

APPROXIMATE BORING LOCATION



EXHIBIT

A-21

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon
 Consulting Engineers and Scientists

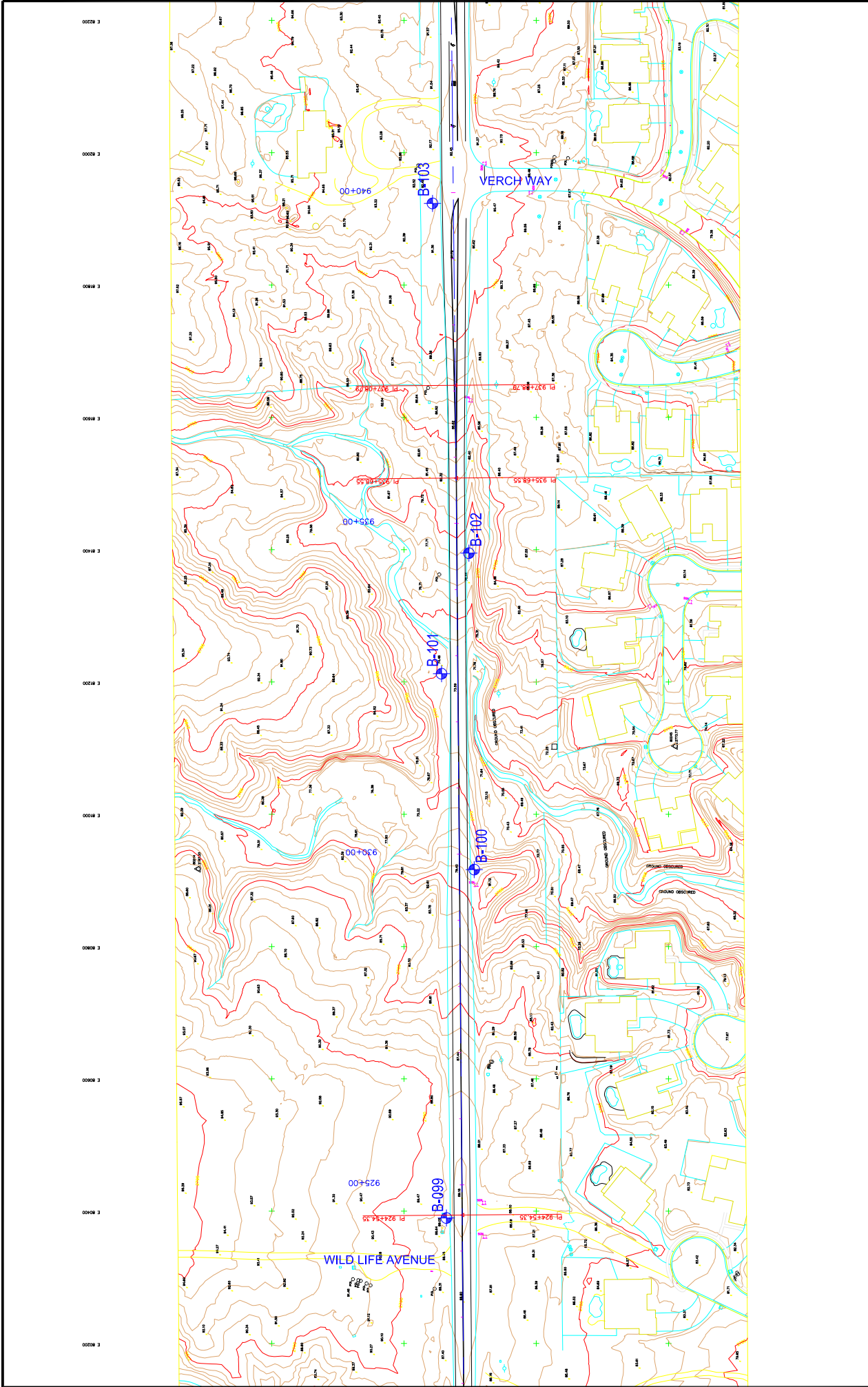
355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-1789
 FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

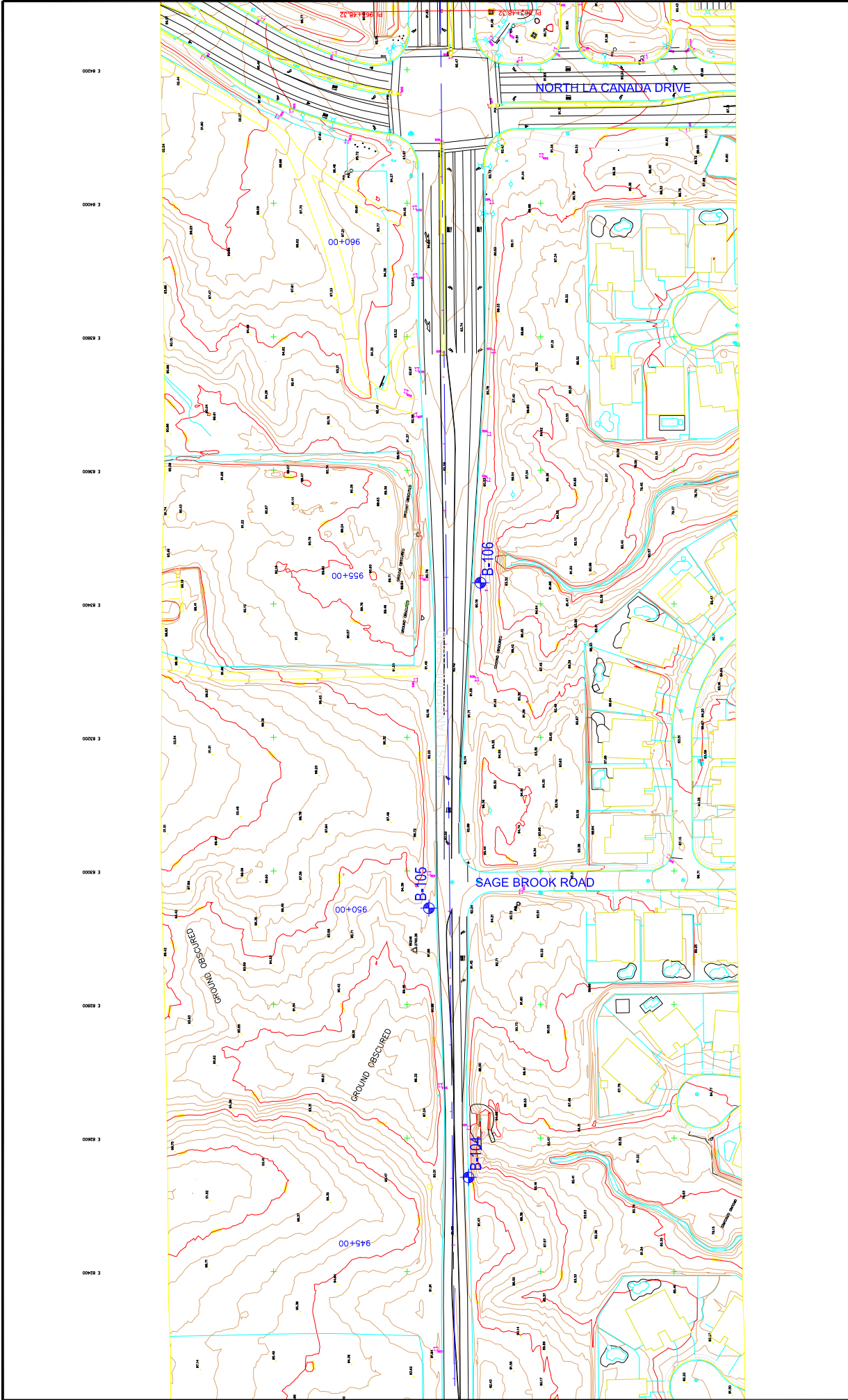
Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100
0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



	<p>SCALE IN FEET</p>	<p>APPROXIMATE BORING LOCATION</p>
<p>TERRACON Consulting Engineers and Scientists 355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</p>		
<p>SITE PLAN & BORING LOCATIONS DIAGRAM</p> <p>PSOMAS</p> <p>TANGERINE ROAD CORRIDOR PROJECT</p> <p>I-10 TO LA CANADA DRIVE</p> <p>PIMA COUNTY ARIZONA</p>		
<p>Project Mgr: BWR</p> <p>Drawn By: JJP</p> <p>Checked By: OBL</p> <p>Approved By: OBL</p>	<p>Project No: 63105079</p> <p>Scale: 1" = 200'</p> <p>File No: 63105079.DWG</p> <p>Date: 01/2011</p>	



TANGERINE ROAD - EASTERN ALIGNMENT

EXHIBIT
A-23

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

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355 S EUCLID, SUITE 107
PH: (520) 770-1789
TUCSON, AZ 85719
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Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100
0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION

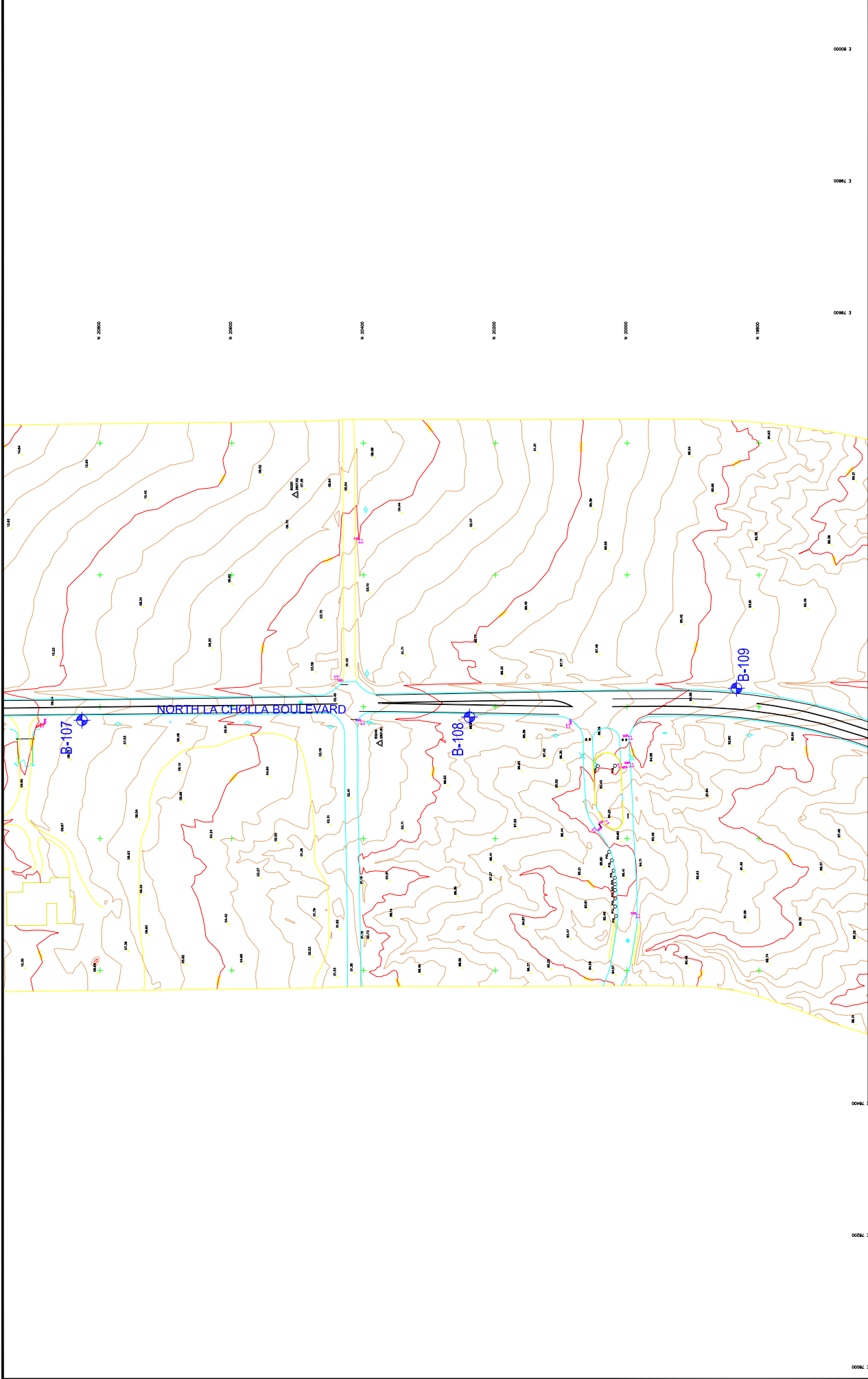


EXHIBIT
A-24

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

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Consulting Engineers and Scientists
355 S EUCLID, SUITE 107
PH: (520) 770-1789
TUCSON, AZ 85719
FAX: (520) 792-3549

Project No. 63105079
Scale: 1" = 200'
File No. 63105079.DWG
Date: 01/2011

Project Mgr: BWR
Drawn By: JJP
Checked By: OBL
Approved By: OBL

100 0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION

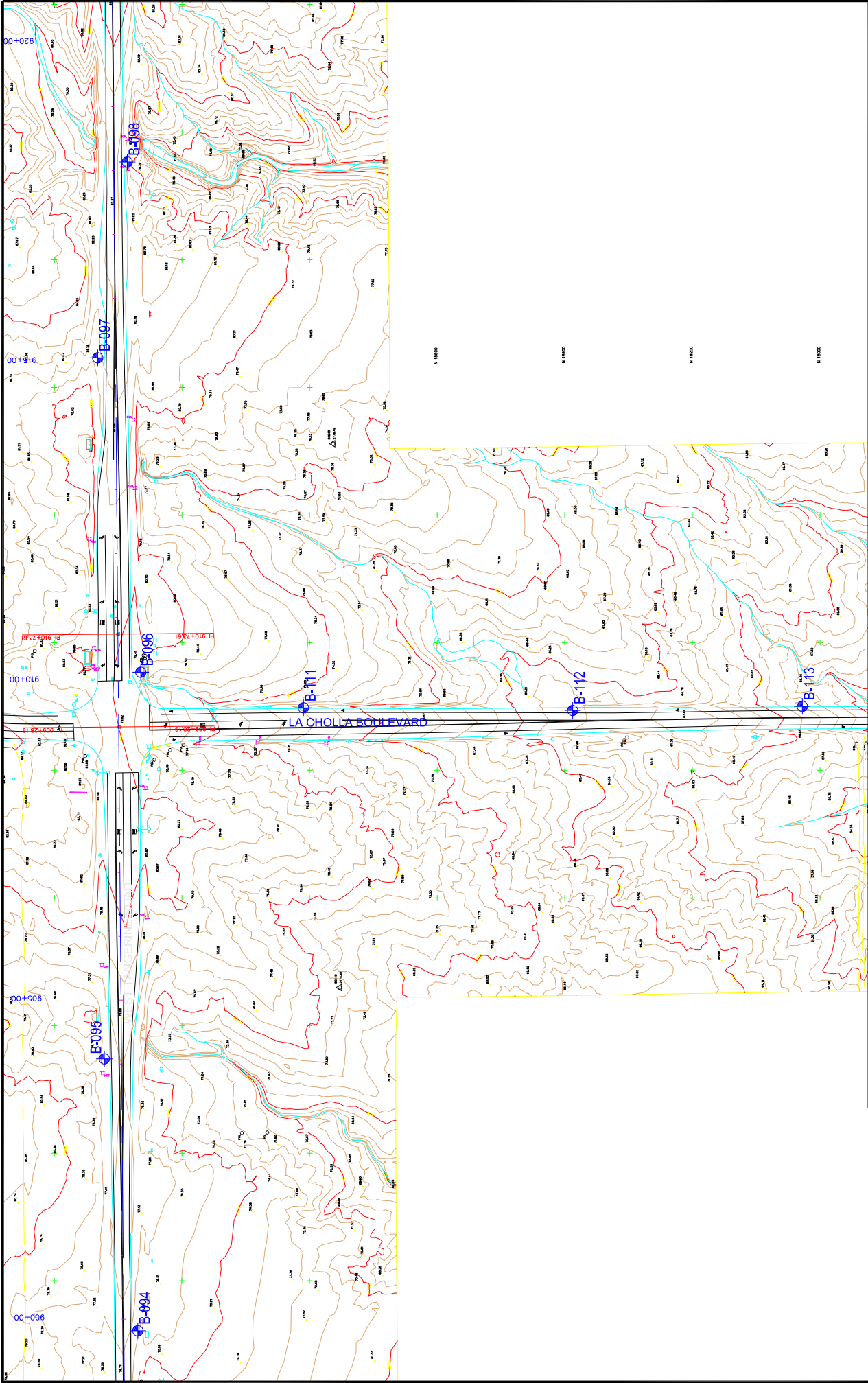


EXHIBIT
A-25

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

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Consulting Engineers and Scientists
355 S EUCLID, SUITE 107
PHX, (520) 770-1789
TUCSON, AZ 85719
FAX: (520) 792-3549

Project No: 63105079
Scale: 1" = 200'
File No: 63105079.DWG
Date: 01/2011

Project Mgr: BWR
Drawn By: JJP
Checked By: OBL
Approved By: OBL

100 0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT
A-26
 PIMA COUNTY
 ARIZONA

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 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-7789
 FAX: (520) 792-3549

Project No. 63105079
 Scale: 1" = 200'
 File No. 63105079.DWG
 Date: 01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
 SCALE IN FEET

APPROXIMATE BORING LOCATION

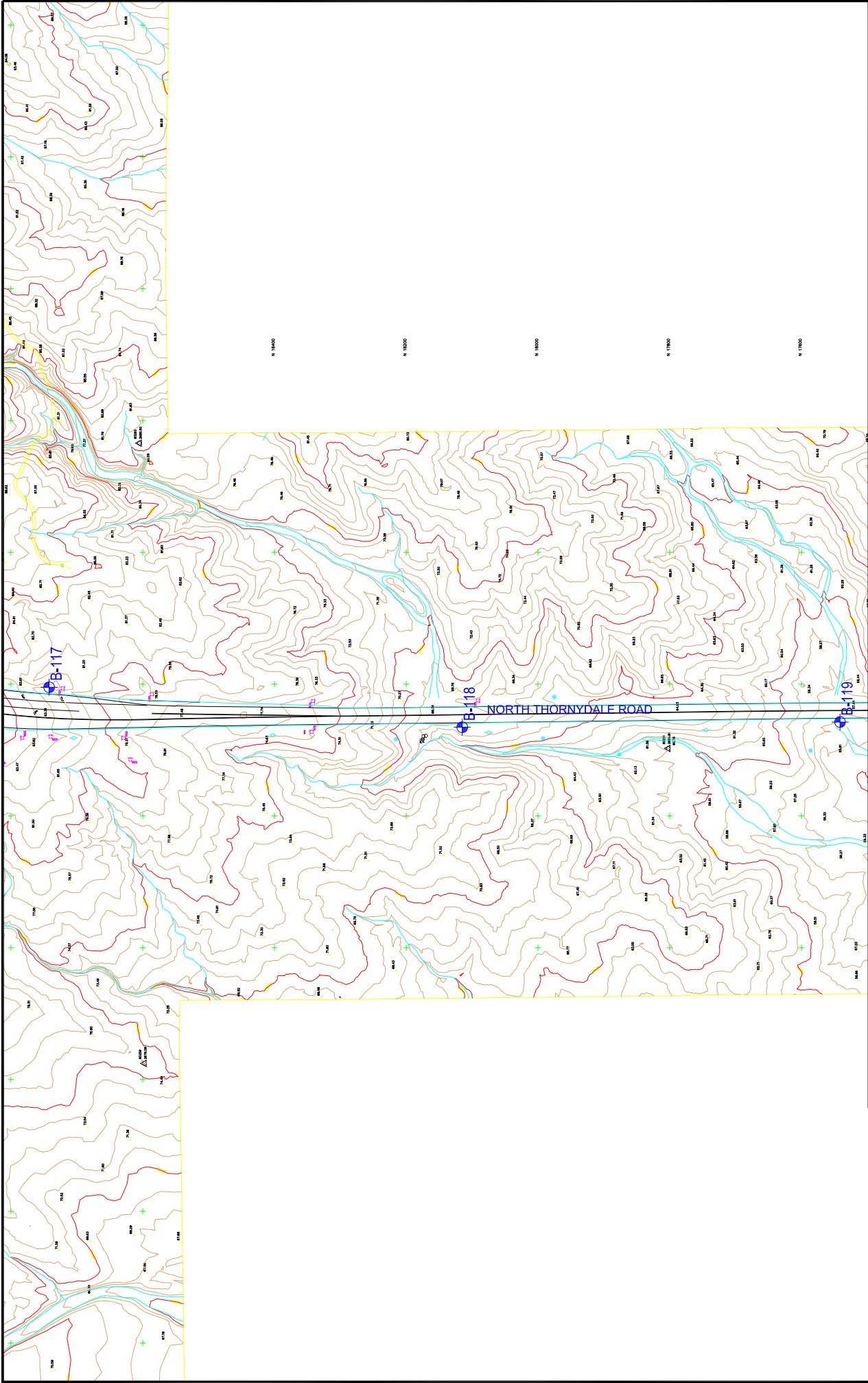


EXHIBIT
A-27

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107
TUCSON, AZ 85719
PH: (520) 770-1788 FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
SCALE IN FEET

N

APPROXIMATE BORING LOCATION

Pavement Design Summary

Tangerine Road Corridor Project ■ Pima County, Arizona

Terracon Project No. 63105079

**Laboratory Test Data Summary**

Sample ID	Approximate Station and Offset	PI	#200	Correlated R-Value	Laboratory R-Value
B-001	Sta. 447+20, 20'L	14	60	25	
B-002	Sta. 451+70, 15'R	12	48	32	25
B-003	Sta. 456+90, 35'L	15	55	26	
B-004	Sta. 461+50, 30'R	14	56	27	
B-005	Sta. 466+40, 10'L	5	61	35	
B-006	Sta. 471+10, 40R	5	38	49	
B-007	Sta. 476+50, 10'L	7	59	34	36
B-008	Sta. 481+70, 40'R	2	29	62	
B-009	Sta. 486+60, 20'L	0	68	39	
B-010	Sta. 490+60, 30'R	0	26	70	
B-011	Sta. 497+10, 40'L	0	42	56	
B-012	Sta. 502+10, 20'R	0	31	65	73
B-013	Sta. 506+90, 15'L	0	15	81	
B-014	Sta. 512+00, 20'L	0	33	63	
B-015	Sta. 515+70, 15'L	0	17	79	
B-016	Sta. 521+70, 15'R	0	24	72	
B-017	Sta. 527+30, 30'L	0	12	85	
B-018	Sta. 523+30, 30'R	0	30	66	
B-019	Sta. 536+90, 40'L	0	19	77	
B-020	Sta. 540+10, 30'R	0	15	81	
B-021	Sta. 545+80, 50'L	0	12	85	
B-022	Sta. 551+50, 30'R	10	23	49	69
B-023	Sta. 557+20, 25'L	0	13.7	83	
B-024	Sta. 561+70, 20'R	1	21	72	
B-025	Sta. 566+80, 30'L	0	10.8	86	
B-026	Sta. 570+25, 20'R	0	17	79	
B-027	Sta. 577+05, 20'L	0	10.4	87	86
B-028	Sta. 581+90, 20'R	0	17	79	
B-029	Sta. 588+50, 25'L	0	18	78	
B-030	Sta. 591+30, 30'R	0	15	81	
B-031	Sta. 597+15, 30'L	0	11.8	85	
B-032	Sta. 602+05, 25'R	0	17.5	79	
B-033	Sta. 607+35, 30'L	0	18.2	78	63
B-034	Sta. 613+75, 30'L	0	13	84	
B-035	Sta. 617+95, 30'R	0	16.9	79	
B-036	Sta. 622+10, 25'R	0	17.8	78	66
B-037	Sta. 628+50, 25'L	0	16.1	80	
B-038	Sta. 632+50, 25'R	0	15.8	80	
B-039	Sta. 636+60, 20'L	0	18	78	
B-040	Sta. 642+15, 25'R	0	18.8	77	69
B-041	Sta. 645+90, 30'L	0	12.7	84	
B-042	Sta. 652+20, 35'R	0	13.6	83	

Pavement Design Summary

Tangerine Road Corridor Project ■ Pima County, Arizona

Terracon Project No. 63105079

**Laboratory Test Data Summary**

Sample ID	Approximate Station and Offset	PI	#200	Correlated R-Value	Laboratory R-Value
B-043	Sta. 655+00, 35'L	0	8.5	89	
B-044	Sta. 661+85, 30'R	0	15.4	81	
B-045	Sta. 667+45, 20'L	0	15.2	81	58
B-046	Sta. 672+75, 20'L	0	11.1	86	
B-047	Sta. 677+00, 25'L	0	16.6	80	
B-048	Sta. 681+90, 30'R	0	17.3	79	
B-049	Sta. 687+30, 20'L	0	15.8	80	
B-050	Sta. 691+60, 30'R	0	22	74	64
B-051	Sta. 694+65, 25'L	0	21.5	74	
B-052	Sta. 697+20, 35'L	0	20	76	
B-053	Sta. 701+80, 60'L	3	21.6	66	
B-054	Sta. 707+00, 20'R	0	17.9	78	
B-055	Sta. 712+50, 55'L	2	18.4	72	
B-056	Sta. 716+60, 25'R	0	16.7	79	58
B-057	Sta. 722+05, 20'L	0	20.7	75	
B-058	Sta. 726+80, 20'R	0	16	80	
B-059	Sta. 731+45, 20'L	0	14.3	82	
B-060	Sta. 737+45, 20'R	0	15.1	81	
B-061	Sta. 743+50, 5'L	0	19.8	76	59
B-062	Sta. 745+95, 60'R	0	19	77	
B-063	Sta. 752+20, 10'L	10	26.3	47	
B-064	Sta. 757+80, 50'R	0	18.6	77	
B-065	Sta. 761+70, 10'L	0	18.8	77	
B-066	Sta. 767+30, 30'R	0	22.3	73	66
B-067	Sta. 772+00, 30'L	0	7.7	90	
B-068	Sta. 777+90, 30'R	0	19.1	77	
B-069	Sta. 780+15, 20'L	12	20	47	
B-070	Sta. 788+15, 20'R	0	18.6	77	
B-071	Sta. 794+20, 40'L	8	14.4	60	
B-072	Sta. 800+20, 45'R	14	14.2	48	48
B-073	Sta. 805+70, 75'L	0	25.1	71	66
B-074	Sta. 811+65, 40'R	0	22	74	
B-075	Sta. 815+10, 30'L	9	23.7	51	
B-076	Sta. 818+55, 55'L	8	26.2	51	
B-077	Sta. 825+20, 30'R	7	27.9	52	58
B-078	Sta. 827+90, 20'L	0	8.8	89	
B-079	Sta. 830+85, 25'R	9	24.7	50	64
B-080	Sta. 836+80, 20'L	0	11.9	85	
B-081	Sta. 840+10, 30'R	4	22.6	63	
B-082	Sta. 845+10, 20'L	0	11.1	86	
B-083	Sta. 849+90, 20'R	0	19.1	77	67
B-084	Sta. 855+10, 25'L	0	15.2	81	

Pavement Design Summary

Tangerine Road Corridor Project ■ Pima County, Arizona

Terracon Project No. 63105079

**Laboratory Test Data Summary**

Sample ID	Approximate Station and Offset	PI	#200	Correlated R-Value	Laboratory R-Value
B-085	Sta. 857+15, 25'R	0	25.3	71	
B-086	Sta. 860+40, 25'R	0	19.4	76	
B-087	Sta. 864+50, 30'R	0	19.8	76	
B-088	Sta. 870+25, 45'L	0	17.2	79	66
B-089	Sta. 875+60, 20'R	10	15.7	54	
B-090	Sta. 880+45, 30'R	3	26	62	
B-091	Sta. 884+70, 25'L	0	14.9	81	
B-092	Sta. 890+25, 40'R	4	27.8	58	
B-093	Sta. 895+95, 30'L	0	29.4	67	
B-094	Sta. 899+80, 20'R	0	22.1	74	70
B-095	Sta. 904+10, 20'L	0	26.1	70	
B-096	Sta. 910+15, 40'R	20	38.2	27	
B-097	Sta. 915+05, 25'L	0	21.4	74	
B-098	Sta. 918+05, 20'R	7	34.3	47	
B-099	Sta. 924+45, 20'L	14	32.5	37	45
B-100	Sta. 929+75, 20'R	17	26.6	36	
B-101	Sta. 932+50, 25'L	0	13.6	83	
B-102	Sta. 934+55, 15'R	0	16.2	80	
B-103	Sta. 939+80, 25'L	5	28.6	55	
B-104	Sta. 946+00, 25'R	20	26.8	32	
B-105	Sta. 950+050, 30'L	12	22.8	46	40
B-106	Sta. 954+90, 50'R	10	19.6	52	
B-107	La Cholla 1675' N of Tangerine	14	39.3	34	
B-108	La Cholla 1200' N of Tangerine	16	24.4	38	44
B-109	La Cholla 775' N of Tangerine	17	30.5	34	
B-110	La Cholla 275' N of Tangerine	9	29.9	47	
B-111	La Cholla 250' S of Tangerine	0	13.4	83	
B-112	La Cholla 750' S of Tangerine	0	25.5	70	67
B-113	La Cholla 1250' S of Tangerine	8	15	59	
B-114	Thornydale 1275' N of Tangerine	0	21.5	74	79
B-115	Thornydale 750' N of Tangerine	7	34.9	47	
B-116	Thornydale 250' N of Tangerine	5	28.9	55	52
B-117	Thornydale 250' S of Tangerine	11	21.3	48	
B-118	Thornydale 825' S of Tangerine	0	18	78	
B-119	Thornydale 1400' S of Tangerine	0	7.7	90	

APPENDIX B
Flexible Pavement Design

Tangerine, I-10 to Dove Mountain

Year	YEARLY ESALS											Total ESALS			
	ADT	Auto	LT	MT	Bus	TS	TT	TST	0.0008	0.0100	0.4000		0.2500	2.6210	2.4309
2021	10,567	7,026	2,107	879	72	220	250	13	2,051	7,691	128,279	6,540	2,10,544	222,206	19,634
2022	11,134	7,402	2,220	926	76	232	264	14	2,162	8,104	135,159	6,891	221,836	234,123	20,687
2023	11,731	7,799	2,339	975	80	244	278	15	2,277	8,538	142,408	7,260	233,734	246,680	21,796
2024	12,360	8,218	2,465	1,028	84	257	293	16	2,400	8,966	150,046	7,650	246,270	259,911	22,965
2025	13,023	8,659	2,597	1,083	88	271	309	17	2,528	9,479	158,094	8,060	259,478	273,851	24,197
2026	13,722	9,123	2,736	1,141	93	286	325	18	2,664	9,987	166,573	8,492	273,395	288,538	25,495
2027	14,458	9,612	2,883	1,202	98	301	343	18	2,807	10,523	175,507	8,948	288,058	304,014	26,862
2028	15,233	10,128	3,038	1,267	103	317	361	19	2,957	11,087	184,920	9,428	303,319	320,319	28,303
2029	16,050	10,671	3,201	1,335	109	334	380	20	3,116	11,682	194,838	9,934	319,786	337,499	29,821
2030	16,911	11,243	3,372	1,406	115	352	401	22	3,283	12,308	205,287	10,466	336,937	355,600	31,420
2031	17,818	11,846	3,553	1,481	121	371	422	23	3,459	12,969	216,298	11,028	355,008	374,672	33,105
2032	18,773	12,482	3,744	1,561	127	391	445	24	3,645	13,664	227,899	11,619	374,049	394,767	34,881
2033	19,780	13,151	3,944	1,645	134	412	469	25	3,840	14,397	240,122	12,242	394,110	415,940	36,751
2034	20,841	13,856	4,156	1,733	141	434	494	27	4,046	15,169	253,000	12,899	415,248	438,248	38,723
2035	21,959	14,600	4,379	1,826	149	457	520	28	4,263	15,983	266,569	13,591	437,519	461,753	40,799
2036	23,137	15,383	4,614	1,924	157	482	548	30	4,492	16,840	280,866	14,320	460,985	486,518	42,988
2037	24,378	16,208	4,861	2,027	165	508	578	31	4,733	17,743	295,930	15,088	485,709	512,612	45,293
2038	25,685	17,077	5,122	2,136	174	535	609	33	4,986	18,695	311,802	15,897	511,759	540,105	47,722
2039	27,063	17,993	5,397	2,250	184	564	641	35	5,254	19,697	328,525	16,749	539,207	569,073	50,282
2040	28,514	18,958	5,686	2,371	193	594	676	36	5,536	20,754	346,145	17,648	568,126	599,595	52,979
Total ESALS														20,513,808	
% Veh in Design Lane														45%	
Design ESALS														9,231,214	

Tangerine, Dove Mountain to La Cañada

Year	YEARLY ESALS											Total ESALS			
	ADT	Auto	LT	MT	Bus	TS	TT	TST	0.0008	0.0100	0.4000		0.2500	2.4825	2.3289
2015	17,668	12,166	3,523	1,447	64	197	266	4	3,553	12,859	211,318	5,822	178,759	226,364	5,387
2016	18,269	12,580	3,643	1,497	66	204	275	4	3,673	13,297	218,505	6,020	184,838	234,061	5,570
2017	18,890	13,008	3,767	1,548	68	211	285	4	3,798	13,749	225,935	6,225	191,124	242,021	5,760
2018	19,533	13,450	3,895	1,600	71	218	294	4	3,927	14,216	233,619	6,437	197,623	250,252	5,955
2019	20,197	13,908	4,027	1,655	73	226	304	4	4,061	14,700	241,563	6,656	204,344	258,762	6,158
2020	20,884	14,381	4,164	1,711	75	233	315	5	4,199	15,200	249,778	6,882	211,293	267,562	6,367
2021	21,594	14,870	4,306	1,769	78	241	325	5	4,342	15,717	258,272	7,116	218,478	276,660	6,584
2022	22,328	15,375	4,452	1,829	81	249	337	5	4,490	16,251	267,055	7,358	225,908	286,069	6,808
2023	23,088	15,898	4,604	1,891	83	258	348	5	4,642	16,804	276,137	7,608	233,591	295,797	7,039
2024	23,873	16,439	4,760	1,956	86	267	360	5	4,800	17,375	285,528	7,867	241,534	305,856	7,279
2025	24,685	16,998	4,922	2,022	89	276	372	5	4,963	17,966	295,238	8,135	249,748	316,257	7,526
2026	25,524	17,576	5,090	2,091	92	285	385	6	5,132	18,577	305,278	8,411	258,241	327,012	7,782
2027	26,392	18,174	5,263	2,162	95	295	398	6	5,307	19,209	315,659	8,697	267,023	338,133	8,047
2028	27,289	18,792	5,442	2,236	99	305	411	6	5,487	19,862	326,394	8,993	276,104	349,632	8,320
2029	28,218	19,431	5,627	2,312	102	315	425	6	5,674	20,537	337,494	9,299	285,493	361,522	8,603
2030	29,177	20,092	5,818	2,390	105	326	440	6	5,867	21,236	348,971	9,615	295,202	373,816	8,896
2031	30,169	20,775	6,016	2,471	109	337	455	7	6,066	21,958	360,838	9,942	305,241	386,528	9,199
2032	31,195	21,481	6,220	2,556	113	348	470	7	6,273	22,705	373,109	10,280	315,621	399,673	9,511
2033	32,256	22,212	6,432	2,642	116	360	486	7	6,486	23,477	385,797	10,630	326,355	413,265	9,835
2034	33,353	22,967	6,651	2,732	120	372	503	7	6,706	24,275	398,917	10,991	337,453	427,319	10,169
Total ESALS														18,029,140	
% Veh in Design Lane														45%	
Design ESALS														8,113,113	

Thornydale Rd South of Tangerine

Year	% of TRAFFIC										YEARLY ESALS										Total ESALS	
	ADT	Auto	LT	18.5%	5.9%	0.7%	0.2%	0.9%	TT	TST	0.0%	Auto	0.0100	0.4000	0.2500	2.4825	2.3289	3.7779	TT	TST	Total ESALS	
2015	10,705	7,906	1,977	632	71	24	96	-	-	-	2,308	7,217	92,317	6,459	21,378	81,225	-	-	-	-	210,904	
2016	11,156	8,239	2,061	659	74	25	100	-	-	-	2,406	7,521	96,210	6,731	22,280	84,649	-	-	-	-	219,797	
2017	11,627	8,586	2,147	687	77	26	104	-	-	-	2,507	7,838	100,266	7,015	23,219	88,219	-	-	-	-	229,064	
2018	12,117	8,948	2,238	716	80	27	108	-	-	-	2,613	8,168	104,494	7,311	24,198	91,938	-	-	-	-	238,722	
2019	12,628	9,326	2,332	746	83	28	113	-	-	-	2,723	8,513	108,899	7,619	25,218	95,814	-	-	-	-	248,787	
2020	13,160	9,719	2,431	777	87	29	117	-	-	-	2,838	8,872	113,491	7,940	26,282	99,854	-	-	-	-	259,276	
2021	13,715	10,129	2,533	810	91	30	122	-	-	-	2,958	9,246	118,276	8,275	27,390	104,064	-	-	-	-	270,208	
2022	14,293	10,556	2,640	844	95	32	128	-	-	-	3,082	9,636	123,263	8,624	28,545	108,452	-	-	-	-	281,601	
2023	14,896	11,001	2,751	880	98	33	133	-	-	-	3,212	10,042	128,460	8,987	29,748	113,024	-	-	-	-	293,474	
2024	15,524	11,465	2,867	917	103	34	139	-	-	-	3,348	10,465	133,876	9,366	31,002	117,790	-	-	-	-	305,847	
2025	16,179	11,948	2,988	956	107	36	144	-	-	-	3,489	10,907	139,520	9,761	32,310	122,756	-	-	-	-	318,743	
2026	16,861	12,452	3,114	996	111	37	151	-	-	-	3,636	11,366	145,403	10,173	33,672	127,932	-	-	-	-	332,182	
2027	17,572	12,977	3,245	1,038	116	39	157	-	-	-	3,789	11,846	151,534	10,602	35,091	133,326	-	-	-	-	346,187	
2028	18,313	13,524	3,382	1,082	121	40	163	-	-	-	3,949	12,345	157,923	11,049	36,571	138,947	-	-	-	-	360,783	
2029	19,085	14,094	3,525	1,127	126	42	170	-	-	-	4,115	12,866	164,581	11,515	38,113	144,806	-	-	-	-	375,995	
2030	19,889	14,688	3,673	1,175	132	44	178	-	-	-	4,289	13,408	171,520	12,000	39,720	150,911	-	-	-	-	391,848	
2031	20,728	15,308	3,828	1,224	137	46	185	-	-	-	4,470	13,973	178,752	12,506	41,395	157,274	-	-	-	-	408,369	
2032	21,602	15,953	3,990	1,276	143	48	193	-	-	-	4,658	14,562	186,288	13,033	43,140	163,905	-	-	-	-	425,587	
2033	22,513	16,626	4,158	1,330	149	50	201	-	-	-	4,855	15,176	194,143	13,583	44,959	170,815	-	-	-	-	443,531	
2034	23,462	17,327	4,333	1,386	155	52	209	-	-	-	5,059	15,816	202,328	14,155	46,854	178,017	-	-	-	-	462,231	
											Total ESALS											6,423,136
											% Veh in Design Lane											45%
											Design ESALS											2,890,411

La Cholla, South of Tangerine

% of TRAFFIC Year	YEARLY ESALS										Total ESALS								
	ADT	Auto	74.3%	17.9%	6.4%	0.6%	0.1%	0.7%	0.0%	0.0%	Auto	LT	MT	Bus	TS	TT	TST	Total ESALS	
2015	9,113	6,767	1,630	587	54	8	65	2	2	1,976	5,950	85,754	4,882	7,377	54,871	3,208	164,017		
2016	9,463	7,027	1,693	610	56	8	67	2	2	2,052	6,179	89,054	5,070	7,661	56,982	3,331	170,329		
2017	9,828	7,298	1,758	633	58	9	70	3	3	2,131	6,417	92,482	5,265	7,956	59,176	3,459	176,885		
2018	10,206	7,579	1,826	658	60	9	72	3	3	2,213	6,663	96,041	5,468	8,262	61,453	3,592	183,693		
2019	10,599	7,870	1,896	683	62	9	75	3	3	2,298	6,920	99,738	5,678	8,580	63,819	3,731	190,764		
2020	11,007	8,173	1,969	709	65	10	78	3	3	2,387	7,186	103,577	5,897	8,910	66,275	3,874	198,106		
2021	11,430	8,488	2,045	737	67	10	81	3	3	2,478	7,463	107,563	6,124	9,253	68,826	4,023	205,731		
2022	11,870	8,814	2,123	765	70	11	84	3	3	2,574	7,750	111,703	6,359	9,610	71,475	4,178	213,649		
2023	12,327	9,154	2,205	795	72	11	87	3	3	2,673	8,048	116,003	6,604	9,979	74,226	4,339	221,873		
2024	12,802	9,506	2,290	825	75	11	91	3	3	2,776	8,358	120,468	6,858	10,363	77,083	4,506	230,412		
2025	13,294	9,872	2,378	857	78	12	94	3	3	2,883	8,680	125,104	7,122	10,762	80,050	4,680	239,281		
2026	13,806	10,252	2,470	890	81	12	98	4	4	2,994	9,014	129,920	7,396	11,177	83,131	4,860	248,491		
2027	14,337	10,646	2,565	924	84	13	102	4	4	3,109	9,361	134,920	7,681	11,607	86,330	5,047	258,055		
2028	14,889	11,056	2,663	960	87	13	105	4	4	3,228	9,721	140,113	7,977	12,053	89,653	5,241	267,987		
2029	15,462	11,482	2,766	997	91	14	110	4	4	3,353	10,095	145,506	8,284	12,517	93,104	5,443	278,302		
2030	16,057	11,924	2,872	1,035	94	14	114	4	4	3,482	10,484	151,106	8,603	12,999	96,687	5,652	289,014		
2031	16,676	12,383	2,983	1,075	98	15	118	4	4	3,616	10,887	156,922	8,934	13,500	100,409	5,870	300,137		
2032	17,317	12,859	3,098	1,116	102	15	123	4	4	3,755	11,307	162,962	9,278	14,019	104,273	6,096	311,690		
2033	17,984	13,354	3,217	1,159	106	16	127	5	5	3,899	11,742	169,235	9,635	14,559	108,287	6,330	323,686		
2034	18,676	13,868	3,341	1,204	110	17	132	5	5	4,050	12,194	175,748	10,005	15,119	112,455	6,574	336,145		
																		Total ESALS	
																			4,808,247
																			% Veh in Design Lane
																			45%
																			Design ESALS
																			2,163,711

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 1
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	30
Resilient Modulus MR (psi)	13,001
Design Modulus (psi)	13,001

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 4.27

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		7.5	9		16.5	4.29
B		8.0	8		16.0	4.40
C	2.0	5.5	8		15.5	4.40

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 1
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	30
Resilient Modulus MR (psi)	13,001
Design Modulus (psi)	13,001

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 4.27

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
D	1.5	6.0	8		15.5	4.35

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 1
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	36
Resilient Modulus MR (psi)	15,790
Design Modulus (psi)	15,790

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 3.96

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
E		5.0	5	6	16.0	4.13
F	2.0	2.5	5	6	15.5	4.13
G	1.5	3.5	5	6	16.0	4.30

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 1
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	36
Resilient Modulus MR (psi)	15,790
Design Modulus (psi)	15,790

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 3.96

Alternative	Recommended Pavement Section Thickness Inches					Total Structural Number
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
H		7.0	8		15.0	3.96
I	2.0	4.5	8		14.5	3.96
J	1.5	5.5	7		14.0	4.02

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 2
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	54
Resilient Modulus MR (psi)	25,412
Design Modulus (psi)	25,412

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 3.26

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		5.5	8		13.5	3.30
B		6.0	6		12.0	3.30
C	2.0	3.0	8		13.0	3.30

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 2
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	9,231,214
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	54
Resilient Modulus MR (psi)	25,412
Design Modulus (psi)	25,412

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 3.26

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
D	1.5	4.0	8		12.0	3.47

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 3
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	52
Resilient Modulus MR (psi)	24,250
Design Modulus (psi)	24,250

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 3.25

Alternative	Recommended Pavement Section Thickness Inches					Total Structural Number
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		5.5	8		13.5	3.30
B		6.0	6		12.0	3.30
C	2.0	3.0	8		13.0	3.30

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 3
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	52
Resilient Modulus MR (psi)	24,250
Design Modulus (psi)	24,250

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 3.25

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
D	1.5	3.5	8		13.0	3.25

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 4
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	32
Resilient Modulus MR (psi)	13,907
Design Modulus (psi)	13,907

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 4.07

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		7.5	8		15.5	4.18
B		7.0	9		16.0	4.07
C	2.0	4.5	10		16.5	4.18

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 4
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	32
Resilient Modulus MR (psi)	13,907
Design Modulus (psi)	13,907

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 4.07

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
D	1.5	5.0	10		16.5	4.13

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 4 with CTS
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	44
Resilient Modulus MR (psi)	19,834
Design Modulus (psi)	19,834

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

Structural Drainage

Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 3.53

Alternative	Recommended Pavement Section Thickness Inches					Total Structural Number
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
E		5.0	5	6	16.0	4.13
F	2.0	2.5	5	6	15.5	4.13
G	1.5	3.5	5	6	16.0	4.30

Flexible Pavement Design Analysis

Design Criteria

Project Name Tangerine - Section 4 with CTS
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	8,113,113
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	44
Resilient Modulus MR (psi)	19,834
Design Modulus (psi)	19,834

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	1.00

Design Calculations

Target Structural Number SN: 3.53

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
H		6.5	7		13.5	3.63
I	2.0	4.0	7		13.0	3.63
J	1.5	4.5	7		13.0	3.58

Flexible Pavement Design Analysis

Design Criteria

Project Name La Cholla
Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	2,163,711
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	39
Resilient Modulus MR (psi)	17,262
Design Modulus (psi)	17,262

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 2.95

Alternative	Recommended Pavement Section Thickness					Total Structural Number
	Inches					
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		5.0	7		12.0	2.97
B		5.5	6		11.5	3.08
C	2.0	3.0	5		10.0	2.97

Flexible Pavement Design Analysis

Design Criteria

Project Name La Cholla
 Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	2,163,711
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	39
Resilient Modulus MR (psi)	17,262
Design Modulus (psi)	17,262

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 2.95

Alternative	Recommended Pavement Section Thickness Inches					Total Structural Number
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
D	1.5	3.5	6		11.0	3.03

Flexible Pavement Design Analysis

Design Criteria

Project Name Thornydale
Project Number 63105079

PROJECT DATA

Design Life (years)	20
Equivalent Axle Loads/Day	**
Total EAL's	2,890,411
Seasonal Variation Factor	1.7
Reliability	95%
Overall Standard Deviation	0.35

SUBGRADE CONDITIONS

AASHTO Classification	**
% Passing #200 Sieve	**
Plasticity Index	**
Correlated R-Value	52
Resilient Modulus MR (psi)	24,250
Design Modulus (psi)	24,250

SERVICEABILITY

Present (2.5 to 5.0)	4.2
Terminal (1.5 to 4.1)	2.8

LAYER COEFFICIENTS

	Structural	Drainage
Asphalt Rubber Asphaltic Concrete	0.55	N/A
Asphalt Concrete Surface Course	0.44	N/A
Aggregate Base Course	0.12	0.92
Cement Treated Subgrade	0.23	0.92

Design Calculations

Target Structural Number SN: 2.70

Alternative	Recommended Pavement Section Thickness Inches					Total Structural Number
	Asphalt Rubber Concrete	Asphalt Concrete Surface	Aggregate Base Course	Cement Treated Subgrade	Total	
A		5.0	5		10.0	2.75
B	2.0	2.5	5		9.5	2.75
C	1.5	3.0	5		9.5	2.70

APPENDIX C
Supporting Documents

Response to Comments

As submitted 9-12-11

Responses are in gray

1. Page 1 mentions no bridge in the project. Recent discussions with Marana indicate that we may have 3 bridges for wildlife with spans of ~70 ft. Remove or modify the sentence as necessary.

The sentence has been modified. Our original understanding of the scope included enlarged box culverts for wildlife crossing. Structures of this magnitude were not anticipated as part of our investigation. Additional explorations may be needed to provide recommendations for these bridges.

2. Page 2 indicated boring numbers B-001 to B-120 and total 119 borings. Boring numbers seem to be B-001 to B-119 in the appendix. Please verify.

119 borings were drilled. The sentence was corrected.

3. Page 4 recommends lowering both construction control R-value and Design R-value. Have the design R-values been lowered in the report and the pavement design?

The design was corrected to include the lowered R-values.

4. Pavement design parameters (seasonal variation factor, Initial PSI, Terminal PSI, Layer coefficients, Drainage Coefficient) should be based on Pima County Roadway Design Manual instead of ADOT. This will also affect the minimum SN (2.64 instead of 3.0).

The design was modified to Pima County Roadway Design Standards.

5. Use 2" ARAC in the pavement design.

An alternative design that includes ARAC has been added.

6. Please submit a QC form (from the QC plan)

The form is now included.

CERTIFICATE OF COMPLIANCE

DATE: 12-29-11

TO: Town of Marana Department of Transportation
11555 W. Civic Center Drive
Marana, AZ 85653-7003

ATTN: Mr. Scott Leska, P.E., P.T.O.E.
Project Manager

RE: QUALITY ASSURANCE REVIEW – STAGE I SUBMITTAL
Tangerine Road Corridor – Interstate 10 to La Cañada Drive

CONSULTANT: Psomas
800 E. Wetmore Road, Suite 110
Tucson, AZ 85719

SUBCONSULTANT:

CERTIFICATE OF COMPLIANCE

This is to certify that I have monitored the quality control (QC) process during production and review. That I have completed and signed the attached QC Checklists for each element of the project. That I have completed and documented the required QC Review of the production and review quality control documentation for all elements of this submittal. This QA Review was conducted on 29th (day) January, 2011, after all QC procedures were complete. Submittal plans, associated production and review check prints and quality control documents for the referenced elements have been evaluated, initialed and are available for review upon request.

This certificate is issued to document my review and to confirm that the standards for professional practice processes were followed in producing the submittal documents. In my professional opinion, these documents meet the standards of the Town of Marana, Department of Public Works and are ready for review.

SIGNED: Bryan V Reed
Project Manager

GEOTECH ADDENDUM

November 10, 2011

Psomas, Inc.
800 East Wetmore Road
Suite 110
Tucson, AZ 85719

Attn: Alejandro Angel, P.E.
P: 520.690.7866
F: 520.690.1290
E: aangel@psomas.com

Re: Addendum 1 Roadway Geotechnical Engineering Report
Tangerine Road Corridor Project
Interstate 10 to La Canada Drive
Pima County, Arizona
Terracon Project No. 63105079

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This letter addresses issues related specifically to the roadway portion of the project. A pavement design summary report has also been prepared for this project. This letter has been prepared in order to address comments received from the Town of Marana.

Comment 1: Based on our experience with similar soils the following infiltration rates may be used to assist in the conceptual design of future retention basins along the roadway corridor:

Location	Estimated Infiltration Rate (min/in)
Tangerine Road Segment 1	60 to 120
Tangerine Road Segment 2	5 to 30
Tangerine Road Segment 3	5 to 30
Tangerine Road Segment 4	20 to 60

The estimation is based only on our experience with similar soils, the percent of material passing the #200 sieve, and the plasticity index (the former two are reported in the Roadway Geotechnical Engineering Report). These ranges should only be used for conceptual design and specific testing (infiltration testing) should be performed at the planned retention basins to determine the actual infiltration rate. Terracon can perform this testing if requested.



Foundations:

Our original understanding of the scope of work included the construction of reinforced concrete box (RCB) culverts at the large wash crossings. We also understood several modified RCB culverts would be used for wildlife crossings. At the time of our proposal we were not provided with locations of the wildlife crossings. We have since been provided with wildlife crossing locations and now understand several of the RCB culvert crossings will now be constructed as arch structures and the wildlife crossings will be constructed as bridges. The estimated depth of scour, as provided by CMG Drainage Engineering, at these structures is between 10 and 15 feet.

Structures will be constructed at the following locations (stationing is approximate):

Structure	Structure Station Bounds		Boring Number	Approximate Boring Station	Depth of Boring (feet)
Arch	528+50	531+50	B-017	527+30	30
Bridge	574+00	577+00	B-026	570+25	30
Arch	610+50	613+50	B-034	613+75	30
Arch	627+00	630+00	B-037	628+50	30
Bridge	653+00	656+00	B-043	655+00	15
Bridge	671+00	674+00	B-046	672+75	30
Arch	735+00	738+00	B-059	731+45	30
Arch	758+00	761+00	B-064	757+80	15
Bridge	771+00	774+00	B-067	772+00	30
Arch	827+00	830+00	B-078	827+90	30
Arch	853+00	856+00	B-085	857+15	30
Arch	882+50	885+50	B-091	884+70	30
Bridge	928+00	931+00	B-101	932+50	30
Arch	944+00	947+00	B-104	946+00	30

The arch and bridge structures can be supported by shallow, spread footing foundation systems or on drilled shafts. Shallow spread footings will not be suitable in areas subject to scour, and deep foundations will need to be considered at these locations, unless some form of scour protection (soil cement bank protection, gabion baskets, etc.) is provided. Foundation excavations and bearing soils should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required. Design recommendations for foundations for the proposed structures and related structural elements are presented in the following paragraphs.

Shallow Foundations for Arch and Bridge Structures:

Due to the presence of hydrocompactive soils, shallow foundations should bear on engineered fill as follows:

Depth of Fill Below Footing	Lateral Extent of Fill Beyond Edge of Footing
24 inches for footings 48 inches wide or less.	24 inches for footings 36 inches wide or less.
1/2 the width of the footing for footings larger than 48 inches wide.	2/3 width of footings larger than 36 inches wide.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned, and compacted per the compaction requirements in Section 4.2.4.

Shallow Foundation Design Recommendations

Description	Recommendation
Structures	Bridge and Arch Structures. ¹
Bearing Material	Engineered fill as prepared in the earthwork section of this report
Allowable Bearing Pressure	Embedment (ft) psf
	2 2,000
	3 2,500
	4 3,500
5 5,000	
Total Estimated Settlement	1 inch
Estimated Differential Settlement	1/2-inch

¹Note: These structures should be supported on drilled shaft foundations at locations where scour is present, unless protection of the shallow foundations from scour is provided

Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings, and finished floor level for interior footings.

The allowable foundation bearing pressures may include dead loads plus design live-load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead-load computations.

Total and differential settlements should not exceed predicted values, provided that:

- foundations are constructed as recommended, and
- essentially no changes occur in water contents of foundation soils.

Additional foundation movements could occur if water from any source infiltrates the foundation soils; therefore, proper drainage should be provided in the final design and during construction.

Drilled Shaft Foundation Design Recommendations

Description	Recommendation
Structures	Bridge and Arch
Minimum Dimensions	Minimum shaft diameter of 24 inches. Straight sided shafts are recommended.
Minimum Embedment Depth Below Finished Grade	10 feet below maximum depth of scour
Total Estimated Settlement	1 inch

Conceptual drilled shaft foundations can be evaluated using the preliminary allowable end-bearing pressures and skin-friction values tabulated below. Also included in the tabulation are estimated passive pressures and parameters for lateral-load analysis using the computer program *COM624*, or *LPILE*. It should be noted the values provided include soils affected by scour, it should be assumed that design parameters within the zone of scour will not contribute to foundation support (laterally or in compression) and should be disregarded. We anticipate that additional and deeper explorations will need to be performed to develop final drilled shaft foundation capacities and Structures Selection Report. Please contact Terracon to prepare an additional scope of services for these additional recommendations. The preliminary design parameters are as follows:

Arch Structure Location: 528+50 to 531+50

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 7.5	28	115	---	200	800	25
7.5 – 15	30	115	7,200	300	800	50
15 – 20	35	120	20,000	450	1,200	175
20 – 25	32	115	12,000	600	800	90

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s = kx$ where x is the depth below the surface

Arch and Bridge Structures located between Stations 574+00 to 656+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 7.5	35	120	---	200	1,200	125
7.5 – 15	35	120	26,000	300	1,200	125
15 – 20	35	125	26,000	450	1,200	175
20 – 25	35	125	26,000	600	1,200	175

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

Bridge Structure located between: 671+00 to 674+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 10	28	110	---	200	800	25
10 – 15	30	115	26,000	300	1,200	225
15 – 20	35	120	10,000	450	800	50
20 – 25	32	115	26,000	600	800	225

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

Arch and Bridge Structures located between Stations 735+00 to 774+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 10	30	110	---	200	800	50
10 – 15	30	110	7,200	300	800	50
15 – 20	32	115	14,400	450	1,000	125
20 – 25	35	125	19,200	600	1,200	150

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

Arch Structure located between Stations 827+00 to 830+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 10	35	110	---	200	800	175
10 – 15	35	110	26,000	300	800	175
15 – 20	30	115	9,600	450	1,000	50
20 – 25	35	125	26,000	600	1,200	175

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

Arch and Bridge Structures located between Stations 853+00 to 931+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 10	30	110	---	200	800	50
10 – 15	30	110	7,200	300	800	50
15 – 20	32	115	14,400	450	1,000	125
20 – 25	35	125	19,200	600	1,200	150

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

Arch Structure located between Stations 944+00 to 947+00

Depth Below Existing Grade (feet)	Internal Angle of Friction (degrees)	Total Unit Weight (pcf)	Allowable End Bearing Pressure (psf)	Allowable Skin Friction ¹ (psf)	Ultimate Lateral Earth Pressure ² (pcf)	Static Lateral Subgrade Modulus ³ (pci)
0 – 3	---	---	---	---	---	---
3 – 10	30	110	---	200	800	100
10 – 15	30	110	19,200	300	1,000	125
15 – 20	35	115	26,000	450	1,200	225
20 – 25	35	125	26,000	600	1,200	225

Note: ¹Compression or Tension

²Equivalent Fluid Pressure

³This is the k coefficient used in the equation $E_s=kx$ where x is the depth below the surface

The passive pressures are ultimate values; therefore, appropriate factors of safety, or shaft deflection limits, should be applied in the shaft design. The above parameters assume the groundwater level is below the maximum depth of the drilled shaft. The load capacities provided are based only on the stresses induced in the supporting soils; the structural capacity of the shafts should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. The response of the drilled shaft foundations to lateral loads is dependent upon the soil/structure interaction as well as the shaft's actual diameter, length, stiffness, and "fixity" (fixed or free-head condition). When designing to resist uplift forces, the effective weight of the shaft and structure (divided by an appropriate factor of safety) and the allowable skin-friction values provided above should be used.

Temporary casing will likely be required during shaft excavation to prevent caving in the granular soils. Temporary casing should also be used whenever shafts are installed adjacent to existing structures or improvements, to reduce potential ground loss and movement due to drilled shaft excavation.

Based on criteria outlined in Section 4.6.5.6.1.4 of AASHTO (1996), drilled shafts may be considered to act individually under lateral loading where the center-to-center shaft spacing is greater than 2.5 diameters in the direction normal to loading, and where the center-to-center shaft spacing is greater than 8 diameters in the direction parallel to loading. For shaft layouts not conforming to these criteria, the effect of shaft interaction should be considered in the design. The effect of group action for center-to-center spacing less than 8 diameters in the direction of loading may be considered using the following criteria indicated by the ADOT Geotechnical Design Group in their memorandum of January 13, 1998:

Ratio of Resistance of Shaft In Group to Single Shaft Resistance		
Boundary Condition	Center to Center Shaft Spacing	
	3 Diameters	8 Diameters
Pipe Cap/Footing in intimate contact with soil	0.8	1.0
Pipe Cap/Footing not in intimate contact with soil	0.6	1.0

Notes:

1. Applies to parallel loading only.
2. Efficiency factors are to be applied to all shafts in a group regardless of pile arrangement.
3. Efficiency factors shall be linearly interpolated between diameters of 3D and 8D.
4. Other portions of AASHTO Section 4.6.5.6 are applicable.

Shaft concrete should be placed immediately after completion of drilling and cleaning. Water, if encountered, should be removed from the shaft excavation prior to concrete placement. If shaft concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Shaft concrete should have a relatively high fluidity when placed in cased holes or through a tremie; concrete with slump in the range of 6 to 8 inches is recommended. Temporary casing should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete inside the casing to counteract earth and any hydrostatic pressures outside the casing. An insufficient head of concrete inside the case can cause “necking” of the shaft, resulting in a reduced shaft capacity. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

If downhole inspection or cleanout is required we recommend:

- Casing be installed for the full shaft depth;
- Shaft diameters be a minimum of 30 inches;
- The contractor should check for oxygen deficiency and harmful gases;
- All necessary monitoring and safety precautions as required by OSHA, state, or local codes, should be strictly enforced.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to confirm that soils encountered are consistent with the recommended design parameters.

If you have any questions regarding this letter, please contact me.

Sincerely,
Terracon Consultants, Inc.

Bryan W. Reed, P.E.
Project Manager

Copies to: Addressee (1 via e-mail)



Oleg B. Lysyj, P.E.
Principal

GEOTECH REPORT

Roadway Geotechnical Engineering Report

Tangerine Road Corridor Project
Interstate 10 to La Canada Drive
Pima County, Arizona

September 21, 2011

Terracon Project No. 63105079

Prepared for:

Psomas, Inc.
Tucson, Arizona

Prepared by:

Terracon Consultants, Inc.
Tucson, Arizona



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Terracon

Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

September 21, 2011

Psomas, Inc.
800 East Wetmore Road
Suite 110
Tucson, AZ 85719

Attn: Alejandro Angel, P.E.
P: 520.690.7866
F: 520.690.1290
E: aangel@psomas.com

Re: Roadway Geotechnical Engineering Report
Tangerine Road Corridor Project
Interstate 10 to La Canada Drive
Pima County, Arizona
Terracon Project No. 63105079

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This report is specific to the roadway portion of the project. These services were performed in general accordance with our proposal, number P63100026 Revision 1, dated February 26, 2010. This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of pavements, drainage structures, and light pole/signal supports for the proposed project. A pavement design summary and materials memorandum for the project has been provided under a separate cover.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.



Oleg B. Lysyj, P.E.
Principal



Bryan W. Reed, P.E.
Project Manager

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Copies to: Addressee (1 via email, 4 via mail)

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APPENDIX A – FIELD EXPLORATION

Exhibits A-1 to A-27	Site Plan and Boring Location Diagram
Exhibit A-28	Field Exploration Description
Exhibit A-29 to A-31	Summary of Boring Depths and Purpose
Exhibits A-32 to A-150	Boring Logs

APPENDIX B – LABORATORY TESTING

Exhibit B-1	Laboratory Testing Description
Exhibits B-2 to B-7	Atterberg Limits Test Results
Exhibits B-8 to B-31	Sieve Analysis Test Results
Exhibits B-32 to B-51	Consolidation Test Results
Exhibits B-52 to B-72	Moisture Density Relationship Results
Exhibits B-73 to B-98	R-value Test Results
Exhibits B-99 to B-109	Summary of Laboratory Test Results
Exhibits B-110 and B-111	Summary of Moisture Density Relationship and R-values
Exhibits B-112	Summary of Corrosion Testing Results

APPENDIX C – SUPPORTING DOCUMENTS

Exhibit C-1	General Notes
Exhibit C-2	Unified Soil Classification
Exhibit C-3	Response to Comments
Exhibit C-4	Quality Control



Expires 06/30/2012

**ROADWAY GEOTECHNICAL ENGINEERING REPORT
TANGERINE ROAD CORRIDOR PROJECT
INTERSTATE 10 TO LA CANADA DRIVE
PIMA COUNTY, ARIZONA**

Terracon Project No. 63105079

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the Tangerine Road Corridor Project, extending from Interstate 10 to La Canada Drive, in Pima County, Arizona. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Earthwork
- Drainage Structures
- Pavement Design and Construction
- Light Poles and Signal Supports

Our geotechnical engineering scope of work for this project included the advancement of 119 test borings to depths of approximately 6 to 31½ feet below existing site grades.

Logs of the borings along with the Site Plan and Boring Locations Diagrams (Exhibits A-1 through A-27), are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices. A summary of the depth and purpose of the borings are summarized in Appendix A.

2.0 PROJECT INFORMATION

We understand the project will consist of improvements to Tangerine Road. The project alignment extends from the approximate location of the eastern limits of a proposed traffic interchange on the east side of Interstate 10 to the west side of the La Canada Drive intersection (approximately 9.9 miles). The project also incorporates roadway sections 1,500 feet north and south of each of the intersections of Tangerine Road with La Cholla Boulevard and Thornydale Road. We understand the improvements will include reconstructing and widening the existing 2-lane road to a total of 4 lanes, construction of new CMP and RCB culvert crossings, the extension of existing drainage structures at wash crossings, and the possible construction of new multi-purpose culvert

structures for pedestrian and wildlife crossing/access. New traffic signal lights will be installed at intersections. We also understand that no large retaining walls (greater than 6-feet tall) are anticipated as part of the design and construction.

At this time we expect that final grades will be within 1 to 5 feet from the existing surface elevations. A combination of cut and fill is expected along the project alignment. The new pavement surface will generally follow the existing roadway alignment.

3.0 SUBSURFACE CONDITIONS

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix A of this report. Based on the results of the borings, subsurface conditions we identified three distinct sections within the near surface soils along the alignment, these can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency/Density
Tangerine Section 1 (Borings B-001 to B-010)	6 (max. depth of exploration)	Sandy Lean Clay, Clayey Sand with Gravel, Sandy Silty Clay, and Sandy Silt	Stiff to Medium Stiff/Loose
Tangerine Section 2 (Boring B-011 to B-052)	31½ (max. depth of exploration)	Silty Sand, Well Graded Sand with Silt and occasional layers of Clayey Sand	Loose to Very Dense
Tangerine Section 3 (Boring B-096 to B-106)	6 (max. depth of exploration)	Clayey Sand and Silty Clayey Sand	Loose to Very Dense
La Cholla (Borings B-107 to B-113)	16½ (max. depth of exploration)	Clayey Sand and Silty Clayey Sand	Loose to Very Dense
Thornydale (Borings B-114 to B-119)	6 (max. depth of exploration)	Silty Sand and Silty Clayey Sand	Loose to Very Dense

The clayey sand soils have plasticities in the low to medium range and the sandy silty clay soils have low plasticity. The silty sand soils have low plasticities or are non-plastic.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. Laboratory test results indicate that the subsoils at shallow depth exhibit low to moderate compression at in-situ moisture contents. Most of the soils at proposed wash crossings show a significant tendency for hydro-compaction when elevated in moisture content. Hydro-compactive soils, sometimes referred to as collapsible soils, are capable of supporting substantial loads with low strain at natural moisture contents, however, these same materials undergo volume decrease (settlement/consolidation) when subjected to increases in moisture content under constant load.

When water is added to samples of laboratory compacted near-surface soils, the materials exhibit low expansion potential under light loading conditions such as those imposed by pavements.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The subgrade soils along the project alignment at pavement subgrade elevation generally consist of silty sand. Overall, the site soils are considered to have good pavement subgrade support characteristics.

Potentially compressible soils, which show significant tendency for hydro-compaction when elevated in moisture content, will require particular attention in the design and construction at drainage structure locations. Hydro-compactive soils, sometimes referred to as collapsible soils, are capable of supporting typical structure loads at natural moisture contents; these same materials however, undergo volume decrease, including settlement and consolidation, when subjected to increases in moisture content under constant load.

Due to the potential for hydro-compaction in the near surface soils we recommend drainage structures be supported on a minimum of 2 feet of engineered fill.

Signal and light supports may be supported on drilled shaft foundations or direct-set pole foundations.

Estimated movements described in this report are based on effective drainage for the life of the pavements and drainage structures and cannot be relied upon if effective drainage is not maintained. Exposed ground should be sloped a minimum of 5% away from pavements and drainage structures extending at least 10 feet, to provide positive drainage away from the structures. Grades should be periodically inspected and adjusted as part of the roadway maintenance program.

Geotechnical engineering recommendations for earthwork, pavements, and foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Pavement Subgrade Parameters

The recommended resilient modulus for pavement design was determined by analysis of the correlated and laboratory tested R-value results in accordance with the procedures of the Pima County Roadway Design Manual (2010).

The resilient modulus and design R-value for each section are determined based on the location of the project and laboratory test results from soils collected during our investigation. A seasonal variation factor of 1.7 was used for the analysis. The sections are as follows:

Project Section		Correlated R-Values	Laboratory R-Values	Mean R-Value	Design Resilient Modulus* (M _r)
Tangerine Soil Section 1 (B-001 to B-010)	Mean	39.9	30.5	36	15,656
	Standard Deviation	15.5	7.8		
Tangerine Soil Section 2 (B-011 to B-052)	Mean	77.8	68.5	76	26,000
	Standard Deviation	8.0	8.4		
Tangerine Soil Section 3 (B-053 to B-095)	Mean	70.6	62.2	67	26,000
	Standard Deviation	12.1	6.5		
Tangerine Soil Section 4 (B-096 to B-106)	Mean	51.7	42.5	44	19,774
	Standard Deviation	19.6	3.5		
La Cholla (Borings B-107 to B-113)	Mean	50.9	55.5	53	24,559
	Standard Deviation	20.9	16.3		
Thornydale (Borings B-114 to B-119)	Mean	65.5	65.5	66	26,000
	Standard Deviation	17.7	19.1		

*ADOT recommends the Design Resilient Modulus be limited to no more than 26,000

Based on our understanding of the anticipated traffic patterns, the soil in the middle section of Tangerine Road described in Section 3.0 was analyzed as two sections, divided by Dove Mountain Road in the above table they are identified as Tangerine Soil Section 2 and Tangerine Soil Section 3.

In addition to the design R-value for each roadway section, a construction control R-value was also calculated. The construction control R-value is used to determine the lower bounds of the resilient modulus that existing on-site soils need to meet in order to provide adequate subgrade support for the proposed pavement sections. On-site soils that have an R-value below the construction control R-value should be removed from the roadway prism and replaced with material that meets or exceeds the design R-value. ADOT recommends limiting the construction control R-value to 5 below the design R-value. This is to reduce future maintenance and increase pavement reliability in poor subgrade locations. However, in order to reduce the amount of earthwork required, we recommend lowering both the construction control R-value and the design R-value so all existing on-site soils can remain in place. We have used the lowered R-values for this pavement design.

Lowering the design R-value will generally increase the total designed pavement section thickness, however for most of the project this increase is minimal, and along some segments there is no change to the design pavement thickness. The exception is along Tangerine Road Section 4. Of the 11 boring locations, 4 borings encountered soils with a correlated R-value less than the calculated construction control R-value. The soils with correlated R-values less than the construction control would need to be removed to a depth of 3 feet below the pavement surface and replaced with materials meeting the equation provided for imported soil material on page 14 of this report. As an alternative to removal and replacement we have provided a pavement section that included using 6-inches of cement treated subgrade in the areas where soils along Tangerine Segment 4 do not meet the calculated construction control R-value.

The following table provides the recommended design and construction control R-values for each section of the roadway:

Soil Section	Recommended Design R-Value	Construction Control R-Value	Recommended Design Resilient Modulus (M_r)
Tangerine Soil Section 1 (B-001 to B-010) (Sta 445+00 to 494+00)	30	25	13,001
Tangerine Soil Section 2 (B-011 to B-052) (Sta 494+00 to 700+00)	54	49	25,412

Soil Section	Recommended Design R-Value	Construction Control R-Value	Recommended Design Resilient Modulus (M _r)
Tangerine Soil Section 3 (B-053 to B-095) (Sta 700+00 to 907+50)	52	47	24,250
Tangerine Soil Section 4 (B-096 to B-106) (Sta 907+50 to 960+00)	32	27	13,907
La Cholla Soil Section 5 (Borings B-107 to B-113)	39	34	17,262
Thornsdale Soil Section 6 (Borings B-114 to B-119)	52	47	24,250

Note 1: Stationing is approximate. No stationing was provided for La Cholla Boulevard or Thornsdale Road

The roadway subgrade soils generally have good to excellent soil support characteristics. Full details of the pavement design for this project including recommended pavement section alternatives are provided in the separate Pavement Design Summary Report.

4.3 Foundations for Minor Structures

4.3.1 Light Poles, Signal Supports and Signage

Structures such as light poles, traffic signal supports, and signage, which will be constructed as part of this project, may be supported on drilled shaft or direct set pole foundations bearing at depths of at least 5 feet below the ground surface. An allowable bearing pressure of 5,000 psf may be used for axial loading with a shaft tip depth between 5 and 10 feet below the ground surface. A passive resistance pressure of 275 psf/ft may be used for lateral loading design.

Temporary casing will likely be required during shaft excavation to prevent caving in the granular soils. Temporary casing should also be used whenever shafts are installed adjacent to existing structures or improvements, to reduce potential ground loss and movement due to drilled shaft excavation.

Shaft concrete should be placed immediately after completion of drilling and cleaning. Water, if encountered, should be removed from the shaft excavation prior to concrete placement. If shaft concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Shaft concrete should have a relatively high fluidity when placed in cased holes or through a tremie; concrete with slump in the range of 6 to 8 inches is recommended. Temporary casing

should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete inside the casing to counteract earth and any hydrostatic pressures outside the casing. An insufficient head of concrete inside the case can cause “necking” of the shaft, resulting in a reduced shaft capacity. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to confirm that soils encountered are consistent with the recommended design parameters.

4.3.2 Drainage Structures

Due to the potential for hydro-compaction in the near surface soils we recommend drainage structures be supported on a minimum of 2 feet of engineered fill. Excavations, subgrade preparation and construction of engineered fill beneath drainage structures should be in accordance with Sections 203 and 205 of the Standard and Specifications¹ of Pima County.

Drainage structures supported on engineered fill prepared as outlined in the above referenced specifications may be designed with an allowable bearing capacity of 2,000 psf. We anticipate settlement on the order of ½ inch.

4.4 Earthwork

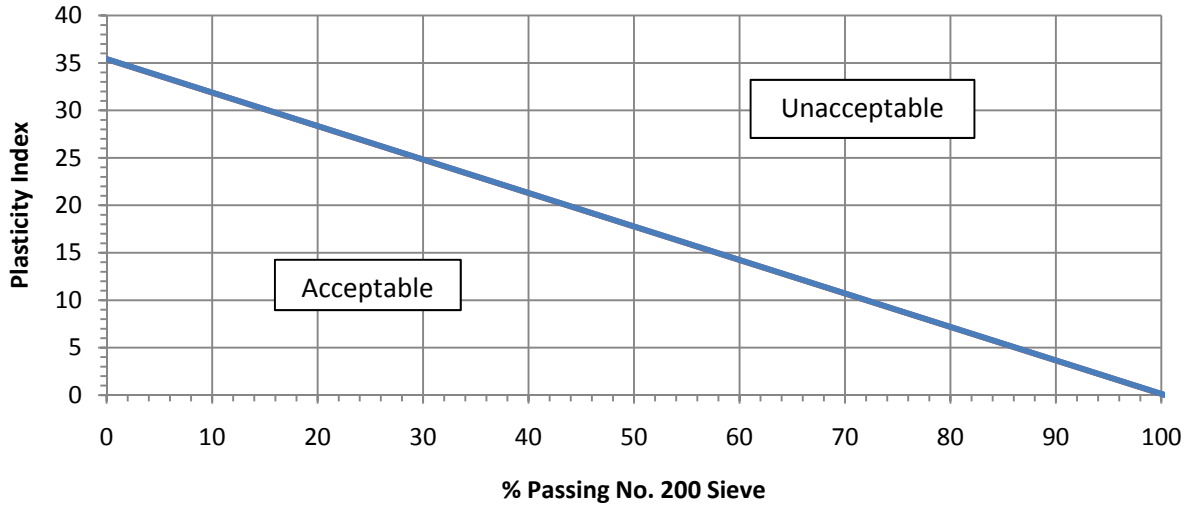
Earthwork and roadway grading shall be performed in conformance with the requirements of Sections 203 and 205 of the standards and specifications of the City of Tucson/Pima County¹ unless provided otherwise on the Plans or in the Special Provisions.

A ground compaction factor of 0.2 feet is estimated for existing subgrade soils. A shrinkage factor of 10% is estimated for most on-site soils on the alignment compacted to 95% of the material’s Standard Proctor dry density. The soils in Section 1 of Tangerine Road are estimated to be 20% when compacted to 95% of the material’s Standard Proctor dry density. These estimates do not include any material lost in transit or oversized material or material unsuitable for use, or compaction greater than 95%.

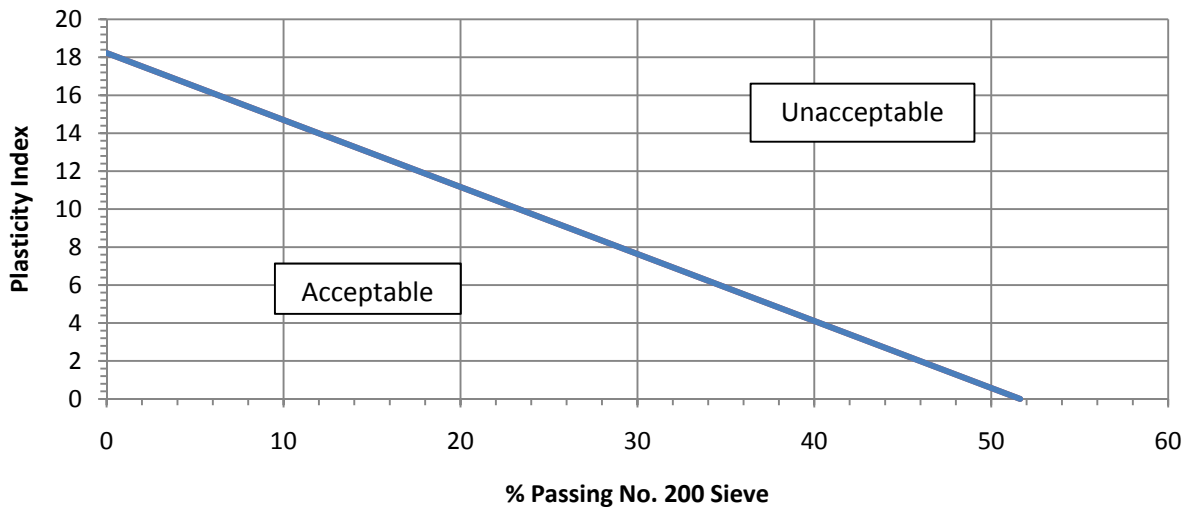
The following on-site subgrade acceptance charts are provided to assist in determining the acceptability of existing on-site soils use as subgrade material within 3-feet of finished pavement subgrade. Each chart is based upon using the construction control R-values for each section as provided in this report:

¹ Pima County/City of Tucson, 2003, **Standard Specifications for Public Improvements**, Tucson, Arizona.

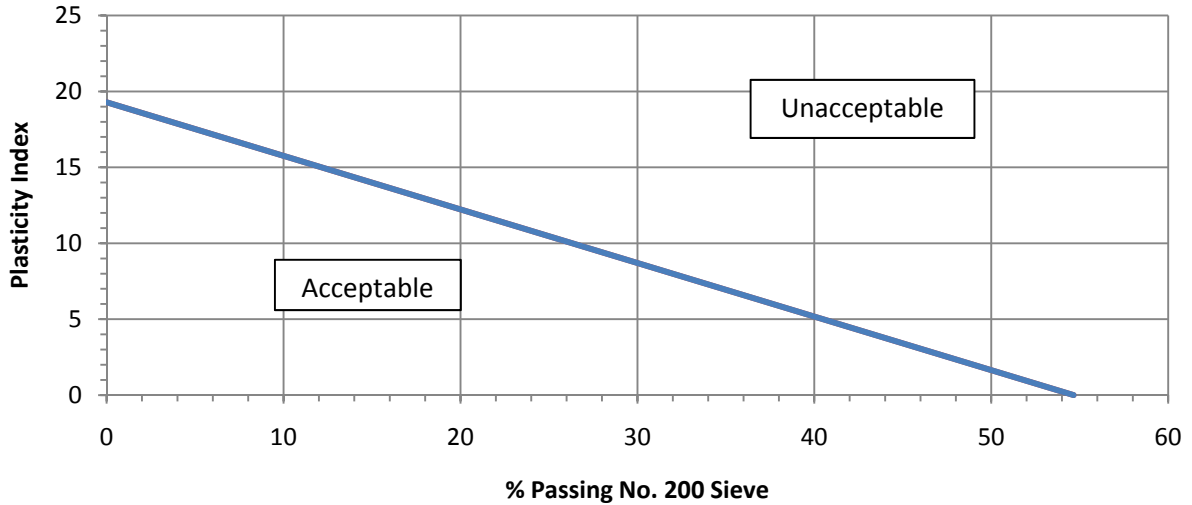
On-Site Materials Subgrade Acceptance Chart Tangerine Road - Section 1



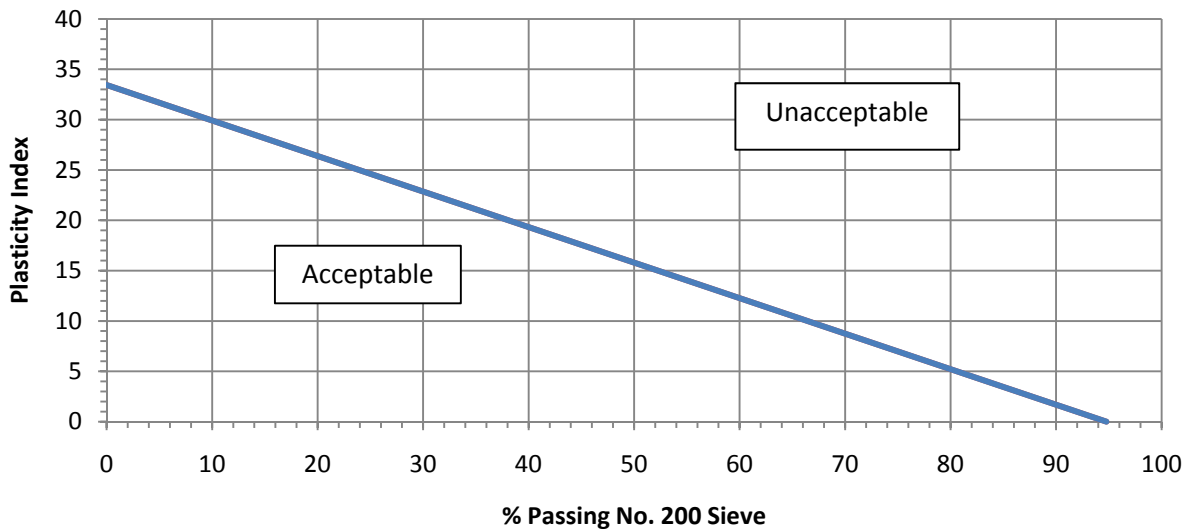
On-Site Materials Subgrade Acceptance Chart Tangerine Road - Section 2



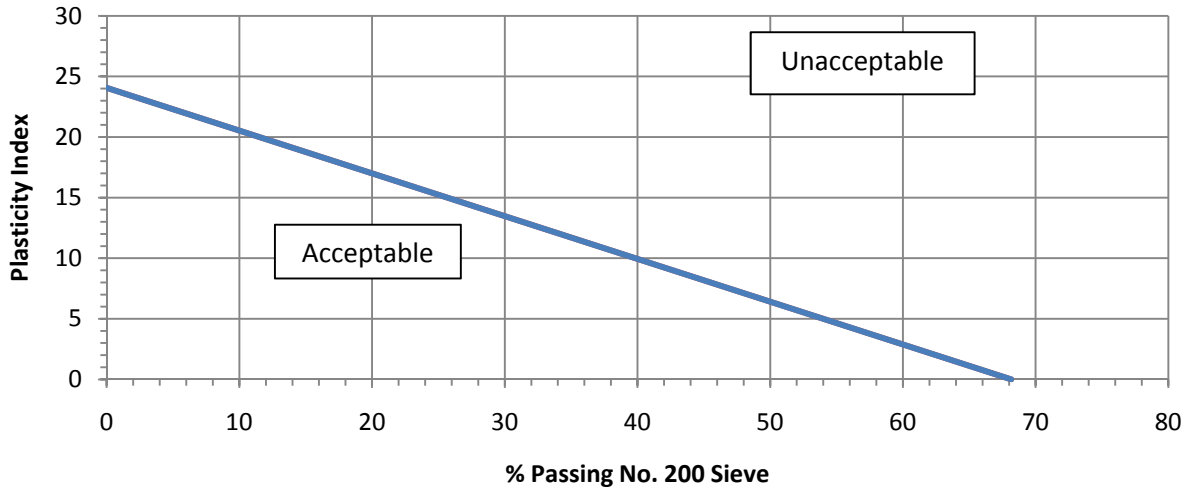
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 3**



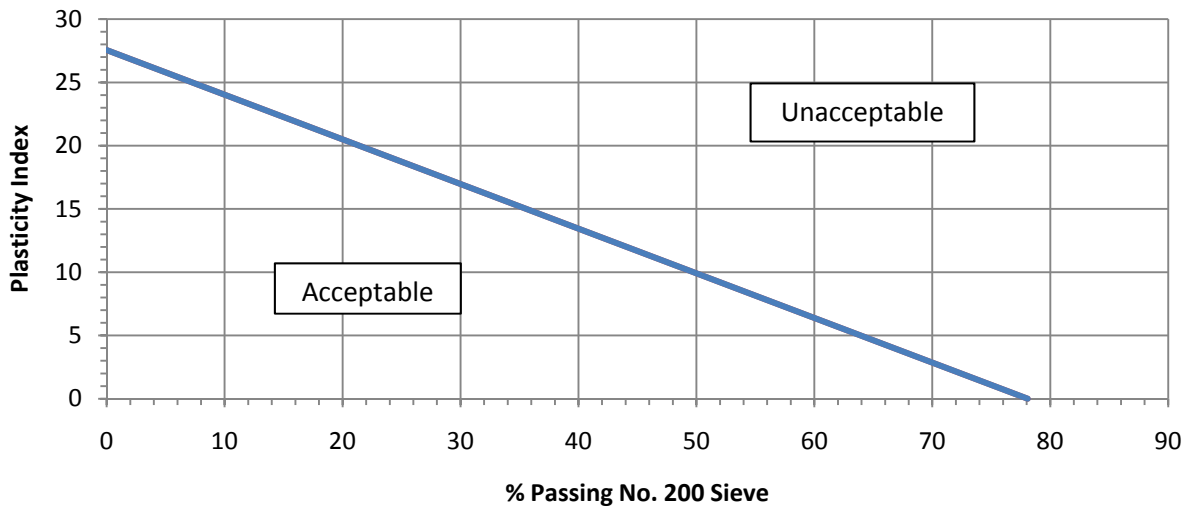
**On-Site Materials Subgrade Acceptance Chart
 Tangerine Road - Section 4**
 For use with Pavement Design Alternatives A, B, and C, as described in the
 Pavement Design Summary



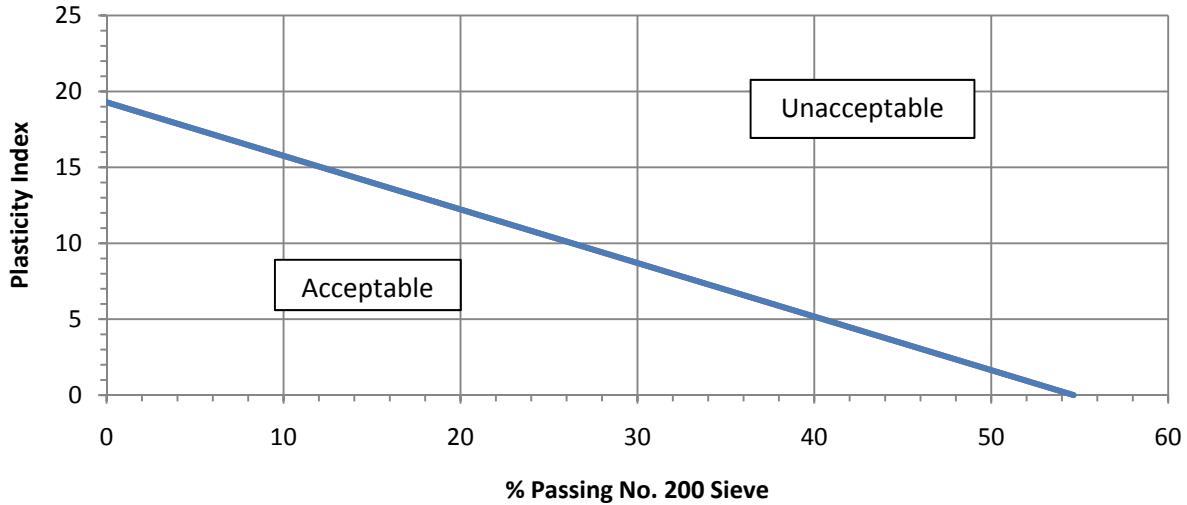
On-Site Materials Subgrade Acceptance Chart
Tangerine Road - Section 4
For use with Pavement Design Alternatives D, E, and F, as described in the
Pavement Design Summary



On-Site Materials Subgrade Acceptance Chart
La Cholla Boulevard- Section 5



On-Site Materials Subgrade Acceptance Chart Thornydale Road - Section 6



If the existing subgrade soils do not meet these criteria, the unsuitable soils should be removed to a minimum depth of 3 feet below finished pavement subgrade and be replaced with suitable fill meeting the criteria outlined below. Close observation will be required during construction to identify areas of unsuitable existing subgrade soils.

All off-site, or imported fill materials placed for pavement support should meet the following minimum requirements to satisfy the recommended design resilient modulus:

Tangerine Road - Section 1

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 87 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 2

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 45 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 3

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 47 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 4

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 82 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Tangerine Road - Section 4 if CTS is used

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 59 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

La Cholla Boulevard

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 68 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

Thornsdale Road

The Plasticity Index (PI) and the percent passing the No. 200 sieve when used in the equation below, shall give a value of “X” that does not exceed 47 for all imported materials placed within 3-feet of finished pavement subgrade.

$$X = (\text{Minus No. 200 Sieve}) + 2.83 (\text{PI})$$

4.5 Slopes

For permanent slopes in compacted fill and cut native areas, recommended maximum configurations and erosion control measures are provided in the following table:

Slope (horizontal:vertical)	Recommended Surface Treatment
5:1 to 3:1	Re-vegetate
3:1 to 2:1	Rip-rap over filter fabric
2:1 to 1.5:1	Grouted rip-rap or 6-inch thick grout over filter fabric, with integrated toe-down at base of slope having a minimum depth of ¼ the total slope height
Steeper than 1.5:1	Stability analysis required, or structural retaining wall

We expect slopes with these configurations and surface treatments to be resistant to erosion and stable against circular failure. The face of all slopes should be compacted to the minimum specification for fill embankments. Alternately, fill slopes can be over-built and trimmed to compacted material.

4.6 Corrosion Potential

Results of soluble sulfate testing indicate that ASTM Type I/II Portland cement is suitable for all concrete on and below grade. Foundation concrete should be designed for low sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

Laboratory test results indicate that on-site soils have resistivities ranging from 2,550 to 15,443 ohm-centimeters, and pH values ranging from 6.4 to 8.7. These values should be used to determine potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Based on the pH and resistivity testing results it appears these soils are generally mildly to moderately corrosive (resistivity values above 2000 ohm-centimeters).

While resistivity and pH are two parameters which indicate the potential of corrosion, these properties alone are not solely responsible for the corrosive effects of soil. One major consideration in combination with other parameters is the in-situ moisture content of the soils. As the moisture content of soils increases, the corrosion potential increases in like manner provided that other properties of the soils indicate corrosive potential.

Corrosion potential of soils is generally not a major consideration in the Tucson area primarily due to the relatively low in-situ moisture contents of the soils. Even where physical and/or chemical parameters of the soils would indicate potentially corrosive conditions, cathodic protection is not generally utilized.

For this project, the corrosion of buried ferrous materials will likely be relatively remote provided that the moisture content of the subgrade soils surrounding the materials does not approach saturation. If there is concern regarding pipe and other appurtenant utility lines, the use of PVC or poly-wrap of utilities should be considered.

Refer to Summary of Laboratory Results contained in Appendix B for the complete results of the various corrosivity testing conducted on the site soils in conjunction with this geotechnical exploration.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

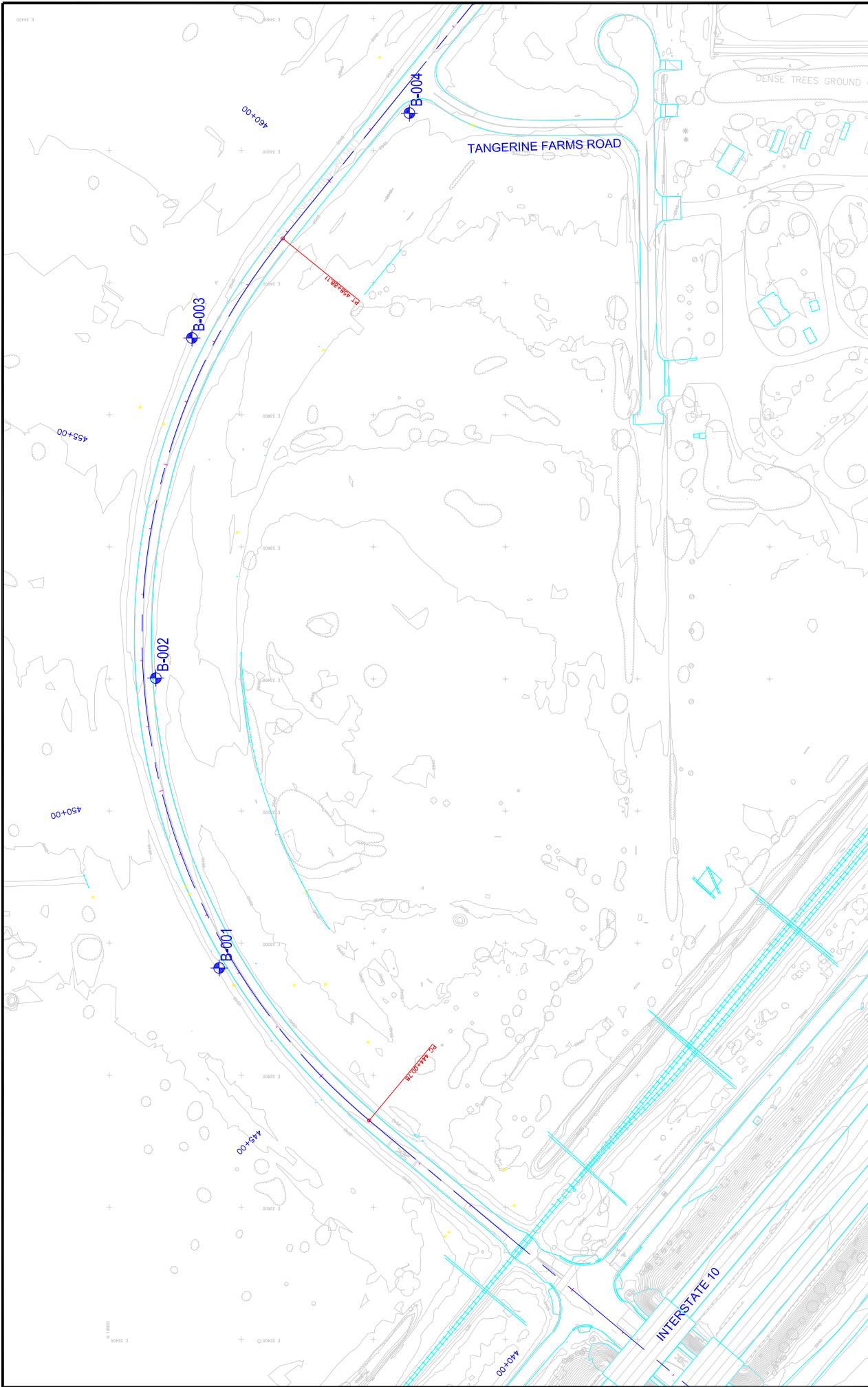
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we

should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



EXHIBIT

A-1

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon
Consulting Engineers and Scientists

355 S EUCLID, SUITE 107
TUCSON, AZ 85719

PH: (520) 770-1789
FAX: (520) 792-3549

Project No. 63105079

Scale: 1" = 200'

File No. 63105079.DWG

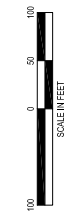
Date: 01/2011

Project Mgr: BWR

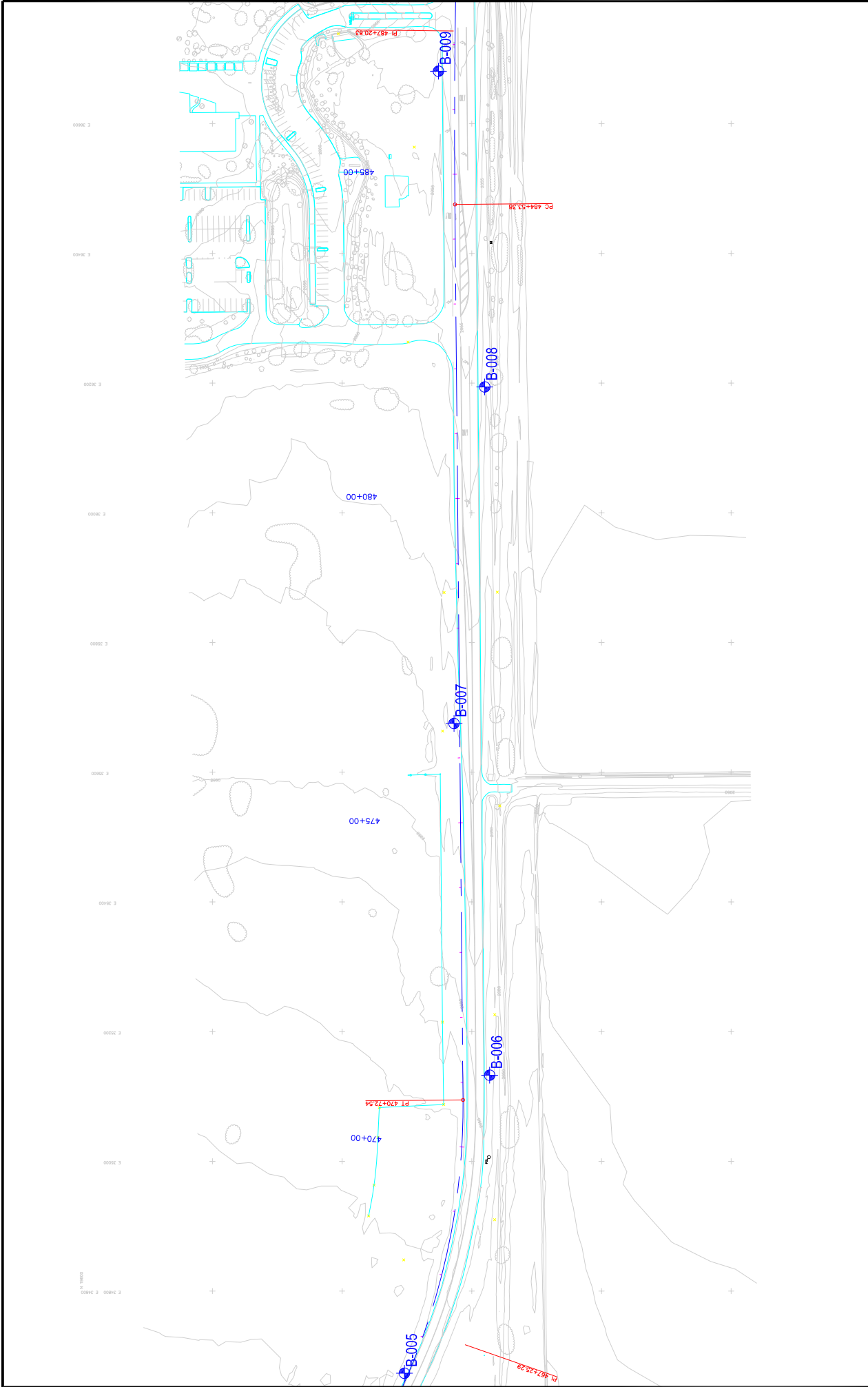
Drawn By: JJP

Checked By: OBL

Approved By: OBL



APPROXIMATE BORING LOCATION



EXHIBIT

A-2

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE

ARIZONA

PIMA COUNTY

Terracon
 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107
 TUCSON, AZ 85719
 PH: (520) 770-1789 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

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APPROXIMATE BORING LOCATION

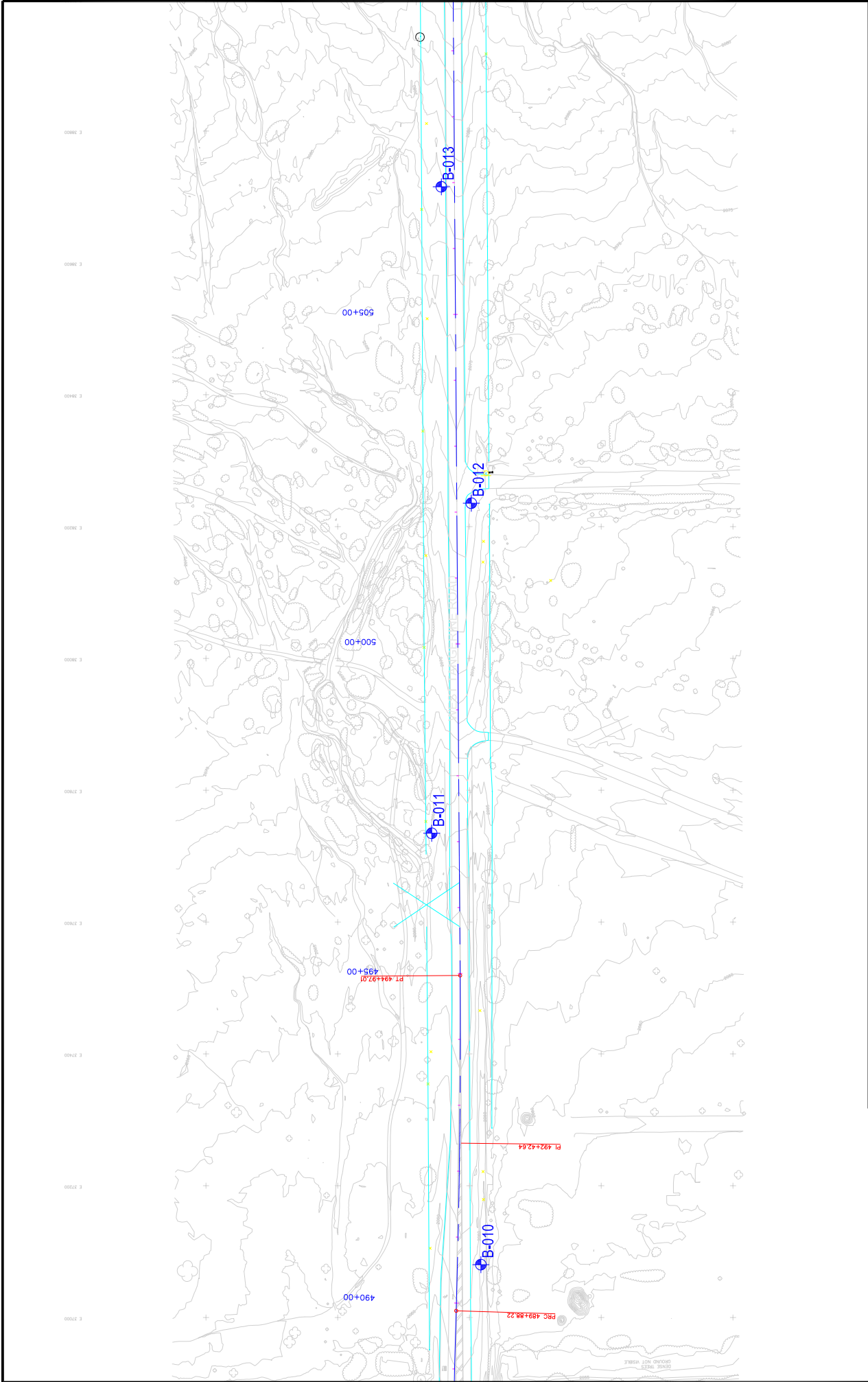


EXHIBIT
A-3

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107 TUCSON, AZ 85719
PH: (520) 770-1788 FAX: (520) 792-3549

Project No. 63105079
Scale: 1" = 200'
File No. 63105079.DWG
Date: 01/2011

Project Mgr: BWR
Drawn By: JJP
Checked By: OBL
Approved By: OBL

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APPROXIMATE BORING LOCATION

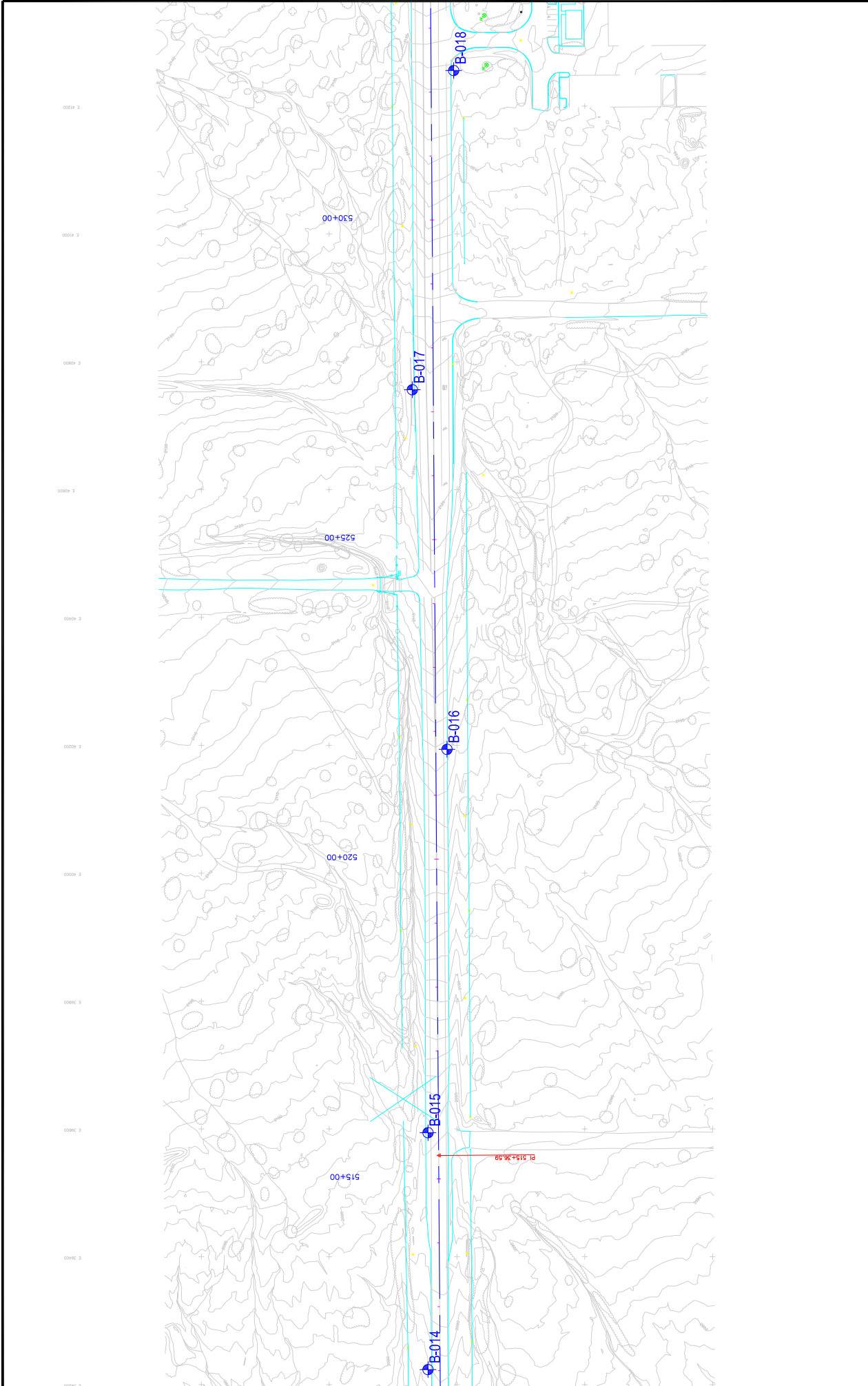


EXHIBIT
A-4

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

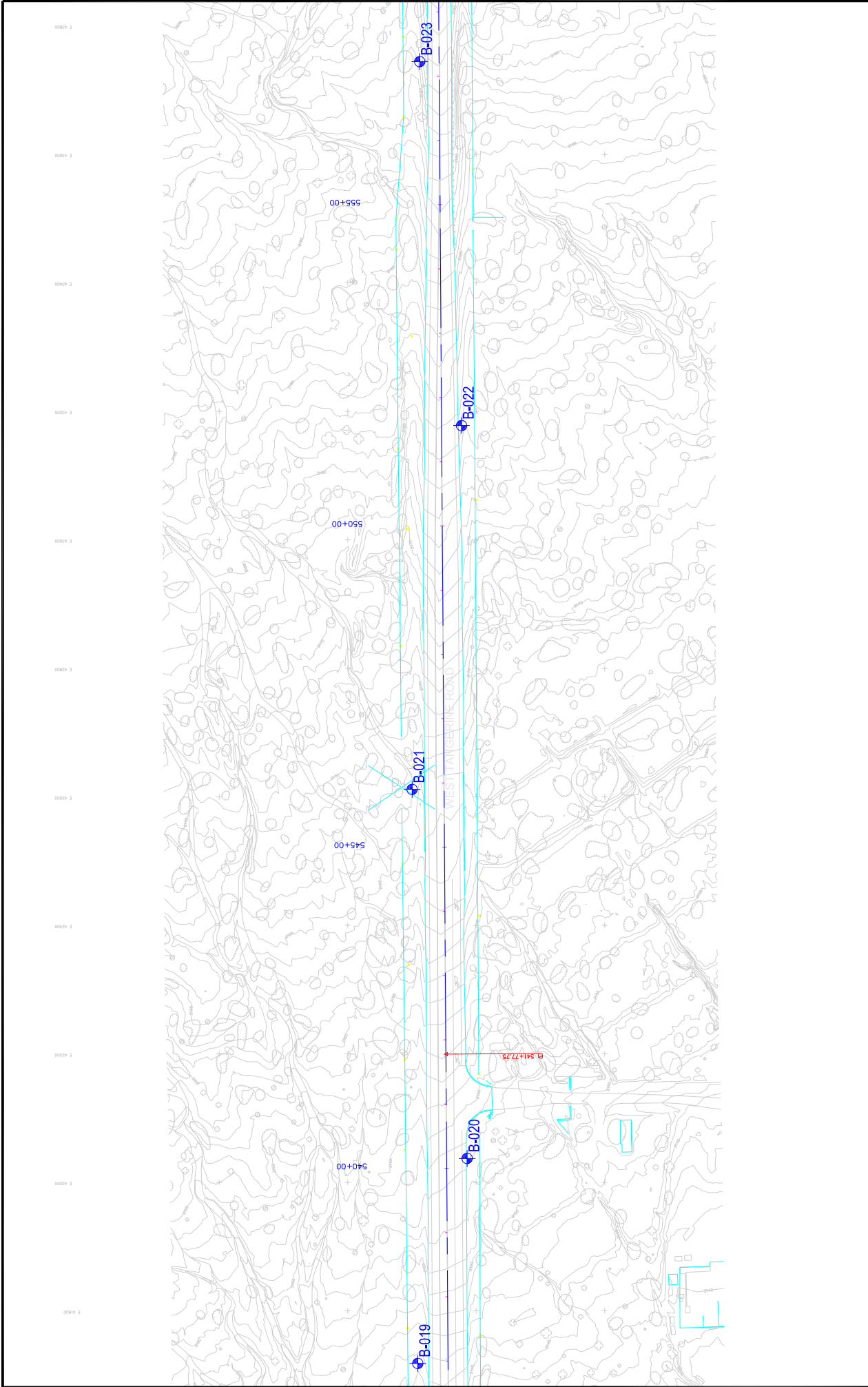
Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107 TUCSON, AZ 85719
PH: (520) 770-1789 FAX: (520) 792-3549

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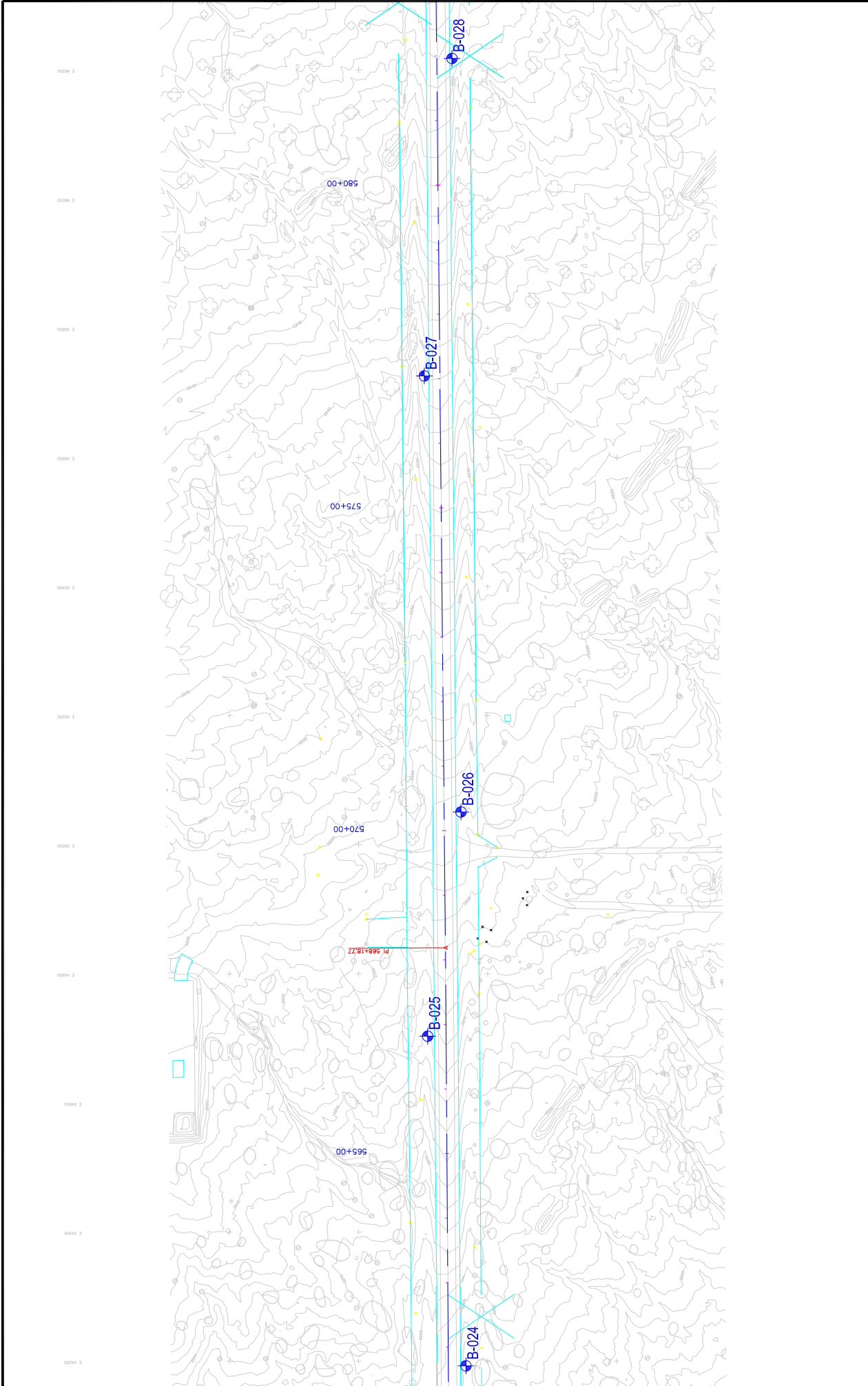
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Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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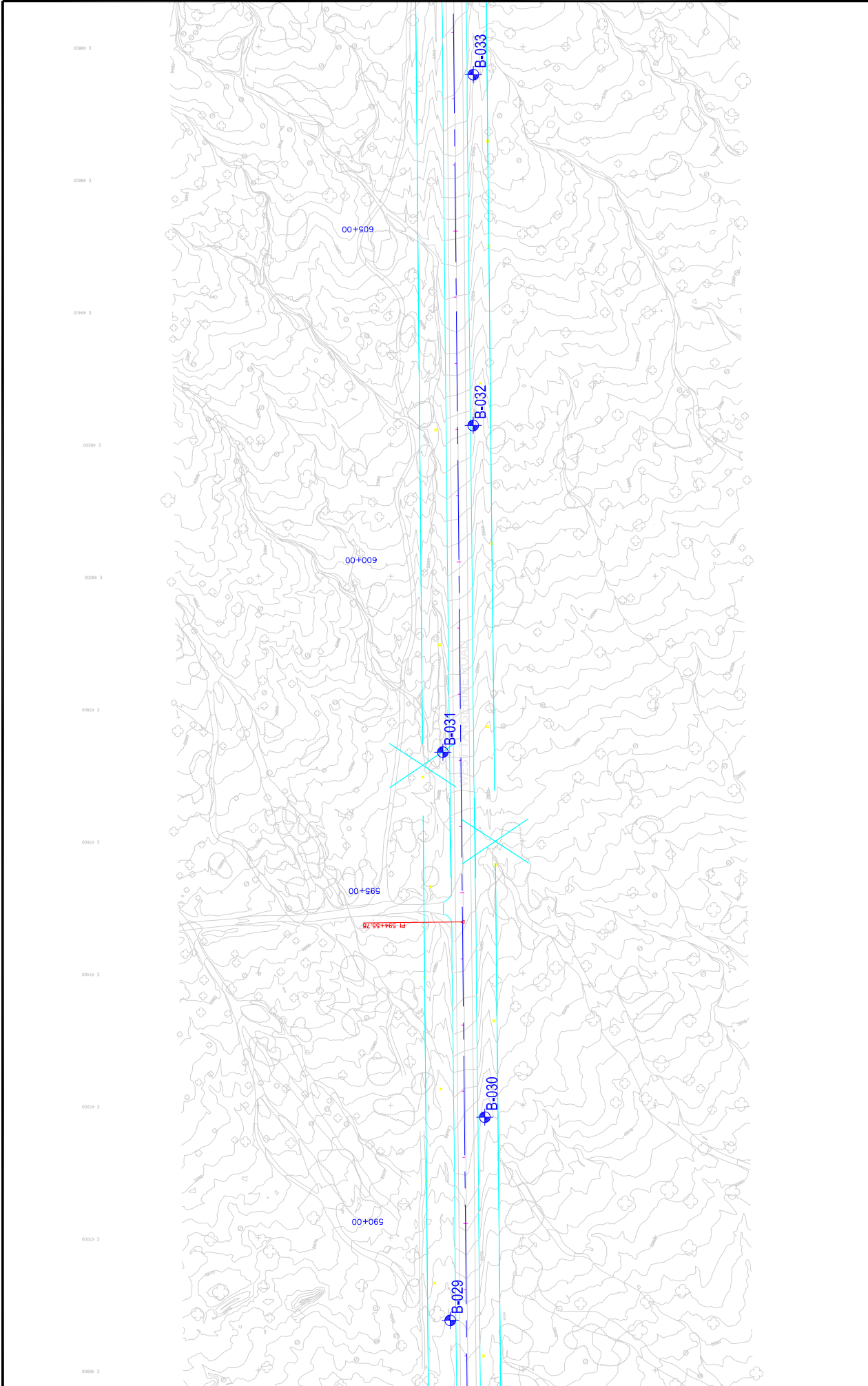
APPROXIMATE BORING LOCATION



<p>EXHIBIT</p> <p>A-5</p>	
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<p>Terracon Consulting Engineers and Scientists</p> <p>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1788 FAX: (520) 792-3549</p>	
<p>Project Mgr: BWR</p> <p>Drawn By: JJP</p> <p>Checked By: OBL</p> <p>Approved By: OBL</p>	<p>Project No. 63105079</p> <p>Scale: 1" = 200'</p> <p>File No. 63105079.DWG</p> <p>Date: 01/2011</p>
<p>APPROXIMATE BORING LOCATION</p>	



		<p>APPROXIMATE BORING LOCATION</p>	<p>EXHIBIT</p> <p style="font-size: 2em; font-weight: bold;">A-6</p>
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Project Mgr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011



EXHIBIT

A-7

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107
TUCSON, AZ 85719
PH: (520) 770-1789
FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

SCALE IN FEET

APPROXIMATE BORING LOCATION

Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107 TUCSON, AZ 85719
PH: (520) 770-1788 FAX: (520) 792-3549

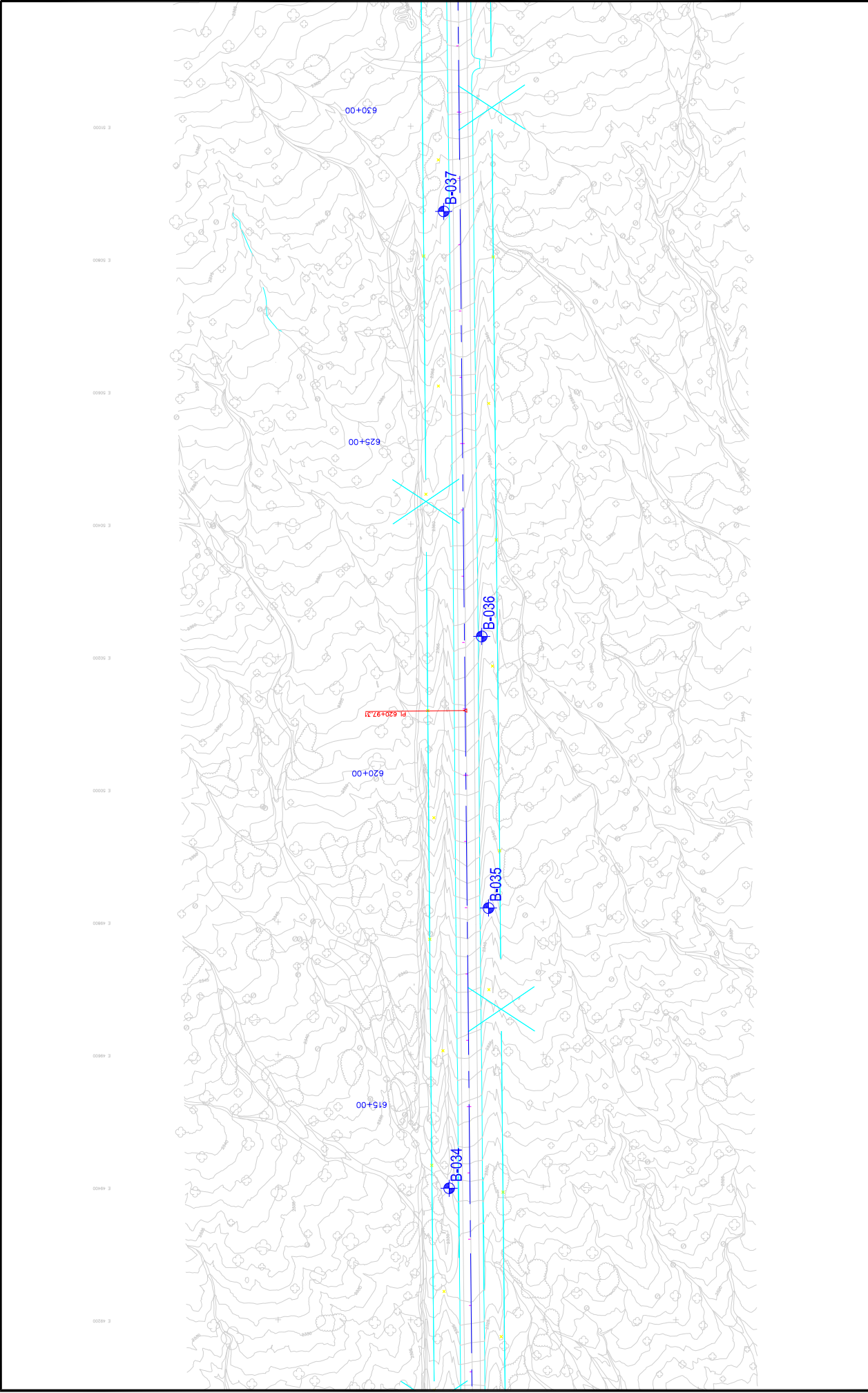
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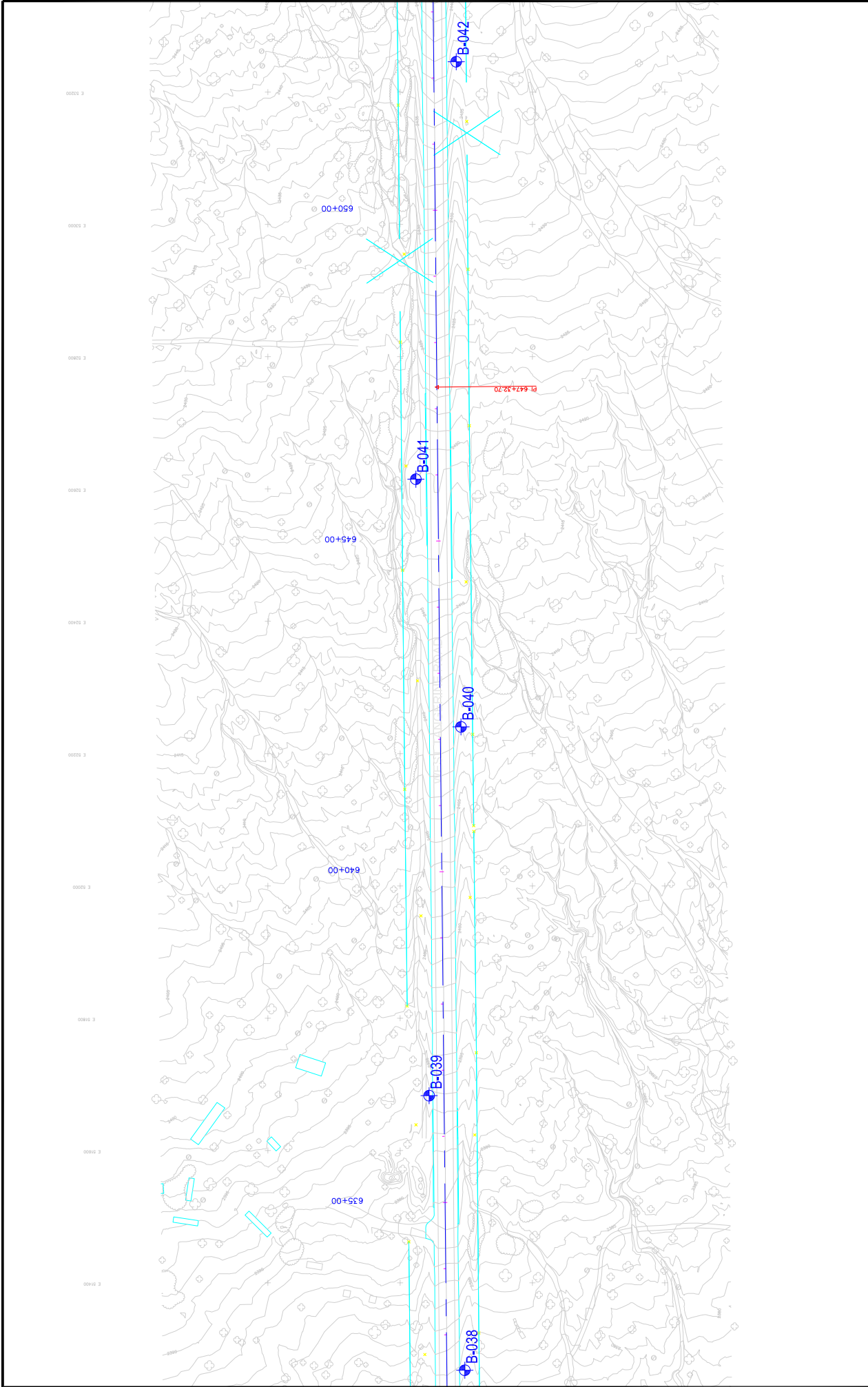
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Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
SCALE IN FEET

N

APPROXIMATE BORING LOCATION





EXHIBIT

A-9

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE

PIMA COUNTY ARIZONA

Terracon
Consulting Engineers and Scientists

355 S EUCLID, SUITE 107 TUCSON, AZ 85719
PH: (520) 770-1789 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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SCALE IN FEET

N

APPROXIMATE BORING LOCATION

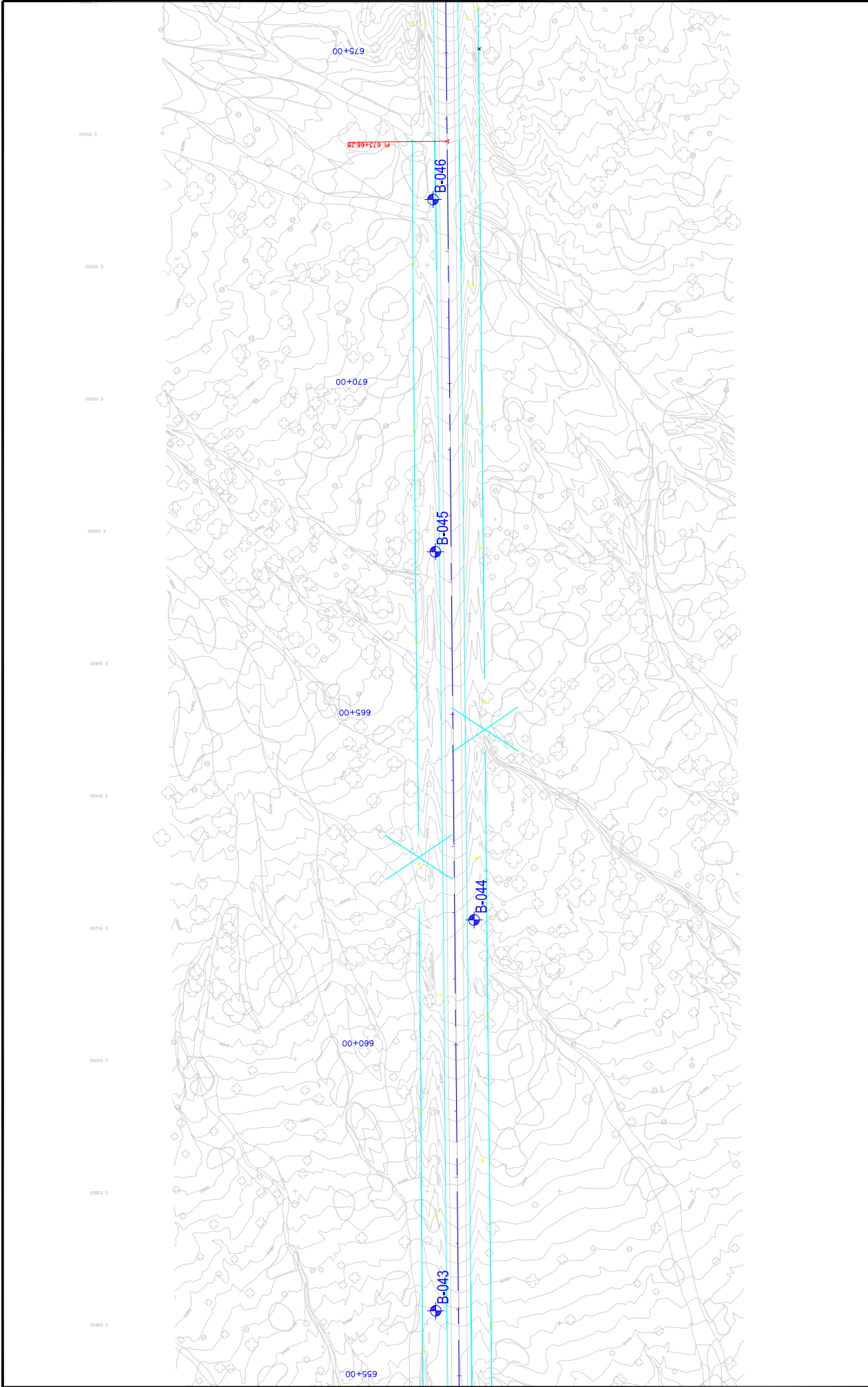


EXHIBIT
A-10

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

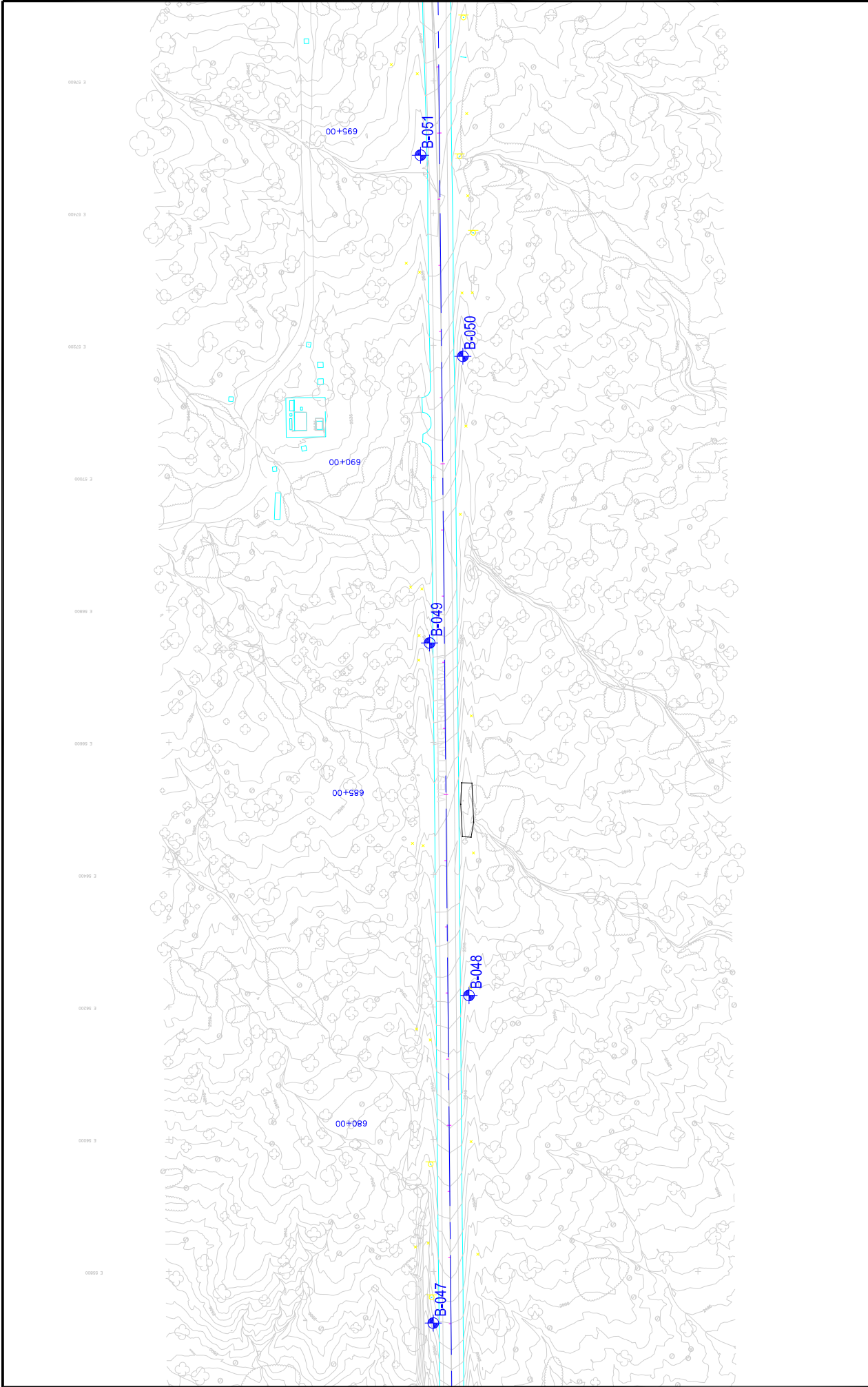
Terracon
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PH: (520) 770-1789 FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION





EXHIBIT

A-11

SITE PLAN & BORING LOCATIONS DIAGRAM
 PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

Terracon
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Project Mgr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011

 SCALE IN FEET
APPROXIMATE BORING LOCATION

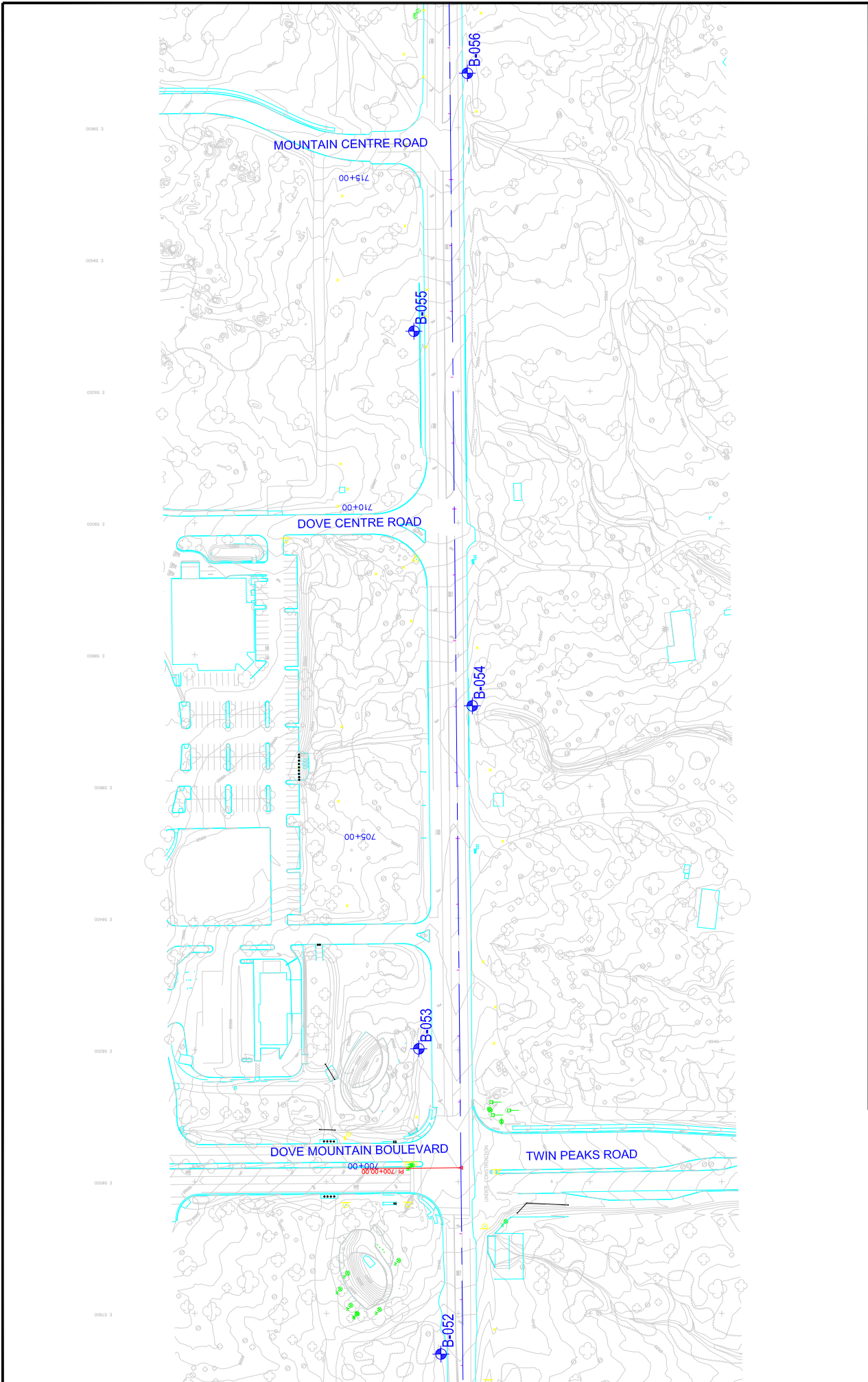


EXHIBIT
A-12

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

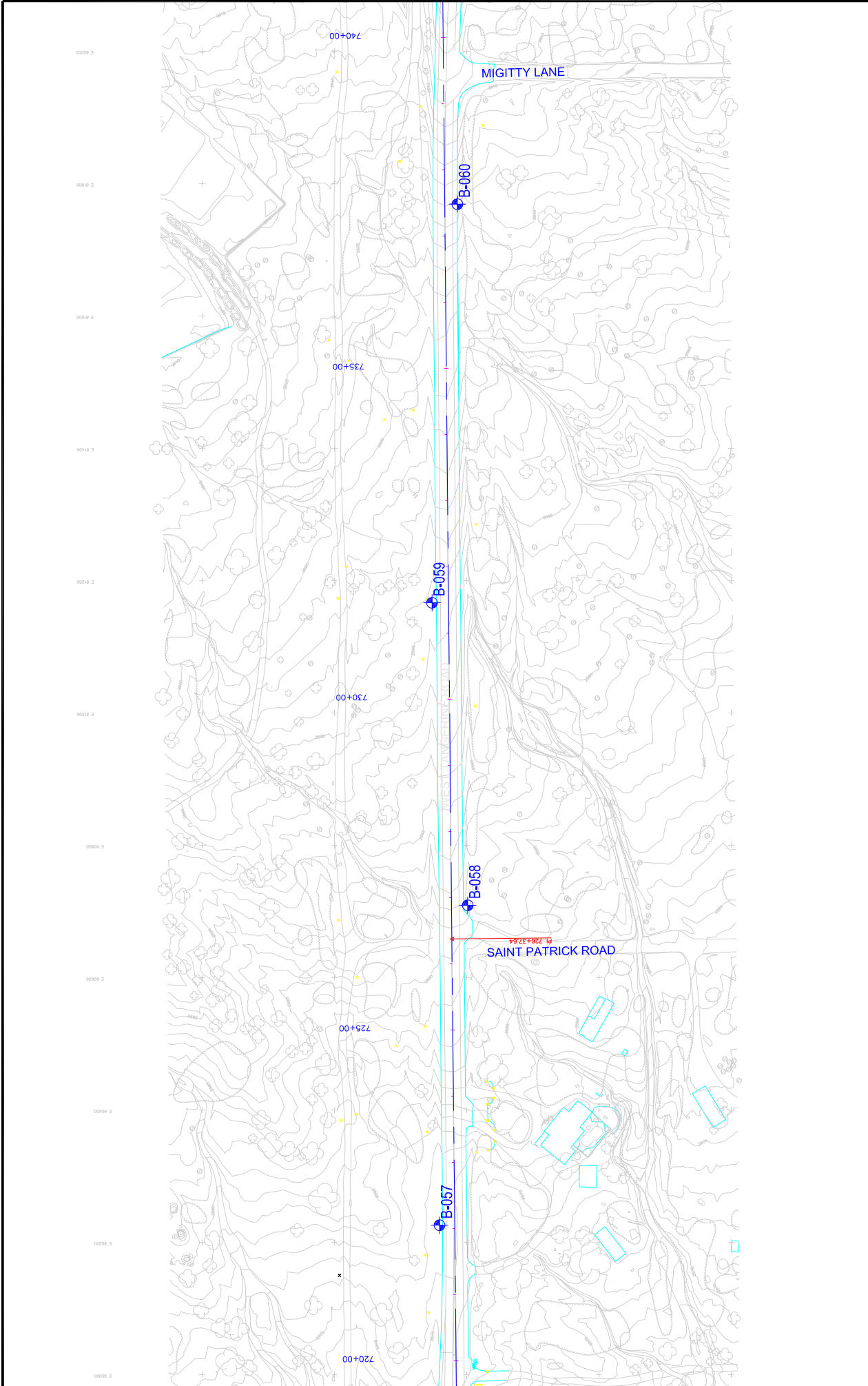
Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107 TUCSON, AZ 85719
PH: (520) 770-1788 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

100 0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-13

SITE PLAN & BORING LOCATIONS DIAGRAM
 PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

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 355 S EUCLID, SUITE 107 TUCSON, AZ 85719
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Project No. 63105079
 Scale: 1" = 200'
 File No. 63105079.DWG
 Date: 01/2011

Project Mgr: BWR
 Drawn By: JJP
 Checked By: OBL
 Approved By: OBL

APPROXIMATE BORING LOCATION

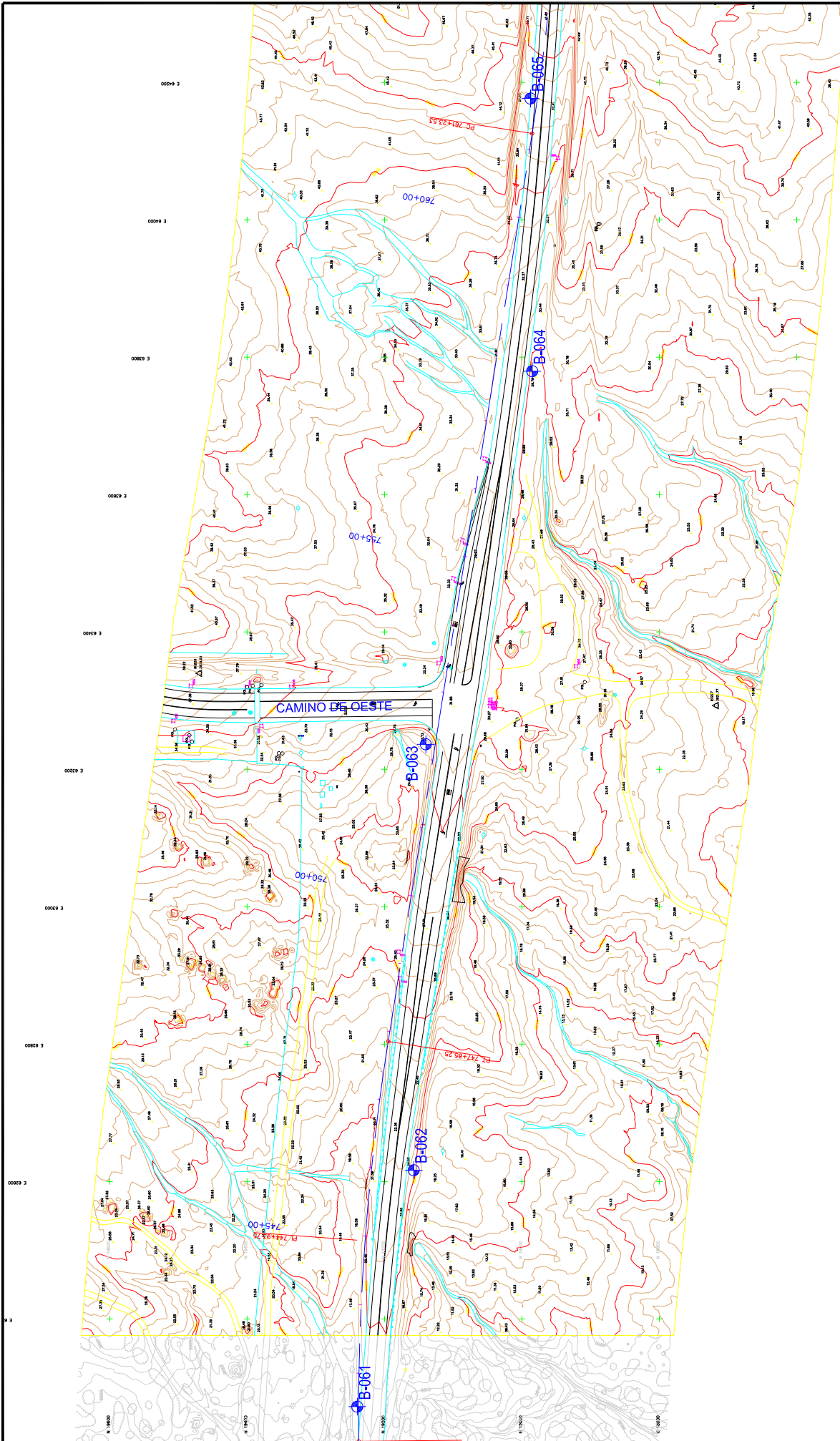


EXHIBIT
A-14

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

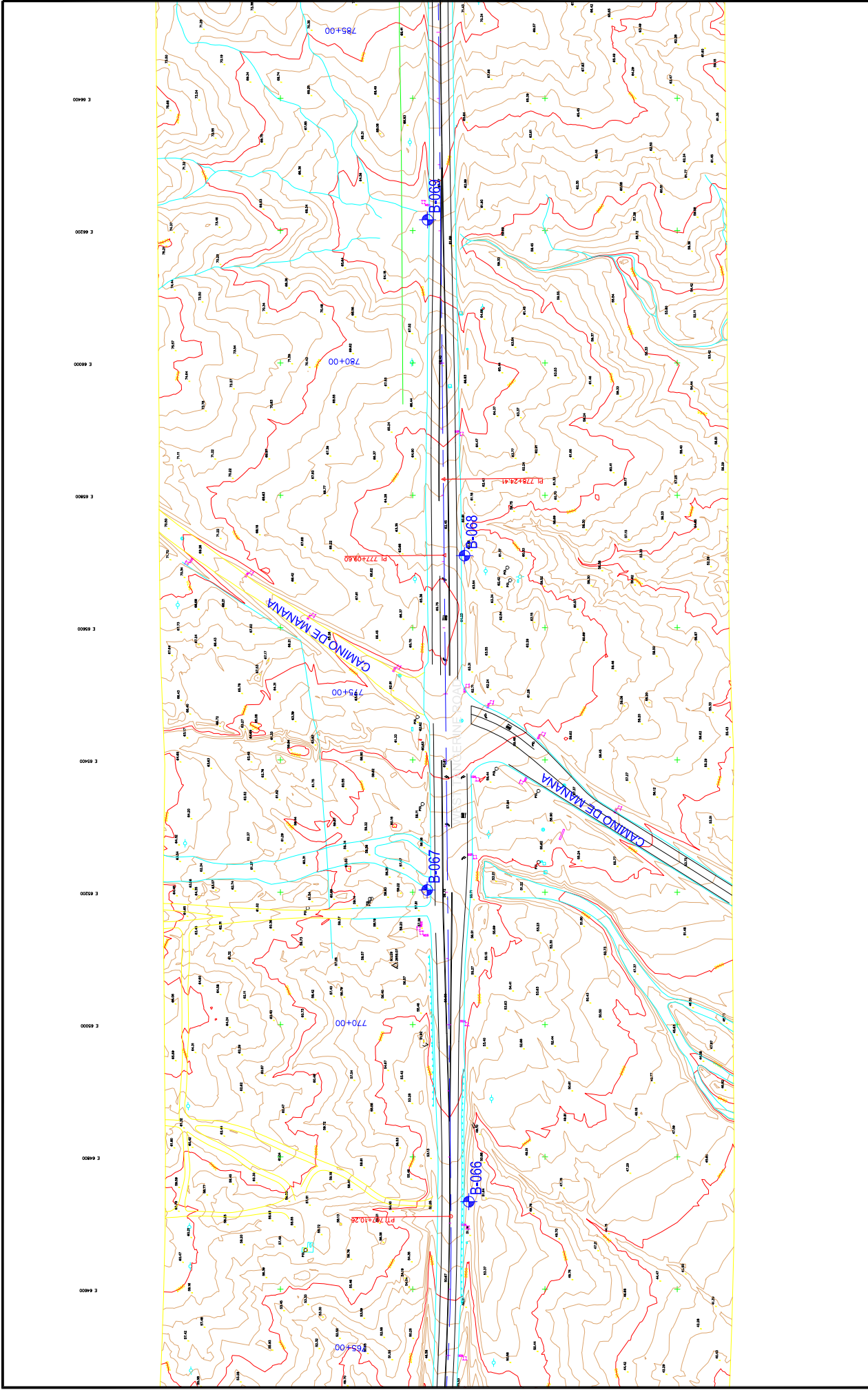
Terracon
Consulting Engineers and Scientists
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TUCSON, AZ 85719
PH: (520) 770-1789
FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

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0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



		APPROXIMATE BORING LOCATION 	EXHIBIT A-15 ARIZONA
SITE PLAN & BORING LOCATIONS DIAGRAM PSOMAS TANGERINE ROAD CORRIDOR PROJECT I-10 TO LA CANADA DRIVE PIMA COUNTY			
Project No. 63105079 Scale: 1" = 200' File No. 63105079.DWG Date: 01/2011		 Consulting Engineers and Scientists 355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549	
Project Mgr: BWR Drawn By: JJP Checked By: OBL Approved By: OBL			



EXHIBIT
A-16

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

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FAX: (520) 792-3549

Project Mgr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011

100
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SCALE IN FEET

APPROXIMATE BORING LOCATION

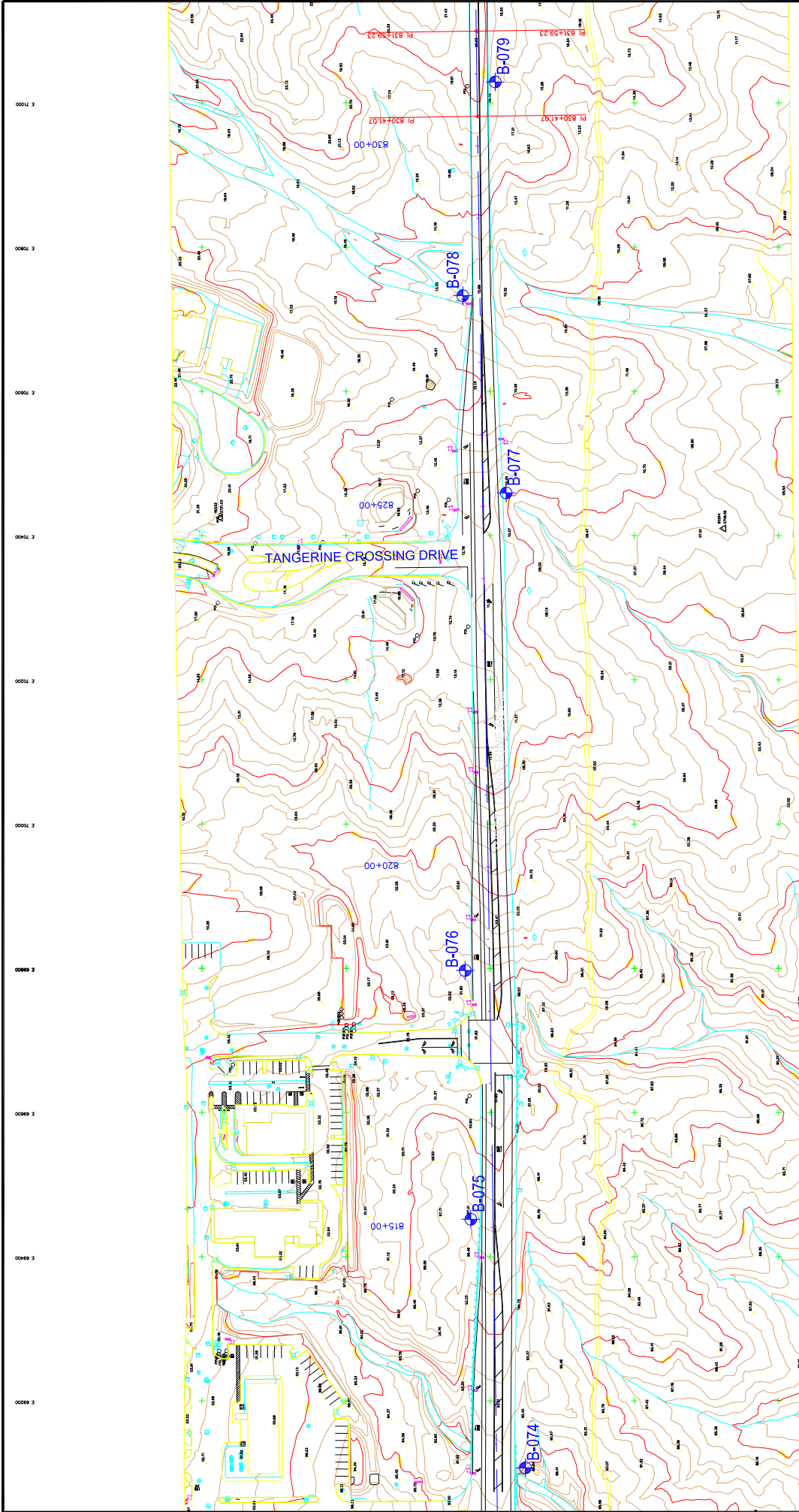


EXHIBIT
A-17

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

Terracon
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TUCSON, AZ 85719
355 S EUCLID, SUITE 107
PH: (520) 770-1789 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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SCALE IN FEET

APPROXIMATE BORING LOCATION

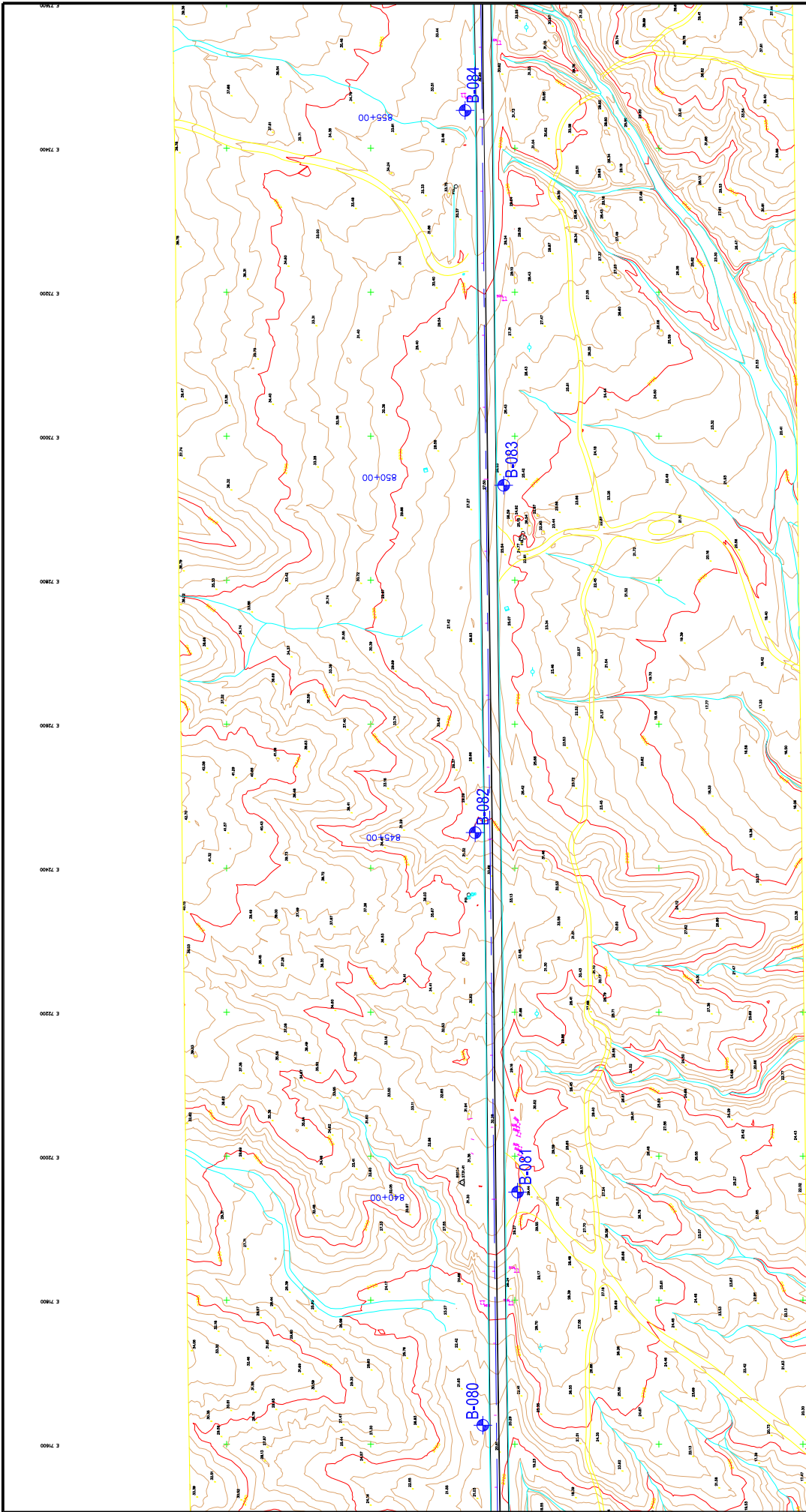


EXHIBIT
A-18

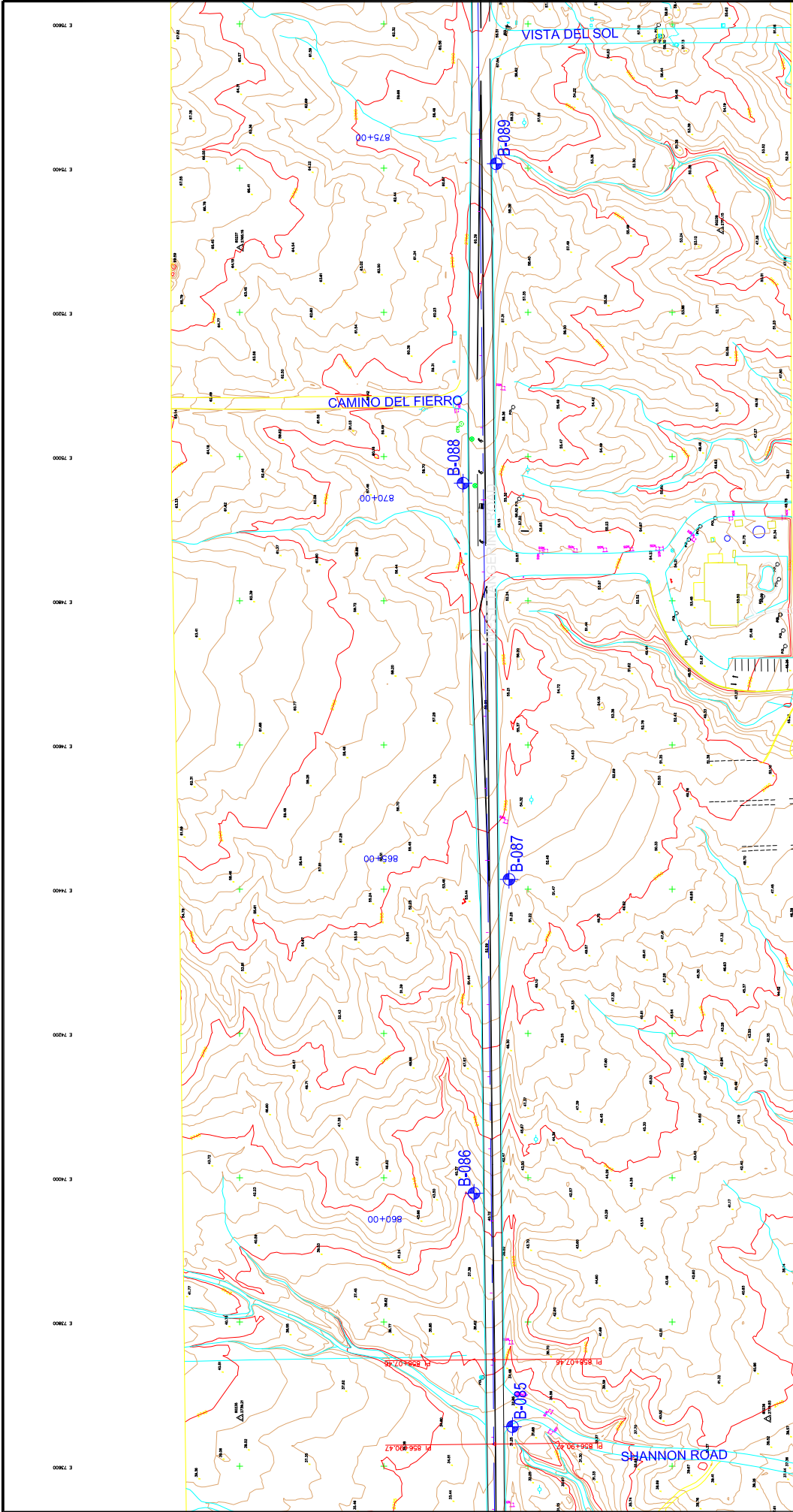
SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

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Project Migr:	BWR	Project No.:	63105079
Drawn By:	JJP	Scale:	1" = 200'
Checked By:	OBL	File No.:	63105079.DWG
Approved By:	OBL	Date:	01/2011

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SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-19

SITE PLAN & BORING LOCATIONS DIAGRAM
 PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

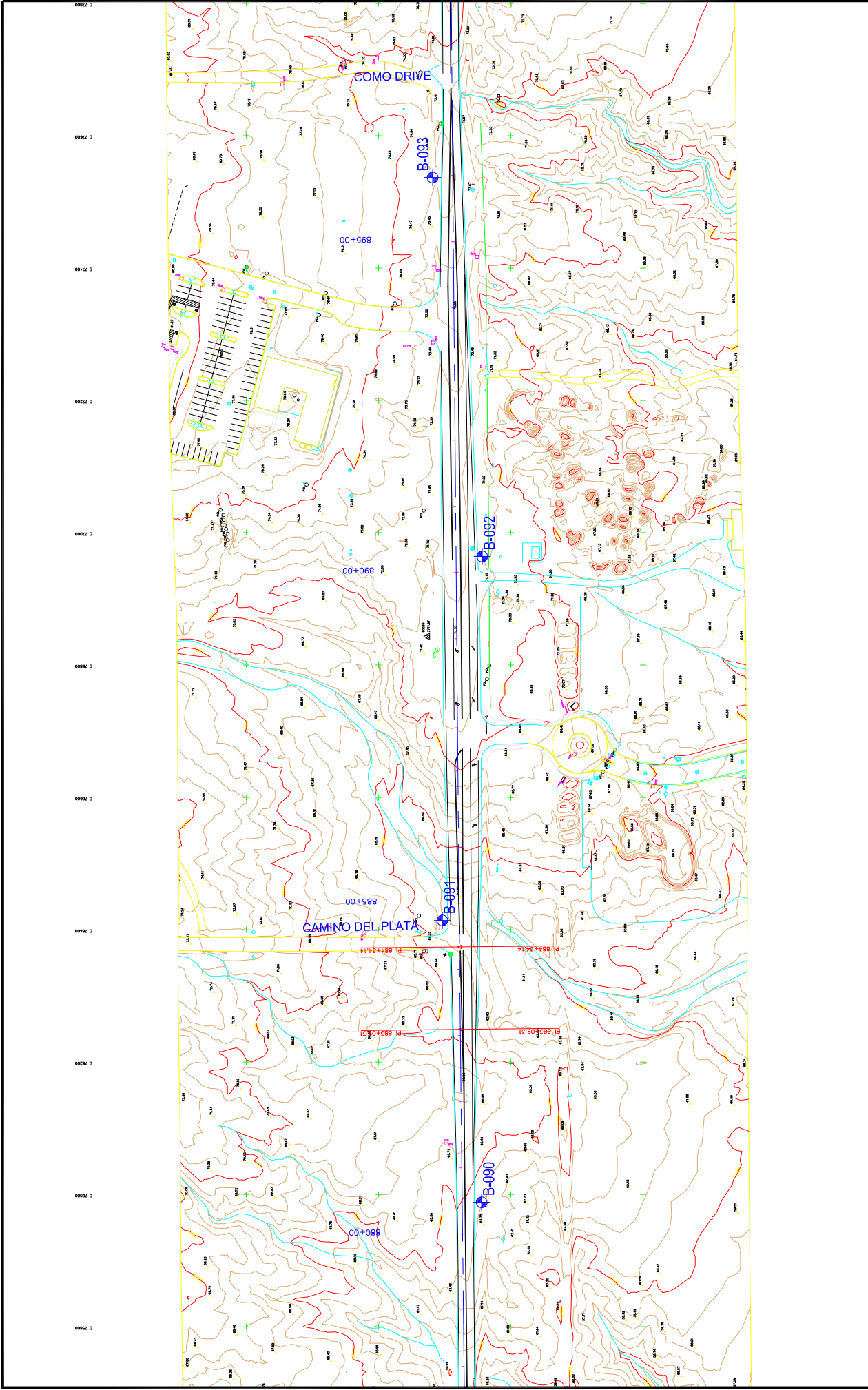
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 PH: (520) 770-1788 FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100 0 50 100
 SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-20

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS
 TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE

ARIZONA

PIMA COUNTY

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 TUCSON, AZ 85719
 PH: (520) 770-1789 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR	JJP	OBL	OBL
Drawn By:				
Checked By:				
Approved By:				

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 SCALE IN FEET

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APPROXIMATE BORING LOCATION

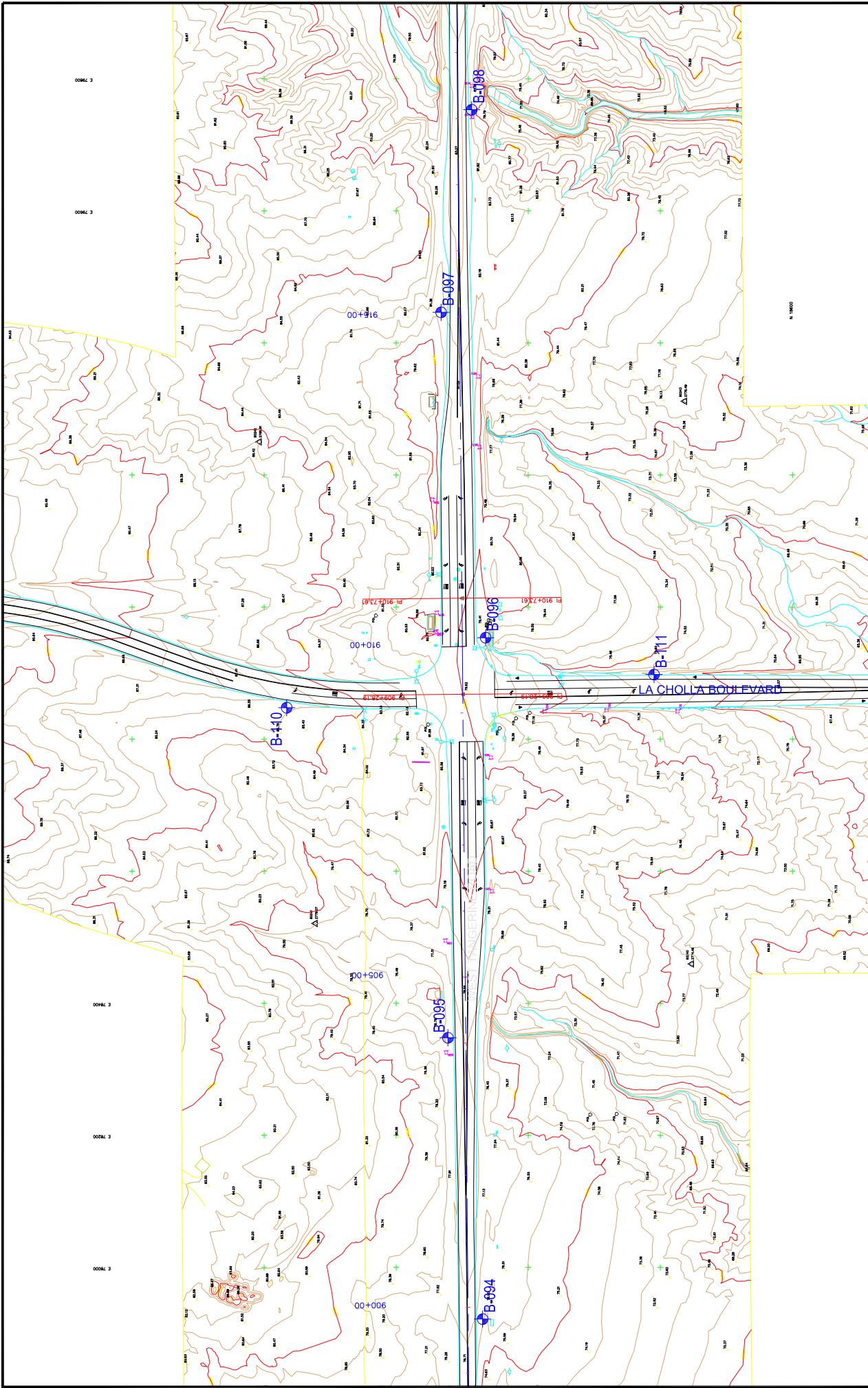


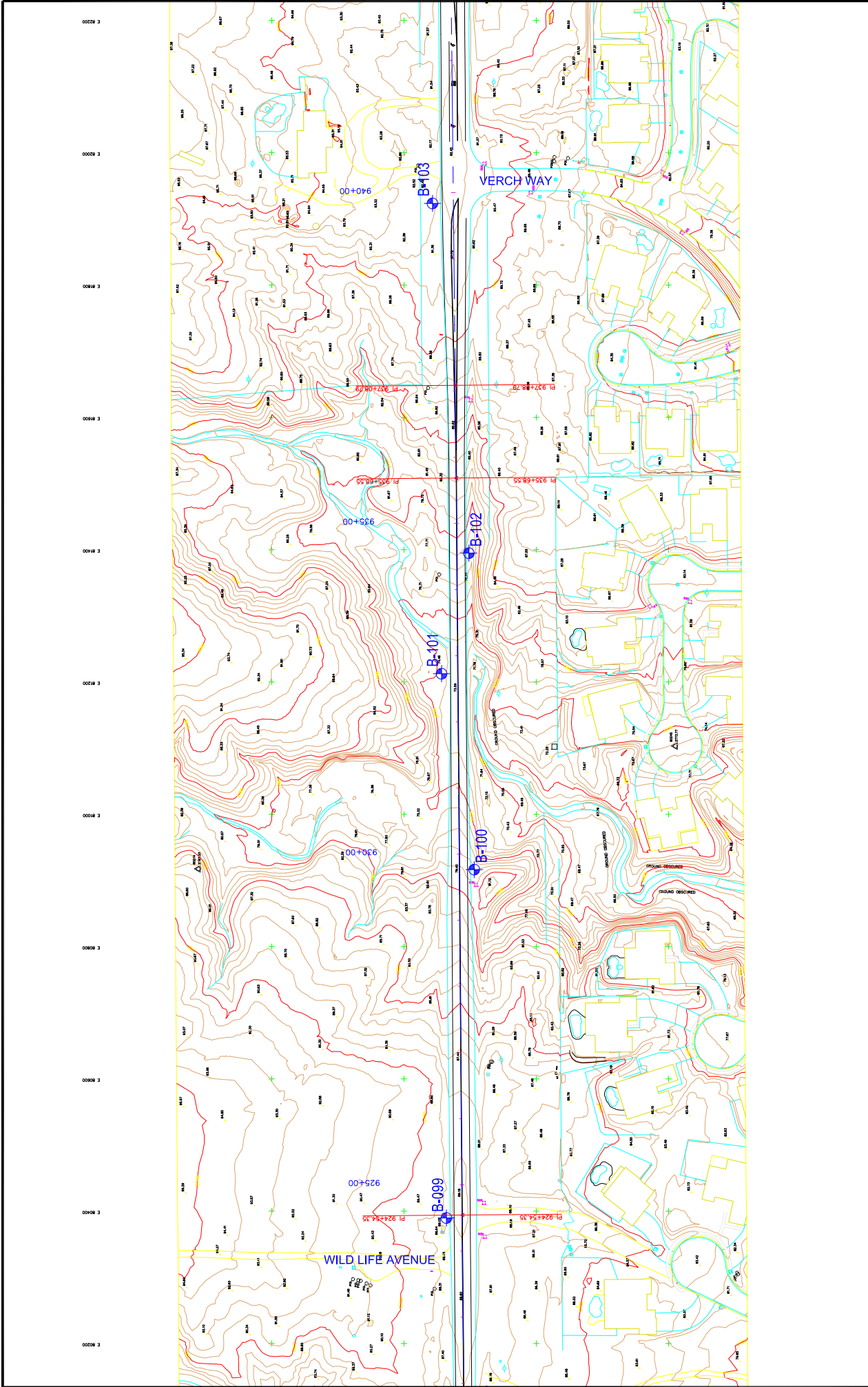
EXHIBIT
A-21
 ARIZONA
 PIMA COUNTY
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PSOMAS
 SITE PLAN & BORING LOCATIONS DIAGRAM

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 355 S EUCLID, SUITE 107
 PH: (520) 770-1789
 FAX: (520) 792-3549

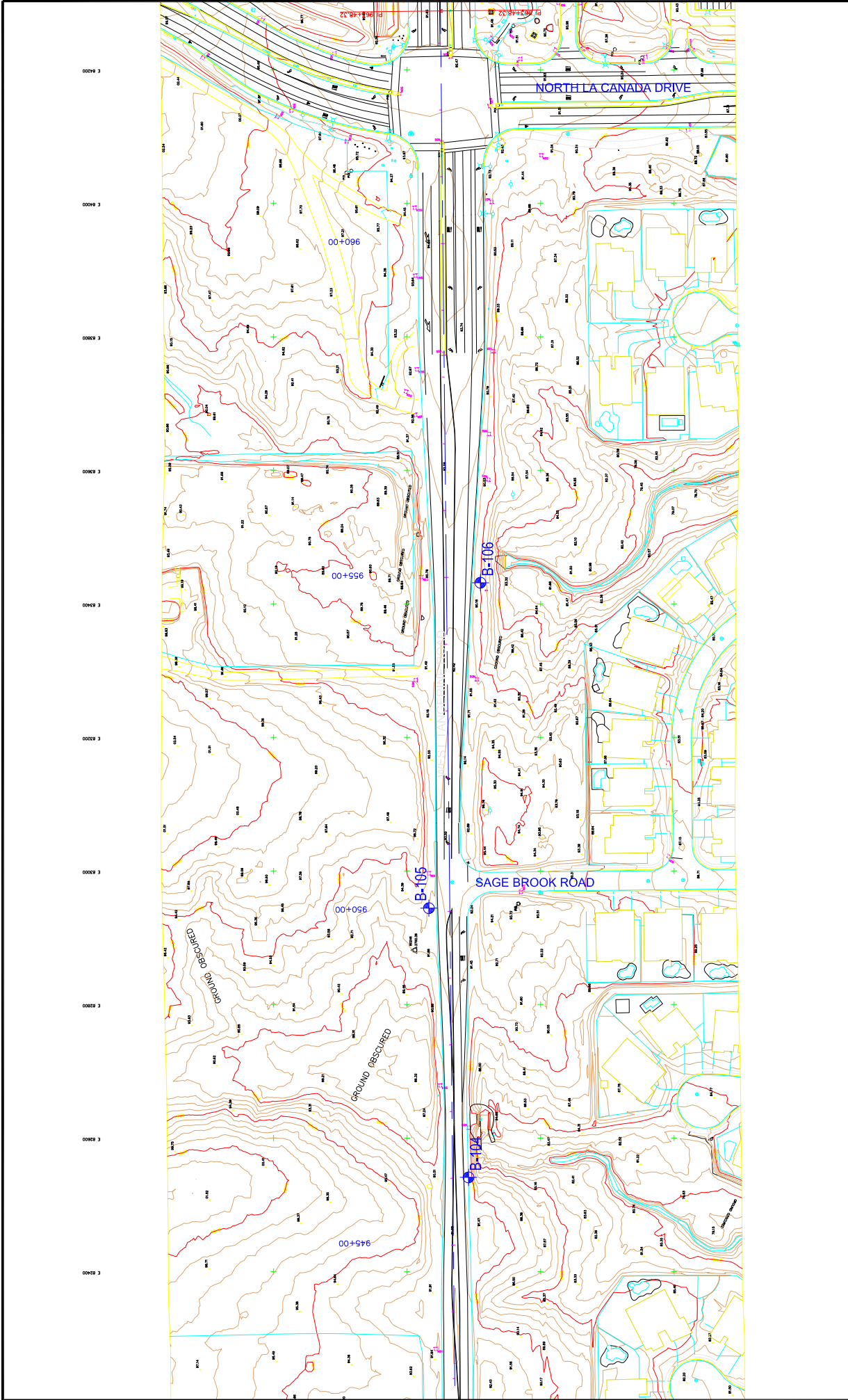
Project No.:	63105079
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Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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 APPROXIMATE BORING LOCATION



	 <p>SCALE IN FEET</p>	<p>APPROXIMATE BORING LOCATION</p> 																									
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Project Mgr:	BWR	JJP																									
Drawn By:	JJP	OBL																									
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Project No.:	63105079	01/2011																									
Scale:	1" = 200'																										
File No.:	63105079.DWG																										
Date:																											
<p>EXHIBIT</p> <p>A-22</p>																											



TANGERINE ROAD - EASTERN ALIGNMENT

EXHIBIT

A-23

SITE PLAN & BORING LOCATIONS DIAGRAM

PSOMAS

TANGERINE ROAD CORRIDOR PROJECT

I-10 TO LA CANADA DRIVE

PIMA COUNTY

ARIZONA

Terracon

Consulting Engineers and Scientists

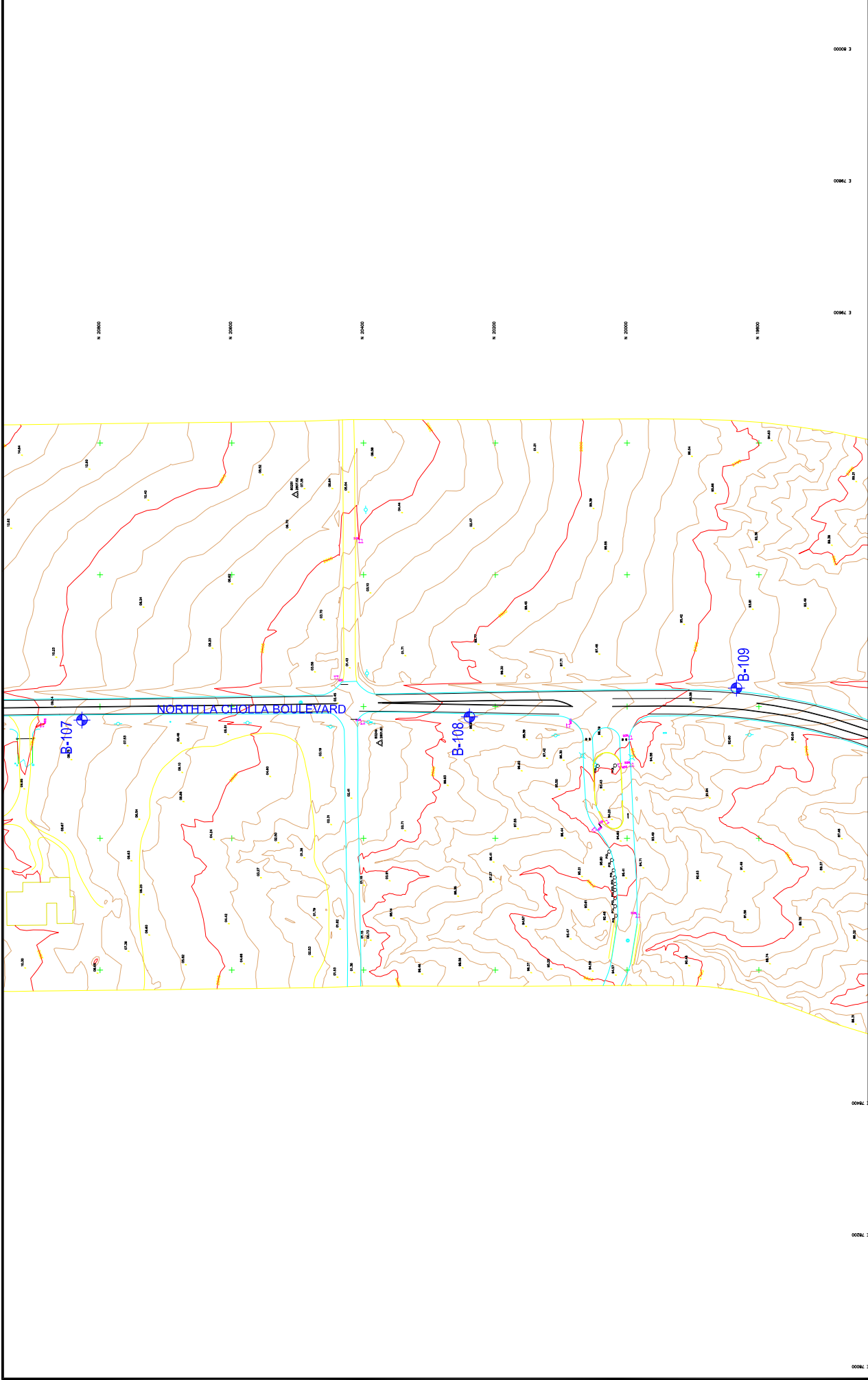
355 S EUCLID, SUITE 107
TUCSON, AZ 85719
PH: (520) 770-1789 FAX: (520) 792-3549

Project No.	63105079
Scale:	1" = 200'
File No.	63105079.DWG
Date:	01/2011

Project Mgr:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

100
0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION



EXHIBIT

A-24

SITE PLAN & BORING LOCATIONS DIAGRAM
 PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
 I-10 TO LA CANADA DRIVE
 PIMA COUNTY ARIZONA

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 PH: (520) 770-1789
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Project No. 63105079
 Scale: 1" = 200'
 File No. 63105079.DWG
 Date: 01/2011

Project Mgr: BWR
 Drawn By: JJP
 Checked By: OBL
 Approved By: OBL

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 SCALE IN FEET

N

APPROXIMATE BORING LOCATION

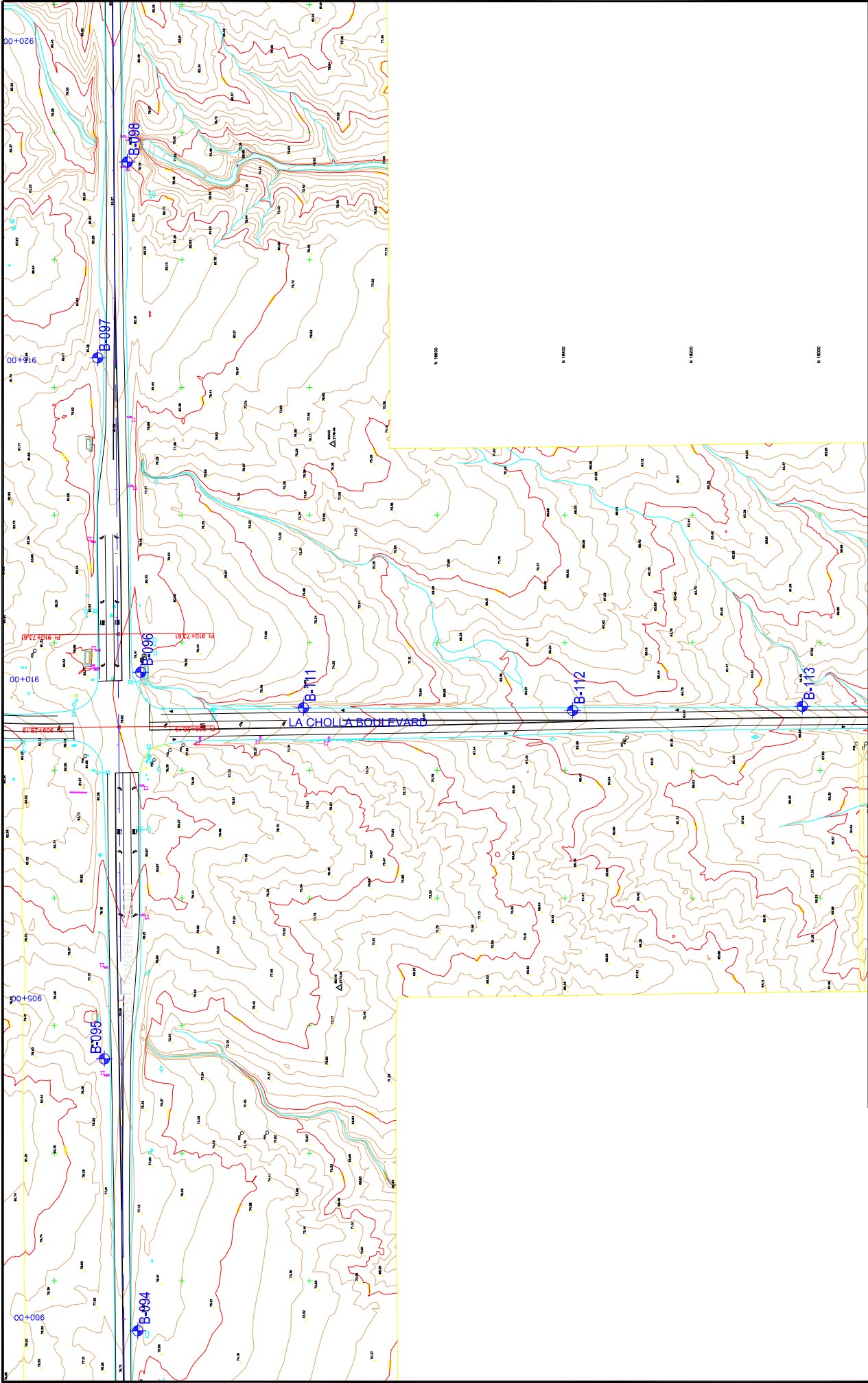


EXHIBIT	A-25			ARIZONA
SITE PLAN & BORING LOCATIONS DIAGRAM PSOMAS TANGERINE ROAD CORRIDOR PROJECT I-10 TO LA CANADA DRIVE				
PIMA COUNTY				
 Consulting Engineers and Scientists <small>355 S EUCLID, SUITE 107 TUCSON, AZ 85719 PH: (520) 770-1789 FAX: (520) 792-3549</small>				
Project No.:	63105079	Project Mgr.:	BWR	
Scale:	1" = 200'	Drawn By:	JJP	
File No.:	63105079.DWG	Checked By:	OBL	
Date:	01/2011	Approved By:	OBL	
 APPROXIMATE BORING LOCATION				



EXHIBIT
A-26

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY
ARIZONA

Terracon
Consulting Engineers and Scientists
355 S EUCLID, SUITE 107
TUCSON, AZ 85719
PH: (520) 770-7788
FAX: (520) 792-3549

Project No.:	63105079
Scale:	1" = 200'
File No.:	63105079.DWG
Date:	01/2011

Project Mgr.:	BWR
Drawn By:	JJP
Checked By:	OBL
Approved By:	OBL

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SCALE IN FEET

APPROXIMATE BORING LOCATION

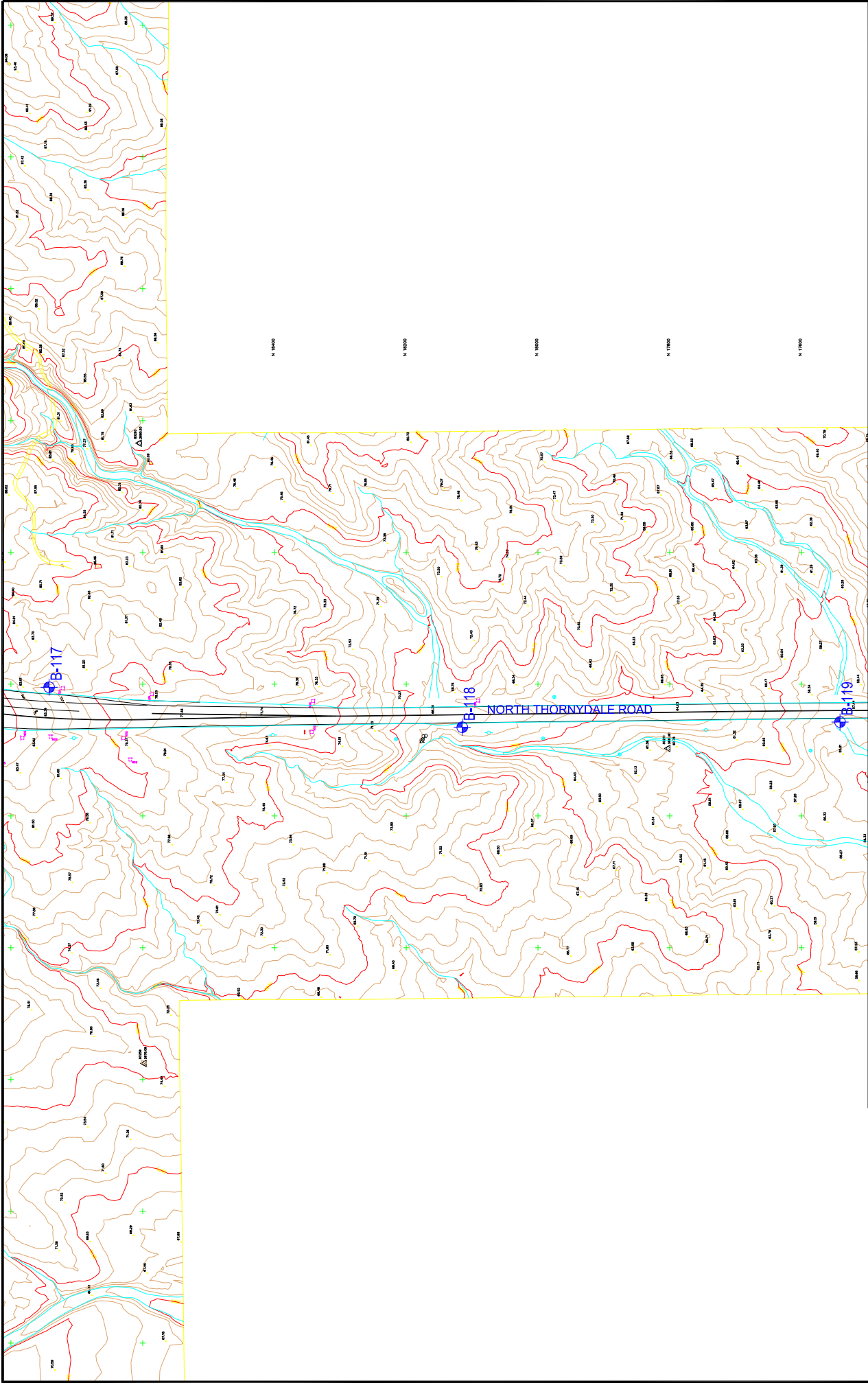


EXHIBIT
A-27

SITE PLAN & BORING LOCATIONS DIAGRAM
PSOMAS
TANGERINE ROAD CORRIDOR PROJECT
I-10 TO LA CANADA DRIVE
PIMA COUNTY ARIZONA

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Project No. 63105079
Scale: 1" = 200'
File No. 63105079.DWG
Date: 01/2011

Project Mgr: BWR
Drawn By: JJP
Checked By: OBL
Approved By: OBL

100 0 50 100
SCALE IN FEET

APPROXIMATE BORING LOCATION

Field Exploration Description

Terracon performed 119 soil borings for this project, designated B-001 through B-119. The depth of borings and purpose are summarized on the table that follows this page.

These borings were drilled at the site between October 25, 2010 and January 5, 2011. The borings were drilled to depths ranging from approximately 5 to 31½ feet below the ground surface at the approximate locations shown on the attached Site Plan and Boring Locations Diagram, Exhibit A-1 through A-27. The test borings were advanced with a truck-mounted CME-55 or CME-75 drill rig utilizing 8-inch diameter hollow-stem augers.

The borings were located in the field by using the proposed site plan, an aerial photograph of the site, and measuring from existing property lines. Stationing, offsets, and elevations provided within the report are approximate, and are based on interpolation from the electronic plans provided by Psomas. Stationing was not provided for La Cholla Boulevard or Thornydale Road, locations of borings along these roadways is based on the relative distance north or south of Tangerine Road. The accuracy of boring locations, and elevations should only be assumed to the level implied by the method used.

Continuous lithologic logs of each boring were recorded by the field geologist during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

Groundwater conditions were evaluated in each boring at the time of site exploration.

The purpose and depth of each boring is summarized in the following table:

Boring Label	Approximate Station and Offset	Purpose	Depth (feet)
B-001	Sta. 447+20, 20'L	pavement	5
B-002	Sta. 451+70, 15'R	pavement	5
B-003	Sta. 456+90, 35'L	pavement	5
B-004	Sta. 461+50, 30'R	pavement	5
B-005	Sta. 466+40, 10'L	pavement	5
B-006	Sta. 471+10, 40R	pavement	5
B-007	Sta. 476+50, 10'L	pavement	5
B-008	Sta. 481+70, 40'R	pavement	5
B-009	Sta. 486+60, 20'L	pavement	5
B-010	Sta. 490+60, 30'R	pavement	5
B-011	Sta. 497+10, 40'L	wash	30
B-012	Sta. 502+10, 20'R	pavement	5
B-013	Sta. 506+90, 15'L	pavement	5
B-014	Sta. 512+00, 20'L	pavement	5
B-015	Sta. 515+70, 15'L	wash	30
B-016	Sta. 521+70, 15'R	pavement	5
B-017	Sta. 527+30, 30'L	wash	30
B-018	Sta. 523+30, 30'R	pavement	5
B-019	Sta. 536+90, 40'L	pavement	5
B-020	Sta. 540+10, 30'R	wash	15
B-021	Sta. 545+80, 50'L	wash	15
B-022	Sta. 551+50, 30'R	pavement	5
B-023	Sta. 557+20, 25'L	pavement	5
B-024	Sta. 561+70, 20'R	pavement	5
B-025	Sta. 566+80, 30'L	pavement	5
B-026	Sta. 570+25, 20'R	wash	30
B-027	Sta. 577+05, 20'L	pavement	5
B-028	Sta. 581+90, 20'R	pavement	5
B-029	Sta. 588+50, 25'L	wash	30
B-030	Sta. 591+30, 30'R	wash	30
B-031	Sta. 597+15, 30'L	pavement	5
B-032	Sta. 602+05, 25'R	pavement	5
B-033	Sta. 607+35, 30'L	pavement	5
B-034	Sta. 613+75, 30'L	wash	30
B-035	Sta. 617+95, 30'R	pavement	5
B-036	Sta. 622+10, 25'R	pavement	5
B-037	Sta. 628+50, 25'L	wash	30
B-038	Sta. 632+50, 25'R	pavement	5
B-039	Sta. 636+60, 20'L	wash	15
B-040	Sta. 642+15, 25'R	pavement	5

Boring Label	Approximate Station and Offset	Purpose	Depth (feet)
B-041	Sta. 645+90, 30'L	wash	15
B-042	Sta. 652+20, 35'R	pavement	5
B-043	Sta. 655+00, 35'L	wash	15
B-044	Sta. 661+85, 30'R	pavement	5
B-045	Sta. 667+45, 20'L	pavement	5
B-046	Sta. 672+75, 20'L	wash	30
B-047	Sta. 677+00, 25'L	pavement	5
B-048	Sta. 681+90, 30'R	pavement	5
B-049	Sta. 687+30, 20'L	pavement	5
B-050	Sta. 691+60, 30'R	pavement	5
B-051	Sta. 694+65, 25'L	wash	30
B-052	Sta. 697+20, 35'L	pavement	5
B-053	Sta. 701+80, 60'L	pavement	5
B-054	Sta. 707+00, 20'R	wash	15
B-055	Sta. 712+50, 55'L	wash	30
B-056	Sta. 716+60, 25'R	pavement	5
B-057	Sta. 722+05, 20'L	pavement	5
B-058	Sta. 726+80, 20'R	pavement	5
B-059	Sta. 731+45, 20'L	wash	30
B-060	Sta. 737+45, 20'R	pavement	5
B-061	Sta. 743+50, 5'L	pavement	5
B-062	Sta. 745+95, 60'R	pavement	5
B-063	Sta. 752+20, 10'L	pavement	5
B-064	Sta. 757+80, 50'R	wash	15
B-065	Sta. 761+70, 10'L	pavement	5
B-066	Sta. 767+30, 30'R	pavement	5
B-067	Sta. 772+00, 30'L	wash	30
B-068	Sta. 777+90, 30'R	pavement	5
B-069	Sta. 780+15, 20'L	wash	15
B-070	Sta. 788+15, 20'R	pavement	5
B-071	Sta. 794+20, 40'L	wash	30
B-072	Sta. 800+20, 45'R	pavement	5
B-073	Sta. 805+70, 75'L	pavement	5
B-074	Sta. 811+65, 40'R	wash	15
B-075	Sta. 815+10, 30'L	pavement	5
B-076	Sta. 818+55, 55'L	wash	15
B-077	Sta. 825+20, 30'R	pavement	5
B-078	Sta. 827+90, 20'L	wash	30
B-079	Sta. 830+85, 25'R	pavement	5
B-080	Sta. 836+80, 20'L	wash	15
B-081	Sta. 840+10, 30'R	pavement	5
B-082	Sta. 845+10, 20'L	pavement	5
B-083	Sta. 849+90, 20'R	pavement	5
B-084	Sta. 855+10, 25'L	pavement	5

Boring Label	Approximate Station and Offset	Purpose	Depth (feet)
B-085	Sta. 857+15, 25'R	wash	30
B-086	Sta. 860+40, 25'R	pavement	5
B-087	Sta. 864+50, 30'R	pavement	5
B-088	Sta. 870+25, 45'L	pavement	5
B-089	Sta. 875+60, 20'R	wash	15
B-090	Sta. 880+45, 30'R	pavement	5
B-091	Sta. 884+70, 25'L	wash	30
B-092	Sta. 890+25, 40'R	pavement	5
B-093	Sta. 895+95, 30'L	pavement	5
B-094	Sta. 899+80, 20'R	pavement	5
B-095	Sta. 904+10, 20'L	wash	15
B-096	Sta. 910+15, 40'R	pavement	5
B-097	Sta. 915+05, 25'L	pavement	5
B-098	Sta. 918+05, 20'R	wash	15
B-099	Sta. 924+45, 20'L	pavement	5
B-100	Sta. 929+75, 20'R	pavement	5
B-101	Sta. 932+50, 25'L	wash	30
B-102	Sta. 934+55, 15'R	pavement	5
B-103	Sta. 939+80, 25'L	pavement	5
B-104	Sta. 946+00, 25'R	wash	30
B-105	Sta. 950+050, 30'L	pavement	5
B-106	Sta. 954+90, 50'R	wash	15
B-107	La Cholla 1675' N of Tangerine	pavement	5
B-108	La Cholla 1200' N of Tangerine	pavement	5
B-109	La Cholla 775' N of Tangerine	pavement	5
B-110	La Cholla 275' N of Tangerine	pavement	5
B-111	La Cholla 250' S of Tangerine	pavement	5
B-112	La Cholla 750' S of Tangerine	pavement	5
B-113	La Cholla 1250' S of Tangerine	pavement	5
B-114	Thornydale 1275' N of Tangerine	pavement	5
B-115	Thornydale 750' N of Tangerine	pavement	5
B-116	Thornydale 250' N of Tangerine	pavement	5
B-117	Thornydale 250' S of Tangerine	pavement	5
B-118	Thornydale 825' S of Tangerine	pavement	5
B-119	Thornydale 1400' S of Tangerine	wash	15

LOG OF BORING NO. B-001

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 447+20, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2040.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	CL	↑	BS				34	14	60
2	CL	↓	RS	12	13	97			
4									
6	CL	↓	RS	11	6	99			

6 2034.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-002

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 451+70, 15'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2040 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SC	↑	BS					32	12	48
2	SC	↓	RS	12	9	82				
6	SC	X	SPT	16						

6.5 2033.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-003

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 456+90, 35'L.

DESCRIPTION

Approx. Surface Elev.: 2043 ft

SANDY LEAN CLAY WITH GRAVEL;
brown, medium stiff to stiff, slightly damp,
medium plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0	CL						37	15	55
2	CL	1-2	RS	9	12	87			
4									
6	CL	5-6	RS	16	20	88			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None	WD
WL		
WL	Backfilled Upon Completion	



BORING STARTED	10-29-10
BORING COMPLETED	10-29-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-004

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 461+50, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2045.5 ft

SANDY LEAN CLAY WITH GRAVEL;
brown, stiff, slightly damp, medium
plasticity.

6.5 2039

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
1	CL	↑	BS				34	14	56
2	CL	↓	RS	11	9	83			
4									
6	CL	X	SPT	11					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-005

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 466+40, 10'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2047.5 ft

SANDY SILTY CLAY; brown, medium stiff to stiff, slightly damp, low plasticity.

6 2041.5
BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	CL-ML	↑	BS				25	5	61
4	CL-ML	↓	RS	6	9	89			
6	CL-ML	↓	RS	14	9	91			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-006

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 471+10, 40R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2049.5 ft

4	2045.5	SILTY CLAYEY SAND ; light brown, loose, slightly damp, low plasticity.
6.5	2043	SILTY SAND ; light brown, loose, slightly damp, non-plastic.
<u>BOTTOM OF BORING.</u>		

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC-SM	↑	BS				23	5	38
4	SC-SM	↓	RS	15					
6	SM	X	SPT	8					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	None WD
WL	▽	
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-007

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 476+50, 10'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2052 ft

SANDY SILTY CLAY; brown, medium stiff to stiff, slightly damp, low plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	CL-ML	↑	BS				26	7	59
4	CL-ML	↓	RS	12	6	84			
6	CL-ML	↓	RS	9	8	83			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-008

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 481+70, 40'R.

DESCRIPTION

Approx. Surface Elev.: 2053.5 ft

SILTY SAND; light brown, loose, slightly damp, low plasticity.

6.5

BOTTOM OF BORING. 2047

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				22	2	29
4	SM	↓	RS	10	8	81			
6	SM	X	SPT	8					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-009

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 486+60, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2056 ft

SAMPLE TESTS

DEPTH, ft.	USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
1	ML	↑	BS				NP	NP	68
2	ML	↓	RS	7	8	80			
4									
6	ML	↓	RS	8	9	91			

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-010

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 490+60, 30'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2059 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	26
4	SM	↓	RS	10	4	93				
6	SM	X	SPT	9						

SILTY SAND; light brown, loose, slightly damp, non-plastic.

6.5 2052.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-011

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 497+10, 40'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2065 ft

4	<p>SILTY SAND; light brown, loose, slightly damp, non-plastic.</p>	2061
7	<p>SILTY CLAYEY SAND; light brown, loose, slightly damp, low plasticity.</p>	2058
14	<p>SILTY SAND; light brown, medium dense, slightly damp, non-plastic.</p>	2051
28	<p>SILTY CLAYEY SAND; light brown, medium dense, slightly damp, low plasticity.</p> <p>becomes dense.</p>	2037
31.5	<p>POORLY GRADED SAND WITH GRAVEL; light brown, medium dense, slightly damp, non-plastic.</p>	2033.5
<u>BOTTOM OF BORING.</u>		

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	42
4	SM	↓	RS	14	2	98				
6	SC-SM	↓	RS	17	6	87				
10	SM	X	SPT	16						
16	SC-SM	X	SPT	23						
20	SC-SM	X	SPT	27						
26	SC-SM	X	SPT	40						
30	SP	X	SPT	28						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL	▼	▼
WL	Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-012

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 502+10, 20'R.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2072.5 ft										
	SILTY SAND ; light brown, medium dense, slightly damp, non-plastic.	1	SM	↑	BS				NP	NP	31
		2	SM	↓	RS	28	2	116			
	becomes loose.	4									
		6	SM	X	SPT	8					
	<u>BOTTOM OF BORING.</u>	6.5									2066

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-013

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 506+90, 15'L.

DESCRIPTION

Approx. Surface Elev.: 2079 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	15
4	SM	↓	RS	16	1	101				
6	SM	↓	RS	19	2	114				

SILTY SAND: light brown, loose, slightly damp, non-plastic.

CLAYEY SAND: light brown, medium dense, slightly damp, low plasticity.

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	



BORING STARTED		10-29-10	
BORING COMPLETED		10-29-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-014

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 512+00, 20'L.

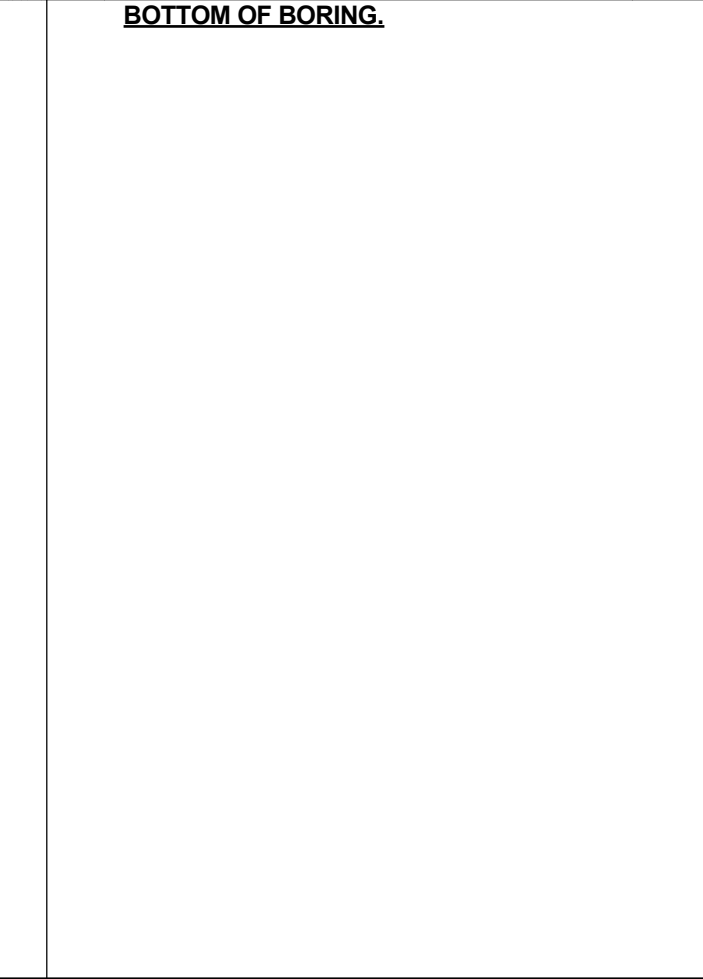
DESCRIPTION

Approx. Surface Elev.: 2088 ft

SILTY SAND; light brown, loose, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	33
4	SM	↓	RS	17	2	107				
6	SM	X	SPT	6						



The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-015

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 515+70, 15'L.

DESCRIPTION

Approx. Surface Elev.: 2093.5 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

30.5 becomes very dense.
BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	17
2	SM	↓	RS	22	2	119				
4										
6	SM	↓	RS	20	1	117				
8										
10	SM	×	SPT	13						
12										
14										
16	SM	×	SPT	12						
18										
20	SM	×	SPT	11						
22										
24										
26	SM	×	SPT	21						
28										
30	SM	×	SPT	50/6"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	10-29-10
BORING COMPLETED	10-29-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-016

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 521+70, 15'R.

DESCRIPTION

Approx. Surface Elev.: 2110.5 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes loose.

6.5 2104

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	BS							
2	SM	RS	33	2	120				
6	SM	SPT	7						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-017

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 527+30, 30'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2121 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	SM	↑	BS				NP	NP	12
2	SM	↓	RS	13	1	113			
4									
6	SM	↓	RS	17	2	117			
8									
10	SM	↓	SPT	13					
12									
14									
16	SM	↓	SPT	21					
18									
20	SM	↓	SPT	62					
22									
24									
26	SM	↓	SPT	33					
28									
30	SM	↓	SPT	26					
31.5									
2089.5									

SILTY SAND; light brown, loose, slightly damp, non-plastic.

becomes medium dense.

becomes very dense.

becomes dense.

becomes medium dense.

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	None	WD	▼
WL	▼		▼
WL	Backfilled Upon Completion		



BORING STARTED	10-29-10
BORING COMPLETED	10-29-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-018

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 523+30, 30'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2134.5 ft

SILTY SAND; light brown, loose, slightly damp, non-plastic.

becomes medium dense.

6.5

2128

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	30
4	SM	↓	RS	12	2	112			
6	SM	X	SPT	10					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL ∇ None WD ∇

WL ∇ ∇

WL Backfilled Upon Completion



BORING STARTED 10-28-10

BORING COMPLETED 10-28-10

RIG CME-55 FOREMAN OBL

APPROVED OBL JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-019

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 536+90, 40'L.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2145.5 ft										
	SILTY SAND ; light brown, loose, slightly damp, non-plastic.	2	SM	↑	BS				NP	NP	19
		4	SM	↓	RS	14	3	114			
		6	SM	X	SPT	7					
	<u>BOTTOM OF BORING.</u>	6.5									2139

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-020

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 540+10, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2153 ft

SILTY SAND WITH GRAVEL; light brown, loose, slightly damp, non-plastic.

very dense, strong cementation.

becomes loose, no cementation.

becomes dense with moderate cementation.

16.5 **BOTTOM OF BORING.** 2136.5

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	15
2	SM	↓	RS	14	2	116				
6	SM	X	SPT	57/10"						
10	SM	X	RS	15						
16	SM	X	SPT	46						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		10-28-10	
BORING COMPLETED		10-28-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-021

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 545+80, 50'L.

DESCRIPTION

Approx. Surface Elev.: 2167 ft

WELL GRADED SAND WITH SILT; light brown, loose, slightly damp, non-plastic.

16 becomes very dense. 2151

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SW-SM		BS					NP	NP	12
2	SW-SM		RS	12	2	112				
4										
6	SW-SM		SPT	6						
8										
10	SW-SM		SPT	5						
12										
14										
16	SW-SM		SPT	82/9"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	



BORING STARTED	10-28-10
BORING COMPLETED	10-28-10
RIG CME-55	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-022

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 551+50, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2180 ft

CLAYEY SAND WITH GRAVEL; brown, medium dense, slightly damp, low plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS			
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				27	10	23
2	SC	↓	RS	45	2	110			
6	SC	X	SPT	10					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-4-10	
BORING COMPLETED		11-4-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-023

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 557+20, 25'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2192 ft

SILTY SAND; light brown, loose, slightly damp, non-plastic.

becomes medium dense.

BOTTOM OF BORING.

2186

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	14
4	SM	↓	RS	16	2	110			
6	SM	↓	RS	20					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL ∇ None WD ∇

WL ∇ ∇

WL Backfilled Upon Completion



BORING STARTED 11-9-10

BORING COMPLETED 11-9-10

RIG CME-55 FOREMAN BWR

APPROVED OBL JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-024

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 561+70, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2202.5 ft

SILTY SAND; light brown, medium dense, slightly damp, low plasticity.

becomes very dense.

6.5 2196

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				18	1	21
2	SM	↓	RS	24	3	110			
6	SM	X	SPT	74					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-4-10	
BORING COMPLETED		11-4-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-025

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 566+80, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2215 ft

WELL GRADED SAND WITH SILT; light brown, medium dense, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SW-SM	↑	BS				NP	NP	11
4	SW-SM	↓	RS	31	2	113			
6	SW-SM	↓	RS	53					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-9-10	
BORING COMPLETED		11-9-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-026

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 570+25, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2220 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes dense, strong cementation.

becomes dense to very dense.

31.5 2188.5

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	17
2	SM	↓	RS	28	2	119				
4										
6	SM	↓	SPT	15						
8										
10	SM	↓	RS	82/11"						
12										
14										
16	SM	↓	SPT	50/5"						
18										
20	SM	↓	SPT	70						
22										
24										
26	SM	↓	SPT	40						
28										
30	SM	↓	SPT	62						

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED		11-4-10	
BORING COMPLETED		11-4-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-027

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 577+05, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2239.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SW-SM	↑	BS				NP	NP	10
2	SW-SM	↓	RS	35	2	116			
4	SW-SM	↓							
5	SW-SM		RS	50/0"					

WELL GRADED SAND WITH SILT; light brown, medium dense, slightly damp, non-plastic.

becomes very dense.
BOTTOM OF BORING.

2234.5

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▼	None WD	▼
WL	▼		▼
WL		Backfilled Upon Completion	



BORING STARTED		11-9-10	
BORING COMPLETED		11-9-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-028

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 581+90, 20'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2254 ft

SILTY SAND WITH GRAVEL; light brown, medium dense, slightly damp, non-plastic.

becomes very dense.

6.5

2247.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	17
2	SM	↓	RS	22	2	119			
4									
6	SM	X	SPT	65					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL ∇ None WD ∇

WL ∇ ∇

WL Backfilled Upon Completion



BORING STARTED 11-4-10

BORING COMPLETED 11-4-10

RIG CME-55 FOREMAN OBL

APPROVED OBL JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-029

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 588+50, 25'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2268 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

moderate cementation below 7'.

becomes very dense.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	18
2	SM	↓	RS	25	2	113				
6	SM	↓	SPT	17						
10	SM	↓	SPT	66						
16	SM	↓	SPT	50/5"						
20	SM	↓	SPT	50/6"						
26	SM	↓	SPT	71						
30	SM	↓	SPT	84						
31.5	<u>BOTTOM OF BORING.</u>									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-4-10
BORING COMPLETED	11-4-10
RIG CME-55	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-030

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 591+30, 30'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2274 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

moderate cementation below 7'.

becomes very dense.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	15
2	SM	↓	RS	28	2	116				
4										
6	SM	↓	SPT	21						
8										
10	SM	↓	RS	50/3"						
12										
14										
16	SM	↓	SPT	63						
18										
20	SM	↓	SPT	80/9"						
22										
24										
26	SM	↓	SPT	80/10"						
28										
30	SM	↓	SPT	80/11"						
31.5										
2242.5										

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED		11-4-10	
BORING COMPLETED		11-4-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-031

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 597+15, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2286.5 ft

WELL GRADED SAND WITH SILT;
brown, dense, moist, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SW-SM	↑	BS				NP	NP	12
4	SW-SM	↓	RS	63	3	111			
6	SW-SM	↓	RS	50/4"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-032

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 602+05, 25'R.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	Approx. Surface Elev.: 2300 ft										
	SILTY SAND ; light brown, loose, slightly damp, non-plastic.	2	SM	↑	BS				NP	NP	18
		4	SM	↓	RS	16	2	117			
	5.5 2294.5		SM	↓	RS	50/3"					
	becomes very dense. <u>BOTTOM OF BORING.</u>										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-9-10	
BORING COMPLETED		11-9-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-033

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 607+35, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2312.5 ft

SILTY SAND; brown, medium dense, moist, non-plastic.

5.5 becomes very dense. 2307
BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	18
2	SM	↓	RS	39	2	118				
4	SM	↓	RS	50/4"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-034

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 613+75, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2329.5 ft

SILTY SAND; light brown, dense, slightly damp, non-plastic.

becomes dense to very dense.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
1	SM	↑	BS					NP	NP	13
2	SM	↓	RS	80	3	115				
4										
6	SM	×	SPT	50/5"						
8										
10	SM	×	SPT	73/11"						
12										
14										
16	SM	×	SPT	71						
18										
20	SM	×	SPT	74						
22										
24										
26	SM	×	SPT	41						
28										
30	SM	×	SPT	50/4"						

31.5 2298

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED		11-9-10	
BORING COMPLETED		11-9-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-035

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 617+95, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2341.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	17
2	SM	↓	RS	58	2	127				
4	SM	↓	RS	50/4"						

SILTY SAND: brown, medium dense, slightly damp, non-plastic.

5.5 becomes very dense. 2336

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-036

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 622+10, 25'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2353.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	18
4	SM	↓	RS	66	4	101				
6	SM	↓	RS	8						
7	SM	↓	RS	20						
2346.5										

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▼	None WD	▼
WL	▼		▼
WL		Backfilled Upon Completion	



BORING STARTED		11-19-10	
BORING COMPLETED		11-19-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-037

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 628+50, 25'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2371.5 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes very dense.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	16
2	SM	↓	RS	52	3	113				
4										
6	SM	↓	RS	50/4"						
8										
10	SM	↓	SPT	50/5"						
12										
14										
16	SM	↓	SPT	50/2"						
18										
20	SM	↓	SPT	81/9"						
22										
24										
26	SM	↓	SPT	65/9"						
28										
30	SM	↓	SPT	77						
31.5										
										2340

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-12-10
BORING COMPLETED	11-12-10
RIG CME-55	FOREMAN HPS
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-038

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 632+50, 25'R.

DESCRIPTION

Approx. Surface Elev.: 2381 ft

SILTY SAND: brown, medium dense, slightly damp, non-plastic.

CLAYEY SAND WITH GRAVEL: light brown, very dense, slightly damp, low plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	16
4	SM	↓	RS	50	2	119				
6	SM	↓	RS	50/3"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-039

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 636+60, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2393.5 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes loose.

becomes very dense.

16.5 2377

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	18
2	SM	↓	RS	38	2	120				
4										
6	SM	↓	RS	18	3	112				
8										
10	SM	X	SPT	50/6"						
12										
14										
16	SM	X	SPT	50/4"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-040

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 642+15, 25'R.

DESCRIPTION

Approx. Surface Elev.: 2408 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	19
4	SM	↓	RS	35	2	119				
6	SC	↓	RS	63						

SILTY SAND; brown, medium dense, slightly damp, non-plastic.

CLAYEY SAND; light brown, dense, slightly damp, low plasticity.

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None WD	▽
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-041

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 645+90, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2419 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	13
2	SM	↓	RS	60	2	120				
4										
6	SM	↓	RS	48	10	109				
8										
10	SM	X	SPT	50/3"						
12										
14										
16	SM	X	SPT	94/6"						

SILTY SAND; brown, dense, slightly damp, non-plastic.

becomes medium dense.

becomes very dense.

16.5 2402.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		11-12-10	
BORING COMPLETED		11-12-10	
RIG	CME-55	FOREMAN	HPS
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-042

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 652+20, 35'R.

DESCRIPTION

Approx. Surface Elev.: 2437 ft

SILTY SAND; light brown, loose, slightly damp, non-plastic.

becomes medium dense. 2431

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	14
4	SM	↓	RS	18	1	105				
6	SM	↓	RS	37						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-15-10	
BORING COMPLETED		11-15-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-043

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 655+00, 35'L.

DESCRIPTION

Approx. Surface Elev.: 2449 ft

WELL GRADED SAND WITH SILT;
brown, medium dense, slightly damp,
non-plastic.

becomes dense.

16.5 2432.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SW-SM	↑	BS					NP	NP	9
2	SW-SM	↓	RS	38	1	104				
4										
6	SW-SM	↓	RS	45	3	114				
8										
10	SW-SM	X	SPT	44						
12										
14										
16	SW-SM	X	SPT	55						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED	11-12-10
BORING COMPLETED	11-12-10
RIG CME-55	FOREMAN HPS
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-044

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 661+85, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2466 ft

SAMPLE TESTS

SILTY SAND; brown, dense, slightly damp, non-plastic.

DEPTH, ft.	USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	15
4	SM	↓	RS	27	2	114			
6	SM	↓	RS	20					

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-15-10	
BORING COMPLETED		11-15-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-045

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 667+45, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2477.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	15
4	SM	↓	RS	23	1	113				
6	SM	↓	RS	17						

SILTY SAND; brown, dense, slightly damp, non-plastic.

becomes loose.

2471.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL ∇ None WD ∇

WL ∇ ∇

WL Backfilled Upon Completion



BORING STARTED 11-12-10

BORING COMPLETED 11-12-10

RIG CME-55 FOREMAN HPS

APPROVED OBL JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-046

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 672+75, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2486 ft

WELL GRADED SAND WITH SILT AND GRAVEL; brown, medium dense, slightly damp, non-plastic.

becomes loose.

becomes very dense.

becomes medium dense.

becomes very dense.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SW-SM		BS					NP	NP	11
2	SW-SM		RS	27	1	113				
4										
6	SW-SM		RS	31	2	112				
8										
10	SW-SM		SPT	8						
12										
14										
16	SW-SM		SPT	72/10"						
18										
20	SW-SM		SPT	50/5"						
22										
24										
26	SW-SM		SPT	19						
28										
30	SW-SM		SPT	59						
31.5										
2454.5										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
Backfilled Upon Completion		



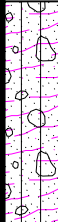
BORING STARTED	11-16-10
BORING COMPLETED	11-16-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-047

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 677+00, 25'L.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2502 ft										
	SILTY SAND WITH GRAVEL ; light brown, medium dense, slightly damp, weak cementation, non-plastic.	1	SM	↑	BS				NP	NP	17
		2	SM	↓	RS	57					
		4									
	becomes dense.	6	SM	↓	RS	62					
	<u>BOTTOM OF BORING.</u>	6									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-15-10	
BORING COMPLETED		11-15-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-048

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 681+90, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2543 ft

SILTY SAND; light brown, dense, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	17
4	SM	↓	RS	34	2	117				
6	SM	X	SPT	27						

6.5 2536.5

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	None WD
WL	▽	
WL		Backfilled Upon Completion



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-049

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

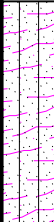
PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 687+30, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2525.5 ft



SILTY SAND; light brown, medium dense, slightly damp, weak cementation, non-plastic.

becomes loose.

2519.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SM	↑	BS					NP	NP	16
2	SM	↓	RS	46	2	116				
4										
6	SM	↓	RS	18						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		11-15-10	
BORING COMPLETED		11-15-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-050

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 691+60, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2531 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

6.5 2524.5
BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	22
2	SM	↓	RS	36	2	118				
6	SM	X	SPT	15						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-051

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 694+65, 25'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2537.5 ft

SILTY SAND; brown, loose, damp, non-plastic.

becomes medium dense.

becomes very dense.

becomes medium dense.

becomes dense.

becomes very dense.

31.5

2506

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	22
2	SM	↓	RS	13	6	106				
4										
6	SM	↓	RS	8	4	106				
8										
10	SM	↓	SPT	17						
12										
14										
16	SM	↓	SPT	92/11"						
18										
20	SM	↓	SPT	27						
22										
24										
26	SM	↓	SPT	46						
28										
30	SM	↓	SPT	64						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-15-10
BORING COMPLETED	11-15-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-052

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 697+20, 35'L.

DESCRIPTION

Approx. Surface Elev.: 2541 ft

SAMPLE			TESTS						
DEPTH, ft.	USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200

SILTY SAND; brown, medium dense, slightly damp, non-plastic.

6 becomes loose. 2535

BOTTOM OF BORING.

1	SM	↑	BS				NP	NP	20
2	SM	↓	RS	58					
4									
6	SM	↓	RS	15					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-053

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 701+80, 60'L.

DESCRIPTION

Approx. Surface Elev.: 2549.5 ft

SILTY SAND; light brown, loose, slightly damp, low plasticity.

5.5 becomes very dense. 2544
BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				21	3	22
2	SM	↓	RS	11	2	118			
4	SM	↓	RS	50/5"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-054

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 707+00, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2548.5 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes loose.

becomes medium dense.

16.5 **BOTTOM OF BORING.** 2532

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	18
2	SM	↓	RS	21	2	101				
6	SM	↓	RS	15	3	108				
10	SM	X	SPT	14						
16	SM	X	SPT	22						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-16-10
BORING COMPLETED	11-16-10
RIG CME-55	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-055

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 712+50, 55'L.

DESCRIPTION

Approx. Surface Elev.: 2557.5 ft

SILTY SAND; light brown, dense, slightly damp, low plasticity.

becomes medium dense.

becomes dense.

becomes very dense.

becomes medium dense.

becomes dense.

31.5 2526

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SM	↑	BS					21	2	18
2	SM	↓	RS	69						
4										
6	SM	↓	RS	46	3	106				
8										
10	SM	↓	SPT	49						
12										
14										
16	SM	↓	SPT	77						
18										
20	SM	↓	SPT	13						
22										
24										
26	SM	↓	SPT	32						
28										
30	SM	↓	SPT	34						

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-14-10
BORING COMPLETED	12-14-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-056

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 716+60, 25'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2564 ft

SILTY SAND; light brown, very dense, slightly damp, non-plastic.

becomes loose.

6.5

2557.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
1	SM	↑	BS					NP	NP	17
2	SM	↓	RS	67/9"	4	108				
4										
6	SM	X	SPT	5						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



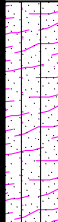
BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-057

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 722+05, 20'L.	DEPTH, ft.	SAMPLE			TESTS				
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX
	DESCRIPTION									
	Approx. Surface Elev.: 2576.5 ft									
	SILTY SAND ; light brown, very dense, slightly damp, weak cementation, non-plastic.	2	SM	↑	BS				NP	NP
		4	SM	↓	RS	50/5"	10	88		
		6	SM	↓	RS	73/11"				
	<u>BOTTOM OF BORING.</u>	6								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-15-10	
BORING COMPLETED		11-15-10	
RIG	CME-55	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-058

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 726+80, 20'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2586 ft

SILTY SAND; light brown, very dense, slightly damp, non-plastic.

becomes dense.

BOTTOM OF BORING.

2580

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	16
4	SM	↓	RS	77/9"	3	103				
6	SM	↓	RS	61						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-059

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 731+45, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2595 ft

SILTY SAND; brown, loose to medium dense, slightly damp, non-plastic.

becomes very dense.

becomes loose.

becomes medium dense to dense.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM	↑	BS					NP	NP	14
2	SM	↓	RS	19	2	110				
4										
6	SM	↓	RS	14	3	112				
8										
10	SM	↓	SPT	72						
12										
14										
16	SM	↓	SPT	7						
18										
20	SM	↓	SPT	27						
22										
24										
26	SM	↓	SPT	34						
28										
30	SM	↓	SPT	29						
31.5										
2563.5										

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽ None	WD	▽
WL	▽		▽
WL	Backfilled Upon Completion		



BORING STARTED	11-15-10
BORING COMPLETED	11-15-10
RIG CME-55	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-060

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 737+45, 20'R.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2605.5 ft										
6.5	SILTY SAND ; light brown, very dense, slightly damp, non-plastic.	2	SM	BS				NP	NP	15	
		4	SM	RS	94/9"	2	108				
		6	SM	SPT	88/9"						
	<u>BOTTOM OF BORING.</u>	2599									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL	▼	▼
WL	Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-062

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 745+95, 60'R.

DESCRIPTION

Approx. Surface Elev.: 2620 ft

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

becomes loose.

6.5 2613.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	19
2	SM	↓	RS	37	3	115				
6	SM	X	SPT	7						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None WD	▽
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-063

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 752+20, 10'L.

DESCRIPTION

Approx. Surface Elev.: 2627.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
1	SC	↑	BS				28	10	26
2	SC	↓	RS	30	8	112			
4									
6	SC	X	SPT	41					

CLAYEY SAND; light brown, medium dense, slightly damp, low plasticity.

becomes loose.

6.5 2621
BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-064

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 757+80, 50'R.

DESCRIPTION

Approx. Surface Elev.: 2630 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SM	↑	BS					NP	NP	19
2	SM	↓	RS	23	2	109				
4										
6	SC	↓	SPT	78						
8										
10	SM	↓	SPT	22						
12										
14										
16	SC	↓	RS	72						
16										

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

4 2626

CLAYEY SAND; light brown, very dense, slightly damp, low plasticity.

9 2621

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

13 2617

CLAYEY SAND; red brown, very dense, slightly damp, low plasticity.

16 2614

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-16-10
BORING COMPLETED	11-16-10
RIG CME-55	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-065

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 761+70, 10'L.

DESCRIPTION

Approx. Surface Elev.: 2638 ft

SILTY SAND: light brown, very dense, slightly damp, moderate cementation, low plasticity.

becomes medium dense.

BOTTOM OF BORING.



DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0 - 2	SM	↑	BS					NP	NP	19
2 - 4	SM	↓	RS	78/9"	7	103				
4 - 6	SM	↓	SPT	46						
6 - 6.5										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None	WD
WL		
WL	Backfilled Upon Completion	



BORING STARTED	11-16-10
BORING COMPLETED	11-16-10
RIG CME-55	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-066

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 767+30, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2651 ft

SAMPLE			TESTS					
DEPTH, ft.	USCS SYMBOL	INTERVAL	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200

SILTY SAND; light brown, very dense, slightly damp, non-plastic.

becomes medium dense.

6.5 2644.5

BOTTOM OF BORING.

2	SM	BS				NP	NP	22
4	SM	RS	74/9"	3	112			
6	SM	SPT	10					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		11-16-10	
BORING COMPLETED		11-16-10	
RIG	CME-55	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-067

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 772+00, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2659 ft

WELL GRADED SAND WITH SILT; brown, medium dense, slightly damp, non-plastic.

CLAYEY SAND WITH GRAVEL; brown, dense, slightly damp, medium plasticity.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
1	SW-SM	↑	BS					NP	NP	8
2	SW-SM	↓	RS	21	2	100				
4										
6	SW-SM	↓	RS	55	4	116				
8										
10	SW-SM	×	SPT	17						
12										
14										
16	SW-SM	×	SPT	22						
18										
20	SC	×	SPT	31						
22										
24										
26	SC	×	SPT	31						
28										
30	SC	×	SPT	44						
31.5										

17 2642

31.5 2627.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-13-10
BORING COMPLETED	12-13-10
RIG CME-55	FOREMAN HPS
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-068

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 777+90, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2662.5 ft

SAMPLE			TESTS						
DEPTH, ft.	USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200

SILTY SAND; light brown, very dense, slightly damp, non-plastic.

6 becomes medium dense. 2656.5

2	SM	↑	BS				NP	NP	19
4	SM	↓	RS	50/3"					
6	SM	↓	RS	46	2	121			

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		11-19-10	
BORING COMPLETED		11-19-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-069

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 780+15, 20'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2663 ft



FILL - CLAYEY SAND; brown, dense, moist, medium plasticity, trash in cuttings.

5

2658



CLAYEY SAND; light brown, dense, moist, medium plasticity.
becomes very dense.

16.5

2646.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0	SC	↑	BS				29	12	20
2	SC	↓	RS	30	4	95			
4									
6	SC	↓	RS	18	5	103			
8	SC	×	SPT	64					
10	SC	×	SPT	50					
12									
14									
16	SC	×	SPT	34					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None	WD	∇
WL	∇		∇
WL	Backfilled Upon Completion		



BORING STARTED	12-13-10
BORING COMPLETED	12-13-10
RIG CME-55	FOREMAN HPS
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-070

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 788+15, 20'R.

DESCRIPTION

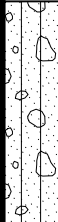
Approx. Surface Elev.: 2668 ft

SILTY SAND WITH GRAVEL; light brown, loose, slightly damp, non-plastic.

6 becomes medium dense. 2662

BOTTOM OF BORING.

GRAPHIC LOG



DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
1	SM	↑	BS					NP	NP	19
2	SM	↓	RS	13	4	103				
4										
6	SM	↓	RS	59						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None WD	▽
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-071

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 794+20, 40'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2672 ft

CLAYEY SAND WITH GRAVEL; with cobbles, brown, medium dense, slightly damp, low plasticity.

SILTY SAND; brown, medium dense, slightly damp, non-plastic.

POORLY GRADED SAND WITH SILT AND GRAVEL; light brown, very dense, slightly damp, non-plastic.

SILTY SAND WITH GRAVEL; light brown, dense, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SC	↑	BS					25	8	14
2	SC	↓	RS	34	4	109				
4										
6	SC	↓	RS	50						
8	SM	×	SPT	12						
10	SM	×	SPT	10						
12										
14										
16	SP	×	SPT	16						
18										
20	SM	×	SPT	50						
22										
24										
26	SM	×	SPT	84						
28										
30	SM	×	SPT	42						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	None	WD	▼
WL	▼		▼
WL	Backfilled Upon Completion		



BORING STARTED	12-13-10
BORING COMPLETED	12-13-10
RIG CME-55	FOREMAN HPS
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-072

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 800+20, 45'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2681.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SC	↑	BS					35	14	14
2	SC	↓	RS	23	5	106				
4										
6	SC	↓	RS	44	7	102				

6 2675.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		11-19-10	
BORING COMPLETED		11-19-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-073

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 805+70, 75'L.

DESCRIPTION

Approx. Surface Elev.: 2691.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	25
3	SM	↓	RS	35	5	113			
6	SM	↓	RS	86/11"					

SILTY SAND; light brown, medium dense, slightly damp, non-plastic.

6 becomes very dense. 2685.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽ None	WD	▽
WL	▽		▽
WL	Backfilled Upon Completion		



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-074

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 811+65, 40'R.

DESCRIPTION

Approx. Surface Elev.: 2687 ft

SILTY SAND; light brown, dense, slightly damp, non-plastic.

becomes loose.

becomes dense.

CLAYEY SAND; light brown, dense, slightly damp, low plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SM	↑	BS					NP	NP	22
2	SM	↓	RS	50	2	121				
4										
6	SM	↓	RS	15	2	106				
8										
10	SM	↓	SPT	36						
12										
14										
16	SM	↓	SPT	41						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-19-10
BORING COMPLETED	11-19-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-075

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 815+10, 30'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2697.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				27	9	24
4	SC	↓	RS	48	6	109			
6	SC	↓	RS	34	6	100			

CLAYEY SAND; brown, medium dense, damp, low plasticity.

BOTTOM OF BORING. 2691.5

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		11-19-10	
BORING COMPLETED		11-19-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-076

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 818+55, 55'L.

DESCRIPTION

Approx. Surface Elev.: 2701 ft

CLAYEY SAND; light brown, medium dense, slightly damp, weak cementation, low plasticity.

becomes dense.

becomes medium dense.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
0	SC	↑	BS					26	8	26
2	SC	↓	RS	44	4	107				
4										
6	SC	↓	RS	56	4	120				
8										
10	SC	×	SPT	44						
12										
14										
16	SC	×	SPT	27						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	11-19-10
BORING COMPLETED	11-19-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-077

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: Sta. 825+20, 30'R.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION Approx. Surface Elev.: 2710.5 ft										
	SILTY CLAYEY SAND ; brown, medium dense, slightly damp, low plasticity.	2	SC-SM	↑	BS				24	7	28
		4	SC-SM	↓	RS	24	5	105			
		6	SC-SM	↓	RS	41					
	<u>BOTTOM OF BORING.</u>	6	SC-SM								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▼
WL	▽		▼
WL		Backfilled Upon Completion	



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-078

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 827+90, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2713 ft

WELL GRADED SAND WITH SILT;
brown, dense, slightly damp, non-plastic.

becomes very dense.

CLAYEY SAND; brown, very dense,
slightly damp, low plasticity.

SILTY SAND; light brown, medium dense,
slightly damp, non-plastic.

CLAYEY SAND; light brown, dense,
slightly damp, low plasticity.

becomes very dense.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SW-SM		BS					NP	NP	9
2	SW-SM		RS	36	2	111				
6	SW-SM		RS	89/11"	4	117				
10	SC		SPT	51						
16	SC		SPT	58						
20	SC		SPT	20						
26	SM		SPT	44						
30	SM		SPT	50/5"						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	



BORING STARTED	11-19-10
BORING COMPLETED	11-19-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-079

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 830+85, 25'R.

DESCRIPTION

Approx. Surface Elev.: 2718.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				30	9	25
2	SC	↓	RS	91/9"	6	108			
4	SC	↓	RS	50/6"	4	115			

CLAYEY SAND; light brown, very dense, slightly damp, low plasticity.

5.5 2713

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		11-19-10	
BORING COMPLETED		11-19-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-080

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 836+80, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2721.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	12
4	SM	↓	RS	25	1	105				
6	SC	X	SPT	35						
10	SM	X	RS	36	2	108				
16	SM	X	SPT	59						

SILTY SAND; brown, medium dense, slightly damp, non-plastic.

CLAYEY SAND; light brown, dense, slightly damp, medium plasticity.

SILTY SAND; light brown, dense, slightly damp, non-plastic.

becomes very dense.

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-081

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 840+10, 30'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2729.5 ft



SILTY CLAYEY SAND WITH GRAVEL;
light brown, dense, slightly damp, low
plasticity.

6 2723.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0	SC-SM	↑	BS				20	4	23
2	SC-SM	↓	RS	66	3	116			
4									
6	SC-SM	↓	RS	70					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED		12-14-10	
BORING COMPLETED		12-14-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-082

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 845+10, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2731.5 ft

WELL GRADED SAND WITH SILT AND GRAVEL; light brown, medium dense, slightly damp, non-plastic.

4 2727.5

CLAYEY SAND; light brown, medium dense, slightly damp, medium plasticity.

6.5 2725

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	SW-SM	↑	BS				NP	NP	11
2	SW-SM	↓	RS	37	1	114			
4									
6	SC	×	SPT	19					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	

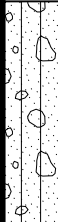


BORING STARTED	12-17-10
BORING COMPLETED	12-17-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-083

CLIENT <p style="text-align: center;">Psomas, Inc.</p>	
SITE <p style="text-align: center;">E. of I-10 to La Canada Drive Pima County, Arizona</p>	PROJECT <p style="text-align: center;">Tangerine Road Corridor Project</p>

GRAPHIC LOG	BORING Location: Sta. 849+90, 20'R. DESCRIPTION Approx. Surface Elev.: 2726 ft	DEPTH, ft.	SAMPLE			TESTS				
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX
	<p>SILTY SAND WITH GRAVEL; brown, loose, slightly damp, non-plastic.</p>	2 4 6	SM SM SM	BS RS RS	13 13	3	111	NP	NP	19
	<p><u>BOTTOM OF BORING.</u></p>	6								

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft WL None WD WL WL Backfilled Upon Completion		BORING STARTED 12-14-10 BORING COMPLETED 12-14-10 RIG CME-75 FOREMAN BWR APPROVED OBL JOB # 63105079
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BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-084

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 855+10, 25'L.

DESCRIPTION

Approx. Surface Elev.: 2733.5 ft

SILTY SAND; brown, medium dense, slightly damp, non-plastic.

becomes dense.

6.5 2727

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	15
2	SM	↓	RS	23	2	100				
6	SM	X	SPT	33						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-085

CLIENT <p style="text-align: center;">Psomas, Inc.</p>	
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SITE <p style="text-align: center;">E. of I-10 to La Canada Drive Pima County, Arizona</p>	PROJECT <p style="text-align: center;">Tangerine Road Corridor Project</p>
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GRAPHIC LOG	BORING Location: Sta. 857+15, 25'R.	DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
				INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2731.5 ft										
	SILTY SAND ; light brown, medium dense, slightly damp, non-plastic.	2	SM	BS					NP	NP	25
		2	SM	RS	21	2	114				
	becomes loose.	6	SM	SPT	7						
	becomes medium dense.	10	SM	RS	35	2	113				
	12 2719.5	12									
	CLAYEY SAND ; red brown, very dense, slightly damp, moderate cementation, medium plasticity.	17	SC	SPT	72/11"						
	17 2714.5	17									
	SILTY SAND ; light brown, dense, slightly damp, non-plastic.	20	SM	SPT	31						
	with gravel, very dense.	26	SM	SPT	92/10"						
	28 2703.5	28									
	SILTY CLAYEY SAND ; light brown, dense, slightly damp, low plasticity.	30	SC-SM	SPT	40						
	31.5 2700	30									
	BOTTOM OF BORING.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	None	WD	
WL			
WL	Backfilled Upon Completion		



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-086

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 860+40, 25'R.

DESCRIPTION

Approx. Surface Elev.: 2740.5 ft

0.2' **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2740.5
SILTY SAND: light brown, very dense, slightly damp, non-plastic.

5.5' **BOTTOM OF BORING.** 2735

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SM	↑	BS				NP	NP	19
2	SM	↓	RS	56	3	114			
4	SM	↓	RS	50/5"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-14-10
BORING COMPLETED	12-14-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-087

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 864+50, 30'R.

DESCRIPTION

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS			
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200

Approx. Surface Elev.: 2752.5 ft

0.2' **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2752.5'

SILTY SAND: light brown, medium dense, slightly damp, non-plastic.

becomes loose.

6.5' 2746'

0.2	SM	↑	BS					NP	NP	20
2	SM	↓	RS	40	3	113				
4										
6	SM	X	SPT	7						

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None	WD	∇
WL	∇		∇
WL	Backfilled Upon Completion		



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-088

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 870+25, 45'L.

DESCRIPTION

Approx. Surface Elev.: 2760 ft

0.2 **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2760
SILTY SAND: light brown, dense, slightly damp, weak cementation, non-plastic.

5.5 becomes very dense. 2754.5
BOTTOM OF BORING.



DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SM	↑	BS				NP	NP	17
2	SM	↓	RS	74	4	108			
4									
5.5	SM	↓	RS	50/5"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-14-10
BORING COMPLETED	12-14-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-089

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 875+60, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2760 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2760
	CLAYEY SAND WITH GRAVEL; light brown, medium dense, slightly damp, low plasticity.	
8	SILTY SAND; light brown, medium dense, damp, non-plastic.	2752
13	CLAYEY SAND; light brown, very dense, slightly damp, medium plasticity.	2747
16.5	BOTTOM OF BORING.	2743.5

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
	SC	↑	BS				28	10	16
2	SC	↓	RS	45	3	107			
6	SC	↓	SPT	25					
10	SM	↓	RS	45	2	103			
16	SC	↓	SPT	87/11"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-090

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

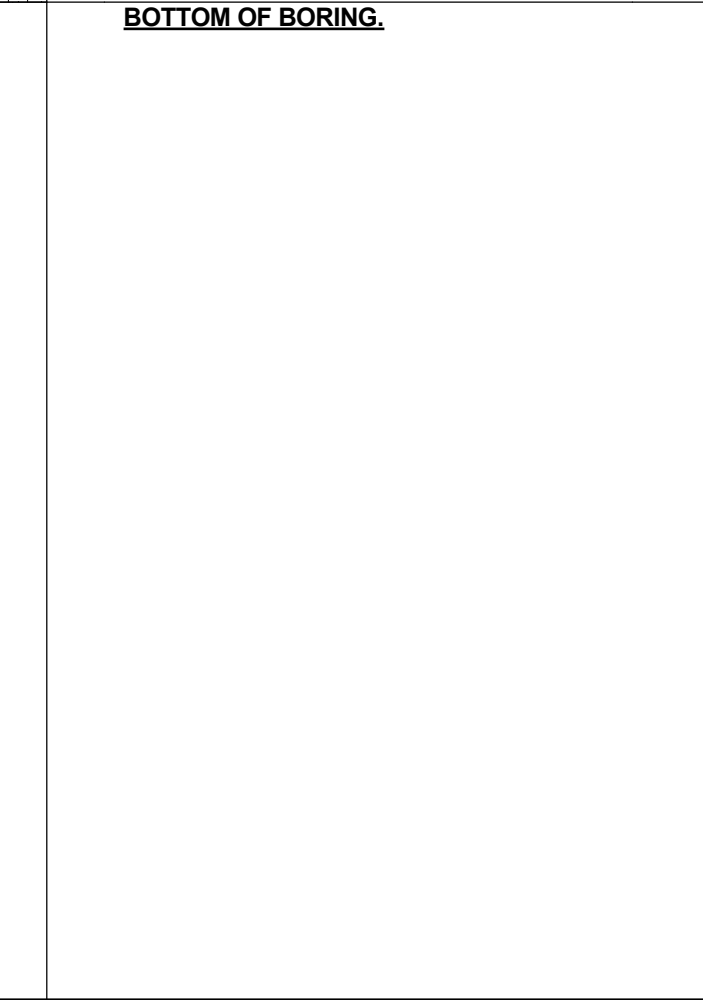
BORING Location: Sta. 880+45, 30'R.

DESCRIPTION

Approx. Surface Elev.: 2764 ft

0.2' **1" to 2" OF COMPACTED ASPHALT MILLINGS.**
SILTY SAND; light brown, medium dense, slightly damp, weak cementation, low plasticity.

6' **BOTTOM OF BORING.**



DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
0.2	SM	↑	BS					19	3	26
2	SM	↓	RS	42						
4										
6	SM	↓	RS	33						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-14-10
BORING COMPLETED	12-14-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERRA2000.GDT 9/20/11

LOG OF BORING NO. B-091

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 884+70, 25'L.

DESCRIPTION

Approx. Surface Elev.: 2764.5 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2764.5
4	SILTY SAND; light brown, loose, slightly damp, non-plastic.	2760.5
9	CLAYEY SAND; red brown, dense, slightly damp, medium plasticity.	2755.5
13	SILTY SAND; light brown, medium dense, slightly damp, non-plastic.	2751.5
13	CLAYEY SAND; light brown, very dense, slightly damp, low plasticity.	2751.5
31.5	becomes dense. becomes very dense.	2733
<u>BOTTOM OF BORING.</u>		

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
	SM		BS					NP	NP	15
2	SM		RS	15	1	91				
6	SC		SPT	39						
10	SM		RS	42	3	114				
16	SC		SPT	54						
20	SC		SPT	45						
26	SC		SPT	87/9"						
30	SC		SPT	68						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽	None WD	▽
WL	▽		▽
WL	Backfilled Upon Completion		



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-092

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 890+25, 40'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2771 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2771
	SILTY CLAYEY SAND; brown, medium dense, slightly damp, low plasticity.	
6.5	<u>BOTTOM OF BORING.</u>	2764.5

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
1	SC-SM	↑	BS				20	4	28
2	SC-SM	↓	RS	26	5	107			
6	SC-SM	X	SPT	10					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-093

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 895+95, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2774.5 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2774.5
	SILTY SAND; brown, medium dense, slightly damp, non-plastic.	
4		2770.5
	CLAYEY SAND; brown, very dense, slightly damp, medium plasticity.	
6.5		2768

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SM	↑	BS				NP	NP	29
2	SM	↓	RS	37	3	106			
4									
6	SC	X	SPT	67					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-094

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 899+80, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2776 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2776
	SILTY SAND; light brown, medium dense, slightly damp, non-plastic.	
4		2772
	CLAYEY SAND; light brown, dense, slightly damp, medium plasticity.	
6.5		2769.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SM	↑	BS				NP	NP	22
2	SM	↓	RS	27	3	108			
6	SC	X	SPT	30					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERRA2000.GDT 9/20/11

LOG OF BORING NO. B-095

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 904+10, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2777.5 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2777.5
3	SILTY SAND; brown, medium dense, slightly damp, non-plastic.	2774.5
16.5	CLAYEY SAND; brown, dense, slightly damp, medium plasticity.	2761

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SM	↑	BS				NP	NP	26
2	SM	↓	RS	50	5	113			
6	SC	X	SPT	44					
10	SC	X	RS	50/6"					
16	SC	X	SPT	43					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	
WL		
WL	Backfilled Upon Completion	



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-096

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 910+15, 40'R.

DESCRIPTION

Approx. Surface Elev.: 2779.5 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2779.5
2	CLAYEY SAND WITH GRAVEL; brown, damp, medium plasticity.	2777.5
6.5	SILTY SAND WITH GRAVEL; white-brown, medium dense, slightly damp, moderate cementation, non-plastic. becomes dense.	2773

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				38	20	38
2	SM	↓	RS	31	4	101			
6	SM	X	SPT	45					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-17-10	
BORING COMPLETED		12-17-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-097

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 915+05, 25'L.

DESCRIPTION

Approx. Surface Elev.: 2785.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
0.2	SM	↑	BS					NP	NP	21
2	SM	↓	RS	19	3	106				
6	SM	X	SPT	18						

1" to 2" OF COMPACTED ASPHALT MILLINGS.

SILTY SAND: brown, medium dense, slightly damp, non-plastic.

2785.5

2779

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED	12-16-10
BORING COMPLETED	12-16-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-098

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 918+05, 20'R.

Approx. Surface Elev.: 2782 ft

GRAPHIC LOG

DESCRIPTION

0.2 **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2782

3 **FILL - SILTY CLAYEY SAND;** brown, loose, damp, low plasticity. 2779

CLAYEY SAND; light brown, dense, slightly damp, medium plasticity.

8 **SILTY SAND;** light brown, medium dense, slightly damp, non-plastic. 2774

16.5 becomes dense. 2765.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2 - 3	SC-SM	BS					21	7	34
3 - 6	SC-SM	RS	13	2	105				
6 - 10	SC	SPT	39						
10 - 16.5	SM	RS	43	2	108				
16.5 - 16.5	SM	SPT	42						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None	WD
WL		
WL	Backfilled Upon Completion	



BORING STARTED	12-17-10
BORING COMPLETED	12-17-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-099

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 924+45, 20'L.

DESCRIPTION

Approx. Surface Elev.: 2789 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2789
2	CLAYEY SAND; brown, medium dense, slightly damp, medium plasticity.	2787
4	SILTY CLAYEY SAND; white, dense, slightly damp, strong cementation, low plasticity.	2785
6	SILTY SAND; light brown, medium dense, slightly damp, non-plastic.	2783
BOTTOM OF BORING.		

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				27	14	33
2	SC-SM	↓	RS	66	9	120			
6	SM	X	SPT	23					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-100

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 929+75, 20'R.

DESCRIPTION

Approx. Surface Elev.: 2778.5 ft

0.2' **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2778.5

CLAYEY SAND; brown, medium dense, damp, medium plasticity.

6' becomes white very dense and strongly cemented. 2772.5

BOTTOM OF BORING.

GRAPHIC LOG

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				34	17	27
2	SC	↓	RS	29	14	106			
6	SC	↓	RS	77/11"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None WD	▽
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-101

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 932+50, 25'L.

DESCRIPTION

Approx. Surface Elev.: 2774.5 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2774.5
	SILTY SAND; light brown, medium dense, slightly damp, non-plastic.	
4		2770.5
	CLAYEY SAND; light brown, very dense, slightly damp, medium plasticity.	
9		2765.5
	WELL GRADED SAND WITH SILT; light brown, medium dense, slightly damp, non-plastic.	
	becomes dense.	
18		2756.5
	SILTY SAND; light brown, very dense, slightly damp, non-plastic.	
30.5		2744
	BOTTOM OF BORING.	

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
	SM	↑	BS				NP	NP	14
2	SM	↓	RS	27	5	103			
4									
6	SC	↓	SPT	62					
8									
10	SW-SM	↓	RS	42	2	111			
12									
14									
16	SW-SM	↓	SPT	42					
18									
20	SM	↓	SPT	73					
22									
24									
26	SM	↓	SPT	82/11"					
28									
30	SM	↓	SPT	50/5"					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-16-10
BORING COMPLETED	12-16-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-102

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 934+55, 15'R.

GRAPHIC LOG	DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS					
			INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
DESCRIPTION											
Approx. Surface Elev.: 2778 ft											
0.2' 1" to 2" OF COMPACTED ASPHALT MILLINGS. SILTY SAND WITH GRAVEL; brown, medium dense, damp, low plasticity.	2778	SM	BS					NP	NP	16	
5' CLAYEY SAND WITH GRAVEL; white-brown, very dense, very stiff, slightly damp, strong cementation, low plasticity. BOTTOM OF BORING.	2773 2772	SM SC	RS RS	29	6	114					
	6			85/10"							

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-103

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 939+80, 25'L.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2792 ft

0.2	1" to 2" OF COMPACTED ASPHALT MILLINGS.	2792
	SILTY CLAYEY SAND; light brown, medium dense, slightly damp, low plasticity.	
6.5		2785.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC-SM	↑	BS				20	5	29
2	SC-SM	↓	RS	30	3	104			
6	SC-SM	X	SPT	11					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		12-16-10	
BORING COMPLETED		12-16-10	
RIG	CME-75	FOREMAN	OBL
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-104

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 946+00, 25'R.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2791.5 ft

0.2' **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2791.5'
FILL - CLAYEY SAND: with cobbles, light brown, medium dense, slightly damp, medium plasticity.

7' **SILTY SAND:** light brown, very dense, slightly damp, non-plastic. 2784.5'

becomes dense.

trace gravel.

31.5' 2760'

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				38	20	27
2	SC	↓	RS	23	6	92			
6	SC	↓	RS	51	6	105			
10	SM	X	SPT	50					
16	SM	X	SPT	33					
20	SM	X	SPT	34					
26	SM	X	SPT	37					
30	SM	X	SPT	43					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None	WD	∇
WL	∇		∇
WL	Backfilled Upon Completion		



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-105

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 950+050, 30'L.

DESCRIPTION

Approx. Surface Elev.: 2793 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				28	12	23
2	SC	↓	RS	49	5	109			
6	SC	↓	SPT	9					

1" to 2" OF COMPACTED ASPHALT MILLINGS.

CLAYEY SAND; red brown, loose to medium dense, slightly damp, medium plasticity.

becomes loose.

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-16-10
BORING COMPLETED	12-16-10
RIG CME-75	FOREMAN OBL
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-106

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: Sta. 954+90, 50'R.

DESCRIPTION

Approx. Surface Elev.: 2790 ft

0.2 **1" to 2" OF COMPACTED ASPHALT MILLINGS.** 2790
FILL - CLAYEY SAND; trace boulders, brown, medium dense, damp, low plasticity.
7 2783

SILTY SAND WITH GRAVEL; light brown, loose, slightly damp, weak cementation, non-plastic.

becomes medium dense.
16.5 2773.5

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
0.2	SC	↑	BS				27	10	20
2	SC	↓	RS	33	5	108			
6	SC	↓	RS	42	3	104			
10	SM	X	SPT	17					
16	SM	X	SPT	30					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	1-4-11
BORING COMPLETED	1-4-11
RIG CME-75	FOREMAN JJP
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERRA2000.GDT 9/20/11

LOG OF BORING NO. B-107

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 1675' N of Tangerine.

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 2808.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE		TESTS					
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SC	↑	BS					31	14	39
2	SC	↓	RS	50/6"						
4										
6	SC	↓	RS	84/9"						

CLAYEY SAND; light brown, very dense, slightly damp, moderate cementation, medium plasticity.

bcomes less cemented. 2802.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-108

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 1200' N of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2800 ft

CLAYEY SAND; light brown, medium dense, slightly damp, medium plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				33	16	24
4	SC	↓	RS	19	2	111			
6	SC	↓	RS	25	2	108			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-109

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: 775' N of Tangerine.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION Approx. Surface Elev.: 2794 ft										
	CLAYEY SAND ; brown, medium dense, slightly damp, medium plasticity.	2	SC	↑	BS				31	17	31
		4	SC	↓	RS	50	5	121			
		6	SC	↓	RS	25	7	82			
	<u>BOTTOM OF BORING.</u>	6									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None WD	▽
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-110

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 275' N of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2787 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				25	9	30
2	SC	↓	RS	65					
4									
6	SC	↓	RS	91/8"					

CLAYEY SAND; light brown, dense, slightly damp, weak cementation, low plasticity.

6 becomes more cemented and very dense. 2781

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-111

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 250' S of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2774.5 ft

SILTY SAND WITH GRAVEL; light brown, medium dense, damp, non-plastic.

6.5 2768

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS			
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SM	↑	BS				NP	NP	13
2	SM	↓	RS	57	5	104			
6	SM	X	SPT	21					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-112

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 750' S of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2764 ft

SILTY SAND; light brown, loose, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	26
4	SM	↓	RS	10	4	90				
6	SM	↓	RS	15	3	92				

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-113

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 1250' S of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2756.5 ft

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SC	↑	BS					25	8	15
2	SC	↓	RS	23	6	113				
4										
6	SC	↓	RS	88/11"						

CLAYEY SAND; brown, medium dense, damp, low plasticity.

6 becomes very dense. 2750.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-114

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 1275' N of Tangerine.

DESCRIPTION

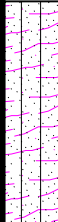
Approx. Surface Elev.: 2807 ft

SILTY SAND; light brown, very dense, slightly damp, weak cementation, non-plastic.

6 becomes loose. 2801

BOTTOM OF BORING.

GRAPHIC LOG



DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200	
2	SM	↑	BS					NP	NP	22
2	SM	↓	RS	50/5"	6	102				
4										
6	SM	↓	RS	13						

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-15-10
BORING COMPLETED	12-15-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-115

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 750' N of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2800.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC-SM	↑	BS				25	7	35
4	SC-SM	↓	RS	60	4	111			
6	SC-SM	↓	RS	43					

SILTY CLAYEY SAND; brown, dense, slightly damp, low plasticity.

6 becomes medium dense. 2794.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽ None	WD
WL	▽	▽
WL	Backfilled Upon Completion	



BORING STARTED		12-15-10	
BORING COMPLETED		12-15-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-116

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 250' N of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2790.5 ft

SILTY CLAYEY SAND WITH GRAVEL;
light brown, medium dense to very dense,
slightly damp, low plasticity.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pcf	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC-SM	↑	BS				23	5	29
4	SC-SM	↓	RS	50/5"	5	105			
6	SC-SM	↓	RS	53					

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		12-15-10	
BORING COMPLETED		12-15-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-117

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 250' S of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2783.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLE			TESTS				
		INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
2	SC	↑	BS				29	11	21
4	SC	↓	RS	64					
6	SC	↓	RS	13					

CLAYEY SAND; light brown, dense, slightly damp, medium plasticity.

6 becomes loose. 2777.5

BOTTOM OF BORING.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	▼
WL		▼
WL	Backfilled Upon Completion	



BORING STARTED		1-5-11	
BORING COMPLETED		1-5-11	
RIG	CME-75	FOREMAN	JJP
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-118

CLIENT **Psomas, Inc.**

SITE **E. of I-10 to La Canada Drive
Pima County, Arizona** PROJECT **Tangerine Road Corridor Project**

GRAPHIC LOG	BORING Location: 825' S of Tangerine.	DEPTH, ft.	SAMPLE			TESTS					
			USCS SYMBOL	INTERVAL	TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200
	DESCRIPTION										
	Approx. Surface Elev.: 2768.5 ft										
	FILL - SILTY SAND ; light brown, medium dense, slightly damp, non-plastic.	1	SM	↑	BS				NP	NP	18
		2	SM	↓	RS	22	3	107			
		4									
	becomes loose.	5	SM	↓	RS	5					
		6									
	Encountered apparent waterline pipe bedding in cuttings and terminated boring at 7 feet. <u>BOTTOM OF BORING.</u>	7									2761.5

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft

WL	▽	None WD	▽
WL	▽		▽
WL		Backfilled Upon Completion	



BORING STARTED		12-15-10	
BORING COMPLETED		12-15-10	
RIG	CME-75	FOREMAN	BWR
APPROVED	OBL	JOB #	63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

LOG OF BORING NO. B-119

CLIENT
Psomas, Inc.

SITE
**E. of I-10 to La Canada Drive
Pima County, Arizona**

PROJECT
Tangerine Road Corridor Project

BORING Location: 1400' S of Tangerine.

DESCRIPTION

Approx. Surface Elev.: 2756.5 ft

WELL GRADED SAND WITH SILT; light brown, medium dense, slightly damp, non-plastic.

BOTTOM OF BORING.

DEPTH, ft.	USCS SYMBOL	INTERVAL	SAMPLE			TESTS				
			TYPE	PENETRATION TEST RESULTS (BLOWS/FT.)	WATER CONTENT, %	DRY DENSITY pct	LIQUID LIMIT	PLASTICITY INDEX	#200	
1	SW-SM	↑	BS					NP	NP	8
2	SW-SM	↓	RS	14	5	101				
4										
6	SW-SM	↓	RS	15	8	101				
8										
10	SW-SM	×	SPT	28						
12										
14										
16	SW-SM	×	SPT	20						

16.5 2740

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None WD	∇
WL	∇	∇
WL	Backfilled Upon Completion	



BORING STARTED	12-15-10
BORING COMPLETED	12-15-10
RIG CME-75	FOREMAN BWR
APPROVED OBL	JOB # 63105079

BOREHOLE 2008 63105079.GPJ TERR2000.GDT 9/20/11

APPENDIX B
LABORATORY TESTING

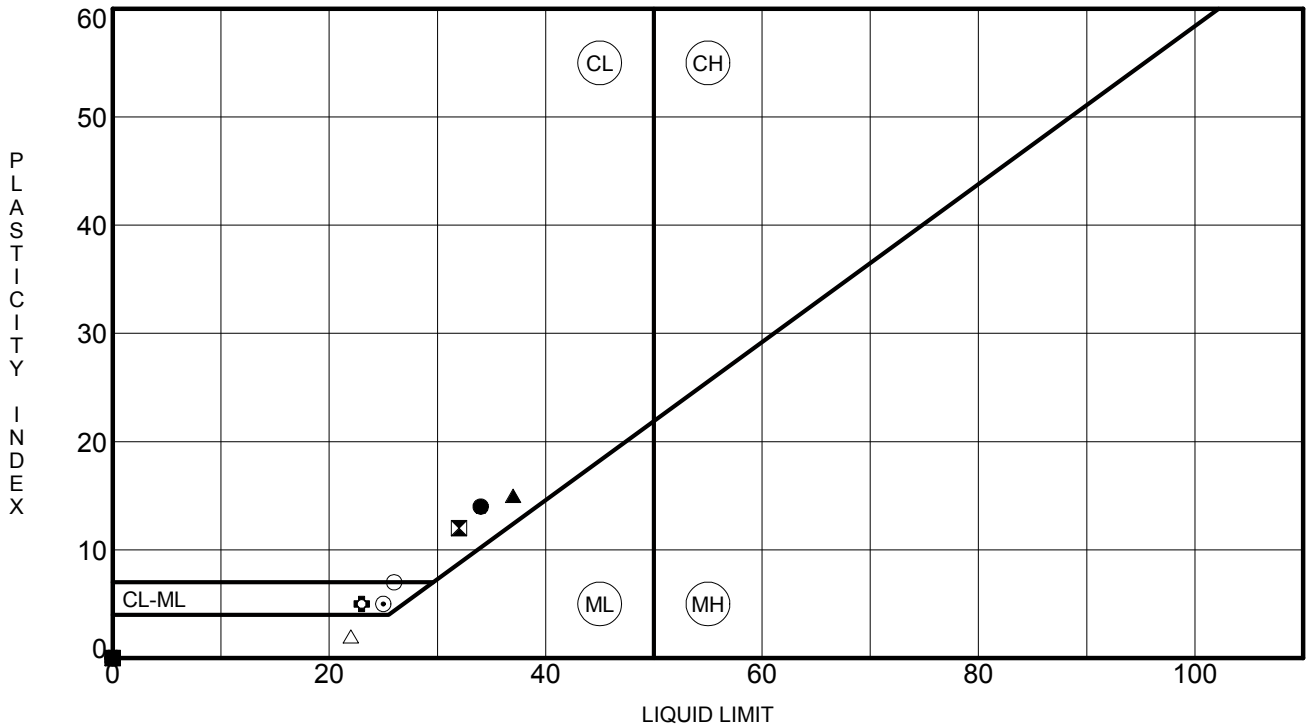
Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Standard Proctor
- Sieve Analysis
- Atterberg Limits
- Soil pH
- Sulphate Content
- Swell Potential
- In-situ Water Content
- In-situ Dry Density
- R-value
- Soil Resistivity
- Chloride Content



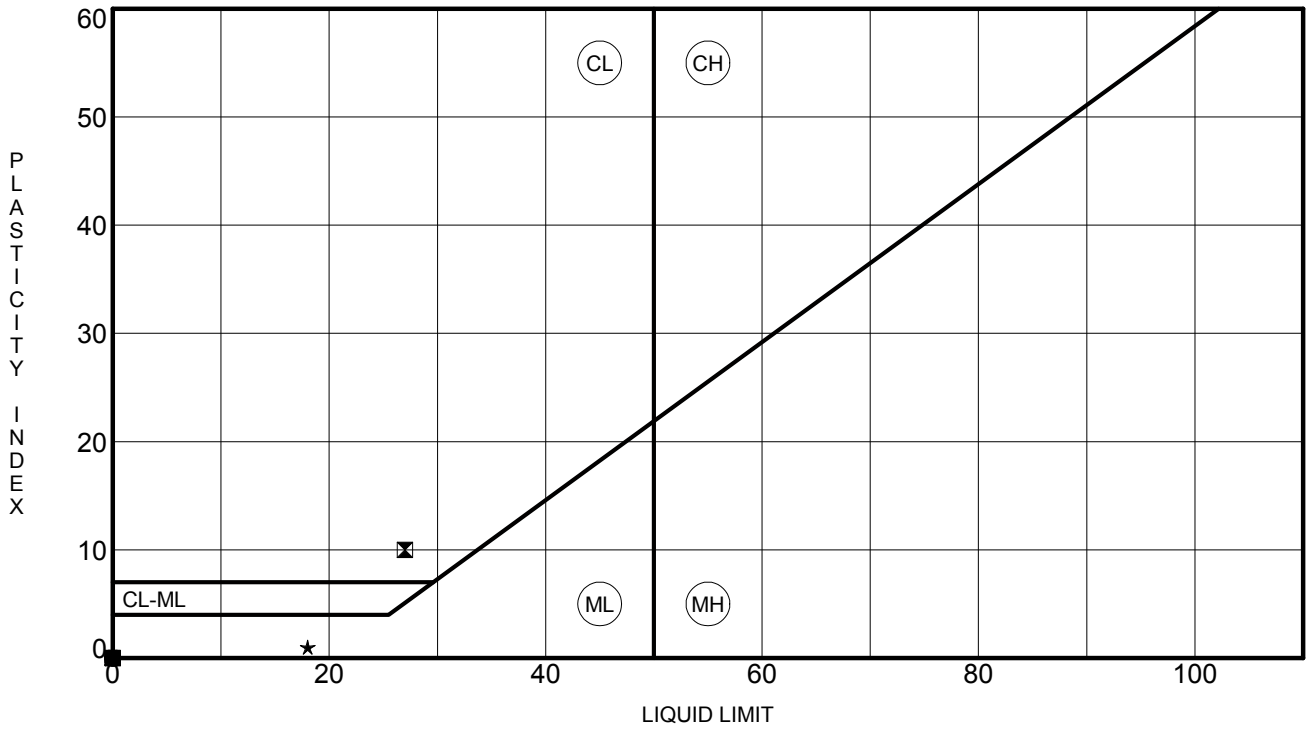
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-001	0.0ft	34	20	14	60 SANDY LEAN CLAY(CL)
⊠ B-002	0.0ft	32	20	12	48 CLAYEY SAND with GRAVEL(SC)
▲ B-003	0.0ft	37	22	15	55 SANDY LEAN CLAY with GRAVEL(CL)
★ B-004	0.0ft	34	20	14	56 SANDY LEAN CLAY with GRAVEL(CL)
⊙ B-005	0.0ft	25	20	5	61 SANDY SILTY CLAY(CL-ML)
⊕ B-006	0.0ft	23	18	5	38 SILTY, CLAYEY SAND(SC-SM)
○ B-007	0.0ft	26	19	7	59 SANDY SILTY CLAY(CL-ML)
△ B-008	0.0ft	22	20	2	29 SILTY SAND(SM)
⊗ B-009	0.0ft	NP	NP	NP	68 SANDY SILT(ML)
⊕ B-010	0.0ft	NP	NP	NP	26 SILTY SAND(SM)
□ B-011	0.0ft	NP	NP	NP	42 SILTY SAND(SM)
⊕ B-012	0.0ft	NP	NP	NP	31 SILTY SAND(SM)
⊕ B-013	0.0ft	NP	NP	NP	15 SILTY SAND(SM)
☆ B-014	0.0ft	NP	NP	NP	33 SILTY SAND(SM)
⊗ B-015	0.0ft	NP	NP	NP	17 SILTY SAND(SM)
■ B-016	0.0ft	NP	NP	NP	24 SILTY SAND(SM)
◆ B-017	0.0ft	NP	NP	NP	12 SILTY SAND(SM)
◇ B-018	0.0ft	NP	NP	NP	30 SILTY SAND(SM)
× B-019	0.0ft	NP	NP	NP	19 SILTY SAND(SM)
⊗ B-020	0.0ft	NP	NP	NP	15 SILTY SAND with GRAVEL(SM)

ATTERBERG LIMITS RESULTS



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TC-ATTERBERG LIMITS 63105079.GPJ TERRACON.GDT 9/20/11



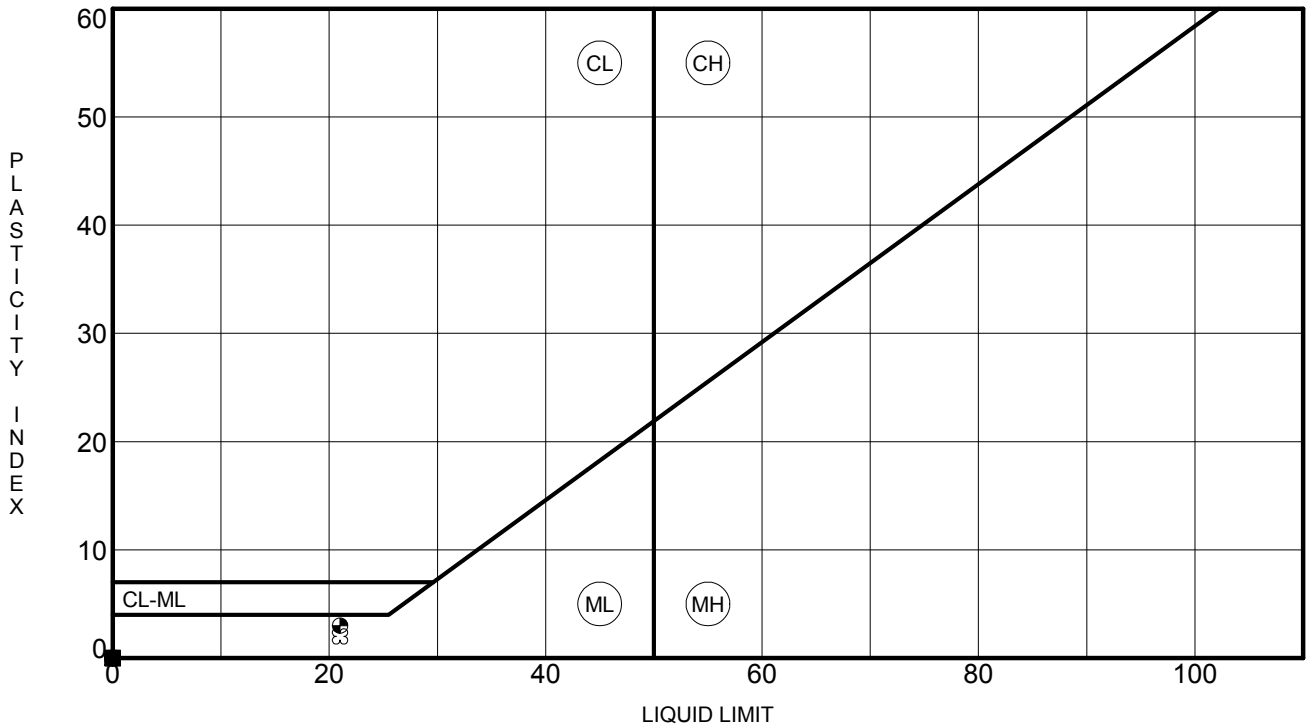
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-021	0.0ft	NP	NP	NP	12 WELL-GRADED SAND with SILT(SW-SM)
☒ B-022	0.0ft	27	17	10	23 CLAYEY SAND with GRAVEL(SC)
▲ B-023	0.0ft	NP	NP	NP	14 SILTY SAND(SM)
★ B-024	0.0ft	18	17	1	21 SILTY SAND(SM)
⊙ B-025	0.0ft	NP	NP	NP	11 WELL-GRADED SAND with SILT(SW-SM)
⊕ B-026	0.0ft	NP	NP	NP	17 SILTY SAND(SM)
○ B-027	0.0ft	NP	NP	NP	10 WELL-GRADED SAND with SILT(SW-SM)
△ B-028	0.0ft	NP	NP	NP	17 SILTY SAND with GRAVEL(SM)
⊗ B-029	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
⊕ B-030	0.0ft	NP	NP	NP	15 SILTY SAND(SM)
□ B-031	0.0ft	NP	NP	NP	12 WELL-GRADED SAND with SILT(SW-SM)
⊕ B-032	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
⊕ B-033	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
☆ B-034	0.0ft	NP	NP	NP	13 SILTY SAND(SM)
⊗ B-035	0.0ft	NP	NP	NP	17 SILTY SAND(SM)
■ B-036	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
◆ B-037	0.0ft	NP	NP	NP	16 SILTY SAND(SM)
◇ B-038	0.0ft	NP	NP	NP	16 SILTY SAND(SM)
× B-039	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
✱ B-040	0.0ft	NP	NP	NP	19 SILTY SAND(SM)

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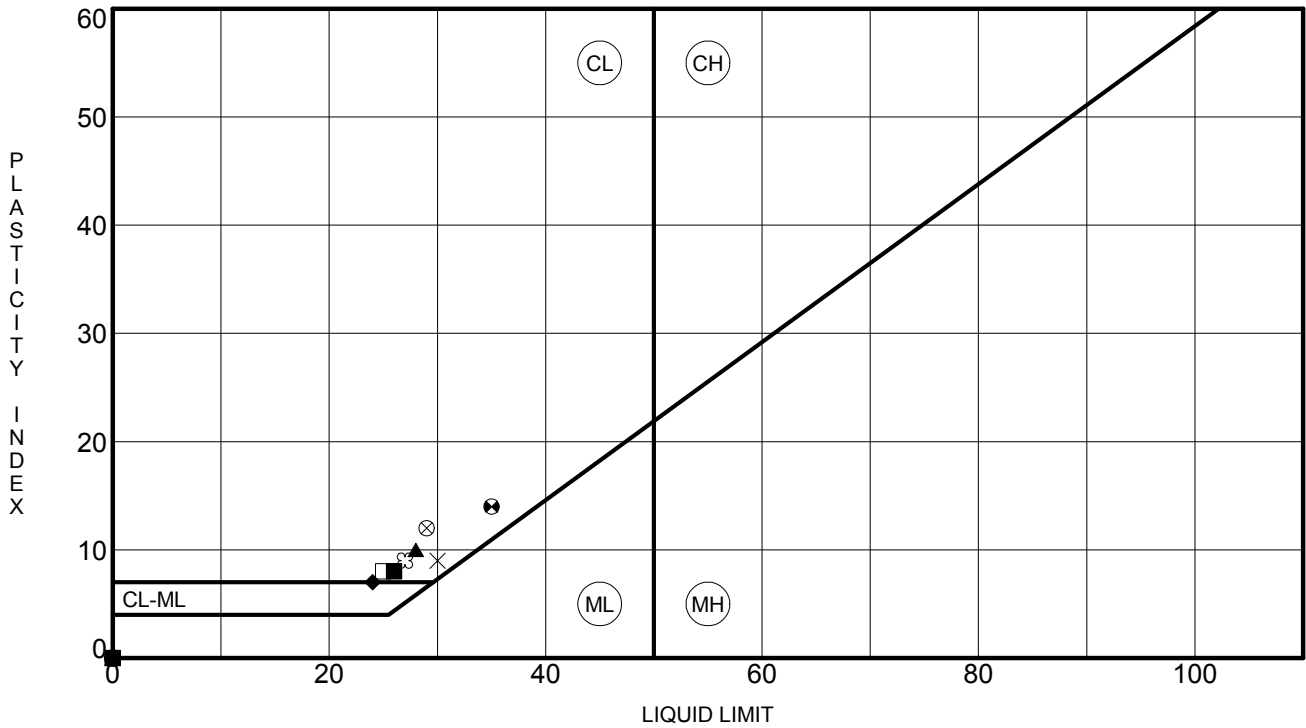
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-041	0.0ft	NP	NP	NP	13 SILTY SAND(SM)
☒ B-042	0.0ft	NP	NP	NP	14 SILTY SAND(SM)
▲ B-043	0.0ft	NP	NP	NP	9 WELL-GRADED SAND with SILT(SW-SM)
★ B-044	0.0ft	NP	NP	NP	15 SILTY SAND(SM)
⊙ B-045	0.0ft	NP	NP	NP	15 SILTY SAND(SM)
⊕ B-046	0.0ft	NP	NP	NP	11 WELL-GRADED SAND with SILT and GRAVEL(SW-SM)
○ B-047	0.0ft	NP	NP	NP	17 SILTY SAND with GRAVEL(SM)
△ B-048	0.0ft	NP	NP	NP	17 SILTY SAND(SM)
⊗ B-049	0.0ft	NP	NP	NP	16 SILTY SAND(SM)
⊕ B-050	0.0ft	NP	NP	NP	22 SILTY SAND(SM)
□ B-051	0.0ft	NP	NP	NP	22 SILTY SAND(SM)
⊕ B-052	0.0ft	NP	NP	NP	20 SILTY SAND(SM)
⊕ B-053	0.0ft	21	18	3	22 SILTY SAND(SM)
☆ B-054	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
⊗ B-055	0.0ft	21	19	2	18 SILTY SAND(SM)
■ B-056	0.0ft	NP	NP	NP	17 SILTY SAND(SM)
◆ B-057	0.0ft	NP	NP	NP	21 SILTY SAND(SM)
◇ B-058	0.0ft	NP	NP	NP	16 SILTY SAND(SM)
× B-059	0.0ft	NP	NP	NP	14 SILTY SAND(SM)
⊗ B-060	0.0ft	NP	NP	NP	15 SILTY SAND(SM)

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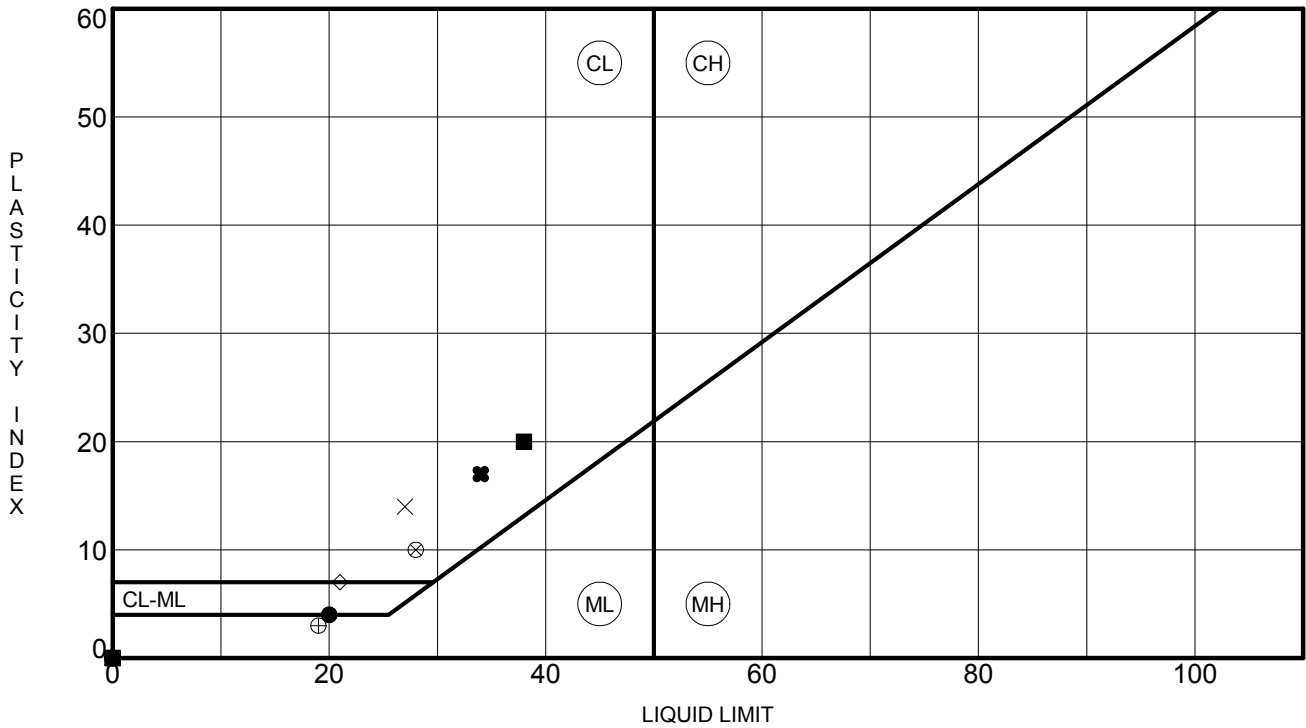
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-061	0.0ft	NP	NP	NP	20 SILTY SAND(SM)
⊠ B-062	0.0ft	NP	NP	NP	19 SILTY SAND(SM)
▲ B-063	0.0ft	28	18	10	26 CLAYEY SAND(SC)
★ B-064	0.0ft	NP	NP	NP	19 SILTY SAND(SM)
⊙ B-065	0.0ft	NP	NP	NP	19 SILTY SAND(SM)
⊕ B-066	0.0ft	NP	NP	NP	22 SILTY SAND(SM)
○ B-067	0.0ft	NP	NP	NP	8 WELL-GRADED SAND with SILT(SW-SM)
△ B-068	0.0ft	NP	NP	NP	19 SILTY SAND(SM)
⊗ B-069	0.0ft	29	17	12	20 CLAYEY SAND(SC)
⊕ B-070	0.0ft	NP	NP	NP	19 SILTY SAND with GRAVEL(SM)
□ B-071	0.0ft	25	17	8	14 CLAYEY SAND with GRAVEL(SC)
⊕ B-072	0.0ft	35	21	14	14 CLAYEY SAND(SC)
⊕ B-073	0.0ft	NP	NP	NP	25 SILTY SAND(SM)
☆ B-074	0.0ft	NP	NP	NP	22 SILTY SAND(SM)
⊗ B-075	0.0ft	27	18	9	24 CLAYEY SAND(SC)
■ B-076	0.0ft	26	18	8	26 CLAYEY SAND(SC)
◆ B-077	0.0ft	24	17	7	28 SILTY, CLAYEY SAND(SC-SM)
◇ B-078	0.0ft	NP	NP	NP	9 WELL-GRADED SAND with SILT(SW-SM)
× B-079	0.0ft	30	21	9	25 CLAYEY SAND(SC)
⊗ B-080	0.0ft	NP	NP	NP	12 WELL-GRADED SAND with SILT and GRAVEL(SW-SM)

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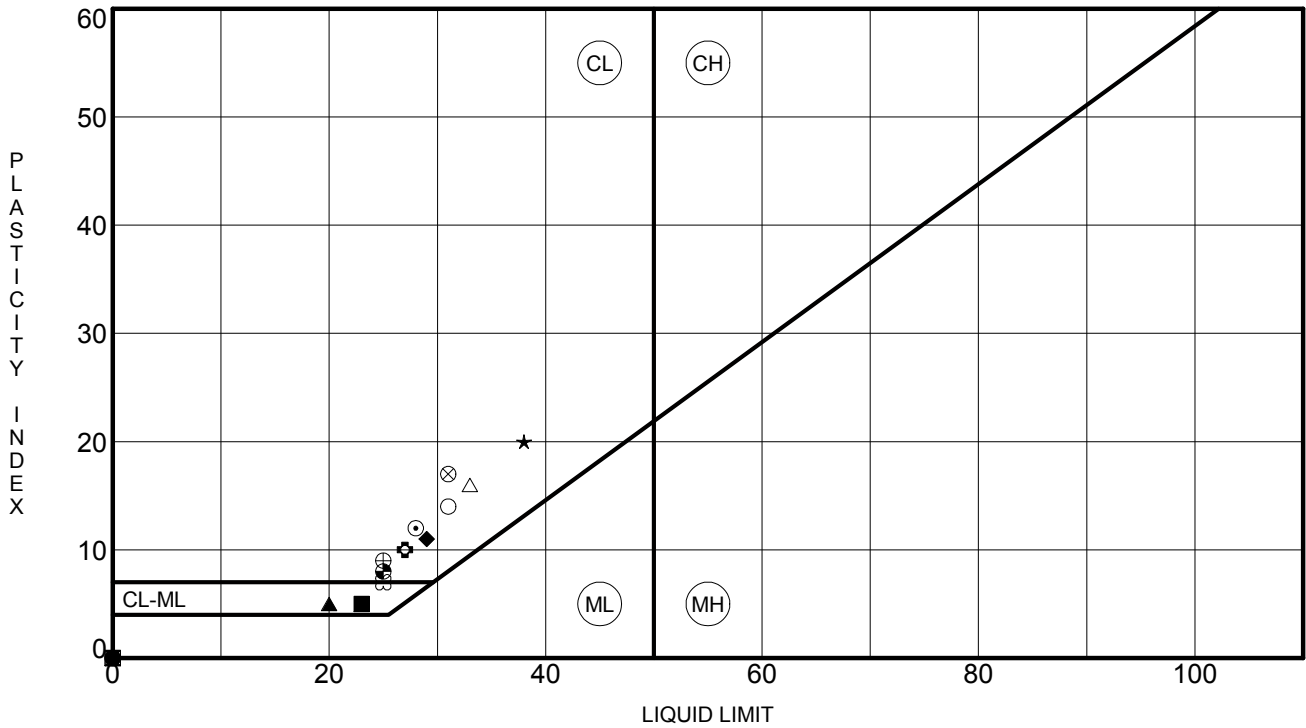
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-081	0.0ft	20	16	4	23 SILTY, CLAYEY SAND with GRAVEL(SC-SM)
⊠ B-082	0.0ft	NP	NP	NP	11 WELL-GRADED SAND with SILT and GRAVEL(SW-SM)
▲ B-083	0.0ft	NP	NP	NP	19 SILTY SAND with GRAVEL(SM)
★ B-084	0.0ft	NP	NP	NP	15 SILTY SAND(SM)
⊙ B-085	0.0ft	NP	NP	NP	25 SILTY SAND(SM)
⊕ B-086	0.2ft	NP	NP	NP	19 SILTY SAND(SM)
○ B-087	0.2ft	NP	NP	NP	20 SILTY SAND(SM)
△ B-088	0.2ft	NP	NP	NP	17 SILTY SAND(SM)
⊗ B-089	0.2ft	28	18	10	16 CLAYEY SAND with GRAVEL(SC)
⊕ B-090	0.2ft	19	16	3	26 SILTY SAND(SM)
□ B-091	0.2ft	NP	NP	NP	15 SILTY SAND(SM)
⊕ B-092	0.2ft	20	16	4	28 SILTY, CLAYEY SAND(SC-SM)
⊕ B-093	0.2ft	NP	NP	NP	29 SILTY SAND(SM)
☆ B-094	0.2ft	NP	NP	NP	22 SILTY SAND(SM)
⊗ B-095	0.2ft	NP	NP	NP	26 SILTY SAND(SM)
■ B-096	0.2ft	38	18	20	38 CLAYEY SAND with GRAVEL(SC)
◆ B-097	0.2ft	NP	NP	NP	21 SILTY SAND(SM)
◇ B-098	0.2ft	21	14	7	34 SILTY, CLAYEY SAND(SC-SM)
× B-099	0.2ft	27	13	14	33 CLAYEY SAND(SC)
⊗ B-100	0.2ft	34	17	17	27 CLAYEY SAND(SC)

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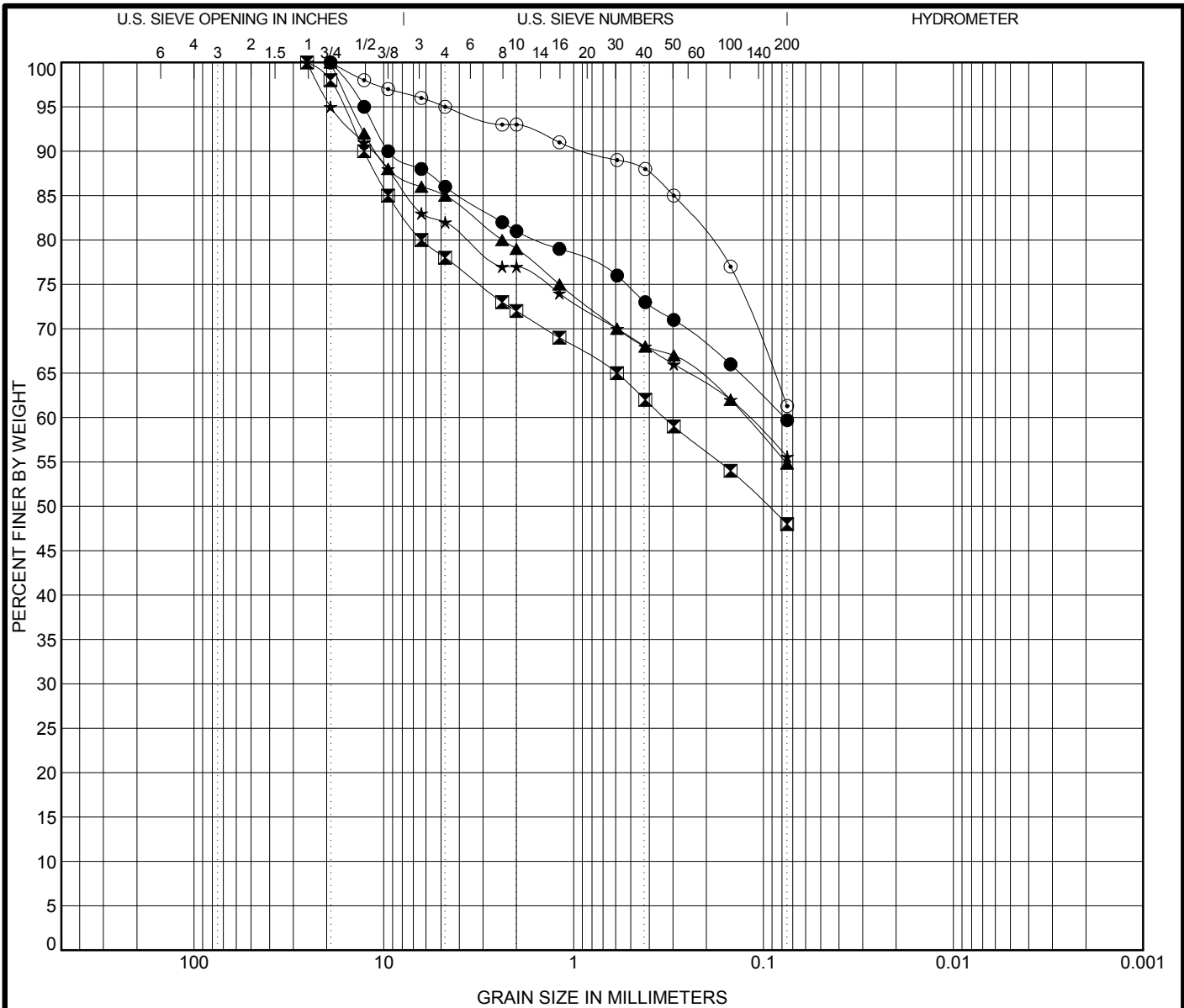
Specimen Identification	LL	PL	PI	%-#200	Soil Description
● B-101	0.2ft	NP	NP	NP	14 SILTY SAND(SM)
⊠ B-102	0.2ft	NP	NP	NP	16 SILTY SAND with GRAVEL(SM)
▲ B-103	0.2ft	20	15	5	29 SILTY, CLAYEY SAND(SC-SM)
★ B-104	0.2ft	38	18	20	27 CLAYEY SAND(SC)
⊙ B-105	0.2ft	28	16	12	23 CLAYEY SAND(SC)
⊕ B-106	0.2ft	27	17	10	20 CLAYEY SAND(SC)
○ B-107	0.0ft	31	17	14	39 CLAYEY SAND(SC)
△ B-108	0.0ft	33	17	16	24 CLAYEY SAND(SC)
⊗ B-109	0.0ft	31	14	17	31 CLAYEY SAND(SC)
⊕ B-110	0.0ft	25	16	9	30 CLAYEY SAND(SC)
□ B-111	0.0ft	NP	NP	NP	13 SILTY SAND with GRAVEL(SM)
⊕ B-112	0.0ft	NP	NP	NP	26 SILTY SAND(SM)
⊕ B-113	0.0ft	25	17	8	15 CLAYEY SAND(SC)
☆ B-114	0.0ft	NP	NP	NP	22 SILTY SAND(SM)
⊗ B-115	0.0ft	25	18	7	35 SILTY, CLAYEY SAND(SC-SM)
■ B-116	0.0ft	23	18	5	29 SILTY, CLAYEY SAND with GRAVEL(SC-SM)
◆ B-117	0.0ft	29	18	11	21 CLAYEY SAND(SC)
◇ B-118	0.0ft	NP	NP	NP	18 SILTY SAND(SM)
⊗ B-119	0.0ft	NP	NP	NP	8 WELL-GRADED SAND with SILT(SW-SM)

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

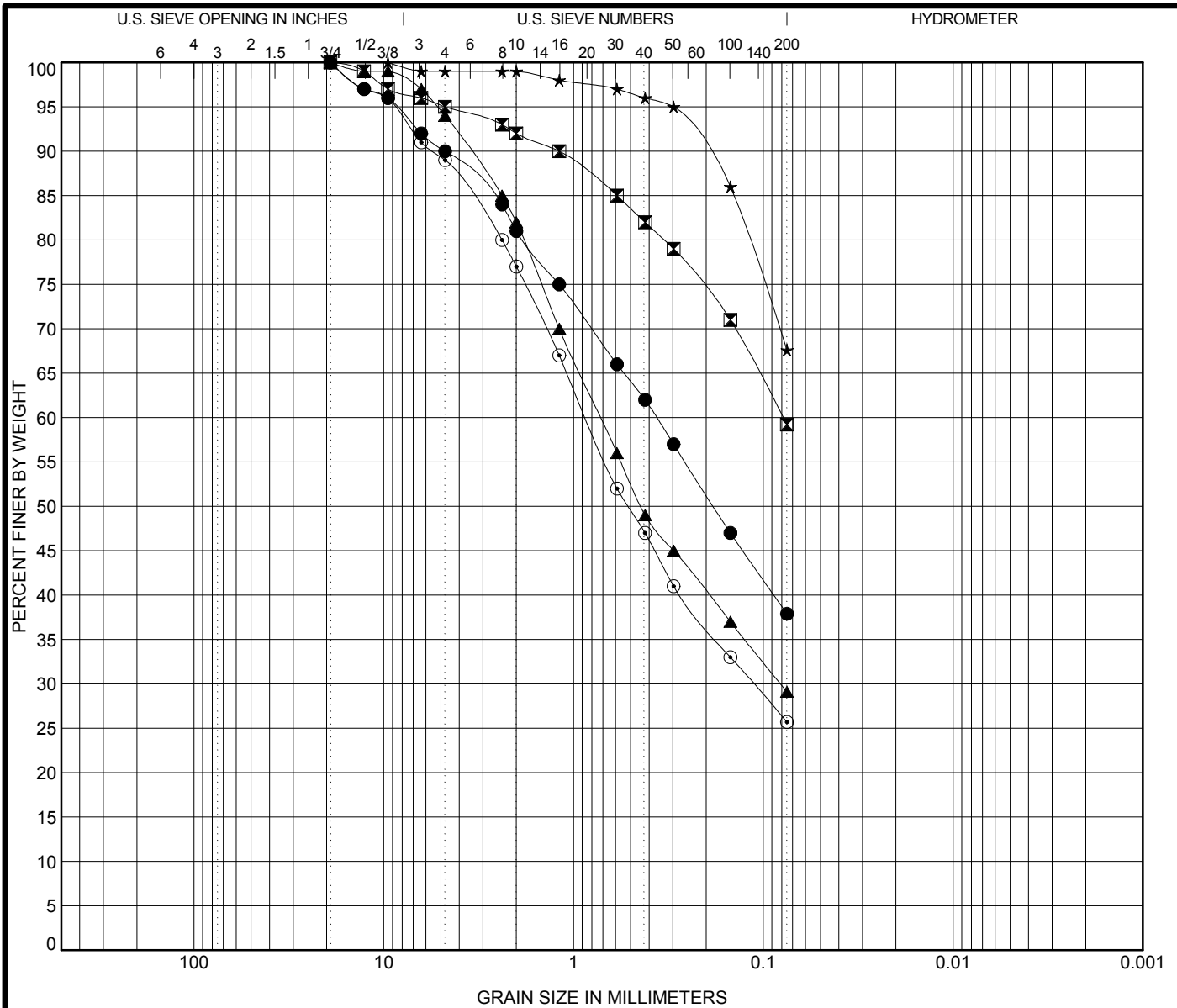
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-001 0.0 ft	SANDY LEAN CLAY (CL)					34	20	14		
☒	B-002 0.0 ft	CLAYEY SAND with GRAVEL (SC)					32	20	12		
▲	B-003 0.0 ft	SANDY LEAN CLAY with GRAVEL (CL)					37	22	15		
★	B-004 0.0 ft	SANDY LEAN CLAY with GRAVEL (CL)					34	20	14		
⊙	B-005 0.0 ft	SANDY SILTY CLAY (CL-ML)					25	20	5		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-001 0.0 ft	19.1	0.077			14	26		60		
☒	B-002 0.0 ft	25.4	0.333			22	30		48		
▲	B-003 0.0 ft	19.1	0.123			15	30		55		
★	B-004 0.0 ft	25.4	0.12			18	26		56		
⊙	B-005 0.0 ft	19.1				5	34		61		

GRAIN SIZE DISTRIBUTION



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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

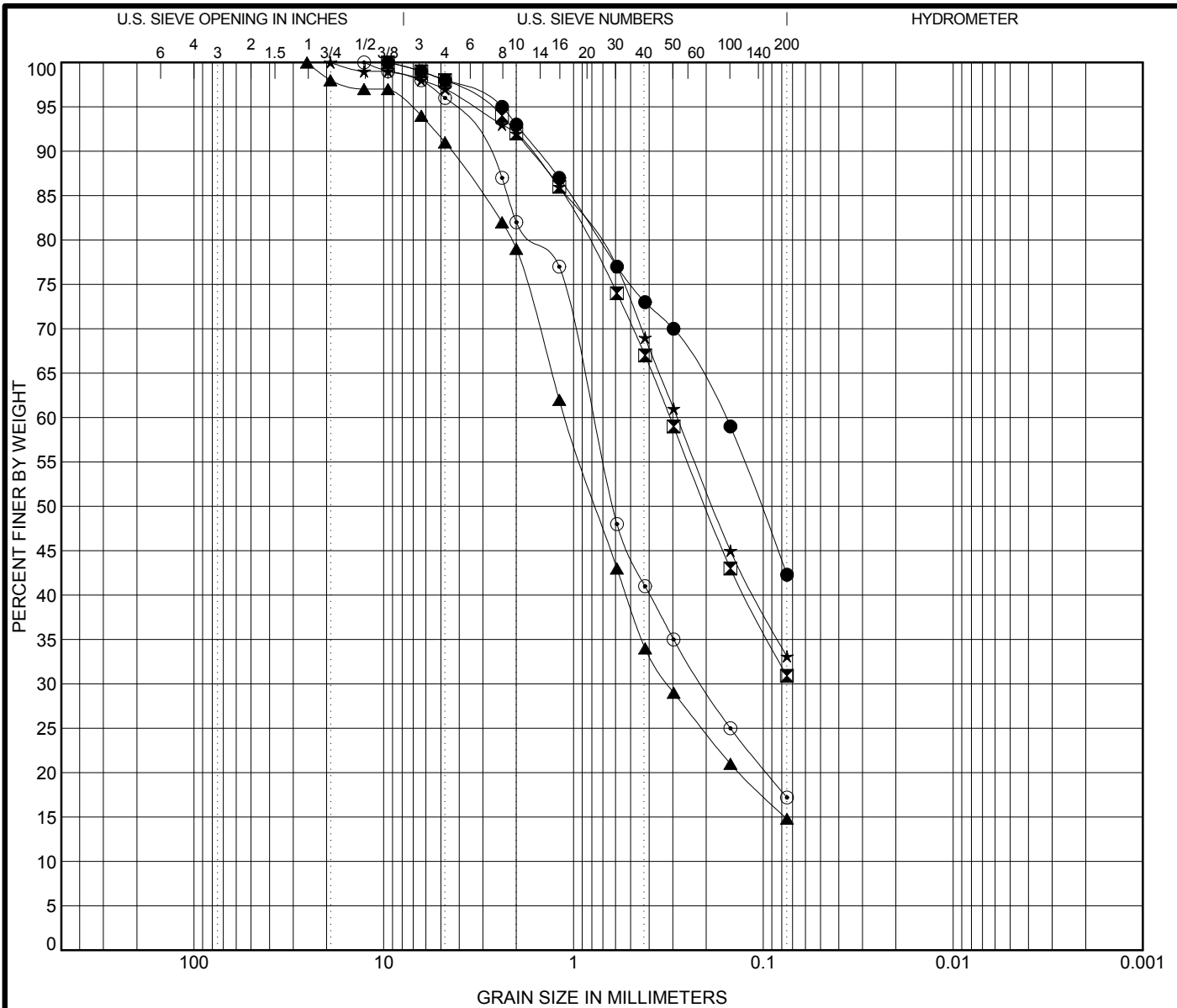
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-006 0.0 ft	SILTY, CLAYEY SAND(SC-SM)					23	18	5		
■	B-007 0.0 ft	SANDY SILTY CLAY(CL-ML)					26	19	7		
▲	B-008 0.0 ft	SILTY SAND(SM)					22	20	2		
★	B-009 0.0 ft	SANDY SILT(ML)					NP	NP	NP		
○	B-010 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-006 0.0 ft	19.1	0.366			10	52		38		
■	B-007 0.0 ft	19.1	0.079			5	36		59		
▲	B-008 0.0 ft	19.1	0.721	0.081		6	65		29		
★	B-009 0.0 ft	9.5				1	31		68		
○	B-010 0.0 ft	19.1	0.858	0.112		11	63		26		

GRAIN SIZE DISTRIBUTION

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

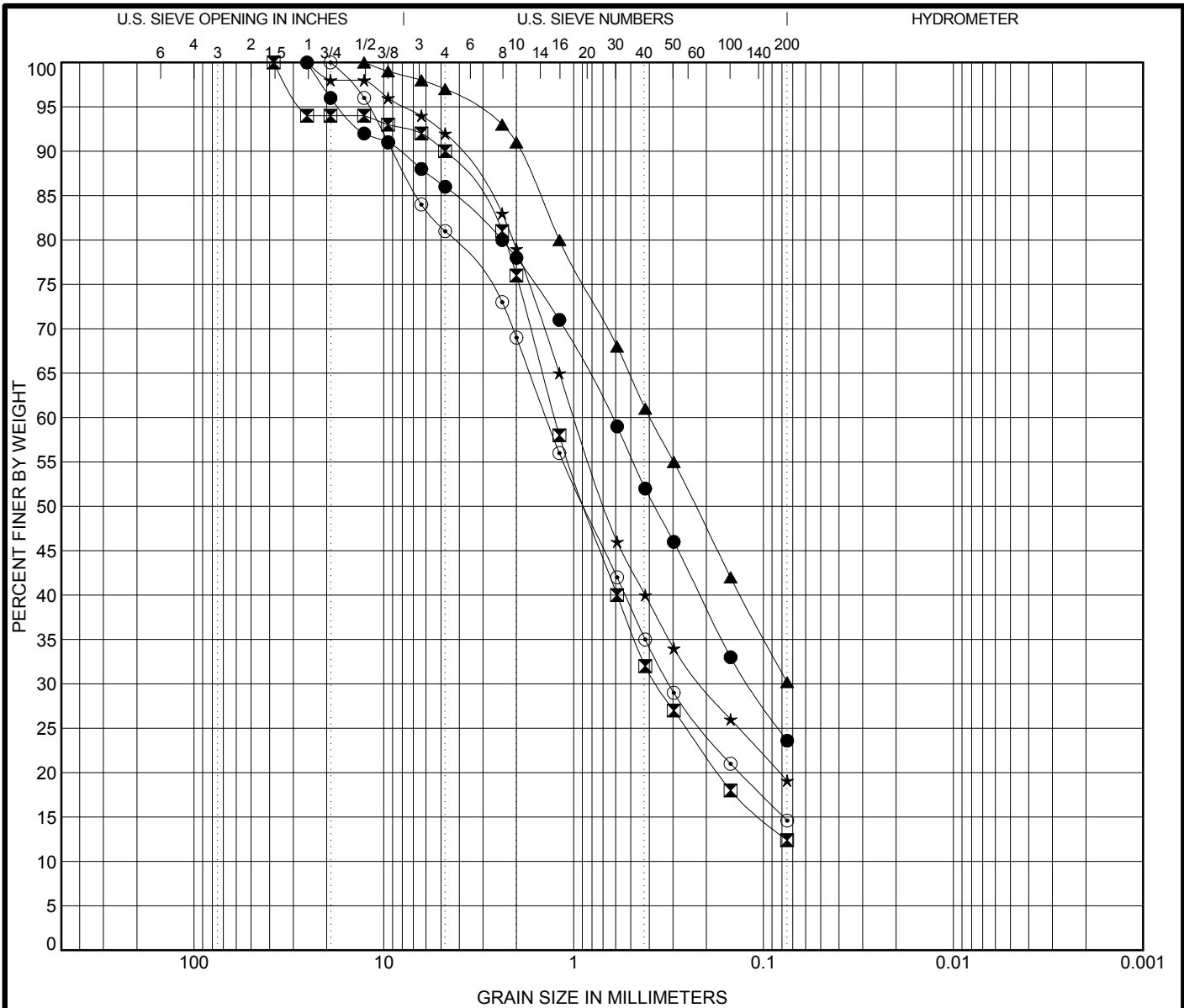
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-011 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒	B-012 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲	B-013 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-014 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
◎	B-015 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-011 0.0 ft	9.5	0.159			2	56	42			
☒	B-012 0.0 ft	9.5	0.31			2	67	31			
▲	B-013 0.0 ft	25.4	1.105	0.318		9	76	15			
★	B-014 0.0 ft	19.1	0.284			3	64	33			
◎	B-015 0.0 ft	12.7	0.789	0.21		4	79	17			

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

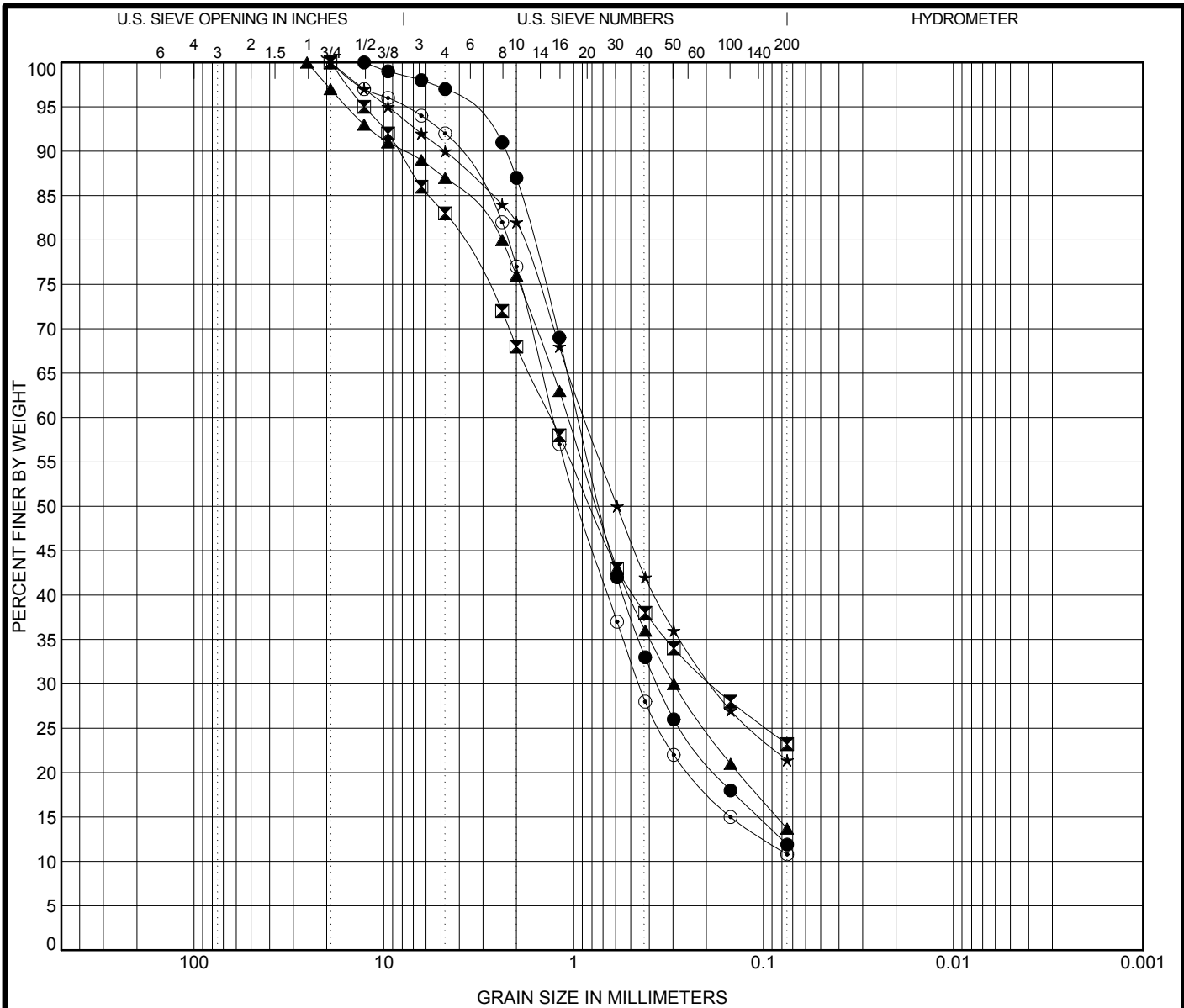
Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-016 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒ B-017 0.0 ft	SILTY SAND(SM)					NP	NP	NP	1.9	22.6
▲ B-018 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★ B-019 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙ B-020 0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-016 0.0 ft	25.4	0.626	0.12		14	62		24		
☒ B-017 0.0 ft	38.1	1.261	0.366		10	78		12		
▲ B-018 0.0 ft	12.7	0.396			3	67		30		
★ B-019 0.0 ft	25.4	0.989	0.21		8	73		19		
⊙ B-020 0.0 ft	19.1	1.396	0.315		19	66		15		

GRAIN SIZE DISTRIBUTION

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

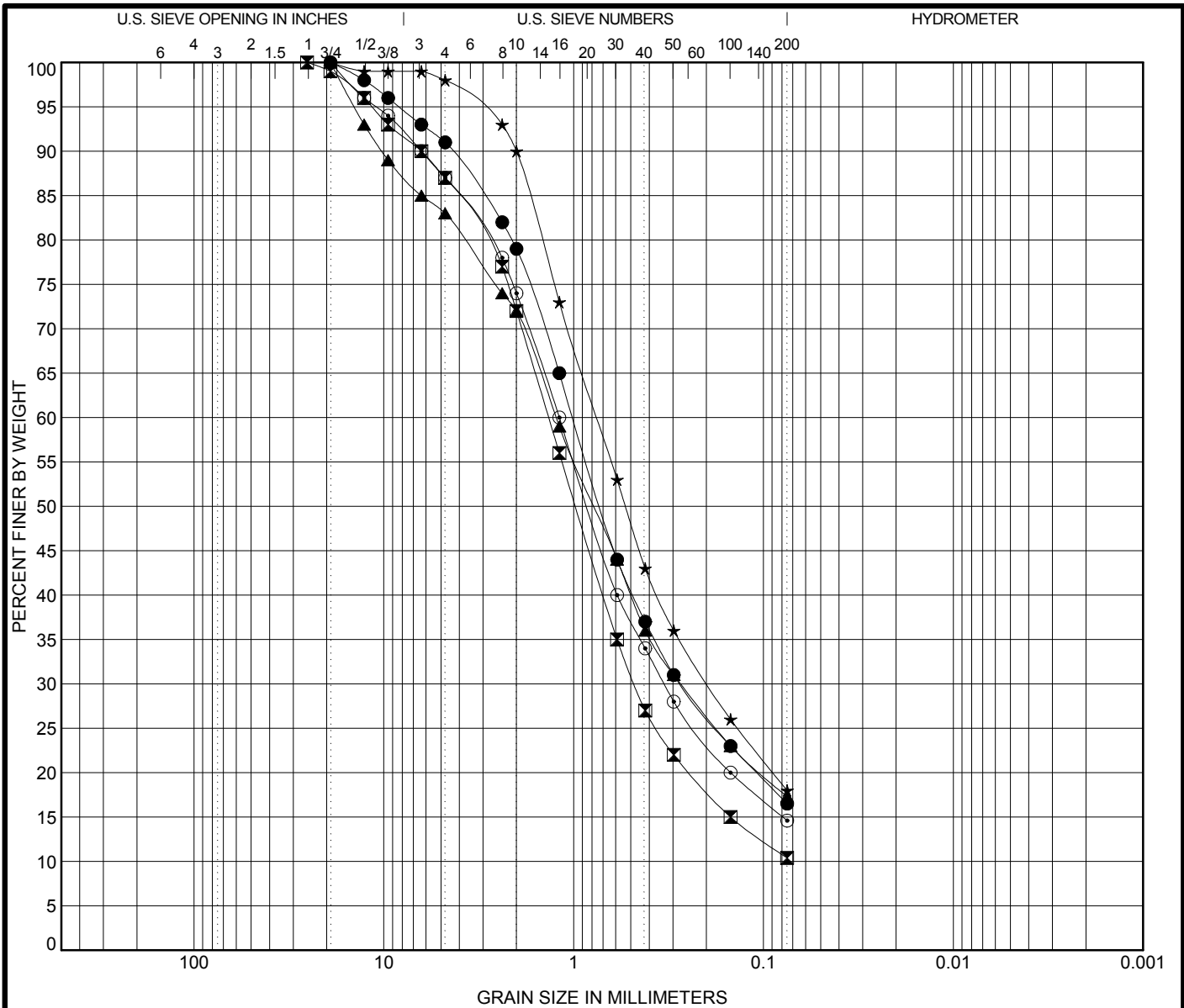
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-021 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.3	15.6
⊠	B-022 0.0 ft	CLAYEY SAND with GRAVEL(SC)					27	17	10		
▲	B-023 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-024 0.0 ft	SILTY SAND(SM)					18	17	1		
⊙	B-025 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.4	19.5
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-021 0.0 ft	12.7	0.942	0.362		3	85		12		
⊠	B-022 0.0 ft	19.1	1.32	0.188		17	60		23		
▲	B-023 0.0 ft	25.4	1.071	0.297		13	73		14		
★	B-024 0.0 ft	19.1	0.871	0.188		10	69		21		
⊙	B-025 0.0 ft	19.1	1.286	0.453		8	81		11		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

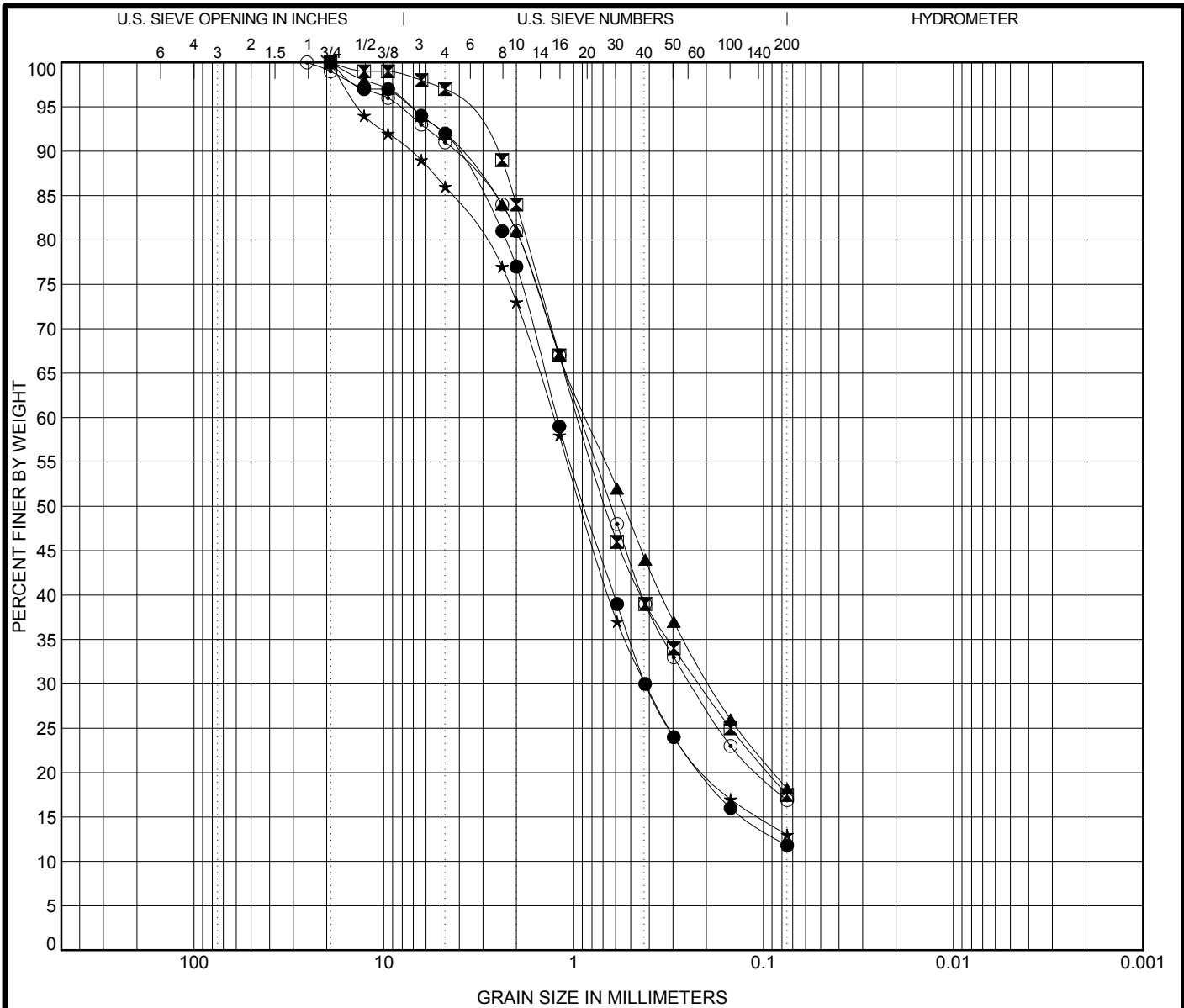
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu	
●	B-026	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊠	B-027	0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.4	19.2
▲	B-028	0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
★	B-029	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-030	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay			
●	B-026	0.0 ft	19.1	1.007	0.272	9	75		17			
⊠	B-027	0.0 ft	25.4	1.355	0.477	13	77		10			
▲	B-028	0.0 ft	19.1	1.238	0.272	17	66		17			
★	B-029	0.0 ft	19.1	0.754	0.196	2	80		18			
⊙	B-030	0.0 ft	19.1	1.19	0.333	13	72		15			

GRAIN SIZE DISTRIBUTION

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

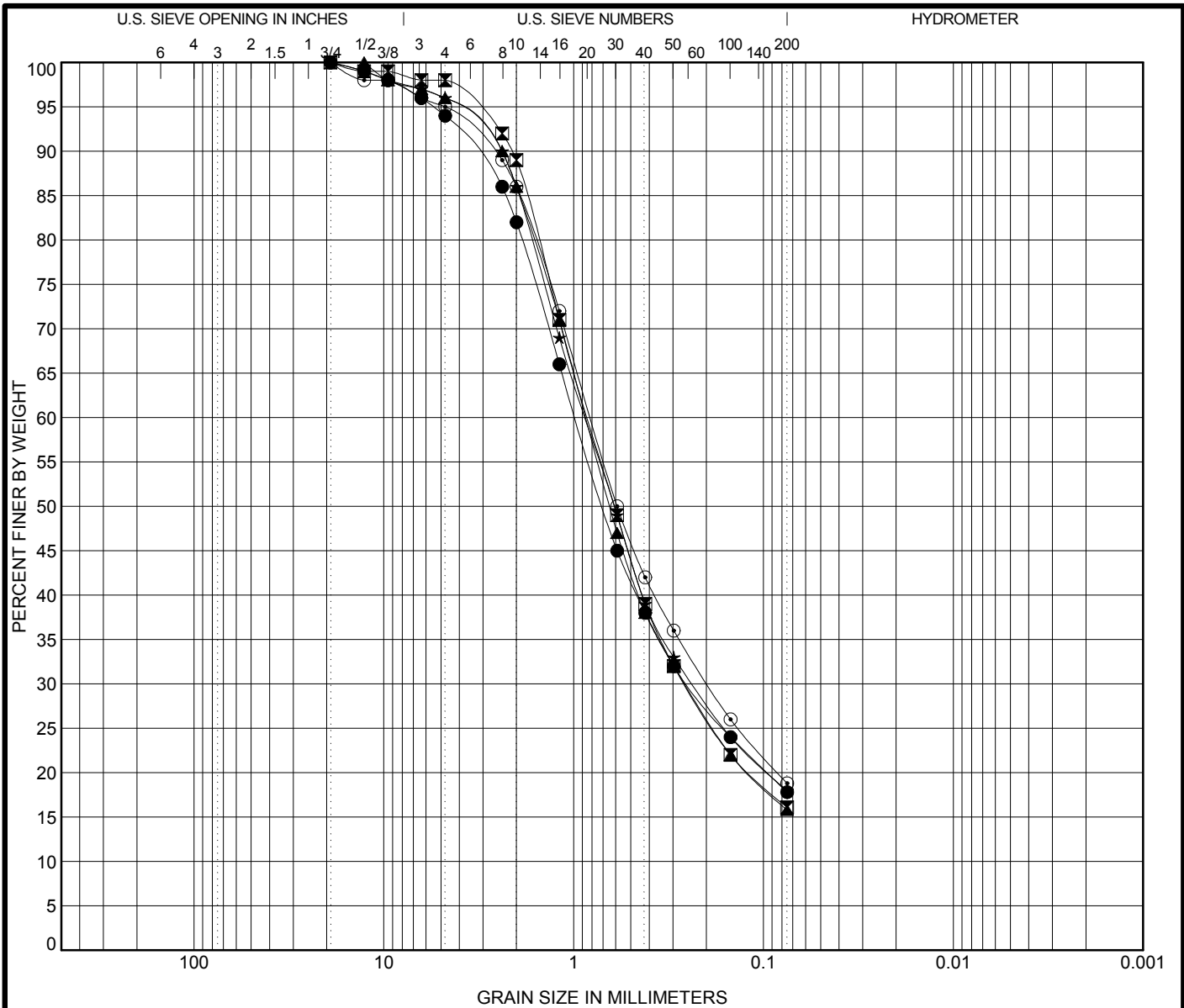
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-031 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.6	21.9
☒	B-032 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲	B-033 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-034 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-035 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-031 0.0 ft	19.1	1.225	0.42		8	80		12		
☒	B-032 0.0 ft	19.1	0.942	0.219		3	80		18		
▲	B-033 0.0 ft	19.1	0.858	0.191		8	74		18		
★	B-034 0.0 ft	19.1	1.275	0.42		14	73		13		
⊙	B-035 0.0 ft	25.4	0.919	0.241		9	74		17		

GRAIN SIZE DISTRIBUTION

Project: Tangerine Road Corridor Project
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 Job #: 63105079
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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

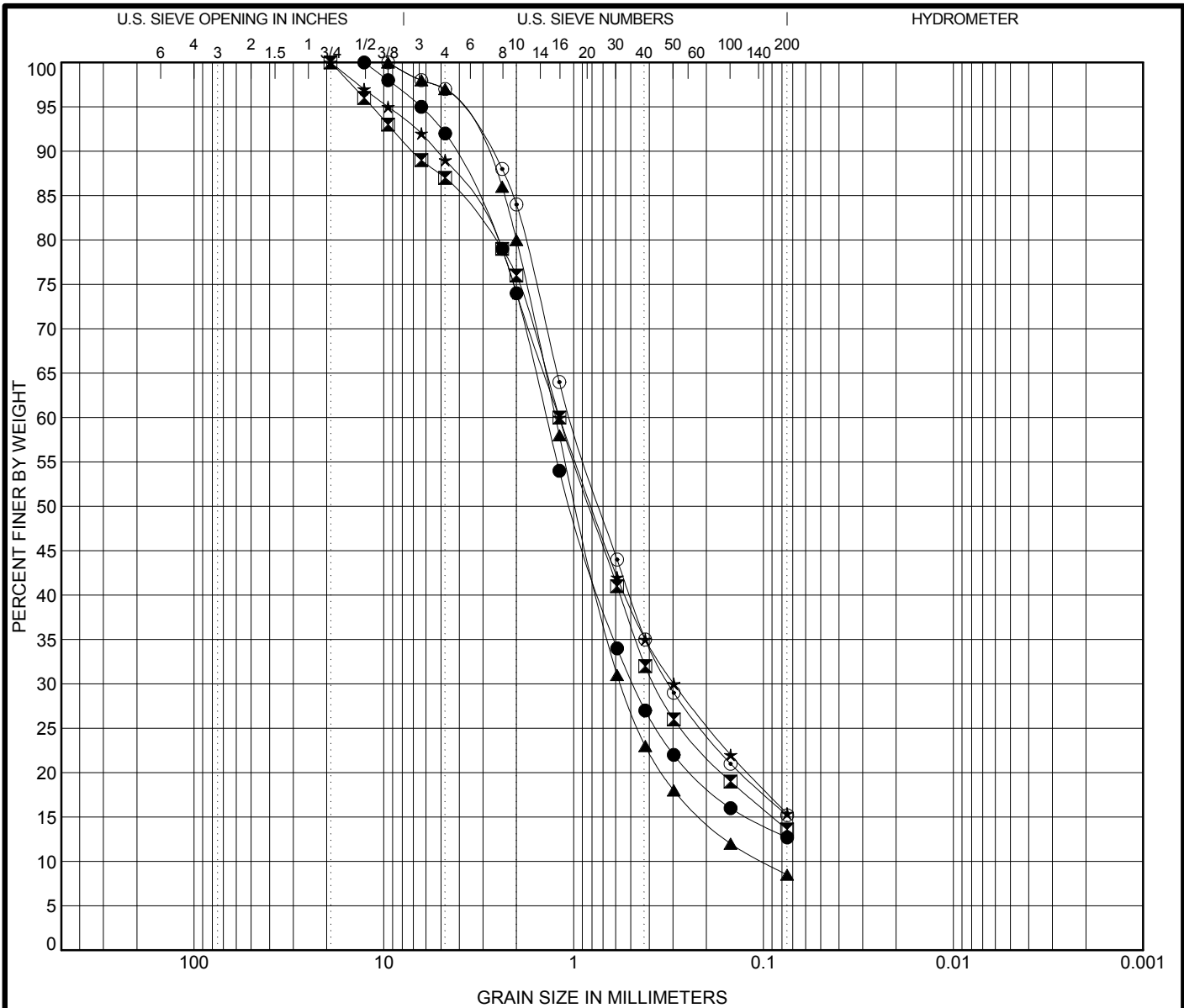
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu	
●	B-036	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊠	B-037	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲	B-038	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-039	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-040	0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay			
●	B-036	0.0 ft	19.1	0.974	0.25	6	76	18				
⊠	B-037	0.0 ft	19.1	0.838	0.259	2	82	16				
▲	B-038	0.0 ft	12.7	0.863	0.259	4	80	16				
★	B-039	0.0 ft	19.1	0.868	0.236	4	78	18				
⊙	B-040	0.0 ft	19.1	0.812	0.196	5	76	19				

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

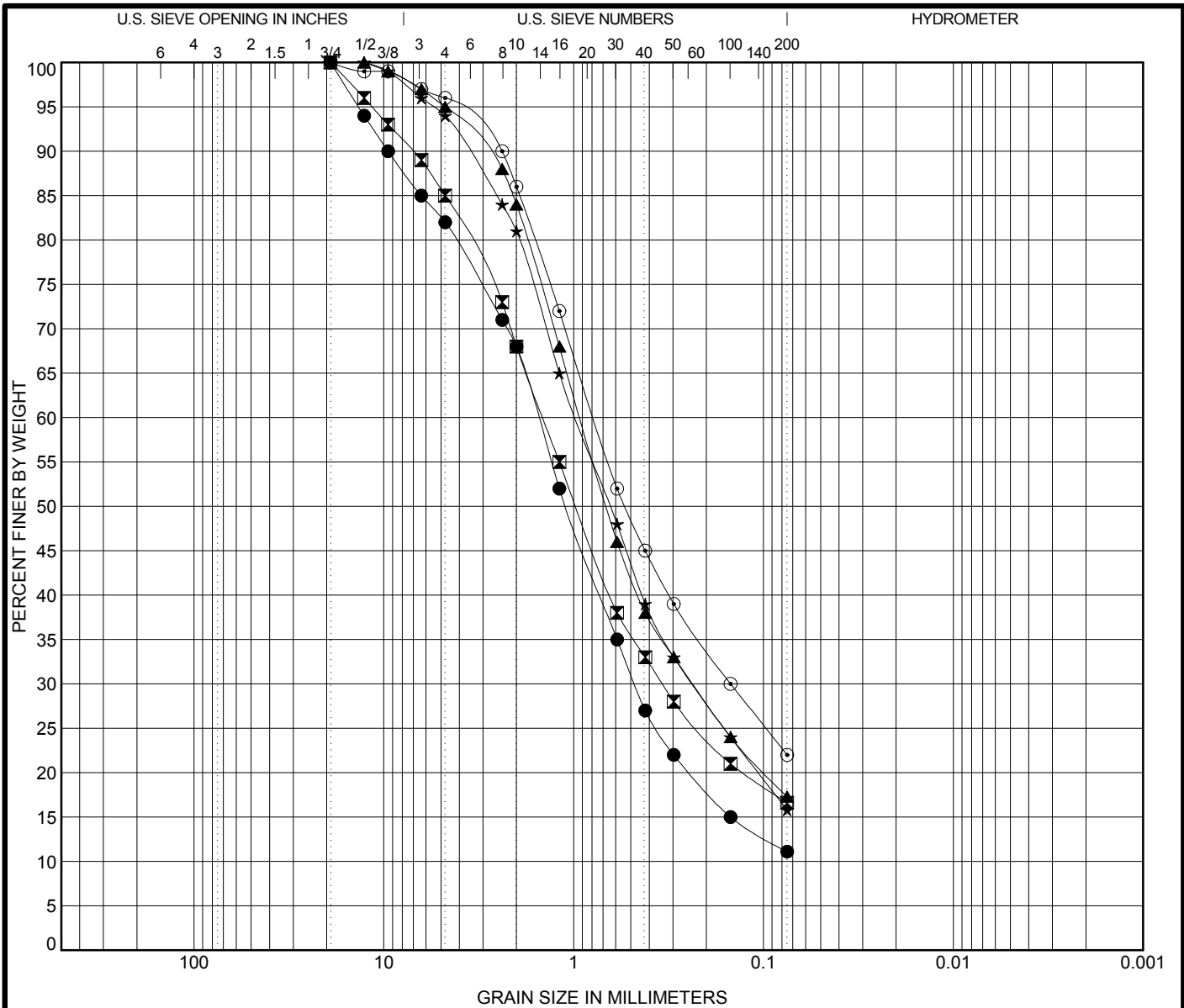
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-041 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒	B-042 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲	B-043 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.5	12.4
★	B-044 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-045 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-041 0.0 ft	12.7	1.391	0.486		8	79		13		
☒	B-042 0.0 ft	19.1	1.19	0.374		13	73		14		
▲	B-043 0.0 ft	9.5	1.248	0.565	0.101	3	89		9		
★	B-044 0.0 ft	19.1	1.19	0.297		11	74		15		
⊙	B-045 0.0 ft	9.5	1.034	0.315		3	82		15		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

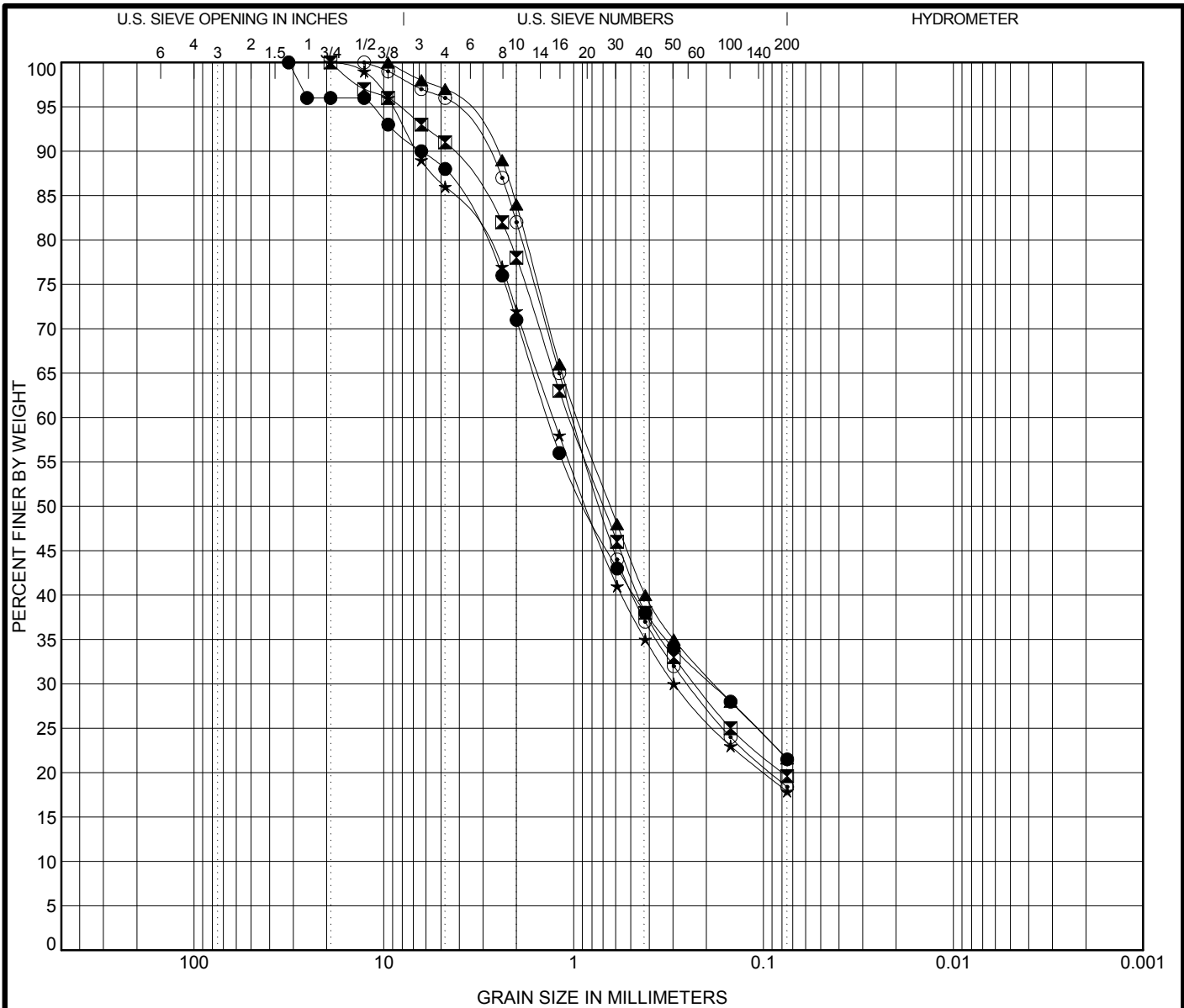
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-046 0.0 ft	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)					NP	NP	NP	2.4	25.0
☒	B-047 0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
▲	B-048 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-049 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
◎	B-050 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-046 0.0 ft	19.1	1.543	0.477		18	71		11		
☒	B-047 0.0 ft	19.1	1.453	0.341		15	68		17		
▲	B-048 0.0 ft	12.7	0.922	0.236		5	78		17		
★	B-049 0.0 ft	12.7	0.968	0.236		6	78		16		
◎	B-050 0.0 ft	19.1	0.781	0.149		4	74		22		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

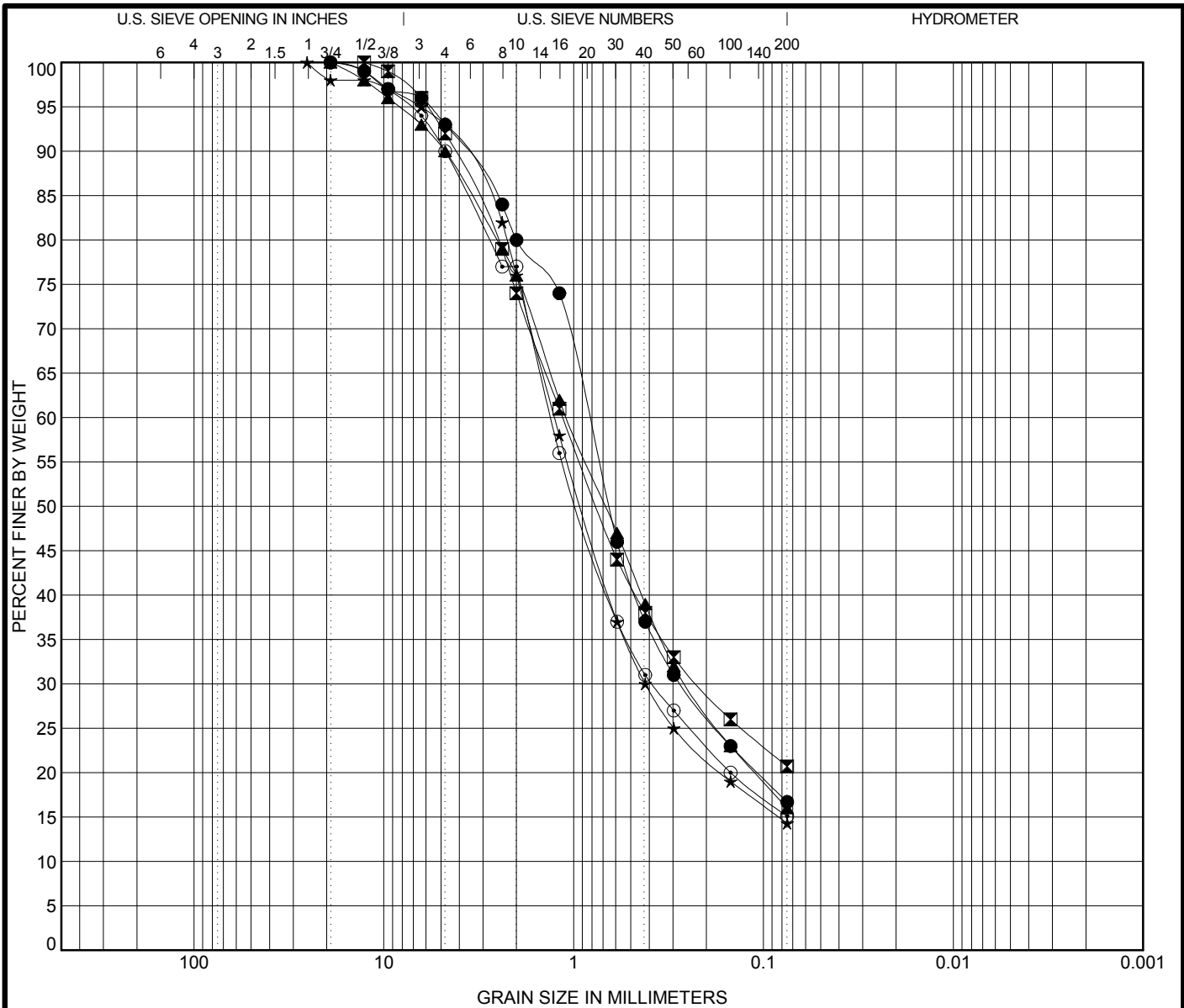
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-051 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒	B-052 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲	B-053 0.0 ft	SILTY SAND(SM)					21	18	3		
★	B-054 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
◎	B-055 0.0 ft	SILTY SAND(SM)					21	19	2		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-051 0.0 ft	31.75	1.367	0.188		12	67		22		
☒	B-052 0.0 ft	19.1	1.051	0.229		9	71		20		
▲	B-053 0.0 ft	9.5	0.942	0.181		3	75		22		
★	B-054 0.0 ft	19.1	1.282	0.297		14	68		18		
◎	B-055 0.0 ft	12.7	1.007	0.25		4	78		18		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

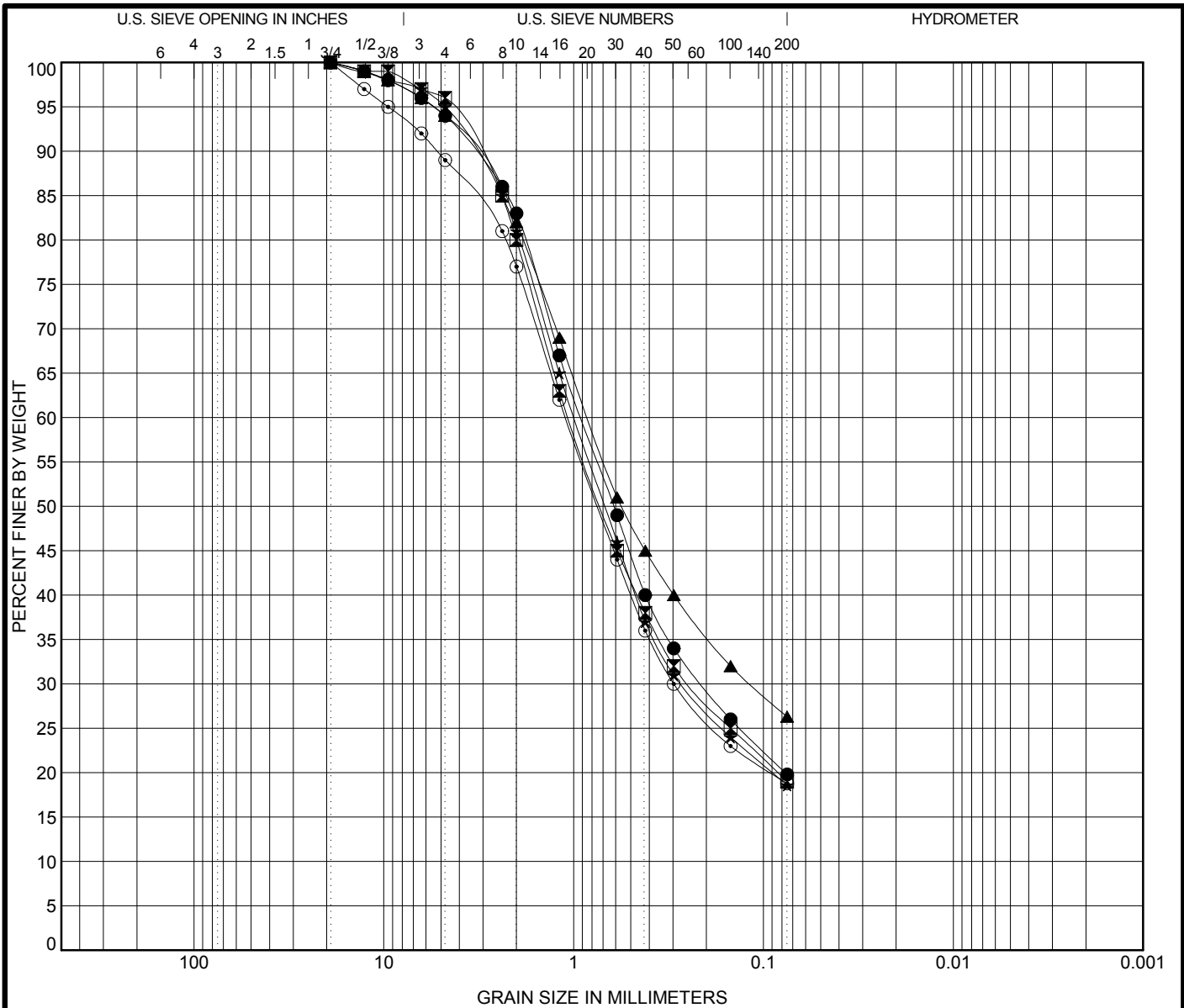
Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-056 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒ B-057 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲ B-058 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★ B-059 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙ B-060 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-056 0.0 ft	19.1	0.838	0.272		7	76		17		
☒ B-057 0.0 ft	12.7	1.142	0.221		8	71		21		
▲ B-058 0.0 ft	19.1	1.084	0.255		10	74		16		
★ B-059 0.0 ft	25.4	1.261	0.42		7	79		14		
⊙ B-060 0.0 ft	19.1	1.314	0.385		10	75		15		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	USCS Soil Classification	LL	PL	PI	Cc	Cu
● B-061 0.0 ft	SILTY SAND(SM)	NP	NP	NP		
☒ B-062 0.0 ft	SILTY SAND(SM)	NP	NP	NP		
▲ B-063 0.0 ft	CLAYEY SAND(SC)	28	18	10		
★ B-064 0.0 ft	SILTY SAND(SM)	NP	NP	NP		
⊙ B-065 0.0 ft	SILTY SAND(SM)	NP	NP	NP		

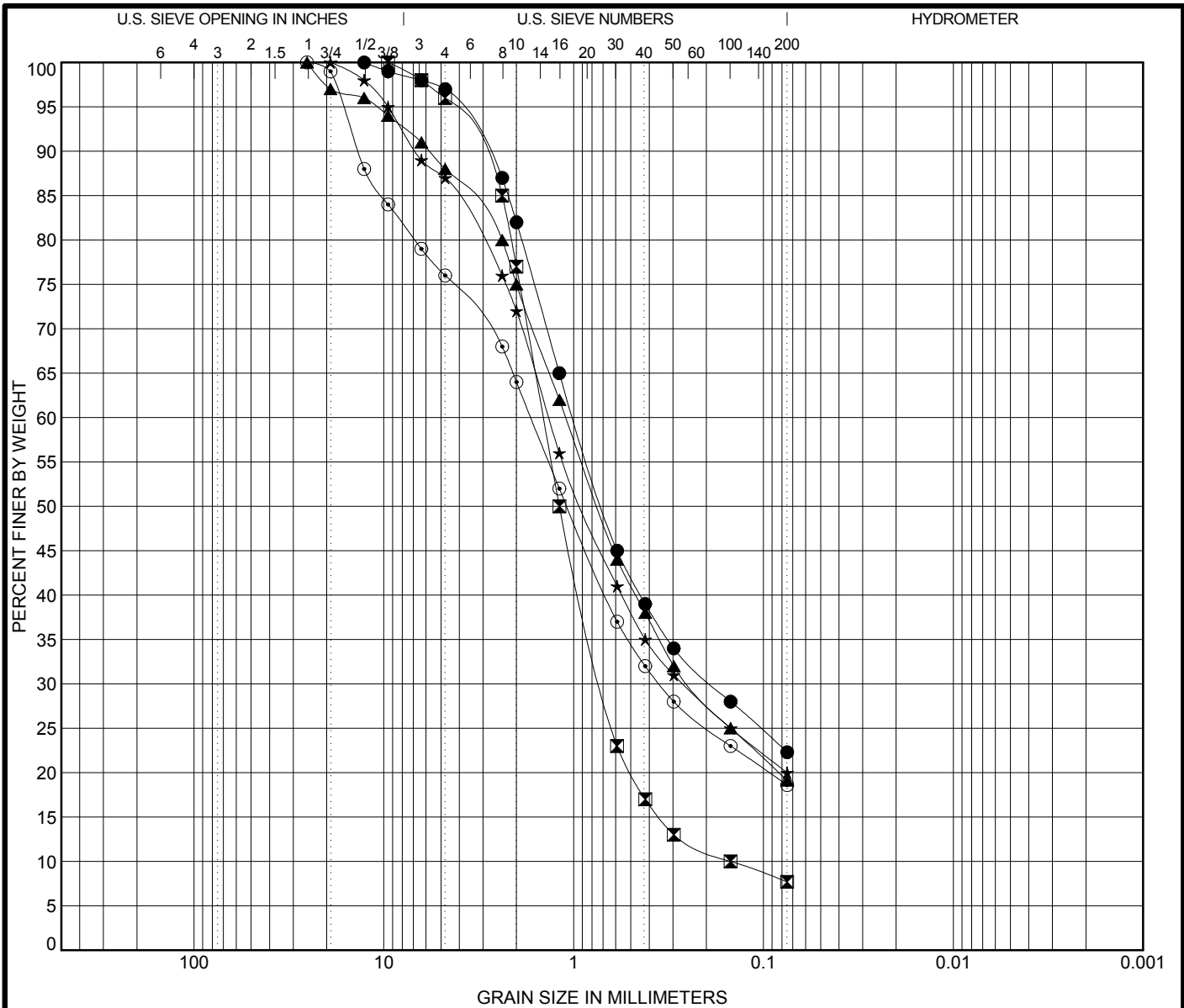
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-061 0.0 ft	19.1	0.906	0.21		6	74	20	
☒ B-062 0.0 ft	19.1	1.059	0.244		4	77	19	
▲ B-063 0.0 ft	19.1	0.838	0.117		6	68	26	
★ B-064 0.0 ft	19.1	0.989	0.269		5	76	19	
⊙ B-065 0.0 ft	19.1	1.101	0.297		11	70	19	

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

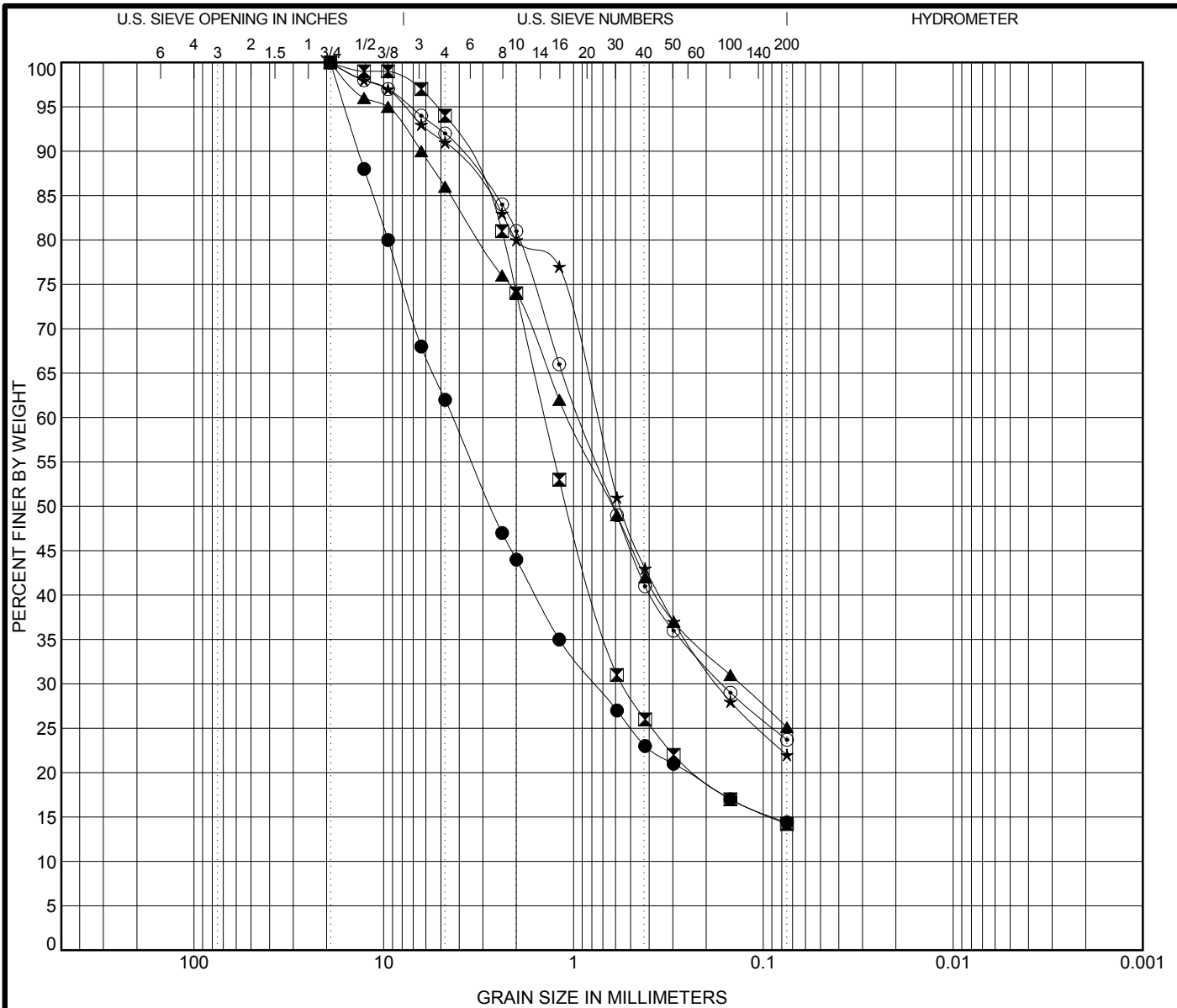
Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-066 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
☒ B-067 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.3	9.7
▲ B-068 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★ B-069 0.0 ft	CLAYEY SAND(SC)					29	17	12		
⊙ B-070 0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-066 0.0 ft	12.7	0.999	0.188		3	75		22		
☒ B-067 0.0 ft	9.5	1.442	0.708	0.149	4	88		8		
▲ B-068 0.0 ft	25.4	1.101	0.244		12	69		19		
★ B-069 0.0 ft	19.1	1.355	0.265		13	67		20		
⊙ B-070 0.0 ft	25.4	1.682	0.353		24	57		19		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

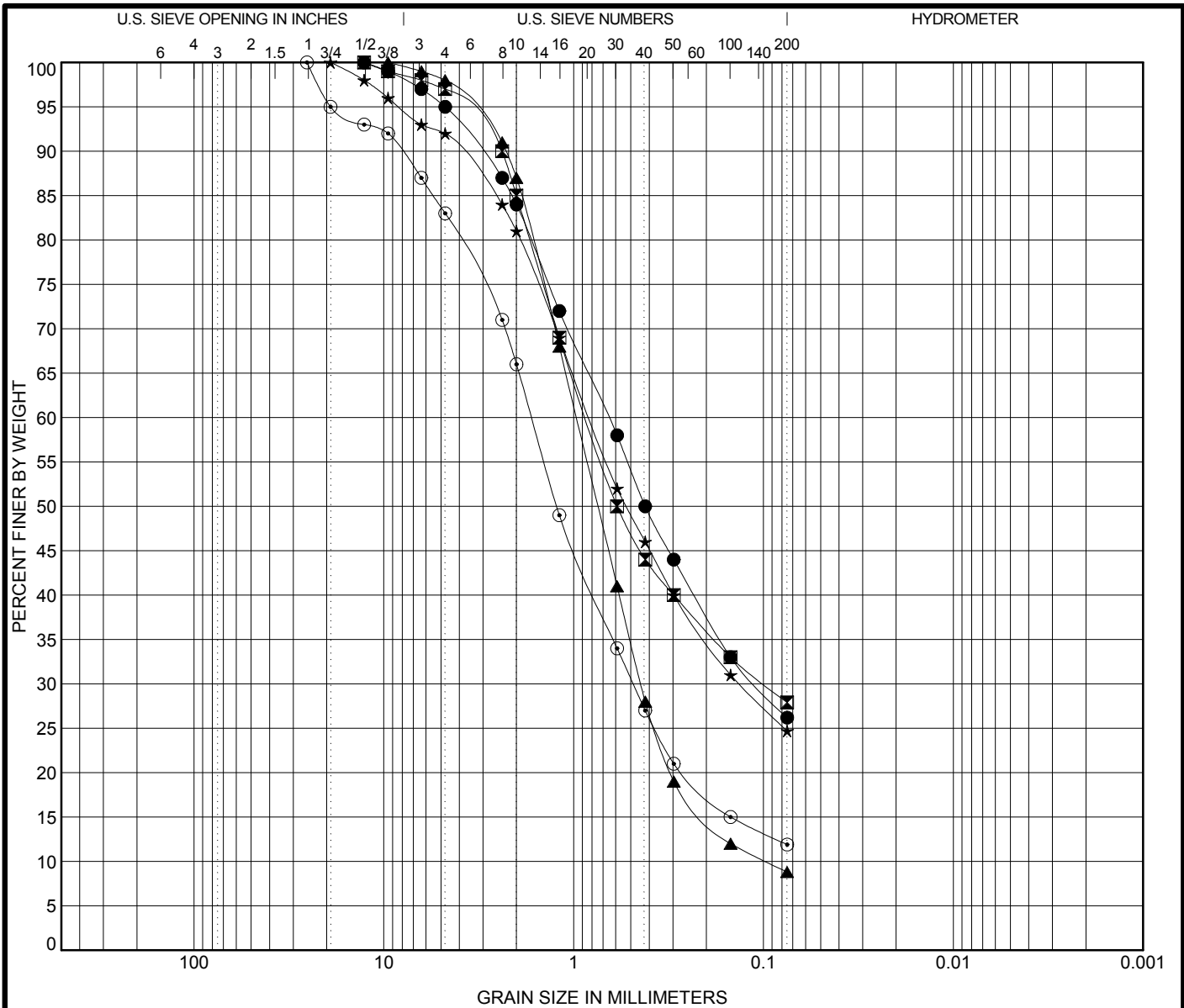
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-071 0.0 ft	CLAYEY SAND with GRAVEL(SC)					25	17	8		
☒	B-072 0.0 ft	CLAYEY SAND(SC)					35	21	14		
▲	B-073 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-074 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-075 0.0 ft	CLAYEY SAND(SC)					27	18	9		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-071 0.0 ft	19.1	4.332	0.768		38	48		14		
☒	B-072 0.0 ft	19.1	1.415	0.551		6	80		14		
▲	B-073 0.0 ft	19.1	1.068	0.133		14	61		25		
★	B-074 0.0 ft	19.1	0.752	0.174		9	69		22		
⊙	B-075 0.0 ft	19.1	0.929	0.164		8	68		24		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

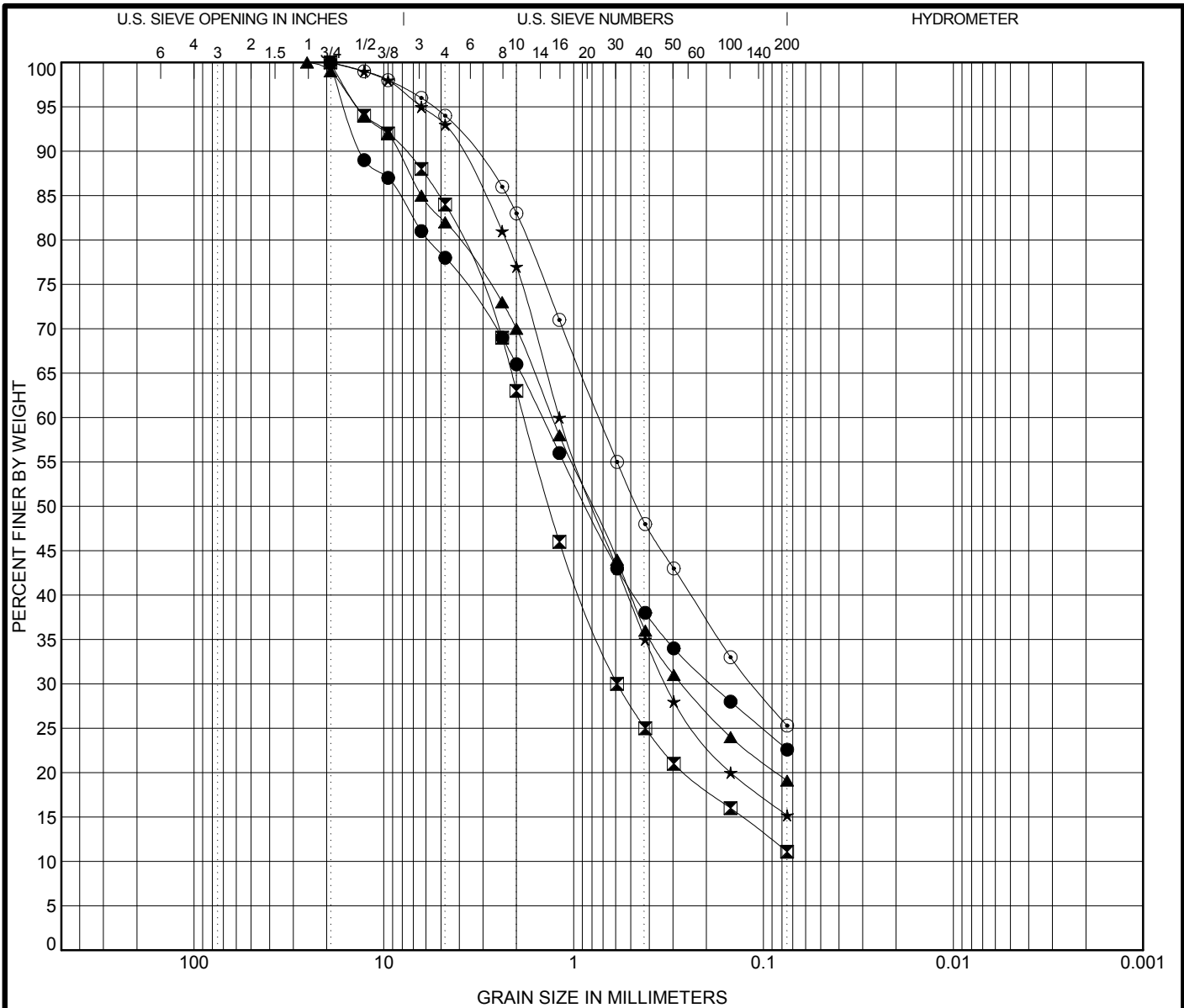
Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-076 0.0 ft	CLAYEY SAND(SC)					26	18	8		
⊠ B-077 0.0 ft	SILTY, CLAYEY SAND(SC-SM)					24	17	7		
▲ B-078 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	2.1	10.0
★ B-079 0.0 ft	CLAYEY SAND(SC)					30	21	9		
⊙ B-080 0.0 ft	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)					NP	NP	NP	2.9	33.8
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● B-076 0.0 ft	12.7	0.652	0.11		5	69		26		
⊠ B-077 0.0 ft	12.7	0.854	0.099		3	69		28		
▲ B-078 0.0 ft	9.5	0.967	0.443	0.097	2	89		9		
★ B-079 0.0 ft	19.1	0.821	0.134		8	67		25		
⊙ B-080 0.0 ft	25.4	1.665	0.486		17	71		12		

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

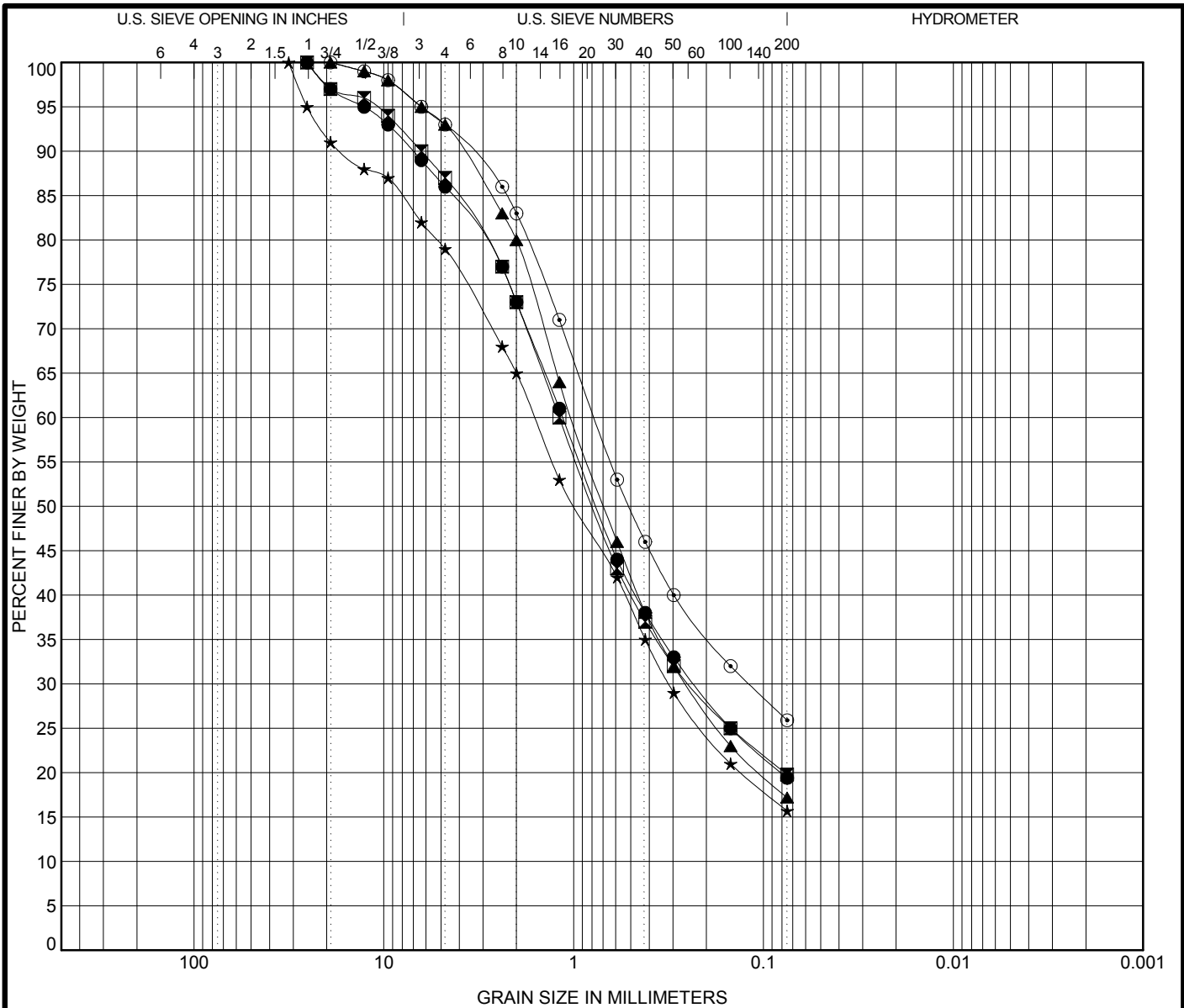
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-081 0.0 ft	SILTY, CLAYEY SAND with GRAVEL(SC-SM)					20	16	4		
⊠	B-082 0.0 ft	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)					NP	NP	NP	3.0	28.4
▲	B-083 0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
★	B-084 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-085 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-081 0.0 ft	19.1	1.465	0.188		22	55		23		
⊠	B-082 0.0 ft	19.1	1.825	0.59		16	73		11		
▲	B-083 0.0 ft	25.4	1.298	0.269		18	63		19		
★	B-084 0.0 ft	19.1	1.19	0.328		7	78		15		
⊙	B-085 0.0 ft	19.1	0.735	0.114		6	69		25		



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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

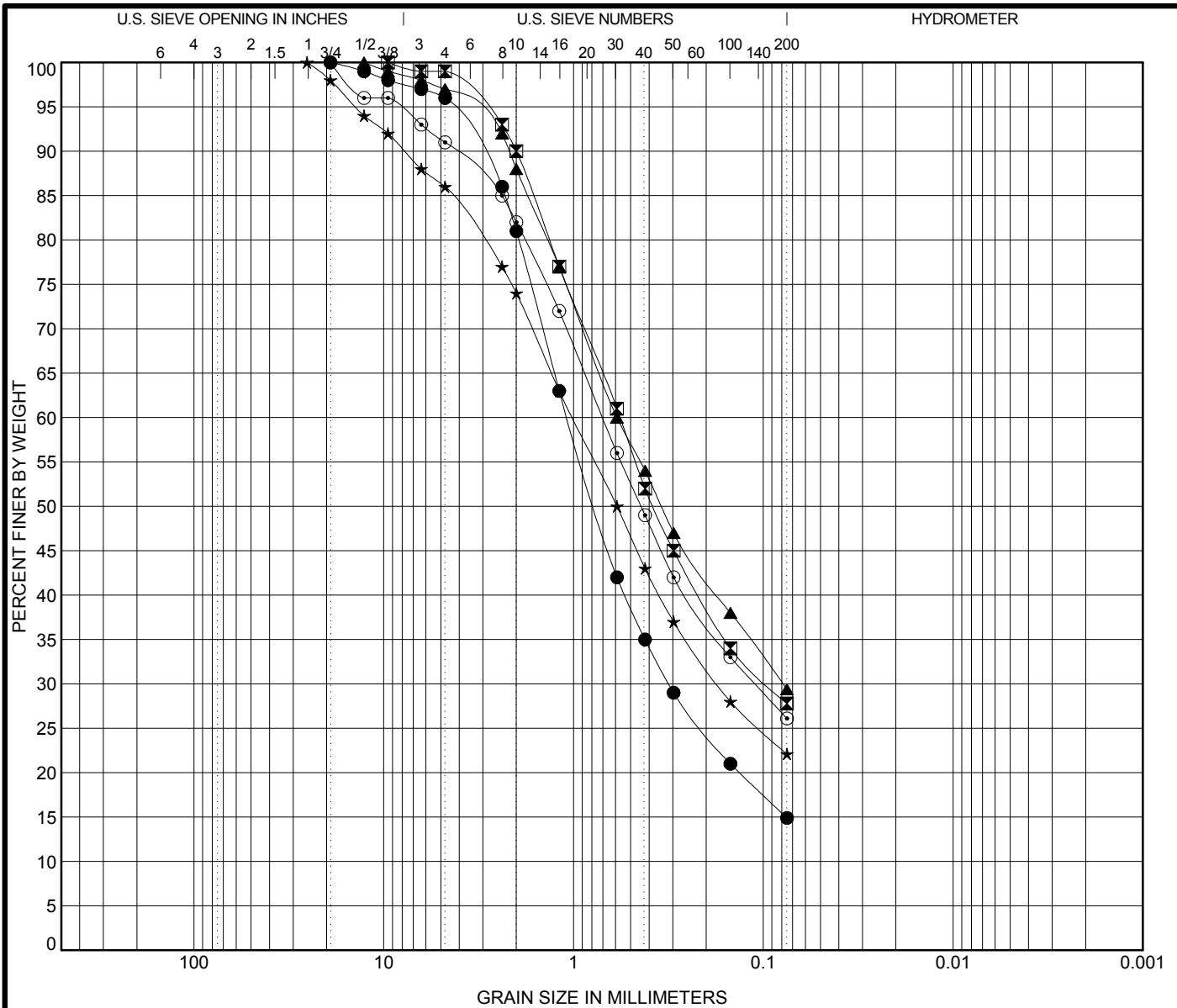
Specimen Identification		USCS Soil Classification				LL	PL	PI	Cc	Cu
●	B-086 0.2 ft	SILTY SAND(SM)				NP	NP	NP		
☒	B-087 0.2 ft	SILTY SAND(SM)				NP	NP	NP		
▲	B-088 0.2 ft	SILTY SAND(SM)				NP	NP	NP		
★	B-089 0.2 ft	CLAYEY SAND with GRAVEL(SC)				28	18	10		
⊙	B-090 0.2 ft	SILTY SAND(SM)				19	16	3		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-086 0.2 ft	25.4	1.142	0.229		14	67		19	
☒	B-087 0.2 ft	25.4	1.19	0.244		13	67		20	
▲	B-088 0.2 ft	19.1	1.018	0.255		7	76		17	
★	B-089 0.2 ft	31.75	1.611	0.315		21	63		16	
⊙	B-090 0.2 ft	19.1	0.775	0.119		7	67		26	

GRAIN SIZE DISTRIBUTION

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

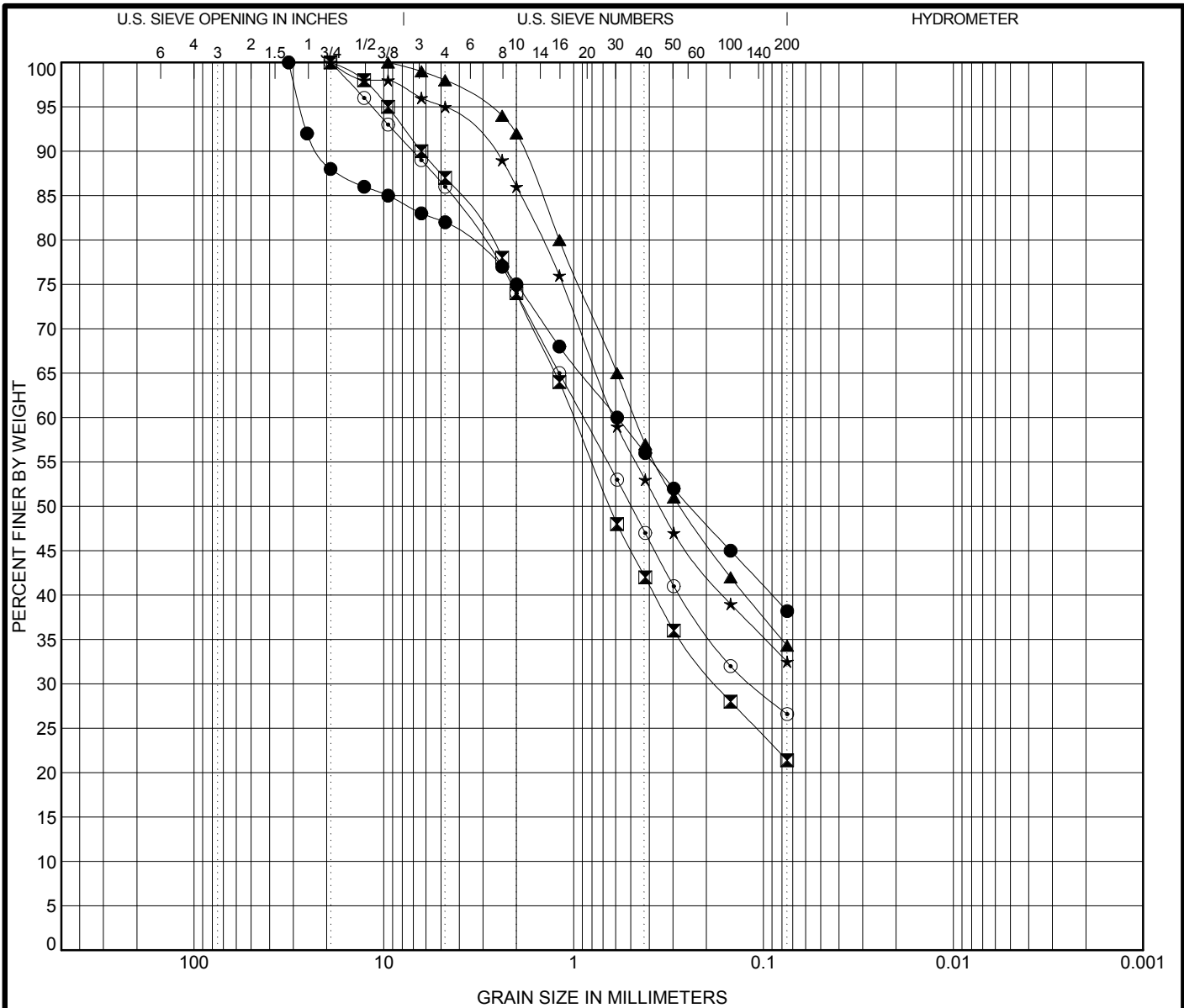
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu	
●	B-091	0.2 ft	SILTY SAND(SM)					NP	NP	NP		
☒	B-092	0.2 ft	SILTY, CLAYEY SAND(SC-SM)					20	16	4		
▲	B-093	0.2 ft	SILTY SAND(SM)					NP	NP	NP		
★	B-094	0.2 ft	SILTY SAND(SM)					NP	NP	NP		
⊙	B-095	0.2 ft	SILTY SAND(SM)					NP	NP	NP		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay			
●	B-091	0.2 ft	19.1	1.077	0.315	4	81	15				
☒	B-092	0.2 ft	9.5	0.568	0.096	1	71	28				
▲	B-093	0.2 ft	12.7	0.59	0.079	3	68	29				
★	B-094	0.2 ft	25.4	1.012	0.174	14	64	22				
⊙	B-095	0.2 ft	19.1	0.703	0.111	9	65	26				

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

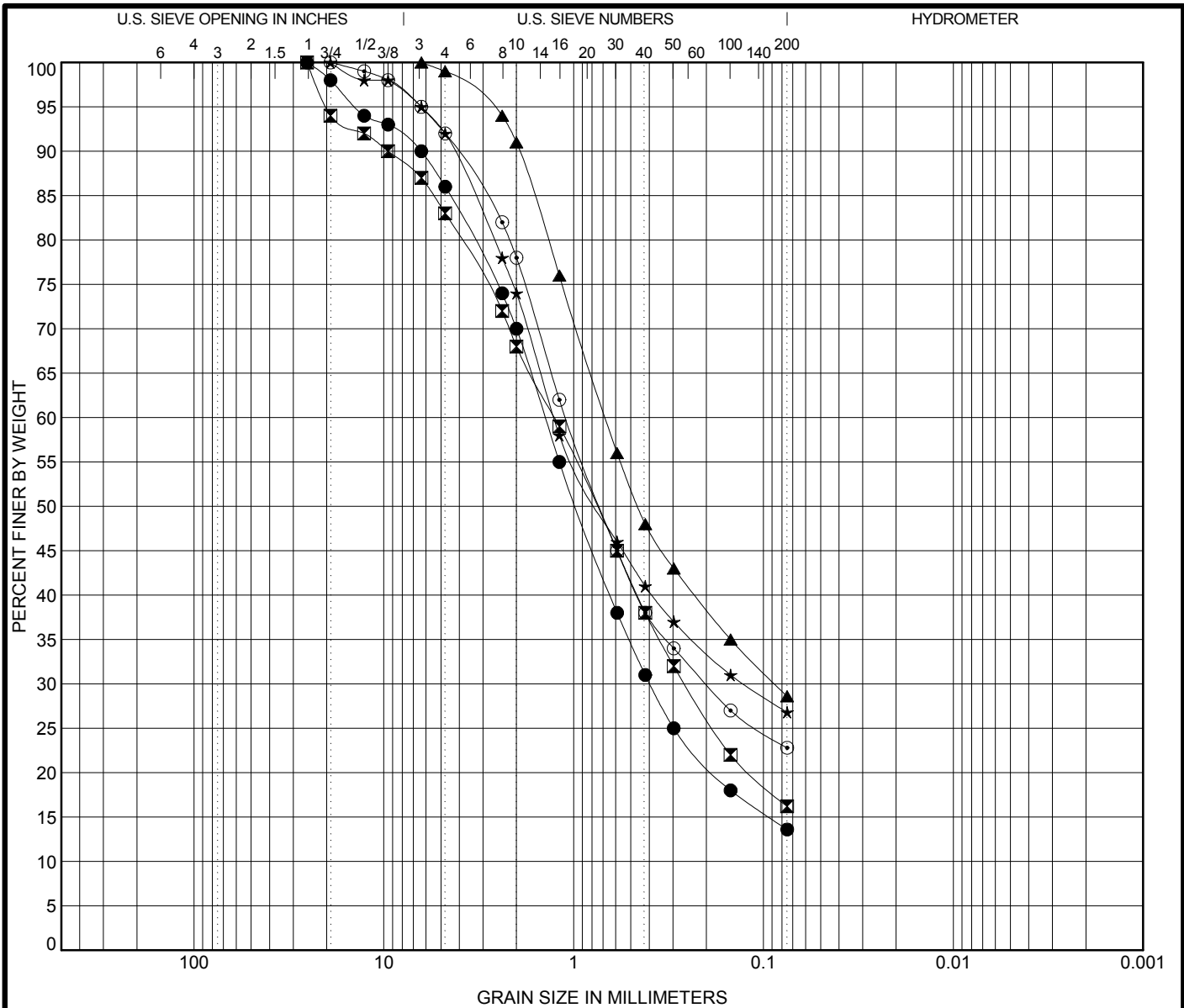
Specimen Identification			USCS Soil Classification				LL	PL	PI	Cc	Cu
●	B-096	0.2 ft	CLAYEY SAND with GRAVEL(SC)				38	18	20		
⊠	B-097	0.2 ft	SILTY SAND(SM)				NP	NP	NP		
▲	B-098	0.2 ft	SILTY, CLAYEY SAND(SC-SM)				21	14	7		
★	B-099	0.2 ft	CLAYEY SAND(SC)				27	13	14		
⊙	B-100	0.2 ft	CLAYEY SAND(SC)				34	17	17		
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-096	0.2 ft	31.75	0.59			18	44		38	
⊠	B-097	0.2 ft	19.1	0.999	0.177		13	66		21	
▲	B-098	0.2 ft	9.5	0.477			2	64		34	
★	B-099	0.2 ft	19.1	0.615			5	63		33	
⊙	B-100	0.2 ft	19.1	0.888	0.116		14	59		27	

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

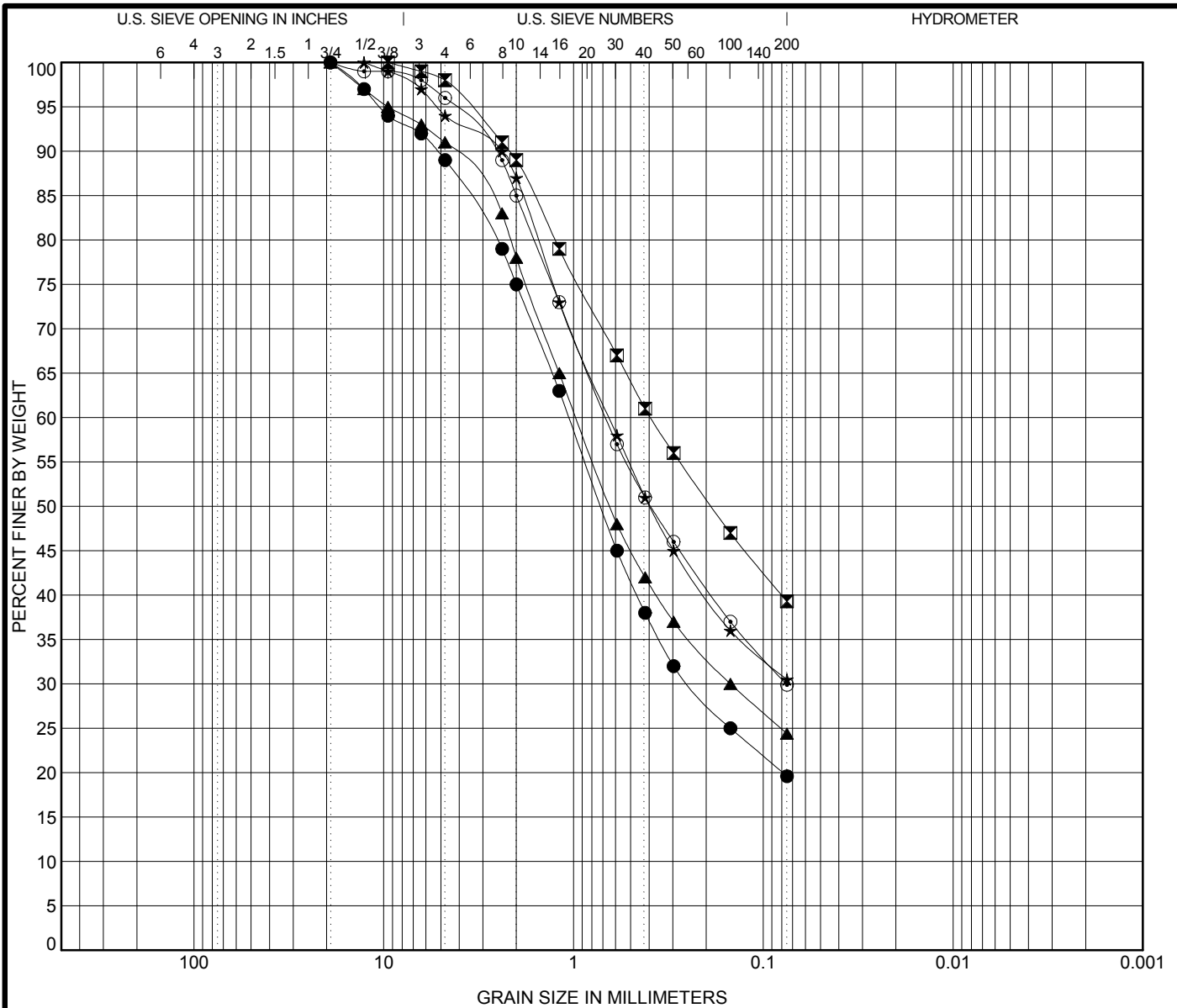
Specimen Identification		USCS Soil Classification				LL	PL	PI	Cc	Cu
●	B-101 0.2 ft	SILTY SAND(SM)				NP	NP	NP		
■	B-102 0.2 ft	SILTY SAND with GRAVEL(SM)				NP	NP	NP		
▲	B-103 0.2 ft	SILTY, CLAYEY SAND(SC-SM)				20	15	5		
★	B-104 0.2 ft	CLAYEY SAND(SC)				38	18	20		
⊙	B-105 0.2 ft	CLAYEY SAND(SC)				28	16	12		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-101 0.2 ft	25.4	1.415	0.396		14	72		14	
■	B-102 0.2 ft	25.4	1.261	0.259		17	67		16	
▲	B-103 0.2 ft	6.35	0.679	0.087		1	70		29	
★	B-104 0.2 ft	19.1	1.27	0.127		8	65		27	
⊙	B-105 0.2 ft	19.1	1.096	0.2		8	69		23	

GRAIN SIZE DISTRIBUTION

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



TC_GRAIN_SIZE_MULTI 63105079.GPJ TERRACON.GDT 9/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

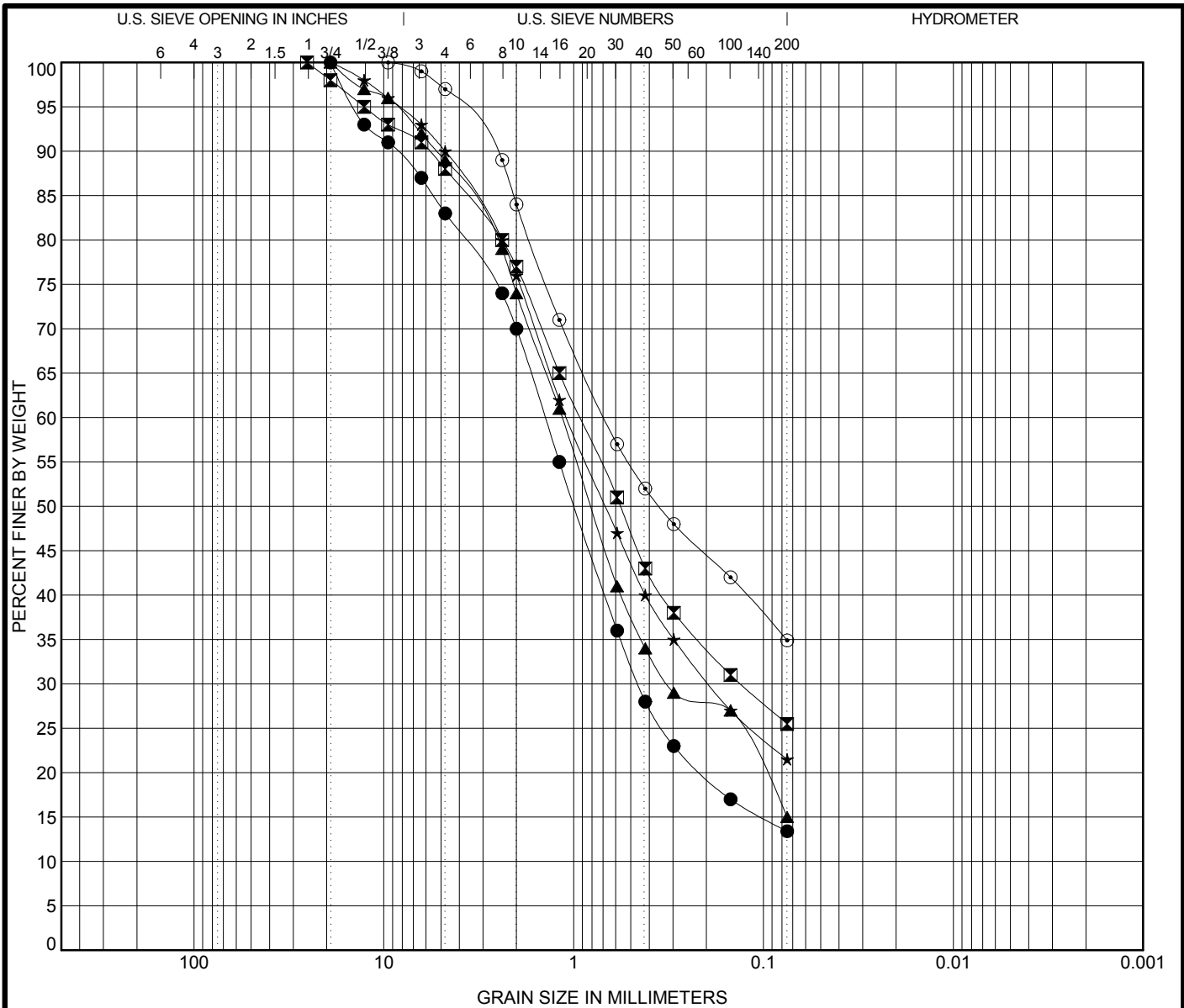
Specimen Identification		USCS Soil Classification					LL	PL	PI	Cc	Cu
●	B-106 0.2 ft	CLAYEY SAND(SC)					27	17	10		
☒	B-107 0.0 ft	CLAYEY SAND(SC)					31	17	14		
▲	B-108 0.0 ft	CLAYEY SAND(SC)					33	17	16		
★	B-109 0.0 ft	CLAYEY SAND(SC)					31	14	17		
⊙	B-110 0.0 ft	CLAYEY SAND(SC)					25	16	9		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-106 0.2 ft	19.1	1.059	0.244		11	69		20		
☒	B-107 0.0 ft	9.5	0.392			2	59		39		
▲	B-108 0.0 ft	19.1	0.968	0.149		9	67		24		
★	B-109 0.0 ft	12.7	0.648			6	64		31		
⊙	B-110 0.0 ft	19.1	0.673	0.076		4	66		30		

GRAIN SIZE DISTRIBUTION

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



TC_GRAIN_SIZE_MULTI 63105079.GPJ TERRACON.GDT 9/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-111 0.0 ft	SILTY SAND with GRAVEL(SM)					NP	NP	NP		
☒ B-112 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
▲ B-113 0.0 ft	CLAYEY SAND(SC)					25	17	8		
★ B-114 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
◎ B-115 0.0 ft	SILTY, CLAYEY SAND(SC-SM)					25	18	7		

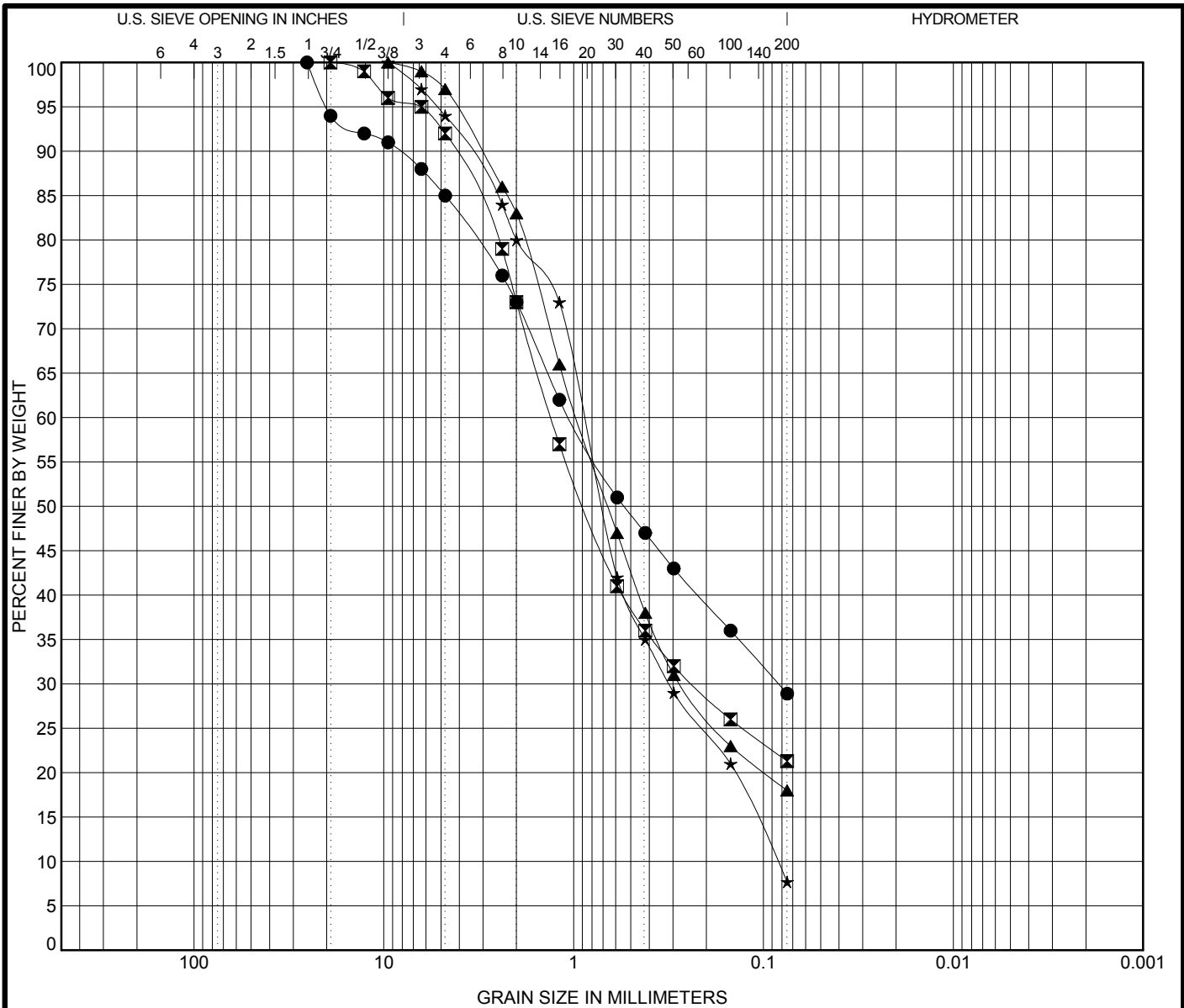
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-111 0.0 ft	19.1	1.415	0.457		17	70		13
☒ B-112 0.0 ft	25.4	0.926	0.132		12	63		26
▲ B-113 0.0 ft	19.1	1.149	0.318		11	74		15
★ B-114 0.0 ft	19.1	1.084	0.193		10	69		22
◎ B-115 0.0 ft	9.5	0.686			3	62		35

GRAIN SIZE DISTRIBUTION

Project: Tangerine Road Corridor Project
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 Job #: 63105079
 Date: 9-20-11



TC_GRAIN_SIZE_MULTI_63105079.GPJ TERRACON.GDT 9/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	USCS Soil Classification					LL	PL	PI	Cc	Cu
● B-116 0.0 ft	SILTY, CLAYEY SAND with GRAVEL(SC-SM)					23	18	5		
⊠ B-117 0.0 ft	CLAYEY SAND(SC)					29	18	11		
▲ B-118 0.0 ft	SILTY SAND(SM)					NP	NP	NP		
★ B-119 0.0 ft	WELL-GRADED SAND with SILT(SW-SM)					NP	NP	NP	1.3	10.5

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-116 0.0 ft	25.4	1.047	0.083		15	56		29
⊠ B-117 0.0 ft	19.1	1.312	0.236		8	71		21
▲ B-118 0.0 ft	9.5	0.954	0.272		3	79		18
★ B-119 0.0 ft	9.5	0.887	0.315	0.084	6	86		8

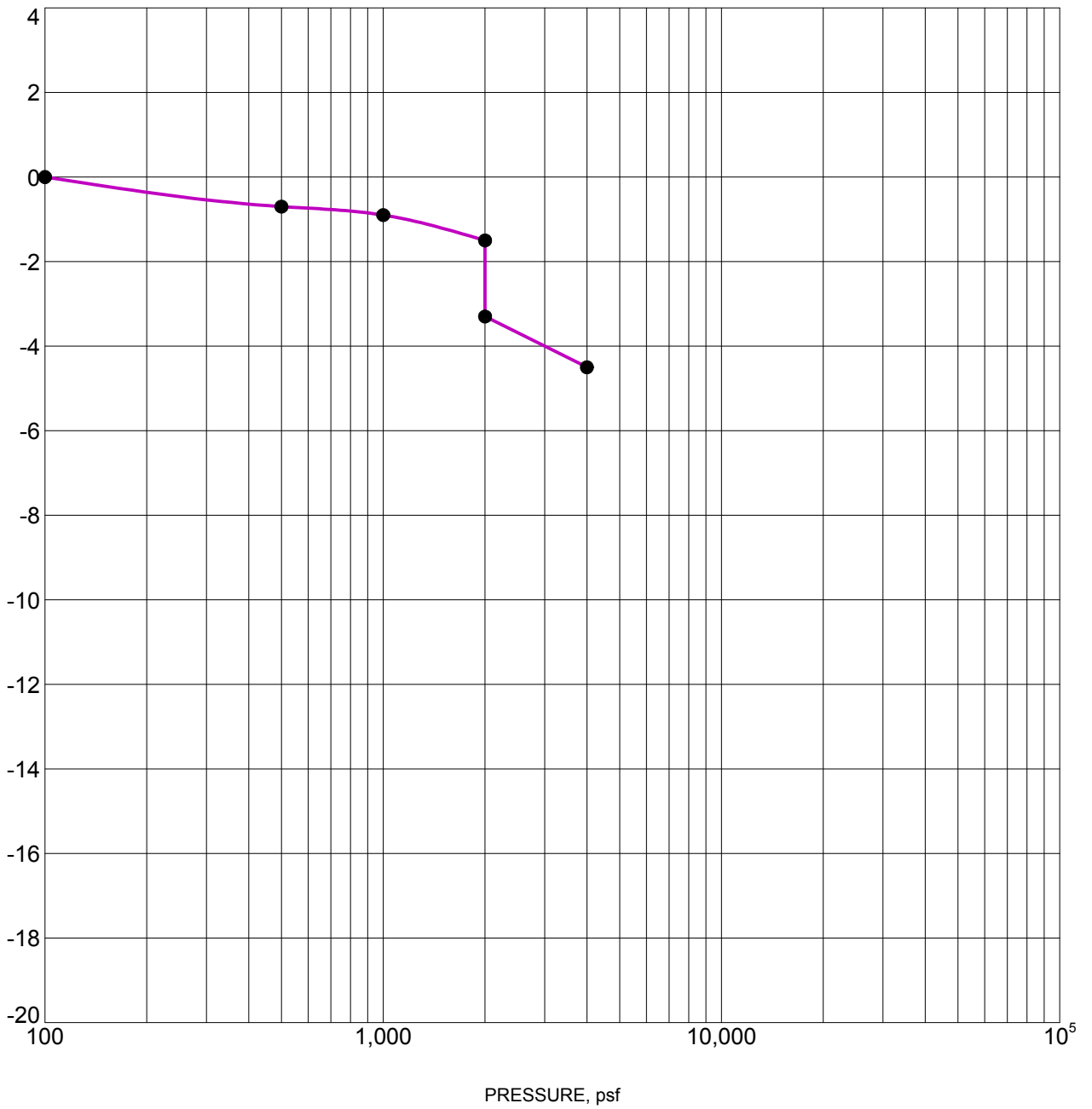
GRAIN SIZE DISTRIBUTION

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



TC_GRAIN_SIZE_MULTI 63105079.GPJ TERRACON.GDT 9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-015 2.0ft	SILTY SAND	119	2

Water added at 2,000 psf

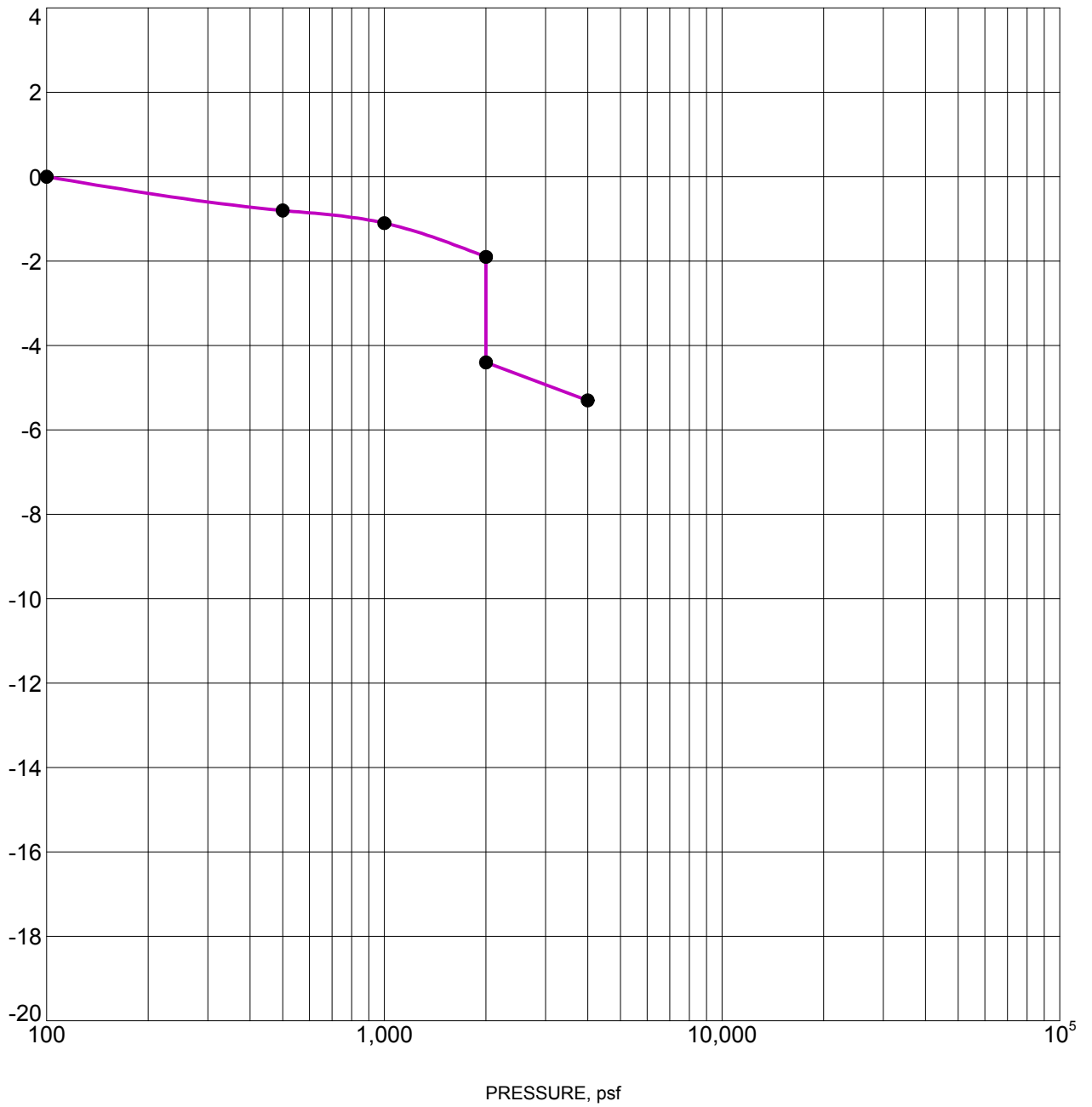


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-017 5.0ft	SILTY SAND	117	2

Water added at 2,000 psf

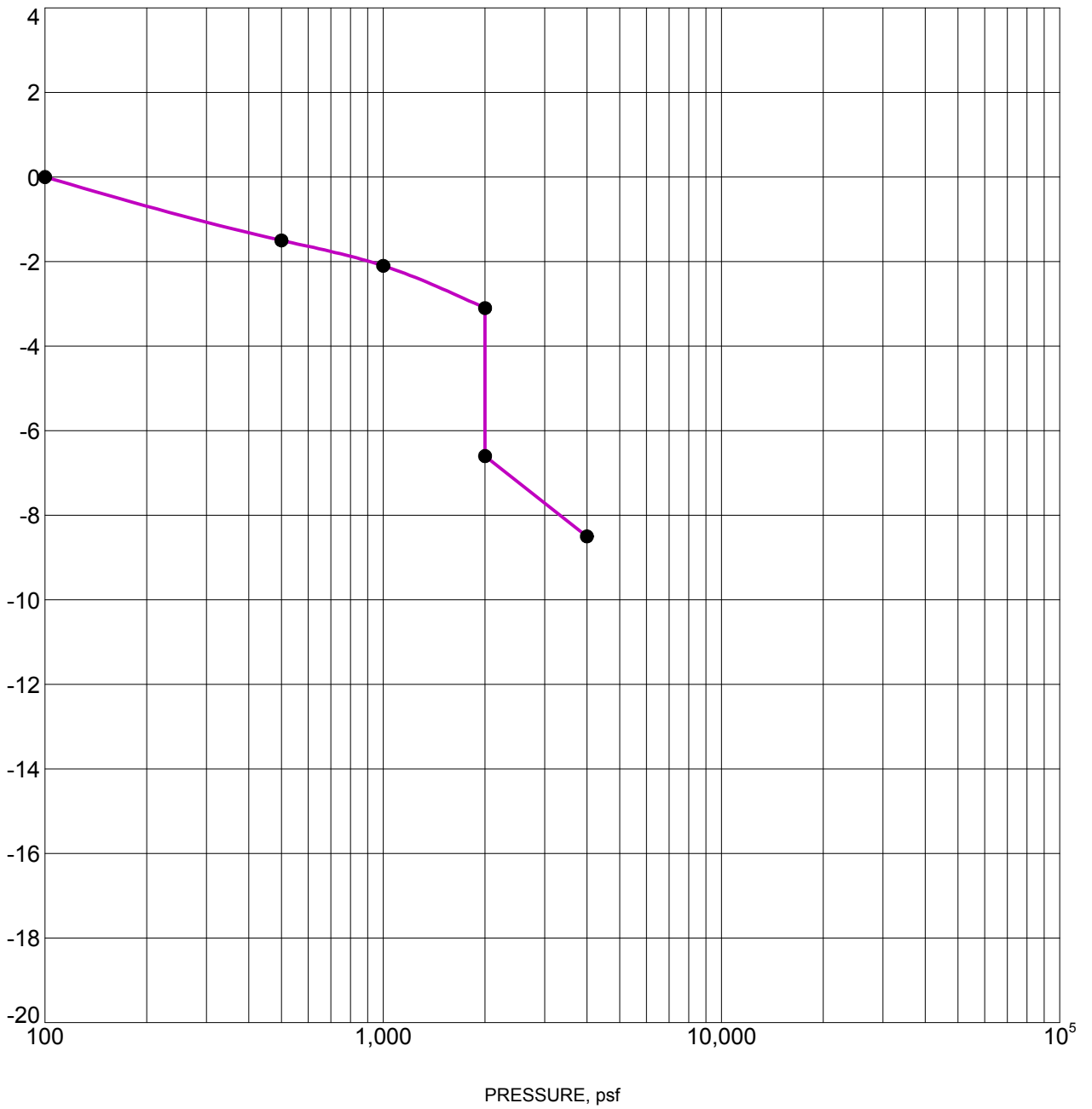


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-039 5.0ft	SILTY SAND	112	3

Water added at 2,000 psf

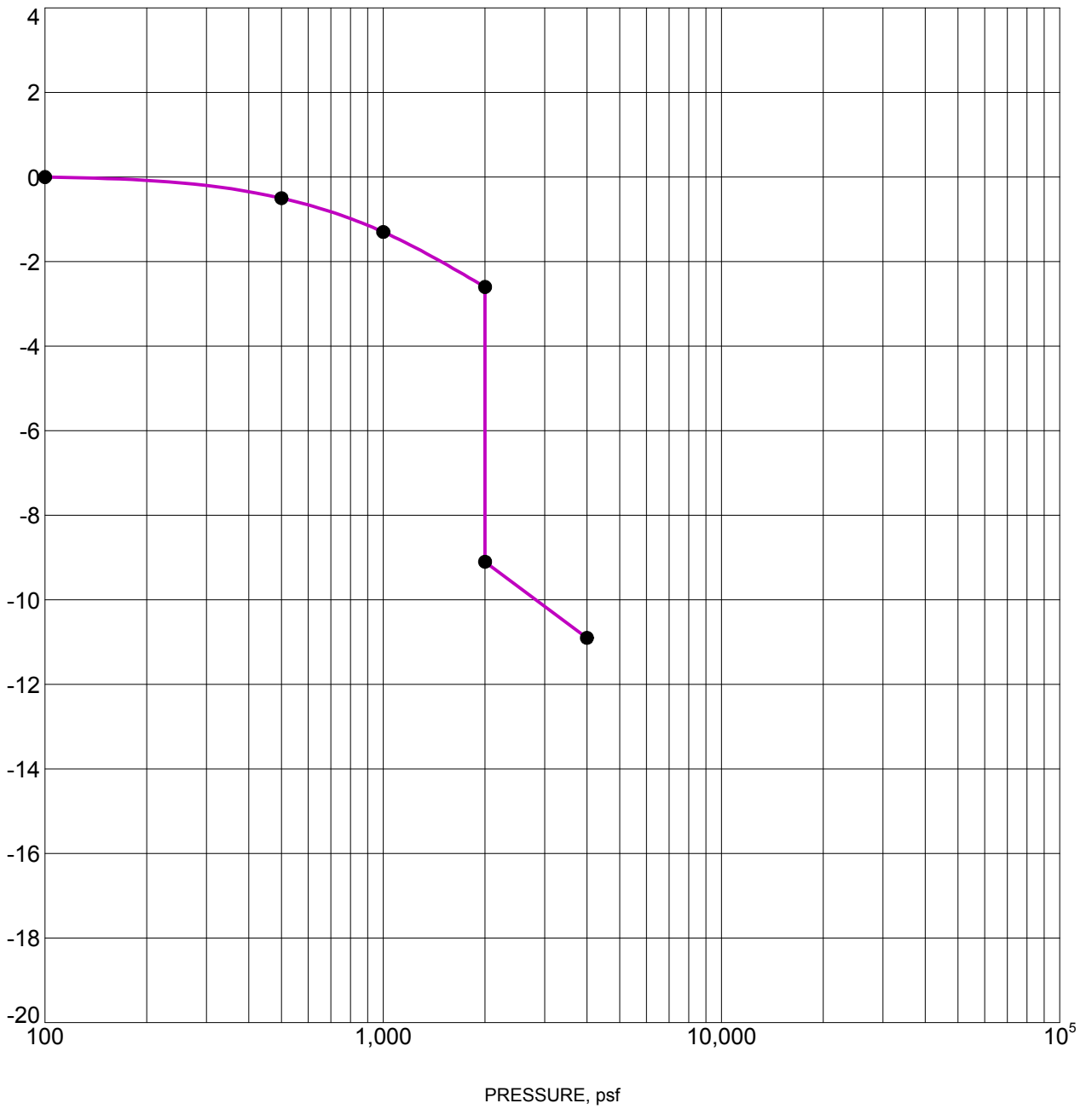


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-041 5.0ft	SILTY SAND	109	10

Water added at 2,000 psf

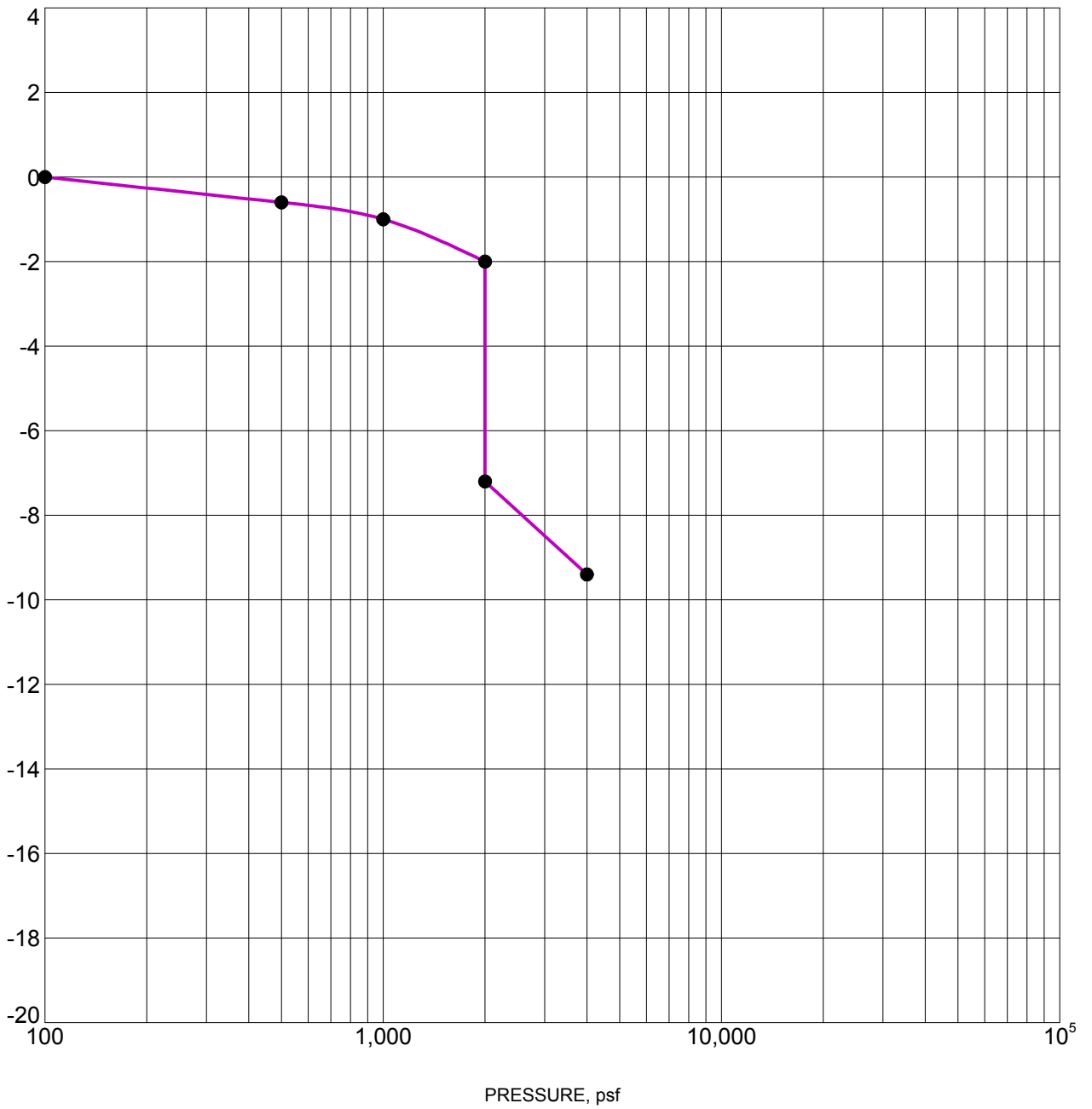


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-043 5.0ft	WELL GRADED SAND WITH SILT	114	3

Water added at 2,000 psf

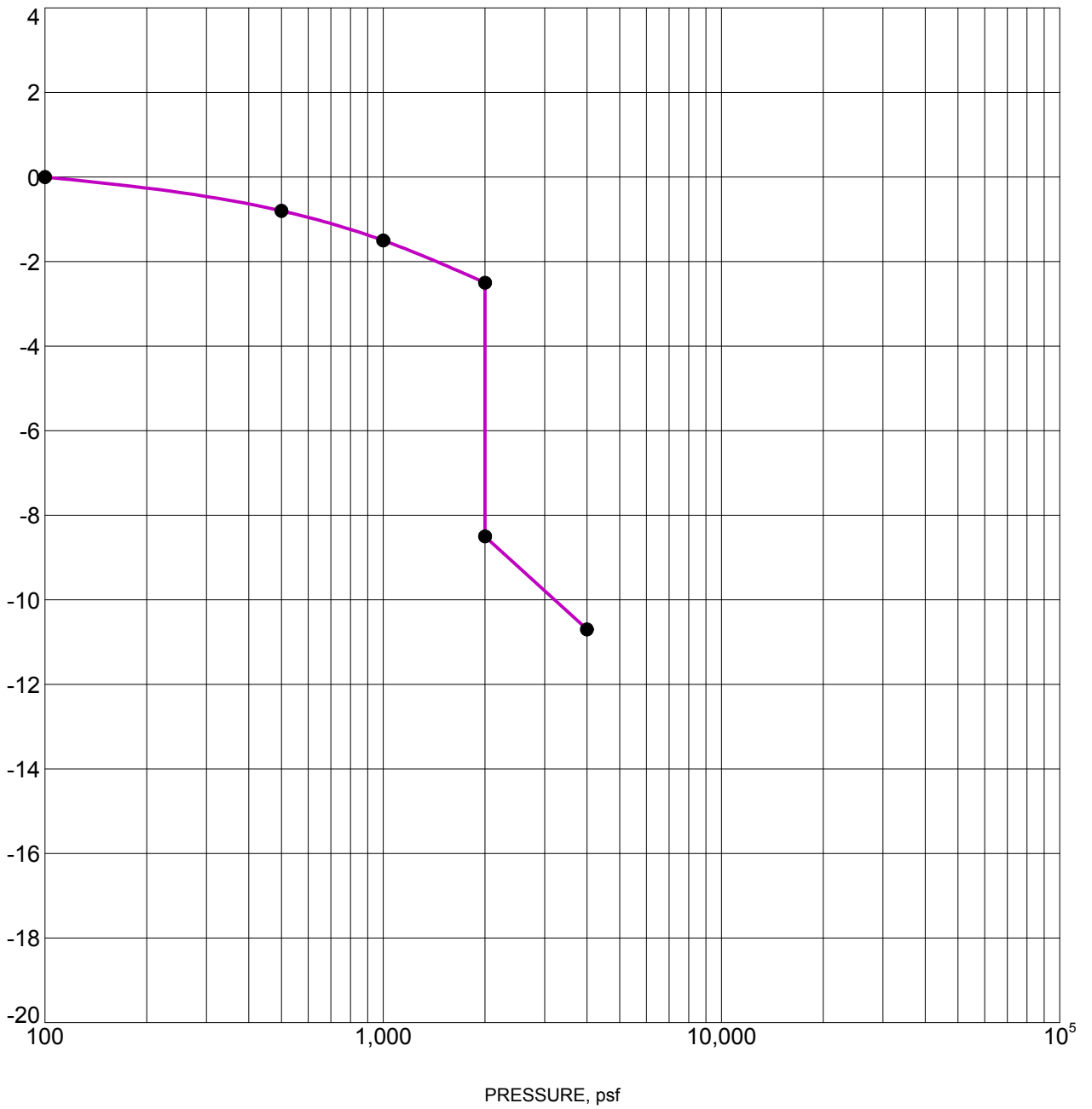


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-046 5.0ft	WELL GRADED SAND WITH SILT AND GRAVEL	112	2

Water added at 2,000 psf

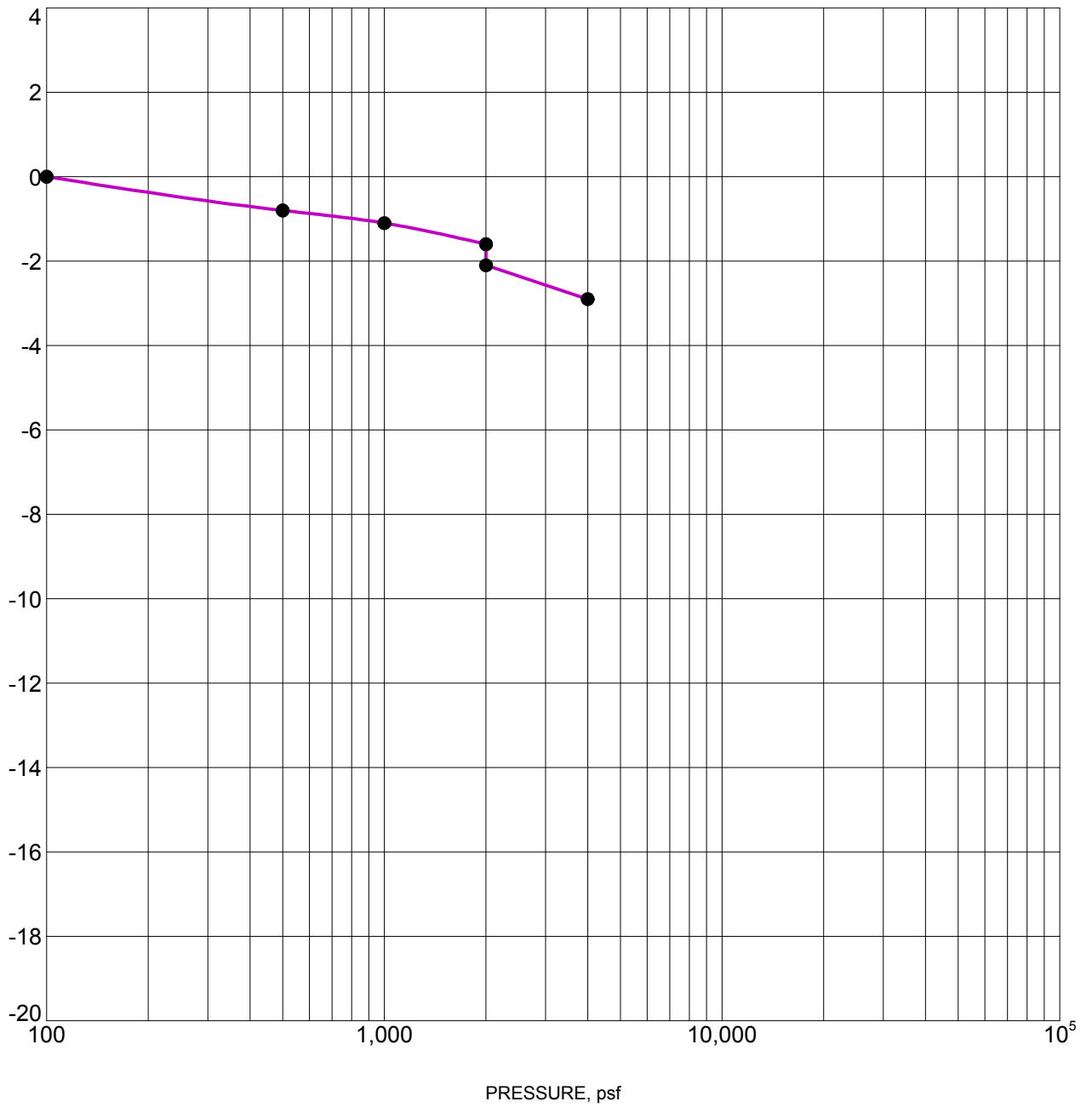


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-051 5.0ft	SILTY SAND	106	4

Water added at 2,000 psf

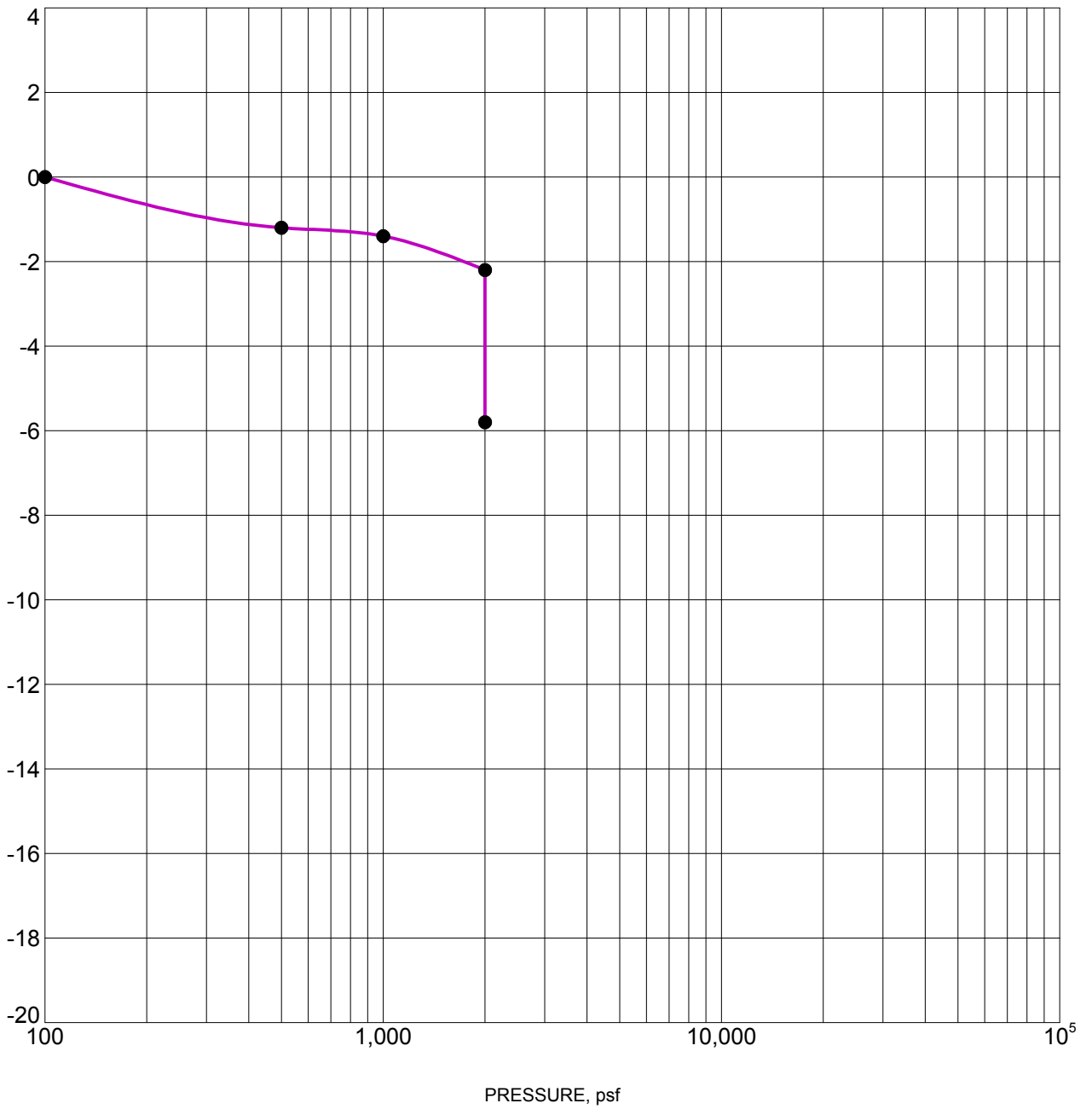


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-054 5.0ft	SILTY SAND	108	3

Water added at 2,000 psf

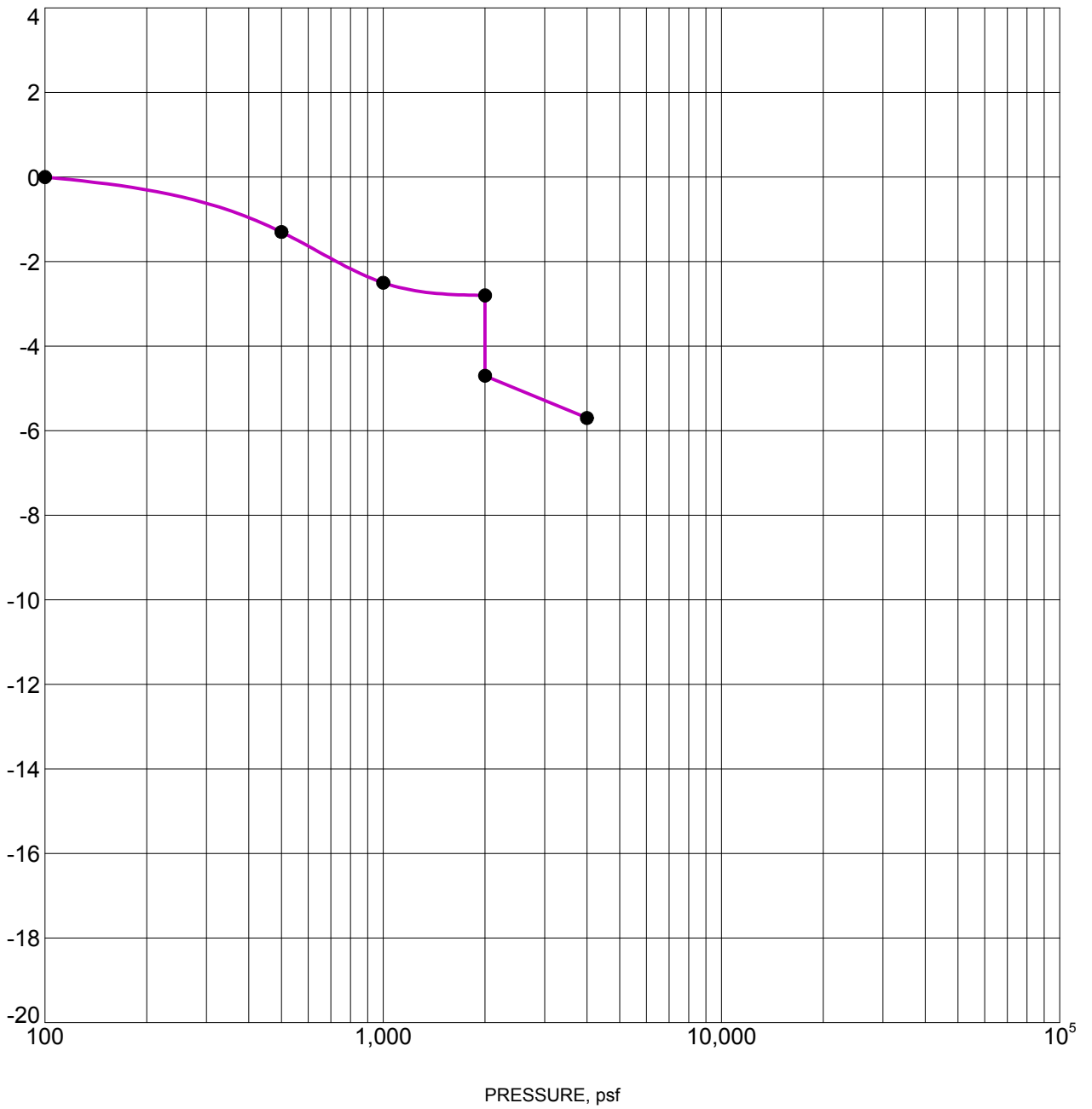


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-055 5.0ft	SILTY SAND	106	3

Water added at 2,000 psf

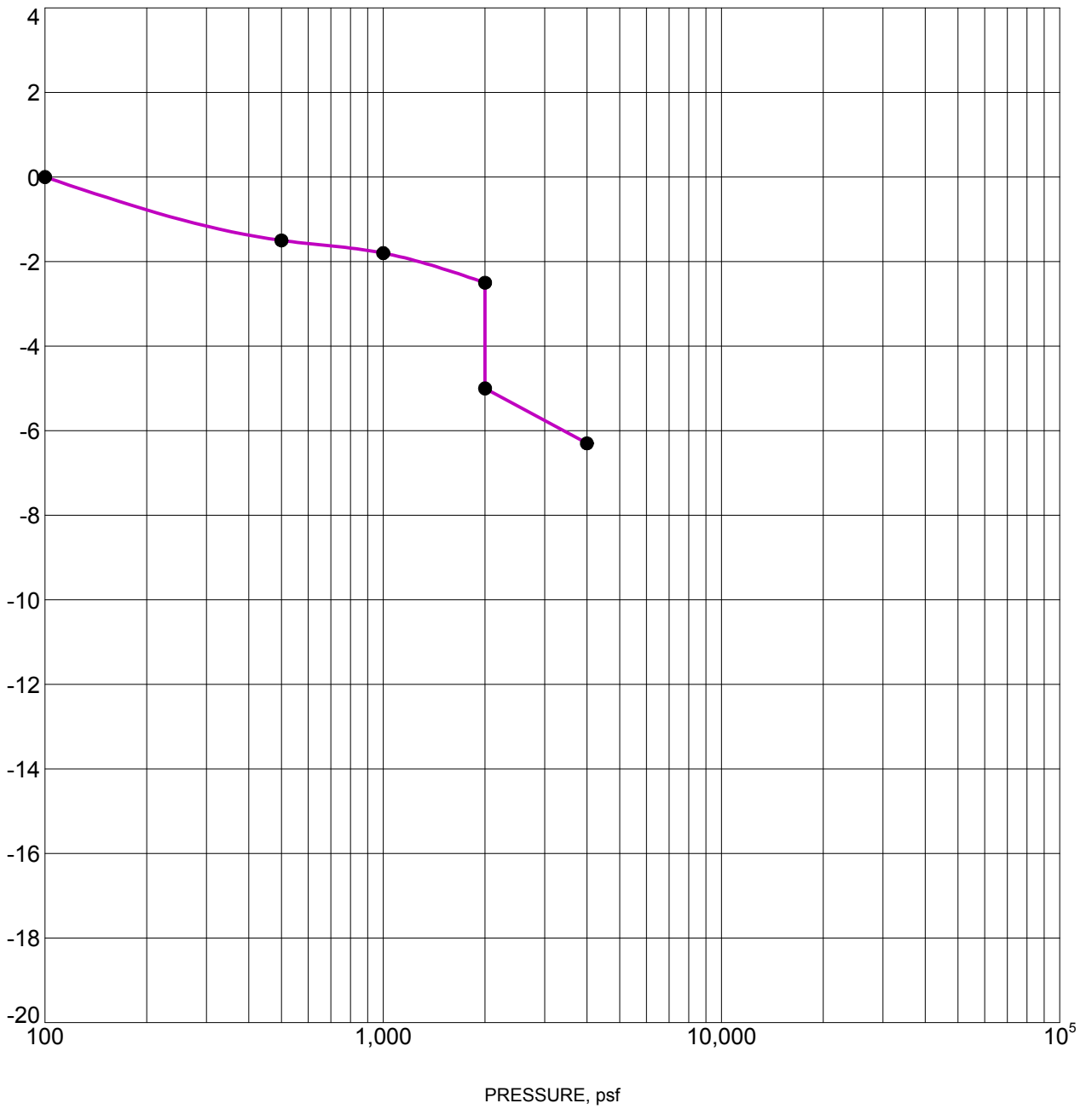


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-059 5.0ft	SILTY SAND	112	3

Water added at 2,000 psf

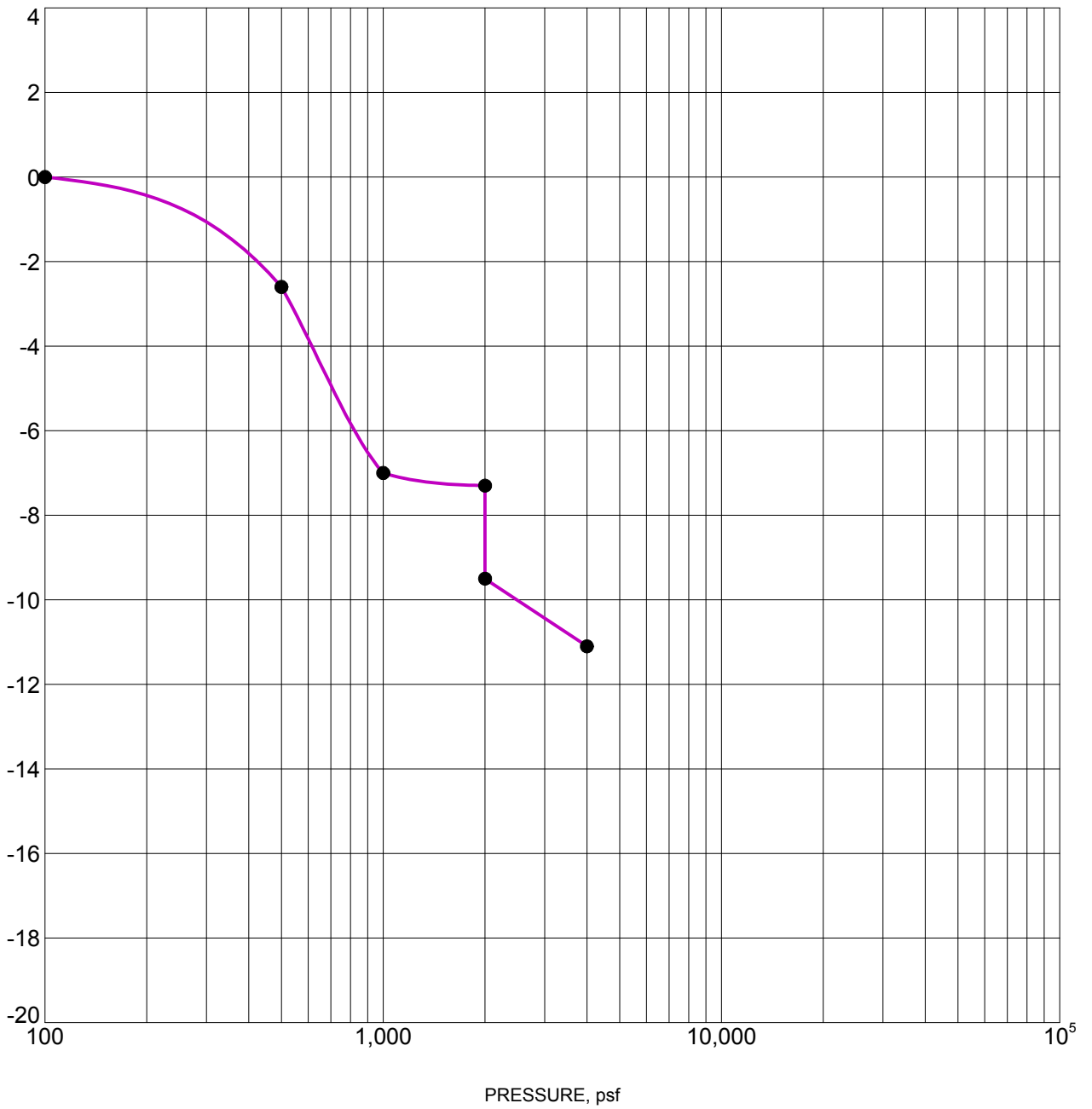


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-067 5.0ft	WELL GRADED SAND WITH SILT	116	4

Water added at 2,000 psf

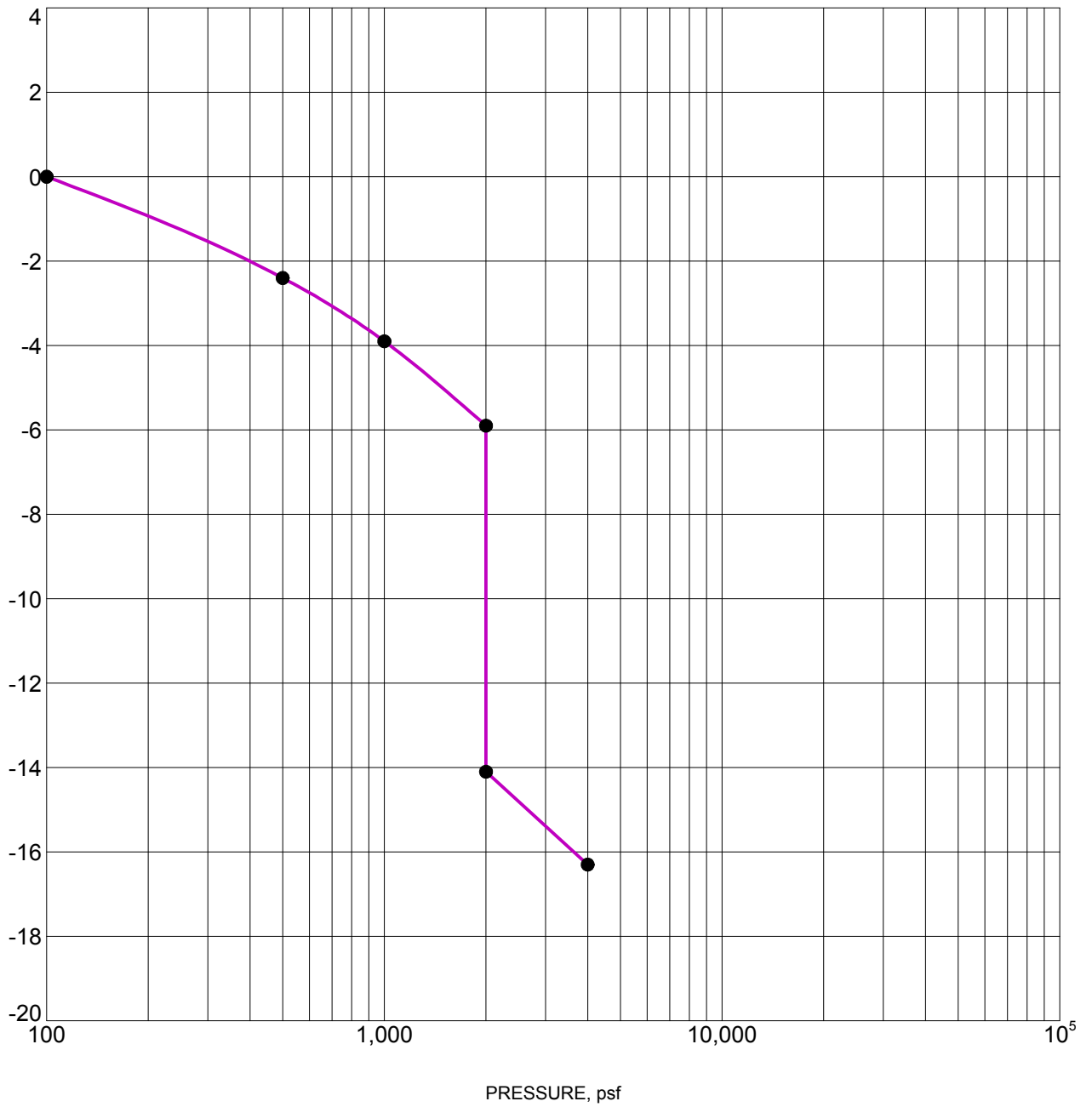


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-069 5.0ft	CLAYEY SAND	103	5

Water added at 2,000 psf

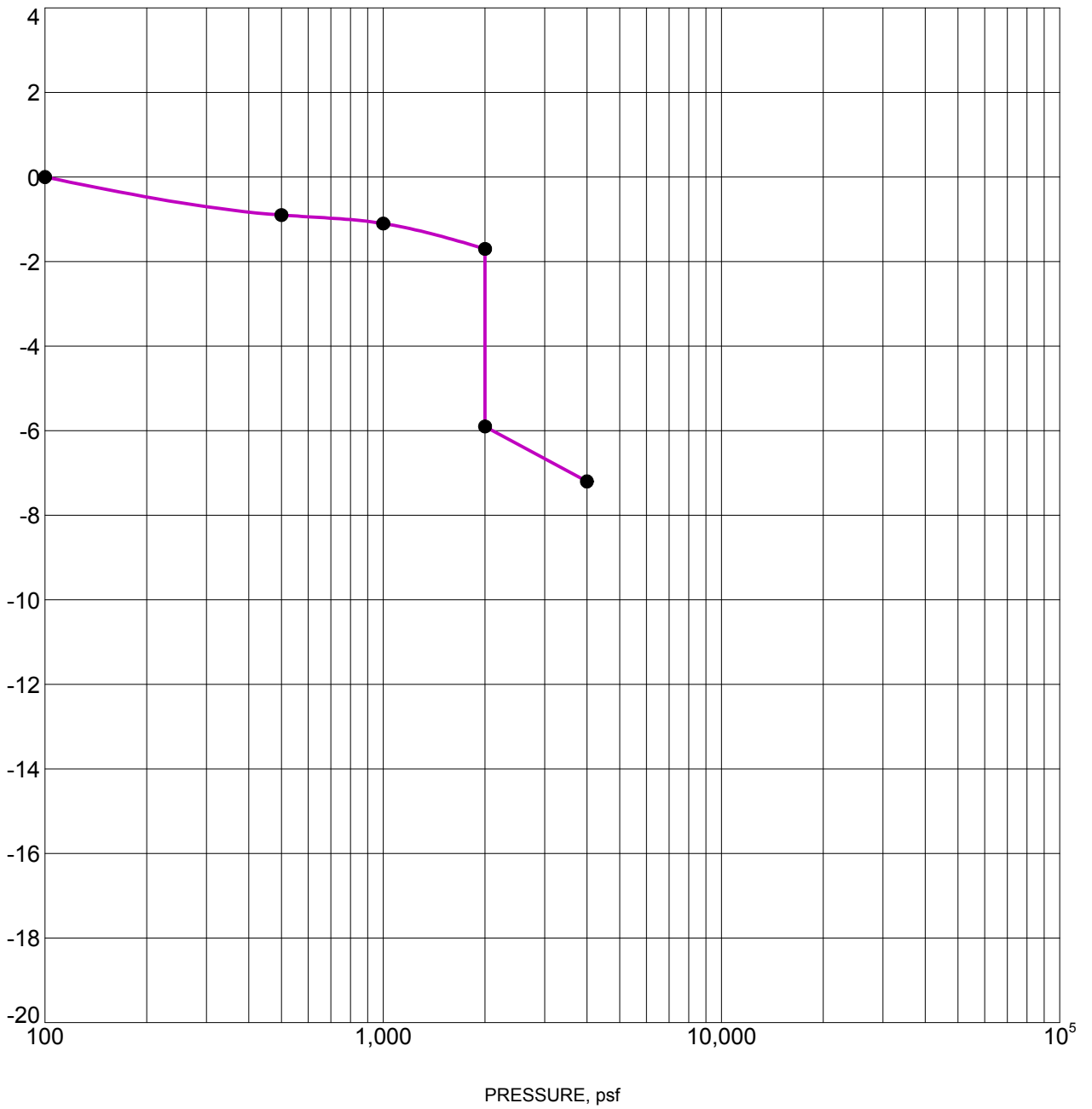


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-074 5.0ft	SILTY SAND	106	2

Water added at 2,000 psf

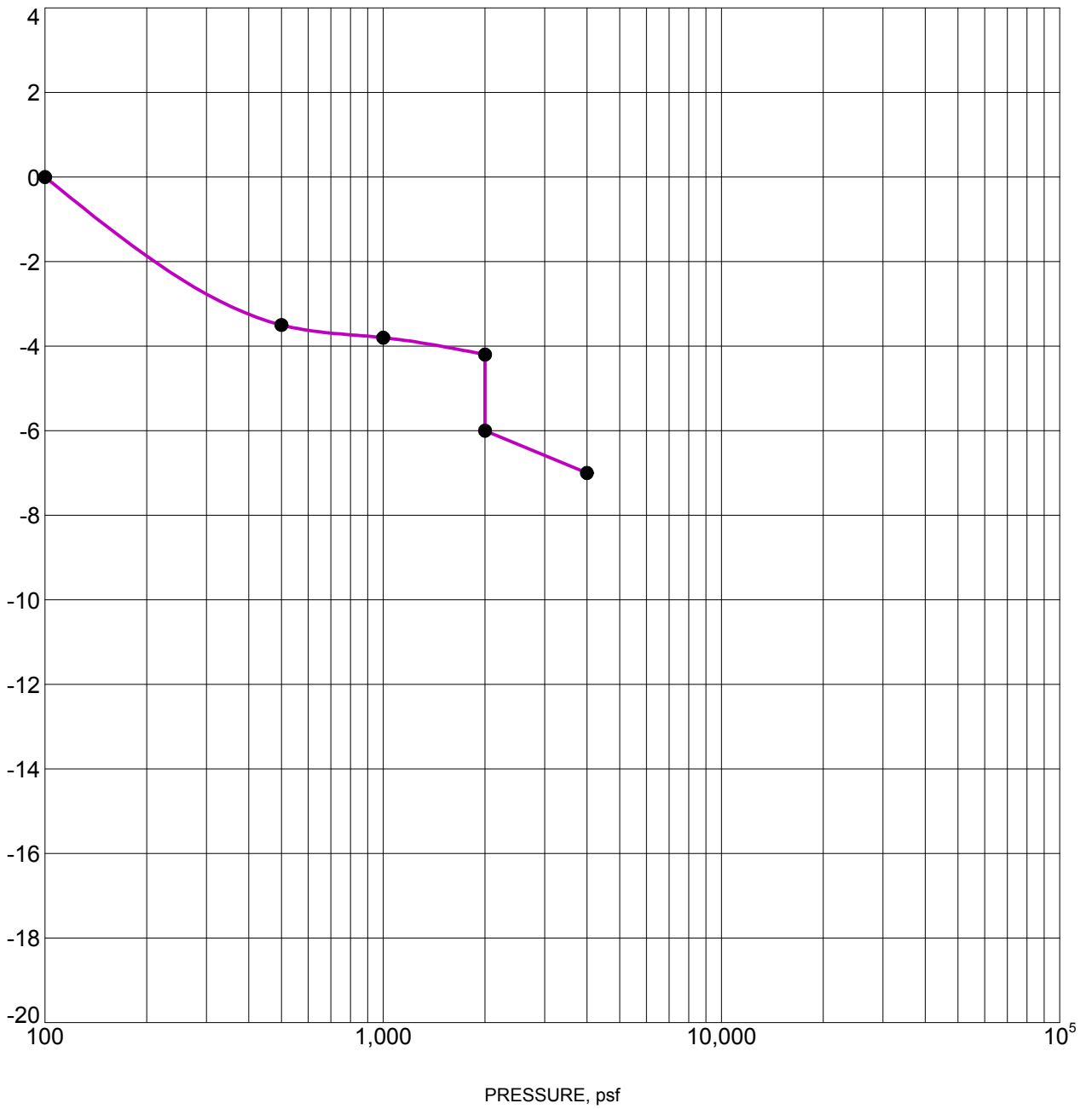


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-078 2.0ft	WELL GRADED SAND WITH SILT	111	2

Water added at 2,000 psf

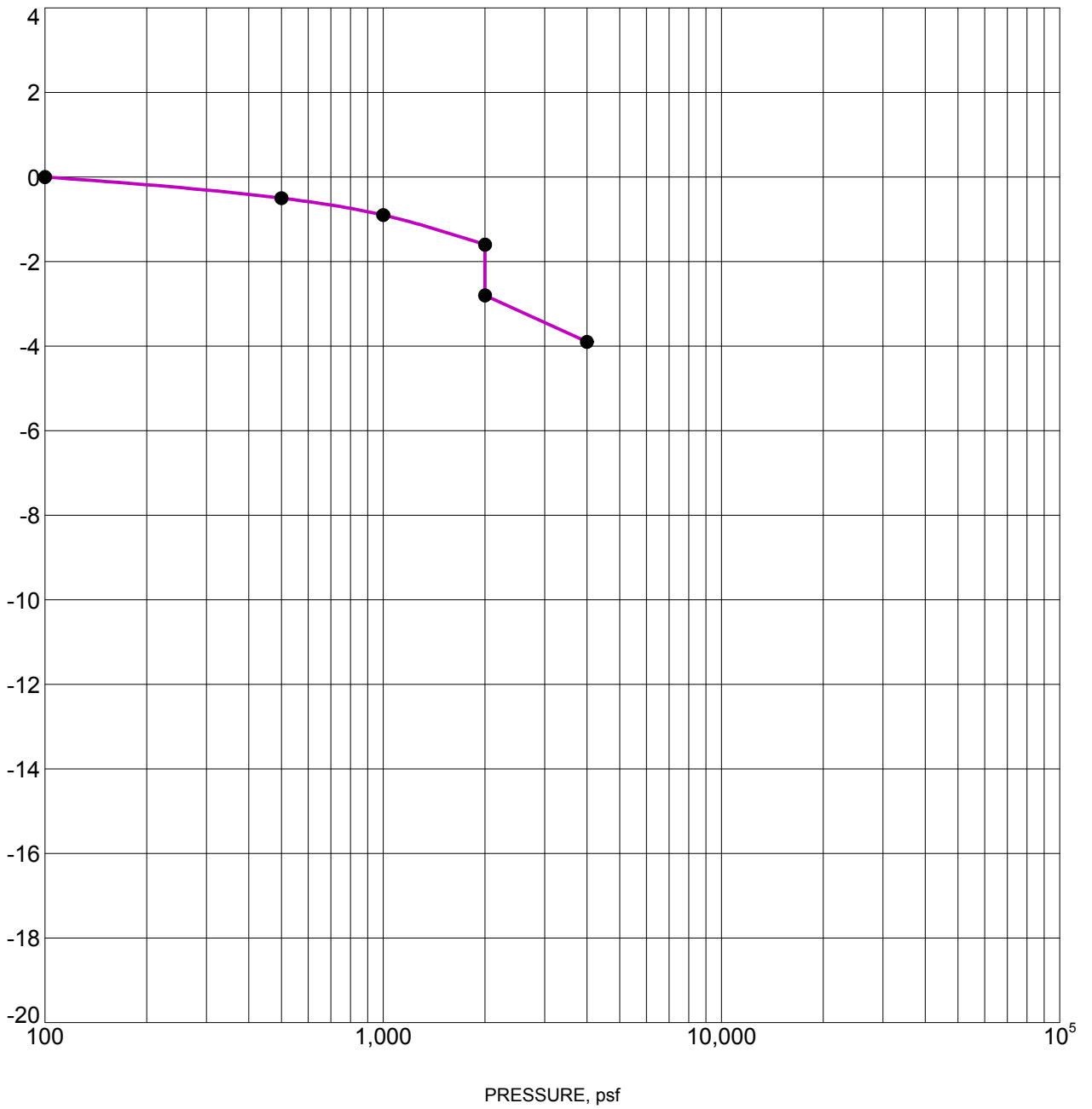


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
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 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-080 10.0ft	SILTY SAND	108	2

Water added at 2,000 psf

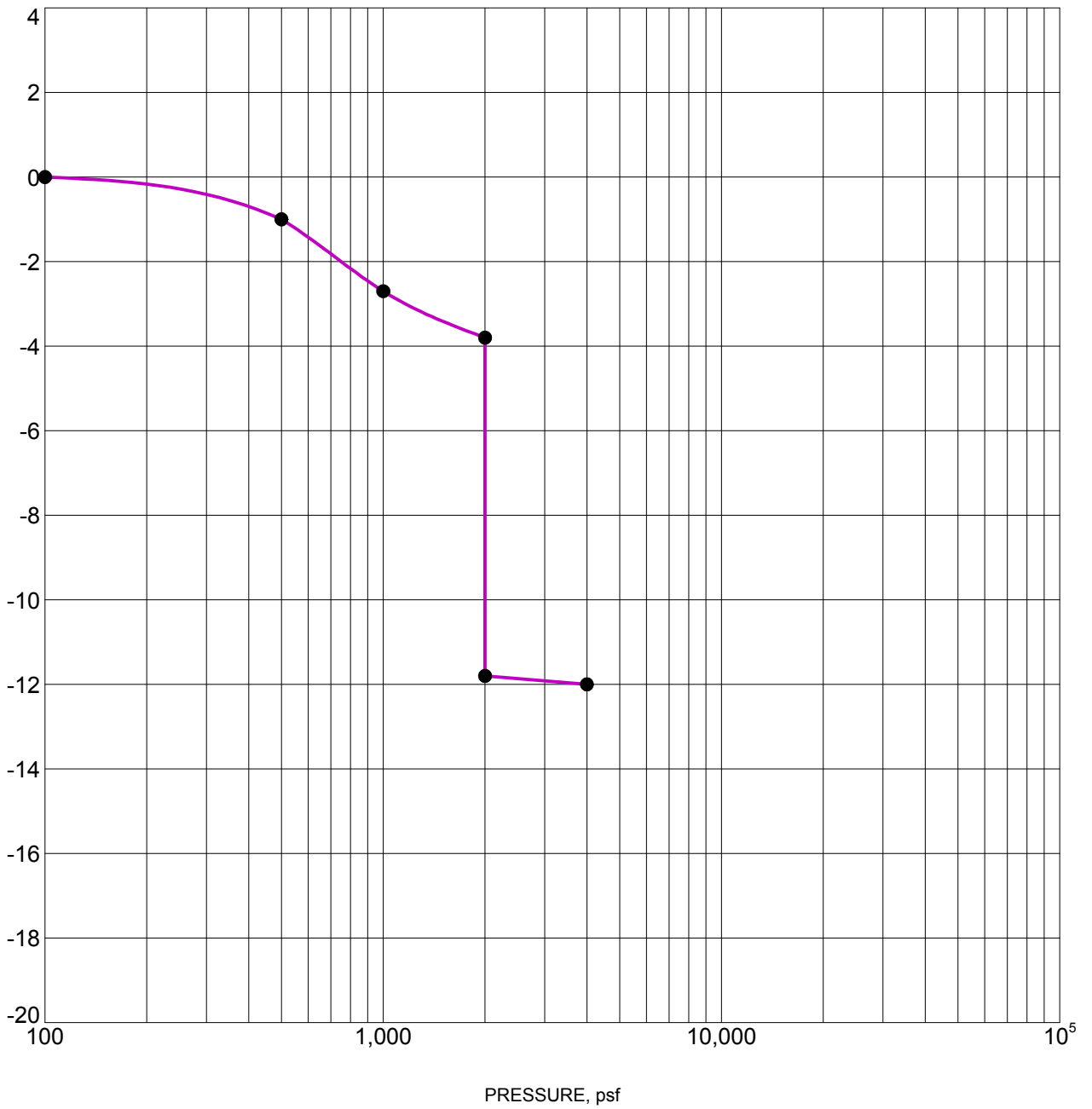


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
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 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-085 10.0ft	SILTY SAND	113	2

Water added at 2,000 psf

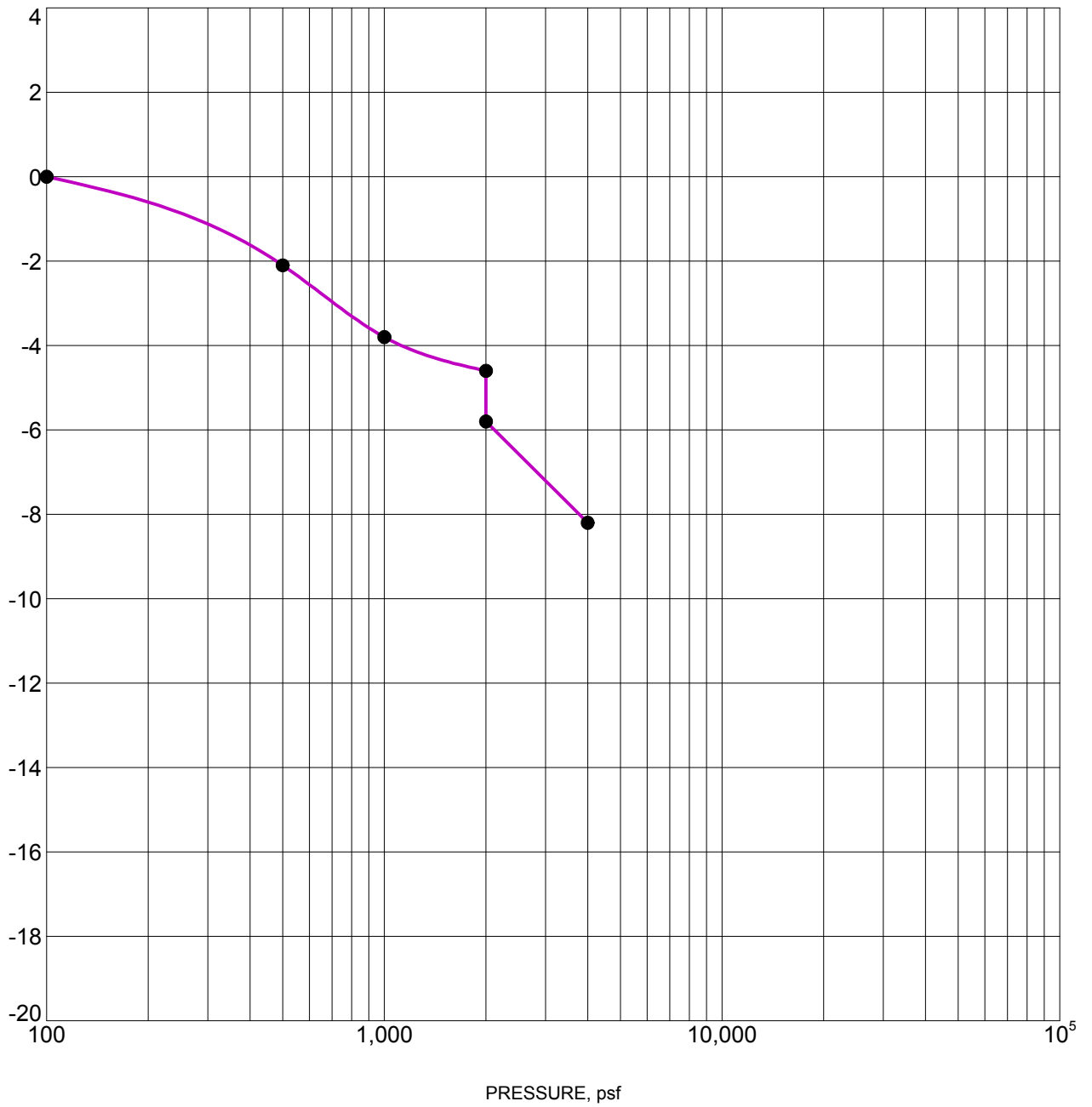


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-089 10.0ft	SILTY SAND	103	2

Water added at 2,000 psf

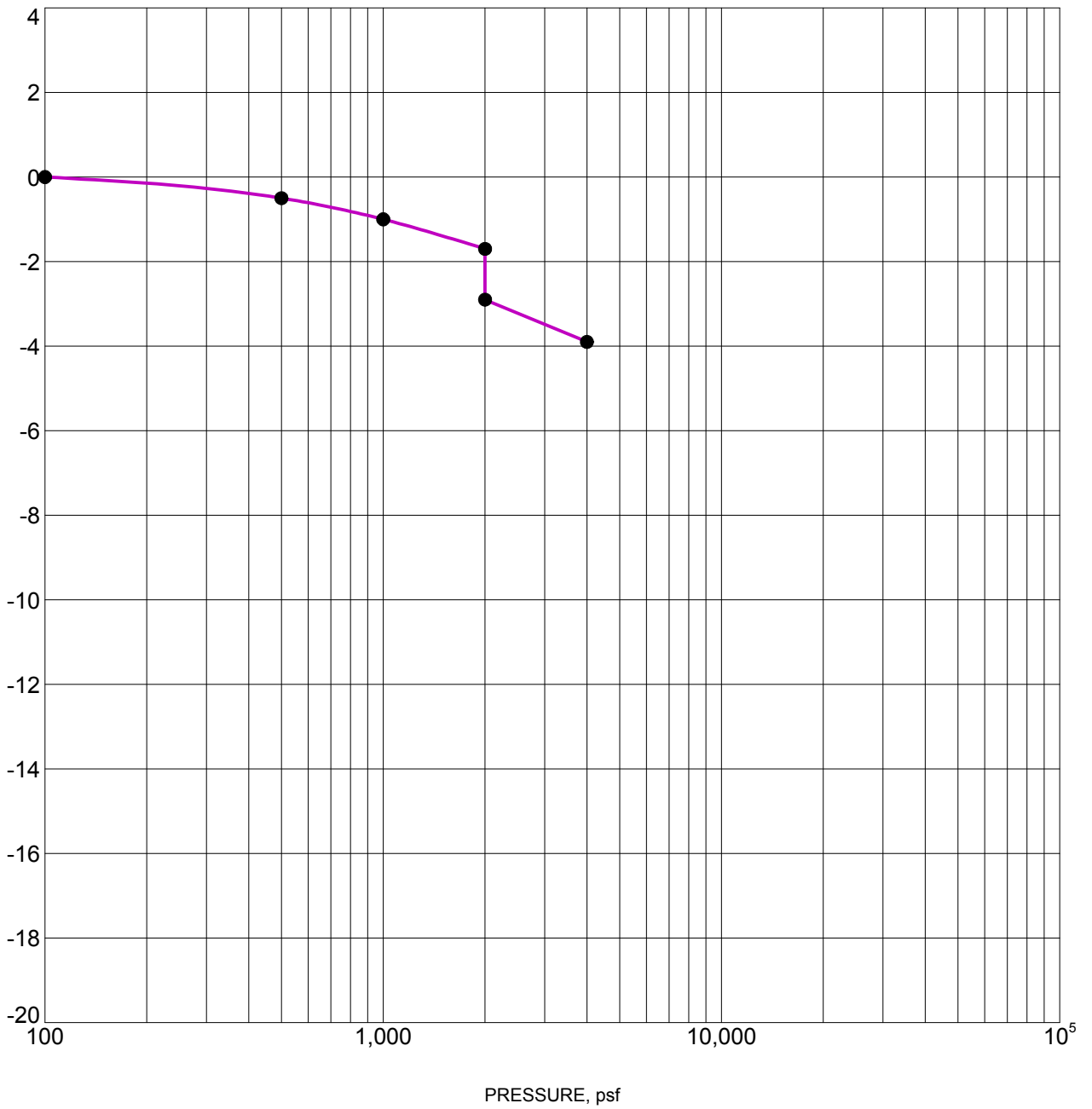


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
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 Job #: 63105079
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TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-091 10.0ft	SILTY SAND	114	3

Water added at 2,000 psf

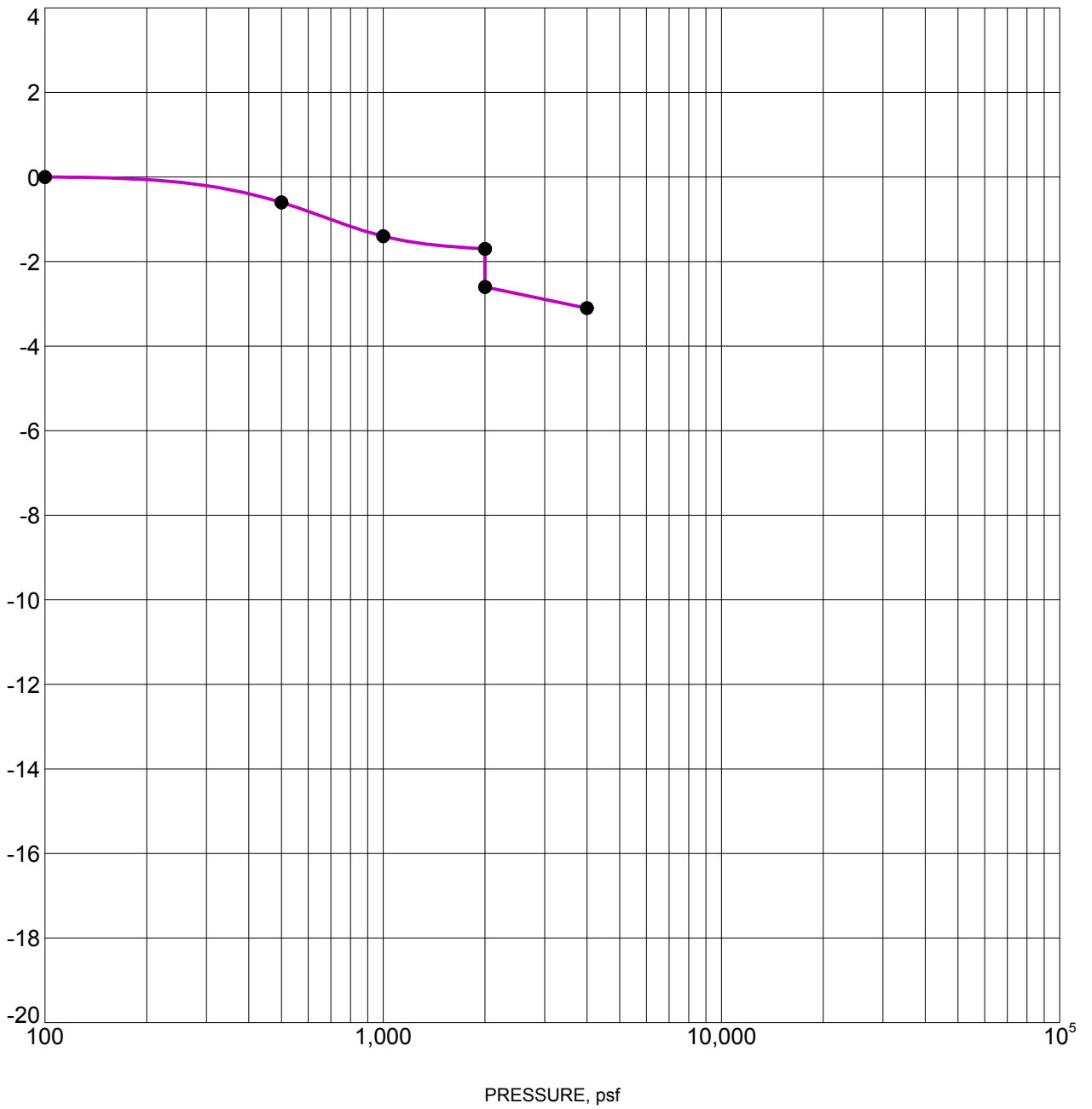


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-101 10.0ft	WELL GRADED SAND WITH SILT	111	2

Water added at 2,000 psf

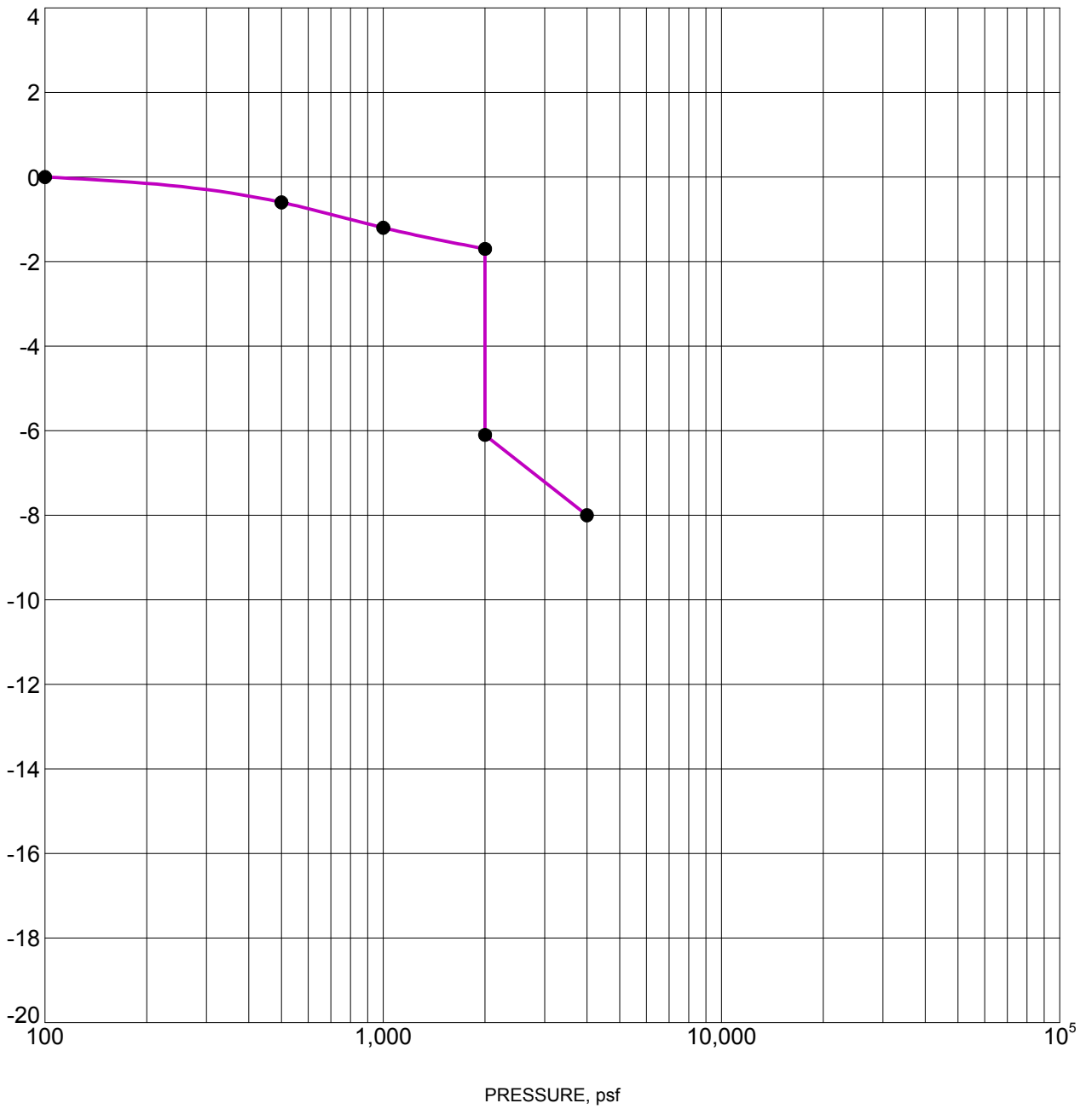


CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
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TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11

AXIAL STRAIN, %



Specimen Identification	Classification	γ_d , pcf	WC, %
● B-119 5.0ft	WELL GRADED SAND WITH SILT	101	8

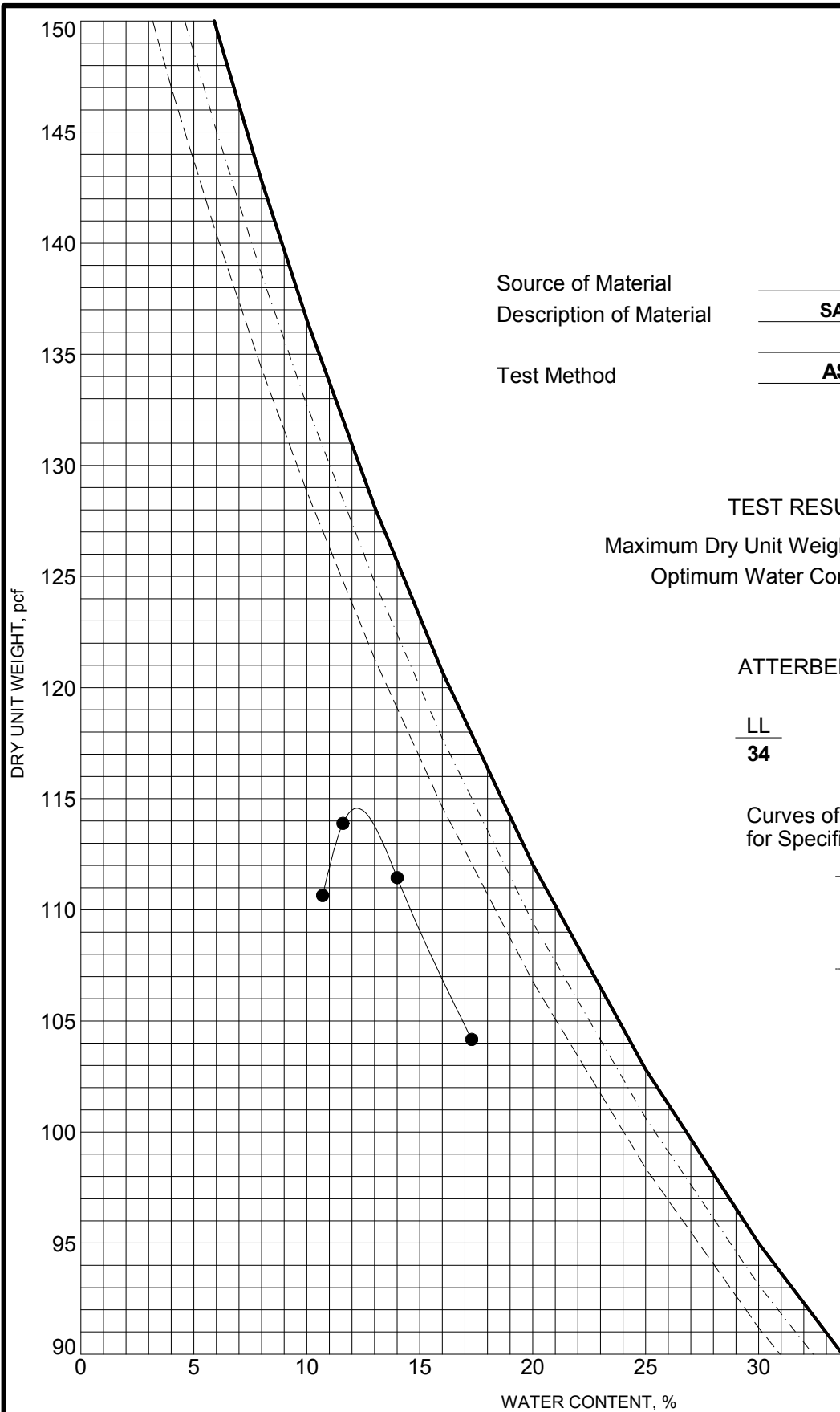
Water added at 2,000 psf



CONSOLIDATION TEST RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
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 Date: 9-20-11

TC_CONSOL_STRAIN_63105079.GPJ_TERRACON.GDT_9/20/11



Source of Material B-004 0.0ft
 Description of Material SANDY LEAN CLAY with GRAVEL (CL)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 114.5 PCF
 Optimum Water Content 12.0 %

ATTERBERG LIMITS

LL	PL	PI
34	20	14

Curves of 100% Saturation for Specific Gravity Equal to:

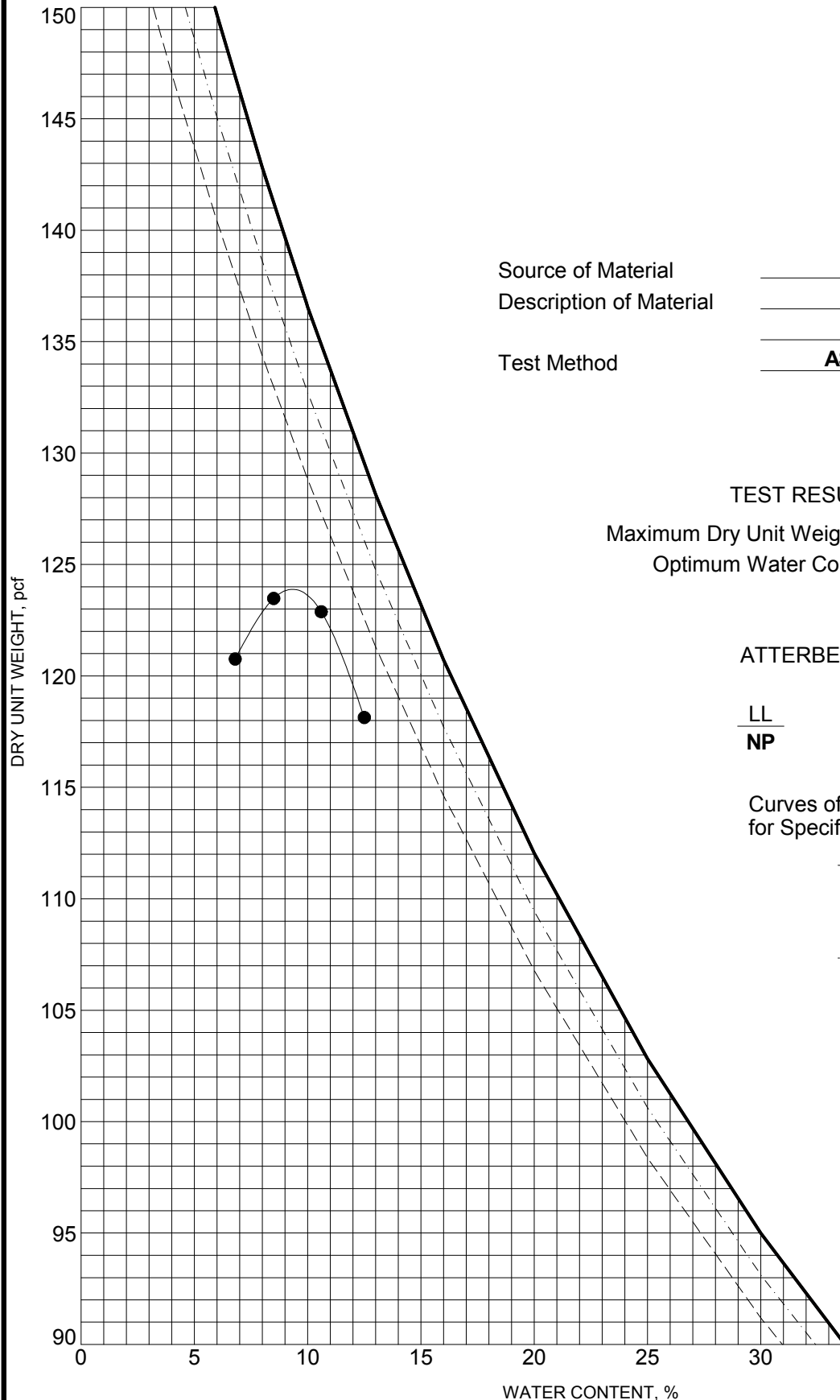
- 2.80
- - - - - 2.70
- · - · - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-010 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 124.0 PCF
 Optimum Water Content 9.5 %

ATTERBERG LIMITS

LL NP	PL NP	PI NP

Curves of 100% Saturation for Specific Gravity Equal to:

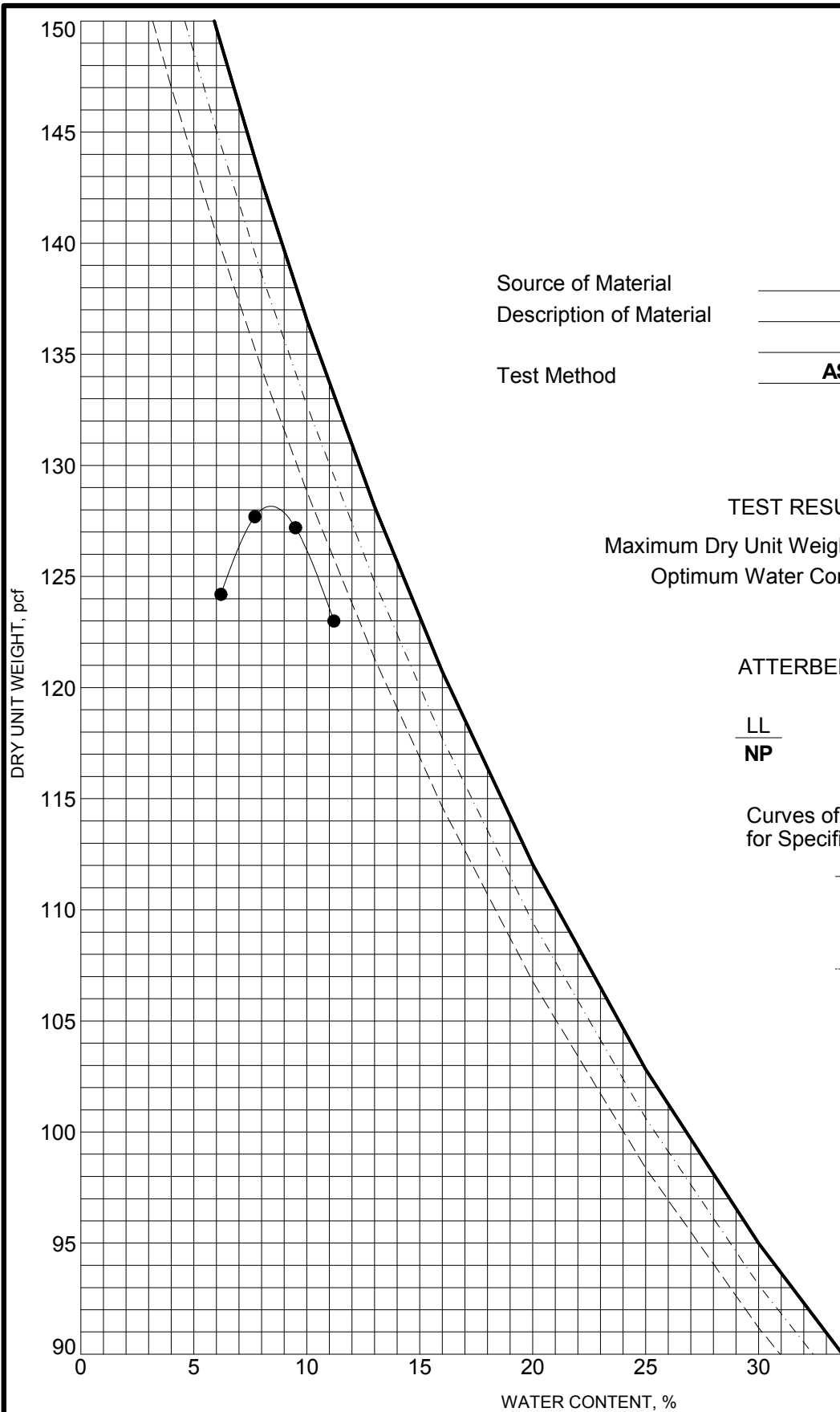
- 2.80
- - - - - 2.70
- - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-026 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 128.2 PCF
 Optimum Water Content 8.4 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

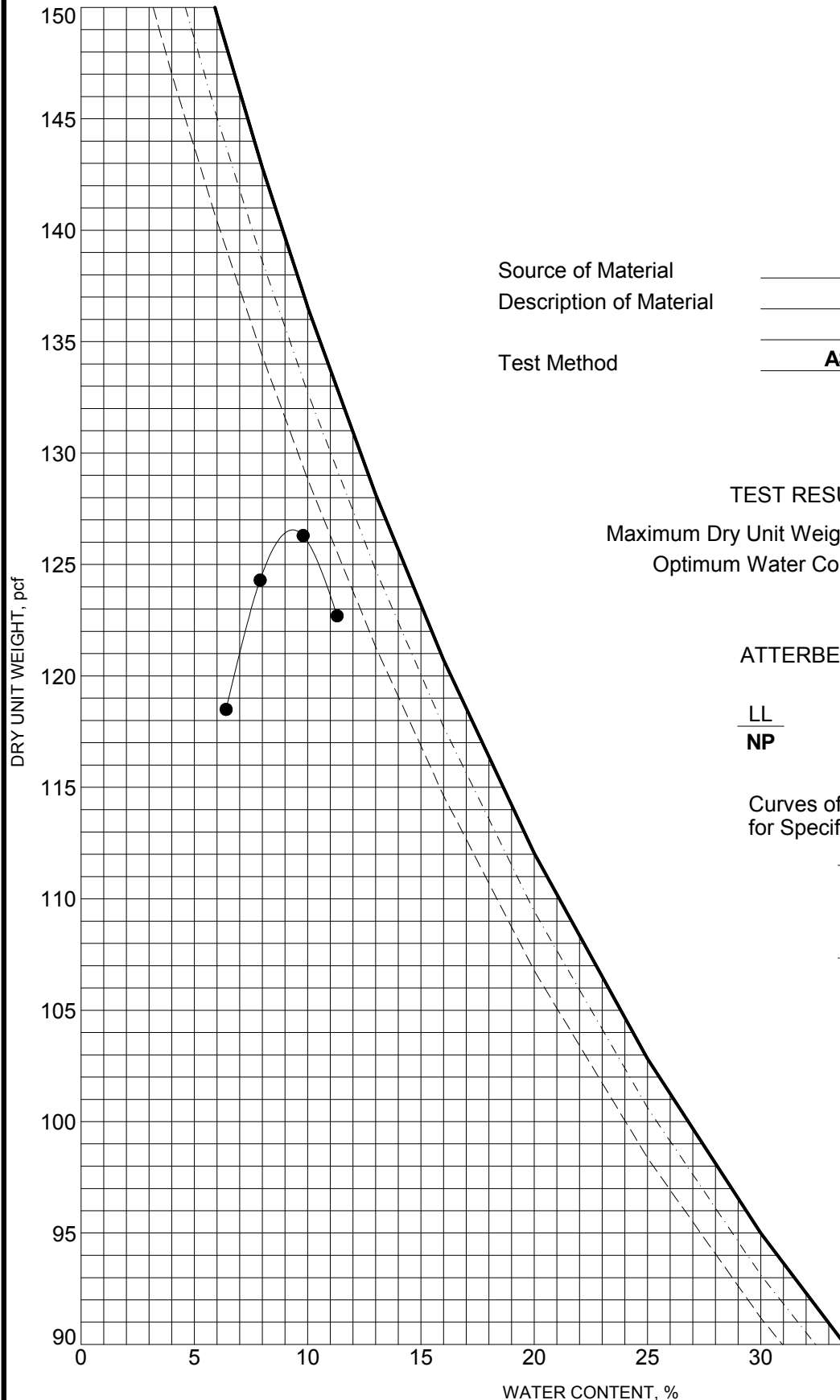
Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-030 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 126.6 PCF
 Optimum Water Content 9.3 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation for Specific Gravity Equal to:

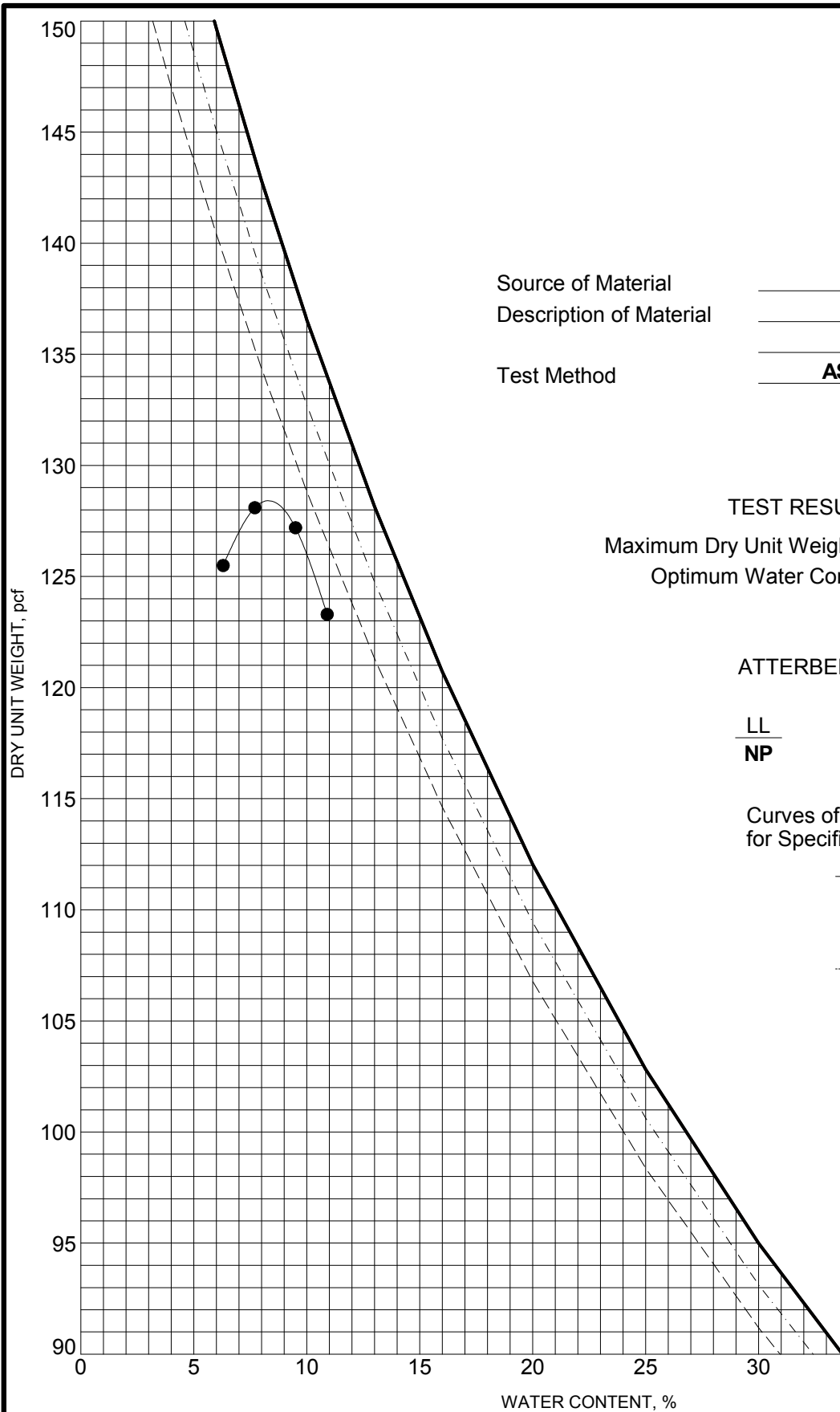
————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-034 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 128.4 PCF
 Optimum Water Content 8.3 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - - - - - 2.60

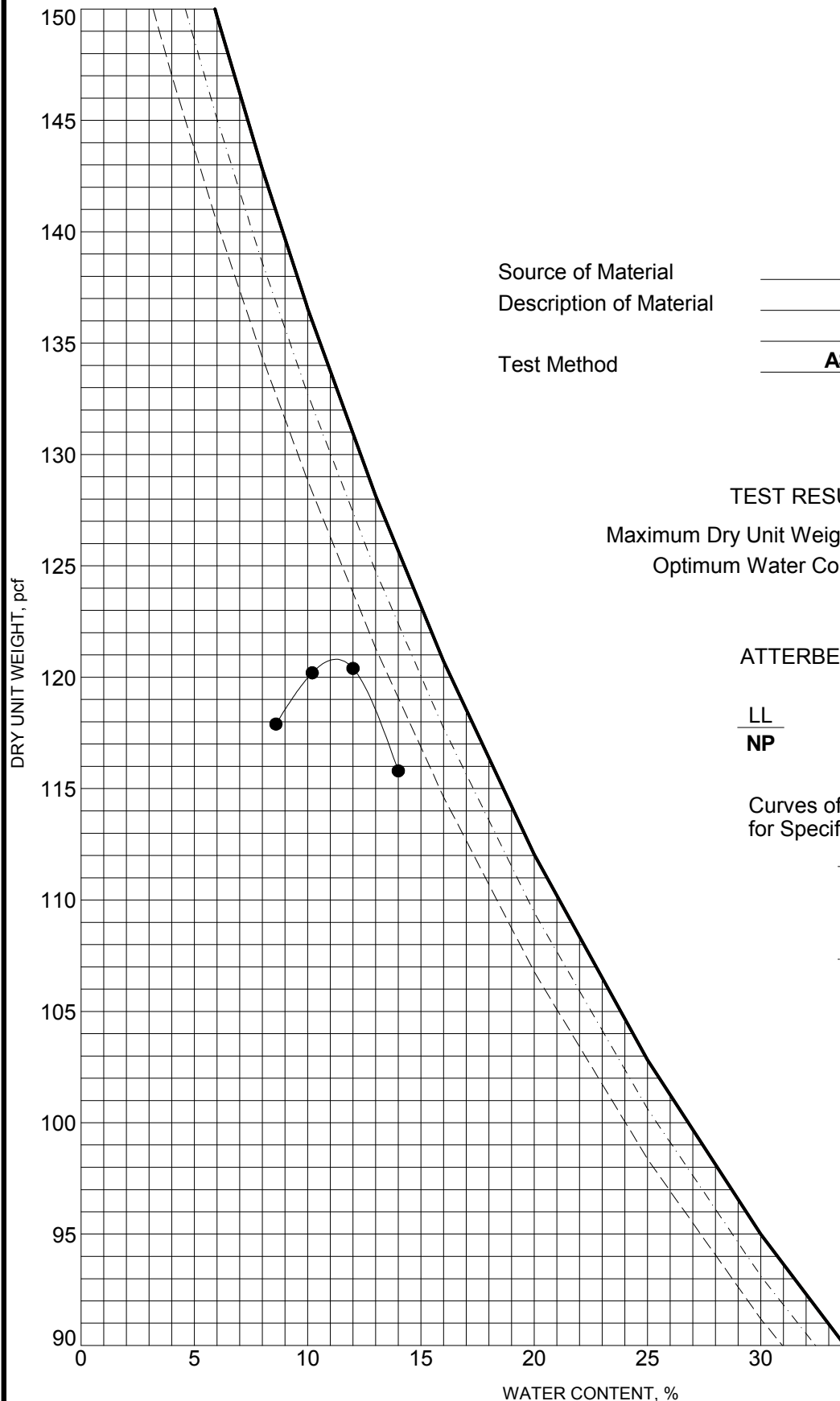
TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



Source of Material	<u>B-037 0.0ft</u>
Description of Material	<u>SILTY SAND(SM)</u>
Test Method	<u>ASTM D698 Method A</u>

TEST RESULTS	
Maximum Dry Unit Weight	<u>120.8 PCF</u>
Optimum Water Content	<u>11.2 %</u>

ATTERBERG LIMITS

<u>LL</u>	<u>PL</u>	<u>PI</u>
NP	NP	NP

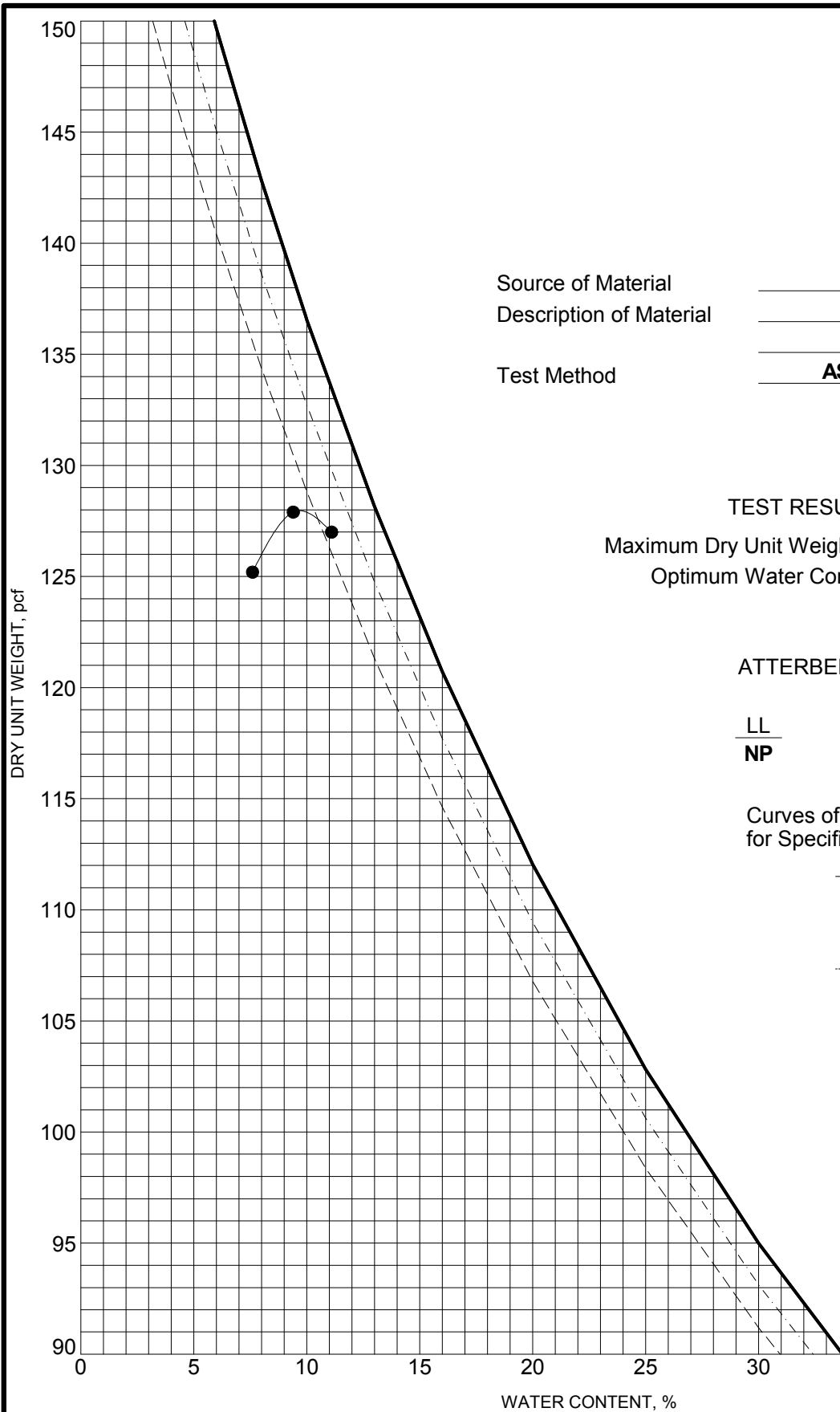
Curves of 100% Saturation for Specific Gravity Equal to:

—————	2.80
.....	2.70
-----	2.60

MOISTURE-DENSITY RELATIONSHIP



Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-041 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 128.0 PCF
 Optimum Water Content 9.7 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation
 for Specific Gravity Equal to:

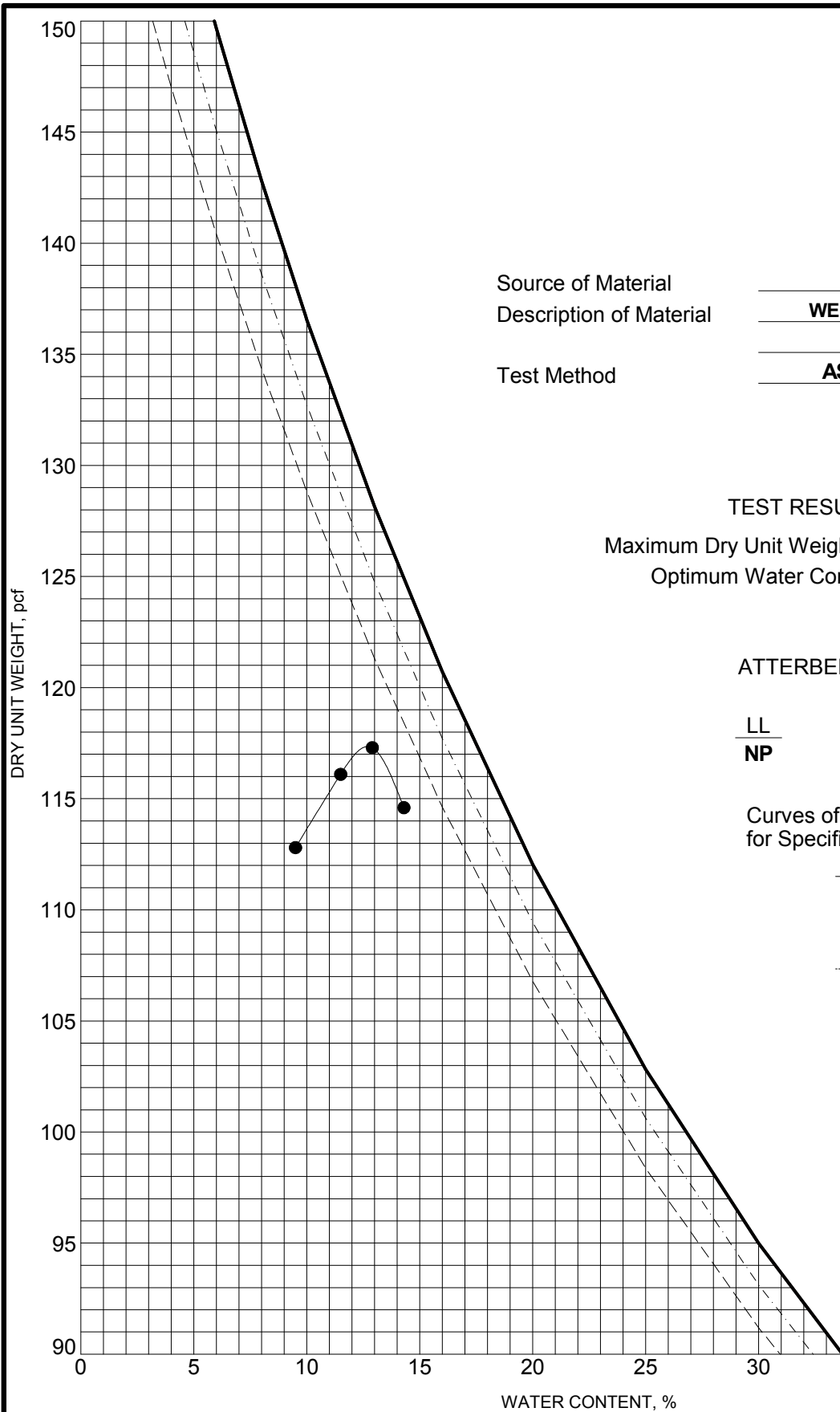
- 2.80
- - - - - 2.70
- - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-043 0.0ft
 Description of Material WELL-GRADED SAND with SILT(SW-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 117.4 PCF
 Optimum Water Content 12.7 %

ATTERBERG LIMITS

LL NP	PL NP	PI NP

Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - · - · - 2.60

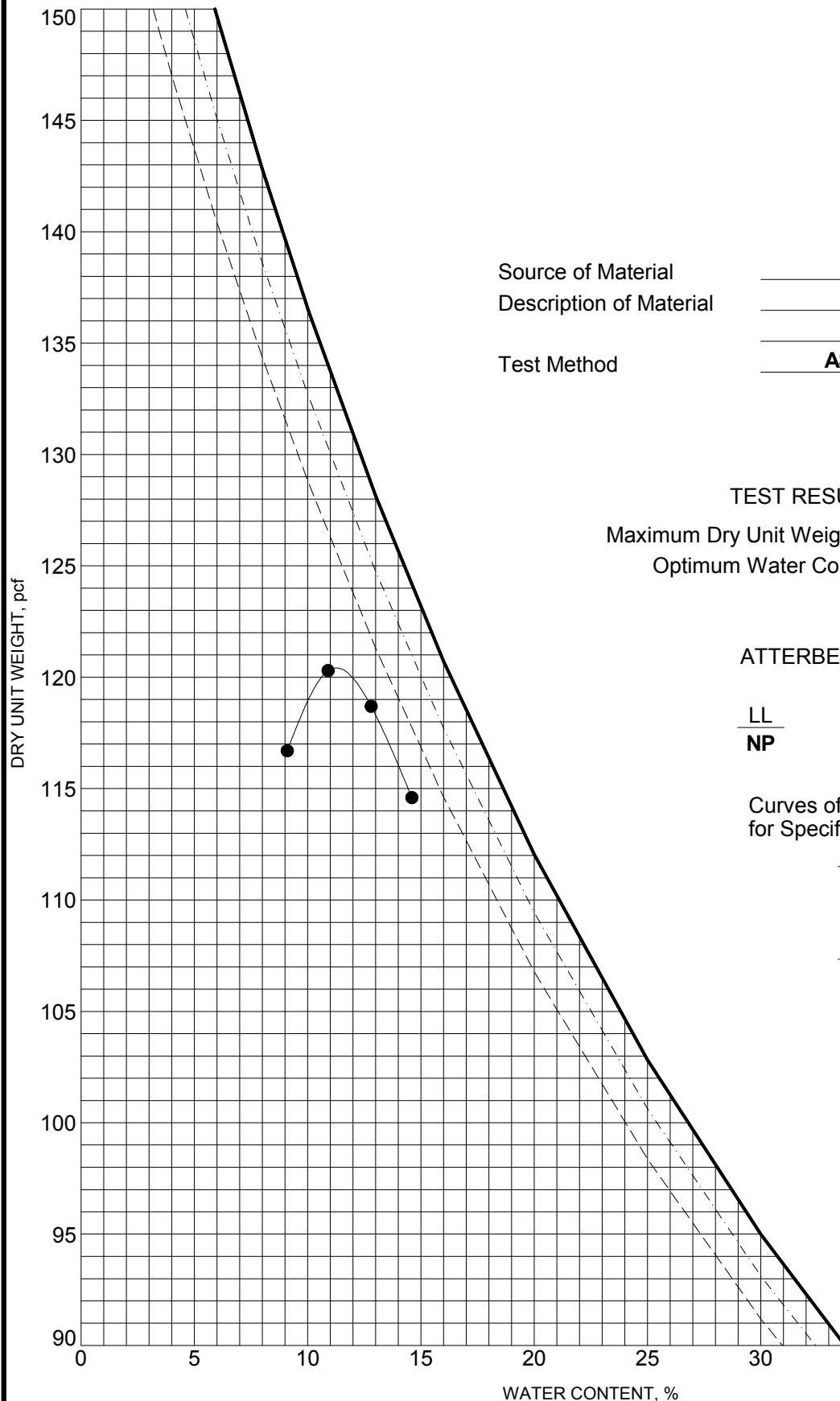
TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



Source of Material B-057 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 120.4 PCF
 Optimum Water Content 11.3 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

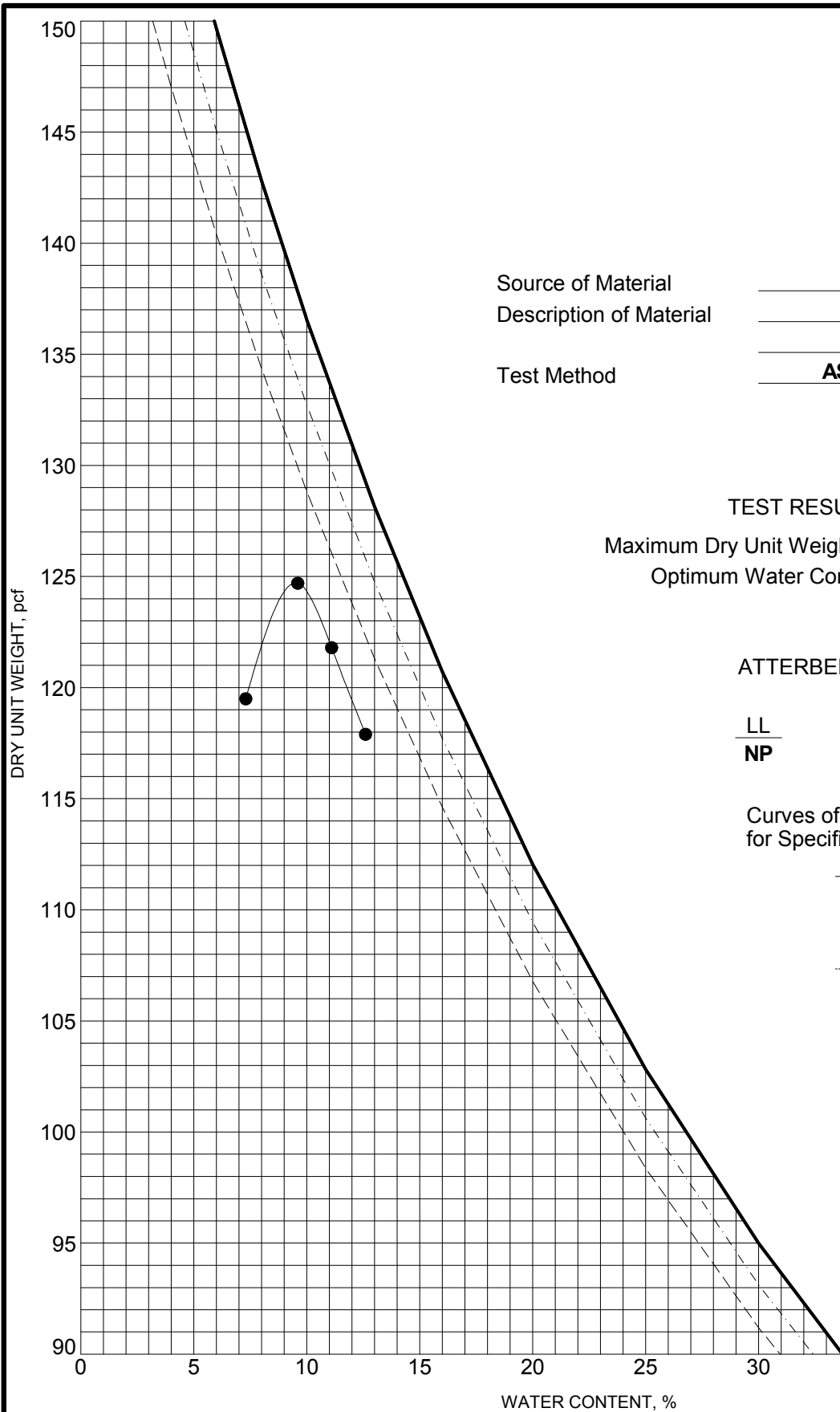
Curves of 100% Saturation for Specific Gravity Equal to:

————— 2.80
 - - - - - 2.70
 - - - - - 2.60

MOISTURE-DENSITY RELATIONSHIP



Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-058 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 124.7 PCF
 Optimum Water Content 9.5 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

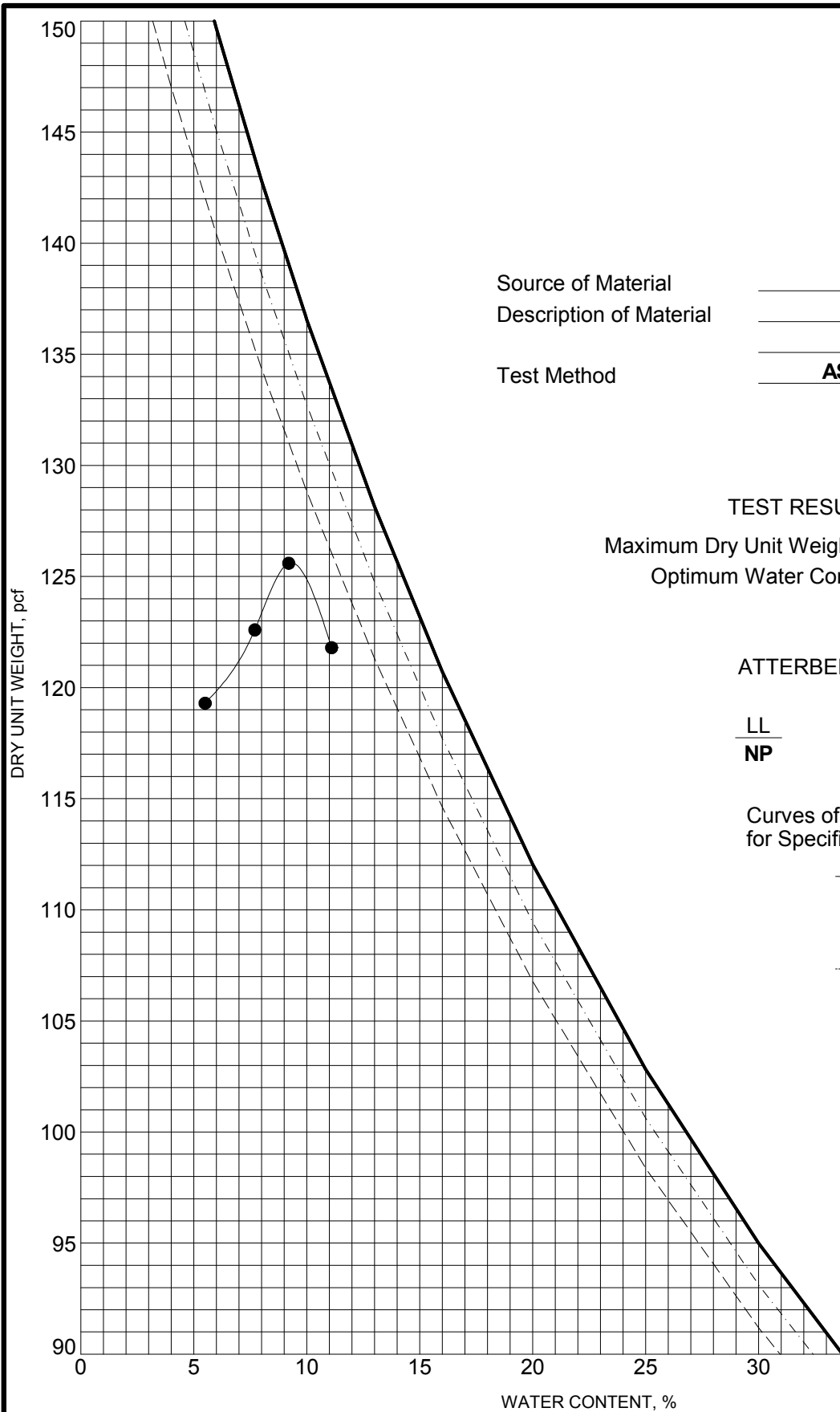
Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-062 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 125.6 PCF
 Optimum Water Content 9.3 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation for Specific Gravity Equal to:

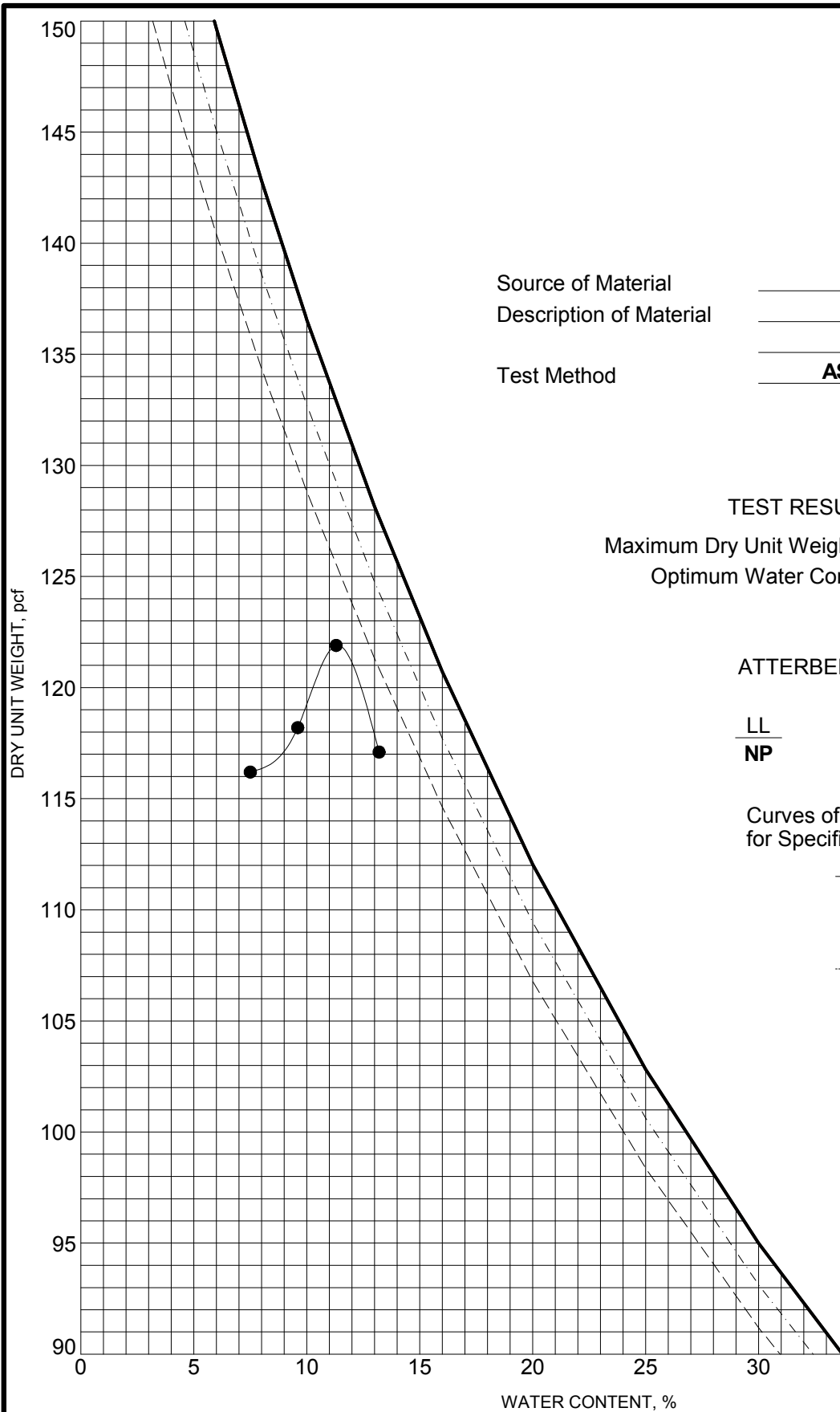
————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-065 0.0ft
 Description of Material SILTY SAND(SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 121.9 PCF
 Optimum Water Content 11.4 %

ATTERBERG LIMITS

LL NP	PL NP	PI NP

Curves of 100% Saturation
 for Specific Gravity Equal to:

- 2.80
- - - - - 2.70
- · - · - 2.60

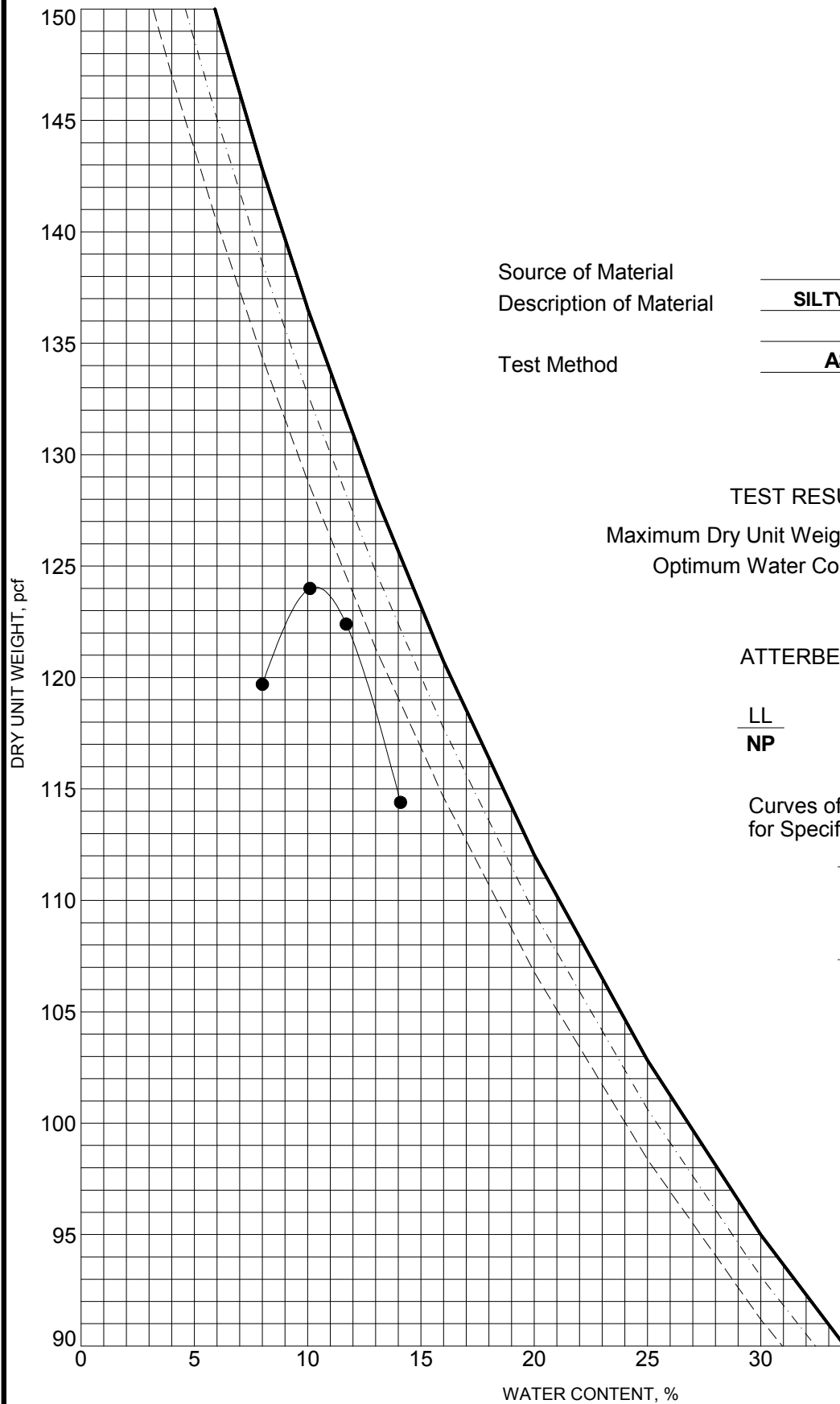
TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



Source of Material	<u>B-070 0.0ft</u>
Description of Material	<u>SILTY SAND with GRAVEL(SM)</u>
Test Method	<u>ASTM D698 Method A</u>

TEST RESULTS

Maximum Dry Unit Weight	<u>124.0 PCF</u>
Optimum Water Content	<u>10.5 %</u>

ATTERBERG LIMITS

<u>LL</u>	<u>PL</u>	<u>PI</u>
NP	NP	NP

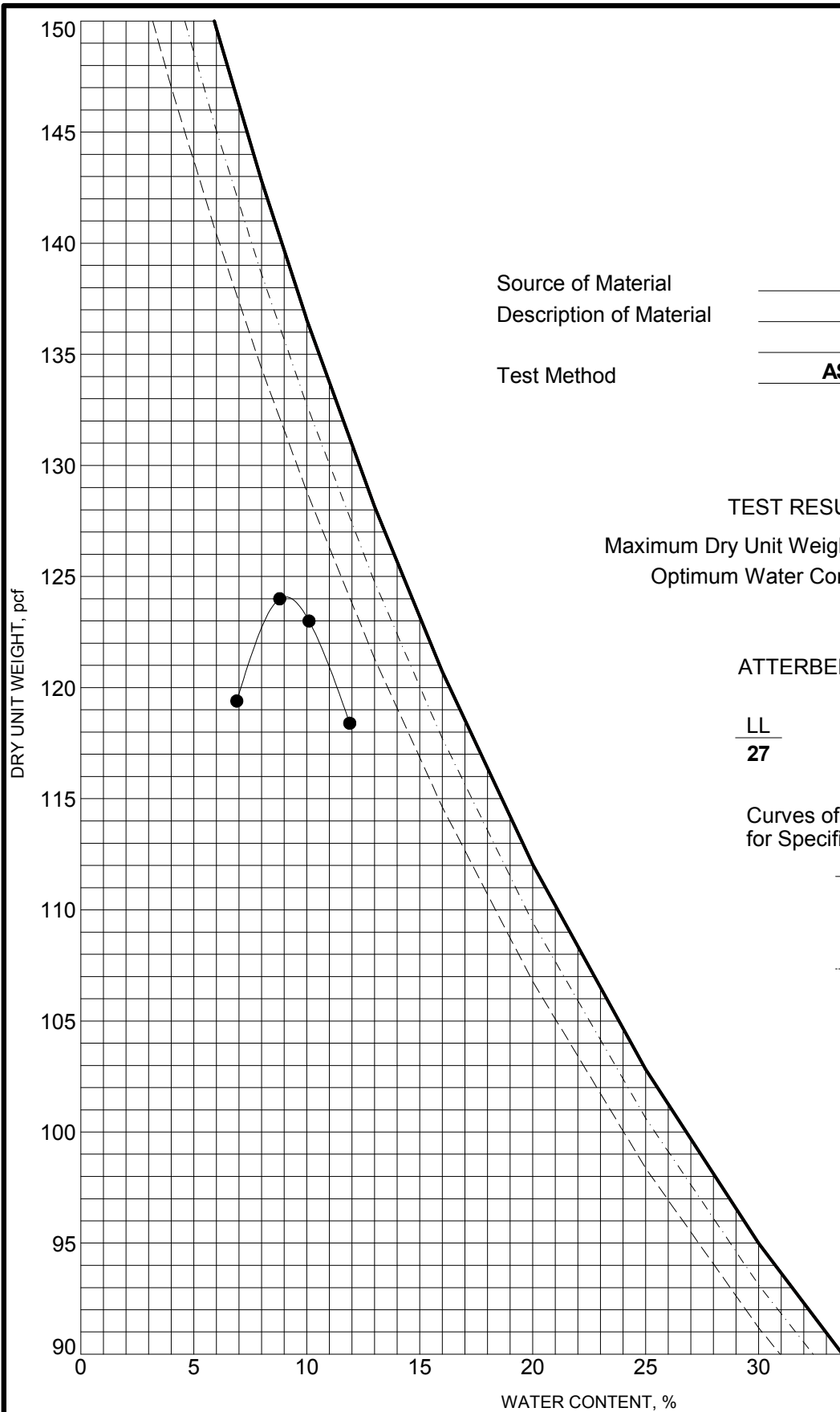
Curves of 100% Saturation for Specific Gravity Equal to:

- 2.80
- - - - - 2.70
- - - - - 2.60



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-075 0.0ft
 Description of Material CLAYEY SAND(SC)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 124.1 PCF
 Optimum Water Content 9.1 %

ATTERBERG LIMITS

LL	PL	PI
27	18	9

Curves of 100% Saturation for Specific Gravity Equal to:

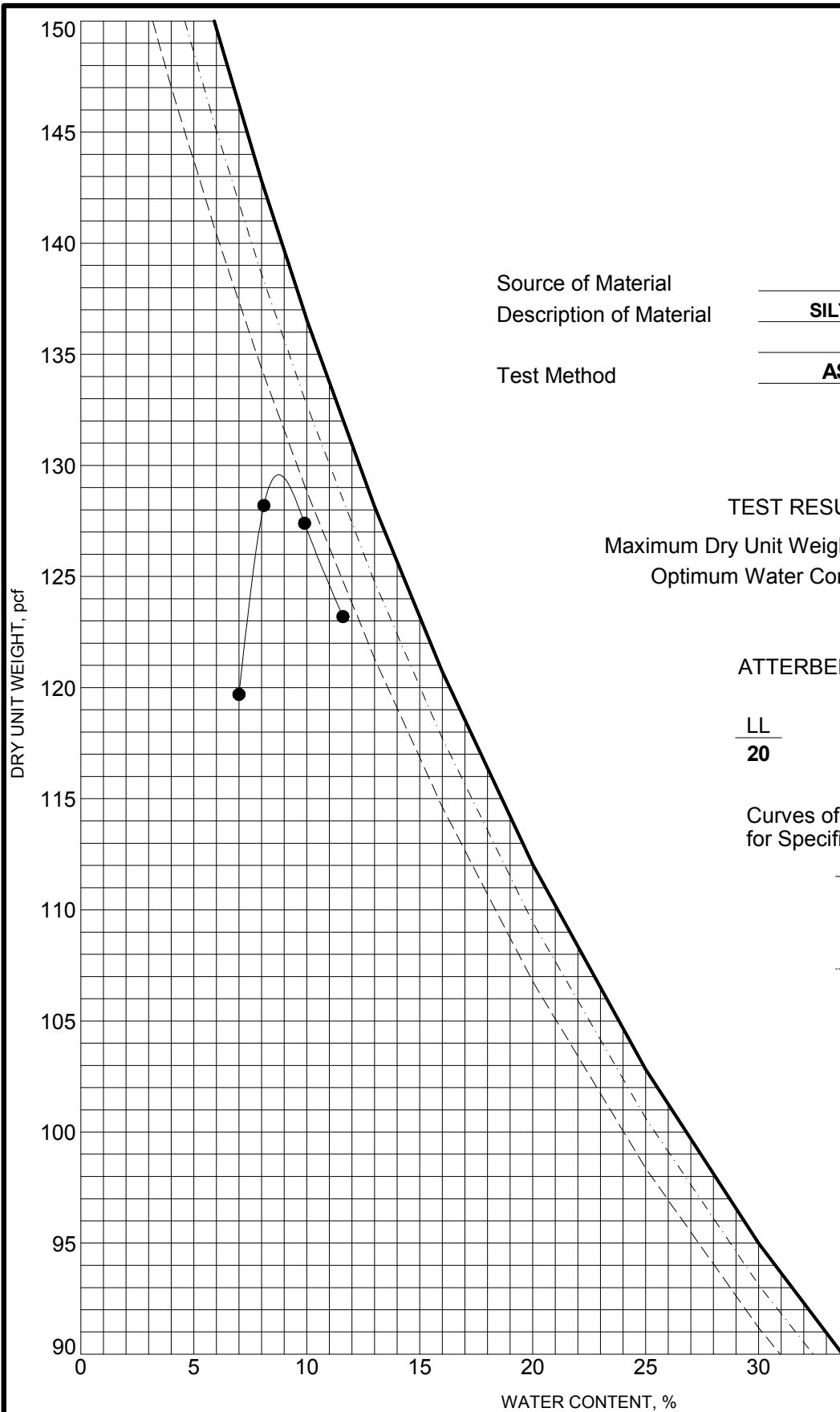
- 2.80
- - - - - 2.70
- - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-081 0.0ft
 Description of Material SILTY, CLAYEY SAND with GRAVEL(SC-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 129.6 PCF
 Optimum Water Content 8.8 %

ATTERBERG LIMITS

LL	PL	PI
20	16	4

Curves of 100% Saturation for Specific Gravity Equal to:

- 2.80
- - - - - 2.70
- - - - - 2.60

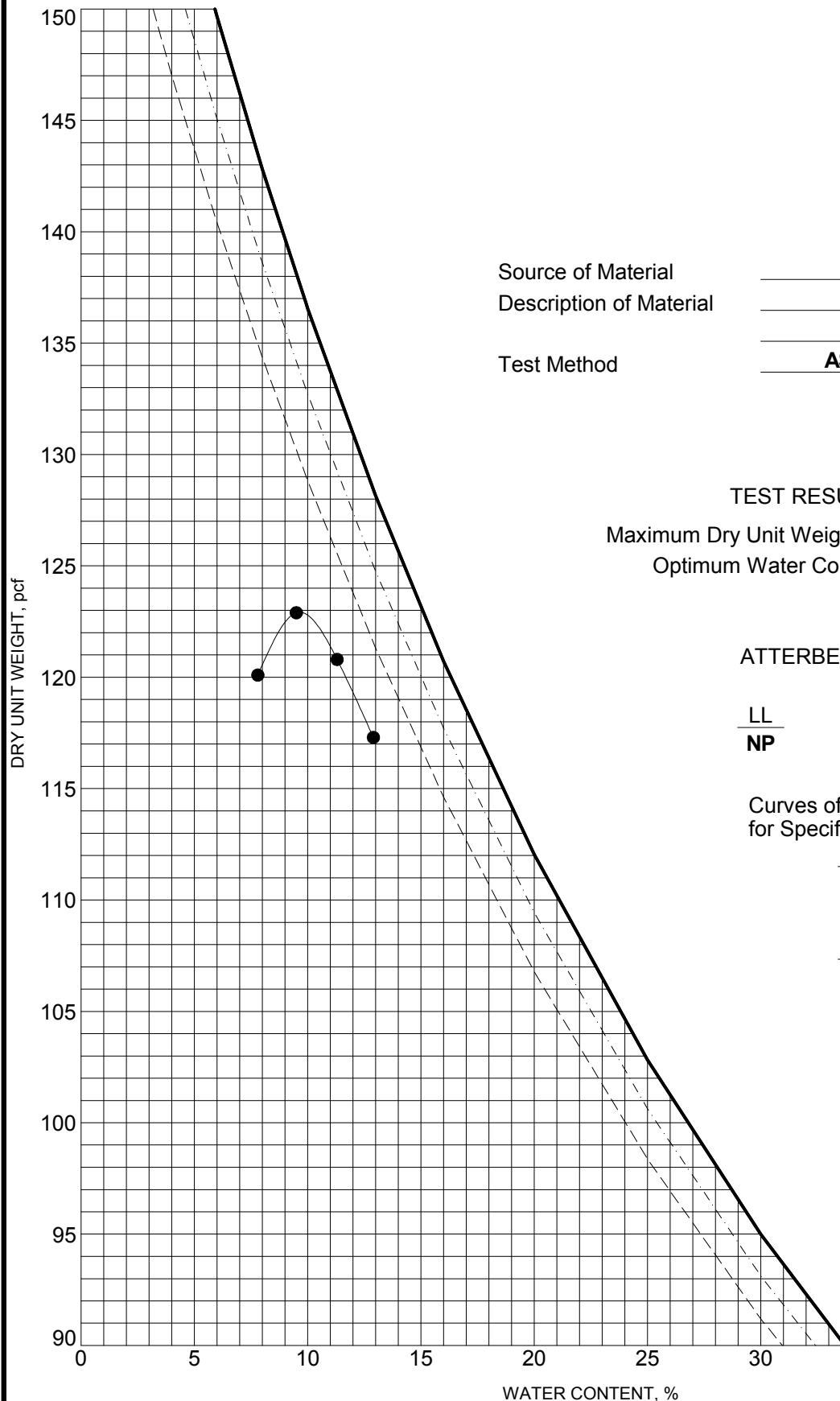
TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



Source of Material	<u>B-086 0.2ft</u>
Description of Material	<u>SILTY SAND(SM)</u>
Test Method	<u>ASTM D698 Method A</u>

TEST RESULTS	
Maximum Dry Unit Weight	<u>123.0 PCF</u>
Optimum Water Content	<u>9.5 %</u>

ATTERBERG LIMITS

<u>LL</u>	<u>PL</u>	<u>PI</u>
NP	NP	NP

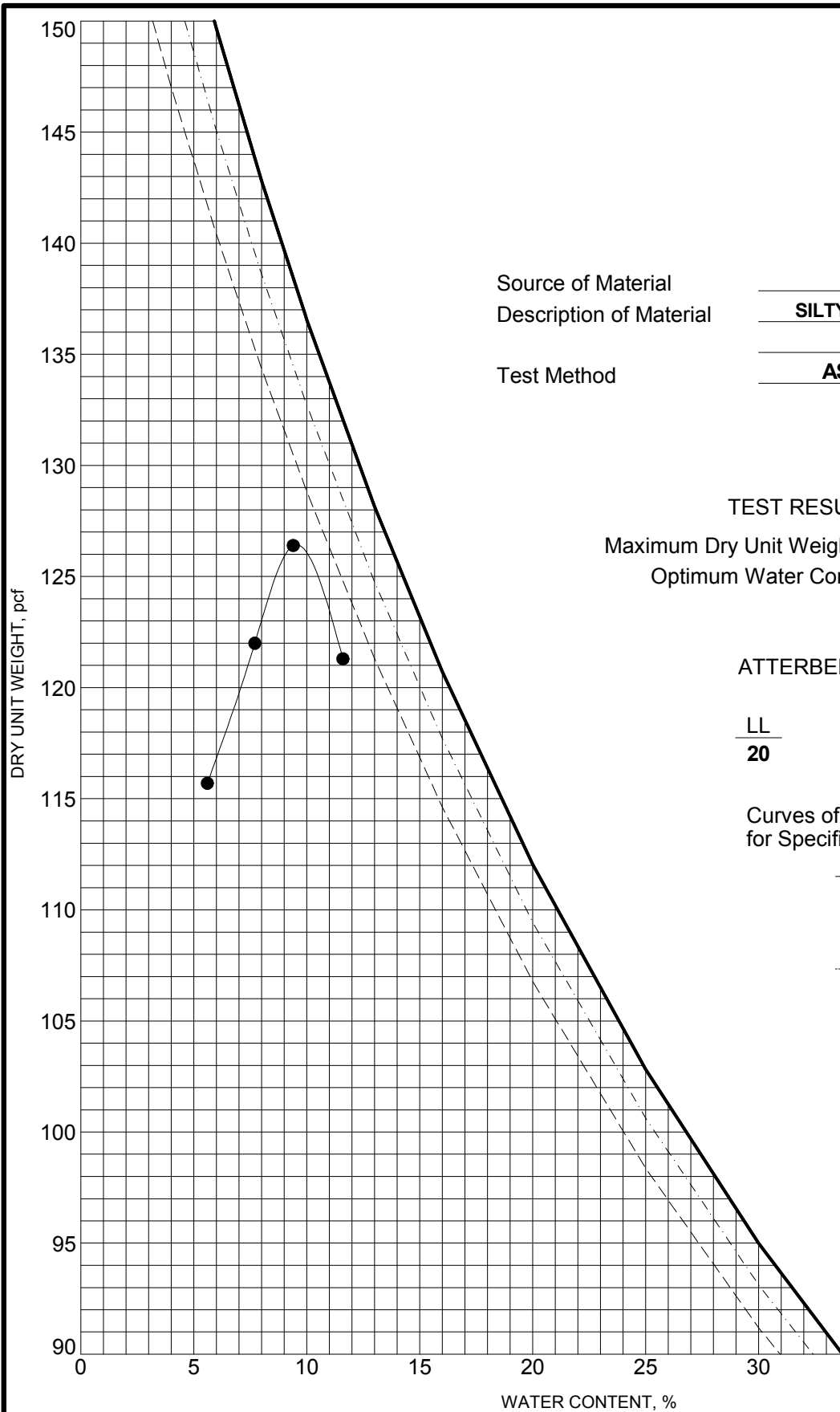
Curves of 100% Saturation for Specific Gravity Equal to:

—————	2.80
- - - - -	2.70
- - - - -	2.60

MOISTURE-DENSITY RELATIONSHIP



Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-092 0.2ft
 Description of Material SILTY, CLAYEY SAND(SC-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 126.5 PCF
 Optimum Water Content 9.5 %

ATTERBERG LIMITS

LL	PL	PI
20	16	4

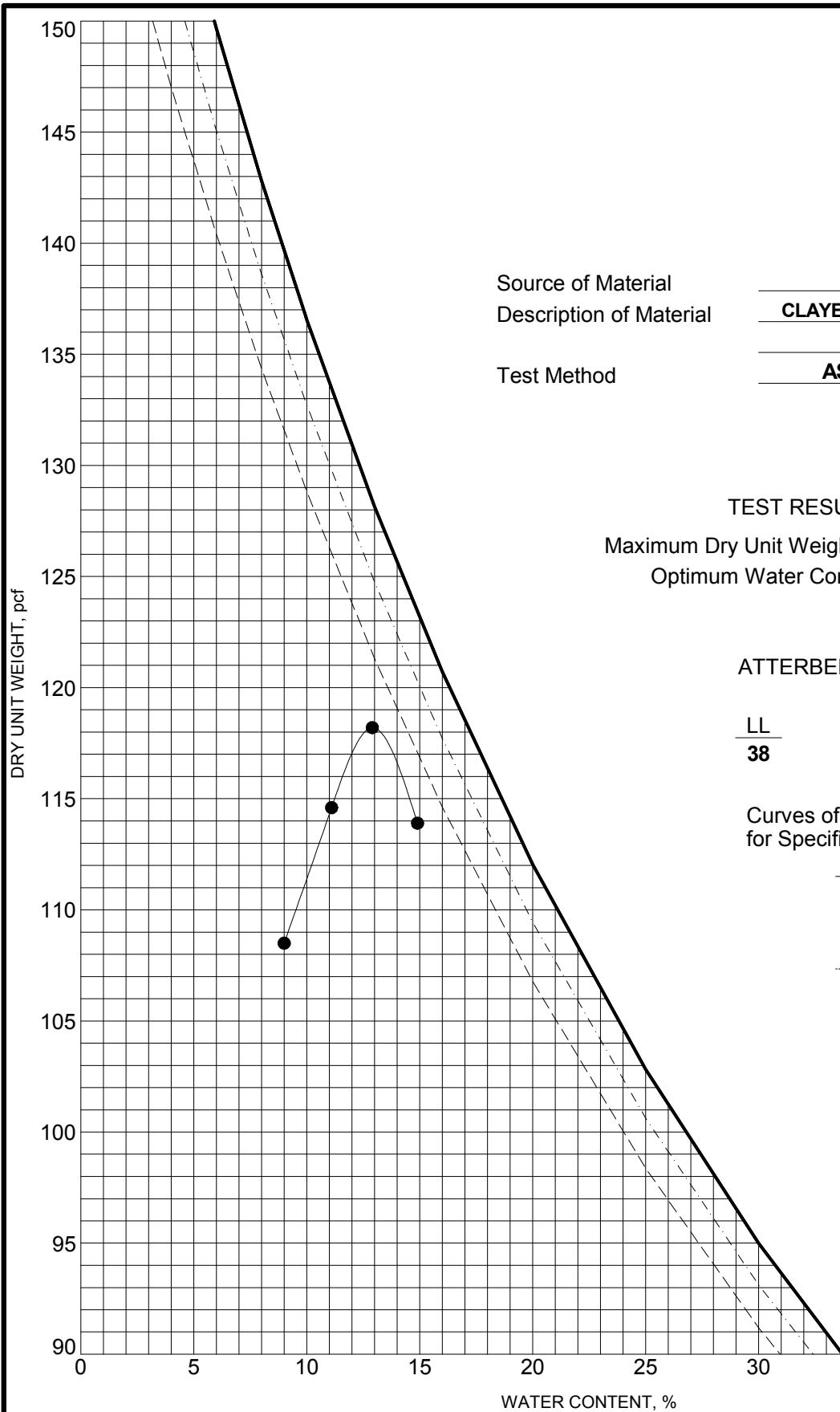
Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-096 0.2ft
 Description of Material CLAYEY SAND with GRAVEL(SC)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 118.0 PCF
 Optimum Water Content 13.0 %

ATTERBERG LIMITS

LL	PL	PI
38	18	20

Curves of 100% Saturation for Specific Gravity Equal to:

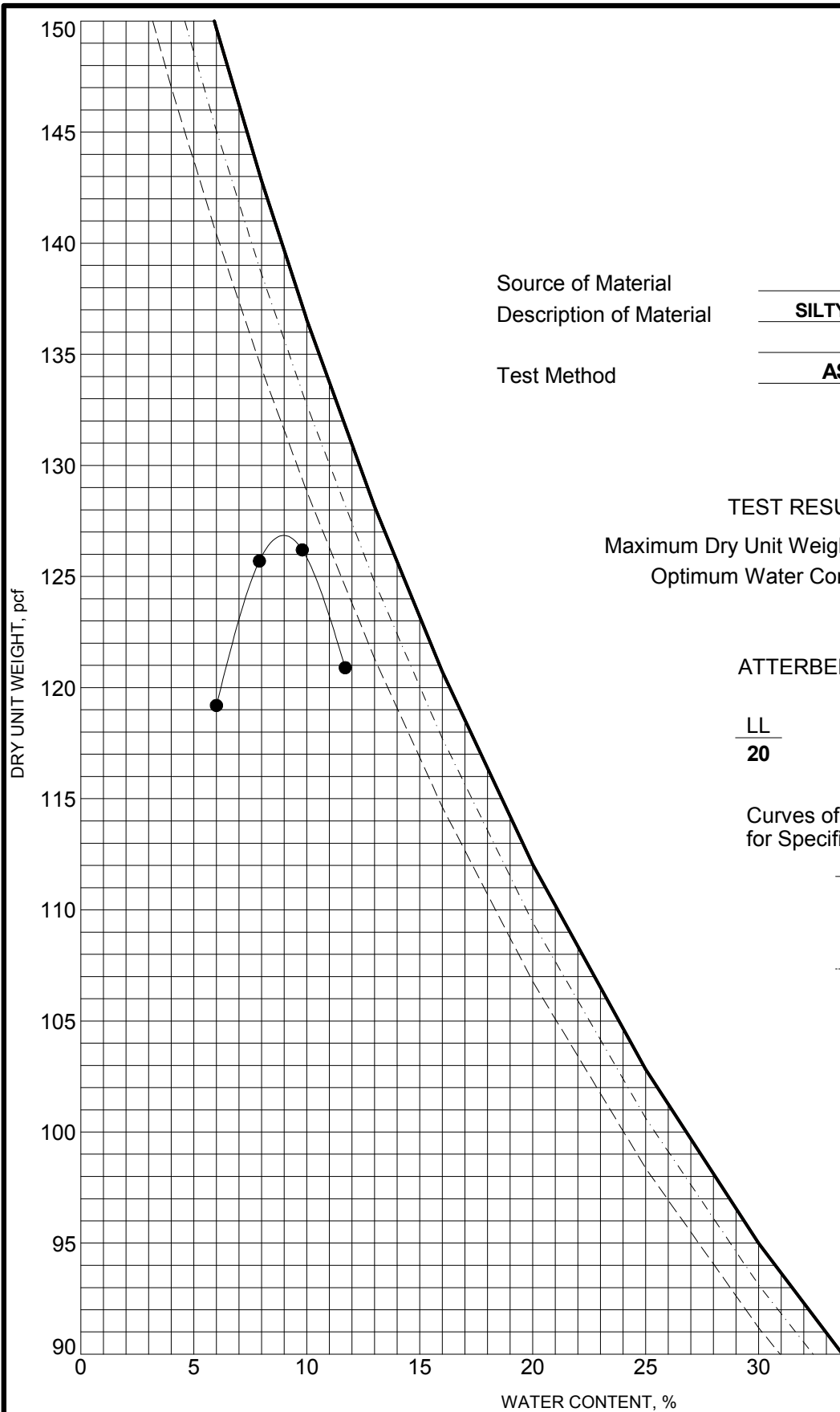
- 2.80
- - - - - 2.70
- · - · - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-103 0.2ft
 Description of Material SILTY, CLAYEY SAND(SC-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 127.0 PCF
 Optimum Water Content 9.0 %

ATTERBERG LIMITS

LL	PL	PI
20	15	5

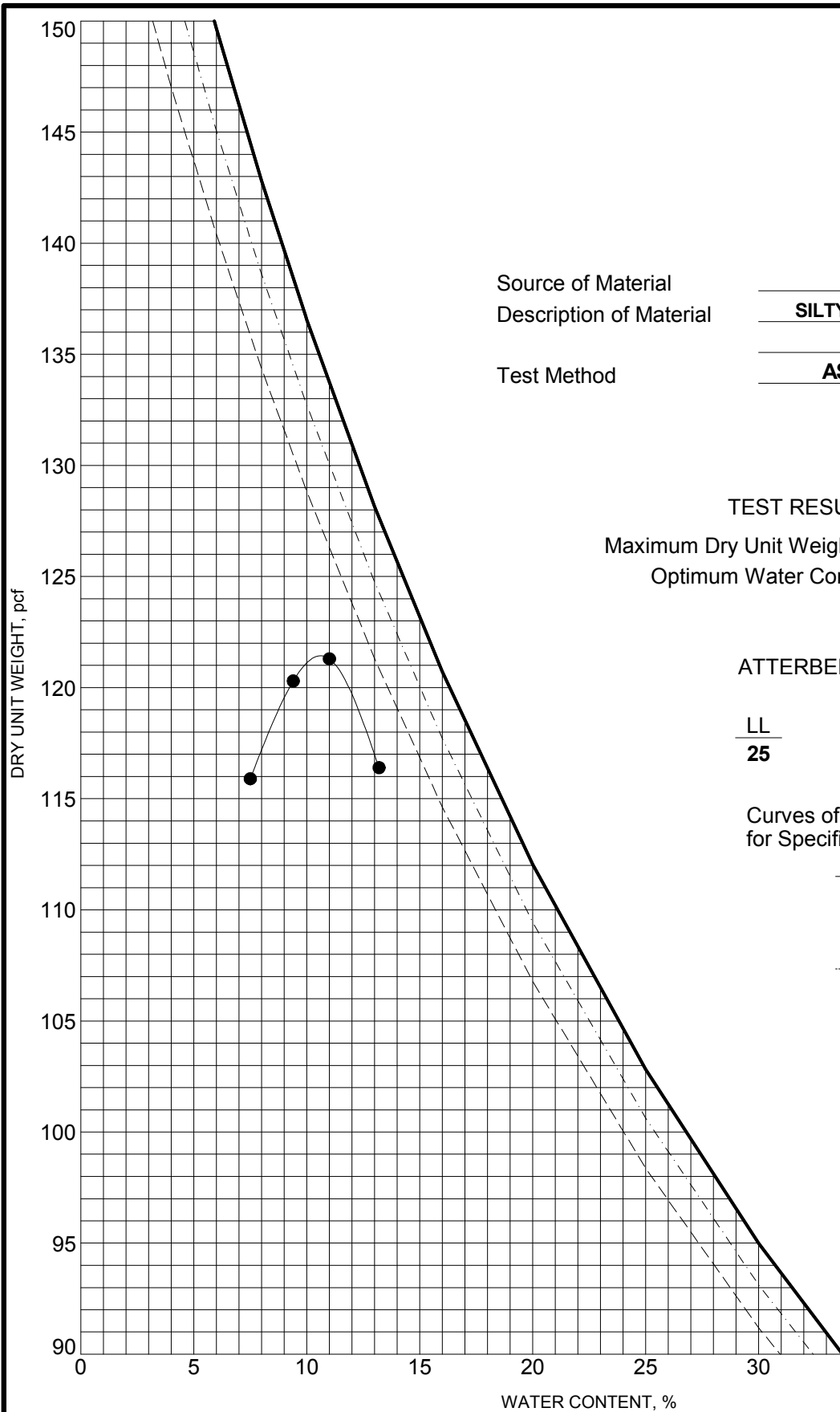
Curves of 100% Saturation for Specific Gravity Equal to:
 ————— 2.80
 - - - - - 2.70
 - - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-115 0.0ft
 Description of Material SILTY, CLAYEY SAND(SC-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 121.4 PCF
 Optimum Water Content 10.6 %

ATTERBERG LIMITS

LL	PL	PI
25	18	7

Curves of 100% Saturation for Specific Gravity Equal to:

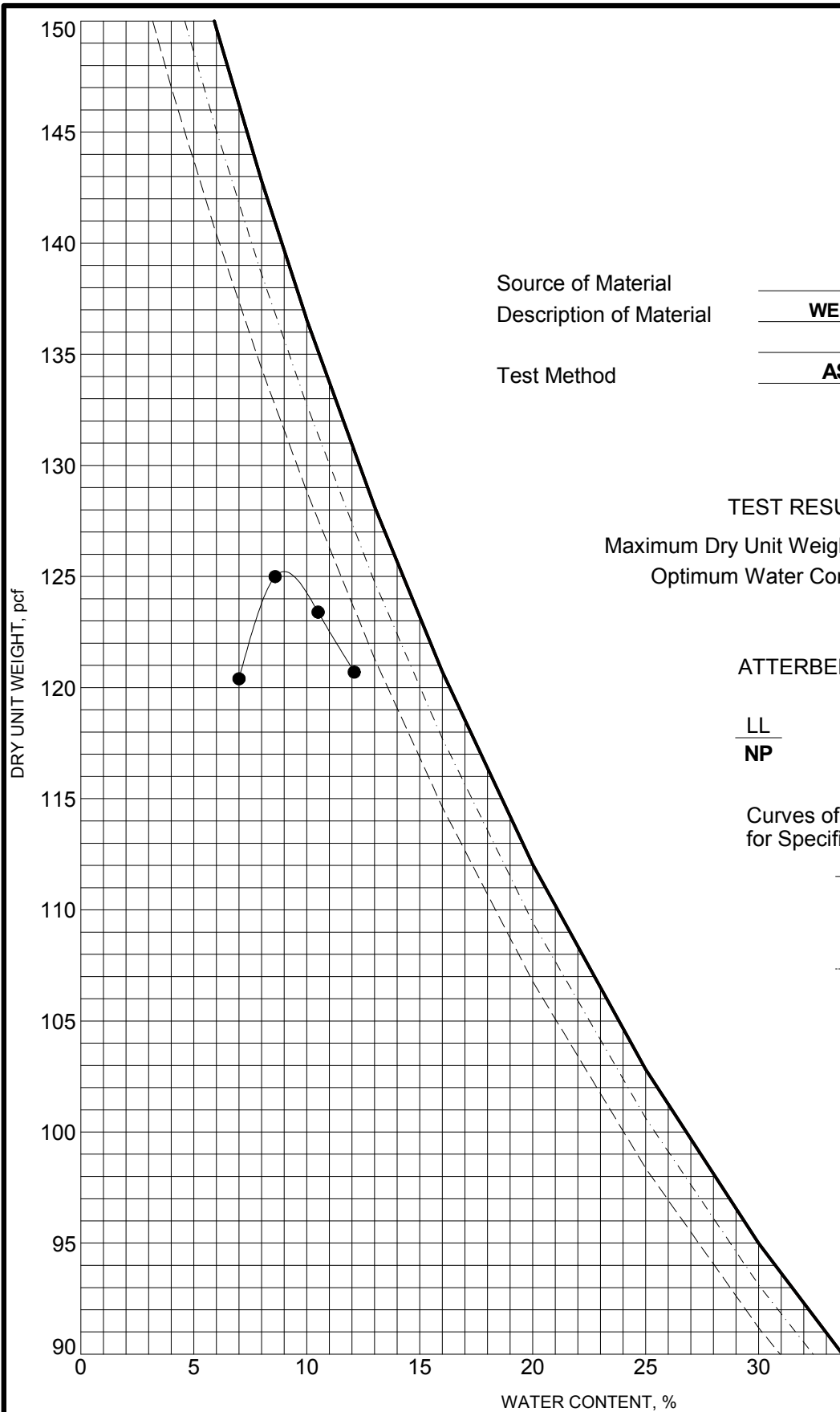
- 2.80
- - - - - 2.70
- - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Source of Material B-119 0.0ft
 Description of Material WELL-GRADED SAND with SILT(SW-SM)
 Test Method ASTM D698 Method A

TEST RESULTS
 Maximum Dry Unit Weight 125.2 PCF
 Optimum Water Content 9.0 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation for Specific Gravity Equal to:

- 2.80
- - - - - 2.70
- - - - - 2.60

TC_COMPACTION 63105079.GPJ TERRACON.GDT 9/20/11



MOISTURE-DENSITY RELATIONSHIP

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE: Subgrade

MATERIAL DESCRIPTION/CONDITION: Brown, Clayey Sand W/Gravel

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-2 at depth 0-5'

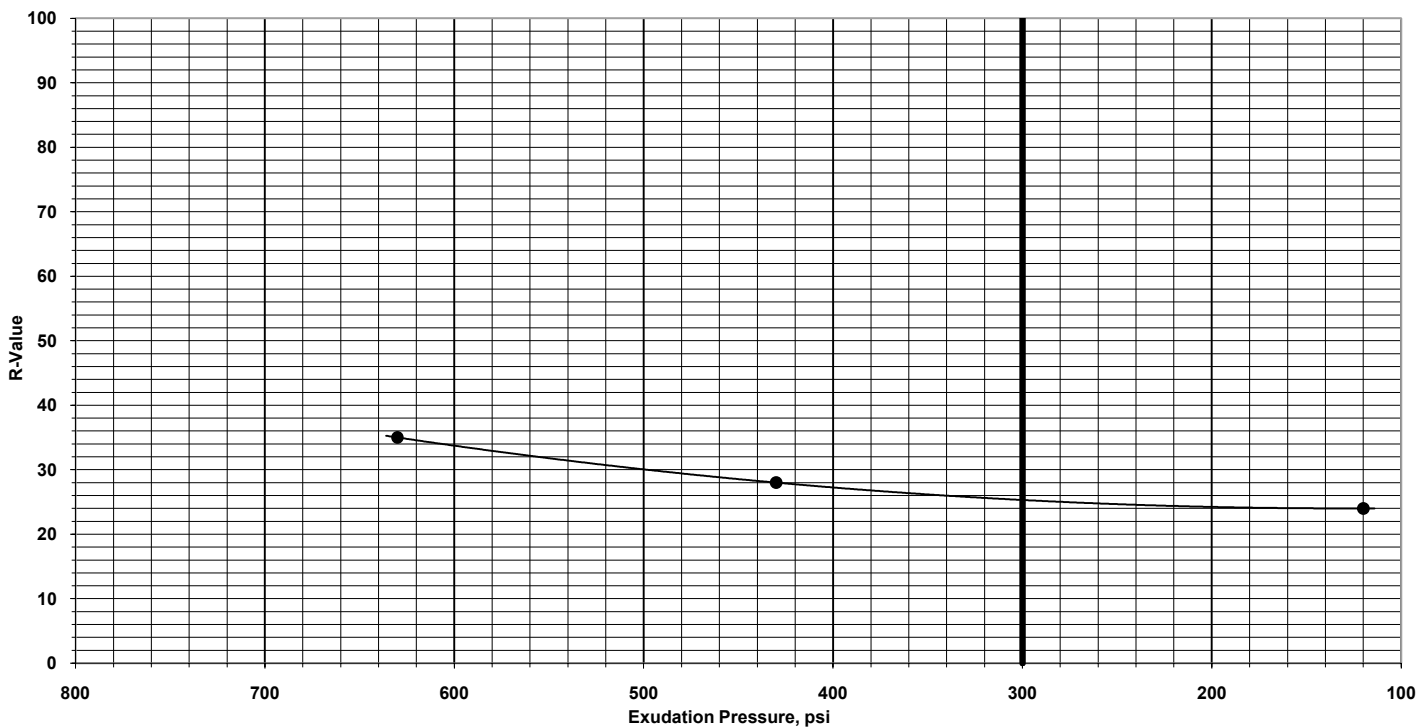
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-2

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 26

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Sandy Silty Clay

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-7 at depth 0-5'

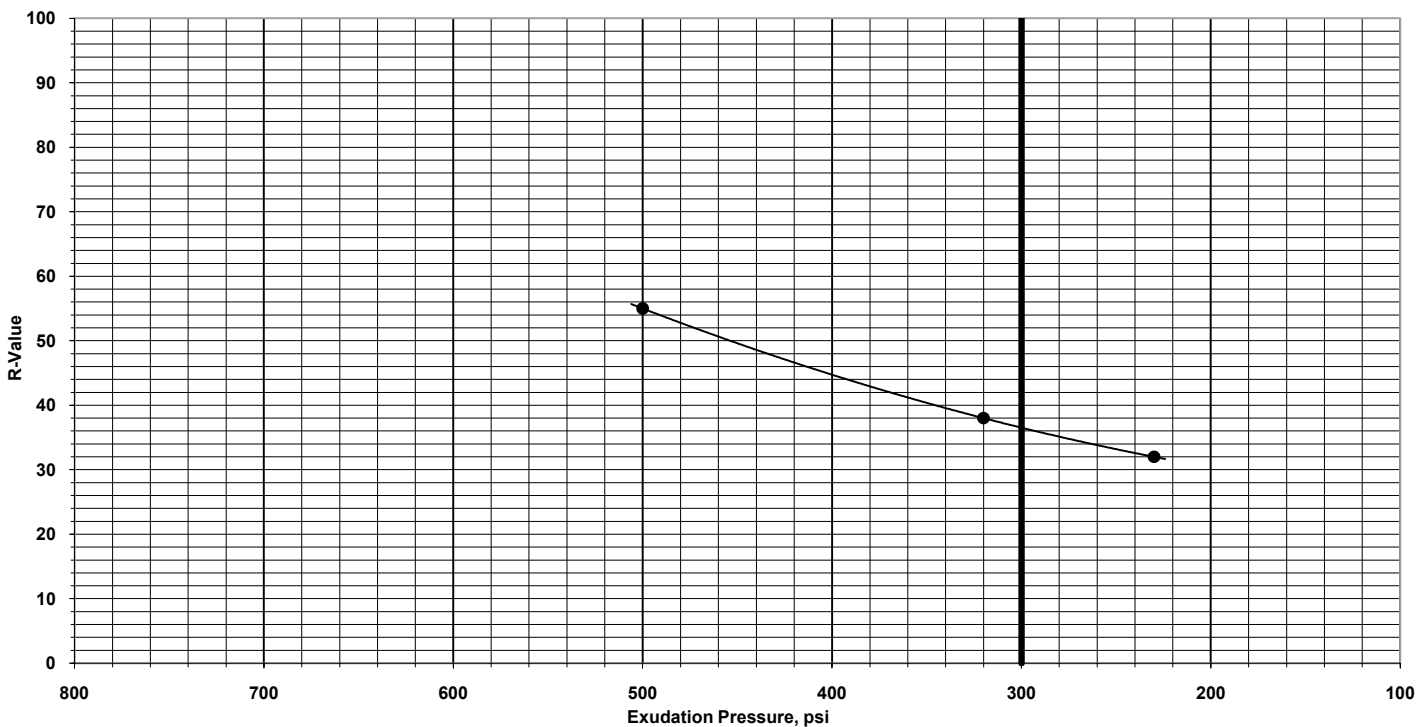
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-7

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 38

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-12 at depth 0-5'

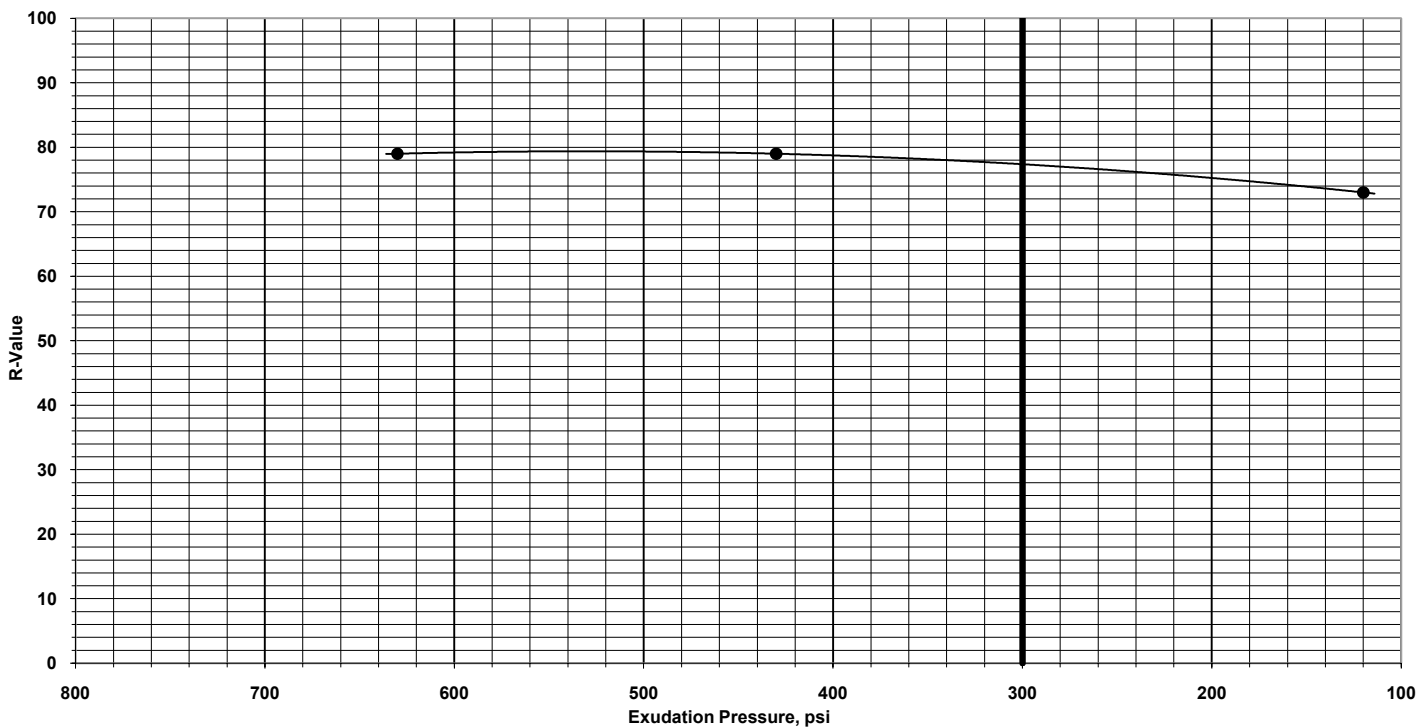
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-12

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 78

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Clayey Sand W/Gravel

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-22 at depth 0-5'

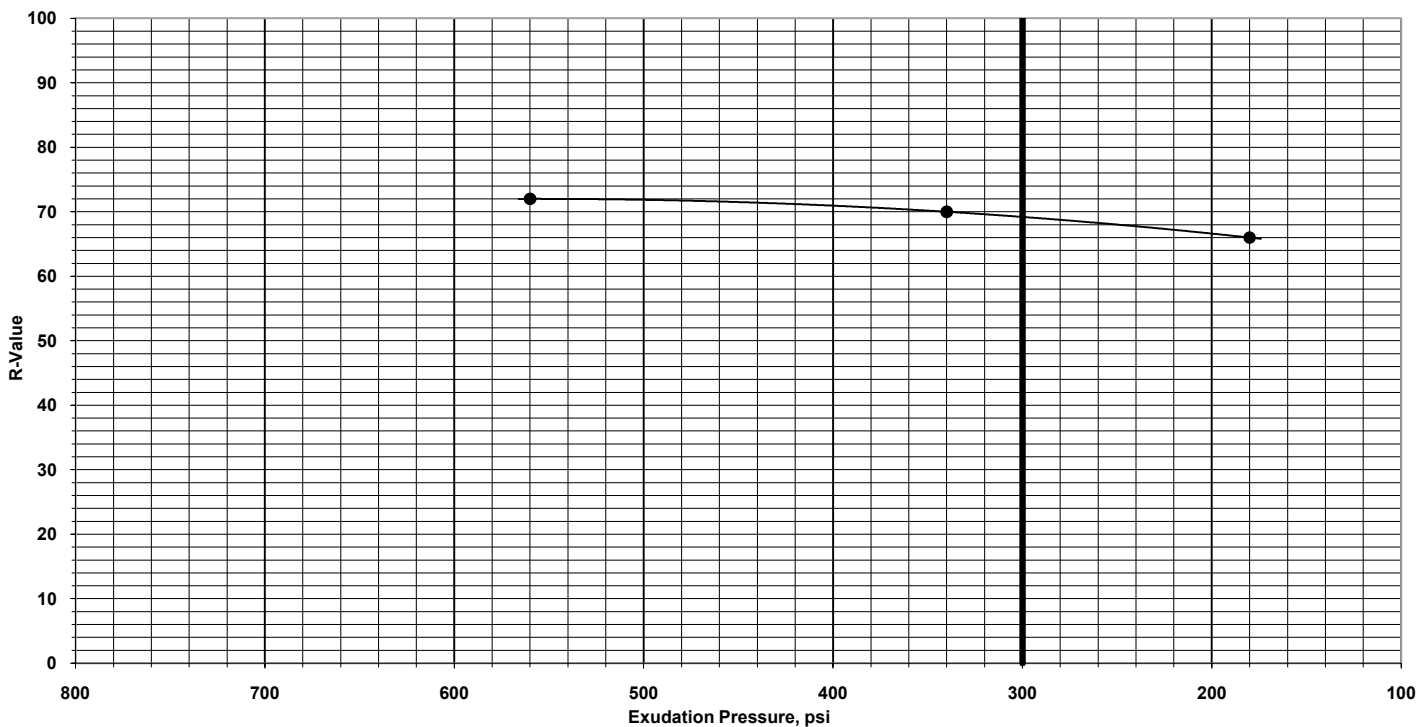
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-22

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 69

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

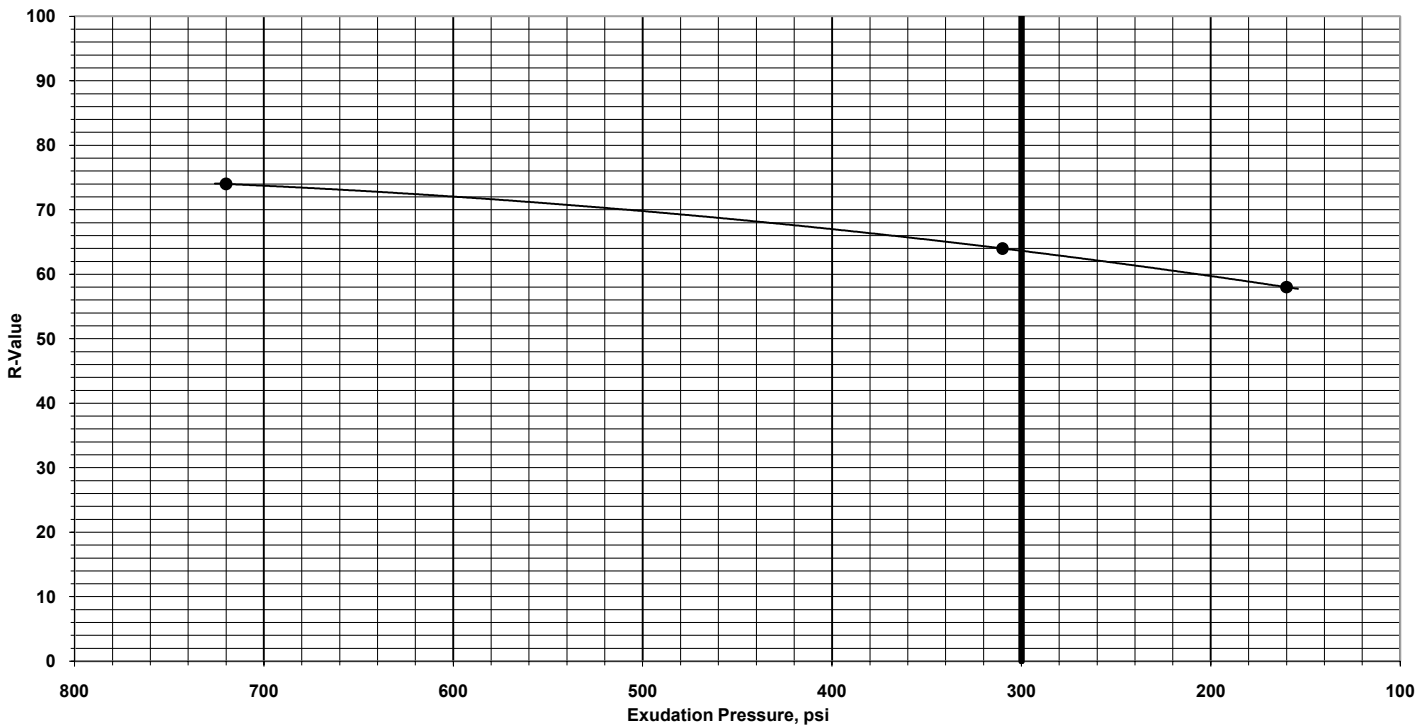
PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 12/6/2010
JOB NO.: 63105079
Sample No.: B-50 at depth 0-5'
MATERIAL SOURCE: Native
SAMPLE LOCATION: B-50

SAMPLED BY: _____ Date: _____

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 64

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-45 at depth 0-5'

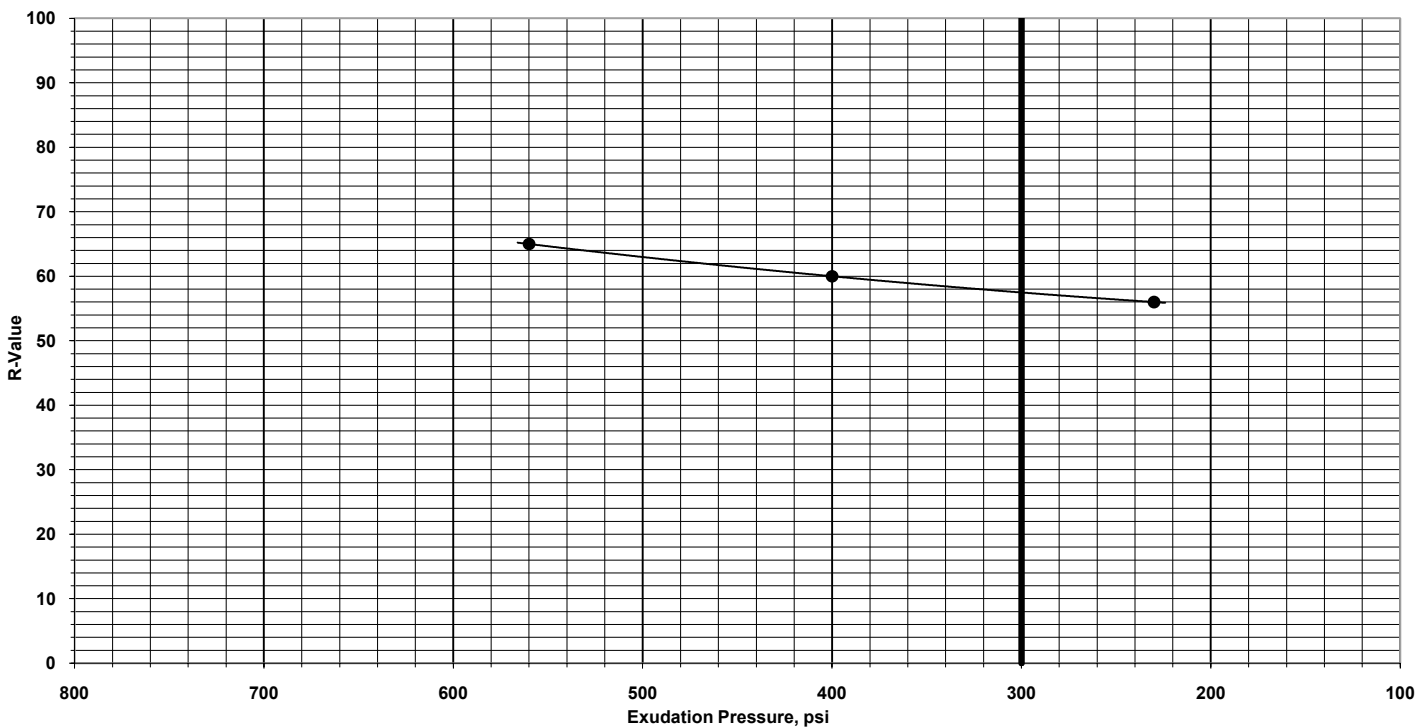
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-45

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 58

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-40 at depth 0-5'

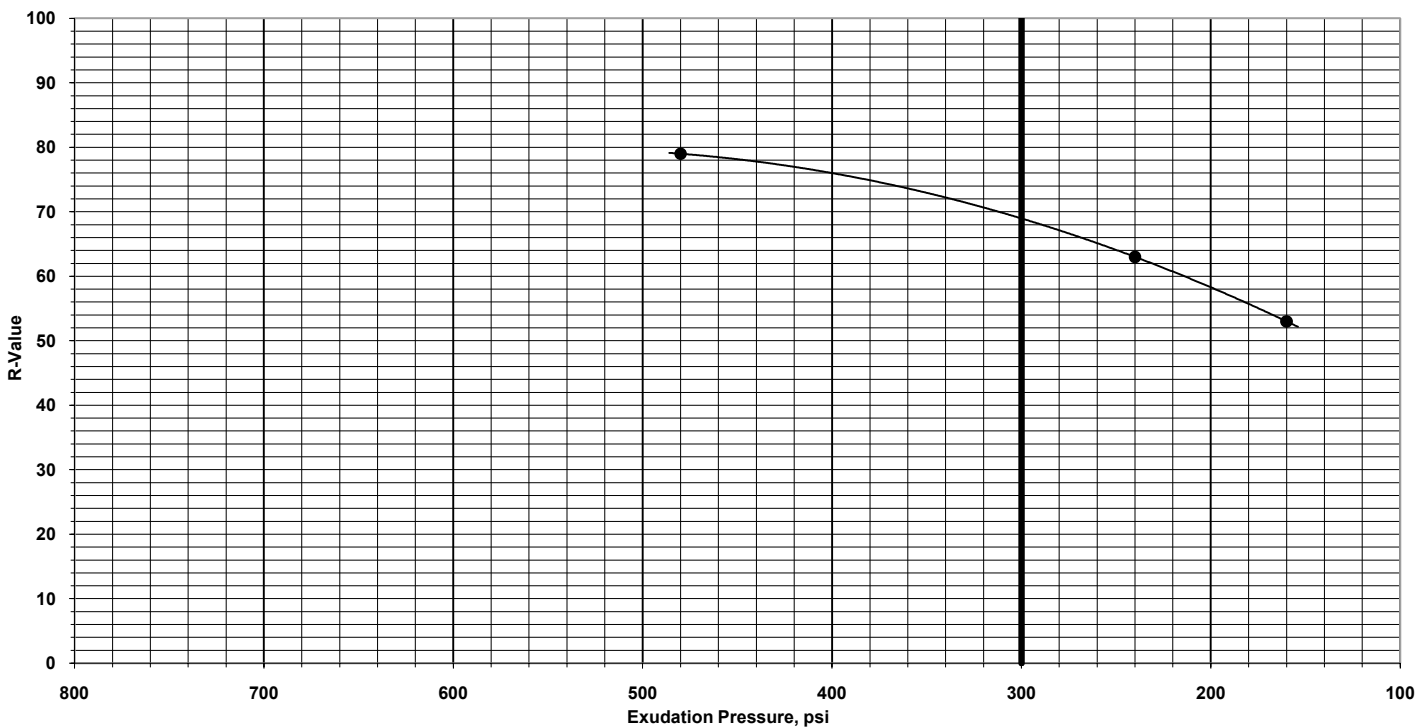
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-40

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 69

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

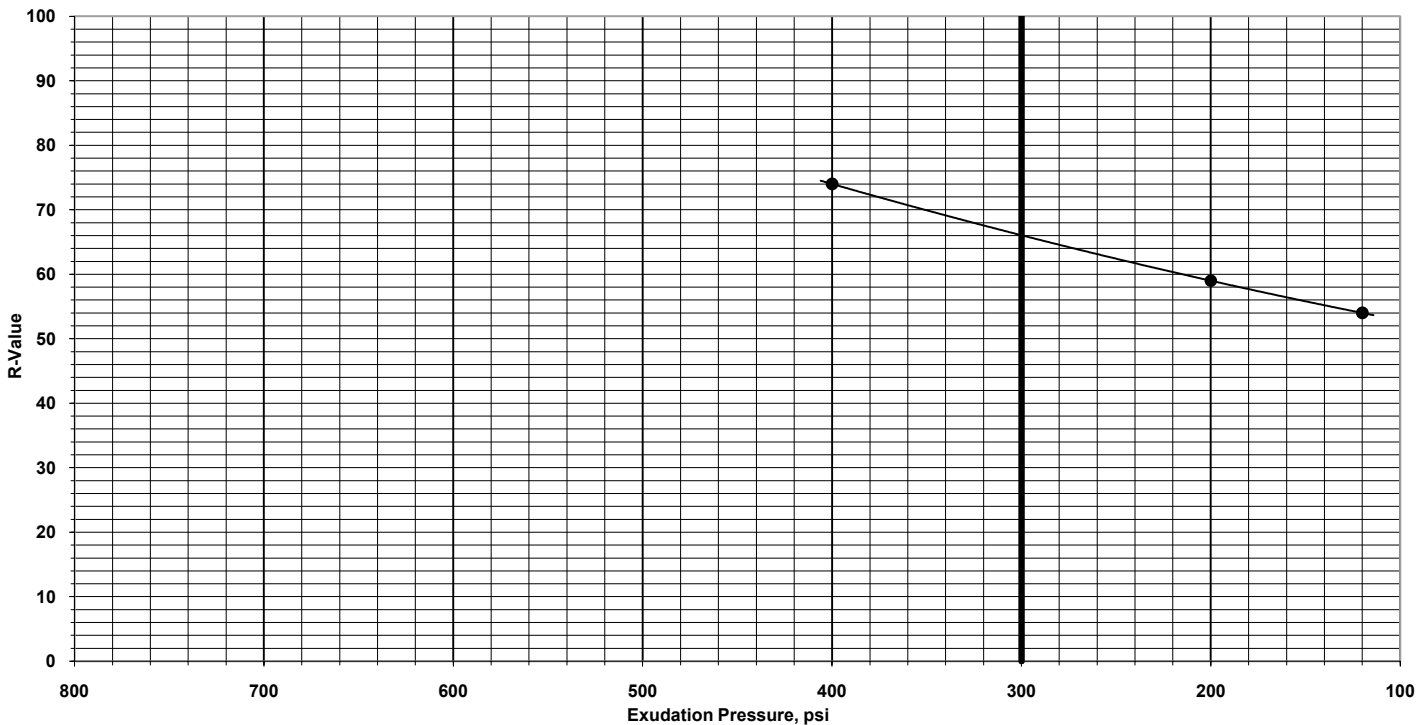
PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 12/6/2010
JOB NO.: 63105079
Sample No.: B-36 at depth 0-5'
MATERIAL SOURCE: Native
SAMPLE LOCATION: B-36

SAMPLED BY: _____ Date: _____

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 66

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date:

JOB NO.: 63105079

Sample No.: B-33 at depth 0-5'

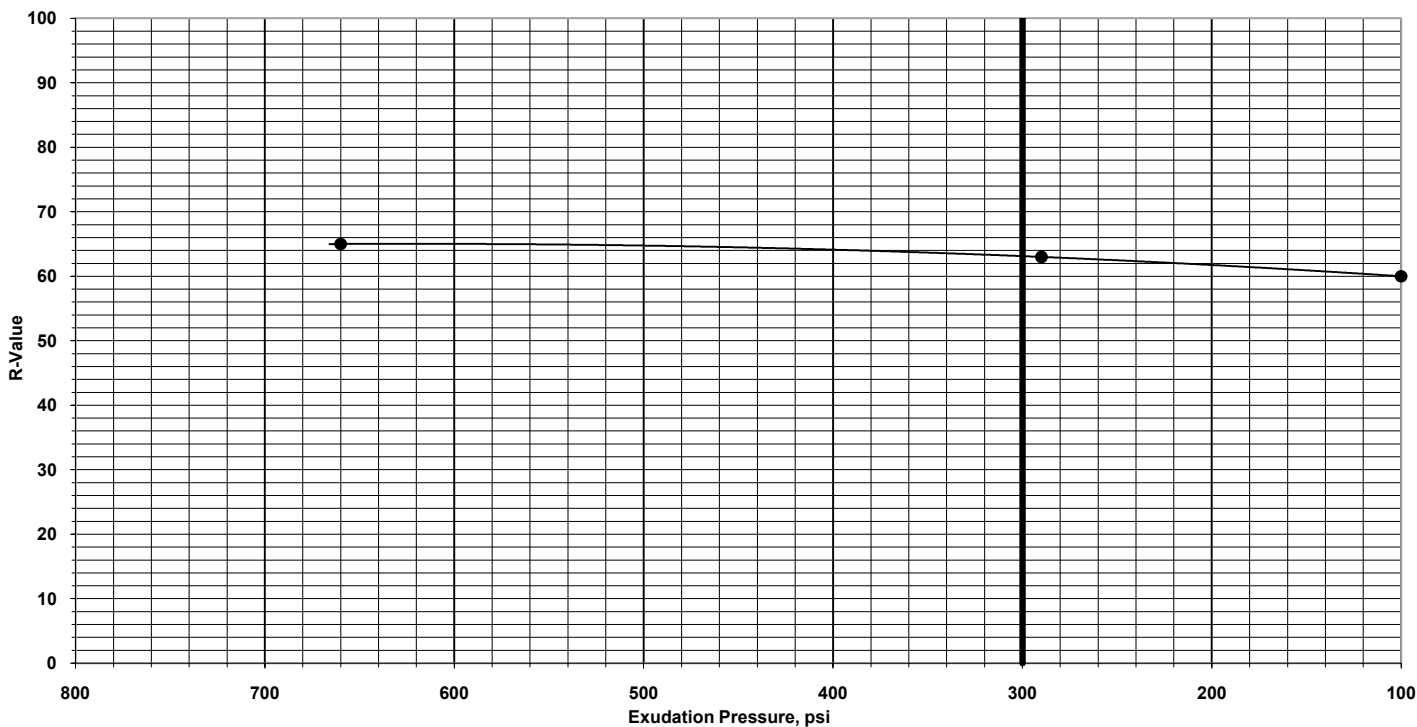
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-33

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 63

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Well Graded Sand W/Silt

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-27 at depth 0-5'

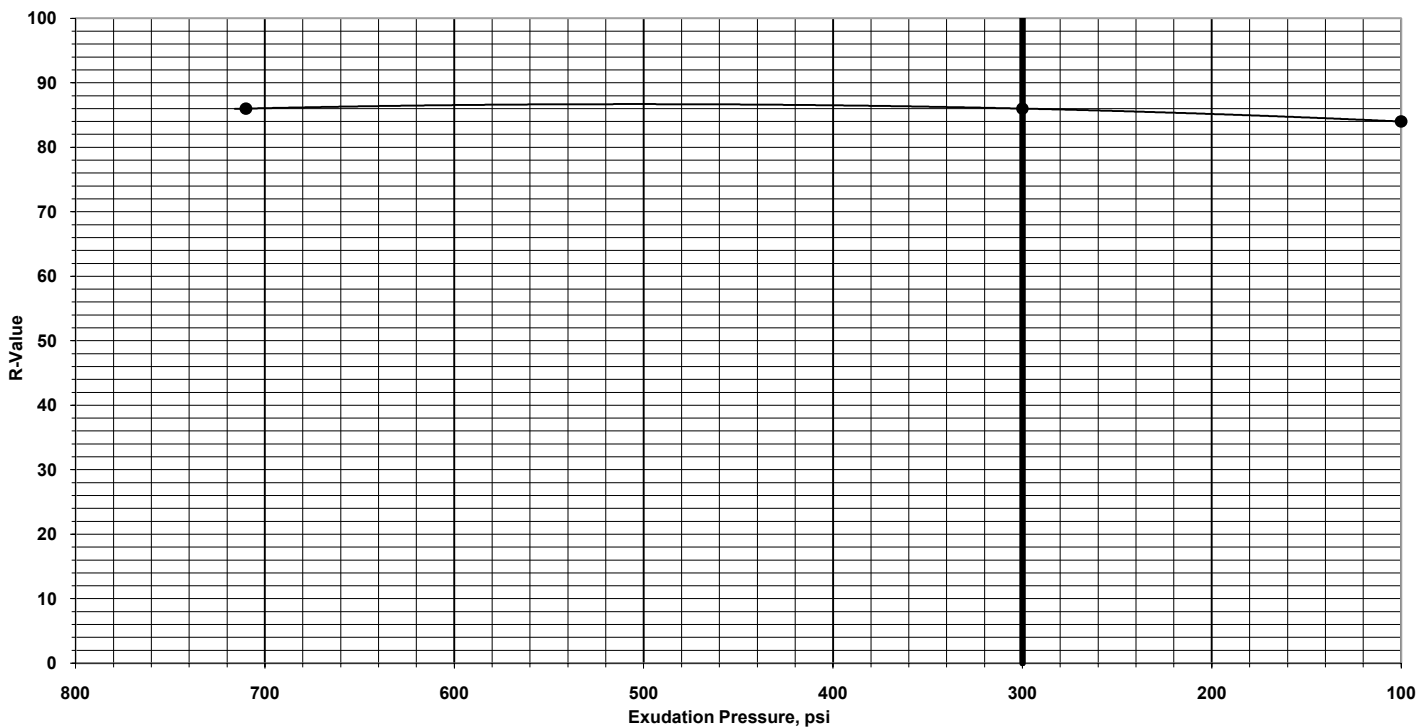
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-27

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 86

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Clayey Sand W/Gravel

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-116 at depth 0-5'

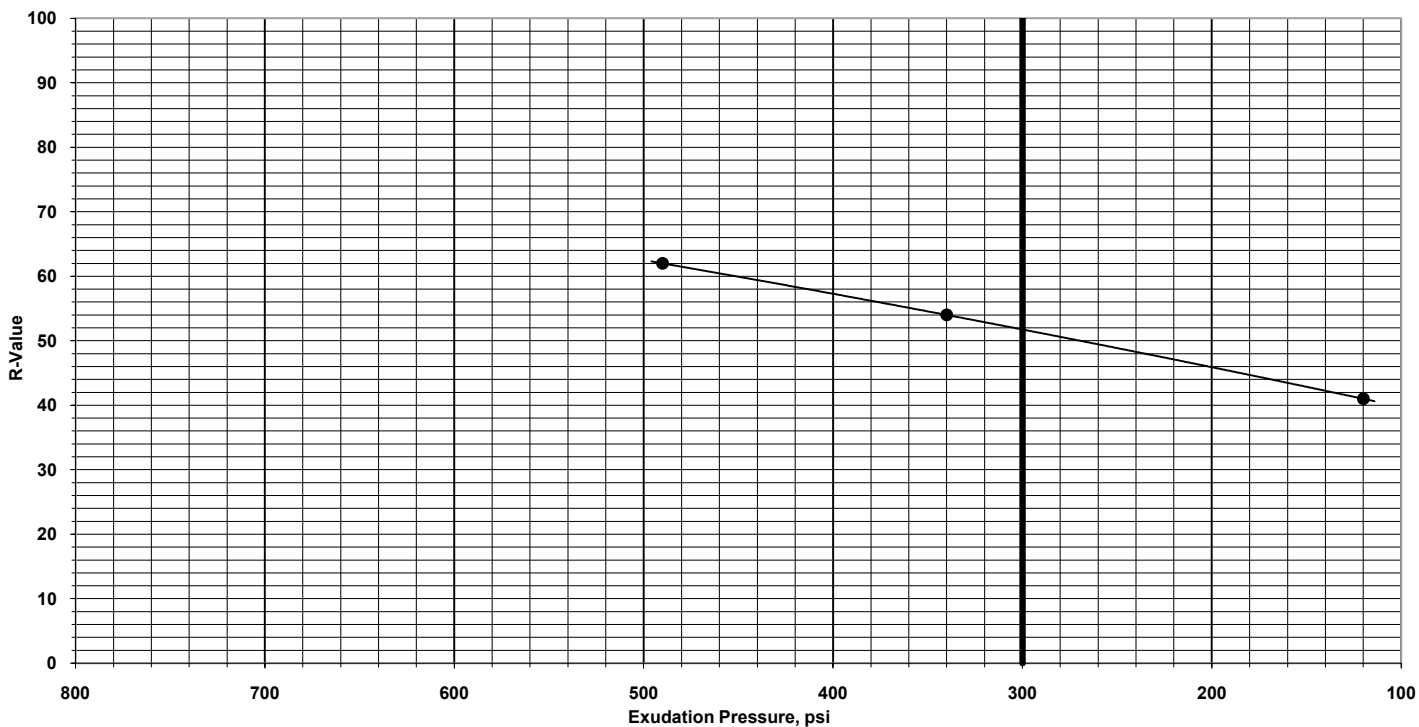
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-116

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 52

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand W/Gravel

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-114 at depth 0-5'

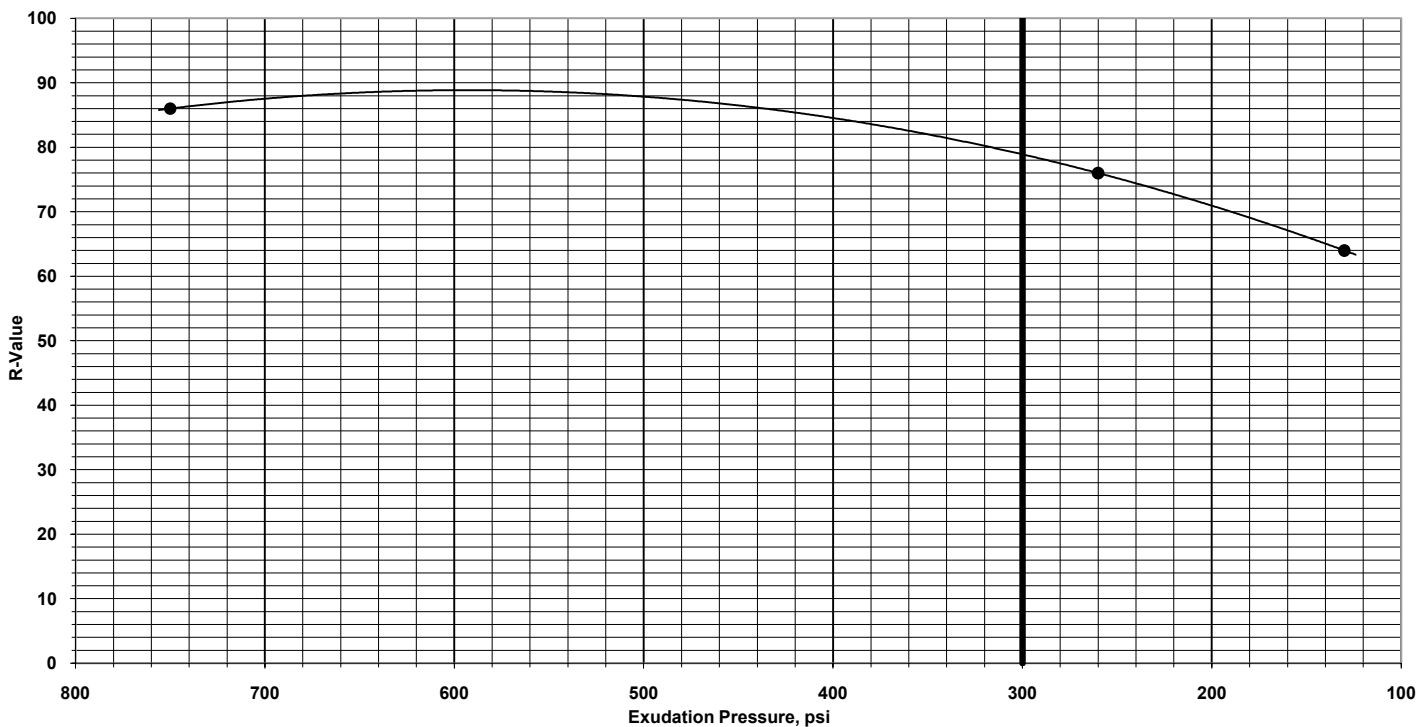
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-114

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 79

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 1/17/2011

JOB NO.: 63105079

Sample No.: B-112 at depth 0-5'

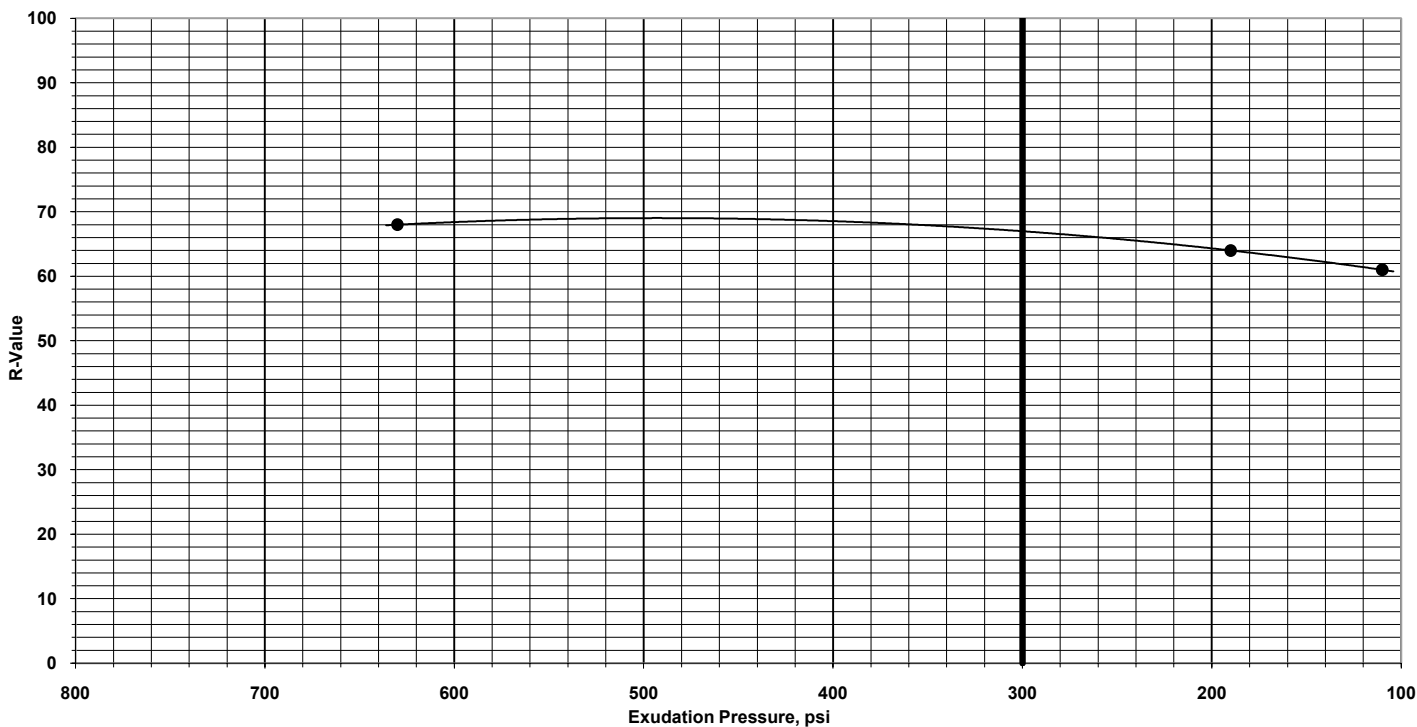
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-112

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 67

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Clayey Sand

Report Date: 1/17/2010

JOB NO.: 63105079

Sample No.: B-108 at depth 0-5'

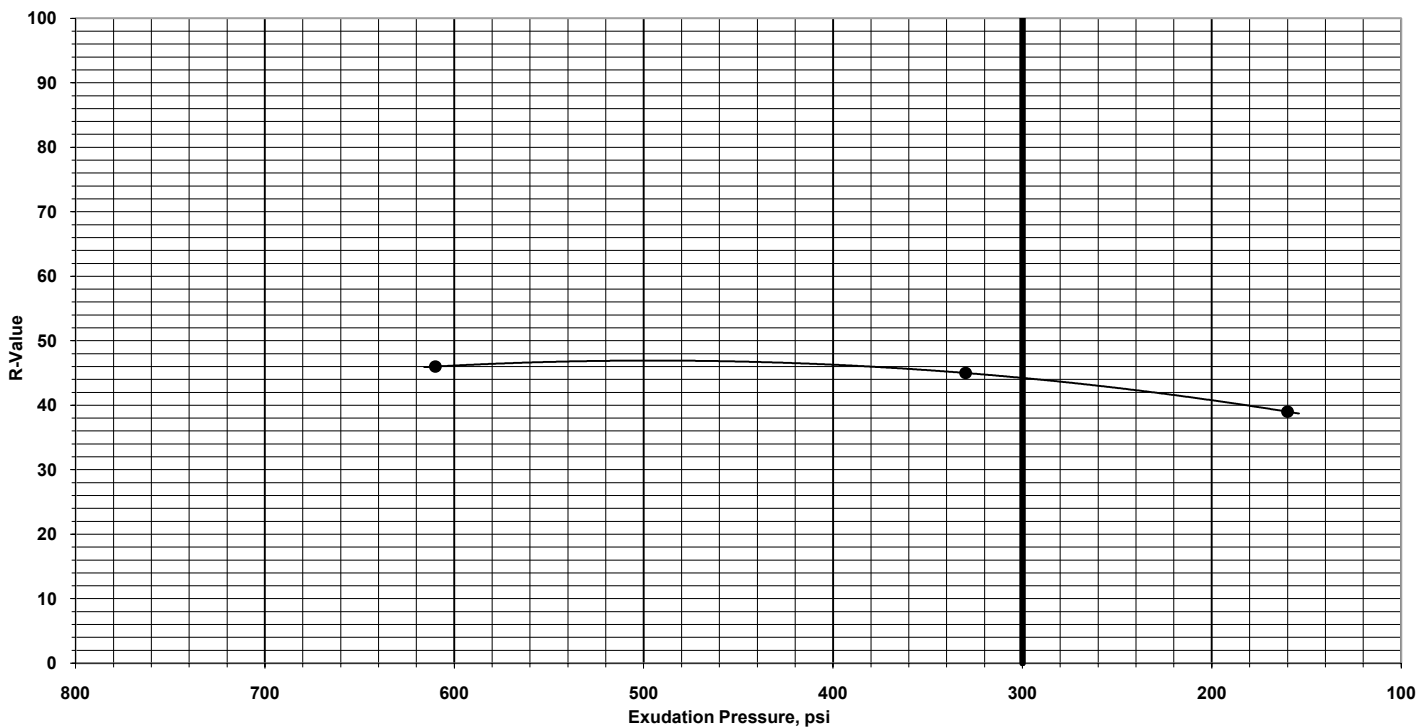
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-108

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 44

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Clayey Sand

Report Date: 1/3/2011

JOB NO.: 63105079

Sample No.: B-105 at depth 0-5'

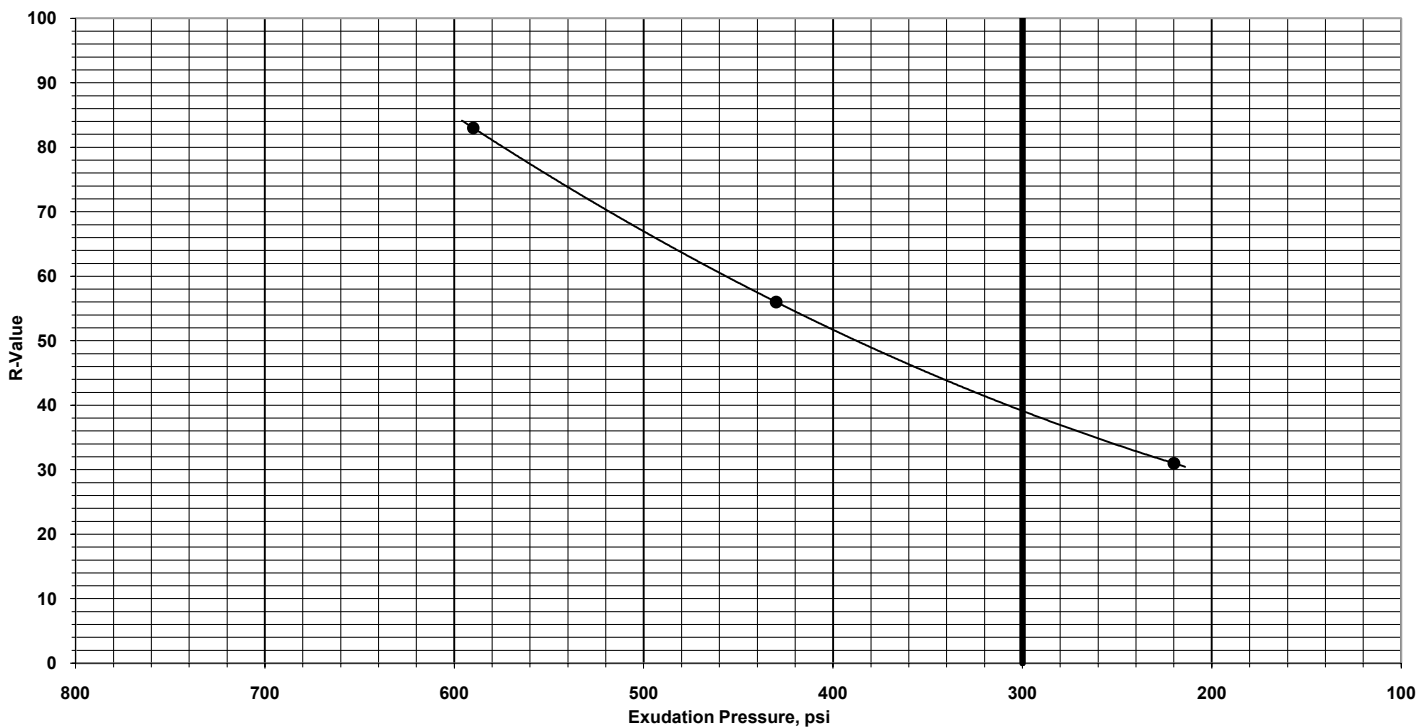
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-105

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 40

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Dark Brown, Clayey Sand

Report Date: 1/5/2011

JOB NO.: 63105079

Sample No.: B-99 at depth 0-5'

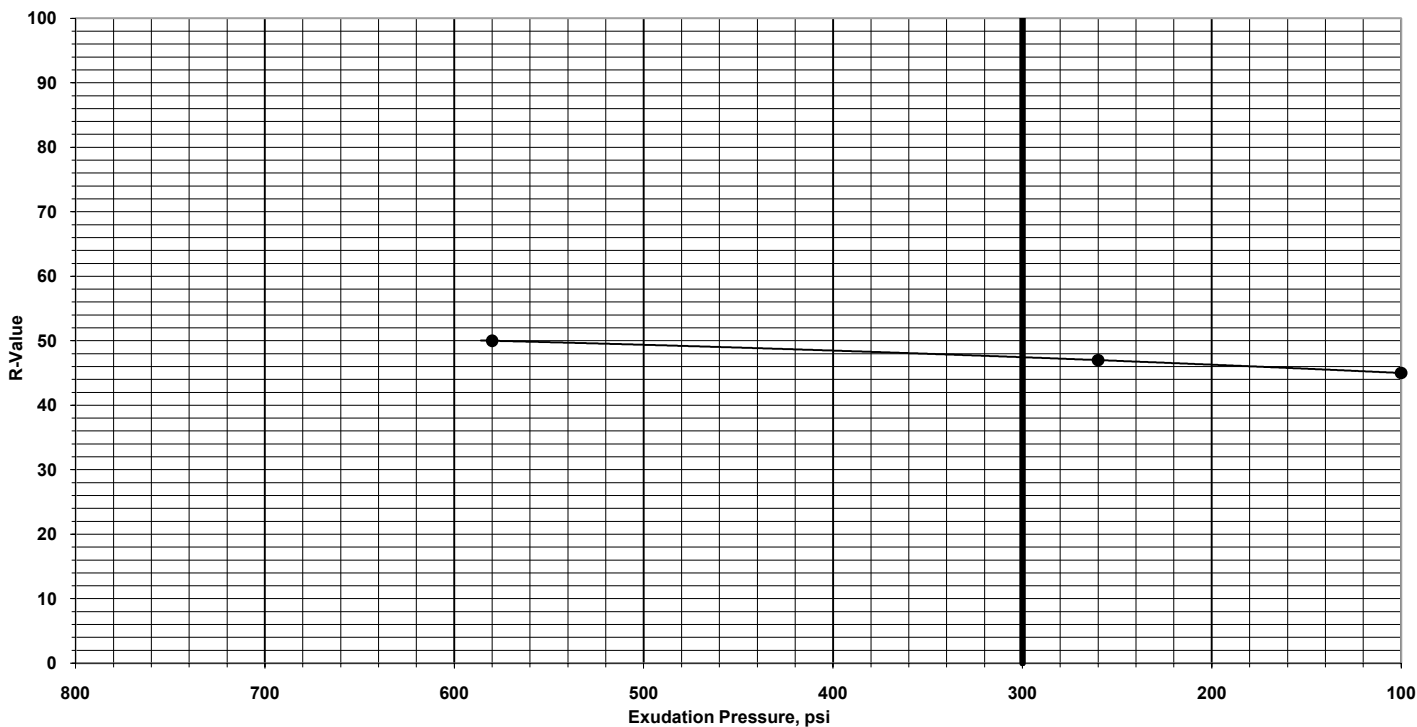
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-99

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 48

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 1/3/2011

JOB NO.: 63105079

Sample No.: B-094 at depth 0-5'

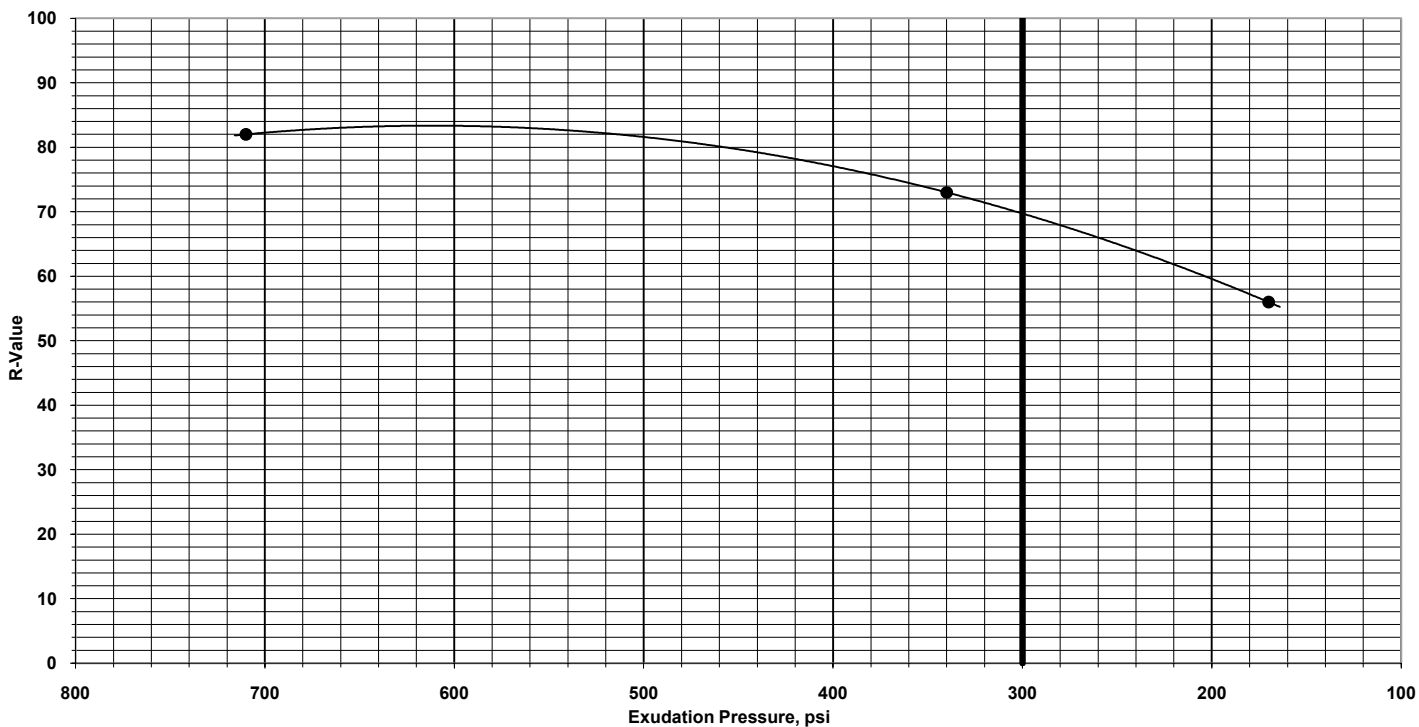
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-094

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 70

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-088 at depth 0-5'

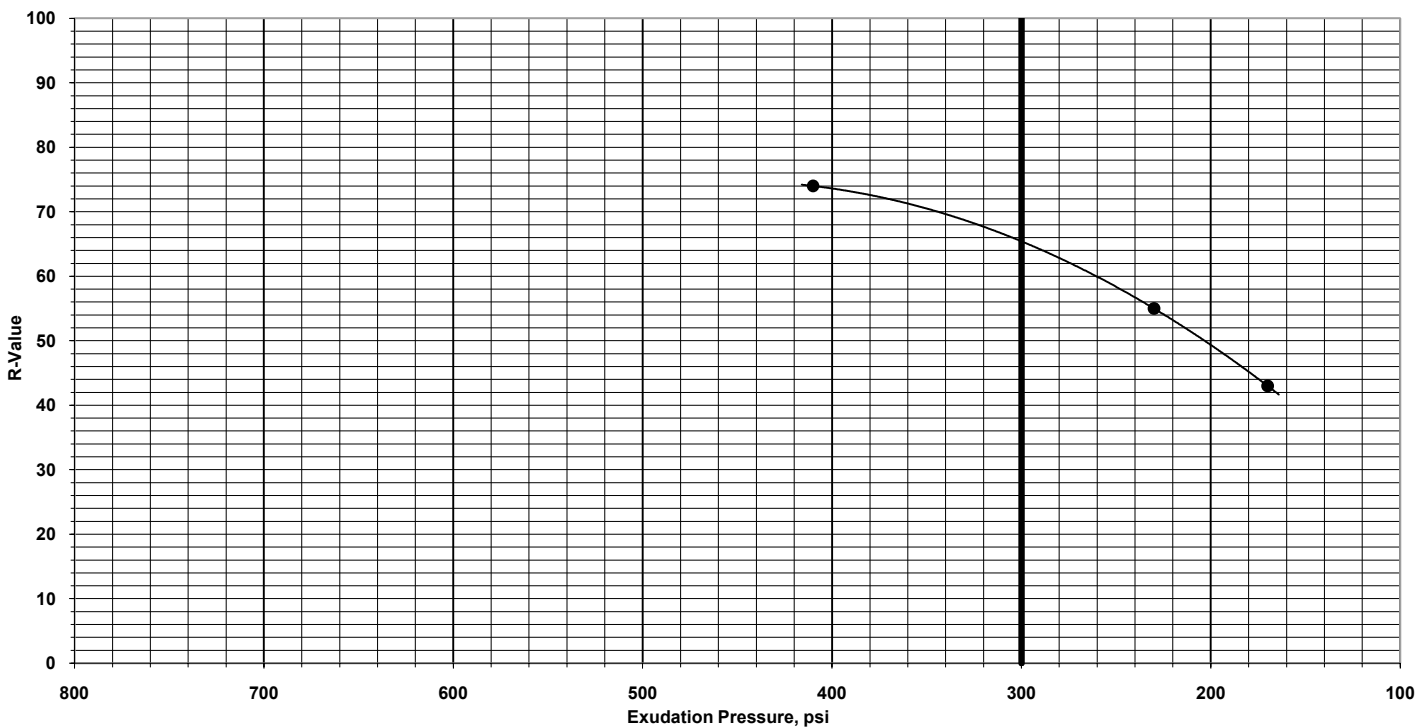
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-088

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 66

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand W/Gravel

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-083 at depth 0-5'

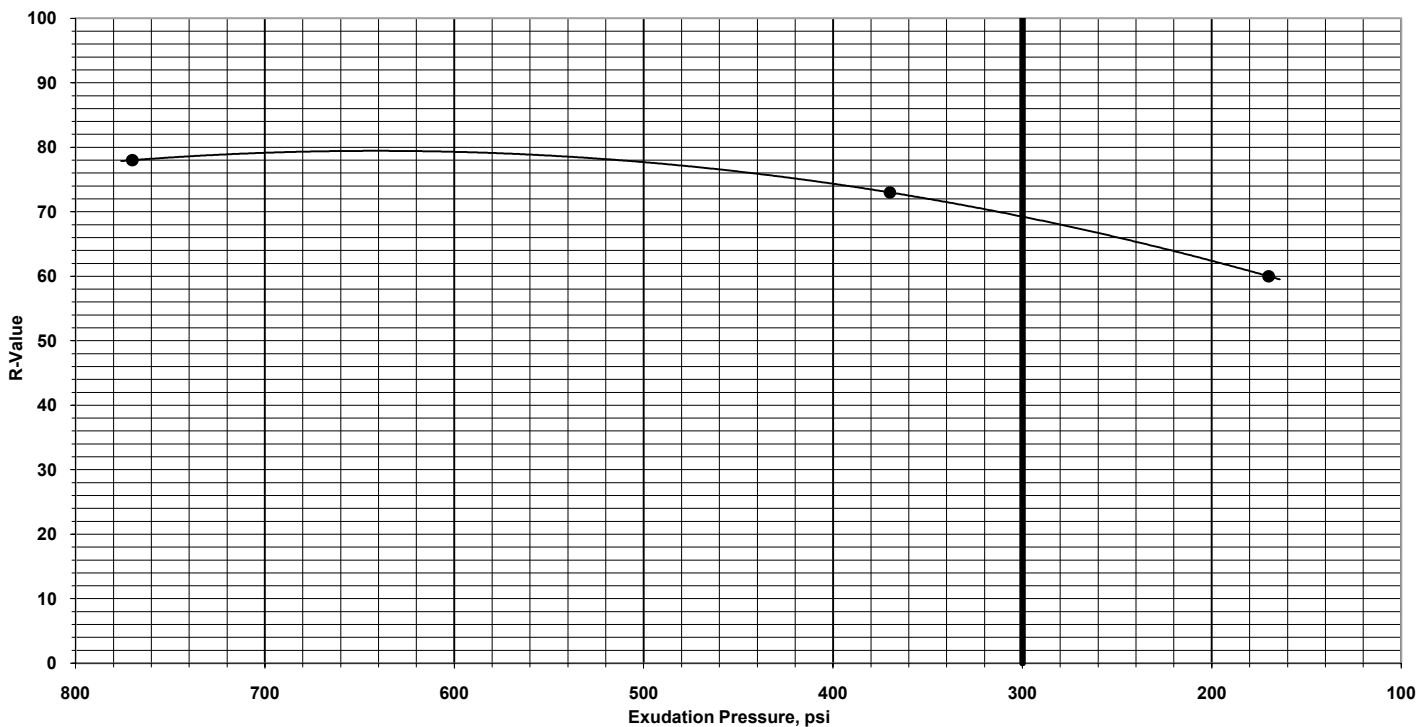
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-083

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 70

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Clayey Sand

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-079 at depth 0-5'

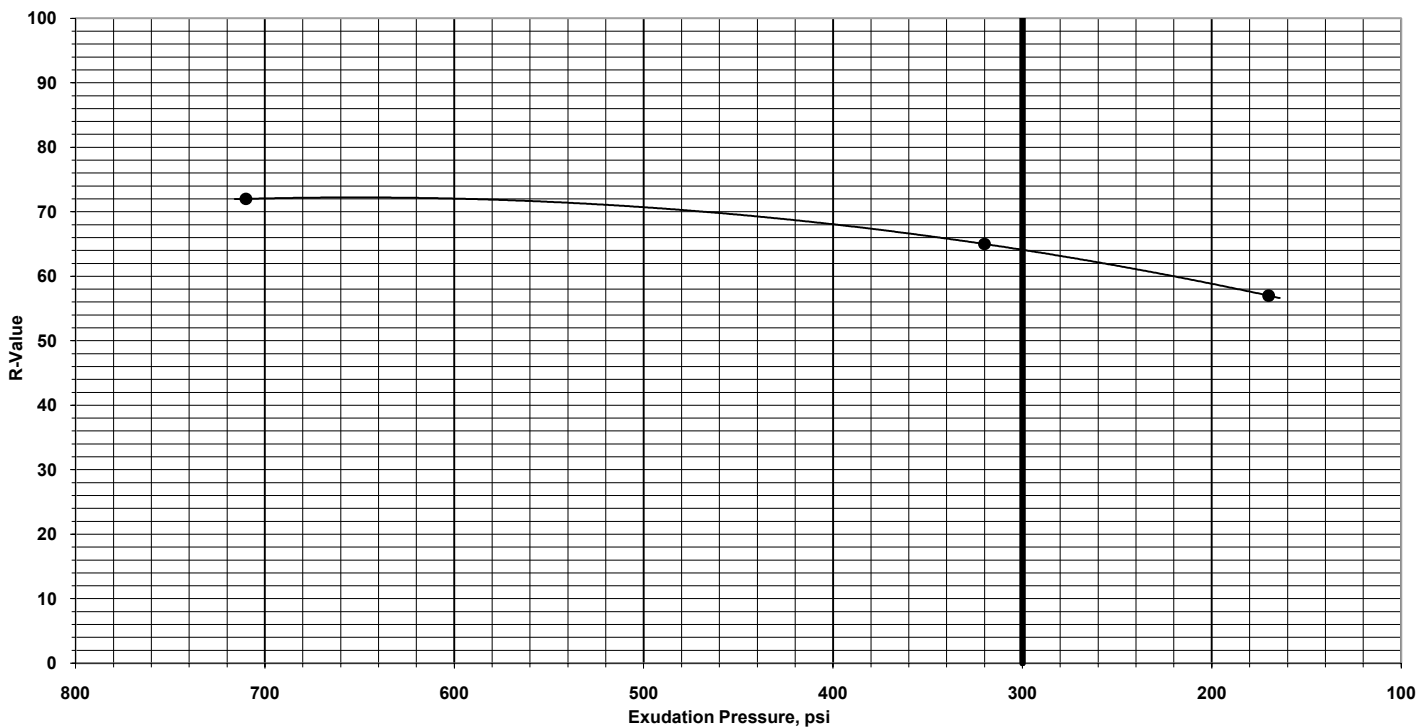
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-079

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 64

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Clayey Sand

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-077 at depth 0-5'

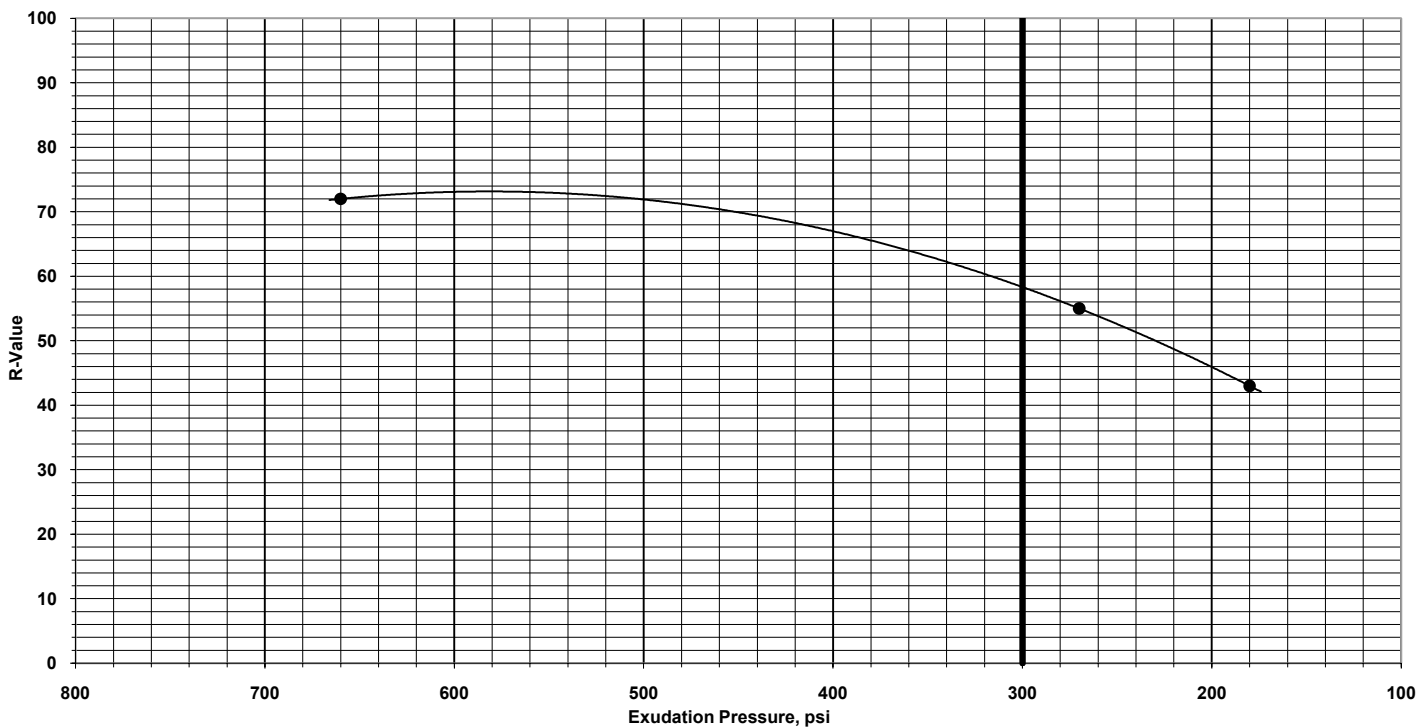
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-077

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 58

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 1/5/2010

JOB NO.: 63105079

Sample No.: B-73 at depth 0-5'

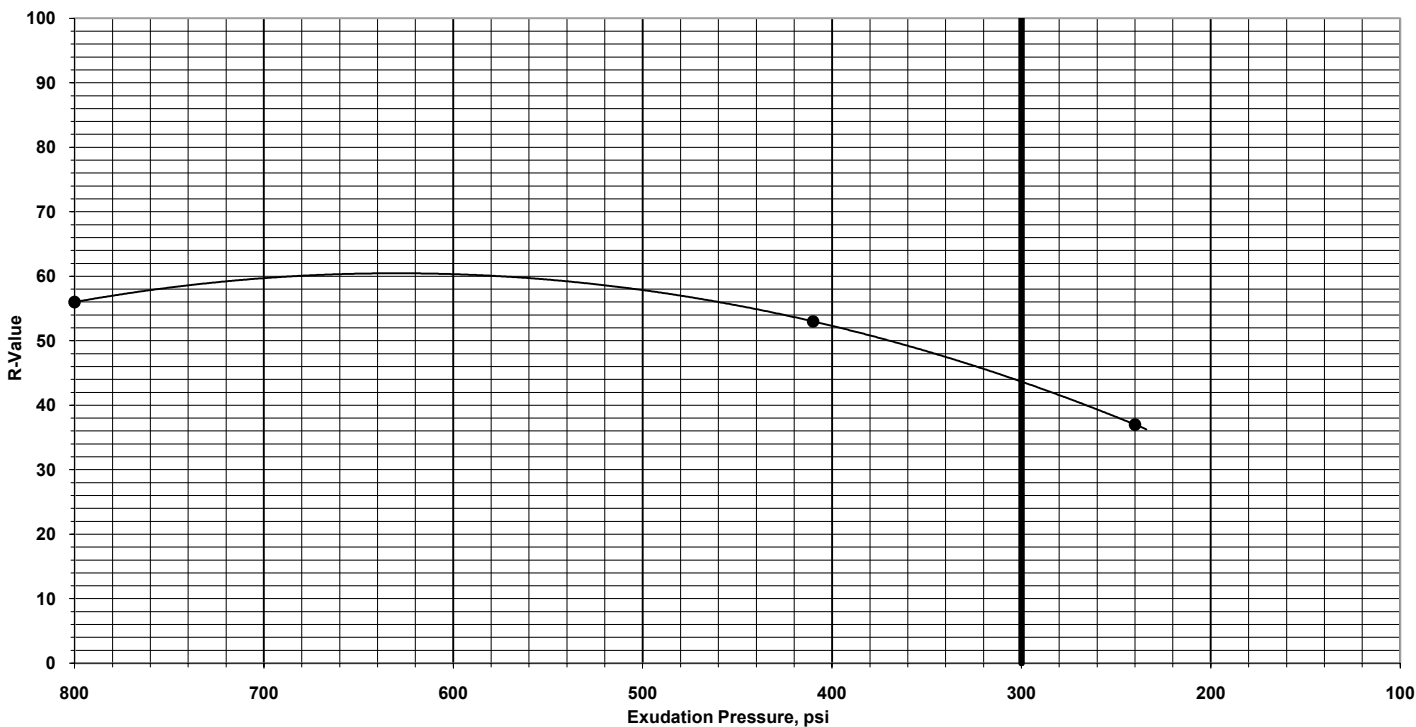
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-73

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 44

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Clayey Sand

Report Date: 1/3/2011

JOB NO.: 63105079

Sample No.: B-072 at depth 0-5'

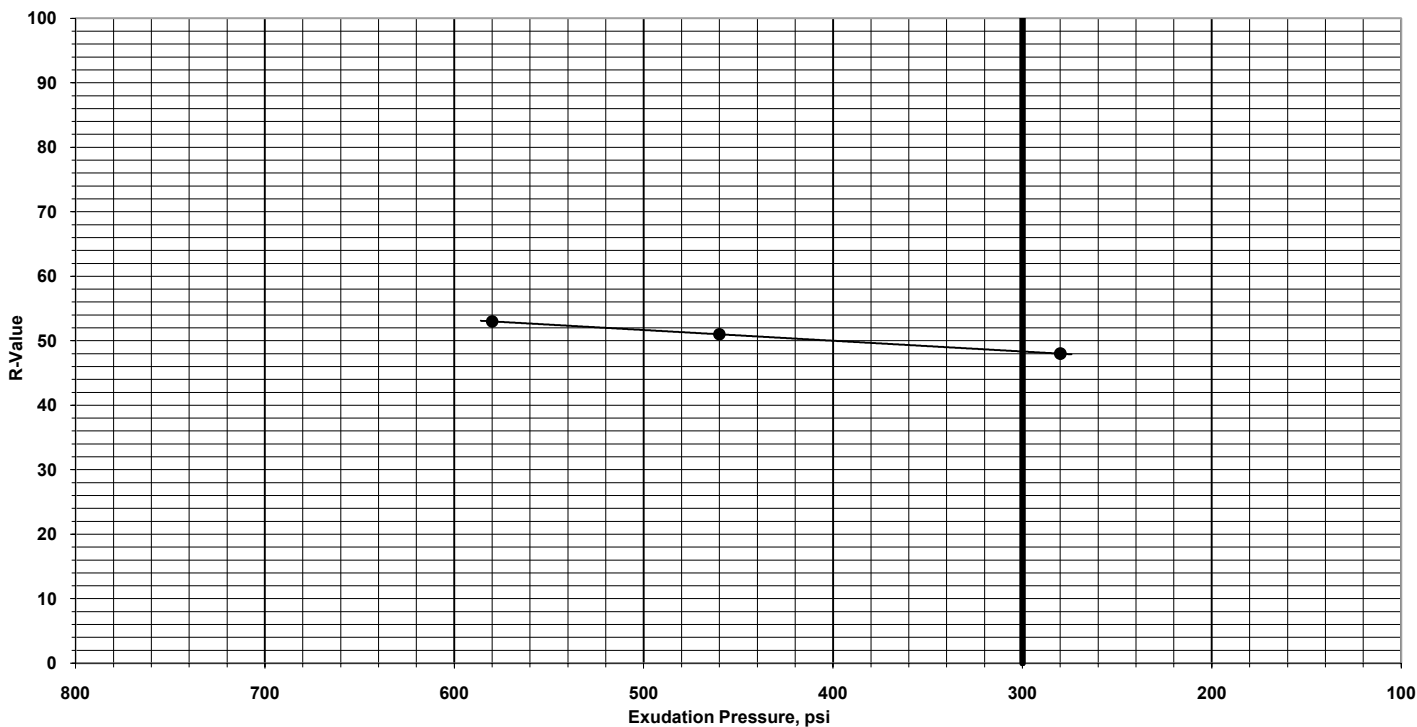
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-072

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 48

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-66 at dpth 0-5'

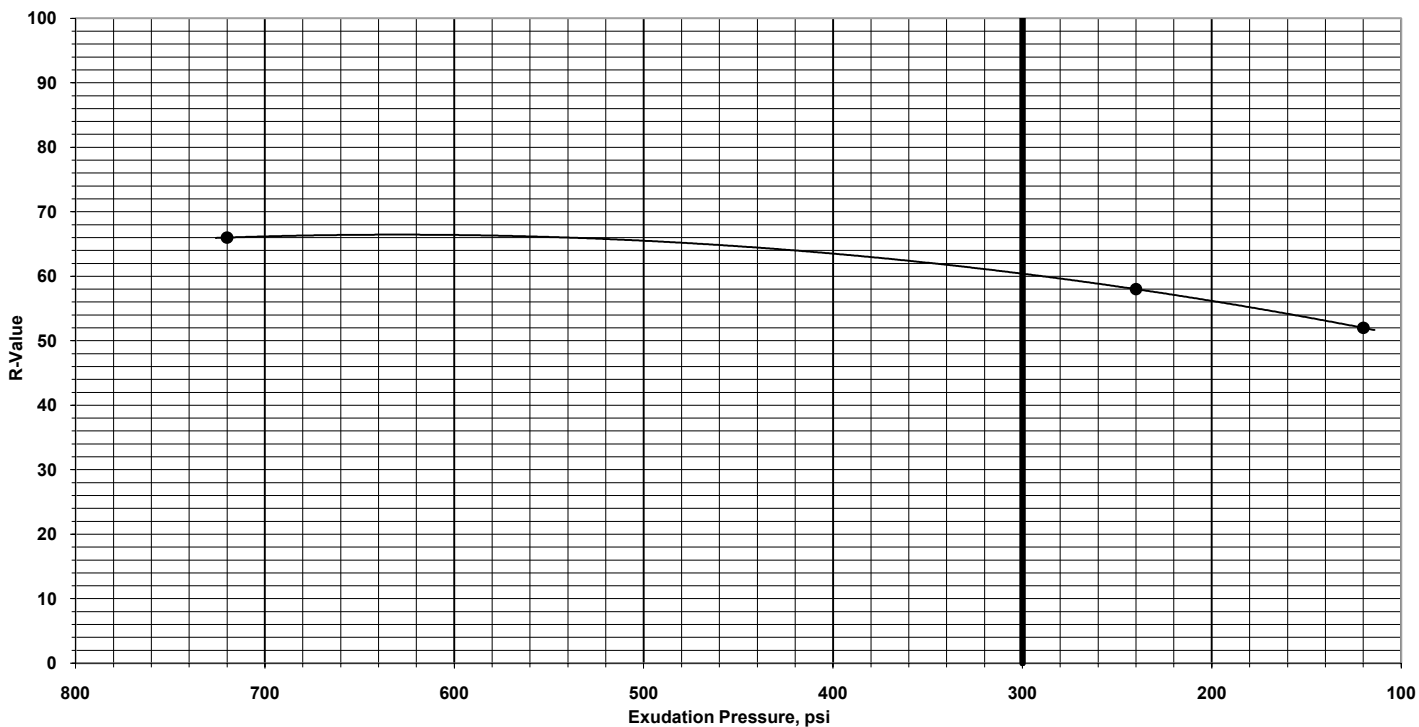
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-66

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 60

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-61 at depth 0-5'

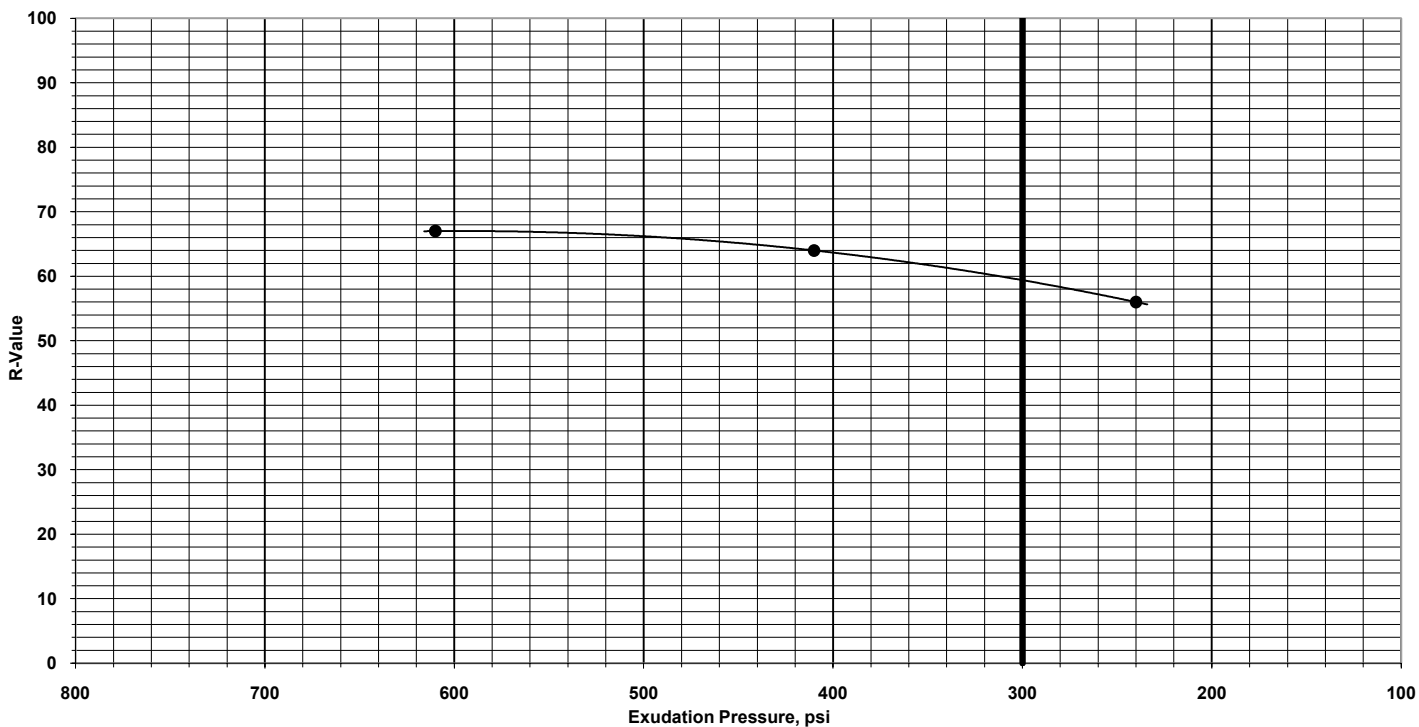
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-61

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 59

Reviewed By:

Remarks:

Choose Review'd by



SUMMARY OF R-VALUE TEST RESULTS

Psomas
800 East Wetmore Rd
Tucson, AZ 85719

ATTENTION: Alejandro Angel, P.E.

PROJECT: Tangerine Road Improvements
INTENDED USE:

MATERIAL DESCRIPTION/CONDITION: Light Brown, Silty Sand

Report Date: 12/6/2010

JOB NO.: 63105079

Sample No.: B-56 at depth 0-5'

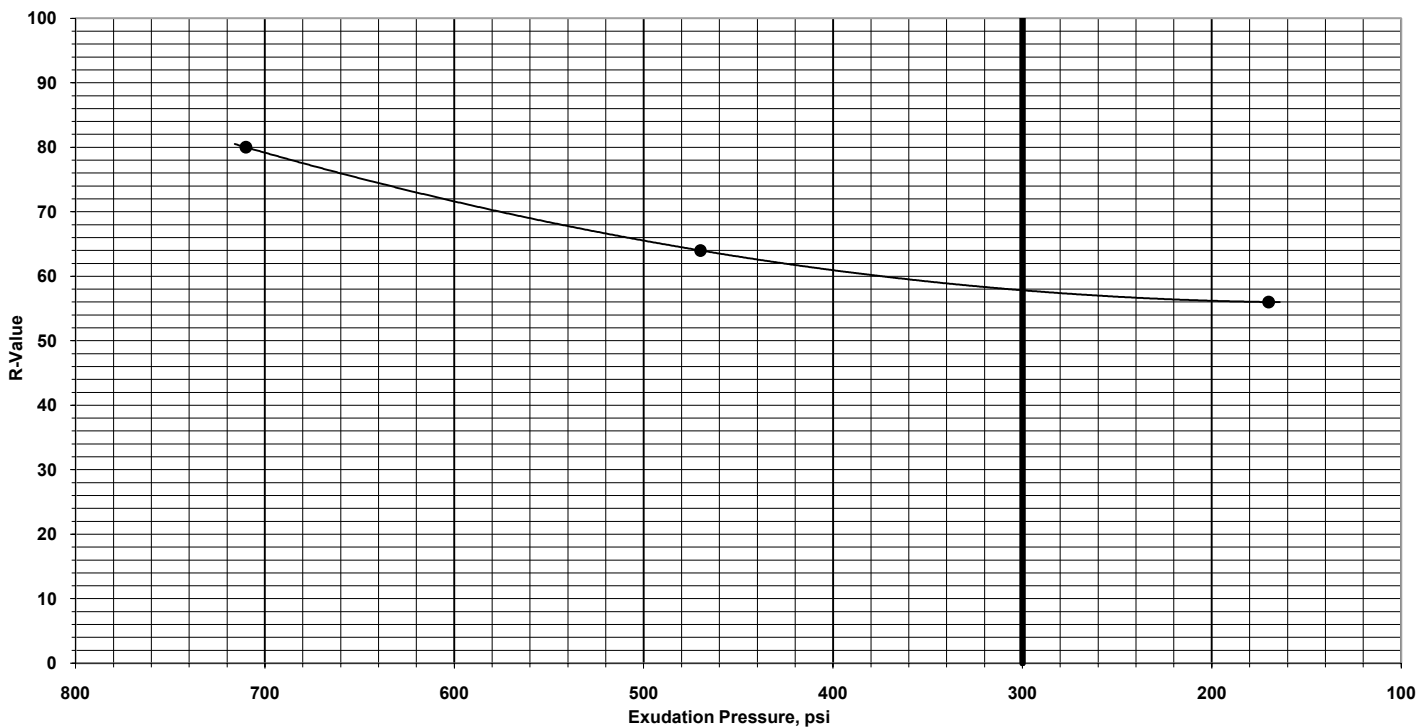
MATERIAL SOURCE: Native

SAMPLE LOCATION: B-56

SAMPLED BY:

Date:

R-Value (ASTM D2844)



TEST SPECIMEN NO.

COMPACTION PRESSURE (PSI)

R-Value At 300 psi Exudation Pressure: 58

Reviewed By:

Remarks:

Choose Review'd by



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
B-011	2	SM	98	2														1, 2
B-011	5	SC-SM	87	6														1, 2
B-012	0	SM			31	NP	NP	NP										
B-012	2	SM	116	2														1, 2
B-013	0	SM			15	NP	NP	NP										
B-013	2	SM	101	1														1, 2
B-013	5	SM	114	2														1, 2
B-014	0	SM			33	NP	NP	NP										
B-014	2	SM	107	2														1, 2
B-015	0	SM			17	NP	NP	NP							8.6	8052	0	0
B-015	2	SM	119	2														1, 2
B-015	5	SM	117	1														1, 2
B-016	0	SM			24	NP	NP	NP										
B-016	2	SM	120	2														1, 2
B-017	0	SM			12	NP	NP	NP							8.7	10736	0	0
B-017	2	SM	113	1														1, 2
B-017	5	SM	117	2														1, 2
B-018	0	SM			30	NP	NP	NP										
B-018	2	SM	112	2														1, 2
B-019	0	SM			19	NP	NP	NP										
B-019	2	SM	114	3														1, 2
B-020	0	SM			15	NP	NP	NP										
B-020	2	SM	116	2											8.3	5368	0	0
B-021	0	SW-SM			12	NP	NP	NP										
B-021	2	SW-SM	112	2											8.5	9394	0	0

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing				Corrosivity				Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)		
B-022	0	SC			23	27	17	10										
B-022	2	SC	110	2														1, 2
B-023	0	SM			14	NP	NP	NP										
B-023	2	SM	110	2														1, 2
B-024	0	SM			21	18	17	1										
B-024	2	SM	110	3														1, 2
B-025	0	SW-SM			11	NP	NP	NP										
B-025	2	SW-SM	113	2														1, 2
B-026	0	SM			17	NP	NP	NP							8.5	6039	0	0
B-026	2	SM	119	2														1, 2
B-027	0	SW-SM			10	NP	NP	NP										
B-027	2	SW-SM	116	2														1, 2
B-028	0	SM			17	NP	NP	NP										
B-028	2	SM	119	2														1, 2
B-029	0	SM			18	NP	NP	NP							8.5	8052	0	0
B-029	2	SM	113	2														1, 2
B-030	0	SM			15	NP	NP	NP							8.1	8052	0	0
B-030	2	SM	116	2														1, 2
B-031	0	SW-SM			12	NP	NP	NP										
B-031	2	SW-SM	111	3														1, 2
B-032	0	SM			18	NP	NP	NP										
B-032	2	SM	117	2														1, 2
B-033	0	SM			18	NP	NP	NP										
B-033	2	SM	118	2														1, 2
B-034	0	SM			13	NP	NP	NP							8.1	10736	0	0

REMARKS

- Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
- Visual Classification.
- Submerged to approximate saturation.
- Expansion Index in accordance with ASTM D4829-95.
- Air-Dried Sample

SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
B-034	2	SM	115	3														1, 2
B-035	0	SM			17	NP	NP	NP										
B-035	2	SM	127	2														1, 2
B-036	0	SM			18	NP	NP	NP										
B-036	2	SM	101	4														1, 2
B-037	0	SM			16	NP	NP	NP						8.1	3892	0	0	
B-037	2	SM	113	3														1, 2
B-038	0	SM			16	NP	NP	NP										
B-038	2	SM	119	2														1, 2
B-039	0	SM			18	NP	NP	NP										
B-039	2	SM	120	2														1, 2
B-039	5	SM	112	3														1, 2
B-040	0	SM			19	NP	NP	NP										
B-040	2	SM	119	2														1, 2
B-041	0	SM			13	NP	NP	NP										
B-041	2	SM	120	2														1, 2
B-041	5	SM	109	10														1, 2
B-042	0	SM			14	NP	NP	NP										
B-042	2	SM	105	1														1, 2
B-043	0	SW-SM			9	NP	NP	NP										
B-043	2	SW-SM	104	1														1, 2
B-043	5	SW-SM	114	3														1, 2
B-044	0	SM			15	NP	NP	NP										
B-044	2	SM	114	2														1, 2
B-045	0	SM			15	NP	NP	NP										

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing				Corrosivity				Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)		
B-045	2	SM	113	1														1, 2
B-046	0	SW-SM			11	NP	NP	NP						7.3	6710	0	0	
B-046	2	SW-SM	113	1														1, 2
B-046	5	SW-SM	112	2														1, 2
B-047	0	SM			17	NP	NP	NP										
B-048	0	SM			17	NP	NP	NP										
B-048	2	SM	117	2														1, 2
B-049	0	SM			16	NP	NP	NP										
B-049	2	SM	116	2														1, 2
B-050	0	SM			22	NP	NP	NP										
B-050	2	SM	118	2														1, 2
B-051	0	SM			22	NP	NP	NP						7.3	6106	0	0	
B-051	2	SM	106	6														1, 2
B-051	5	SM	106	4														1, 2
B-052	0	SM			20	NP	NP	NP										
B-053	0	SM			22	21	18	3										
B-053	2	SM	118	2														1, 2
B-054	0	SM			18	NP	NP	NP										
B-054	2	SM	101	2														1, 2
B-054	5	SM	108	3														1, 2
B-055	0	SM			18	21	19	2						6.4	4697	0	0	
B-055	5	SM	106	3														1, 2
B-056	0	SM			17	NP	NP	NP										
B-056	2	SM	108	4														1, 2
B-057	0	SM			21	NP	NP	NP										

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification			Expansion Testing					Corrosivity			Remarks		
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)		Sulfates (ppm)	Chlorides (ppm)
B-057	2	SM	88	10														1, 2
B-058	0	SM			16	NP	NP	NP										
B-058	2	SM	103	3														1, 2
B-059	0	SM			14	NP	NP	NP							8.4	6173	0	0
B-059	2	SM	110	2														1, 2
B-059	5	SM	112	3														1, 2
B-060	0	SM			15	NP	NP	NP										
B-060	2	SM	108	2														1, 2
B-061	0	SM			20	NP	NP	NP										
B-061	2	SM	111	2														1, 2
B-062	0	SM			19	NP	NP	NP										
B-062	2	SM	115	3														1, 2
B-063	0	SC			26	28	18	10										1, 2
B-063	2	SC	112	8														
B-064	0	SM			19	NP	NP	NP							8.5	3020	0	0
B-064	2	SM	109	2														1, 2
B-065	0	SM			19	NP	NP	NP										
B-065	2	SM	103	7														1, 2
B-066	0	SM			22	NP	NP	NP										
B-066	2	SM	112	3														1, 2
B-067	0	SW-SM			8	NP	NP	NP							7.1	15433	0	0
B-067	2	SW-SM	100	2														1, 2
B-067	5	SW-SM	116	4														1, 2
B-068	0	SM			19	NP	NP	NP										
B-068	5	SM	121	2														1, 2

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
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5. Air-Dried Sample

SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)		
B-069	0	SC			20	29	17	12							6.9	3623	0	0	
B-069	2	SC	95	4															1, 2
B-069	5	SC	103	5															1, 2
B-070	0	SM			19	NP	NP	NP											
B-070	2	SM	103	4															1, 2
B-071	0	SC			14	25	17	8							7.4	5838	0	0	
B-071	2	SC	109	4															1, 2
B-072	0	SC			14	35	21	14											
B-072	2	SC	106	5															1, 2
B-072	5	SC	102	7															1, 2
B-073	0	SM			25	NP	NP	NP											
B-073	2	SM	113	5															1, 2
B-074	0	SM			22	NP	NP	NP							8.5	2818	100	29	
B-074	2	SM	121	2															1, 2
B-074	5	SM	106	2															1, 2
B-075	0	SC			24	27	18	9											
B-075	2	SC	109	6															1, 2
B-075	5	SC	100	6															1, 2
B-076	0	SC			26	26	18	8							8.3	2550	0	12	
B-076	2	SC	107	4															1, 2
B-076	5	SC	120	4															1, 2
B-077	0	SC-SM			28	24	17	7											
B-077	2	SC-SM	105	5															1, 2
B-078	0	SW-SM			9	NP	NP	NP							7.3	15433	0	0	
B-078	2	SW-SM	111	2															1, 2

REMARKS

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Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity			Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)		Chlorides (ppm)
B-078	5	SW-SM	117	4														1, 2
B-079	0	SC			25	30	21	9										
B-079	2	SC	108	6														1, 2
B-079	5	SC	115	4														1, 2
B-080	0	SW-SM			12	NP	NP	NP						7.3	5368	57	11	
B-080	2	SM	105	1														1, 2
B-080	10	SM	108	2														1, 2
B-081	0	SC-SM			23	20	16	4										
B-081	2	SC-SM	116	3														1, 2
B-082	0	SW-SM			11	NP	NP	NP										
B-082	2	SW-SM	114	1														1, 2
B-083	0	SM			19	NP	NP	NP										
B-083	2	SM	111	3														1, 2
B-084	0	SM			15	NP	NP	NP										
B-084	2	SM	100	2														1, 2
B-085	0	SM			25	NP	NP	NP						7.5	6039	0	0	
B-085	2	SM	114	2														1, 2
B-085	10	SM	113	2														1, 2
B-086	0	SM			19	NP	NP	NP										
B-086	2	SM	114	3														1, 2
B-087	0	SM			20	NP	NP	NP										
B-087	2	SM	113	3														1, 2
B-088	0	SM			17	NP	NP	NP										
B-088	2	SM	108	4														1, 2
B-089	0	SC			16	28	18	10						7.6	7381	0	0	

REMARKS

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Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing				Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
B-089	2	SC	107	3													1, 2
B-089	10	SM	103	2													1, 2
B-090	0	SM			26	19	16	3									
B-091	0	SM			15	NP	NP	NP						7.7	7381	0	0
B-091	2	SM	91	1													1, 2
B-091	10	SM	114	3													1, 2
B-092	0	SC-SM			28	20	16	4									
B-092	2	SC-SM	107	5													1, 2
B-093	0	SM			29	NP	NP	NP									
B-093	2	SM	106	3													1, 2
B-094	0	SM			22	NP	NP	NP									
B-094	2	SM	108	3													1, 2
B-095	0	SM			26	NP	NP	NP						8.2	3758	55	0
B-095	2	SM	113	5													1, 2
B-096	0	SC			38	38	18	20									
B-096	2	SM	101	4													1, 2
B-097	0	SM			21	NP	NP	NP									
B-097	2	SM	106	3													1, 2
B-098	0	SC-SM			34	21	14	7						8.1	3892	0	0
B-098	2	SC-SM	105	2													1, 2
B-098	10	SM	108	2													1, 2
B-099	0	SC			33	27	13	14									
B-099	2	SC-SM	120	9													1, 2
B-100	0	SC			27	34	17	17									
B-100	2	SC	106	14													1, 2

REMARKS

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 Site: E. of I-10 to La Canada Drive Pima County, Arizona
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Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity			Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
B-101	0	SM			14	NP	NP	NP					8.3	3892	0	0	
B-101	2	SM	103	5													1, 2
B-101	10	SW-SM	111	2													1, 2
B-102	0	SM			16	NP	NP	NP									
B-102	2	SM	114	6													1, 2
B-103	0	SC-SM			29	20	15	5									
B-103	2	SC-SM	104	3													1, 2
B-104	0	SC			27	38	18	20					8.0	2617	80	22	
B-104	2	SC	92	6													1, 2
B-104	5	SC	105	6													1, 2
B-105	0	SC			23	28	16	12									
B-105	2	SC	109	5													1, 2
B-106	0	SC			20	27	17	10					8.1	2550	0	20	
B-106	2	SC	108	5													1, 2
B-106	5	SC	104	3													1, 2
B-107	0	SC			39	31	17	14									
B-108	0	SC			24	33	17	16									
B-108	2	SC	111	2													1, 2
B-108	5	SC	108	2													1, 2
B-109	0	SC			31	31	14	17									
B-109	2	SC	121	5													1, 2
B-109	5	SC	82	7													1, 2
B-110	0	SC			30	25	16	9									
B-111	0	SM			13	NP	NP	NP									
B-111	2	SM	104	5													1, 2

REMARKS

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SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)			
B-112	0	SM			26	NP	NP	NP											
B-112	2	SM	90	4															1, 2
B-112	5	SM	92	3															1, 2
B-113	0	SC			15	25	17	8											
B-113	2	SC	113	6															1, 2
B-114	0	SM			22	NP	NP	NP											
B-114	2	SM	102	6															1, 2
B-115	0	SC-SM			35	25	18	7											
B-115	2	SC-SM	111	4															1, 2
B-116	0	SC-SM			29	23	18	5											
B-116	2	SC-SM	105	5															1, 2
B-117	0	SC			21	29	18	11											
B-118	0	SM			18	NP	NP	NP							8.5	5368	0	0	
B-118	2	SM	107	3															1, 2
B-119	0	SW-SM			8	NP	NP	NP											
B-119	2	SW-SM	101	5											8.4	7381	0	0	
B-119	5	SW-SM	101	8															1, 2

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
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SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Moisture-Density Relationship			Organic Content	Specific Gravity	Porosity	R-Value	Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits			Max Dry Density (pcf)	Optimum Water Content (%)	Method					
						LL	PL	PI								
B-002	0	SC			48	32	20	12							25	
B-004	0	CL			56	34	20	14			114.5	12.0	698A			
B-007	0	CL-ML			59	26	19	7							36	
B-010	0	SM			26	NP	NP	NP			124.0	9.5	698A			
B-012	0	SM			31	NP	NP	NP							73	
B-022	0	SC			23	27	17	10							69	
B-026	0	SM			17	NP	NP	NP			128.2	8.4	698A			
B-027	0	SW-SM			10	NP	NP	NP							86	
B-030	0	SM			15	NP	NP	NP			126.6	9.3	698A			
B-033	0	SM			18	NP	NP	NP							63	
B-034	0	SM			13	NP	NP	NP			128.4	8.3	698A			
B-036	0	SM			18	NP	NP	NP							66	
B-037	0	SM			16	NP	NP	NP			120.8	11.2	698A			
B-040	0	SM			19	NP	NP	NP							69	
B-041	0	SM			13	NP	NP	NP			128.0	9.7	698A			
B-043	0	SW-SM			9	NP	NP	NP			117.4	12.7	698A			
B-045	0	SM			15	NP	NP	NP							58	
B-050	0	SM			22	NP	NP	NP							64	
B-056	0	SM			17	NP	NP	NP							58	
B-057	0	SM			21	NP	NP	NP			120.4	11.3	698A			
B-058	0	SM			16	NP	NP	NP			124.7	9.5	698A			
B-061	0	SM			20	NP	NP	NP							59	
B-062	0	SM			19	NP	NP	NP			125.6	9.3	698A			
B-065	0	SM			19	NP	NP	NP			121.9	11.4	698A			
B-066	0	SM			22	NP	NP	NP							66	

REMARKS

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SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Moisture-Density Relationship			Organic Content	Specific Gravity	Porosity	R-Value	Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Max Dry Density (pcf)	Optimum Water Content (%)	Method					
B-070	0	SM			19	NP	NP	NP	124.0	10.5	698A					
B-072	0	SC			14	35	21	14							48	
B-073	0	SM			25	NP	NP	NP							66	
B-075	0	SC			24	27	18	9	124.1	9.1	698A					
B-077	0	SC-SM			28	24	17	7							58	
B-079	0	SC			25	30	21	9							64	
B-081	0	SC-SM			23	20	16	4	129.6	8.8	698A					
B-083	0	SM			19	NP	NP	NP							67	
B-086	0.2	SM			19	NP	NP	NP	123.0	9.5	698A					
B-088	0.2	SM			17	NP	NP	NP							66	
B-092	0.2	SC-SM			28	20	16	4	126.5	9.5	698A					
B-094	0.2	SM			22	NP	NP	NP							70	
B-096	0.2	SC			38	38	18	20	118.0	13.0	698A					
B-099	0.2	SC			33	27	13	14							45	
B-103	0.2	SC-SM			29	20	15	5	127.0	9.0	698A					
B-105	0.2	SC			23	28	16	12							40	
B-108	0	SC			24	33	17	16							44	
B-112	0	SM			26	NP	NP	NP							67	
B-114	0	SM			22	NP	NP	NP							79	
B-115	0	SC-SM			35	25	18	7	121.4	10.6	698A					
B-116	0	SC-SM			29	23	18	5							52	
B-119	0	SW-SM			8	NP	NP	NP	125.2	9.0	698A					

REMARKS

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SUMMARY OF LABORATORY RESULTS

Project: Tangerine Road Corridor Project
 Site: E. of I-10 to La Canada Drive Pima County, Arizona
 Job #: 63105079
 Date: 9-20-11



Summary of Corrosion Testing Results

Boring Label	Approximate Station	pH	Resistivity (ohm-cm)	Sulphate* (ppm)	Chloride* (ppm)
B-011	Sta. 497+10, 40'L	8.1	5,055	ND	ND
B-015	Sta. 515+70, 15'L	8.6	8,052	ND	ND
B-017	Sta. 527+30, 30'L	8.7	10,736	ND	ND
B-020	Sta. 540+10, 30'R	8.3	5,368	ND	ND
B-021	Sta. 545+80, 50'L	8.5	9,394	ND	ND
B-026	Sta. 570+25, 20'R	8.5	6,039	ND	ND
B-029	Sta. 588+50, 25'L	8.5	8,052	ND	ND
B-030	Sta. 591+30, 30'R	8.1	8,052	ND	ND
B-034	Sta. 613+75, 30'L	8.1	10,736	ND	ND
B-037	Sta. 628+50, 25'L	8.1	3,892	ND	ND
B-039	Sta. 636+60, 20'L	7.6	4,026	ND	ND
B-041	Sta. 645+90, 30'L	8.1	7,381	ND	ND
B-043	Sta. 655+00, 35'L	6.8	8,723	ND	ND
B-046	Sta. 672+75, 20'L	7.3	6,710	ND	ND
B-051	Sta. 694+65, 25'L	7.3	6,106	ND	ND
B-054	Sta. 707+00, 20'R	7.5	4,294	ND	ND
B-055	Sta. 712+50, 55'L	6.4	4,697	ND	ND
B-059	Sta. 731+45, 20'L	8.4	6,173	ND	ND
B-064	Sta. 757+80, 50'R	8.5	3,020	ND	ND
B-067	Sta. 772+00, 30'L	7.1	15,433	ND	ND
B-069	Sta. 780+15, 20'L	6.9	3,623	ND	ND
B-071	Sta. 794+20, 40'L	7.4	5,838	ND	ND
B-074	Sta. 811+65, 40'R	8.5	2,818	29	100
B-076	Sta. 818+55, 55'L	8.3	2,550	12	ND
B-078	Sta. 827+90, 20'L	7.3	15,433	ND	ND
B-080	Sta. 836+80, 20'L	7.3	5,368	57	11
B-085	Sta. 857+15, 25'R	7.5	6,039	ND	ND
B-089	Sta. 875+60, 20'R	7.6	7,381	ND	ND
B-091	Sta. 884+70, 25'L	7.7	7,381	ND	ND
B-095	Sta. 904+10, 20'L	8.2	3,758	55	ND
B-098	Sta. 918+05, 20'R	8.1	3,892	ND	ND
B-101	Sta. 932+50, 25'L	8.3	3,892	ND	ND
B-104	Sta. 946+00, 25'R	8.0	2,617	80	22
B-106	Sta. 954+90, 50'R	8.1	2,550	ND	ND
B-118	Thornysdale 825' S of Tangerine	8.5	5,368	ND	20
B-119	Thornysdale 1400' S of Tangerine	8.4	7,381	ND	ND

*ND=Below the detection limit of the method used

APPENDIX C
Supporting Documents

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1- ³ / ₈ " I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., 3" O.D. unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	0 - 1	Very Soft
500 - 1,000	2 - 4	Soft
1,000 - 2,000	4 - 8	Medium Stiff
2,000 - 4,000	8 - 15	Stiff
4,000 - 8,000	15 - 30	Very Stiff
8,000+	≥ 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Ring Sampler (RS) Blows/Ft.</u>	<u>Relative Density</u>
0 - 3	0-6	Very Loose
4 - 9	7-18	Loose
10 - 29	19-58	Medium Dense
30 - 50	59-98	Dense
≥ 50	≥ 99	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1-10
Medium	11-30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

			Soil Classification			
			Group Symbol	Group Name ^B		
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel ^F	
	Sands 50% or more of coarse fraction passes No. 4 sieve	Gravels with Fines More than 12% fines ^C	Clean Sands Less than 5% fines ^D	Fines classify as ML or MH $Cu \geq 6$ and $1 \leq Cc \leq 3^E$	GM	Silty gravel ^{F,G,H}
				Fines classify as CL or CH $Cu < 6$ and/or $1 > Cc > 3^E$	GC	Clayey gravel ^{F,G,H}
		Sands with Fines More than 12% fines ^D	Clean Sands Less than 5% fines ^D	Fines classify as ML or MH $Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand ^I
				Fines classify as CL or CH $Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand ^I
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}	
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}	
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay ^{K,L,M,N}	
				OH	Organic silt ^{K,L,M,O}	
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}	
			PI plots below "A" line	MH	Elastic Silt ^{K,L,M}	
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay ^{K,L,M,P}	
				OH	Organic silt ^{K,L,M,O}	
	Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

^ABased on the material passing the 3-in. (75-mm) sieve

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^DSands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^KIf soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

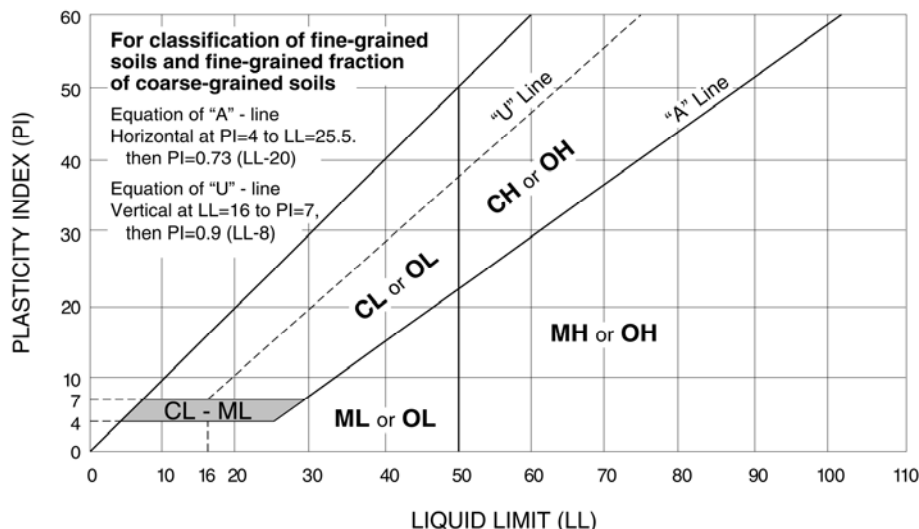
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.





Town of Marana
 Development Services Center
 Design/Construction Division
 11555 W. Center Dr. Bldg. A2, Tucson, AZ 85653
 (520) 382-2600 Fax: (520) 382-2640

9/19/2011
 1 of 2

TANGERINE ROAD, I-10 TO LA CANADA DRIVE /// PROJECT NO. 2005-061 /// GEOTECHNICAL REPORT TOWN OF MARANA						
REVIEWER'S NAME:		H	CIP	CatGEO. REPT.	Completed by	Check by
No. Sheet / Page	Location	Category	Comment	By	Action	
1	Cover Letter	Seal, Signature & Date	Document to be Sealed, Signed and Dated.	H	will comply	BWR
2	i	Engineered Fill	We recommend the second sentence of the second bullet be rewritten as follows: We recommend that all drainage structures be supported by a minimum of two (2) feet of engineered fill. Comment applies to all other locations in the document.	H	will comply	BWR
3	1	Second Paragraph	The Executive Summary states five (5) to 31 1/2 feet below.... Resolve.	H	removed Executive Summary from Report	BWR
4	1	Third Paragraph	A-25 should read A-27.	H	will comply	BWR
5	1	Proposed Traffic Interchange	Does this statement refer to the proposed new Traffic Interchange for I-10 and Tangerine Road? If so, then additional borings need to be advanced along the proposed alignment. Resolve.	H	The project extends from the eastern limits of the proposed interchange. The interchange is not part of the scope of this project.	BWR
6	2	Street Lights	Is Street Lights referring to Traffic Signals? If so, revise the language accordingly.	H	Streets lights and traffic signals. Will comply	BWR
7	2	Table	Is there a need to generalize on the Borings from 107 - 119 as part of the table? If so, please include language in the table.	H	will comply	BWR
8	4	Table	Is there a need to provide the relative information, Borings 107 - 119, similar to the data provided in the table for other borings? If so, please include language in the table.	H	will comply	BWR
9	4	Second Paragraph; Last sentence	The recommendation is to lower the two (2) values so that all existing on-site soils can remain in place; this would reduce the amount of earthwork required for the Project. With that being said, what are the ramifications of lowering the values and to what extent, order of magnitude, would it take to accomplish the proposal? What is the long range effect of this proposal?	H	Lowering the design R-value should allow all of the on-site soils to remain as subgrade support for pavements, however it does increase the pavement section. Generally the pavement section increase is minimal. As an alternative we have provided a pavement alternative that include cement treated subgrade, other alternatives include removal and replacement of soils that do not meet the construction control correlated r-value or subgrade improvement (cement, lime, or geotextiles)	BWR
10	5	Subsection 4.2	Is there a need to provide the relative information, Borings 107 - 119, similar to the data provided in the table for other borings? If so, please include language in the table.	H	will comply	BWR
11	5	Subsection 4.4	We recommend the first sentence of the paragraph be rewritten as follows: Earthwork and roadway grading shall be performed in conformance with the requirements of Sections 203 and 205 of the City of Tucson/Pima County Standard Specifications unless provided otherwise on the Plans or in the Special Provisions.	H	will comply	BWR
12	7	Subsection 4.4	Is there a need for a table for Boring 107 - 119? If so please provide accordingly.	H	will comply	BWR
13	9	Subsection 4.4	This is a repeat as shown on page 8 of the document. Resolve. Thornydale Road is missing. Resolve.	H	will comply	BWR
14	Appendix A; A-28	A-1 - A 119 Street Names	Provide the street names for the North/South streets.	H	will comply	BWR
15	Appendix A; A-28	Second Paragraph Bottom of Boring	A-25 should read A-27.	H	will comply	BWR
16	A-135	Spelling	Correct the spelling of the word "becomes".	H	will comply	BWR



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9/19/2011
 2 of 2

TANGERINE ROAD, I-10 TO LA CANADA DRIVE /// PROJECT NO. 2005-061 /// GEOTECHNICAL REPORT
 TOWN OF MARANA
 CIP

REVIEWER'S NAME:		H		CIP		CatGEO. REPT.	
No. Sheet / Page	Location	Category	Comment	By	Action	Completed by	Check by
17	B-1	Page Number	B-1 should be added to the bottom of the page.	H	will comply	BWR	
18	B-182	R-Value	Should the R-Value be 44???	H	will comply	BWR	
19	B-192	Sample No. & Sample Location	The Sample No. & Sample Location have a different value; all other preceding sheets have the same value. Resolve. Make changes on the Summary Sheet accordingly.	H	will comply	BWR	
20	B-193	Sample No. & Sample Location	The Sample No. & Sample Location have a different value; all other preceding sheets have the same value. Resolve. Make changes on the Summary Sheet accordingly.	H	will comply	BWR	
21	B-194 thru B-204	Various Data on the Summary of Laboratory Results	Please check the various test sheets for relativity of the Data shown on the Summary Sheet.	H	will comply	BWR	
22	B-205	R-Value	Page B-168 has the R-Value at 24. Resolve.	H	will comply	BWR	
23	B-205	R-Value	Page B-170 has the R-Value at 77. Resolve.	H	will comply	BWR	
24	B-205	R-Value	Page B-180 has the R-Value at 60. Resolve.	H	will comply	BWR	
25	B-206	R-Value	Page B-182 has the R-Value at 44. Resolve.	H	will comply	BWR	
26	B-206	R-Value	Page B-185 has the R-Value at 70. Resolve.	H	will comply	BWR	
27	B-206	R-Value	Page B-188 has the R-Value at 48. Resolve.	H	will comply	BWR	
28	B-208 thru B-208	Various Data on the Summary of Laboratory Results	Please check the various test sheets for relativity of the Data shown on the Summary Sheet.	H	will comply	BWR	
29				H			
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CERTIFICATE OF COMPLIANCE

DATE: September 21, 2011

TO: Town of Marana Department of Transportation
11555 W. Civic Center Drive
Marana, AZ 85653-7003

ATTN: Mr. Scott Leska, P.E., P.T.O.E.
Project Manager

RE: QUALITY ASSURANCE REVIEW – STAGE I SUBMITTAL
Tangerine Road Corridor – Interstate 10 to La Cañada Drive

CONSULTANT: Psomas
800 E. Wetmore Road, Suite 110
Tucson, AZ 85719

SUBCONSULTANT:

CERTIFICATE OF COMPLIANCE

This is to certify that I have monitored the quality control (QC) process during production and review. That I have completed and signed the attached QC Checklists for each element of the project. That I have completed and documented the required QC Review of the production and review quality control documentation for all elements of this submittal. This QA Review was conducted on September (day) 19, 2011, after all QC procedures were complete. Submittal plans, associated production and review check prints and quality control documents for the referenced elements have been evaluated, initialed and are available for review upon request.

This certificate is issued to document my review and to confirm that the standards for professional practice processes were followed in producing the submittal documents. In my professional opinion, these documents meet the standards of the Town of Marana, Department of Public Works and are ready for review.

SIGNED: 
Project Manager