

Memorandum

To: Melisa Wiedemeier
Hydraulics
District 11
MS#321

Date: September 9, 2009
File: 11-SD-SR11
EA 11-056310
PM ~~00/07~~ 0.0/2.7

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Proposed State Route 11 Extension: Hydrogeologic Site Assessment/ Storm Water Data Report.

Introduction

Pursuant to your request a hydrogeologic investigation has been conducted at the location of the proposed State Route 11 extension. The investigation consisted of a site reconnaissance, review of the pertinent archived documents, exploratory drilling, installation of piezometers, percolation testing, hydrogeologic analyses and the writing of this memorandum. This memorandum is intended to convey information relevant to the design of the proposed detention basins to be constructed within the limits of the proposed extension, and to provide general subsurface hydrologic site conditions.

Site Location

The project site is located along the border between the United States and Mexico, east of the community of Otay Mesa, in San Diego, California. To the west it is bounded by Enrico Fermi Drive, to the north by Otay Mesa Road, and to the south by the aforementioned border. The San Ysidro Mountains border the site to the east. For the project location reference is directed to Figure 1.

Site Geology

The location of the proposed SR-11 extension is located within the Peninsular Ranges Geomorphic Province of California. Based on the review of published geologic literature and maps, and our subsurface investigation program of 2009, the project area is generally underlain by the Oligocene to Miocene-age Otay Formation. The Santiago Peak Volcanics basement, in turn, underlies this formation. The Otay Formation is composed of poorly graded and poorly indurated sandstone and claystone. The claystone is composed almost exclusively of bentonite, therefore, creating a potential for the expansiveness of the Otay Formation soils (Kennedy, 1977). Bentonite is clay formed by the decomposition of volcanic ash, having the ability to absorb large quantities

of water and to expand to several times its normal volume. In addition this soil has a very low intrinsic permeability (less than 10^{-2} Darcy) that greatly restricts the movement of ground water, making it almost impermeable. Santiago Peak Volcanics basement consists of Jurassic to Cretaceous-age metavolcanic rocks consisting of mildly metamorphosed volcanic, volcanoclastic, and sedimentary rocks (Kennedy, 1977). In addition, bottoms of the arroyos are filled with alluvial soils derived from the local sources, and a relatively thin mantle of topsoil consisting of slightly organic silty clayey sands overlies almost the entire site.

Subsurface Exploration and Testing

During the subsurface exploration program for this project two relatively deep borings were drilled utilizing coring (wet rotary) method. Boring R-09-101 was drilled to the depth of 130 feet below the ground level (to an elevation of 434.4 feet), and Boring R-09-102 was drilled to the depth of 50 feet below the ground level (to an elevation of 441.5 feet). Boring Records for both borings are attached to this memorandum. Upon the completion of drilling, borings R-09-101 and R-09-102 were developed into cluster piezometers – two per each boring – installed. For the piezometers specifications and readings data reference is directed to Table 1 and Table 2, in Site Hydrogeologic Data section of this memorandum.

In addition to deep borings, four relatively shallow borings A-09-103, A-09-104, A-09-105, and A-09-106 were drilled utilizing augering (dry rotary) method. These borings were drilled to the depths ranging from 26.5 feet to 36.5 feet below the ground level. Boring Records for these borings are attached to this report.

In order to conduct percolation tests seven relatively shallow borings were developed employing augering (dry rotary) method. These borings were drilled to the depth of five and one half feet below the ground level. Percolation tests per California Test Method 750, 1986, were performed in these borings. Percolation Test Records are attached to this memorandum. For the percolation rates reference is directed to Table 3., The Site Hydrogeologic Data section of this memorandum. For the locations of exploratory borings and percolation tests reference is directed to Figure 2. In addition, the Caltrans Office of Surveys surveyed all borings.

Site Hydrogeologic Data

Table 1, Specifications for Piezometers installed in Borings R-09-101 and R-09-102, on July 15, 2009.

Boring R-09-101		Boring R-09-102		Piezometer Slotted Section Elevations (ft)
Piezom-A				434.4 – 467.4
	Piezom-B			472.9 – 492.9
		Piezom-A		441.5 – 456.5
			Piezom-B	459.5 – 479.5

Table 2, Groundwater Elevations (in feet) Observed in Piezometers R-09-101 and R-09-102

Piezometer R-09-101		Piezometer R-09-102		Date
Piezom-A	Piezom-B	Piezom-A	Piezom-B	
523.95	531.82	449.09	464.38	7/31/09
521.52	529.75	448.83	461.98	8/20/09
520.40	529.49	448.80	461.56	9/02/09
519.20	529.70	448.83	461.90	9/15/09

Table 3, Percolation Tests Rate (in min/inch)

PT-C A-09-103	PT-C2	PT-D A-09-104	PT-E	PT-F A-09-105	PT-G A-09-106	PT-H
59.9	71.1	174.5	*	34.5	*	1.4

* - no percolation was observed

Groundwater

No groundwater was encountered in all borings drilled during the exploration program for this project. Borings R-09-101 and R-09-102 were drilled utilizing drilling fluid. Therefore, water encountered in the piezometers is most likely a remnant of water-based drilling fluid slowly dissipating into the surrounding formation. This process will take time to complete.

Preliminary groundwater data obtained from the subsurface exploration program for this project (including the readings of piezometers) suggests that no groundwater exists within the Otay Formation. In Boring R-09-101 the interface of this sedimentary formation and underlying Santiago Peak Volcanics bedrock was logged to be at an elevation of 463.4 feet, and in Boring R-09-102 this interface was logged to be at an elevation of 459.5.0 feet. Based on preliminary results of our exploration program and available geologic literature it is very unlikely that significant ground water exists within the Otay Formation. However, our office will continue monitoring the piezometers, and any groundwater-related data that differs with the conclusions of this memorandum will be reported to your office. Perched groundwater could potentially be encountered at some locations within the Otay Formation, especially during the rainy season. Perched groundwater is unconfined ground water that is trapped by underlying layer or lens of impermeable soil, usually clay.

No groundwater was logged within the Santiago Peak Volcanic bedrock, to the maximum depth of our exploratory borings. The maximum depth this formation was explored in Boring R-09-101 was 130.0 feet below ground level (elevation of 434.4 feet). In Boring R-09-102 the

bedrock was explored to the depth of 50.0 feet below the ground level (elevation of 441.5 feet). At this time the existence of groundwater within this Santiago Peak Volcanics Formation is inconclusive, as the piezometer readings have yet to stabilize and continue to trend downward. However, our office will continue monitoring piezometers installed in both borings, and any groundwater-related data that differs with the conclusions of this memorandum will be reported to your office.

Conclusions

Soils encountered during our subsurface investigation including percolation testing consisted of a relatively thin (about one to two feet thick) layer of top soil composed of silty and clayey sands and lean clays with sand and traces of organics. This top soil layer was found to be underlain by the Otay Formation consisting of clayey and silty sands that with depth graded to siltstone and/or sandstone. The relative density of soils within this formation, based on SPT sampling (blow counts), was found to range from medium dense to very dense. The Otay Formation was found to be underlain by the Santiago Peak Volcanics bedrock consisting of breccia composed of andesitic gravels and cobbles within silty sand matrix.

No groundwater was encountered during the subsurface investigation, and subsequent readings of piezometers installed during this investigation indicate that no significant groundwater is likely to exist within the Otay Formation. In addition, the existence of ground water within the bedrock basement is inconclusive. However, the core samples gathered during exploratory drilling suggest that the Santiago Peak Volcanics basement has characteristics that are not conducive to the storage or transmission of groundwater.

Results of percolation tests revealed that the percolation rates at the project site are generally low, corresponding with the clayey (bentonite) and silty composition of the surficial soils and the dense, underlying sedimentary formation. In addition, percolation rates fluctuate from no percolation observed (Percolation Tests PT-E and PT-G) to the rate of 1.4 min/inch observed in Percolation Test PT-H. However, the relatively fast percolation rate in PT-H is attributed to the sandy nature of soils encountered only at this test location. This sandy granular soil is believed to be localized and not representative of a pervasive sedimentary stratum capable of absorbing and infiltrating runoff.

If you have additional questions or require clarification please contact Jeff Tesar at (office) 858 467-2716 or (mobile) 858 945-0458.



Jeff Tesar, C.E.G.
Engineering Geologist
Office of Geotechnical Design – South-2



Figures

1. Figure 1, Project Location
2. Figure 2, Boring and Percolation Test Locations

Attachments

1. Boring Records
2. Percolation Test Records

References

1. Geology of National City, Imperial Beach and Otay Mesa Quadrangles, Southern San Diego Metropolitan Area, California, by M.P. Kennedy, CDMG Map Sheet 29,1977.
2. Otay Mesa Quadrangle, California San Diego Co., 7.5 Minutes Topographic, 1955.
3. State Route 11 Extension, Geotechnical Review, Caltrans, by Jeff Tesar, 2001.
4. Caltrans SR-11, Preliminary Geotechnical Study, by Ninyo & Moore, 2007.

cc: Abbas Abghari
OGDS2 Files

A handwritten signature in black ink, appearing to be 'JA' or similar, with a horizontal line extending to the right.

INDEX OF PLANS

SHEET No.	DESCRIPTION
1	TITLE AND LOCATION MAP
2	DESCRIPTION
3	DESCRIPTION
4	DESCRIPTION
5	DESCRIPTION
6	DESCRIPTION
7	DESCRIPTION

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

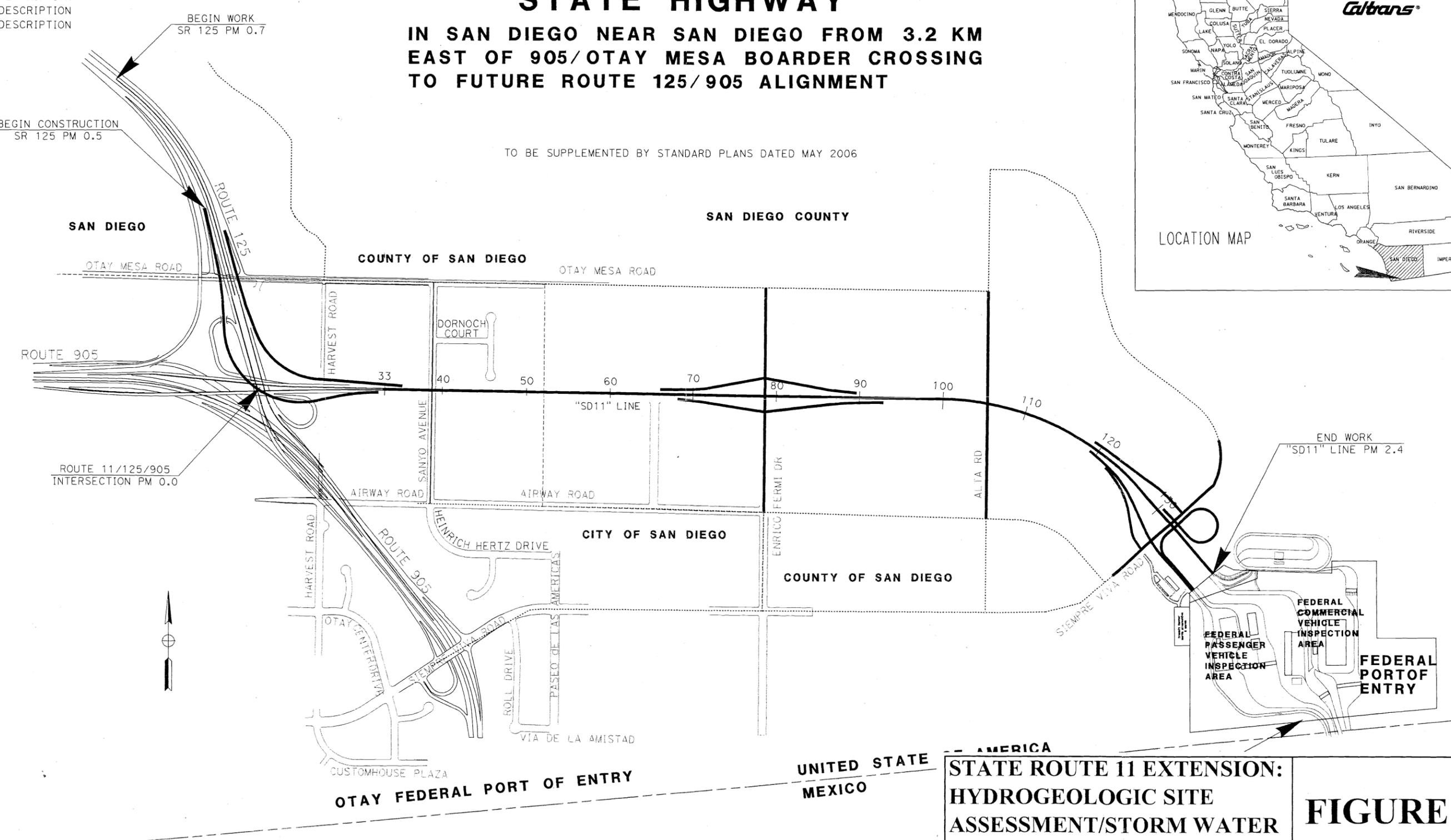
PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY

IN SAN DIEGO NEAR SAN DIEGO FROM 3.2 KM EAST OF 905/OTAY MESA BORDER CROSSING TO FUTURE ROUTE 125/905 ALIGNMENT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	11	0.0 / 2.7	1	1



TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006



ROUTE 11/125/905 INTERSECTION PM 0.0



END WORK "SD11" LINE PM 2.4

PROJECT MANAGER
M. BAZA
DESIGN ENGINEER
F. BEHBOODY

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO CONTRACTORS."

STATE ROUTE 11 EXTENSION:
HYDROGEOLOGIC SITE
ASSESSMENT/STORM WATER
DATA REPORT
PROJECT LOCATION

FIGURE 1
EA 11-056310

PRELIMINARY FOR DESIGN STUDY ONLY

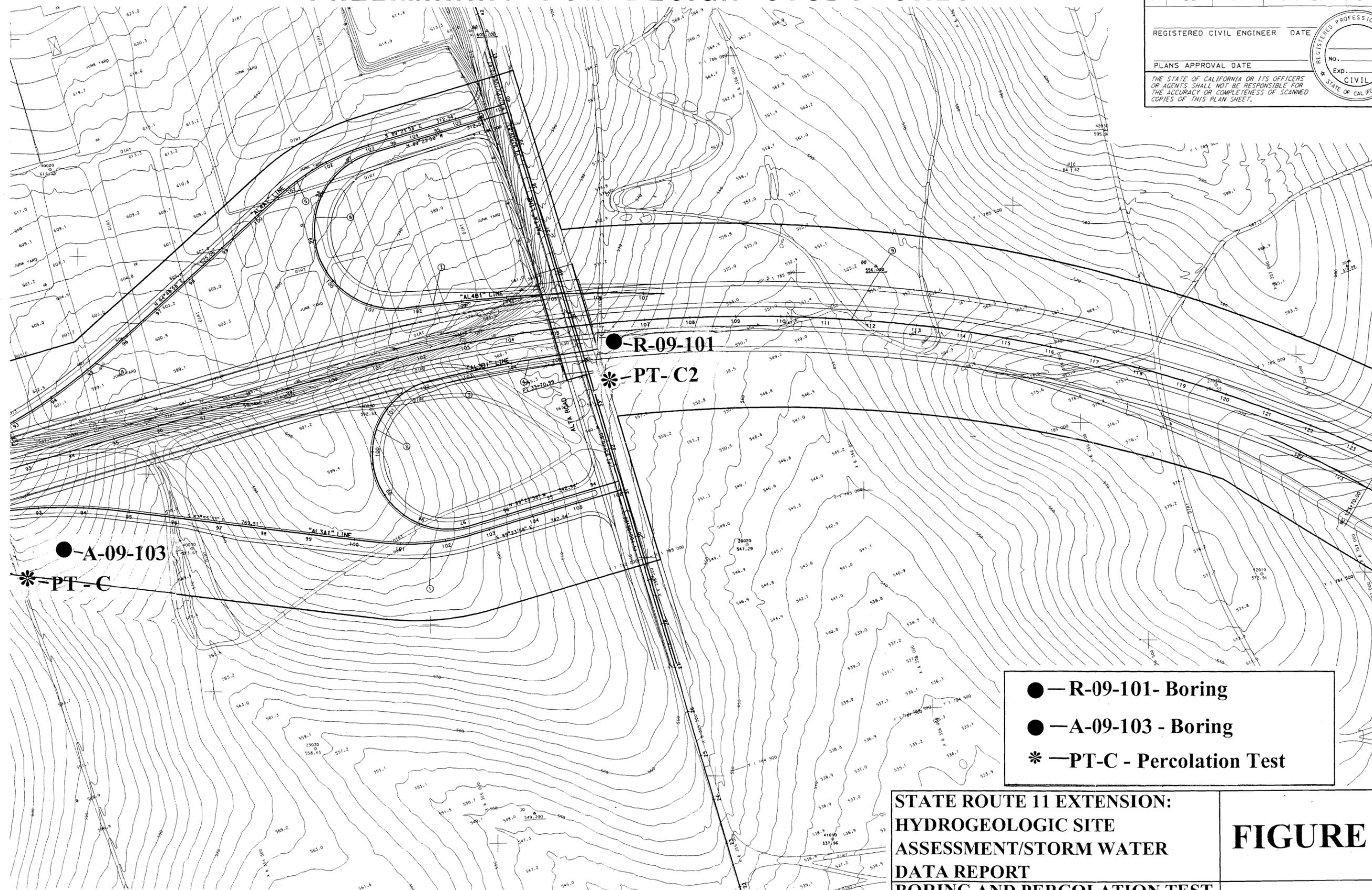
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	11	0.0/2.7	3	5

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	



REGISTERED PROFESSIONAL ENGINEER
No. _____
Exp. _____
CIVIL
STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



- — R-09-101 - Boring
- — A-09-103 - Boring
- * — PT-C - Percolation Test

**STATE ROUTE 11 EXTENSION:
HYDROGEOLOGIC SITE
ASSESSMENT/STORM WATER
DATA REPORT
BORING AND PERCOLATION TEST
LOCATIONS**

FIGURE 2

EA 11-056310

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
St. Gobans ENGINEERING SERVICES
 FUNCTIONAL SUPERVISOR
 CALCULATED/DESIGNED BY
 CHECKED BY
 REVISED BY
 DATE REVISED

LAST REVISION DATE PLOTTED => 08-SEP-2009
 09-08-09 TIME PLOTTED => 08:01

PRELIMINARY FOR DESIGN STUDY ONLY

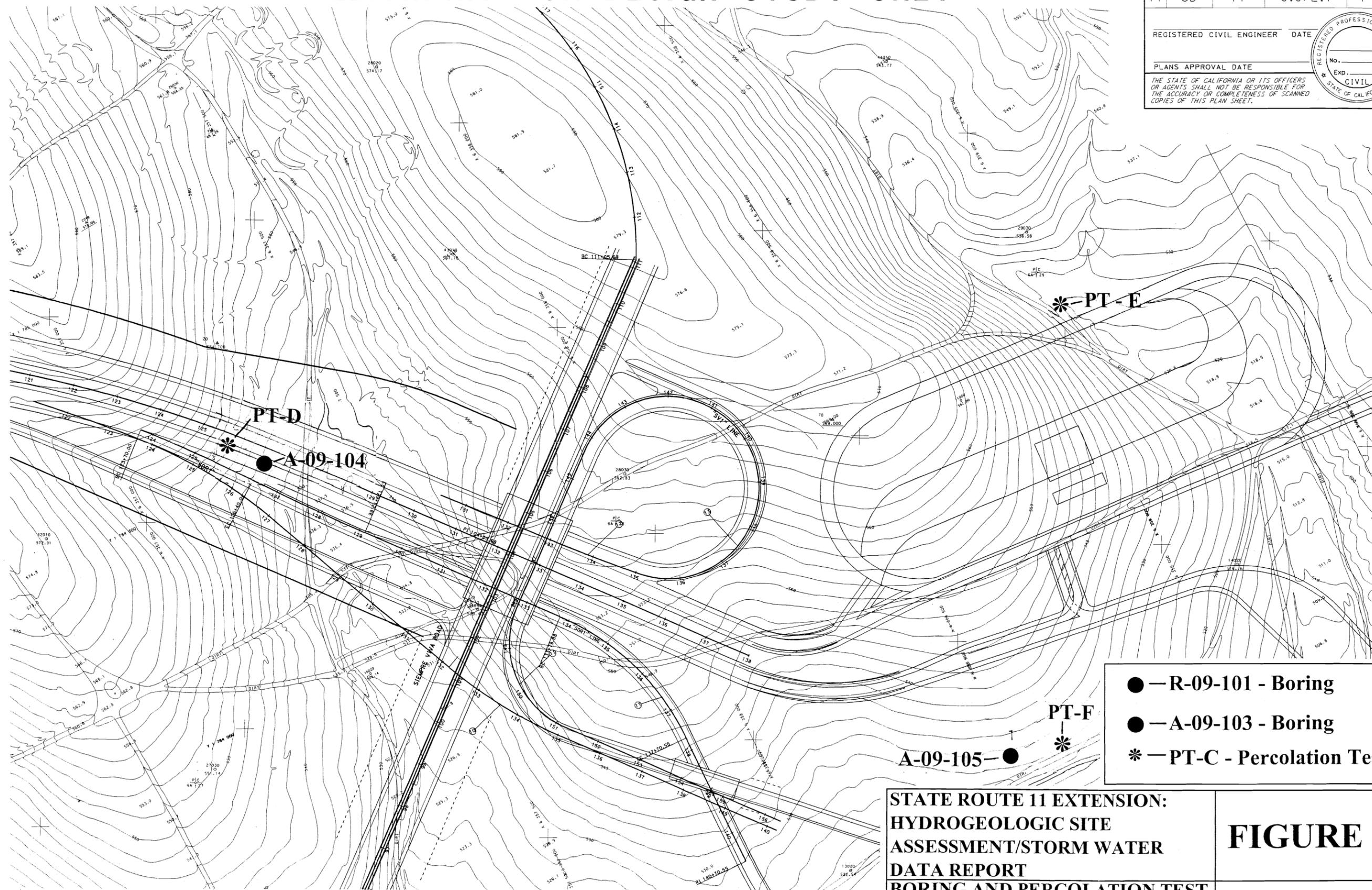
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	11	0.0/2.7	4	5

REGISTERED CIVIL ENGINEER DATE _____
 PLANS APPROVAL DATE _____



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- — R-09-101 - Boring
- — A-09-103 - Boring
- * — PT-C - Percolation Test

**STATE ROUTE 11 EXTENSION:
 HYDROGEOLOGIC SITE
 ASSESSMENT/STORM WATER
 DATA REPORT
 BORING AND PERCOLATION TEST
 LOCATIONS**

FIGURE 2
 EA 11-056310

PRELIMINARY FOR DESIGN STUDY ONLY

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	11	0.0/2.7	5	5

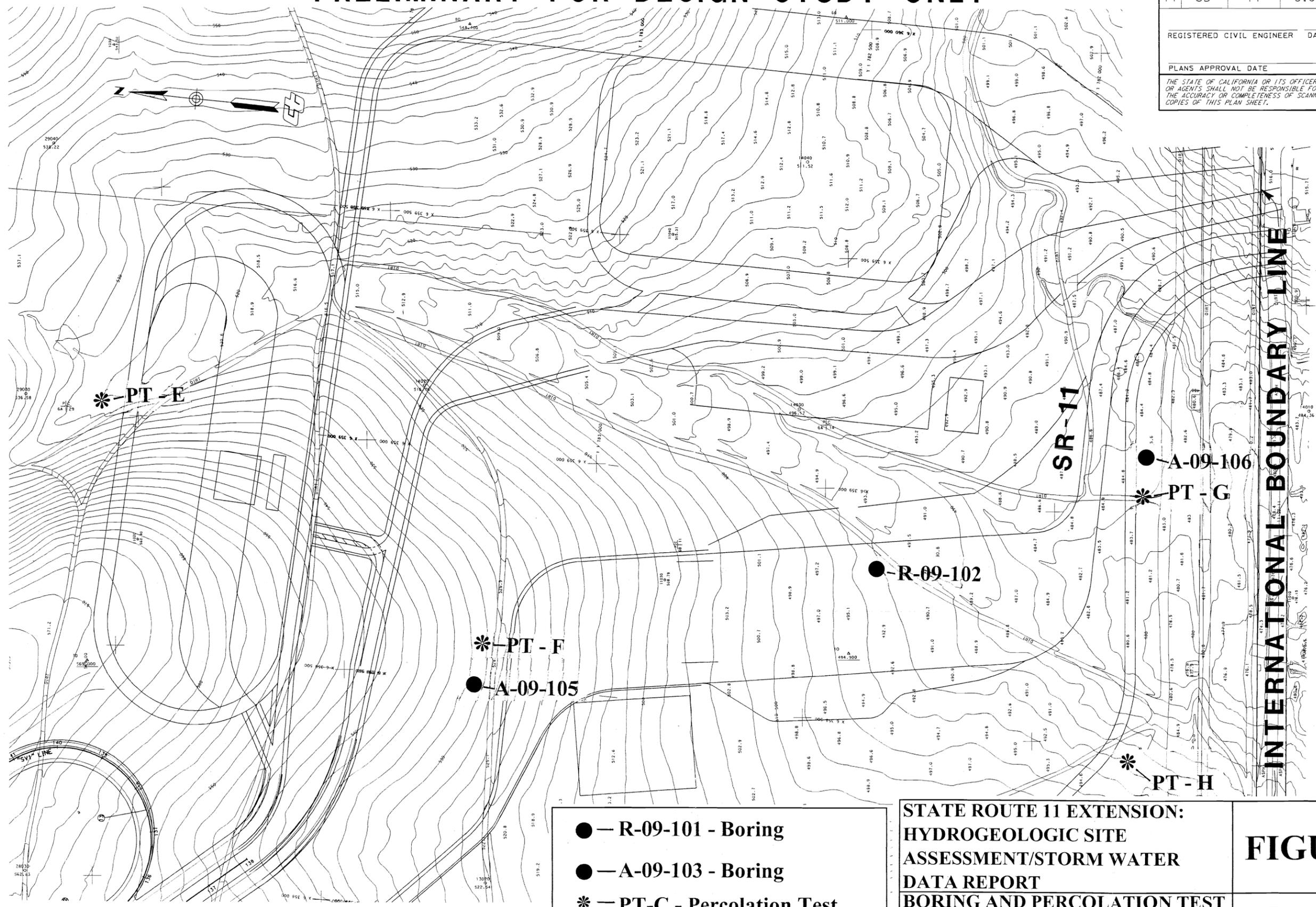
REGISTERED CIVIL ENGINEER DATE _____

PLANS APPROVAL DATE _____

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans ENGINEERING SERVICES
 FUNCTIONAL SUPERVISOR
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 DATE REVISED



- - R-09-101 - Boring
- - A-09-103 - Boring
- * - PT-C - Percolation Test

**STATE ROUTE 11 EXTENSION:
 HYDROGEOLOGIC SITE
 ASSESSMENT/STORM WATER
 DATA REPORT
 BORING AND PERCOLATION TEST
 LOCATIONS**

FIGURE 2
 EA 11-056310

LOGGED BY JEFF TESAR	BEGIN DATE 07/15/09	COMPLETION DATE 07/20/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32° 33' 48.440" N 116° 55' 05.277" W		HOLE ID: R-09-101
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line)			SURFACE ELEVATION 564.37ft	
DRILLING METHOD MUD ROTARY - CORING	DRILL RIG CS 2000			BOREHOLE DAIMETER 4.5 in	
SAMPLER TYPE(S) AND SIZE(S) [ID] SPT (1.4), WIRELINE SAMPLER 4.5 "	SPT HAMMER TYPE AUTOMATIC			HAMMER EFFICIENCY (ER) 84 %	
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG	GROUNDWATER READINGS	DURING DRILLING NOT INVESTIGATED	AFTER DRILLING (DATE) MONITORED		TOTAL DEPTH OF BORING 130.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Coring Run	Casing Depth	REMARKS									
564.4	1		Top Soil (Silty SAND)																					
562.9	2		Poorly graded SAND (SP); Dense, gray, moist, fine grained, trace of coarse SAND, locally clayey. (Otay Formation).	S1	12	42																		
	3	18																						
	4	24																						
	5																							
	6																							
	7																							
	8																							
555.4	9		Silty SAND (SM): Dense, gray, moist, fine grained sand, locally clayey.	S2	12	38																		
	10	15																						
	11	23																						
	12																							
	13																							
	14																							
	15																							
	16			S3	8	36																		
	17	17																						
	18	21																						
	19																							
	20																							

Washed out during drilling - not intended to recover.

(continued)

ELEVATION (ft)	DEPTH (ft)	Material Graphics	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS		
544.4	21	Sedimentary Rock (SANDY SILTSTONE): fine grained, thinly bedded, gray, moderately weathered, soft, slightly fractured. [Silty SAND (SM) dense, gray, moist, fine grained.]	4	15												
	22			21	43											
	23			22				88%	100%							
	24															
539.4	25		At Elev. 539.4 ft, very dense.	5	21											
	26				27	62										
	27				35				100%	86%						
	28															
	29															
	30				6	15										
	31	24		59												
	32	35						100%	86%							
	33															
	34															
	35		7	14												
	36	27		66												
	37	39					100%	100%								
	38															
	39															
	40															

(continued)



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 GEOTECHNICAL DESIGN REPORT FOR SR 11
 DISTRICT COUNTY ROUTE POSTMILE(KP)
 11 SAN DIEGO SR-11 0/4
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER PREPARED BY DATE
 N/A E. GALLETTA 08/30/09

HOLE ID: **R-09-101**
 EA
 11-056310

SHEET
 2 of 7

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Coring Run	Casing Depth	REMARKS	
523.4	41		At Elev. 523.4 ft: brown, dense.	8	14											
		18														
		27			45											
519.4	45		At Elev. 519.4 ft: very dense.	9	13											
		24														
		36			60											
50	47			10	25											
		30														
		42			72											
559.4	55		At Elev. 559.4 ft: dense.	11	17											
		18														
		30			48											
	57															
	58															
	59															
	60															

(continued)



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 GEOTECHNICAL DESIGN REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER N/A

ROUTE
 SR-11
 PREPARED BY
 E. GALLETA

POSTMILE(KP)
 0/4
 DATE
 08/30/09

HOLE ID: **R-09-101**
 EA
 11-056310

SHEET
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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS	
	61		Poorly graded SAND (SP): Very dense, gray, moist, fine to medium grained, locally silty.	X	12	14		66%	100%							
						22										
						37	59									
	62															
	63															
	64															
	65			X	13	19		86%	93%							
					27											
					33	60										
	66															
	67															
	68															
	69															
494.4	70		At Elev. 494.4 ft: dense.	X	14	13		100%	100%							
					29											
					19	48										
	71															
	72															
	73															
	74															
489.4	75		Sedimentary Rock (SANDSTONE): fine to medium grained, thinly bedded, gray, moderately weathered, soft, slightly fractured. [Poorly graded SAND (SP), very dense, gray, moist, fine to coarse grained, traces of coarse sand.]					72%	100%							
	76															
	77															
	78															
	79															
	80															

(continued)



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
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 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
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 11 SAN DIEGO SR-11 0/4
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 SR-11
 BRIDGE NUMBER N/A PREPARED BY E. GALLETÀ DATE 08/30/09 SHEET 4 of 7

HOLE ID: **R-09-101**
 EA
 11-056310

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 In	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS
	81				15	24 29 35	64								
	82							100%	100%						
	83														
	84														
	85														
	86														
	87							100%	100%						
	88														
	89														
474.4	90		Sedimentary Rock (SILTSTONE): thinly bedded, gray, moderately weathered, very soft, slightly fractured.		16	21 31 39	70								
	91														
	92								100%	100%					
	93														
	94														
	95														
	96														
	97							100%	100%						
	98														
	99														
	100														

(continued)



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
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 N/A E. GALLETA 08/30/09

HOLE ID: **R-09-101**
 ROUTE POSTMILE(KP)
 SR-11 0/4
 EA 11-056310

SHEET
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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS	
464.4			Elev 464.4 ft: blowcount affected by gravel.	X		20										
					17	20	Ref									
463.4	101				Sedimentary Rock (BRECCIA): Gravels and cobbles within silty sand matrix, (often indurated or siliceous). Gravel content 40%, intensely weathered, moderately soft, moderately fractured.		*50									
	102							80%	75%							
	103															
	104															
	105															
	106															
	107															
	108								92%	59%						
	109															
	110			X		18	*50/4"	Ref								
	111							100%	60%							
	112															
	113															
	114							80%	75%							
	115															
	116															
	117															
	118															
	119															
	120							60%	33%							

(continued)

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Coring Run	Casing Depth	REMARKS
	121			X	19	*50/3"	Ref								
	122							60%	33%						
	123														
	124														
	125														
438.4	126		At Elev. 438.4 ft : more gravels and cobbles.												
	127							60%	50%						
	128														
	129														
434.4	130		Boring completed at the planned depth of 130 ft, Elev 434.4 ft Installed 2 piezometers: Piezo A to the depth of 130 ft Piezo B to the depth of 91.5 ft	X	20	*50/3"	Ref								
	131														
	132														
	133														
	134														
	135														
	136														
	137														
	138														
	139														
	140														



DEPARTMENT OF TRANSPORTATION
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 SR-11
 BRIDGE NUMBER N/A
 PREPARED BY
 E. GALLETÀ

ROUTE POSTMILE(KP)
 SR-11 0/4
 HOLE ID: R-09-101
 EA
 11-056310

DATE SHEET
 08/30/09 7 of 7

LOGGED BY JEFF TESAR	BEGIN DATE 07/21/09	COMPLETION DATE 07/22/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32° 33' 17.903" N 116° 54' 26.481" W	HOLE ID: R-09-102
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line)		SURFACE ELEVATION 491.48 ft	
DRILLING METHOD MUD ROTARY - CORING	DRILL RIG CS 2000		BOREHOLE DAIMETER 4.5 in	
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT (1.4), WIRELINE SAMPLER 4.5"	SPT HAMMER TYPE AUTOMATIC		HAMMER EFFICIENCY (ER) 84 %	
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG			GROUNDWATER READINGS	TOTAL DEPTH OF BORING 50.0 ft
			DURING DRILLING NOT INVESTIGATED	AFTER DRILLING (DATE) MONITORED

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	ROD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS
491.48 ft	1		Top Soil (Silty SAND)												
490.0	2		Poorly graded SAND with SILT (SP-SM); Dense, gray, moist, fine grained sand, locally clayey. (Otay Formation).												
	3														
	4														
486.5	5		Silty SAND (SM): Dense, gray, moist, fine grained sand.												
	6			1	10	14	20	34							
	7														
	8														
	9														
481.5	10		At Elev. 481.5 ft medium dense.												
	11			2	10	14	20	34							
	12														
	13														
	14														
476.5	15		Poorly graded SAND with SILT (SP-SM): Very dense, gray, moist, fine grained sand.												
	16			3	17	28	24	62							
	17														
	18														
	19														
	20														

Washed out during drilling: not intended to recover.

(continued)



DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
GEOTECHNICAL DESIGN REPORT FOR SR 11
DISTRICT COUNTY ROUTE POSTMILE(KP)
11 SAN DIEGO SR-11 0/4
PROJECT OR BRIDGE NAME
SR-11
BRIDGE NUMBER PREPARED BY DATE SHEET
N/A E. GALLETÀ 08/30/09 1 of 3

HOLE ID: **R-09-102**
EA
11-056310

ELEVATION (ft)	DEPTH (ft)	Material Graphics	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RCD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS
471.5	21		4	21 22 29	51									
467.5	24	Sedimentary Rock (Gravelly SANDSTONE): thinly bedded, gray, moderately weathered, soft, slightly fractured. [Poorly graded Gravel with SILT and SAND/Poorly graded SAND with SILT and GRAVEL (GP-GM/SP-SM: Very dense, moist, gray, fine grained sand.)]	5	*42	Ref									
	25													
	26													
	27													
	28													
	30		6	50 *50/4"	Ref									
459.5	32	Sedimentary Rock (BRECCIA): Cobbles and gravels within silty sand/sandy siltstone matrix. Gray, intensely weathered, soft, moderately fractured. Cobbles ~ 30 %, gravels ~ 30 to 40 %.					75%	0%						
	33						100%	0%						
	34						100%	60%						
	35			7	*	Ref								
	36						100%	56%						
	38													
	39						100%	100%						
	40													

Not intended to recover samples.

N/A

(continued)



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 GEOTECHNICAL DESIGN REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER
 N/A

HOLE ID: **R-09-102**
 ROUTE POSTMILE(KP) EA
 SR-11 0/4 11-056310
 PREPARED BY DATE SHEET
 E. GALLETÀ 08/30/09 2 of 3

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Coring Run	Casing Depth	REMARKS
	41							100%	50%						
	42							70%	0%						
	43														
	44							67%	50%						
	45			⊗	8	*50/3"	Ref								
	46							80%	0%						
	47														
	48														
	49							100%	17%						
441.5	50		Boring terminated at depth of 50 ft, elev 441.5 ft. due to expenditure of allotted drilling resources. Installed 2 piezometers: Piezo A to the depth of 50 ft. Piezo B to the depth of 31 ft. * - blowcounts affected by gravels												
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 GEOTECHNICAL DESIGN REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER
 N/A

ROUTE
 SR-11

POSTMILE(KP)
 0/4

HOLE ID: **R-09-102**

EA
 11-056310

PREPARED BY
 E. GALLETÀ

DATE
 08/30/09

SHEET
 3 of 3

LOGGED BY J. TESAR	BEGIN DATE 07/15/09	COMPLETION DATE 07/15/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32° 33' 47.572" N 116° 55' 20.806" W	HOLE ID: A-09-103
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line) 115 feet from CL (RT)		SURFACE ELEVATION 588.8 ft	
DRILLING METHOD AUGER	DRILL RIG CS 2000		BOREHOLE DAIMETER 6 in	
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT (1.4)	SPT HAMMER TYPE AUTOMATIC		HAMMER EFFICIENCY (ER _s) 84 %	
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG	GROUNDWATER DURING DRILLING READINGS	NOT ENCOUNTERED	AFTER DRILLING (DATE) NOT ENCOUNTERED	TOTAL DEPTH OF BORING 31.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
588.8	1		Top Soil (Clayey Sand)												
587.3	2		Well graded SAND with SILT (SW-SM): Very dense, light brown, moist, fine grained, locally clayey, few gravel. (Otay Formation)												
	3														
	4														
	5														
	6			1		17									
						30	68								
						38									
	7														
	8														
	9														
578.8	10		Silty SAND[SM]: Very dense, dark gray, moist, fine grained, exhibits mottled texture (Sedimentary).			17									
	11				2		40	101							
							61								
	12														
	13														
	14														
573.8	15		Poorly graded SAND [SP]: Very dense, light gray, moist, fine grained, locally silty and clayey.			21									
	16				3		77	98							
	17														
	18														
	19														
568.8	20														

(continued)



DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
HYDROGEOLOGIC REPORT FOR SR 11
DISTRICT COUNTY
11 SAN DIEGO
PROJECT OR BRIDGE NAME
SR-11
BRIDGE NUMBER
N/A
PREPARED BY
E. GALLETÀ
DATE
08/30/09

HOLE ID: **A-09-103**
ROUTE POSTMILE(KP)
SR-11 0/4
EA
11-056310
SHEET
1 of 2

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
568.8	21		Sedimentary Rock (Silty SANDSTONE): Fine grained, thinly bedded, gray, moderately weathered, soft, slightly fractured. [Silty SAND(SM): Dense, gray, moist, fine grained.]	X	4	24	69								
	22	26													
	23	43													
563.8	25		Poorly graded SAND (SP): Very dense, gray, moist, fine grained, locally silty.	X	5	14	55								
	26	15													
	27	40													
561.3	28		Well-graded SAND with SILT (SW-SM): Dense, light brown, moist, fine grained.	X	6	10	31								
	29	14													
	30	17													
557.3	31		Boring completed at the planned depth of 31.5 ft., elev. 557.3 ft. No groundwater encountered.												
	32														
	33														
	34														
	35														
	36														
	37														
	38														
	39														
	40														



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 HYDROGEOLOGIC REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER PREPARED BY DATE
 N/A E. GALLET 08/30/09

HOLE ID: **A-09-103**
 ROUTE POSTMILE(KP) EA
 SR-11 0/4 11-056310
 SHEET
 2 of 2

LOGGED BY J. TESAR	BEGIN DATE 07/15/09	COMPLETION DATE 07/15/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32°33'39.570" N 116°54'45.668" W	HOLE ID: A-09-104
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line) 48 ft from Center Line (RT)		SURFACE ELEVATION 549.0 ft	
DRILLING METHOD AUGER	DRILL RIG CS 2000		BOREHOLE DIAMETER 6 in	
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT (1.4)	SPT HAMMER TYPE AUTOMATIC		HAMMER EFFICIENCY (ER) 84 %	
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG	GROUNDWATER DURING DRILLING READINGS	AFTER DRILLING (DATE) NOT ENCOUNTERED	TOTAL DEPTH OF BORING 26.5 ft	

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS		
549.0	1		Top soil (Clayey SAND)														
547.5	2		Silty, clayey SAND (SM/SC): Medium dense, light gray, moist, fine grained.	1													
	3																
	4																
	5																
	6					10											
						11	26										
						15											
	7																
	8																
540.0	9		Well-graded SAND with SILT (SW-SM): Dense, light gray, moist, fine grained.	2													
	10																
	11																
	12																
	13					8											
						18	36										
						18											
	14																
	15		Poorly graded SAND (SP): Medium dense, light gray, moist, locally clayey.	3													
534.0	16																
	17																
	18																
	19					7											
						8	22										
						14											
	20																

(continued)



DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
HYDROGEOLOGIC REPORT FOR SR 11
DISTRICT COUNTY
11 SAN DIEGO
PROJECT OR BRIDGE NAME
SR-11
BRIDGE NUMBER
N/A

PREPARED BY
E. GALLETÀ
DATE
08/30/09

HOLE ID: **A-09-104**

ROUTE POSTMILE(KP) EA
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SHEET
1 of 2

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 In	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
529.0	21		Poorly graded SAND (SP) , dense, gray,moist, fine grained, locally silty.		4	11	40								
						18									
						22									
524.0	25		At Elev 524.0 ft grades to very dense.		5	12	55								
						27									
						28									
522.5	26		Boring completed at planned depth of 26.5 ft, Elev 522.5 ft No groundwater encountered.												
	27														
	28														
	29														
	30														
	31														
	32														
	33														
	34														
	35														
	36														
	37														
	38														
	39														
	40														



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 HYDROGEOLOGIC REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER N/A
 PREPARED BY
 E. GALLETÀ
 DATE
 08/30/09

ROUTE
 SR-11

POSTMILE(KP)
 0/4

HOLE ID: **A-09-104**

EA
 11-056310

SHEET
 2 of 2

LOGGED BY J. TESAR	BEGIN DATE 07/14/09	COMPLETION DATE 07/14/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32° 33' 26.365" N 116° 54' 33.004" W	HOLE ID: A-09-105
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line) 134 ft from Center Line (RT)			SURFACE ELEVATION 526.4 ft
DRILLING METHOD AUGER	DRILL RIG CS 2000			BOREHOLE DAIMETER 6 in
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT (1.4)	SPT HAMMER TYPE AUTOMATIC			HAMMER EFFICIENCY (ER) 84 %
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG	GROUNDWATER DURING DRILLING READINGS	NOT ENCOUNTERED	AFTER DRILLING (DATE) NOT ENCOUNTERED	TOTAL DEPTH OF BORING 31.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
526.4	1		Top Soil (Lean CLAY).												
524.9	2		Well graded SAND with SILT (SW-SM): Medium dense, light gray, moist, fine grained sand. (Otay Formation)												
	3														
	4														
	5														
	6			1	8										
					9										
					14		23								
	7														
	8														
	9														
516.4	10		Poorly graded SAND (SP): Medium dense, light gray, moist, fine grained, slightly micaceous.												
	11														
	12														
	13														
	14														
	15														
	16			3	7										
					7										
					14		21								
	17														
	18														
	19														
	20														

(continued)



DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
HYDROGEOLOGIC REPORT FOR SR 11
DISTRICT COUNTY
11 SAN DIEGO
PROJECT OR BRIDGE NAME
SR-11
BRIDGE NUMBER
N/A

PREPARED BY
E. GALLETA

ROUTE POSTMILE(KP)
SR-11 0/4
DATE
08/30/09

HOLE ID: **A-09-105**
EA
11-056310

SHEET
1 of 2

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS	
506.4	21		Silty SAND (SM): Dense, gray, moist, fine grained, exhibits mottled texture, (sedimentary).	X	4	11	46									
	22	18														
	23	28														
501.4	25		At Elev. 501.4 ft grades to very dense.	X	5	19	67									
	26	28														
	27	39														
495.7	30		At Elev 495.7 ft silty sand indurated: siltstone.	X	6	32	Ref									
495.4	31	81														
	32		Boring completed at the planned depth of 31 ft, Elev. 495.4 ft. No groundwater encountered.													
	33															
	34															
	35															
	36															
	37															
	38															
	39															
	40															



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 HYDROGEOLOGIC REPORT FOR SR 11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER PREPARED BY DATE
 N/A E. GALLETA 08/30/09

ROUTE
 SR-11

POSTMILE(KP)
 0/4

HOLE ID: **A-09-105**

EA
 11-056310

SHEET
 2 of 2

LOGGED BY J. TESAR	BEGIN DATE 07/14/09	COMPLETION DATE 07/14/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32' 33' 12.418 N 116' 54' 23.793 W	HOLE ID: A-09-106
			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION

LOGGED BY J. TESAR	BEGIN DATE 07/14/09	COMPLETION DATE 07/14/09	BOREHOLE LOCATION (Lat/Long or North/East and Datum) 32' 33' 12.418 N 116' 54' 23.793 W	HOLE ID: A-09-106
DRILLING CONTRACTOR CALTRANS DRILLING SERVICES	BOREHOLE LOCATION (Station, Offset, and Line) 184 ft from CL (RT)			SURFACE ELEVATION 483.6 ft
DRILLING METHOD AUGER	DRILL RIG CS 2000			BOREHOLE DAIMETER 6 INCH
SAMPLER TYPE(S) AND SIZE(S) [ID] SPT (1.4)	SPT HAMMER TYPE AUTOMATIC			HAMMER EFFICIENCY (ER) 84 %
BOREHOLE BACKFILL AND COMPLETION HOLE CUTTINGS AND ENVIROPLUG	GROUNDWATER DURING DRILLING READINGS	NOT ENCOUNTERED	AFTER DRILLING (DATE) NOT ENCOUNTERED	TOTAL DEPTH OF BORING 31.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
483.6			Top Soil (Lean Clay with Sand and some organics).												
482.6	1		Lean CLAY with SAND (CL): Light brown, moist, coarse sand.												
	2														
481.1	3		Poorly graded SAND (SP), Very dense, light brown, moist, coarse grained, trace of andesitic gravel, (Otay Formation)												
	4														
	5														
	6			1	19										
					21	51									
					30										
	7														
	8														
	9														
	10			2	19										
					19	52									
					33										
	12														
	13														
	14														
	15														
				3	22										
					24	57									
					33										
	17														
	18														
	19														
	20														

(continued)



DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
HYDROGEOLOGIC REPORT FOR SR -11
DISTRICT COUNTY
11 SAN DIEGO
PROJECT OR BRIDGE NAME
SR-11
BRIDGE NUMBER
N/A

ROUTE POSTMILE(KP)
SR-11 0/4
PREPARED BY
E.GALLETTA
DATE
08/30/09

HOLE ID: **A-09-106**
EA
11-056310

SHEET
1 of 2

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Augering	Casing Depth	REMARKS
	21		Poorly graded SAND (SP): Very dense, light brown, moist, fine grained, slightly clayey.		4	18	51								
	22				24										
461.1	23				27										
	25		At Elev. 458.6 ft, dense.		5	14	46								
	26				22										
458.6	27				24										
	29		Poorly graded SAND (SP) dense, light brown, dry, coarse grained.		6	14	44								
	30				19										
455.4	31				25										
452.1	32		Boring completed at the planned depth of 31.5 ft, Elev. 452.1 ft. No groundwater encountered.												
	33														
	34														
	35														
	36														
	37														
	38														
	39														
	40														



DEPARTMENT OF TRANSPORTATION
 DIVISION OF ENGINEERING SERVICES
 GEOTECHNICAL SERVICES
 OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
 HYDROGEOLOGIC REPORT FOR SR-11
 DISTRICT COUNTY
 11 SAN DIEGO
 PROJECT OR BRIDGE NAME
 SR-11
 BRIDGE NUMBER N/A PREPARED BY
 E. GALLETA

ROUTE
 SR-11

POSTMILE(KP)
 0/4

HOLE ID: **A-09-106**

EA
 11-056310

DATE
 08/30/09

SHEET
 2 of 2

PERCOLATION TEST RECORD

GEOTECHNICAL DESIGN SOUTH - 2

		SITE LAYOUT/LOCATION	
PROJECT LOCATION	SR-11		
EA #	11-056310		
DATE	7/15/2009		
TEST MADE BY	EG		
AMBIENT TEMP			
WEATHER COND'N	SUNNY		
SOAKING PERIOD	16 HRS		
TYPE OF SOIL	SEE BELOW		

HOLE NO.	C	C2	D
DEPTH (ft)	5.3	5.63	5.65
DIAMETER (in)	6	6	6
READINGS	TIME	TIME	TIME
8" - 7"	14' 12"	18' 25"	39' 52"
8" - 7"	17' 47"	22' 33"	46' 10"
8" - 7"	19' 47"	24' 20"	54' 46"
8" - 7"	20' 09"	25' 32"	59' 16"
8" - 7"	21' 03"	25' 03"	63' 28"
8" - 7"	21' 43"	25' 44"	64' 24"
AVERAGE (Last 3)= __ min/in	21' 25"	25' 26"	62' 22"
Longitude	32° 33' 47.572" N	32° 33' 48.558" N	32° 33' 39.570" N
Latitude	116° 55' 20.806" W	116° 55' 05.331" W	116° 54' 45.668" W
Elevation	588.78 ft	564.37 ft	548.97 ft
Offset	210 ft Right	36 ft Right	48 ft Right

CALCULATION:

1) Correction Factor

$$C = n[1 - (O/D)^2] + (I/D)^2$$

n = Porosity of the pea gravel

I = Inside diameter of perforated pipe in inches

O = Outside diameter of perforated pipe in inches

D = actual diameter of percolation test hole in inches

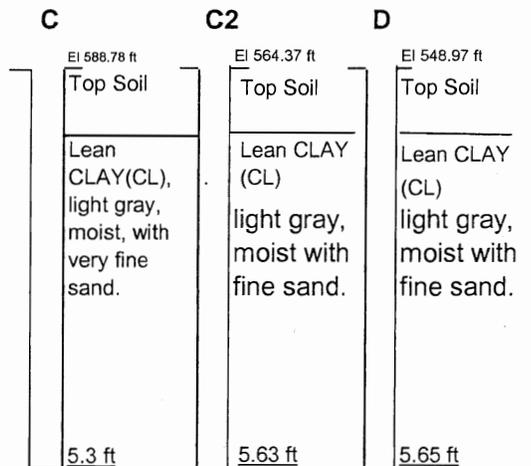
2) Conversion factor (K)

$$K = 0.27 + 8.7/D$$

3) Equivalent Unlined 12-inch Diameter Percolation Rate (P)

$$P = K \times R/C$$

P = min/in



PERCOLATION TEST RECORD

GEOTECHNICAL DESIGN SOUTH - 2

		SITE LAYOUT/LOCATION
PROJECT LOCATIO	SR-11	
EA #	11-056310	
DATE	7/16/2009	
TEST MADE BY	EG	
AMBIENT TEMP		
WEATHER COND'N	SUNNY	
SOAKING PERIOD	16 HRS	
TYPE OF SOIL	SEE BELOW	

HOLE NO.	E								
DEPTH (ft)	5.4								
DIAMETER (in)	6								
READINGS	TIME								
8" - 7"	No								
8" - 7"	recorded								
8" - 7"	movement								
8" - 7"	for 3 hrs.								
8" - 7"									
8" - 7"									
AVERAGE (Last 3) = ___ min/in									
Longitude	32° 33' 35.228" N								
Latitude	116° 54' 24.691" W								
Elevation	525.64 ft								
Offset	1009 ft Left								

CALCULATION:

1) Correction Factor

$$C = n[1 - (O/D)^2] + (I/D)^2$$

n = Porosity of the pea gravel

I = Inside diameter of perforated pipe in inches

O = Outside diameter of perforated pipe in inches

D = actual diameter of percolation test hole in inches

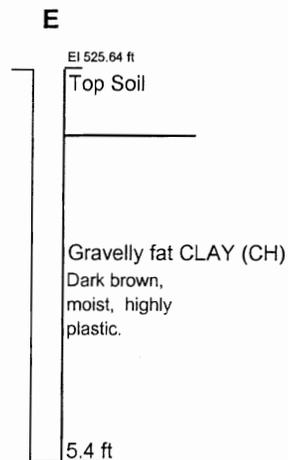
2) Conversion factor (K)

$$K = 0.27 + 8.7/D$$

3) Equivalent Unlined 12-inch Diameter Percolation Rate (P)

$$P = K \times R/C$$

P = min/in



PERCOLATION TEST RECORD

GEOTECHNICAL DESIGN SOUTH - 2

		SITE LAYOUT/LOCATION
PROJECT LOCATION	SR-11	
EA #	11-056310	
DATE	7/15/2009	
TEST MADE BY	EG	
AMBIENT TEMP		
WEATHER COND'N	SUNNY	
SOAKING PERIOD	16 HRS	
TYPE OF SOIL	SEE BELOW	

HOLE NO.	F								
DEPTH (ft)	5.7								
DIAMETER (in)	6								
READINGS	TIME								
8" - 7"	12' 01"								
8" - 7"	12' 05"								
8" - 7"	12' 15"								
8" - 7"	12' 21"								
8" - 7"	12' 27"								
8" - 7"	12' 15"								
8" - 7"	12' 24"								
AVERAGE (Last 3) = _____ min/in	12' 22"								
Longitude	32° 33' 26.365" N								
Latitude	116° 54' 33.004" W								
Elevation	526.44 ft								
Offset	134 ft Right								

CALCULATION:

1) Correction Factor

$$C = n[1 - (O/D)^2] + (I/D)^2$$

n = Porosity of the pea gravel

I = Inside diameter of perforated pipe in inches

O = Outside diameter of perforated pipe in inches

D = actual diameter of percolation test hole in inches

2) Conversion factor (K)

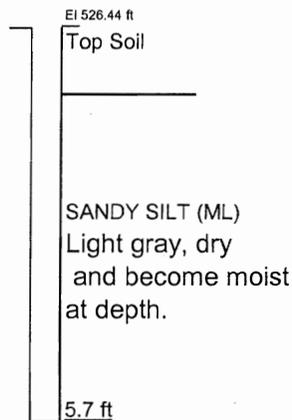
$$K = 0.27 + 8.7/D$$

3) Equivalent Unlined 12-inch Diameter Percolation Rate (P)

$$P = K \times R/C$$

$$P = \text{min/in}$$

F



PERCOLATION TEST RECORD

GEOTECHNICAL DESIGN SOUTH - 2

		SITE LAYOUT/LOCATION
PROJECT LOCATION	SR-11	
EA #	11-056310	
DATE	7/14-15/2009	
TEST MADE BY	EG	
AMBIENT TEMP		
WEATHER COND'N	SUNNY	
SOAKING PERIOD	18 HRS	
TYPE OF SOIL	SEE BELOW	

HOLE NO.	G	H				
DEPTH (ft)	5.3	5.7				
DIAMETER (in)	6	6				
READINGS	TIME	TIME				
8" - 7"	86' 32" for 1/8 inch					
8" - 7"		0' 21"				
8" - 7"		0' 25"				
8" - 7"		0' 27"				
8" - 7"		0' 28"				
8" - 7"		0' 28"				
8" - 7"		0' 29"				
		0' 29"				
		0' 33"				
AVERAGE (Last 3) = _____ min/in	?	0' 30"				
Longitude	32° 33' 12.418" N		32° 33' 12.193" N			
Latitude	116° 54' 23.793" W		116° 54' 31.644" W			
Elevation	483.65ft		494.11 ft			
Offset	184 ft Right		843 ft Right			

CALCULATION:

1) Correction Factor

$$C = n[1 - (O/D)^2] + (I/D)^2$$

n = Porosity of the pea gravel

I = Inside diameter of perforated pipe in inches

O = Outside diameter of perforated pipe in inches

D = actual diameter of percolation test hole in inches

2) Conversion factor (K)

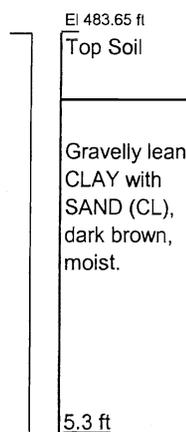
$$K = 0.27 + 8.7/D$$

3) Equivalent Unlined 12-inch Diameter Percolation Rate (P)

$$P = K \times R/C$$

$$P = \text{min/in}$$

G



H

