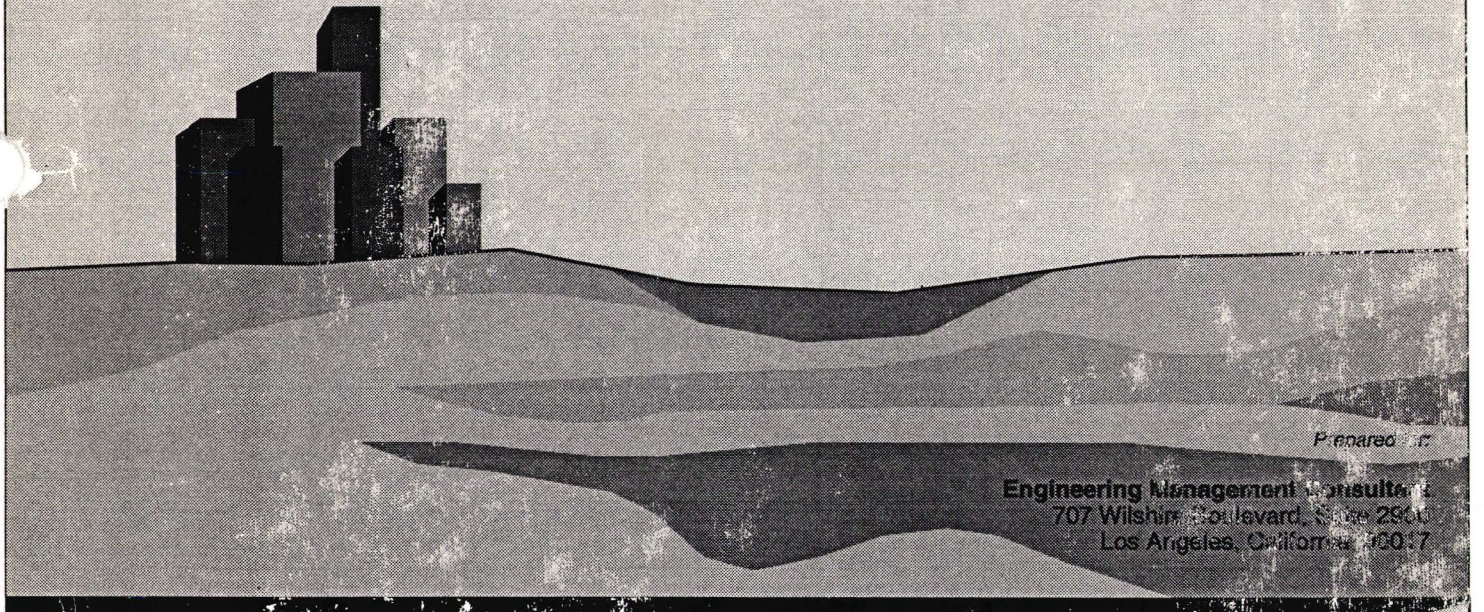
A2667

Final Draft
Geotechnical Investigation for:

Union-Little Tokyo Tunnels & Little Tokyo Station
Eastside Extension
Metro Red Line Project

Volume II of II



Prepared for:

Engineering Management Consultants
707 Wilshire Boulevard, Suite 2901
Los Angeles, California 90017

Prepared by:

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100 W. Broadway, Suite 5000
Long Beach, California 90802-4443

Project No.: 93-0347-04
December, 1995

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APPENDIX A

FIELD EXPLORATION

FIELD EXPLORATION

GENERAL

The field exploration program consisting of 17 rotary wash borings (DD-1, DD-2S, DD-3, DD-3C, DD-3D, DD-4, DD-4-1, DD-7 DD-9, DD-10, DD-12,DD-65, SD-1, SD-3, SD-3A, SD-4 and SD-5), one bucket auger boring (DD-5), and three Becker hammer borings (DD-2, DD-6 and SD-2) was conducted from June 19, to July 19, 1995. Prior to this investigation, six geotechnical borings (PE-18, PE-27, PE-28, PE-29, PE-30 and PE-31) and two fault borings (DD-8 and DD-11) were drilled in November and December 1993, and April 1994, respectively. The mud rotary, hollow stem auger, bucket auger and Becker hammer drilling was performed by the drilling subcontractor C & L Drilling, Inc. and A & R Drilling, Inc. Logging of borings and soil sampling were performed by qualified geologists and engineers from EARTH TECH, Inc. and their subcontractors Diaz Yourman and Associates, and Geotechnique Consultants, under the supervision of an EARTH TECH Certified Engineering Geologist (CEG). Ten piezometers/monitoring wells were installed in this investigation and four piezometers/monitoring wells were installed previously at selected boring locations to monitor groundwater levels. The boring locations were established in the field by an EARTH TECH engineer by tape measurements from adjacent street curbs and other fixed features. The approximate locations of exploration points along the alignment are shown in Plate 3.

BORINGS AND PIEZOMETER INSTALLATION

Exploratory borings were drilled using a truck-mounted MAYHEW-1000 and a Midway 13 mud rotary rigs, and CME-75 and CME-85 hollow stem auger rigs. The mud rotary borings for the geotechnical exploration were approximately 5 to 6 inches in diameter and the depths ranged from 36.5 feet to 126.0 feet below ground surface (BGS). In general, soil samples were obtained at 5-foot-depth intervals and at significant changes in stratigraphy, by alternately using standard split-spoon samplers (Standard Penetration Test Method) and 2.4-inch inner diameter California-type drive samplers lined with 1-inch high brass rings. A cone-type plastic catcher and a sample catcher assembly consisting of a brass ring containing 8 metallic teeth and a rubber donut were used with the split-spoon samplers and California drive samplers, respectively. The bucket auger boring was drilled using a EZ bore bucket auger. The borehole was 30 inches in diameter and the depth 32.5 feet BGS. Representative bulk grab soil samples were obtained at approximate 5 foot depth intervals and at stratum charges. The Becker hammer borings for liquefaction potential assessment using a Link Belt 180 Becker drill rig with an AR-1000 diesel hammer were advanced with a 6.6 inch O.D. closed driller bit. Drilling was advanced by switches to 6.6 inch O.D. open bit when encountered and drilling conditions. Becker blowcounts were correlated to standard penetration test blowcounts.

Standard Penetration Tests (SPT) were performed according to the American Society for Testing Materials (ASTM) Standard Procedure D1586. This method consists of driving the standard split-spoon sampler 18 inches into the soil with a 140-pound hammer falling 30 inches. Blow counts were recorded for each 6-inch driving increment. The number of blows required to drive a standard split-spoon sampler for the last 12 of 18 inches is called the standard penetration resistance.

The driving was terminated when one of the following occurred:

- A total of 100 blows was reached for penetration of 12 inches or less
- No obvious sampler advance was observed during driving

- Sampler was advanced 18 inches.

Split spoon samples were examined and carefully removed from the spoon, logged, sealed and transported to the laboratory for testing.

Relatively undisturbed soil samples were obtained with the California-type drive sampler by driving the sampler with a 300-, 380- or 400-pound downhole hammer falling 18 inches. Hammer weights and the corresponding drop heights used for driving the sampler are indicated in boring logs. Blow counts were recorded for each 6-inch driving increment. The 12-inch long samples were examined and the middle six rings were collected in a plastic tube for transportation to the laboratory for testing. In order to compare the blow counts on a uniform basis, the California sampler downhole hammer blow counts were corrected for sampler dimensions, different hammer weights, height of fall, and buoyancy and viscous drag in the bentonite drilling mud. The corrected blow counts designated as "Equivalent SPT Value" are presented in Table 3-5.

Ten piezometers/monitoring wells were installed in this investigation and four piezometers/monitoring wells installed previously after the completion of soil sampling at selected station locations to monitor groundwater levels. In the rotary wash drilling method, observation of groundwater levels during drilling is generally not possible since the borings are filled with drilling fluid. Estimates of the groundwater level were, however, made by observing the moisture conditions of the samples.

Tap water was used to flush each boring to remove or thin the drilling fluid prior to piezometer installation. Backfill sand ranged from 34 to 75 feet (#2/12 Monterey)/1/2-inch size bentonite pellets/sluff was placed at the bottom of borings. Following this, PVC casing assembly was inserted into the boring, backfill sand was placed to about 1.5 to 10 feet above the top of the screened interval of the casing assembly, and 1/2-inch size bentonite pellets were then dropped in to form a 3-to 4.7-foot thick bentonite plug. Cement grout was then poured into the annulus between the PVC casing and the boring wall from the top of the bentonite plug to within 12 inches to 18 inches of the ground surface. At completion, a circular 8-inch diameter metal traffic box was installed at the piezometer location flush with the ground surface. Piezometer installation diagrams are presented in Figures A-3B, A-4B, A-6B, A-7B, A-9B, A-13B, A-14B, A-15B, A-16B, A-23B, A-24B, A-27B, A-28B and A-29B.

The logs of borings accompany this appendix. Stratification lines on the logs represent approximate boundaries between predominant soil types. Geologic and engineering descriptions and material classifications used on the boring logs are in general accordance with the Unified Soil Classification System (USCS) and the American Society for Testing and Materials (ASTM D2487 and D2488) Methods. The material was visually classified in the field and independently verified in the laboratory using the general guidelines presented in ASTM D-2488. For samples on which laboratory classification (gradation and/or Atterberg Limits) were performed, material classification was done in general accordance with ASTM D-2487. Figure A-1 presents the Laboratory and Field Soil Classification Systems used in material classification, as presented on the logs. Figure A-2 presents an explanation for the log symbols and terminology.

M E M O R A N D U M

95-8347

Date: June 20, 1995

To: Bomi Ghadiali, EMC

From: Suji Somasundaram, Geotransit Consultants

Subject: Hammer Weight Calibration
Eastside Extension

Attached please find calibration certificates for the two 140 pound hammers (serial numbers MW8701 and MW8702) submitted to us by C & L Drilling, for the borings within the Union Station to Little Tokyo station segment. We understand that Class F - tolerance indicates $\pm$ 2.3 grams.

C & L DRILLING CO.

Contractors License #568520

600 E. LAMBERT RD.
LA HABRA, CALIFORNIA 90631
(310) 691-3533 FAX (310) 690-0264

FAX TRANSMITTAL

DATE 6-6-95

COMPANY Earth Technology

ATTENTION Grant Miller

FAX# 714-724-1557

OF PAGES TRANSMITTED Cover + 2

REMARKS Calibration - SPT hammers

IF YOU DO NOT RECEIVE ALL OF THE PAGES INDICATED ABOVE, PLEASE CALL (310) 691-3533, AND WE WILL RE-TRANSMIT THE MISSING PAGES.

EMPIRE scale co

12055 CLARK STREET
SANTA FE SPRINGS, CA 90670

(310) 946-0761
FAX (310) 944-0770

June 5, 1995

C & L Drilling
600 E. Lambert Rd
La Habra, CA 90631

Service Order # 22556
P.O.# Verbal - Odell
S/N M#8701

CERTIFICATION OF GUARANTEED CALIBRATION

This is to certify that the Drill Head was thoroughly tested before packing and shipment using weights directly traceable to National Institute of Standards and Technology. This equipment guaranteed accurate to within Class 'F' Tolerance.
Complies to Mil-Spec. 45662A
MS-12572

ACTUAL WEIGHT: 140.0 Lbs.

Service Technician

EMPIRE Scale co.

12055 CLARK STREET
SANTA FE SPRINGS, CA 90670

(310) 946-0761
FAX (310) 944-0770

June 5, 1995

C & L Drilling
600 E. Lambert Rd.
La Habra, CA 90631

Service Order # 22556
P.O.# Verbal - Odell
S/N MM8702

CERTIFICATION OF GUARANTEED CALIBRATION

This is to certify that the Drill Head was thoroughly tested before packing and shipment using weights directly traceable to National Institute of Standards and Technology. This equipment guaranteed accurate to within Class "F" Tolerance.
Complies to Mil-Spec. 45662A
MS-12572

ACTUAL WEIGHT: 140.0 Lbs.

Service Technician

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD- 1
Sheet 1 of 4			
Boring Location:	East Commercial Street	Elevation and Datum(feet)	273.5
Health and Safety:	Level D	Date Started: 6/20/95	Date Finished: 6/20/95
Drilling Equipment:	Mayhew 1000	Total Depth (feet): 88.0	Depth to Bedrock(feet): 84.5
Drilling Method:	Mud Rotary	Number of Samples: 18	Depth to Water (feet): 31.1
Boring Diameter:	5 inches	Completion Information:	Installed Piezometer
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: Greg Renfrew	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT/BASE										
		ARTIFICIAL FILL GRAVEL; dark grayish brown, moist, loose, coarse gravel, black oil stains, trash with fine to medium sand	GP	af								
		SILTY SAND; dark grayish brown, moist, loose, fine to medium grained, trace mica	SM									
5					1	S	4 3 5	8/18	78.0 [7.0]			
		ALLUVIUM SAND with SILT and GRAVEL; gray, moist, loose, fine to medium sand, trace coarse sand, some fine subangular to angular gravel, occasional coarse gravel to 2-1/2", sand locally laminated	SP-SM	Qya								
		increased gravel content at 7 feet, medium dense, fine sand, some medium to coarse sand, fine gravel to 1/2", trace mica										
10					1	D	16 20	10/12	9.0 [8.0]	107	12	
		fine sand with silt at 10 feet; light olive brown, some medium to coarse sand, fine gravel to 1/4" trace mica										
15		olive brown, fine sand, occasional medium sand, trace mica			2	S	6 10 11	13/18	12.0 [6.0]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD- 1	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		LEAN CLAY; 2" thick layer, olive, moist, soft to firm, medium plasticity, medium to coarse gravel embedded, hydrocarbon odor	CL	Qya	2	D	16 30	9/12	10.0 [8.0]	92	33	
		SAND with SILT and GRAVEL; gray, dry, very dense, fine to coarse sand, subangular gravel to 1/2", strong hydrocarbon odor	SP-SM									
25		olive gray, some gravel to 1/2", trace mica, silt			3	S	25 66 41	13/18	120.0 [7.0]			
30		wet at 30 feet			3	D	55 57/1"	6/7	9.0 [6.0]	124	13	
		6" cobbles up to 8" at 33.5 feet and 34.0 feet										
35		saturated, gravel to 2", sulfur odor			4	S	24 26 20	11/18	10.0 [5.0]		14	
		[rig chatter from 36.5 to 39 feet]										
40		SAND with SILT and GRAVEL; light olive gray, moist, very dense, fine to coarse sand, gravel to 1" in size, hydrocarbon odor	SW-SM		4	D	47 45	10/12	14.0 [6.0]	125	10	
		7" cobble at 42.5 feet										
45		SAND with SILT and GRAVEL; light olive gray, fine to coarse sand, gravel to 1/2", sulfur odor	SP-SM		5	S	14 38 46	12/18	10.0 [6.0]			
		cobbles to 8" from 47 feet to 49 feet										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

RAW TUNNEL DIA = 22'
18' [illegible] TRACK & 4' [illegible]

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD- 1	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND; gray, moist, fine to coarse sand, gravel to 2"	GP-GM	Qya			16 21	0/12				
					5	D	100	6/6		123	13	
		2" thick silt layer in shoe, oily stains, strong hydrocarbon odor										
55		gray, wet, very dense, fine to medium grained sand with silt (SP-SM), from 54 feet to 57 feet, scattered gravel to 1", tar or oil, strong hydrocarbon odor			6	S	31 45 46	17/18	85.0 [6.0]			
		thin silt layer about 1-1/2" thick at 58.5 feet										
60		gray, gravel to 2", fine to medium sand, cobble fragment in shoe			6	D	100/5"	5/5	7.0 [6.0]	128	11	
		4" cobble at 64 feet										
65		SILT; greenish gray, wet, hard, porous, pockets of fine sand, hydrocarbon odor	ML		7	S	9 19 23	16/18	940.0 [6.0]			
		SAND; gray, moist to wet, dense, fine to medium	SP									
		SILTY SAND; dark gray, moist to wet, fine sand, micaceous, medium hydrocarbon odor	SM									
70					7	D	25 40	12/12	16.0 [6.0]	99	25	
		SAND; gray, wet, very dense, medium sand, trace coarse sand and fine gravel at 71.5 feet increased silt content from 73.0 to 74.5 feet (SM)	SP		8	S	46 100	12/12	440.0 [6.0]			
75		SAND with SILT; gray, wet, very dense, uniform fine sand, trace mica	SP-SM		8	D	70	6/6	400.0 [6.0]	105	21	
		SAND with SILT and GRAVEL; gray, wet, very dense, fine to coarse sand, fine subangular gravel	SW-SM									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

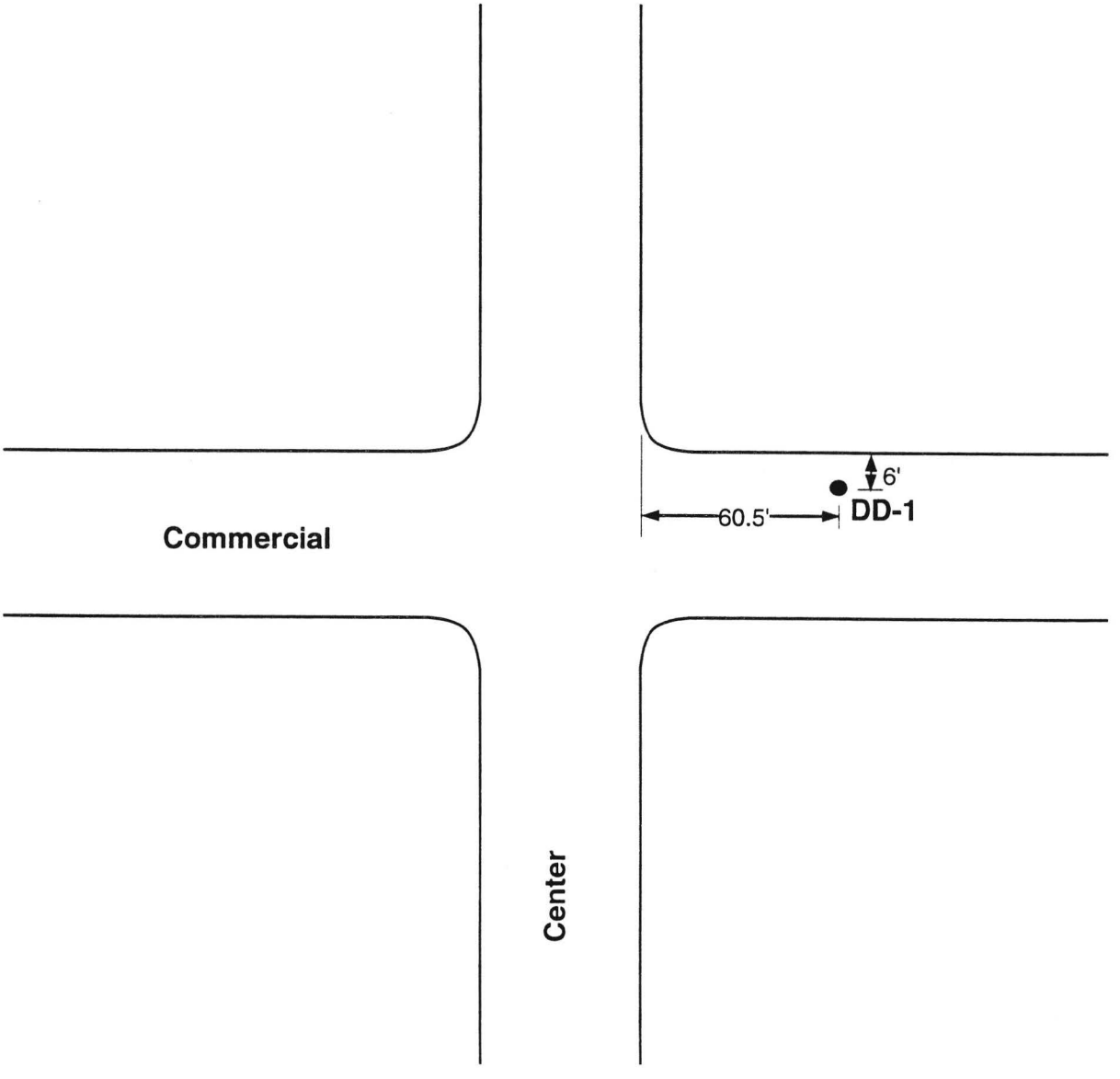
GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD- 1

Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND; gray, wet, very dense, trace coarse sand and subangular to subrounded gravel to 3/4"	SW	Qya	9	S	63 65	12/12	120.0 [6.0]			
85		**FERNANDO/PUENTE FORMATION** SILTSTONE, dark olive gray, moist, soft, laminated, low angle bedding, fossiliforous 2 mm in size, calcareous, medium hydrocarbon odor	ML	Tf/Tp	9	D	20 30	10/12	18.0 [6.0]	89	32	
		End of boring at 88 feet. Groundwater measured on 9/22/95 at 31.1 feet below surface.										
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



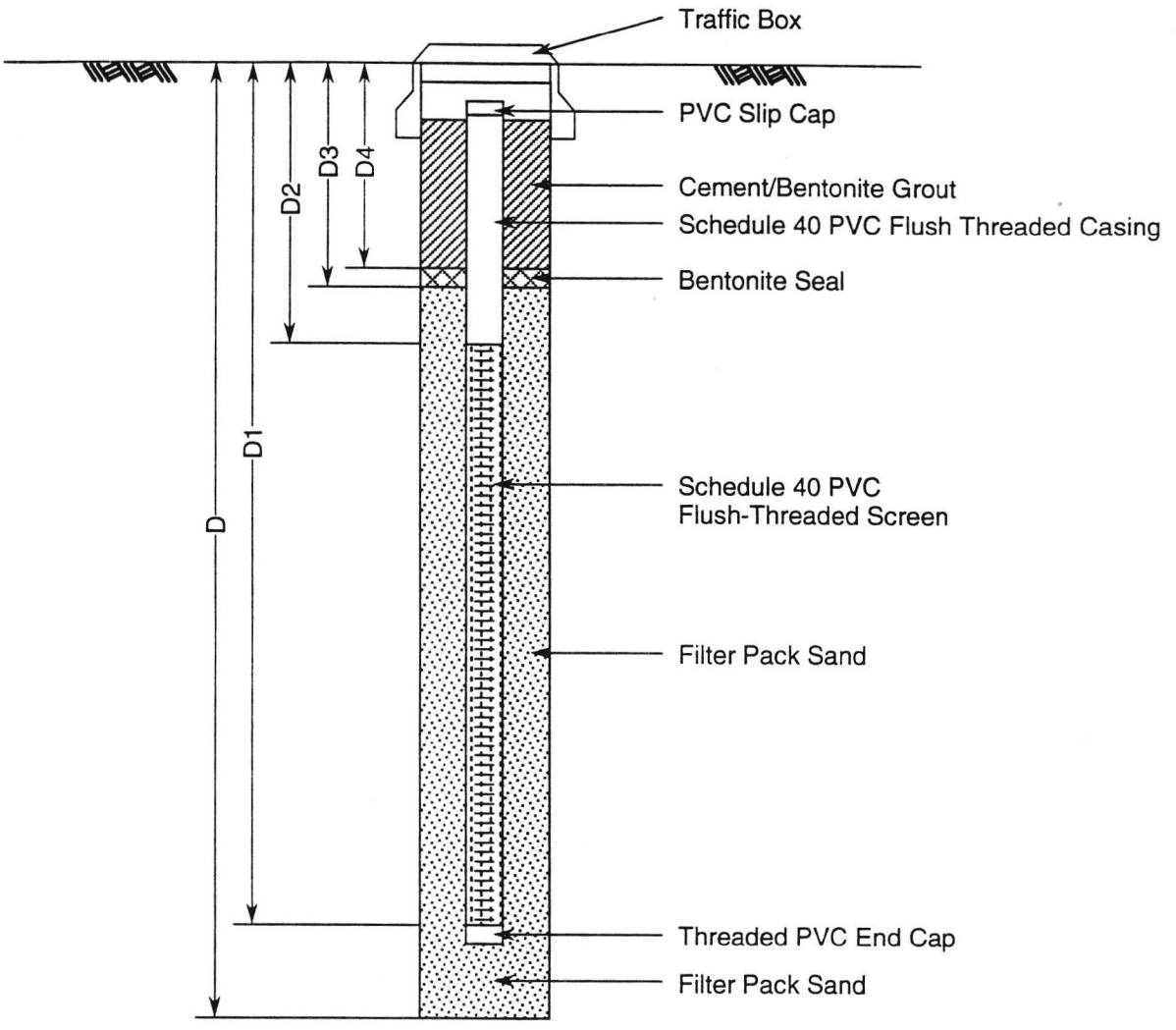
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-1

10-95

Figure A-3A



Total Depth (D)	=	88	Feet
Total Depth of Casing (D1)	=	85	Feet
Depth to Top of Well Screen (D2)	=	20	Feet
Depth to Bottom of Top Seal (D3)	=	18	Feet
Depth to Top of Top Seal (D4)	=	14.5	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

GeoTransit Consultants

Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
DD-1

8-95

Figure A-3B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2	Sheet 1 of 3
Boring Location:	Ducommun St.	Elevation and Datum(feet): 272.5	
Health and Safety:	Level D	Date Started: 6/29/95	Date Finished: 6/29/95
Drilling Equipment:	Link Belt 180	Total Depth (feet): 62.0	Depth to Bedrock(feet): N/A
Drilling Method:	Impact	Number of Samples: 4	Depth to Water (feet): 31.6
Boring Diameter:	6.6 inches	Completion Information: Installed piezometer	
Hammer Information: AP-1000		Logged By: Jorge Sandoval	Checked By: M. Payne

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Becker Blow Count (no./12 inches)	Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		Closed end bit, 7" of asphalt										
				Qya			31	15				39:15
							1	10				
							2	8				
							0	0				
5							35	14				39:45
							0	0				
							0	0				
							0	10				
							0	5				
		added rod at 9 feet					0	0				40:30 48:30
10							0	0				49:15
							4	0				51:00
							0	0				
							0	0				
15							0	0				
							0	0				
							0	0				52:00
							0	8				
							5	8				52:15
		added rod at 19 feet										58:35
							2	14				58:45

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2	Sheet 2 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
				Qya			0	0				59:00
							90	19				00:00
							108	26				01:15
		blower on at 23 feet					111	26				02:30
25							92	25				03:30
							75	24				04:20
							70	23				05:05
							120	24				06:30
							391	25				10:50
		switched from closed end bit to open end bit, decomposed granitic clast at bit tip			1	B	155	20				10:40 12:20
30							40/6"	20				
		stopped at 30.5 feet, hydrocarbon odor, headspace OVA reading at 5 ppm					218	22				49:31 50:40
		WATER TABLE					95	25				51:45
							76	20				53:40
35					2	B	85	20				53:59
							90	21				54:30
							110	21				55:15
							149	22				56:45
							90	21				57:40
		added rod and switched from open end bit to closed end bit at 39 feet					95	24				52:15 53:15
40							96	23				54:20
							60	22				55:00
							37	24				55:35
							45	23				56:10
45							90	23				57:10
							98	22				58:15
							117	23				59:30
							96	24				00:35
							118	25				01:50
		added rod at 49 feet					148	24				11:20 12:55

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

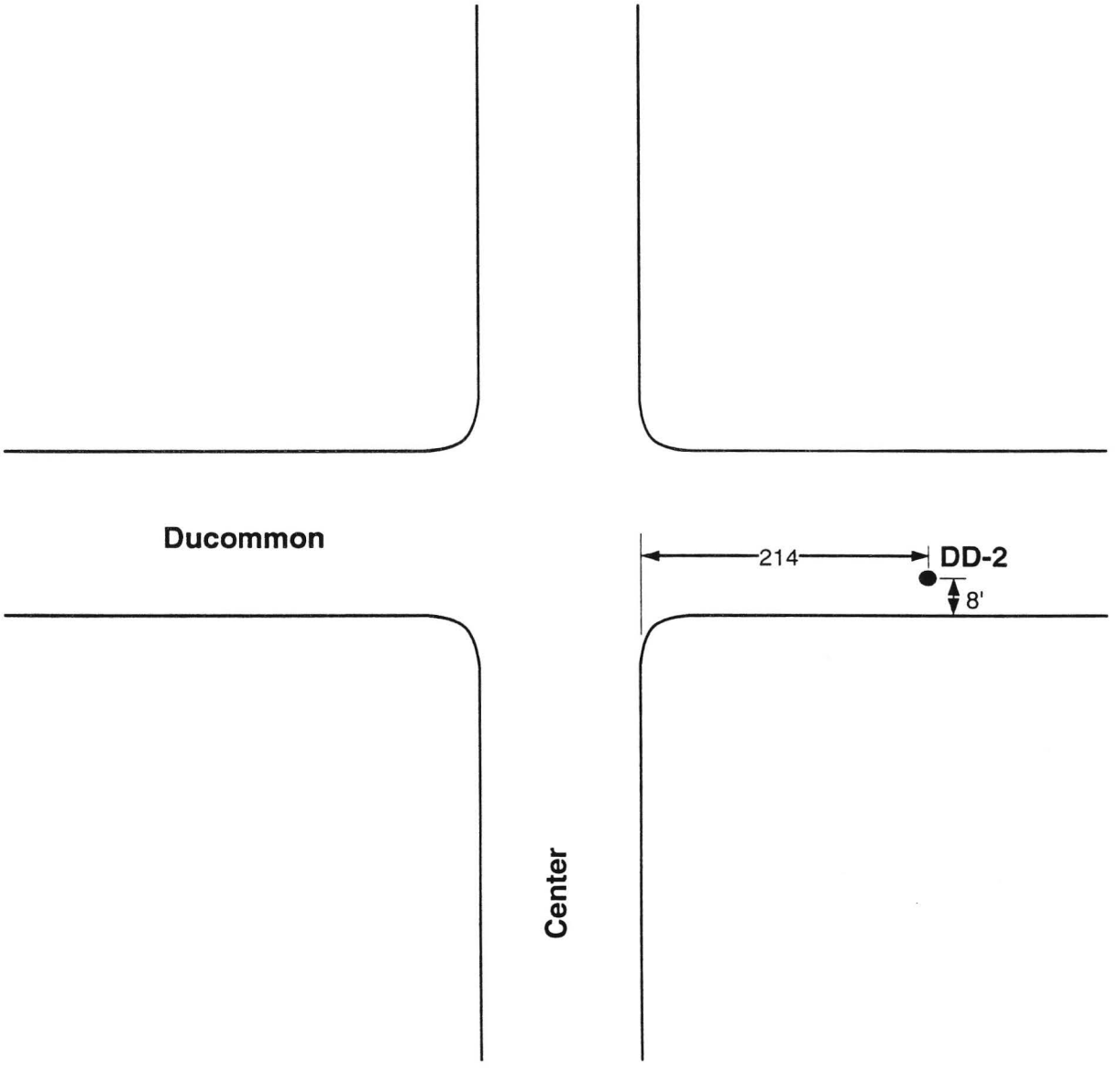
SEE DD-2-S. FOR SOIL CLASSIFICATION

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2	Sheet 3 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
				Qya			152	23				14:35
							271	24				17:30
							452	25				22:30
		switched from closed end bit to open end bit, very hard to drill at 53 feet					205	12				58:30 00:40
55		TOP OF TUNNEL					180	22				01:40
							0	0				02:00
							24	12				06:32 06:51
							21	10				07:10
							32	14				07:25
		switched from open end bit to closed end bit, soft at 59 feet					15	5				41:00 41:20
60							16	5				41:30
		Boring terminated at 62 feet below surface due to the presence of hydrocarbon contamination. Groundwater measured on 9/22/95 at 31.6 feet below surface. Note: drilling time is presented in minutes and seconds (i.e. 41:30 or 41 minutes and 30 seconds).										
65												
70		TUNNEL INVERT										
75		BOTTOM OF TUNNEL										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



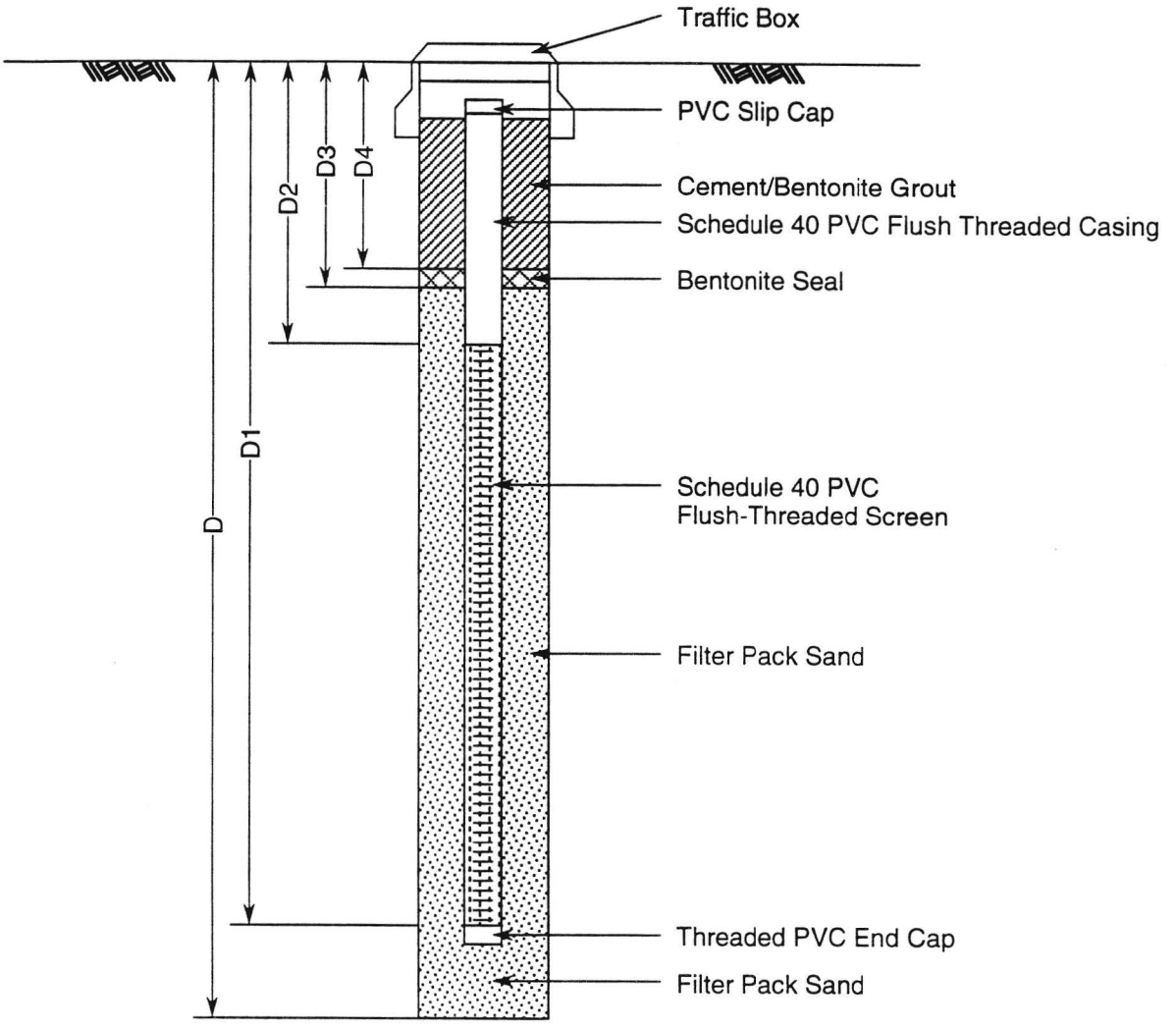
GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-2

10-95

Figure A-4A



Total Depth (D)	=	61	Feet
Total Depth of Casing (D1)	=	59	Feet
Depth to Top of Well Screen (D2)	=	29	Feet
Depth to Bottom of Top Seal (D3)	=	27	Feet
Depth to Top of Top Seal (D4)	=	23	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

GeoTransit Consultants

Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
DD-2

8-95

Figure A-4B

GeoTransit Consultants

Project Name:	**METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN**		
Project Number:	**95-8347**	Boring Number: **DD-2S**	Sheet 1 of 4
Boring Location:	**Ducommon St, East of Center**	Elevation and Datum(feet): **272.0**	
Health and Safety:	**Level D**	Date Started: **12/5/95**	Date Finished: **12/6/95**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **100.0**	Depth to Bedrock(feet): **75**
Drilling Method:	**Rotary Wash**	Number of Samples: **37**	Depth to Water (feet): **N/A**
Boring Diameter:	**8"**	Completion Information: **Grouted to surface**	
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop** **Downhole Hammer: 400-lb and 18-inch drop**		Logged By: **R. Jie**	Checked By: **K. Kabilamany**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								07:45
		ALLUVIUM GRAVEL with SAND; gray, moist, loose, subrounded to subangular gravel to 3/4" in size, fine to coarse grained sand	GP	Qya								
		2" thick sandy silt lens, brown, mica [rig chatter]										07:57
5		brown, loose, subrounded to subangular gravel to 2" in size, fine to medium grained			1	D	3 4	2/12	4.7 [4.4]			08:00
		SAND with GRAVEL; brown, moist, loose, fine to coarse grained, subangular gravel to 1" in size [occasional rig chatter]	SP									
		1" lens of silt										
10					2	S	1 3 3	8/18	5.0 [4.4]			08:13
		fine grained										
		GRAVEL; brown, moist, dense, subangular to angular gravel to 2" in size [heavy rig chatter]	GP									
		[lost circulation]										
15		SAND with GRAVEL; dark yellowish brown, moist, dense, fine to coarse grained, subangular fine gravel to 1/2" in size	SP		3	D	29 32	6/12	6.0 [6.0]	120	6	09:55
		subangular to angular gravel to 1" in size, [occasional heavy rig chatter]										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2S	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		SAND with GRAVEL; brown, moist, very dense, fine to coarse grained, subangular to angular gravel to 3/4" in size	SP	Qya	4	S	88 12/0"	5/6	6.0 [6.0]			10:12
		gray										
		[rig chatter]										
25		yellowish brown, subrounded to subangular gravel to 2-1/2" in size, pockets of gray silt			5	D	80 70/5"	6/12	6.0 [6.0]	120	12	10:35
		[rig chatter]							6.8 [6.8]			10:50
		pocket of sweet odor										
30		SAND with SILT and GRAVEL; dark gray, moist, very dense, fine to coarse grained, subrounded to subangular gravel to 3/4" in size, strong odor	SW-SM		6	S	34 36 62	10/18	32.0 [6.2]			10:59
					7	E	130 20/0.5"	5/6.5				11:25
		[heavy rig chatter]										
		GRAVEL with SAND; dark gray, wet, very dense, subrounded to subangular gravel to 1" in size, fine to coarse grained sand, slight odor	GP						4.6 [4.6]			11:47
35		3' thick layer of cobble to 6" in size										
					8	D	150/5.5"	3/5.5	12.0			12:35
					9	E	150/4"	0/4	[7.4]			12:45
40		cobble to 6" in size										
		SAND with SILT and GRAVEL; dark gray, wet, very dense, fine to coarse grained, subangular to subrounded gravel to 1" in size, nonplastic silt, slight odor	SP-SM		10	S	89 111/0.5"	5/6.5	14.0 [7.0]			13:13
		gravel to 2-1/2" in size, [rig chatter]			11	E	150	6/6				13:40
					12	D	150	3/6	5.0			13:58
					13	E	150	4/6	[7.0]			14:05
45					14	S	52 48/3"	7/9	12.0 [4.0]			14:24
		[rig chatter]										
					15	D	150	6/6	10.0	112	18	14:42
					16	E	150/0.5"	5/6.5	[4.0]			14:50

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2S	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		see previous page, [rig chatter]	SP-SM	Qya					5.0 [5.0]			15:03
		GRAVEL with SAND; dark gray, wet, very dense, subrounded to subangular gravel to 1" in size, fine to coarse grained sand, slight odor	GP		17	S	61 39/1"	2/7	9.4 [6.4]			15:10
		TOP OF TUNNEL										
55					18	D	125	6/6.5	15.0 [4.0]	118	15	15:28
		SILTY SAND; dark gray, wet, very dense, fine to medium grained, nonplastic silt, slight odor, trace pea gravel	SM		19	E	25/0.5" 150	5/6				15:38
		trace subangular gravel to 1/2" in size, moderate odor			20	S	56 44/3"	6/9	18.0 [4.0]			15:56
60		[hole was reamed to 6"]										
		LEAN CLAY; dark gray, moist, hard, low to medium plasticity, trace fine grained sand, trace mica, strong odor	CL		21	D	110 40/2"	7/8	460.0 [7.5]	100	26	09:12 09:18
		tiny light gray dots, calcareous nodules to 3/4" in diameter, strong sewage odor, trace organic material			22	E	112 38/3"	9/9				
		SANDY LEAN CLAY; fine grained sand			23	S	64 36/3"	6/9	480.0 [7.3]			09:50
65												
		SILTY SAND; dark gray, moist, very dense, fine grained, nonplastic silt, trace mica, strong odor	SM		24	D	100 50/2"	7/8	320.0 [7.5]	101	25	10:10
					25	E	110 40/3"	8/9				10:20
		SAND with GRAVEL; dark gray, wet, very dense, medium to coarse grained, subrounded to subangular gravel to 3/4" in size, strong odor	SP									
70		[heavy rig chatter from 70 to 72 feet]										
		TUNNEL INVERT			26	S	100/5"	4/5	78.0 [6.0]			10:39
		[rig chatter]										
75												
		FERNANDO/PUENTE FORMATION SILTSTONE; dark greenish gray, moist, soft, medium to high plasticity, trace mica, trace light gray silt dots	MH	Tf/Tp	27	D	65 85/2"	8/8	180.0 [6.0]	91	30	11:06
					28	E	90 10/1"	5/7				11:12
		[hole was reamed to 8"]										
		TUNNEL BOTTOM			29	P		7/30				13:36
		very soft, slight odor										

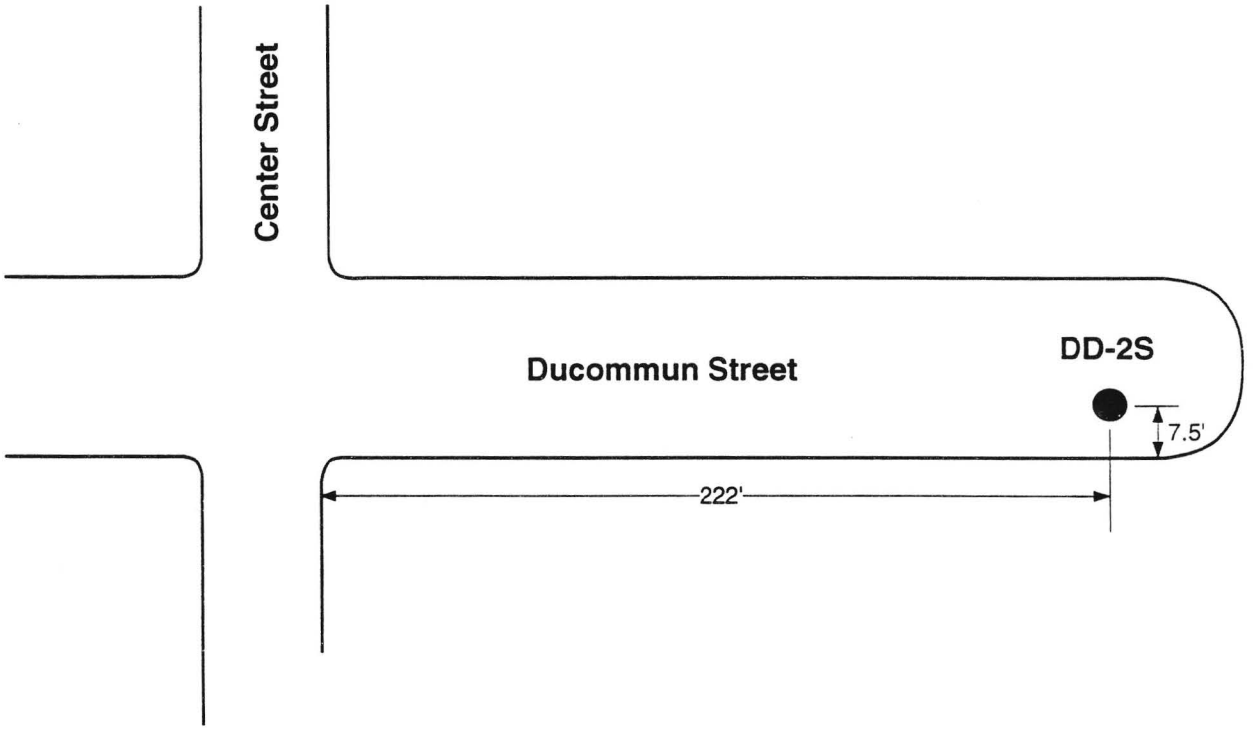
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-2S	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTSTONE; dark greenish gray, moist, soft, medium to high plasticity, trace mica, light gray silt dots, slight odor, +/- 7.5 degree bedding	MH	Tf/Tp								13:40
					30	D	150/5.5"	5/5.5	170.0 [7.0]	91	29	14:04
					31	E	76	6/6				14:12
					32	P		34/34				14:35
85												
		with 1/8" thick streaks of light gray silt			33	D	125 25/2"	8/8	340.0 [7.0]	90	31	14:59
					34	E	125 25/1"	7/7				15:06
90					35	P		24/30				15:35
95					36	E	85	6/6				15:57
					37	S	28 49 51/5"	17/17	> 1000 [7.0]			15:10
		pocket of light gray silt, strong reaction to Hcl, slight odor										
100		End of boring at 100 feet.										
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-2S

10-95

Figure A-5

GeoTransit Consultants

Project Name:	**METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN**		
Project Number:	**95-8347**	Boring Number: **DD-3**	Sheet 1 of 3
Boring Location:	**Jackson and Center**	Elevation and Datum(feet): **270.0**	
Health and Safety:	**Level D**	Date Started: **6/30/95**	Date Finished: **6/30/95**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **74.0**	Depth to Bedrock(feet): **73**
Drilling Method:	**Mud Rotary**	Number of Samples: **11**	Depth to Water (feet): **35.6**
Boring Diameter:	**5 inches**	Completion Information: **Installed piezometer**	
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop**		Logged By: **Greg Renfrew**	Checked By: **Bill Lu**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT/BASE; 1/2" gravel										
		ARTIFICIAL FILL railroad tie below asphalt, brick below tie (previous pavement)		af								
		SILT with GRAVEL; brown, dry to moist, loose to medium stiff, angular gravel to 1/2", medium sand	ML									
5		**ALLUVIUM** SAND; light yellowish brown, dry, loose to medium dense, fine to medium grained, trace fine subangular gravel	SP	Qya	1	D	6 6	12/12	12.0 [4.9]			
10		SAND with GRAVEL/GRAVEL with SAND; yellowish brown, moist, medium dense, fine to medium coarse sand, fine to coarse subangular gravel to 2", with silty sand contains trace subrounded gravel	SW/GP		2	D	11 19	8/12	4.9 [4.9]	115	10	
15		GRAVEL with SAND; yellowish brown, moist, medium dense, fine to medium sand, coarse subangular gravel to 2", subangular small cobble, some 4" cobble	GP		3	D	12 25	10/12	6.0 [4.9]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3	Sheet 2 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		increased sand with silt (SW-SM)	GP	Qya	4	D	20 30	10/12	5.0 [4.8]	129	6	
25		GRAVEL with SILT; yellowish brown, moist, dense, some silt, small cobble to 3" broken in shoe, coarse gravel up to 2"	GP-GM		5	D	25 55	10/12	4.9 [4.8]			
30		SAND; light brown, moist, very dense, fine to medium grained, trace mica	SP		6	D	65 40	7/12	4.9 [4.8]	104	14	
		[strong rig chatter] SAND with SILT and GRAVEL; olive yellow, moist, dense, fine to medium grained sand, gravel to 1-1/2" in size	SW-SM									
35					7	D	40 90/5"	8/11		131	7	
		GRAVEL with SAND; yellowish brown, wet, very dense, large cobble below sample, cobble layer 9" to small boulders	GP									
40		yellowish brown to dark gray, silty coarse gravel and cobbles, some fine to coarse sand				D	75/2"	0/2				
		cobble layer 4" to 6" at 42 feet										
		6"-8" cobble layer										
45		coarse gravel fragments to 2" in shoe				D	85/5"	0/5				
		frequent cobble layer 4" to 6"										
		6" cobble										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

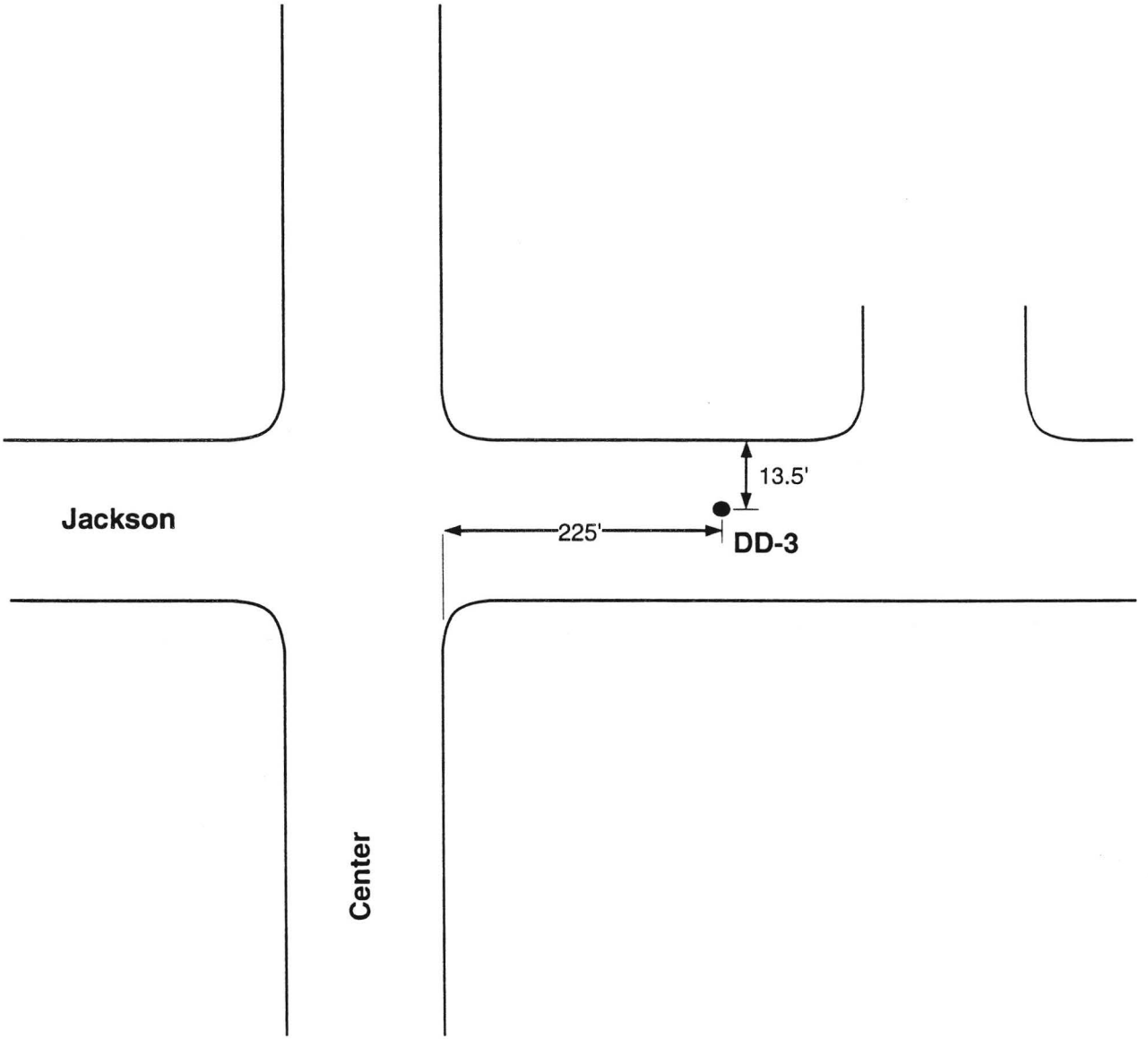
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-3

Sheet 3 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT; dark gray, wet, very dense, fine to medium grained, trace coarse sand, trace subrounded gravel to 3/4", trace silt, sulfur odor	SP-SM	Qya	8	D	37 75	10/12	5.2 [4.8]	120	14	
55		sulfur odor			9	D	40 35	8/12	142.0 [4.8]			
		silty cuttings at 60 feet										
60		SANDY SILT/SILTY SAND; dark gray, moist to wet, very stiff, micaceous, sulfur odor	ML/SM		10	D	15 25	12/12	480.0 [4.9]	105	22	
		[rig chatter]										
		SAND with SILT; gray, wet, very dense, fine to medium grained, scattered coarse sand, rounded to subrounded gravel to 3/4", trace gravel to 2"	SW-SM									
65					11	D	55 75/3"		130.0 [4.9]		14	
		trace gravel at 69 feet										
70		[strong rig chatter at 72 feet, some gravel to 3/4"]										
		FERNANDO/PUENTE FORMATION SILTSTONE; dark greenish gray, moist to wet, very soft, calcareous, fresh	ML	Tf/Tp								
75		End of boring at 74 feet. Groundwater measured on 9/22/95 at 35.6 feet below surface.										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



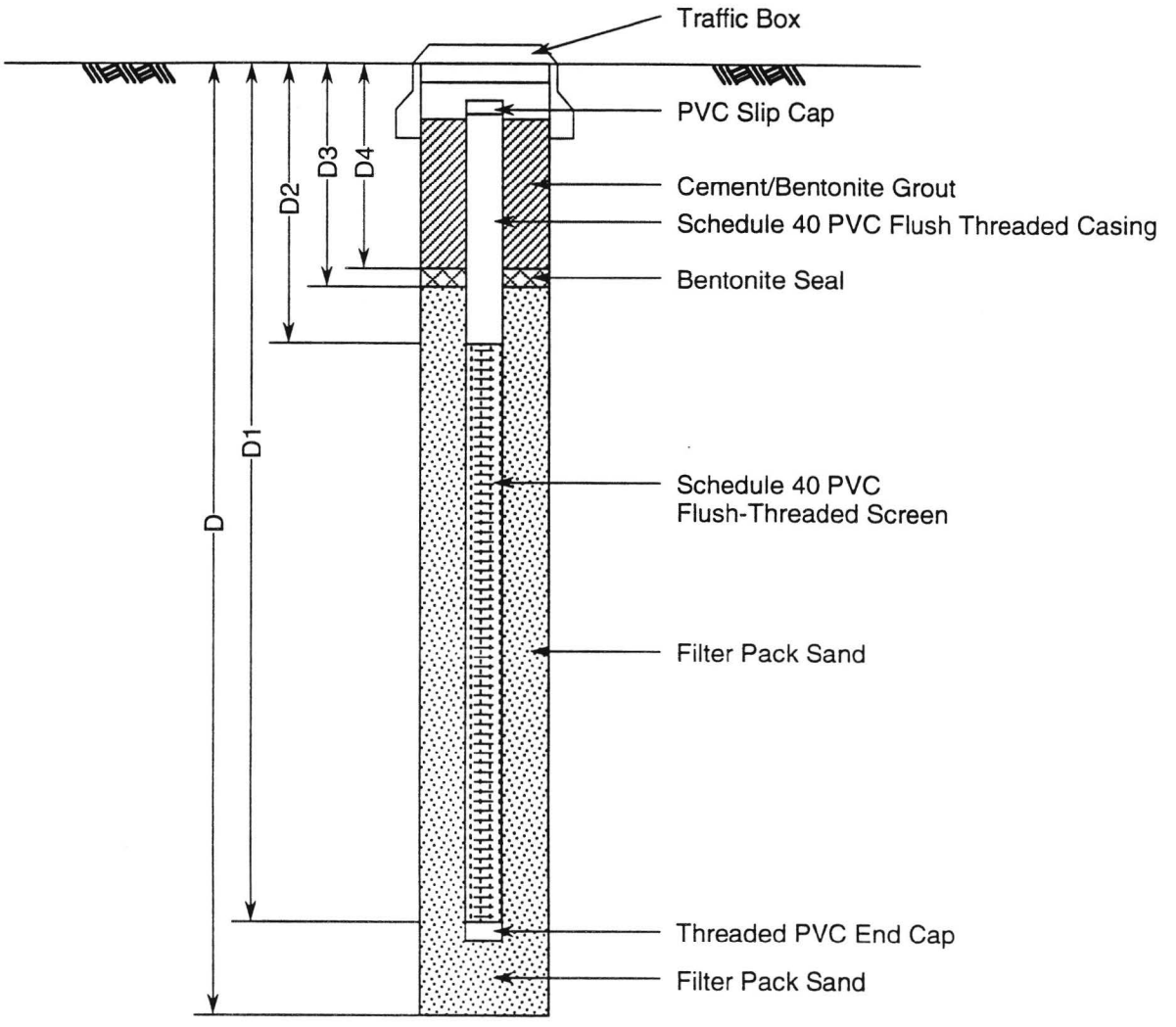
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-3

10-95

Figure A-6A



Total Depth (D)	=	74	Feet
Total Depth of Casing (D1)	=	70	Feet
Depth to Top of Well Screen (D2)	=	20	Feet
Depth to Bottom of Top Seal (D3)	=	23	Feet
Depth to Top of Top Seal (D4)	=	19.5	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
DD-3

8-95

Figure A-6B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3C	Sheet 1 of 3
Boring Location:	Jackson and Center	Elevation and Datum(feet): 270.0	
Health and Safety:	Level D	Date Started: 6/28/95	Date Finished: 6/29/95
Drilling Equipment:	Mayhew 1000	Total Depth (feet): 78.0	Depth to Bedrock(feet): 73.5
Drilling Method:	Mud Rotary	Number of Samples: 14	Depth to Water (feet): 35.7
Boring Diameter:	10 inches	Completion Information: Installed well	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: Greg Renfrew	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT/BASE	ML	af								
		FILL SANDY SILT with GRAVEL; dark yellowish brown, moist, medium dense, trace to some gravel, fine to medium sand, brick fragments										
5		**ALLUVIUM** SAND with SILT and GRAVEL; olive brown, moist, medium dense, fine to medium sand, trace fine to coarse gravel to 1-1/4", pockets of silt	SP-SM	Qya	0	S	8 9 11	0/18				
					1	S	5 5 9	9/18	6.3 [5.5]			
10		SAND with GRAVEL/GRAVEL with SAND; yellowish brown, fine to coarse sand, fine to coarse subangular gravel to 1-3/4", trace silt	SP/GP		2	D	12 13	8/12	6.2 [5.8]	125	13	
15		[strong rig chatter at 14.5 feet] brown, dense, coarse gravel to 1"			3	S	7 24 22	10/18	6.9 [5.5]			
		SILTY SAND with GRAVEL; yellowish brown, moist, dense, fine to medium sand, trace coarse gravel to 1-3/4"	SM									
		SAND with GRAVEL/GRAVEL with SAND; see next page	SW/GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3C	Sheet 2 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with GRAVEL/GRAVEL with SAND; yellowish brown, moist, dense, fine to coarse sand, coarse gravel to 2-1/2", trace silt	SW/GP	Qya	4	D	25 33	9/12	6.0 [5.5]	123	8	
25		SILTY SAND with GRAVEL/SILTY GRAVEL with SAND; yellowish brown, moist, very dense, fine to medium sand, coarse gravel, trace fine subangular gravel	SM/GM		5	S	14 43 45	9/18	6.2 [5.4]			
30		SAND with SILT; brown, moist, dense, fine to medium grained, trace fine gravel [strong rig chatter at 32.5 feet]	SP-SM		6	D	18 35	11/12	7.9 [9.5]	105	13	
35		SILTY SAND with GRAVEL/SILTY GRAVEL with SAND; light gray, moist, very dense, fine to medium sand, gravel to about 2-1/2", hydrocarbon odor	SM/GM		7	S	33 100/2"	7/8	14.0 [6.7]			
		SILTY GRAVEL with SAND, cobble layer 8" at 36.5 feet, scattered cobbles below 36 feet cobbles to 4" to 8" in size	GM									
40		GRAVEL with SAND; olive gray, wet, very dense, fine to coarse gravel, cobbles to about 8", some fine to medium sand, trace silt, hydrocarbon odor	GP		8	D	100/5"	4/5	6.3 [5.9]		13	
45		[strong rig chatter]			9	D	75/3"	0/3	6.0 [5.6]			
		cobble to about 4" at 49 feet										

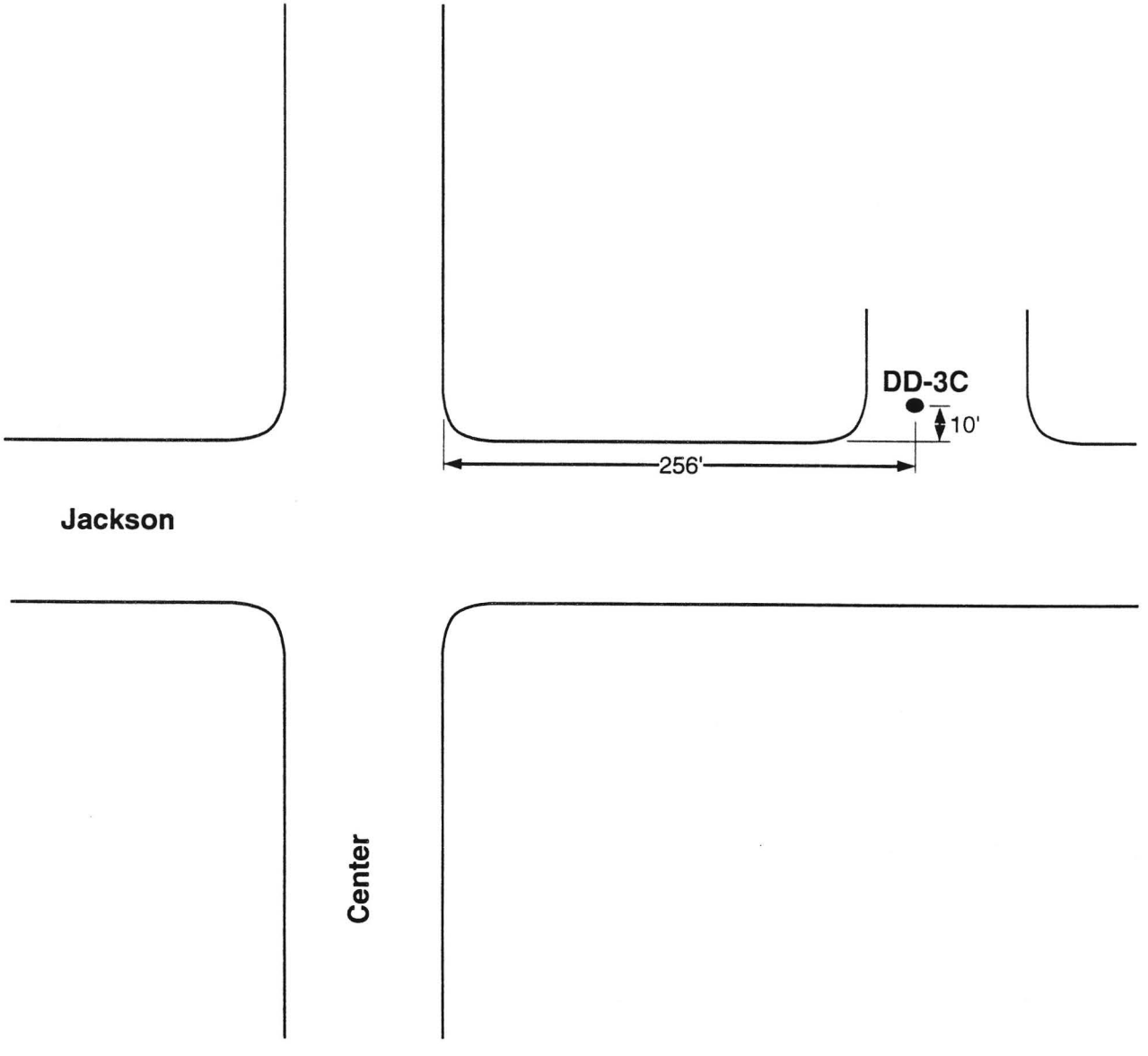
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3C	Sheet 3 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL wiht SAND; olive gray, wet, very dense, fine to medium sand, trace coarse sand, gravel to 1"	GP	Qya	10	S	75 25/1.5"	7.5 /7.5	13.0 [5.4]			
		TOP OF TUNNEL										
55		SANDY SILT/SILTY SAND; dark greenish gray, moist to wet, medium dense, low plasticity, fine grained sand, gradational laminated, micaceous, organic inclusions (wood), sulfur odor,	ML/SM		11	D	16 28	12/12	14.0 [5.4]	108	20	
60		gray, non plastic sandy silt, fine sand, trace mica			12	S	27 25 35	18/18	920.0 [5.4]			
65					13	D	31 58	12/12	130.0 [5.5]	104	23	
		SAND; dark gray, moist to wet, very dense, fine grained, micaceous	SP									
		SAND with SILT; light gray, moist to wet, very dense, fine to coarse grained, ~~some subangular~~ gravel to 1/2", sulfur odor	SW-SM		14	S	66 34/3"	9/9	69.0 [5.8]			
70		TRANSITION										
		FERNANDO/PUENTE FORMATION SILTSTONE; dark greenish gray, moist, soft, fresh, calcareous, laminated, trace fine sand, fossiliferous	ML	Tf/Tp								
75					15	D	26 29	12/12	320.0 [5.8]	100	23	
		End of boring at 78 feet. Groundwater measured on 9/22/95 at 35.7 feet below surface.										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



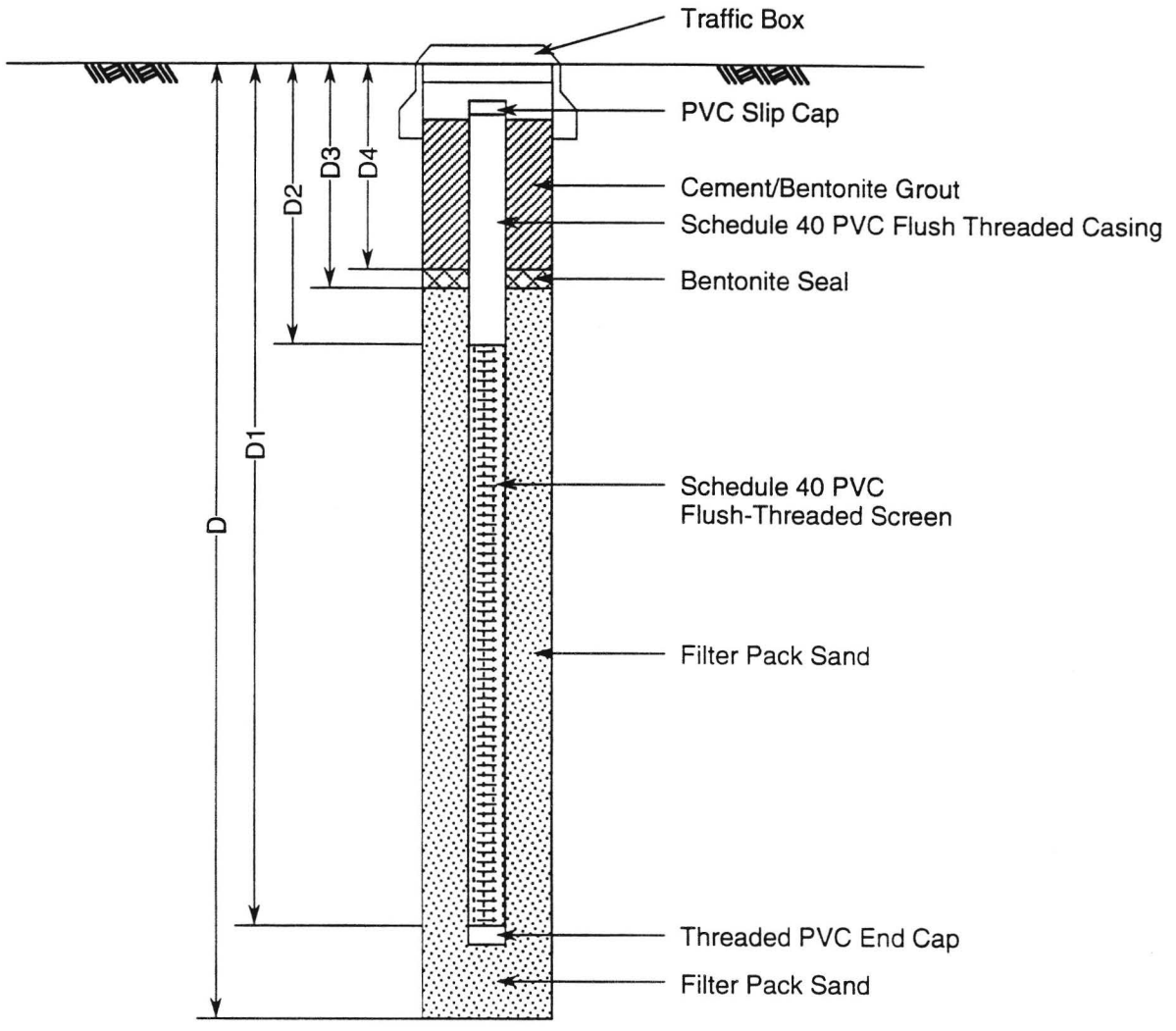
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-3C

10-95

Figure A-7A



Total Depth (D)	=	78	Feet
Total Depth of Casing (D1)	=	74	Feet
Depth to Top of Well Screen (D2)	=	34	Feet
Depth to Bottom of Top Seal (D3)	=	24	Feet
Depth to Top of Top Seal (D4)	=	20	Feet
Well Casing Diameter	=	6	Inches
Well Screen Slot Size	=	0.06	Inch
Filter Pack Sand Type	=	#6/16	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic DD-3C

8-95

Figure A-7B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3D	Sheet 1 of 2
Boring Location:	Jackson Street	Elevation and Datum(feet): 270.0	
Health and Safety:	Level D	Date Started: 6/27/95	Date Finished: 6/27/95
Drilling Equipment:	Midway 13	Total Depth (feet): 36.5	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 7	Depth to Water (feet): N/A
Boring Diameter:	4 7/8"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Grant Miller

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL gravel to 1" at 2 feet										
		gravel to 1" at 4 feet red brick fragments at 4.5 feet										
5		**ALLUVIUM** SILTY SAND; light olive brown, moist, dense, fine grained, trace fine gravel to 2-1/4"	SM	Qya	1	S	14 15 18	14/18	6.2 [3.9]			
		gravel to 1"										
10		SAND; olive, wet, medium dense, fine to coarse grained, few fine to coarse gravel to 2", trace brown decomposed granitic clasts caving at 12 feet	SP		2	D	10 13	5/12	5.4 [5.4]			
		caving at 13 feet										
		[rig chatter at 14.5 feet] fine gravel 1/4" to 1/2" in size at 15 feet										
15		SAND with GRAVEL/SILTY SAND with GRAVEL; olive brown, moist, very dense, fine to coarse grained, fine to coarse gravel to 1" [rig chatter from 16 feet to 19 feet]	SP/SM		3	S	3 18 36	10/18	5.8 [5.4]			

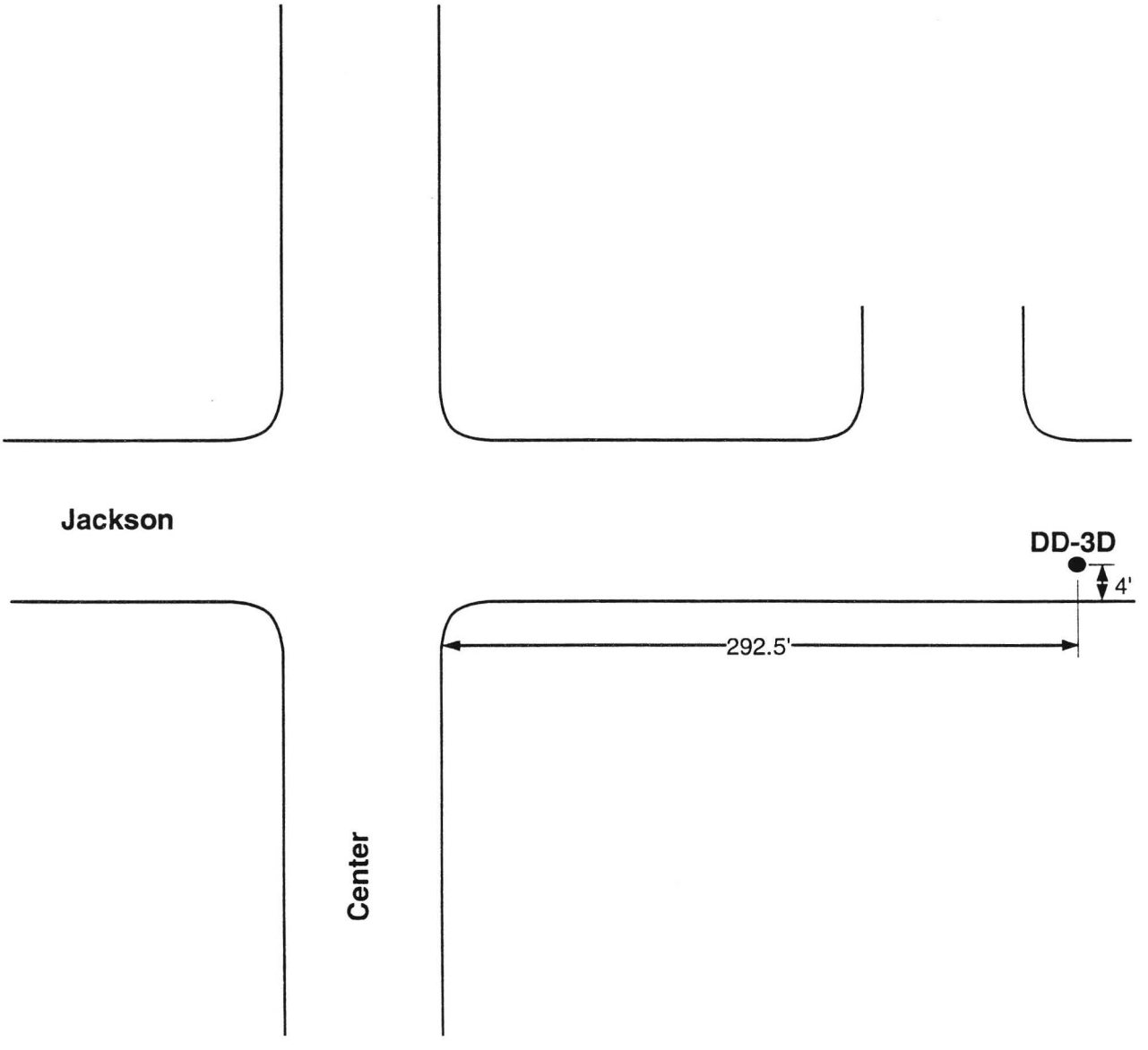
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-3D	Sheet 2 of 2

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND; light olive brown, moist, dense, fine to coarse gravel to 1", fine to coarse sand	GP	Qya	4	D	54 10	8/12	5.8 [5.4]	125	10	
		[rig chatter from 23 feet to 25 feet]										
25		boulder to about 1-1/2' at 25 feet										
		coarse gravel to 1-1/2", some sand			5	S	4 6 47	9/18	6.0 [5.1]			
30		[rig chatter from 30 feet to 31 feet]			6	D	12 20	5/12	6.2 [5.6]	98	11	
		gravel to 1", medium dense, some sand, (disturbed sample)										
		[rig chatter from 33 feet to 35 feet]										
35		GRAVEL with SAND and SILT; light gray, moist, very dense, fine to coarse sand, very dense, 2" of silty sand, very dark gray, moist, very dense, fine to medium grained, trace gravel to 1/2" in size, trace low plasticity fines interbedded with very dark gray silty sand, gravel to 1" at 36 feet	GW-GM		7	S	6 11 85	5/18	6.1 [5.3]			
		caving at 36.5 feet										
40		End of boring at 36.5 feet. Boring abandoned due to caving. Boring backfilled with cement-bentonite grout.										
45												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-3D

10-95

Figure A-8

GeoTransit Consultants

Project Name:	**METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN**		
Project Number:	**95-8347**	Boring Number: **DD-4**	Sheet 1 of 4
Boring Location:	**Center and Bannig**	Elevation and Datum(feet): **270.0**	
Health and Safety:	**Level D**	Date Started: **6/26/95**	Date Finished: **6/27/95**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **98.0**	Depth to Bedrock(feet): **57**
Drilling Method:	**Mud Rotary**	Number of Samples: **27**	Depth to Water (feet): **42.5**
Boring Diameter:	**6 inches**	Completion Information: **Installed piezometer**	
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop**		Logged By: **Greg Renfrew**	Checked By: **Grant Miller**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		brick below asphalt										
		ARTIFICIAL FILL SILT; dark grayish brown, moist, stiff, trace fine sand, hydrocarbon odor	ML									
5					1	S	2 2 7	16/18	160 [3.4]			
		ALLUVIUM SILTY SAND; dark brown, moist, medium dense, fine to medium grained, trace gravel to 3/4", some silt, hydrocarbon odor	SM	Qya								
		[rig chatter at 8 feet]										
10		dark brown to yellowish brown, moist, dense, trace angular gravel, 3/4" common			2	D	18 20	7/12	3.7 [3.2]	122	11	
		increased gravel content										
		SILTY SAND with GRAVEL/SILTY GRAVEL with SAND; brown, very dense, fine to coarse sand, fine to coarse subangular to angular gravel to 2", hydrocarbon odor	SM/GM									
15					3	S	36 63	9/12	6.5 [3.8]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-4	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND; brown, moist, dense, coarse subangular gravel to 2", 1-1/2" gravel common, fine to coarse sand, some silt	GP-GM	Qya	4	D	25 35	10/12	54 [3.1]	120	13	
25		fine to coarse sand, gravel to 1"			5	S	13 19 26	4.5/18	6.6 [3.4]			
		Cobbles to about 5" at 28.5 feet, gravel and rock cuttings in drilling mud										
30		GRAVEL with SILT and SAND; brown, moist, very dense, coarse gravel to 3", cobbles up to 7", fine to medium sand	GW-GM		6	D	61 89/3"	7/9	6.3 [3.1]	131	10	
35		SAND with GRAVEL; fine to coarse grained sand, scattered gravel to 3/4" and scattered cobbles to about 4"	SP-SM		7	S	74 26/1"	5.5/7	5.9 [3.3]			
		boulder to about 13", angular gravel chips in drilling mud at 38 feet										
40		GRAVEL with SILT and SAND; brown, wet, very dense, fine to coarse sand, 2" gravel fragment in sampler	GP-GM		8	D	74 79	9/12	3.8 [3.1]	127	9	
		WATER TABLE										
45		increased silt content, grayish green to green, wet, very dense, fine to coarse sand, fine to coarse gravel to 2" (GM), scattered cobbles to 6" at 44.5 feet			9	S	100	6/6	7.7 [3.2]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-4

Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
50		TOP OF TUNNEL										
		SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; greenish gray to dark gray, wet, very dense, fine to coarse sand, coarse gravel	SW-SM /GP-GM	Qya	10	D	100/5"	5/5	5.0 [3.1]	122	13	
		SILTY SAND with GRAVEL; greenish gray, wet, very dense, coarse gravel to about 3" in size	SM		11	S	54 46/2"	8/8	7.3 [3.2]		12	
		4" cobble at 54 feet										
55		1/2" thick silty layer, green				D	110/4"	4/4	5.5 [3.2]		11	
		FERNANDO/PUENTE FORMATION SILTSTONE; dark greenish gray, moist, soft, fresh, laminated, fossiliforous, calcareous, trace fine sand, low plasticity, bedding near horizontal to approximately 35 degrees	ML	Tf/Tp		D	16 20	12/12	7.1 [3.1]			
					13	P		23.5 /36	3.2 [3.0]			
60						D	14 20	0/12				
					14	S	5 21 52	11/18				
65					15	D	20 30	12/12	3.8 [3.2]			
					16	P		26.5 /36	3.6 [3.1]	95	27	
		TUNNEL INVERT										
70					17	D	20 23	12/12	4.2 [3.1]			
					18	P		35.5 /36	8.0 [3.2]			
75					19	D	16 22	12/12	4.2 [3.1]			
					20	P		28/36	10 [3.1]	100	25	
					21	P		29/36	3.8 [3.1]	108	19	

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

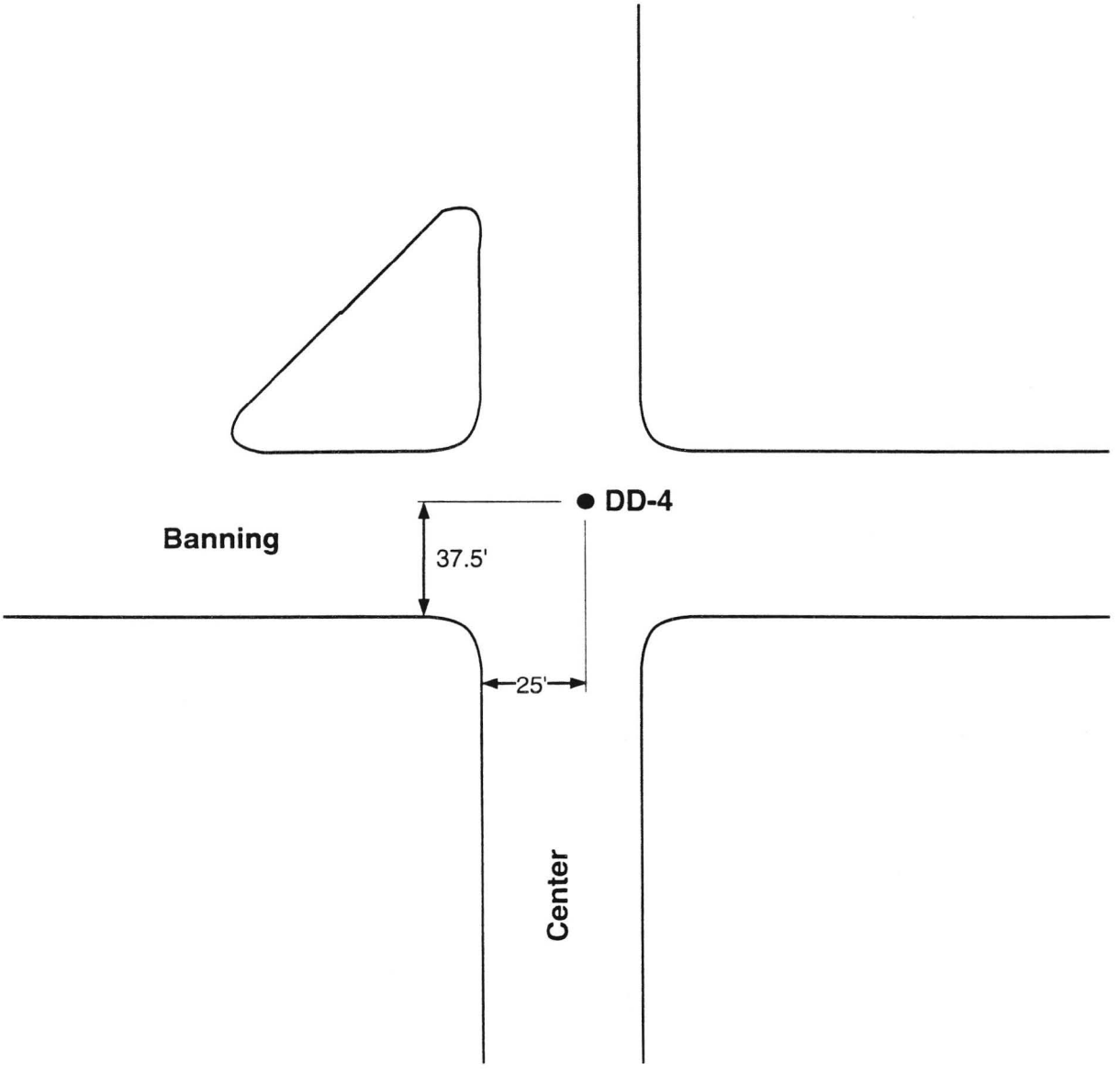
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-4

Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTSTONE as above	ML	Tf/Tp								
					22	P		20/36	120.0 [3.2]			
85					23	P		20.5 /36	140 [3.1]			
		CLAYSTONE; dark olive, moist, soft	CL		24	P		35.5 /36	180.0 [3.1]	96	27	
90					25	P		35.8 /36	160.0 [3.2]			
					26	P		28/36	260.0 [3.1]			
95												
		End of boring at 98 feet. Groundwater measured on 9/22/95 at 42.5 feet below surface.										
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

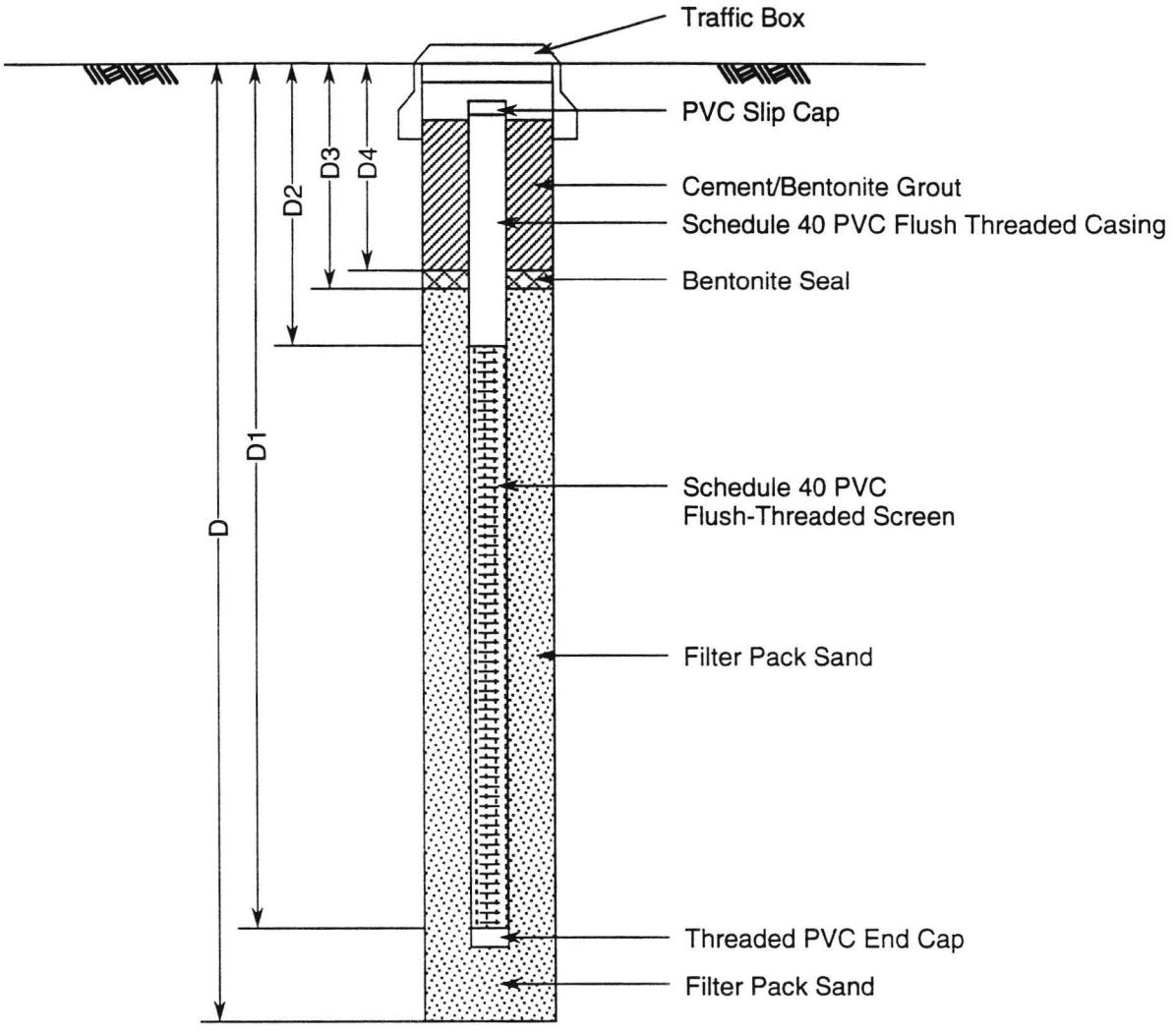
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-4

10-95

Figure A-9A



Total Depth (D)	=	98	Feet
Total Depth of Casing (D1)	=	95	Feet
Depth to Top of Well Screen (D2)	=	25	Feet
Depth to Bottom of Top Seal (D3)	=	23	Feet
Depth to Top of Top Seal (D4)	=	19	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic DD-4

8-95

Figure A-9B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN				
Project Number:	95-8347	Boring Number:	DD-4-1	Sheet 1 of 4	
Boring Location:	E. Temple/Center			Elevation and Datum(feet): 272.0	
Health and Safety:	Level D	Date Started: 11/11/95		Date Finished: 11/11/95	
Drilling Equipment:	Mayhew 1000	Total Depth (feet): 98.0		Depth to Bedrock(feet): 54.5	
Drilling Method:	Rotary Wash	Number of Samples: 27		Depth to Water (feet): N/A	
Boring Diameter:	6"	Completion Information: Grouted to surface			
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: R. Jie		Checked By: K. Kabilamany	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								06:25
		FILL										
5		**ALLUVIUM** SAND; light brown, dry, dense, fine to coarse grained, trace nonplastic silt and subrounded gravel to 1-1/2" in size]	SP	Qya	1	B			14.0 [12]			07:15
		[rig chatter]										
10		subrounded to subangular gravel to 2-1/2" in size some gravel to 5/8" in size			2	D	14 60	5/12	13.0 [12.0]	126	8	07:30
		[heavy rig chatter]										
15		SAND with SILT and GRAVEL; pale brown, moist, very dense, fine to coarse grained, angular gravel to 5/8" in size, nonplastic silt [occasional rig chatter]	SP-SM		3	S	14 98	6/12	15.0 [12.0]			07:44
		[heavy rig chatter]										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-4-1

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT and GRAVEL; pale brown to brown, moist to wet, medium dense, fine to coarse grained, subrounded gravel to 2" in size, nonplastic silt	SP-SM	Qya	4	D	17 30	6/12	13.0 [12.0]	111	16	08:05
		[occasional rig chatter] reduced gravel content										
25		gray, moist, very dense, subrounded gravel to 1-1/2" in size	SW-SM		5	S	22 38 41	12/18	36.0 [12.0]			08:16
		[rig chatter]										
30		moist to wet, dense, subrounded gravels to 1" in size	SP-SM		6	D	30 40	5/12	78.0 [12.0]	115	16	08:28
		hydrocarbon odor, [heavy rig chatter]										
		1' thick layer of cobble to 6" in size GRAVEL with SAND; gray, moist to wet, very dense, subrounded gravel to 1-1/2" in size, fine to coarse grained sand	GP									
35		0.5' thick layer of cobble to 6" in size hydrocarbon odor			7	S	21 27 42	10/18	330.0 [12.0]			08:58
		[rig chatter], cobbles to 7" in size										
40		angular to subrounded gravel to 2-1/2" in size			8	D	150/4"	3/4	64.0 [12.0]			09:32
		increased gravel content										
		[heavy rig chatter], hydrocarbon odor										
		subangular gravel to 1/2" in size			9	S	71 29/1"	3/7	54.0 [12]			09:55
45		subrounded gravel to 2-1/2" in size, fine to coarse sand, hydrocarbon odor			10	D	59 79	7/12	62.0 [12.0]	117	12	10:19
		GRAVEL/SAND; subrounded gravel to 1" in size, hydrocarbon odor	GP/SP		11	S	81 19/1"	6/7	140.0 [12.0]			10:30

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-4-1

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		[see previous page]	GP	Qya								
		SAND with SILT; gray, wet, dense, fine to medium grained, trace mica, trace gravel to 2-1/2" in size, hydrocarbon odor	SP		12	D	23 32	8/12	>1000 [12.0]	107	20	10:44
55		**FERNANDO/PUENTE FORMATION** CLAYSTONE/SILTSTONE; dark gray, moist, very soft, trace mica, no apparent bedding, unweathered hydrocarbon odor	CL/ML	Tf/Tp	13	S	11 15 22	18/18	>1000 [12.0]			10:57
					14	P		21/30	>1000 [12.0]	98	25	11:53
60		streaks of light gray silt			15	D	15 17	6/12	72.0 [12.0]			12:06
					16	P		30/30	>1000 [12.0]			12:42
65								0/12				12:58
		trace tiny white dots caving in of rocks observed			17	D	15 19	7/12	>1000 [12.0]	102	24	13:10
70					18	P		30/30	>1000 [12.0]			13:23
		slight sulfur odor			19	D	18 30	11/12	620.0 [12.0]	101	24	13:36
75					20	P		30/30	>1000 [12.0]			13:50
					21	S	17 24	17/18	>1000 [12.0]			14:01

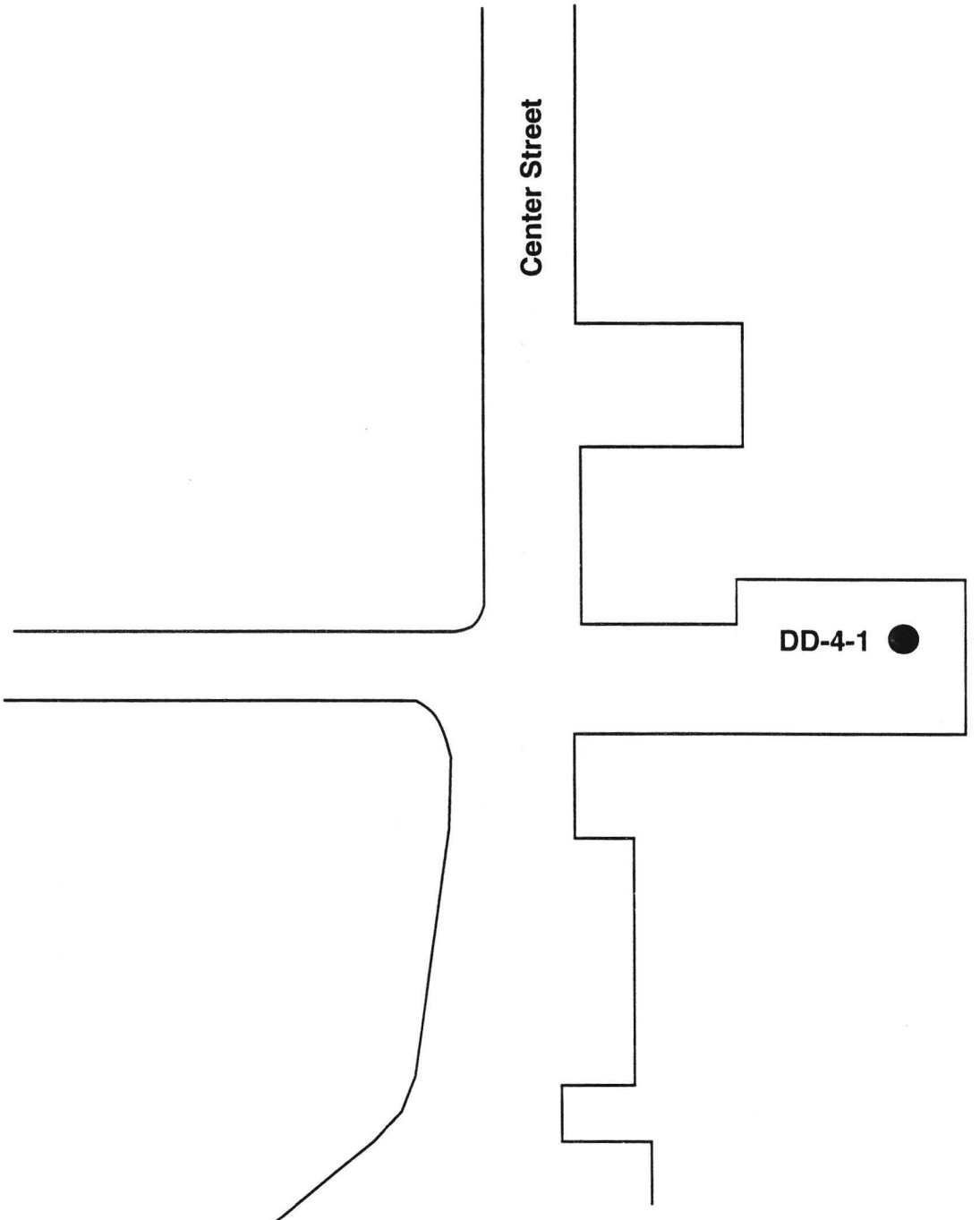
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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-4-1	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		CLAYSTONE/SILTSTONE; dark gray, moist, very soft, trace mica, no apparent bedding, unweathered	CL/ML	Tf/Tp			29					
					22	P		29/30	>1000 [12.0]			14:18
85					23	D	15 20	11/12	740 [12.0]	101	24	14:35
					24	P		28/30	>1000 [12.0]			14:43
90					25	D	16 22	6/12	>1000 [12.0]	98	26	14:57
					26	P		27/30	>1000 [12.0]			15:07
95					27	D	17 25	7/12	>1000 [12.0]	100	25	15:20
		End of Boring at 98 feet										
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-4-1

10-95

Figure A-10

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-5	Sheet 1 of 2
Boring Location:	Metro Red Line Yard	Elevation and Datum(feet): 267.0	
Health and Safety:	Modified level D	Date Started: 7/19/95	Date Finished: 7/19/95
Drilling Equipment:	EZ Bore	Total Depth (feet): 32.5	Depth to Bedrock(feet): N/A
Drilling Method:	Bucket Auger	Number of Samples: 6	Depth to Water (feet): N/A
Boring Diameter:	30 inches	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: Nondb and 18-inch drop		Logged By: A. Pace	Checked By: Grant Miller

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT/BASE		af								
		ARTIFICIAL FILL										
		SILTY SAND; brown, slightly moist, brick fragments	SM									
		ALLUVIUM	SW	Qya								
		SAND; light brown, slightly moist, loose, fine to medium sand, some gravel to 1/2"										
		6" subrounded cobble										
5		SAND; light brown, moist, medium dense, fine to medium sand, trace coarse sand and fine gravel, trace mica	SP		1	B			7.2 [3.3]			
		increased grain size										
10		SAND with SILT and GRAVEL; light brown, moist, medium dense, fine to medium sand, some coarse gravel to 2", trace mica	SP-SM		2	B			3.2 [3.2] 8.0 [3.0]			
		trace cobbles, subrounded										
		SAND with SILT and GRAVEL; light olive brown, moist, loose, fine to medium sand, some coarse sand, gravel to 2"	SW-SM									
15					3	B			7.8 [2.8]			

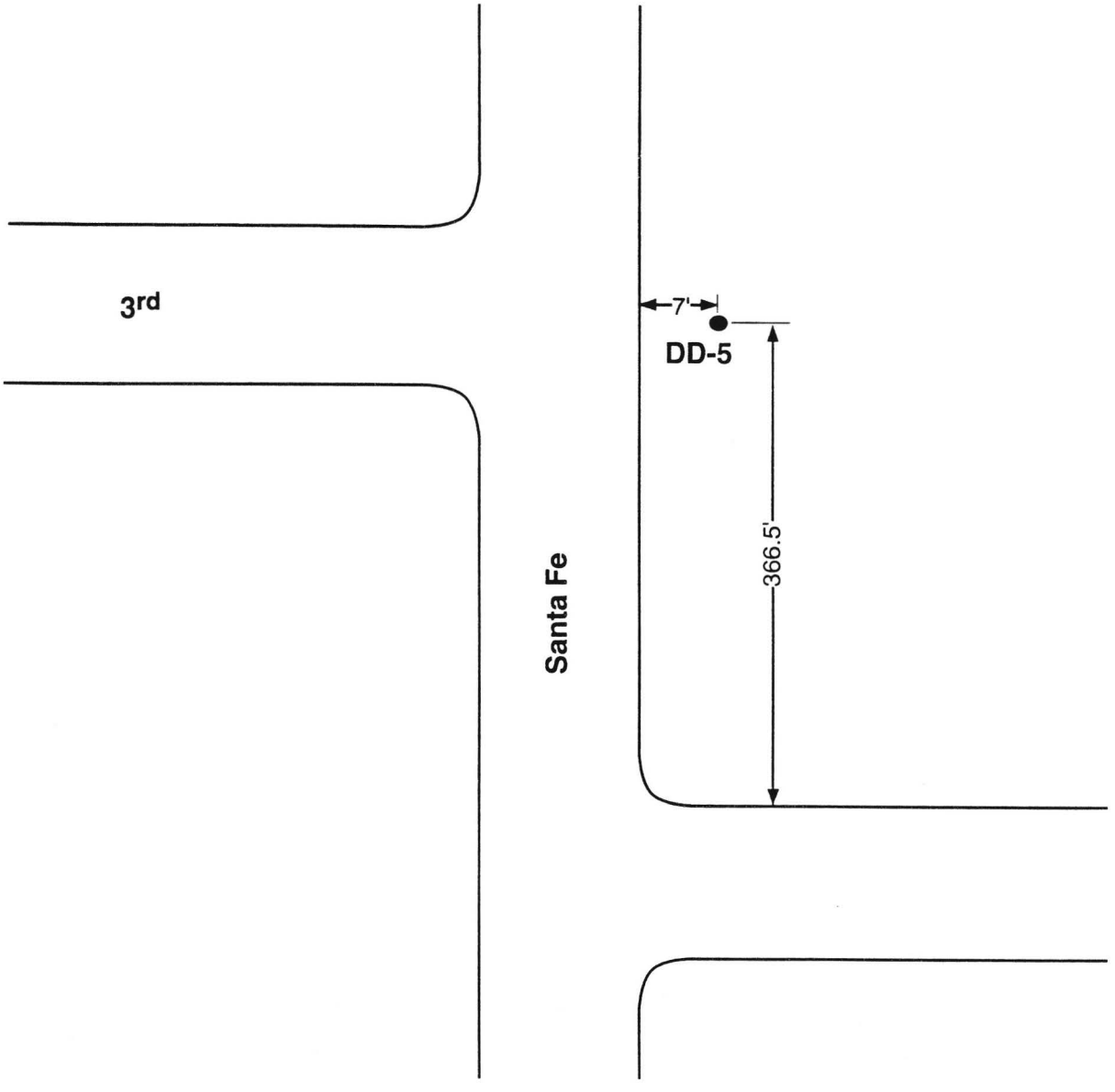
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-5	Sheet 2 of 2

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		SAND with SILT and GRAVEL; light olive brown, moist, medium dense, fine to coarse grained, gravel to 1-1/4", trace mica	SW-SM	Qya	4	B			3.0 [3.0] 9.6 [2.6]			
		decreased gravels										
		medium dense to loose, some subrounded gravel										
25		gravel to 1/4", trace mica			5	B			11.0 [2.5]		2	
		some gravel, trace cobbles							2.6 [2.5]			
		increased gravel							2.5 [2.4]			
30		12" cobbles, difficult drilling gravel to 2"			6	B			7.6 [2.5]			
		End of boring at 32.5 feet. No groundwater observed. Boring abandoned due to severe caving below 30 feet. Boring backfilled with cement-bentonite grout.										
35												
40												
45												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-5

10-95

Figure A-11

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN				
Project Number:	95-8347	Boring Number:	DD-6	Sheet 1 of 3	
Boring Location:	Jackson Street			Elevation and Datum(feet): 272.0	
Health and Safety:	Level D	Date Started: 6/28/95		Date Finished: 6/28/95	
Drilling Equipment:	Link Belt 180	Total Depth (feet): 69.0		Depth to Bedrock(feet): 63	
Drilling Method:	Impact	Number of Samples: 6		Depth to Water (feet): N/A	
Boring Diameter:	6.6 inches	Completion Information: Grouted to surface			
Hammer Information: AP-1000		Logged By: Jorge Sandoval		Checked By: Bill Lu	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		Closed end bit, ASPHALT		Qya			37	10				30:00
							18	8				
							6	4				
							0	0				
5							0	0				
							0	0				
							13	9				
							16	11				
							22	11				
		added rod at 9 feet					8	14				33:00 39:00
10							27	15				
							50	15				40:20
							66	17				41:05
							0	20				42:00
		blower on at 14 feet					0	21				43:00
15				Qya			0	23				44:10
							0	21				45:30
							0	22				46:45
							0	20				48:00
		added rod at 19 feet					97	22				54:00 55:05

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-6	Sheet 2 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
							105	22				56:45
							180	23				58:45
							262	24				00:40
							154	23				02:25
25							92	22				03:25
							82	30				04:00
							64	21				04:55
							305	24				08:10
							540	23				14:15
		added rod at 29 feet										23:00
30							325	24				26:25
							490	25				32:00
							630	25				39:00
							500	28				45:50
		pulled rods up 3.5 feet and reset rods at 33 feet					620	26				59:00
							333	27				02:40
35		? PERCH WATER TABLE		Qya			145	27				04:45
							127	27				06:15
							182	26				08:00
							235	29				10:40
		pulled rods up about 4 feet, and rod added at 39 feet										33:45
40							144	26				24:20
							110	27				25:35
							150	27				27:00
							134	27				28:30
							114	28				31:45
45		TOP OF TUNNEL					180	28				34:10
							218	27				
							152	28				35:50
							178	28				37:45
							112	27				39:00
		pulled rods up about 3 feet, rod added at 49 feet										52:15
							250	26				55:00

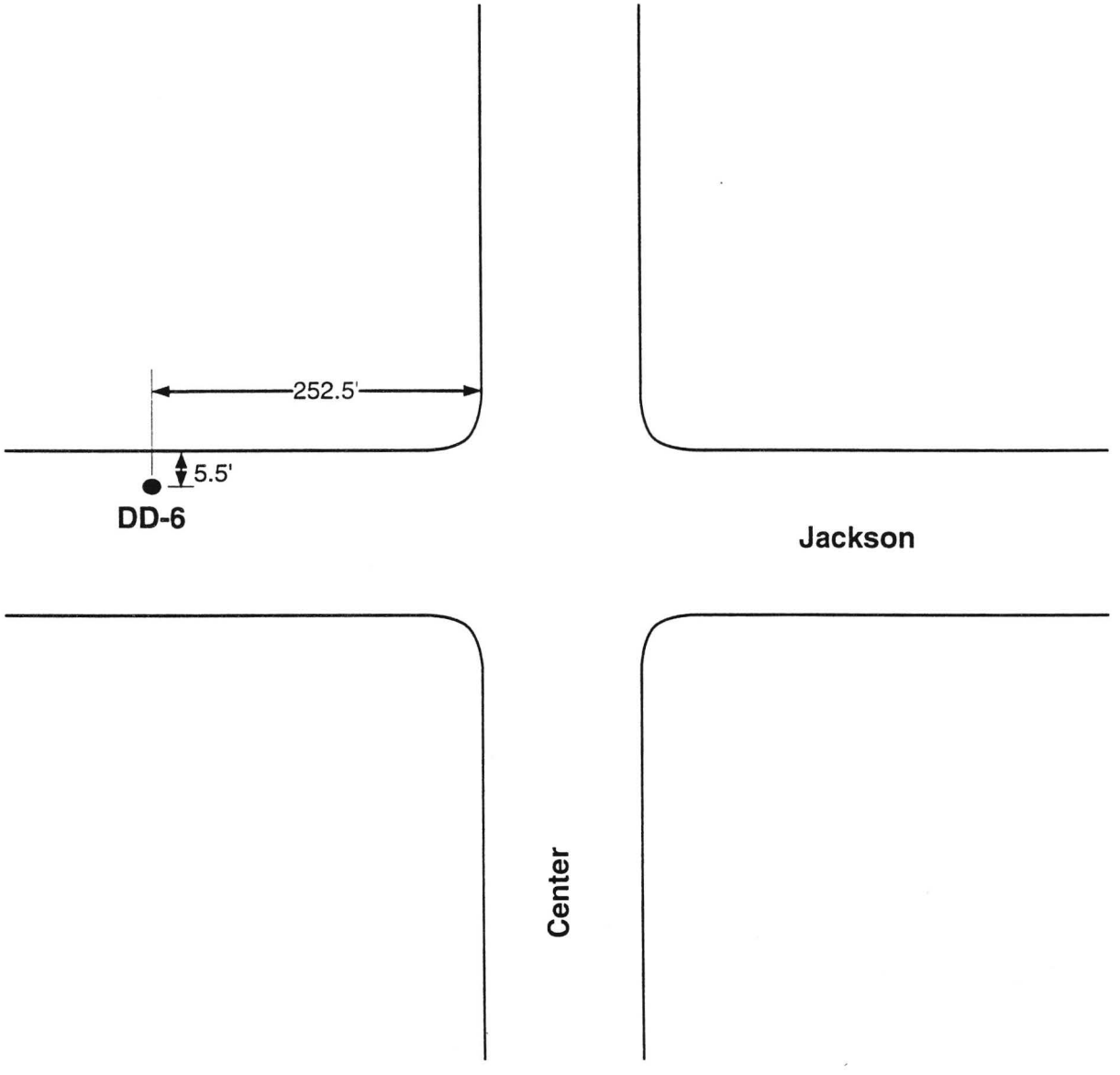
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-6	Sheet 3 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Becker Blow Count (no./12 inches)	Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
50												
							227	27				51:30
							235	27				00:00
							113	26				01:15
							438	28				06:00
55							457	28				11:00
				Qya			540	28				17:00
		switched from closed end bit to open end bit at 56 feet										40:15
							127	20				41:40
					1	B	80	21				42:30
		GRAVEL with SAND; gray, olive, wet, very dense, fine to coarse gravel from 1/4" to 1"	GW/GP				118	25				43:55
		rod added at 59 feet										52:10
60		cobbles to about 3-1/2" at 60 feet (GW)			2	B	82	23				53:00
							104	25				54:00
					3	B	83	22				55:00
		SAND; greenish gray, wet, very dense, fine to coarse grained, trace fine gravel to 1/2", trace cobbles to 3-1/2"	SP				66	20				55:45
			ML	Tf/Tp	4	B	65	17				56:30
		~~FERNANDO/PUENTE FORMATION~~ TUNNEL INVERT.										
		SILTSTONE; olive, moist, soft					45	20				57:00
65					5	B	47	19				57:30
							44	22				58:00
					6	B	43	23				58:30
							40	19				58:58
		At 69 feet, no air was possible to advance the drilling rods nor were soil cuttings retrieved. Drilling rods were pulled out then it was noted that the open end bit was clogged with approximately 6 feet of silt.			7	B						
70		Boring terminated at 69 feet.										
		Groundwater not measured due to caving at about 18 feet below ground surface.										
		~~Boring backfilled with cement-bentonite~~ grout.		BOTTOM OF TUNNEL								
75		Note: drilling time is presented as minutes and seconds (i.e. 58:58).										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-6

10-95

Figure A-12

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-7	Sheet 1 of 4
Boring Location:	Santa Fe/Banning	Elevation and Datum(feet): 269.0	
Health and Safety:	Level D	Date Started: 6/21/95	Date Finished: 6/21/95
Drilling Equipment:	Meyhew 1000	Total Depth (feet): 93.0	Depth to Bedrock(feet): 54
Drilling Method:	Mud Rotary	Number of Samples: 22	Depth to Water (feet): 41.3
Boring Diameter:	5 inches	Completion Information: Installed Piezometer	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: Greg Renfrew	Checked By: Grant Miller

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL GRAVEL with SILT and SAND; grayish brown to yellowish brown, dry to moist, loose, fine gravel, subangular silt at 2 feet to 2.5 feet	GM									
5		SANDY SILT; olive brown, moist, nonplastic silt soft, fine sand, trace mica	ML		1	S	1 2 3	12/18	6.8 [3.6]			
		ALLUVIUM SAND; yellowish brown, dry to moist, loose, fine to medium sand, scattered fine gravel, some mica	SP	Qya								
10		SAND with SILT and GRAVEL/GRAVEL with SAND; yellowish brown, moist, loose, fine to medium grained, trace coarse sand, subangular to angular gravel to 1-1/2", trace silt	SP-SM /GP		2	D	6 9	9/12	3.9 [3.8]	100	22	
15		SAND; light olive brown, moist, dense, fine to coarse sand, fine gravel to 3/8", trace mica	SW		3	S	7 15 18	11/18	7.2 [3.4]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-7	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; light olive brown, wet, medium dense, fine to coarse sand, coarse gravel to 1", trace silt	SW-SM /GP-GM	Qya	4	D	12 31	7/12	50.0 [3.8]	110	13	
25		gravel to 3/4", trace silt			5	S	17 32 40	12/18	7.0 [3.2]			
		SAND; pale yellow, dry, very dense, fine to medium grained, laminated	SP									
		[rig chatter]										
		GRAVEL with SILT and SAND/SAND with SILT and GRAVEL; olive brown, moist, very dense, fine to coarse sand, gravel to 1", trace decomposed granitic clasts, trace mica, subrounded gravel to 1/2", cobble to about 4", 1" gravel at 29.5 feet	GP-GM /SP-SM									
30					6	D	41 60/5"	8/11	5.9 [4.0]	129	11	
		cobbles to about 4" at 33 feet										
35					7	S	75	4/6	6.2 [3.4]			
		cobbles 4" to 6" at 39 feet fine to medium reddish yellow sand, gravel to 3" at 39.5 feet										
40		gray, very dense, fine grained sand (SP-SM), trace gravel to 1-1/2"			8	D	75 80/2"	0/8	17.0 [4.0]		14	
		GRAVEL with SILT and SAND; gray, wet, very dense, fine to coarse sand, subangular gravel to 2-1/2", strong sulfur odor	GP-GM									
45					9	S	22 43 38	12/18	66.0 [3.6]		6	

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-7

Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTY GRAVEL with SAND; fine grained, pockets of silt	GM	Qya	10	D	65 50/1"	7/7	5.5 [4.2]	126	11	
		TOP OF TUNNEL										
		4" cobble at 54 feet										
55		**FERNANDO/PUENTE FORMATION** SILTSTONE; ~~dark greenish gray~~, soft, fresh, laminated, average low angle bedding, calcareous, abundant 1/16" white fossiliferous, subangular gravel clasts, trace of fine sand, embedded near bedrock surface, high plasticity	ML	Tf/Tp	11	S	11 23 26	18/18	12.0 [3.8]			
		pitcher sample at 57 feet contains cemented sandstone, light gray, dry, moderately hard, fine sand, calcareous, fresh			12	P		14/36	8.0 [4.9]			
60					13	P		21/36	5.0 [4.9]			
		[some rig chatter for the last 12"]			14	P		19/36	5.0 [4.9]	103	24	
65					15	P		19/36	7.0 [4.8]			
					16	P		20/36	5.0 [4.8]			
70		TUNNEL INVERT										
					17	P		16.5/36	5.0 [4.8]	101	25	
75		layer of SILTSTONE-CLAYSTONE (MH-CH) from 75 to 78 feet			18	P		29/36	4.9 [6.8]			
					19	P		22.8/36	5.0 [6.9]			

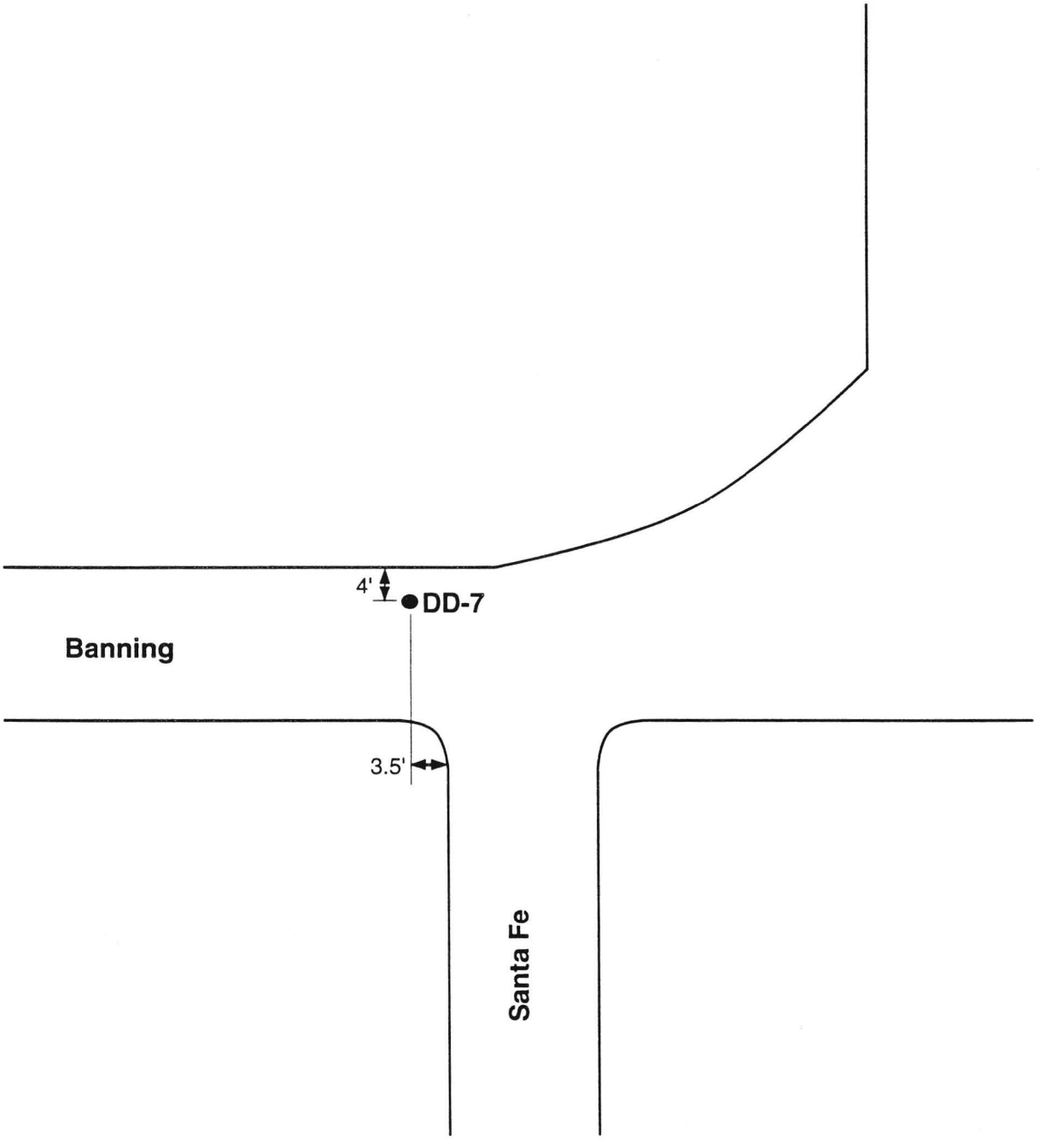
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-7	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content(%)	Drilling Time
		SILTSTONE, as above	ML	Tf/Tp								
		CLAYSTONE; dark olive gray, moist, soft, medium plasticity	CH		20	P		30/36	5.0 [4.9]	98	28	
85					21	P		32/36	5.0 [4.8]			
		SILTSTONE; dark olive gray, moist, soft, low plasticity	ML		22	P		36/36	4.9 [4.9]			
90												
		End of boring at 93 feet. Groundwater measured on 9/22/1995 at 41.3 feet below surface.										
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

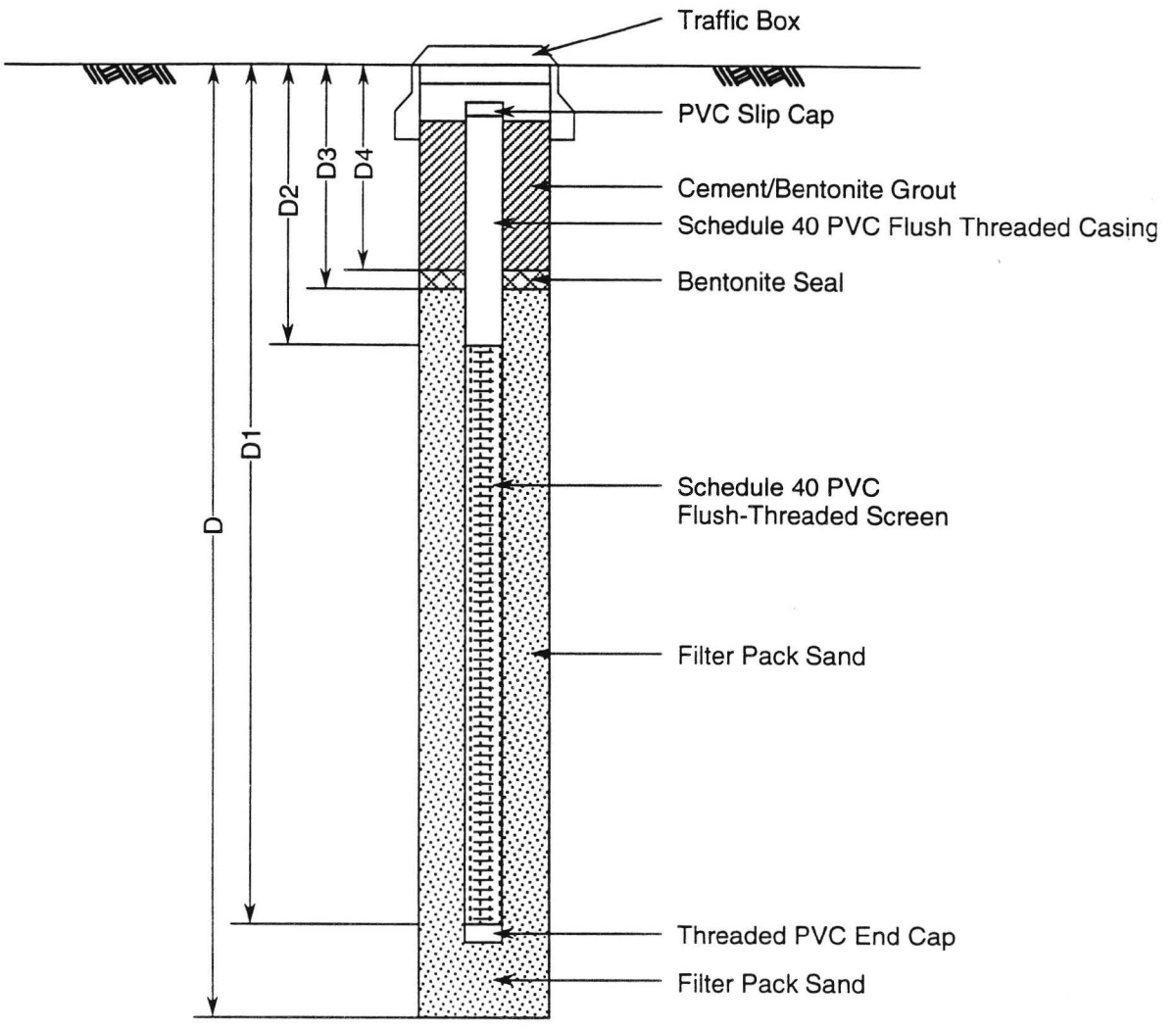
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-7

10-95

Figure A-13A



Total Depth (D)	=	93	Feet
Total Depth of Casing (D1)	=	90	Feet
Depth to Top of Well Screen (D2)	=	25	Feet
Depth to Bottom of Top Seal (D3)	=	23	Feet
Depth to Top of Top Seal (D4)	=	20	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

GeoTransit Consultants

Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic DD-7

8-95

Figure A-13B

GeoTransit Consultants

Project Name:	**METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN**		
Project Number:	**95-8347**	Boring Number: **DD-9**	Sheet **1** of **4**
Boring Location:	**Santa Fe/1st Street**	Elevation and Datum(feet): **266.0**	
Health and Safety:	**Level D**	Date Started: **6/22/95**	Date Finished: **6/23/95**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **93.0**	Depth to Bedrock(feet): **59.8**
Drilling Method:	**Mud Rotary**	Number of Samples: **24**	Depth to Water (feet): **54.7**
Boring Diameter:	**6 inches**	Completion Information: **Installed piezometer**	
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop** **Downhole Hammer: 400-lb and 18-inch drop**		Logged By: **Greg Renfrew**	Checked By: **Grant Miller**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL SILT; yellowish brown, moist, mediun stiff, trace medium sand, concrete and brick fragments	ML									
5		**ALLUVIUM** SAND with SILT and GRAVEL; brown, moist, medium dense, fine to medium sand, fine subangular to angular gravel to 1"	SP-SM	Qya	1	S	4 8 6	9/18	110.0 [6.8]			
10		SAND with SILT and GRAVEL; yellowish brown, moist, medium dense, fine to coarse sand, fine to coarse subangular gravel to 1-3/4"	SW-SM		2	D	15 21	9/12	16.5 [3.2]	124	7	
15		GRAVEL with SILT and SAND; yellowish brown, moist, medium dense, fine to coarse gravel to 1", fine to coarse sand, trace silt	GP-GM		3	S	4 15 15	6/18	8.5 [6.8]			
		dense, fine to medium sand, trace coarse sand, coarse gravel, trace mica										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-9	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND as above	GP-GM	Qya	4	D	25 35	9/12	8.3 [3.2]	108	14	
25		moist, very dense, gravel to 1", fine to coarse grained sand, trace mica			5	S	28 35/2"	7/8	5.0 [4.9]			
30		SAND; light olive brown, moist, dense, fine to coarse sand, some gravel to 3/8", trace mica gravels from 3/4" to about 2"	SP		6	D	26 37	9/12	5.0 [4.4]	115	12	
35		SAND with SILT and GRAVEL; olive brown, moist, very dense, fine to coarse sand, gravel to 3/4", trace silt and mica	SP-SM		7	S	65 35/1"	5/7	4.8 [4.5]			
		[strong rig chatter] GRAVEL with SILT and SAND; yellowish brown, moist, very dense, mostly fine to coarse gravel, and cobbles to about 6", some fine to coarse sand, cobbles to 6" at 37 feet	GW-GM									
40						D	100/2"	0/2				
		[strong rig chatter] silt about 1" thick at 44 feet	GC/SC									
45		CLAYEY GRAVEL with SAND/CLAYEY SAND with GRAVEL; olive gray with rusty stains, moist, very dense, very fine sand, trace mica, decomposed granitic clasts			8	D	100	5/6	5.0 [4.5]	107	17	
		SILTY GRAVEL with SAND/SILTY SAND with GRAVEL; yellow brown, very dense, fine to coarse sand, gravel to 1", 2-1/2" clast in shoe	GM/SM		9	D	100/4"	4/4	6.8 [4.5]		18	

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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number:	DD-9

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		[strong rig catter] yellowish brown, moist, very dense, fine to coarse sand, some gravel to 1/2", trace mica	GM/SM	Qya	10	S	100/4"	3.5/4	4.4 [4.2]			
		[strong rig chatter] cobbles to 6" in size at 51 feet										
		2" silt layer at 53.5 feet										
55		olive gray, fine to medium sand (SP-SM) at 55 feet, some coarse sand, trace gravel to 1", trace silt and mica			11	D	100/4"	4/4	16.0 [4.2]	120	11	
		silty sand (SM) at 59 feet			12	S	19 16 25	18/18	18.0 [4.2]			
60		**FERNANDO/PUENTE FORMATION** SILTSTONE; dark greenish gray, moist, soft, fresh, laminated, variable bedding, little fine sand, micro lenses of white sand, trace angular gravel to 5/8"	ML	Tf/Tp	13	D	16 27	12/12	16.0 [2.7]	94	29	
					14	S	10 19 22	18/18	28.0 [2.8]			
					15	P		29.8 /36	88.0 [2.3]	101	25	
65		weak reaction to HCL, trace of fossil fragments, medium to high plasticity			16	D	19 24	?/12	84.0 [2.2]	101	25	
					17	S	10 20 23	?/18	80.0 [2.3]			
		near vertical tight fracture with pale green surface, low angle bedding			18	P		35/36	72.0 [2.9]			
70		CLAYSTONE; dark olive gray, moist, soft	CH		19	P		28.8 /36	100.0 [5.8]	97	28	
75		SILTSTONE; dark olive gray, moist, soft	ML		20	P		34.8 /36	74.0 [5.6]			
					21	P		30.5 /36	180.0 [5.6]			

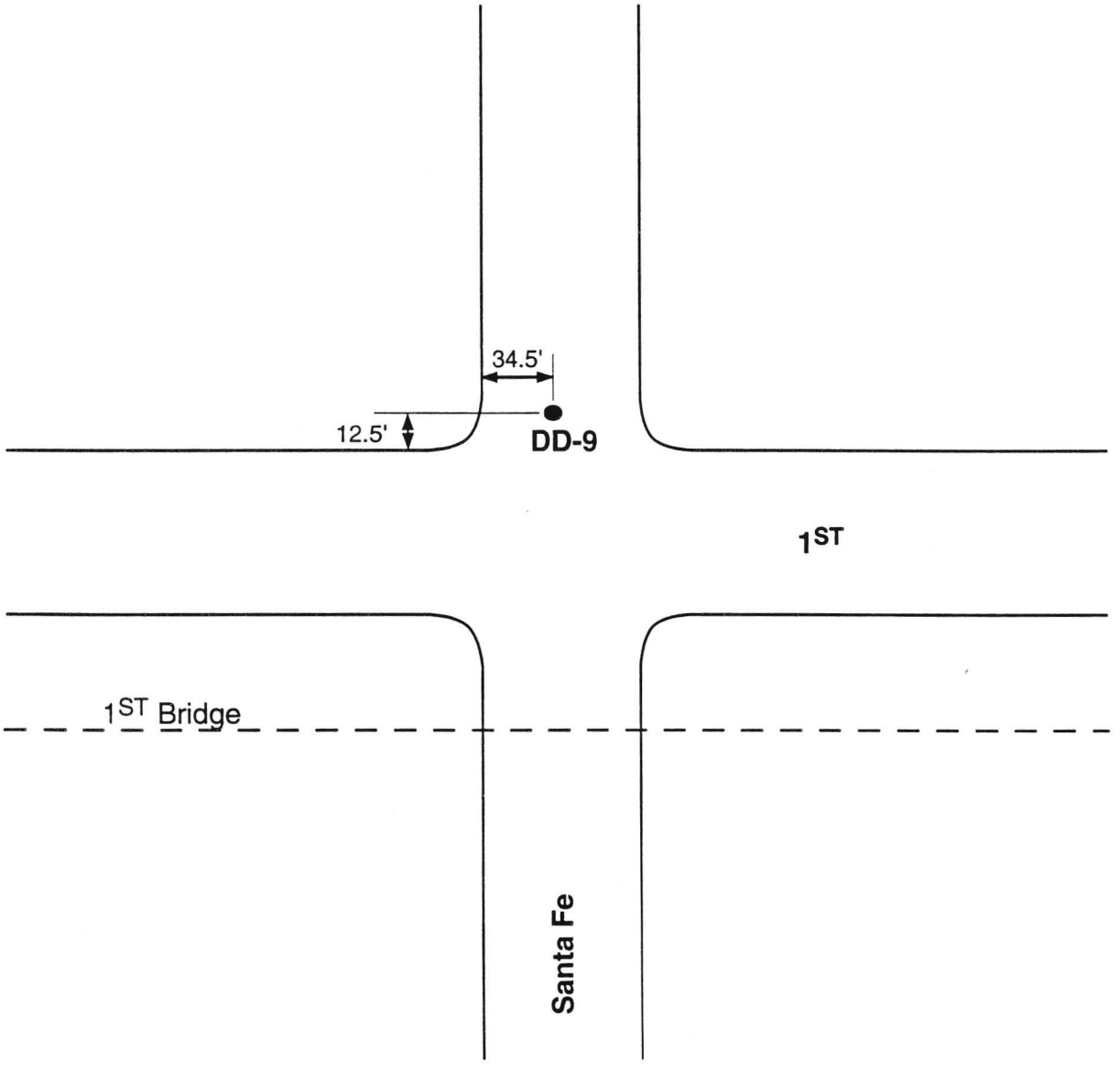
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-9	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		high angle bedding in sample at 80 feet	ML	Tf/Tp	22	P		26.5 /36	40.0 [5.5]			
					23	P		35/36	180.0 [5.5]	97	26	
85		some fine sand in siltstone, low angle bedding			24	P		19.5 /36	27.0 [5.5]			
		end of sampler contains blocky sandstone fragment and rounded 1/2" quartz clast										
90												
		End of boring at 93 feet. Groundwater measured on 9/22/95 at 54.7 feet below surface.										
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

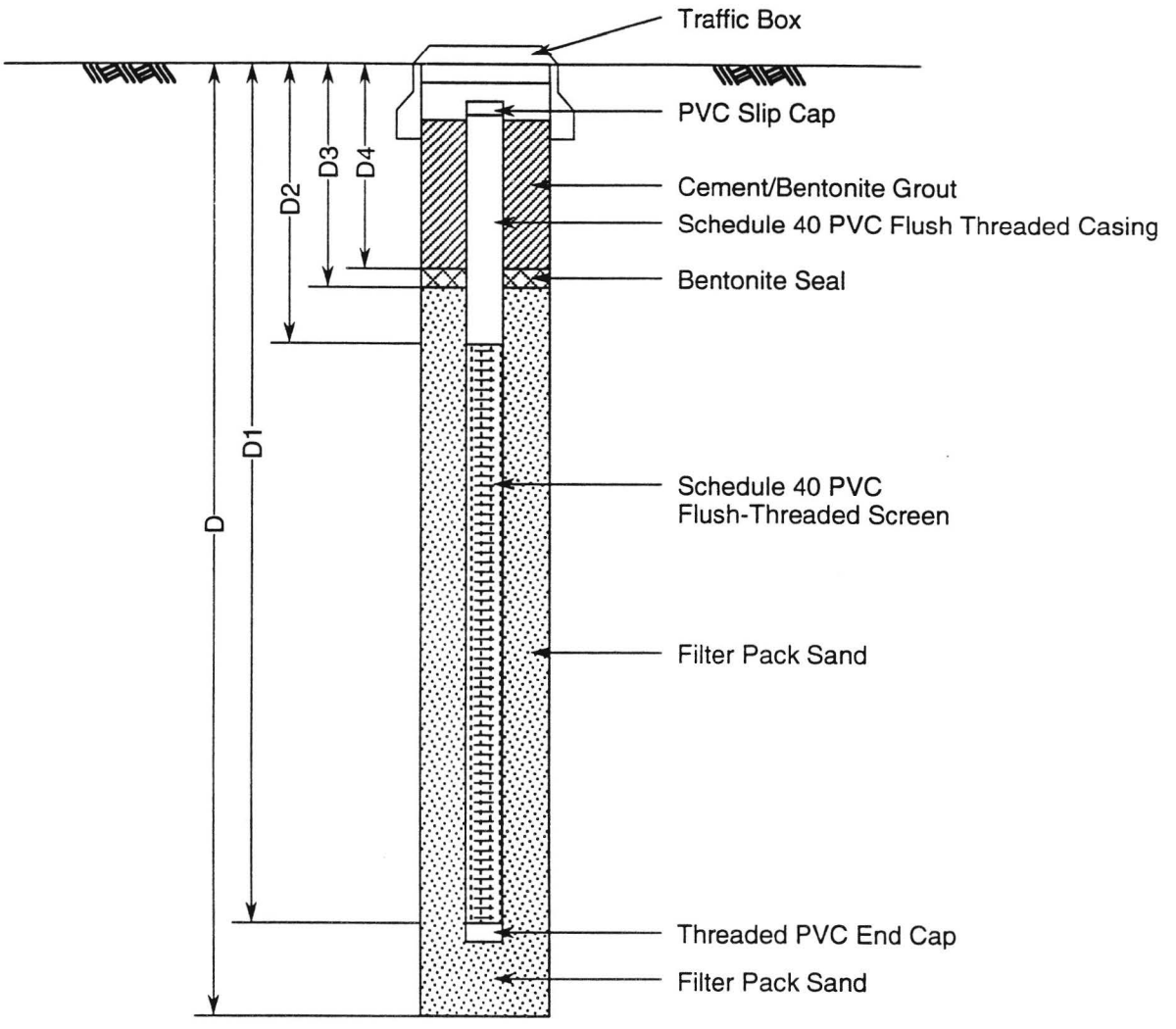
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-9

10-95

Figure A-14A



Total Depth (D)	=	93	Feet
Total Depth of Casing (D1)	=	90	Feet
Depth to Top of Well Screen (D2)	=	30	Feet
Depth to Bottom of Top Seal (D3)	=	28	Feet
Depth to Top of Top Seal (D4)	=	25	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
DD-9

8-95

Figure A-14B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN				
Project Number:	95-8347	Boring Number:	DD-10	Sheet 1 of 4	
Boring Location:	Santa Fe			Elevation and Datum(feet): 266.0	
Health and Safety:	Level D	Date Started: 6/23/95		Date Finished: 6/23/95	
Drilling Equipment:	Midway 13	Total Depth (feet): 92.5		Depth to Bedrock(feet): N/A	
Drilling Method:	Mud Rotary	Number of Samples: 20		Depth to Water (feet): 74.9	
Boring Diameter:	4 7/8"	Completion Information: Installed piezometer			
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval		Checked By: Grant Miller	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL SILTY SAND; olive brown, moist, medium dense, fine to medium grained, micaceous	SM									
5					1	S	3 5 6	10/18	4.7 [3.2]			
		ALLUVIUM SAND with GRAVEL; light olive brown, moist, fine to coarse grained, fine subangular gravel to 1/2"	SP	Qya	2	D	4 11	4/12	96.0 [3.2]			
10		SILTY SAND/SAND; light olive brown, moist, loose to medium dense, fine to medium grained, trace mica	SM/SP		3	D	6 9	4/12	4.7 [3.2]	93	26	
15		SAND with GRAVEL; light brown, moist, very dense, fine to coarse grained, trace fine gravel to 3/4"	SP		4	S	16 48 36	2/18	4.8 [3.2]			
		[rig chatter at 17 feet]										
		fine gravel to 1-1/2"										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-10	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with GRAVEL; olive, moist, medium dense, fine to coarse grained sand	SP	Qya	5	D	9 31	4/12	3.8 [3.6]	125	11	
25		SAND with SILT and GRAVEL; light olive brown, moist, dense, fine to coarse grained, trace fine subangular gravel to 1/2", trace mica	SP-SM		6	S	12 27 18	9/18	4.4 [3.5]			
		layer of CLAYEY SAND (SC) from 28 to 30 feet; light brownish gray, moist to wet, medium dense, medium plasticity, stratified reddish brown stains			7	D	8 6	4/12	5.8 [3.5]	107	14	
30		[rig chatter at 30 feet]	GP-GM		8	S	16 84	8/12	9.6 [4.8]			
		GRAVEL with SILT and SAND; light olive brown, moist, very dense, fine to coarse grained, some fines, gravel to 1", cobbles of about 6" to 7" at 30 feet [rig chatter at 33 feet, small boulder to about 1 feet] [rig chatter at 34 and 35 feet]										
35		SAND with SILT and GRAVEL; olive brown, moist, very dense, fine to medium grained, medium to coarse gravel to 3/4" [rig chatter at 37 feet]	SW-SM		9	D	21 109	5/12	8.9 [4.6]	129	9	
40		SAND; very dark gray, wet, very dense, fine to medium grained, trace fine gravel to 1/2", hydrocarbon odor [rig chatter from 41 to 44 feet]	SP-SM		10	S	28 58	11/12	90.0 [4.6]			
		GRAVEL with SAND; very dark gray, wet, very dense, fine to medium grained, fine to coarse gravel to 1-1/2", hydrocarbon odor	GW									
45		lost mud circulation at 47 feet [rig chatter from 48 to 50 feet]			11	D	28 50	6/12	460.0 [5.5]	115	8	

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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-10	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND as above	GW	Qya	12	S	6 50 44/4"	0/16				
		highly disturbed sample, not representative, material from caving, medium dense, coarse gravel to 3/4", clast of decomposed granite to 3.5", hydrocarbon odor			13	D	8 6	5/12	15.0 [7.2]			
55		[rig chatter from 55 to 59.5 feet]										
60		SILTY SAND; gray, wet, very dense, fine to medium grained	SM		14	S	60 40/2"	5/8	9.3 [6.5]			
		CLAYEY SAND with GRAVEL; dark olive brown, wet, hard, medium plasticity, fine gravel to 1/4"	SC									
65		[rig chatter at 64 feet]			15	D	20 35 50	8/18	12.0 [6.4]	115	13	
		SILTY SAND; olive gray with olive brown, mottled, wet, very dense, fine to coarse grained, trace fine gravel to 1/2"	SM									
70		light gray, fine to medium grained			16	S	35 70	11/12	18.0 [7.1]		15	
75		SAND with SILT; dark gray, moist, very dense, fine to coarse grained, dark gray, gravel to 3/4"	SP-SM		17	D	61 89/3"	5/9	18.0 [7.2]	122	10	

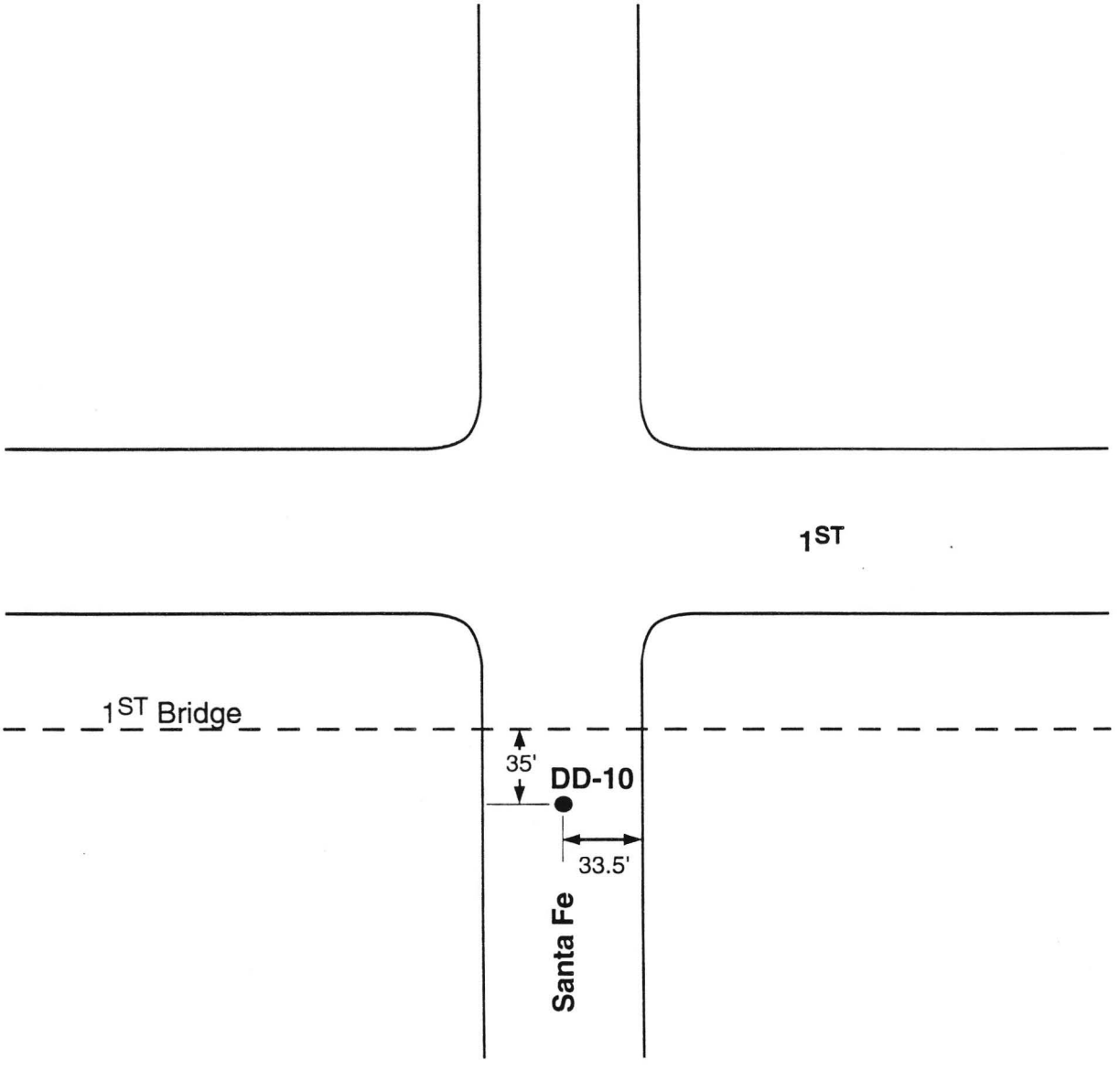
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-10	Sheet 4 of 4

Depth (feet)	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
	SILTY SAND; light olive gray, moist, very dense, fine to medium grained, trace of coarse sand, some fine gravel to 1/2", low plasticity fines	SM	Qya	18	S	72 28/2"	6.5/8	16.0 [8.2]			
	SILTY SAND with GRAVEL; light olive gray, wet, very dense, fine gravel, strong rig chatter from 82 to 84 feet (gravelly, cobbly?)	SM									
85				19	D	150/5"	4/5	13.0 [7.0]		11	
	dense gravel at 89 feet										
	SAND with SILT and GRAVEL; dark olive gray with olive brown, mottled, wet, very dense, fine to medium sand, trace of coarse sand, some fine gravel to 1/2" in size, trace of coarse gravel to 2" in size	SP-SM									
90	very hard to drive sampler then drilled 2 feet down			20	D	150	3/6	16.0 [6.0]	103	15	
	[chatter at 91 feet]										
	End of boring at 92.5 feet. Groundwater measured on 9/22/95 at 74.9 feet below surface.										
95											
100											
105											

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

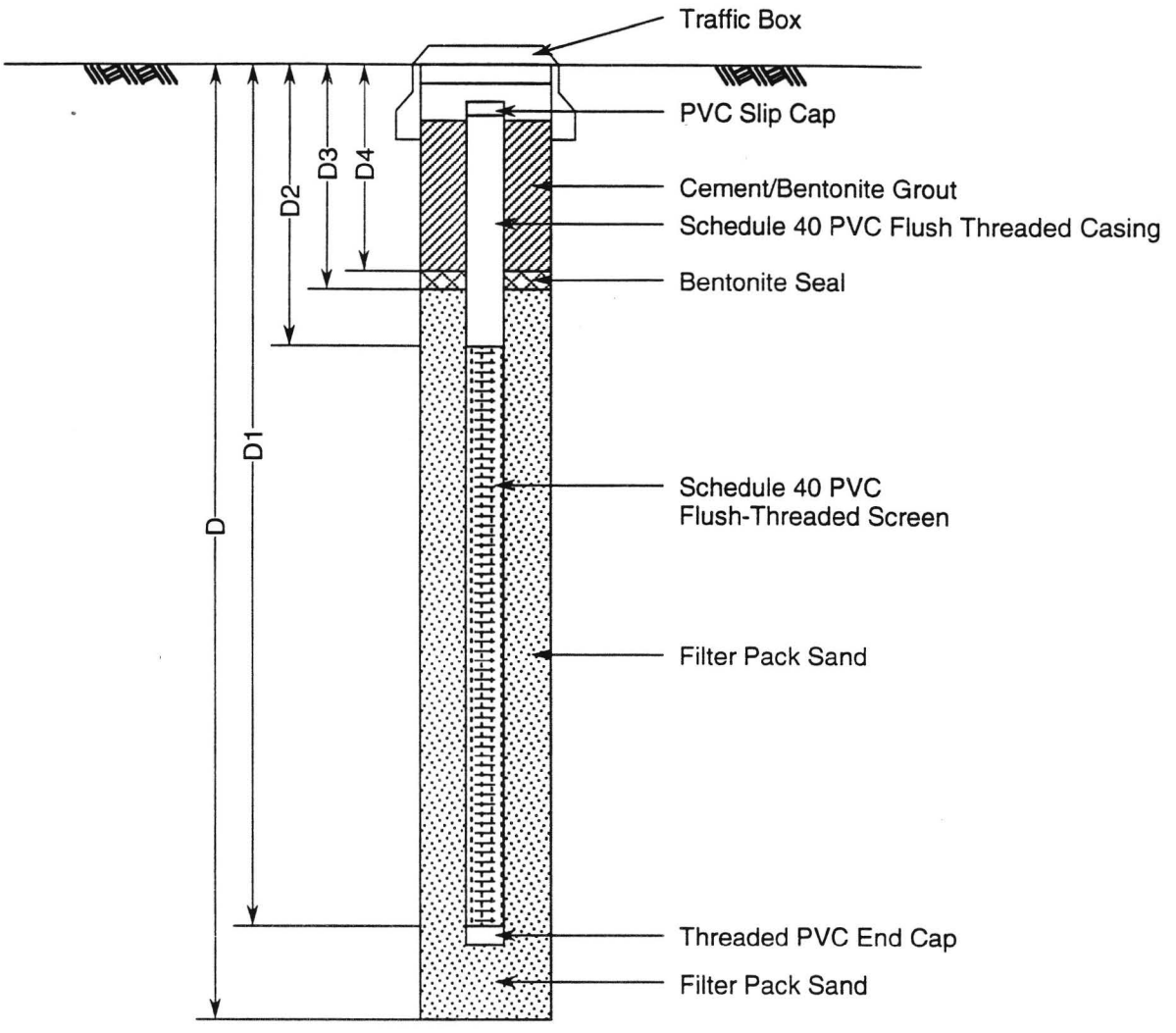
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-10

10-95

Figure A-15A



Total Depth (D)	=	92.5	Feet
Total Depth of Casing (D1)	=	85	Feet
Depth to Top of Well Screen (D2)	=	25	Feet
Depth to Bottom of Top Seal (D3)	=	23.7	Feet
Depth to Top of Top Seal (D4)	=	19	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
DD-10

8-95

Figure A-15B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-12	Sheet 1 of 4
Boring Location:	Santa Fe Ave. near 1st St.	Elevation and Datum(feet): 267.0	
Health and Safety:	Level D	Date Started: 6/22/95	Date Finished: 6/22/95
Drilling Equipment:	Midway 13	Total Depth (feet): 86.0	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 22	Depth to Water (feet): N/A
Boring Diameter:	4 7/8"	Completion Information: Installed piezometer	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Grant Miller

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL SANDY SILT; dark brown, moist, firm, fine sand, micaceous, low plasticity	ML									
		[rig chatter at 4 feet]										
5					1	S	1 2 3	9/18	0.6 [0.0]			
		ALLUVIUM SILTY SAND; dark yellowish brown, moist, loose, fine sand with trace medium to coarse sand, trace mica	SM	Qya	2	D	1 2	10/12				
10		SAND; light brown, moist, loose, fine to coarse grained, trace fine gravel, mica	SP		3	D	3 8	11/12	0.0 [0.0]	102	19	
		[rig chatter at 14.5 feet, gravel?]										
15		light olive brown, very dense, trace gravel to 1"			4	S	12 26 26	10/18	1.0 [0.2]			
		[rig chatter at 19 feet, fine gravel from cuttings]										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-12	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with GRAVEL; light brown, moist, medium dense, fine to coarse grained, fine to coarse gravel to 1/2"	SW	Qya	5	D	6 12	3/12	0.4 [0.8]	114	14	
25		fragments of coarse gravel, very dense			6	S	20 47 45	3/18	0.6 [0.2]			
		GRAVEL; yellowish brown, moist, very dense, coarse gravel to 1-1/2", trace medium to coarse sand	GP									
30					7	D	5 22	0/12	1.0 [0.2]		4	
		SAND; olive brown, moist, very dense, fine to coarse grained, trace fine gravel to 1/2", some decomposed granitic clasts	SP									
35		[rig chatter at 36 feet, gravel?]			8	D	31 100/3"	6/9	0.7 [0.2]			
		GRAVEL with SAND; light olive brown, moist, very dense, fine gravel to 3/4", fine to coarse grained sand, decomposed granitic clasts	GP		9	D	35 150/5"	6/11	0.4 0.3			
40		light olive brown, moist, very dense, fine to coarse grained, fine gravel to 1/2", some silty sand (SM), micaceous olive brown, fine to medium grained, trace coarse sand, some gravel to 3/8", trace dark colored decomposed granitic clasts cobble of above 6" to 8" at 42 feet			10	D	50 75	6/12	0.4 [0.2]	134	5	
45		SILTY SAND with GRAVEL; light olive brown, moist, very dense, fine to coarse grained, fine gravel to 1/2"	SM		11	S	70 30/2"	4/8	0.3 [0.3]			
		GRAVEL with SILT and SAND; olive brown, moist, very dense, coarse gravel to 1"	GP-GM		12	D	44 106	4/12	0.4 [0.3]		6	

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-12	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND as above, fragments of decomposed granitic clasts, trace silt, trace mica [rig chatter at 52]	GP-GM	Qya								
55		SILTY SAND; light olive brown, moist, dense, fine grained, trace fine gravel	SM		13	D	30 36	8/12	0.4 [0.2]			
		SILTY SAND with GRAVEL; light olive brown, moist, very dense, fine to medium grained, trace fine gravel, micaceous	SM		14	D	32 58	12/12	0.3 [0.3]	114	18	
60					15	S	60/2"	2/2	1.0 [0.0]			
		SAND with SILT; light olive brown, moist, very dense, fine to medium grained, trace coarse sand trace fine gravel, micaceous	SP-SM		16	S	53 50/4"	8/10	0.0 [0.0]		17	
65					17	D	27 28	10/12	0.2 [0.2]	108	16	
		SAND with SILT and GRAVEL; light olive brown, moist, fine to coarse grained, trace gravel to 3/4"	SP-SM		18	S	100/4"	3/4	1.2 [0.0]			
70		SAND with GRAVEL; light olive brown, fine to medium grained, gravels to 1-1/2" in size	SP		19	D	88 62/5"	10/11	0.2 [0.0]	128	8	
75		SILTY SAND/SAND; yellowish brown, moist, very dense, fine to medium grained, some gravels, fragments of reddish brown metamorphic rock clasts	SM/SP		20	S	100/3"	3/3	0.7 [0.0]			

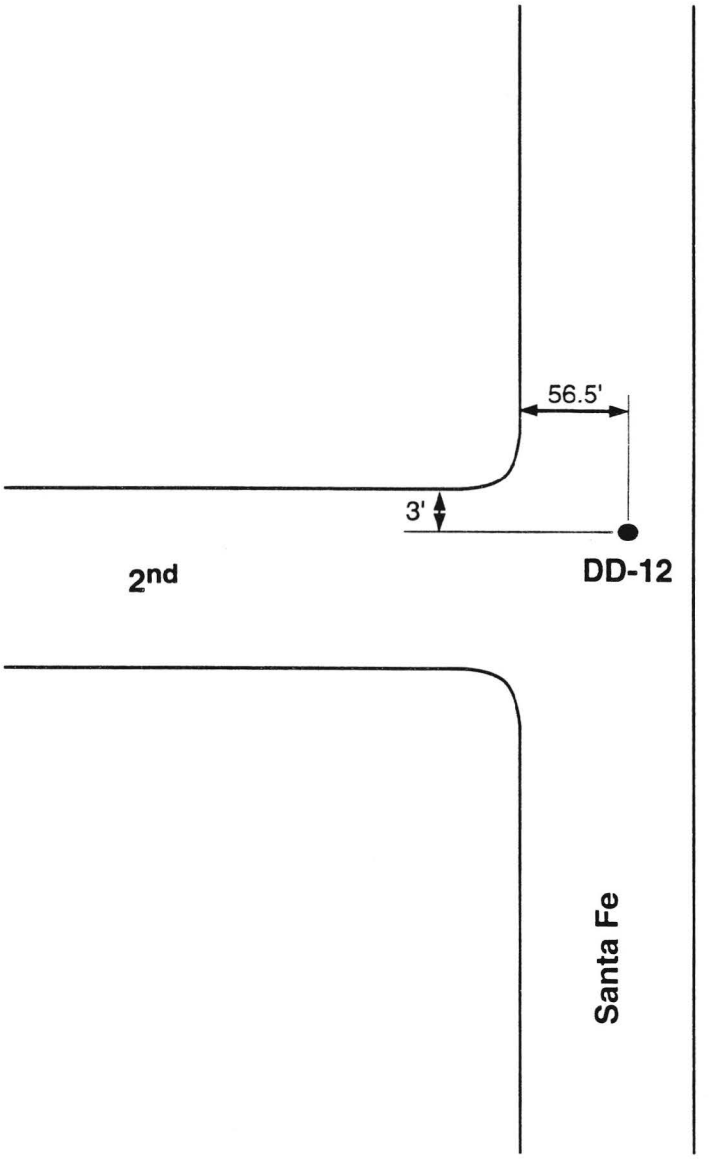
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-12	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND; light olive brown, wet, very dense, fine to medium grained sand, coarse gravel to 1-1/2"	GP-GM	Qya	21	D	150	4/6	0.0 [0.0]	124	12	
85		SAND; olive, wet, very dense, fine to coarse grained	SP		22	D	60 90/1"	5.5/7	0.4 [0.0]			
		End of boring at 85.5 feet. No groundwater encountered on 9/22/95.										
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

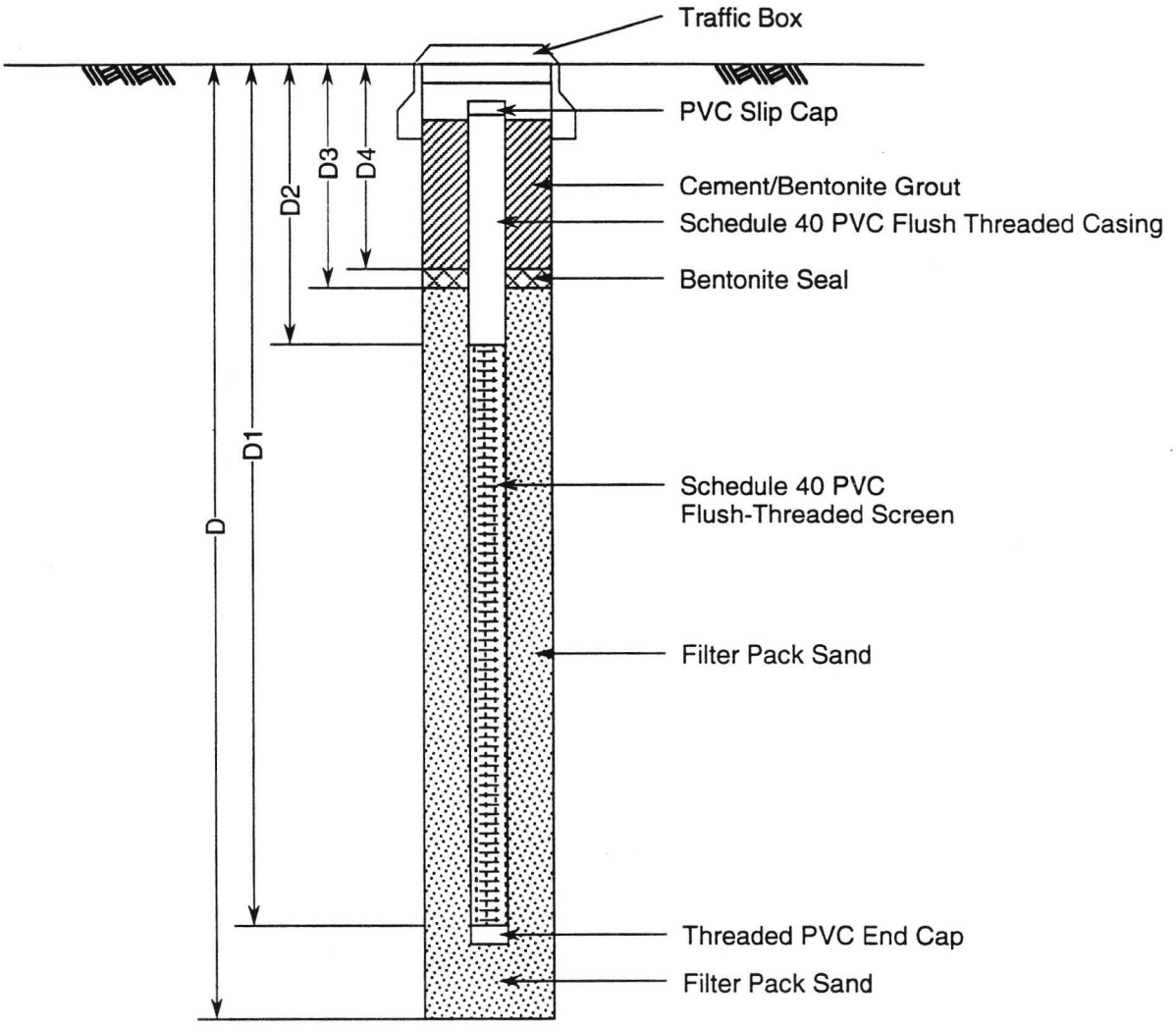
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-12

10-95

Figure A-16A



Total Depth (D)	=	86	Feet
Total Depth of Casing (D1)	=	84	Feet
Depth to Top of Well Screen (D2)	=	24	Feet
Depth to Bottom of Top Seal (D3)	=	22	Feet
Depth to Top of Top Seal (D4)	=	18	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic DD-12

8-95

Figure A-16B

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-65	Sheet 1 of 3
Boring Location:	Center St, West of 101 Fwy	Elevation and Datum(feet): 275.0	
Health and Safety:	Level D	Date Started: 12/8/95	Date Finished: 12/8/95
Drilling Equipment:	Mayhew 1000	Total Depth (feet): 75.0	Depth to Bedrock(feet): N/A
Drilling Method:	Rotary Wash	Number of Samples: 27	Depth to Water (feet): N/A
Boring Diameter:	6"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: R. Jie	Checked By: K. Kabilamany

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		1' Asphalt		af								06:40
		ALLUVIUM GRAVEL with SAND; brown, very dense, subangular gravel to 2-1/2" in size, fine to coarse grained sand	GP	Qya								
5		[rig chatter]							7.0 [7.0]			07:10
		2' thick layer of cobble to 5" in size, [heavy rig chatter]										
		SAND; light brown, wet, very dense, fine to medium grained, trace coarse grained, trace fine gravel	SP									
10					1	D	33 90	8/12	7.0 [7.0]	104	10	07:20
15		subangular to subrounded fine gravel to 3/4" in size, trace oxidation [rig chatter], increased gravel content			2	S	16 33 55	18/18	7.0 [7.0]			07:36
		yellowish brown			3	D	81 69/2"	6/8	7.0 [7.0]	117	11	07:54

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-65	Sheet 2 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT; gray, wet, very dense, fine to medium grained, trace coarse grained, nonplastic silt, trace subrounded gravel to 1/2" in size [heavy rig chatter]	SW-SM	Qya	4	S	42 64/3"	5/9	8.0 [7.0]			08:07
		GRAVEL with SAND; gray, wet, very dense, subrounded gravel to 2-1/2" in size, fine to coarse grained sand, trace silt	GP		5	D	150/4.5"	12/4.5	13.0 [7.0]			08:23
25		1' thick layer of cobble to 6" in size										
		very dark gray, subrounded to subangular gravel to 1" in size [rig chatter]			6	S	72 28/.5"	3/6.5	19.0 [6.0]			08:47
30		gravel to 1-1/2" in size			7	D	140 10/.5"	4/6.5	7.0 [6.0]			09:08
		[heavy rig chatter]			8	E	110	5/6				09:09
					9	SPT	100/4.5"	1/4.5	8.0 [6.0]			09:26
35		[rig chatter] lost some circulation 1' thick layer of cobble to 6" in size										
		decreased sand content, GRAVEL; dark gray, subrounded to subangular gravel to 2-1/2" in size, trace silt			10	D	131 19/1"	5/7	10.0 [7.0]	130	9	10:33
					11	E	110	5/6				10:44
40		1' thick layer of cobble to 3-1/2" in size, [heavy rig chatter]										
		SAND with GRAVEL; dark gray, wet, very dense, fine to coarse grained, subrounded to subangular gravel to 1-1/2" in size, trace silt	SP		12	S	34 54 46/5"	14/17	22.0 [7.0]			11:04
		[occasional rig chatter] trace subangular gravel to 3/8" in size, trace mica, moderate odor			13	D	131 19/1"	5/7	76.0 [7.0]	116	11	11:20
					14	E	90	1/6				11:29
45		reduced gravel content, SAND with SILT [rig chatter], slight odor	SP-SM		15	S	38 62/3"	7/9	9.0 [7.0]			11:44
		GRAVEL/SAND; dark gray, wet, very dense, fine to coarse grained sand	GP									
		see next page	SP		16	D	133 17/1"	4/7	43.0 [7.0]	111	19	12:01

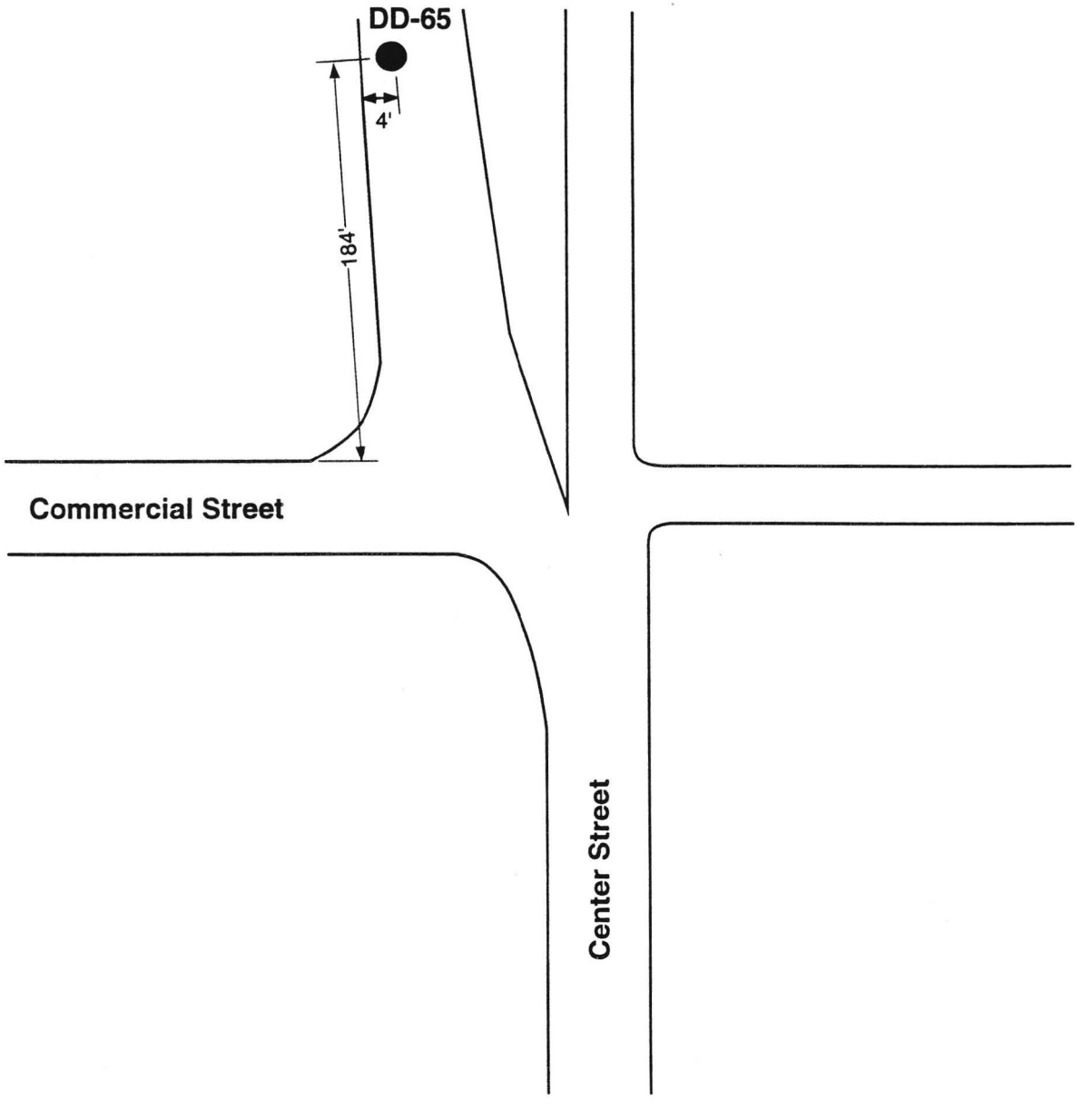
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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: DD-65	Sheet 3 of 3

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND; dark gray, wet, very dense, fine to medium grained, trace coarse grained, angular gravel to 3/8" in size, trace mica	SP	Qya	17	E	92	6/6				12:08
		increased gravel content, SAND with GRAVEL; fine to coarse grained, subangular to subrounded gravel to 1/2" in size, moderate odor			18	S	89 11/0"	6/6	24.0 [7.0]			12:25
55		very strong sulfur odor [heavy rig chatter]										
		decreased gravel content, SAND; gravel to 1" in size			19	D	68 72	7/12	72.0 [7.0]	110	20	12:38
		strong sulfur odor [occasional rig chatter], gravel to 1/2" in size			20	E	39 60/3"	7/9				12:53
		GRAVEL with SAND; dark gray, wet, very dense, subrounded to subangular gravel to 1" in size, fine to coarse grained sand, strong sulfur odor, cobble to 5" in size, [occasional heavy rig chatter]	GP		21	S	95 5/0"	2/6	9.0 [7.0]			13:14
60					22	D	150/5"	0/5				13:32
		SAND with GRAVEL; dark gray, wet, very dense, fine to coarse grained, subrounded gravel to 1" in size, moderate odor	SP		23	D	150/5.5"	5/5.5	39.0 [7.0]	125	13	13:40
					24	E	150/4.5"	4/4.5				13:58
65					25	S	100/4.5"	1/4.5	8.0 [6.0]			14:20
		[heavy rig chatter], moderate sulfur odor										
		3.5' layer of cobble to 7" in size	GP									
70												
		GRAVEL with SAND; dark gray to black, wet, very dense, subangular to subrounded gravel to 2" in size, fine to coarse grained sand, moderate sulfur odor [heavy rig chatter]			26	D	150/5"	3/5	18.0 [6.0]			14:56
					27	E	150/3"	1/3				
75		End of Boring at 75 feet.										15:30

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-65

10-95

Figure A-17

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD- 1	Sheet 1 of 4
Boring Location:	Redline yard	Elevation and Datum(feet): 267.0	
Health and Safety:	Modified level D	Date Started: 6/21/95	Date Finished: 6/21/95
Drilling Equipment:	Midway 13	Total Depth (feet): 95.5	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 23	Depth to Water (feet): 91.0
Boring Diameter:	4 7/8"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Grant Miller

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT		af								
		ARTIFICIAL FILL SILTY SAND with GRAVEL; moist	SM		1	B						
5		SANDY SILT; dark olive brown, moist, medium stiff, fine grained sand, micaceous	ML		2	S	3 3 4	10/18	4.2 [4.0]			
		ALLUVIUM SILTY SAND with GRAVEL; olive brown, moist, loose, coarse grained sand, fine subangular gravel to 1/2", trace mica	SM	Qya								
10					3	D	2 6	8/12	4.0 [4.0]	114	12	
		SAND with SILT and GRAVEL; light brown, moist, very dense, fine to coarse grained, fine gravel to 1/2", trace mica	SW-SM									
15					4	S	12 31 37	10/18	4.1 [3.9]			
		[rig chatter at 18 feet, coarse gravel to 1/2" cuttings]			2	B						
		GRAVEL with SAND; see next page	GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD- 1	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		GRAVEL with SAND; dark yellowish brown, moist, medium dense, fine to coarse grained, gravel to 1"; at bottom of ring, yellowish brown sand, fine to medium grained, trace coarse grained, fine gravel	GP	Qya	5	D	8 16	5/12	4.0 [3.9]	117	14	
25		SAND with SILT and GRAVEL; light olive brown, moist, very dense, fine to coarse grained	SW-SM		6	S	8 17 36	4/18	4.0 [3.9]			
30		GRAVEL with SAND; light olive brown, moist, medium dense to very dense, coarse subrounded gravel to 1", fine to coarse grained sand, trace black silty sand [rig chatter at 33 feet, cobbles to about 8" to 10"]	GP		7	D	5 28	4/12	3.9 [3.9]		2	
35		SAND with SILT and GRAVEL; light olive brown, moist, very dense, fine to coarse grained, fine subangular gravel 1/2", dark brown to black fine grained silty sand [rig chatter at 39 feet]	SP-SM		8	S	30 100/4"	4/10	4.3 [3.9]			
40		GRAVEL with SAND; olive brown, moist, very dense, subangular gravel to 2", trace silt, medium to coarse sand [rig chatter at 41 feet and 42feet]	GP		9	D	150/5"	0/5	4.5 [3.8]		5	
45		SAND with GRAVEL; olive brown, moist, very dense, fine to coarse grained, fine subangular gravel to 3/4", coarse gravel fragment in shoe [rig chatter at 44 feet and 45 feet]	SP		10	S	100	5/6	4.2 [3.7]			
		GRAVEL with SAND; olive brown, moist, very dense, coarse gravel to 1-1/2"	GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD- 1	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND, see above	GP	Qya	11	D	100 50/4"	0/10	4.6 [3.6]			
		SANDY SILT ; light olive brown, moist, hard, fine grained sand, oxidized bedding planes?, micaceous	ML		12	D	44 75	10/12	4.0 [3.6]	106	18	
55		SILTY SAND; olive brown with orange brown staining, moist, very dense, fine to medium grained sand, micaceous, silt at tip of shoe with very dark brown staining	SM		13	S	42 73 27/4"	14/16	3.6 [3.6]			
		SILTY SAND/ SANDY SILT; light olive brown, moist, very dense, fine sand, micaceous	SM/ML									
60					14	D	40 110/5"	8/11	3.7 [3.6]	101	20	
		SAND with SILT; light yellowish brown, moist, very dense, fine to medium grained, subangular, nonplastic silt	SP-SM									
65					15	S	60 78	10.5 /12	4.4 [3.5]		17	
		SAND with SILT and GRAVEL; olive, moist, very dense, fine to coarse sand, gravel to 1" in size [rig chatter at 68 feet (gravel/cobbles?)]	SP-SM									
70					16	D	100 50/1"	5/7	3.5 [3.4]	112	13	
		[rig chatter at 73 feet (gravel?)]										
75		GRAVEL with SAND; olive brown, moist, very dense, 1/2" gravel [rig chatter at 76 feet; cobbles?]	GP		17	S	100/3"	1/3	3.9 [3.4]			
					18	D	150/4"	0/4	3.9 [3.4]			

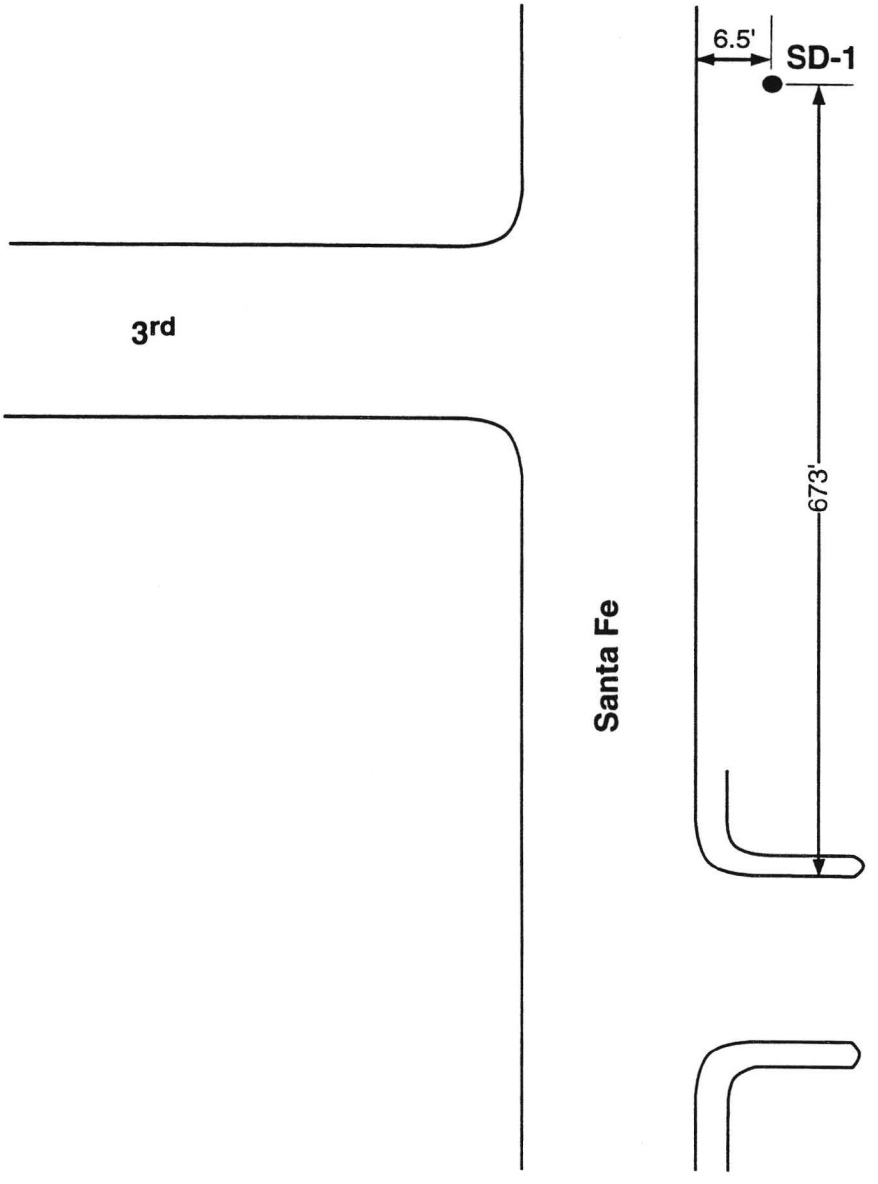
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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD- 1	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND; light olive brown, moist to wet, very dense, fine to coarse grained, fine multicolored gravel to 1/2", trace light yellow brown silt	GP	Qya	19	D	40 110/5"	8/11	3.4 [3.3]	126	8	
85		SAND with SILT; yellowish brown, moist, very dense, fine to coarse grained with slightly plastic fines, subangular, fine gravel to 1/2"	SP-SM		20	S	100/5"	4/5	2.7 [2.6]			
90		light olive brown, wet, very dense, fine to coarse grained, decomposed gravel to 3/8", trace fine			21	D	60 40/3"	4/9	2.9 [2.6]	113	16	
		SAND with SILT and GRAVEL, yellowish brown, wet, very dense, fine to coarse grained, fragments of methamorfic rock to 1/2", some low plastic fines	SP-SM									
95					22	S	100/3"	1.5/3	2.8 [2.3]			
		End of boring at 95.5 feet. Groundwater encountered at 91 feet.										
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-1

10-95

Figure A-18

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-2	Sheet 1 of 2
Boring Location:	Santa Fe Avenue	Elevation and Datum(feet): 266.0	
Health and Safety:	Level D	Date Started: 6/28/95	Date Finished: 6/28/95
Drilling Equipment:	Link Belt 180	Total Depth (feet): 34.5	Depth to Bedrock(feet): N/A
Drilling Method:	Impact	Number of Samples: 0	Depth to Water (feet): 26
Boring Diameter:	6.6 inches	Completion Information: Grouted to surface	
Hammer Information: AP-1000		Logged By: Jorge Sandoval	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		Closed end bit, ASPHALT/BASE					18	15				15:00
							18	10				25:00
							12	12				
							14	15				
5							13	6				
							4	6				
							5	7				30:00
		added rod at 9 feet					5	7				
10							6	9				
							20	12				
							42	16				
							44	16				
							56	19				
15		blower on at 15 feet					71	20				
							76	22				
							80	22				
							92	21				
		added rod at 19 feet					62	21				32:00 44:00

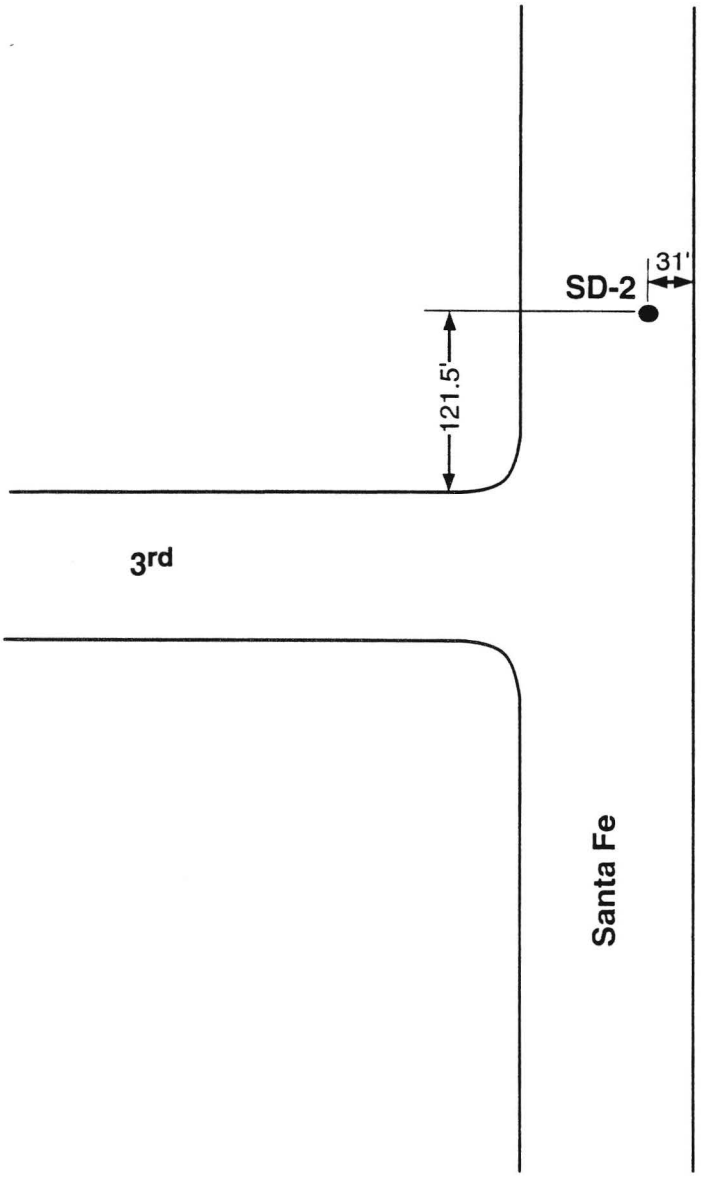
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-2	Sheet 2 of 2

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Becker Blow Count (no./12 inches)	Samples: Bounce Chamber Pressure (psi)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
							48	21				
							43	22				
							50	22				
							63	23				
25							67	23				
							74	23				
							113	23				
							132	23				
							138	23				
		added rod at 29 feet					100	25				52:00 02:00
30							125	26				
							236	26				
							521	27				
							910	26				27:20
		refusal at 34.3 feet with closed bit then switched to open bit										52:00
35		Boring abandoned at 34.5 feet due to heavy thick oil coating (free product?) on the drilling rods. Oil contamination suspected at about 7 feet below ground surface.										
		Perched fluid (hydrocarbon?) encountered at 26 feet.										
		Note: drilling time is presented as minutes and seconds (i.e. 52:00 or 52 minutes:00 seconds).										
40												
45												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-2

10-95

Figure A-19

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3	Sheet 1 of 2
Boring Location:	Redline yard	Elevation and Datum(feet): 265.0	
Health and Safety:	Level D	Date Started: 6/21/95	Date Finished: 6/21/95
Drilling Equipment:	Midway 13	Total Depth (feet): 36.0	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 6	Depth to Water (feet): N/A
Boring Diameter:	4 7/8"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT										
		ALLUVIUM SAND; light brown, moist, loose, fine to medium grained, trace coarse sand, trace fine to coarse gravel to 1"	SP	Qya								
5					1	D	2 3 6	10/18	1.8	96	19	
10		olive brown, fine to coarse grained, angular to subrounded gravel to 3/4"			2	S	19 28 23	8/18	1.0			
15		SAND with SILT and GRAVEL; olive brown, moist, medium dense, fine to coarse sand with gravel to 1"	SP-SM		3	D	4 16 17	5/18	0.6	137	9	
		SAND with SILT; olive brown, moist, very dense, fine to coarse grained, trace fine subangular gravel	SP-SM									

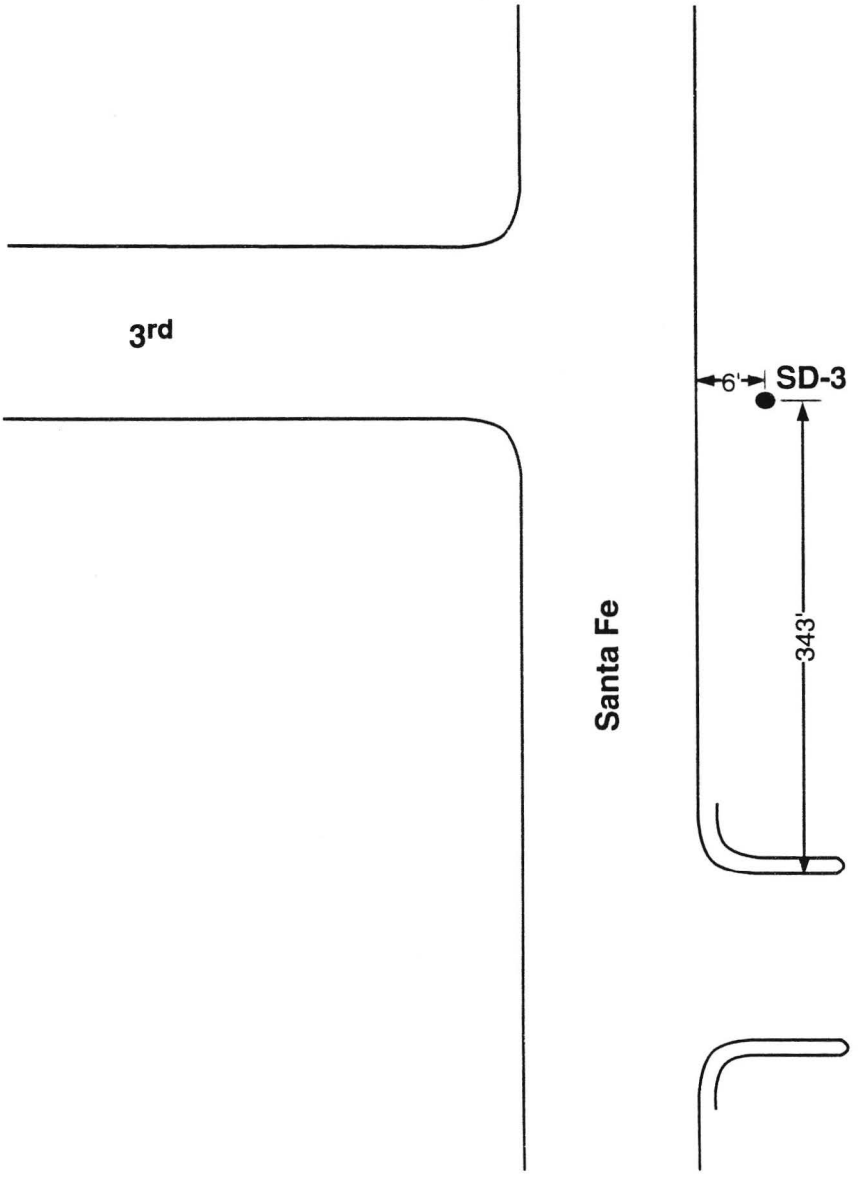
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3	Sheet 2 of 2

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT; olive brown, moist, very dense, fine to coarse grained, trace fine subangular gravel	SP-SM	Qya	4	S	19 29 47	6/18	0.4			
25		some gravel to 3/4"			5	D	9 29 40	4/18	0.4	124	7	
		SAND wiht SILT and GRAVEL; olive brown, moist, very dense, fine to coarse grained sand, fine subangular to subrounded gravel to 1/2"	SP-SM									
30					6	S	48 50 50	4/18	0.5			
		loss of drilling mud at 34 feet										
35		loss of drilling mud at 35 feet. Probably gravel/cobble zone (GP)			7	D					6	
		Boring terminated at 35.5 feet due to excessive drilling mud loss. 300 pounds of bentonite used to stabilize the hole without success. Moved to boring SD-3A.										
40												
45												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-3

10-95

Figure A-20

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3A	Sheet 1 of 5
Boring Location:	Redline yard	Elevation and Datum(feet): 265.0	
Health and Safety:	Level D	Date Started: 6/19/95	Date Finished: 6/20/95
Drilling Equipment:	Midway 13	Total Depth (feet): 126.0	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 25	Depth to Water (feet): 88
Boring Diameter:	4 7/8"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT										
		ALLUVIUM advanced to 35 feet using tricone bit. No sampling in this interval. Soil cuttings used for soil description.	SP	Qya								
5		SAND; light brown, medium to coarse grained, trace fine to coarse gravel to 1"										
10												
15		some gravel at 14 feet, fine to coarse grained		Qya								
		SAND with SILT; medium to coarse grained, subangular to subrounded	SP-SM									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3A	Sheet 2 of 5

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
25		SAND with SILT; medium to coarse grained, subangular to subrounded cobble to about 6" to 8" at 24 feet	SP-SM	Qya								
30		SAND with SILT and fine GRAVEL at 28 feet	SP-SM									
35		GRAVEL with SAND; fine gravel to 1/2" 10" cobble at 35 feet gray, moist, dense, fine to coarse gravel to 2", subangular	GP		1	D	11 26 33	6/18	0.6		5	
		12" cobble at 39 feet										
40		GRAVEL with SILT and SAND; gray, moist, very dense, gravel to 1", subangular [rig chatter at 41 feet]	GP-GM		2	S	26 46 30	2/18	0.4			
					3	D	3 8 25	12/18	2.2	130	9	
		increased medium to coarse grained sand content at 43 feet decomposed dark granitic clasts at 44 feet										
45		GRAVEL; gray, moist, very dense, subangular gravel to 1", some fine to coarse sand	GP		4	D	30 100	6/12	1.0			
		increased 1/2" gravel content and light brown coarse sand at 48 feet	GP									
		GRAVEL with SAND; light gray, moist, very dense										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3A	Sheet 3 of 5

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTY SAND with GRAVEL; gray, moist, very dense, fine gravel to 3/4", fine to coarse sand	SM	Qya	5	S	43 100/4"	3/10	0.4			
		8" to 10" cobble at 52 feet										
		increased cobble content from 54 feet to 55 feet										
55		coarse subangular gravel to 2-1/2", trace mica moist, dense SILTY SAND at 56 feet			6	D	20 48 33	10/18	1.0	115	11	
		SANDY SILT; light olive brown, moist, dense to very dense, very fine sand, micaceous,	ML									
60		1" gravel fragment lodged in sampler shoe			7	S	100	1/6				
		SILTY SAND; light olive brown, wet, very dense, fine sand, non plastic fines, micaceous	SM		8	S	42 100/12"	10/18	0.8			
65		moist and slightly coarser sand with silt (SP-SM)			9	D	32 50 55	10/18	1.0	101	19	
		SAND; light brown, moist, fine to coarse grained, trace fine subangular gravel to 3/4"	SP									
70					10	S	100/6"	4/6	1.8 [0.2]			
		fine gravel at 74 feet										
75		SAND with SILT and GRAVEL; light brown, moist, very dense, fine to coarse sand, fine gravel to 1/2", trace yellowish brown silt	SW-SM		11	D	60 40/4"	6/10	0.0	116	13	

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3A	Sheet 4 of 5

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		GRAVEL with SAND; yellowish brown, moist, very dense, fine to medium sand, 1-1/2" gravel at shoe's tip	GP	Qya	12	S	100/5"	1/5	2.0 [0.4]			
		SAND/SILTY SAND; light brown, wet, very dense, fine to coarse grained, subangular to rounded, trace mica	SP/SM		13	D	61 105	12/18	4.0 [0.1]	110	10	
		trace silt at 84 feet										
85		light olive brown sand (SP-SM), moist, fine to medium grained, trace mica			14	D	28 60	12/12	3.0 [0.0]	97	27	
		SILT; grayish brown some orange brown stains, wet, hard, some very fine sand	ML									
90					15	S	30 43 50	18/18	0.4 [0.6]			
		SANDY SILT; olive brown to light olive gray, wet, hard, non plastic, trace mica	ML		16	D	15 40	12/12	2.2 [0.0]	105	22	
95		SILTY, CLAYEY SAND; olive brown, wet, very dense, fine grained sand, trace mica	SC-SM		17	D	30 60	12/12		112	18	
		SAND with GRAVEL; light brown, wet, very dense, fine to coarse grained, some fine gravel to 3/8", decomposed granite at shoe's tip, dark brown, micaceous	SW		18	S	100	6/6	0.6 [0.0]			
100		gravel to 1" at 101 feet			19	D	75 75/3"	6/9		115	13	
		SILTY SAND with GRAVEL; olive yellow, fine to coarse grained sand, fine gravel to 1", trace silt	SM									
105					20	D	75 75/3"	6/9	0.0 [0.0]	117	17	

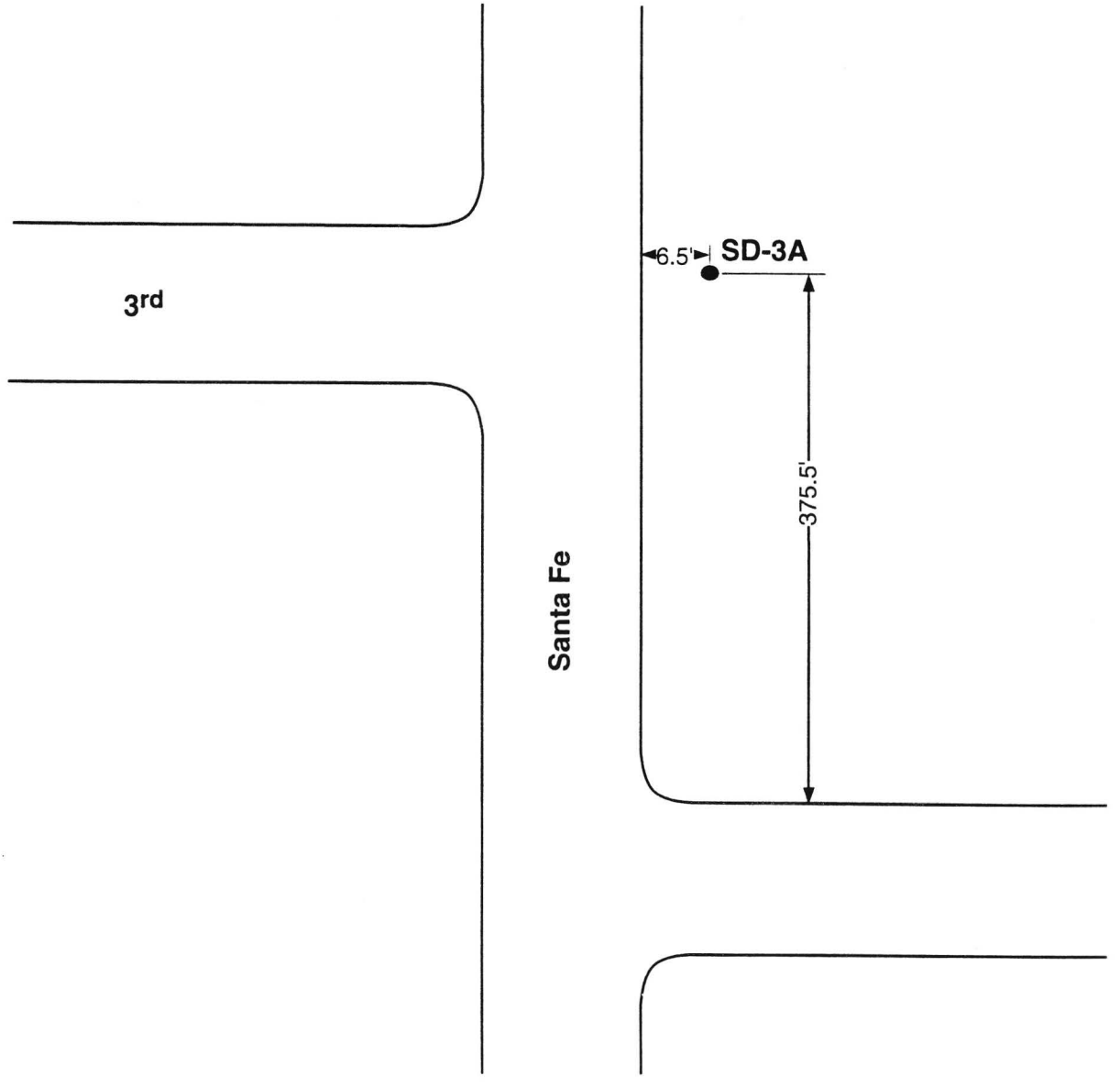
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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-3A	Sheet 5 of 5

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		SILTY SAND; yellowish brown, moist to wet, very dense, fine to coarse grained with clay pockets, trace black decomposed granite, trace fine gravel to 3/4", medium plasticity clay	SM	Qya	21	S	100/5"	4/5	1.0 [0.0]			
115		SAND with SILT; olive brown, wet, very dense, medium to coarse sand with fine gravel to 3/8" non plastic fines, trace mica, 1-1/2" piece of white decomposed granite, trace siltstone (dark brown)	SP-SM		22	D	150/6"	2/6	0.8 [0.5]	111	13	
120		SILTY SAND; light gray, moist to wet, very dense, fine to coarse grained, fine gravel to 1/4"	SM		23	S	100/4"	3/4	1.0 [0.6]			
		gravel to 1/2", pocket of low plastic clay, decomposed granite at 121 feet			24	D	150/6"	3/6	0.5 [0.0]			
125		dark gray, fine grained sand, trace mica			25	D	34 60	10/12	2.6 [0.0]	108	21	
		End of boring at 126 feet. Groundwater encountered at 88 feet.										
130												
135												
140												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-3A

10-95

Figure A-21

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-4	Sheet 1 of 4
Boring Location:		Elevation and Datum(feet): 265.0	
Health and Safety:	Level D	Date Started: 6/26/95	Date Finished: 6/26/95
Drilling Equipment:	Midway 13	Total Depth (feet): 95.5	Depth to Bedrock(feet): N/A
Drilling Method:	Mud Rotary	Number of Samples: 21	Depth to Water (feet): N/A
Boring Diameter:	4 7/8"	Completion Information: Grouted to surface	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 300-lb and 18-inch drop		Logged By: Jorge Sandoval	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		ASPHALT and CONCRETE		af								
		ARTIFICIAL FILL SILTY SAND; olive yellowish, moist	SM									
5		SANDY SILT; olive brown, moist, medium stiff, very fine grained sand, medium plastic fines, trace mica	ML		1	S	2 3 4	10/18	5.0 [3.6]			
		fine gravel from 1/4" to 1/2" at 9.5 feet										
10		**ALLUVIUM** SILTY SAND; olive brown, moist, loose, fine to medium grained, trace coarse sand, trace fine gravel to 1/4"	SM	Qya	2	D	4 4	3/12	4.6 [4.2]	115	13	
15		SAND; olive yellow, moist, dense, fine to medium grained, trace fine gravel to 1/2"	SP		3	S	16 22 25	10/18	5.2 [4.8]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-4	Sheet 2 of 4

Depth (feet)	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
	SAND with SILT; olive brown, moist, medium dense, fine to coarse sand, trace coarse gravel to 2-1/2", trace mica	SP-SM	Qya	4	D	10 19	5/12	5.8 [4.9]	113	15	
	gravel to 1" at 24 feet										
25	SAND/SILTY SAND; light olive brown, moist, very dense, fine to coarse grained, gravel to 3/4"	SW/SM		5	S	22 40 60	7/18	6.0 [5.0]			
	sand with gravel at 29.5 feet										
30	GRAVEL with SAND; olive brown, moist, medium dense, fine to coarse gravel to 2", disturbed sample	GP		6	D	20 20	0/12	5.4 [5.2]		5	
35	SAND with SILT; olive brown, moist, very dense, fine to coarse grained,	SW-SM		7	S	25 50/2"	6/8"	6.0 [5.4]			
	SAND with SILT; light olive brown, moist, very dense, fine to coarse grained, trace of coarse gravel to 1" 8" cobble at 38 feet	SP-SM		8	S	33 77/3"	4.5/9	60 [5.4]			
40	GRAVEL with SILT and SAND; light olive brown, moist, very dense, fine to coarse sand, fine to coarse gravel to 2-1/2" [rig chatter from 41 to 45 feet]	GP-GM		9	D	150	4/6	5.6 [5.6]		9	
45				10	S	100/5"	3.5/5	5.9 [5.8]			
	SAND with SILT and GRAVEL; light olive brown, moist, very dense, fine to coarse grained, fine gravel to 3/4"	SP-SM									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-4	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND; olive brown, moist, very dense, coarse gravel to 1-1/2" [rig chatter from 52 to 53.5 feet]	GP-GM	Qya	11	D	150	4/6	5.9 [5.9]	124	13	
55		SAND; light olive brown, moist, very dense, fine to coarse grained	SP		12	S	38 62/5"	8.5 /11	6.6 [6.0]			
60		SILTY SAND; yellowish brown, moist, dense, fine grained, trace mica	SM		13	D	16 40	8/12	6.4 [6.0]	109	19	
65		SAND with SILT; dark yellowish brown, moist, very dense, fine to medium grained, trace coarse sand, mica	SP-SM		14	S	55 45/2"	7/8	8.3 [6.2]		15	
70		SAND with SILT; olive brown, moist, very dense, fine to coarse grained, fine gravel to 1/4"	SW-SM		15	D	71 79/2"	4/8	7.2 [6.3]	113	17	
75		SILTY SAND and SILT; olive brown, moist, very dense, fine grained, pocket of fine to medium sand	SM		16	S	43 54	8/12	7.0 [6.4]			
		SAND; light olive brown, moist, very dense, fine to coarse sand, trace gravel to 1/4", 2" of silt at 76.5 feet	SW		17	D	70 80/5"	6/11	6.6 [6.4]	114	16	

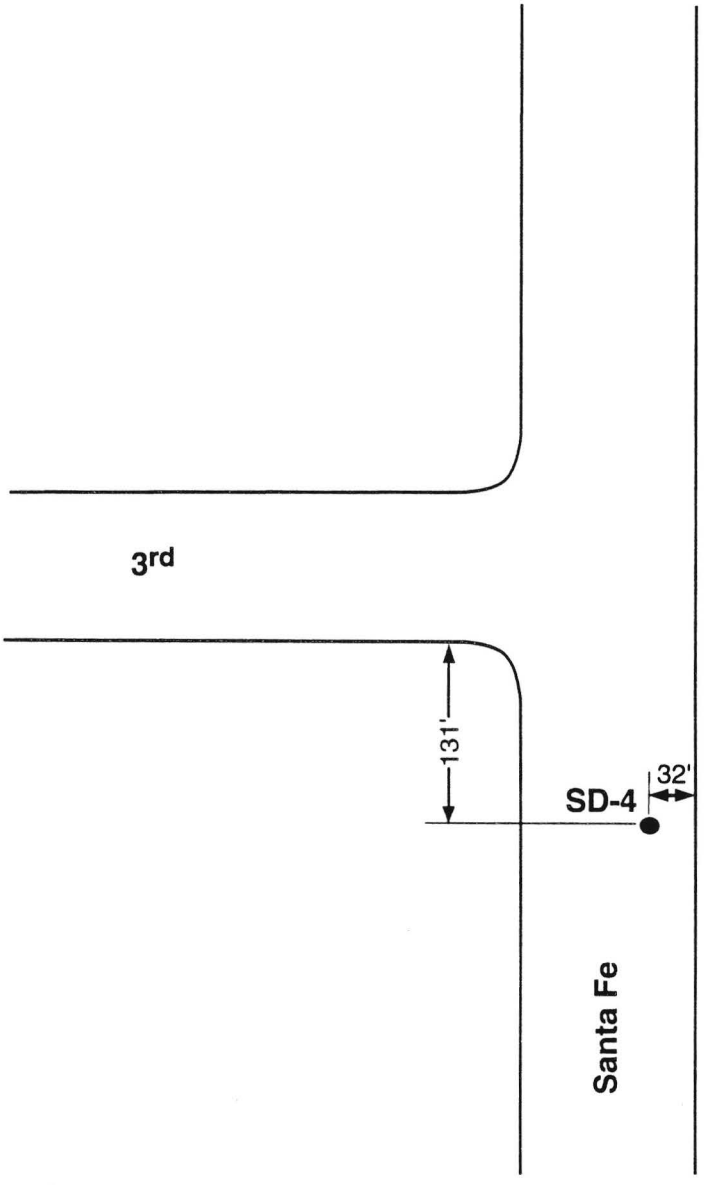
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GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-4	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTY SAND; light brown, moist, dense to very dense, fine to medium grained, trace coarse sand, trace fine gravel	SM	Qya	18	D	50 60	6/12	6.8 [6.6]	93	17	
85		SAND with GRAVEL; light yellowish brown, moist to wet, very dense, fine to coarse grained, trace coarse gravel to 1", fragments of black decomposed granite	SP		19	S	100/5"	5/5	7.2 [6.7]			
		SANDY SILT; olive gray, moist, hard, non plastic, fine to very fine sand, trace mica	ML									
90					20	D	17 36	9/12	7.0 [6.8]	112	19	
95		SILTY SAND; brown, moist, very dense, fine grained, laminated, trace mica, iron oxides along laminate	SM		21	S	100/5"	5/5	7.3 [6.9]			
		End of boring at 95.5 feet.										
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-4

10-95

Figure A-22

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-5	Sheet 1 of 4
Boring Location:	Little Tokyo Station	Elevation and Datum(feet): 264.0	
Health and Safety:	Level D	Date Started: 6/19/95	Date Finished: 6/19/95
Drilling Equipment:	Mayhew 1000	Total Depth (feet): 100.5	Depth to Bedrock(feet): 89
Drilling Method:	Mud Rotary	Number of Samples: 22	Depth to Water (feet): 78.3
Boring Diameter:	5 inches	Completion Information: Installed piezometer	
Hammer Information: SPT Hammer: 140-lb and 30-inch drop Downhole Hammer: 400-lb and 18-inch drop		Logged By: Greg Renfrew	Checked By: Bill Lu

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
5		**ARTIFICIAL FILL** SILTY SAND with GRAVEL; yellowish brown, dry, loose, fine to medium grained, trace coarse sand, fine to coarse subangular gravel moist, trace gravel to 1/2", trace mica	SM	af	1	S	2 4 4	10/18	9.0 [8.0]			
10		[rig chatter at 12 feet]			1	D	6 11	10/12	9.0 [8.0]	105	13	
15		**ALLUVIUM** SILTY SAND with GRAVEL/SILTY GRAVEL with SAND; yellowish brown, moist, dense to very dense, fine to medium sand, trace coarse sand, fine to medium subangular to angular to 1" gravel, non plastic fines, trace mica cobbles at 18.5 feet	SM/GM	Qya	2	S	15 30 20	3/18	7.0 [7.0]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-5	Sheet 2 of 4

Depth (feet)	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
	GRAVEL with SILT and SAND/SAND with SILT and GRAVEL; yellowish brown, moist, dense	GP-GM /SP-SM	Qya	2	D	25 40	8/12	78.0 [8.0]	119	10	
	fine to coarse sand (SW-SM), subangular to angular gravel to 2", trace non plastic fines										
	SILTY SAND with GRAVEL/SILTY GRAVEL with SAND; moist, very dense, gravel to 1", fine to medium sand	SM/GM									
25				3	S	24 54 22/3"	6/15	10.0 [8.0]			
	SAND with SILT and GRAVEL; olive brown, moist, very dense, fine to coarse sand, subangular to angular gravel to 2-1/2"	SW-SM									
30				3	D	30 55	11/12	18.0 [8.0]	120	13	
	[strong rig chatter at 31 feet]										
	GRAVEL with SILT and SAND	GP-GM									
	[rig chatter at 35 feet, cobbles?]										
35	light brown silty sand (SM), moist, very dense, fine to medium grained, trace fine			4	S	17 27 50	10/18	9.0 [8.0]			
		GM									
	SILTY GRAVEL with SAND; dark brown, moist, very dense, fine to medium sand, subangular to angular coarse gravel										
	[rig chatter at 38 feet, 6" cobbles at 38 feet]										
40	increased sand content (SW-SM)				S	75/4"	0/4	8.0 [8.0]			
	cobbles to 6" at 41.5 feet										
	2" gravel, [rig chatter at 41 feet and 42 feet]			4	D	75	6/6	8.0 [8.0]	133	12	
45	fine to medium sand (SP-SM) with gravel to 1/4" in size, olive brown to dark brown, trace coarse sand			5	S	33 40/2"	6/8	8.0 [8.0]			

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-5	Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		GRAVEL with SAND; yellowish brown, moist, very dense, fine to coarse sand, fine to coarse gravel, cobbles to 7", less silt	GP	Qya	5	D	43 50	11/12	10.0 [8.0]	132	10	
55		SAND; yellowish brown, dry to moist, very dense, fine to medium grained, trace coarse sand, trace white silt, micaceous	SP		6	S	29 55 22	11/18	10.0 [8.0]			
		fine cuttings at 59 feet										
60		LEAN CLAY; light olive brown, moist, very stiff, low plasticity, micaceous, interbedded with fine sand	CL		6	D	12 25	12/12	8.0 [8.0]	100	27	
65		increased sand content (SM), light olive brown, moist, very dense, fine grained			7	S	20 35 50	10/18	8.0 [8.0]		18	
70		SAND; olive brown, moist, very dense, fine to medium sand, trace coarse, trace of silt, micaceous	SP		7	D	61 89	10/12	9.0 [8.0]	108	16	
75		SILTY SAND/SANDY SILT; olive brown, moist, very dense, fine sand, trace mica	SM/ML		8	S	16 31 39	18/18	9.0 [8.0]			
		SAND with SILT and GRAVEL; see next page	SP-SM									

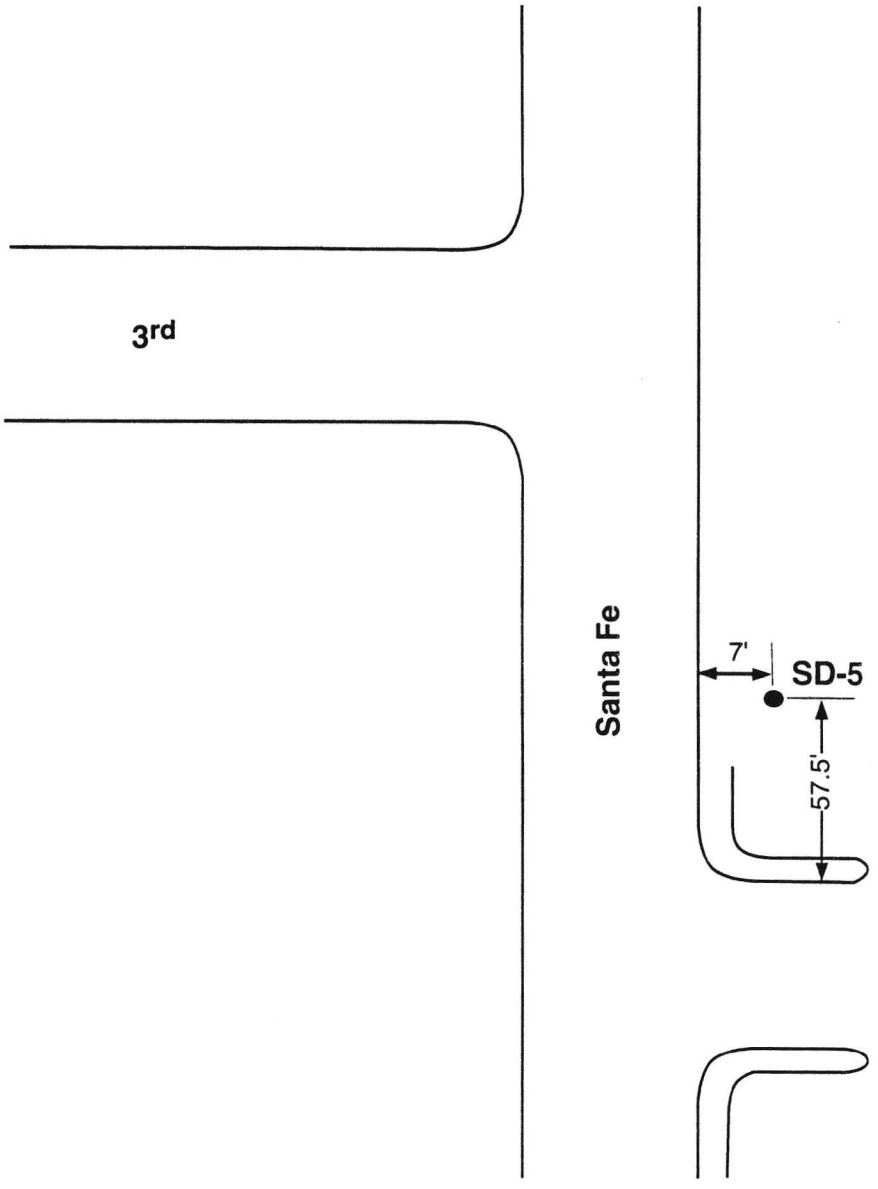
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	METRO RED LINE- EASTSIDE EXTENSION, DETAILED DESIGN		
Project Number:	95-8347	Boring Number: SD-5	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT and GRAVEL; olive brown, wet, very dense, fine to coarse sand, trace fine to coarse subangular gravel to 2-1/2", trace silt, slightly plastic fines, a clay seam 1/4" at about 80 feet	SP-SM	Qya	8	D	65 70	12/12	8.0 [7.0]	113	14	
85		olive brown, fine sand, trace medium to coarse sand, trace mica, non plastic fines			9	S	53 50	9/12	9.0 [7.0]			
		LEAN CLAY; dark olive gray, moist, hard, fine sand, low angle bedding, faintly laminated	CL									
90					9	D	38 56	12/12	7.0 [7.0]	115	16	
		SILTY SAND; yellowish brown, wet, very dense, fine to coarse grained	SM		10	D	40 110/5"	8/11				
95		SAND; yellowish brown, wet, very dense, fine to medium sand grained, silt, trace mica	SP		11	D	100/5"	5/5	7.0 [7.0]			
100					12	D	100	6/6	7.0 [7.0]	108	19	
		End of boring at 100.5 feet. Groundwater measured on 9/22/95 at 78.3 feet below surface.										
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

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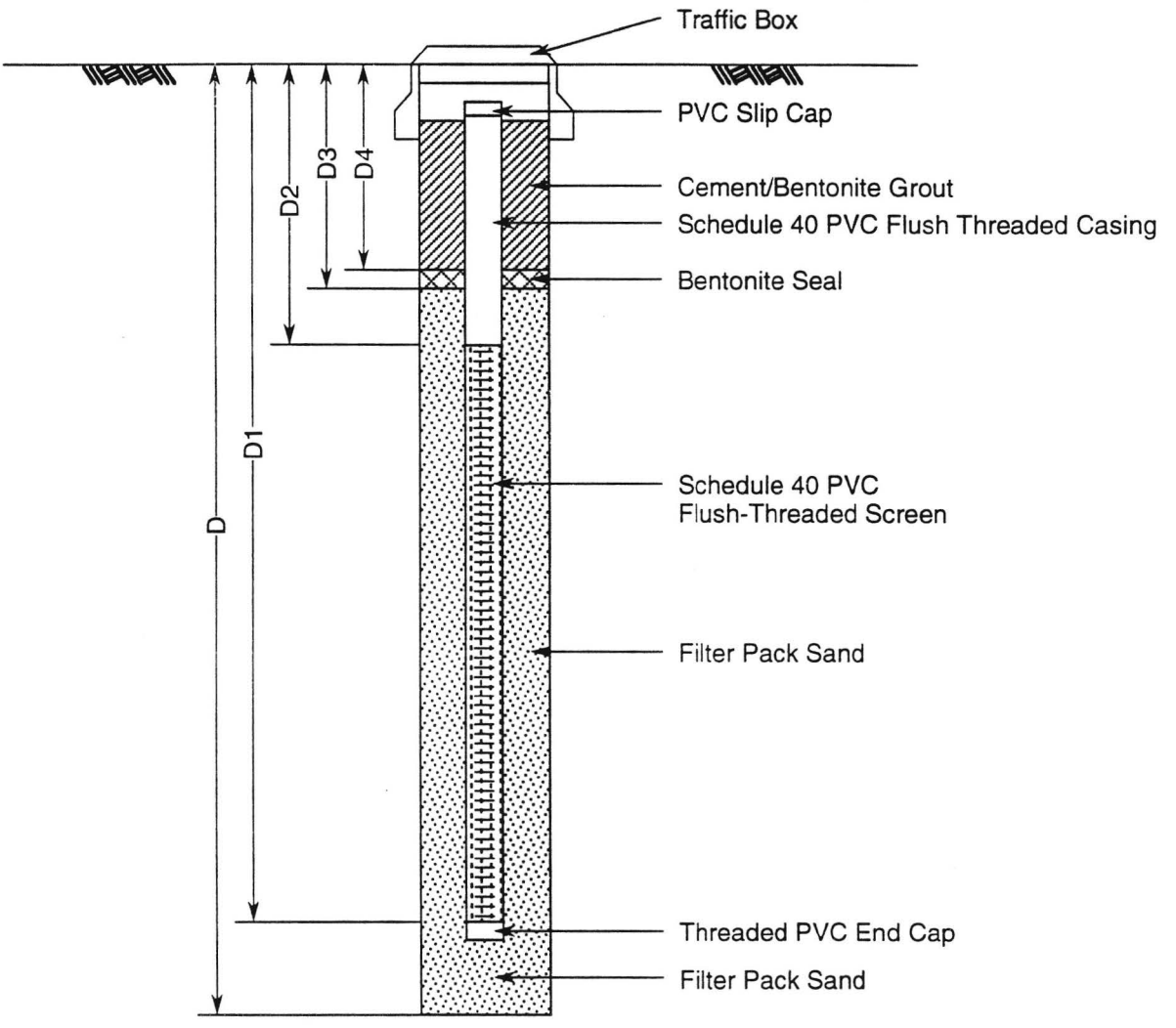
Project No.: 95-8347

Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring SD-5

10-95

Figure A-23A



Total Depth (D)	=	100	Feet
Total Depth of Casing (D1)	=	96	Feet
Depth to Top of Well Screen (D2)	=	41	Feet
Depth to Bottom of Top Seal (D3)	=	38	Feet
Depth to Top of Top Seal (D4)	=	34	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/4	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic SD-5

8-95

Figure A-23B

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Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**		
Project Number:	**94-1100**	Boring Number: **PE-18**	Sheet **1** of **4**
Boring Location:	**Third/Santa Fe**	Elevation and Datum(feet):	**265 MSL**
Health and Safety:	**Level D**	Date Started: **11/29/93**	Date Finished: **11/29/93**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **86.0**	Depth to Bedrock(feet): **85.7**
Drilling Method:	**Mud Rotary**	Number of Samples: **16**	Depth to Water (feet): **79.2**
Boring Diameter:	**5 inches**	Completion Information:	**Piezometer installed, converted to monitoring well**
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 400-lb and 18-inch drop.**		Logged By: **Greg Renfrew**	Checked By: **Grant Miller**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		FILL Asphaltic concrete to 4.5"and concrete to 9"		af								
		ALLUVIUM SANDY SILT; dark yellowish brown, moist to wet, soft, low plasticity, fine-grained sand, micaceous	ML	Qya								
5					1	S	1 1 1	11/18	5.3 [4.2]			0715
10		GRAVEL with SAND/SAND with GRAVEL; brown to light olive brown, moist, medium dense, fine to coarse subangular to angular gravel to 2" in size, fine- to coarse-grained sand	GW/SW		2	D	15 21	4/12	5.6 [4.7]	129	8	0725
15		gravel to 1-1/4" in size, trace silt			3	S	8 10 14	9/18	5.7 [4.6]			0735
		decreased sand content, GRAVEL with SAND, moist to wet, subangular to angular gravel to 3/4" in size, few cobbles 4" to 6" in size	GW									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

Project Number: **94-1100** | Boring Number: **PE-18** | Sheet 2 of 4

Depth (feet)	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
	GRAVEL with SAND; brown to light olive brown, moist to wet, medium dense, rounded to subangular gravel and cobbles to 6" in size, fine- to coarse-grained sand, some nonplastic silt	GW	Qya	4	D	20 25	6/12	--	121	11	0755
	increased sand content, GRAVEL with SAND/SAND with GRAVEL, very dense, fine to coarse gravel to 2-1/4" in size	GW/SW									
25				5	S	17 23 35	4/18	5.7 [4.3]			0810
	decreased sand content, GRAVEL with SAND, brown to light olive brown, rounded to subangular gravel to 2-1/4" in size	GW									
30	gravel to 2-1/2" in size			6	D	40 50	5/12	--	123	7	0900
35	gravel to 1-3/4" in size, some finer gravel to 1/2" in size below 35'			7	S	60 40/2"	5/8	5.5 [4.8]			0930
40	cobble to 5" in size			8	D	100	4/6	5.4 [4.8]	129	12	0955
45	gravel to 1-1/4" in size			9	S	100/7"	4/7	5.3 [4.8]			1018

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GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line														
Project Number:	94-1100	Boring Number:	PE-18											Sheet 3 of 4	
Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples										
					Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time			
		GRAVEL with SAND; brown to light olive brown, moist, very dense, rounded to subangular gravel to 2-1/2" in size, fine- to coarse-grained sand, trace silt	GW	Qya	10	D	100/4"	< 1/4	5.5 [5.1]		7	1050			
55		SILTY SAND; light olive brown, moist to wet, very dense, fine- to coarse-grained, nonplastic silt, some subangular to subrounded gravel to 1-1/2" in size	SM		11	S	40 60/4"	7/10	6.1 [5.8]			1110			
		dense, fine-grained with trace medium-grained, nonplastic to low plasticity silt, micaceous													
60		interval of SAND, fine- to medium-grained	SP SM		12	D	30 35	8/12	6.2 [5.9]	110	17	1120			
		very dense, fine- to medium-grained, nonplastic silt, trace fine gravel													
65					13	S	25 55 20/2"	12/14	6.6 [5.9]			1140			
70		SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; brown to light olive brown, wet, very dense, fine- to coarse-grained sand, subangular gravel to 1-1/4" in size, nonplastic silt	SW-SM / GW-GM		14	D	100/7"	3/7	6.6 [6.3]	124	13	1200			
75		angular rock fragments in cuttings, possible gravel and cobbles to 78.5'													
		SILTY SAND; see next sheet	SM		15	S	40 60	10/12	8.6 [8.0]			1220			

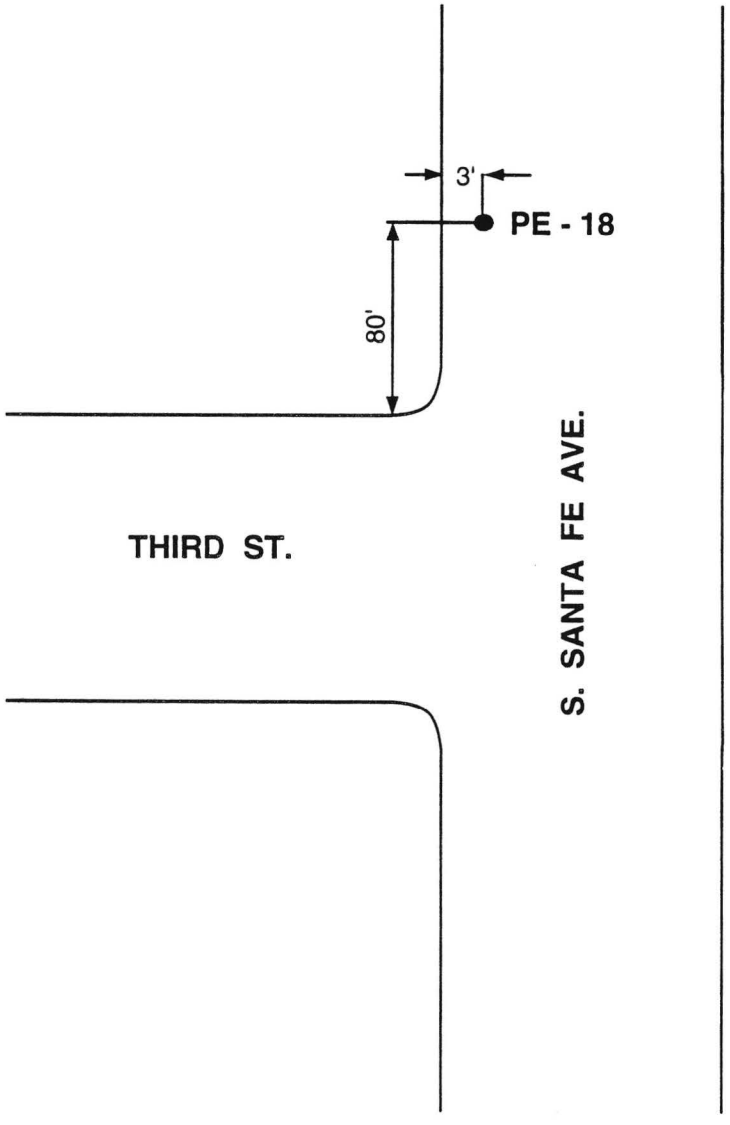
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Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: PE-18	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		SILTY SAND; light olive brown, wet, very dense, fine-grained, trace medium- to coarse-grained, gravel to 3/4" in size	SM	Qya								
		increased silt content, hard, nonplastic to low plasticity silt										
85		SILT with SAND; olive brown, wet, hard, fine grained sand, trace mica	ML		16	D	20 30	6/12	8.4 [8.2]	107	20	1255
		Boring terminated at 86.0 feet. Groundwater measured on 1/11/94 at 79.2 feet below surface.										
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

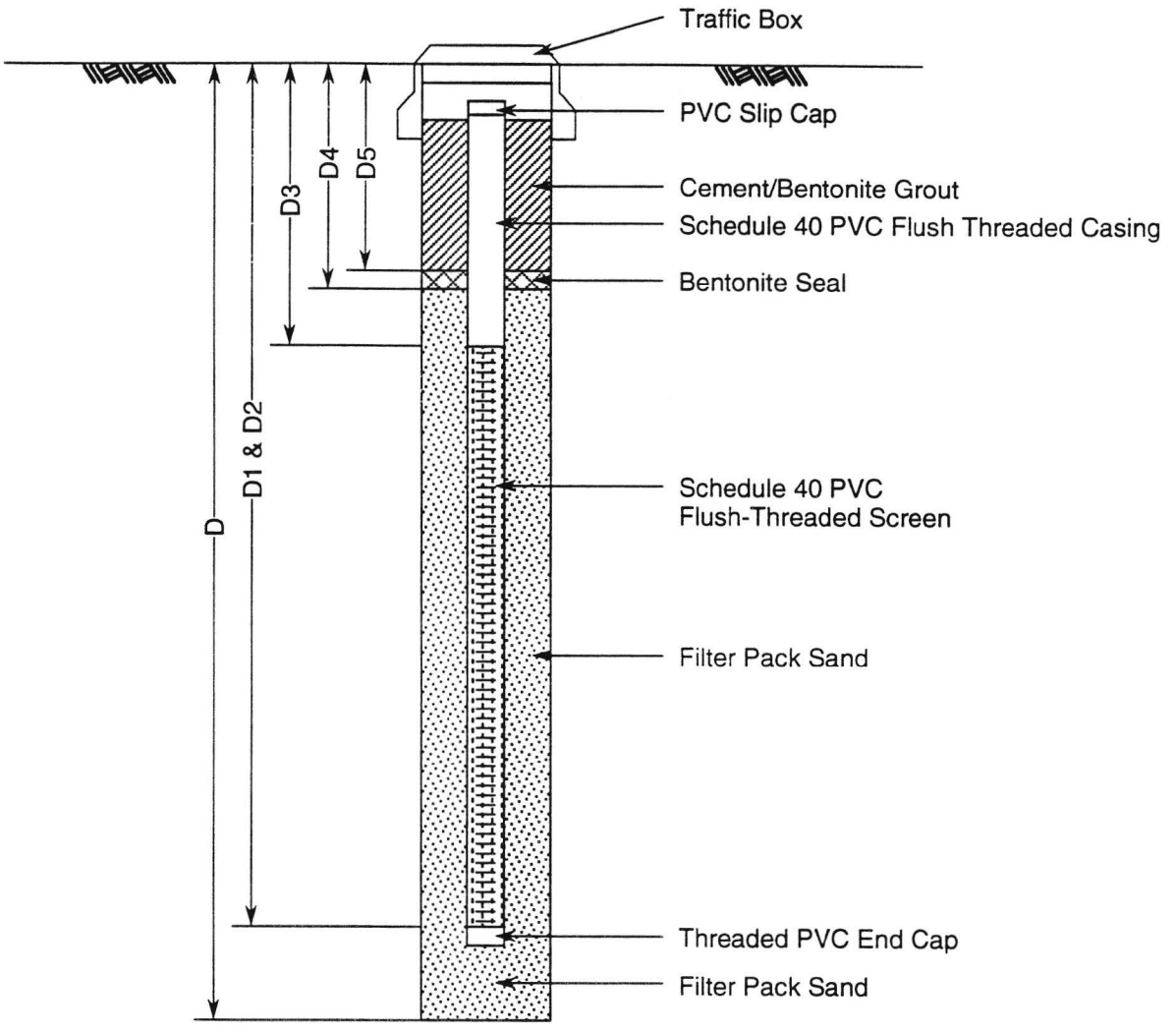
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring PE - 18

10-95

Figure A -24A



Total Depth (D)	=	86	Feet
Total Depth of Casing (D1)	=	84	Feet
Depth to Bottom of Well Screen (D2)	=	84	Feet
Depth to Top of Well Screen (D3)	=	24	Feet
Depth to Bottom of Top Seal (D4)	=	22	Feet
Depth to Top of Top Seal (D5)	=	18	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/2	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic PE-18

10-95

Figure A-24B

GeoTransit Consultant

Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**		
Project Number:	**94-1100**	Boring Number: **PE-27**	Sheet **1** of **4**
Boring Location:	**Banning/Santa Fe**	Elevation and Datum(feet): **270 MSL**	
Health and Safety:	**Level D**	Date Started: **12/8/93**	Date Finished: **12/8/93**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **81.5**	Depth to Bedrock(feet): **50**
Drilling Method:	**Mud Rotary**	Number of Samples: **15**	Depth to Water (feet): **---**
Boring Diameter:	**5 inches**	Completion Information: **Grouted to surface**	
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 400-lb and 18-inch drop.**		Logged By: **Greg Renfrew**	Checked By: **Grant Miller**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		FILL Asphaltic concrete and base		af								
5		**ALLUVIUM** SAND with SILT; olive brown, moist, loose, fine-grained, trace medium-grained, nonplastic silt	SP-SM	Qya	1	D	4 3	8/12	7.0 [7.0]	99	10	0700
10		GRAVEL with SILT and SAND/SAND with SILT and GRAVEL; light olive brown, moist, medium dense, subangular to subrounded gravel to 1-1/4" in size, nonplastic silt, fine- to coarse-grained sand	GP-GM / SP-SM		2	S	2 10 12	8/18	7.0 [7.0]			0705
15		decreased silt and sand content, GRAVEL with SAND, dense, gravel to 2-1/2" in size	GP/GW		3	D	18 30	6/12	8.5 [7.0]		2	0715

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Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: PE-27	Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND; light olive brown, moist, dense, gravel to 1-1/2" in size, fine- to coarse-grained sand, trace nonplastic silt, trace cobbles suggested by 2" angular fragments in cuttings, 1/4" to 1-1/4" rounded gravel common	GP/GW	Qya	4	S	11 14 26	3/18	7.5 [7.0]			0740
25		gravel to 1-1/2" in size			5	D	20 35	5/12	8.0 [7.0]	121	10	0755
30		light olive brown to dark yellowish brown, very dense			6	S	15 26 30	6/18	8.0 [7.0]			0810
35		interbedded sand layers to 4" thick, fine- to medium-grained sand, coarse gravel to 3" with few cobbles			7	D	30 45	6/12	8.0 [7.0]	123	10	0840
40		grayish brown			8	S	50/4"	3/4	7.5 [7.0]			0900
45		SAND with GRAVEL/GRAVEL with SAND; dark greenish gray, wet, very dense, fine- to coarse-grained sand, subrounded to subangular gravel to 2-1/2" in size	SW/GW		9	D	100	3/6	11 [7.0]		11	–

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Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

Project Number: **94-1100** | Boring Number: **PE-27** | Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		FERNANDO/PUENTE FORMATION SILTSTONE; dark olive gray, wet, soft rock, low to medium plasticity, trace fine-grained sand, 1-1/2" rounded clast in siltstone, thinly laminated, fossiliferous, slightly weathered to fresh, laminations inclined at low angles generally less than 10 degrees	ML	Tf/Tp	10	S	6 12 20	2/18	7.0 [7.0]			0950
55					11	D	20 30	12/12	9.0 [7.0]		26	1010
60					12	S	8 12 17	11/18	8.0 [7.0]			1022
65					13	D	20 35	12/12	10 [7.0]		25	1040
70		dark olive brown, slightly weathered			14	S	9 23 28	1/18	7.0 [7.0]			1050
75					15	D	20 25	12/12	7.0 [7.0]		25	1105

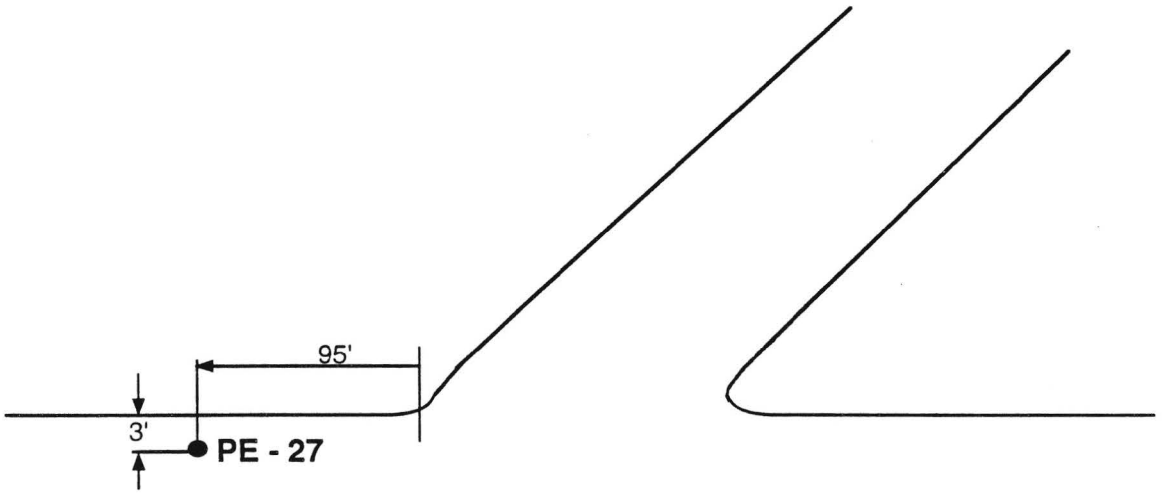
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Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	PE-27	Sheet 4 of 4	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) (Background)	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		SILTSTONE; dark olive brown	ML	Tf/Tp		S	8 20 27	0/18				1120
		Boring terminated at 81.5 feet. Groundwater was not apparent.										
85												
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



BANNING ST.

S. SANTA FE AVE.

North

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring PE - 27

10-95

Figure A 25

GeoTransit Consultants

Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**				
Project Number:	**94-1100**	Boring Number:	**PE-28**	Sheet 1 of 4	
Boring Location:	**Vignes/Temple**			Elevation and Datum(feet): **270 MSL**	
Health and Safety:	**Level D**	Date Started: **12/8/93**		Date Finished: **12/8/93**	
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **80.9**		Depth to Bedrock(feet): **45**	
Drilling Method:	**Mud Rotary**	Number of Samples: **16**		Depth to Water (feet): **---**	
Boring Diameter:	**5 inches**	Completion Information: **Grouted to surface**			
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 300-lb and 18-inch drop.**		Logged By: **Hossein Rashidi**		Checked By: **Grant Miller**	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		FILL Asphaltic concrete to 3" and base to 12"		af								
		ALLUVIUM SILTY SAND/CLAYEY SAND; dark brown, moist, very loose, fine- to coarse-grained, low plasticity, some rounded gravel to 3/4" in size	SM/SC	Qya								
5					1	D	1 2	9/12	6.5 [6.5]	101	22	0758
		GRAVEL with SAND; white to light brown, moist, dense, gravel to 2" in size, fine- to coarse-grained sand, trace nonplastic silt	GW									
10					2	S	16 23 23	4/18	6.5 [6.5]			0815
		rounded to subangular gravel to 1" in size										
15		SAND with GRAVEL; yellowish brown, moist, very dense, fine- to coarse-grained, rounded to subangular gravel to 1-1/2" in size, trace nonplastic silt	SP		3	D	20 45	7/12	6.5 [6.5]	130	9	0837

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

Project Number: **94-1100** | Boring Number: **PE-28** | Sheet 2 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		GRAVEL with SAND; yellowish brown, moist, mostly subangular to angular gravel, some rounded gravel, trace coarse-grained sand	GW	Qya	4	B						0845
25		SAND with SILT; dark olive brown, moist, very dense, fine- to coarse-grained, nonplastic silt, trace fine gravel to 1/4" in size	SP-SM		5	S	23 50/ 5.5"	6/11.5	6.5 [6.5]			0900
		gravel to 1/2" in size										
		decreased silt content, SAND, dark grayish brown, moist to wet, trace rounded gravel to 1" in size	SP									
30		[strong rig chatter at 31'], possible cobble to 10 " in size			6	D	50 50/4"	5/10	6.5 [6.5]	116	15	0920
		GRAVEL with SAND; moist, gravel to 1" in size, coarse-grained sand	GW/GP									
35					7	B	50/1"	0/1	6.5 [6.5]			0950
		[strong rig chatter]										
40		large cobbles to 10" in size, possible boulders to 36" in size			8	B						1015
45		**FERNANDO/PUENTE FORMATION** CLAYSTONE; dark olive, moist, soft to moderately hard rock, medium plasticity, laminated, layers of cemented claystone to 1/2" thick causing rig chatter, laminations possibly inclined 45 degrees, fresh, strong sulfur odor	CL/CH	Tf/Tp	9	D	40 40	7/12	21.5 [6.5]	92	32	1120

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

Project Number: **94-1100** | Boring Number: **PE-28** | Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SILTSTONE; dark olive, moist, soft to moderately hard rock, low plasticity, trace fine-grained sand, laminated, layers of cemented siltstone to 1/2" thick causing rig chatter, fresh, strong sulfur odor	ML	Tf/Tp	10	S	50	0/6	21.5 [6.5]			1215
55		no odor, increased plasticity			11	D	30 40	10/12	21.5 [6.5]	100	26	1235
		SANDY CLAYSTONE; yellowish brown, moist, soft to moderately hard rock, medium plasticity, fine- to coarse-grained sand, with cemeted intervals and beds present	CL									
		[violent rig chatter from 59' to 63.5'], cemented beds to 1/2" thick, moderately hard to hard rock				S	50/3"	0/3				1253
60					12	B			16.5 [6.5]			1310
65		decreased sand content, CLAYSTONE; dark olive, soft rock, massive, no obvious bedding,fresh			13	D	80	6/6	26.5 [6.5]	103	22	1330
70		scattered fossils, (bi-valves, gastropods)			14	S	28 50	8/12	36.5 [6.5]			1350
75					15	D	70	4/6	110 [6.5]	101	24	1420

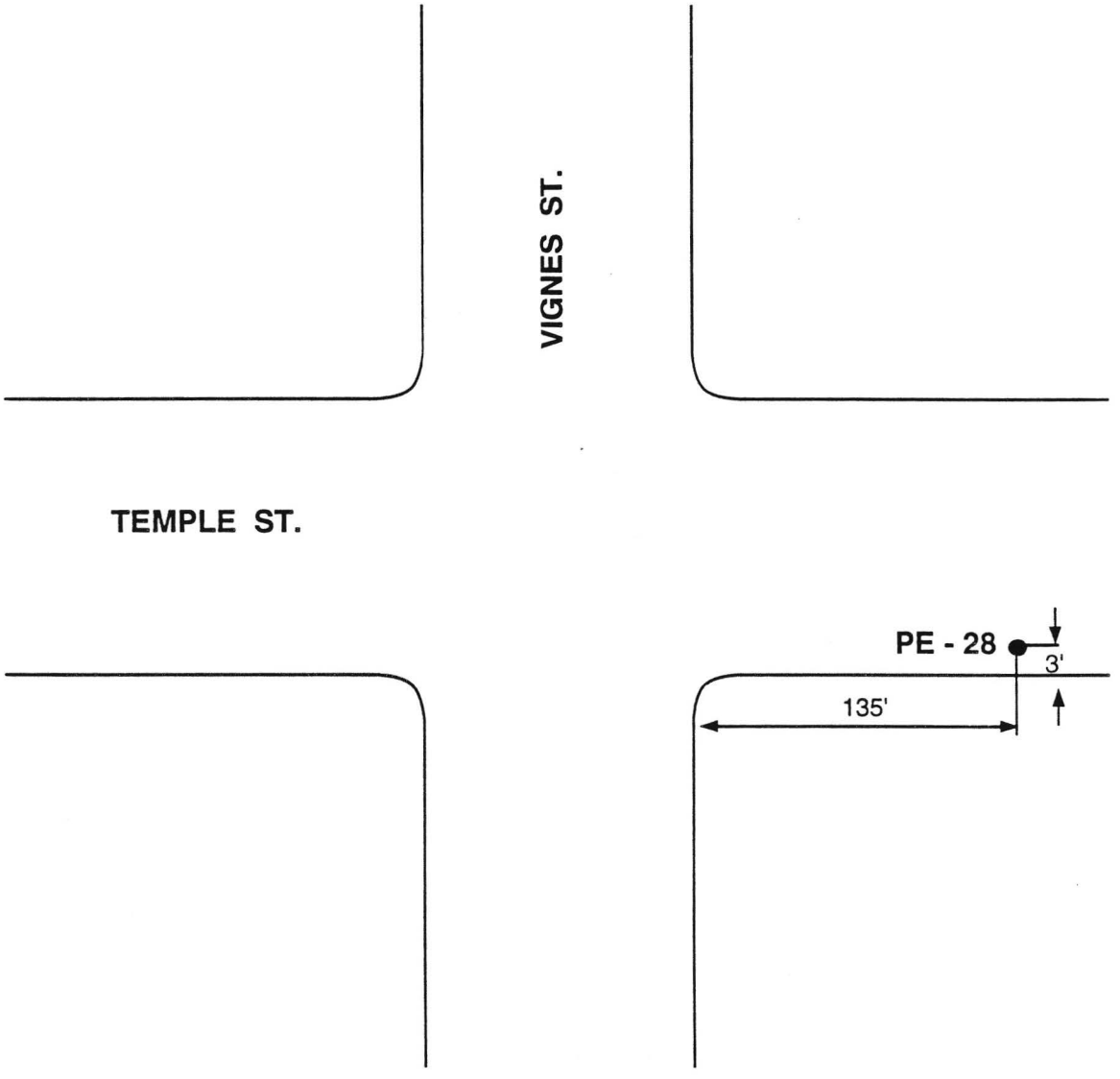
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Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: PE-28	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		CLAYSTONE; dark olive, moist, soft rock, medium plasticity, trace fine-grained sand, massive, no obvious bedding, no fossils, fresh	CL	Tf/Tp	16	S	38 60/5"	8/11	110 [6.5]			1446
		Boring terminated at 80.9 feet. Groundwater was not apparent.										
85												
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring
PE - 28

10-95

Figure A 26

GeoTransit Consultants

Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**				
Project Number:	**94-1100**	Boring Number:	**PE-29**	Sheet 1 of 4	
Boring Location:	**Vignes/Ducommun**		Elevation and Datum(feet): **271 MSL**		
Health and Safety:	**Level D**	Date Started: **12/9/93**		Date Finished: **12/10/93**	
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **82.0**		Depth to Bedrock(feet): **70**	
Drilling Method:	**Mud Rotary**	Number of Samples: **16**		Depth to Water (feet): **35.0**	
Boring Diameter:	**5 inches**	Completion Information: **Piezometer installed, converted to monitoring well**			
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 400-lb and 18-inch drop.**		Logged By: **Greg Renfrew**		Checked By: **Grant Miller**	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		FILL Asphaltic concrete and base, mostly subangular 3/4" gravel [relocated twice, encountered concrete at two locations at 18"]		af								
		SILTY SAND; olive brown, moist to wet, medium dense, fine- to coarse-grained, trace fine subrounded gravel, asphalt chunks	SM									
5		[rig chatter at 6'], gravel to 3" in size, brick and mortar fragments, asphalt chunks	GW		1	D	11 17	8/12	8.0 [7.0]	106	18	0750
		ALLUVIUM SILTY SAND; olive brown to dark yellowish brown, moist, medium dense, fine- to coarse-grained, some fine to coarse subangular gravel to 1-1/2" in size	SM	Qya								
10		[black film on surface of mud tank]			2	S	2 6 8	6/18	7.5 [7.0]			0845
		[due to deviation of drill rod in third hole, started new hole] [samples beyond 15' are from fourth hole] GRAVEL; dark yellowish brown to light olive brown, moist, medium dense, angular to subrounded, fine to coarse, to 3" in size, some fine- to coarse-grained sand, trace silt	GP/GW									
15		increased sand content			3	D	11 15	4/12	8.0 [7.0]		5	0935

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

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Project Name:	Metro Rail: Eastside Extension - Metro Red Line																
Project Number:	94-1100	Boring Number:	PE-29													Sheet 2 of 4	
Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples												
					Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time					
		GRAVEL with SAND; dark yellowish brown to light olive brown, moist to wet, very dense, subangular to angular gravel to 2" in size, fine- to coarse-grained sand, trace nonplastic silt	GP/GW	Qya	4	S	12 27 35	6/18	7.5 [7.0]			1000					
		interval of light olive brown SAND from 20.7'to 21.5', fine- to medium-grained, with very thin silt interbeds, some gravel to 2" in size															
25					5	D	20 80/3"	2/9	7.5 [7.0]			1025					
		[easier drilling], increased sand, less gravel															
30		boulders, 1-1/2" to 2" subrounded to subangular gravel															
		interval of SAND with SILT and GRAVEL, dark gray, wet, subrounded to subangular gravel to 1-1/4" in size, sulfur odor	SP-SM		6	S	37 60/5"	5/11	10 [7.0]			1300					
		dark gray, trace silt, cobbles to 6" in size	GP														
35					7	D	60 40/4"	3/10	80 [7.0]	128	7	1345					
		small cobbles common at 38', sulfur odor															
40					8	S	40 60	7/12	20 [7.0]			1430					
		[resumed drilling on 12/10/93]															
		increased silt content, GRAVEL with SILT and SAND, dark greenish gray, with thin layers of silty clay of medium plasticity, subrounded gravel to 3", strong sulfur odor	GP-GM														
45		interval of CLAYEY SILT	ML/CL		9	D	25 30	5/12	150 [4.6]	124	9	0715					
		decreased silt content, GRAVEL with SAND, dark gray, trace silt	GP														

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

Project Number: **94-1100** | Boring Number: **PE-29** | Sheet 3 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND; dark gray, wet, very dense, trace silt, cobbly	GP	Qya	10	S	100	0/6	14 [5.0]			0740
		interval of SILT	ML									
		[rig chatter]										
55		increased silt content, GRAVEL with SILT and SAND, angular to subangular gravel to 1" in size, nonplastic silt, fine- to coarse-grained sand, strong sulfur odor	GP-GM		11	D	100/4"	1/4	70 [5.0]	98	9	0755
60												
		SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; dark greenish gray, wet, very dense, fine- to coarse-grained sand, predominantly medium-grained sand, nonplastic silt, angular to subrounded gravel to 1-1/4" in size, some thin silt layers, some 3" gravel, strong sulfur odor	SW-SM / GP-GM		12	S	37 51 20/2"	12/14	80 [4.6]			0820
65					13	D	40 60/5"	8/11	60 [7.6]	125	12	0845
70		FERNANDO/PUENTE FORMATION CLAYSTONE; dark olive gray, wet, soft rock, medium to high plasticity, very thinly laminated with variable dips (cross-laminations), calcareous fossiliferous (possible shell fragments), fresh, trace fine-grained sand, strong sulfur odor	CH	Tf/Tp	14	S	36 35 23	15/18	410 [7.6]			0915
75		low angle laminations, less than 20 degrees			15	D	20 25	12/12	780 [9.5]		31	0935

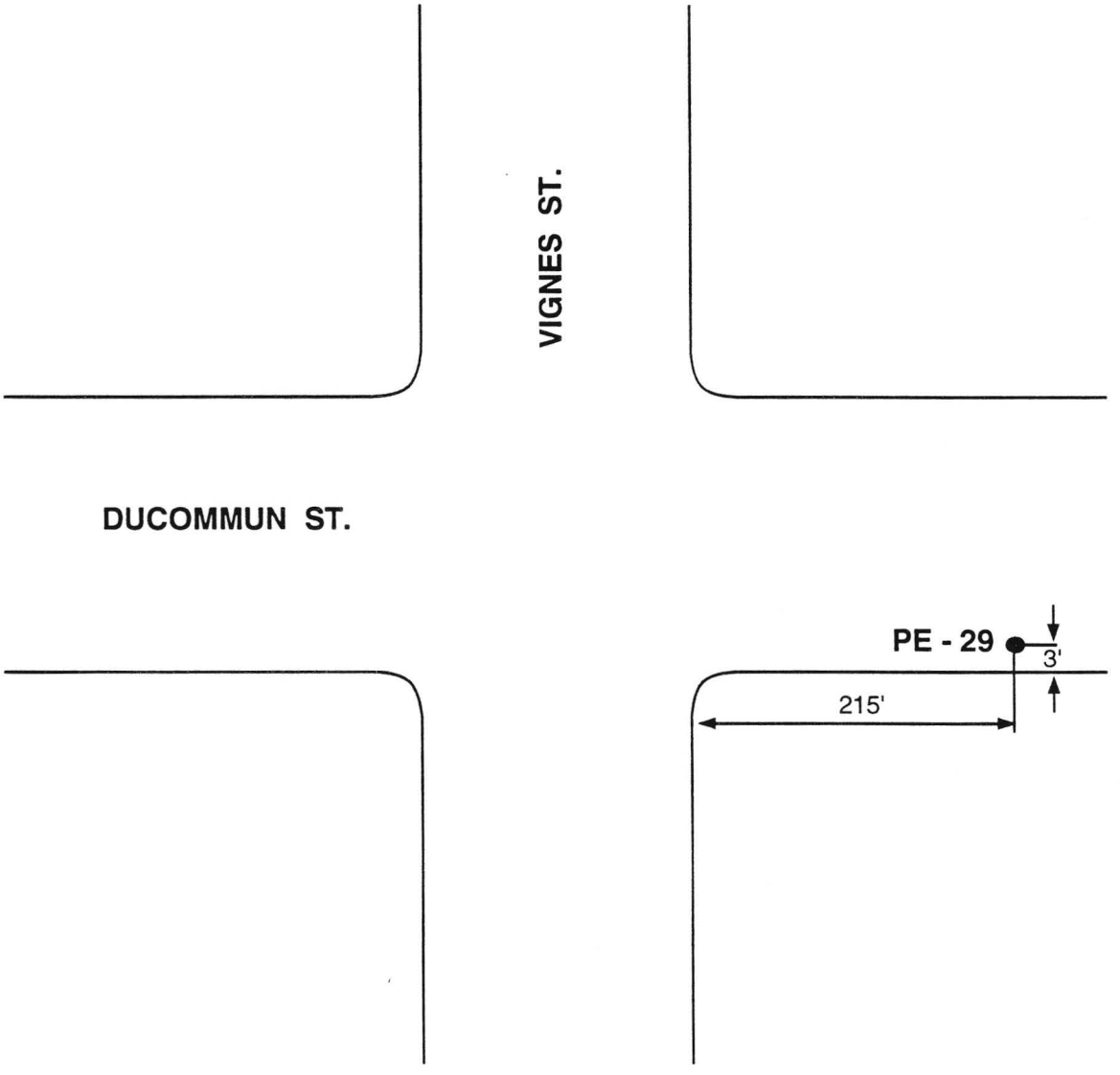
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Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	PE-29	Sheet 4 of 4	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		CLAYSTONE; dark olive gray, wet, soft rock, medium to high plasticity, fresh	CH	Tf/Tp	16	S	23 28 31	18/18	950 [9.5]			–
		Boring terminated at 82.0 feet. Groundwater measured on 1/11/94 at 35.0 feet below surface.										
85												
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

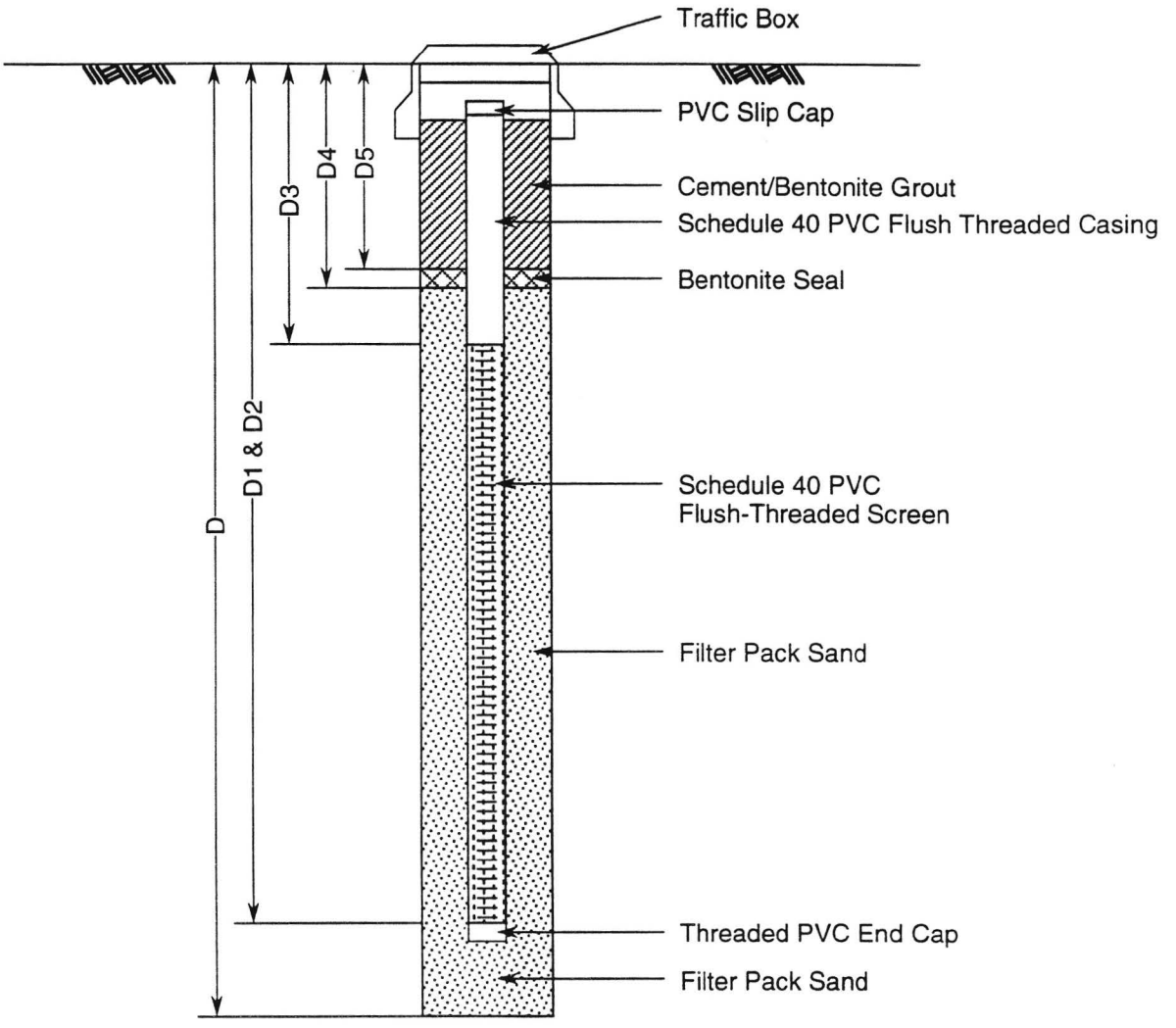
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Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring PE - 29

10-95

Figure A -27A



Total Depth (D)	=	82	Feet
Total Depth of Casing (D1)	=	80	Feet
Depth to Bottom of Well Screen (D2)	=	80	Feet
Depth to Top of Well Screen (D3)	=	20	Feet
Depth to Bottom of Top Seal (D4)	=	17.5	Feet
Depth to Top of Top Seal (D5)	=	13.7	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/2	Inch Pellets

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Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
PE-29

10-95

Figure A-27B

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Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**		
Project Number:	**94-1100**	Boring Number: **PE-30**	Sheet **1** of **4**
Boring Location:	**Vignes/Commercial**	Elevation and Datum(feet):	**275 MSL**
Health and Safety:	**Level D**	Date Started: **12/9/93**	Date Finished: **12/10/93**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet): **80.8**	Depth to Bedrock(feet): **73.5**
Drilling Method:	**Mud Rotary**	Number of Samples: **15**	Depth to Water (feet): **36.5**
Boring Diameter:	**5 inches**	Completion Information:	**Piezometer installed, converted to monitoring well**
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 300-lb and 18-inch drop.**		Logged By: **Hossein Rashidi**	Checked By: **Grant Miller**

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		FILL Asphaltic concrete to 2" and brick pavement to 12"	GP	af								
		GRAVEL [abandoned 2" pipe at 2' below surface]	SM/GM									
		SAND, SILT, and GRAVEL fill										
5		piece of concrete 2-3" in size in shoe and gravel on screen				D	5 7	0/12	5.6 [5.6]			0820
					1	B						
		ALLUVIUM SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; light yellowish brown, moist, medium dense, fine- to coarse-grained sand, rounded to subangular gravel to 1-1/2" in size	SP-SM / GP-GM	Qya								
10					2	S	7 11 11	4/18	8.4 [7.0]			0845
15		increased gravel content, to 2" in size			3	D	12 26	6/12	--			0920

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GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number:	PE-30

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		SAND with SILT and GRAVEL/GRAVEL with SILT and SAND; light yellowish brown, moist, medium dense, fine- to medium-grained sand, trace coarse-grained sand, rounded to subangular coarse gravel to 1-1/2" in size [moderate rig chatter]	SP-SM / GP-GM	Qya								0927
25		GRAVEL with SILT and SAND; olive yellow, moist, very dense, subangular to subrounded gravel to 1" in size, nonplastic silt, fine- to coarse-grained sand	GP-GM		4	S	28 20/2"	4/8	9.6 [7.0]			0950
30		SAND; dark gray, moist to wet, very dense, mostly coarse-grained, some medium-grained and fine gravel, sulfur odor	SP		5	D	70/5"	3/5	7.5 [7.5]			1005
35		[extremely slow drilling], cobbles to possibly 12" in size	GP		6	B			15 [8.0]			1020
40					7	B			8.0 [8.0]			1220
45		GRAVEL with SILT and SAND; dark bluish gray, moist to wet, very dense, rounded to subangular gravel to 1-1/2" in size, nonplastic silt, fine- to coarse-grained sand, sulfur odor	GW-GM		8	B			12 [7.5]			1254

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Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	PE-30	Sheet 3 of 4	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SILT and SAND; dark bluish gray, moist to wet, very dense, rounded to subangular gravel to 1-1/2" in size, nonplastic silt, fine- to coarse-grained sand, strong sulfur odor	GW-GM	Qya	9	D	73	4/6	100 [7.0]		16	1315
55					10	S	50/5.5"	3/5.5	20 [8.5]			1340
		[strong rig chatter]										
60												1415
65					11	B			14 [8.5]			1430
		6" to 8" cobble, cobbly to 73.5'										
70					12	B			30 [9.5]			1445
		[resumed drilling on 12/10/93]										1530
		FERNANDO/PUENTE FORMATION CLAYSTONE/SILTSTONE; dark olive, moist, soft rock, medium to high plasticity, trace medium- to coarse-grained sand, massive, vertical bedding, fresh, sulfur odor	CH/MH	Tf/Tp	13	B			55 [7.8]			0855
75					14	S	17 29	10/12	220 [7.8]			0930

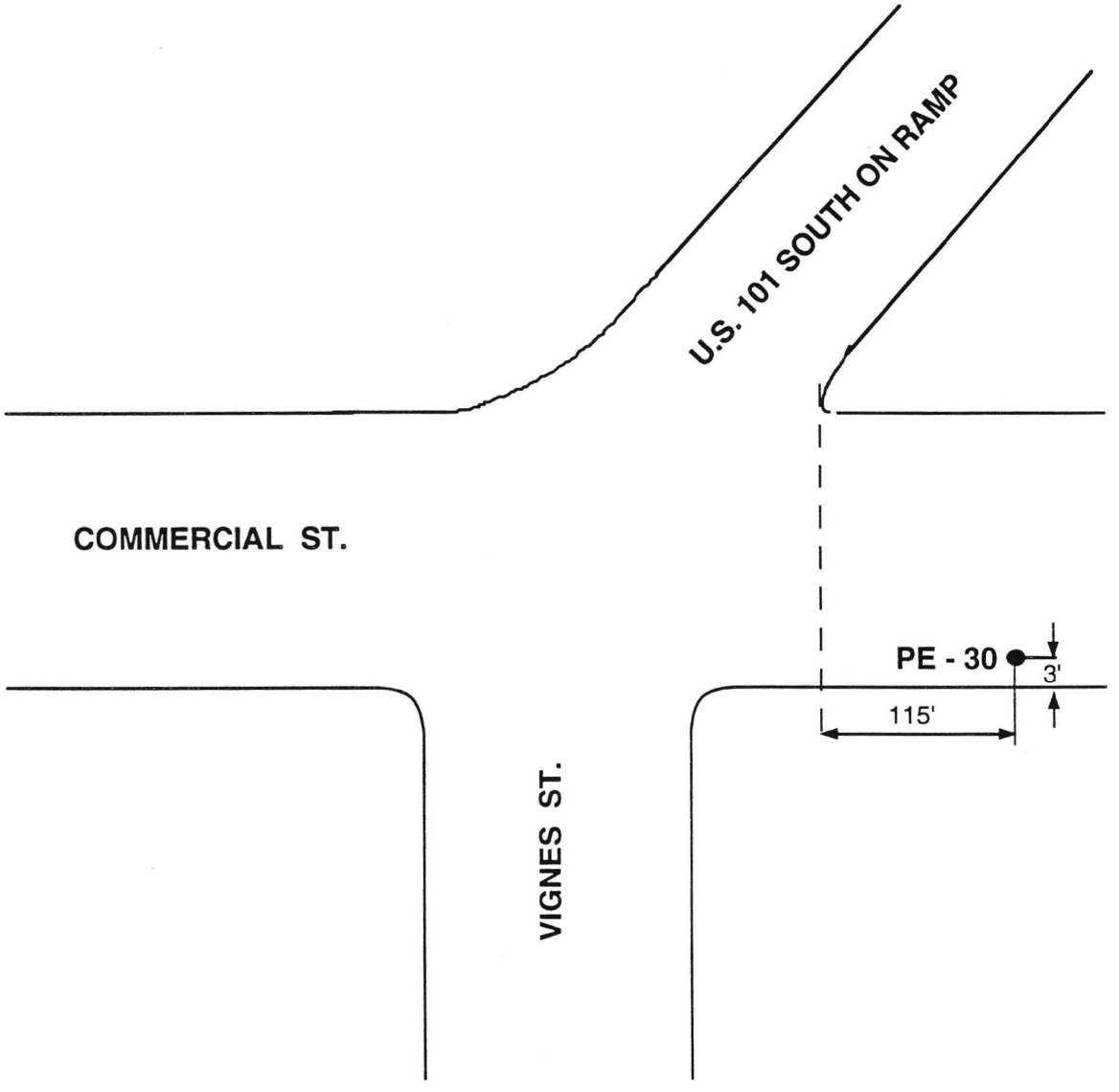
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GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: PE-30	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content (%)	Drilling Time
		CLAYSTONE/SILTSTONE; dark olive, moist, soft rock, medium to high plasticity, massive, no obvious bedding, fresh, sulfur odor	CH/MH	Tf/Tp	15	S	33 50/3"	9/9	>1000 [7.8]			0953
		Boring terminated at 80.8 feet. Groundwater measured on 1/11/94 at 36.5 feet below surface.										
85												
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



North

Not to Scale

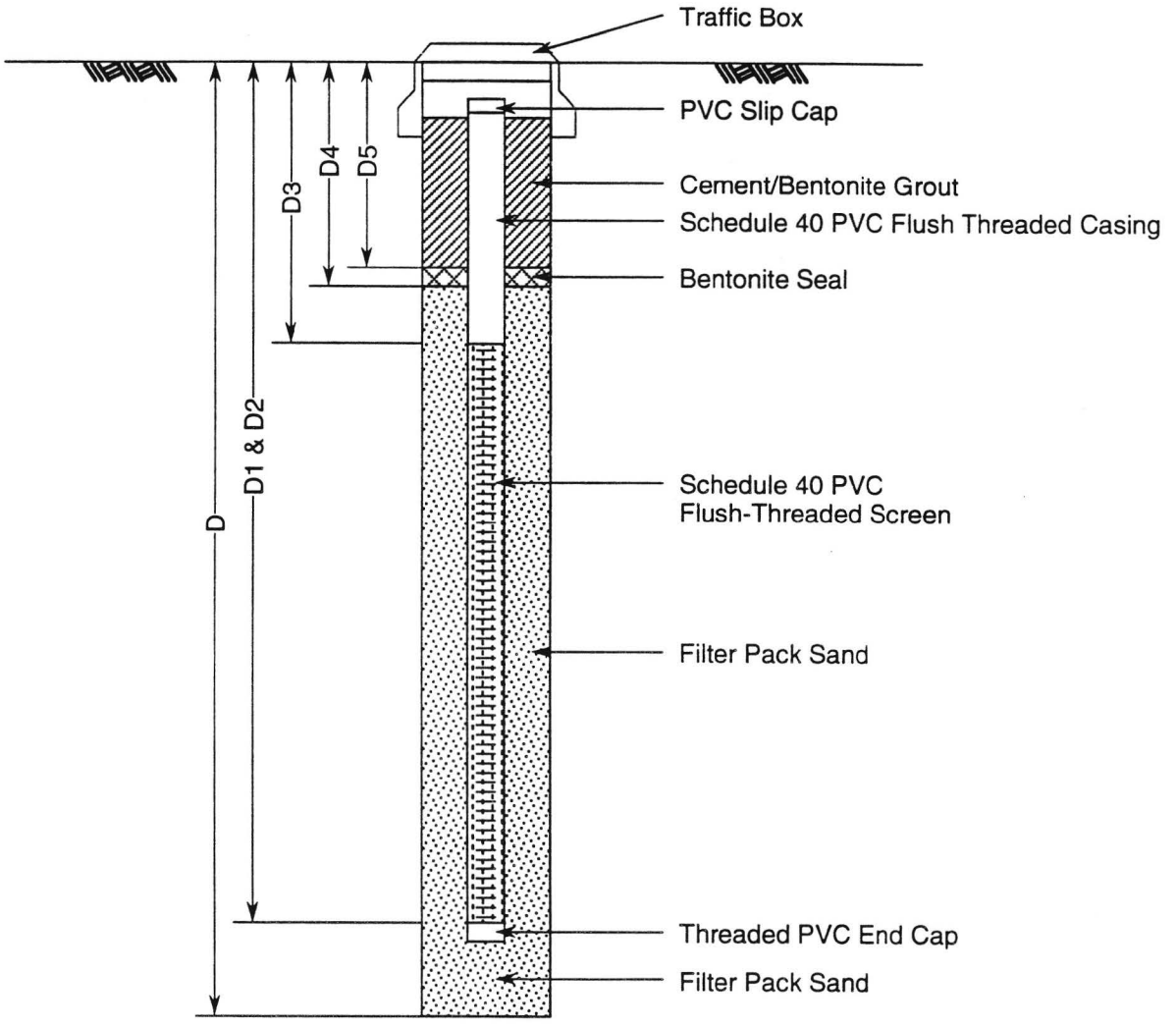
GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring
PE - 30

10-95

Figure A -28A



Total Depth (D)	=	80.8	Feet
Total Depth of Casing (D1)	=	78	Feet
Depth to Bottom of Well Screen (D2)	=	78	Feet
Depth to Top of Well Screen (D3)	=	17.5	Feet
Depth to Bottom of Top Seal (D4)	=	17	Feet
Depth to Top of Top Seal (D5)	=	14	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/2	Inch Pellets

GeoTransit Consultants

Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
PE-30

10-95

Figure A-28B

GeoTransit Consultant

Project Name:	**Metro Rail: Eastside Extension - Metro Red Line**				
Project Number:	**94-1100**	Boring Number:	**PE-31**	Sheet 1 of 4	
Boring Location:	**Jackson cul-de-sac**			Elevation and Datum(feet):	**270 MSL**
Health and Safety:	**Level D**	Date Started:	**12/13/93**	Date Finished:	**12/13/93**
Drilling Equipment:	**Mayhew 1000**	Total Depth (feet):	**83.0**	Depth to Bedrock(feet):	**73**
Drilling Method:	**Mud Rotary**	Number of Samples:	**15**	Depth to Water (feet):	**38.3**
Boring Diameter:	**5 inches**	Completion Information:	**Piezometer installed, converted to monitoring well**		
Hammer Information: **SPT Hammer: 140-lb and 30-inch drop. Downhole Hammer: 400-lb and 18-inch drop.**		Logged By: **Greg Renfrew**		Checked By: **Grant Miller**	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		FILL Asphaltic concrete to 5" and base		af								
		ALLUVIUM SILTY SAND; dark yellowish brown, moist, medium dense, fine- to medium-grained, trace clay, some gravel	SM	Qya								
5		SAND with GRAVEL; light olive brown, moist, medium dense, fine- to coarse-grained, possibly angular to subrounded gravel between 4' and 5'	SP		1	D	5 6	8/12	5.4 [5.0]	90	15	0655
10		GRAVEL with SAND/SAND with GRAVEL; yellowish brown, moist, medium dense, fine to coarse angular to mostly subangular gravel to 2-1/2" in size, fine- to coarse-grained sand, trace nonplastic silt	GP/SP		2	S	7 8 12	4/18	5.6 [5.2]			0700
15		strong brown (iron oxide stained)			3	D	17 18	6/12	6.2 [5.2]	122	11	0708

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests. where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	PE-31	Sheet 2 of 4	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	Drilling Time
		GRAVEL with SAND/SAND with GRAVEL; yellowish brown, moist, medium dense, fine to coarse subrounded to subangular gravel to 2-1/2" in size, fine- to coarse-grained sand, trace nonplastic silt	GP/SP	Qya	4	S	14 15 11	2.5/18	6.6 [5.4]			0720
25		moist to wet, dense			5	D	20 45	8/12	7.0 [5.4]		25	0735
30		very dense			6	S	3 31 35	7/18	10 [5.4]			0750
		[hard drilling] dark gray, wet, cobbles from 6" to 12" in size, gravel commonly from 1-1/2" to 3" in size, strong hydrocarbon odor			7	D	50/5"	4/5	74 [5.8]		9	0825
40		moderate hydrocarbon odor			8	S	27 57 18/1"	3/13	10 [7.2]			0850
45		4" cobble			9	D	100	3/6	10 [5.4]	119	13	0920

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	PE-31	Sheet 3 of 4	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	Drilling Time
		GRAVEL with SAND/SAND with SILT and GRAVEL; dark greenish gray, wet, very dense, fine to coarse subangular to subrounded gravel to 2" in size, fine- to coarse-grained sand, nonplastic silt, strong hydrocarbon odor	GP/SP-SM	Qya	10	S	14 34 35	6/18	10 [6.6]			0940
		interval of SILTY SAND, fine- to medium-grained, strong sulfur odor	SM									
55					11	D	35 40	8/12	20 [5.4]	111	17	1010
		SANDY CLAYEY SILT; dark greenish gray, wet, hard, medium plasticity, fine- to coarse-grained sand, trace subangular fine gravel	ML/CL									
60					12	S	21 45 33/3"	0/15	25 [7.2]			1035
		SANDY SILT/SILTY SAND/SAND; dark greenish gray, wet, hard/very dense, silt shows very thin laminations, low to medium plasticity, fine-grained sand, strong sulfur odor	ML/SM/SP									
65					13	D	18 20	9/12	280 [10]	100	27	1050
70		interval of SILTY GRAVEL, gray, fine to coarse to 1" in size	GM									
		FERNANDO/PUENTE FORMATION CLAYEY SILTSTONE; dark olive gray, moist to wet, soft rock, medium plasticity, very thinly laminated, inclined about 40 degrees to low angles at 80 feet, moderate to highly calcareous, fresh, weak sulfur odor, trace fine-grained sand, fossil shell fragments	ML/CL	Tf/Tp								
75					14	S	10 20 30	9/18	320 [6.0]			1130

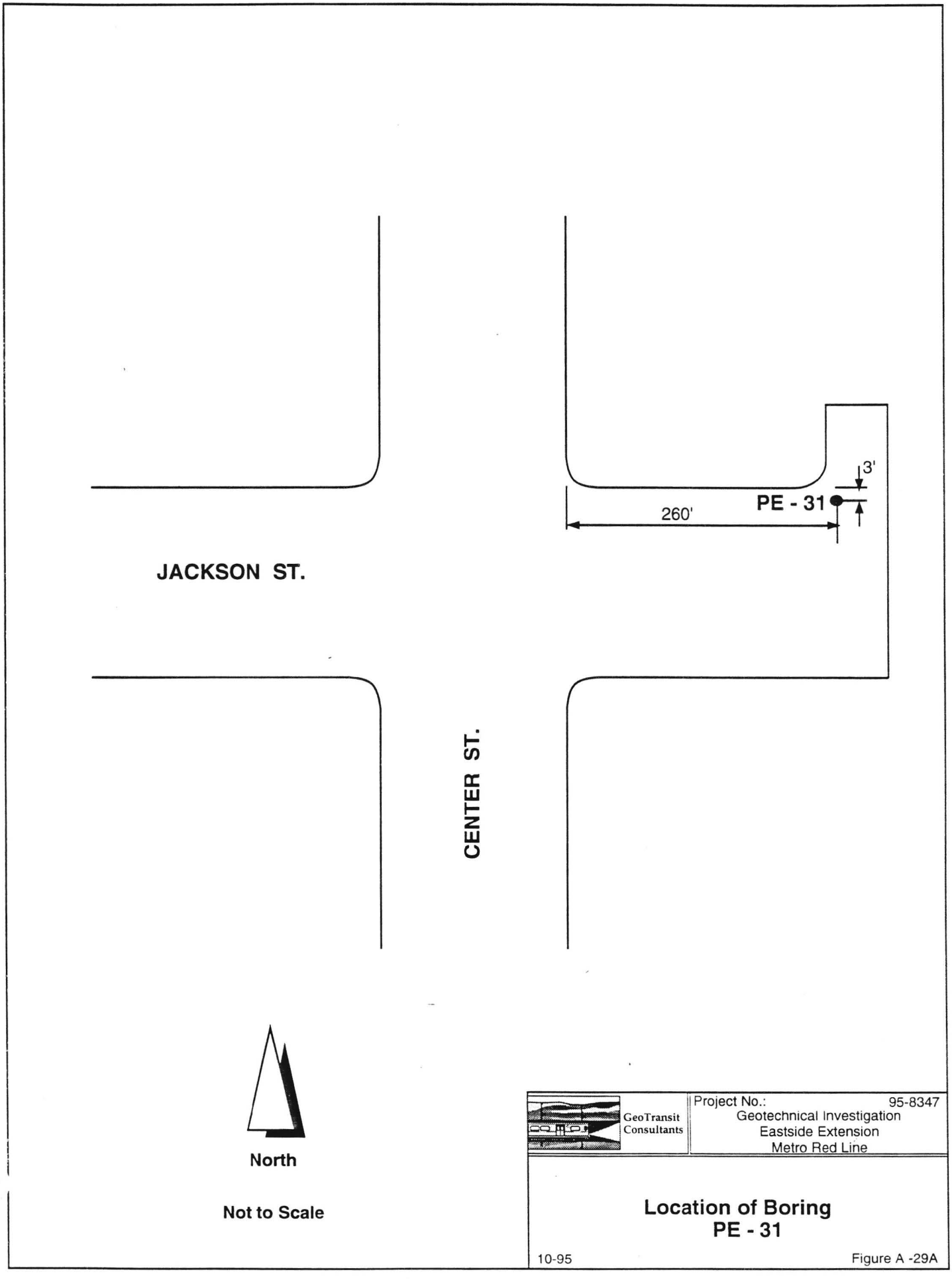
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: PE-31	Sheet 4 of 4

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Samples: Type	Samples: Blow Count (no./6 inches)	Samples: Recovery (inches/inches)	Samples: OVA (ppm) [Background]	Samples: Dry Density (pcf)	Samples: Moisture Content(%)	Drilling Time
		CLAYEY SILTSTONE; dark olive gray, moist to wet, soft rock, medium plasticity, very thinly laminated, inclined at low angles at 80 feet, moderate to highly calcareous, weak sulfur odor, trace fine-grained sand, fresh, fossil shell fragments	ML/CL	Tf/Tp	15	S	11 29 30	10/18	680 [10]			1145
		Boring terminated at 83.0 feet. Groundwater measured on 1/11/94 at 38.3 feet below surface. Note: Adjacent cut exposes occasional large cobbles (to 12") about 10 feet below street level.										
85												
90												
95												
100												
105												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent approximate boundaries between subsurface material types and the transitions may be gradual.



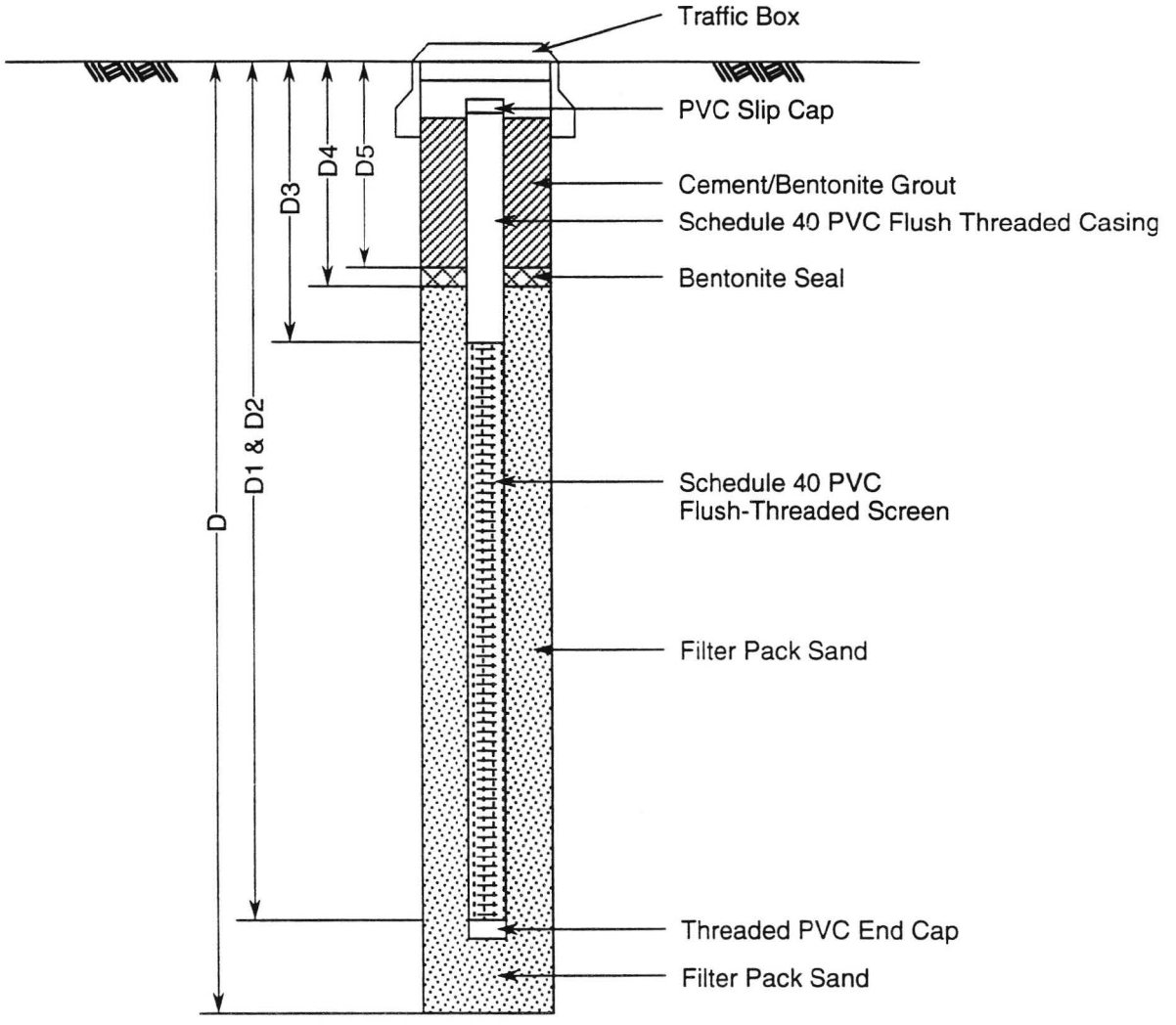
GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring
PE - 31

10-95

Figure A -29A



Total Depth (D)	=	83	Feet
Total Depth of Casing (D1)	=	80	Feet
Depth to Bottom of Well Screen (D2)	=	80	Feet
Depth to Top of Well Screen (D3)	=	20	Feet
Depth to Bottom of Top Seal (D4)	=	17.8	Feet
Depth to Top of Top Seal (D5)	=	14.4	Feet
Well Casing Diameter	=	2	Inches
Well Screen Slot Size	=	0.01	Inch
Filter Pack Sand Type	=	#2/12	Monterey
Bentonite Seal Type	=	1/2	Inch Pellets

GeoTransit Consultants

Project No. 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Piezometer Installation Schematic
PE-31

10-95

Figure A-29B

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number:	DD- 8
Sheet 1 of 7			
Boring Location:	Santa Fe Avenue	Elevation(feet):	268.0
Health and Safety:	Level D	Date Started:	4/13/94
Date Finished:	4/18/94		
Drilling Equipment:	CME75HT&Speedstar25K	Total Depth (feet):	96.2
Depth to Bedrock(feet):	49		
Drilling Method:	Hollow-Stem & Mud Rotary	Number of Samples:	18
Depth to Water (feet):	45		
Boring Diameter:	8 inches	Completion Information:	Grouted to Surface
Hammer Information:	140-lb automatic and uphole, 30" drop	Logged By:	Greg Renfrew
Checked By:	Grant Miller		

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		Asphaltic Concrete and Concrete		Fill								
		CLAYEY SILT to SILTY SAND; brownish yellow, dry to moist, medium stiff to loose, low to high plasticity clay and silt, fine-grained sand [Hand augered to 5' depth]	ML-CL /SM									
		increased sand content, clean										
		color becomes dark yellowish brown										
5					1	D	2 3	12/12	1.2 [1.1]	71	47	.4 [.2]
		SAND and GRAVEL; yellowish brown, moist, loose, fine- to coarse-grained sand, subangular to angular granitic gravel to 2", trace silt, micaceous	SW/GW	Young Alluvial Deposits								
					2	S	2 3	12/18	1.3 [1.1]			.2 [.2]

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: DD- 8	Sheet 2 of 7

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND and GRAVEL; yellowish brown, moist, loose, fine- to coarse-grained sand with mostly medium-grained, fine gravel	SW/GW	Young Alluvial Deposits			3					
15		medium dense, gravel to 1 1/2" in size			3	D	8 15	7/12	1.7 [1.1]	122	8	.8 [.2]
20		dense, with blackened (carbonaceous ?) fine to coarse gravel to 2 1/2"			4	S	12 26 27	17/18	1.2 [1.1]			.6 [.2]

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: DD- 8	Sheet 3 of 7

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND and GRAVEL; yellowish brown, moist, dense, fine- to coarse-grained sand, subangular to angular granitic gravel to 2 1/2", carbonaceous	SW/GW	Young Alluvial Deposits	5	D	16 30	10/12	1.5 [1.1]	112	2	.4 [.2]
30		SAND; brownish yellow, moist, medium dense, fine-grained, trace silt, micaceous	SP		6	S	4 4 6	18/18	1.5 [1.1]			.4 [.2]
		SAND and GRAVEL; yellowish brown, moist, dense, fine- to medium-grained sand	SP/GP									
35		angular gravel to 2 1/2" in size			7	D	86 54	10/12	4.8 [1.3]	126	4	.6 [.2]
		GRAVEL; yellowish brown, subangular coarse gravel and cobbles to 3 1/2" in size [rig chatter]	GP									
		SAND and GRAVEL; yellowish brown	SP/GP									
		interval of GRAVEL; coarse [rig chatter]	GP									
		SAND and GRAVEL; with cobbles to 4" in size	SP/GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: DD- 8	Sheet 4 of 7

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND and GRAVEL; mostly fine- to medium-grained sand, angular rock fragments >1.5", trace cobbles to 4"	GP/SP	Young Alluvial Deposits	8	S	75 25/1"	7/7	1.5 [1.1]			.8 [.2]
		GRAVEL and COBBLES; to 12" [extremely hard drilling] [refusal with hollow-stem auger rig at 42.5 feet; drill with mud rotary to 50.2 feet; cored to 57 feet with no recovery; Switched back to hollow-stem auger and continue to total depth of boring]	GP			D	4 105	0/12				
45		SAND and GRAVEL with SILT; dark gray to dark greenish gray, moist to wet, very dense, fine- to medium-grained sand, fine to coarse gravel, cobbles to 4", faint hydrocarbon odor [attempted to sample at 44.3' with no recovery]	SP-SM / GP-GM		9	D	6 70	12/12	1.6 [1.1]			.8 [.2]
50		CLAYEY SILTSTONE; dark olive gray, moist to wet, very soft, fresh, laminated, mostly low angle bedding with some undulation, trace subrounded fine gravel, calcareous, trace fossil worm tubes, trace white fine-grained sand, strong reaction with HCl [140lb uphole hammer used for 10S] [cored from 51.7' to 57' with no recovery]	ML/CL	Tf	10	S	17 44 56/5.5"	10/ 17.5	1.3 [1.1]			.6 [.2]
					1	C		0/ 40.1				

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: DD- 8	Sheet 5 of 7

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		CLAYEY SILTSTONE; dark olive gray, moist to wet, very soft, fresh, laminated, mostly low angle bedding with some undulation, calcareous, trace fossil worm tubes, trace white fine-grained sand, strong reaction with HCl	ML/CL	Tf	2	C		0/24				
					11	D	30 91	9/12	1.4 [.8]	96	26	.2 [.1]
60		micro shell fragments, some cross bedding about 20 degree dip, trace white fine-grained extremely thin sand lenses, decreased clay										
					12	S	8 14 20	18/18	4.6 [.8]			.2 [.1]
65		moist, very stiff										
					13	D	4 10	11/12	14 [.8]	101	25	.4 [.1]

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number: DD- 8	Sheet 6 of 7

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		CLAYEY SILTSTONE; dark olive gray, moist to wet, very soft, fresh, laminated, mostly low angle bedding with some undulation, calcareous, trace fossil worm tubes, trace white fine-grained sand, strong reaction with HCl	ML/CL	Tf								
75					14	S	4 9 15	18/18	52 [.6]			.2 [.1]
					15	D	9 17	12/12	29 [.8]	97	25	.3 [.1]
80		cross bedding approximately 30 degree dip, common shell fragments										
					16	S	5 10 16	18/18	62 [.8]			.4 [.1]

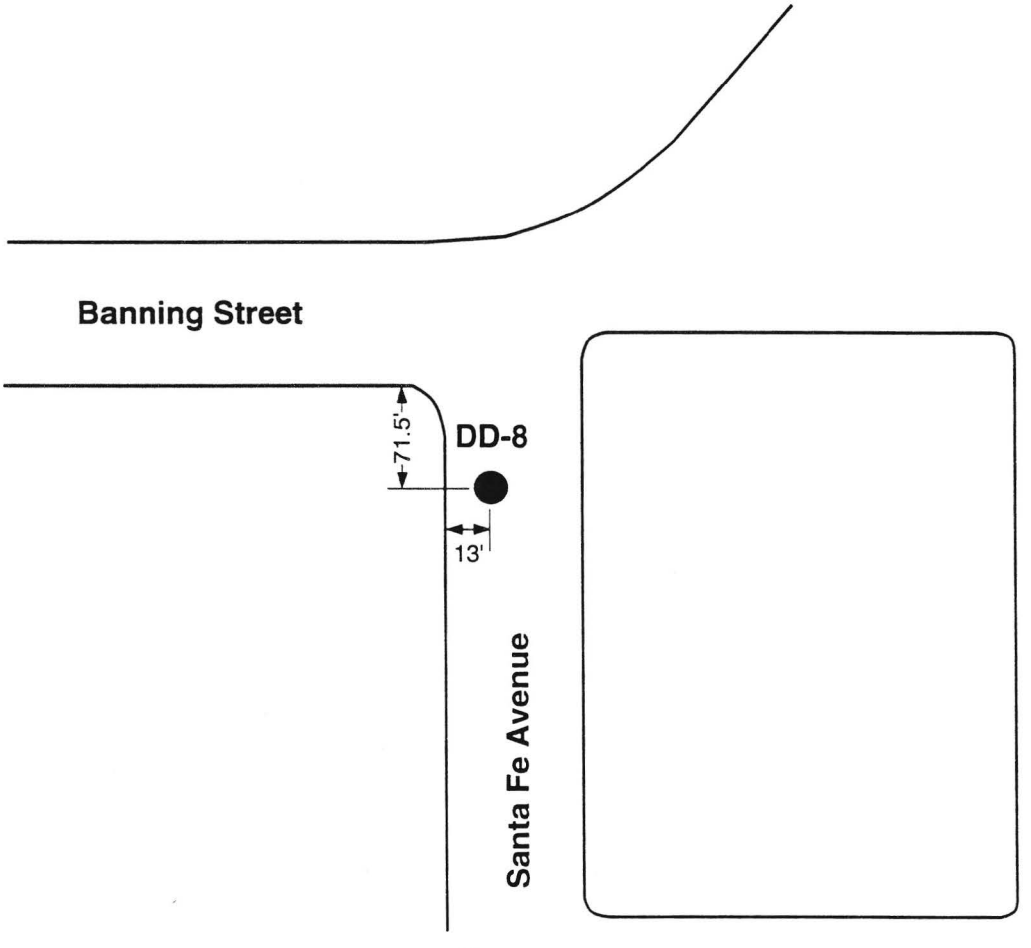
Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	DD- 8	Sheet 7 of 7	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		CLAYEY SILTSTONE; dark olive gray, moist to wet, very soft, fresh, laminated, cross bedding to 30 degrees, calcareous, trace fossil worm tubes, trace white fine-grained sand, strong reaction with HCl, common shell fragments, 1/4" thick laminations at 86'	ML/CL	Tf								
90		some cross bedding inclined 20 degrees			17	D	70 17	10/12	23 [.8]	101	24	.2 [.1]
95		poorly laminated			18	S	5 8 14	18/18	31 [.8]			.2 [.1]
		Boring terminated at 96.2 feet. Free groundwater possibly observed at 45 feet. Note: Refusal at 42.5' with CME 75 HT using 8" augers. Drilled with Speedstar 25K Mud Rotary to 50.2' and sampled with split spoon. Cored from 51.6' to 55' and from 55' to 57' with no success. Completed boring with CME 75 HT using 8" augers.										

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.



GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring
DD-8

10-95

Figure A-30

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number:	DD-11
Sheet	1 of 8		
Boring Location:	Santa Fe Avenue	Elevation(feet):	268.0
Health and Safety:	Level D	Date Started:	4/12/94
Date Finished:	4/12/94		
Drilling Equipment:	CME-75 High Torque	Total Depth (feet):	102.0
Depth to Bedrock(feet):	---		
Drilling Method:	Hollow-Stem Auger	Number of Samples:	20
Depth to Water (feet):	89		
Boring Diameter:	8 inches	Completion Information:	Grouted to Surface
Hammer Information:	140-lb automatic, 30" drop	Logged By:	Greg Renfrew
Checked By:	Grant Miller		

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		Asphaltic Concrete and Concrete		Fill								
		SAND; yellowish brown, dry, medium dense, fine-grained, trace silt	SP									
5		SANDY SILT; very dark grayish brown, dry, stiff, medium plasticity, fine-grained sand, micaceous, angular granitic gravel to 3 1/2", clay skins with root pores	ML		1	D	10 12	12/12	3.6 [.8]	76	18	1.0 [.1]
		SAND; yellowish brown, moist, medium dense, fine-grained with trace medium-grained, trace silt, micaceous	SP	Young Alluvial Deposits								

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	DD-11	Sheet 2 of 8	

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		SAND; yellowish brown, moist, medium dense, fine-grained with trace medium-grained, trace silt, micaceous	SP	Young Alluvial Deposits	2	S	2 3 6	18/18	1.5 [.8]			.7 [.1]
		SAND with GRAVEL; light yellowish brown, moist, medium dense, fine- to coarse-grained, with some predominantly medium-grained sand, subrounded to subangular gravel to 1"	SW									
15		subangular granitic gravel and cobbles to 3 1/2"			3	D	8 16	12/12	2.0 [.8]	105	3	1.2 [.1]
20		subangular to platy and rounded gravel and cobbles to 3 1/2"			4	S	5 7 11	18/18	1.1 [.8]			.6 [.1]
		alternating GRAVEL and SAND layers	SP/GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
Project Number:	94-1100	Boring Number:	DD-11

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND with GRAVEL; moist, medium dense, subangular gravel to 1 3/4"	SP	Young Alluvial Deposits	5	D	6 19	12/12	1.3 [.8]	102	5	6.6 [.1]
30		dense, with coarse-grained sand, gravel to 3"			6	S	11 19 27	18/18	1.4 [1.0]			6.6 [.1]
35		strong rig chatter			7	D	26 39	12/12	1.6 [1.0]	121	4	.8 [.1]
		GRAVEL with SAND; light grayish brown to yellowish brown, moist, dense, fine gravel, trace coarse gravel to 3", medium-grained sand, trace coarse-grained sand	GP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
Project Number:	94-1100	Boring Number:	DD-11	Sheet 4	of 8

Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		GRAVEL with SAND; light grayish brown to yellowish brown, moist, dense, fine gravel, trace coarse gravel to 3", medium-grained sand, trace coarse-grained sand	GP	Young Alluvial Deposits	8	S	60 81 75	13/18	1.6 [1.0]			6.5 [.1]
						D	80/4"	0/4				
45					9	D	23 75/3"	9/9	1.5 [1.0]			6.6 [.1]
50					10	S	30 37 25	16/18	1.7 [1.0]			6.7 [.1]
		CLAYEY SILT; light olive brown, moist, very stiff, micaceous	ML		11	D	29	12/12	1.4	97	7	.3

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

GeoTransit Consultants

Project Name: **Metro Rail: Eastside Extension - Metro Red Line**

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Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND; light yellowish brown, moist, dense to very dense, medium-grained	SP	Young Alluvial Deposits			48		[1.1]			[.2]
		GRAVEL with SAND/SAND with GRAVEL; light grayish brown to yellowish brown, moist, dense to very dense, subangular to angular fine to coarse gravel to 1 1/2", medium-grained sand with trace coarse-grained sand, trace cobbles to 3"	GP/SP									
60					12	S	90 105/2"	7/8	4.0 [1.2]			3.0 [.2]
65		subangular gravel to 2 1/2" in size			13	D	26 45	11/12	1.5 [1.3]	115	4	.5 [.2]
					14	S	81	17/18	1.6			.5

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

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Project Name:	Metro Rail: Eastside Extension - Metro Red Line				
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Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content (%)	HNU (ppm) [Background]
		GRAVEL with SAND/SAND with GRAVEL; yellowish brown to olive, moist, dense to very dense, mostly subangular to angular fine gravel to 3/4", fine- to medium-grained sand	GP/SP	Young Alluvial Deposits			99 83		[1.3]			[.2]
75					15	D	90 60	10/12	1.4 [1.3]	107	6	.4 [.2]
80					16	S	37 71 107	18/18	1.9 [1.4]			.5 [.2]
		SILT; olive, moist, hard	ML									
		SAND; light gray green, moist, very dense, fine-grained, trace fine gravel and silt	SP									

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

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Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
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Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND with GRAVEL; light grayish green, moist, very dense, medium-grained sand, fine gravel	SP	Young Alluvial Deposits	17	D	75 75/2"	8/8	3.8 [1.4]	105	28	1.1 [.2]
		dark grayish green, wet, fine- to coarse-grained sand, medium-grained sand predominant, subrounded to subangular gravel to 1 1/4", trace silt, strong hydrocarbon odor			18	S	40 121 100	18/18	3.4 [1.5]			1.7 [.2]
90		trace to some gravel			19	D	41 100 /1.5"	6.5 /7.5	2.4 [1.5]			1.6 [.2]
95		moderate hydrocarbon odor			20	S	75	10/11	4.2			2.9

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.

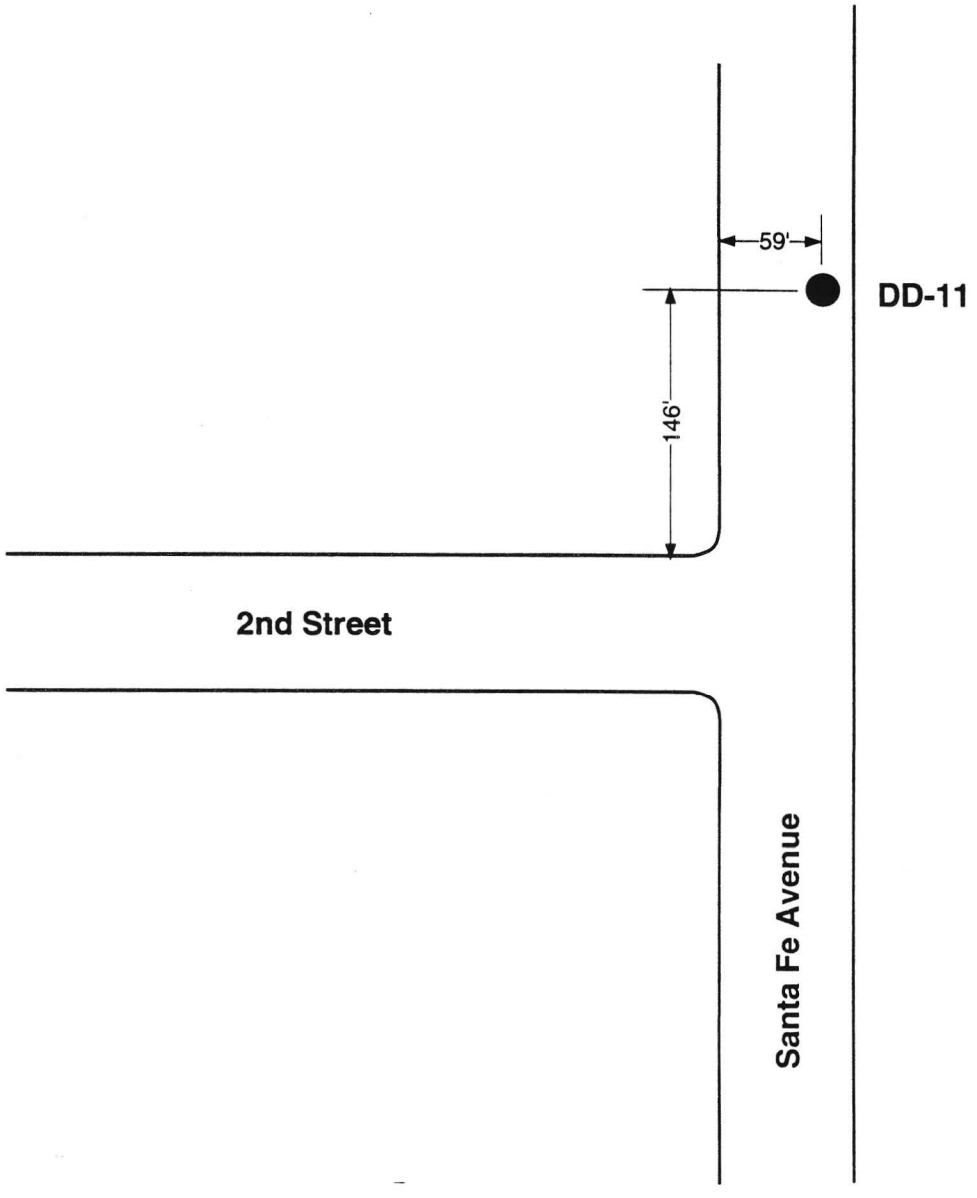
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Project Name:	Metro Rail: Eastside Extension - Metro Red Line		
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Depth (feet)	Lithology	Description	USCS Classification	Geologic Unit	Samples: Number	Type	Blow Count (no./6 inches)	Recovery (inches/inches)	OVA (ppm) [Background]	Dry Density (pcf)	Moisture Content(%)	HNU (ppm) [Background]
		SAND; olive, wet, very dense, medium-grained, subrounded to subangular gravel to 1 1/2", moderate hydrocarbon odor	SP	Young Alluvial Deposits			75/5"		[1.1]			[1.1]
		Boring terminated at 102 feet. Free groundwater encountered at 89 feet. Note: SPT blow-count criteria was exceeded in some instances in order to maximize sample recovery.										
105												
110												

Note: This boring log is based on field classification and visual soil description and is further modified to include results of laboratory classification tests, where available. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of the actual conditions encountered. Lithologic patterns are generalizations and necessarily imprecise. Lithologic contacts indicated represent the approximate boundary between subsurface material types and the transition may be gradual.



North

Not to Scale

GeoTransit Consultants

Project No.: 95-8347
Geotechnical Investigation
Eastside Extension
Metro Red Line

Location of Boring DD-11

10-95

Figure A-31

APPENDIX B

GEOTECHNICAL LABORATORY TEST RESULTS

LABORATORY TESTING

GENERAL

The results of laboratory testing performed in conjunction with this project accompany this appendix. The following laboratory tests were performed on representative samples in accordance with the latest applicable American Society for Testing Materials (ASTM) and California Department of Transportation (Caltrans) standards. Laboratory test results are summarized in Tables 3-5 and 4-3.

CLASSIFICATION

Soils were classified visually in accordance with ASTM Test Method D2488-90. Where laboratory test results were available classification was in accordance with ASTM Test Method D2487-90. The soil classifications are presented in the test data and boring logs.

MOISTURE AND IN PLACE DENSITY

The field moisture content and in place dry density determinations were performed on relatively undisturbed California Drive samples obtained from test borings. The moisture content was obtained in accordance with ASTM Test Method D2216. The in place dry density was computed using the net weight of the entire (ring) sample. The results of these tests are presented in the boring logs.

PARTICLE SIZE ANALYSIS

Grain size distribution of soil samples were obtained in accordance with ASTM Test Method D422. Laboratory test results for the grain size analysis are summarized in Table B-1. Figures B-1 through B-75 present the grain size distribution curves.

FINES CONTENT ANALYSIS

Fines content (percent passing #200 sieve) of soil samples was obtained in accordance with ASTM Test Method D1140. Laboratory test results for the fines content analysis are summarized in Table B-1.

ATTERBERG LIMITS

Tests for Atterberg Limits (Liquid Limit and Plasticity Index) were performed according to ASTM Tests Method D4318. Laboratory test results for the Atterberg Limits are summarized in Table B-2. These results are also presented along with grain size distribution curves.

SPECIFIC GRAVITY

Specific gravity tests were performed on fine-grained (passing #4 sieve) soil samples in accordance with ASTM Test Method D854.

UNCONFINED COMPRESSION TESTS

Unconfined compression tests were performed on selected relatively undisturbed soil samples in accordance with procedures outlined in ASTM Test Method D2168. The soil samples (height/diameter ratio of about 2) were subjected to a constant strain rate of 1 percent per minute. Laboratory test results for the unconfined compression tests are summarized in Table B-3 and graphically presented in Figures B-76 through B-87.

DIRECT SHEAR TESTS

Direct shear tests were performed on selected relatively undisturbed soil samples which were saturated under surcharge equal to the applied normal force during testing. The apparatus used is in conformance with the requirements outlined in ASTM Test Method D3080. The test specimens, 2.4 inches in diameter and 1 inch in height, were subjected to shear along a plane mid-height after allowing time for pore pressure dissipation prior to application of shearing force.

The samples were tested under normal loads of 2, 4, and 8 ksf or 3, 6 and 12 ksf with a different specimen being used for each normal load. Drained and undrained direct shear tests were performed on coarse- and fine-grained soil samples, respectively. The samples were sheared at constant rates of strain ranging 0.0025 inches per minute. Shearing of each specimens was continued until the shear stress became essentially constant or until a deformation of approximately 10 percent of the original diameter had been reached. Laboratory test results for the direct shear tests are summarized in Table B-4, and are graphically presented in Figures B-88 through B-97.

TRIAXIAL COMPRESSION TESTS

Consolidated undrained triaxial compression tests were performed on selected undisturbed bedrock samples in accordance with procedures outlined in ASTM D4767. The samples were saturated by the application of back pressure and tested under effective confining pressure of 20, 40, and 80 psi. The samples were sheared at constant rates of 0.008 in/min. Pore pressure was measured during shearing of each specimens. Shearing of each specimens was continued until a deformation of approximately 20 percent of the original sample height had been reached. Laboratory test results for the triaxial compression tests are summarized in Table B-5 and graphically presented in Figures B-98 through B-100.

CONSOLIDATION AND COLLAPSE TESTS

Consolidation tests were performed on selected relatively undisturbed soil samples in accordance with procedures outlined in ASTM Test Method D2435. The samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The samples (2.4 inches in diameter and 1 inch in height) were permitted to consolidate under each load increment until the slope of the characteristic linear secondary compression portion of the thickness versus log of time plot was apparent.

The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. Hydroconsolidation (collapse) and/or expansion characteristics were also evaluated by monitoring the change in volume with the addition of water while the specimen was confined under a constant normal stress. The consolidation test results are summarized in Table B-6 and are graphically presented in Figures B-101 through B-107.

TRIAXIAL PERMEABILITY TESTS

Triaxial permeability tests were performed on selected relatively undisturbed soil samples in accordance with procedures outlined in ASTM D5084. The samples were saturated by the application of back pressure and tested under an effective confining pressure equivalent to the in situ vertical stress. Water flow between the top and bottom of the sample was measured by applying a pressure head difference of 2 psi. Laboratory test results for the permeability tests are summarized in Table 3-5.

pH, CHLORIDE CONTENT, SULFIDES CONTENT, SULFATE CONTENT AND ELECTRICAL RESISTIVITY TESTS

The concentrations of water soluble sulfate ions of selected soil samples were determined in accordance with the Caltrans Method No. 417-B. Soil pH values were determined in accordance with USEPA Method 9045. Sulfides content was determined in accordance with USEPA Method 9030. Chloride content was determined in accordance with Caltrans Method No 422. Tests to determine the electrical resistivity were conducted in general accordance with Caltrans Method No. 532. Electrical resistivity tests were conducted at in situ moisture content on all samples. The results of pH, chloride content, soluble sulfate content and electrical resistivity evaluations are presented in Table B-7.

SLAKE DURABILITY TESTS

The slake durability tests were conducted on selected bedrock samples in accordance with the ASTM method D4464. The results are summarized in Table 3-5.

TABLE B-1. RESULTS OF GRAIN SIZE AND FINES CONTENT TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Grain-Size Distribution ASTM D422 GR:SA:FI [1] (%)	Percent Passing #200 Sieve ASTM D1140 (%)
DD-1	D-3	30	SP-SM •	Qya	30:63:7	-
	S-4	35	SP-SM		-	9
	D-4	40	SW-SM •		29:64:7	-
	S-5	45	SP-SM		-	10
	D-5	52	(SP-SM •)		42:52:6	-
	S-6	55	(SP-SM)		-	9
	D-6	60	(SP-SM •)		44:50:6	-
	D-7	70	SM		0:62:38	-
	S-8	72	SM		-	33
	D-8	75	SP-SM •		0:90:10	-
DD-2S	S-6	30	SW-SM	Qoa	26:62:12	-
	S-10	40.5	(SM)		29:52:19	-
	S-14	46	SW-SM		12:76:12	-
	S-20	58	SM		5:77:18	-
	S-26	72	SW-SM		27:64:9	-
DD-3	D-7	35	SW-SM •	Af	29:63:8	-
	D-8	50	(SP-SM •)	Qya	6:82:12	-
	D-9	55	SP-SM		-	6
	D-10	60	ML		0:21:79	-
	D-11	65	SW-SM •		8:85:7	-
DD-3C	D-8	40	GP	Qya	72:21:4	-
	S-10	50	(SP-SM)		34:56:10	-
	D-11	54	SM		-	18.0
	D-13	60	ML •		0:21:79	-
	D-13	65	SM		-	44.0
	S-14	69	SW-SM •		11:80:9	-
DD-3D	S-7	35	GW-GM •	Qya	57:35:8	-
DD-4	D-6	30	(SW-SM)	Qya	46:46:8	-

TABLE B-1. RESULTS OF GRAIN SIZE AND FINES CONTENT TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Grain-Size Distribution ASTM D422 GR:SA:FI [1] (%)	Percent Passing #200 Sieve ASTM D1140 (%)
DD-4	S-7	35	SP-SM		-	11
	D-8	40	GP-GM •		68:26:6	-
	D-10	50	(SW-SM •)		17:73:10	-
	D-12A	55	SM		31:48:21	-
DD-4-1	S-5	25	SW-SM	Qya	13:79:8	-
	S-7	35	(GP-GM)		51:41:8	-
	D-10	46	(SP-SM)		37:57:6	-
	S-11	49	(SP-SM)		40:52:8	-
	D-12	52	SP-SM		-	7
DD-5	2	10	SP-SM •	Qya	16:79:5	-
	3	15	SW-SM •		28:66:6	-
	5	25	SW-SM •		17:78:5	-
	6	30	SW-SM •		19:73:8	-
DD-7	D-8	40	(SP-SM •)	Qya	19:74:7	-
	D-10	50	GM		48:37:15	-
DD-9	S-7	35	SP-SM •	Qya	35:53:12	-
	D-8	45	(SC •)		14:63:23	-
	D-11	55	(SP-SM)		-	7
DD-10	S-8	30	(SP-SM •)	Qya	43:47:10	-
	D-9	35	SW-SM •		39:54:7	-
	S-10	40	SP-SM		-	8
	D-11	45	GW •		73:24:3	-
	S-14	60	SM		-	14
	S-16	70	SM		7:78:15	-
	D-17	75	SP-SM		-	9
	S-18	80	SM		6:81:13	-
	D-19	85	SM		-	14
	D-20	92.5	SP-SM •		34:54:12	-

TABLE B-1. RESULTS OF GRAIN SIZE AND FINES CONTENT TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Grain-Size Distribution ASTM D422 GR:SA:FI [1] (%)	Percent Passing #200 Sieve ASTM D1140 (%)
DD-12	D-7	30	GP •	Qya	88:10:2	-
DD-12	D-10	40	(SM)	Qya	26:57:17	-
	S-11	45	SM		-	13
	D-12	49	GP-GM •		50:44:6	-
	D-13	53	SM		-	21
	D-14	56	SM		-	46
	S-15	60	SM		25:57:18	-
	D-17	65	SP-SM •		0:92:8	-
	S-18	69	SM		-	12
	S-20	75	SM		13:69:18	-
	D-21	80	(SP-SM)		18:70:12	-
DD-65	S-4	21	SW-SM	Qya	14:74:12	-
	D-7	30	(SW-SM)		40:51:9	-
	D-10	37	(GP-GM)		50:43:7	-
	S-12	40.5	(SW-SM)		12:78:10	-
	S-15	46	SM		1:86:13	-
	S-18	52	(SW-SM)		17:71:12	-
	S-25	66	(SP-SM)		43:50:7	-
SD-1	S-4	15	SW-SM •	Qya	17:74:9	-
	S-6	25	SW-SM •		21:71:8	-
	S-8	35	SP-SM		-	8
	D-9	40	GP •		71:25:4	-
	D-12	52	ML		0:47:53	-
	D-14	60	SM		-	31
	D-16	70	SP-SM •		43:49:8	-
	S-22	95	SP-SM		-	9
SD-3	D-1	5	SP •	Qya	0:96:4	-
	S-4	20	SP-SM		-	10
SD-3	D-7	35	GP-GM	Qya	-	1

TABLE B-1. RESULTS OF GRAIN SIZE AND FINES CONTENT TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Grain-Size Distribution ASTM D422 GR:SA:FI [1] (%)	Percent Passing #200 Sieve ASTM D1140 (%)
SD-3A	S-2	40	GP-GM •	Qya	62:32:6	-
	S-8	61	SM		-	38
	D-9	65	SP-SM •		0:90:10	-
	D-11	75	(SW-SM •)		39:55:6	-
	D-14	85	SP-SM •		0:89:11	-
	D-16	92.5	ML		-	76
	D-17	95	SC-SM •		-	34
	D-22	115	SP-SM		-	8
	D-25	125	SM		-	37
SD-4	D-2	10	SM	Qya	-	14
	D-4	20	SM		1:86:13	-
	S-7	35	SW-SM •		5:88:7	-
	S-8	36	SP-SM		-	12
	D-9	40	(SP-SM •)		42:50:8	-
	S-10	45	GP-GM		-	8
	D-13	60	SM		-	45
	D-15	70	SW-SM •		8:84:8	-
	S-16	75	SM		-	41
	D-18	80	SM		1:76:23	-
SD-5	D-2	20	(SP-SM •)	Qya	15:79:6	-
	S-4	35	(SM)		-	14
	D-4	40	(SW-SM •)		22:68:10	-
	D-5	50	GP •		79:18:3	-
	D-6	60	CL •		-	77
	S-8	75	ML		-	61
	D-8	80	SP-SM •		4:84:12	-
	D-9	90	CL •		-	62

NOTES:

*** The USCS classification in () parranthesis correspond to laboratory test on finer sample portion only, it may not be representative due to the presence of gravels, cobbles and boulders in the field.

[1] GR:SA:FI = Gravel: Sand : Fines (percent passing #200 sieve)

TABLE B-2. RESULTS OF ATTERBERG LIMITS TEST

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Atterberg Limits ASTM D4318 LL,PL,PI °
DD-1	S-7	65	ML	Qya	32,25,7
DD-2S	D-21	61	CL	Qoa	37,20,17
	D-27	75.2	MH	Tf/Tp	50,35,15
	P-32	84	MH		59,31,28
DD-3	D-10	60	ML •	Qya	30,25,5
DD-4	T-20	75.5	ML	Tp/Tf	47,34,13
	T-21	78.5	ML		37,31,6
	T-24	87.5	CL		41,22,19
DD-4-1	P-16	64	ML	Tf/Tp	39,26,13
	P-20	76	ML		46,28,18
DD-7	T-18	75	CH	Tp/Tf	55,28,27
	T-19	78.5	ML		47,30,17
	T-20	81	CH		55,24,31
DD-9	D-8	45	(SC •)	Qya	31,18,13
	D-16	66.5	ML	Tp/Tf	38,27,11
	T-19	72	CH		51,23,28
DD-10	D-15	65	SC	Qya	50,18,32
SD-3A	D-17	95	SC-SM •	Qya	28,12,7
SD-4	D-20	90	ML/CL	Qya	27,20,7
SD-5	D-6	60	CL •	Qya	35,21,14
	D-9	90	CL •		30,22,8

NOTES:

*** The USCS classification in () parranthesis correspond to laboratory test on finer sample portion only, it may not be representative due to the presence of gravels, cobbles and boulders in the field.

° LL,PL,PI = Liquid Limit, Plastic Limit, Plasticity Index

TABLE B-3. RESULTS OF UNCONFINED COMPRESSION TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Unconfined Compressive Strength ASTM D2166 (ksf)
DD-2S	P-32	84	MH	Tf/Tp	8.781
DD-4	T-16	67.5	ML	Tp/Tf	14.009
	T-21	78.5	ML		9.434
DD-2S	P-32	84	MH	Tf/Tp	8.781
DD-4	T-16	67.5	ML	Tp/Tf	14.009
	T-21	78.5	ML		9.434
	T-24	87.5	CL		13.147
DD-4-1	P-16	64	ML	Tf/Tp	3.035
	P-20	76	ML		3.045
DD-7	T-14	63	ML	Tp/Tf	12.990
	T-17	72	ML		10.336
	T-20	81	CH		18.095
DD-9	T-15	64	ML	Tp/Tf	9.444
	T-19	72	CH		13.158
	T-23	84	ML		20.316

NOTE:

*** The USCS classification in () correspond to laboratory testing on finer portion only, it may not be represantative due to presence of gravels, cobbles and boulders in the field.

TABLE B-4 . RESULTS OF DIRECT SHEAR TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Direct Shear ASTM D3080 (Peak Strength)	
					Effective Cohesion (PSF)	Effective Friction Angle (DEGREES)
DD-1	D-7	70	SM	Qya	800	35
DD-3	D-10	60	ML •	Qya	600	36
DD-9	D-16	66.5	ML	Tp/Tf	800	34
DD-10	D-17	75	SP-SM	Qya	450	43
DD-12	D-17	65	SP-SM •	Qya	450	41
SD-1	D-14	60	SM	Qya	1000	35
SD-3	D-3	15	SP-SM	Qya	0	54
SD-3A	D-9	65	SP-SM •	Qya	800	36
SD-4	D-4	20	(SM)	Qya	0	45
SD-5	D-7	70	SP	Qya	0	45

NOTE:

*** The USCS classification in () correspond to laboratory test on finer sample portion only, it may not be represantative due to presence of gravels, cobbles and boulders in the field.

TABLE B-5. RESULTS OF TRIAXIAL COMPRESSION TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Triaxial Compression ASTM D3080 (Peak Strength)	
					Effective Cohesion (PSF)	Effective Friction Angle (DEGREES)
DD-4	T-24	87.5	CL	Tp/Tf	5800	25
DD-7	T-20	81	CH	Tp/Tf	4600	25
DD-9	T-19	72	CH	Tp/Tf	4000	26

NOTE:

*** The USCS classification in () parranthesis correspond to laboratory test on finer sample portion only, it may not be representative due to the presence of gravels, cobbles and boulders in the field.

TABLE B-6. RESULTS OF CONSOLIDATION TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	°Consolidation Characteristics ASTM D2435				
					Cc	Cs	Cx	Vertical Stress (KSF)	Swell(+)/ Collapse(-) (%)
DD-4	T-20	75.5	ML	Tp/Tf	0.0920	0.0220	8.5E-04	1	+0.82
	T-21	78.5	ML		0.0630	0.0120	-	10	0
DD-7	T-18	75	CH	Tp/Tf	0.0660	0.0190	-	10	+0.01
SD-3A	D-9	65	SP-SM •	Qya	0.0340	0.0050	3.5E-04	1	-0.04
	D-16	91.5	ML		0.0650	0.010	9.0E-04	1	+0.16
SD-4	D-15	70	SW-SM •	Qya	0.042	0.004	5.0E-04	1	-0.04
SD-5	D-9	90	ML •	Qya	0.050	0.011	2.5E-04	2	+0.2

NOTES:

° Cc and Cs are based on vertical strain-log stress plots, Cx is based on vertical strain-log time plot.

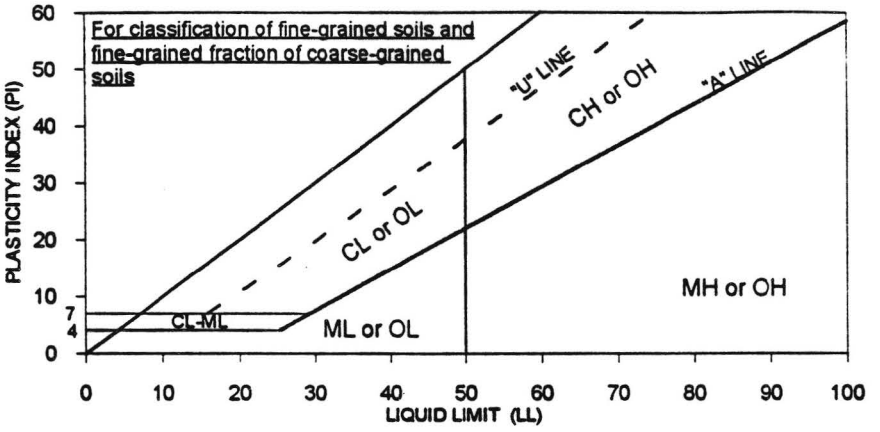
*** The USCS classification in () correspond to laboratory test on finer sample portion only, it may not be represantative due to presence of gravels, cobbles and boulders in the field.

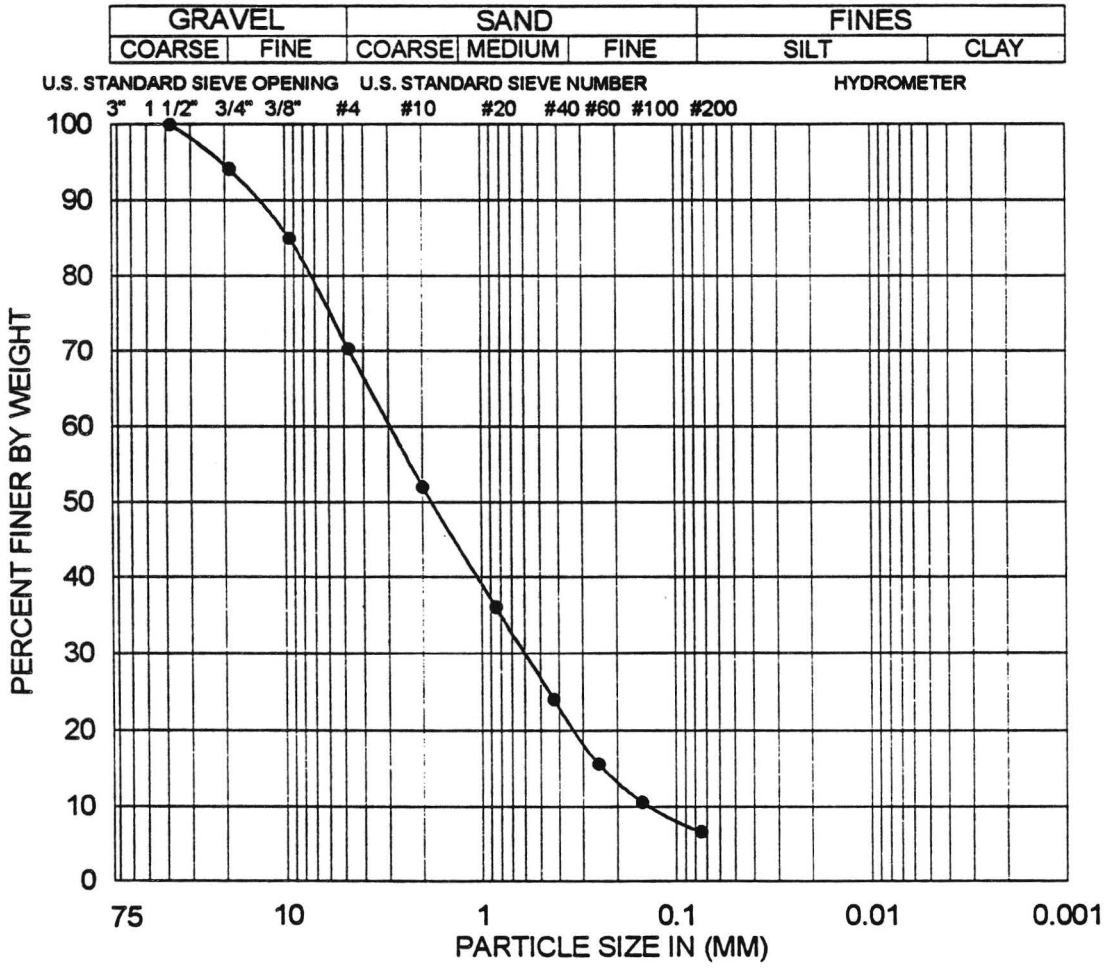
TABLE B-7. RESULTS OF CORROSIVITY TESTS

Boring Number	Sample Number	Sample Depth (ft)	USCS Classification*** ASTM D2487 • ASTM D2488	Geologic Unit	Soil pH USEPA Method 9045	Sulfate Content DOT CA Test 417-B (EPA 300) (ppm)	Chloride Content DOT CA Test 422 (EPA 300) (ppm)	Electrical Resistivity @ Insitu/saturate Moisture Content (ohm-cm)
DD-1	D-4	40	SW-SM •	Qya	7.40	52	95	2168
DD-2S	D-21	61	CL	Qoa	8.25	170	400	1165
DD-3	D-11	65	SW-SM •	Qya	7.27	201	116	5263
DD-4	S-11	52.5	SM	Qya	5.52	215	68	2143
	T-21	78.5	ML	Tp/Tf	6.45	86	169	1256
DD-4-1	P-14	58	CL/ML	Tf/Tp		(940)	(180)	
	P-16	64	ML		7.63	92	890	1601
	P-18	70	CL/ML			(690)	(150)	
	P-22	82	CL/ML			(800)	(210)	
DD-5	5	25	SW-SM •	Qya	7.18	107	72	103,550
DD-7	S-9	45	GP-GM	Qya	3.60	188	1085	2887
DD-9	D-11	55	(SP-SM)	Qya	7.61	186	81	5273
DD-10	S-16	70	SM	Qya	8.11	208	82	4810
DD-12	S-16	62	SP-SM	Qya	7.35	164	85	4810
SD-1	S-15	65	SP-SM	Qya	8.10	131	98	4545
SD-4	S-14	65	SP-SM	Qya	7.95	161	196	5556
SD-5	S-7	65	SM	Qya	5.05	131	98	2801

NOTE :

*** The USCS classification in () parranthesis correspond to laboratory test on finer sample portion only, it may not be representative due to the presence of gravels, cobbles and boulders in the field.





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-3	30.0	DRIVE	SP-SM	30:63:07	N/A

Not enough sample to meet ASTM specification

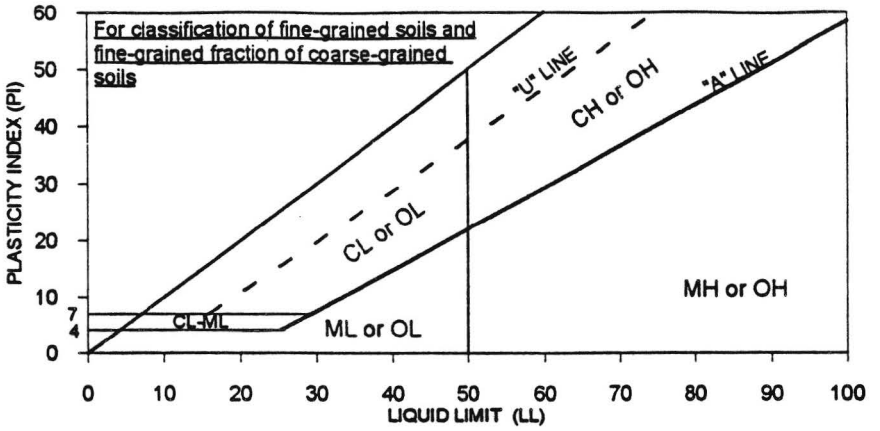
GeoTransit Consultants

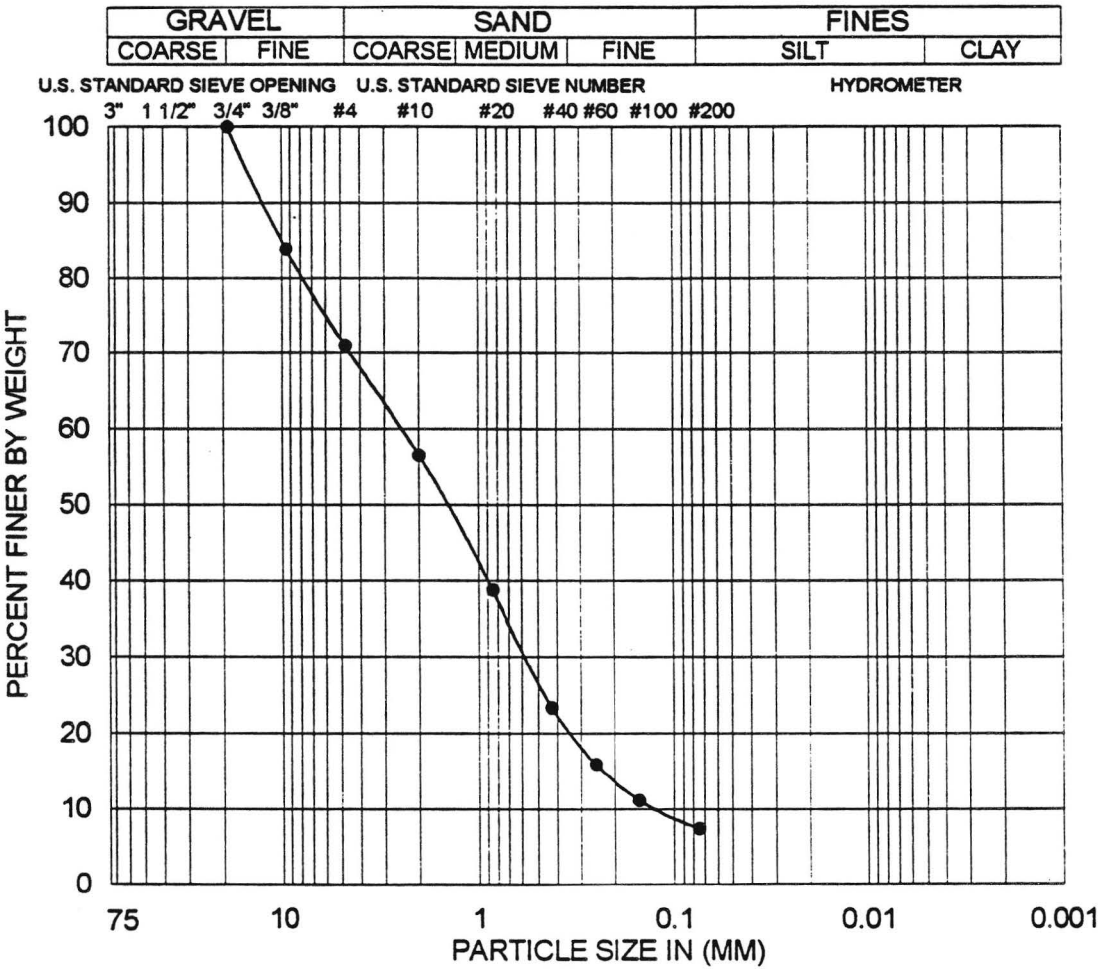
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-1





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-4	40.0	DRIVE	SW-SM	29:64:07	N/A

NOTE:
Not enough sample to meet ASTM specification

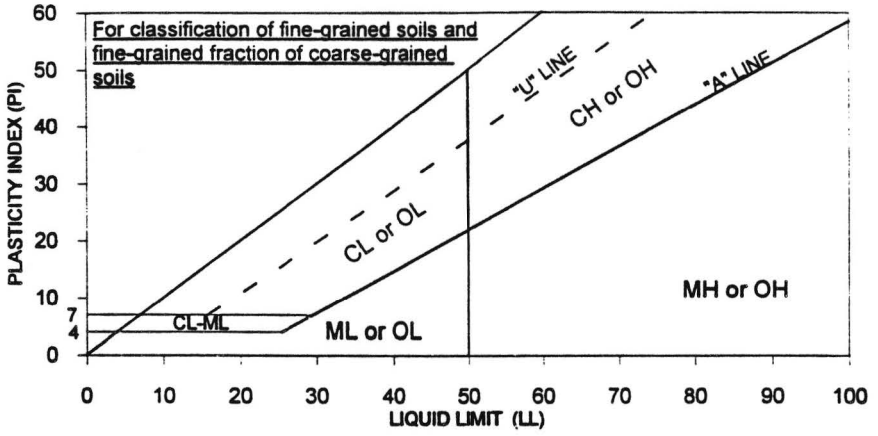
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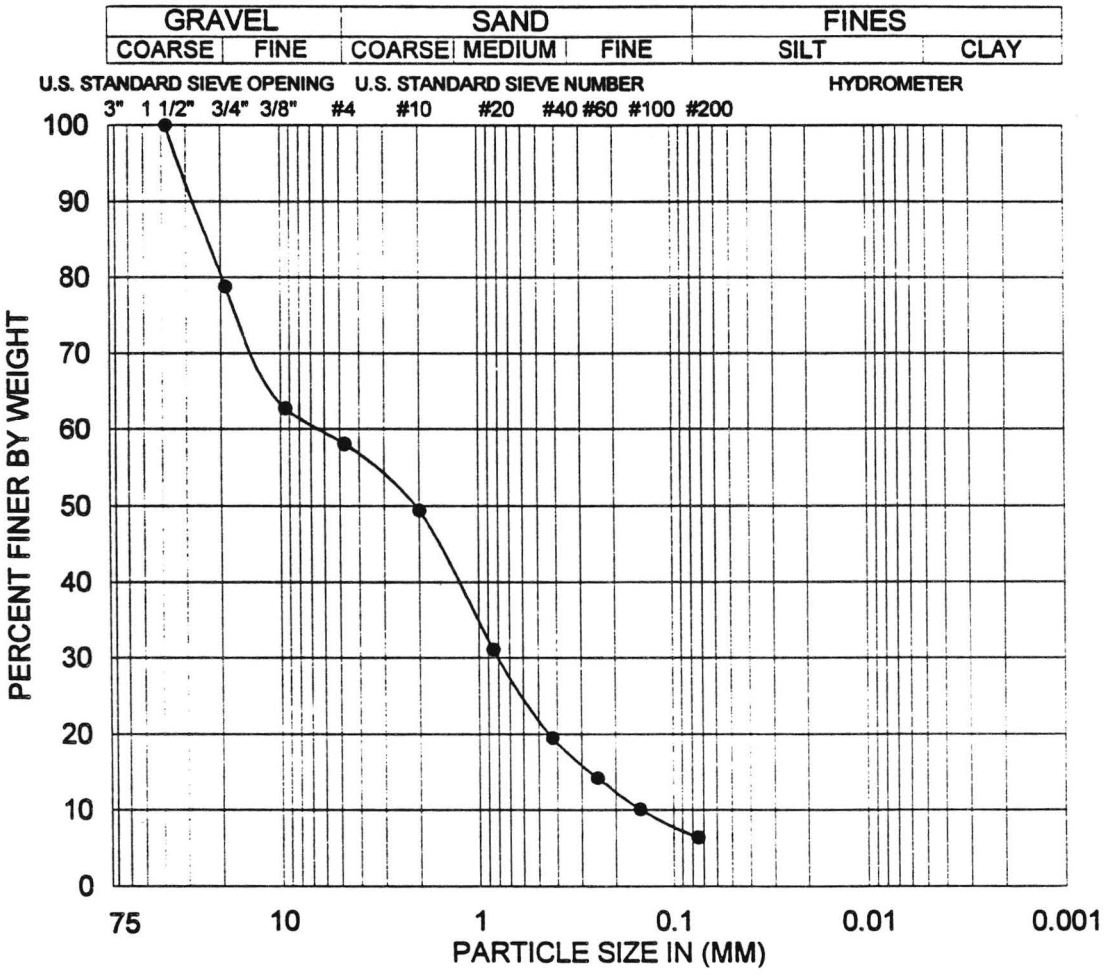
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-2





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-5	50.0	DRIVE	SP-SM	42:52:6	N/A

Not enough sample to meet ASTM specification

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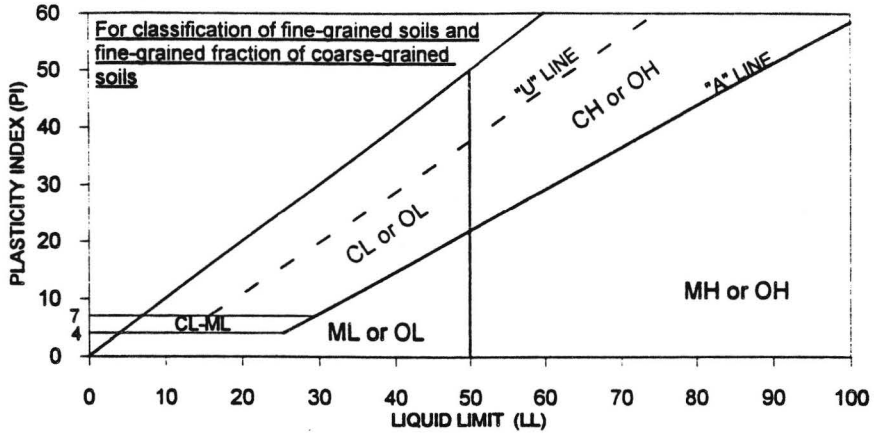
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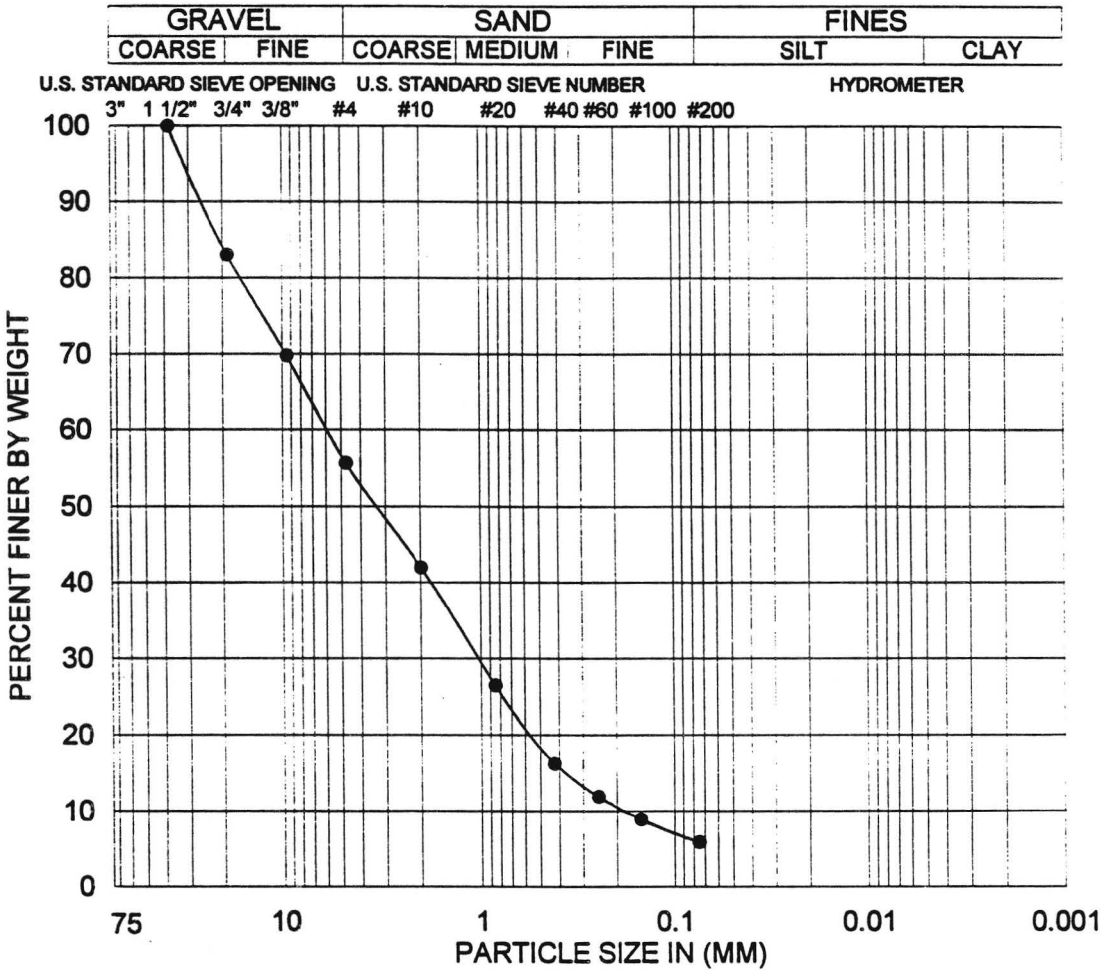
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-3





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-6	60.0	DRIVE	SP-SM	44:50:6	N/A

Not enough sample to meet ASTM specification

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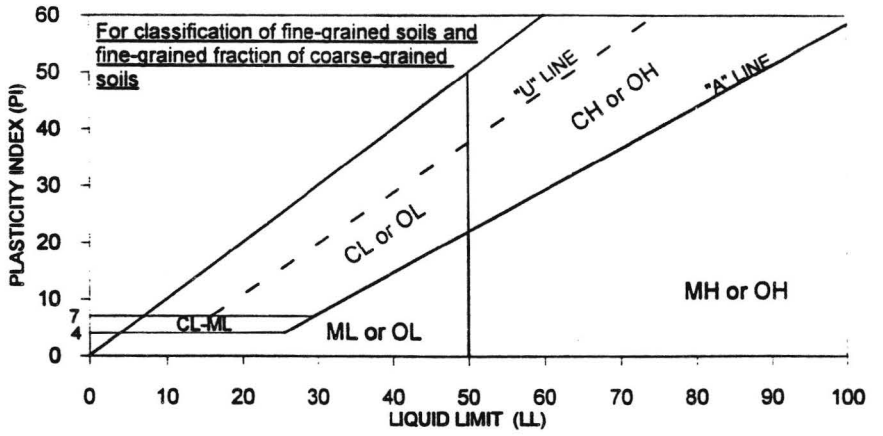
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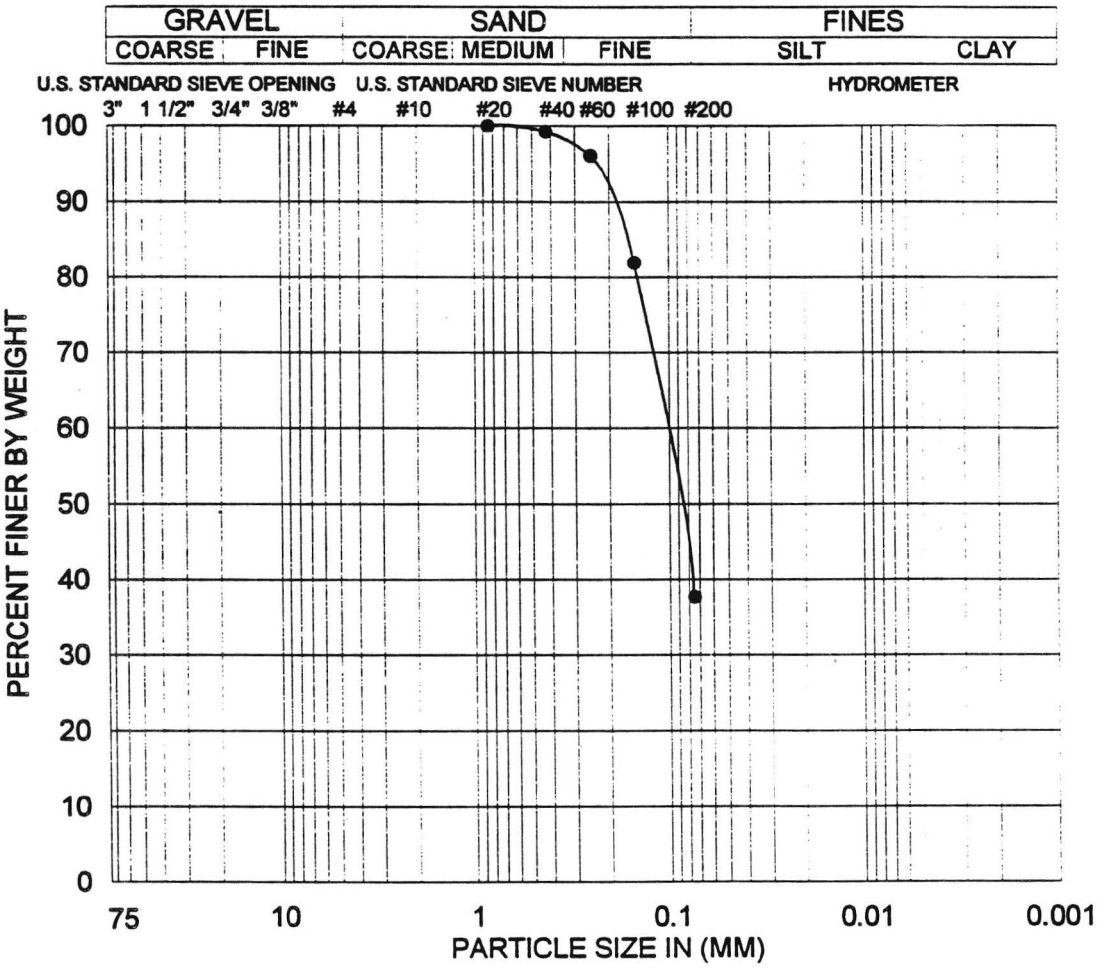
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-4





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-7	70.0	DRIVE	SM	00:62:38	N/A

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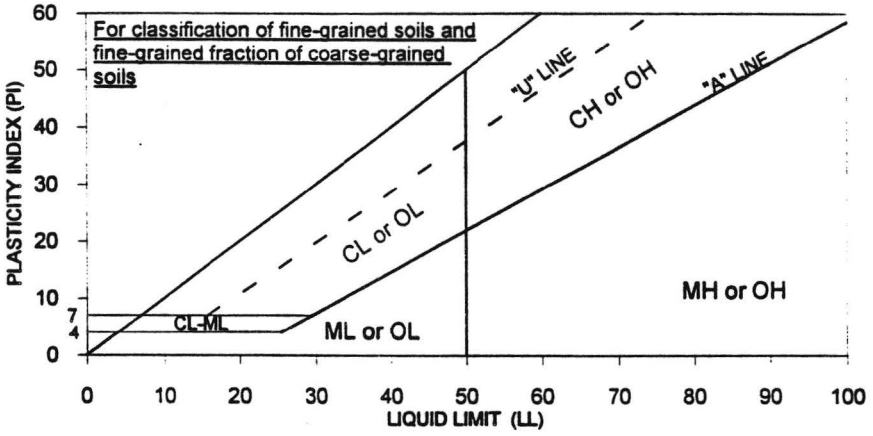
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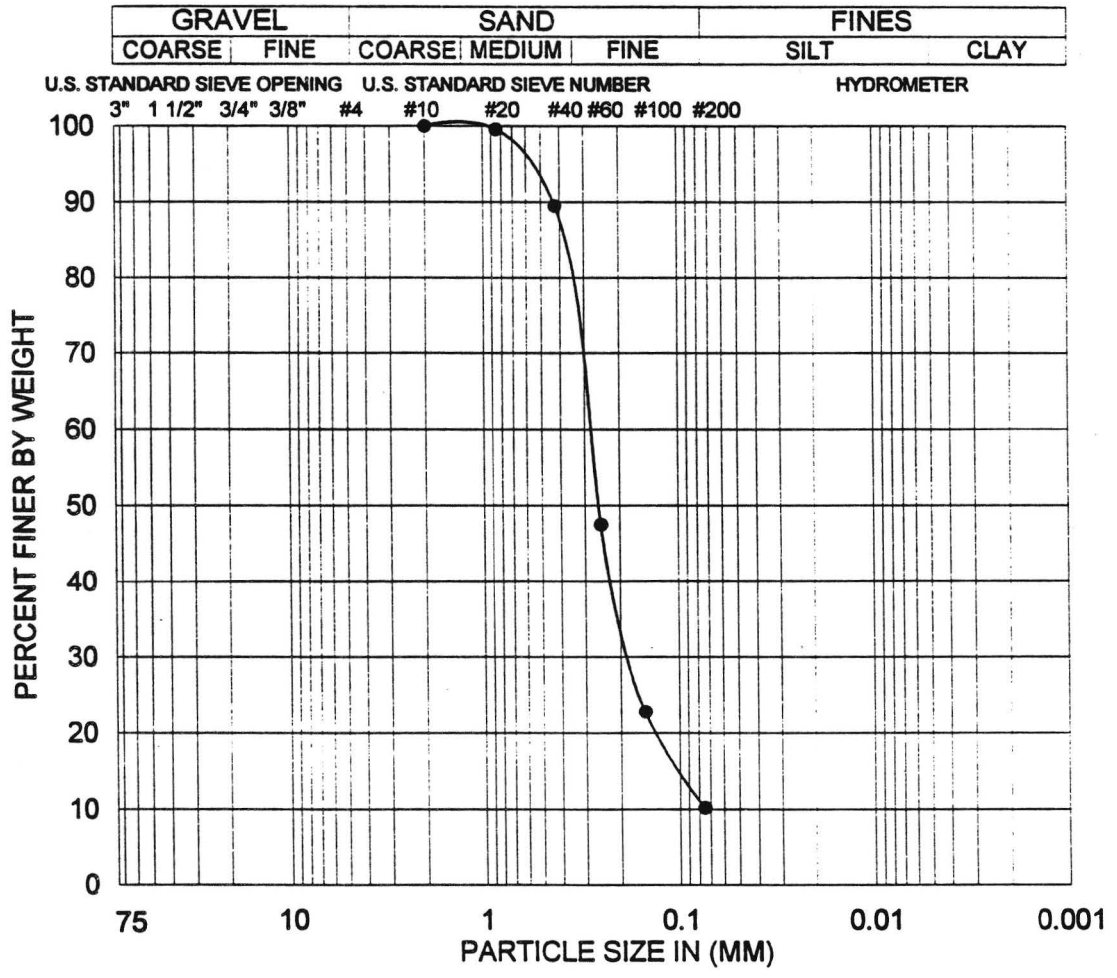
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318.D422)

08-95

Figure B-5





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-1	D-8	80.0	DRIVE	SP-SM	00:90:10	N/A

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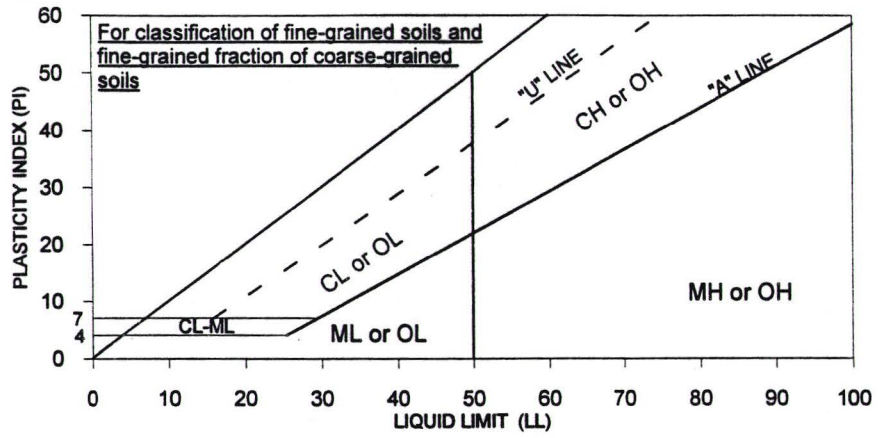
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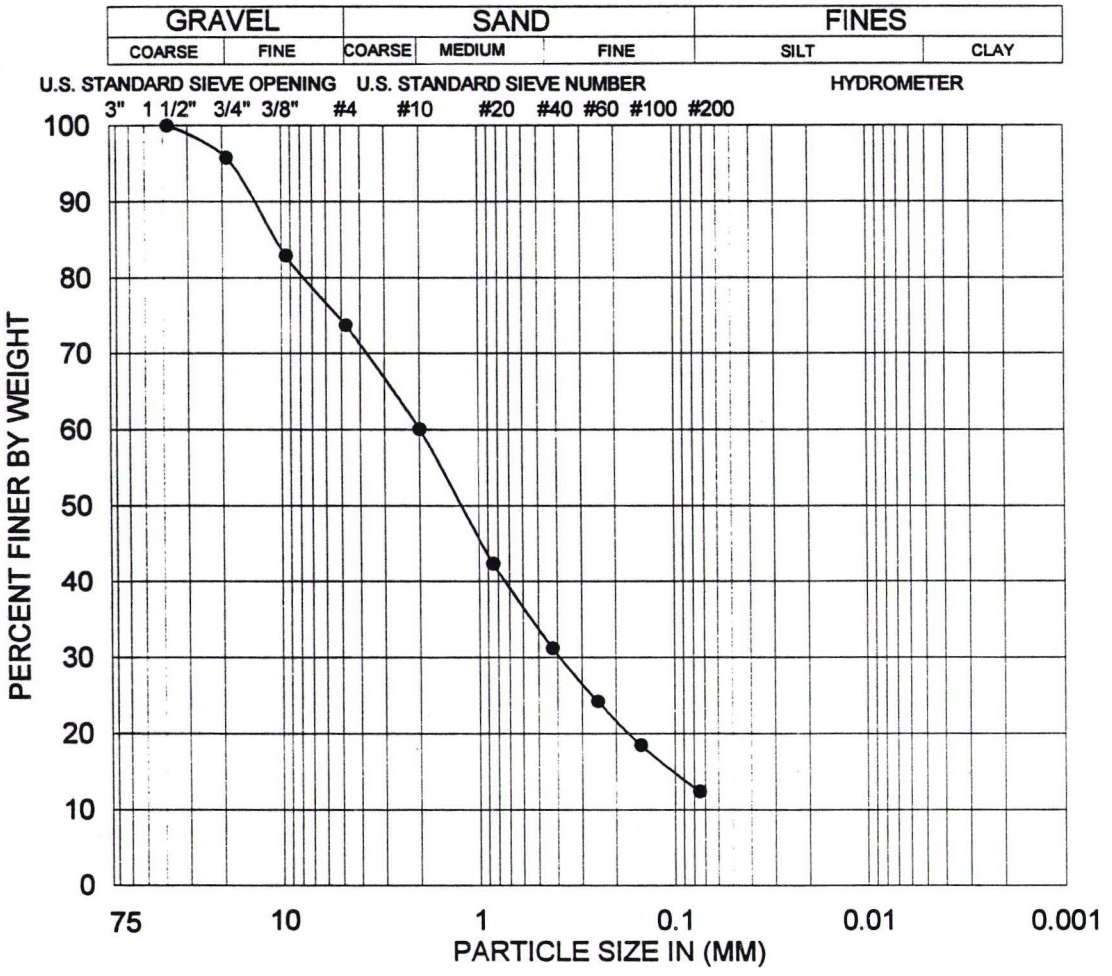
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-6





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-2S	S-6	30.0	SW-SM	26:62:12	N/A

Not enough sample to meet ASTM specification

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Eastside Extension

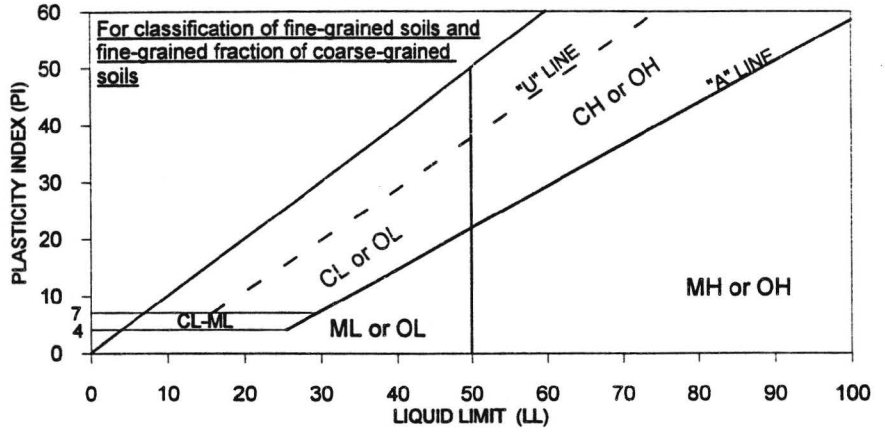
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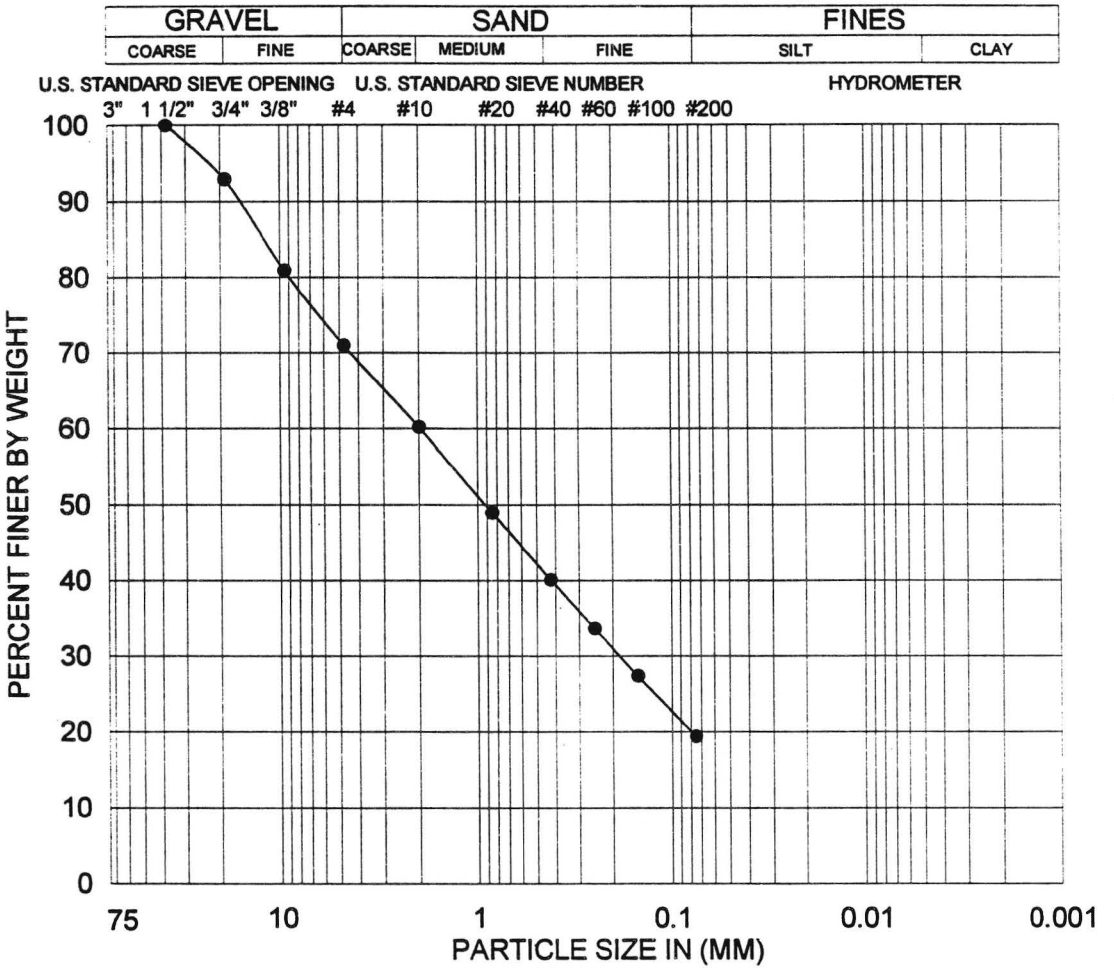
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-7





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-2S	S-10	40.5	SM	29:52:19	N/A

Not enough sample to meet ASTM specification

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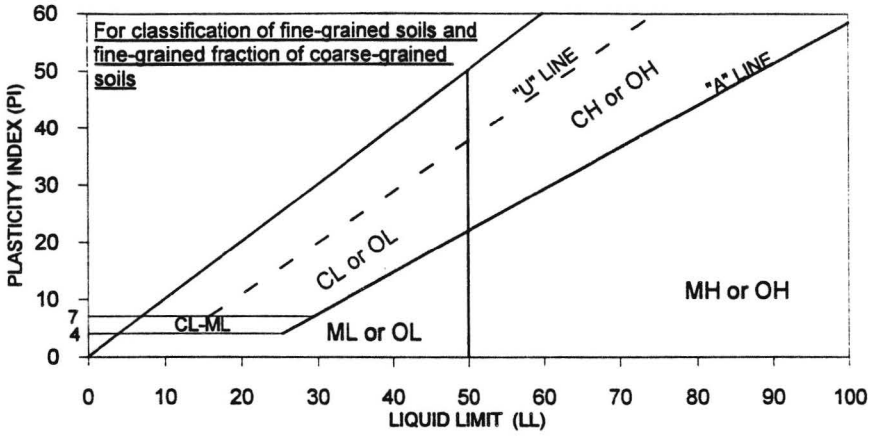
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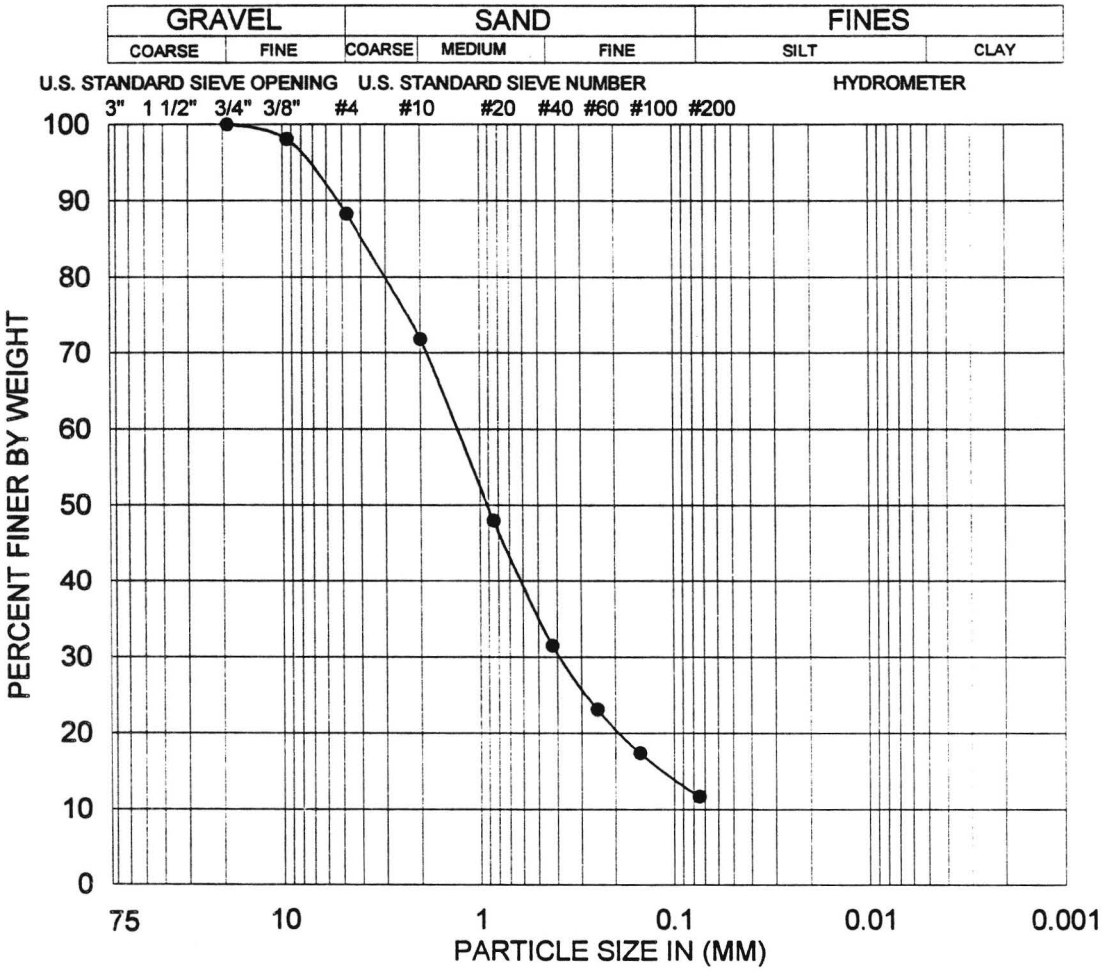
Eastside Extension
Metro Redline 1 (2)

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

12-95

Figure B-8





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-2S	S-14	46.0	SW-SM	12:76:12	N/A

Not enough sample to meet ASTM specification

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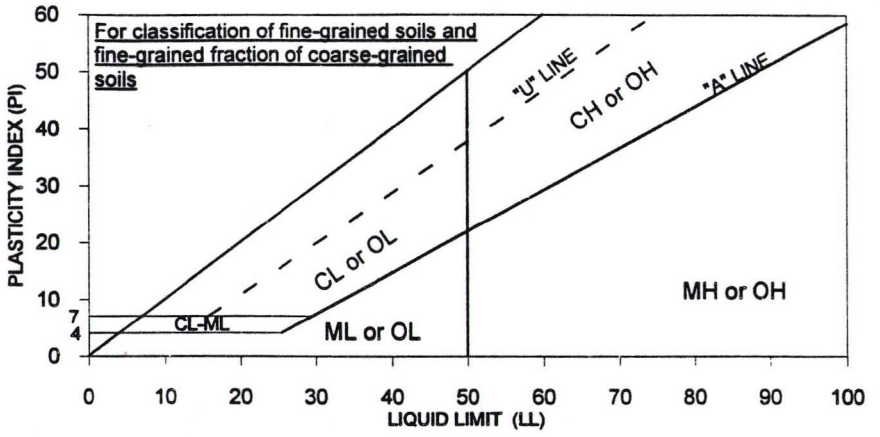
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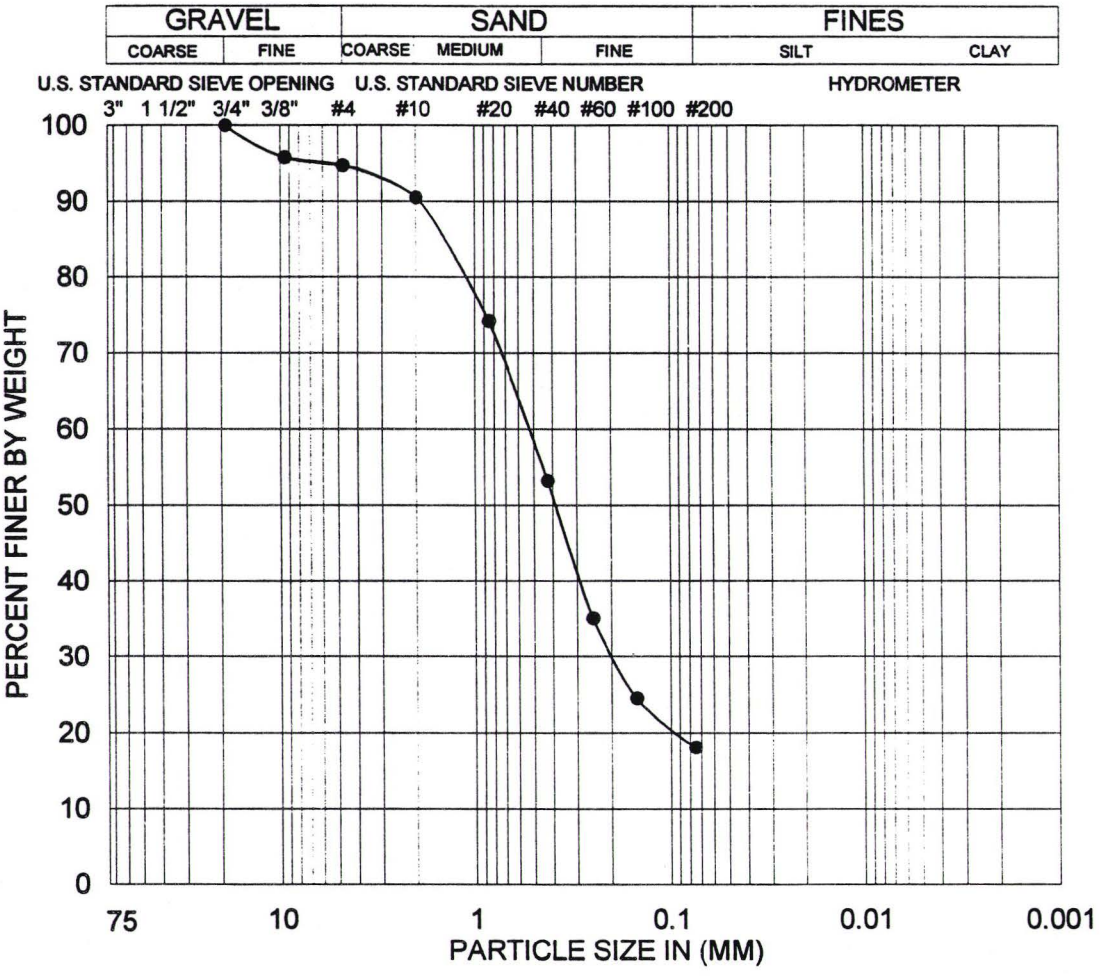
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-9





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-2S	S-20	58.0	SM	5:77:18	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-23

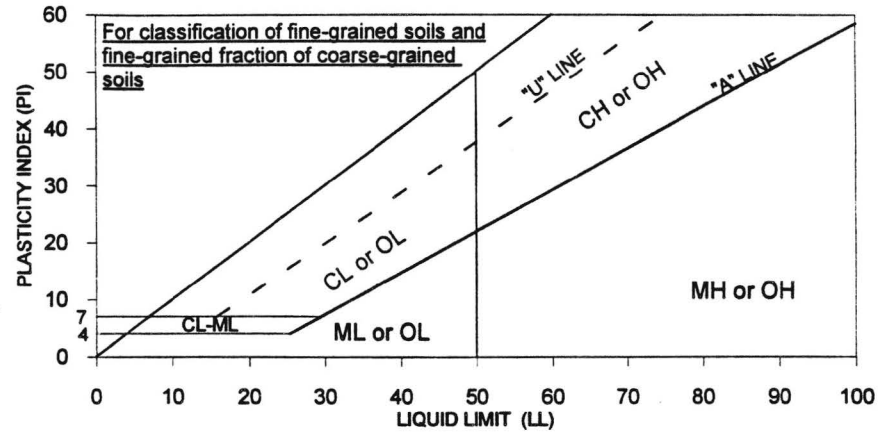
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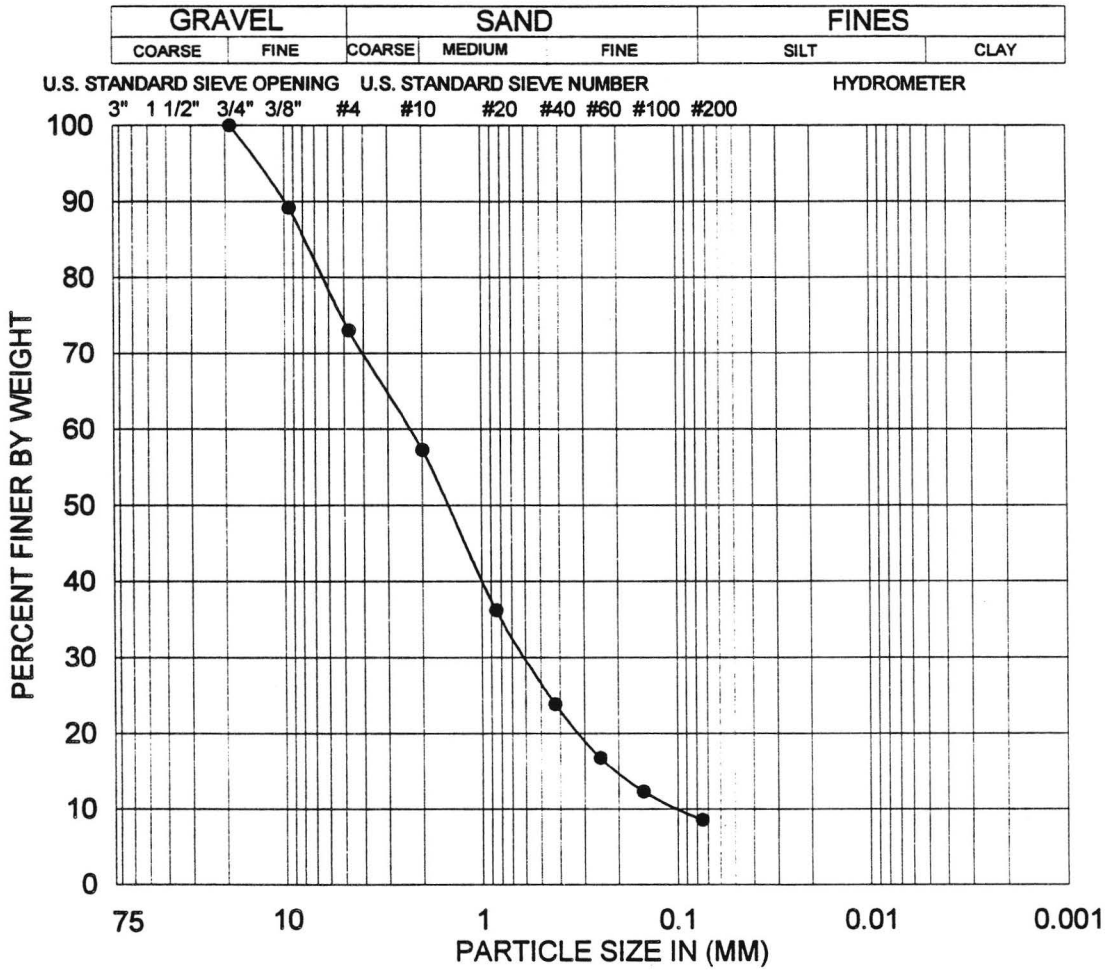
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-10





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-2S	S-26	72.0	SW-SM	27:64:9	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-23

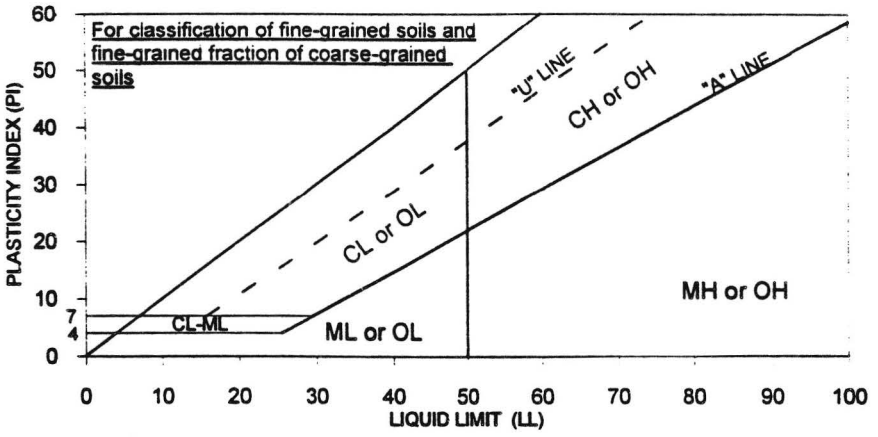
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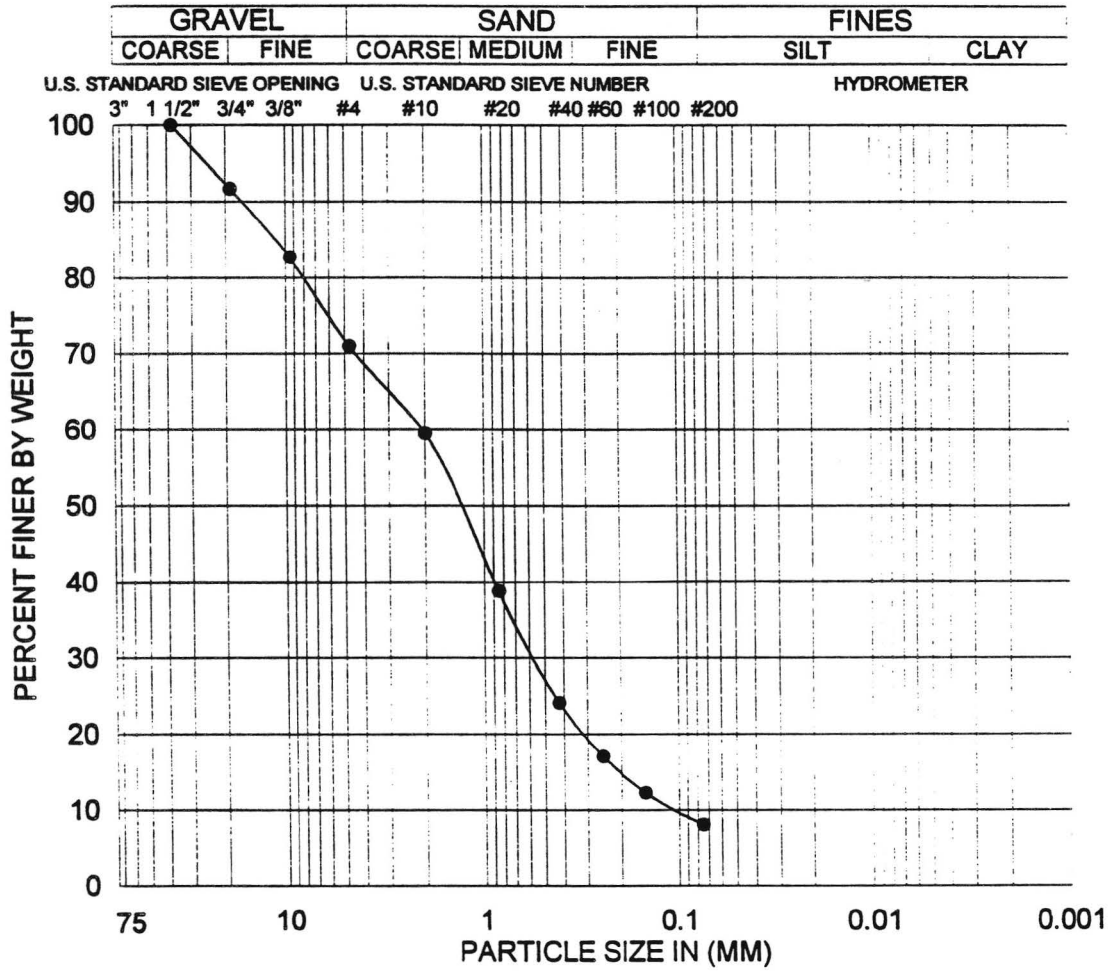
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-11





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3	D-7	35.0	DRIVE	SW-SM	29:63:8	N/A

Not enough sample to meet ASTM specification

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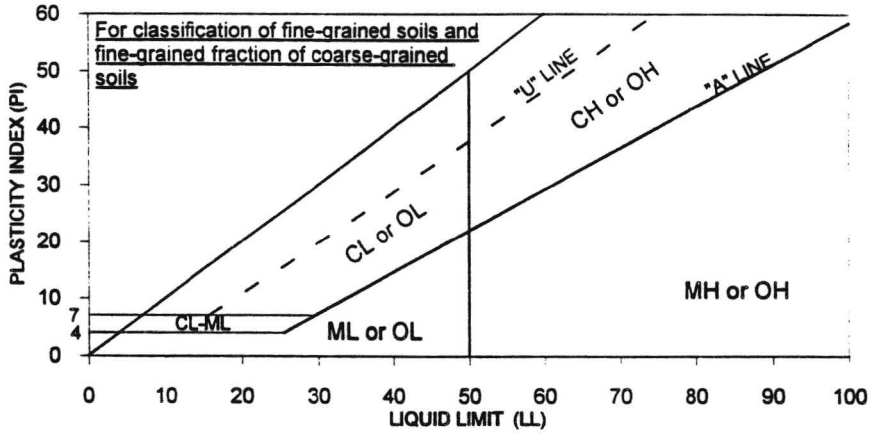
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Metro Redline

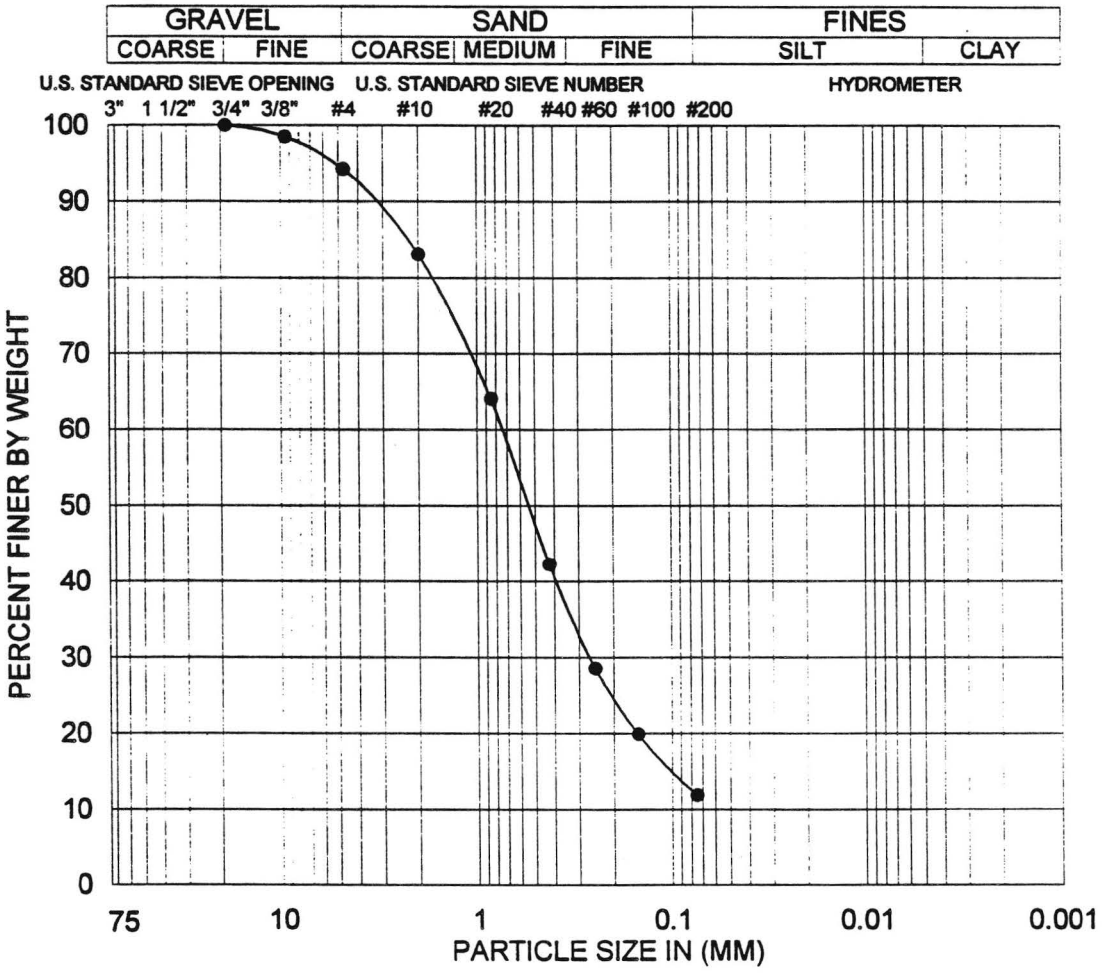
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-12





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3	D-8	50.0	DRIVE	SM	06:82:12	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-03

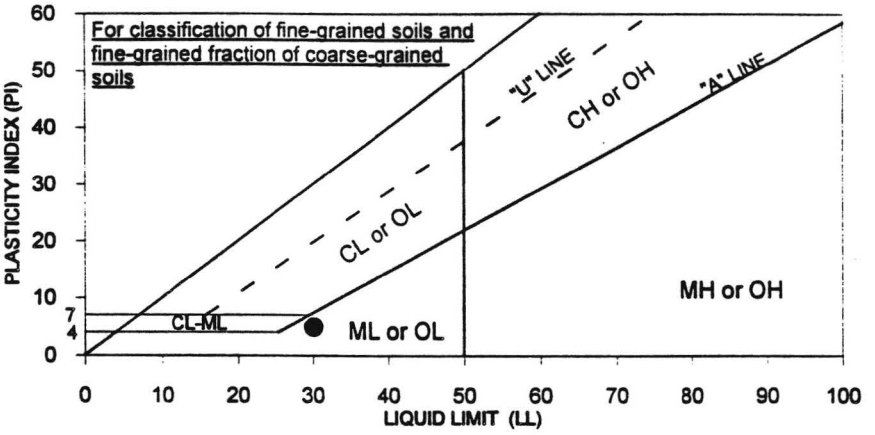
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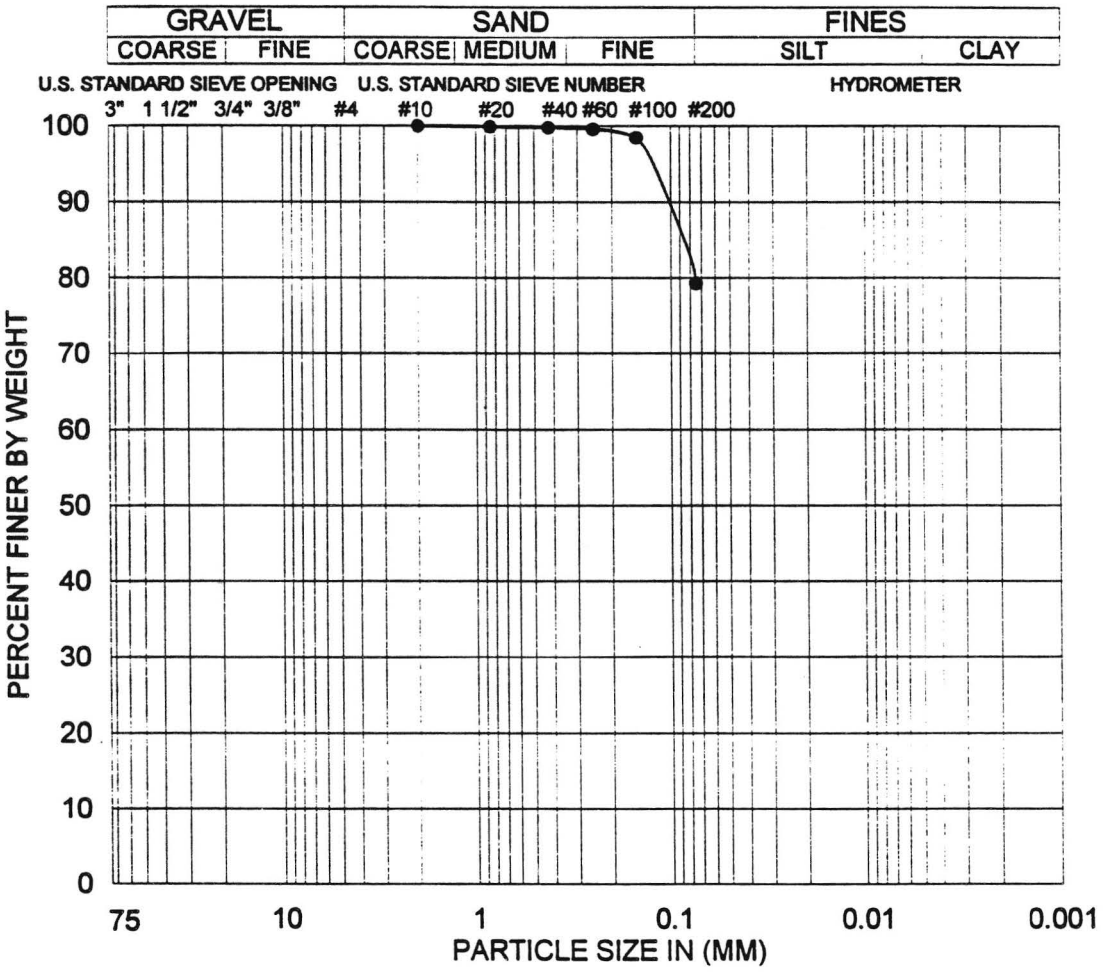
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-13





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3	D-10	60.0	DRIVE	ML	0:21:79	30,25,5

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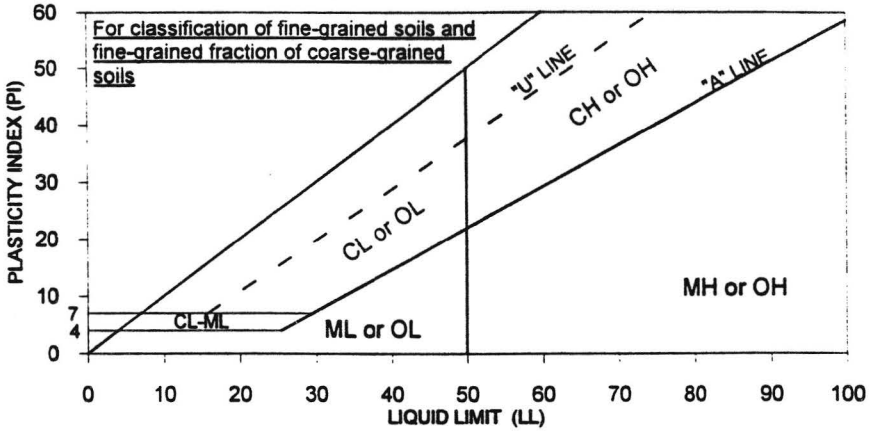
Eastside Extension
Metro Redline

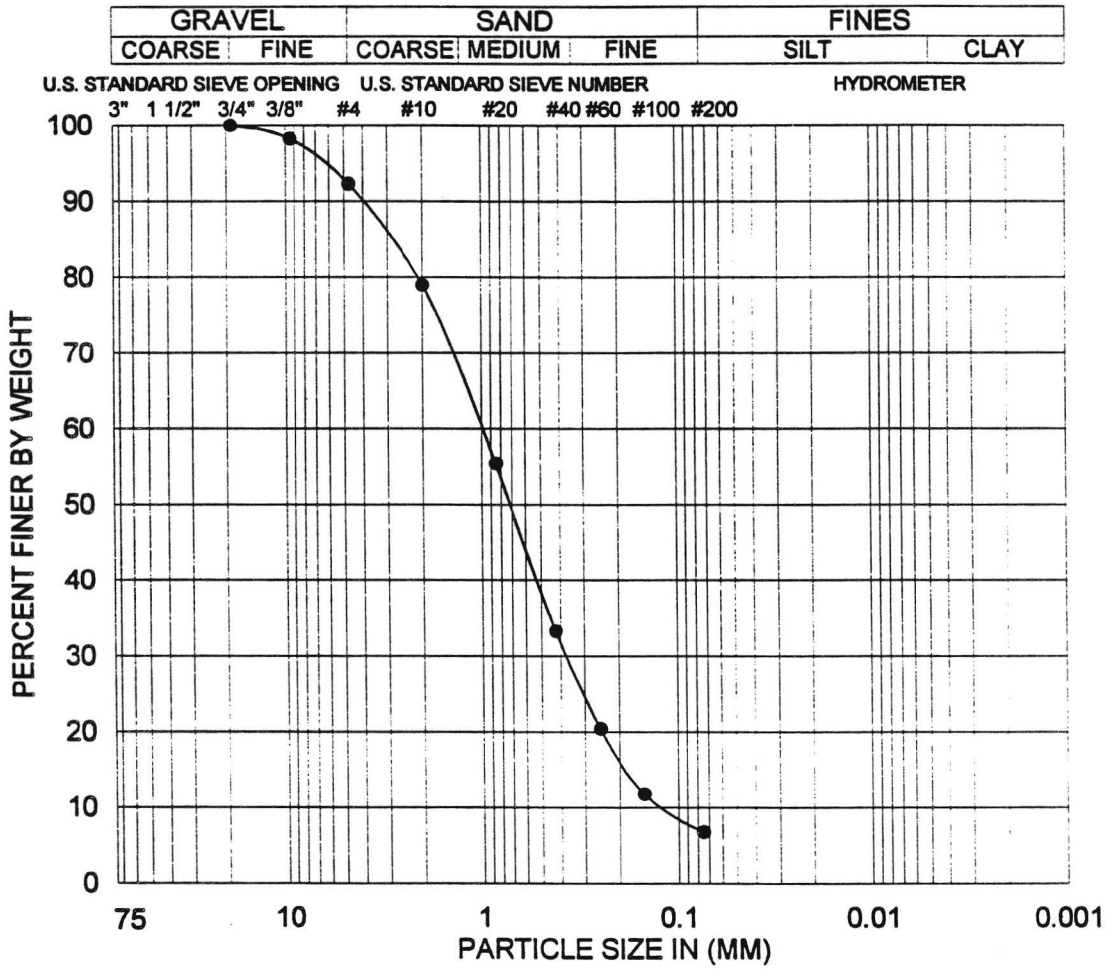
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-14





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3	D-11	65.0	DRIVE	SW-SM	8:85:7	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

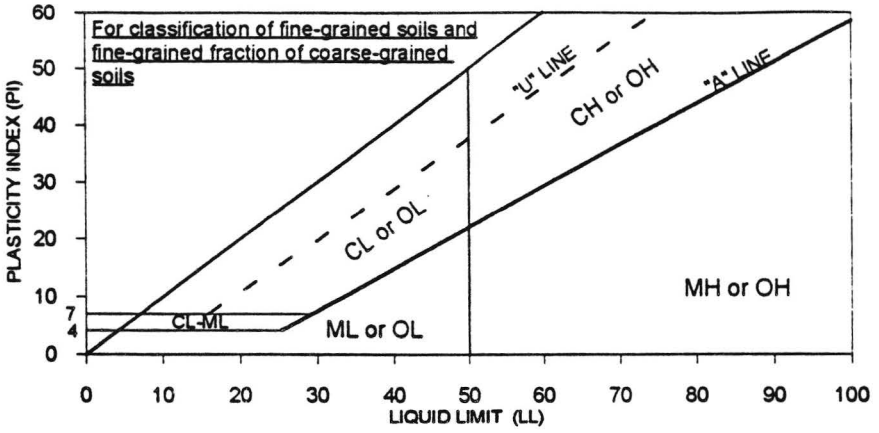
Project No. 95-8347-03

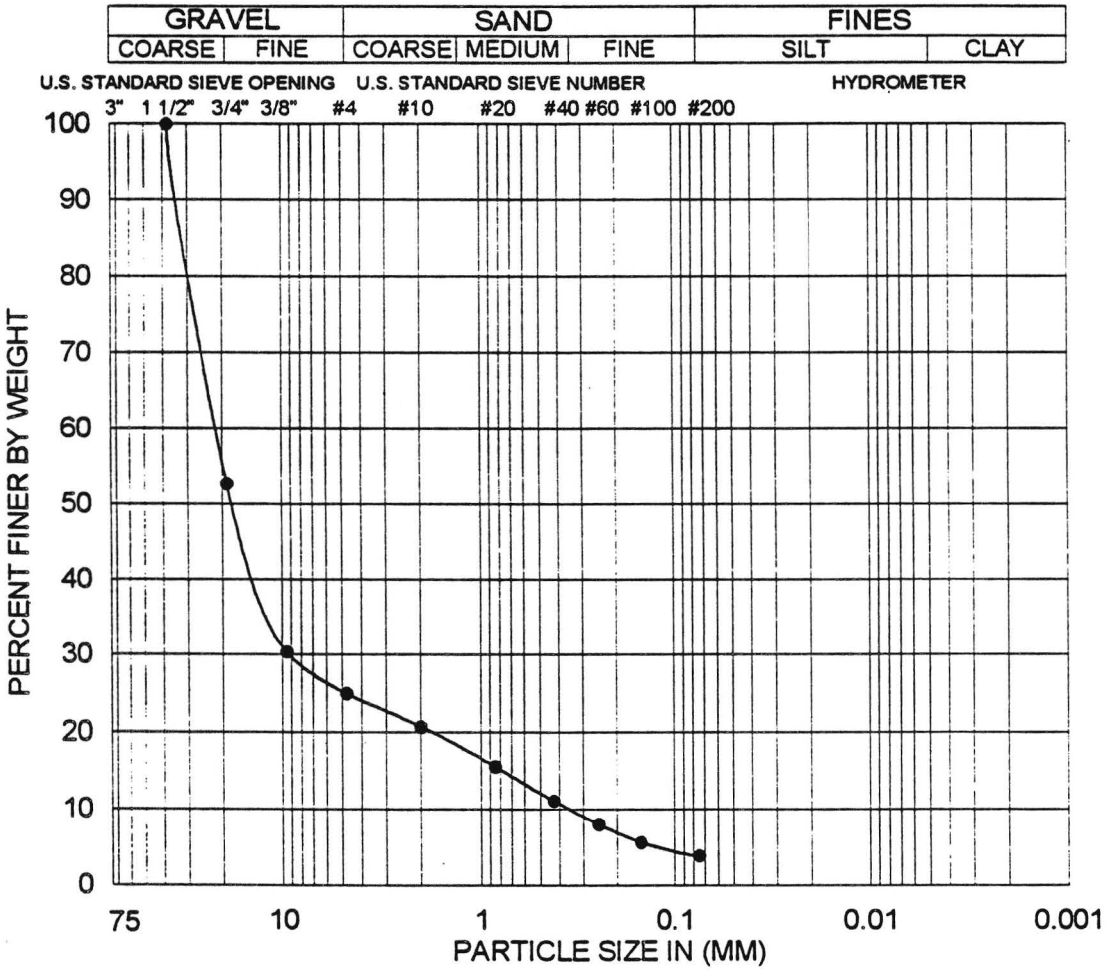
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-15





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3C	D-8	40.0	DRIVE	GP	75:21:04	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

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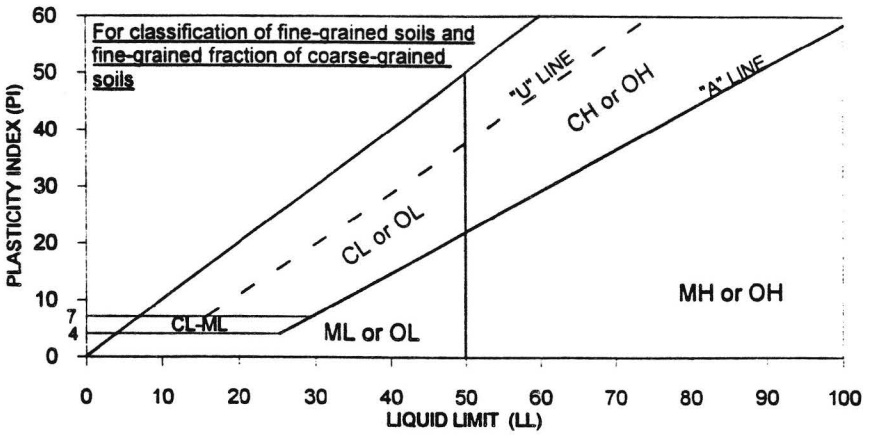
Eastside Extension
Metro Redline

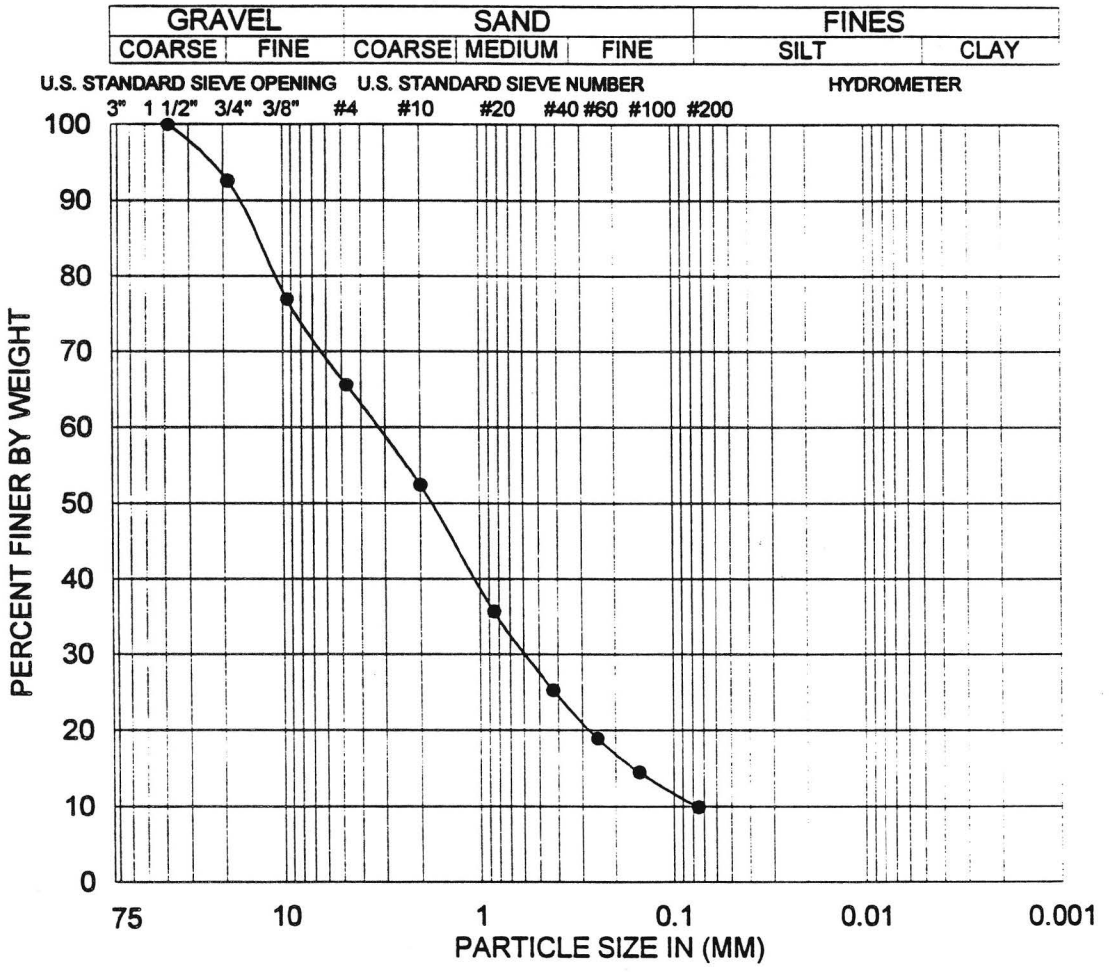
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

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Figure B-16





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3C	S-10	50.0	BAG	SW-SM	34:56:10	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

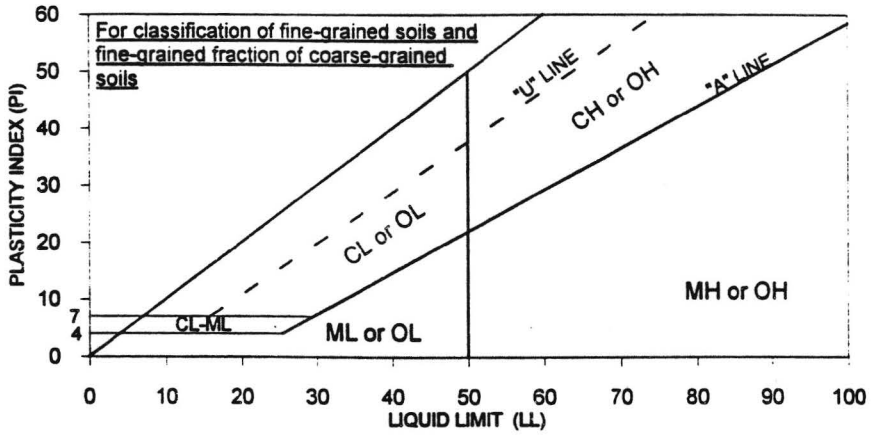
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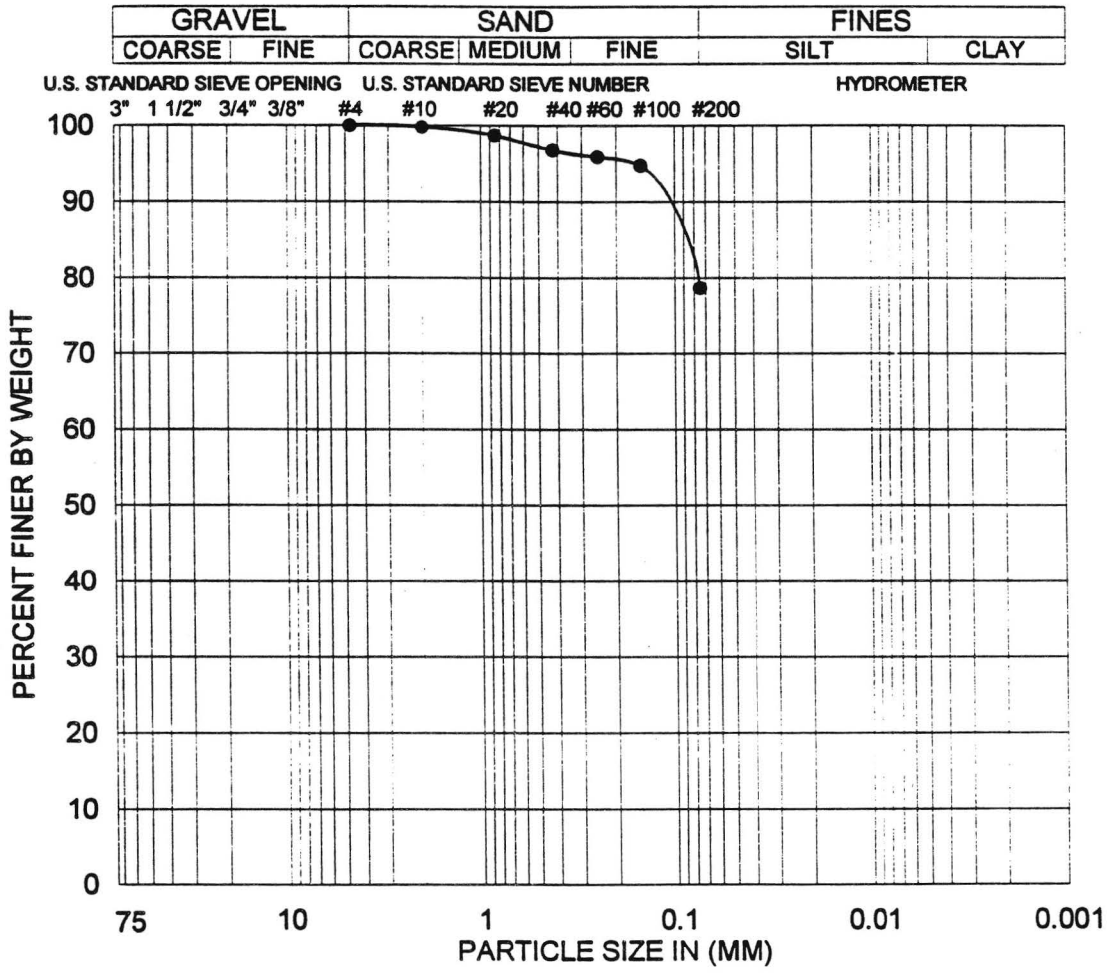
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
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Figure B-17





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3C	S-12	60.0	BAG	CL	00:21:79	N/A

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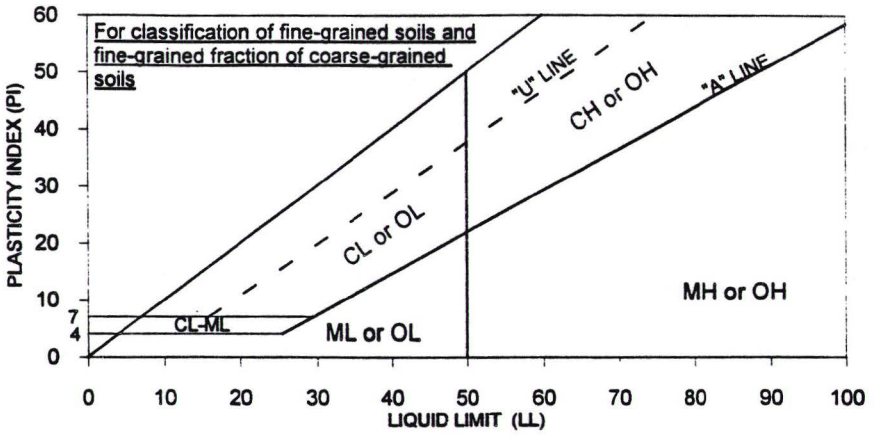
Eastside Extension
Metro Redline

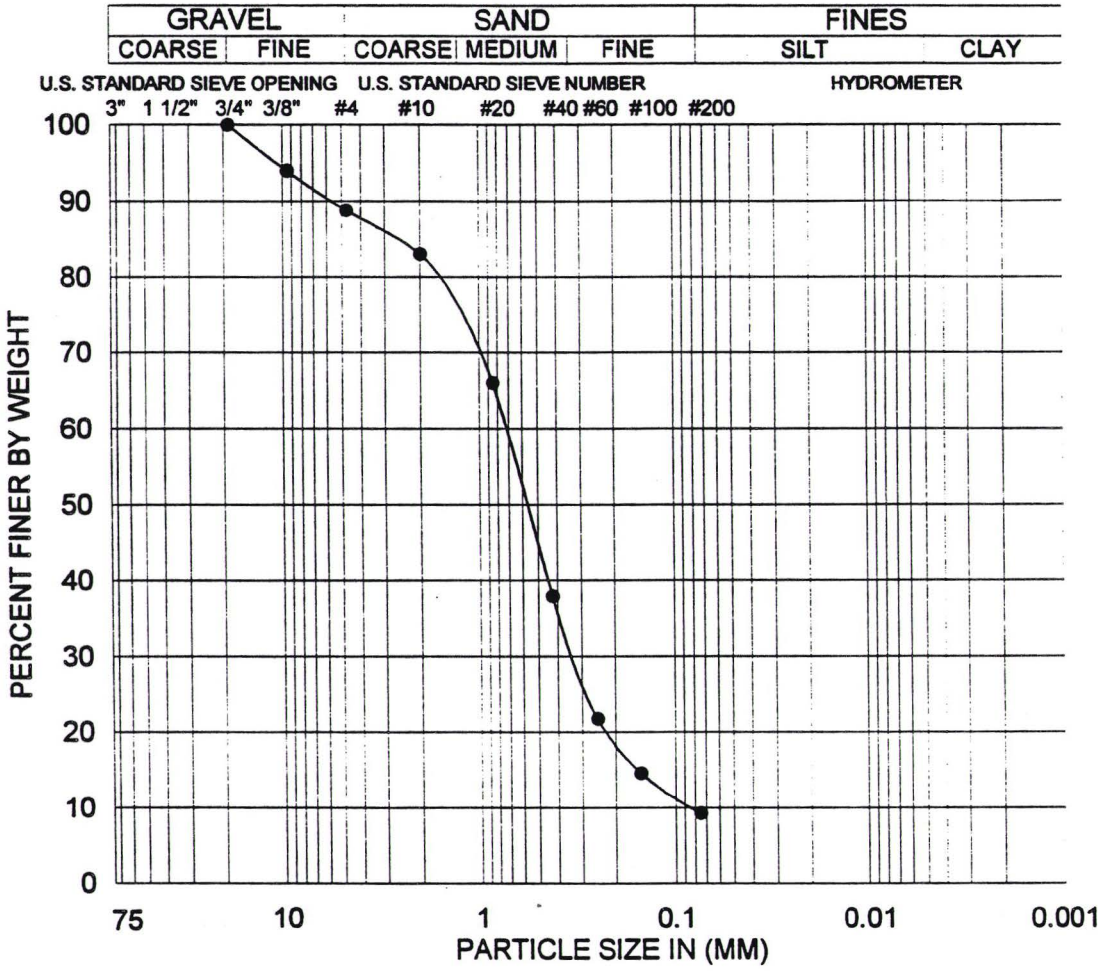
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

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Figure B-18





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3C	S-14	69.0	BAG	SW-SM	11:80:9	N/A

Not enough sample to meet ASTM specification

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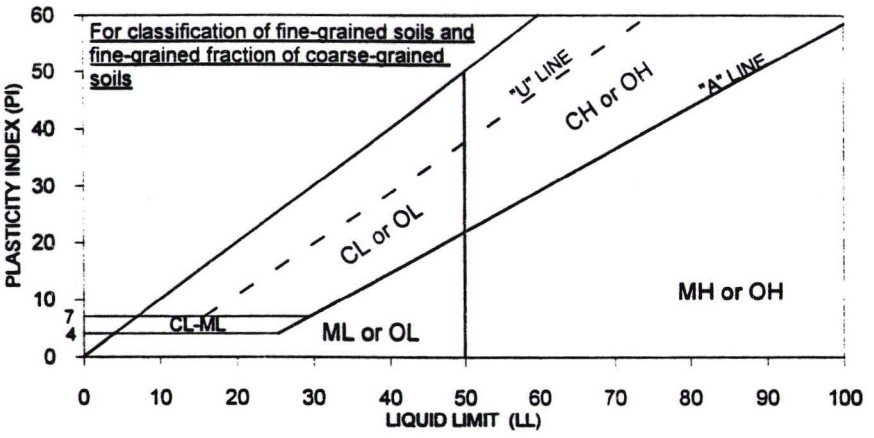
Eastside Extension
Metro Redline

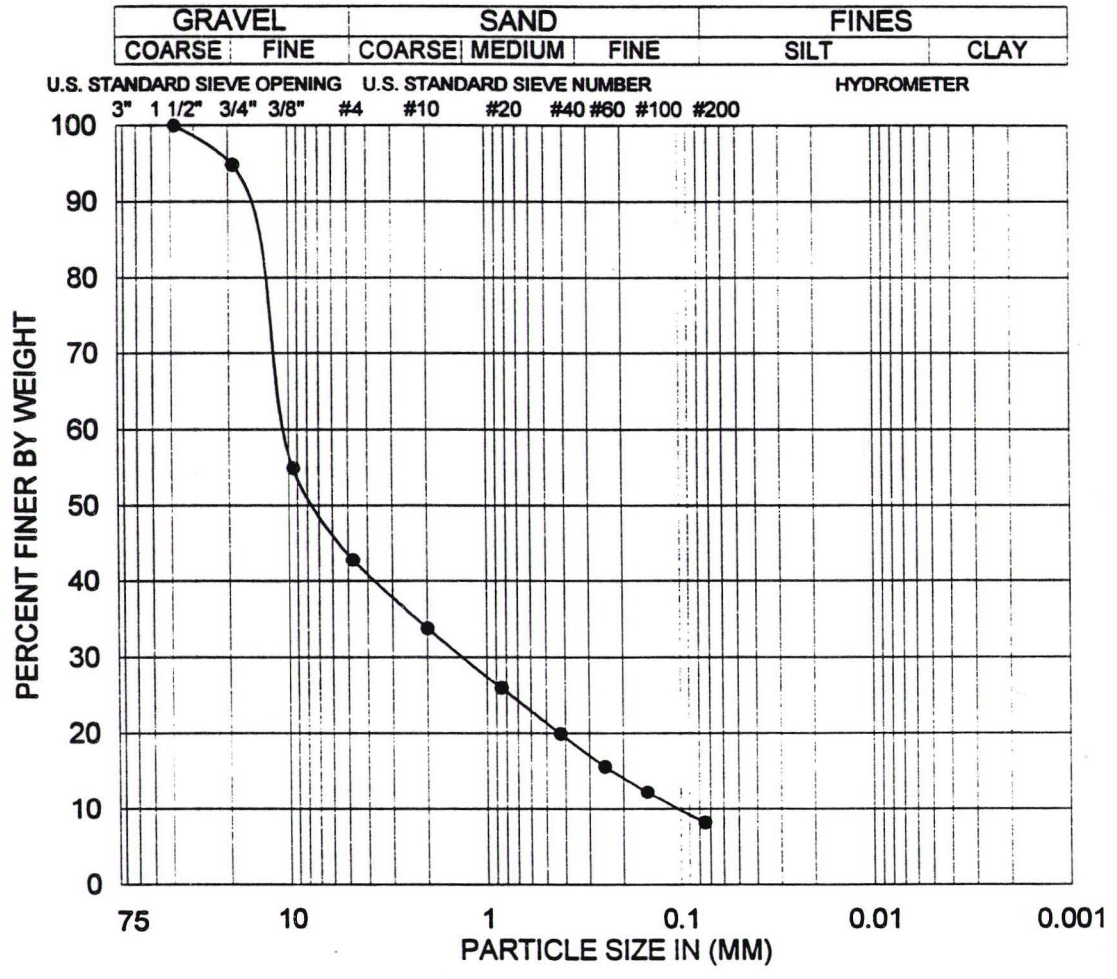
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-19





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-3D	S-7	35.0	BAG	GW-GM	57:35:8	N/A

Not enough sample to meet ASTM specification

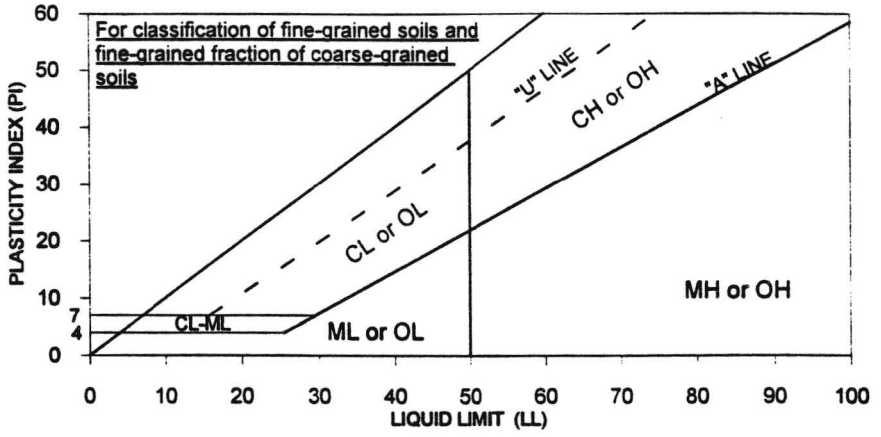
GeoTransit Consultants

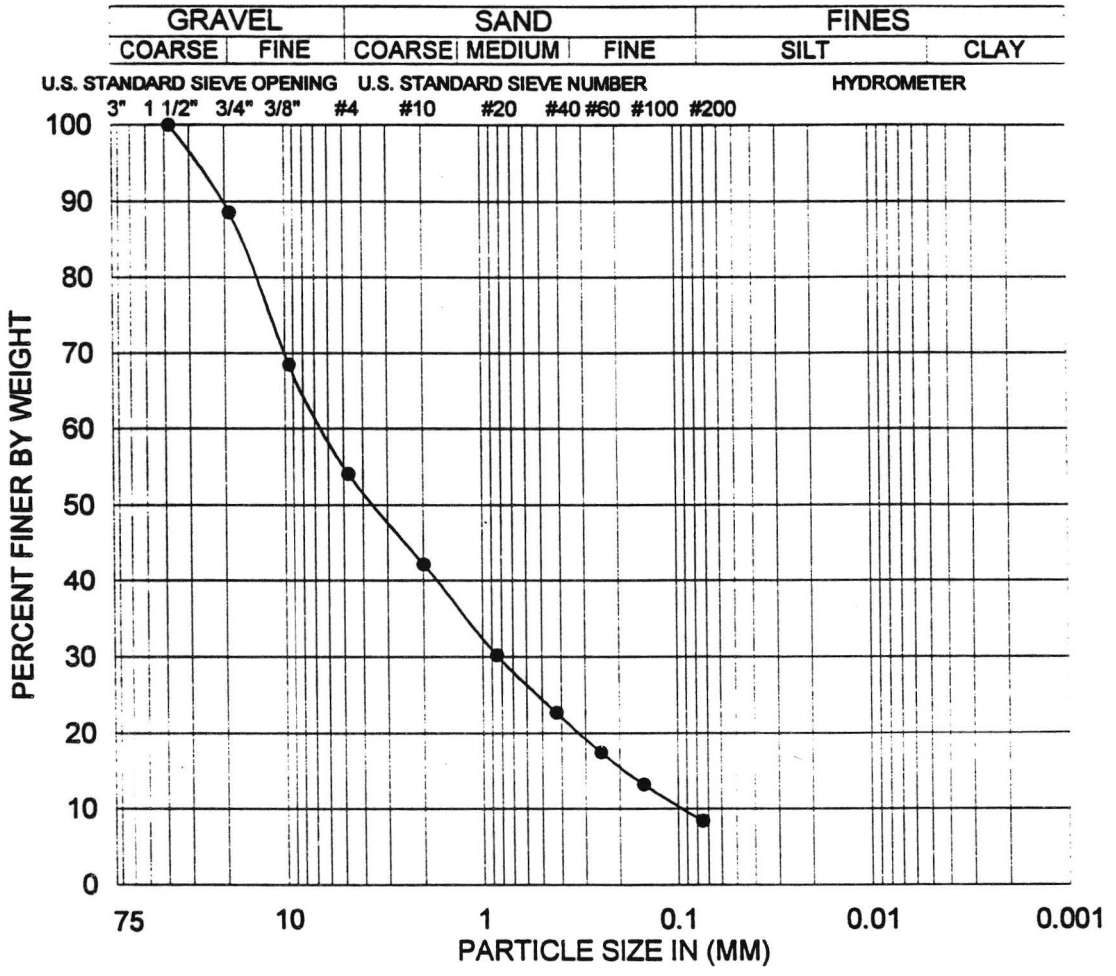
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-20





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4	D-6	30.0	DRIVE	GW-GM/ SW-SM	46:46:8	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-03

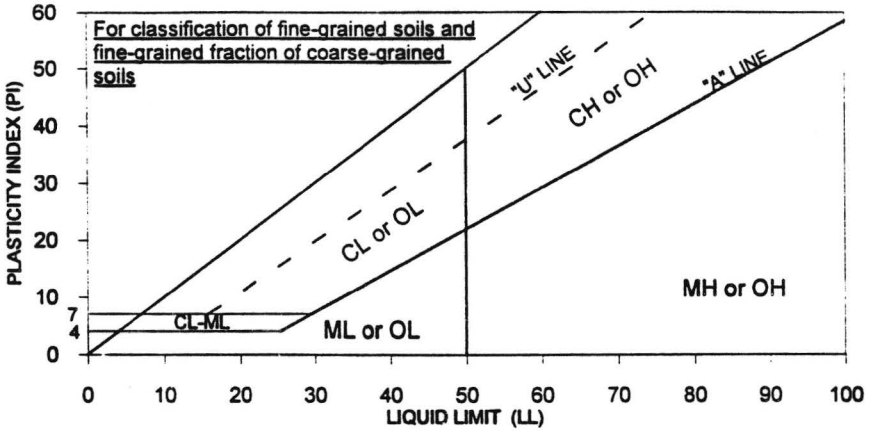
Eastside Extension
Metro Redline

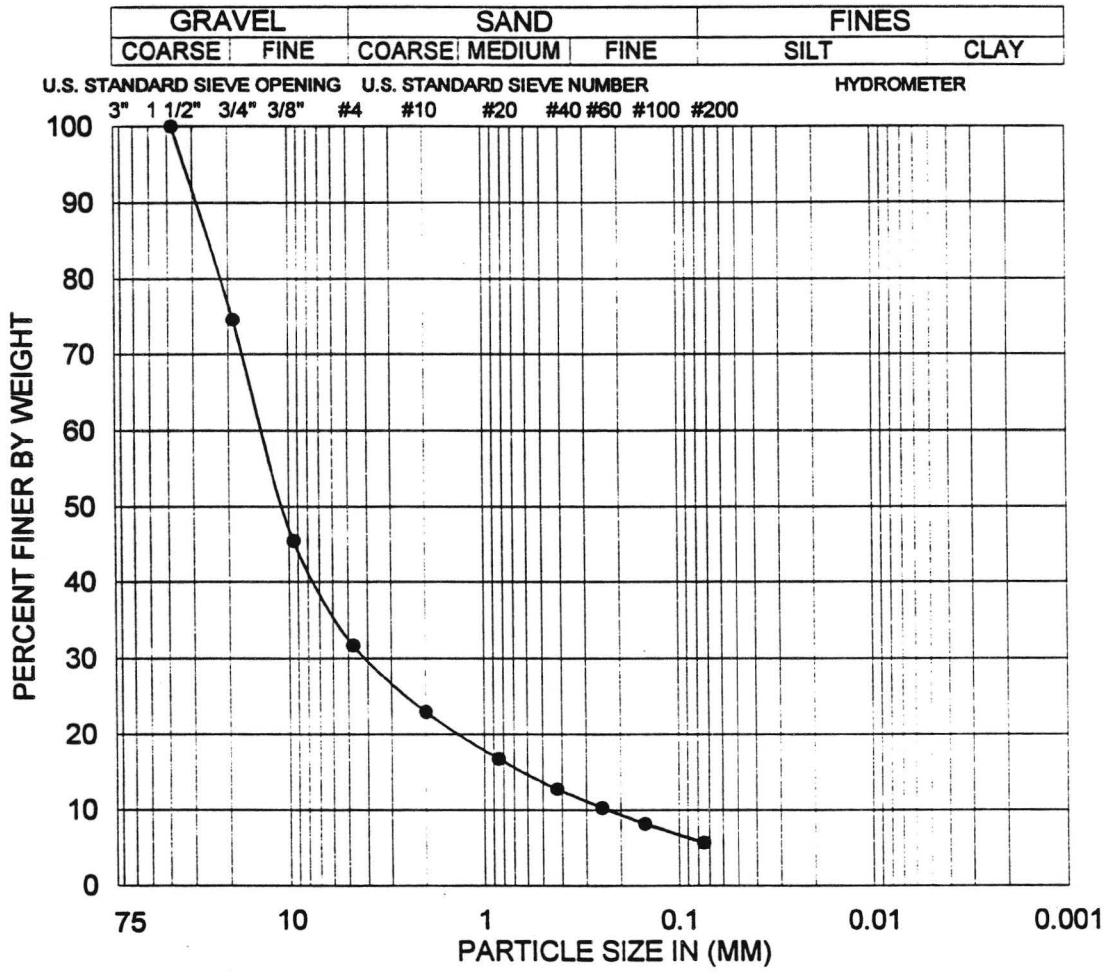
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

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Figure B-21





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4	D-8	40.0	DRIVE	GP-GM	68:26:6	N/A

Not enough sample to meet ASTM specification
1.5 inch = 127.81 gm. (not included)

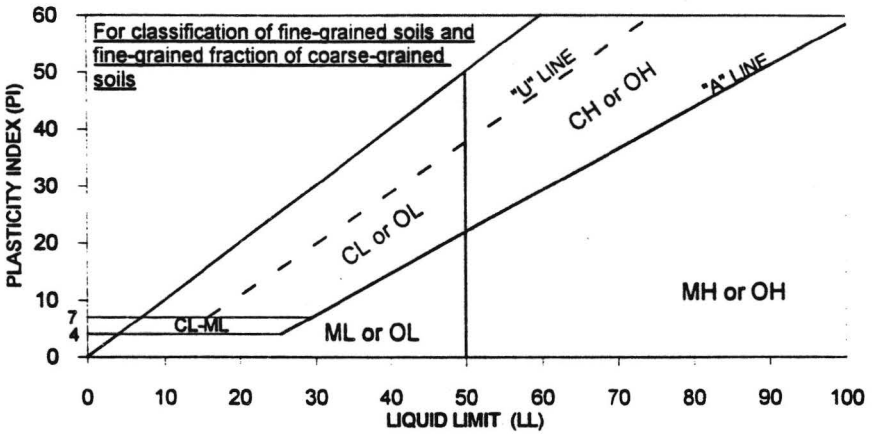
GeoTransit Consultants

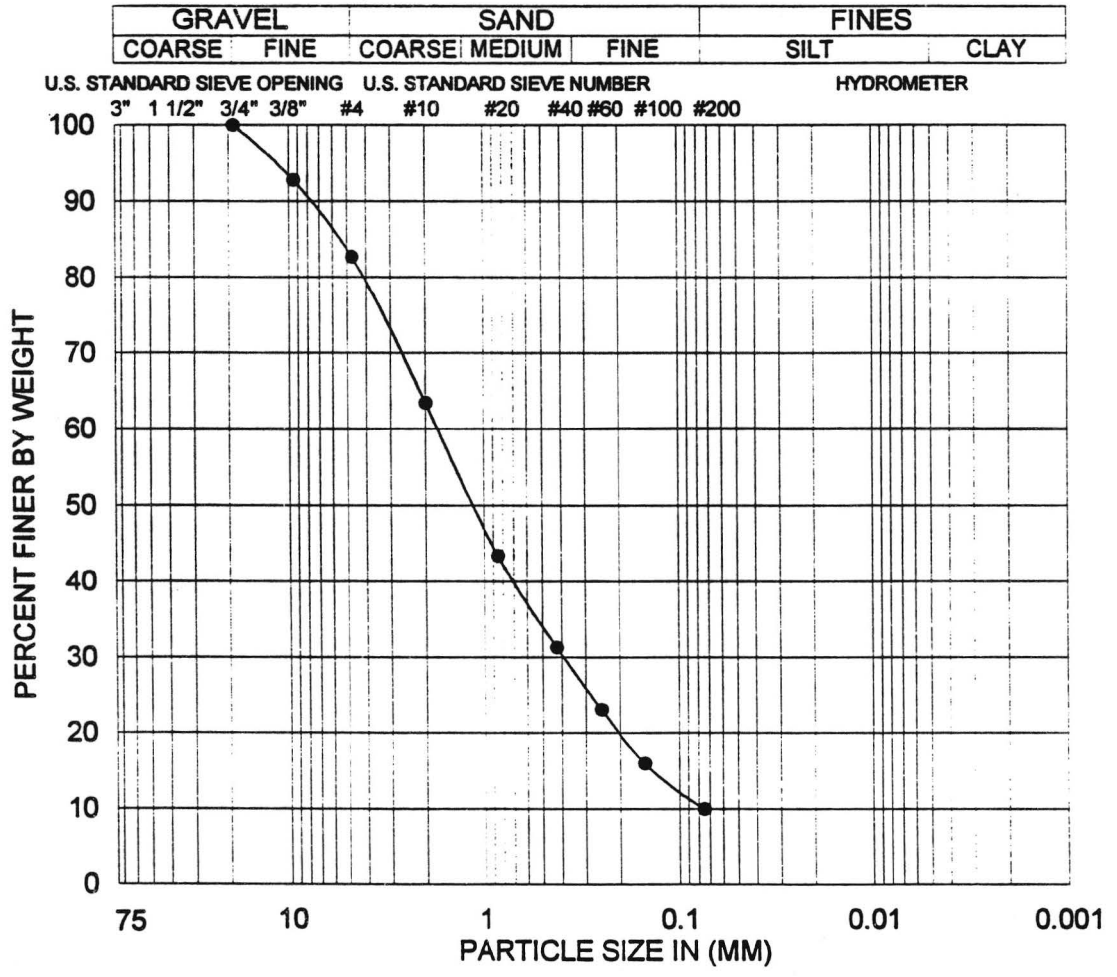
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-22





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4	D-10	50.0	DRIVE	SW-SM	17:73:10	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

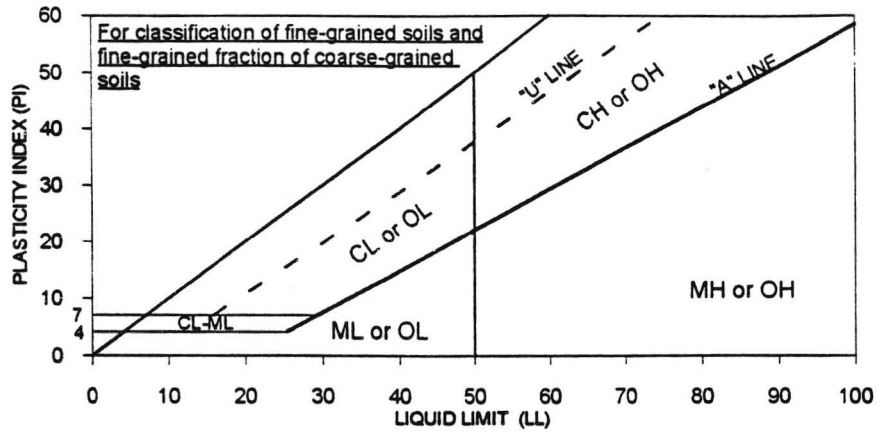
Eastside Extension
Metro Redline

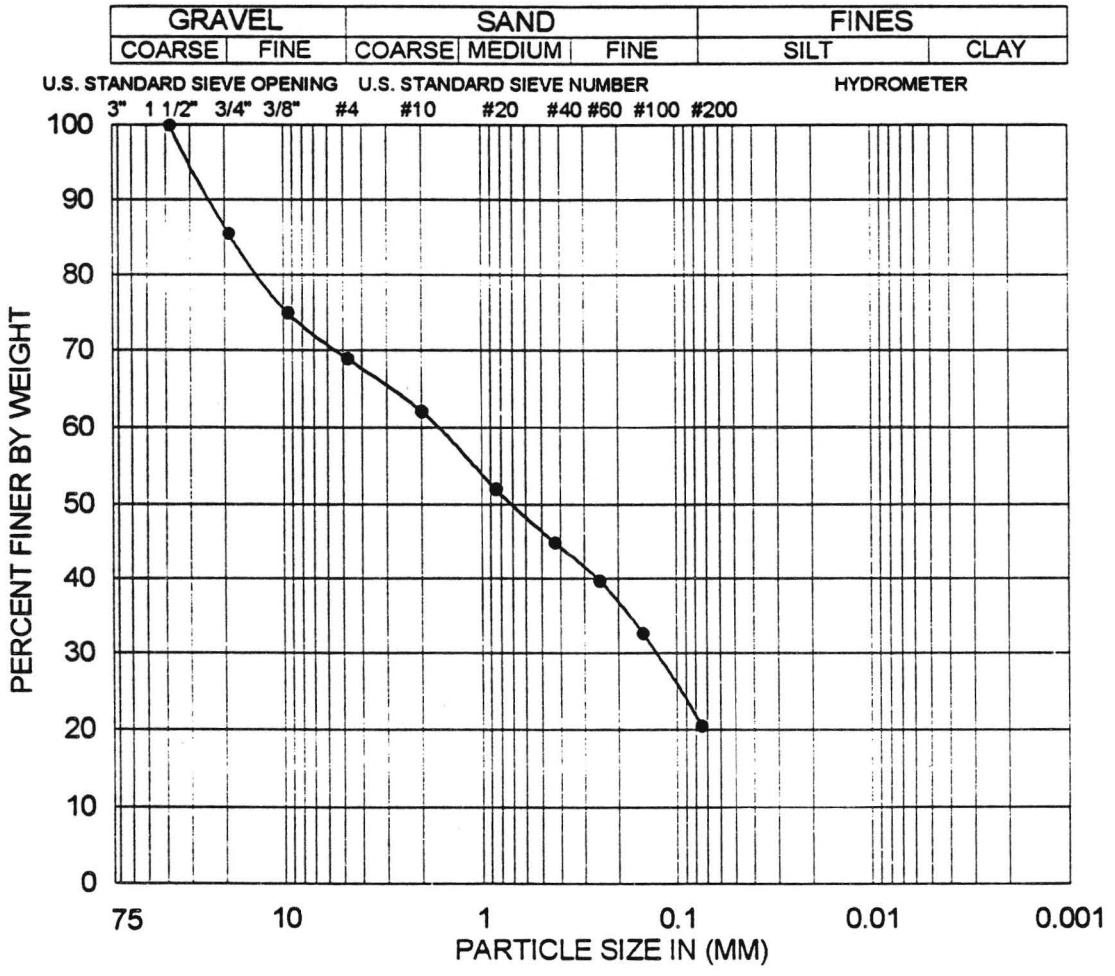
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-23





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4	D-12A	55.0	DRIVE	SM	31:48:21	N/A

Not enough sample to meet ASTM specification
1.5 inch = 80.85 gm. (Not included)

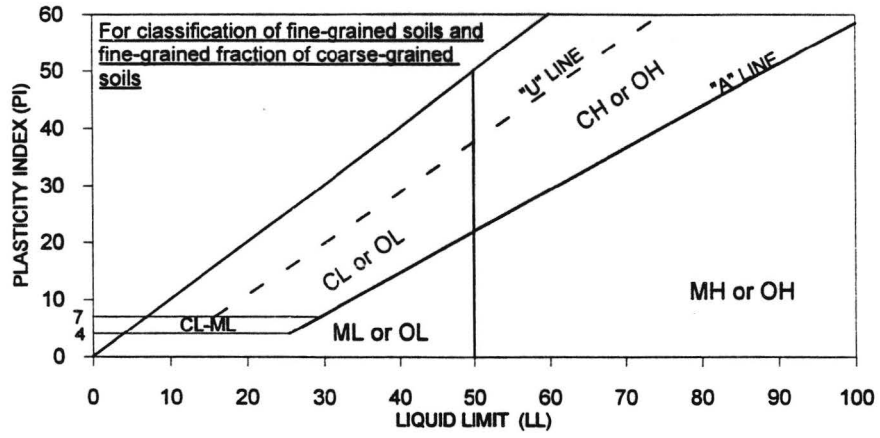
GeoTransit Consultants

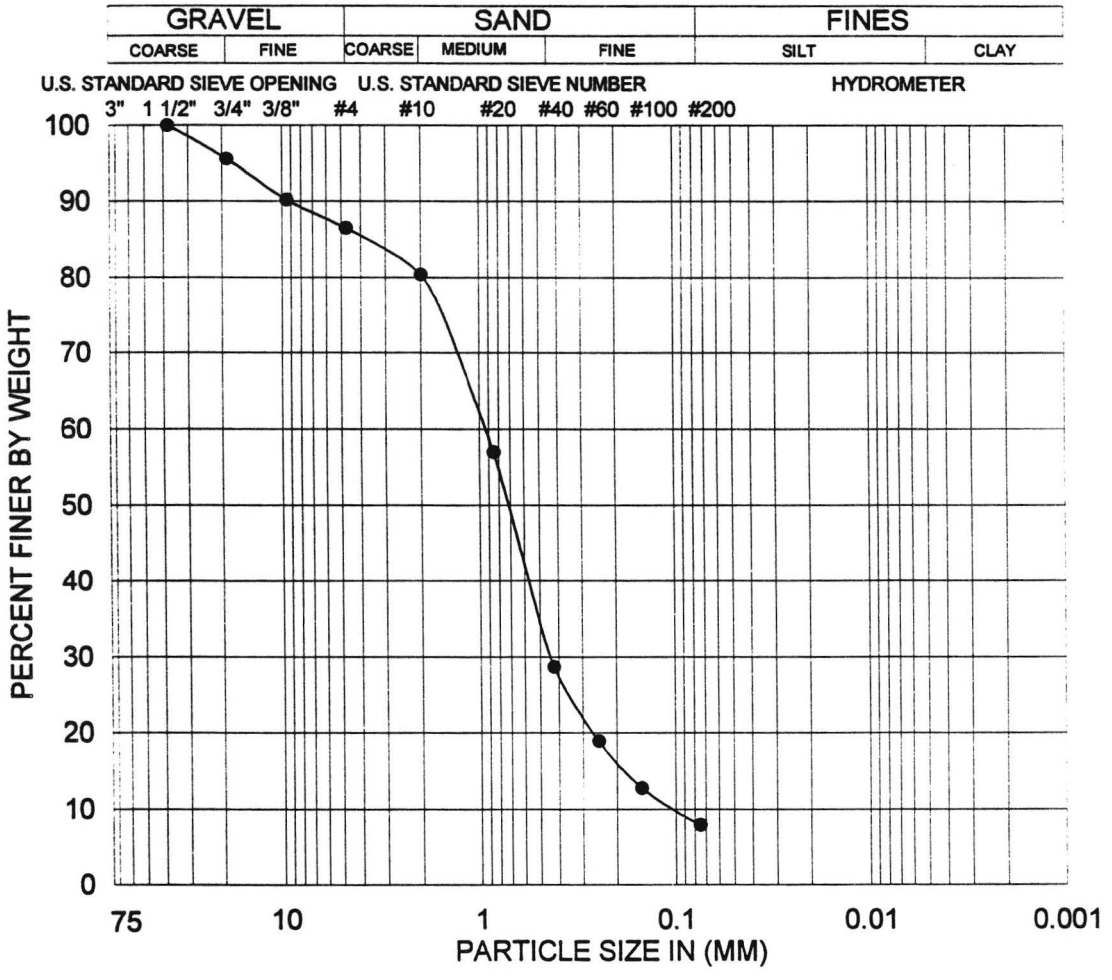
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-24





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4-1	S-5	25.0	SW-SM	13:79:8	N/A

Not enough sample to meet ASTM specification

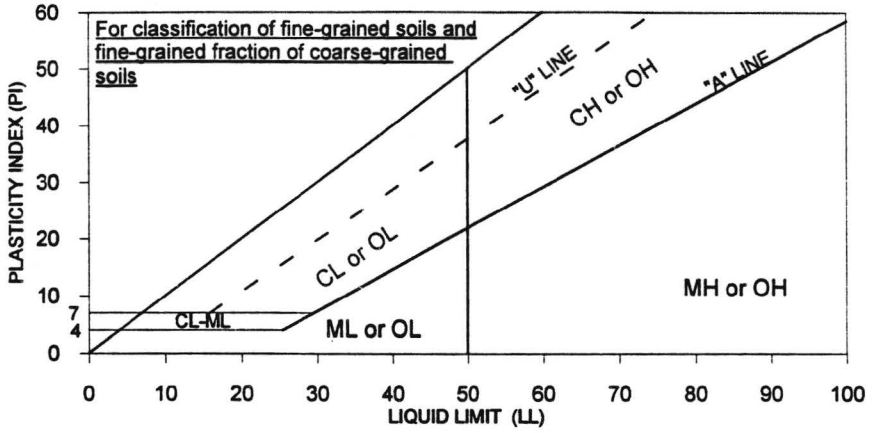
GeoTransit Consultants

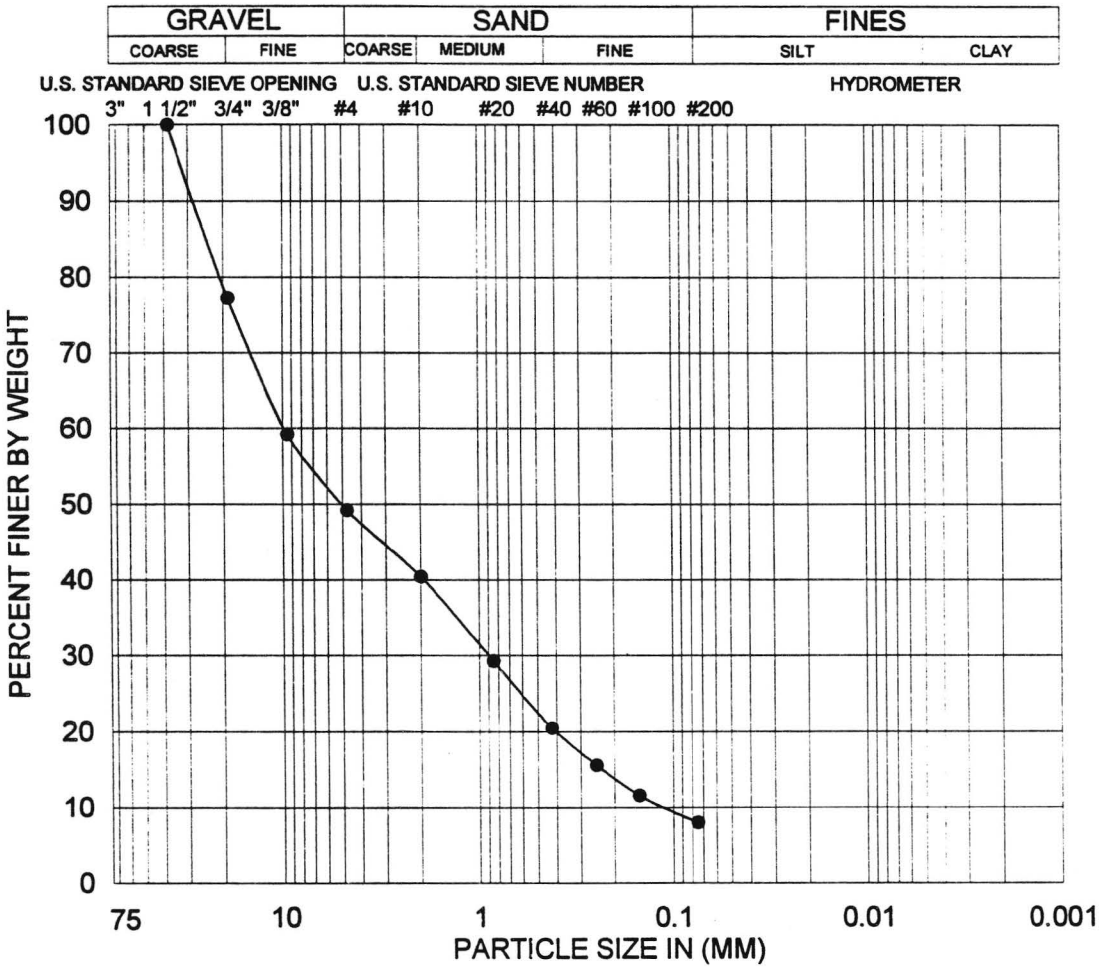
Project No. 95-8347-23
Eastside Extension
Metro Redline 1 (2)

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

12-95

Figure B-25





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4-1	S-7	35.0	GP-GM	51:41:8	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-23

Eastside Extension

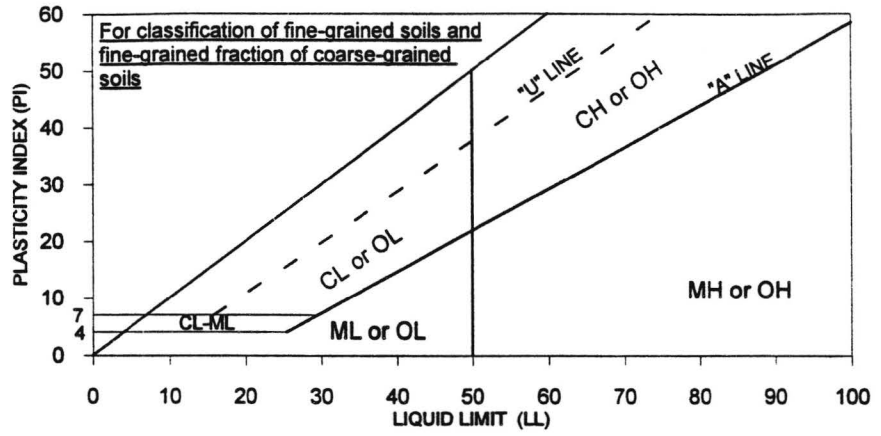
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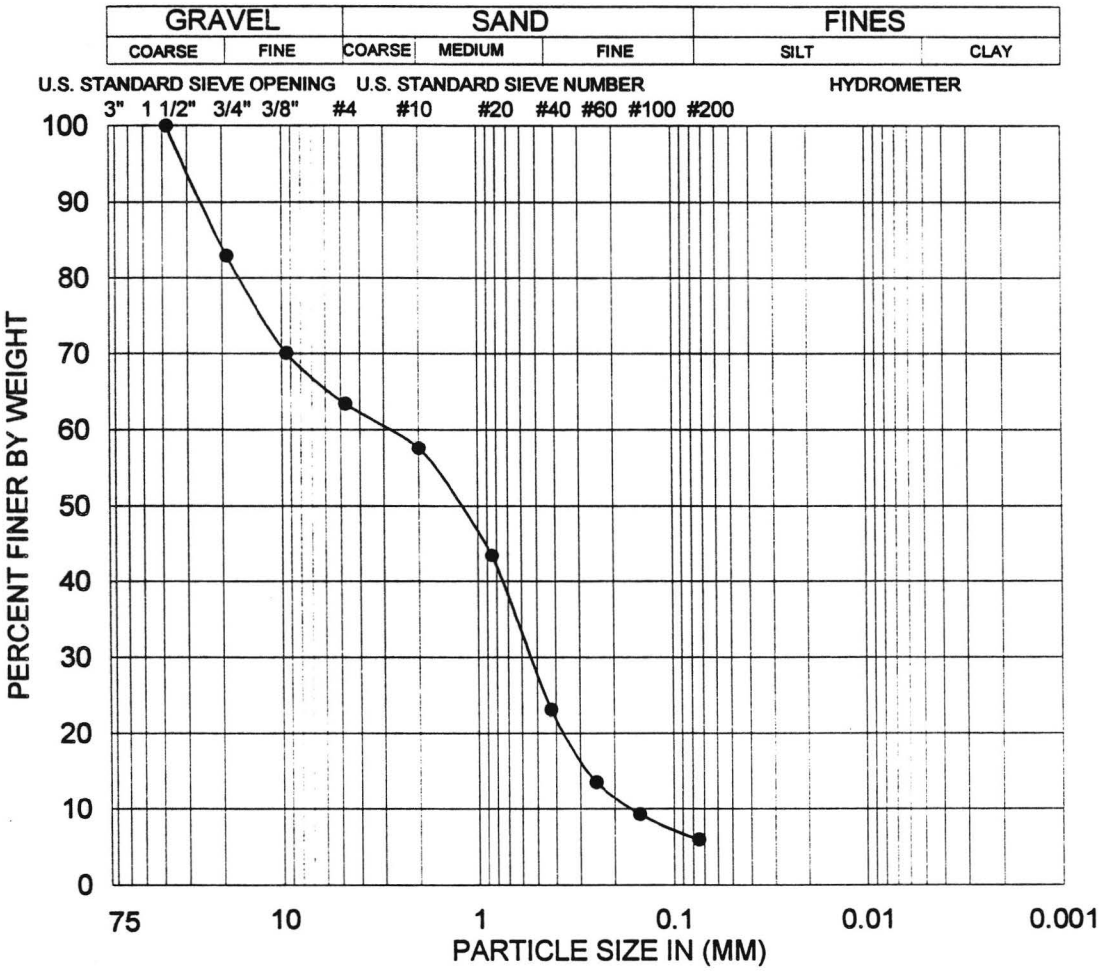
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-26





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4-1	D-10	46.0	SP-SM	37:57:6	N/A

Not enough sample to meet ASTM specification

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Project No. 95-8347-23

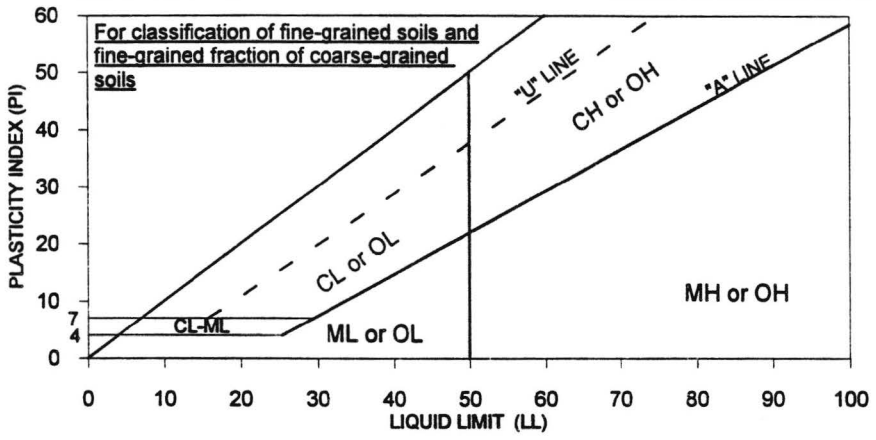
Eastside Extension
Metro Redline 1 (2)

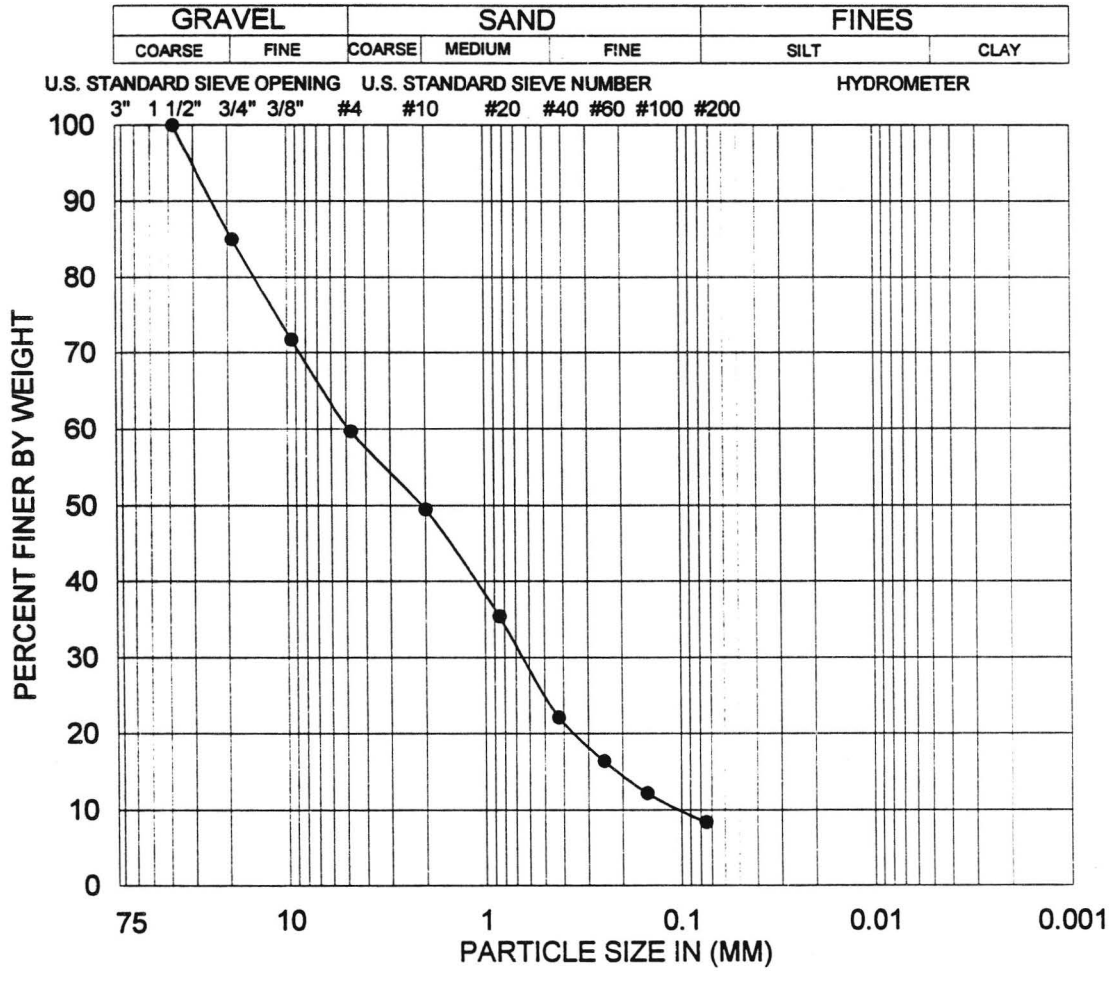
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-27





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-4-1	S-11	49.0	SP-SM	40:52:8	N/A

Not enough sample to meet ASTM specification

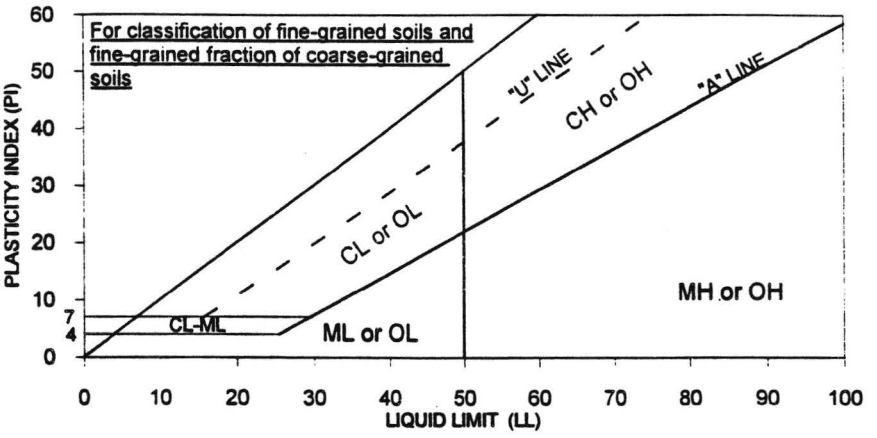
GeoTransit Consultants

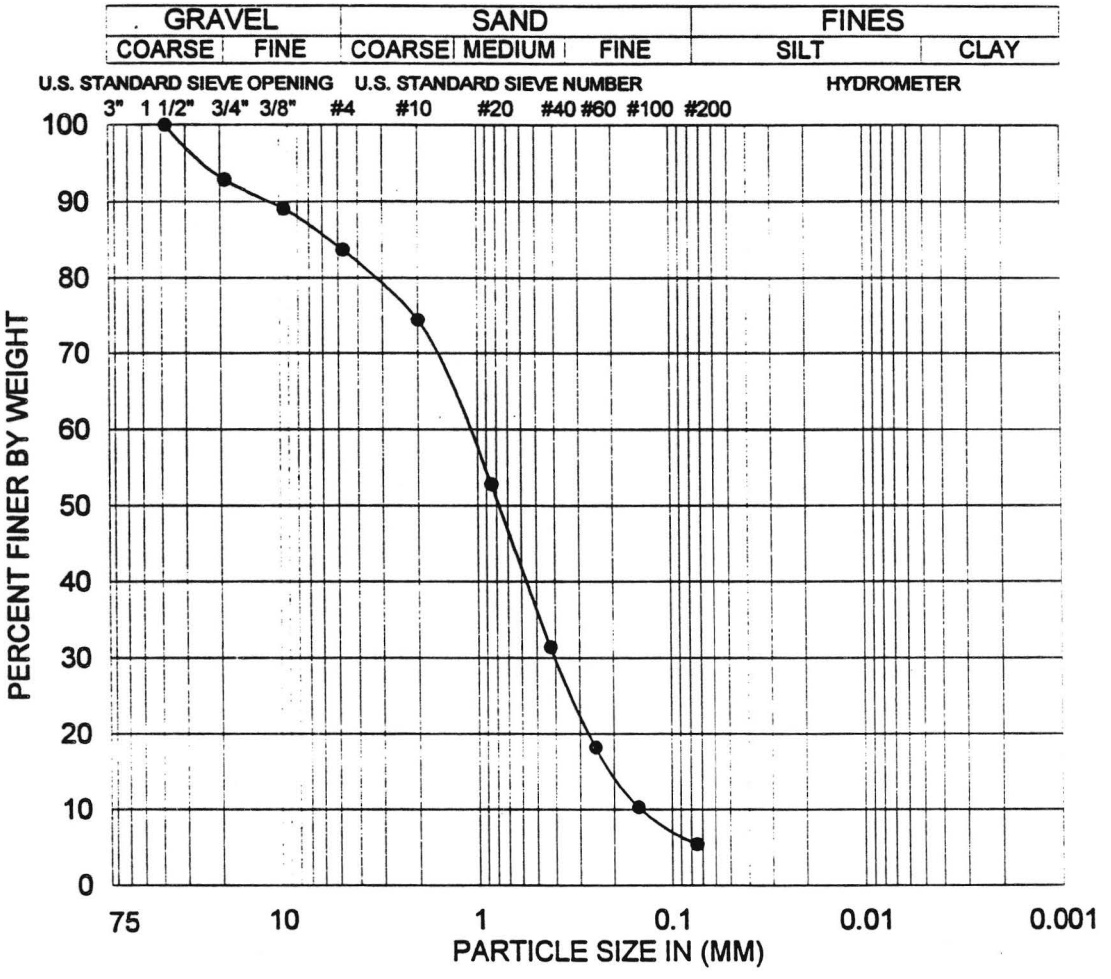
Project No. 95-8347-23
Eastside Extension
Metro Redline 1 (2)

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-28





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-5	2	10.0	BAG	SP-SM	16:79:5	N/A

GeoTransit Consultants

Project No. 95-8347-03

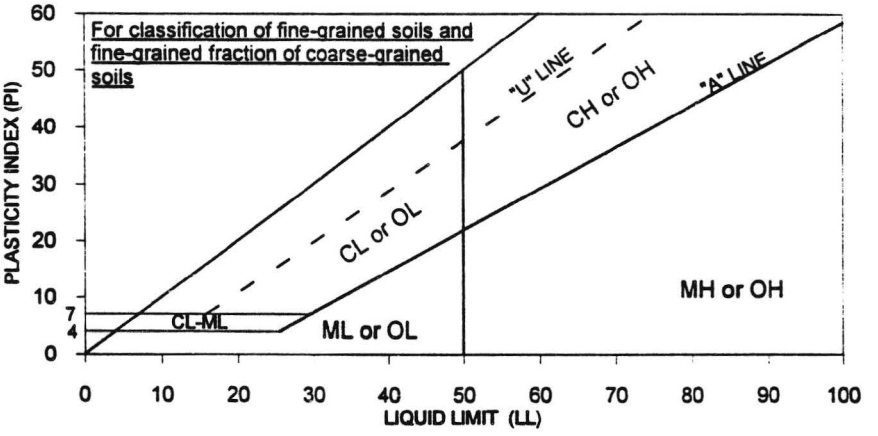
Eastside Extension
Metro Redline

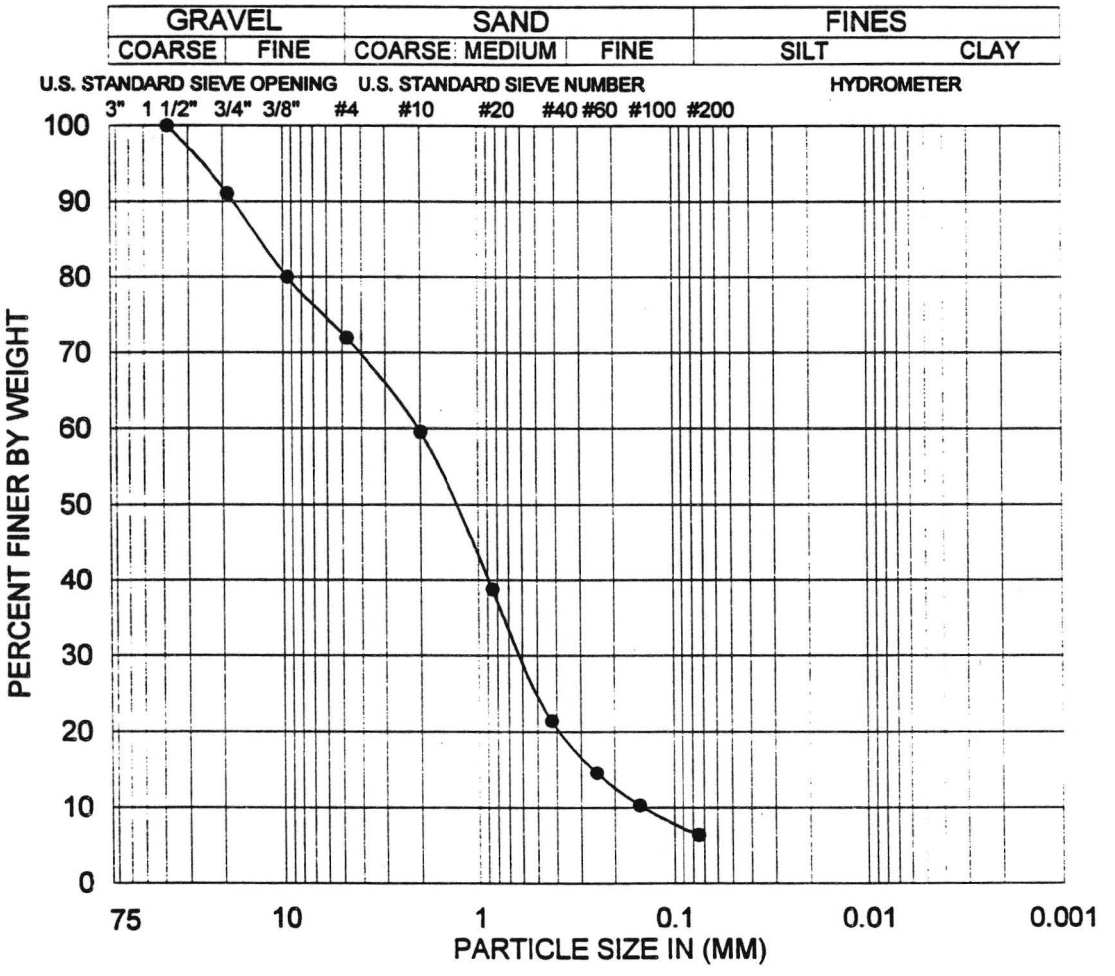
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-29





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-5	3	15.0	BAG	SW-SM	28:66:6	N/A

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Project No. 95-8347-03

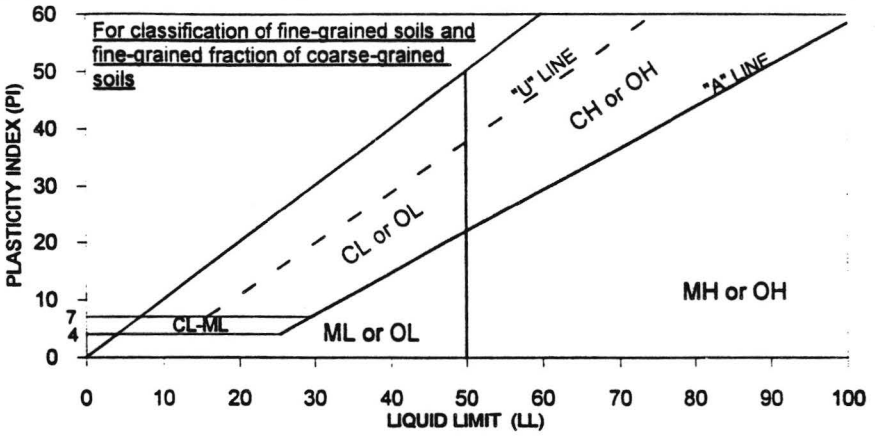
Eastside Extension
Metro Redline

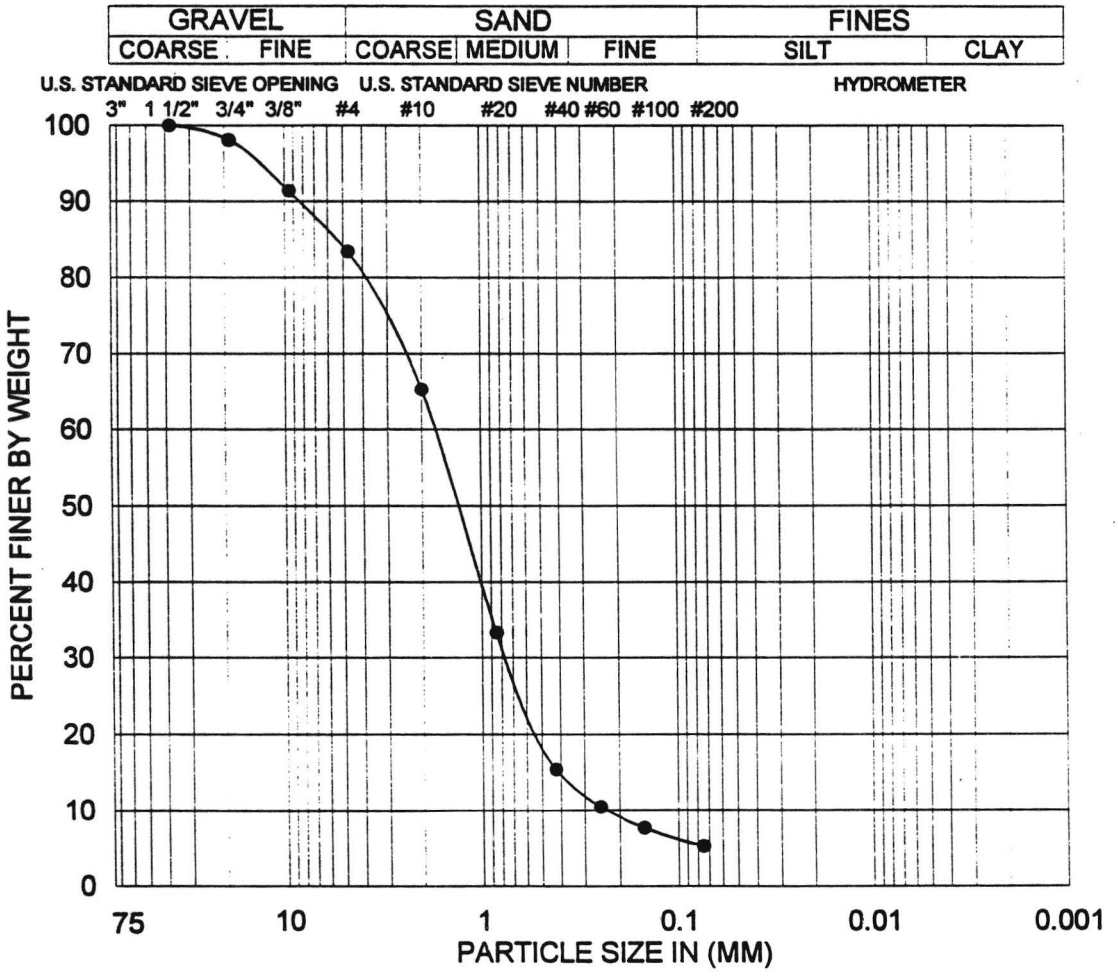
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-30





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-5	5	25.0	BAG	SW-SM	17:78:5	N/A

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Project No. 95-8347-03

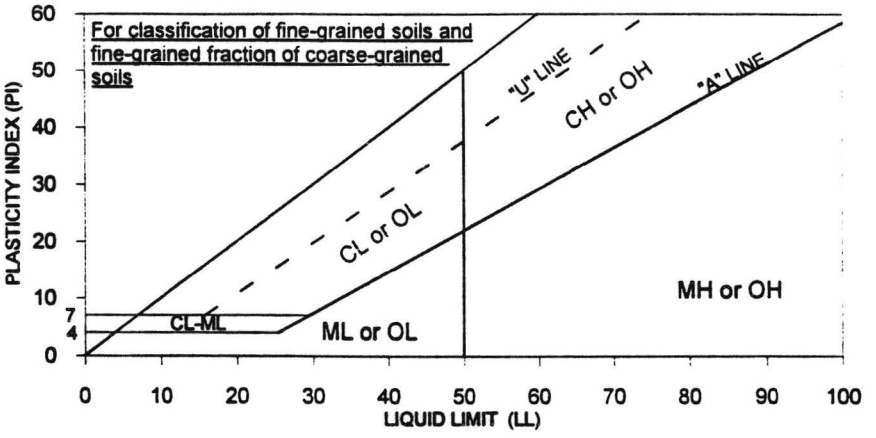
Eastside Extension
Metro Redline

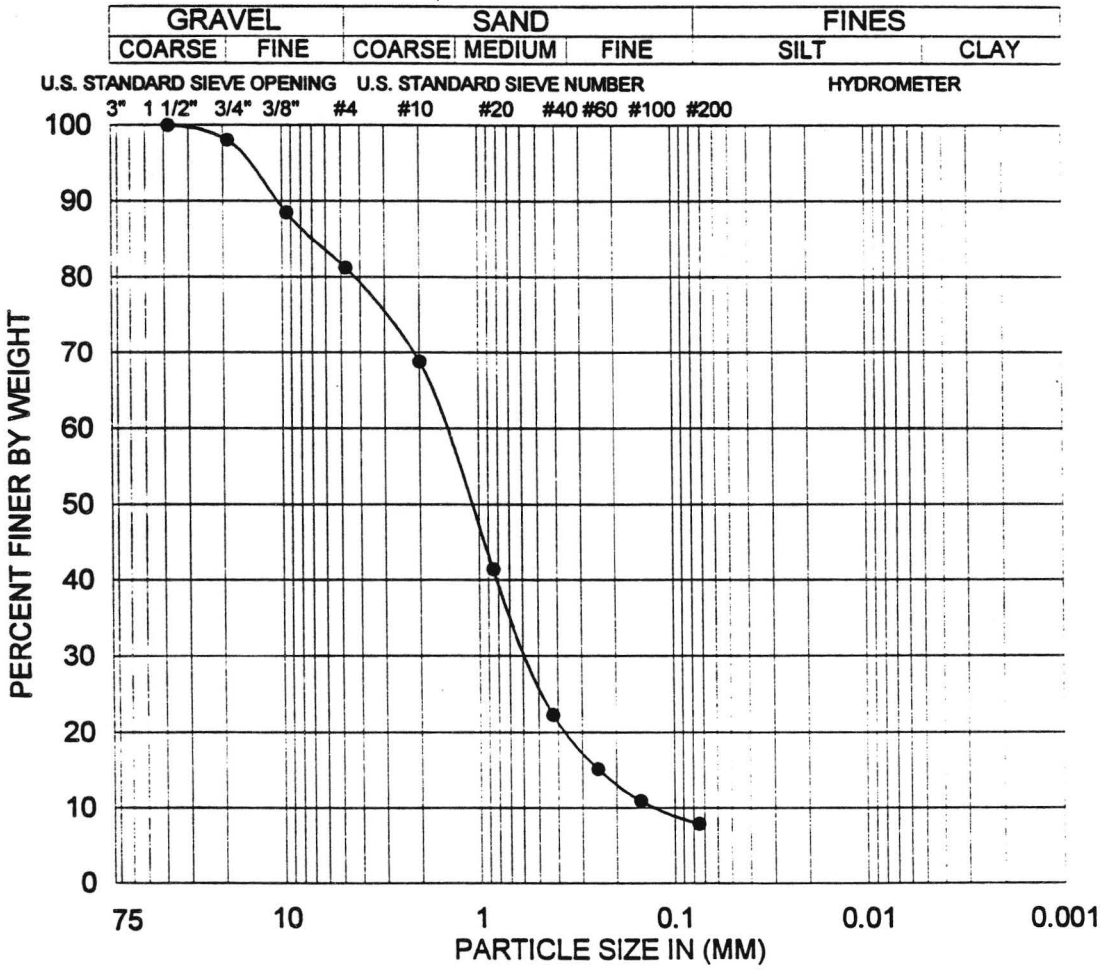
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-31





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-5	6	30.0	BAG	SW-SM	19:73:8	N/A

GeoTransit Consultants

Project No. 95-8347-03

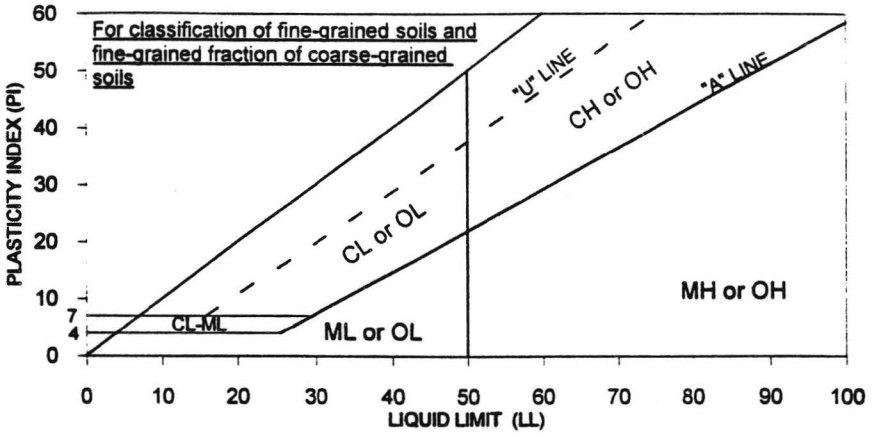
Eastside Extension
Metro Redline

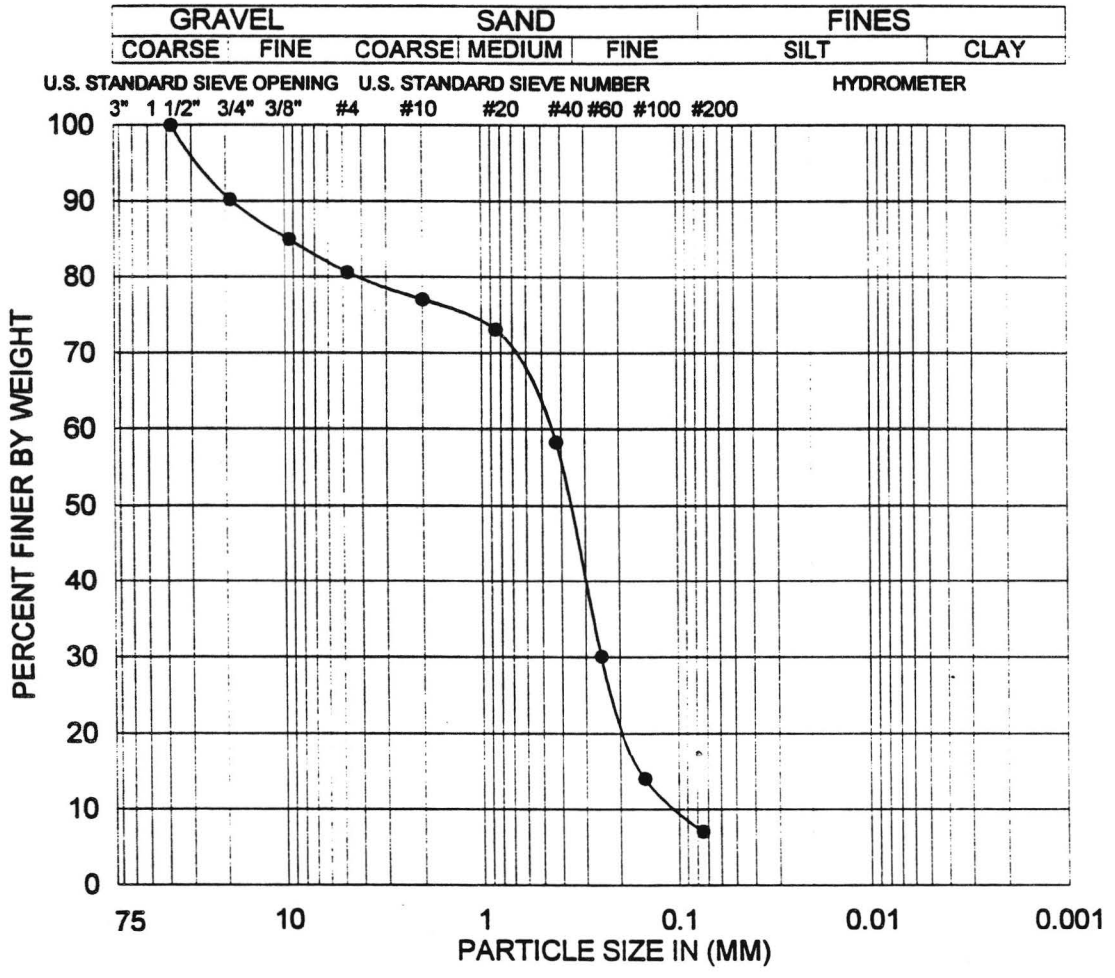
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-32





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-7	D-8	40.0	DRIVE	SP-SM	19:74:7	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

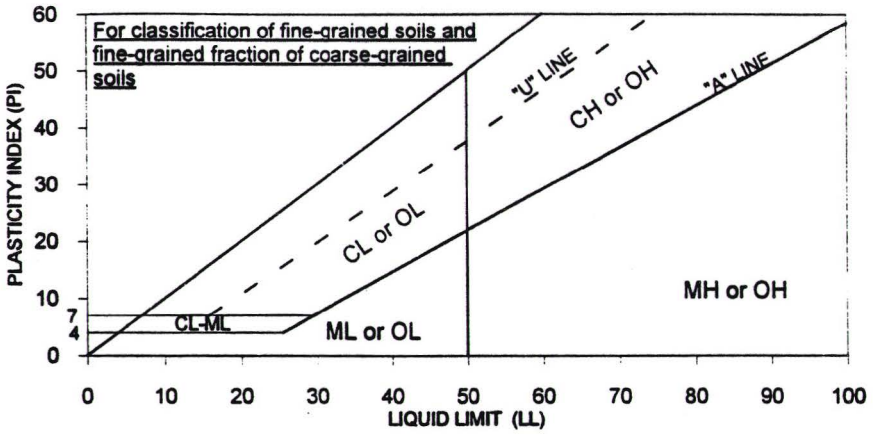
Project No. 95-8347-03

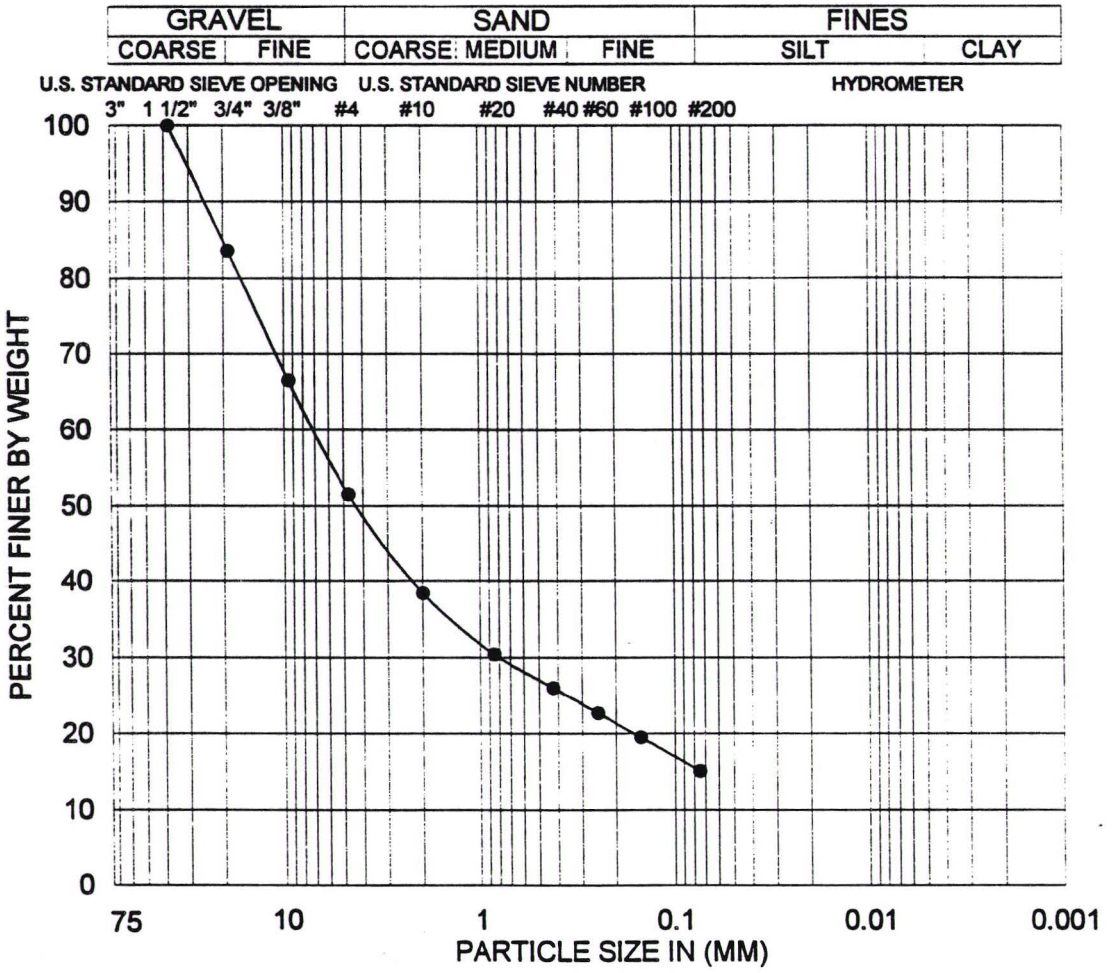
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-33





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-7	D-10	50.0	DRIVE	GM	48:37:15	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

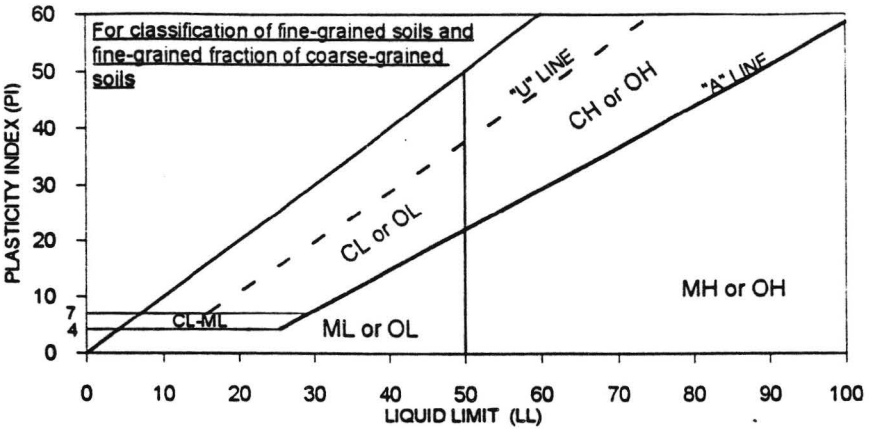
Project No. 95-8347-03

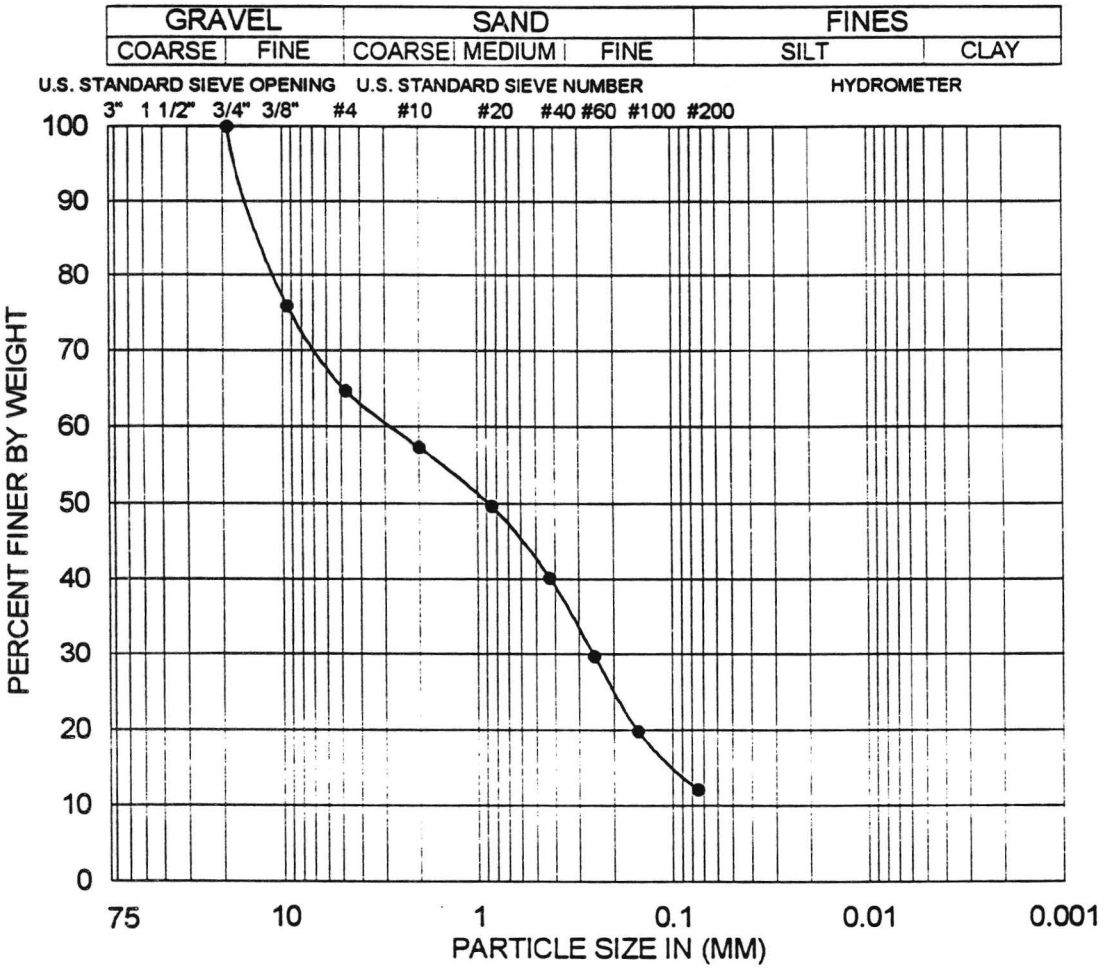
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-34





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-9	S-7	35.0	BULK	SP-SM	35:53:12	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

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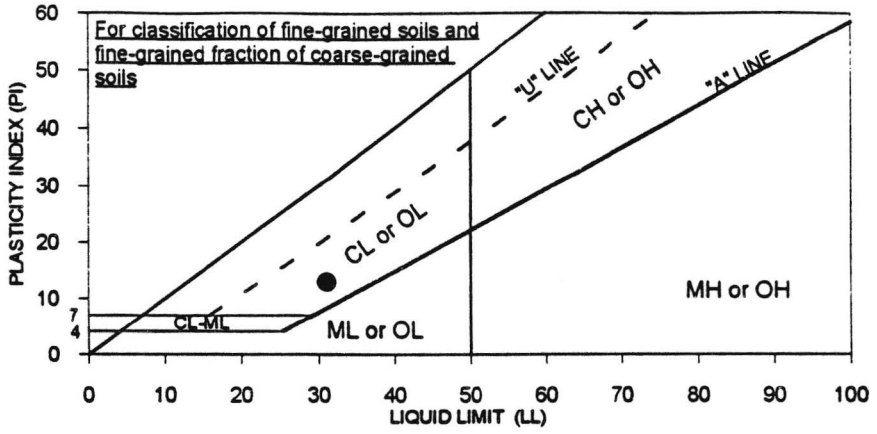
Eastside Extension
Metro Redline

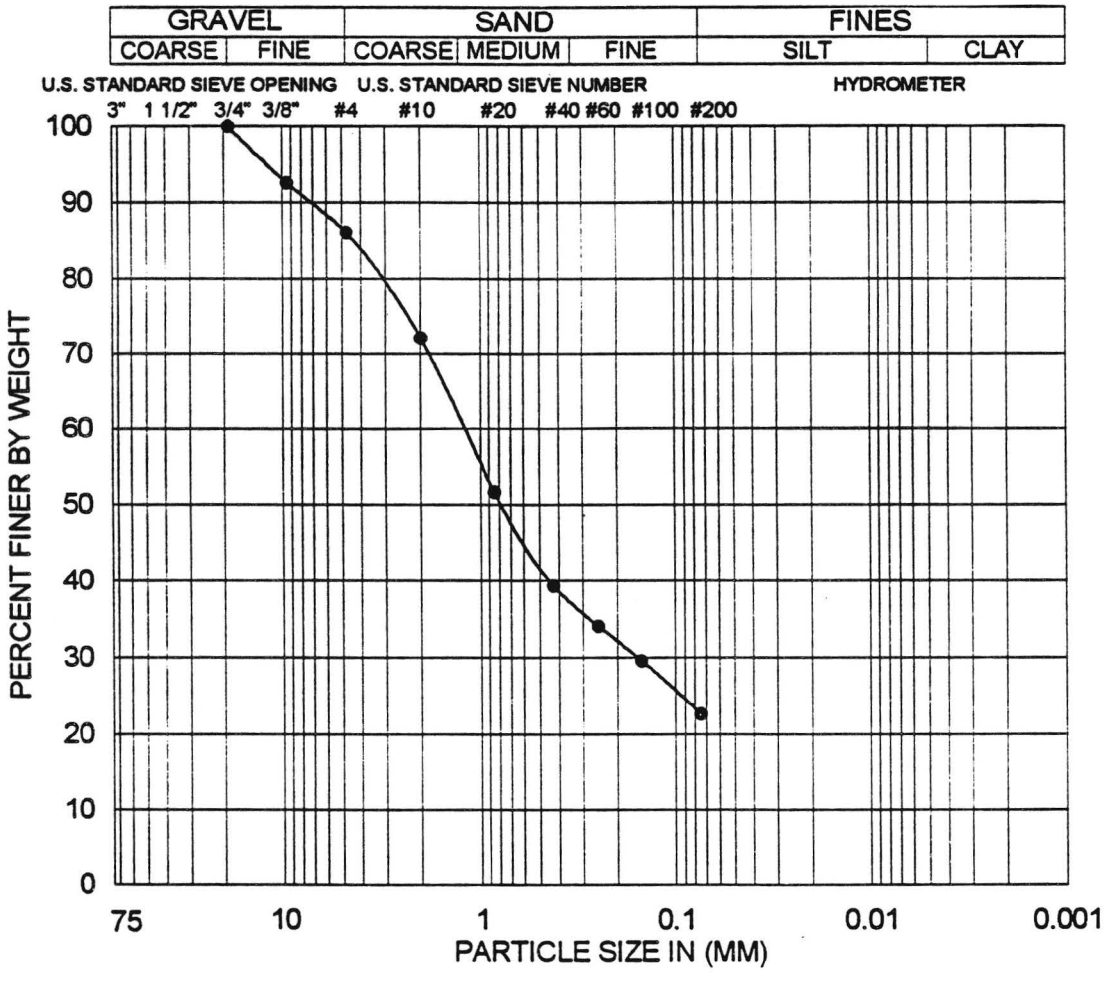
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-35





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-9	D-8	45.0	DRIVE	SC	14:63:23	31,18,13

NOTE:
Not enough sample to meet ASTM specification

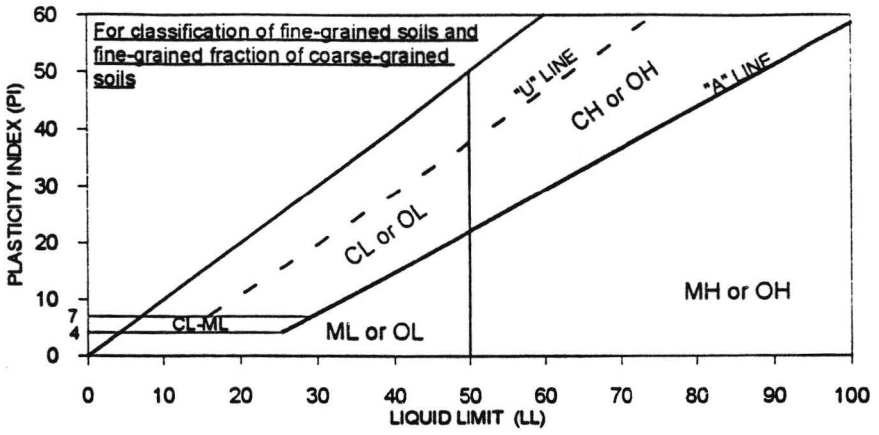
GeoTransit Consultants

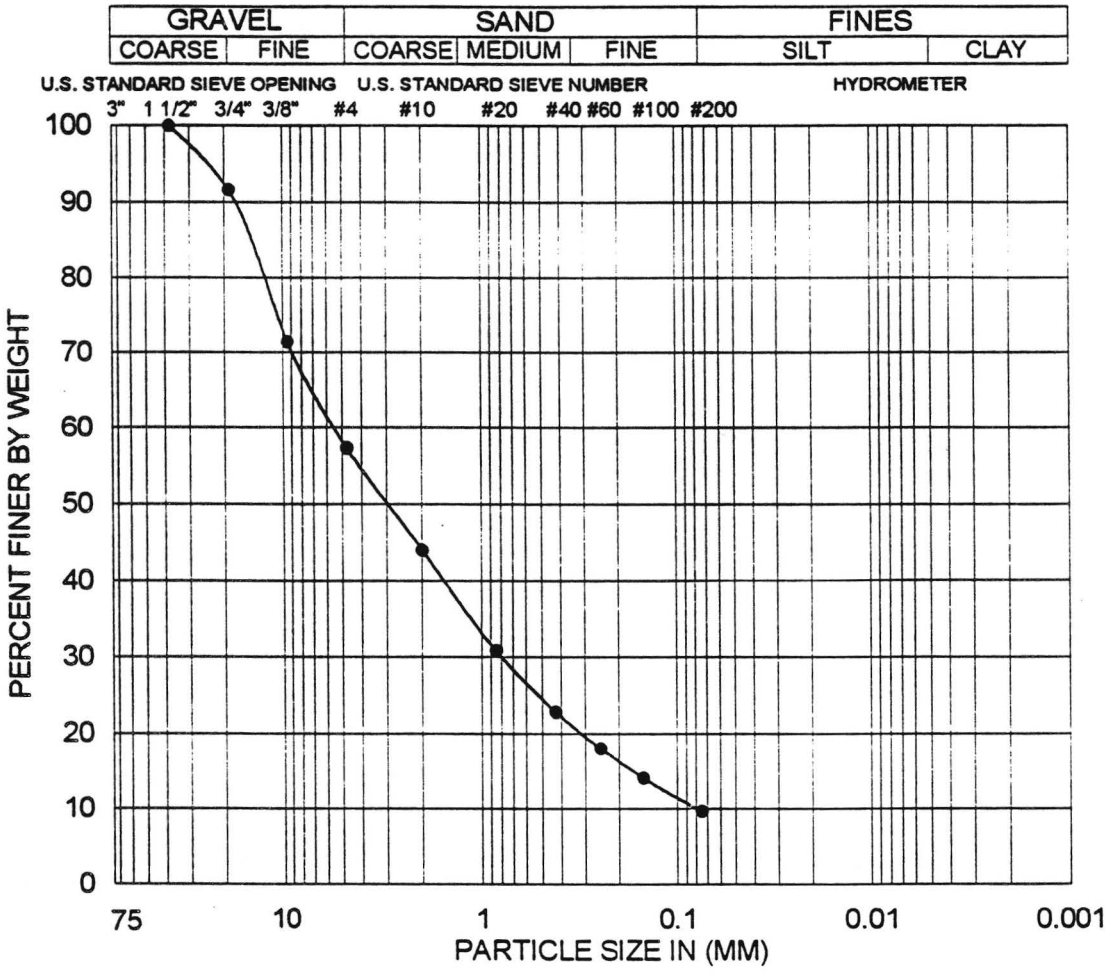
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-36





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	S-8	30.0	BULK	SP-SM	43:47:10	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

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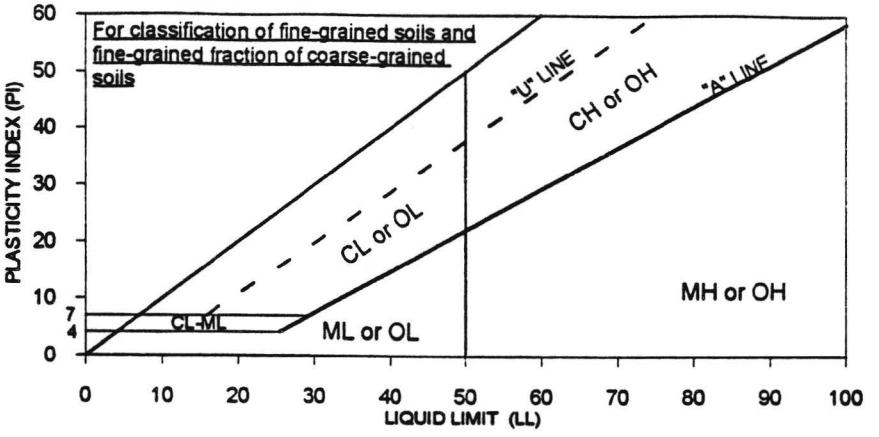
Eastside Extension
Metro Redline

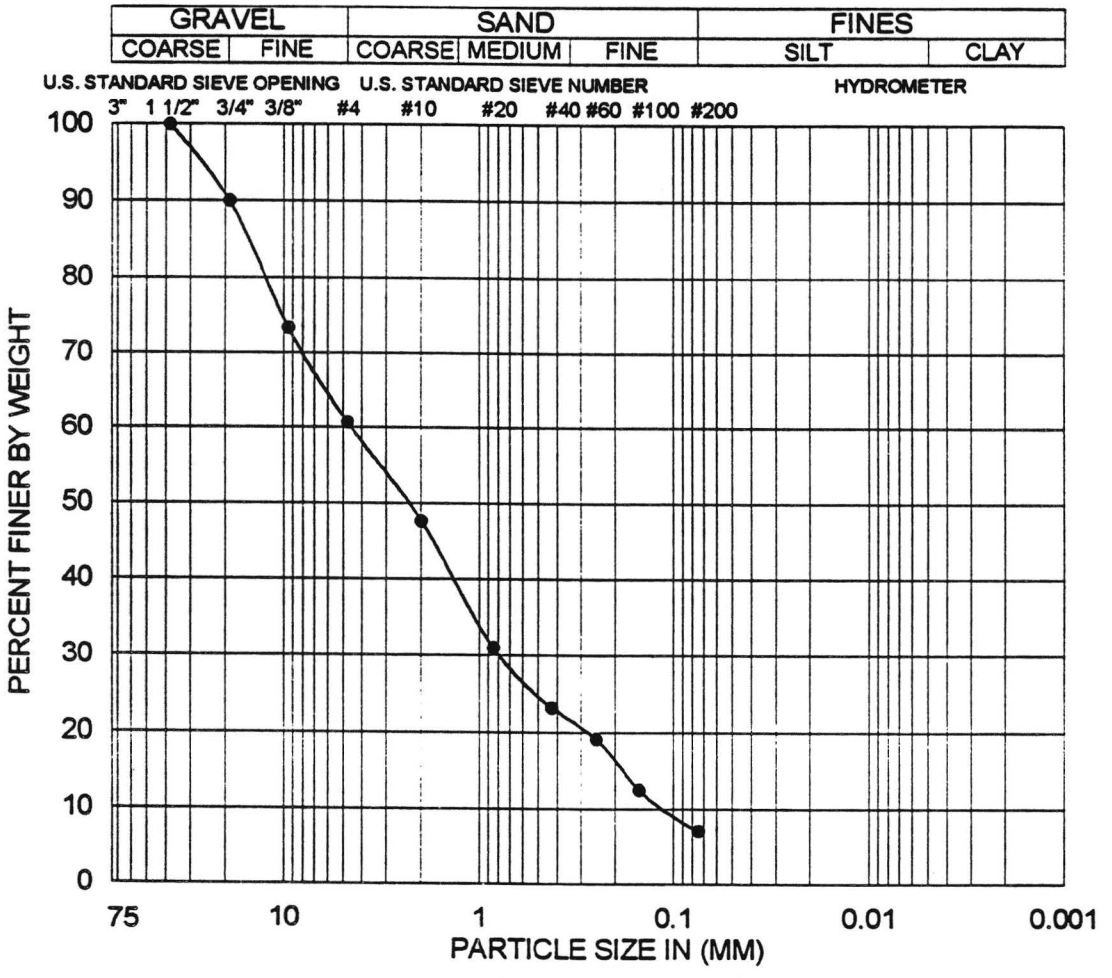
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-37





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	D-9	35.0	DRIVE	SW-SM	39:54:07	N/A

NOTE:
Not enough sample to meet ASTM specification

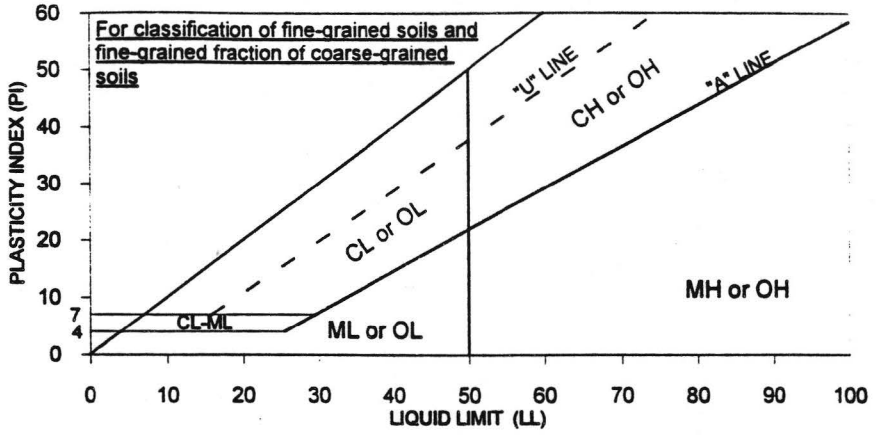
GeoTransit Consultants

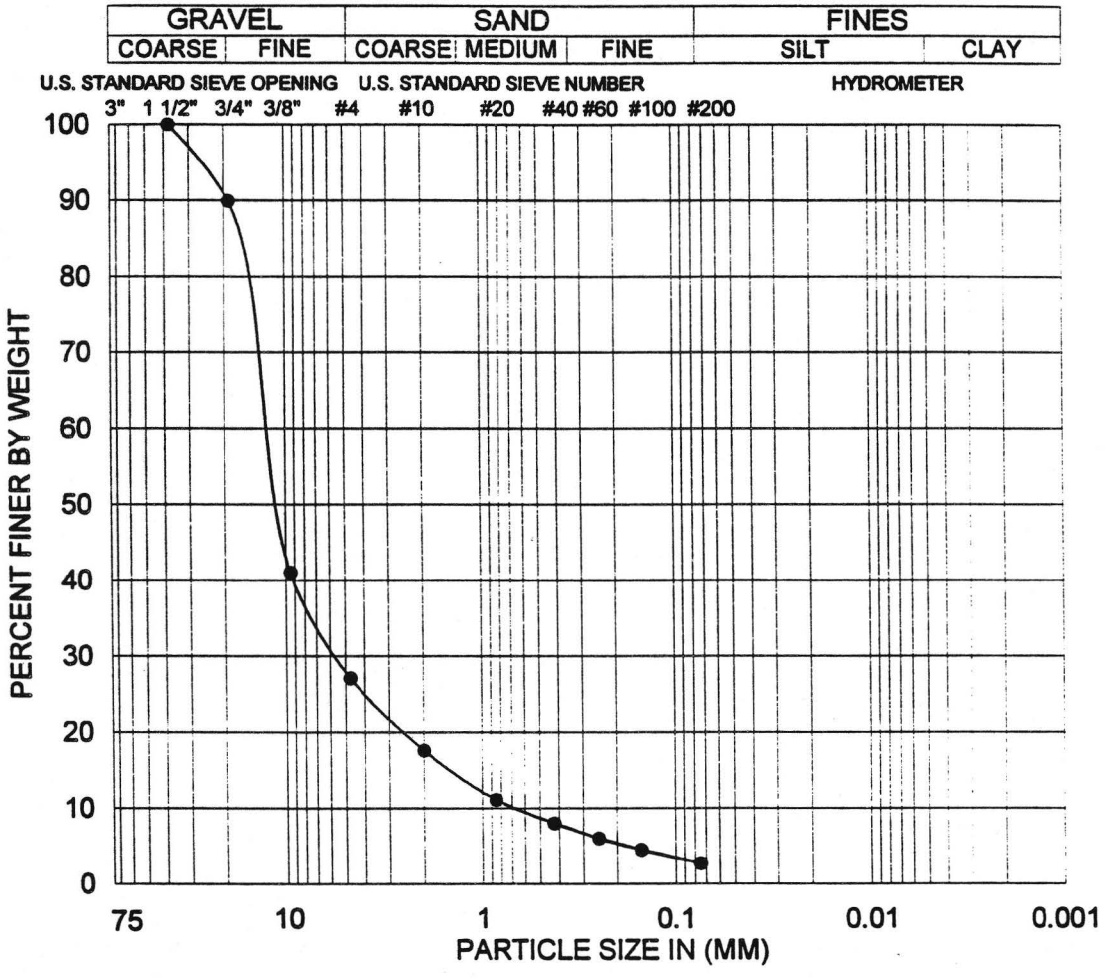
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-38





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	D-11	45.0	DRIVE	GW	73:24:3	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

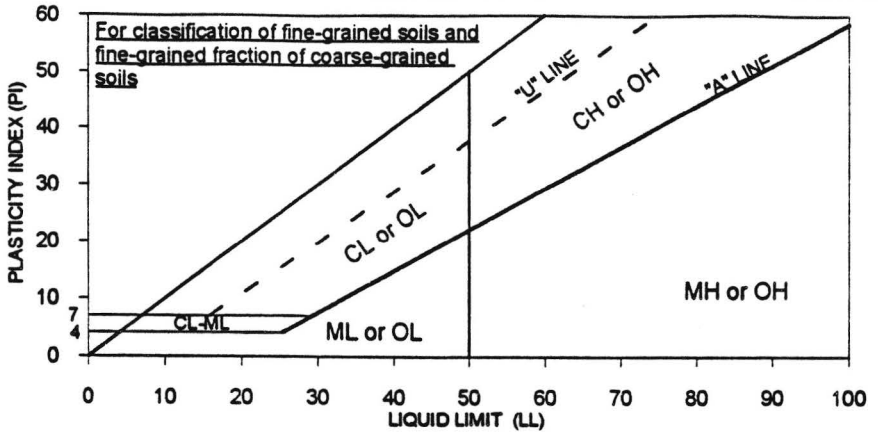
Eastside Extension
Metro Redline

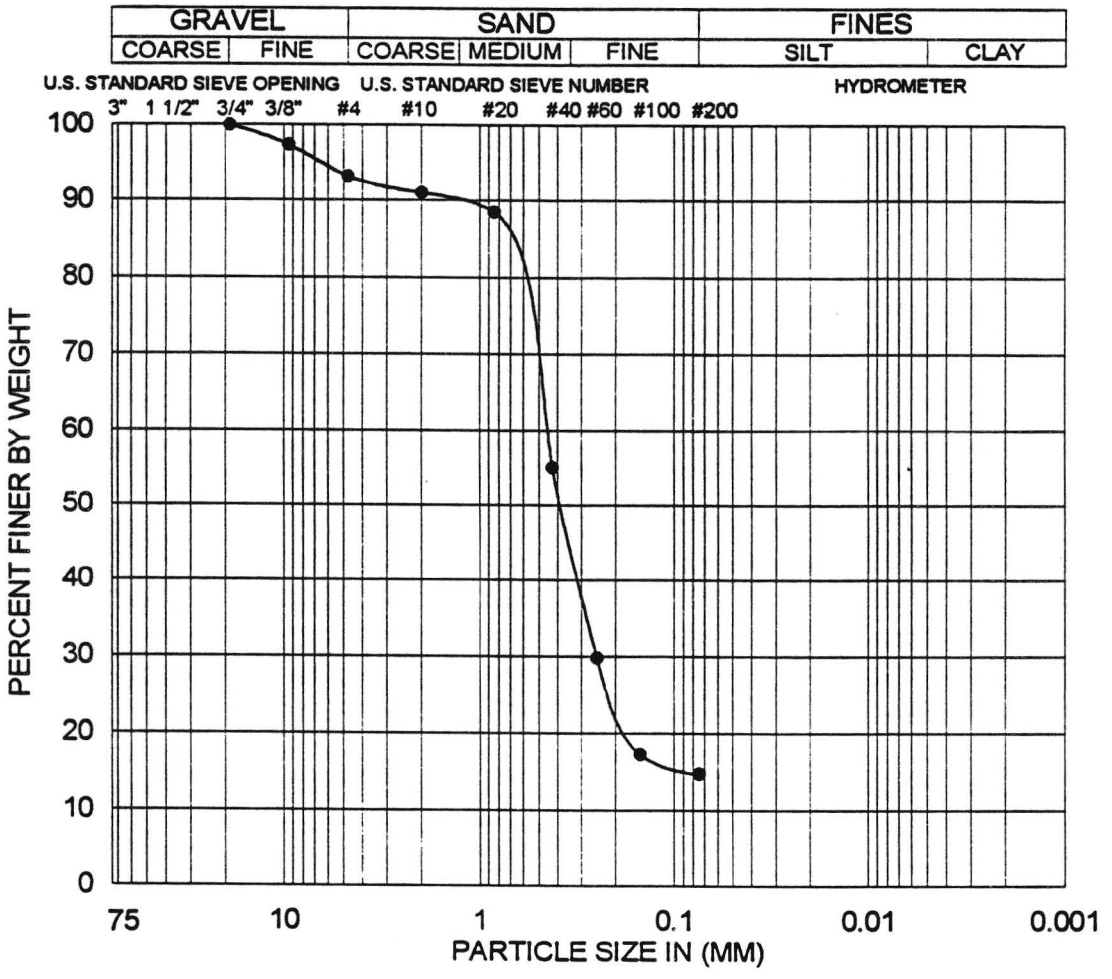
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-39





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	S-16	70.0	BULK	SM	07:78:15	N/A

NOTE:
Not enough sample to meet ASTM specification

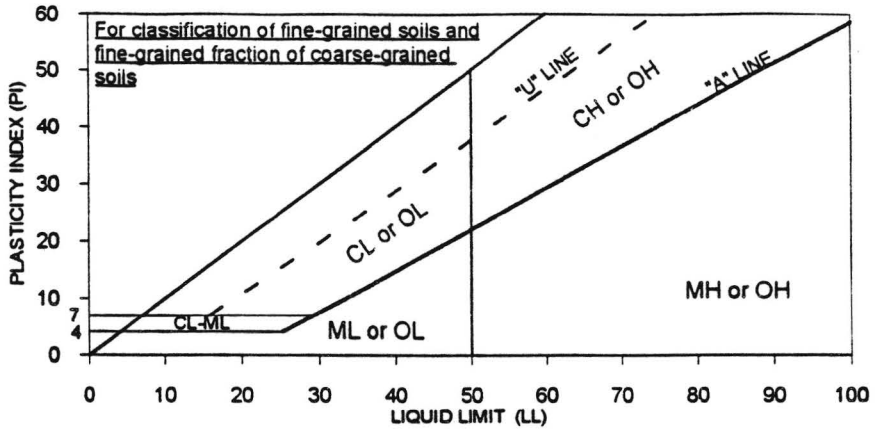
GeoTransit Consultants

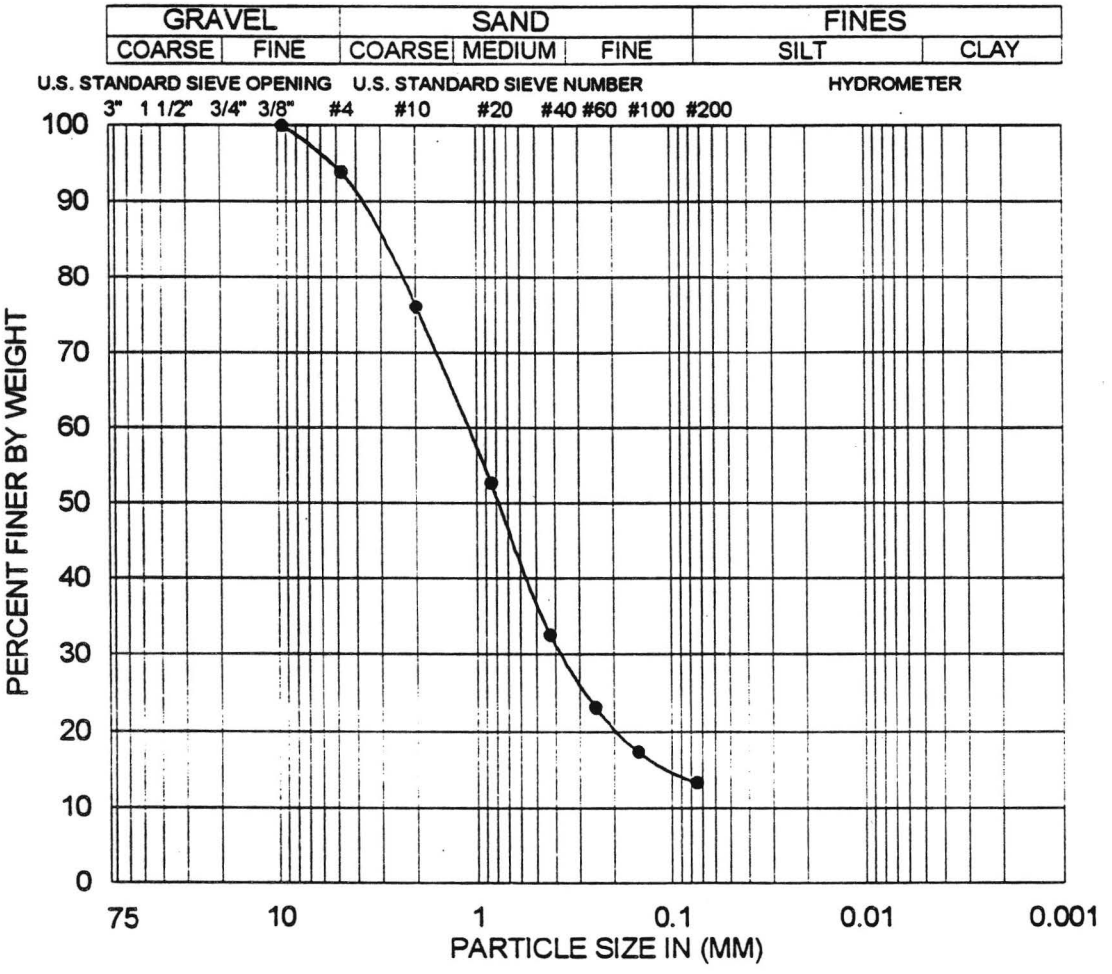
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-40





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	S-18	80.0	BULK	SP-SM	06:81:13	N/A

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Project No. 95-8347-03

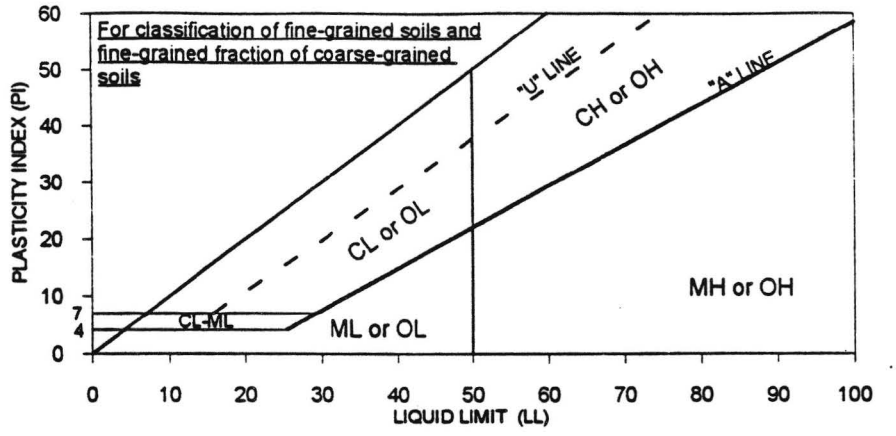
Eastside Extension
Metro Redline

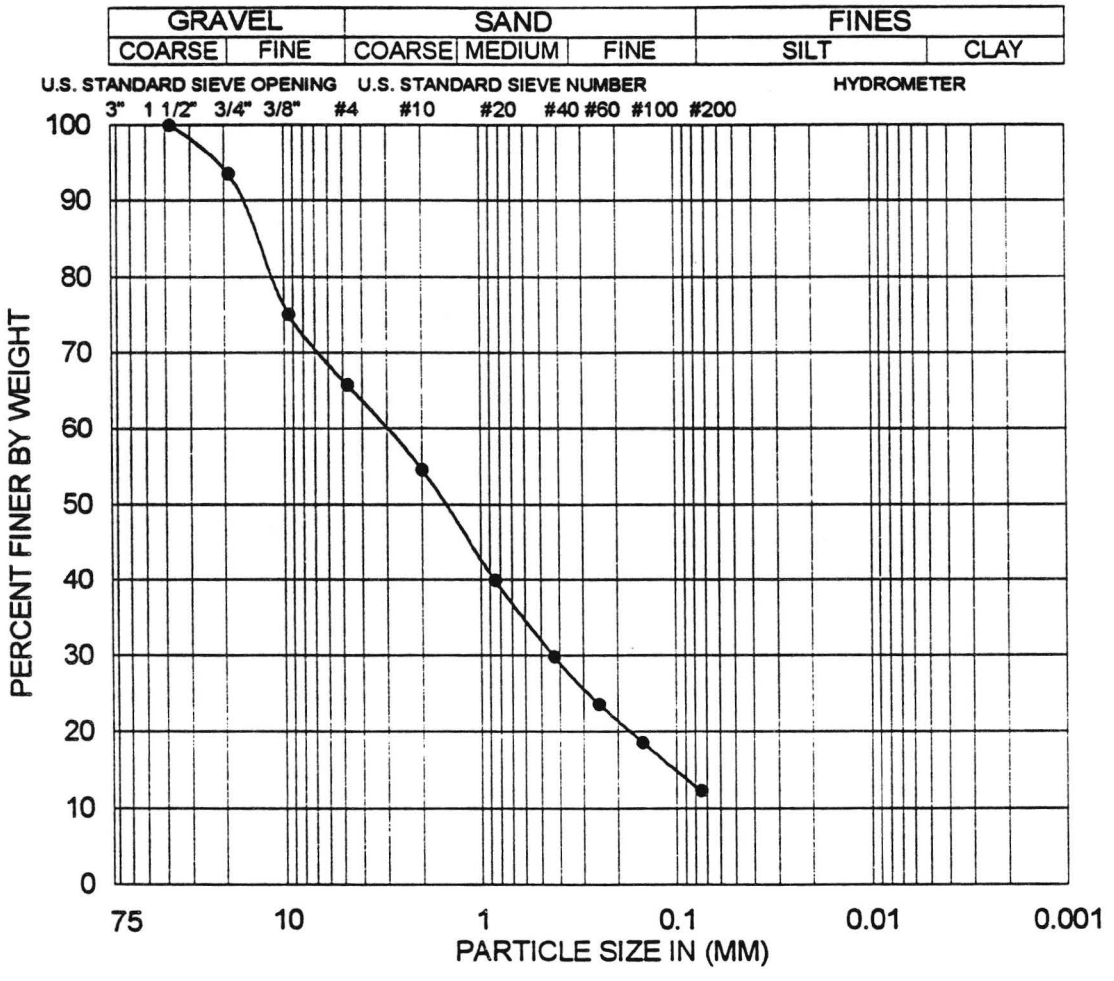
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-41





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-10	D-20	92.0	DRIVE	SP-SM	34:54:12	N/A

NOTE:
Not enough sample to meet ASTM specification

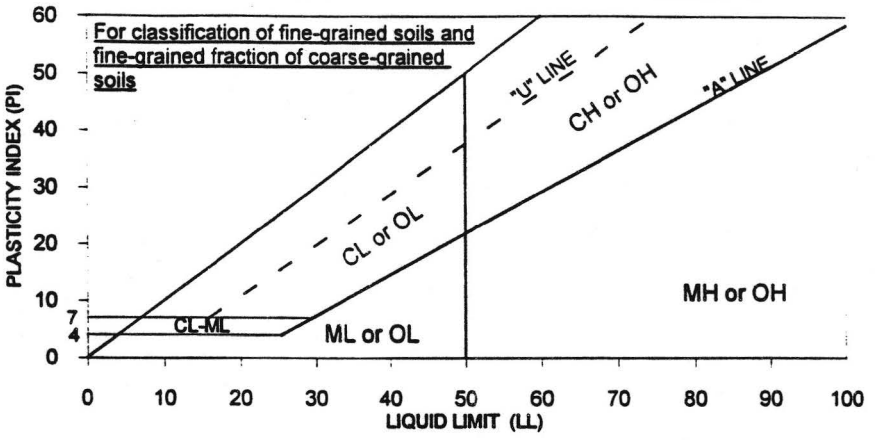
GeoTransit Consultants

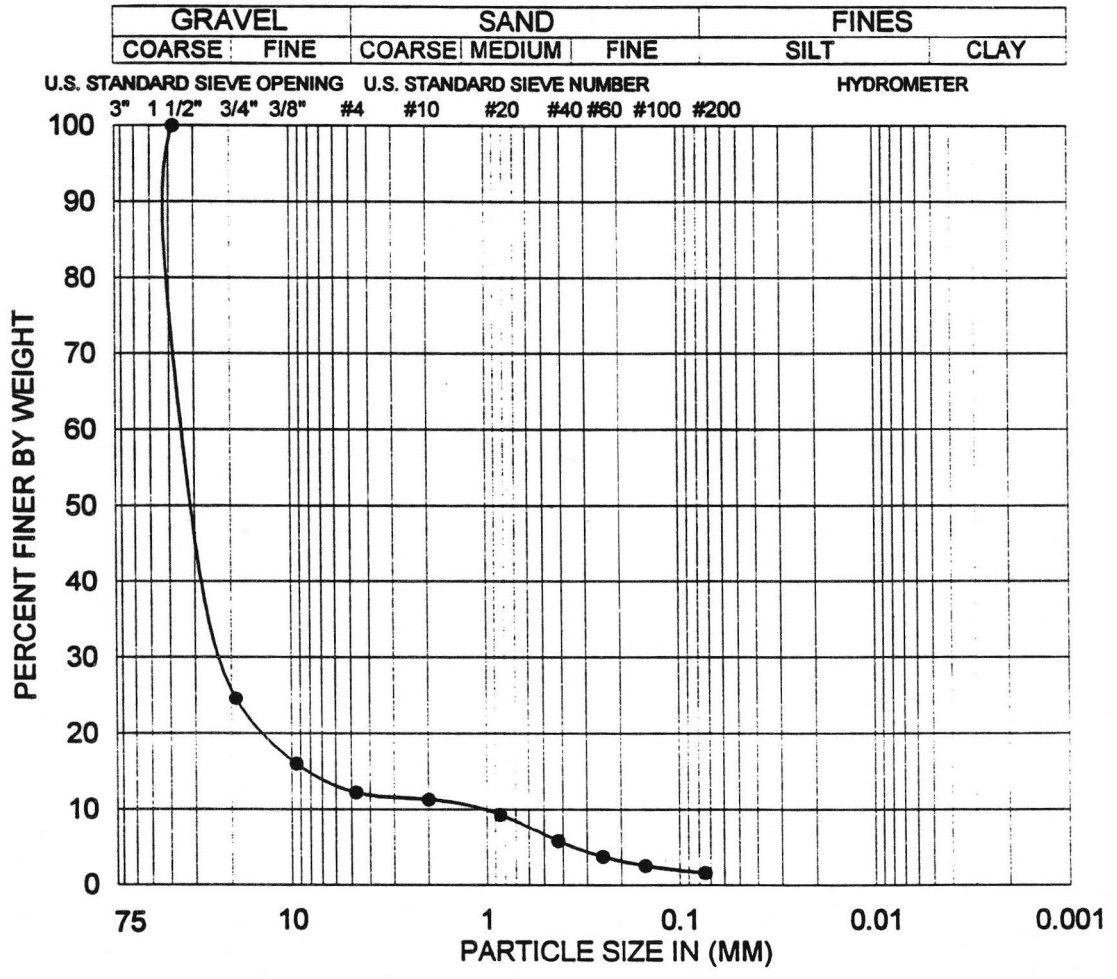
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-42





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	D-7	30.0	DRIVE	GP	88:10:2	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

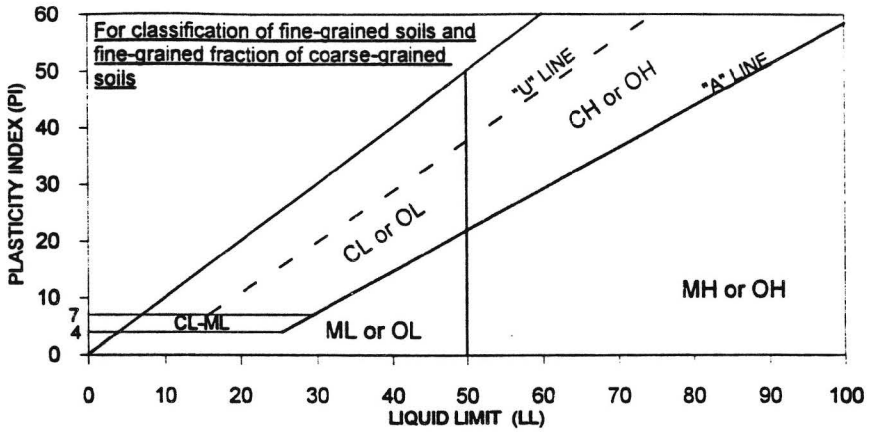
Eastside Extension
Metro Redline

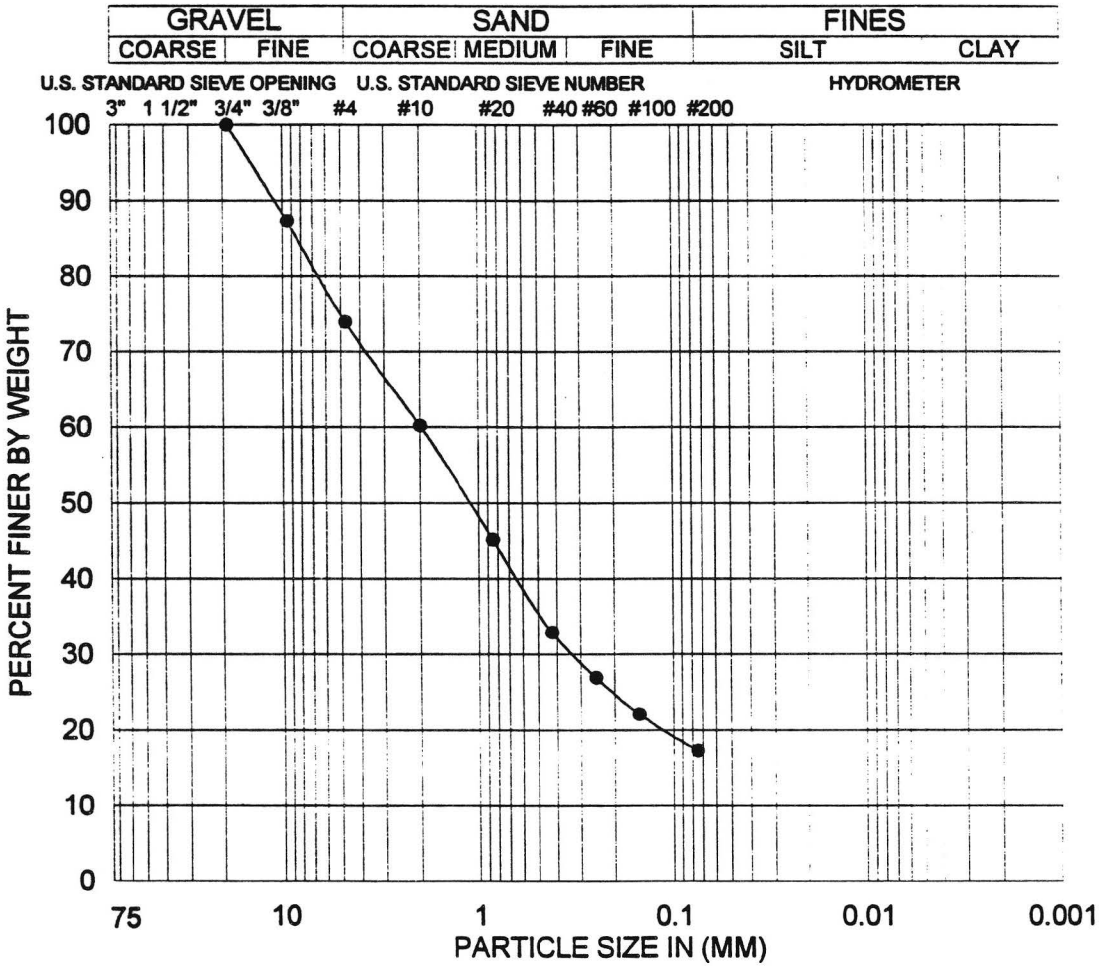
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-43





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	D-10	40.0	DRIVE	SM	26:57:17	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

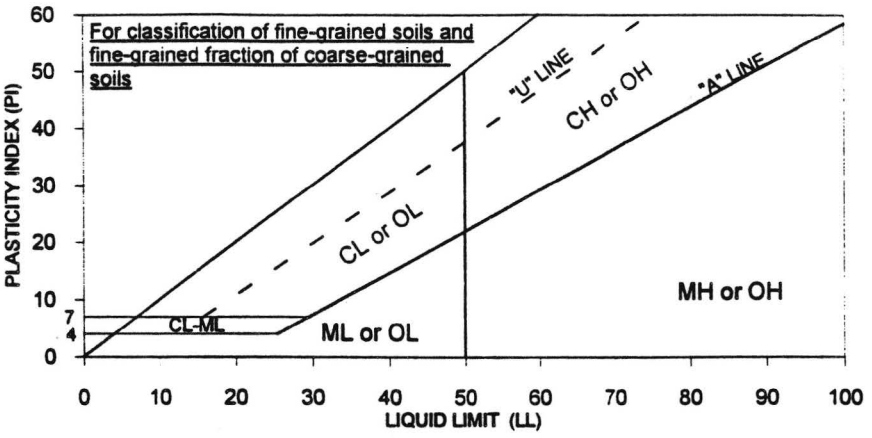
Eastside Extension
Metro Redline

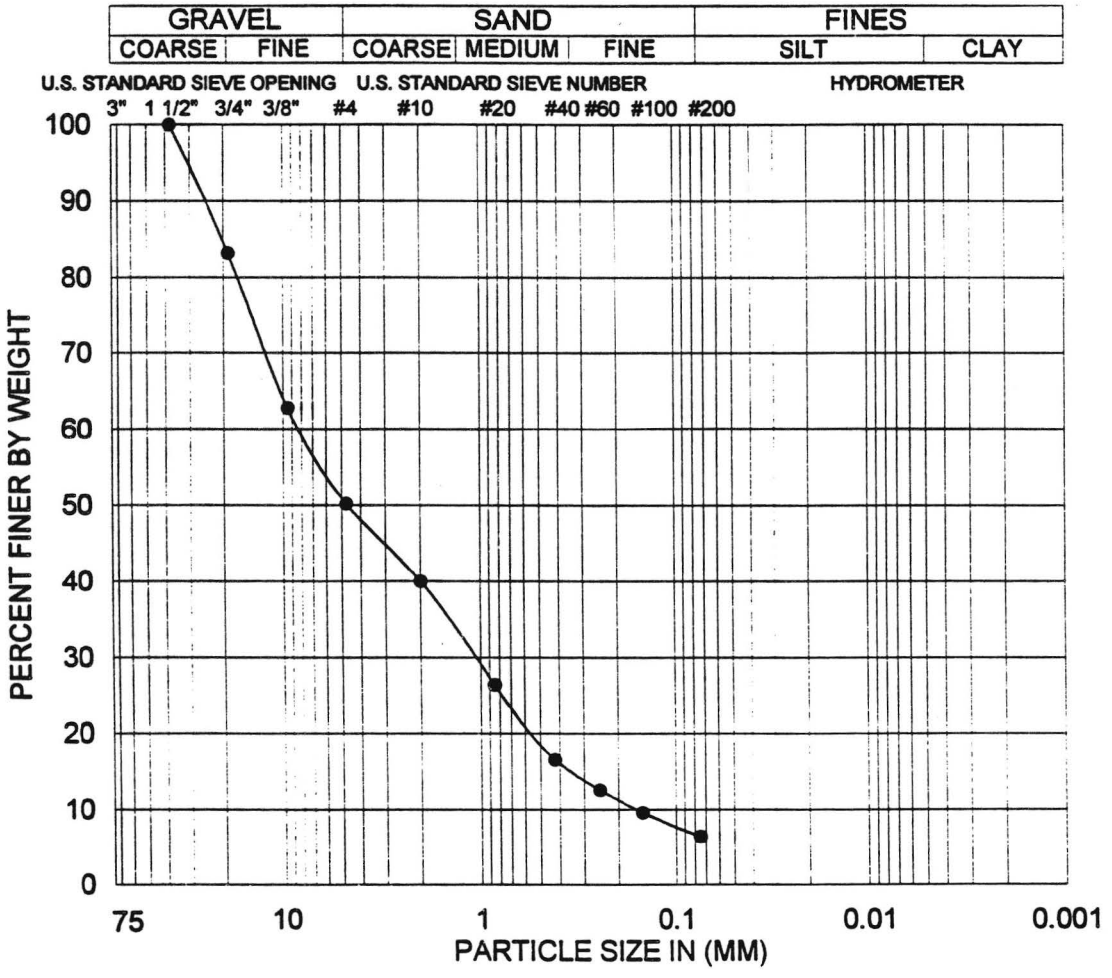
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-44





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	D-12	49.0	DRIVE	GP-GM	50:44:6	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

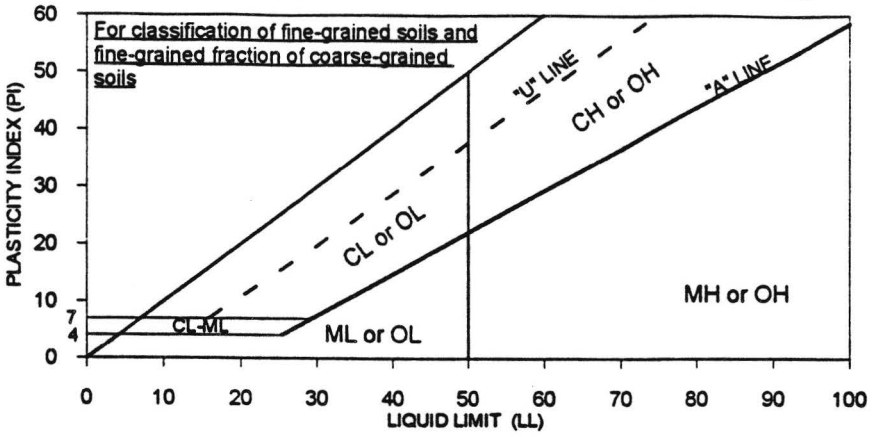
Eastside Extension Metro Redline

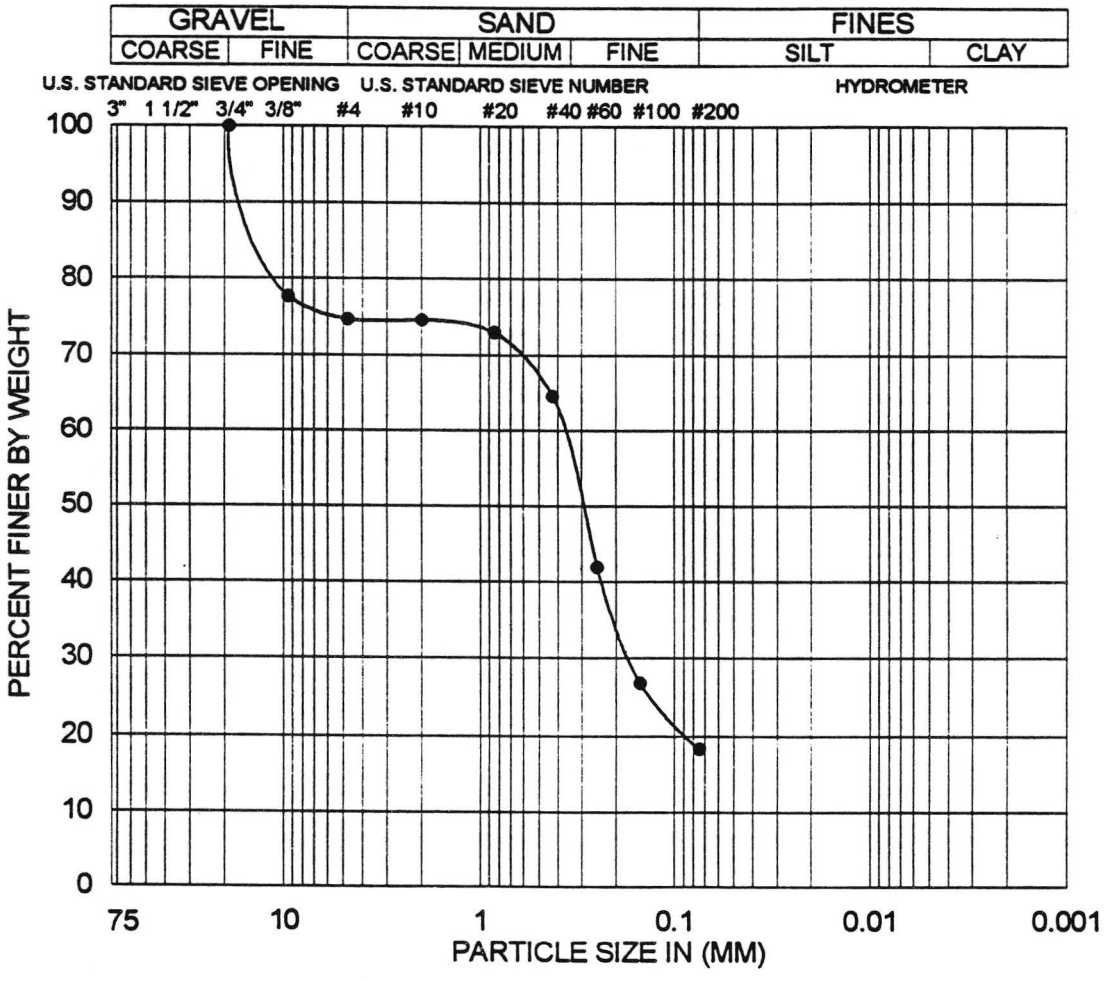
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-45





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	S-15	60.0	BULK	SM	25:57:18	N/A

NOTE:
Not enough sample to meet ASTM specification

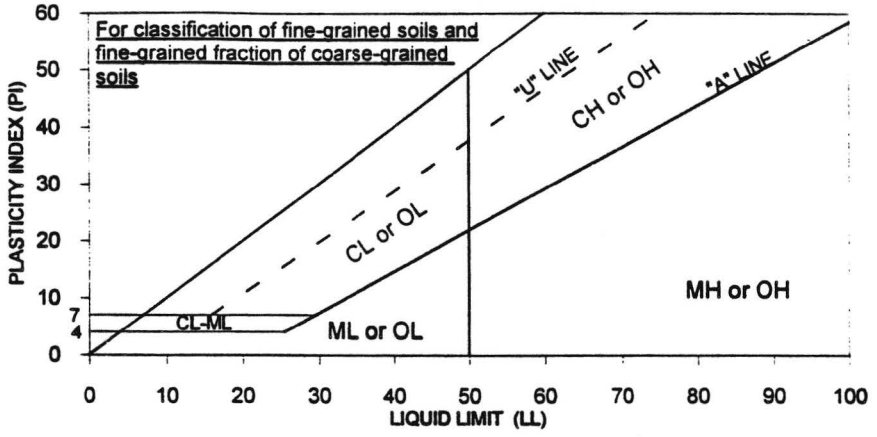
GeoTransit Consultants

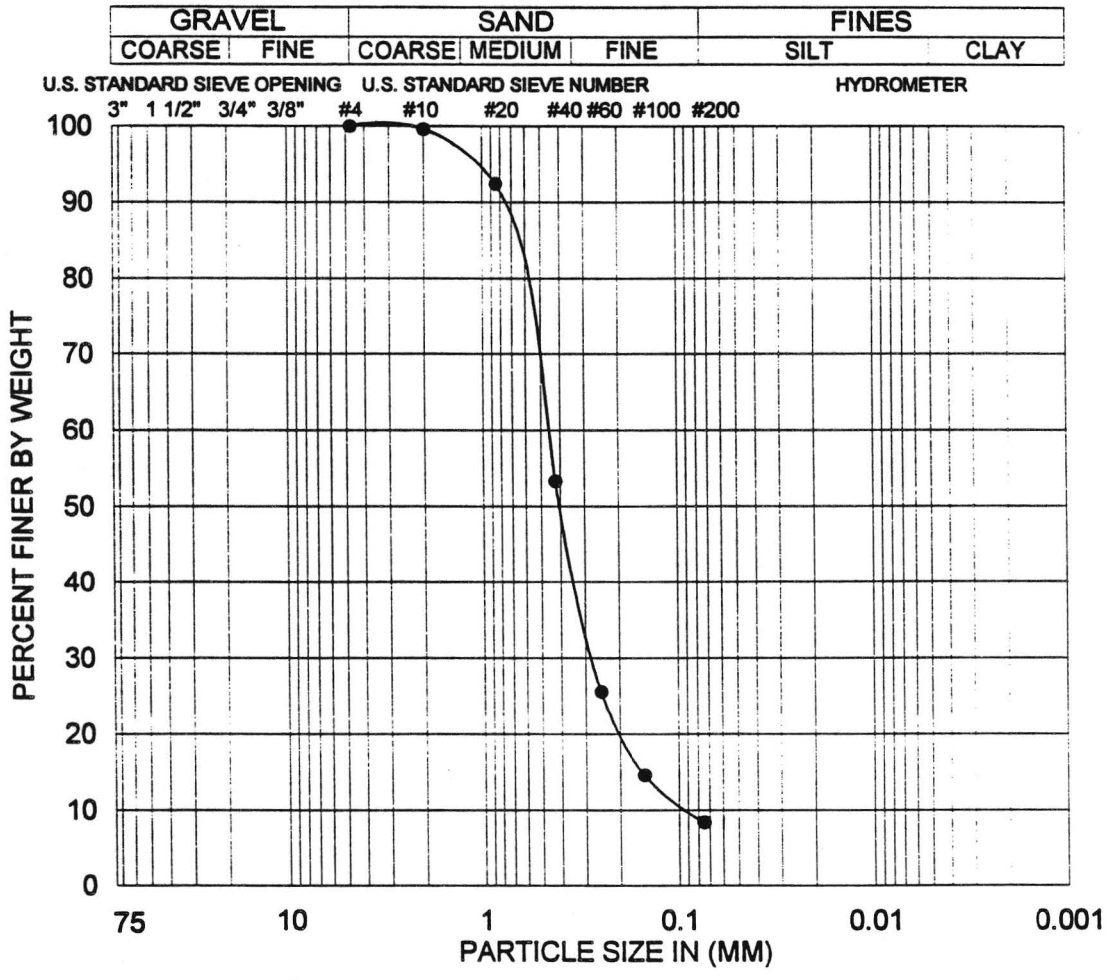
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-46





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	D-17	65.0	DRIVE	SP-SM	0:92:8	N/A

GeoTransit Consultants

Project No. 95-8347-03

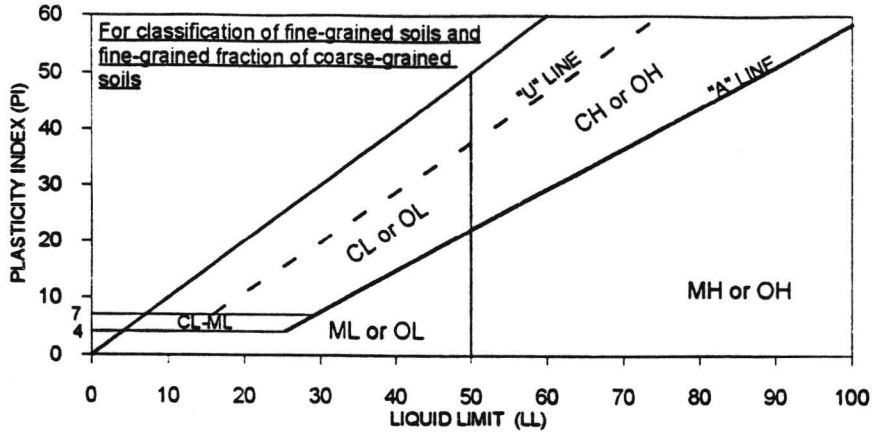
Eastside Extension
Metro Redline

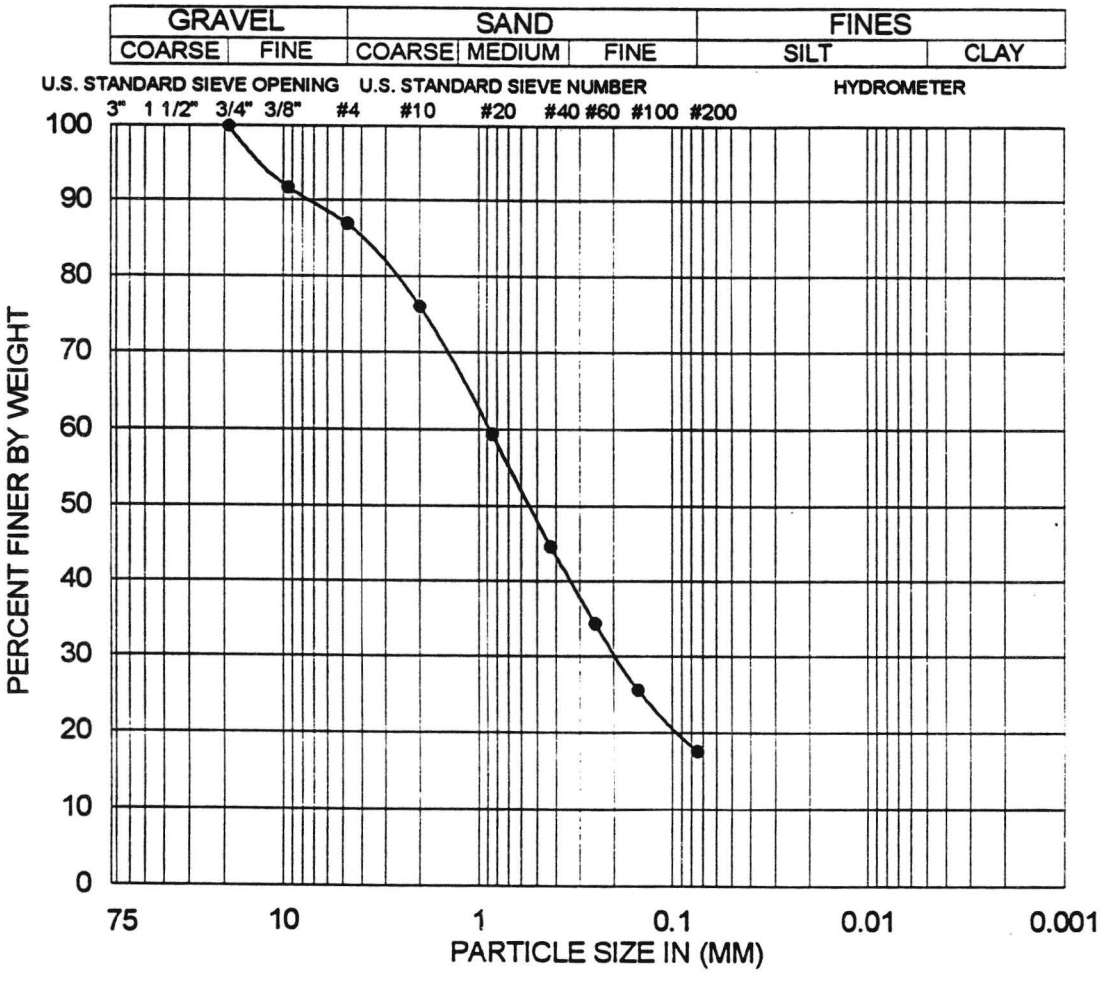
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-47





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	S-20	75.0	BULK	SM	13:69:18	N/A

NOTE:
Not enough sample to meet ASTM specification

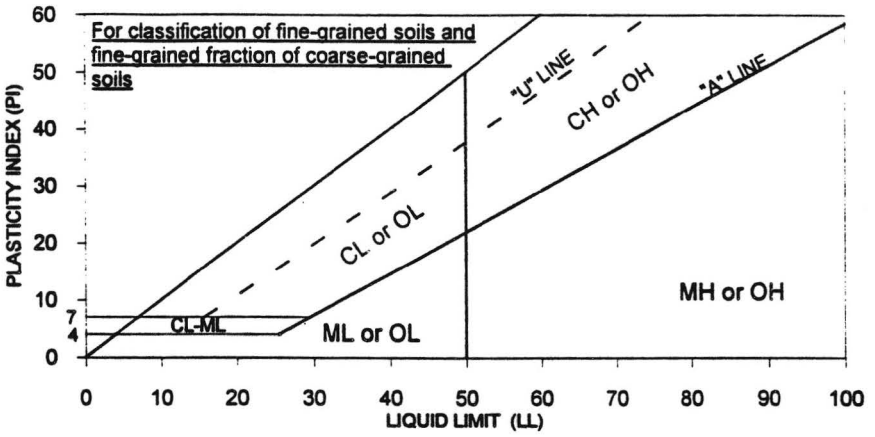
GeoTransit Consultants

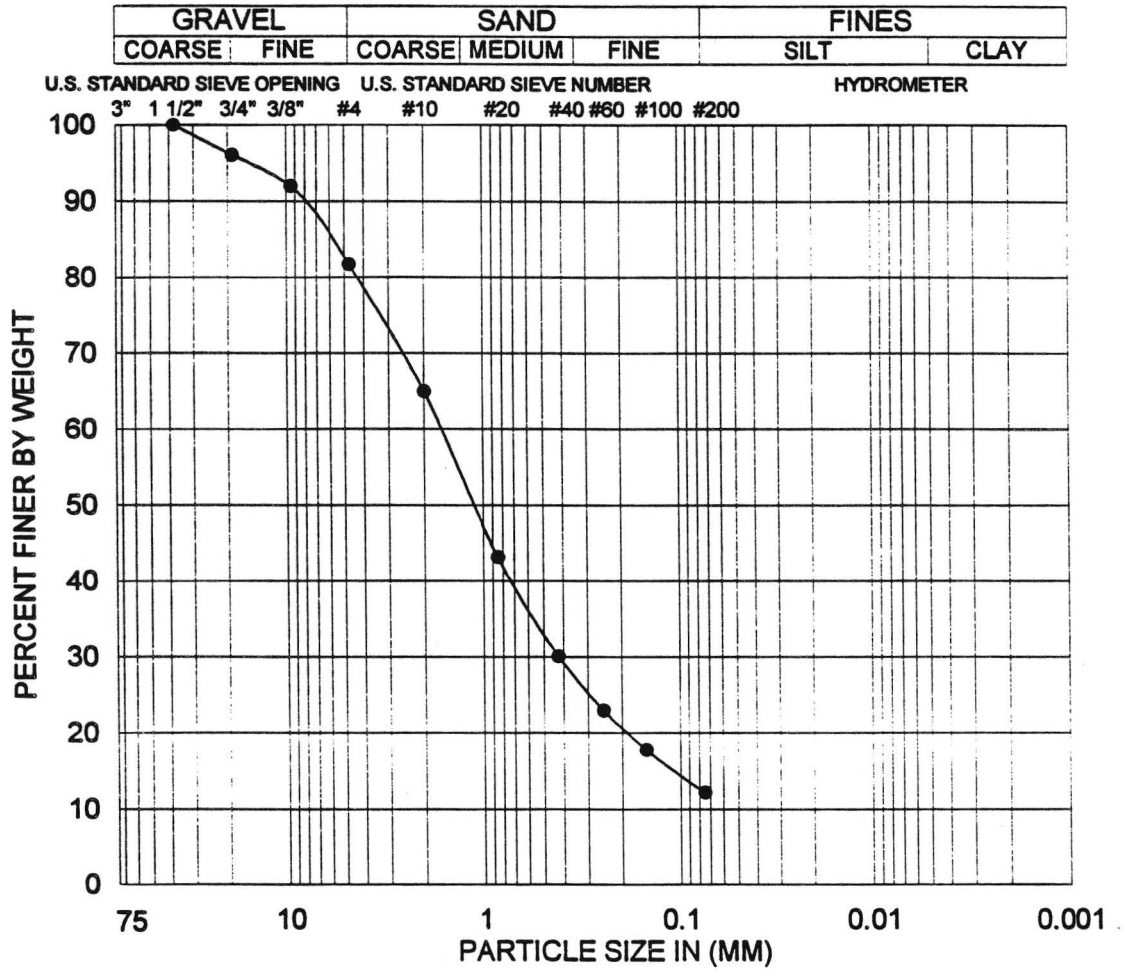
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-48





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-12	D-21	80.0	DRIVE	SM	18:70:12	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

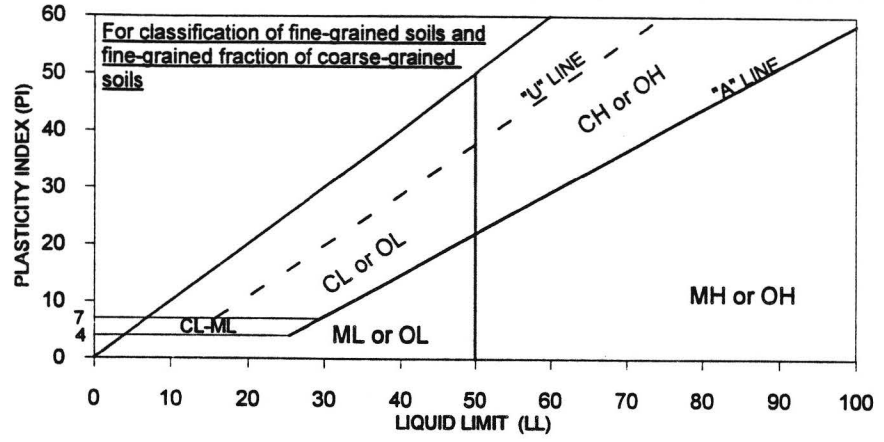
Eastside Extension
Metro Redline

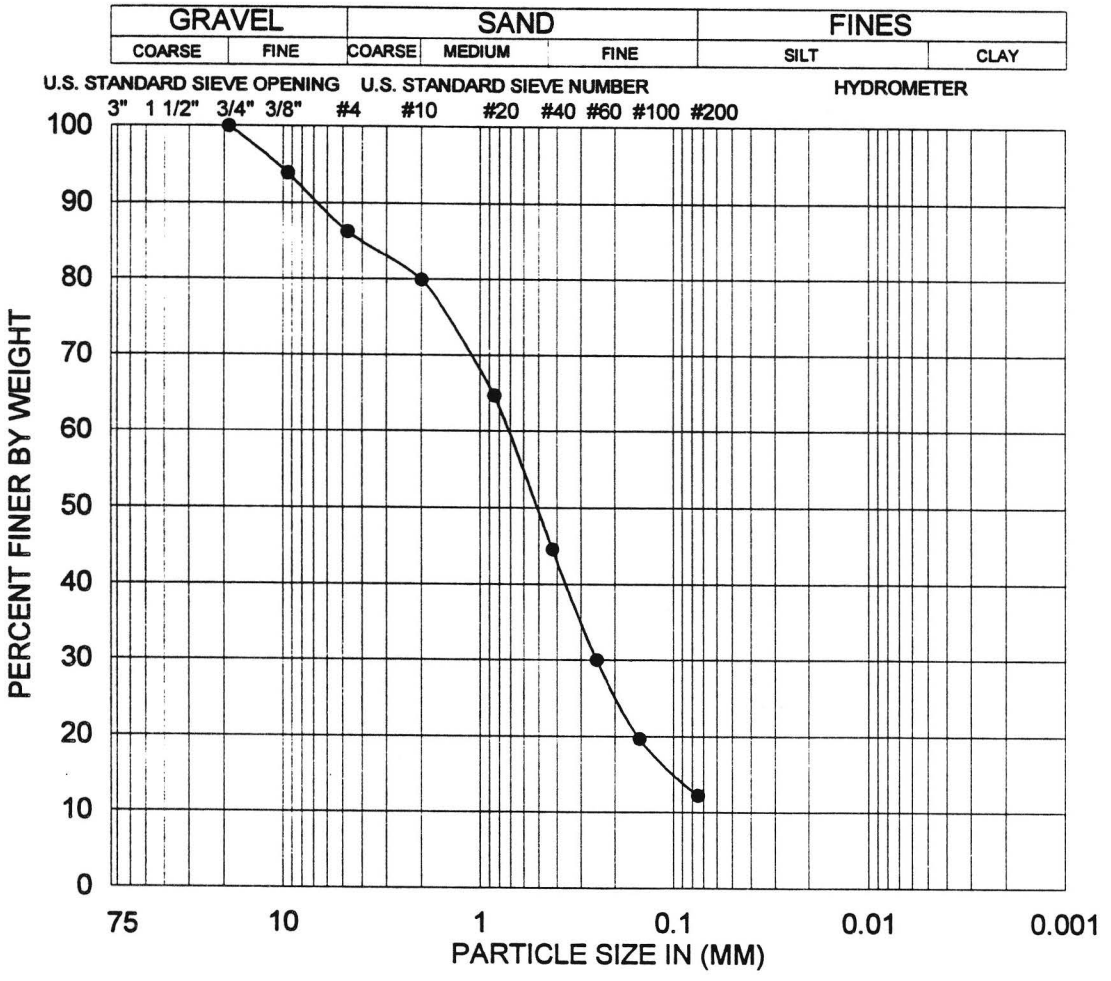
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-49





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	S-4	21.0	SW-SM	14:74:12	N/A

Not enough sample to meet ASTM specification

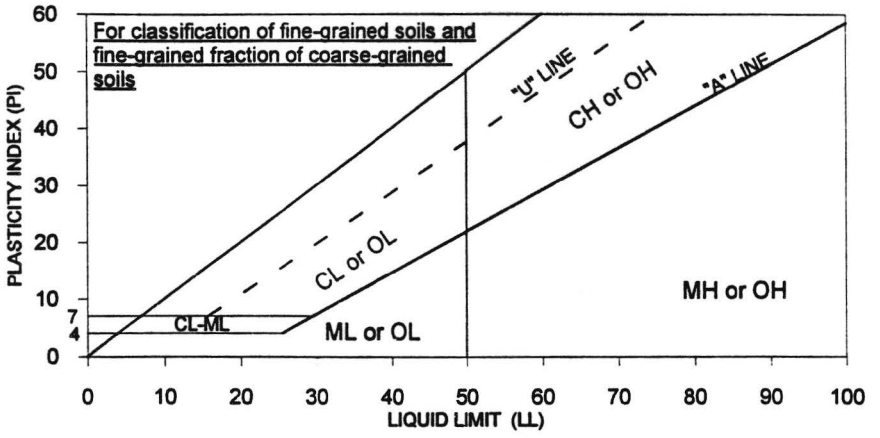
GeoTransit Consultants

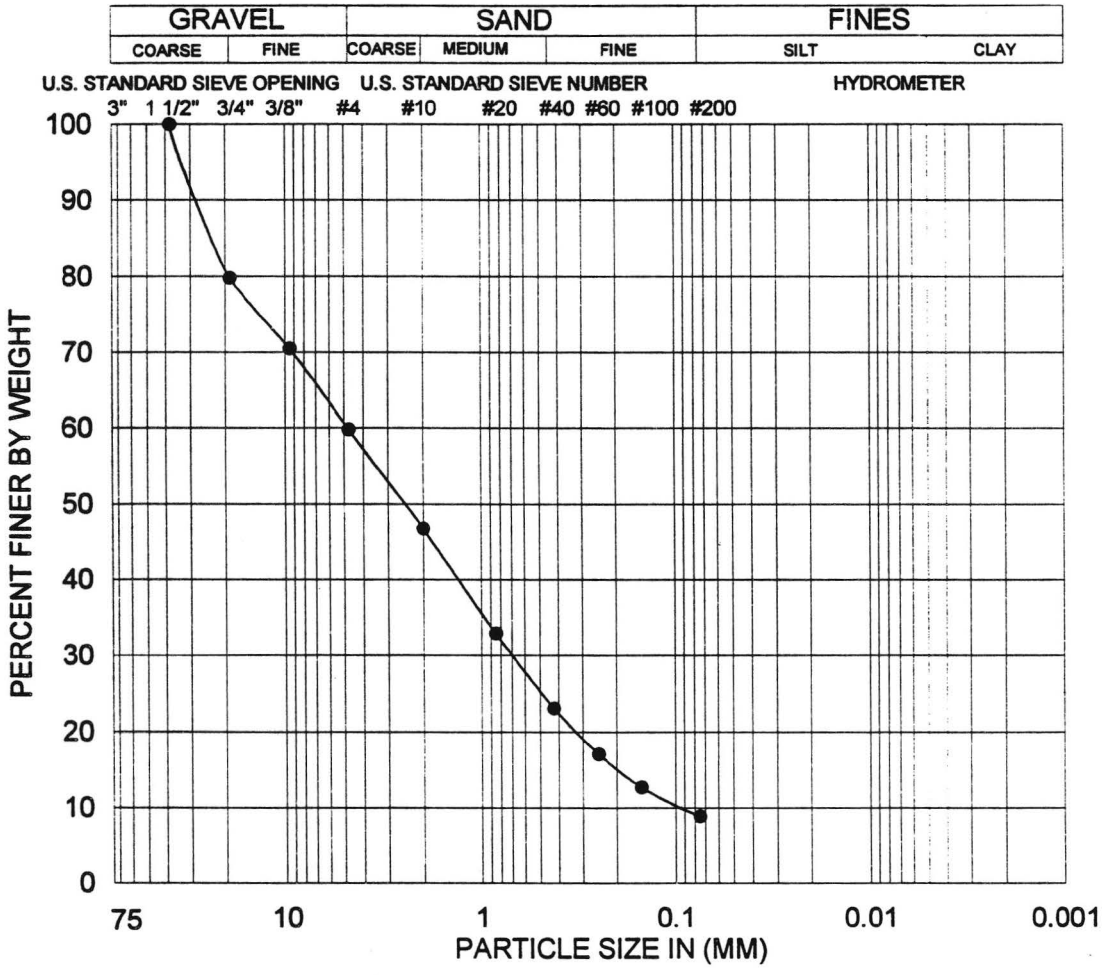
Project No. 95-8347-23
Eastside Extension
Metro Redline 1 (2)

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

12-95

Figure B-50





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	D-7	30.0	SW-SM	40:51:9	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-23

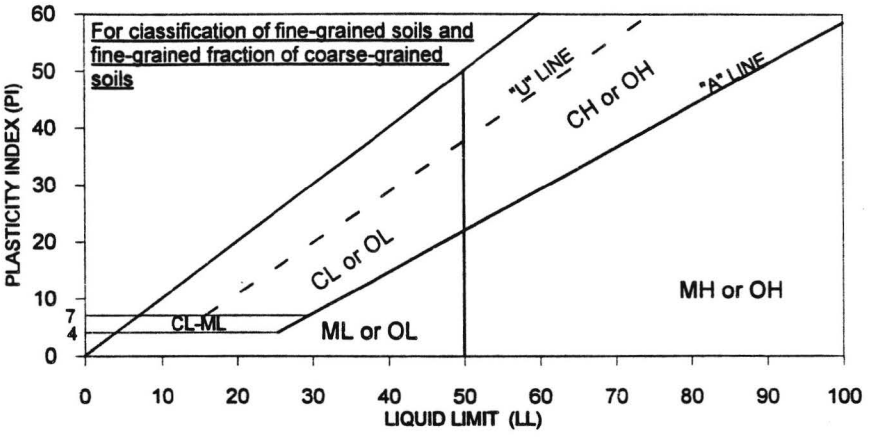
Eastside Extension
Metro Redline 1 (2)

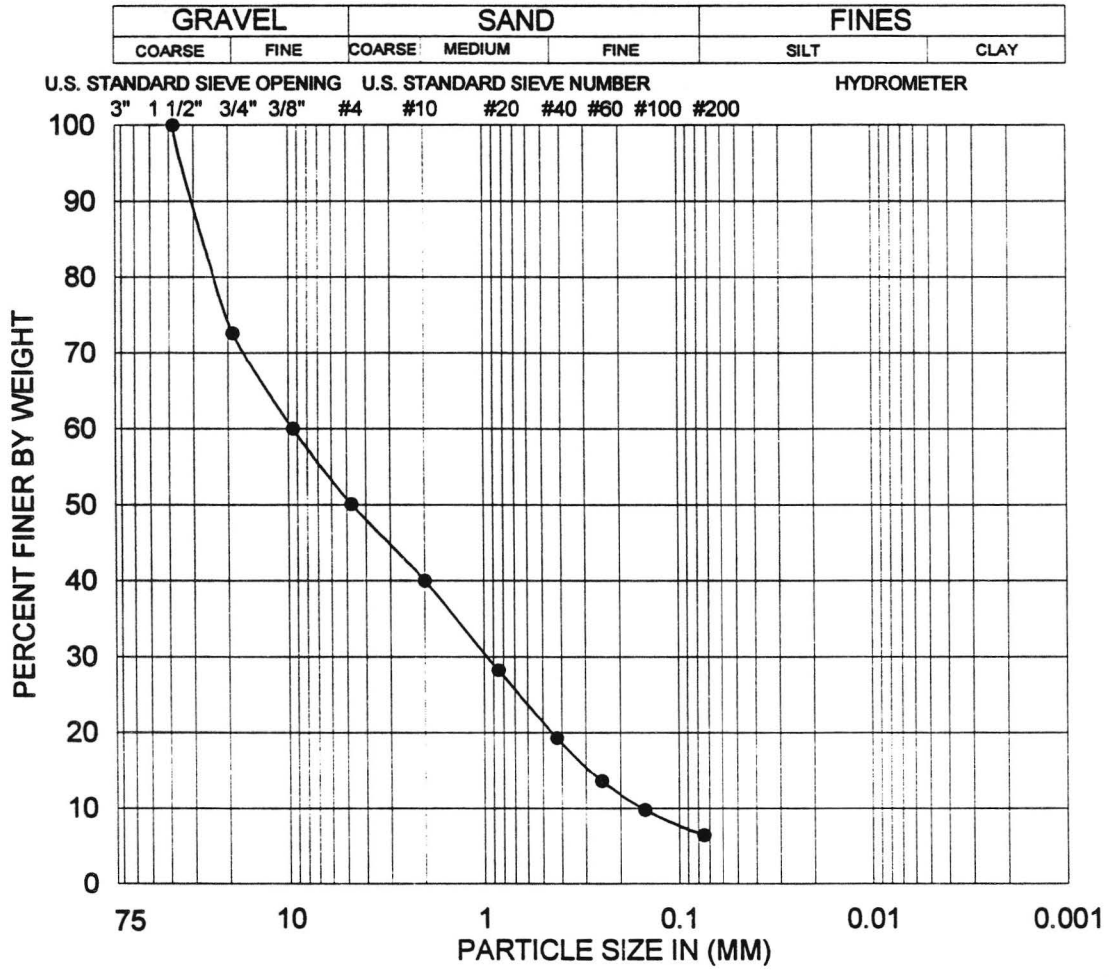
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-51





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	D-10	37.0	GP-GM	50:43:7	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-23

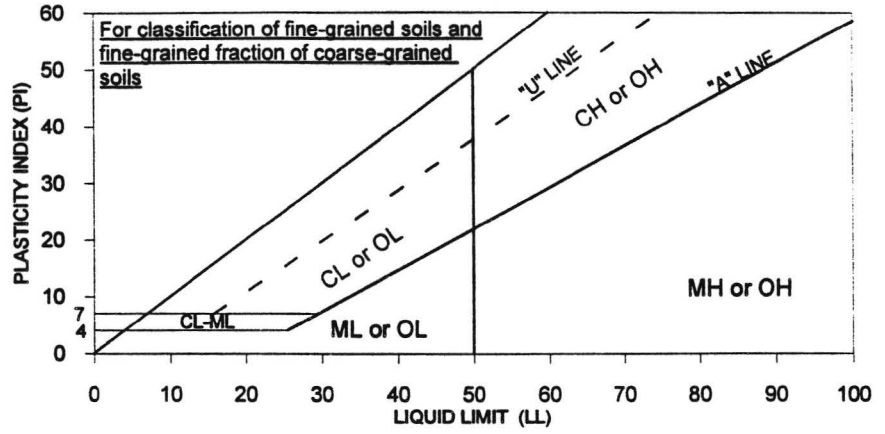
Eastside Extension
Metro Redline 1 (2)

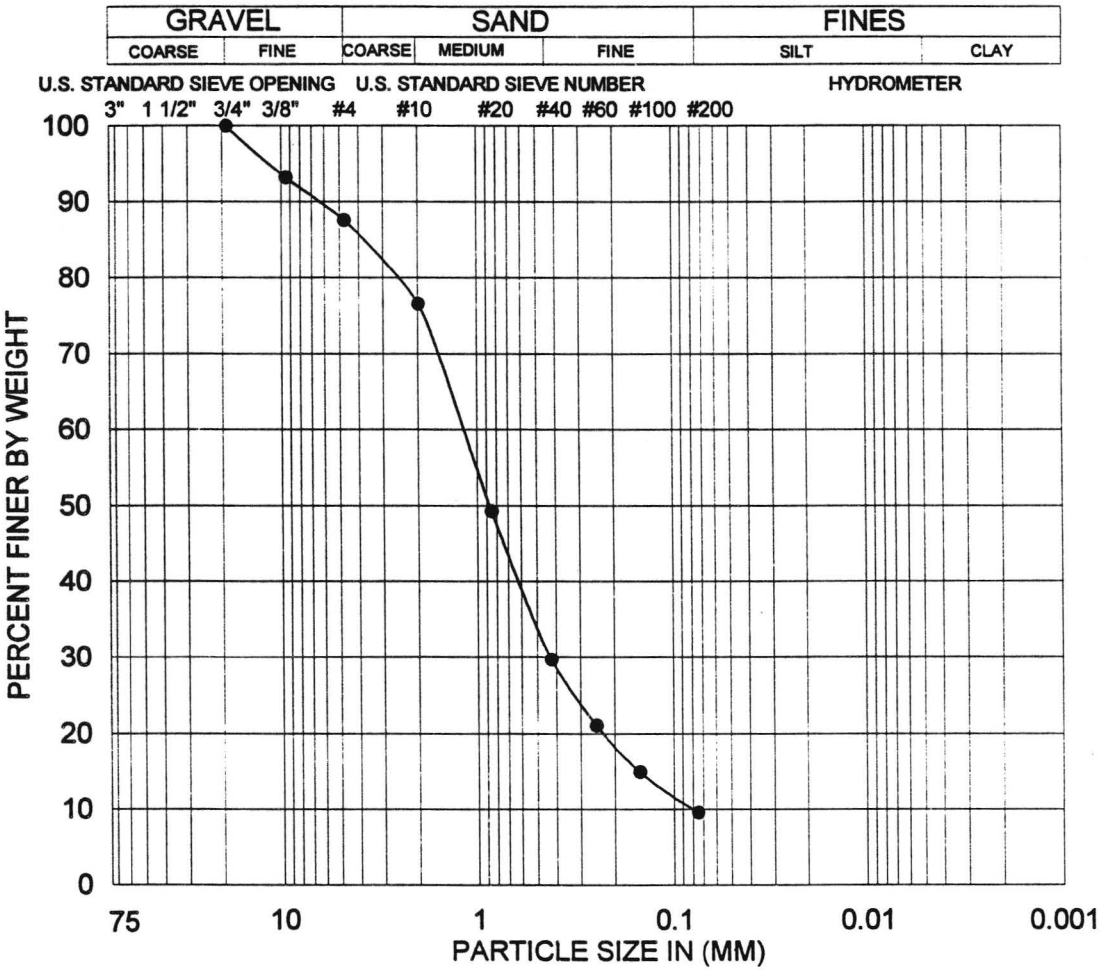
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-52





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	S-12	40.5	SW-SM	12:78:10	N/A

Not enough sample to meet ASTM specification

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Eastside Extension

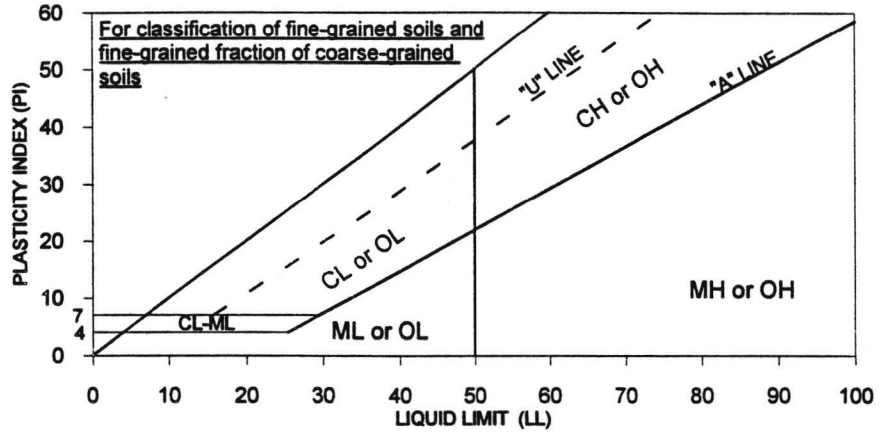
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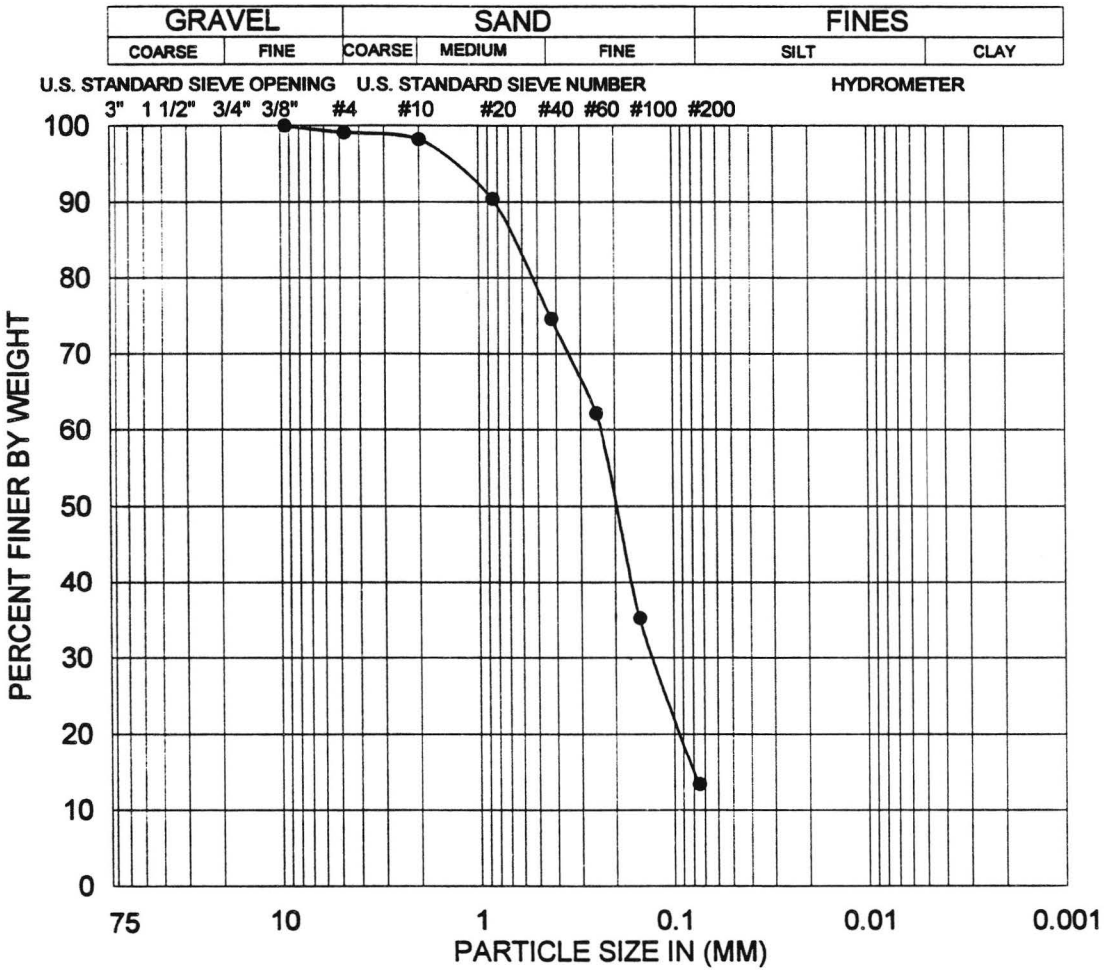
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

12-95

Figure B-53





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	S-15	46.0	SM	1:86:13	N/A

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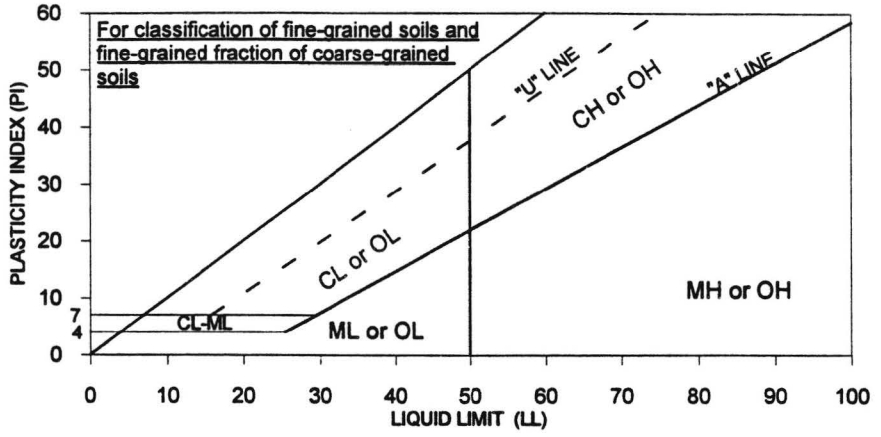
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Metro Redline 1 (2)

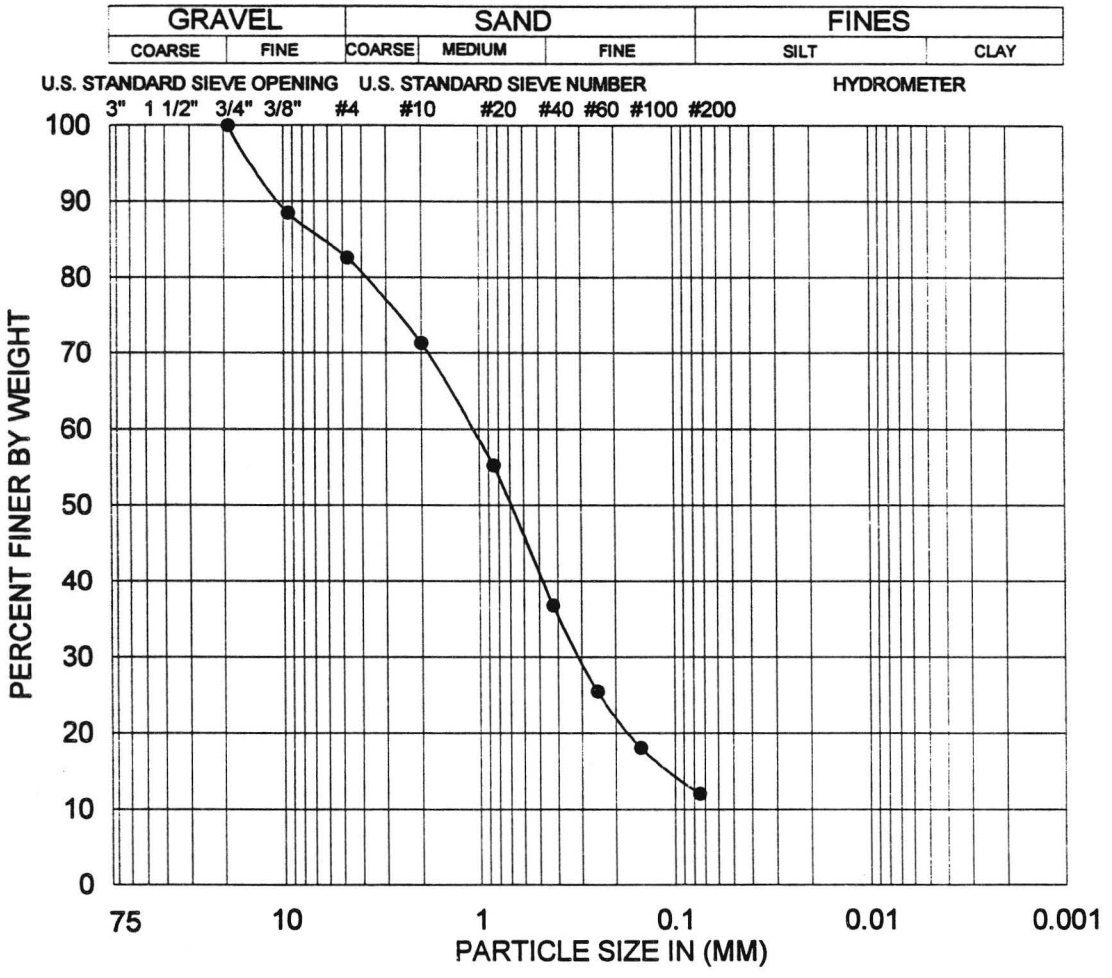
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-54





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	S-18	52.0	SW-SM	17:71:12	N/A

Not enough sample to meet ASTM specification

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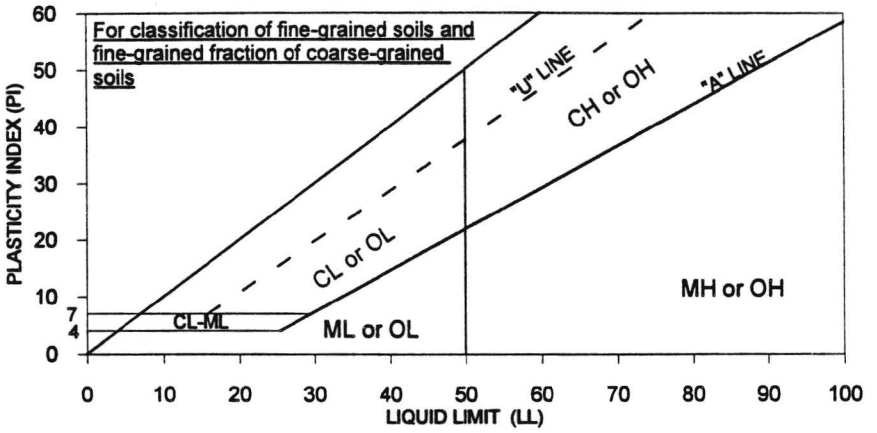
Eastside Extension
Metro Redline 1 (2)

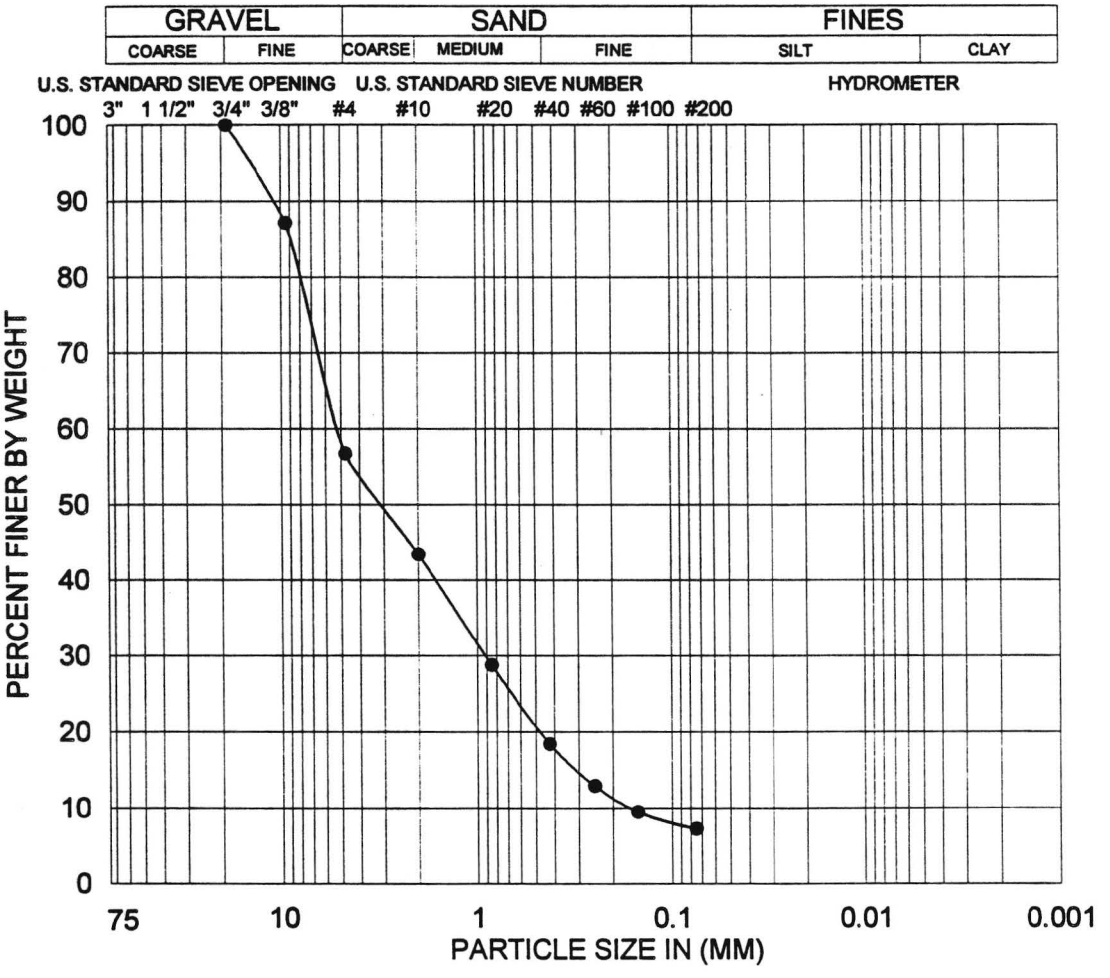
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

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Figure B-55





BORING NO.	SAMPLE NO.	DEPTH (ft)	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
DD-65	S-25	66.0	SP-SM	43:50:7	N/A

Not enough sample to meet ASTM specification

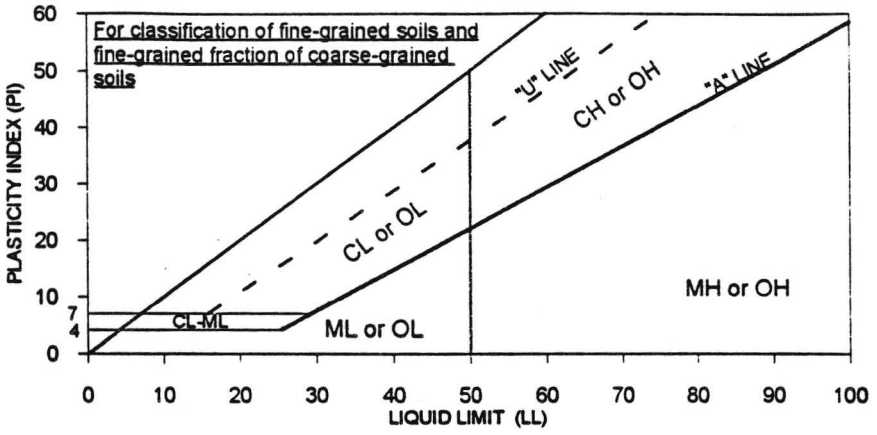
GeoTransit Consultants

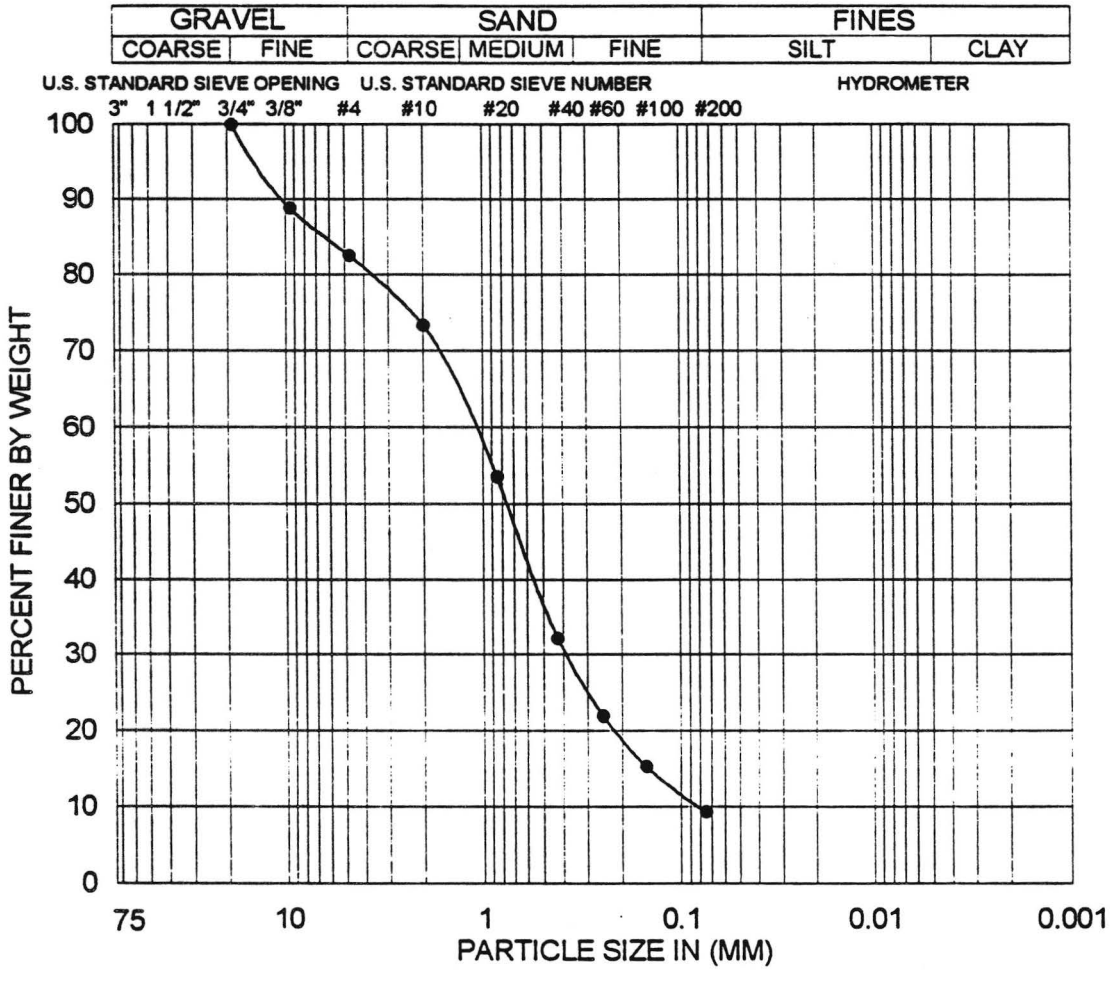
Project No. 95-8347-23
Eastside Extension
Metro Redline 1 (2)

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

12-95

Figure B-56





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-1	S-4	15.0	BULK	SW-SM	17:74:09	N/A

NOTE:
Not enough sample to meet ASTM specification

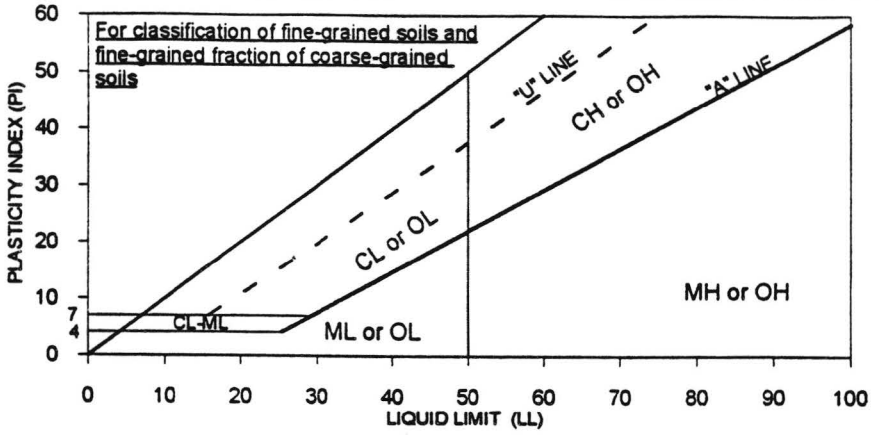
GeoTransit Consultants

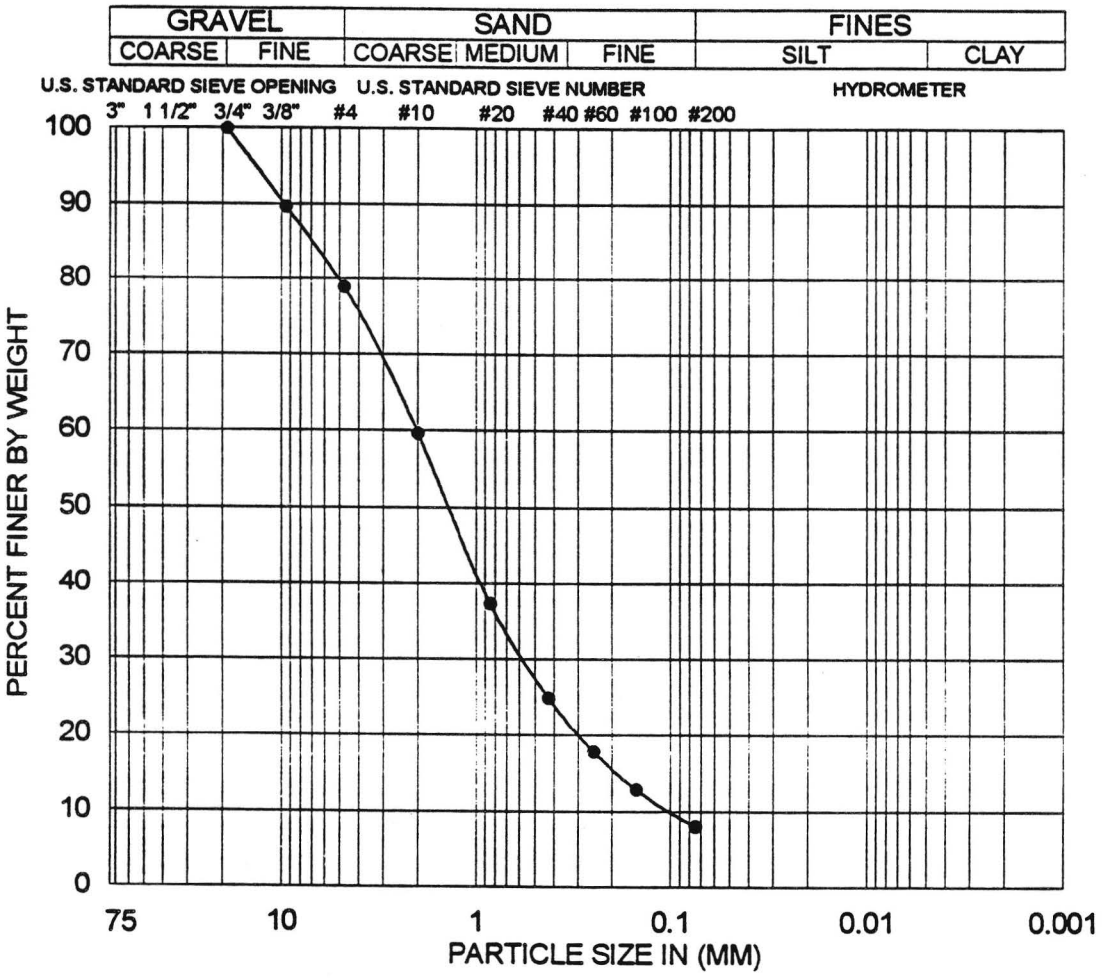
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-57





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-1	S-6	25.0	BULK	SW-SM	21:71:08	N/A

NOTE:
Not enough sample to meet ASTM specification

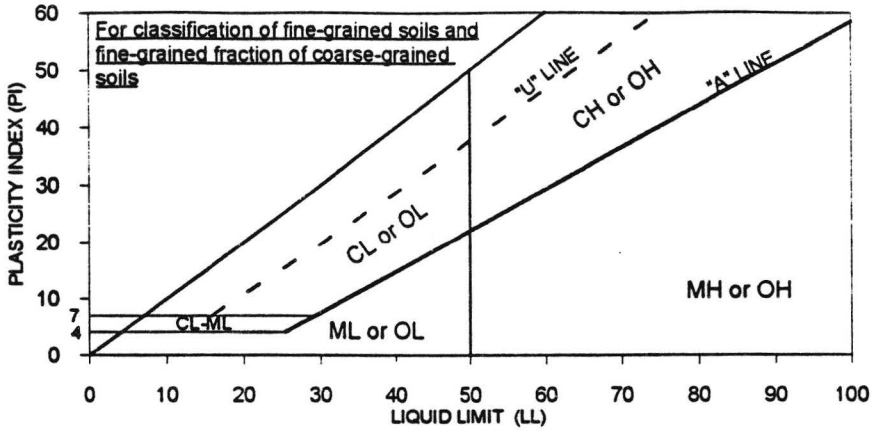
GeoTransit Consultants

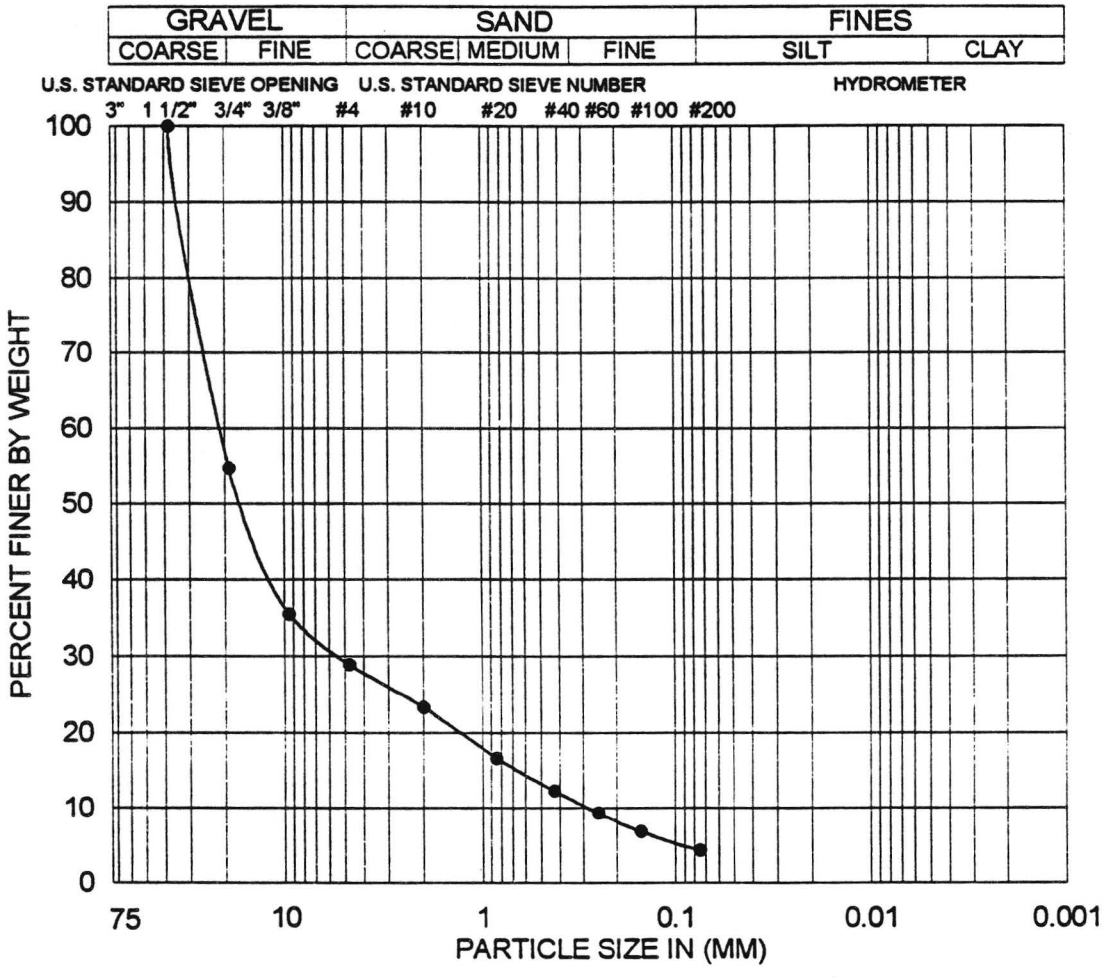
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-58





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-1	D-9	40.0	DRIVE	GP	71:25:04	N/A

NOTE:
Not enough sample to meet ASTM specification

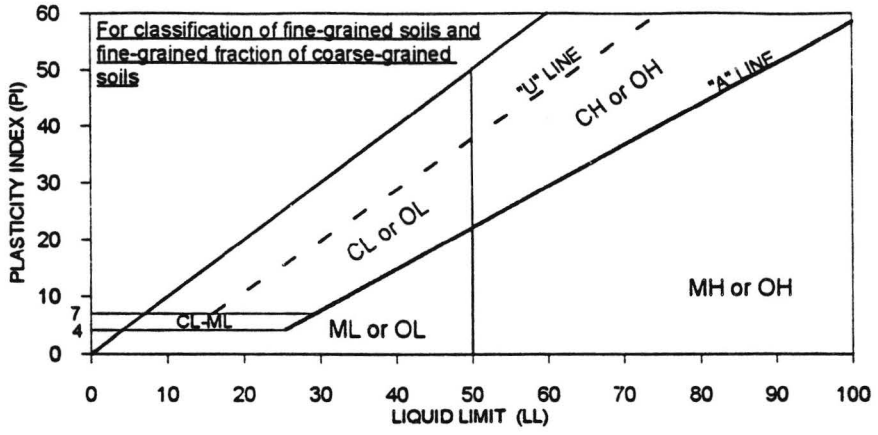
GeoTransit Consultants

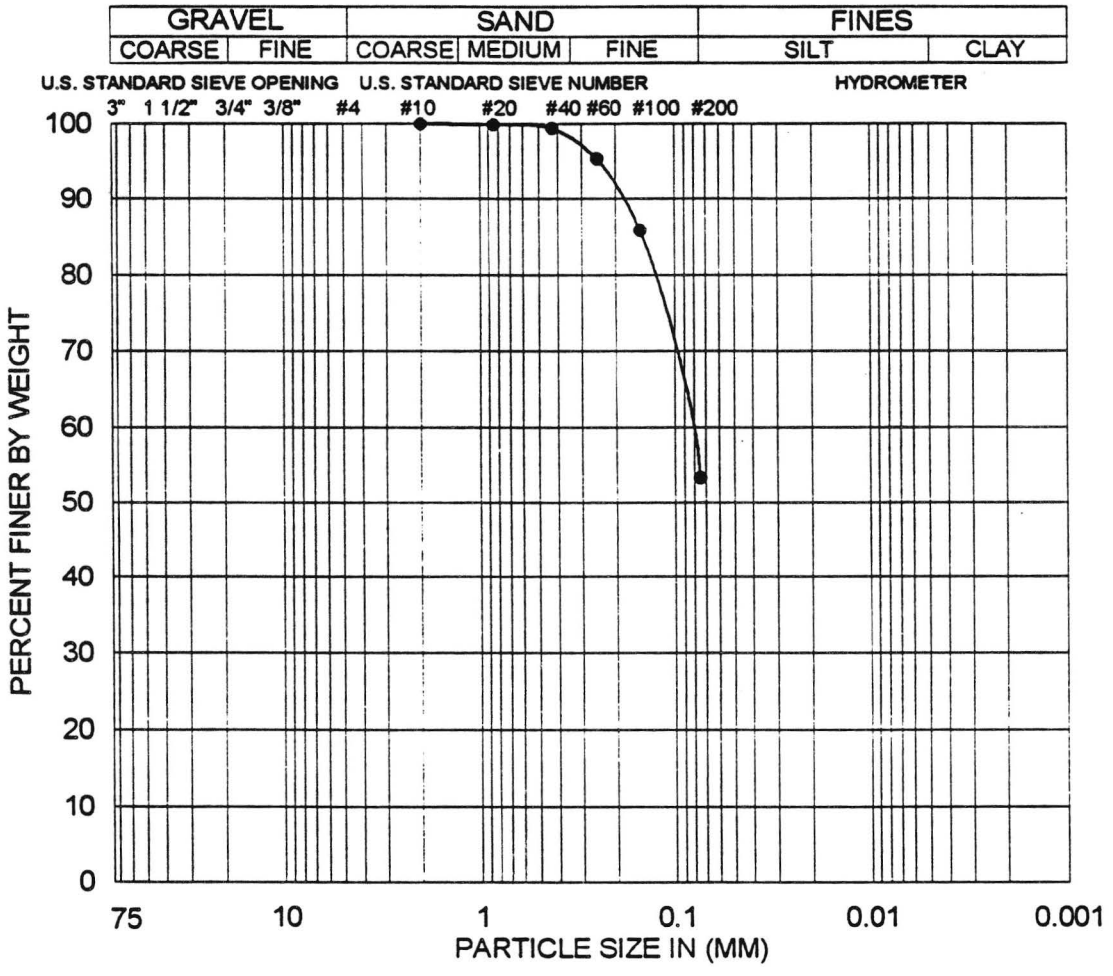
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-59





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-1	D-12	52.0	DRIVE	ML	00:47:53	N/A

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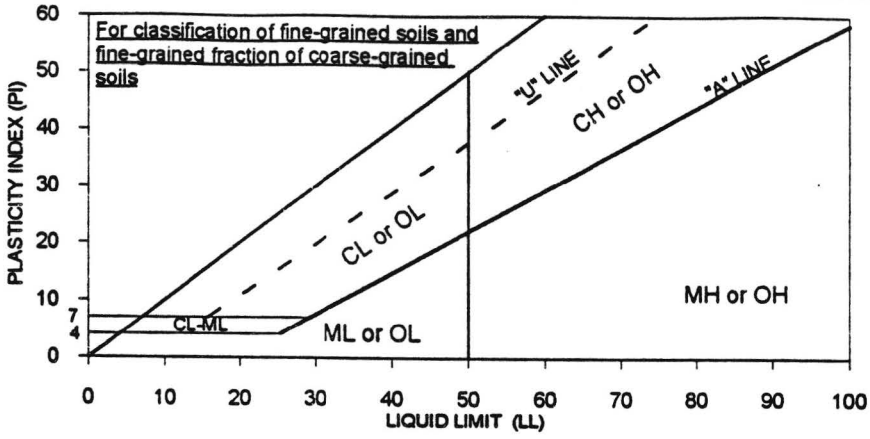
Eastside Extension
Metro Redline

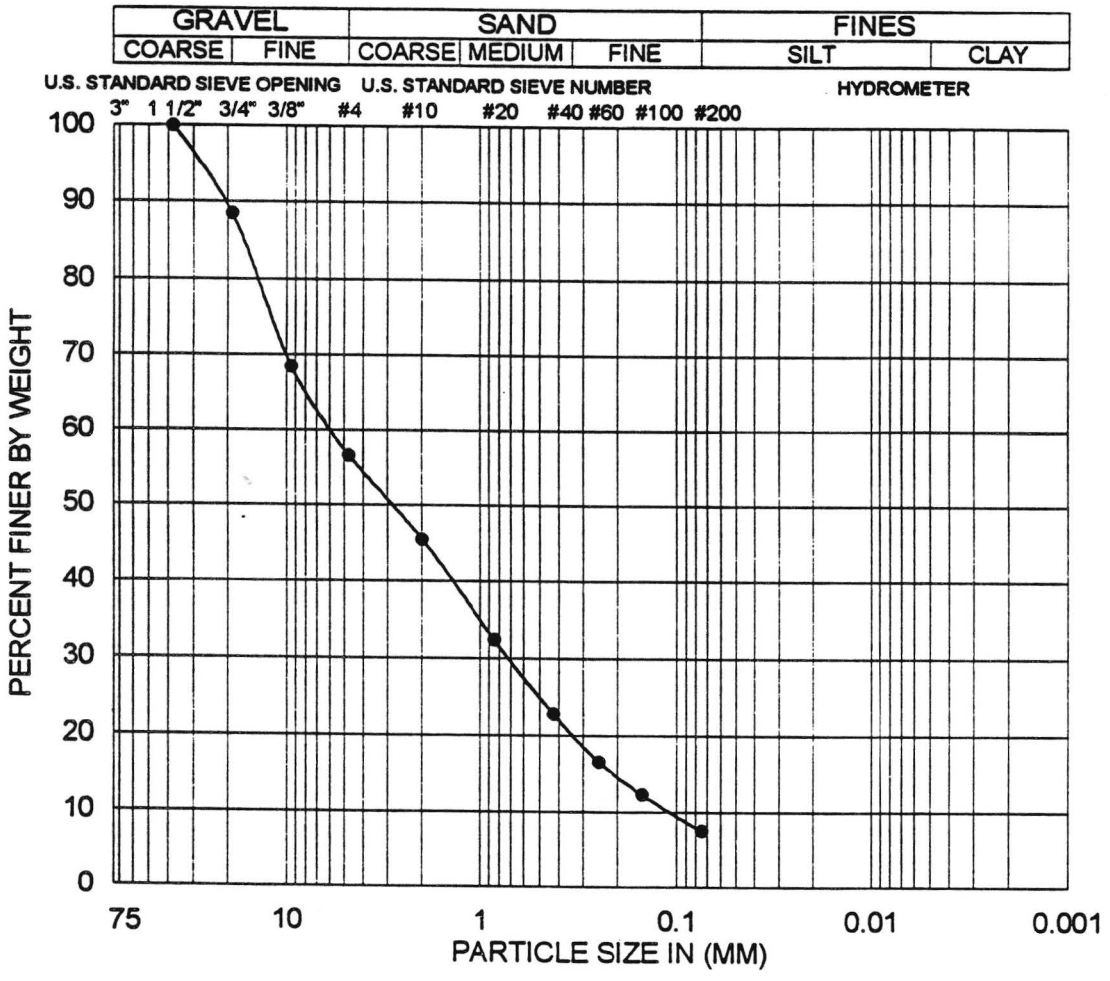
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-60





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-1	D-16	70.0	DRIVE	SP-SM	43:49:08	N/A

NOTE:
Not enough sample to meet ASTM specification

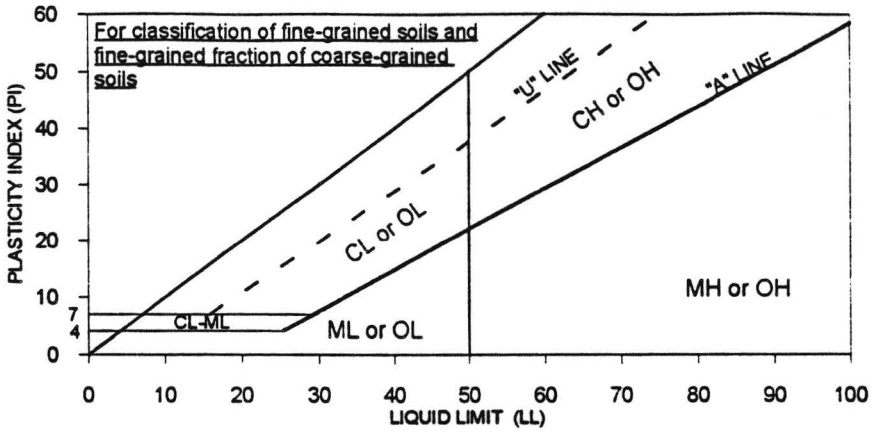
GeoTransit Consultants

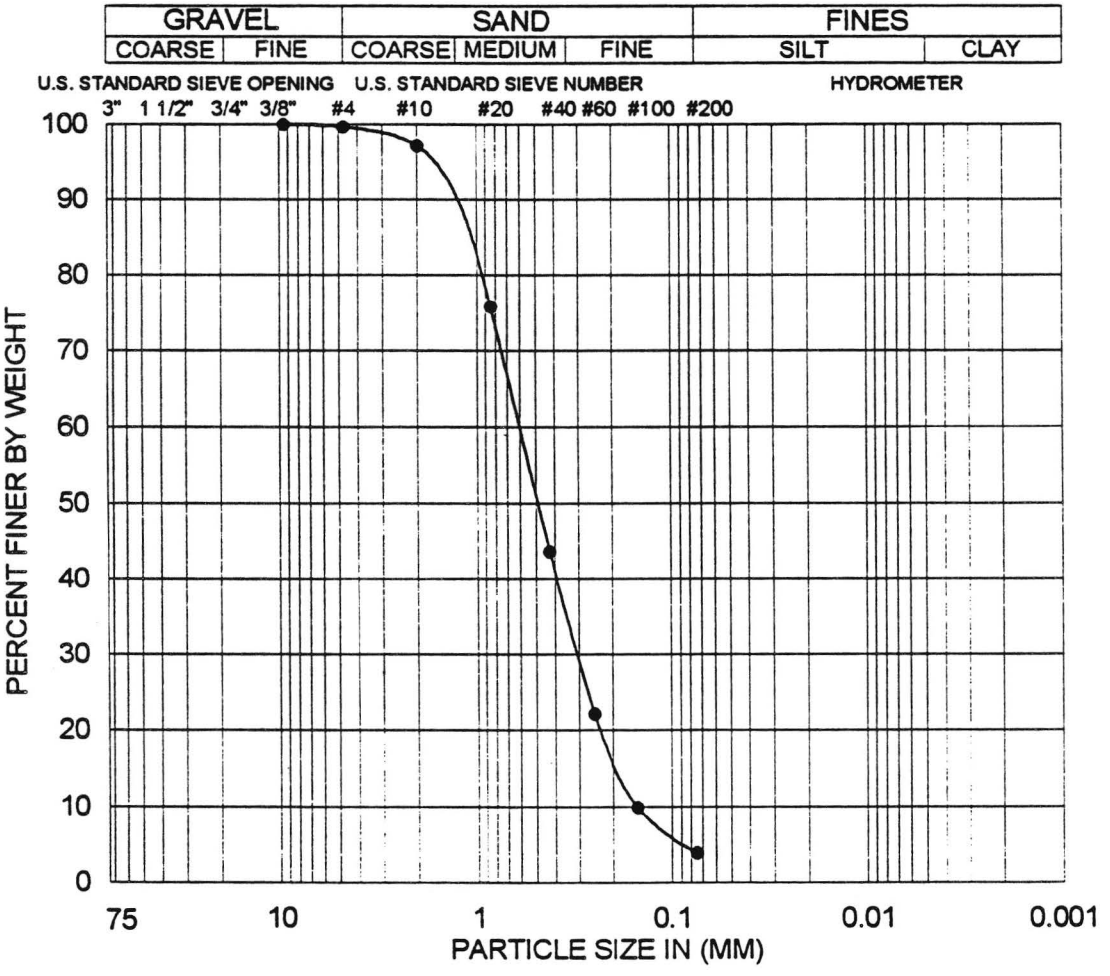
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

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Figure B-61





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-3	D-1	5.0	DRIVE	SP	00:96:04	N/A

NOTE:
Not enough sample to meet ASTM specification

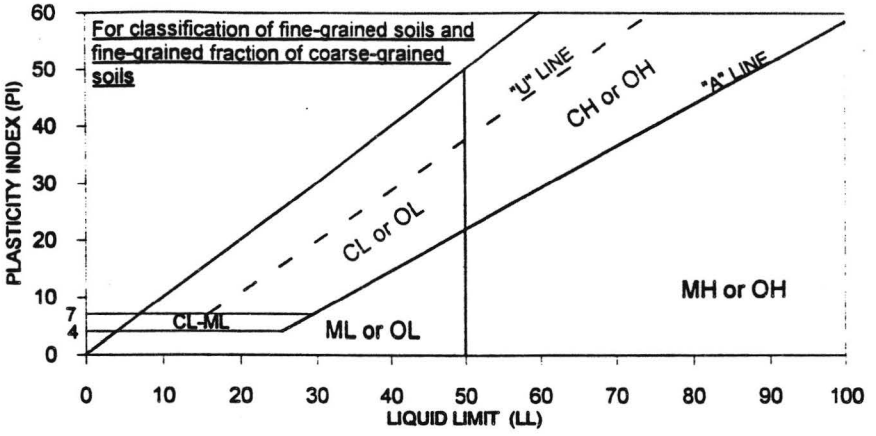
GeoTransit Consultants

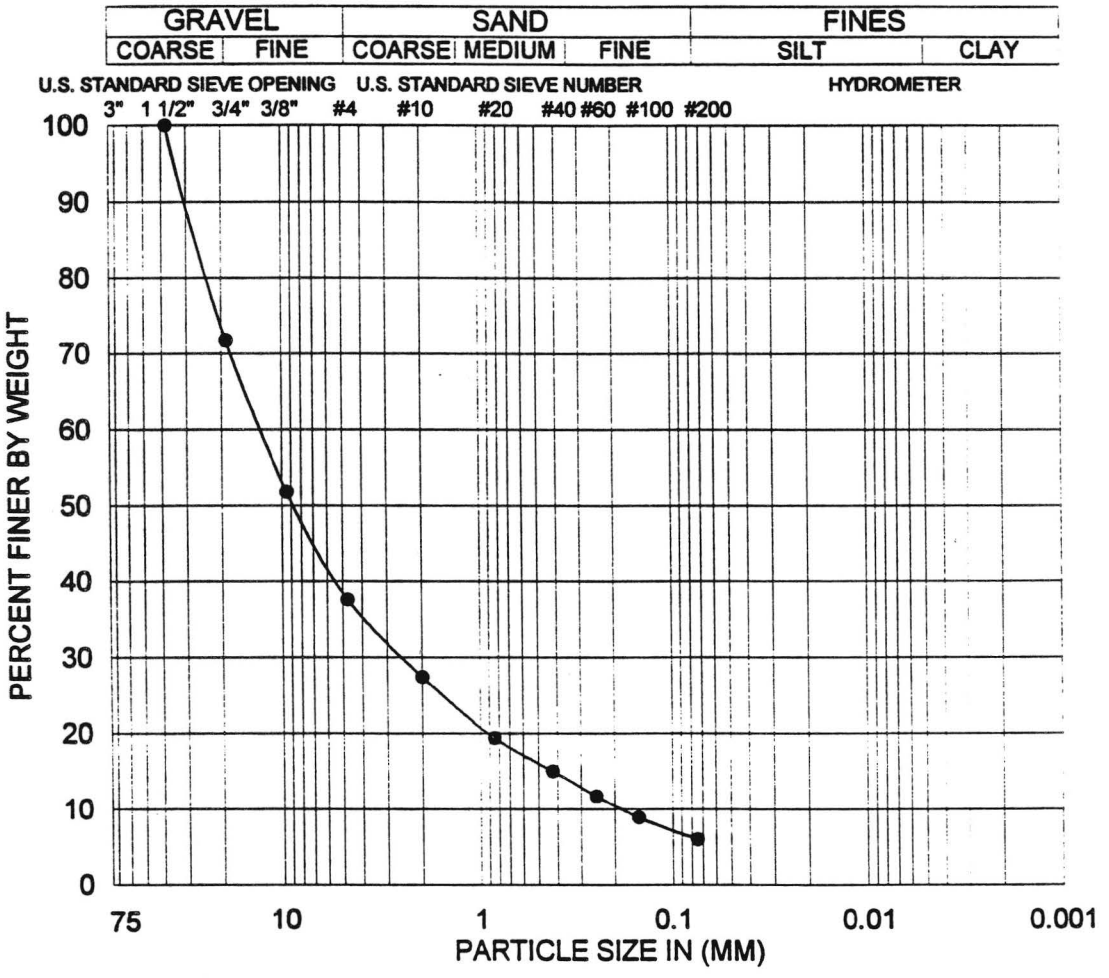
Project No. 95-8347-03
Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-62





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-3A	S-2	40.0	BAG	GP-GM	62:32:6	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

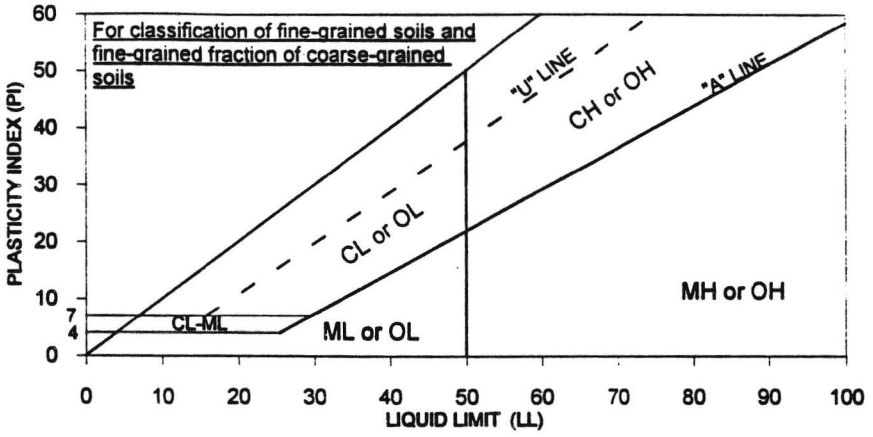
Eastside Extension
Metro Redline

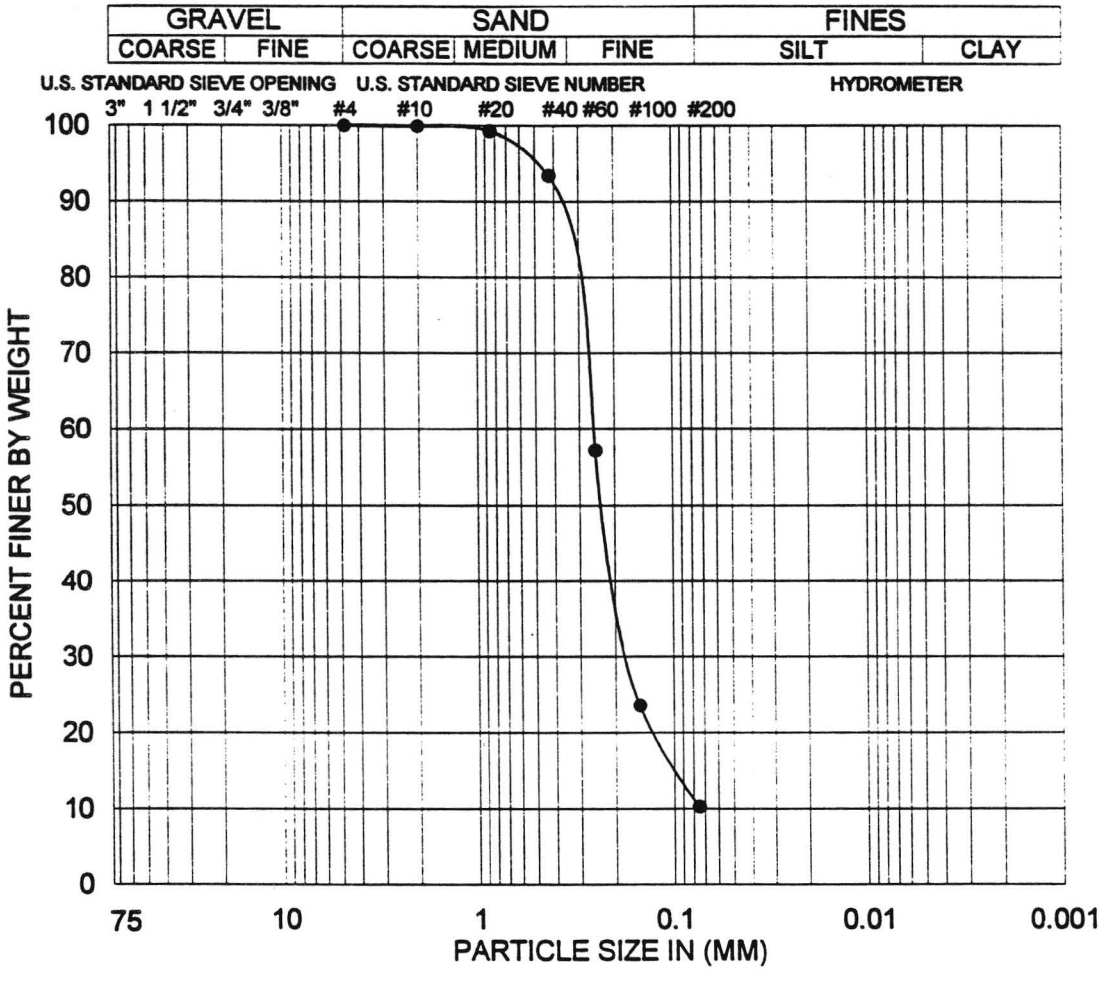
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-63





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-3A	D-9	65.0	DRIVE	SP-SM	00:90:10	N/A

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Project No. 95-8347-03

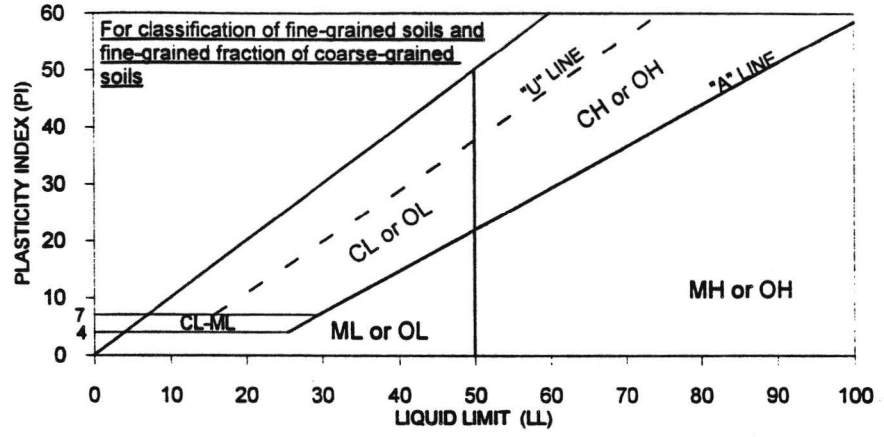
Eastside Extension
Metro Redline

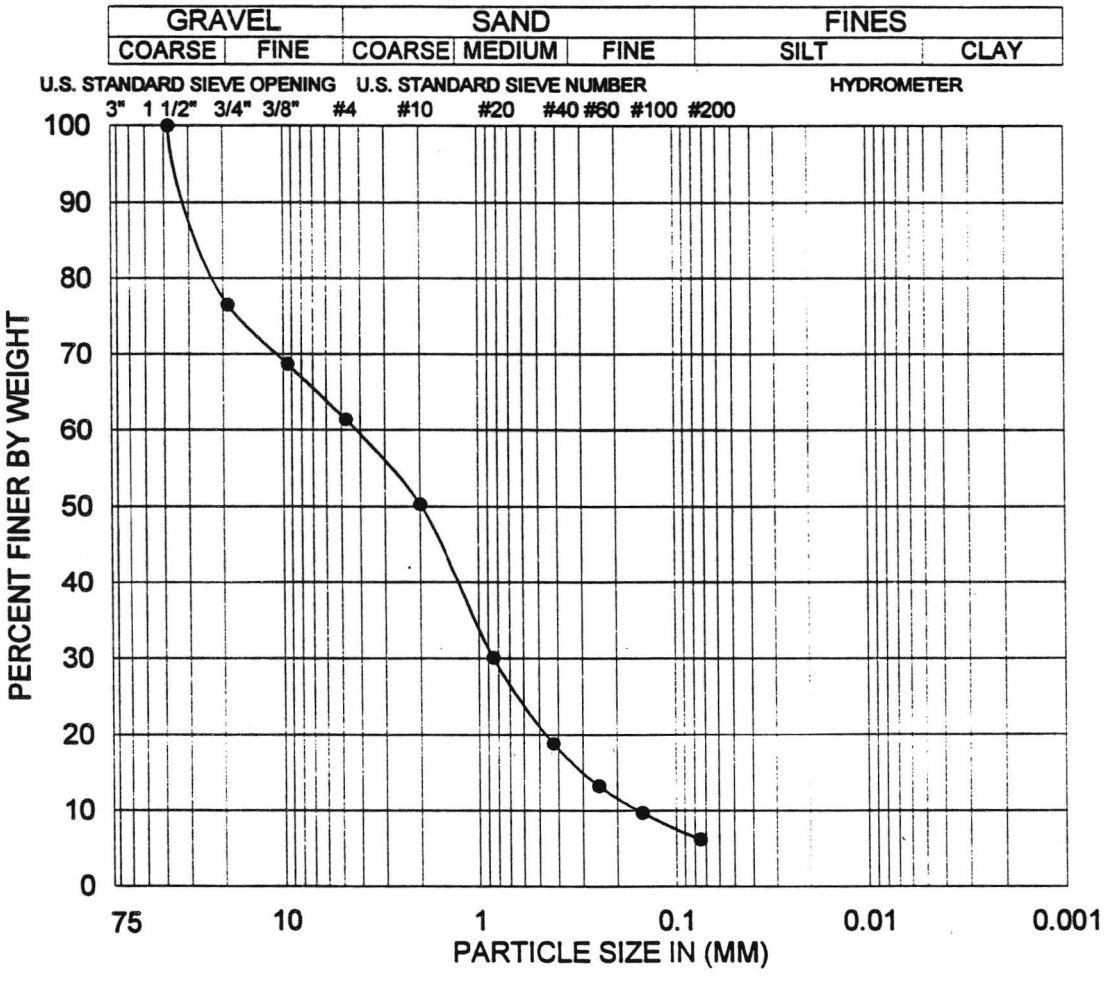
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-64





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-3A	D-11	75.0	DRIVE	SW-SM	39:55:6	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

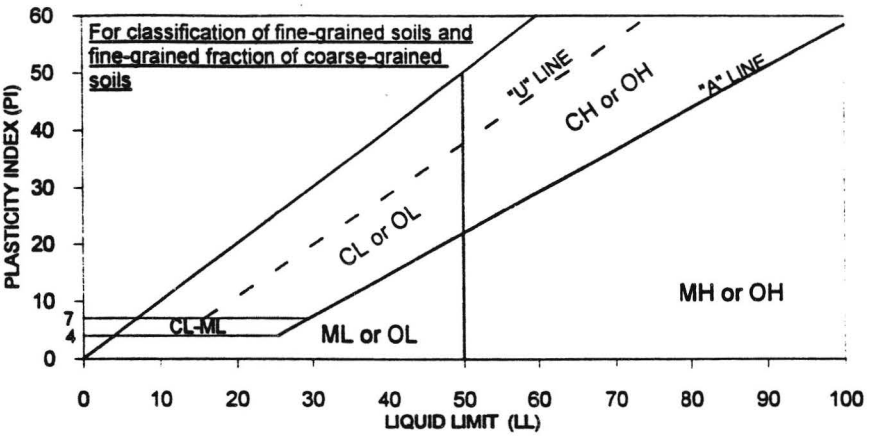
Eastside Extension
Metro Redline

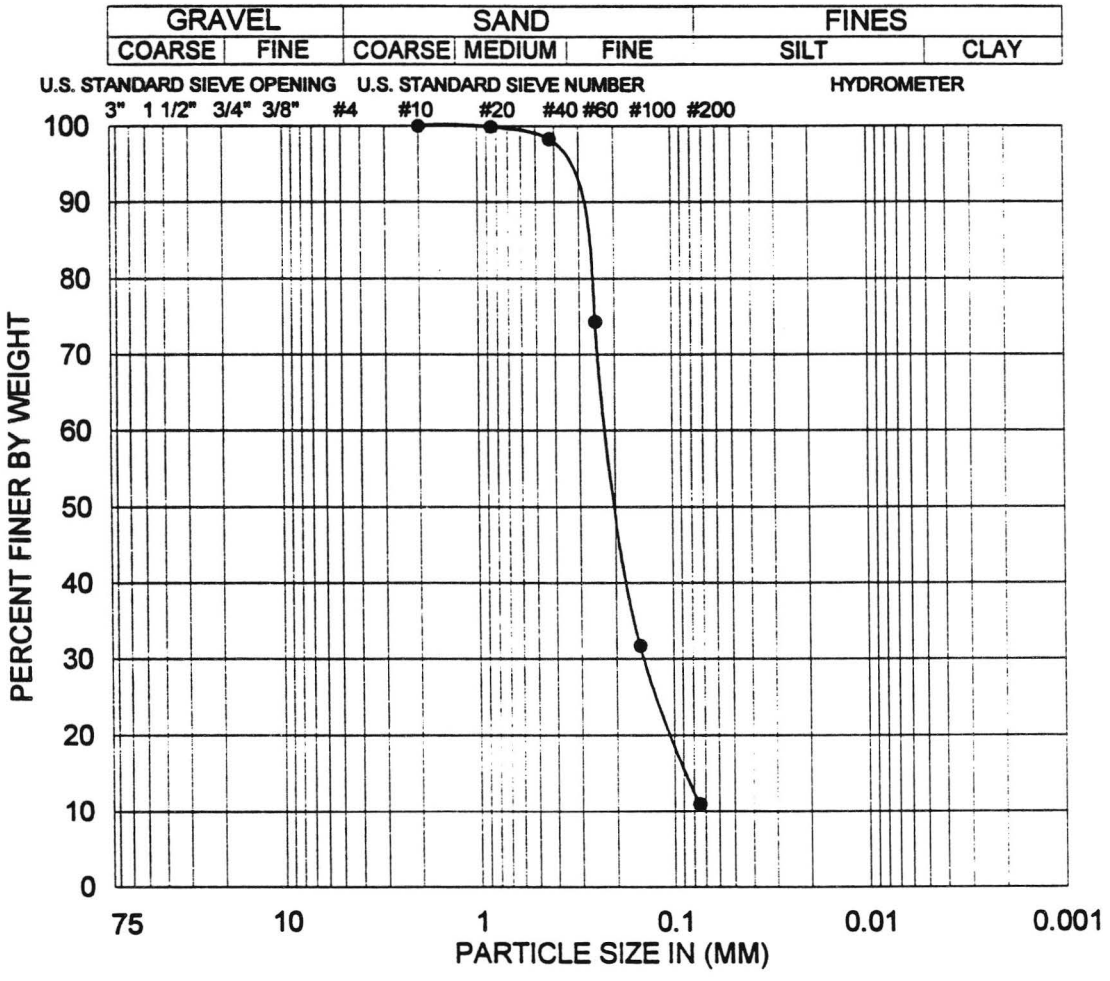
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-65





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-3A	D-14	85.0	DRIVE	SP-SM	00:89:11	N/A

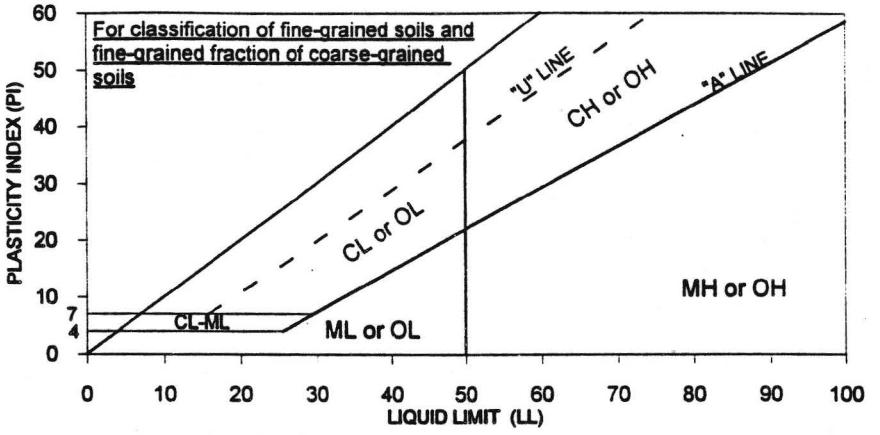
GeoTransit Consultants

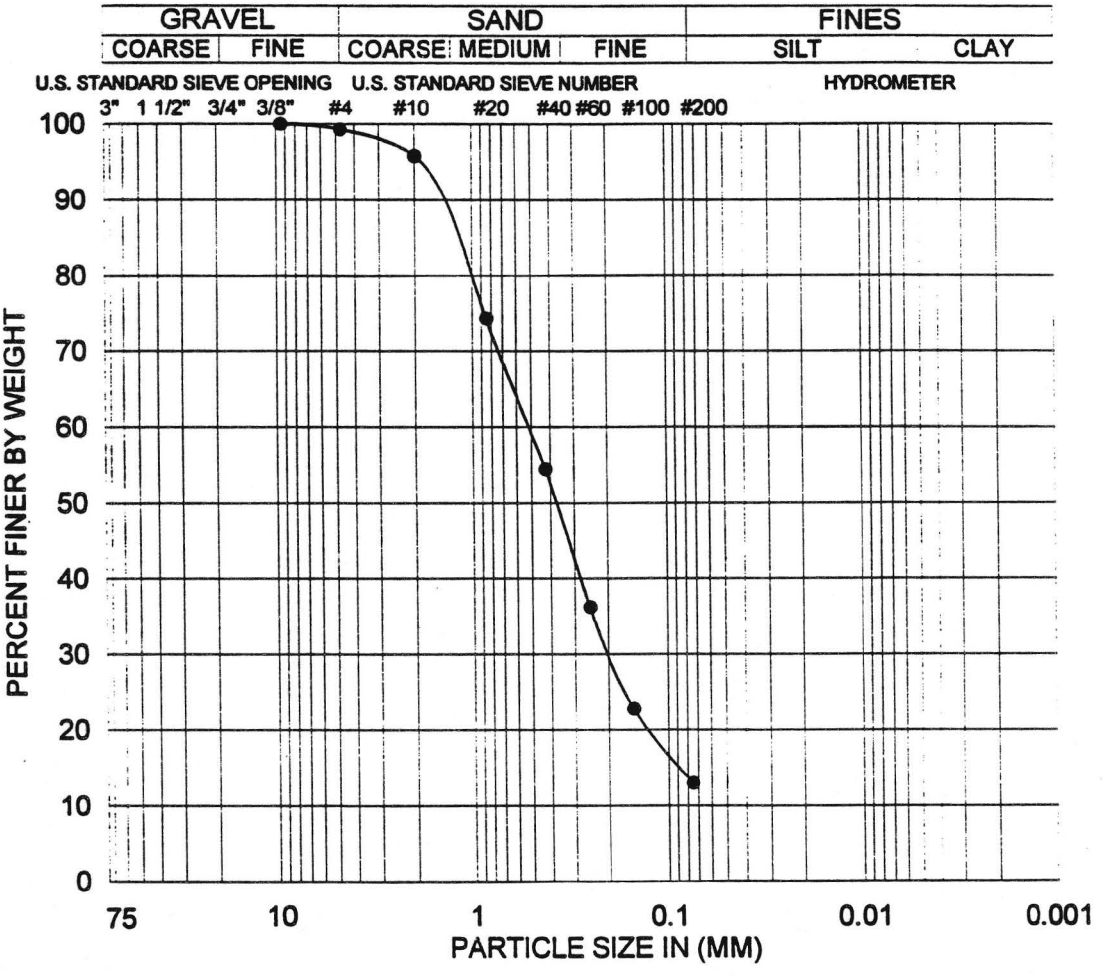
Project No. 95-8347-03

Eastside Extension
Metro Redline

ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-4	D-4	20.0	DRIVE	SM	1:86:13	N/A

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Project No. 95-8347-03

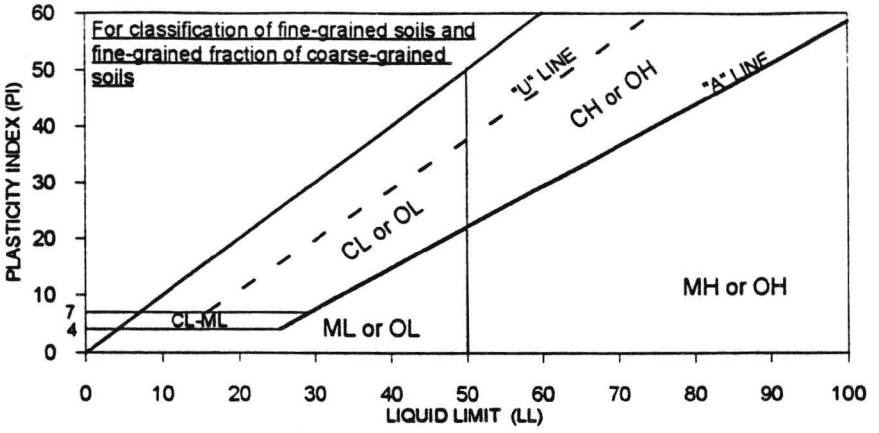
Eastside Extension
Metro Redline

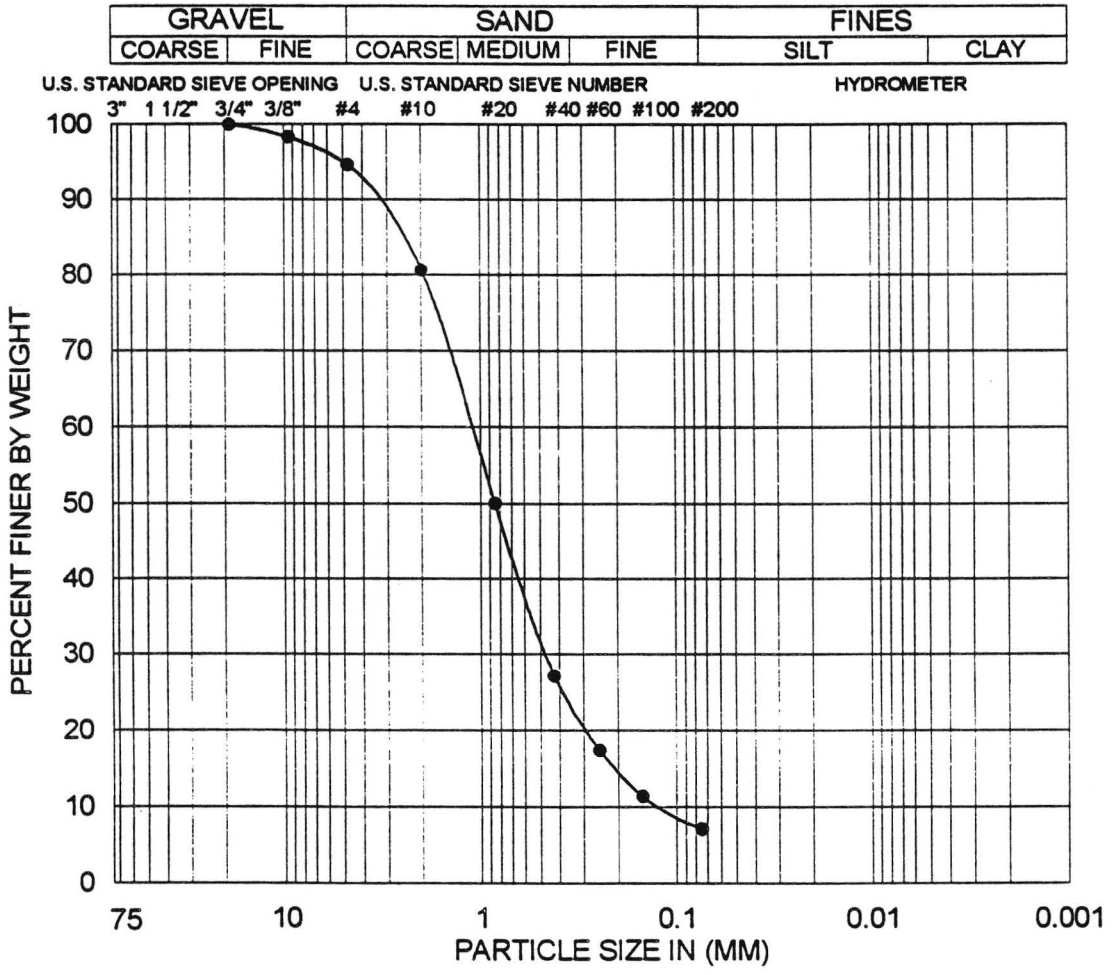
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-67





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-4	S-7	35.0	BAG	SW-SM	5:88:7	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

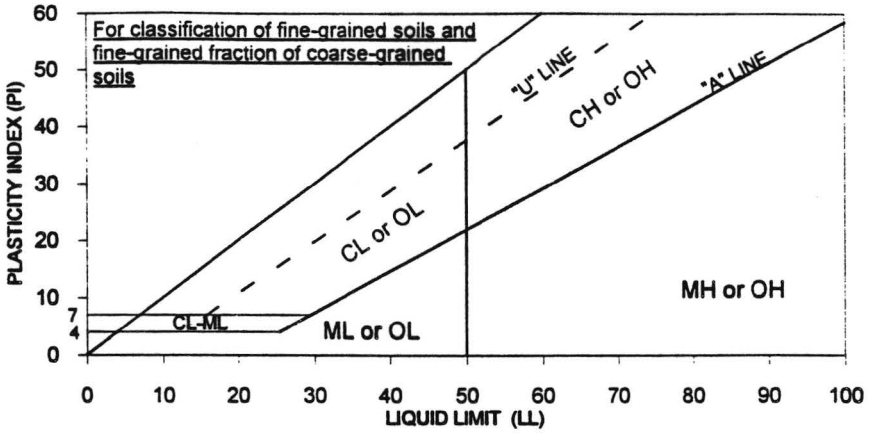
Eastside Extension
Metro Redline

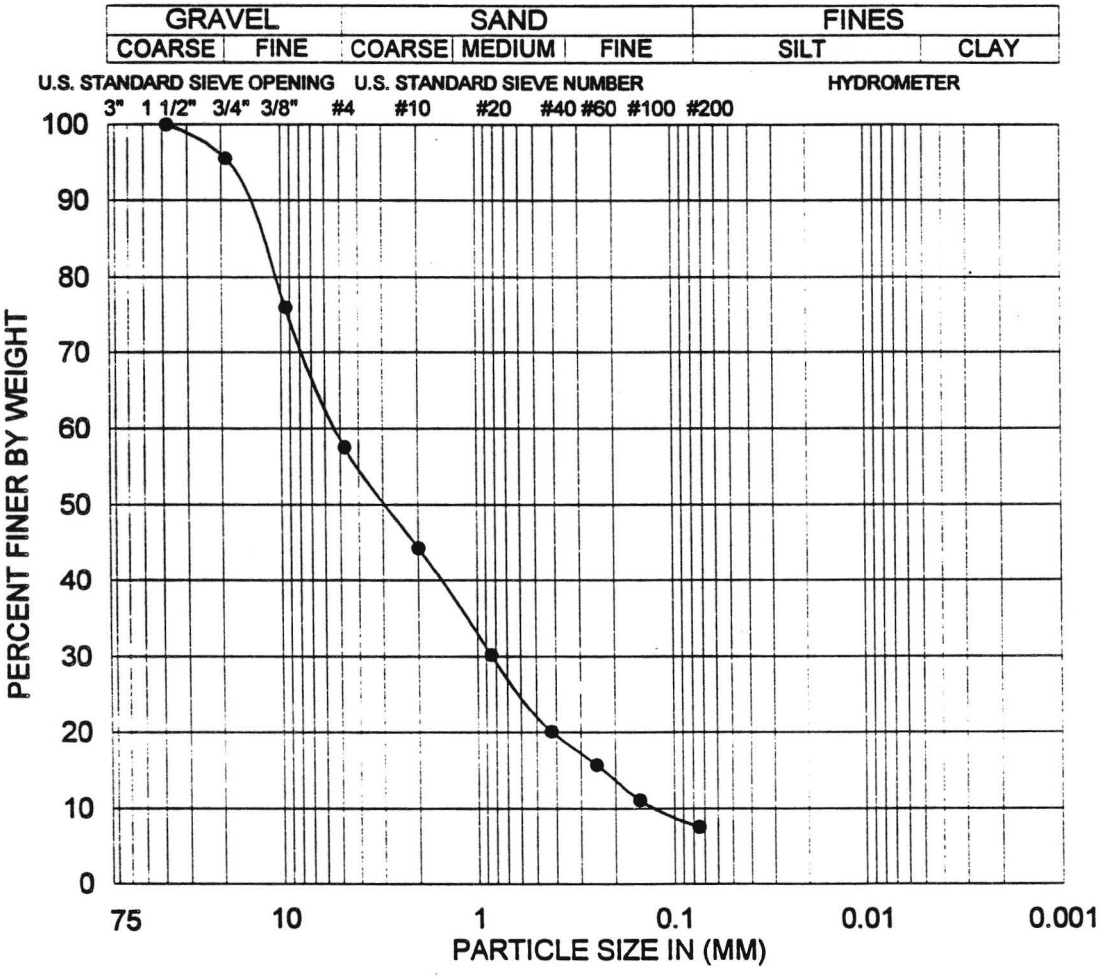
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-68





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-4	D-9	40.0	DRIVE	SP-SM	42:50:8	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

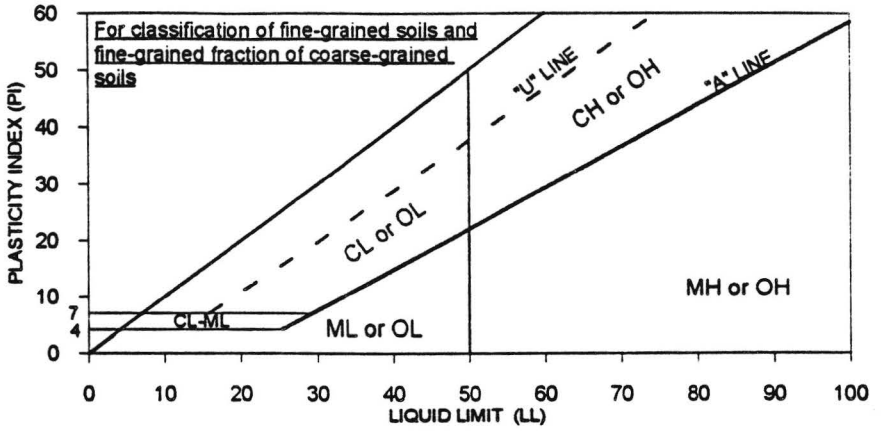
Eastside Extension
Metro Redline

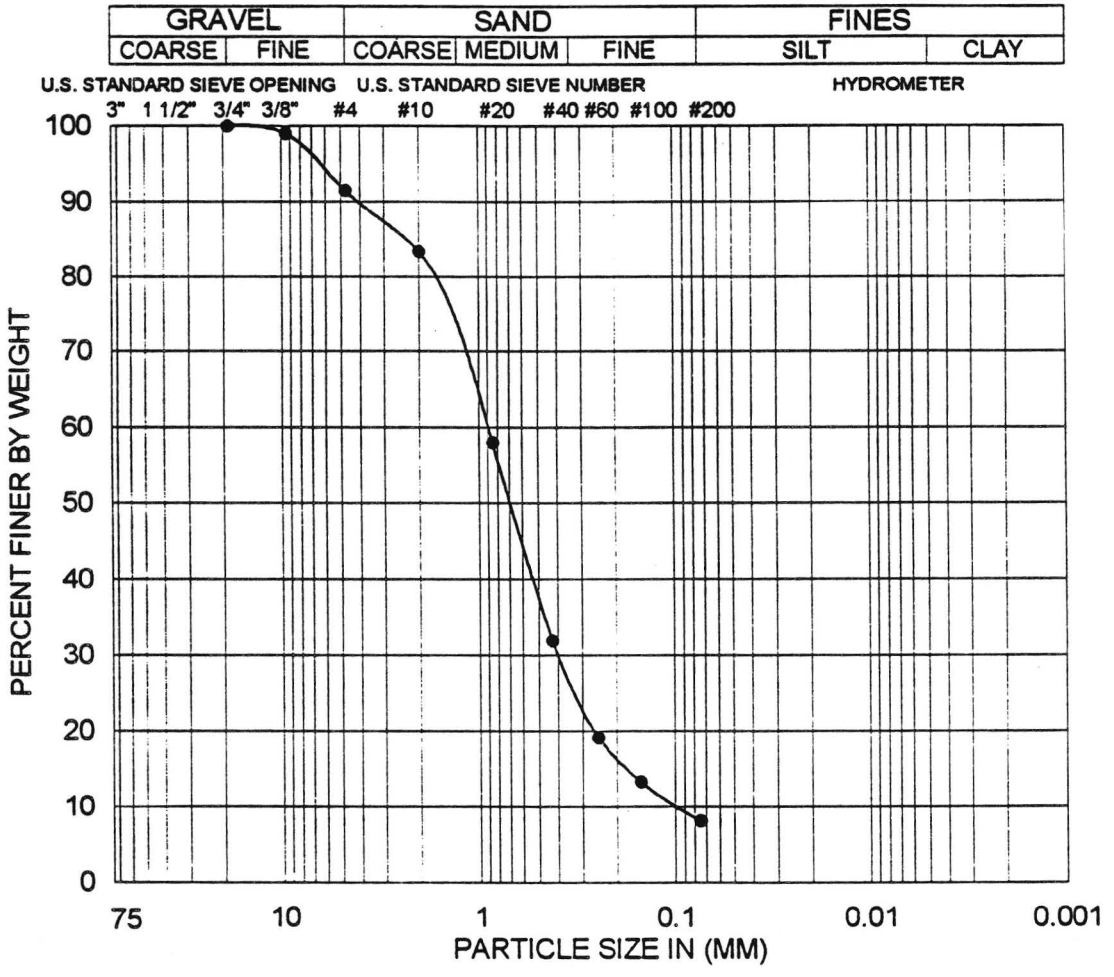
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-69





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-4	D-15	70.0	DRIVE	SW-SM	8:84:8	N/A

Not enough sample to meet ASTM specification

GeoTransit Consultants

Project No. 95-8347-03

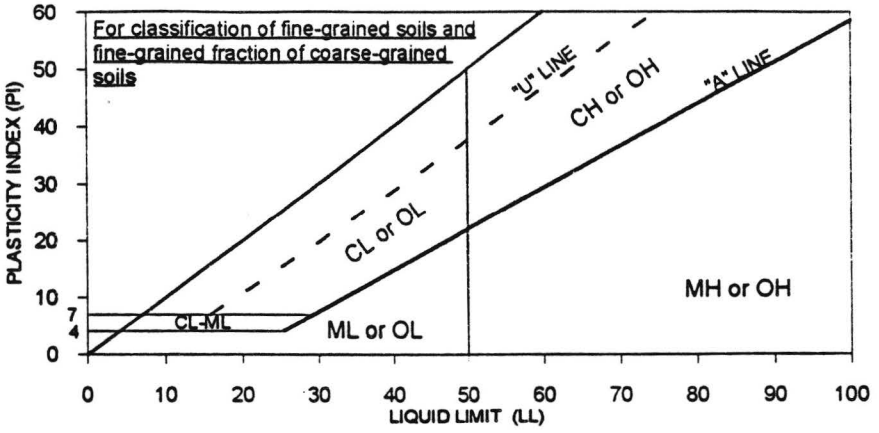
Eastside Extension
Metro Redline

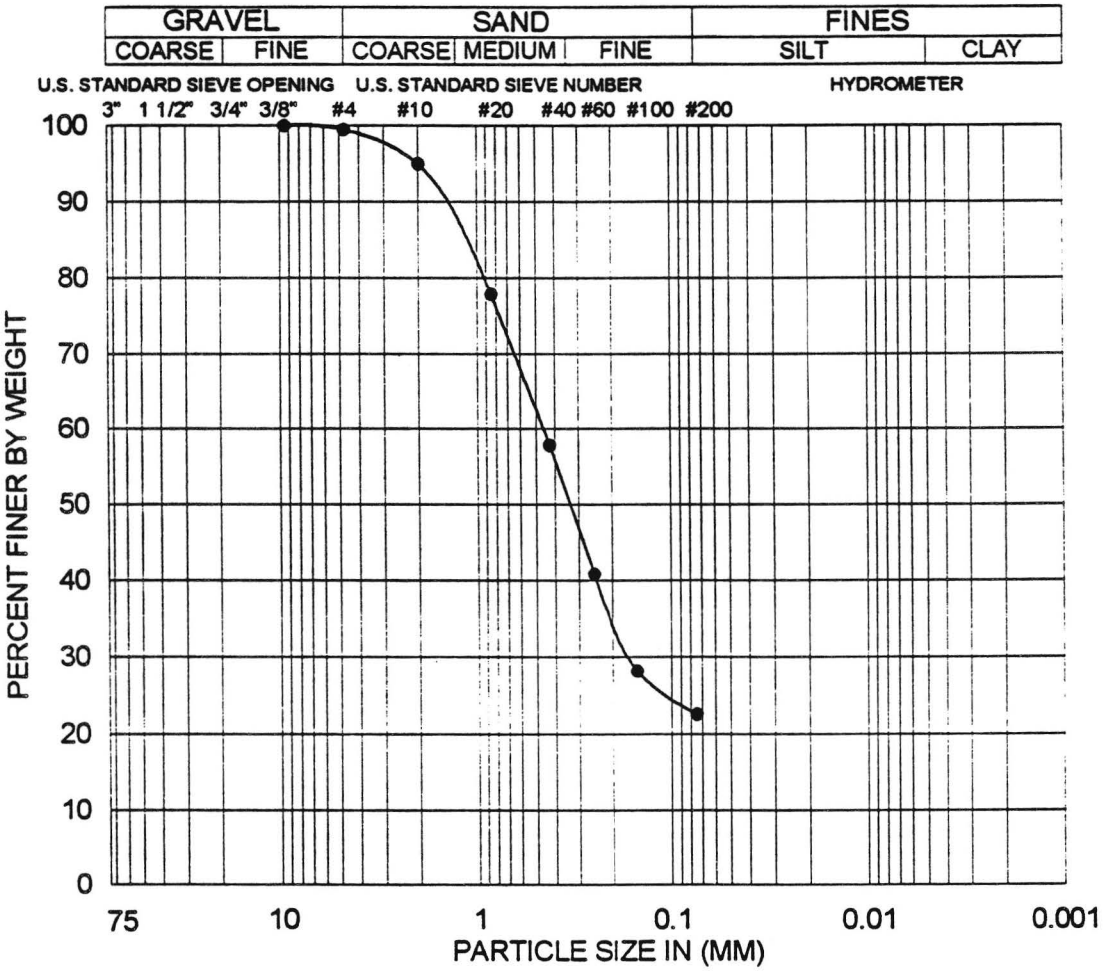
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-70





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-4	D-18	80.0	DRIVE	SM	01:76:23	N/A

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Project No. 95-8347-03

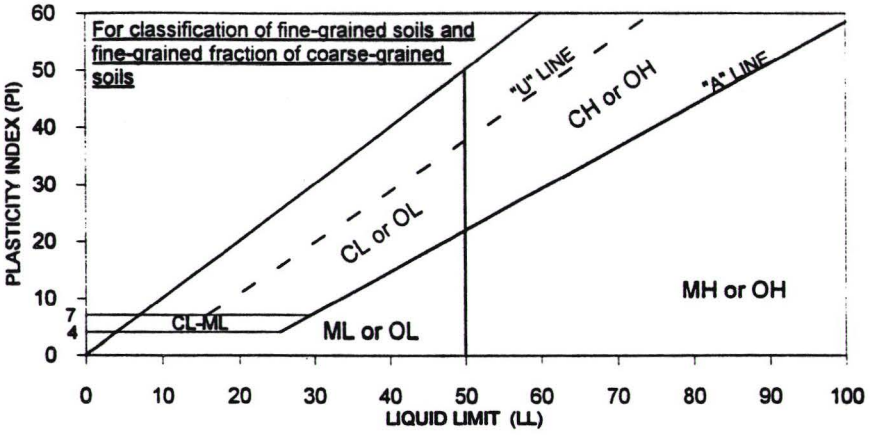
Eastside Extension
Metro Redline

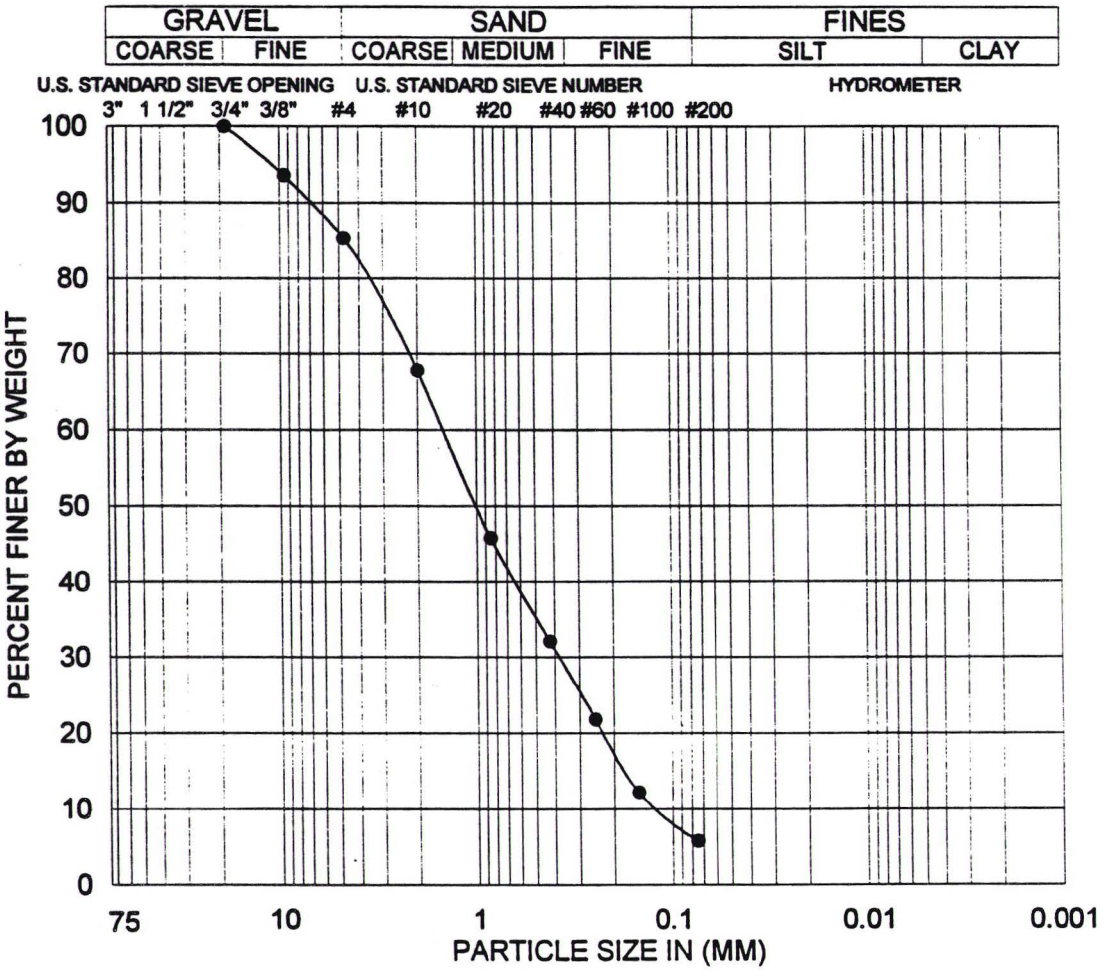
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-71





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-5	D-2	20.0	DRIVE	SP-SM	15:79:6	N/A

Not enough sample to meet ASTM specification

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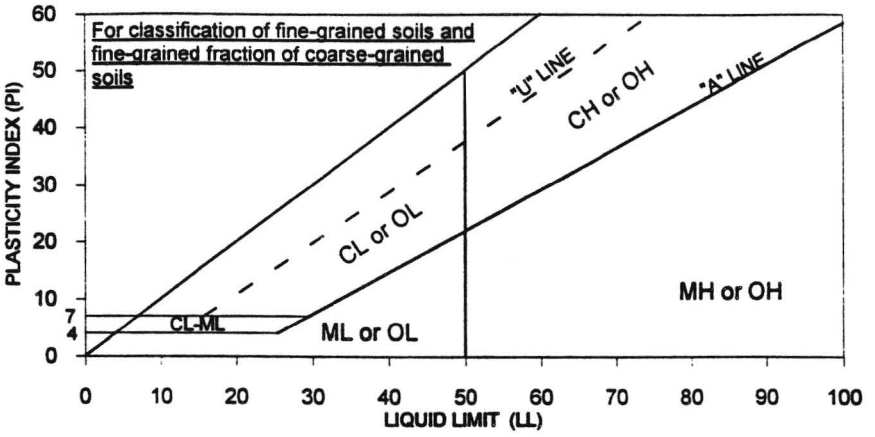
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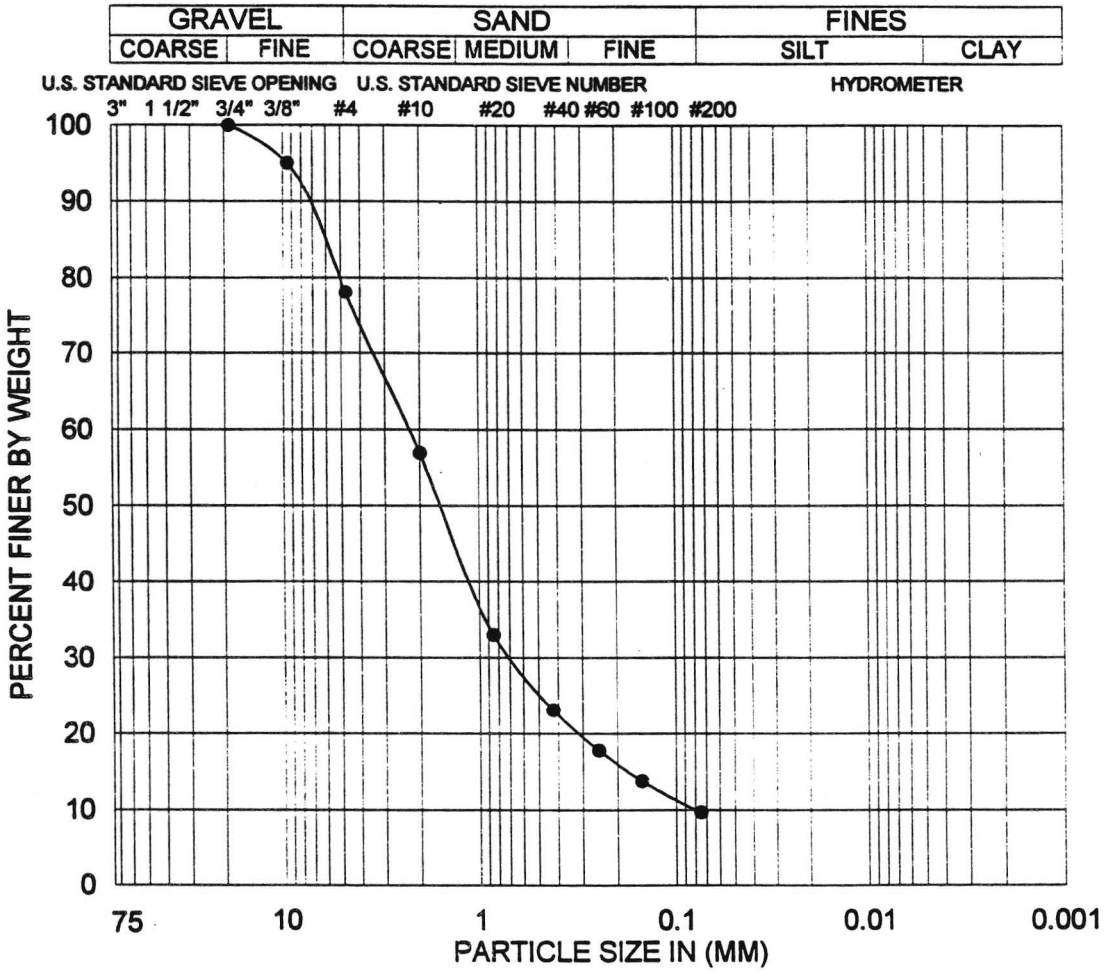
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-72





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-5	D-4	41.5	DRIVE	SW-SM	22:68:10	N/A

Not enough sample to meet ASTM specification

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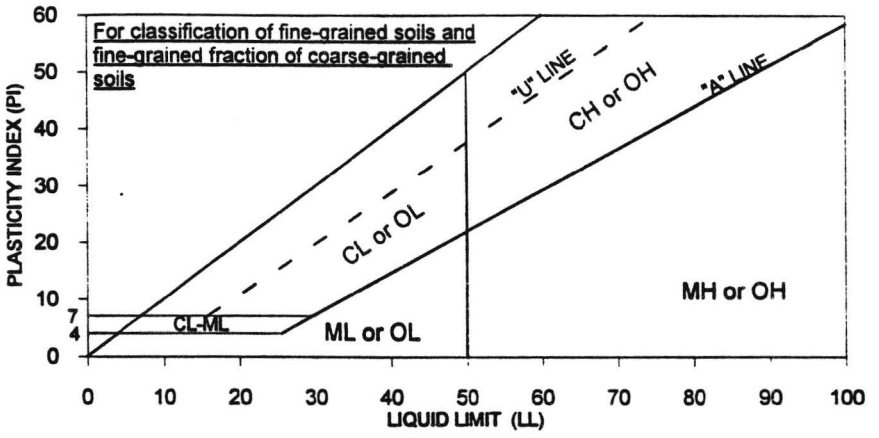
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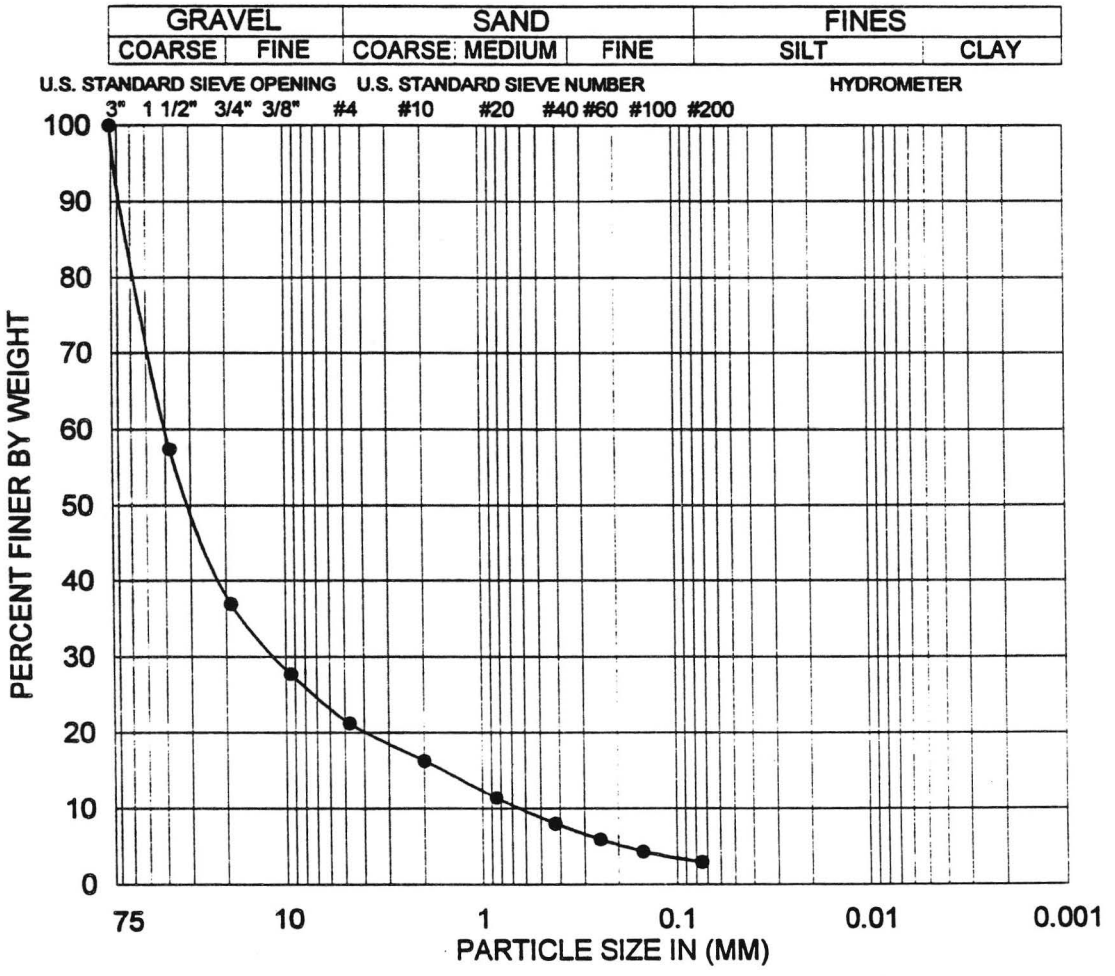
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

08-95

Figure B-73





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-5	D-5	50.0	DRIVE	GP	79:18:3	N/A

Not enough sample to meet ASTM specification

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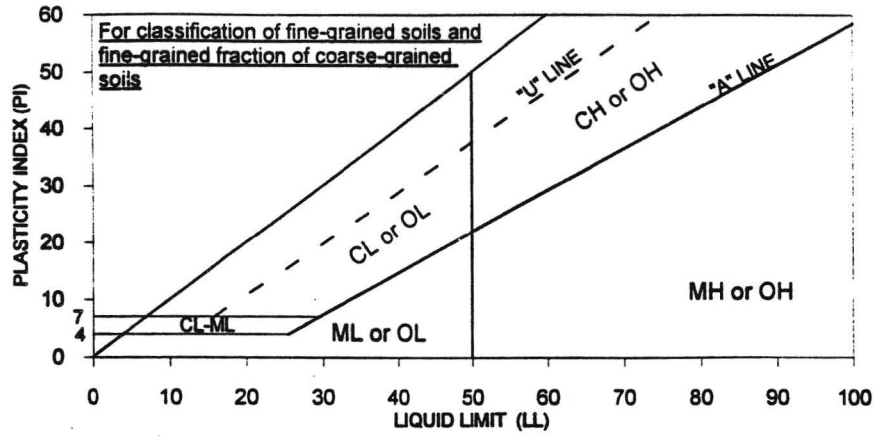
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Metro Redline

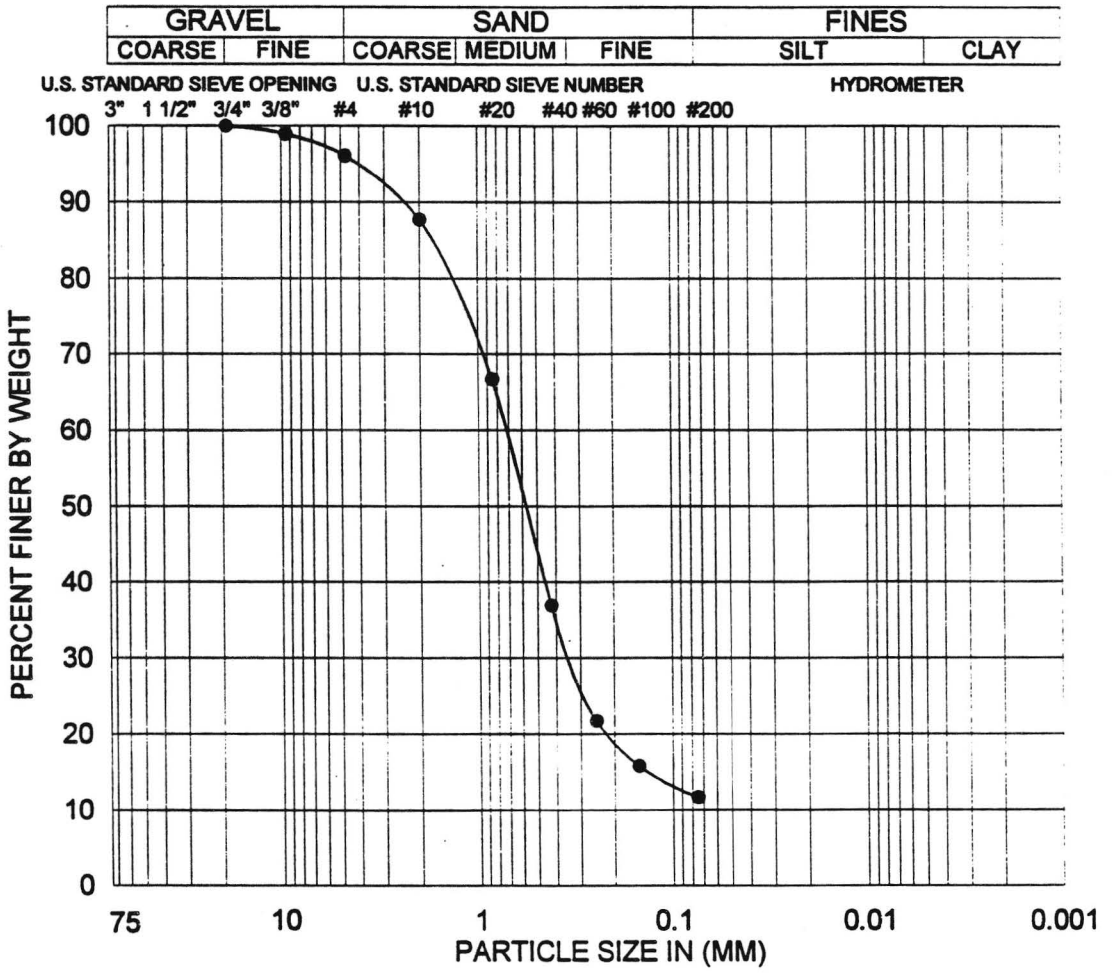
ATTERBERG LIMITS, PARTICLE-SIZE CURVE

(ASTM D4318,D422)

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Figure B-74





BORING NO.	SAMPLE NO.	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	GR:SA:FI (%)	LL,PL,PI
SD-5	D-8	80.0	DRIVE	SP-SM	4:84:12	N/A

Not enough sample to meet ASTM specification

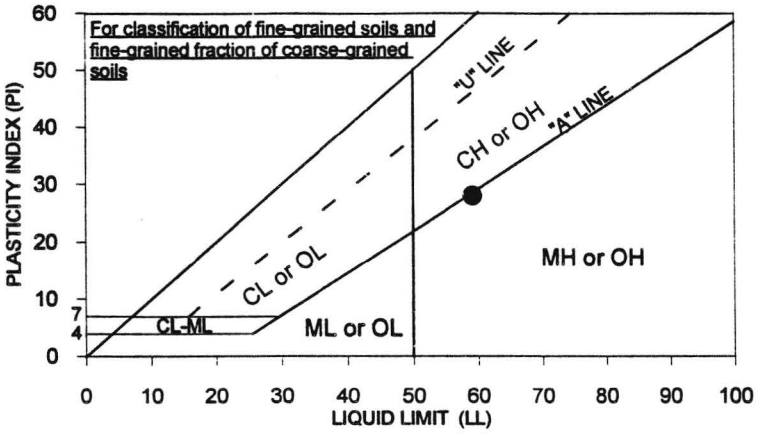
GeoTransit Consultants

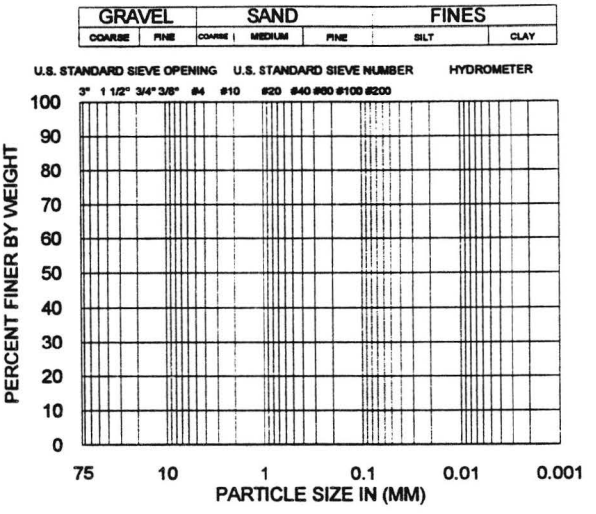
Project No. 95-8347-03
Eastside Extension
Metro Redline

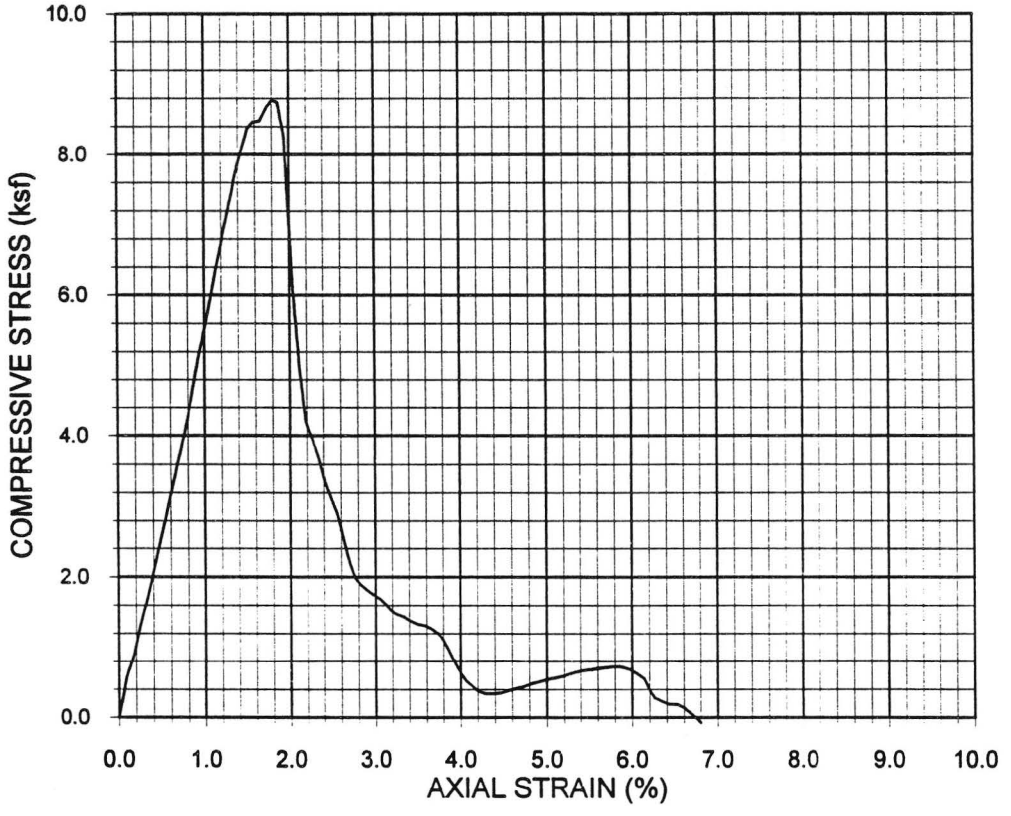
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
(ASTM D4318,D422)

08-95

Figure B-75







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-2S	P-32	84.0	8.781	1.86	N/A	59,31,28

Sample Description: Olive Elastic Silt (MH)

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 30.3
Dry Density (pcf) : 91.1
Avg. Sample Diameter (in.) : 2.875
Avg. Sample Height (in.) : 6.005
Degree of Saturation (%) : 96
Strain Rate (inch/min) : 0.04

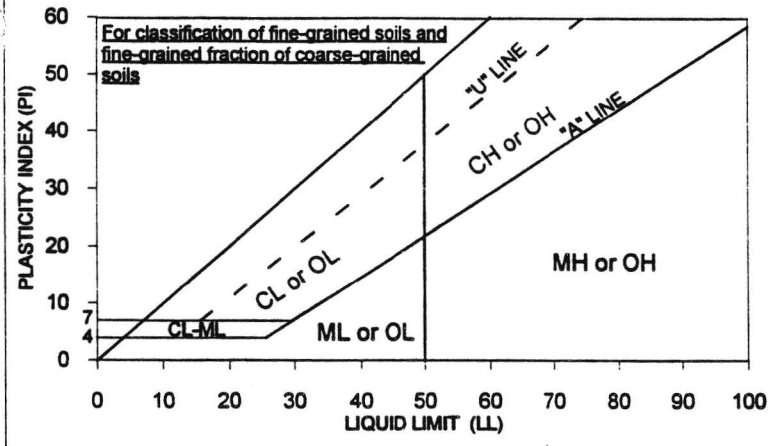
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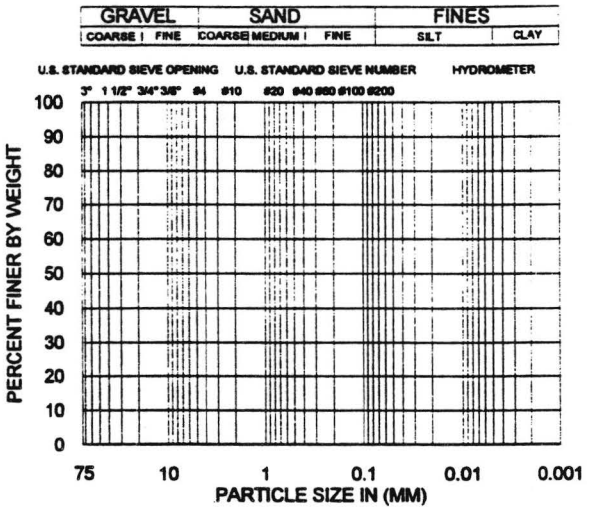
Project No. 95-8347-23
Eastside Extension
Metro Redline I (II)

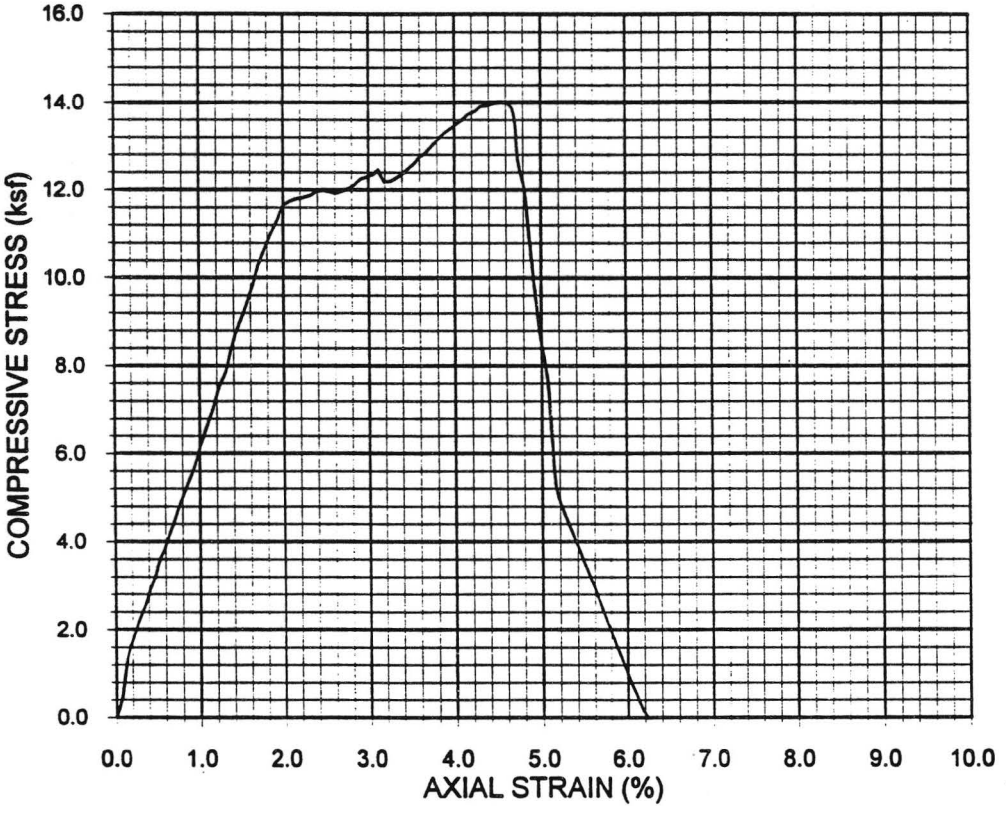
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

12-95

Figure B-76







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-4	T-16	67.5	14.009	4.51	N/A	N/A

Sample Description: Dark Olive Silt (ML) , moist, very stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 25.9
Dry Density (pcf) : 96.4
Avg. Sample Diameter (in.) : 2.868
Avg. Sample Height (in.) : 6.022
Degree of Saturation (%) : 94
Strain Rate (inch/min) : 0.04

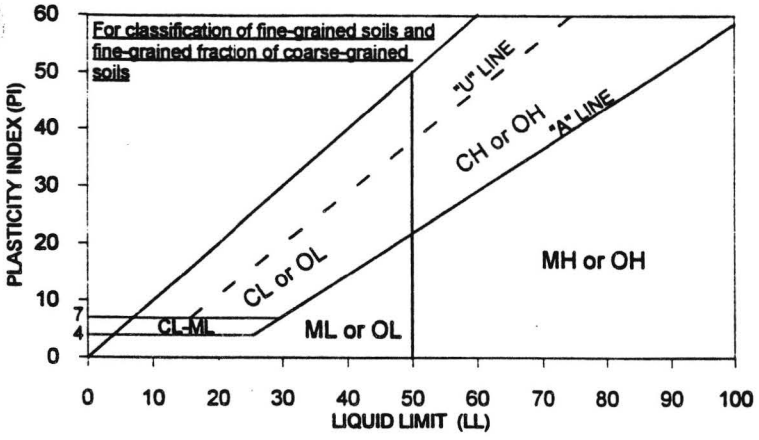
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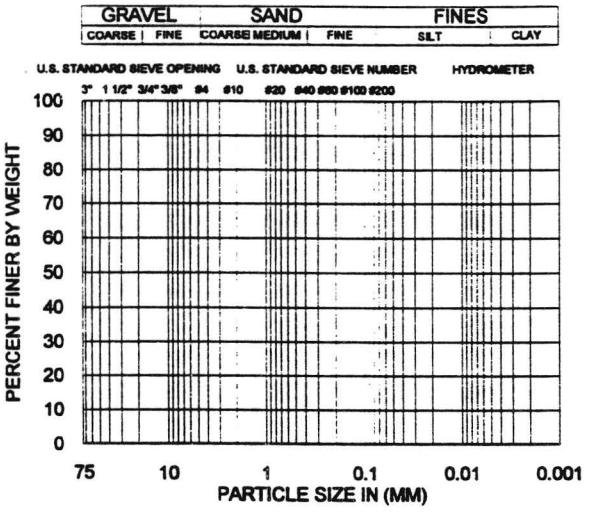
Project No. 95-8347-03
Eastside Extension
Metro Redline

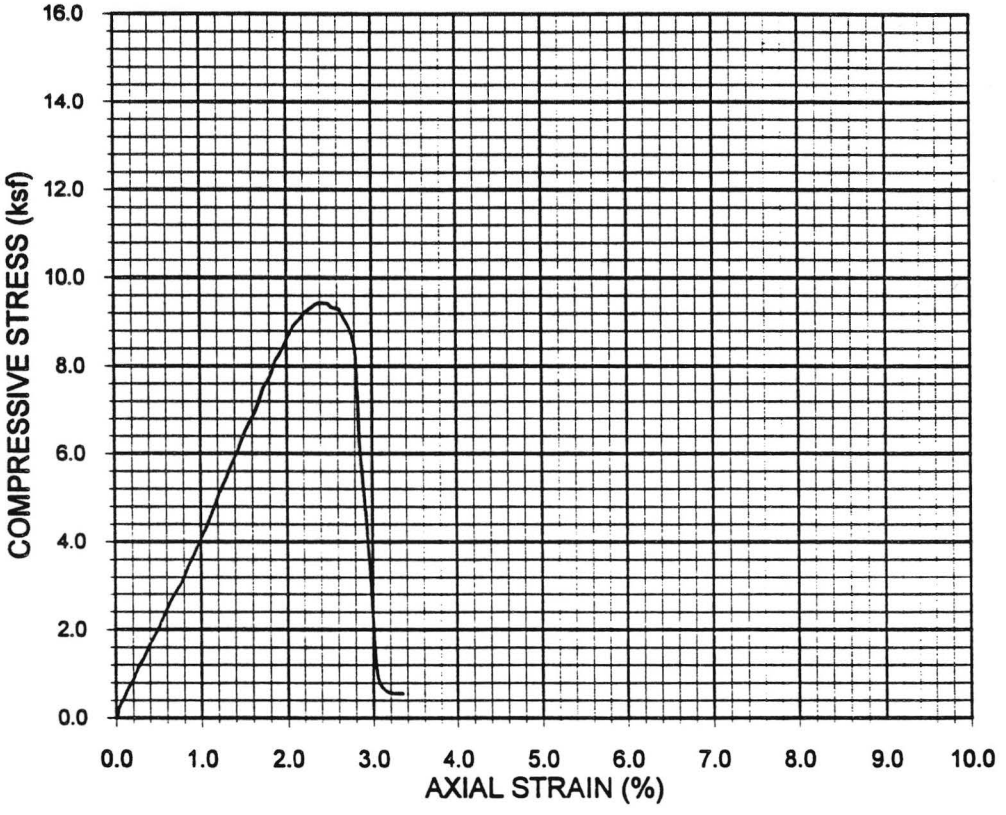
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-77







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-4	T-21	78.5	9.434	2.38	N/A	N/A

Sample Description: Dark Olive Sandy Silty Clay (CL-ML) , moist, stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 20.9
Dry Density (pcf) : 104.8
Avg. Sample Diameter (in.) : 2.878
Avg. Sample Height (in.) : 6.017
Degree of Saturation (%) : 93
Strain Rate (inch/min) : 0.04

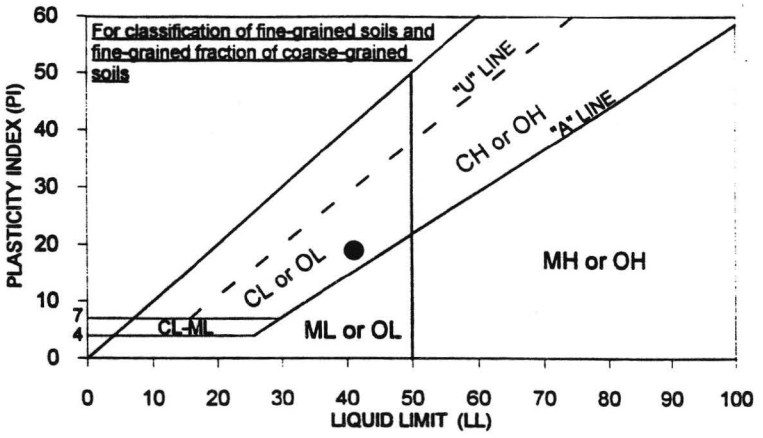
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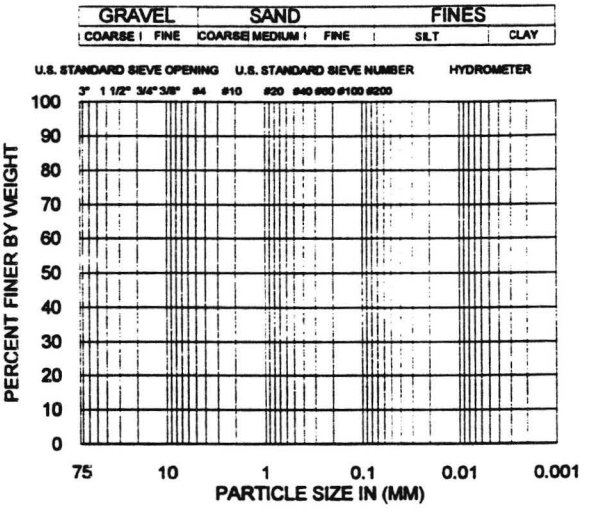
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Eastside Extension
Metro Redline

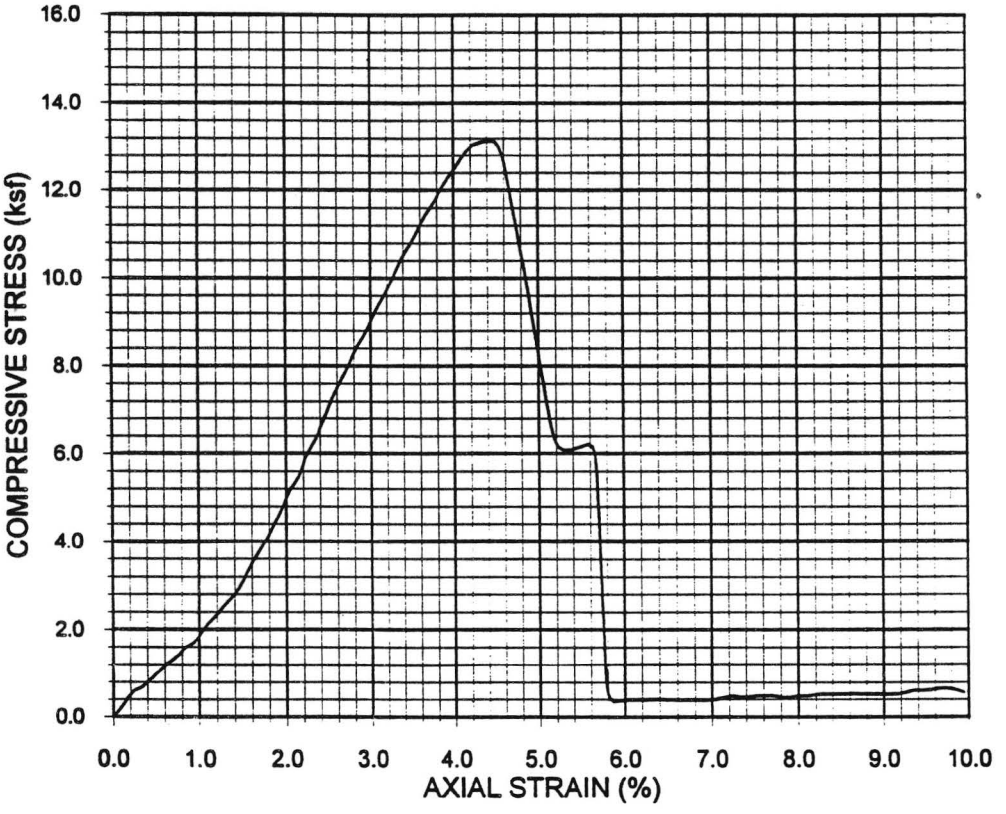
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-78







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-4	T-24	87.5	13.147	4.47	N/A	41,22,19

Sample Description: Dark Olive Lean Clay (CL) , moist, very stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 25.3
Dry Density (pcf) : 99.1
Avg. Sample Diameter (in.) : 2.872
Avg. Sample Height (in.) : 6.010
Degree of Saturation (%) : 97
Strain Rate (inch/min) : 0.04

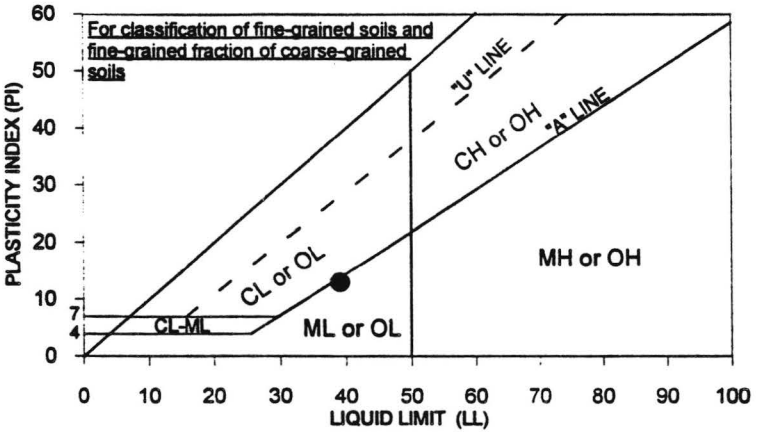
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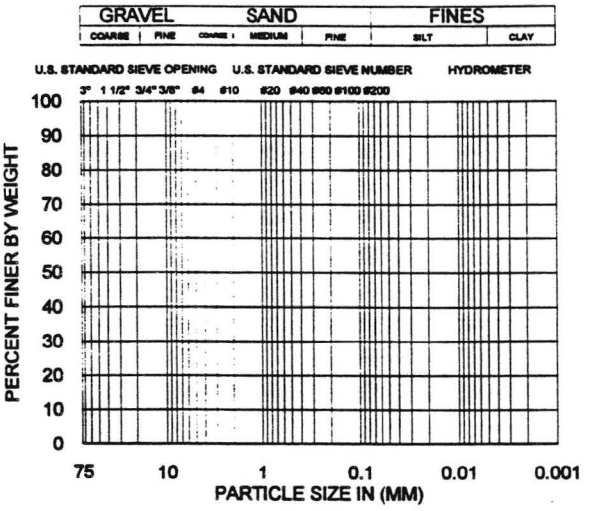
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Eastside Extension
Metro Redline

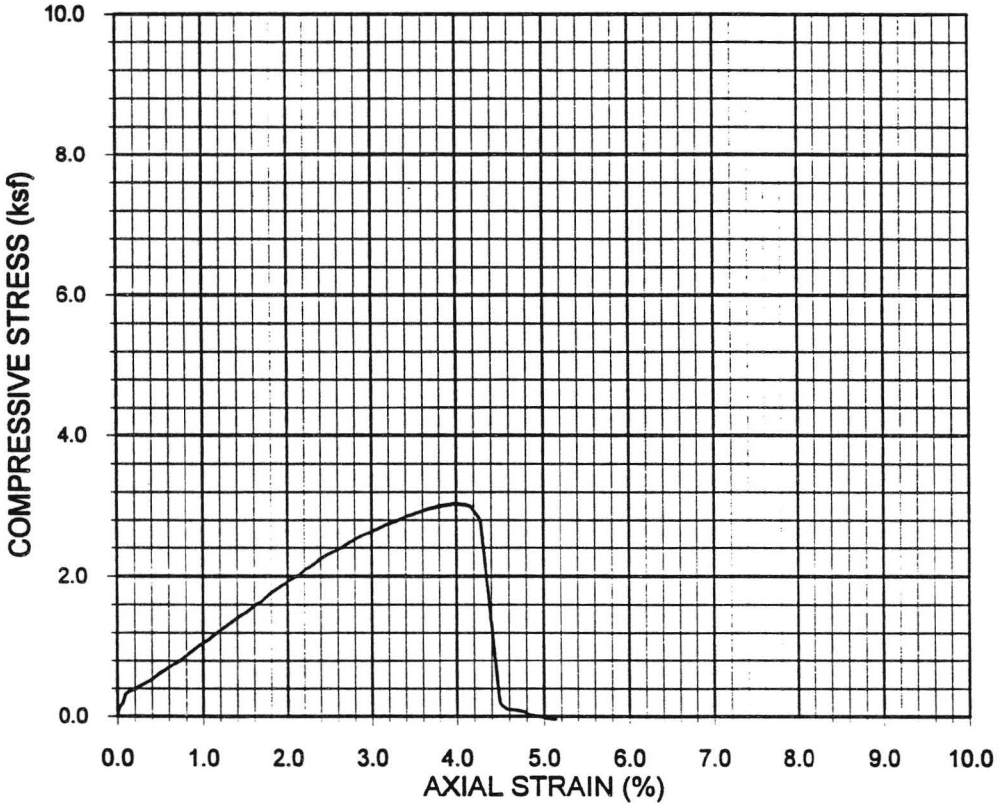
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-79







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-4-1	P-16	64.0	3.035	3.99	N/A	39,26,13

Sample Description: Olive Silt (ML)

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 25.1
Dry Density (pcf) : 99.8
Avg. Sample Diameter (in.) : 2.874
Avg. Sample Height (in.) : 6.140
Degree of Saturation (%) : 99
Strain Rate (inch/min) : 0.04

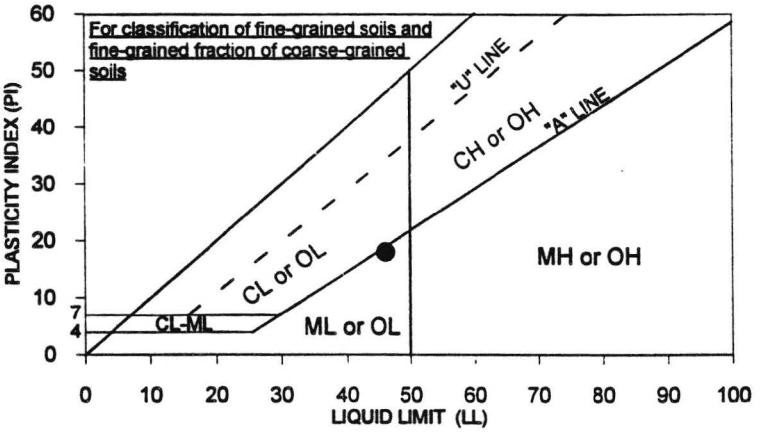
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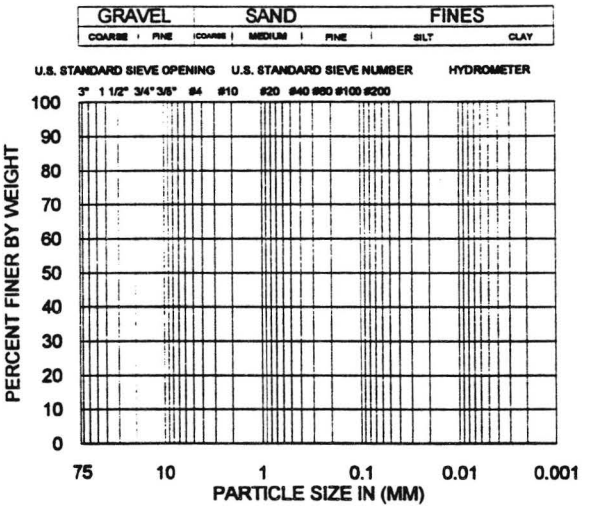
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Eastside Extension
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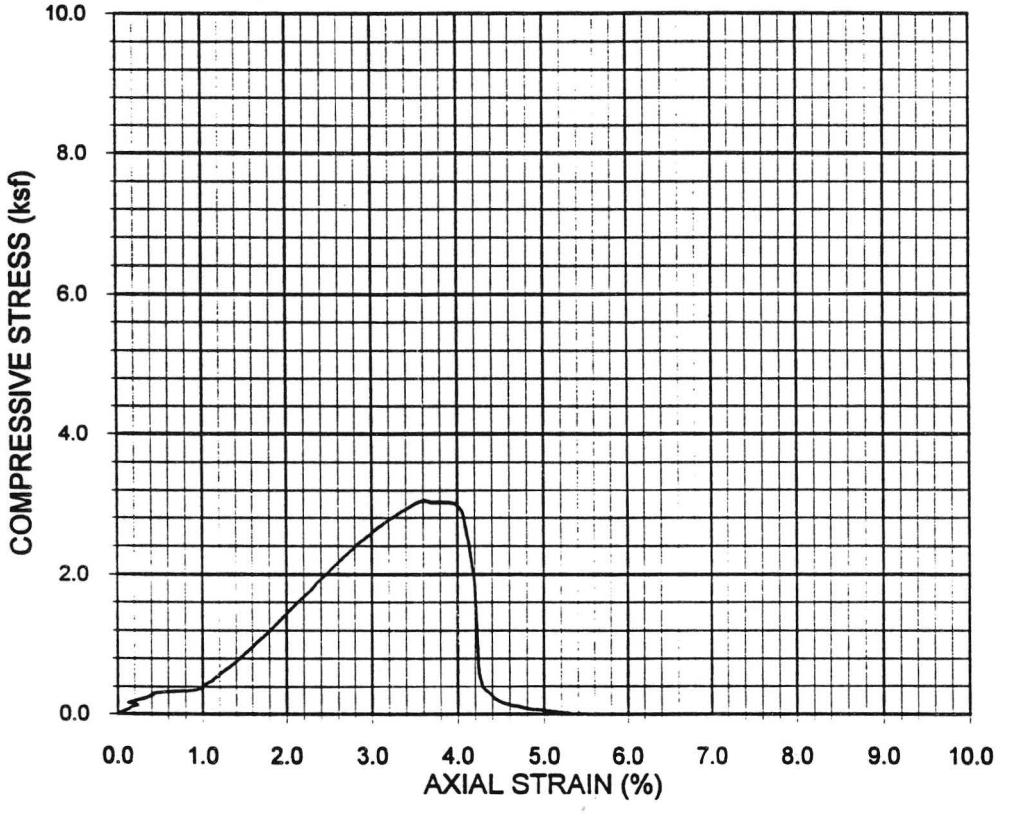
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

12-95

Figure B-80







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-4-1	P-20	76.0	3.045	3.61	N/A	46,28,18

Sample Description: Olive Silt (ML)

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 26.1
Dry Density (pcf) : 98.6
Avg. Sample Diameter (in.) : 2.875
Avg. Sample Height (in.) : 6.140
Degree of Saturation (%) : 99
Strain Rate (inch/min) : 0.04

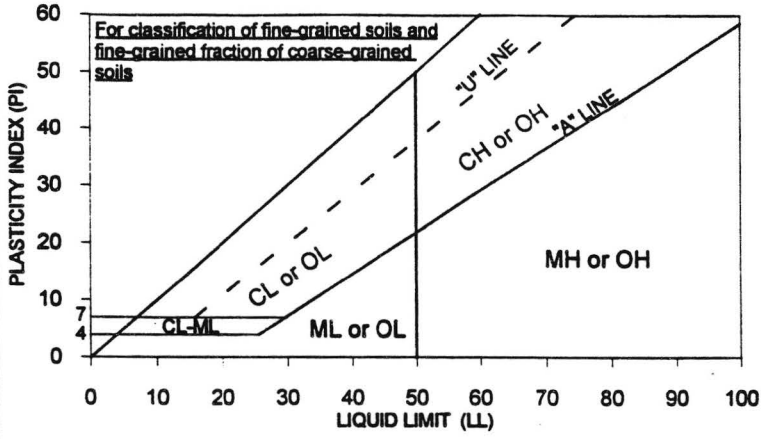
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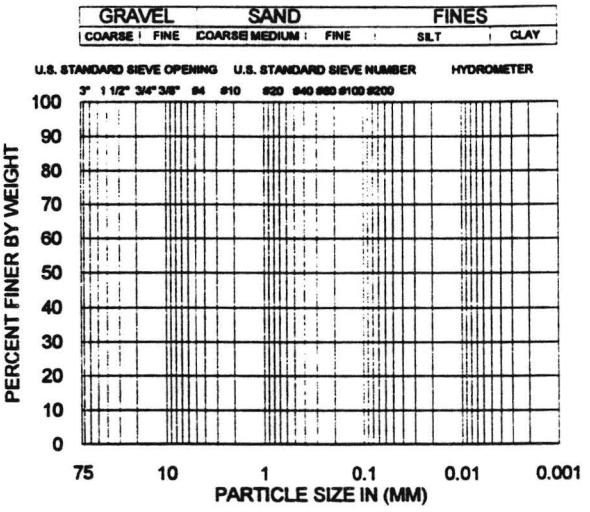
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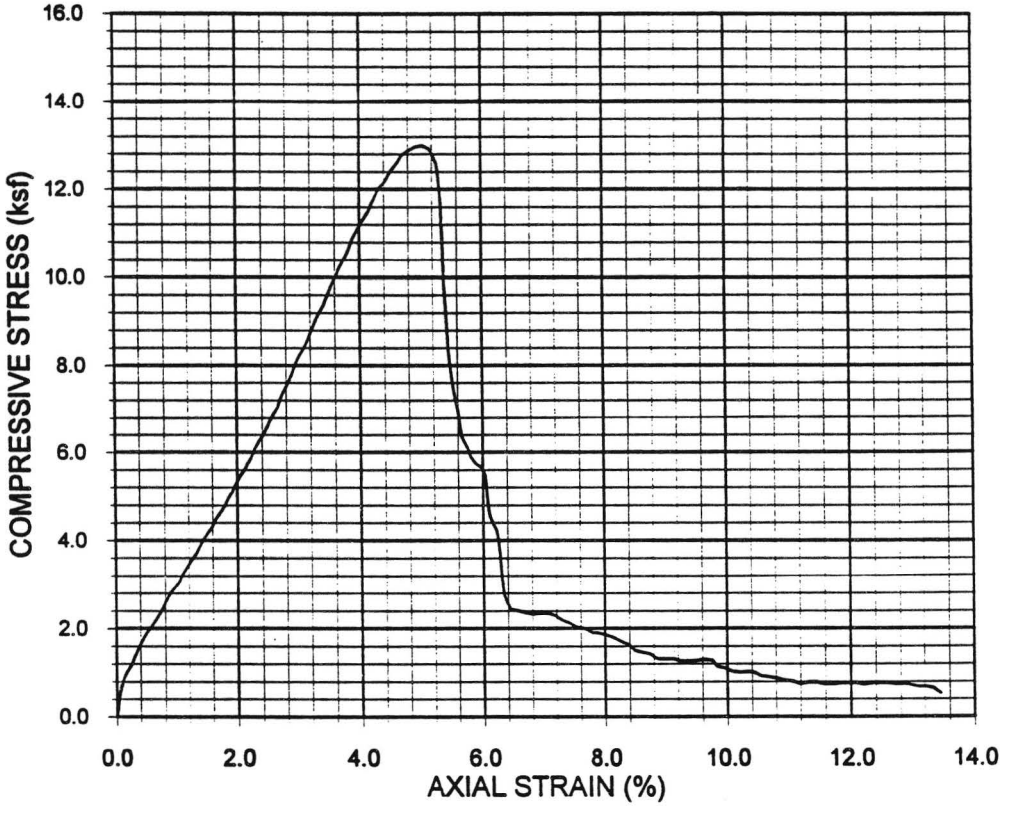
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

12-95

Figure B-81







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-7	T-14	63.0	12.990	5.02	N/A	N/A

Sample Description: Dark Olive Silt (ML) , moist, very stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 23.3
Dry Density (pcf) : 102.8
Avg. Sample Diameter (in.) : 2.870
Avg. Sample Height (in.) : 6.005
Degree of Saturation (%) : 98
Strain Rate (inch/min) : 0.04

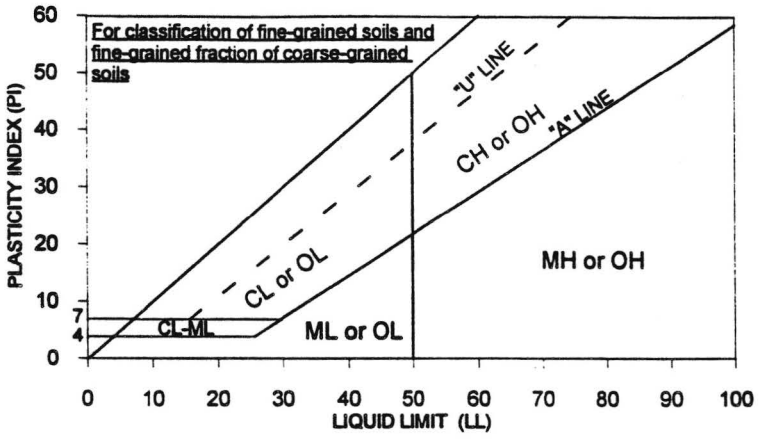
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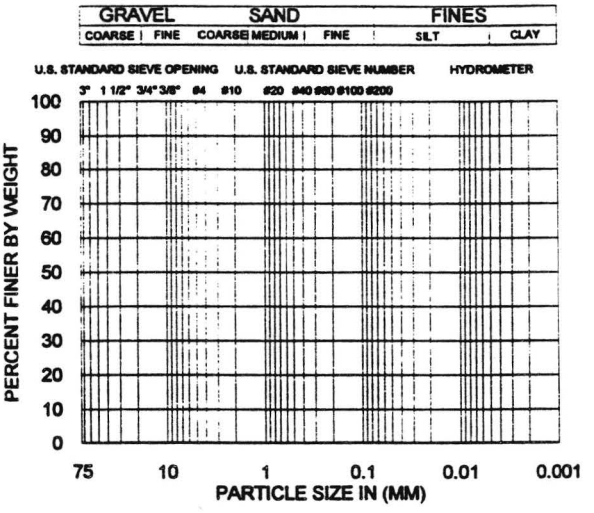
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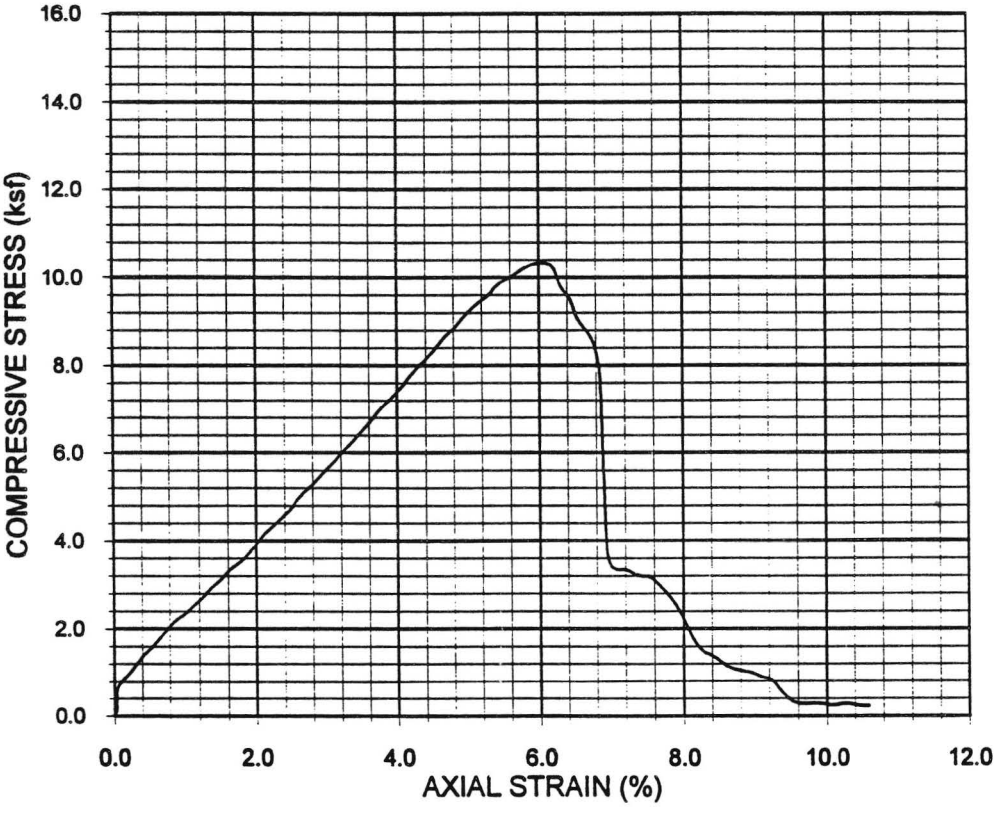
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-82







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-7	T-17	72.0	10.336	6.06	N/A	N/A

Sample Description: Dark Olive Silt (ML) , moist, very stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 22.1
Dry Density (pcf) : 103.3
Avg. Sample Diameter (in.) : 2.870
Avg. Sample Height (in.) : 6.004
Degree of Saturation (%) : 95
Strain Rate (inch/min) : 0.04

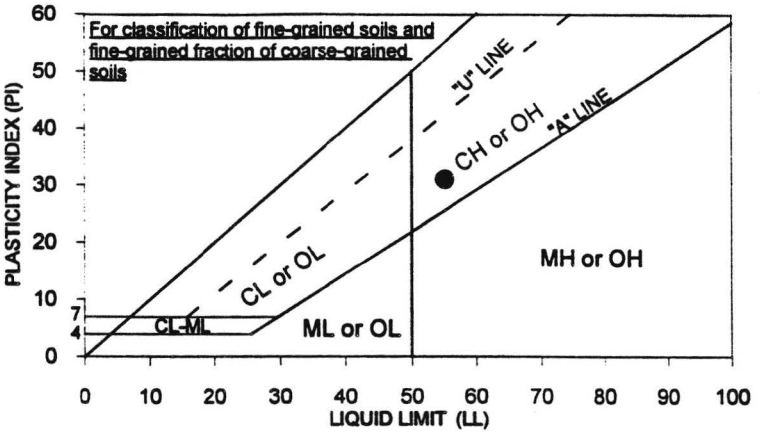
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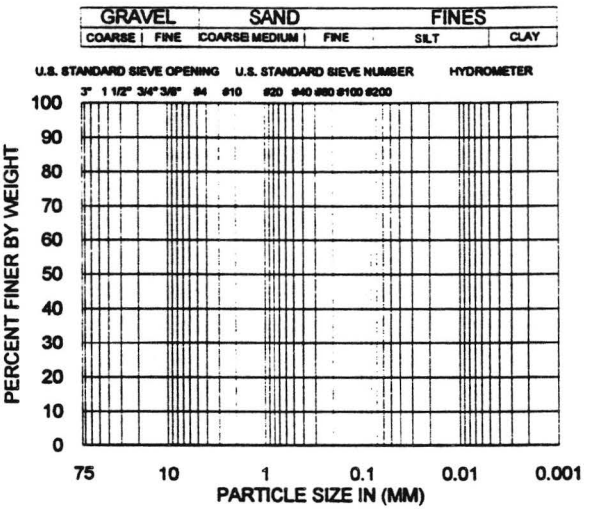
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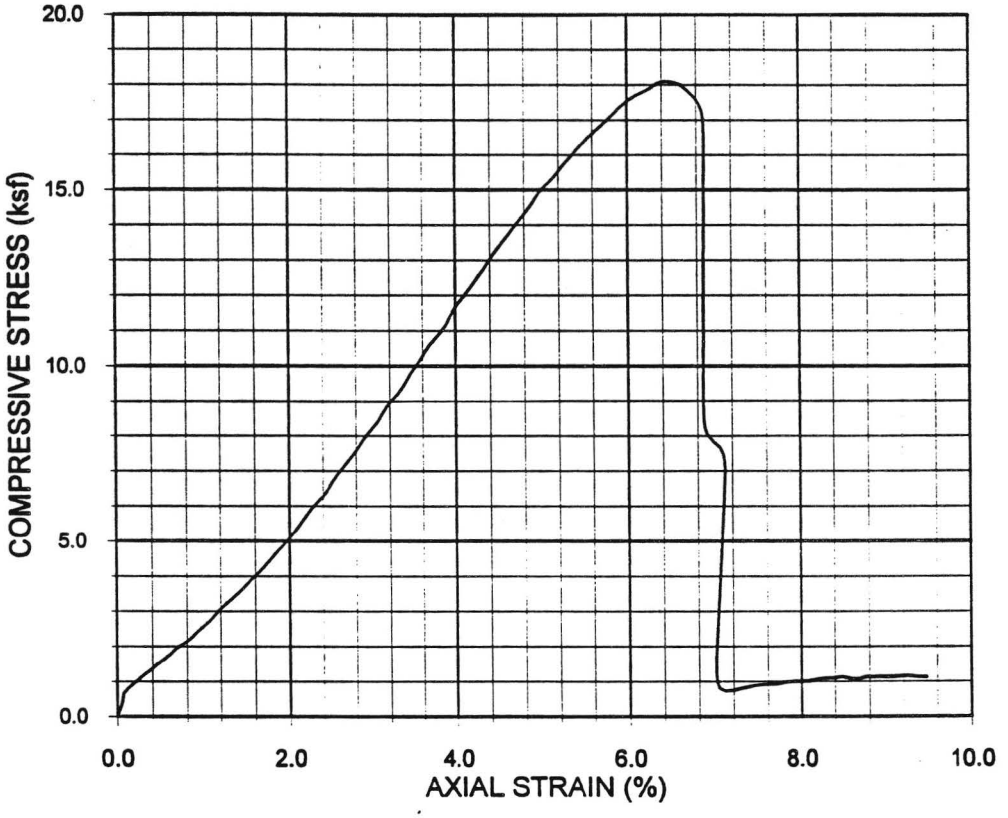
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-83







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-7	T-20	81.0	18.095	6.40	N/A	55,24,31

Sample Description: Dark Olive Fat Clay (CH) , moist, hard

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 29.6
Dry Density (pcf) : 96.9
Avg. Sample Diameter (in.) : 2.870
*Avg. Sample Height (in.) : 5.270 **
Degree of Saturation (%) : 100
Strain Rate (inch/min) : 0.04
** Not enough iength to meet ASTM specification*

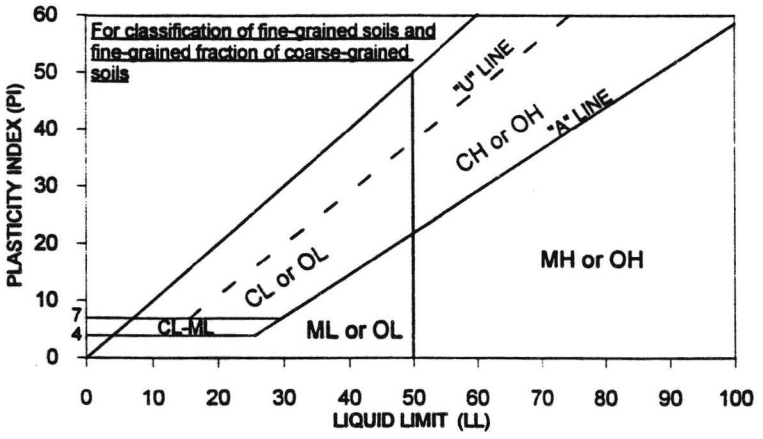
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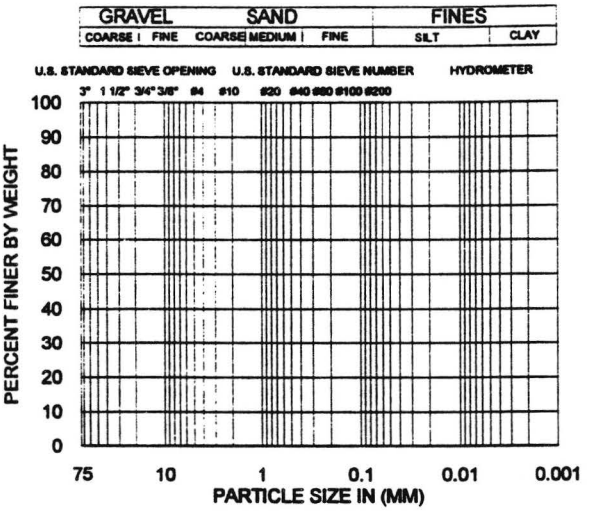
Project No. 95-8347-03
Eastside Extension
Metro Redline

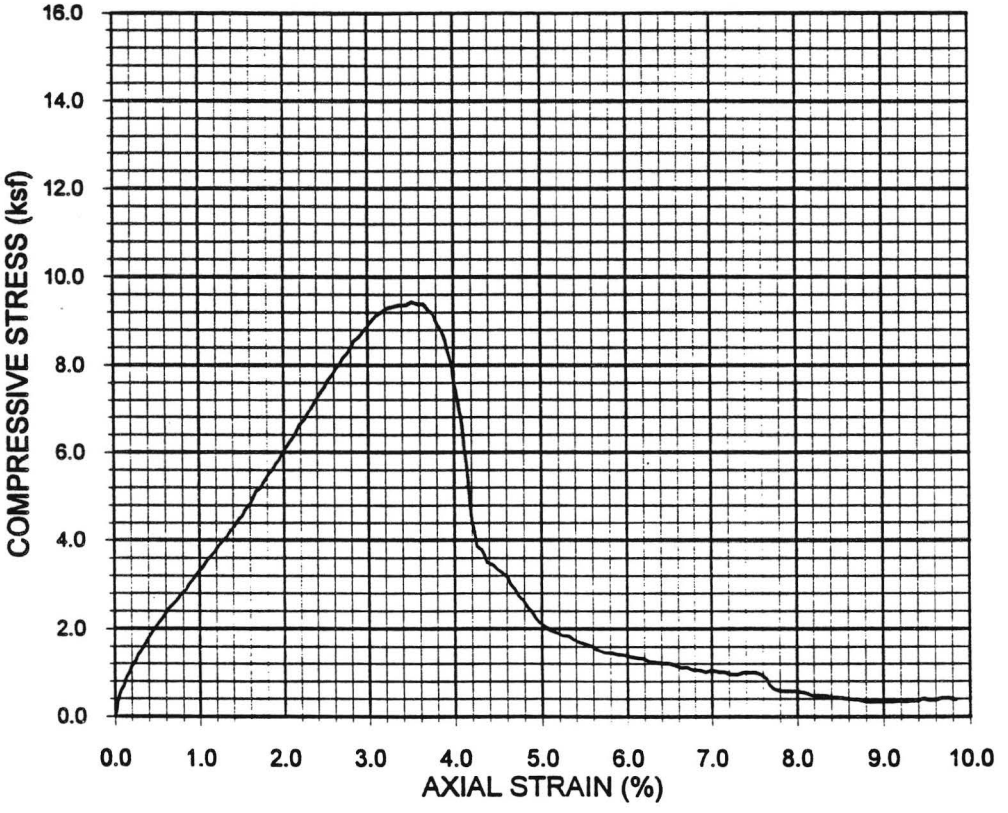
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-84







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-9	T-15	64.0	9.444	3.50	N/A	N/A

Sample Description: Dark Olive Silt (ML) , moist, stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 24.3
Dry Density (pcf) : 103.7
Avg. Sample Diameter (in.) : 2.875
Avg. Sample Height (in.) : 6.023
Degree of Saturation (%) : 100
Strain Rate (inch/min) : 0.04

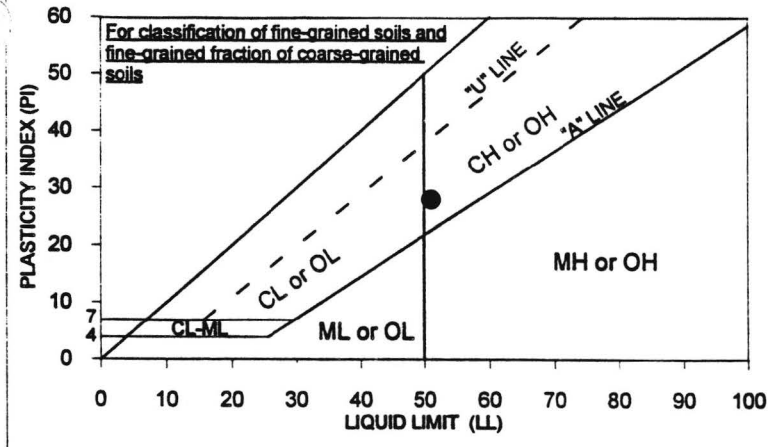
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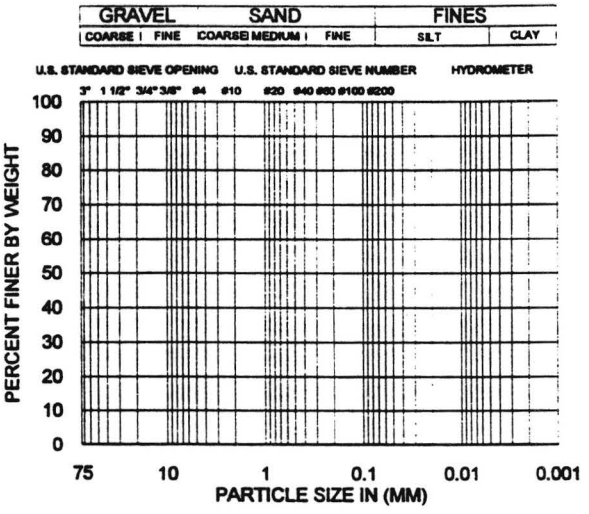
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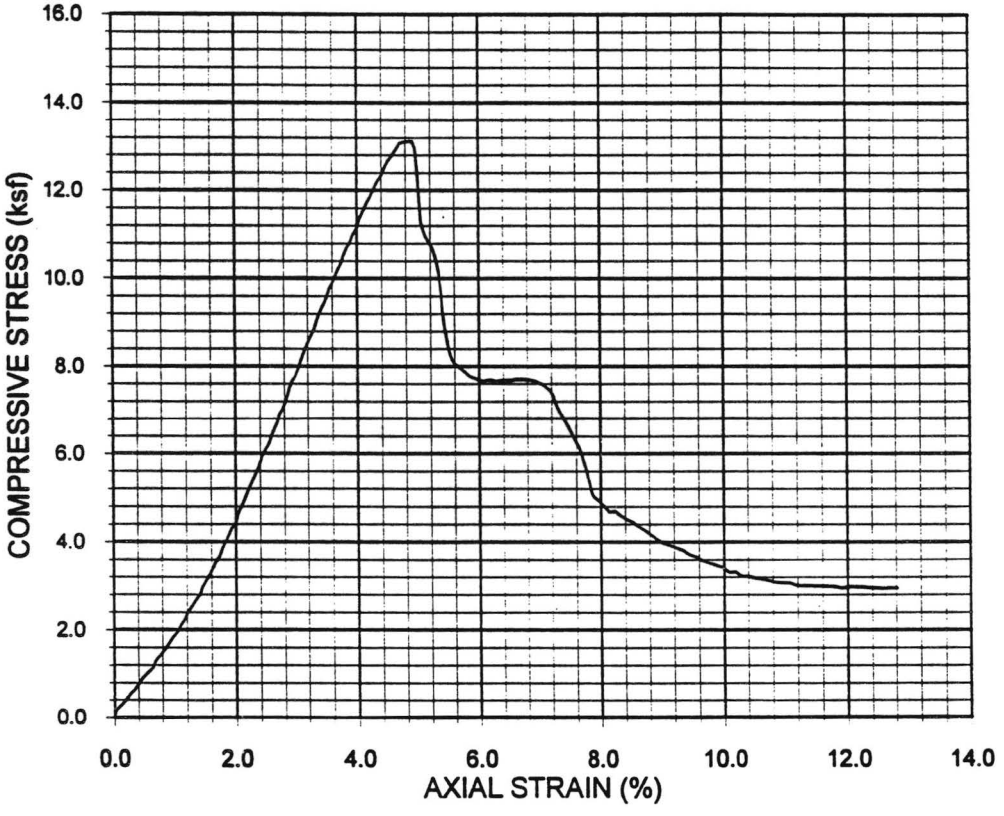
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-85







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-9	T-19	72.0	13.158	4.87	N/A	51,23,28

Sample Description: Dark Olive Grey Fat Clay (CH) , moist, very stiff

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 24.7
Dry Density (pcf) : 98.4
Avg. Sample Diameter (in.) : 2.875
*Avg. Sample Height (in.) : 4.150 **
Degree of Saturation (%) : 93
Strain Rate (inch/min) : 0.04
** Not enough length to meet ASTM specification*

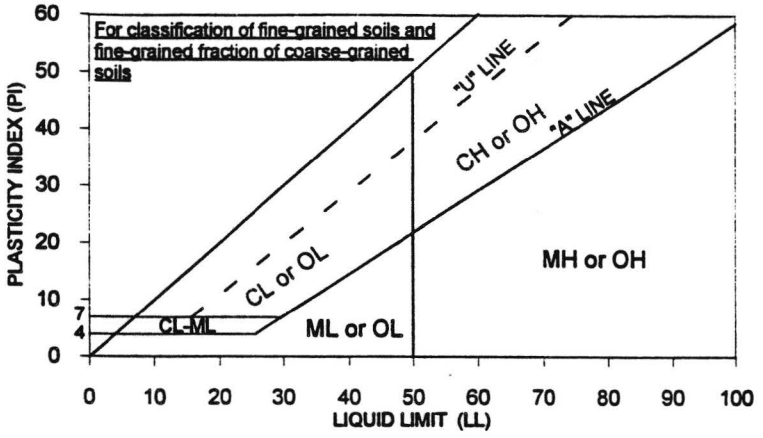
GeoTransit Consultants

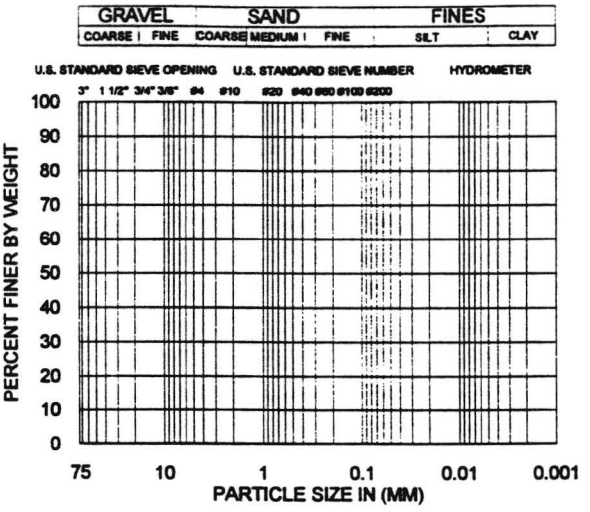
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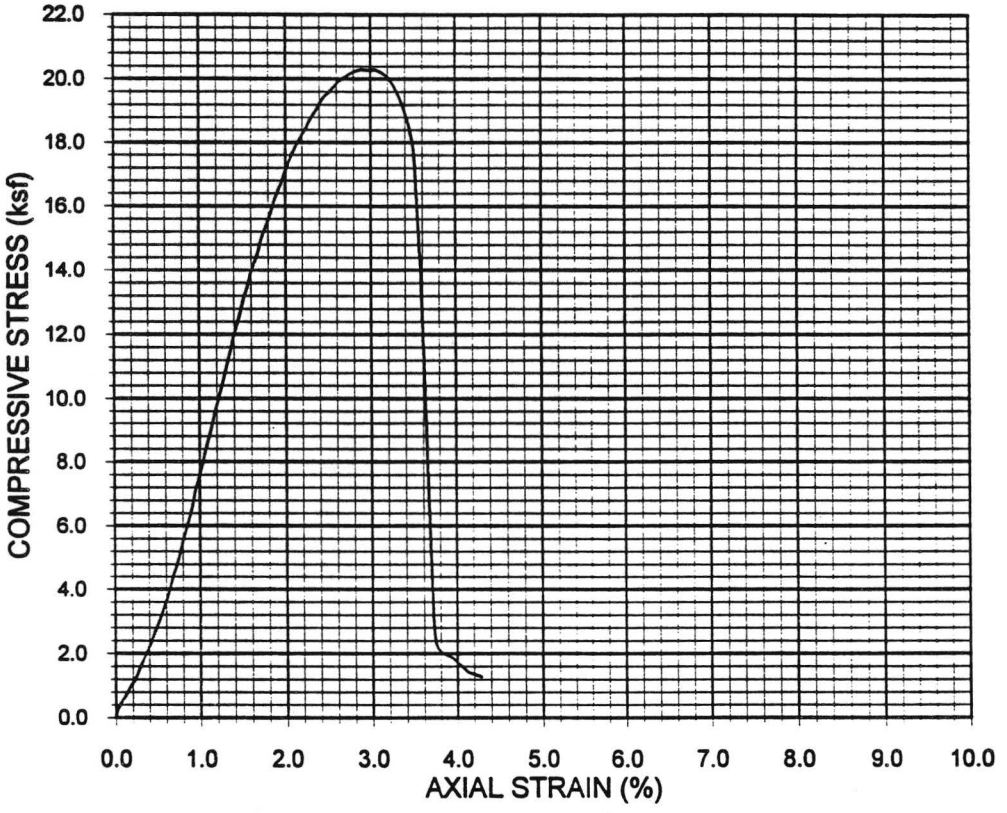
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-86







BORING NO.	SAMPLE NO.	DEPTH (ft)	Unconfined Compressive Strength (ksf)	Strain at Failure (%)	GR:SA:FI (%)	LL,PL,PI
DD-9	T-23	84.0	20.316	2.92	N/A	N/A

Sample Description: Dark Olive Silt (ML) , moist, hard

Sample Type : Undisturbed Shelby Tube
Initial Moisture Content (%) : 24.6
Dry Density (pcf) : 100.3
Avg. Sample Diameter (in.) : 2.873
Avg. Sample Height (in.) : 6.034
Degree of Saturation (%) : 98
Strain Rate (inch/min) : 0.04

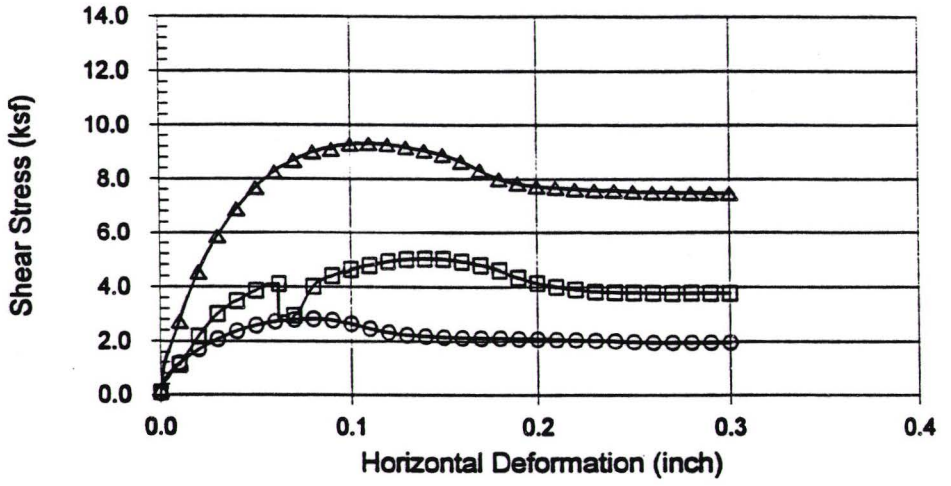
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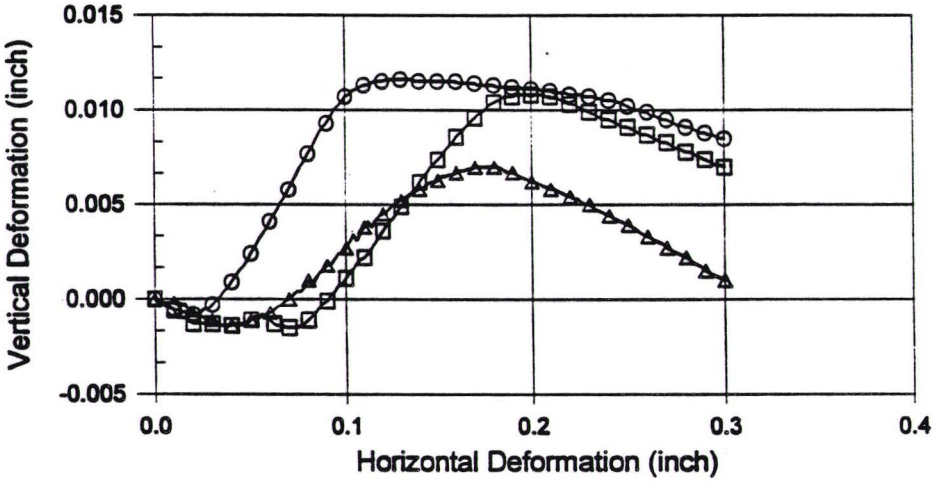
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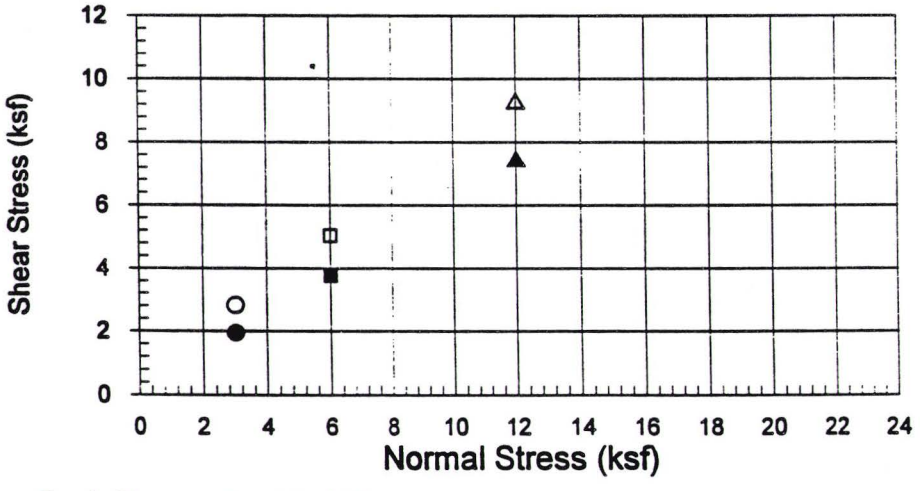
ATTERBERG LIMITS, PARTICLE-SIZE CURVE
UNCONFINED COMPRESSIVE STRENGTH
(ASTM D4318,D422, D2166)

08-95

Figure B-87







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
3.000	○ 2.817	● 1.949
6.000	□ 5.037	■ 3.769
12.000	△ 9.317	▲ 7.472

Boring No. : DD-1
Sample No. : D-7
Depth (ft.) : 70.0
Sample Type : Undisturbed Ring
Soil Type : Dark Grey Silty Sand (SM)

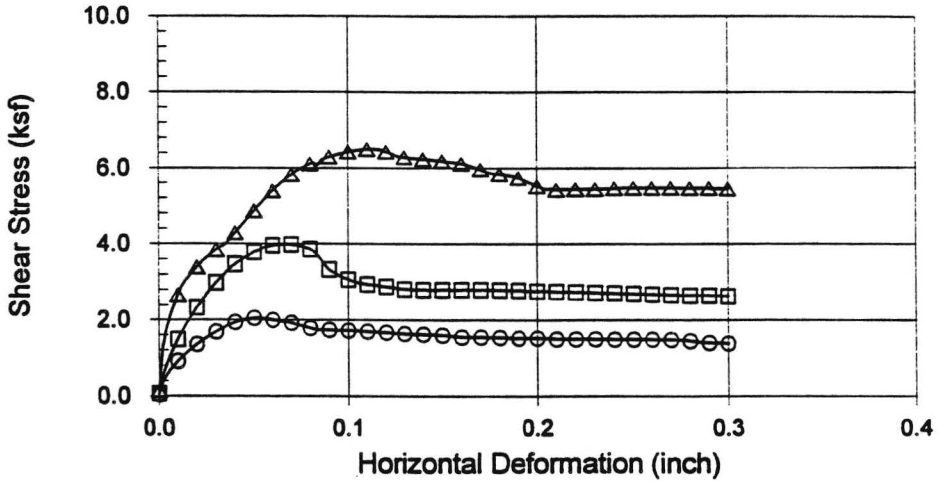
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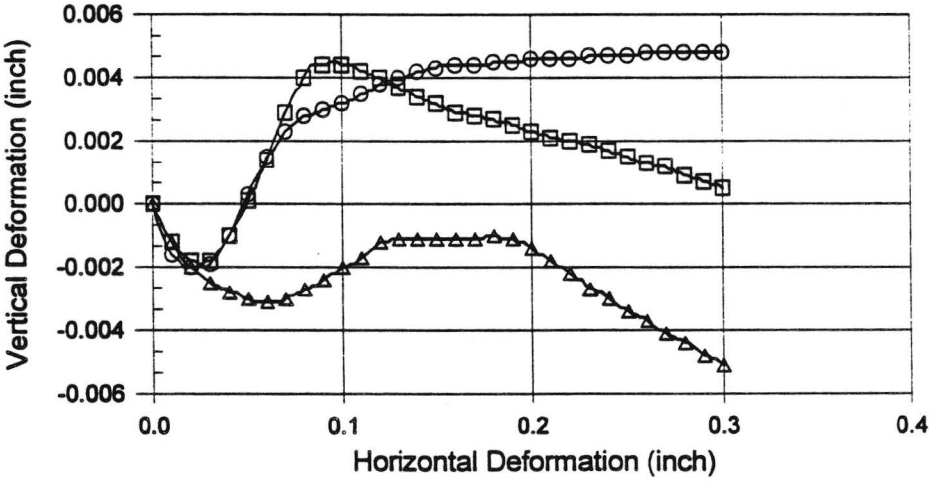
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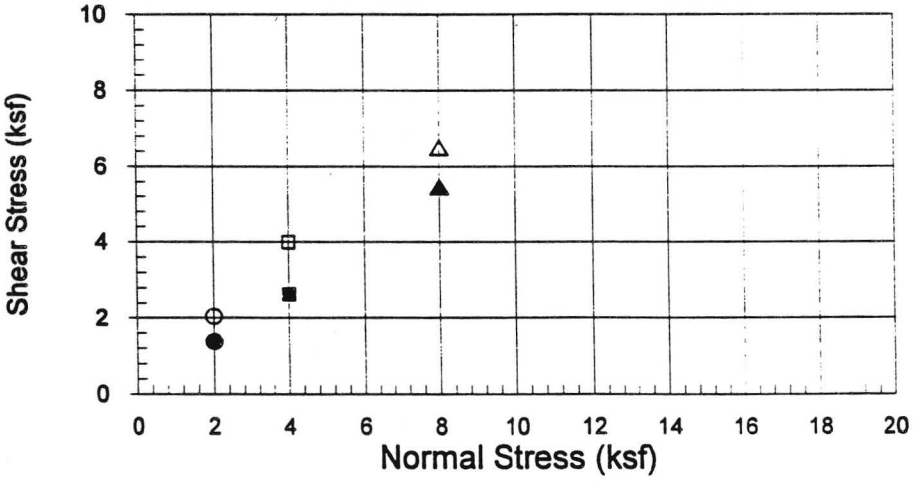
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-88







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
2.000	○ 2.040	● 1.375
4.000	□ 3.986	■ 2.628
8.000	△ 6.504	▲ 5.453

Boring No. : DD-3
Sample No. : D-10
Depth (ft.) : 60.0
Sample Type : Undisturbed Ring
Soil Type : Grey Sandy Silt (ML)

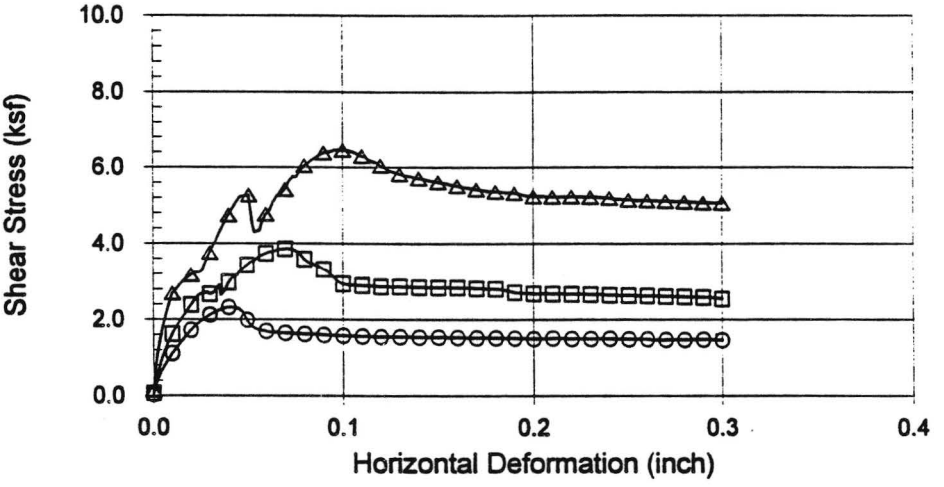
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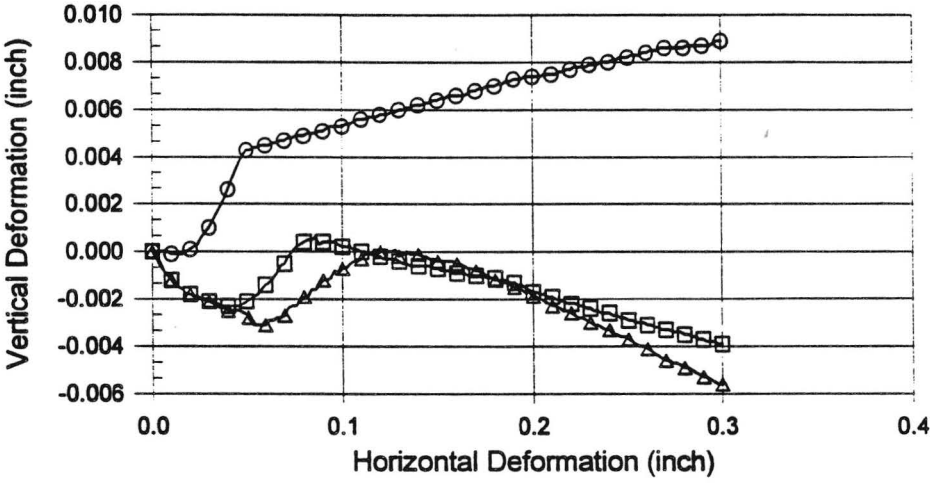
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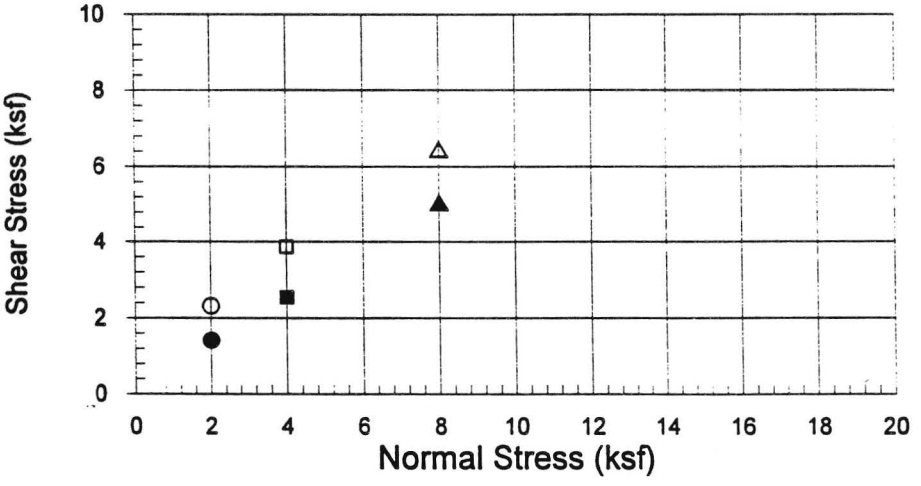
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-89







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
2.000	○ 2.319	● 1.461
4.000	□ 3.863	■ 2.544
8.000	△ 6.456	▲ 5.056

Boring No. : DD-9
Sample No. : D-16
Depth (ft.) : 66.5
Sample Type : Undisturbed Ring
Soil Type : Dark Olive Sandy Silt (ML)

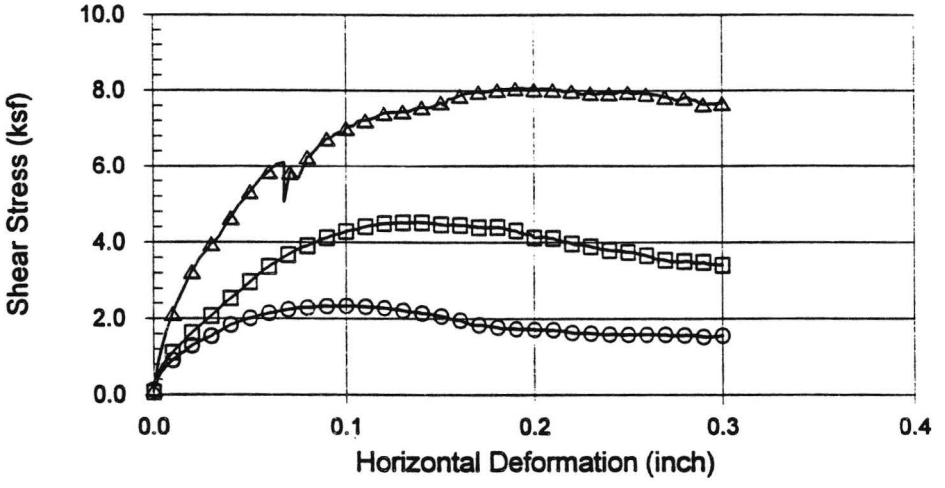
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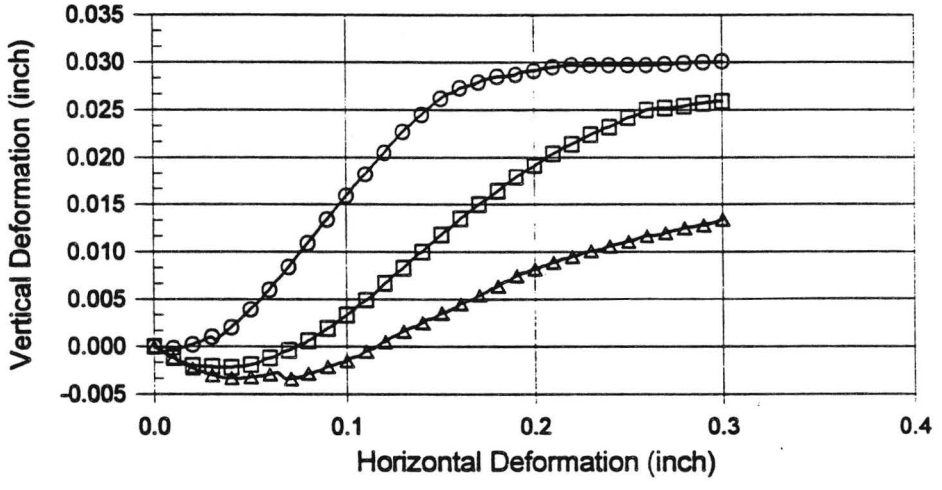
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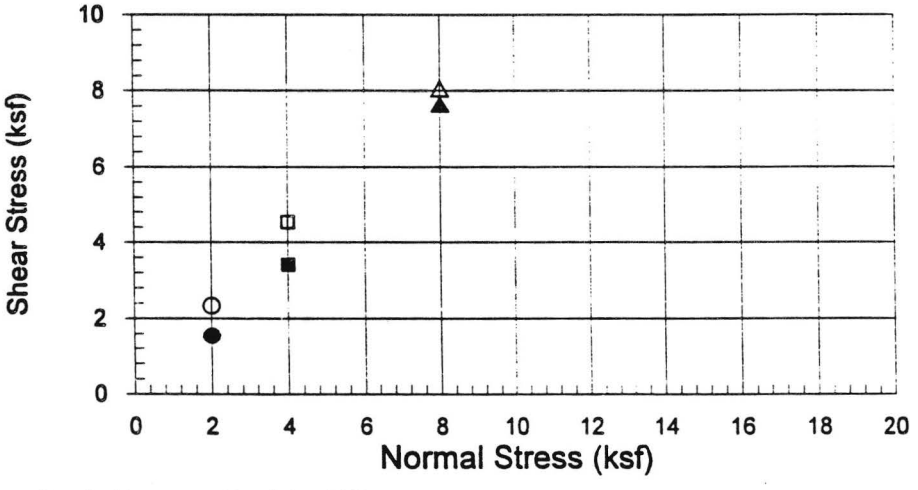
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-90







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
2.000	○ 2.335	● 1.541
4.000	□ 4.531	■ 3.407
8.000	△ 8.060	▲ 7.652

Boring No. : DD-10
Sample No. : D-17
Depth (ft.) : 75.0
Sample Type : Undisturbed Ring
Soil Type : Dark Grey Poorly Graded Sand with Silt (SP-SM)

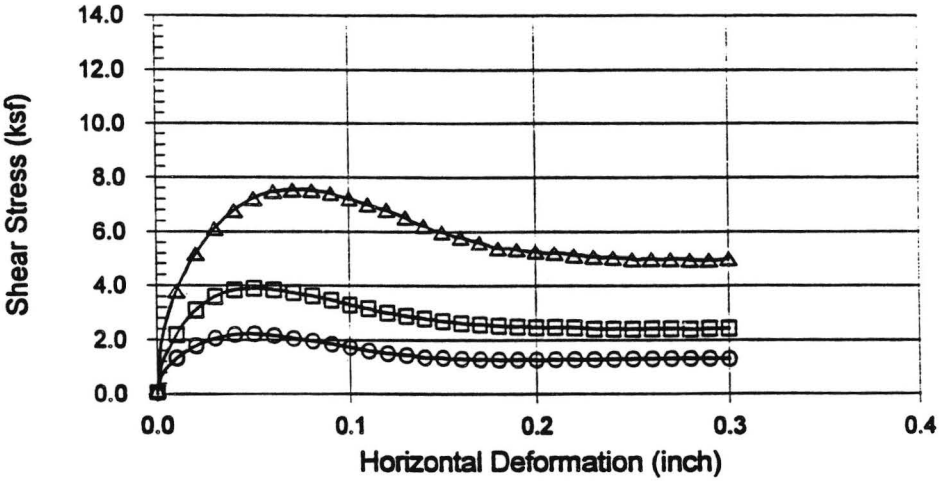
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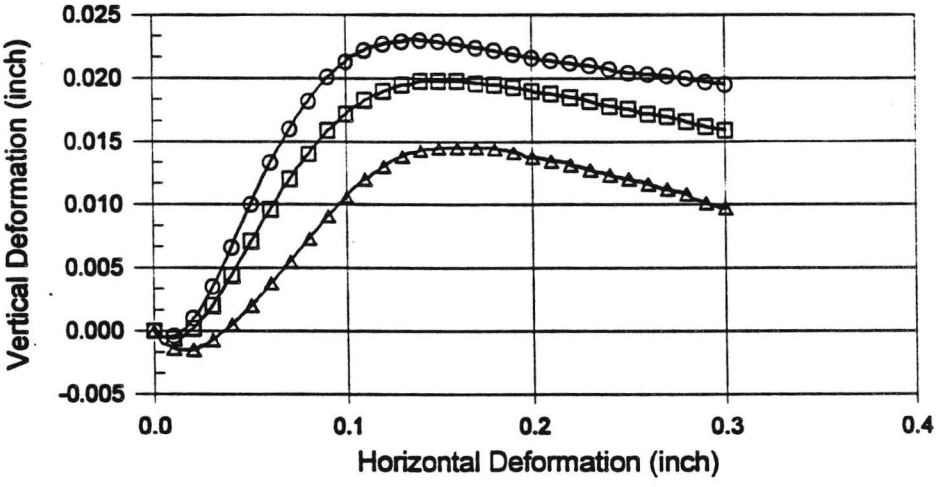
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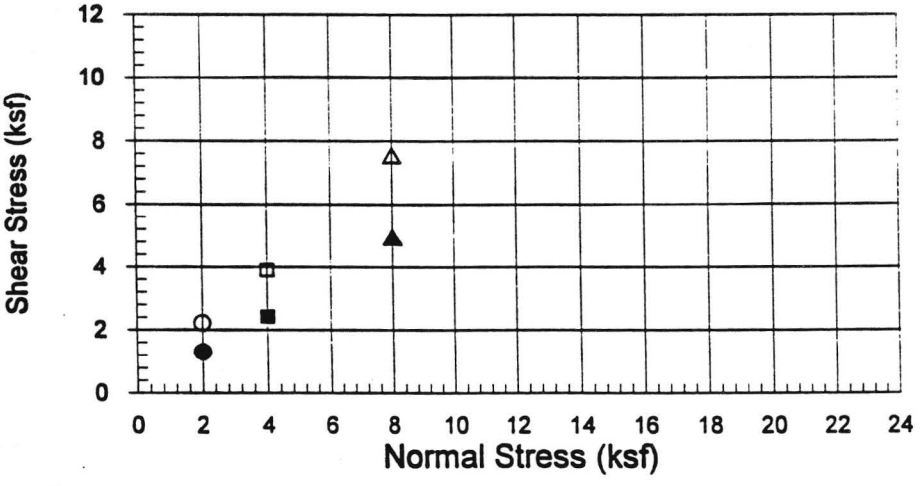
DIRECT SHEAR TEST RESULTS (ASTM D3080)

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Figure B-91







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
2.000	○ 2.218	● 1.297
4.000	□ 3.900	■ 2.415
8.000	△ 7.560	▲ 4.968

Boring No. : DD-12
Sample No. : D-17
Depth (ft.) : 65.0
Sample Type : Undisturbed Ring
Soil Type : Yellowish Brown Poorly Graded Sand with Silt (SP-SM)

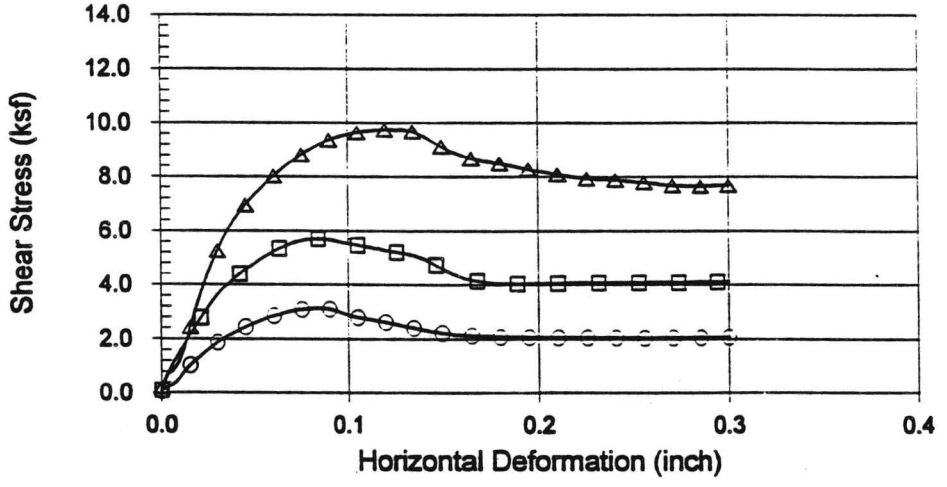
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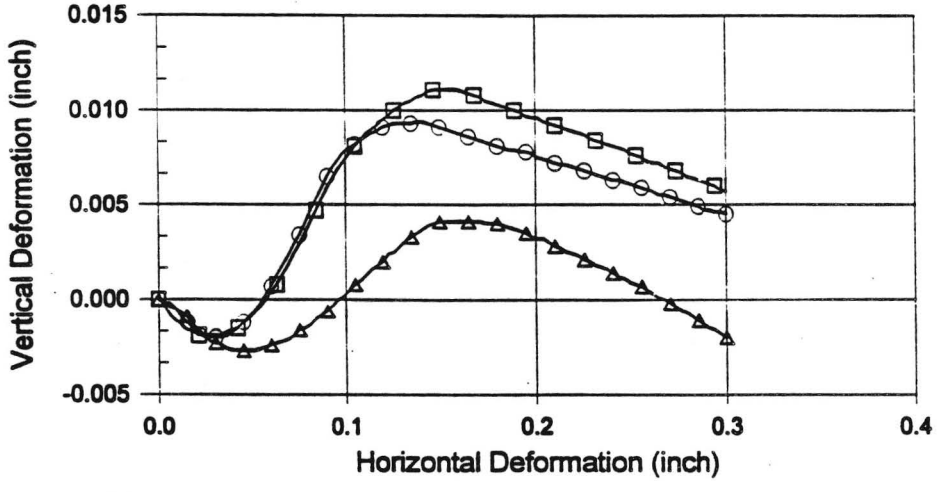
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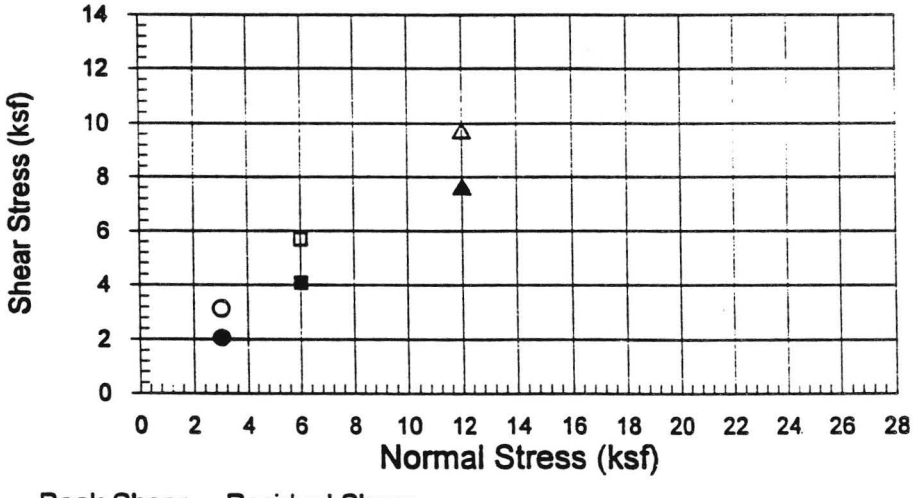
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-92







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
3.000	○ 3.134	● 2.059
6.000	□ 5.705	■ 4.088
12.000	△ 9.758	▲ 7.661

Boring No. : SD-1
Sample No. : D-14
Depth (ft.) : 60.0
Sample Type : Undisturbed Ring
Soil Type : Olive Brown Silty Sand (SM)

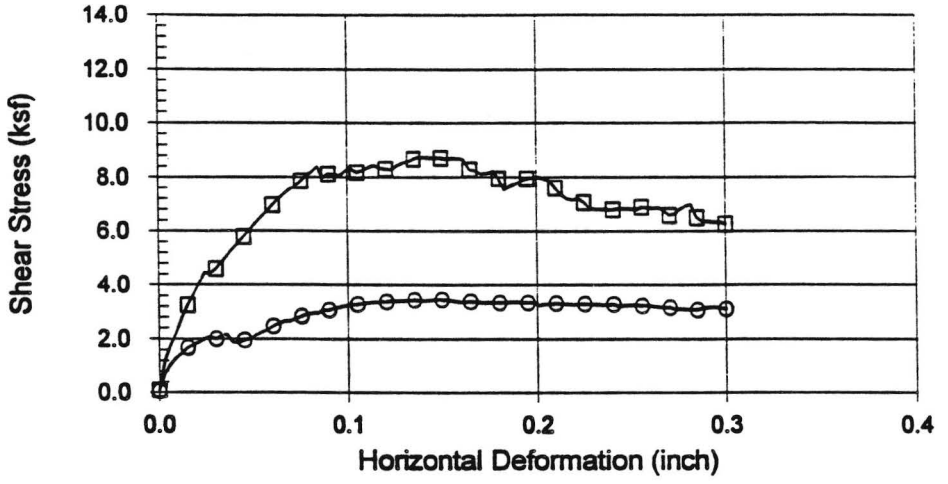
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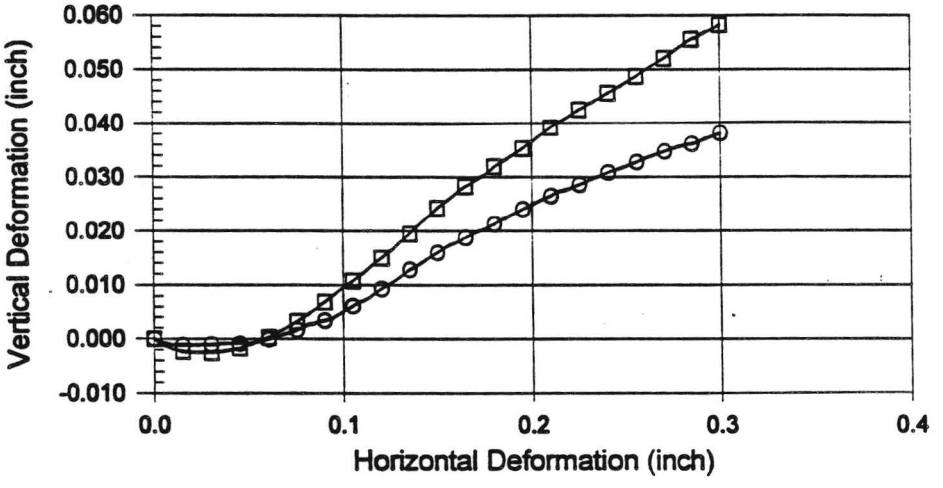
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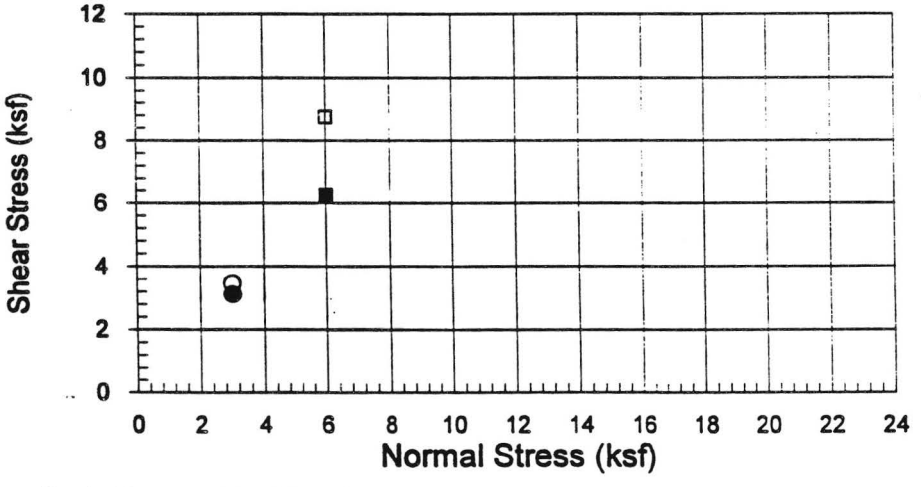
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-93







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
3.000	○ 3.462	● 3.116
6.000	□ 8.743	■ 6.263

Boring No. : SD-3
Sample No. : D-3
Depth (ft.) : 15.0
Sample Type : Undisturbed Ring
Soil Type : Olive Brown Sand with Gravel (SP-SM)

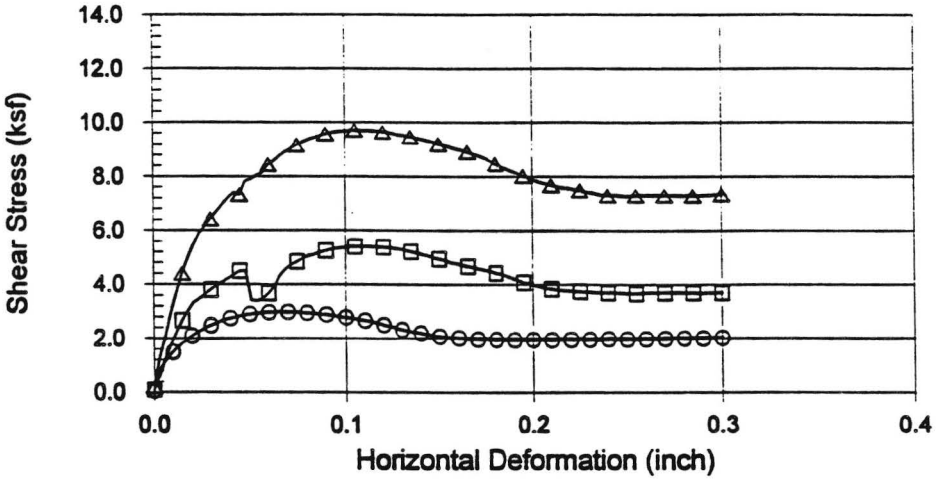
GeoTransit Consultants

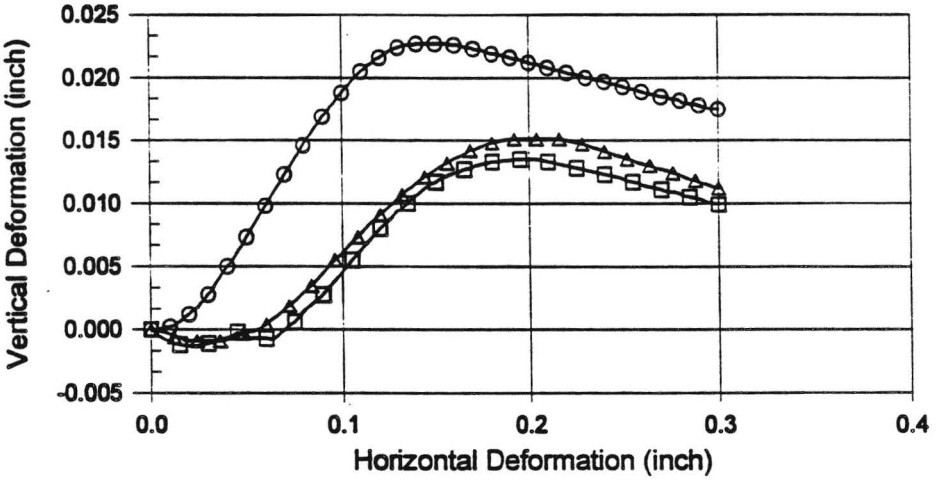
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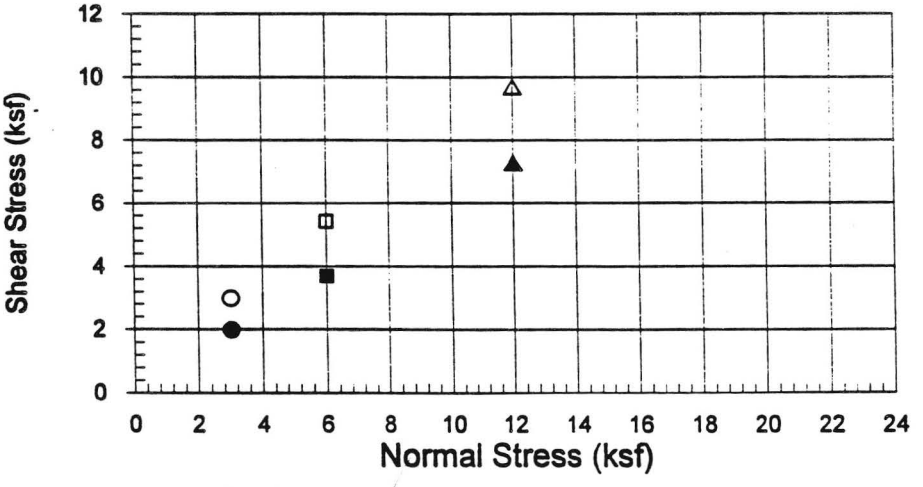
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-94







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
3.000	○ 2.984	● 1.983
6.000	□ 5.414	■ 3.701
12.000	△ 9.703	▲ 7.294

Boring No. : SD-3A
Sample No. : D-9
Depth (ft.) : 65.0
Sample Type : Undisturbed Ring
Soil Type : Olive Brown Poorly Graded Sand with Silt (SP-SM)

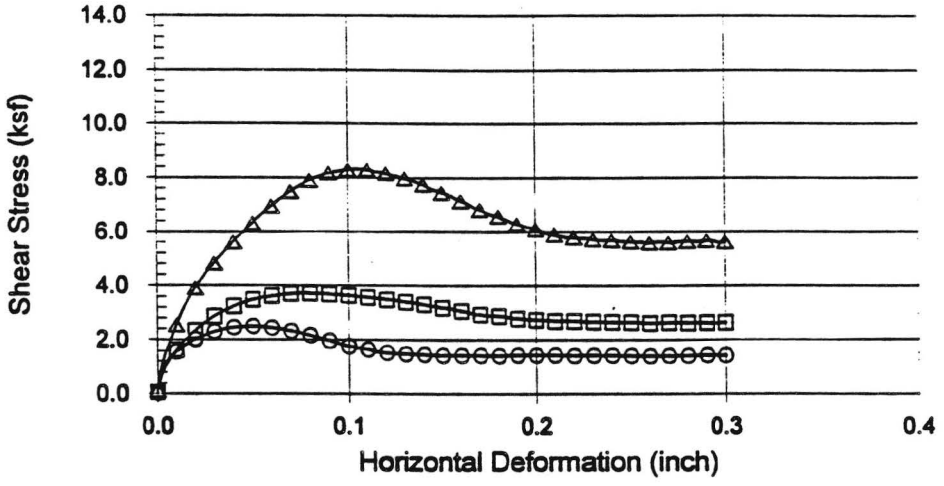
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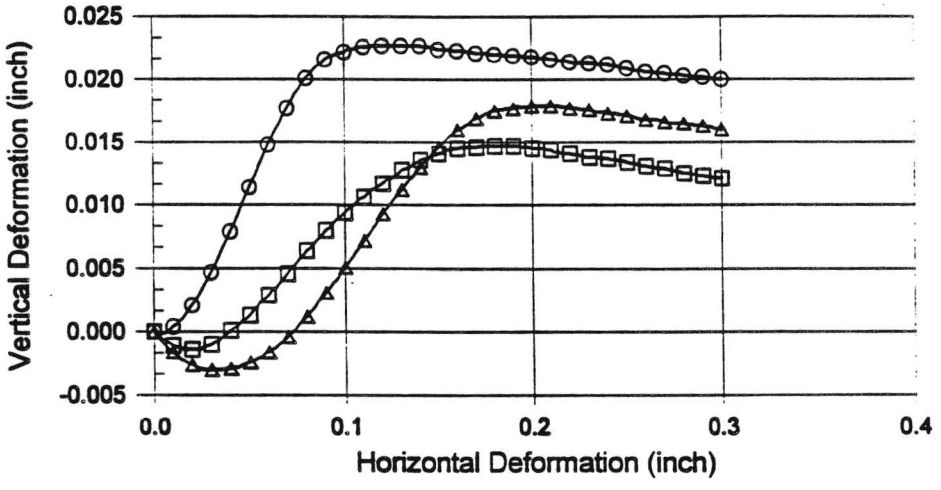
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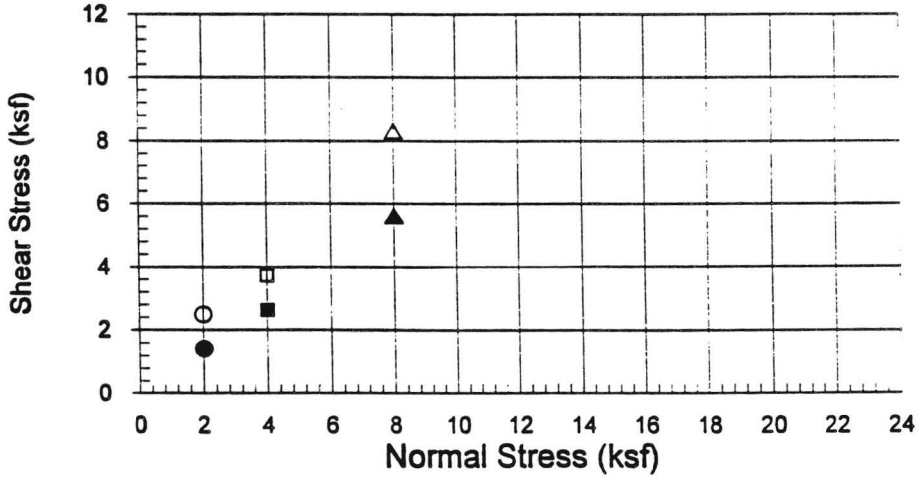
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-95







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
2.000	○ 2.486	● 1.413
4.000	□ 3.724	■ 2.624
8.000	△ 8.316	▲ 5.632

Boring No. : SD-4
Sample No. : D-4
Depth (ft.) : 20.0
Sample Type : Undisturbed Ring
Soil Type : Olive Brown Silty Sand (SM)

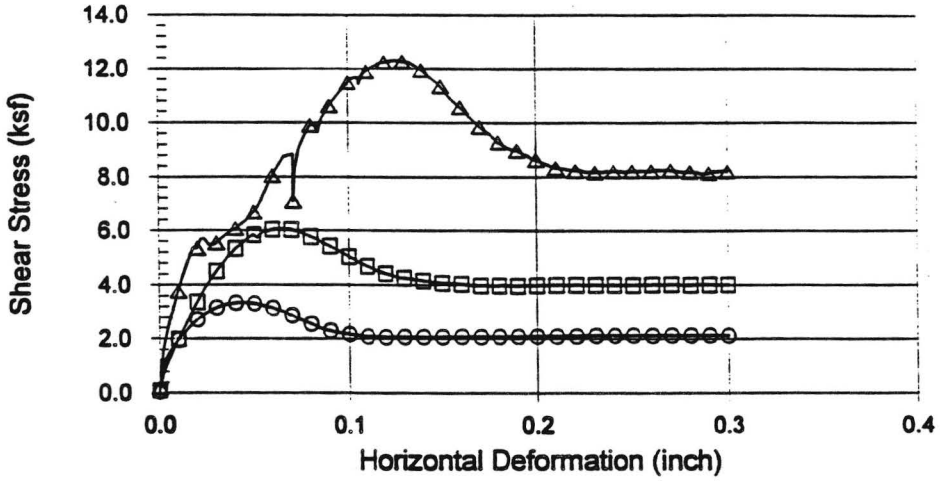
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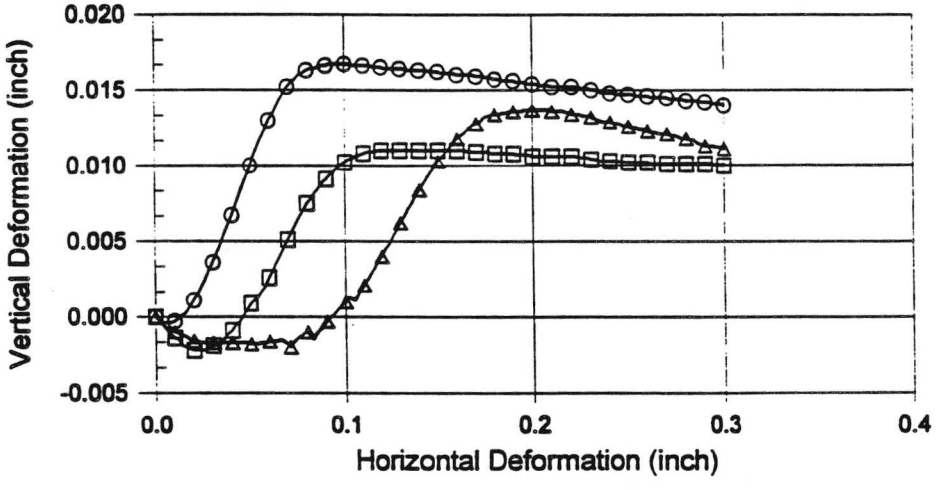
Project No. 95-8347-03
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Metro Redline

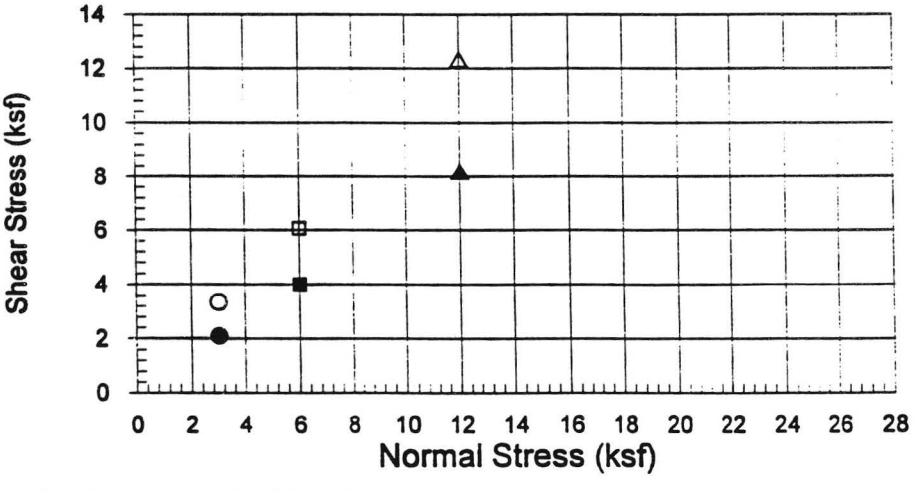
DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

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Figure B-96







Normal Stress (ksf)	Peak Shear Stress (ksf)	Residual Shear Stress (ksf)
3.000	○ 3.342	● 2.094
6.000	□ 6.064	■ 3.999
12.000	△ 12.321	▲ 8.195

Boring No. : SD-5
Sample No. : D-7
Depth (ft.) : 70.0
Sample Type : Undisturbed Ring
Soil Type : Olive Brown Poorly Graded Sand

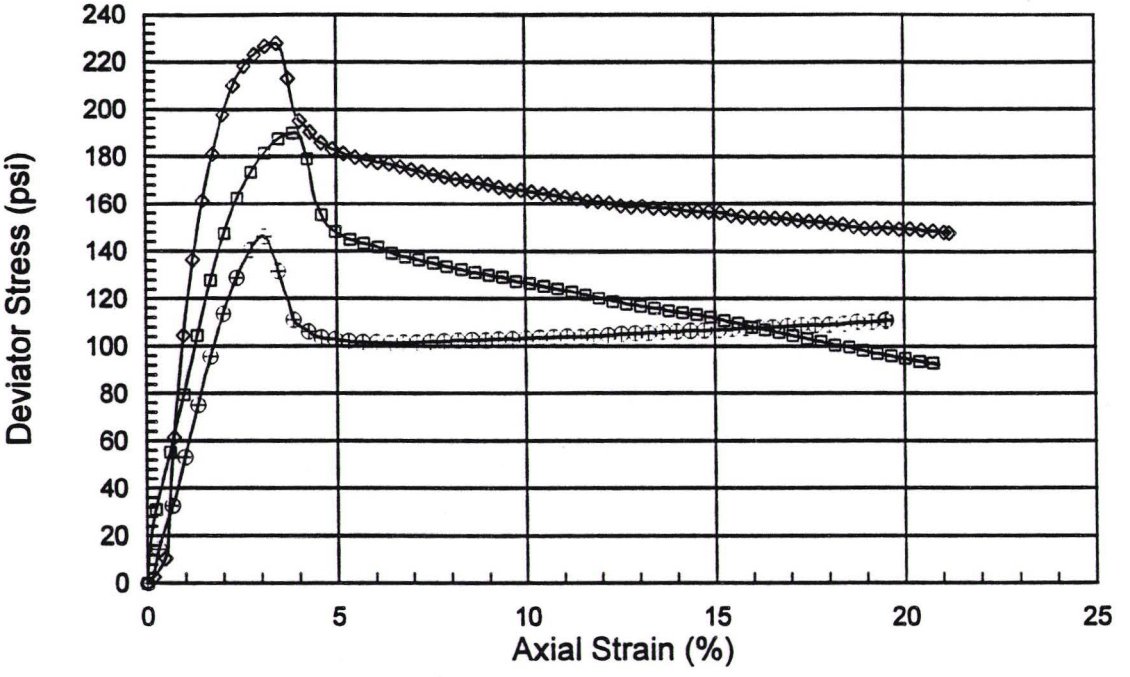
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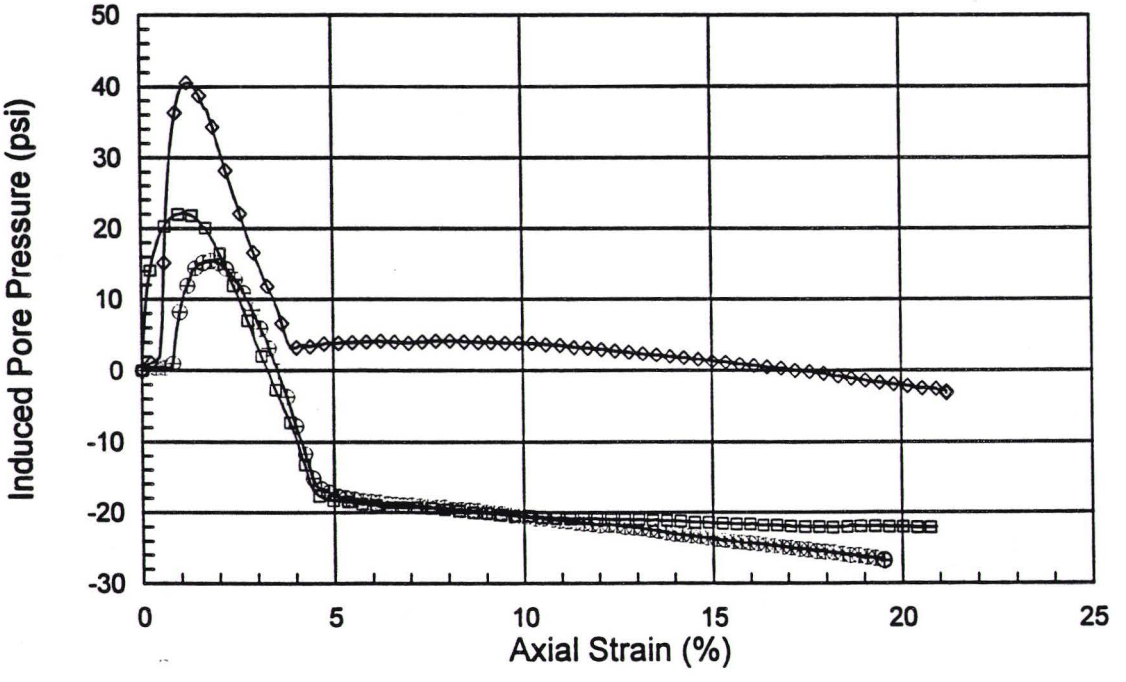
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Metro Redline

DIRECT SHEAR
TEST RESULTS
(ASTM D3080)

08-95

Figure B-97





	Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
⊕	DD-4	T-24	87.5	20.0	146.5
□	DD-4	T-24	87.5	40.0	190.1
◇	DD-4	T-24	87.5	80.0	227.8

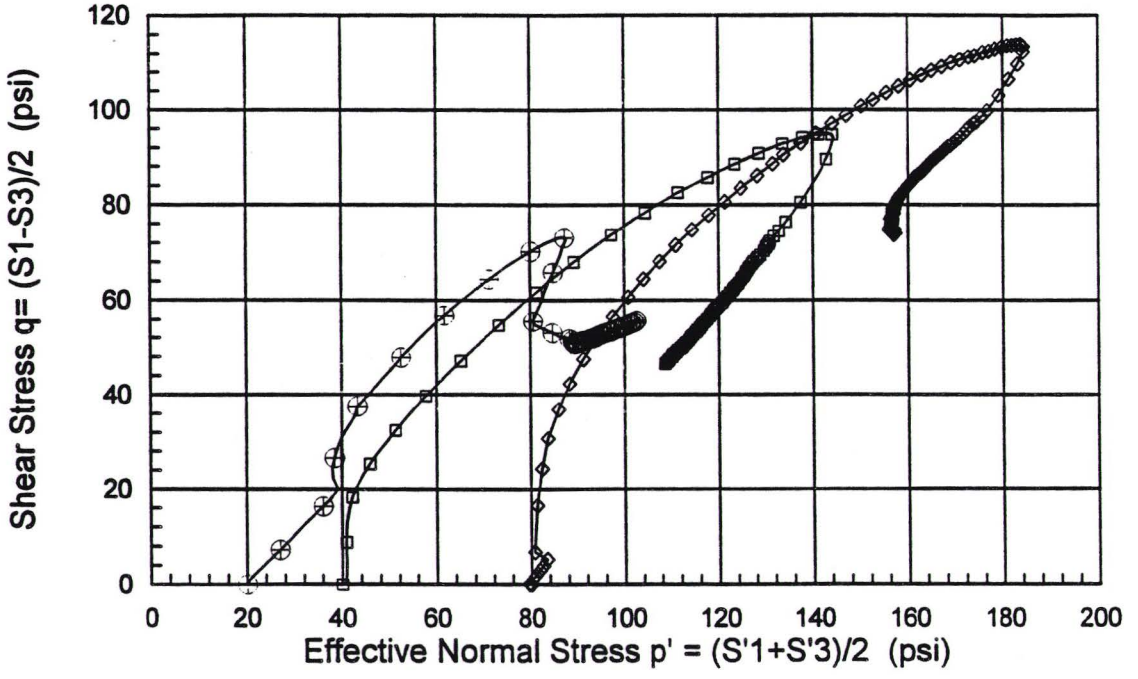
GeoTransit Consultants

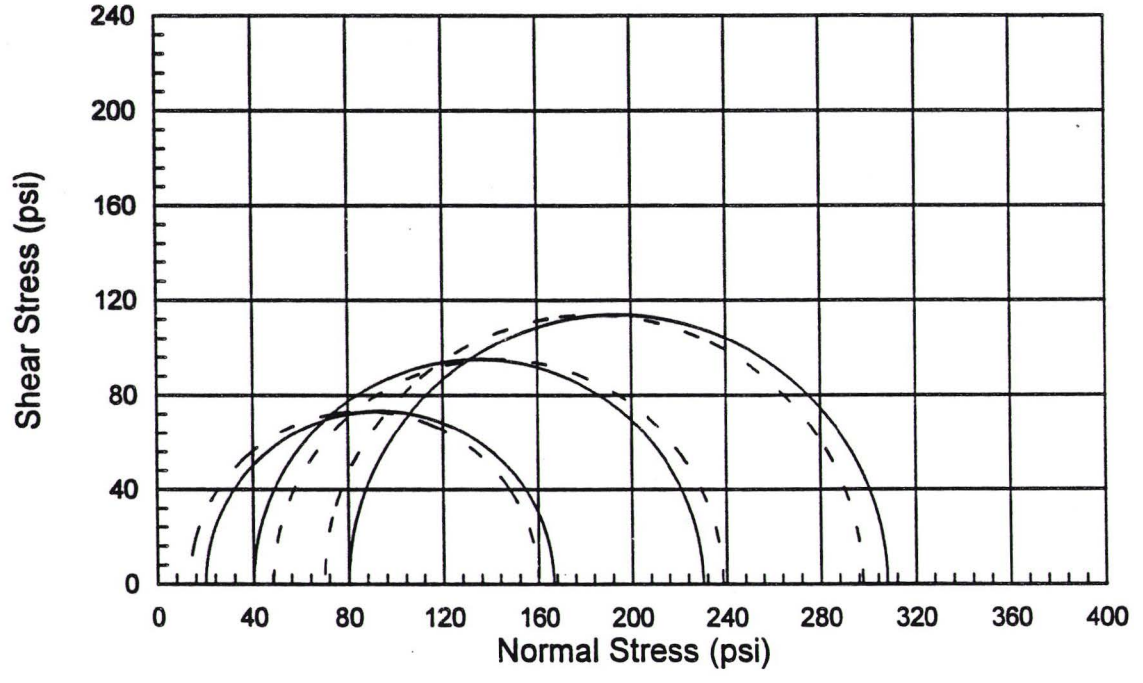
Project No.: 95-8347-03
Eastside Extension
Metro Redline

Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-98a





Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
⊕ DD-4	T-24	87.5	20.0	146.5
□ DD-4	T-24	87.5	40.0	190.1
◇ DD-4	T-24	87.5	80.0	227.8

——— Mohr Circle based on Total Stress
– – – – Mohr Circle based on Effective Stress

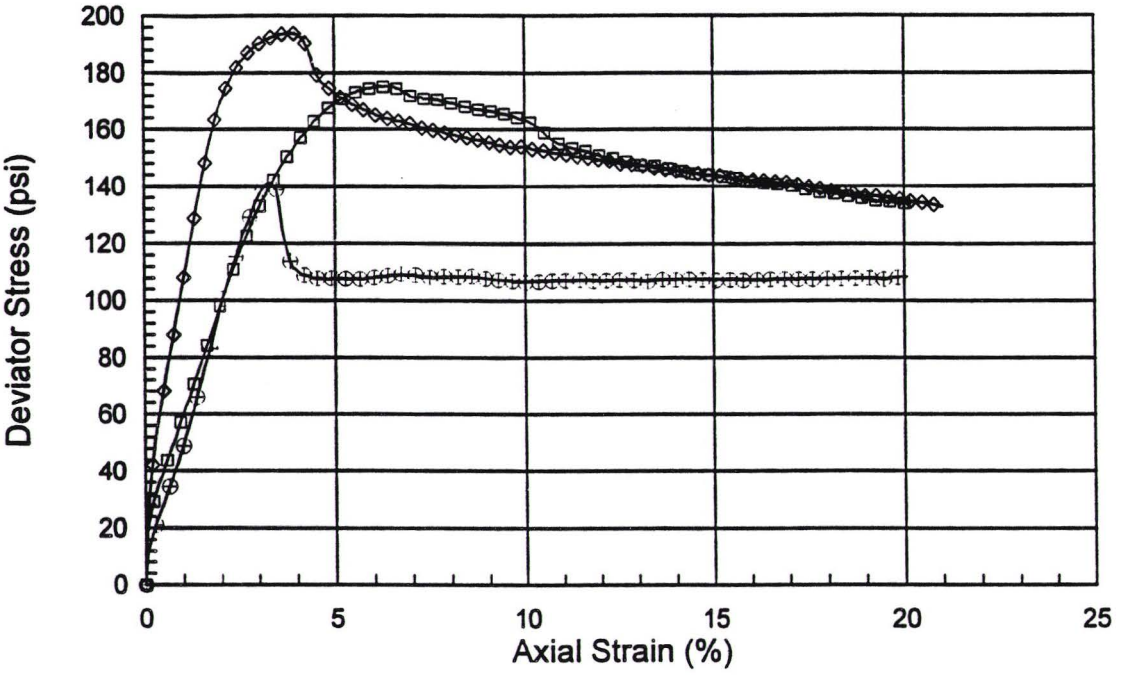
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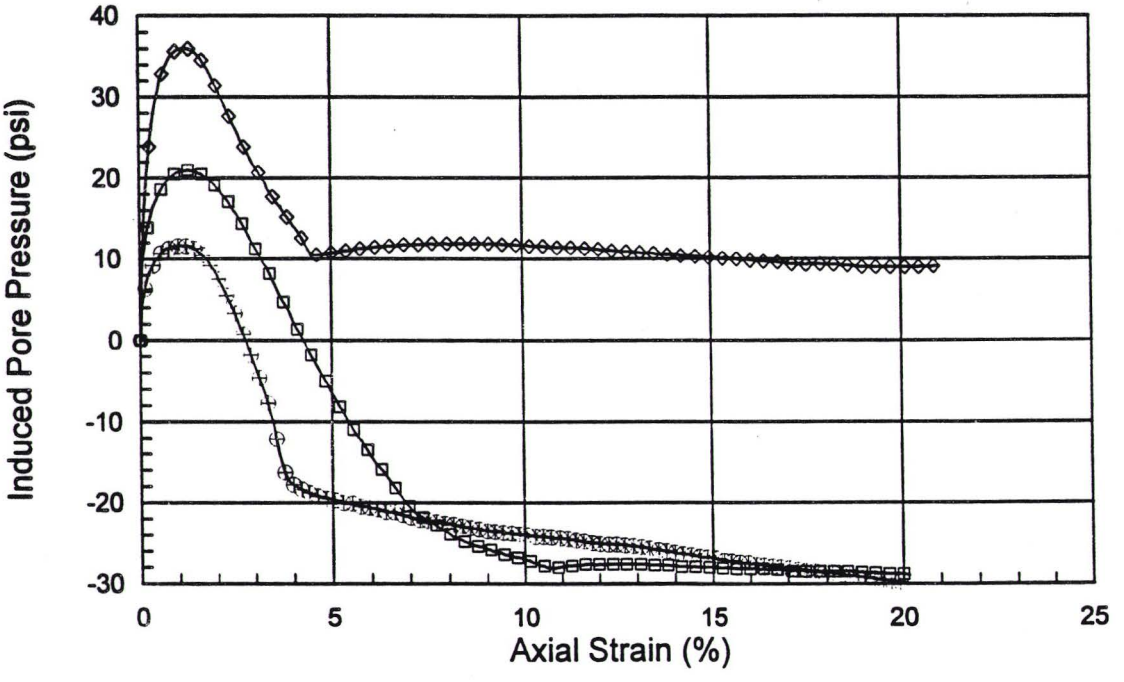
Project No.: 95-8347-03
Eastside Extension
Metro Redline

Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-98b





	Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
⊕	DD-7	T-20	81.0	20.0	141.3
□	DD-7	T-20	81.0	40.0	175.7
◇	DD-7	T-19	78.0	80.0	194.1

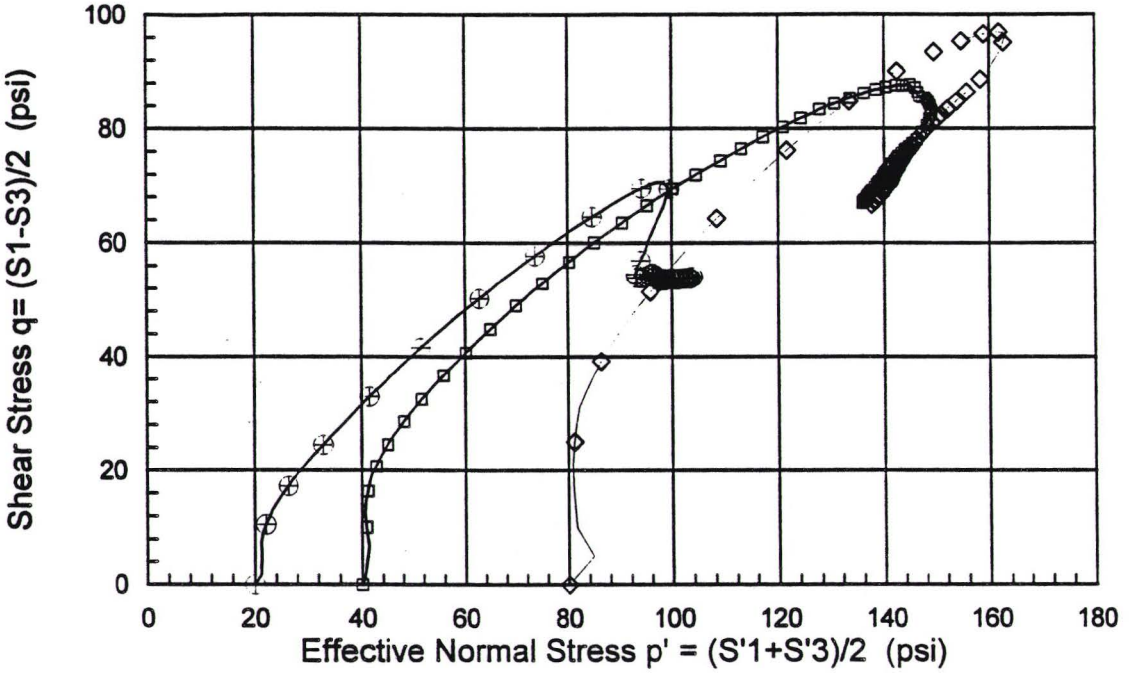
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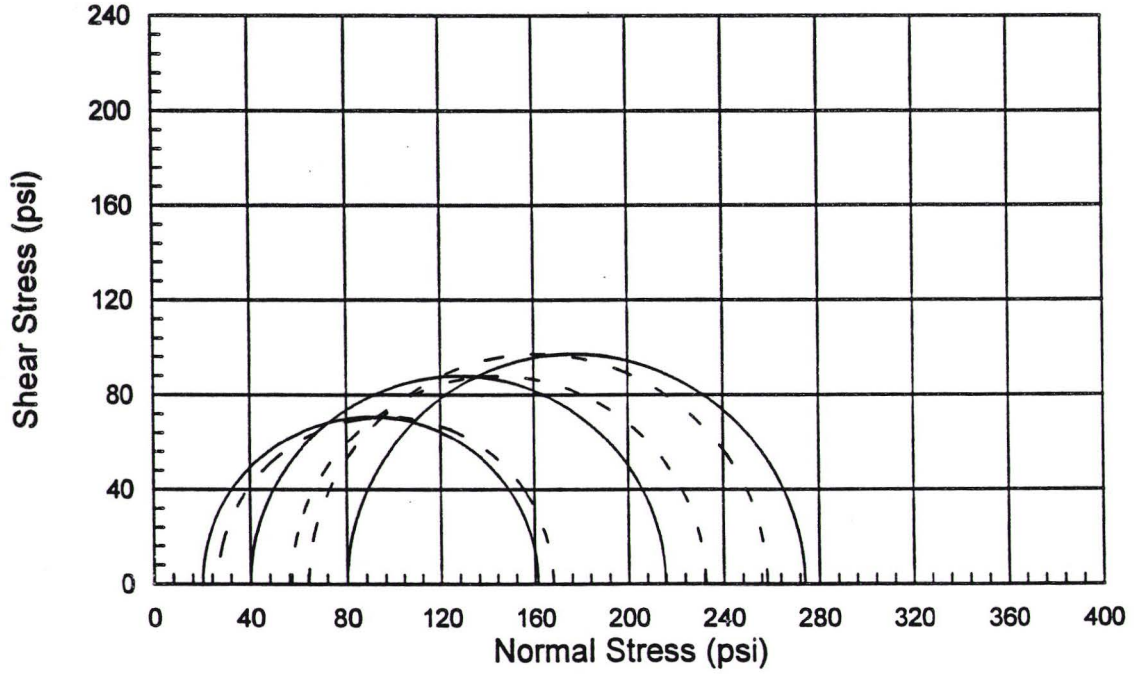
Project No.: 95-8347-03
Eastside Extension
Metro Redline

Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-99a





Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
+ DD-7	T-20	81.0	20.0	141.3
□ DD-7	T-20	81.0	40.0	175.7
◇ DD-7	T-19	78.0	80.0	194.1

——— Mohr Circle based on Total Stress
– – – – Mohr Circle based on Effective Stress

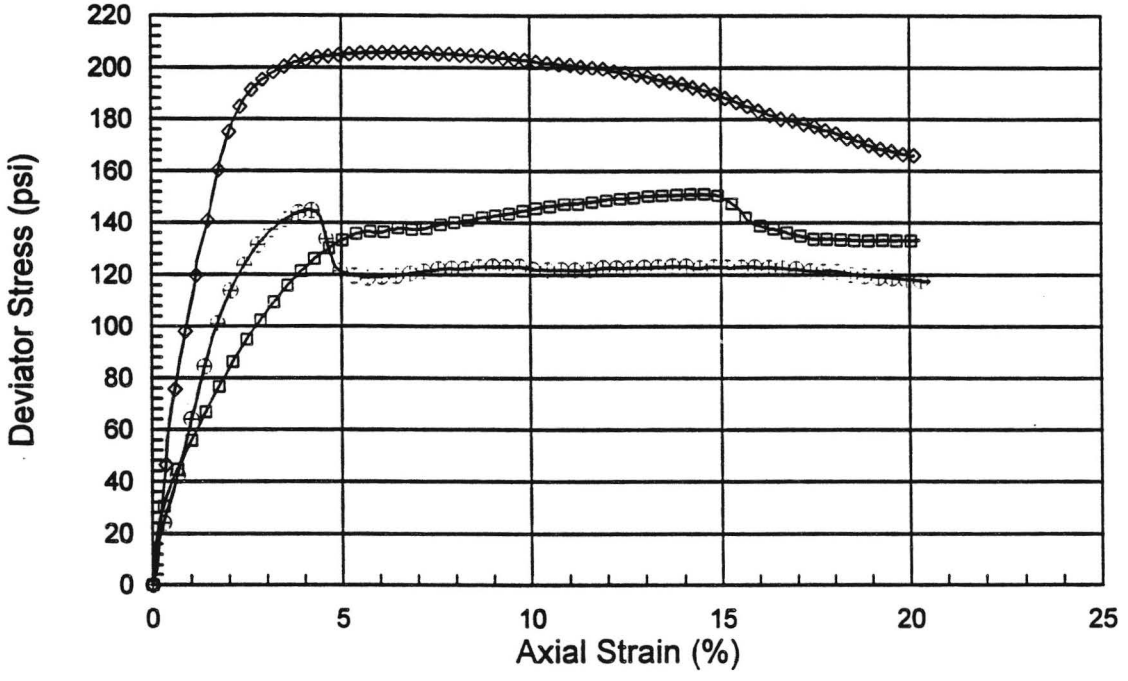
GeoTransit Consultants

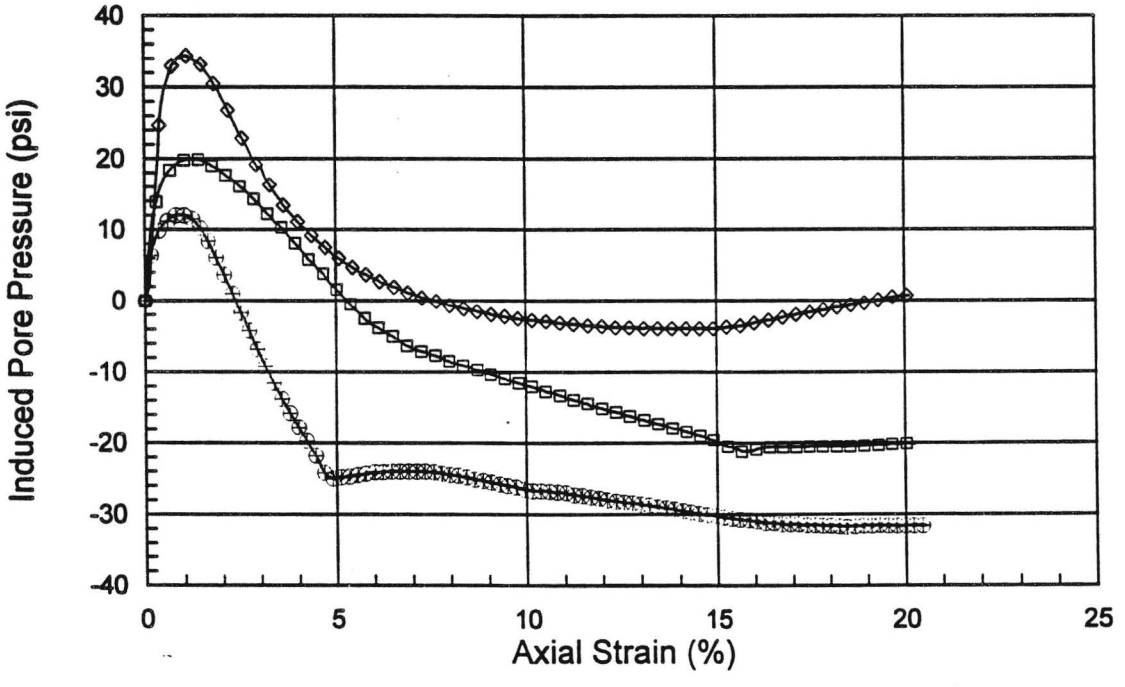
Project No.: 95-8347-03
Eastside Extension
Metro Redline

Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-99b





	Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
⊕	DD-9	T-19	72.0	20.0	145.1
□	DD-9	T-19	72.0	40.0	151.4
◇	DD-9	T-19	72.0	80.0	206.1

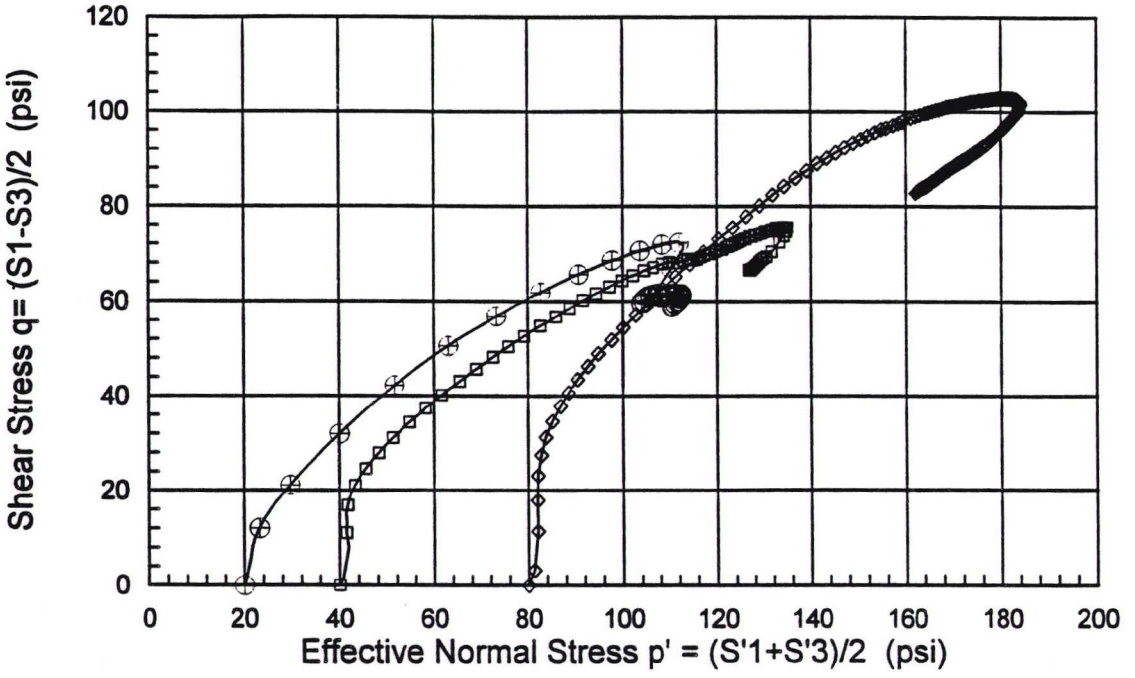
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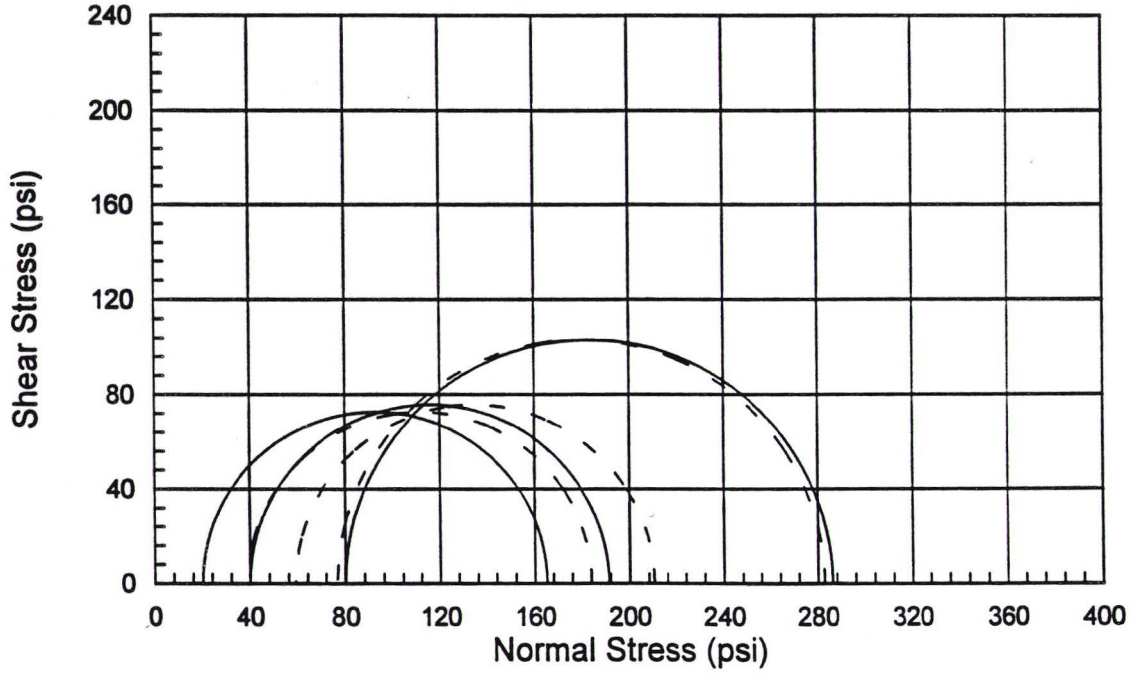
Project No.: 95-8347-03
Eastside Extension
Metro Redline

Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-100a





Boring No.	Sample No.	Depth (ft.)	Eff. Conf. Pressure (psi)	Max. Dev. Stress (psi)
+ DD-9	T-19	72.0	20.0	145.1
□ DD-9	T-19	72.0	40.0	151.4
◇ DD-9	T-19	72.0	80.0	206.1

——— Mohr Circle based on Total Stress
– – – – Mohr Circle based on Effective Stress

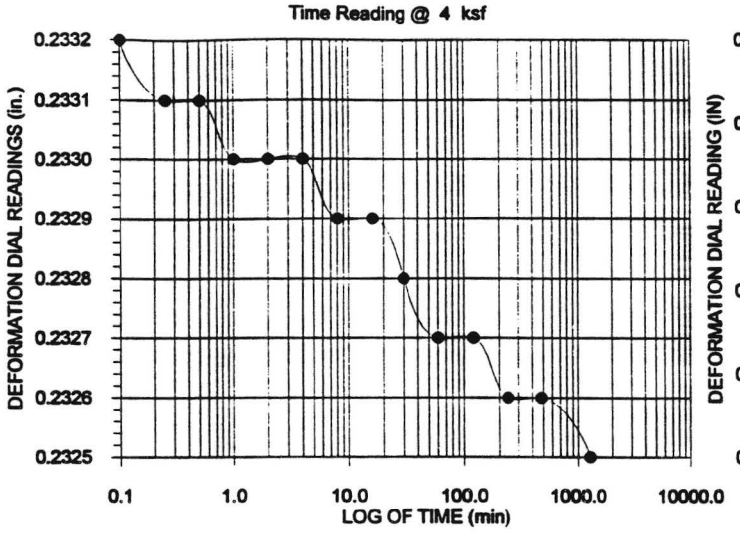
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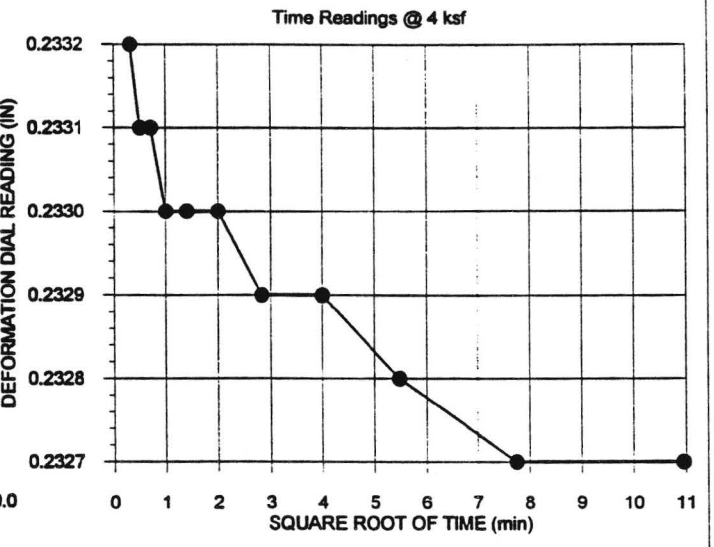
Project No.: 95-8347-03
Eastside Extension
Metro Redline

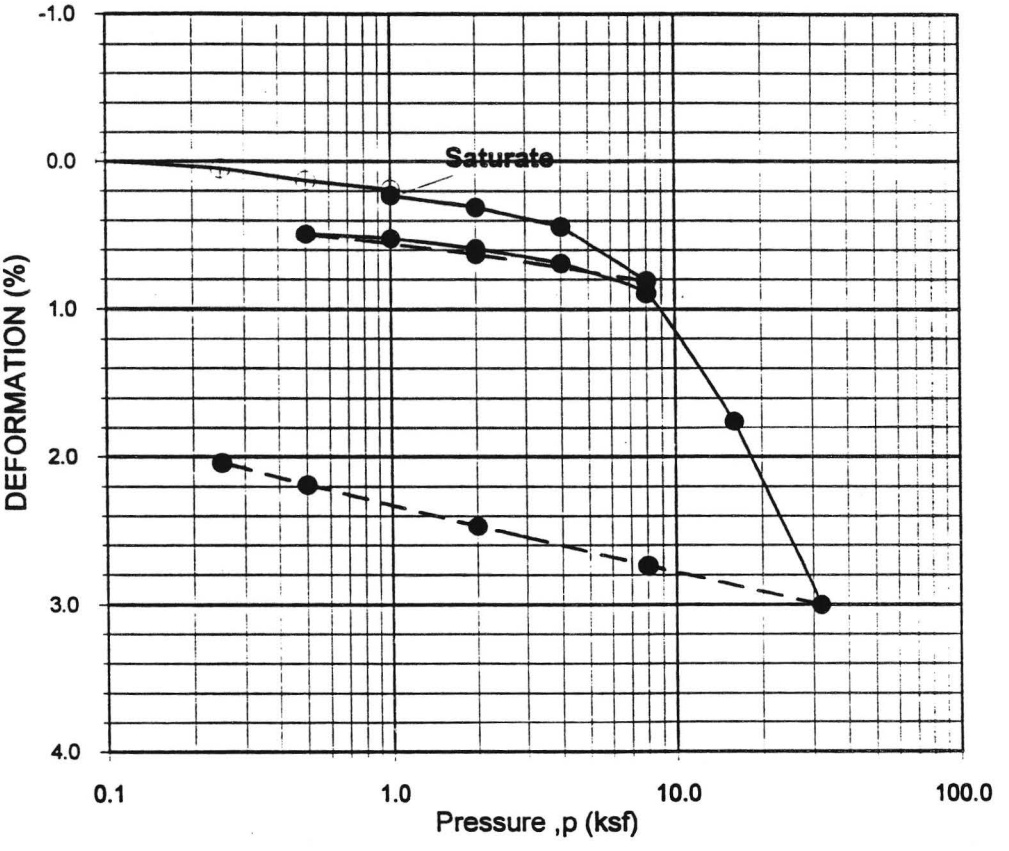
Consolidated-Undrained
Triaxial Compression Test
[ASTM D 4767/EM 1110-2-1906(X)]

08-95

Figure B-100b







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-4	D-15	70.0	16.8 / 15.1	108.6 / 112.5	0.553 / 0.521	82 / 81

SOIL DESCRIPTION: Olive Yellow Poorly Graded Sand with Silt (SP-SM)

GeoTransit Consultants

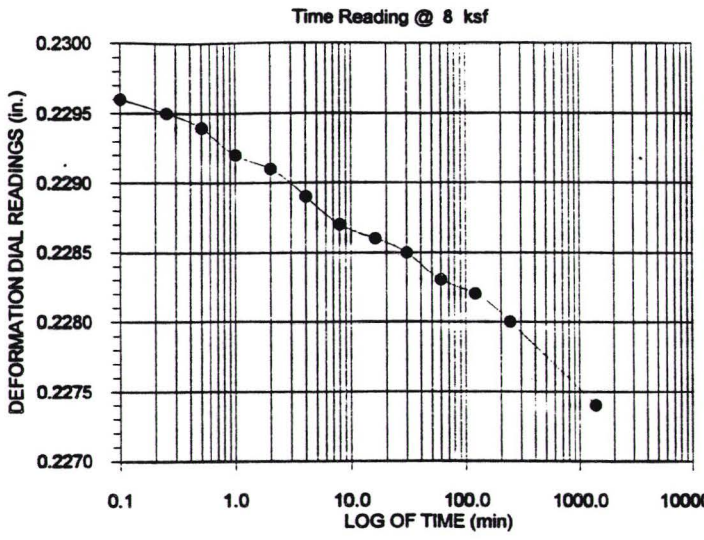
Project No. 95-8347-03
Eastside Extension
Metro Redline

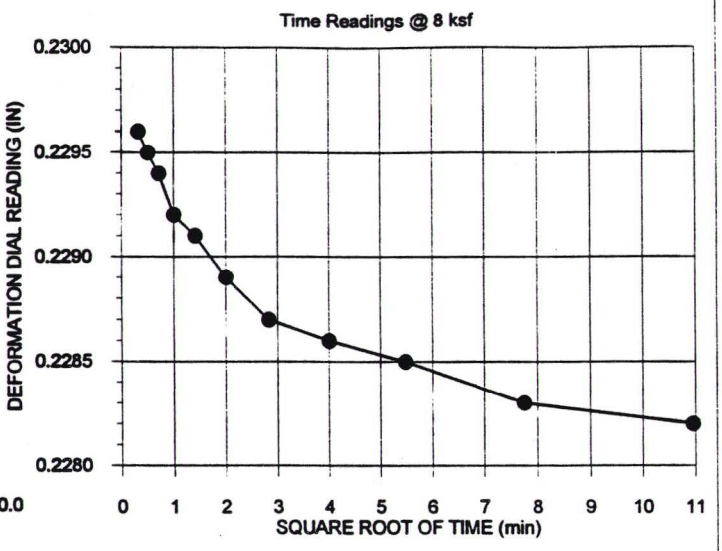
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

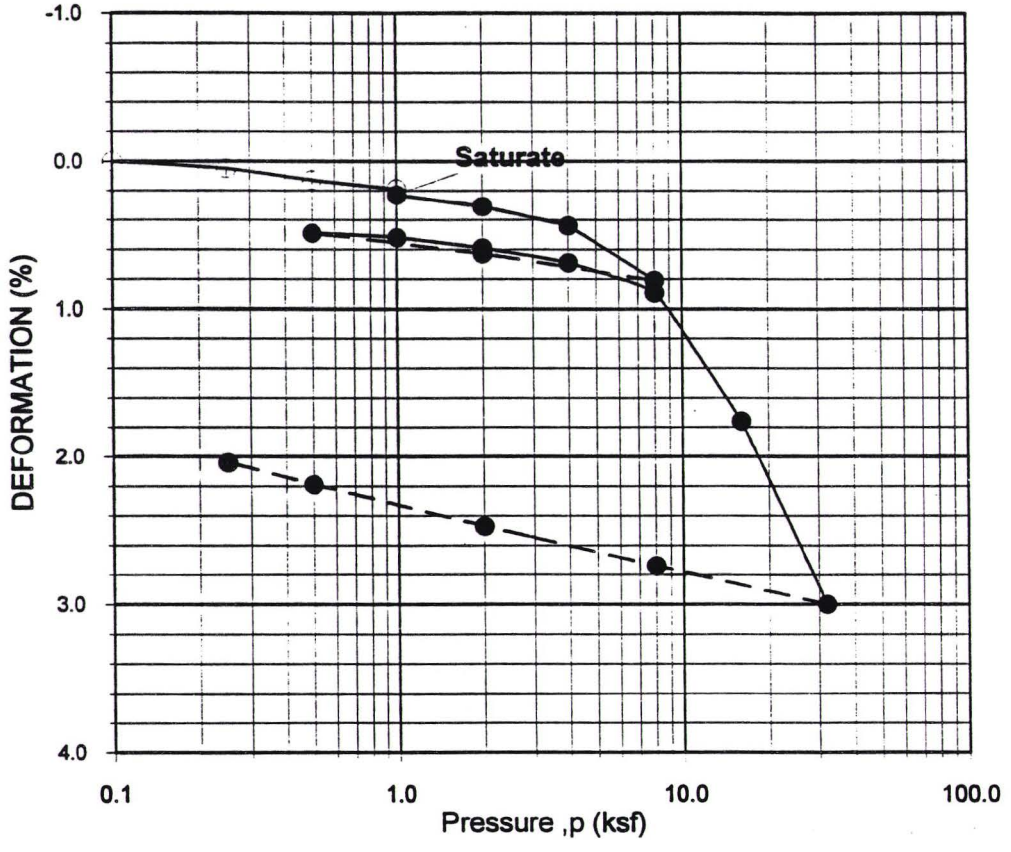
(ASTM D 2435)

08-95

Figure B-101a







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-4	D-15	70.0	16.8 / 15.1	108.6 / 112.5	0.553 / 0.521	82 / 81

SOIL DESCRIPTION: Olive Yellow Poorly Graded Sand with Silt (SP-SM)

GeoTransit Consultants

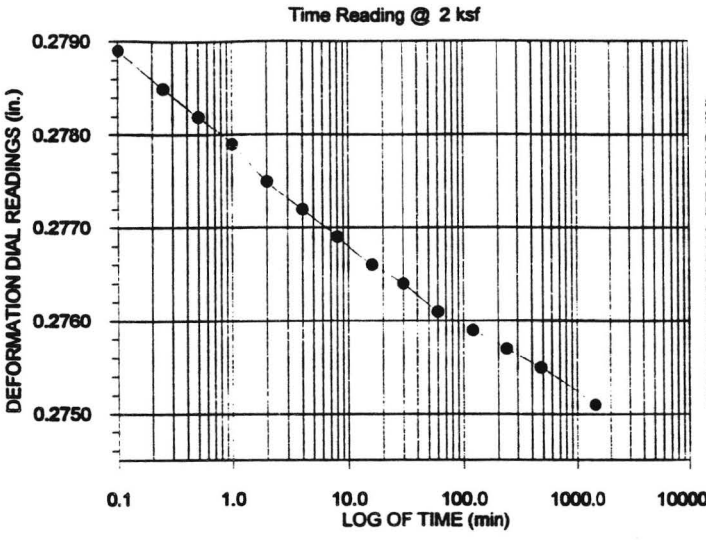
Project No. 95-8347-03
Eastside Extension
Metro Redline

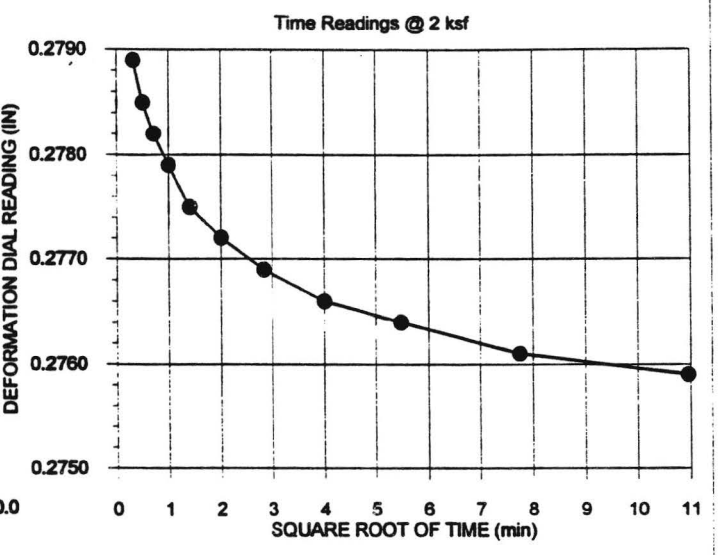
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

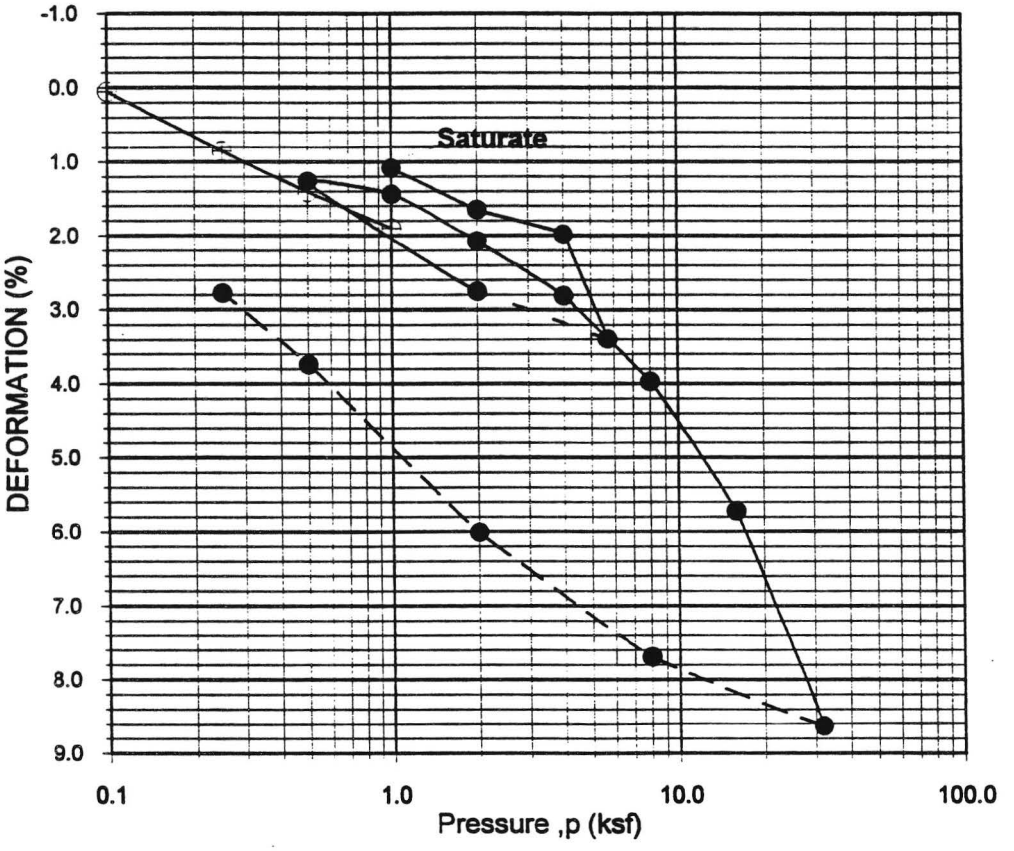
(ASTM D 2435)

08-95

Figure B-101b







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
DD-4	T-20	75.5	23.3 / 24.5	99.5 / 102.3	0.694 / 0.647	91 / 100

SOIL DESCRIPTION: Olive Silt (ML)

GeoTransit Consultants

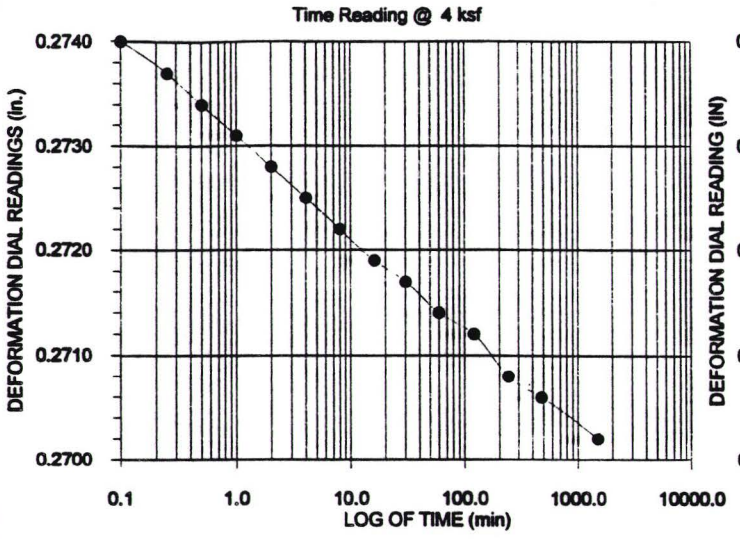
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Eastside Extension
Metro Redline

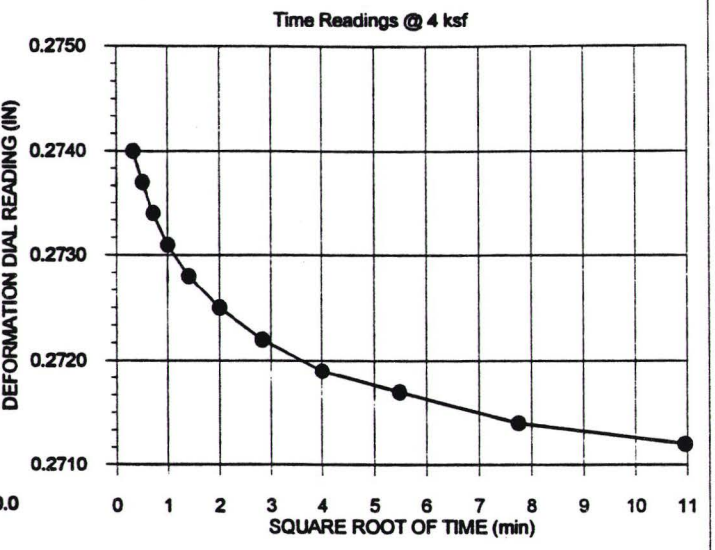
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

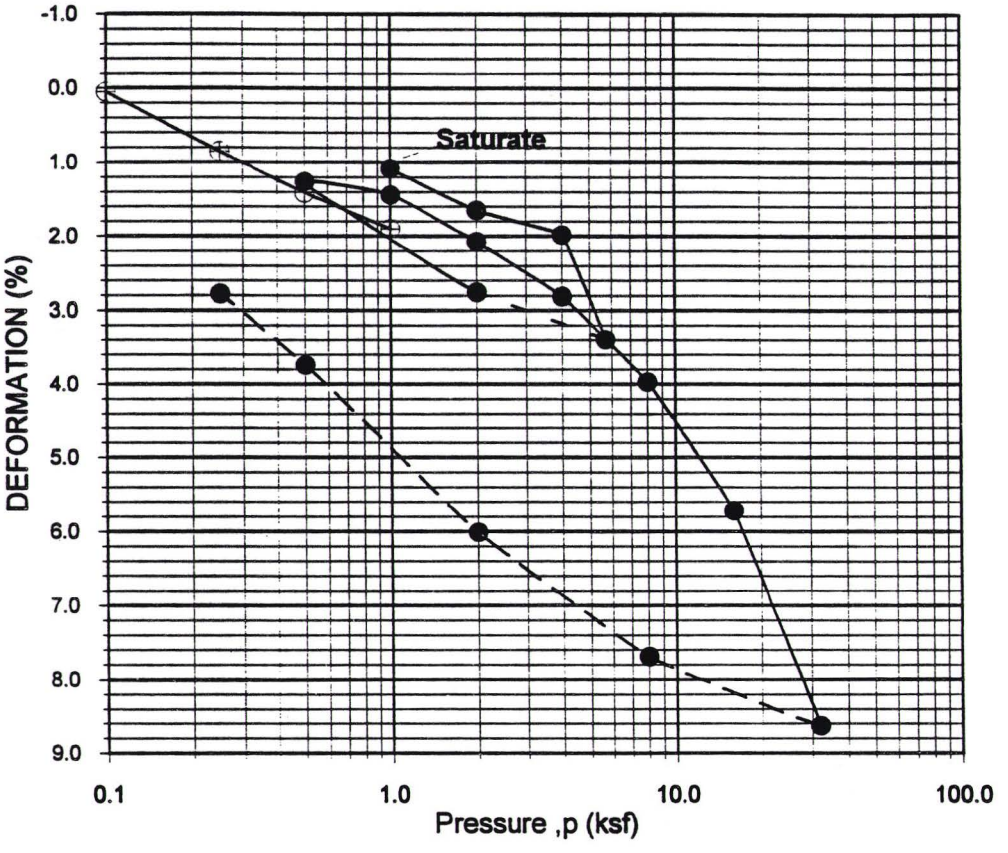
(ASTM D 2435)

08-95

Figure B-102a







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
DD-4	T-20	75.5	23.3 / 24.5	99.5 / 102.3	0.694 / 0.647	91 / 100

SOIL DESCRIPTION: Olive Silt (ML)

GeoTransit Consultants

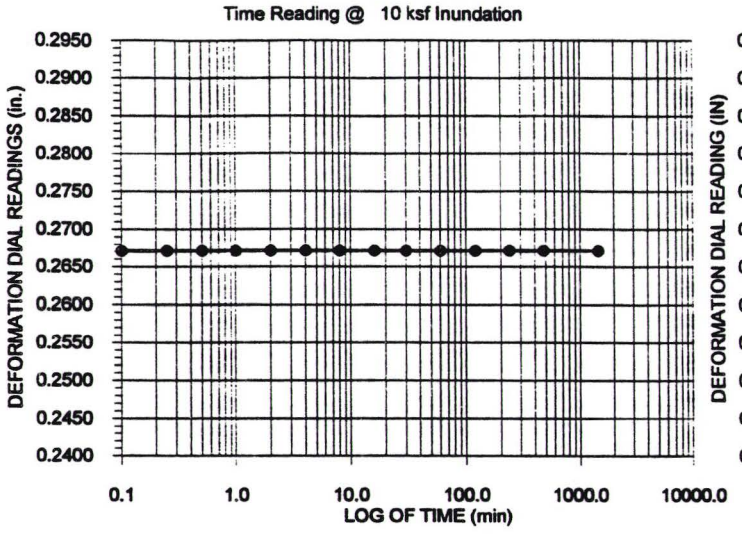
Project No. 95-8347-03
Eastside Extension
Metro Redline

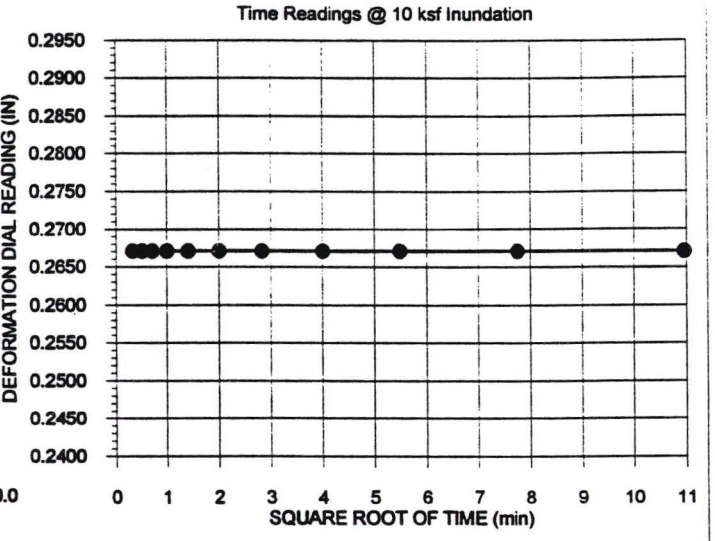
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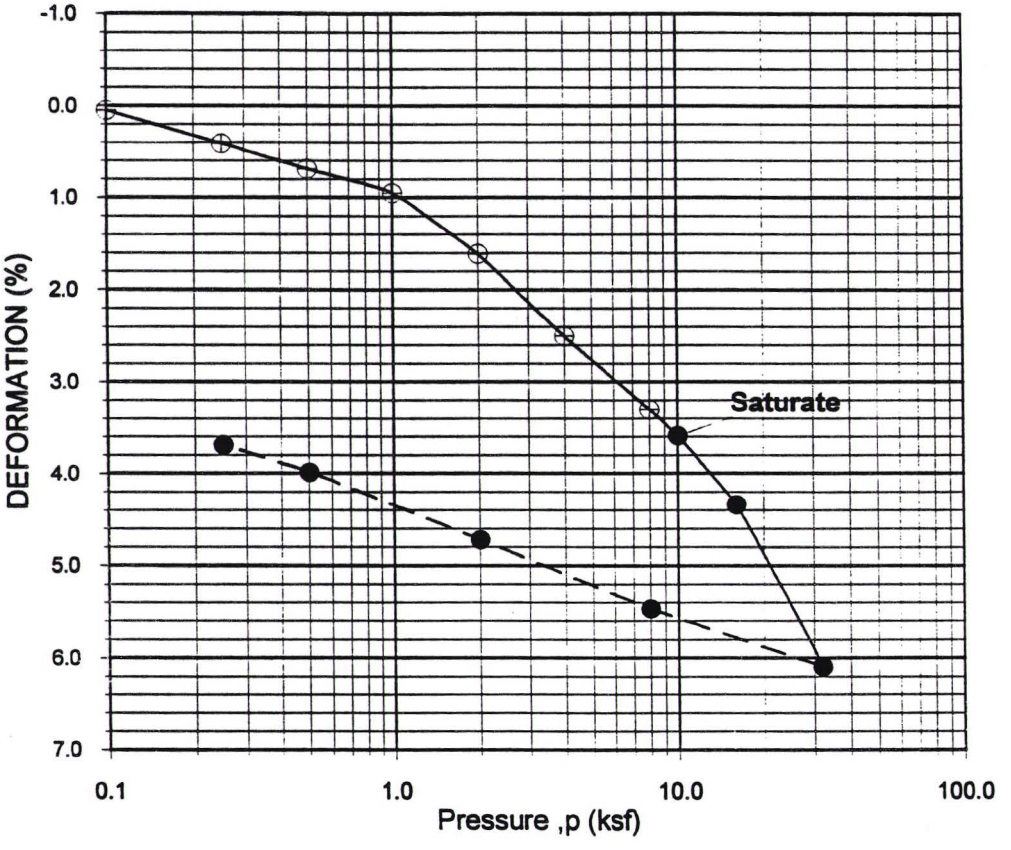
(ASTM D 2435)

08-95

Figure B-102b







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
DD-4	T-20	78.5	28.2 / 33.1	89.4 / 90.5	0.885 / 0.815	86 / 100

SOIL DESCRIPTION: Olive Silt (ML)

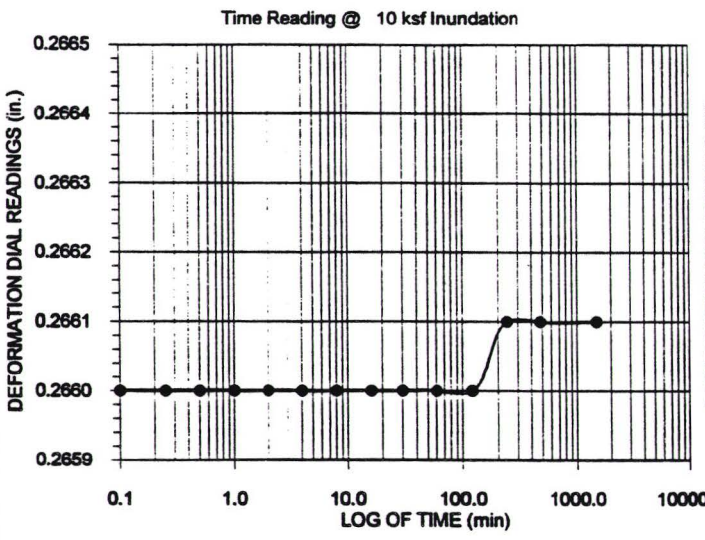
GeoTransit Consultants

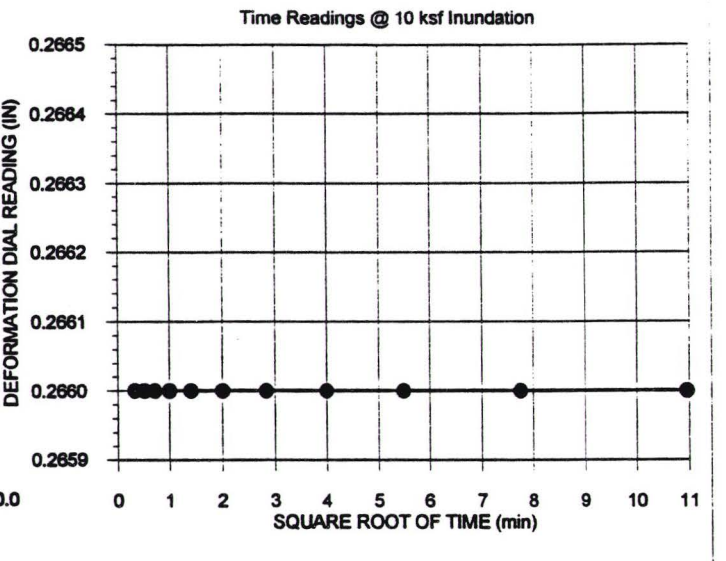
Project No. 95-8347-03
Eastside Extension
Metro Redline

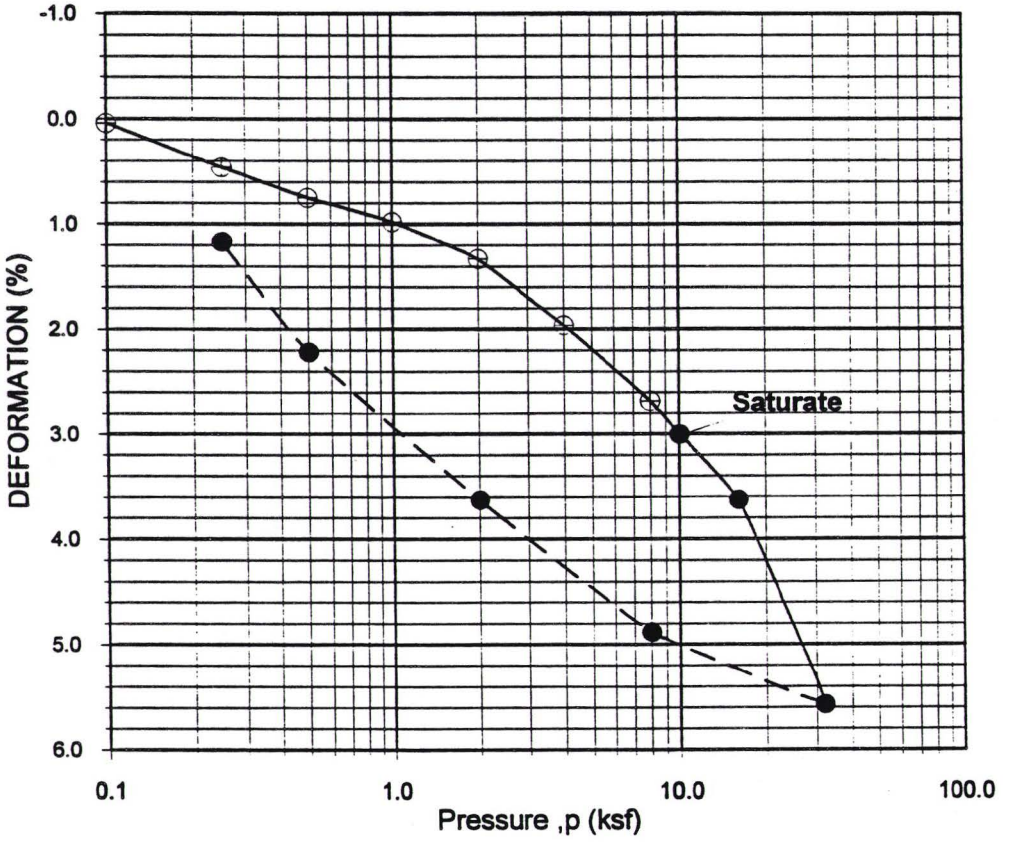
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS
(ASTM D 2435)

10-95

Figure B-103







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
DD-7	T-18	75.0	25.4 / 26.9	98.8 / 100.1	0.705 / 0.685	97 / 100

SOIL DESCRIPTION: Olive Fat Clay (CH)

GeoTransit Consultants

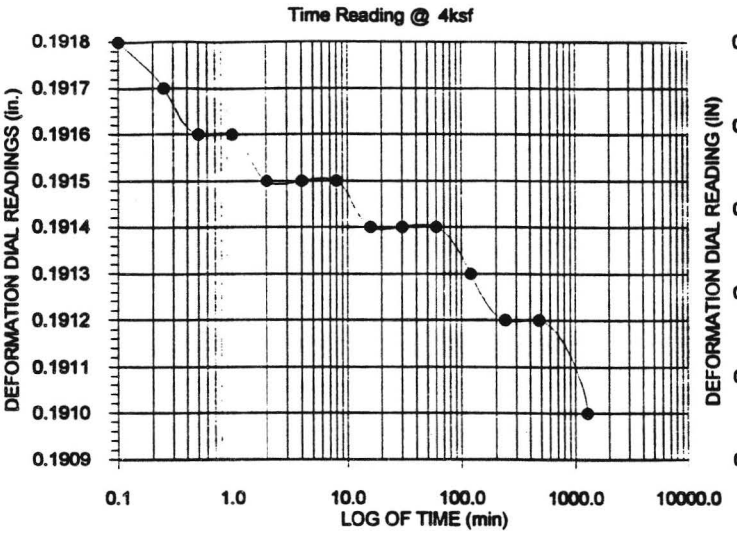
Project No. 95-8347-03
Eastside Extension
Metro Redline

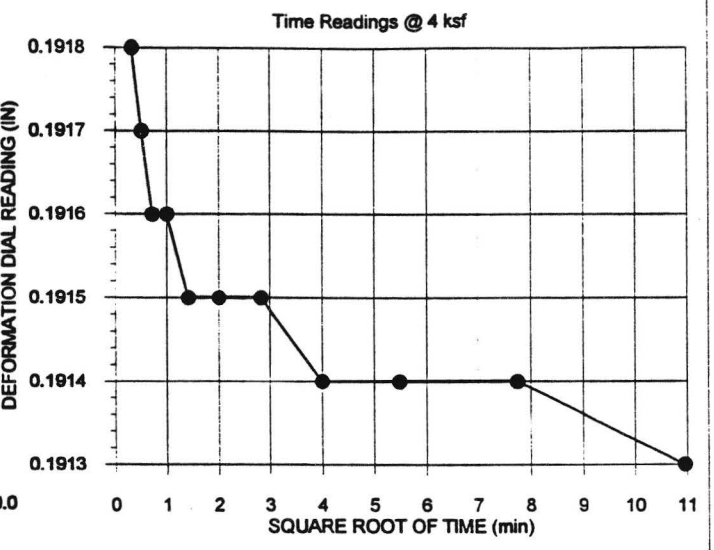
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

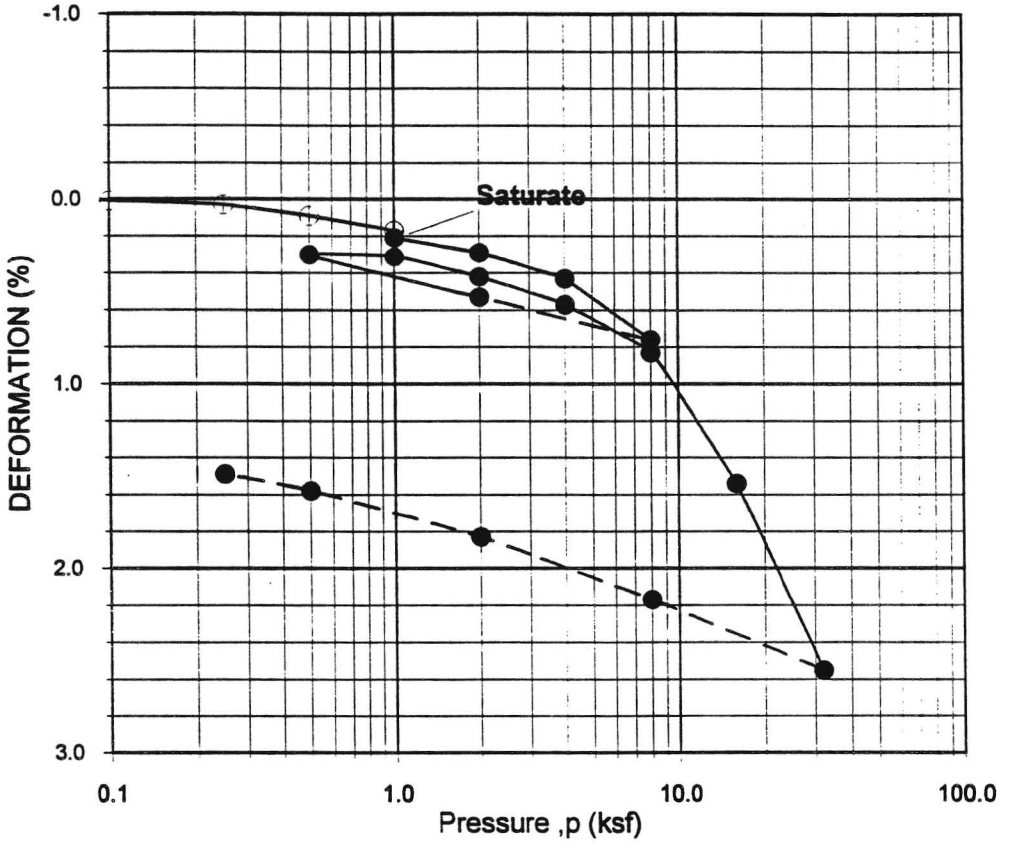
(ASTM D 2435)

10-95

Figure B-104







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-3	D-9	65.0	18.8 / 21.0	96.6 / 100.6	0.746 / 0.720	68 / 83

SOIL DESCRIPTION: Yellowish Brown Poorly Graded Sand with Silt (SP-SM)

GeoTransit Consultants

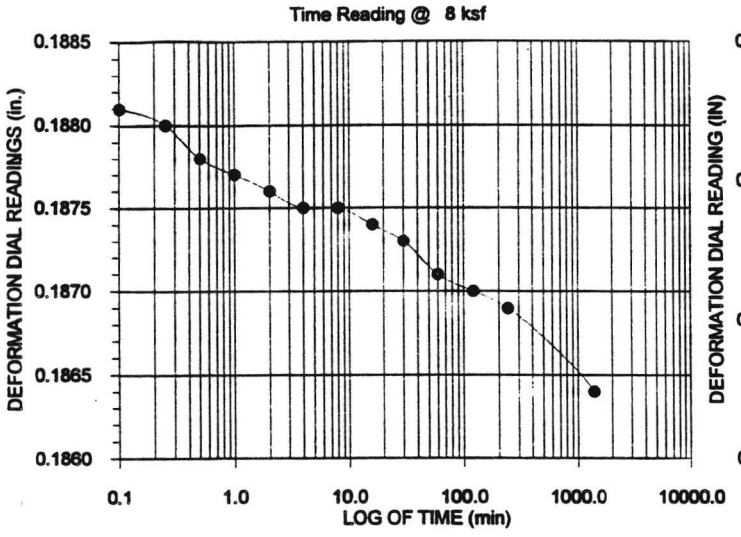
Project No. 95-8347-03
Eastside Extension
Metro Redline

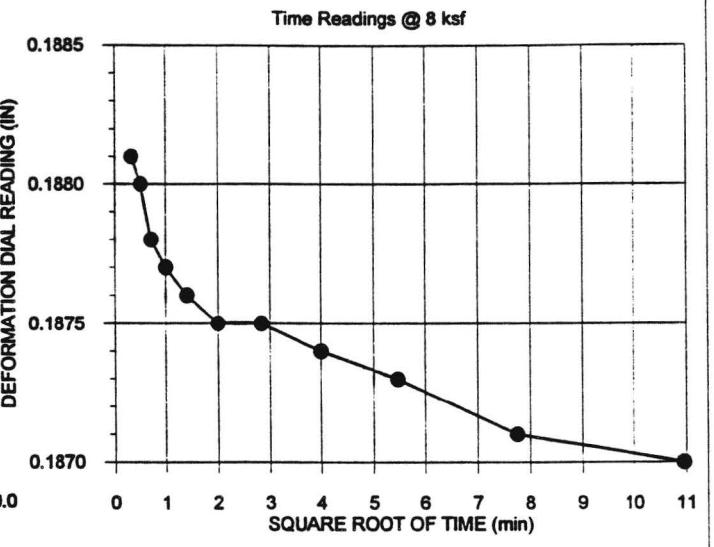
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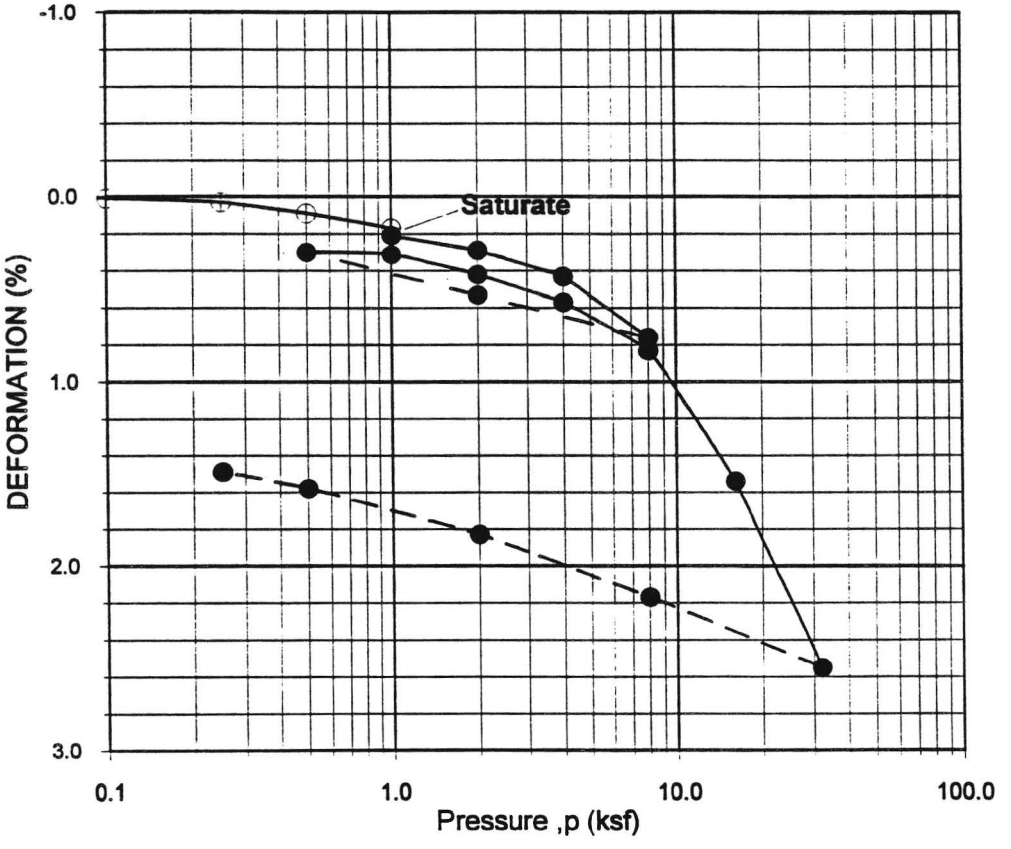
(ASTM D 2435)

08-95

Figure B-105a







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-3	D-9	65.0	18.8 / 21.0	96.6 / 100.6	0.746 / 0.720	68 / 83

SOIL DESCRIPTION: Yellowish Brown Poorly Graded Sand with Silt (SP-SM)

GeoTransit Consultants

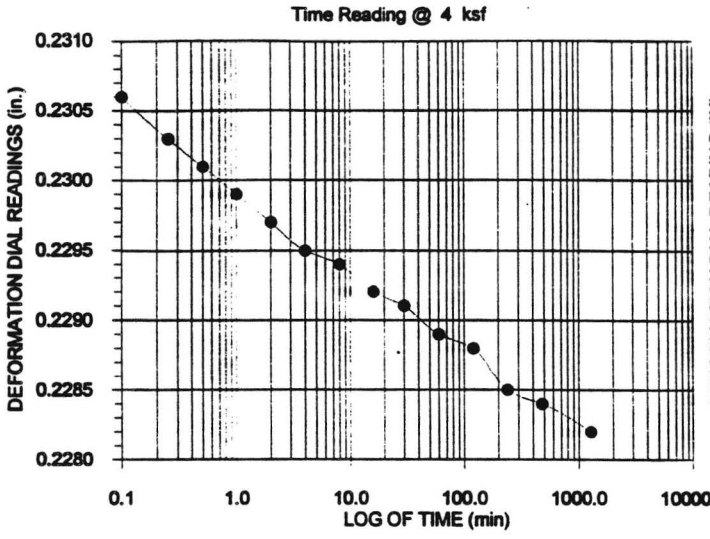
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Eastside Extension
Metro Redline

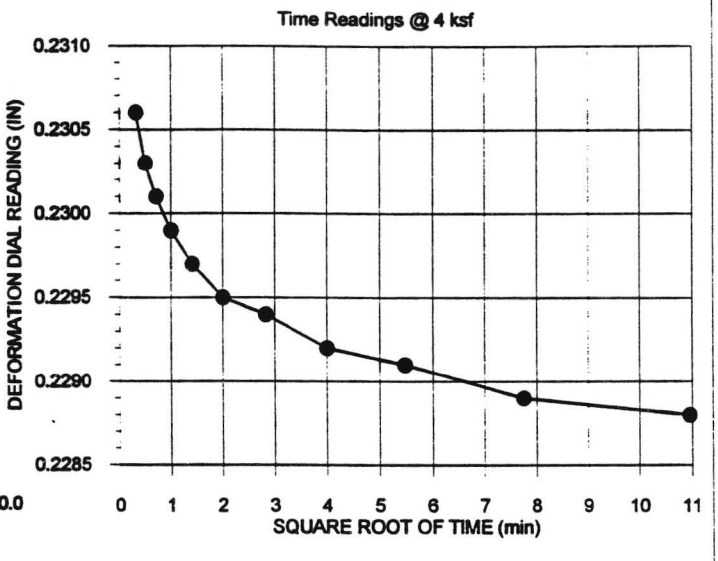
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

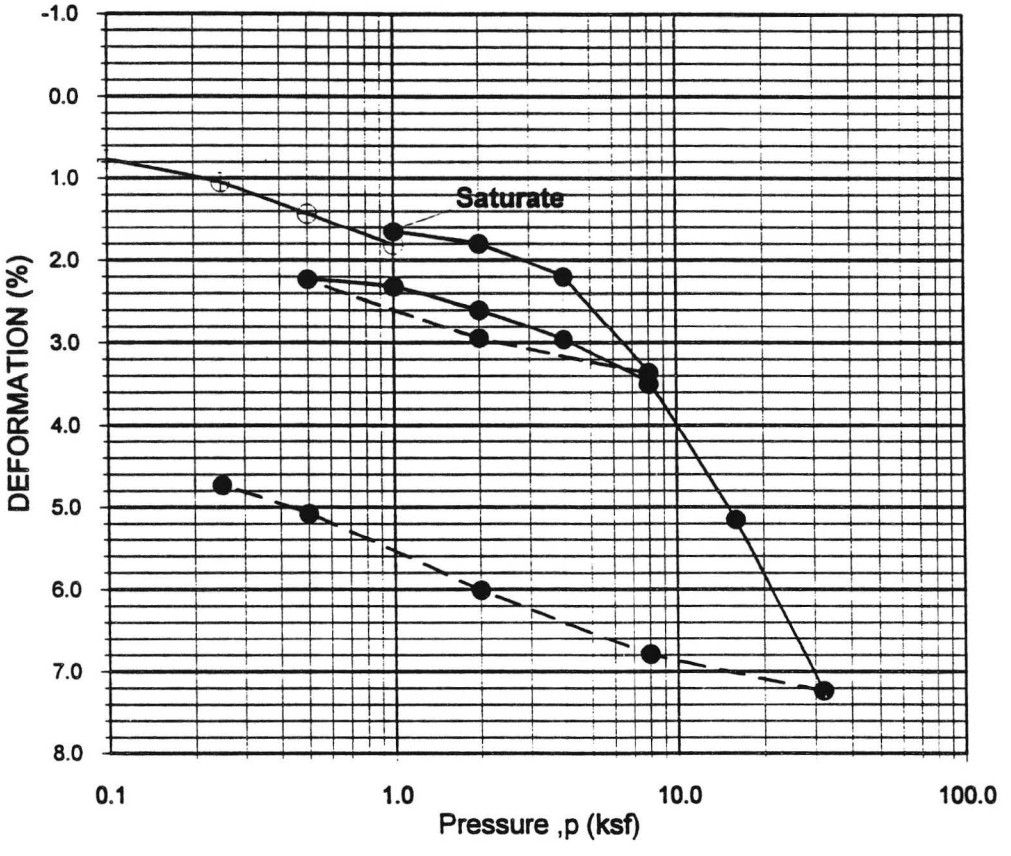
(ASTM D 2435)

08-95

Figure B-105b







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-3A	D-16	92.5	22.2 / 20.9	102.9 / 107.6	0.638 / 0.561	94 / 100

SOIL DESCRIPTION: Olive Silt (ML)

GeoTransit Consultants

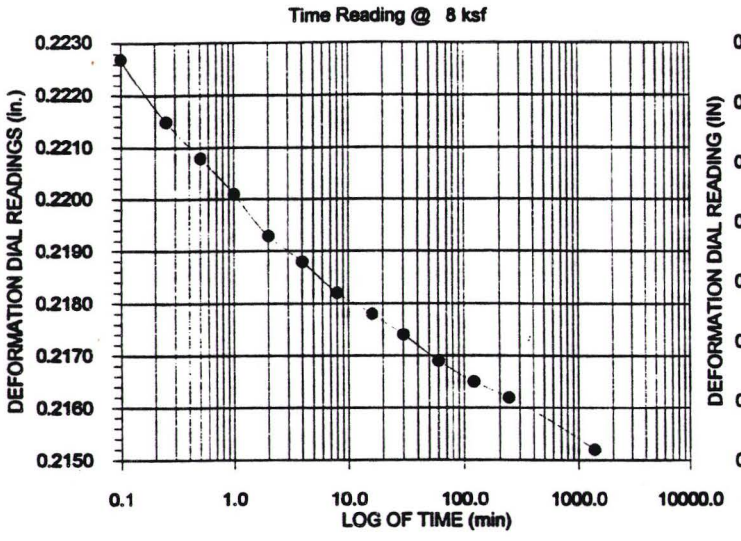
Project No. 95-8347-03
Eastside Extension
Metro Redline

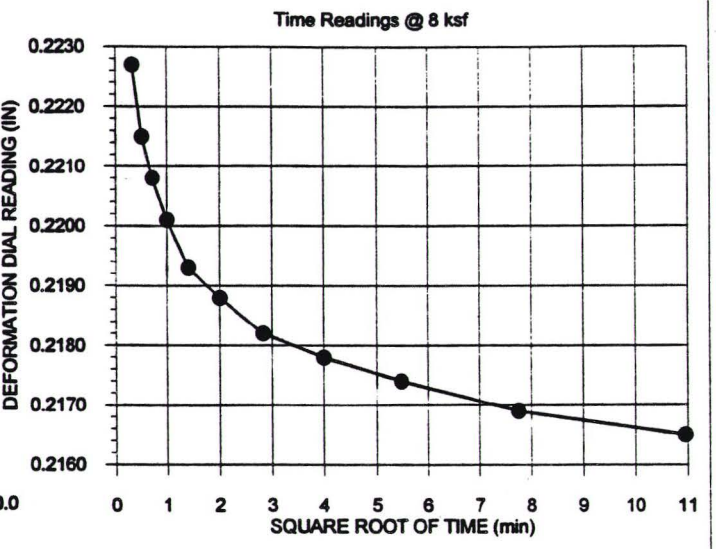
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

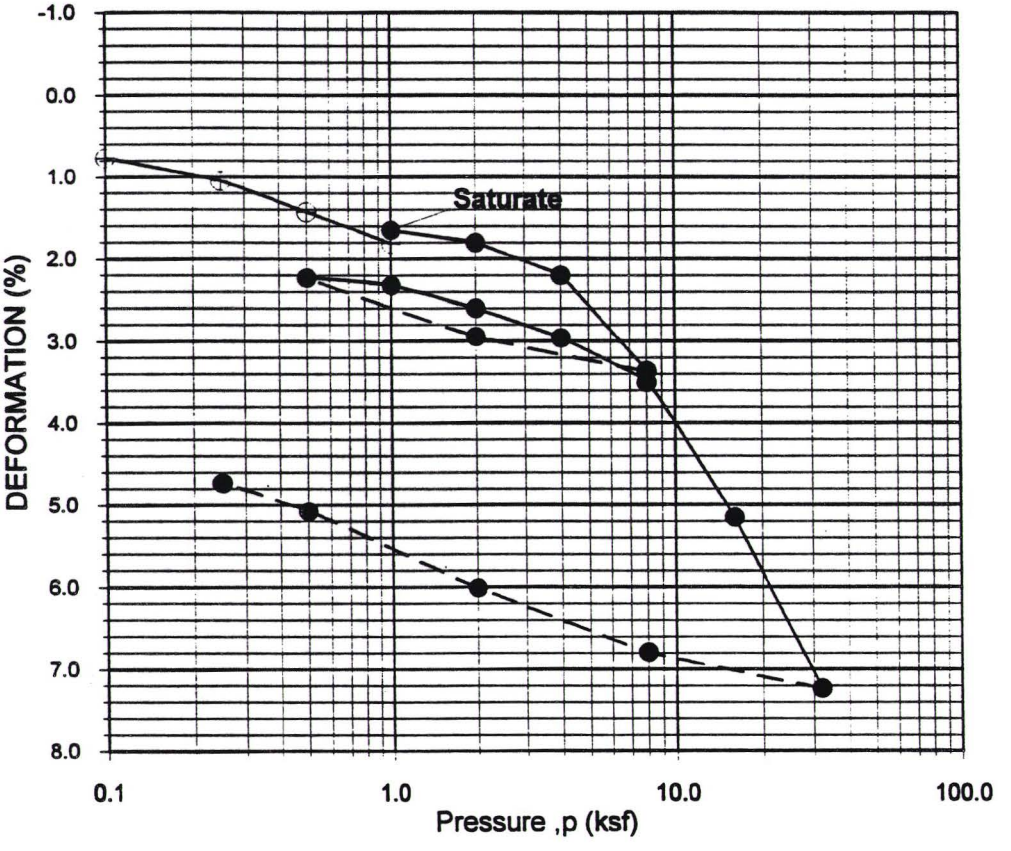
(ASTM D 2435)

08-95

Figure B-106a







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-3A	D-16	92.5	22.2 / 20.9	102.9 / 107.6	0.638 / 0.561	94 / 100

SOIL DESCRIPTION: Olive Silt (ML)

GeoTransit Consultants

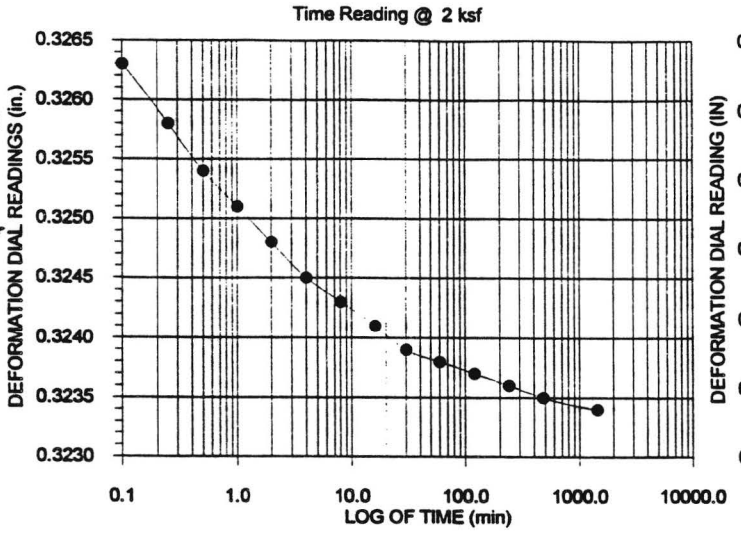
Project No. 95-8347-03
Eastside Extension
Metro Redline

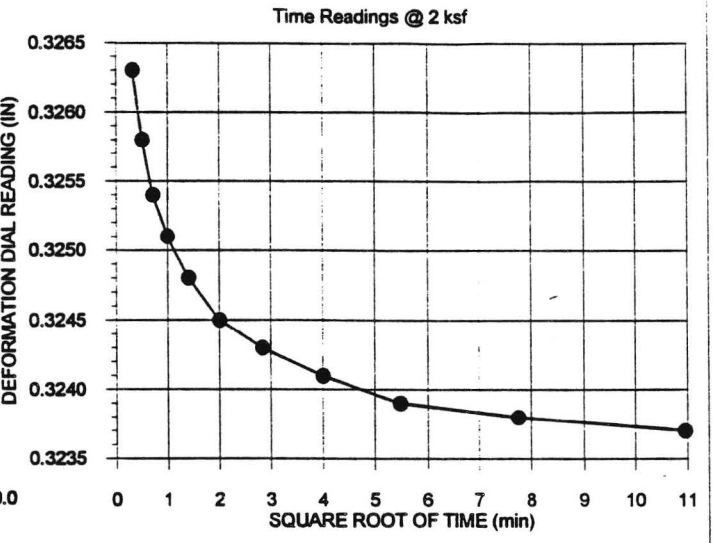
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

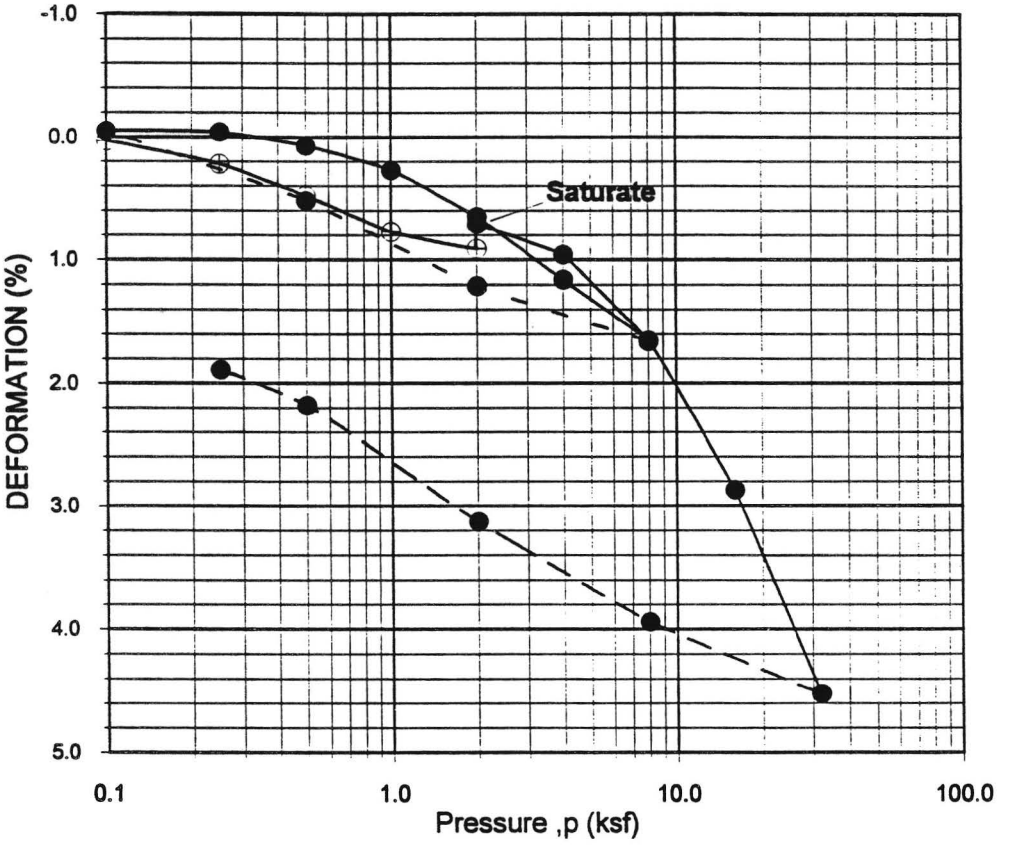
(ASTM D 2435)

08-95

Figure B-106b







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-5	D-9	90.0	17.1 / 18.0	115.4 / 115.6	0.461 / 0.434	100 / 100

SOIL DESCRIPTION: Olive Silty Clay- Clayey Silt (CL-ML)

EARTH TECH

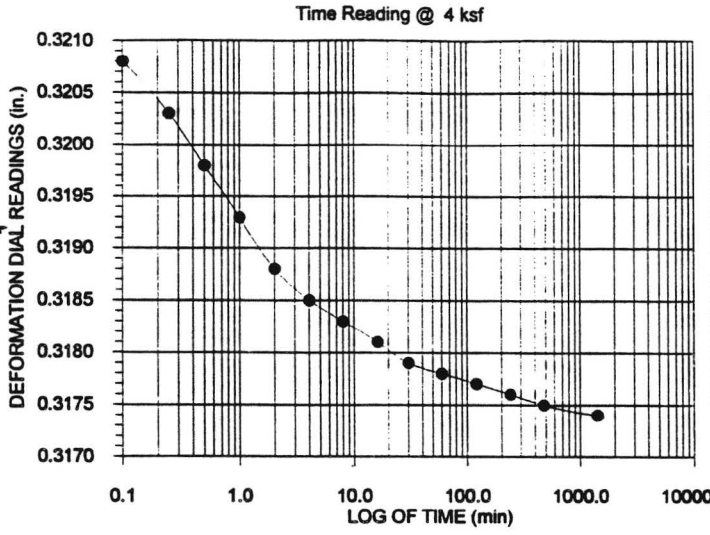
Project No. 95-8347-03
Eastside Extension
Metro Redline

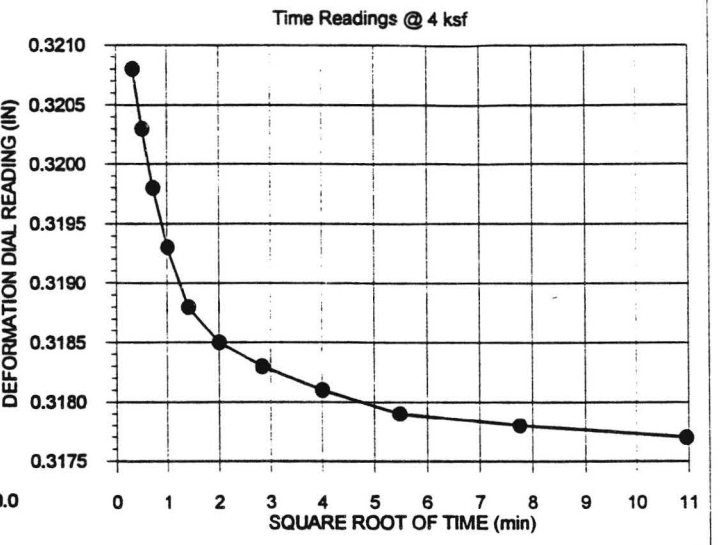
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

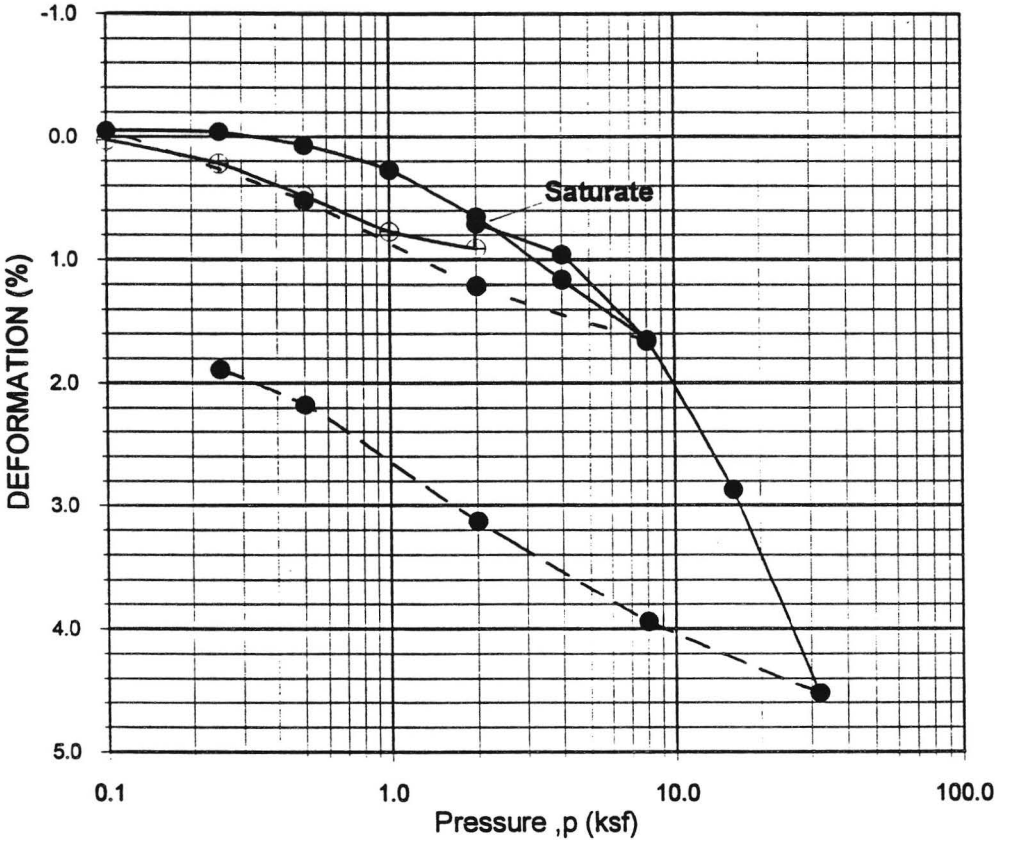
(ASTM D 2435)

10-95

Figure B-107a







BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT (%) Initial / Final	DRY DENSITY (pcf) Initial / Final	VOID RATIO Initial / Final	DEGREE OF SATURATION (%) Initial / Final
SD-5	D-9	90.0	17.1 / 18.0	115.4 / 115.6	0.461 / 0.434	100 / 100

SOIL DESCRIPTION: Olive Silty Clay- Clayey Silt (CL-ML)

EARTH TECH

Project No. 95-8347-03
Eastside Extension
Metro Redline

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS

(ASTM D 2435)

10-95

Figure B-107b

APPENDIX C

CHEMICAL LABORATORY TEST RESULTS

CHEMICAL LABORATORY TEST RESULTS

The laboratory test results pertaining to chemical analyses of groundwater samples collected from Monitoring Wells DD-1, DD-2 AND DD-3C and selected soil samples from Borings DD-S2, DD-4-1 and DD-65 are presented in this appendix. Groundwater samples and soil samples collected from the above Monitoring Wells and Borings were transported to CKY, Inc. of Torrance, California, for a limited characterization of potential chemical contamination. The chemical results on groundwater samples and soil samples are summarized in Table 3-6 and Table 3-7.

C K Y incorporated
Analytical Laboratories

Date: 09-13-1995
CKY Batch No.: 95H163

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Partial Laboratory Report
Project: Metro Redline Eastside Extension

Enclosed is the partial laboratory report for samples received on 08/31/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-1	H163-01	Water	EPA 625
DD-1	H163-02	Water	Oil & Grease
DD-1	H163-03	Water	EPA M8015
DD-1	H163-04	Water	Sulfide
DD-1	H163-05	Water	Sulfate Chloride
DD-1	H163-06	Water	TTLC Metals
DD-1	H163-08	Water	EPA 602
DD-1	H163-09	Water	EPA 624

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
SAMPLE ID:	DD-1	DATE ANALYZED:	09/07/95
CONTROL NO.:	H163-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	(ug/L) RESULT	RL	PARAMETERS	(ug/L) RESULT	RL
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	20	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	15	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	84	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	75	10
2,4-Dimethylphenol	ND	10	Anthracene	11	10
Benzoic Acid	ND	25	Carbazole	110	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
2,4-Dichlorophenol	ND	10	Fluoranthene	ND	10
1,2,4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
Naphthalene	2930*	10	Pyrene	ND	10
4-Chloroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	699*	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	140	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	170+	35-114
2-Fluorobiphenyl	86	43-116
Terphenyl-d14	92	33-141
Phenol-d5	70	10-94
2-Fluorophenol	72	21-110
2,4,6-Tribromophenol	102	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol
* : Over calibration range
\+ : Out of QC criteria due to matrix interference
Note: The sample was reanalyzed at DF 30 on 09/13/95 due to high concentration of Napthalene and 2-methylnapthalene.

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
SAMPLE ID:	DD-1	DATE ANALYZED:	09/13/95
CONTROL NO.:	H163-01R	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	30

PARAMETERS	RESULT (ug/L)	RL (ug/L)	PARAMETERS	RESULT (ug/L)	RL (ug/L)
N-Nitrosodimethylamine	ND	300	3-Nitroaniline	ND	750
Pyridine	ND	300	Acenaphthene	ND	300
Aniline	ND	300	2,4-Dinitrophenol	ND	750
Phenol	ND	300	4-Nitrophenol	ND	750
bis(2-Chloroethyl)ether	ND	300	Dibenzofuran	ND	300
2-Chlorophenol	ND	300	2,4-Dinitrotoluene	ND	300
1,3-Dichlorobenzene	ND	300	Diethylphthalate	ND	300
1,4-Dichlorobenzene	ND	300	4-Chlorophenyl-phenylether	ND	300
Benzyl Alcohol	ND	300	Fluorene	ND	300
1,2-Dichlorobenzene	ND	300	1,2-Diphenylhydrazine	ND	750
2-Methylphenol	ND	300	4-Nitroaniline	ND	750
2,2'-oxybis(1-Chloropropane)	ND	300	4,6-Dinitro-2-methylphenol	ND	750
4-Methylphenol (2)	ND	300	N-Nitrosodiphenylamine (1)	ND	300
N-Nitroso-di-n-propylamine	ND	300	4-Bromophenyl-phenylether	ND	300
Hexachloroethane	ND	300	Hexachlorobenzene	ND	300
Nitrobenzene	ND	300	Pentachlorophenol	ND	750
Isophorone	ND	300	Benzidine	ND	750
2-Nitrophenol	ND	300	Phenanthrene	ND	300
2,4-Dimethylphenol	ND	300	Anthracene	ND	300
Benzoic Acid	ND	750	Carbazole	ND	300
bis(2-Chloroethoxy)methane	ND	300	Di-n-butylphthalate	ND	300
2,4-Dichlorophenol	ND	300	Fluoranthene	ND	300
1,2,4-Trichlorobenzene	ND	300	4,4'-Methylene Dianiline	ND	750
Naphthalene	4700	300	Pyrene	ND	300
4-Chloroaniline	ND	300	Bisphenol-A	ND	300
Hexachloro-1,3-butadiene	ND	300	Butylbenzylphthalate	ND	300
4-Chloro-3-methylphenol	ND	300	3,3'-Dichlorobenzidine	ND	300
2-Methylnaphthalene	410	300	Benzo(a)anthracene	ND	300
Hexachlorocyclopentadiene	ND	300	Chrysene	ND	300
2,4,6-Trichlorophenol	ND	300	bis(2-Ethylhexyl)phthalate	ND	300
2,4,5-Trichlorophenol	ND	750	Di-n-octylphthalate	ND	300
2-Chloronaphthalene	ND	300	Benzo(b)fluoranthene	ND	300
1-Chloronaphthalene	ND	300	Benzo(k)fluoranthene	ND	300
2-Nitroaniline	ND	750	Benzo(a)pyrene	ND	300
Dimethylphthalate	ND	300	Indeno(1,2,3-cd)pyrene	ND	300
Acenaphthylene	ND	300	Dibenzo(a,h)anthracene	ND	300
2,6-Dinitrotoluene	ND	300	Benzo(g,h,i)perylene	ND	300

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	39	35-114
2-Fluorobiphenyl	55	43-116
Terphenyl-d14	54	33-141
Phenol-d5	48	10-94
2-Fluorophenol	45	21-110
2,4,6-Tribromophenol	34	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

[illegible]ENT:	Earth Technology Corp.	DATE COLLECTED:	NA
[illegible]JECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
[illegible]CH NO.:	95H163	DATE EXTRACTED:	09/01/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/06/95
CONTROL NO.:	SVI002WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/L)	RL (ug/L)	PARAMETERS	RESULT (ug/L)	RL (ug/L)
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	ND	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	ND	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	ND	10
2,4-Dimethylphenol	ND	10	Anthracene	ND	10
Benzoic Acid	ND	25	Carbazole	ND	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
2,4-Dichlorophenol	ND	10	Fluoranthene	ND	10
[illegible],4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
[illegible]thalene	ND	10	Pyrene	ND	10
[illegible]hloroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	ND	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	82	35-114
2-Fluorobiphenyl	87	43-116
Terphenyl-d14	100	33-141
Phenol-d5	71	10-94
2-Fluorophenol	71	21-110
2,4,6-Tribromophenol	72	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 625
MATRIX: WATER

BATCH NO.: 95H163
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: SVI002WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 09/01/95
DATE ANALYZED: 09/06/95

ACCESSION: 95H159 95H163 95I002

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Phenol	ND	150	78	52	150	74	49	5
2-Chlorophenol	ND	150	85	57	150	80	53	6
1,4-DCB	ND	100	55	55	100	54	54	2
N-Nitroso-di-n	ND	100	60	60	100	59	59	2
1,2,4-TCB	ND	100	63	63	100	61	61	3
4-Chl-3-Methy	ND	150	89	59	150	84	56	6
Acenaphthene	ND	100	65	65	100	61	61	6
4-Nitrophenol	ND	150	60	40	150	52	35	14
2,4-Dinitrotol	ND	100	64	64	100	59	59	8
Pentachlorophe	ND	150	107	71	150	108	72	1
Pyrene	ND	100	78	78	100	78	78	0

QC LIMIT:			
Phenol	12-110	12-110	42
2-Chlorophenol	27-123	27-123	40
1,4-DCB	36-97	36-97	28
N-Nitroso-di-n	41-116	41-116	38
1,2,4-TCB	39-98	39-98	28
4-Chl-3-Methy	23-97	23-97	42
Acenaphthene	46-118	46-118	31
4-Nitrophenol	10-80	10-80	50
2,4-Dinitrotol	24-96	24-96	38
Pentachlorophe	9-103	9-103	50
Pyrene	26-127	26-127	31

EPA METHOD 413.2
OIL & GREASE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
MATRIX:	WATER	DATE ANALYZED:	09/06/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-1	H163-02	4.5	1	1
MBLK1W	OGI001WB	ND	1	1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 413.2
MATRIX: WATER

==========

BATCH NO.: 95H163
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: OGI001WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 09/01/95
DATE ANALYZED: 09/06/95

ACCESSION: 95H163

Parameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
TROG	ND	5.00	4.60	92	5.00	4.60	92	0
QC LIMIT:				75-125			75-125	30

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Extension	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
MATRIX:	WATER	DATE ANALYZED:	09/05/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MDL (mg/L)
DD-1	H163-03	13	C8-C24	114	123	1	.05
MBLK1W	DSI002WB	ND	N.A.	116	122	1	.05
QC LIMIT:				65-135	60-140		

SURR1 : Bromobenzene
SURR2 : Hexacosane
MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extension
METHOD: EPA M8015
MATRIX: WATER

BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 09/01/95
CONTROL NO.: DSI002WL/C DATE ANALYZED: 09/05/95

ACCESSION: 95H158 95H162 95H163 95I009

PARAMETER	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
DIESEL	ND	1.00	0.89	89	1.00	0.88	88	1
QC LIMIT:				60-140			60-140	30

EPA METHOD 376.1
TOTAL SULFIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/12/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-1	H163-04	80	1	.2
MBLK1W	SDI001WB	ND	1	.2

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 376.1
MATRIX: WATER

==========

BATCH NO.: 95H163
SAMPLE ID: LCS1W
CONTROL NO.: SDI001WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/12/95

ACCESSION: 95H163

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Sulfide	731	710	97

QC LIMIT: 85-115

EPA METHOD 300
CHLORIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/06/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-1	H163-05	461	100	20
MBLK1W	H163-B1W	ND	1	.2

MDL : Method Detection Limit

EPA METHOD 300
SULFATE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/06/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-1	H163-05	77.8	10	10
MBLK1W	H163-B1W	ND	1	1

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 300
MATRIX: WATER

BATCH NO.: 95H163
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: H163-L1W/L1D

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/06/95

ACCESSION: 95H149 95H161 95H163

Parameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
Sulfate	ND	20.00	19.30	97	20.00	19.40	97	1
Chloride	ND	5.00	4.95	99	5.00	4.99	100	1
QC LIMIT:				85-115			85-115	20

EPA METHOD 3005/6010
TTLC CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
SAMPLE ID:	DD-1	DATE ANALYZED:	09/01/95
CONTROL NO.:	H163-06	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	881
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	200	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7470 on 09/06/95

EPA METHOD 3005/6010
TTLC CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95H163	DATE EXTRACTED:	09/01/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/01/95
CONTROL NO.:	IPI001WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	ND
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	200	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7470 on 09/06/95 using sample HGI001WB.

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 3005/6010
MATRIX: WATER

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BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: INF83095 DATE EXTRACTED: 09/01/95
CONTROL NO.: H158-01 DATE ANALYZED: 09/01/95

ACCESSION: 95H158 95H159 95H163 95H164

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
Antimony	ND	1000	444	44	1000	489	49	10
Arsenic	ND	1000	919	92	1000	1014	101	10
Barium	88	1000	967	88	1000	1062	97	10
Beryllium	ND	1000	896	90	1000	991	99	10
Cadmium	ND	1000	956	96	1000	1054	105	10
Chromium	18	1000	939	92	1000	1027	101	9
Cobalt	ND	1000	909	91	1000	999	100	9
Copper	ND	1000	897	90	1000	991	99	10
Lead	ND	1000	934	93	1000	1018	102	9
Mercury^	ND	5.00	4.68	95	5.00	5.12	102	7
Molybdenum	ND	1000	894	89	1000	986	99	10
Nickel	ND	1000	955	95	1000	1036	104	8
Selenium	ND	1000	909	91	1000	999	100	9
Silver	16	1000	960	94	1000	1056	104	10
Thallium	ND	1000	839	84	1000	934	93	11
Vanadium	ND	1000	906	91	1000	1001	100	10
Zinc	31	1000	947	92	1000	1042	101	10
QC LIMIT:				75-125			75-125	20

NOTE:
^ Analyzed by EPA Method 7470 on 09/06/95 using sample I002-01.

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 3005/6010
MATRIX: WATER

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BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 09/01/95
CONTROL NO.: IPI001WL/C DATE ANALYZED: 09/01/95

ACCESSION: 95H158 95H159 95H163 95H164

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Antimony	ND	1000	488	49	1000	494	49	1
Arsenic	ND	1000	982	98	1000	1005	101	2
Barium	ND	1000	987	99	1000	993	99	1
Beryllium	ND	1000	993	99	1000	998	100	1
Cadmium	ND	1000	977	98	1000	988	99	1
Chromium	ND	1000	989	99	1000	998	100	1
Cobalt	ND	1000	978	98	1000	989	99	1
Copper	ND	1000	954	95	1000	958	96	0
Lead	ND	1000	1005	100	1000	1006	101	0
Mercury^	ND	4.90	4.68	95	4.90	4.85	99	4
Molybdenum	ND	1000	968	97	1000	983	98	2
Nickel	ND	1000	1008	101	1000	1028	103	2
Selenium	ND	1000	974	97	1000	941	94	3
Silver	ND	1000	976	98	1000	980	98	0
Thallium	ND	1000	953	95	1000	1019	102	7
Vanadium	ND	1000	985	99	1000	994	99	1
Zinc	ND	1000	967	97	1000	976	98	1
QC LIMIT:				75-125			75-125	20

NOTE:
^ Analyzed by EPA Method 7470 on 09/06/95 using sample HGI001WL/C.

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	DD-1	DATE ANALYZED:	09/08/95
CONTROL NO.:	H163-08	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	500	5
Toluene	90	5
Ethylbenzene	160	5
Total Xylenes	400	15

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	111	65-135

MDL: Method Detection Limit

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/08/95
CONTROL NO.:	VAI077B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1
Total Xylenes	ND	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	92	65-135

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 602
MATRIX: WATER

BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: NA
CONTROL NO.: VAI077L/C DATE ANALYZED: 09/08/95

ACCESSION: 95H163 95I005 95I021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Benzene	ND	20.00	20.90	105	20.00	21.60	108	3
Toluene	ND	20.00	17.30	87	20.00	17.80	89	3
Ethylbenzene	ND	20.00	17.80	89	20.00	17.80	89	0
Total Xylenes	ND	60.00	59.00	98	60.00	58.50	98	1
QC LIMIT:				70-125			70-125	30

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	DD-1	DATE ANALYZED:	09/01/95
CONTROL NO.:	H163-09	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	320	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	3.7	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	2.6	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	3.2	1
cis-1,2-Dichloroethene	36	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	400	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	150	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	1.6	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	55	1
Xylenes (total)	240	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	77	76-114
Toluene-d8	96	88-110
Bromofluorobenzene	93	86-115

MDL: Method Detection Limit
Note: The sample was diluted at 5x and reanalyzed on 09/06/95 due to high concentration level of some target compounds.

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	08/31/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	08/31/95
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	DD-1	DATE ANALYZED:	09/06/95
CONTROL NO.:	H163-09R	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	420	5
Bromodichloromethane	ND	5
Bromoform	ND	5
Bromomethane	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	10
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	5
Chloromethane	ND	10
Dichlorodifluoromethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	31	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	400	5
Methylene Chloride	ND	25
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	5
Toluene	120	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
Trichloroethene	ND	5
Trichlorofluoromethane	ND	5
Vinyl Chloride	38	5
Xylenes (total)	330	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	81	76-114
Toluene-d8	92	88-110
Bromofluorobenzene	92	86-115

MDL: Method Detection Limit

Note: The sample was diluted at 5x due to high concentration of some target compounds.

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/01/95
CONTROL NO.:	VOH0101B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	83	76-114
Toluene-d8	94	88-110
Bromofluorobenzene	90	86-115

MDL: Method Detection Limit

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95H163	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK2W	DATE ANALYZED:	09/06/95
CONTROL NO.:	VOI0401B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	82	76-114
Toluene-d8	94	88-110
Bromofluorobenzene	89	86-115

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: OS-MW-3A DATE EXTRACTED: NA
CONTROL NO.: H155-02 DATE ANALYZED: 09/01/95

ACCESSION: 95H155 95H159 95H163

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
1,1-DCE	ND	50.00	53.10	106	50.00	50.20	100	6
Benzene	9.30	50.00	61.70	105	50.00	61.10	104	1
TCE	ND	50.00	50.00	100	50.00	44.70	89	11
Toluene	2.50	50.00	61.20	117	50.00	53.30	102	14+
Chlorobenzene	ND	50.00	57.60	115	50.00	50.30	101	14+

QC LIMIT:

1,1-DCE	61-145	61-145	14
Benzene	76-127	76-127	11
TCE	71-120	71-120	14
Toluene	76-125	76-125	13
Chlorobenzene	75-130	75-130	13

+ out of QC limit. Since each recovery is in, no corrective action.

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

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BATCH NO.: 95H163
SAMPLE ID: LCS1W
CONTROL NO.: VOH0101L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/01/95

ACCESSION: 95H155 95H159 95H163

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
1,1-DCE	20.00	15.40	77
Benzene	20.00	14.20	71
TCE	20.00	13.70	69
Toluene	20.00	15.60	78
Chlorobenzene	20.00	15.10	76

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

NT: Earth Technology Corp.
ECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: BX-MW-4 DATE EXTRACTED: NA
CONTROL NO.: H142-01 DATE ANALYZED: 09/06/95

ACCESSION: 95H142 95H163

Parameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
1,1-DCE	ND	50.00	46.40	93	50.00	46.50	93	0
Benzene	ND	50.00	44.20	88	50.00	45.00	90	2
TCE	ND	50.00	40.70	81	50.00	41.80	84	3
Toluene	1.90	50.00	49.60	95	50.00	46.10	88	8
Chlorobenzene	ND	50.00	46.00	92	50.00	46.40	93	1
QC LIMIT:								
1,1-DCE				61-145			61-145	14
Benzene				76-127			76-127	11
TCE				71-120			71-120	14
Toluene				76-125			76-125	13
Chlorobenzene				75-130			75-130	13

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

BATCH NO.: 95H163 DATE RECEIVED: NA
SAMPLE ID: LCS2W/LCS2W DATE EXTRACTED: NA
CONTROL NO.: VOI0401L/501C DATE ANALYZED: 09/06/95

ACCESSION: 95H142 95H163 95I002

Parameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
1,1-DCE	ND	20.00	15.60	78	20.00	15.60	78	0
Benzene	ND	20.00	14.70	74	20.00	16.30	82	10
TCE	ND	20.00	14.60	73	20.00	15.90	80	9
Toluene	ND	20.00	16.20	81	20.00	17.80	89	9
Chlorobenzene	ND	20.00	16.00	80	20.00	17.80	89	11
QC LIMIT:								
1,1-DCE				51-150			51-150	14
Benzene				64-136			64-136	11
TCE				67-134			67-134	14
Toluene				75-126			75-126	13
Chlorobenzene				66-134			66-134	13

C K Y incorporated
Analytical Laboratories

Date: 09-25-1995
CKY Batch No.: 95H163

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Metro Redline Eastside Extension

Enclosed is the Laboratory report for samples received on 08/31/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-1	H163-07	Water	Lead

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

K. Y. Pang

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

CERTIFICATE OF ANALYSIS

Job No. 509013 **Date:09-11-95**

This is the Certificate of Analysis for the following samples:

Client :	CKY Incorporated
Project No.:	Yellow Red Line
Date Received:	09-05-95
Number of Samples:	1
Sample Type:	Water

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY NUMBER
H163-7	509013-01A

Reviewed and Approved:

Michael C.C. Lu
Laboratory Director

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Client: CKY Incorporated
Project: Yellow Red Line
Job No: 509013 **Date:** 09-11-95

Analysis: Organic Lead

Sample ID: See below
Lab Job No.: See below
Sample Date: 09-05-95
Analysis Date: 09-11-95

Sample ID	Lab Sample ID	Results (ppm)	Detection Limit (mg/kg)
53-7	01A	<0.05	0.05

COMMENTS: 'ND' INDICATES THAT THE COMPOUND IS NOT DETECTED AT THE SPECIFIED LIMIT.

C K Y incorporated
Analytical Laboratories

Date: 09-22-1995
CKY Batch No.: 95I021

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Metro Redline Eastside Ext.

Enclosed is the Laboratory report for samples received on 09/07/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-2	I021-01	Water	EPA 625 EPA 602 EPA M8015 Metals Sulfide EPA 624 Chloride Sulfate Oil & Grease Organic Pb
DD-2(DRUM)	I021-02	Water	EPA M8015

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

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EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
LAB NO.:	95I021	DATE EXTRACTED:	09/11/95
SAMPLE ID:	DD-2	DATE ANALYZED:	09/13/95
CONTROL NO.:	I021-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/L)	RL (ug/L)	PARAMETERS	RESULT (ug/L)	RL (ug/L)
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	ND	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	ND	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	ND	10
2,4-Dimethylphenol	ND	10	Anthracene	ND	10
Benzoic Acid	ND	25	Carbazole	ND	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
2,4-Dichlorophenol	ND	10	Fluoranthene	ND	10
1,2,4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
Naphthalene	ND	10	Pyrene	ND	10
4-Chloroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	ND	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	66	35-114
2-Fluorobiphenyl	61	43-116
Terphenyl-d14	59	33-141
Phenol-d5	63	10-94
2-Fluorophenol	62	21-110
2,4,6-Tribromophenol	75	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
LAB NO.:	95I021	DATE EXTRACTED:	09/11/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/13/95
CONTROL NO.:	SVI006WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/L)	RL	PARAMETERS	RESULT (ug/L)	RL
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	ND	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	ND	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	ND	10
2,4-Dimethylphenol	ND	10	Anthracene	ND	10
Benzoic Acid	ND	25	Carbazole	ND	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
2,4-Dichlorophenol	ND	10	Fluoranthene	ND	10
[illegible]4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
[illegible]thalene	ND	10	Pyrene	ND	10
[illegible]loroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	ND	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	52	35-114
2-Fluorobiphenyl	51	43-116
Terphenyl-d14	53	33-141
Phenol-d5	53	10-94
2-Fluorophenol	53	21-110
2,4,6-Tribromophenol	60	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 625
MATRIX: WATER

BATCH NO.: 95I021 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 09/11/95
CONTROL NO.: SVI006WL/C DATE ANALYZED: 09/13/95

ACCESSION: 95I032 95I021

Parameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Phenol	ND	150	88	59	150	84	56	5
2-Chlorophenol	ND	150	87	58	150	83	55	5
1,4-DCB	ND	100	53	53	100	54	54	2
N-Nitroso-di-n	ND	100	65	65	100	62	62	5
1,2,4-TCB	ND	100	54	54	100	54	54	0
4-Chl-3-Methy	ND	150	86	57	150	81	54	6
Acenaphthene	ND	100	60	60	100	59	59	2
4-Nitrophenol	ND	150	11	7+	150	41	27	115+
2,4-Dinitrotol	ND	100	59	59	100	59	59	0
Pentachlorophe	ND	150	102	68	150	126	84	21
Pyrene	ND	100	65	65	100	61	61	6

QC LIMIT:			
Phenol	12-110	12-110	42
2-Chlorophenol	27-123	27-123	40
1,4-DCB	36-97	36-97	28
N-Nitroso-di-n	41-116	41-116	38
[illegible]-TCB	39-98	39-98	28
[illegible]-3-Methyl	23-97	23-97	42
Acenaphthene	46-118	46-118	31
4-Nitrophenol	10-80	10-80	50
2,4-Dinitrotol	24-96	24-96	38
Pentachlorophe	9-103	9-103	50
Pyrene	26-127	26-127	31

+ Out QC limits

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	NA
SAMPLE ID:	DD-2	DATE ANALYZED:	09/08/95
CONTROL NO.:	I021-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	250	5
Toluene	ND	5
Ethylbenzene	ND	5
Total Xylenes	300	15

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	110	65-135

MDL: Method Detection Limit

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95I021	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/08/95
CONTROL NO.:	VAI077WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1
Total Xylenes	ND	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	92	65-135

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 602
MATRIX: WATER

BATCH NO.: 95I021 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: NA
CONTROL NO.: VAI077WL/C DATE ANALYZED: 09/08/95

ACCESSION: 95H163 95I005 95I021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Benzene	ND	20.00	20.90	105	20.00	21.60	108	3
Toluene	ND	20.00	17.30	87	20.00	17.80	89	3
Ethylbenzene	ND	20.00	17.80	89	20.00	17.80	89	0
Total Xylenes	ND	60.00	59.00	98	60.00	58.50	98	1
QC LIMIT:				70-125			70-125	30

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
LAB NO.:	95I021	DATE EXTRACTED:	09/07/95
MATRIX:	WATER	DATE ANALYZED:	09/08/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MDL (mg/L)
DD-2	I021-01	0.3	C13-C22	94	104	1	.05
DD-2(DRUM)	I021-02	1.3	C6-C9	112	104	1	.05
		15	C10-C25				
MBLK1W	DSI010WB	ND	N.A.	106	115	1	.05
QC LIMIT:				65-135	60-140		

SURR1 : Bromobenzene
SURR2 : Hexacosane
MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA M8015
MATRIX: WATER

BATCH NO.: 95I021
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: DSI010WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 09/07/95
DATE ANALYZED: 09/08/95

ACCESSION: 95I021 95I023

Parameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
DIESEL	ND	1.00	0.82	82	1.00	0.99	99	19
QC LIMIT:				60-140			60-140	30

EPA METHOD 3005/6010
TAL METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	09/08/95
SAMPLE ID:	DD-2	DATE ANALYZED:	09/12/95
CONTROL NO.:	I021-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Aluminum	50	ND
Antimony	60	ND
Arsenic	100	ND
Barium	10	76.9
Beryllium	5	ND
Cadmium	5	ND
Calcium	1000	248000
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Iron	50	142
Lead	100	ND
Magnesium	1000	84200
Manganese	10	2380
Nickel	20	ND
Potassium	2000	8330
Selenium	200	ND
Silver	10	ND
Sodium	1000	187000
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

EPA METHOD 3005/6010
TAL METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95I021	DATE EXTRACTED:	09/08/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/12/95
CONTROL NO.:	IPI009WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Aluminum	50	ND
Antimony	60	ND
Arsenic	100	ND
Barium	10	ND
Beryllium	5	ND
Cadmium	5	ND
Calcium	1000	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Iron	50	ND
Lead	100	ND
Magnesium	1000	ND
Manganese	10	ND
Nickel	20	ND
Potassium	2000	ND
Selenium	200	ND
Silver	10	ND
Sodium	1000	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
[illegible]OD: EPA 3005/6010
[illegible]IX: WATER

==========

BATCH NO.: 95I021 DATE RECEIVED: NA
SAMPLE ID: SW-17(B&V) DATE EXTRACTED: 09/08/95
CONTROL NO.: I002-01 DATE ANALYZED: 09/12/95

ACCESSION: 95I002 95I021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
Aluminum	2640	10000	13092	105	10000	13545	109	4
Antimony	ND	500.00	448.94	90	500.00	481.09	96	7
Arsenic	ND	1000	966	97	1000	984	98	2
Barium	255	1000	1173	92	1000	1214	96	4
Beryllium	ND	1000	933	93	1000	959	96	3
Cadmium	ND	1000	970	97	1000	997	100	3
Calcium	160507	50000	202510	84	50000	206167	91	8
Chromium	30	1000	965	93	1000	976	95	1
Cobalt	15	1000	972	96	1000	981	97	1
Copper	35	1000	987	95	1000	1079	104	9
Iron	12621	10000	21183	86	10000	21609	90	5
Lead	ND	1000	1004	100	1000	1006	101	0
Magnesium	47756	50000	91535	88	50000	95032	95	8
Manganese	292	1000	1220	93	1000	1242	95	2
Nickel	27	1000	981	95	1000	998	97	2
Potassium	3338	50000	53485	100	50000	56037	105	5
Selenium	ND	1000	949	95	1000	1014	101	7
[illegible]er	ND	1000	980	98	1000	1008	101	3
[illegible]m	41292	50000	84766	87	50000	89805	97	11
Thallium	ND	1000	984	98	1000	1049	105	6
Vanadium	ND	1000	938	94	1000	957	96	2
Zinc	684	1000	1576	89	1000	1662	98	9
QC LIMIT:				75-125			75-125	20

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 3005/6010
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: IPI009WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 09/08/95
DATE ANALYZED: 09/12/95

ACCESSION: 95I002 95I021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Aluminum	ND	10000	9413	94	10000	10346	103	9
Antimony	ND	500.00	471.41	94	500.00	499.53	100	6
Arsenic	ND	1000	938	94	1000	986	99	5
Barium	ND	1000	951	95	1000	1028	103	8
Beryllium	ND	1000	941	94	1000	1022	102	8
Cadmium	ND	1000	925	92	1000	1006	101	8
Calcium	ND	50000	45342	91	50000	49031	98	8
Chromium	ND	1000	936	94	1000	1013	101	8
Cobalt	ND	1000	939	94	1000	1013	101	8
Copper	ND	1000	940	94	1000	1024	102	9
Iron	ND	10000	9483	95	10000	10220	102	7
Lead	ND	1000	998	100	1000	1046	105	5
Magnesium	ND	50000	47151	94	50000	51195	102	8
Manganese	ND	1000	934	93	1000	1006	101	7
Nickel	ND	1000	958	96	1000	1013	101	6
Potassium	ND	50000	48473	97	50000	54179	108	11
Selenium	ND	1000	908	91	1000	996	100	9
Silver	ND	1000	924	92	1000	1002	100	8
Sodium	ND	50000	48702	97	50000	53939	108	10
Thallium	ND	1000	938	94	1000	1074	107	14
Vanadium	ND	1000	929	93	1000	1002	100	8
Zinc	ND	1000	930	93	1000	1014	101	9
QC LIMIT:				75-125			75-125	20

EPA METHOD 376.1
TOTAL SULFIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/12/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-2	I021-01	18	1	.2
MBLK1W	SDI001WB	ND	1	.2

MDL : Method Detection Limit
Note: Sample I021-01 is very dark in color

CKY QUALITY CONTROL DATA
MATRIX SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 376.1
MATRIX: WATER

BATCH NO.: 95I021
SAMPLE ID: DD-2
CONTROL NO.: I021-01

DATE RECEIVED: 09/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 09/12/95

ACCESSION: 95I021 95H163

Parameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	MS CONC (mg/L)	MS % REC
Sulfide	18.00	18.30	37.00	104
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 376.1
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: DD-2
CONTROL NO.: I021-01

DATE RECEIVED: 09/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 09/12/95

ACCESSION: 95I021 95H163

PARAMETER	Sample (mg/L)	Dup. Sample (mg/L)	RPD (%)
Sulfide	18.00	18.00	0

QC LIMIT: 20

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 376.1
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: LCS1W
CONTROL NO.: SDI001WB

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/12/95

ACCESSION: 95I021 95H163

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Sulfide	731	710	97

QC LIMIT: 85-115

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	NA
SAMPLE ID:	DD-2	DATE ANALYZED:	09/12/95
CONTROL NO.:	I021-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	200~	5
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	2.3	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	4.6	1
cis-1,2-Dichloroethene	22	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	2.3	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	1.8	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	41	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	82	76-114
Toluene-d8	91	88-110
Bromofluorobenzene	91	86-115

MDL: Method Detection Limit
~ : Dilution factor = 5

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	NA
BATCH NO.:	95I021	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	09/12/95
CONTROL NO.:	VOI1001B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	80	76-114
Toluene-d8	92	88-110
Bromofluorobenzene	88	86-115

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

BATCH NO.: 95I021
SAMPLE ID: YU-A811301
CONTROL NO.: I003-01

DATE RECEIVED: NA
DATE EXTRACTED: 09/05/95
DATE ANALYZED: 09/12/95

ACCESSION: 95I003 95I021

Parameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
1,1-DCE	ND	50.00	48.40	97	50.00	52.80	106	9
Benzene	ND	50.00	43.90	88	50.00	44.40	89	1
TCE	ND	50.00	42.30	85	50.00	43.70	87	3
Toluene	ND	50.00	46.70	93	50.00	49.20	98	5
Chlorobenzene	ND	50.00	47.50	95	50.00	47.10	94	1
QC LIMIT:								
1,1-DCE				61-145			61-145	14
Benzene				76-127			76-127	11
TCE				71-120			71-120	14
Toluene				76-125			76-125	13
Chlorobenzene				75-130			75-130	13

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 624
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: LCS1W
CONTROL NO.: VOI1401L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/12/95

ACCESSION: 95I003 95I021

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
1,1-DCE	20.00	18.70	94
Benzene	20.00	17.00	85
TCE	20.00	16.00	80
Toluene	20.00	18.40	92
Chlorobenzene	20.00	17.90	90

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

EPA METHOD 300
CHLORIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/18/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-2	I021-01	261	100	20
MBLK1W	IC002WB	ND	1	.2

MDL : Method Detection Limit

EPA METHOD 300
SULFATE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	09/18/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-2	I021-01	394	100	100
MBLK1W	IC002WB	ND	1	1

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: DD-2
CONTROL NO.: I021-01

DATE RECEIVED: 09/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 09/18/95

ACCESSION: 95I021

PARAMETER	Sample Result (mg/L)	Spike Conc. (mg/L)	Spike Result (mg/L)	Spike Recovery (%)
Sulfate	394	1000	1388	99
Chloride	261	200	453	96

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: DD-2
CONTROL NO.: I021-01

DATE RECEIVED: 09/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 09/18/95

ACCESSION: 95I021

PARAMETER	Sample (mg/L)	Dup. Sample (mg/L)	RPD (%)
Sulfate	393	348	12
Chloride	261	210	22
QC LIMIT:			20

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95I021
SAMPLE ID: LCS1W
CONTROL NO.: IC002WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 09/18/95

ACCESSION: 95I021

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Sulfate	88.40	83.80	95
Chloride	122	117	96
QC LIMIT:			85-115

EPA METHOD 413.2
OIL & GREASE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	09/07/95
PROJECT:	Metro Redline Eastside Ext.	DATE RECEIVED:	09/07/95
BATCH NO.:	95I021	DATE EXTRACTED:	09/07/95
MATRIX:	WATER	DATE ANALYZED:	09/08/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-2	I021-01	ND	1	1
MBLK1W	OGI002WB	ND	1	1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Ext.
METHOD: EPA 413.2
MATRIX: WATER

BATCH NO.: 95I021
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: OGI002WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 09/07/95
DATE ANALYZED: 09/08/95

ACCESSION: 95I021

PARAMETER	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
TROG	ND	5.00	4.60	92	5.00	5.00	100	8
QC LIMIT:				75-125			75-125	

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

CERTIFICATE OF ANALYSIS

Job No. 509018 **Date:09-11-95**

This is the Certificate of Analysis for the following samples:

Client :	CKY Incorporated
Project No.:	Yellow Red Line
Date Received:	09-07-95
Number of Samples:	1
Sample Type:	Water

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY NUMBER
95I021-1	509018-01A

Reviewed and Approved:

Michael C.C. Lu
Laboratory Director

CHEMTEK
i n c.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

Client: CKY Incorporated
Project: Yellow Red Line
Job No: 509018 **Date:** 09-11-95

Analysis: Organic Lead

Sample ID: See below
Lab Job No.: See below
Sample Date: 09-07-95
Analysis Date: 09-11-95

Sample ID	Lab Sample ID	Results (ppm)	Detection Limit (mg/kg)
95I021-1	01A	<0.05	0.05

COMMENTS: 'ND' INDICATES THAT THE COMPOUND IS NOT DETECTED AT THE SPECIFIED LIMIT.

C K Y incorporated
Analytical Laboratories

Date: 07-18-1995
CKY Batch No.: 95G017

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Red Line East Side Extension

Enclosed is the Laboratory report for samples received on 07/07/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-3C	G017-01	Water	EPA 602 EPA M8015 Lead EPA 624 EPA 625 Sulfide Sulfate Chloride Oil & Grease Metals

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/10/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	97	1
Toluene	ND	1
Ethylbenzene	4.1	1
Total Xylenes	4.5	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	88	65-135

MDL: Method Detection Limit

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/10/95
CONTROL NO.:	VAG0112B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1
Total Xylenes	ND	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	120	65-135

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 602
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01M/S

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G017

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
Benzene	97.40	50.00	139.70	85	50.00	142.90	91	7
Toluene	ND	50.00	45.10	90	50.00	44.00	88	2
Ethylbenzene	4.10	50.00	44.60	81	50.00	44.50	81	0
Total Xylenes	5	150	126	81	150	126	81	0
QC LIMIT:				65-135			65-135	30

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 602
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: LCS1W
CONTROL NO.: VAG0112L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G017 95G019 95G020

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
Benzene	50.00	43.60	87
Toluene	50.00	41.40	83
Ethylbenzene	50.00	39.50	79
Total Xylenes	150	118	79

QC LIMIT: 65-135

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	07/11/95
MATRIX:	WATER	DATE ANALYZED:	07/11/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MDL (mg/L)
DD-3C	G017-01	.6	C10-C24	87	102	1	.05
MBLK1W	G001-B1W	ND	N.A.	87	95	1	.05
QC LIMIT:				65-135	60-140		

SURR1 : Bromobenzene
SURR2 : Hexacosane
MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA M8015
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: G001L1W/1D

DATE RECEIVED: NA
DATE EXTRACTED: 07/11/95
DATE ANALYZED: 07/11/95

ACCESSION: 95G001 95G014 95G015 95G017

PARAMETER	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
DIESEL	ND	1.00	0.77	77	1.00	0.79	79	3
QC LIMIT:				65-135			65-135	30

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/10/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Acetone	ND	5
Benzene	140	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	62	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	1.8	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	3.0	1
cis-1,2-Dichloroethene	17	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	2.8	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Acetate	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	106	76-114
Toluene-d8	98	88-110
Bromofluorobenzene	111	86-115

MDL: Method Detection Limit

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/10/95
CONTROL NO.:	GBL03-2	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Acetate	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	101	76-114
Toluene-d8	99	88-110
Bromofluorobenzene	101	86-115

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 8240
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: MIR-14-W-002
CONTROL NO.: G012-20M/S

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G012 95G017

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
1,1-DCE	ND	50.00	35.53	71	50.00	41.98	84	17
Benzene	ND	50.00	42.54	85	50.00	44.52	89	5
TCE	ND	50.00	44.68	89	50.00	46.06	92	3
Toluene	ND	50.00	41.61	83	50.00	43.59	87	5
Chlorobenzene	ND	50.00	44.43	89	50.00	45.73	91	3
QC LIMIT:								
1,1-DCE				61-145			61-145	14
Benzene				76-127			76-127	11
TCE				71-120			71-120	14
Toluene				76-125			76-125	13
Chlorobenzene				75-130			75-130	13

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 8240
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: LCS1W
CONTROL NO.: GLC3-2

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G012 95G017

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
1,1-DCE	20.00	15.12	76
Benzene	20.00	18.19	91
TCE	20.00	18.57	93
Toluene	20.00	18.42	92
Chlorobenzene	20.00	18.92	95

QC LIMIT:

1,1-DCE	61-145
Benzene	76-127
TCE	71-120
Toluene	76-125
Chlorobenzene	75-130

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	07/10/95
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/13/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	(ug/L) RESULT	RL	PARAMETERS	(ug/L) RESULT	RL
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	ND	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	ND	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	ND	10
2,4-Dimethylphenol	ND	10	Anthracene	ND	10
Benzoic Acid	ND	25	Carbazole	ND	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
2,4-Dichlorophenol	ND	10	Fluoranthene	ND	10
1,2,4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
Naphthalene	15	10	Pyrene	ND	10
4-Chloroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	ND	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	61	35-114
2-Fluorobiphenyl	75	43-116
Terphenyl-d14	73	33-141
Phenol-d5	64	10-94
2-Fluorophenol	57	21-110
2,4,6-Tribromophenol	134+	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol
+ : Out of QC limit

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

[illegible]NT:	Earth Technology Corp.	DATE COLLECTED:	NA
[illegible]ECT:	Red Line East Side Extension	DATE RECEIVED:	NA
[illegible]CH NO.:	95G017	DATE EXTRACTED:	07/10/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/12/95
CONTROL NO.:	SVG003WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	(ug/L) RESULT	RL	PARAMETERS	(ug/L) RESULT	RL
N-Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
Pyridine	ND	10	Acenaphthene	ND	10
Aniline	ND	10	2,4-Dinitrophenol	ND	25
Phenol	ND	10	4-Nitrophenol	ND	25
bis(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
2-Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
1,3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
1,4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
Benzyl Alcohol	ND	10	Fluorene	ND	10
1,2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
2-Methylphenol	ND	10	4-Nitroaniline	ND	25
2,2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
4-Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
N-Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
Hexachloroethane	ND	10	Hexachlorobenzene	ND	10
Nitrobenzene	ND	10	Pentachlorophenol	ND	25
Isophorone	ND	10	Benzidine	ND	25
2-Nitrophenol	ND	10	Phenanthrene	ND	10
2,4-Dimethylphenol	ND	10	Anthracene	ND	10
Benzoic Acid	ND	25	Carbazole	ND	10
bis(2-Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
[illegible]Dichlorophenol	ND	10	Fluoranthene	ND	10
[illegible]4-Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
[illegible]thalene	ND	10	Pyrene	ND	10
4-Chloroaniline	ND	10	Bisphenol-A	ND	10
Hexachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
4-Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
2-Methylnaphthalene	ND	10	Benzo(a)anthracene	ND	10
Hexachlorocyclopentadiene	ND	10	Chrysene	ND	10
2,4,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
2,4,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
2-Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
1-Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
2-Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
Dimethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
Acenaphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
2,6-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	68	35-114
2-Fluorobiphenyl	78	43-116
Terphenyl-d14	64	33-141
Phenol-d5	75	10-94
2-Fluorophenol	61	21-110
2,4,6-Tribromophenol	97	10-123

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 625
MATRIX: WATER

BATCH NO.: 95G017 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/10/95
CONTROL NO.: SVG003WL/C DATE ANALYZED: 07/12/95

ACCESSION: 95G011 95G013 95G015 95G017 95G021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Phenol	ND	150	70	47	150	69	46	1
2-Chlorophenol	ND	150	70	46	150	69	46	1
1,4-DCB	ND	100	45	45	100	44	44	2
N-Nitroso-di-n	ND	100	50	50	100	52	52	4
1,2,4-TCB	ND	100	47	47	100	49	49	4
4-Chl-3-Methy	ND	150	83	56	150	88	59	5
Acenaphthene	ND	100	59	59	100	60	60	2
4-Nitrophenol	ND	150	102	68	150	105	70	2
2,4-Dinitrotol	ND	100	82	82	100	85	85	3
Pentachlorophe	ND	150	123	82	150	114	76	7
Pyrene	ND	100	105	105	100	99	99	6
QC LIMIT:								
nol				12-110			12-110	42
lorophenol				27-123			27-123	40
DCB				36-97			36-97	28
N-Nitroso-di-n				41-116			41-116	38
1,2,4-TCB				39-98			39-98	28
4-Chl-3-Methy				23-97			23-97	42
Acenaphthene				46-118			46-118	31
4-Nitrophenol				10-80			10-80	50
2,4-Dinitrotol				24-96			24-96	38
Pentachlorophe				9-103			9-103	50
Pyrene				26-127			26-127	31

EPA METHOD 376.1
TOTAL SULFIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/11/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-3C	G017-01	ND	1	.2
MBLK1W	SDG001WB	ND	1	.2

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 376.1
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01M/S

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G012 95G017

PARAMETER	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	MS CONC (mg/L)	MS % REC	SPIKE ADDED (mg/L)	MSD CONC (mg/L)	MSD % REC	% RPD
Sulfide	ND	3.70	3.60	97	3.70	3.60	97	0
QC LIMIT:				75-125			75-125	35

EPA METHOD 300
SULFATE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/11/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-3C	G017-01	544	25	25
MBLK1W	ICG001WB	ND	1	1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: LCS1W
CONTROL NO.: ICG001WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Sulfate	123	132	107

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01M

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	SAMPLE RESULT (mg/L)	SPIKE CONC. (mg/L)	SPIKE RESULT (mg/L)	SPIKE RECRY. (%)
Sulfate	544	250	812	107
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01S

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	SAMPLE (mg/L)	DUP. SAMPLE (mg/L)	RPD (%)
Sulfate	544	545	0
QC LIMIT:			35

EPA METHOD 300
CHLORIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/11/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-3C	G017-01	185	25	5
MBLK1W	ICG001WB	ND	1	.2

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01S

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	SAMPLE (mg/L)	DUP. SAMPLE (mg/L)	RPD (%)
Chloride	185	184	1

QC LIMIT: 35

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: DD-3C
CONTROL NO.: G017-01M

DATE RECEIVED: 07/07/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	SAMPLE RESULT (mg/L)	SPIKE CONC. (mg/L)	SPIKE RESULT (mg/L)	SPIKE RECRY. (%)
Chloride	185	50	243	116

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 300
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: LCS1W
CONTROL NO.: ICG001WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/11/95

ACCESSION: 95G017

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Chloride	141	153	108

QC LIMIT: 75-125

EPA METHOD 413.2
OIL & GREASE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	07/11/95
MATRIX:	WATER	DATE ANALYZED:	07/12/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD-3C	G017-01	ND	1	1
MBLK1W	TRG002WB	ND	1	1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 413.2
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: TRG002WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 07/11/95
DATE ANALYZED: 07/12/95

ACCESSION: 95G017

PARAMETER	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
TROG	ND	150	148	99	150	147	98	1

EPA METHOD 3005/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	07/11/95
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/13/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	100
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7471 on 07/10/95

EPA METHOD 3005/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G017	DATE EXTRACTED:	07/11/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/13/95
CONTROL NO.:	G013-B1W	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	ND
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7471 on 07/10/95

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

BATCH NO.: 95G017 DATE RECEIVED: NA
SAMPLE ID: ER-004 DATE EXTRACTED: 07/11/95
CONTROL NO.: G013-19M/S DATE ANALYZED: 07/13/95

ACCESSION: 95G013 95G014 95G015 95G017 95G021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
Antimony	ND	500	514.39	103	500	471.62	94	9
Arsenic	ND	1000	998.44	100	1000	984.19	98	1
Barium	ND	1000	997.83	100	1000	978.11	98	2
Beryllium	ND	1000	1018.51	102	1000	995.46	100	2
Cadmium	ND	1000	990.42	99	1000	964.72	96	3
Chromium	ND	1000	1016.28	102	1000	995.45	100	2
Cobalt	ND	1000	1015.00	102	1000	1000.66	100	1
Copper	ND	1000	967.12	97	1000	946.78	95	2
Lead	ND	1000	1029.95	103	1000	1049.17	105	2
Mercury^	ND	5.00	5.26	105	5.00	5.16	103	2
Molybdenum	ND	1000	995.14	100	1000	976.96	98	2
Nickel	ND	1000	1024.74	102	1000	1005.44	101	2
Selenium	ND	1000	1094.08	109	1000	1049.97	105	4
Silver	ND	1000	1009.73	101	1000	981.99	98	3
Thallium	ND	1000	1067.84	107	1000	996.68	100	7
Vanadium	ND	1000	1010.82	101	1000	990.17	99	2
[illegible]	ND	1000	1004.96	100	1000	983.31	98	2

NOTE:
^ Analyzed by EPA Method 7471 on 07/10/95 using sample G009-09

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

BATCH NO.: 95G017 DATE RECEIVED: NA
SAMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/11/95
CONTROL NO.: IPG004WL/C DATE ANALYZED: 07/13/95

ACCESSION: 95G013 95G014 95G015 95G017 95G021

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Antimony	ND	500	470.58	94	500	470.55	94	0
Arsenic	ND	1000	1005.26	101	1000	968.80	97	4
Barium	ND	1000	1014.73	101	1000	982.96	98	3
Beryllium	ND	1000	1037.44	104	1000	1002.62	100	3
Cadmium	ND	1000	1002.90	100	1000	972.49	97	3
Chromium	ND	1000	1037.11	104	1000	999.13	100	4
Cobalt	ND	1000	1038.10	104	1000	1001.10	100	4
Copper	ND	1000	984.22	98	1000	948.94	95	4
Lead	ND	1000	1057.64	106	1000	1029.13	103	3
Mercury^	ND	4.90	5.26	107	4.90	5.40	110	3
Molybdenum	ND	1000	1017.86	102	1000	984.52	98	3
Nickel	ND	1000	1056.28	106	1000	1024.52	102	3
Selenium	ND	1000	1025.98	103	1000	1015.88	102	1
Silver	ND	1000	1023.49	102	1000	992.11	99	3
Thallium	ND	1000	1088.53	109	1000	1064.59	106	2
Vanadium	ND	1000	1029.87	103	1000	995.73	100	3
Zinc	ND	1000	1020.35	102	1000	989.83	99	3

NOTE:
^ Analyzed by EPA Method 7471 on 07/10/95

C K Y incorporated
Analytical Laboratories

Date: 08-07-1995
CKY Batch No.: 95G017

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Red Line East Side Extension

Enclosed is the Laboratory report for samples received on 07/07/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-3C	G017-01	Water	Organic Lead

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

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CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

CERTIFICATE OF ANALYSIS

Job No. 507018 **Date:07-12-95**

This is the Certificate of Analysis for the following samples:

Client :	**CKY Incorporated**
Project No.:	**95G017**
Date Received:	**07-10-95**
Number of Samples:	**1**
Sample Type:	**Water**

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY NUMBER
95G017-01	507018-01A

Reviewed and Approved:

Michael C.C. Lu
Laboratory Director

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

Client: CKY Incorporated
Project: 95G017
Job No: 507018 **Date:** 07-12-95

Analysis: CDHS-Organic Lead

Sample ID: See below
Lab Job No.: See below
Sample Date: 07-10-95
Analysis Date: 07-11-95

Sample ID	Lab Sample ID	Results (ppm)	Detection Limit (mg/kg)
95G017	01A	<0.05	0.05

COMMENTS: 'ND' INDICATES THAT THE COMPOUND IS NOT DETECTED AT THE SPECIFIED LIMIT.

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/10/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	140	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	1.8	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	3.0	1
cis-1,2-Dichloroethene	17	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	2.8	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	106	76-114
Toluene-d8	98	88-110
Bromofluorobenzene	111	86-115

MDL: Method Detection Limit

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/10/95
CONTROL NO.:	GBL03-2	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/L)	MDL (ug/L)
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	101	76-114
Toluene-d8	99	88-110
Bromofluorobenzene	101	86-115

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 624
MATRIX: WATER

BATCH NO.: 95G017
SAMPLE ID: MIR-14-W-002
CONTROL NO.: G012-20M/S

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G012 95G017

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
1,1-DCE	ND	50.00	35.53	71	50.00	41.98	84	17
Benzene	ND	50.00	42.54	85	50.00	44.52	89	5
TCE	ND	50.00	44.68	89	50.00	46.06	92	3
Toluene	ND	50.00	41.61	83	50.00	43.59	87	5
Chlorobenzene	ND	50.00	44.43	89	50.00	45.73	91	3
QC LIMIT:								
1,1-DCE				61-145			61-145	14
Benzene				76-127			76-127	11
TCE				71-120			71-120	14
Toluene				76-125			76-125	13
Chlorobenzene				75-130			75-130	13

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 624
MATRIX: WATER

==========

BATCH NO.: 95G017
SAMPLE ID: LCS1W
CONTROL NO.: GLC3-2

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/10/95

ACCESSION: 95G012 95G017

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
1,1-DCE	20.00	15.12	76
Benzene	20.00	18.19	91
TCE	20.00	18.57	93
Toluene	20.00	18.42	92
Chlorobenzene	20.00	18.92	95

QC LIMIT:

1,1-DCE	61-145
Benzene	76-127
TCE	71-120
Toluene	76-125
Chlorobenzene	75-130

C K Y incorporated
Analytical Laboratories

Date: 08-15-1995
CKY Batch No.: 95G017A

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Additional Laboratory Report
Project: Red Line East Side Extension

Enclosed is the additional Laboratory report for samples received on 07/07/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-3C	G017-01	Water	Calcium Sodium Potassium Manganese Magnesium Iron

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Pang

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017A	DATE EXTRACTED:	08/09/95
SAMPLE ID:	DD-3C	DATE ANALYZED:	08/10/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Calcium	1000	259000
Iron	50	166
Magnesium	1000	83800
Manganese	10	2360
Potassium	2000	7570
Sodium	1000	181000

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G017A	DATE EXTRACTED:	08/09/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	08/10/95
CONTROL NO.:	IPH019WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Calcium	1000	ND
Iron	50	ND
Magnesium	1000	ND
Manganese	10	ND
Potassium	2000	ND
Sodium	1000	ND

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

BATCH NO.: 95G017A
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: IPH019WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Calcium	ND	50000	50876	102	50000	53014	106	4
Iron	ND	5000	5148	103	5000	5306	106	3
Magnesium	ND	50000	49280	99	50000	51043	102	4
Manganese	ND	1000	1031	103	1000	1067	107	3
Potassium	ND	50000	47862	96	50000	48606	97	2
Sodium	ND	50000	47515	95	50000	47674	95	0
QC LIMIT:				75-125			75-125	20

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

==========

BATCH NO.: 95G017A
SAMPLE ID: IWTPBP132
CONTROL NO.: H045-03

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE RESULT (ug/L)	DUP SAMPLE RESULT (ug/L)	RPD RESULT (%)
Calcium	53100	54400	2
Iron	140	137	2
Magnesium	25600	26800	4
Manganese	ND	ND	0
Potassium	2420	2590	7
Sodium	8740	9640	10
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

BATCH NO.: 95G017A
SAMPLE ID: IWTPBP132
CONTROL NO.: H045-03

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE RESULT (ug/L)	SPIKE CONC. (ug/L)	SPIKE RESULT (ug/L)	SPIKE RECRY. (%)
Calcium	53100	50000	104059	102
Iron	140	5000	4954	99
Magnesium	25600	50000	74388	98
Manganese	ND	1000	975	98
Potassium	2420	50000	50137	96
Sodium	8740	50000	54623	92

QC LIMIT: 75-125

C K Y incorporated
Analytical Laboratories

Date: 08-17-1995

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Red Line East Side Extension

Enclosed is the tentatively identified compounds (EPA Method 624) for the following samples:

Sample ID	Control No.
DD-3C	G017-01
DD3C-1	G050-01
DD3C-2	G050-02

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, PH.D.
Laboratory Director

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 624
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/07/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/07/95
BATCH NO.:	95G017	DATE EXTRACTED:	NA
SAMPLE ID:	DD-3C	DATE ANALYZED:	07/10/95
CONTROL NO.:	G017-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	R.T. (ug/L)	Est. Conc. (ug/L)
1-Methyl ethylbenzene	12.27	6.0
Octamethyl cyclotetrasiloxane	13.94	11
1,1,1-Trimethyl-N-[2-(trimethylsilyl) oxy]-2-[4-(trimethylsilyl)oxy]phenyl] ethyl]-silanamine	18.43	5.0
(1-methyl-2-cyclopropen-1-yl)-benzene	19.59	9.0
Azulene	20.53	11
Carbon Disulfide	1.54	62

EPA METHOD 624
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-1	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	R.T. (ug/L)	Est. Conc. (ug/L)
Octamethyl, cylotetrasiloxane	14.91	75
1,2,3-trimethyl benzene	15.66	65
1,2,3-trimethyl benzene	16.63	75
Cyclopropylbenzene	17.00	50
1-propyl benzene	17.54	500
1,2-dihydronaphthalene	20.39	55
1-phenyl-1-butyne	20.66	60
Azulene	21.75	490
Benzo (b) ehiophene	21.91	80

EPA METHOD 624
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-2	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-02	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	10

PARAMETERS	R.T. (ug/L)	Est. Conc. (ug/L)
Octamethyl, cylotetrasiloxane	14.91	35
1,2,3-trimethyl benzene	15.66	110
1-ethyl-4-methyl benzene	16.63	90
1-propyl benzene	17.54	85
Benzocycloheptatriene	18.94	150
Benzocycloheptatriene	20.01	310
1,2-dihydronaphthalene	20.44	80
1-phenyl-1-butyne	20.71	90
Naphthalene	21.62	730

C K Y incorporated
Analytical Laboratories

Date: 08-15-1995
CKY Batch No.: 95G050A

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Additional Laboratory Report
Project: Red Line East Side Extension

Enclosed is the additional Laboratory report for samples received on 07/17/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD3C-1	G050-01	Water	Calcium
			Sodium
			Potassium
			Manganese
			Magnesium
			Iron
DD3C-2	G050-02	Water	Calcium
			Sodium
			Potassium
			Manganese
			Magnesium
			Iron

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Pang

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

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EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050A	DATE EXTRACTED:	08/09/95
SAMPLE ID:	DD3C-1	DATE ANALYZED:	08/10/95
CONTROL NO.:	G050-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Calcium	1000	239000
Iron	50	ND
Magnesium	1000	75000
Manganese	10	1760
Potassium	2000	6480
Sodium	1000	244000

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050A	DATE EXTRACTED:	08/09/95
SAMPLE ID:	DD3C-2	DATE ANALYZED:	08/10/95
CONTROL NO.:	G050-02	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Calcium	1000	214000
Iron	50	62.3
Magnesium	1000	69800
Manganese	10	1560
Potassium	2000	6530
Sodium	1000	252000

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G050A	DATE EXTRACTED:	08/09/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	08/10/95
CONTROL NO.:	IPH019WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETER	DET LIMIT (ug/L)	RESULT (ug/L)
Calcium	1000	ND
Iron	50	ND
Magnesium	1000	ND
Manganese	10	ND
Potassium	2000	ND
Sodium	1000	ND

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

==========

BATCH NO.: 95G050A
SAMPLE ID: LCS1W/LCS1WD
CONTROL NO.: IPH019WL/C

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
Calcium	ND	50000	50876	102	50000	53014	106	4
Iron	ND	5000	5148	103	5000	5306	106	3
Magnesium	ND	50000	49280	99	50000	51043	102	4
Manganese	ND	1000	1031	103	1000	1067	107	3
Potassium	ND	50000	47862	96	50000	48606	97	2
Sodium	ND	50000	47515	95	50000	47674	95	0
QC LIMIT:				75-125			75-125	20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

BATCH NO.: 95G050A
SAMPLE ID: IWTPBP132
CONTROL NO.: H045-03

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE RESULT (ug/L)	SPIKE CONC. (ug/L)	SPIKE RESULT (ug/L)	SPIKE RECRY. (%)
Calcium	53100	50000	104059	102
Iron	140	5000	4954	99
Magnesium	25600	50000	74388	98
Manganese	ND	1000	975	98
Potassium	2420	50000	50137	96
Sodium	8740	50000	54623	92

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 3005/6010
MATRIX: WATER

==========

BATCH NO.: 95G050A
SAMPLE ID: IWTPBP132
CONTROL NO.: H045-03

DATE RECEIVED: NA
DATE EXTRACTED: 08/09/95
DATE ANALYZED: 08/10/95

ACCESSION: 95G017 95G050 95H045

PARAMETER	SAMPLE RESULT (ug/L)	DUP SAMPLE RESULT (ug/L)	RPD RESULT (%)
Calcium	53100	54400	2
Iron	140	137	2
Magnesium	25600	26800	4
Manganese	ND	ND	0
Potassium	2420	2590	7
Sodium	8740	9640	10

QC LIMIT: 20

C K Y incorporated
Analytical Laboratories

Date: 07-31-1995
CKY Batch No.: 95G050

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Red Line East Side Extension

Enclosed is the laboratory report for samples received on 07/17/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD3C-1	G050-01	Water	EPA 602
			EPA M8015
			Metals
			EPA 624
			EPA 625
			Sulfide
			Chloride
			Sulfate
			Bicarbonate
			Oil & Grease
			Organic Lead
DD3C-2	G050-02	Water	EPA 602
			EPA M8015
			Metals
			EPA 624
			EPA 625
			Sulfide
			Chloride
			Sulfate
			Bicarbonate
			Oil & Grease
			Organic Lead

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 300
CHLORIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/21/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD3C-1	G050-01	259	100	20
DD3C-2	G050-02*	271	100	20
MBLK1W	ICG007WB	ND	1	.2

MDL : Method Detection Limit
* : Collected on 07/16/95

EPA METHOD 300
SULFATE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/21/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD3C-1	G050-01	385	100	100
DD3C-2	G050-02*	340	100	100
MBLK1W	ICG007WB	ND	1	1

MDL : Method Detection Limit
* : Collected on 07/16/95

CKY QUALITY CONTROL DATA
MATRIX SPIKE ANALYSIS

LIENT: Earth Technology Corp.
ROJECT: Red Line East Side Extension
D: EPA 300
X: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: PTX09-2072-2000-RB DATE EXTRACTED: NA
ONTROL NO.: G060-11 DATE ANALYZED: 07/21/95

CCESSION: 95G040 95G050 95G060

rameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	MS CONC (mg/L)	MS % REC
lfate	ND	10.00	11.91	119
loride	ND	2.00	2.25	113
LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

LIENT: Earth Technology Corp.
R[illegible]ECT: Red Line East Side Extension
[illegible]D: EPA 300
[illegible]X: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: LCS1/LCS1S DATE EXTRACTED: NA
ONTROL NO.: ICG007WL/C DATE ANALYZED: 07/21/95

CCESSION: 95G045 95G050 95G060

arameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
ulfate	ND	123	126	103	123	125	102	1
hloride	ND	141	148	105	141	147	105	1
C LIMIT:				85-115			85-115	20

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	07/18/95
SAMPLE ID:	DD3C-1	DATE ANALYZED:	07/18/95
CONTROL NO.:	G050-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	148
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7471 on 07/25/95

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	07/18/95
SAMPLE ID:	DD3C-2	DATE ANALYZED:	07/18/95
CONTROL NO.:	G050-02	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	148
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7471 on 07/27/95

EPA METHOD 3005/6010
METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G050	DATE EXTRACTED:	07/18/95
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/18/95
CONTROL NO.:	IPG010WB	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (ug/L)	RESULT (ug/L)
Antimony	60	ND
Arsenic	100	ND
Barium	10	ND
Beryllium	5	ND
Cadmium	5	ND
Chromium	10	ND
Cobalt	10	ND
Copper	10	ND
Lead	100	ND
Mercury^	.2	ND
Molybdenum	50	ND
Nickel	20	ND
Selenium	200	ND
Silver	10	ND
Thallium	500	ND
Vanadium	10	ND
Zinc	10	ND

NOTE:
^ Analyzed by EPA Method 7471 on 07/25/95

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

LIENT: Earth Technology Corp.
ROJECT: Red Line East Side Extension
E D: EPA 3005/6010
A X: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: IWTPAS099 DATE EXTRACTED: 07/18/95
ONTROL NO.: G043-03M DATE ANALYZED: 07/18/95

CCESSION: 95G043 95G050

ARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
ıtimony	ND	500	480.45	96	500	494.94	98	3
rsenic	ND	1000	1001.95	100	1000	1012.10	101	1
ırium	ND	1000	986.72	99	1000	1009.77	101	2
eryllium	ND	1000	986.90	99	1000	1010.18	101	2
ıdmium	ND	1000	971.20	97	1000	997.05	100	3
ıromium	ND	1000	971.65	97	1000	997.82	100	3
obalt	ND	1000	983.42	98	1000	1008.79	101	3
opper	ND	1000	967.11	97	1000	992.28	99	3
ead	ND	1000	1024.46	102	1000	1062.21	106	4
ercury^	ND	5.0	4.80	96	5.0	4.90	98	2
olybdenum	ND	1000	972.29	97	1000	1006.79	101	3
ickel	ND	1000	1008.52	101	1000	1010.35	101	0
elenium	ND	1000	989.19	99	1000	1005.56	101	2
ilver	ND	1000	981.85	98	1000	1008.60	101	3
hallium	ND	1000	1031.19	103	1000	1094.24	109	6
anadium	ND	1000	976.08	98	1000	1005.25	101	3
inc	22.90	1000	988.21	97	1000	1010.10	99	2

Analyzed by EPA Method 7471 on 07/25/95, using control no. G075-04 for matrix spike.

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

T: Earth Technology Corp.
ECT: Red Line East Side Extension
ETHOD: EPA 3005/6010
ATRIX: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/18/95
ONTROL NO.: IPG010WL/C DATE ANALYZED: 07/18/95

CCESSION: 95G043 95G050

ARAMETER	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
ntimony	ND	500	483.11	96	500	504.11	100	4
rsenic	ND	1000	1027.03	103	1000	996.93	100	3
arium	ND	1000	1019.16	102	1000	1024.68	102	1
eryllium	ND	1000	1029.00	103	1000	1031.72	103	0
admium	ND	1000	996.89	100	1000	1002.70	100	1
hromium	ND	1000	1005.09	101	1000	1004.11	100	0
obalt	ND	1000	1019.67	102	1000	1020.91	102	0
opper	ND	1000	1001.18	100	1000	998.84	100	0
ead	ND	1000	1093.17	109	1000	1065.86	107	3
ercury^	ND	4.90	4.50	92	4.90	4.45	91	1
olybdenum	ND	1000	997.73	100	1000	1014.08	101	2
ickel	ND	1000	1047.35	105	1000	1054.58	105	1
elenium	ND	1000	1050.66	105	1000	1056.13	106	1
i er	ND	1000	1015.52	102	1000	1014.63	101	0
ium	ND	1000	1135.64	114	1000	1094.18	109	4
ium	ND	1000	1009.02	101	1000	1021.85	102	1
inc	ND	1000	993.95	99	1000	1000.52	100	1

OTE:
Analyzed by EPA Method 7471 on 07/25/95

EPA METHOD 310.1
BICARBONATE ALKALINITY

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/24/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD3C-1	G050-01	648	1	10
DD3C-2	G050-02	485	1	10
MBLK1W	ALG002WB	ND	1	10
MBLK2W	ALG003WB	ND	1	10

MDL: Method Detection Limit
DATE COLLECTED: 07/16/95, for G050-02
DATE ANALYZED: 07/28/95, for G050-02 and ALG003WB

CKY QUALITY CONTROL DATA
MATRIX SPIKE ANALYSIS

NT: Earth Technology Corp.
CT: Red Line East Side Extension
OD: EPA 310.1
ATRIX: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: G065-13 DATE EXTRACTED: NA
ONTROL NO.: G065-13 DATE ANALYZED: 07/24/95

CCESSION: 95G050 95G065

arameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	MS CONC (mg/L)	MS % REC
kalinity	114	180	292	99
LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

ENT: Earth Technology Corp.
JECT: Red Line East Side Extension
METHOD: EPA 310.1
MATRIX: WATER

==========

BATCH NO.: 95G050
SAMPLE ID: LCS1W
CONTROL NO.: ALG002WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/24/95

ACCESSION: 95G050 95G065

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Alkalinity	146	133	91
QC LIMIT:			85-115

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 310.1
MATRIX: WATER

==========

BATCH NO.: 95G050
SAMPLE ID: G065-13
CONTROL NO.: G065-13

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/24/95

ACCESSION: 95G050 95G065

PARAMETER	Sample (mg/L)	Dup. Sample (mg/L)	RPD (%)
Alkalinity	114	116	2
QC LIMIT:			20

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 310.1
MATRIX: WATER

==========

BATCH NO.:	95G050	DATE RECEIVED:	NA
SAMPLE ID:	LCS2W	DATE EXTRACTED:	NA
CONTROL NO.:	ALG003WL	DATE ANALYZED:	07/28/95

ACCESSION: 95G050 95G065

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Alkalinity	146	155	106
QC LIMIT:			85-115

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

NT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
ROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
ATCH NO.:	95G050	DATE EXTRACTED:	07/20/95
ATRIX:	WATER	DATE ANALYZED:	07/21/95

AMPLE ID	CONTROL NO	RESULT (mg/L)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MDL (mg/L)
D3C-1	G050-01	4.9	C9-C24	79	134	1	.05
D3C-2	G050-02	5.6	C9-C24	93	147	1	.05
BLK1W	DSG010WB	ND	N.A.	80	77	1	.05
C LIMIT:				65-135	60-140		

URR1 : Bromobenzene
URR2 : Hexacosane
DL : Method Detection Limit
ATE COLLECTED: 07/16/95, for G050-02
OTE : Hydrocarbon in these samples were not fuel like but was calibrated against diesel.

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

T: Earth Technology Corp.
CT: Red Line East Side Extension
OD: EPA M8015
ATRIX: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/20/95
ONTROL NO.: DSG010WL/C DATE ANALYZED: 07/21/95

CCESSION: 95G050 95G052 95G057 95G061

arameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
IESEL	ND	1.00	0.86	86	1.00	0.75	75	14
C LIMIT:				60-140			60-140	40

EPA METHOD 376.1
TOTAL SULFIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
MATRIX:	WATER	DATE ANALYZED:	07/26/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD3C-1	G050-01	45.66	1	.2
DD3C-2	G050-02	53.80	1	.2
MBLK1W	SDG002WB	ND	1	.2

MDL : Method Detection Limit
DATE COLLECTED: 07/16/95, for G050-02

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 376.1
MATRIX: WATER

==========

BATCH NO.: 95G050
SAMPLE ID: LCS1W
CONTROL NO.: SDG002WL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/26/95

ACCESSION: 95G050

PARAMETER	TRUE VALUE (mg/L)	FOUND VALUE (mg/L)	LCS RECOVERY (%)
Sulfide	817	770	94
QC LIMIT:			85-115

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Red Line East Side Extension
METHOD: EPA 376.1
MATRIX: WATER

==========

BATCH NO.: 95G050
SAMPLE ID: DD3C-2
CONTROL NO.: G050-02

DATE RECEIVED: 07/17/95
DATE EXTRACTED: NA
DATE ANALYZED: 07/26/95

ACCESSION: 95G050

PARAMETER	Sample (mg/L)	Dup. Sample (mg/L)	RPD (%)
Sulfide	45.66	45.48	0
QC LIMIT:			20

CKY QUALITY CONTROL DATA
MATRIX SPIKE ANALYSIS

T: Earth Technology Corp.
CT: Red Line East Side Extension
OD: EPA 376.1
TRIX: WATER

TCH NO.: 95G050 DATE RECEIVED: 07/17/95
MPLE ID: DD3C-1 DATE EXTRACTED: NA
NTROL NO.: G050-01 DATE ANALYZED: 07/26/95

CESSION: 95G050

rameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	MS CONC (mg/L)	MS % REC
lfide	45.66	4.10	49.27	88
LIMIT:				75-125

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-1	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	290	1
Toluene	31	1
Ethylbenzene	350	1
Total Xylenes	230^	150

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	99	65-135

MDL: Method Detection Limit
^ : Dilution factor, 50
Confirmed by GC/MS

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-2	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-02	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	310	1
Toluene	40	1
Ethylbenzene	290	1
Total Xylenes	280	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	118	65-135

MDL: Method Detection Limit
Confirmed by GC/MS

EPA METHOD 602
BTEX

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/19/95
CONTROL NO.:	VAG0712B	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1
Total Xylenes	ND	3

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Bromofluorobenzene	75	65-135

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

T: Earth Technology Corp.
CT: Red Line East Side Extension
ETHOD: EPA 602
ATRIX: WATER

==========

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: 95-07-12-T2-L2A DATE EXTRACTED: NA
ONTROL NO.: G033-05 DATE ANALYZED: 07/19/95

CCESSION: 95G050 95G033 95G057

arameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	MS CONC (ug/L)	MS % REC	SPIKE ADDED (ug/L)	MSD CONC (ug/L)	MSD % REC	% RPD
enzene	11.80	50.00	53.40	83	50.00	51.00	78	6
oluene	1.90	50.00	45.70	88	50.00	43.90	84	4
thylbenzene	2.30	50.00	48.70	93	50.00	53.80	103	10
otal Xylenes	4	150	165	107	150	165	107	0
C LIMIT:				65-135			65-135	30

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

ENT: Earth Technology Corp.
JECT: Red Line East Side Extension
HOD: EPA 602
MATRIX: WATER

==========

BATCH NO.: 95G050
SAMPLE ID: LCS1W
CONTROL NO.: VAG0712L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 07/19/95

ACCESSION: 95G033 95G050 95G057

PARAMETER	TRUE VALUE (ug/L)	FOUND VALUE (ug/L)	LCS RECOVERY (%)
Benzene	50.00	43.30	87
Toluene	50.00	43.80	88
Ethylbenzene	50.00	43.80	88
Total Xylenes	150	131	87
QC LIMIT:			70-125

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

::	Earth Technology Corp.	DATE COLLECTED:	07/15/95
CT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
TCH NO.:	95G050	DATE EXTRACTED:	07/19/95
MPLE ID:	DD3C-1	DATE ANALYZED:	07/20/95
NTROL NO.:	G050-01	MATRIX:	WATER
MOISTURE:	NA	DILUTION FACTOR:	1

RAMETERS	RESULT (ug/L)	RL	PARAMETERS	RESULT (ug/L)	RL
Nitrosodimethylamine	ND	10	3-Nitroaniline	ND	25
ridine	ND	10	Acenaphthene	ND	10
iline	ND	10	2,4-Dinitrophenol	ND	25
enol	ND	10	4-Nitrophenol	ND	25
s(2-Chloroethyl)ether	ND	10	Dibenzofuran	ND	10
Chlorophenol	ND	10	2,4-Dinitrotoluene	ND	10
3-Dichlorobenzene	ND	10	Diethylphthalate	ND	10
4-Dichlorobenzene	ND	10	4-Chlorophenyl-phenylether	ND	10
nzyl Alcohol	ND	10	Fluorene	ND	10
2-Dichlorobenzene	ND	10	1,2-Diphenylhydrazine	ND	25
Methylphenol	ND	10	4-Nitroaniline	ND	25
2'-oxybis(1-Chloropropane)	ND	10	4,6-Dinitro-2-methylphenol	ND	25
Methylphenol (2)	ND	10	N-Nitrosodiphenylamine (1)	ND	10
Nitroso-di-n-propylamine	ND	10	4-Bromophenyl-phenylether	ND	10
xachloroethane	ND	10	Hexachlorobenzene	ND	10
trobenzene	ND	10	Pentachlorophenol	ND	25
ophorone	ND	10	Benzidine	ND	25
Nitrophenol	ND	10	Phenanthrene	ND	10
4-Dimethylphenol	ND	10	Anthracene	ND	10
nzoic Acid	ND	25	Carbazole	ND	10
Chloroethoxy)methane	ND	10	Di-n-butylphthalate	ND	10
chlorophenol	ND	10	Fluoranthene	ND	10
2, Trichlorobenzene	ND	10	4,4'-Methylene Dianiline	ND	25
phthalene	3100~	200	Pyrene	ND	10
Chloroaniline	ND	10	Bisphenol-A	ND	10
xachloro-1,3-butadiene	ND	10	Butylbenzylphthalate	ND	10
Chloro-3-methylphenol	ND	10	3,3'-Dichlorobenzidine	ND	10
Methylnaphthalene	71	10	Benzo(a)anthracene	ND	10
xachlorocyclopentadiene	ND	10	Chrysene	ND	10
,6-Trichlorophenol	ND	10	bis(2-Ethylhexyl)phthalate	ND	10
,5-Trichlorophenol	ND	25	Di-n-octylphthalate	ND	10
Chloronaphthalene	ND	10	Benzo(b)fluoranthene	ND	10
Chloronaphthalene	ND	10	Benzo(k)fluoranthene	ND	10
Nitroaniline	ND	25	Benzo(a)pyrene	ND	10
ethylphthalate	ND	10	Indeno(1,2,3-cd)pyrene	ND	10
naphthylene	ND	10	Dibenzo(a,h)anthracene	ND	10
-Dinitrotoluene	ND	10	Benzo(g,h,i)perylene	ND	10

ROGATE PARAMETER	% RECOVERY	QC LIMIT
trobenzene-d5	120+	35-114
luorobiphenyl	70	43-116
phenyl-d14	46	33-141
nol-d5	36	10-94
luorophenol	43	21-110
,6-Tribromophenol	87	10-123

: Reporting Limit
: Cannot be separated from Diphenylamine
: Cannot be separated from 3-Methylphenol
lution factor, 20
t of QC limits

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

LIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
ECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
I NO.:	95G050	DATE EXTRACTED:	07/19/95
PLE ID:	DD3C-2	DATE ANALYZED:	07/20/95
ONTROL NO.:	G050-02	MATRIX:	WATER
MOISTURE:	NA	DILUTION FACTOR:	1

ARAMETERS	RESULT	(ug/L) RL	PARAMETERS	RESULT	(ug/L) RL
-Nitrosodimethylamine	ND	(10)	3-Nitroaniline	ND	(25)
yridine	ND	(10)	Acenaphthene	ND	(10)
niline	ND	(10)	2,4-Dinitrophenol	ND	(25)
henol	ND	(10)	4-Nitrophenol	ND	(25)
is(2-Chloroethyl)ether	ND	(10)	Dibenzofuran	ND	(10)
-Chlorophenol	ND	(10)	2,4-Dinitrotoluene	ND	(10)
,3-Dichlorobenzene	ND	(10)	Diethylphthalate	ND	(10)
,4-Dichlorobenzene	ND	(10)	4-Chlorophenyl-phenylether	ND	(10)
enzyl Alcohol	ND	(10)	Fluorene	ND	(10)
,2-Dichlorobenzene	ND	(10)	1,2-Diphenylhydrazine	ND	(25)
-Methylphenol	ND	(10)	4-Nitroaniline	ND	(25)
,2'-oxybis(1-Chloropropane)	ND	(10)	4,6-Dinitro-2-methylphenol	ND	(25)
-Methylphenol (2)	ND	(10)	N-Nitrosodiphenylamine (1)	ND	(10)
-Nitroso-di-n-propylamine	ND	(10)	4-Bromophenyl-phenylether	ND	(10)
exachloroethane	ND	(10)	Hexachlorobenzene	ND	(10)
itrobenzene	ND	(10)	Pentachlorophenol	ND	(25)
sophorone	ND	(10)	Benzidine	ND	(25)
-Nitrophenol	ND	(10)	Phenanthrene	ND	(10)
,4-Dimethylphenol	ND	(10)	Anthracene	ND	(10)
enzoic Acid	ND	(25)	Carbazole	ND	(10)
is(2-Chloroethoxy)methane	ND	(10)	Di-n-butylphthalate	ND	(10)
,4-Dichlorophenol	ND	(10)	Fluoranthene	ND	(10)
-Trichlorobenzene	ND	(10)	4,4'-Methylene Dianiline	ND	(25)
naiene	2400~	(200)	Pyrene	ND	(10)
-Chloroaniline	ND	(10)	Bisphenol-A	ND	(10)
exachloro-1,3-butadiene	ND	(10)	Butylbenzylphthalate	ND	(10)
-Chloro-3-methylphenol	ND	(10)	3,3'-Dichlorobenzidine	ND	(10)
-Methylnaphthalene	90	(10)	Benzo(a)anthracene	ND	(10)
exachlorocyclopentadiene	ND	(10)	Chrysene	ND	(10)
,4,6-Trichlorophenol	ND	(10)	bis(2-Ethylhexyl)phthalate	ND	(10)
,4,5-Trichlorophenol	ND	(25)	Di-n-octylphthalate	ND	(10)
-Chloronaphthalene	ND	(10)	Benzo(b)fluoranthene	ND	(10)
-Chloronaphthalene	ND	(10)	Benzo(k)fluoranthene	ND	(10)
-Nitroaniline	ND	(25)	Benzo(a)pyrene	ND	(10)
imethylphthalate	ND	(10)	Indeno(1,2,3-cd)pyrene	ND	(10)
enaphthylene	ND	(10)	Dibenzo(a,h)anthracene	ND	(10)
6-Dinitrotoluene	ND	(10)	Benzo(g,h,i)perylene	ND	(10)

JRROGATE PARAMETER	% RECOVERY	QC LIMIT
itrobenzene-d5	140+	35-114
-Fluorobiphenyl	70	43-116
erphenyl-d14	46	33-141
henol-d5	37	10-94
-Fluorophenol	46	21-110
4,6-Tribromophenol	85	10-123

: Reporting Limit
): Cannot be separated from Diphenylamine
): Cannot be separated from 3-Methylphenol
: Dilution factor, 20
Out of QC criteria

EPA METHOD 625
SEMI VOLATILE ORGANICS BY GC/MS

LIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
CT:	Red Line East Side Extension	DATE RECEIVED:	NA
A NO.:	95G050	DATE EXTRACTED:	07/19/95
AMPLE ID:	MBLK1W	DATE ANALYZED:	07/19/95
ONTROL NO.:	SVG011WB	MATRIX:	WATER
MOISTURE:	NA	DILUTION FACTOR:	1

ARAMETERS	RESULT	(ug/L) RL	PARAMETERS	RESULT	(ug/L) RL
-Nitrosodimethylamine	ND	(10)	3-Nitroaniline	ND	(25)
ridine	ND	(10)	Acenaphthene	ND	(10)
iline	ND	(10)	2,4-Dinitrophenol	ND	(25)
enol	ND	(10)	4-Nitrophenol	ND	(25)
s(2-Chloroethyl)ether	ND	(10)	Dibenzofuran	ND	(10)
-Chlorophenol	ND	(10)	2,4-Dinitrotoluene	ND	(10)
3-Dichlorobenzene	ND	(10)	Diethylphthalate	ND	(10)
4-Dichlorobenzene	ND	(10)	4-Chlorophenyl-phenylether	ND	(10)
enzyl Alcohol	ND	(10)	Fluorene	ND	(10)
2-Dichlorobenzene	ND	(10)	1,2-Diphenylhydrazine	ND	(25)
-Methylphenol	ND	(10)	4-Nitroaniline	ND	(25)
2'-oxybis(1-Chloropropane)	ND	(10)	4,6-Dinitro-2-methylphenol	ND	(25)
-Methylphenol (2)	ND	(10)	N-Nitrosodiphenylamine (1)	ND	(10)
-Nitroso-di-n-propylamine	ND	(10)	4-Bromophenyl-phenylether	ND	(10)
exachloroethane	ND	(10)	Hexachlorobenzene	ND	(10)
trobenzene	ND	(10)	Pentachlorophenol	ND	(25)
ophorone	ND	(10)	Benzidine	ND	(25)
-Nitrophenol	ND	(10)	Phenanthrene	ND	(10)
4-Dimethylphenol	ND	(10)	Anthracene	ND	(10)
enzoic Acid	ND	(25)	Carbazole	ND	(10)
s(2-Chloroethoxy)methane	ND	(10)	Di-n-butylphthalate	ND	(10)
ichlorophenol	ND	(10)	Fluoranthene	ND	(10)
Trichlorobenzene	ND	(10)	4,4'-Methylene Dianiline	ND	(25)
halene	ND	(10)	Pyrene	ND	(10)
-Chloroaniline	ND	(10)	Bisphenol-A	ND	(10)
exachloro-1,3-butadiene	ND	(10)	Butylbenzylphthalate	ND	(10)
Chloro-3-methylphenol	ND	(10)	3,3'-Dichlorobenzidine	ND	(10)
-Methylnaphthalene	ND	(10)	Benzo(a)anthracene	ND	(10)
exachlorocyclopentadiene	ND	(10)	Chrysene	ND	(10)
4,6-Trichlorophenol	ND	(10)	bis(2-Ethylhexyl)phthalate	ND	(10)
4,5-Trichlorophenol	ND	(25)	Di-n-octylphthalate	ND	(10)
Chloronaphthalene	ND	(10)	Benzo(b)fluoranthene	ND	(10)
Chloronaphthalene	ND	(10)	Benzo(k)fluoranthene	ND	(10)
Nitroaniline	ND	(25)	Benzo(a)pyrene	ND	(10)
methylphthalate	ND	(10)	Indeno(1,2,3-cd)pyrene	ND	(10)
enaphthylene	ND	(10)	Dibenzo(a,h)anthracene	ND	(10)
6-Dinitrotoluene	ND	(10)	Benzo(g,h,i)perylene	ND	(10)

RROGATE PARAMETER	% RECOVERY	QC LIMIT
trobenzene-d5	79	35-114
Fluorobiphenyl	81	43-116
rphenyl-d14	46	33-141
enol-d5	48	10-94
Fluorophenol	56	21-110
4,6-Tribromophenol	92	10-123

: Reporting Limit
): Cannot be separated from Diphenylamine
): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

LIENT: Earth Technology Corp.
CT: Red Line East Side Extension
D: EPA 625
X: WATER

TCH NO.: 95G050 DATE RECEIVED: NA
MPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/19/95
NTROL NO.: SVG011WL/C DATE ANALYZED: 07/19/95

CCESSION: 95G050 95G043

rameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
enol	ND	150	60	40	150	61	41	2
Chlorophenol	ND	150	89	59	150	90	60	1
4-DCB	ND	100	59	59	100	61	61	3
Nitroso-di-n	ND	100	65	65	100	67	67	3
2,4-TCB	ND	100	67	67	100	69	69	3
Chl-3-Methy	ND	150	98	65	150	98	65	0
enaphthene	ND	100	67	67	100	67	67	0
Nitrophenol	ND	150	17	11	150	16	11	6
4-Dinitrotol	ND	100	73	73	100	74	74	1
ntachlorophe	ND	150	120	80	150	118	79	2
rene	ND	100	61	61	100	62	62	2

LIMIT:

enol	12-110	12-110	42
Chlorophenol	27-123	27-123	40
CB	36-97	36-97	28
roso-di-n	41-116	41-116	38
TCB	39-98	39-98	28
Chl-3-Methyl	23-97	23-97	42
enaphthene	46-118	46-118	31
Nitrophenol	10-80	10-80	50
4-Dinitrotol	24-96	24-96	38
ntachlorophe	9-103	9-103	50
rene	26-127	26-127	31

EPA METHOD 413.2
OIL & GREASE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
LATCH NO.:	95G050	DATE EXTRACTED:	07/20/95
MATRIX:	WATER	DATE ANALYZED:	07/22/95

SAMPLE ID	CONTROL NO	RESULT (mg/L)	DILUTION FACTOR	MDL (mg/L)
DD3C-1	G050-01	ND	1	1
DD3C-2	G050-02	ND	1	1
MBLK1W	OGG007WB	ND	1	1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

LIENT: Earth Technology Corp.
ECT: Red Line East Side Extension
D: EPA 413.2
X: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: 07/20/95
ONTROL NO.: OGG007WL/C DATE ANALYZED: 07/22/95

CCESSION: 95G050

arameter	SAMPLE CONC (mg/L)	SPIKE ADDED (mg/L)	LCS CONC (mg/L)	LCS % REC	SPIKE ADDED (mg/L)	LCSD CONC (mg/L)	LCSD % REC	% RPD
ROG	ND	150	159	106	150	164	109	3
C LIMIT:				75-125			75-125	

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/15/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-1	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-01	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	300	5
Bromodichloromethane	ND	5
Bromoform	ND	5
Bromomethane	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	10
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	5
Chloromethane	ND	10
Dichlorodifluoromethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	27	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	310	5
Methylene Chloride	ND	25
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	5
Toluene	30	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
Trichloroethene	ND	5
Trichlorofluoromethane	ND	5
Vinyl Chloride	23	5
Xylenes (total)	270	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
1,2-Dichlorobenzene	ND	5

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	92	76-114
Toluene-d8	93	88-110
Bromofluorobenzene	98	86-115

MDL: Method Detection Limit

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	07/16/95
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	07/17/95
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	DD3C-2	DATE ANALYZED:	07/19/95
CONTROL NO.:	G050-02	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	10

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	420	10
Bromodichloromethane	ND	10
Bromoform	ND	10
Bromomethane	ND	10
Carbon Tetrachloride	ND	10
Chlorobenzene	ND	10
Chlorodibromomethane	ND	10
Chloroethane	ND	20
2-Chloroethyl Vinyl Ether	ND	10
Chloroform	ND	10
Chloromethane	ND	20
Dichlorodifluoromethane	ND	10
1,1-Dichloroethane	ND	10
1,2-Dichloroethane	ND	10
1,1-Dichloroethene	ND	10
trans-1,2-Dichloroethene	ND	10
cis-1,2-Dichloroethene	40	10
1,2-Dichloropropane	ND	10
cis-1,3-Dichloropropene	ND	10
trans-1,3-Dichloropropene	ND	10
Ethylbenzene	460	10
Methylene Chloride	ND	50
1,1,2,2-Tetrachloroethane	ND	10
Tetrachloroethene	ND	10
Toluene	53	10
1,1,1-Trichloroethane	ND	10
1,1,2-Trichloroethane	ND	10
Trichloroethene	ND	10
Trichlorofluoromethane	ND	10
Vinyl Chloride	ND	10
Xylenes (total)	380	10
1,3-Dichlorobenzene	ND	10
1,4-Dichlorobenzene	ND	10
1,2-Dichlorobenzene	ND	10

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	94	76-114
Toluene-d8	95	88-110
Bromofluorobenzene	98	86-115

MDL: Method Detection Limit

EPA METHOD 624
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Red Line East Side Extension	DATE RECEIVED:	NA
BATCH NO.:	95G050	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1W	DATE ANALYZED:	07/19/95
CONTROL NO.:	GBL15-3	MATRIX:	WATER
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	results (ug/L)	MDL (ug/L)
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	1
Bromomethane	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	2
2-Chloroethyl Vinyl Ether	ND	1
Chloroform	ND	1
Chloromethane	ND	2
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
Methylene Chloride	ND	5
1,1,2,2-Tetrachloroethane	ND	1
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Trichloroethene	ND	1
Trichlorofluoromethane	ND	1
Vinyl Chloride	ND	1
Xylenes (total)	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	94	76-114
Toluene-d8	92	88-110
Bromofluorobenzene	99	86-115

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

LIENT: Earth Technology Corp.
ROJECT: Red Line East Side Extension
)D: EPA 624
X: WATER

ATCH NO.: 95G050 DATE RECEIVED: NA
AMPLE ID: LCS1W/LCS1WD DATE EXTRACTED: NA
ONTROL NO.: GBL21-3/22-3 DATE ANALYZED: 07/19/95

CCESSION: 95G050

arameter	SAMPLE CONC (ug/L)	SPIKE ADDED (ug/L)	LCS CONC (ug/L)	LCS % REC	SPIKE ADDED (ug/L)	LCSD CONC (ug/L)	LCSD % REC	% RPD
,1-DCE	ND	20.00	22.80	114	20.00	22.60	113	1
enzene	ND	20.00	23.20	116	20.00	21.00	105	10
CE	ND	20.00	25.10	126	20.00	22.40	112	11
oluene	ND	20.00	24.20	121	20.00	21.80	109	10
hlorobenzene	ND	20.00	25.20	126	20.00	22.40	112	12
C LIMIT:								
,1-DCE				61-145			61-145	14
enzene				76-127			76-127	11
CE				71-120			71-120	14
oluene				76-125			76-125	13
hlorobenzene				75-130			75-130	13

C K Y incorporated
Analytical Laboratories

Date: 08-07-1995
CKY Batch No.: 95G050

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Red Line East Side Extension

Enclosed is the laboratory report for samples received on 07/17/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD3C-1	G050-01	Water	Organic Lead
DD3C-2	G050-02	Water	Organic Lead

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

CERTIFICATE OF ANALYSIS

Job No. 507046 **Date:07-21-95**

This is the Certificate of Analysis for the following samples:

Client :	**CKY Incorporated**
Project No.:	**95G050**
Date Received:	**07-18-95**
Number of Samples:	**2**
Sample Type:	**Water**

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY NUMBER
95G050-01	507046-01A
95G050-02	507046-02A

Reviewed and Approved:

Michael C.C. Lu
Laboratory Director

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

Client: CKY Incorporated
Project: 95G050
Job No: 507046 **Date:**07-21-95

Analysis: CDHS-Organic Lead

Sample ID: See below
Lab Job No.: See below
Sample Date: 07-18-95
Analysis Date: 07-21-95

Sample ID	Lab Sample ID	Results (ppm)	Detection Limit (mg/kg)
95G050-01	01A	<0.05	0.05
95G050-02	02A	<0.05	0.05

COMMENTS:'ND' INDICATES THAT THE COMPOUND IS NOT DETECTED AT THE SPECIFIED LIMIT.

C K Y incorporated
Analytical Laboratories

Date: 12-27-1995
CKY Batch No.: 95L048

Attn.: Bill Lu

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Metro Redline Eastside Extens.

Enclosed is the Laboratory report for samples received on 12/07/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-2S,E-22	L048-01	Soil	EPA 5030/M8015 EPA 8260 EPA 8270
DD-2S,E-25	L048-02	Soil	EPA 5030/M8015 EPA 8260
DD-2S,E-36	L048-03	Soil	EPA 5030/M8015 EPA 8260

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA 5030/M8015
TOTAL PETROLEUM HYDROCARBONS BY PURGE & TRAP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/06/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/07/95
BATCH NO.:	95L048	DATE EXTRACTED:	NA
MATRIX:	SOIL	DATE ANALYZED:	12/14/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	% RECOVERY SURR	DL FACTOR	MDL (mg/kg)
DD-2S,E-22	L048-01	2.21	92	1	.5
DD-2S,E-25	L048-02	1.97	98	1	.5
DD-2S,E-36	L048-03	ND	69	1	.5
MBLK1S	VAL1414B	ND	98	1	.5

QC LIMIT: 60-140

SURR : Bromofluorobenzene
MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA M8015G
MATRIX: SOIL

BATCH NO.: 95L048 DATE RECEIVED: 12/07/95
SAMPLE ID: DD-2S,E-22 DATE EXTRACTED: NA
CONTROL NO.: L048-01 DATE ANALYZED: 12/14/95

ACCESSION: 95L047 95L048 95L050

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	MS CONC (mg/kg)	MS % REC	SPIKE ADDED (mg/kg)	MSD CONC (mg/kg)	MSD % REC	% RPD
Gasoline	2.21	5.00	7.02	96	5.00	7.42	104	8
QC LIMIT:				60-140			60-140	40

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA M8015G
MATRIX: SOIL

BATCH NO.: 95L048 DATE RECEIVED: NA
SAMPLE ID: LCS01/LCS01D DATE EXTRACTED: NA
CONTROL NO.: VAL1414L/C DATE ANALYZED: 12/14/95

ACCESSION: 95L047 95L048 95L050

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
Gasoline	ND	5.00	6.29	126	5.00	6.21	124	1
QC LIMIT:				70-125			70-125	40

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/06/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/07/95
BATCH NO.:	95L048	DATE EXTRACTED:	NA
SAMPLE ID:	DD-2S,E-22	DATE ANALYZED:	12/17/95
CONTROL NO.:	L048-01	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	50

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	250
Benzene	410	50
Bromodichloromethane	ND	50
Bromoform	ND	100
Bromomethane	ND	50
2-Butanone	ND	250
Carbon Disulfide	ND	50
Carbon Tetrachloride	ND	50
Chlorobenzene	ND	50
Chlorodibromomethane	ND	50
Chloroethane	ND	50
2-Chloroethyl Vinyl Ether	ND	250
Chloroform	ND	50
Chloromethane	ND	100
Dibromomethane	ND	50
Dichlorodifluoromethane	ND	50
1,1-Dichloroethane	ND	50
1,2-Dichloroethane	ND	50
1,1-Dichloroethene	ND	50
trans-1,2-Dichloroethene	ND	50
cis-1,2-Dichloroethene	ND	50
1,2-Dichloropropane	ND	50
cis-1,3-Dichloropropene	ND	50
trans-1,3-Dichloropropene	ND	50
Ethylbenzene	3800	50
2-Hexanone	ND	50
Methylene Chloride	ND	250
4-Methyl-2-pentanone	ND	50
Styrene	ND	50
1,1,2,2-Tetrachloroethane	ND	250
Tetrachloroethene	ND	50
Toluene	80	50
1,1,1-Trichloroethane	ND	50
1,1,2-Trichloroethane	ND	50
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	250
Trichloroethene	ND	50
Trichlorofluoromethane	ND	100
Vinyl Acetate	ND	250
Vinyl Chloride	ND	100
Xylenes (total)	32000	50

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	88	70-121
Toluene-d8	106	81-117
Bromofluorobenzene	99	74-121

MDL: Method Detection Limit

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/06/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/07/95
BATCH NO.:	95L048	DATE EXTRACTED:	NA
SAMPLE ID:	DD-2S,E-25	DATE ANALYZED:	12/13/95
CONTROL NO.:	L048-02	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	25
Benzene	160	5
Bromodichloromethane	ND	5
Bromoform	ND	10
Bromomethane	ND	5
2-Butanone	ND	25
Carbon Disulfide	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	5
2-Chloroethyl Vinyl Ether	ND	25
Chloroform	ND	5
Chloromethane	ND	10
Dibromomethane	ND	5
Dichlorodifluoromethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	800	5
2-Hexanone	ND	5
Methylene Chloride	ND	25
4-Methyl-2-pentanone	ND	5
Styrene	ND	5
1,1,2,2-Tetrachloroethane	ND	25
Tetrachloroethene	ND	5
Toluene	28	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	25
Trichloroethene	ND	5
Trichlorofluoromethane	ND	10
Vinyl Acetate	ND	25
Vinyl Chloride	ND	10
Xylenes (total)	660	5

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	104	70-121
Toluene-d8	109	81-117
Bromofluorobenzene	102	74-121

MDL: Method Detection Limit

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/06/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/07/95
BATCH NO.:	95L048	DATE EXTRACTED:	NA
SAMPLE ID:	DD-2S,E-36	DATE ANALYZED:	12/13/95
CONTROL NO.:	L048-03	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	110	70-121
Toluene-d8	117	81-117
Bromofluorobenzene	92	74-121

MDL: Method Detection Limit

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95L048	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1S	DATE ANALYZED:	12/13/95
CONTROL NO.:	VOL1603B	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	101	70-121
Toluene-d8	110	81-117
Bromofluorobenzene	102	74-121

MDL: Method Detection Limit

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95L048	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK2S	DATE ANALYZED:	12/17/95
CONTROL NO.:	VOL1903B	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	103	70-121
Toluene-d8	109	81-117
Bromofluorobenzene	102	74-121

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL

BATCH NO.: 95L048 DATE RECEIVED: NA
SAMPLE ID: 030-001-EX-014-018 DATE EXTRACTED: NA
CONTROL NO.: K128-20 DATE ANALYZED: 12/13/95

ACCESSION: 95K128 95L002 95L048 95L065

Parameter	SAMPLE CONC (ug/kg)	SPIKE ADDED (ug/kg)	MS CONC (ug/kg)	MS % REC	SPIKE ADDED (ug/kg)	MSD CONC (ug/kg)	MSD % REC	% RPD
1,1-DCE	ND	50.00	51.30	103	50.00	50.70	101	1
Benzene	ND	50.00	53.30	107	50.00	54.60	109	2
TCE	ND	50.00	50.50	101	50.00	52.70	105	4
Toluene	ND	50.00	57.40	115	50.00	59.30	119	3
Chlorobenzene	ND	50.00	55.70	111	50.00	56.60	113	2
QC LIMIT:								
1,1-DCE				59-172			59-172	22
Benzene				66-142			66-142	21
TCE				62-137			62-137	24
Toluene				59-139			59-139	21
Chlorobenzene				60-133			60-133	21

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL

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BATCH NO.: 95L048
SAMPLE ID: LCS1S
CONTROL NO.: VOL1603L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 12/13/95

ACCESSION: 95L048

PARAMETER	TRUE VALUE (ug/kg)	FOUND VALUE (ug/kg)	LCS RECOVERY (%)
1,1-DCE	20.00	20.20	101
Benzene	20.00	21.30	107
TCE	20.00	21.30	107
Toluene	20.00	22.80	114
Chlorobenzene	20.00	22.70	114

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL

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BATCH NO.: 95L048
SAMPLE ID: LCS2S
CONTROL NO.: VOL1903L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 12/17/95

ACCESSION: 95L048

PARAMETER	TRUE VALUE (ug/kg)	FOUND VALUE (ug/kg)	LCS RECOVERY (%)
1,1-DCE	20.00	24.60	123
Benzene	20.00	22.20	111
TCE	20.00	22.30	112
Toluene	20.00	23.50	118
Chlorobenzene	20.00	23.90	120

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/06/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/07/95
LAB NO.:	95L048	DATE EXTRACTED:	12/09/95
SAMPLE ID:	DD-2S,E-22	DATE ANALYZED:	12/15/95
CONTROL NO.:	L048-01	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	330	3-Nitroaniline	ND	800
Pyridine	ND	330	Acenaphthene	ND	330
Aniline	ND	330	2,4-Dinitrophenol	ND	800
Phenol	ND	330	4-Nitrophenol	ND	800
bis(2-Chloroethyl)ether	ND	330	Dibenzofuran	ND	330
2-Chlorophenol	ND	330	2,4-Dinitrotoluene	ND	330
1,3-Dichlorobenzene	ND	330	Diethylphthalate	ND	330
1,4-Dichlorobenzene	ND	330	4-Chlorophenyl-phenylether	ND	330
Benzyl Alcohol	ND	330	Fluorene	ND	330
1,2-Dichlorobenzene	ND	330	1,2-Diphenylhydrazine	ND	800
2-Methylphenol	ND	330	4-Nitroaniline	ND	800
2,2'-oxybis(1-Chloropropane)	ND	330	4,6-Dinitro-2-methylphenol	ND	800
4-Methylphenol (2)	ND	330	N-Nitrosodiphenylamine (1)	ND	330
N-Nitroso-di-n-propylamine	ND	330	4-Bromophenyl-phenylether	ND	330
Hexachloroethane	ND	330	Hexachlorobenzene	ND	330
Nitrobenzene	ND	330	Pentachlorophenol	ND	800
Isophorone	ND	330	Benzidine	ND	800
2-Nitrophenol	ND	330	Phenanthrene	ND	330
2,4-Dimethylphenol	ND	330	Anthracene	ND	330
Benzoic Acid	ND	800	Carbazole	ND	330
bis(2-Chloroethoxy)methane	ND	330	Di-n-butylphthalate	ND	330
2,4-Dichlorophenol	ND	330	Fluoranthene	ND	330
1,2,4-Trichlorobenzene	ND	330	4,4'-Methylene Dianiline	ND	800
Naphthalene	3300	330	Pyrene	ND	330
4-Chloroaniline	ND	330	Bisphenol-A	ND	330
Hexachloro-1,3-butadiene	ND	330	Butylbenzylphthalate	ND	330
4-Chloro-3-methylphenol	ND	330	3,3'-Dichlorobenzidine	ND	330
2-Methylnaphthalene	ND	330	Benzo(a)anthracene	ND	330
Hexachlorocyclopentadiene	ND	330	Chrysene	ND	330
2,4,6-Trichlorophenol	ND	330	bis(2-Ethylhexyl)phthalate	ND	330
2,4,5-Trichlorophenol	ND	800	Di-n-octylphthalate	ND	330
2-Chloronaphthalene	ND	330	Benzo(b)fluoranthene	ND	330
1-Chloronaphthalene	ND	330	Benzo(k)fluoranthene	ND	330
2-Nitroaniline	ND	800	Benzo(a)pyrene	ND	330
Dimethylphthalate	ND	330	Indeno(1,2,3-cd)pyrene	ND	330
Acenaphthylene	ND	330	Dibenzo(a,h)anthracene	ND	330
2,6-Dinitrotoluene	ND	330	Benzo(g,h,i)perylene	ND	330

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	44	23-120
2-Fluorobiphenyl	53	30-115
Terphenyl-d14	45	18-137
Phenol-d5	39	24-113
2-Fluorophenol	28	25-121
2,4,6-Tribromophenol	56	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95L048	DATE EXTRACTED:	12/09/95
SAMPLE ID:	MBLK1S	DATE ANALYZED:	12/15/95
CONTROL NO.:	SVL012SB	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	330	3-Nitroaniline	ND	800
Pyridine	ND	330	Acenaphthene	ND	330
Aniline	ND	330	2,4-Dinitrophenol	ND	800
Phenol	ND	330	4-Nitrophenol	ND	800
bis(2-Chloroethyl)ether	ND	330	Dibenzofuran	ND	330
2-Chlorophenol	ND	330	2,4-Dinitrotoluene	ND	330
1,3-Dichlorobenzene	ND	330	Diethylphthalate	ND	330
1,4-Dichlorobenzene	ND	330	4-Chlorophenyl-phenylether	ND	330
Benzyl Alcohol	ND	330	Fluorene	ND	330
1,2-Dichlorobenzene	ND	330	1,2-Diphenylhydrazine	ND	800
2-Methylphenol	ND	330	4-Nitroaniline	ND	800
2,2'-oxybis(1-Chloropropane)	ND	330	4,6-Dinitro-2-methylphenol	ND	800
4-Methylphenol (2)	ND	330	N-Nitrosodiphenylamine (1)	ND	330
N-Nitroso-di-n-propylamine	ND	330	4-Bromophenyl-phenylether	ND	330
Hexachloroethane	ND	330	Hexachlorobenzene	ND	330
Nitrobenzene	ND	330	Pentachlorophenol	ND	800
Isophorone	ND	330	Benzidine	ND	800
2-Nitrophenol	ND	330	Phenanthrene	ND	330
2,4-Dimethylphenol	ND	330	Anthracene	ND	330
Benzoic Acid	ND	800	Carbazole	ND	330
bis(2-Chloroethoxy)methane	ND	330	Di-n-butylphthalate	ND	330
2,4-Dichlorophenol	ND	330	Fluoranthene	ND	330
1,2,4-Trichlorobenzene	ND	330	4,4'-Methylene Dianiline	ND	800
Naphthalene	ND	330	Pyrene	ND	330
4-Chloroaniline	ND	330	Bisphenol-A	ND	330
Hexachloro-1,3-butadiene	ND	330	Butylbenzylphthalate	ND	330
4-Chloro-3-methylphenol	ND	330	3,3'-Dichlorobenzidine	ND	330
2-Methylnaphthalene	ND	330	Benzo(a)anthracene	ND	330
Hexachlorocyclopentadiene	ND	330	Chrysene	ND	330
2,4,6-Trichlorophenol	ND	330	bis(2-Ethylhexyl)phthalate	ND	330
2,4,5-Trichlorophenol	ND	800	Di-n-octylphthalate	ND	330
2-Chloronaphthalene	ND	330	Benzo(b)fluoranthene	ND	330
1-Chloronaphthalene	ND	330	Benzo(k)fluoranthene	ND	330
2-Nitroaniline	ND	800	Benzo(a)pyrene	ND	330
Dimethylphthalate	ND	330	Indeno(1,2,3-cd)pyrene	ND	330
Acenaphthylene	ND	330	Dibenzo(a,h)anthracene	ND	330
2,6-Dinitrotoluene	ND	330	Benzo(g,h,i)perylene	ND	330

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	56	23-120
2-Fluorobiphenyl	60	30-115
Terphenyl-d14	47	18-137
Phenol-d5	50	24-113
2-Fluorophenol	41	25-121
2,4,6-Tribromophenol	64	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8270
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95L048
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: SVL012SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 12/09/95
DATE ANALYZED: 12/15/95

ACCESSION: 95L047 95L048

PARAMETER	BLNK RSLT (ug/kg)	SPIKE AMT (ug/kg)	BS RSLT (ug/kg)	BS % REC	SPIKE AMT (ug/kg)	BSD RSLT (ug/kg)	BSD % REC	RPD %	QC LIMIT %	RPD LIMIT %
Phenol	ND	5000.00	2080.00	42	5000.00	2050.00	41	1	5-112	35
2-Chlorophenol	ND	5000.00	2210.00	44	5000.00	2180.00	44	1	23-134	50
1,4-Dichlorobenzene	ND	3330.00	1580.00	48	3330.00	1580.00	47	0	20-124	27
N-Nitroso-di-n-propyl.	ND	3330.00	1580.00	47	3330.00	1520.00	46	4	D-230	38
1,2,4-Trichlorobenzene	ND	3330.00	1780.00	54	3330.00	1810.00	54	2	44-142	23
4-Chloro-3-Methylphenol	ND	5000.00	2390.00	48	5000.00	2420.00	48	1	22-147	33
Acenaphthene	ND	3330.00	1730.00	52	3330.00	1740.00	52	1	47-145	19
4-Nitrophenol	ND	5000.00	2570.00	51	5000.00	2710.00	54	5	D-1320	50
2,4-Dinitrotoluene	ND	3330.00	1820.00	55	3330.00	1860.00	56	2	39-139	47
Pentachlorophenol	ND	5000.00	2450.00	49	5000.00	2610.00	52	6	14-179	47
Pyrene	ND	3330.00	1500.00	45	3330.00	1560.00	47	4	52-115	36

SURROGATE PARAMETER	SPIKE AMT (ug/kg)	BS RSLT (ug/kg)	BS % REC	SPIKE AMT (ug/kg)	BSD RSLT (ug/kg)	BSD % REC	QC LIMIT %
Nitrobenzene	3330.00	1640.00	49	3330.00	1710.00	51	23-120
Fluorobiphenyl	3330.00	1840.00	55	3330.00	1920.00	58	30-115
Terphenyl-d14	3330.00	1490.00	45	3330.00	1650.00	49	18-137
Phenol-d5	5000.00	2120.00	42	5000.00	2200.00	44	24-113
2-Fluorophenol	5000.00	1710.00	34	5000.00	1780.00	36	25-121
2,4,6-Tribromophenol	5000.00	3140.00	63	5000.00	3250.00	65	19-122

CKY

C K Y incorporated
Analytical Laboratories

Date: 12-17-1995
CKY Batch No.: 95K040

Attn.: Grant Miller

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Metro Redline Eastside Extens.

Enclosed is the Laboratory report for samples received on 11/13/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-4-1/P-14	K040-01	Soil	EPA M8015 (CCID) EPA 8240 EPA 8270 Organic Pb Sulfide Chloride Sulfate Oil & Grease Metals Mercury
DD-4-1/P-18	K040-02	Soil	EPA M8015 (CCID) EPA 8240 EPA 8270 Organic Pb Sulfide Chloride Sulfate Oil & Grease Metals Mercury
DD-4-1/P-22	K040-03	Soil	EPA M8015 (CCID) EPA 8240 EPA 8270 Organic Pb Sulfide Chloride Sulfate Oil & Grease Metals Mercury

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/20/95
MATRIX:	SOIL	DATE ANALYZED:	11/30/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	ND	N.A.	82	85	1	18.0	2.44
DD-4-1/P-18	K040-02	ND	N.A.	77	87	1	19.2	2.48
DD-4-1/P-22	K040-03	ND	N.A.	73	77	1	19.6	2.49
MBLK1S	SVK015SB	ND	N.A.	100	100	1	NA	2
QC LIMIT:				60-140	55-150			

SURR1 : Phenol-d5
SURR2 : Nitrobenzene-d5
MDL : Method Detection Limit
Samples were analyzed from SVOA extract since holding time for TEPH extraction was missed.

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	NA
SAMPLE ID:	DD-4-1/P-14	DATE ANALYZED:	11/16/95
CONTROL NO.:	K040-01	MATRIX:	SOIL
% MOISTURE:	18.0	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	6.1
Benzene	ND	1.22
Bromodichloromethane	ND	1.22
Bromoform	ND	2.44
Bromomethane	ND	1.22
2-Butanone	ND	6.1
Carbon Disulfide	ND	1.22
Carbon Tetrachloride	ND	1.22
Chlorobenzene	ND	1.22
Chlorodibromomethane	ND	1.22
Chloroethane	ND	1.22
2-Chloroethyl Vinyl Ether	ND	6.1
Chloroform	ND	1.22
Chloromethane	ND	2.44
Dibromomethane	ND	1.22
Dichlorodifluoromethane	ND	1.22
1,1-Dichloroethane	ND	1.22
1,2-Dichloroethane	ND	1.22
1,1-Dichloroethene	ND	1.22
trans-1,2-Dichloroethene	ND	1.22
cis-1,2-Dichloroethene	ND	1.22
1,2-Dichloropropane	ND	1.22
cis-1,3-Dichloropropene	ND	1.22
trans-1,3-Dichloropropene	ND	1.22
Ethylbenzene	ND	1.22
2-Hexanone	ND	1.22
Methylene Chloride	ND	6.1
4-Methyl-2-pentanone	ND	1.22
Styrene	ND	1.22
1,1,2,2-Tetrachloroethane	ND	6.1
Tetrachloroethene	ND	1.22
Toluene	ND	1.22
1,1,1-Trichloroethane	ND	1.22
1,1,2-Trichloroethane	ND	1.22
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	6.1
Trichloroethene	ND	1.22
Trichlorofluoromethane	ND	2.44
Vinyl Acetate	ND	6.1
Vinyl Chloride	ND	2.44
Xylenes (total)	ND	1.22

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	110	70-121
Toluene-d8	110	81-117
Bromofluorobenzene	87	74-121

MDL: Method Detection Limit
Internal Standards were not of QC limit. Reanalysis had similar results.
Matrix interference was suspected.

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	NA
SAMPLE ID:	DD-4-1/P-18	DATE ANALYZED:	11/16/95
CONTROL NO.:	K040-02	MATRIX:	SOIL
% MOISTURE:	19.2	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	6.19
Benzene	ND	1.24
Bromodichloromethane	ND	1.24
Bromoform	ND	2.48
Bromomethane	ND	1.24
2-Butanone	ND	6.19
Carbon Disulfide	ND	1.24
Carbon Tetrachloride	ND	1.24
Chlorobenzene	ND	1.24
Chlorodibromomethane	ND	1.24
Chloroethane	ND	1.24
2-Chloroethyl Vinyl Ether	ND	6.19
Chloroform	ND	1.24
Chloromethane	ND	2.48
Dibromomethane	ND	1.24
Dichlorodifluoromethane	ND	1.24
1,1-Dichloroethane	ND	1.24
1,2-Dichloroethane	ND	1.24
1,1-Dichloroethene	ND	1.24
trans-1,2-Dichloroethene	ND	1.24
cis-1,2-Dichloroethene	ND	1.24
1,2-Dichloropropane	ND	1.24
cis-1,3-Dichloropropene	ND	1.24
trans-1,3-Dichloropropene	ND	1.24
Ethylbenzene	ND	1.24
2-Hexanone	ND	1.24
Methylene Chloride	ND	6.19
4-Methyl-2-pentanone	ND	1.24
Styrene	ND	1.24
1,1,2,2-Tetrachloroethane	ND	6.19
Tetrachloroethene	ND	1.24
Toluene	ND	1.24
1,1,1-Trichloroethane	ND	1.24
1,1,2-Trichloroethane	ND	1.24
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	6.19
Trichloroethene	ND	1.24
Trichlorofluoromethane	ND	2.48
Vinyl Acetate	ND	6.19
Vinyl Chloride	ND	2.48
Xylenes (total)	ND	1.24

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	106	70-121
Toluene-d8	120+	81-117
Bromofluorobenzene	83	74-121

MDL: Method Detection Limit
+ : Out of QC limits.
Internal Standards were not of QC limit. Reanalysis had similar results.
Matrix interference was suspected.

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	NA
SAMPLE ID:	DD-4-1/P-22	DATE ANALYZED:	11/16/95
CONTROL NO.:	K040-03	MATRIX:	SOIL
% MOISTURE:	19.6	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	6.22
Benzene	ND	1.24
Bromodichloromethane	ND	1.24
Bromoform	ND	2.49
Bromomethane	ND	1.24
2-Butanone	ND	6.22
Carbon Disulfide	ND	1.24
Carbon Tetrachloride	ND	1.24
Chlorobenzene	ND	1.24
Chlorodibromomethane	ND	1.24
Chloroethane	ND	1.24
2-Chloroethyl Vinyl Ether	ND	6.22
Chloroform	ND	1.24
Chloromethane	ND	2.49
Dibromomethane	ND	1.24
Dichlorodifluoromethane	ND	1.24
1,1-Dichloroethane	ND	1.24
1,2-Dichloroethane	ND	1.24
1,1-Dichloroethene	ND	1.24
trans-1,2-Dichloroethene	ND	1.24
cis-1,2-Dichloroethene	ND	1.24
1,2-Dichloropropane	ND	1.24
cis-1,3-Dichloropropene	ND	1.24
trans-1,3-Dichloropropene	ND	1.24
Ethylbenzene	ND	1.24
2-Hexanone	ND	1.24
Methylene Chloride	ND	6.22
4-Methyl-2-pentanone	ND	1.24
Styrene	ND	1.24
1,1,2,2-Tetrachloroethane	ND	6.22
Tetrachloroethene	ND	1.24
Toluene	ND	1.24
1,1,1-Trichloroethane	ND	1.24
1,1,2-Trichloroethane	ND	1.24
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	6.22
Trichloroethene	ND	1.24
Trichlorofluoromethane	ND	2.49
Vinyl Acetate	ND	6.22
Vinyl Chloride	ND	2.49
Xylenes (total)	ND	1.24

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	112	70-121
Toluene-d8	115	81-117
Bromofluorobenzene	87	74-121

MDL: Method Detection Limit
Internal Standards were not of QC limit. Reanalysis had similar results. Matrix interference was suspected.

EPA METHOD 8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95K040	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1S	DATE ANALYZED:	11/16/95
CONTROL NO.:	VOK1002B	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	1.52	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	103	70-121
Toluene-d8	100	81-117
Bromofluorobenzene	99	74-121

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL
% MOISTURE: 1.2

BATCH NO.: 95K040 DATE RECEIVED: NA
SAMPLE ID: 030-000-BF-000-3 DATE EXTRACTED: NA
CONTROL NO.: K027-01 DATE ANALYZED: 11/14/95

ACCESSION: 95K040 95K027

Parameter	SAMPLE CONC (ug/kg)	SPIKE ADDED (ug/kg)	MS CONC (ug/kg)	MS % REC	SPIKE ADDED (ug/kg)	MSD CONC (ug/kg)	MSD % REC	% RPD
1,1-DCE	ND	50.61	56.88	112	50.61	54.76	108	4
Benzene	ND	50.61	59.31	117	50.61	54.55	108	8
TCE	ND	50.61	58.60	116	50.61	56.07	111	4
Toluene	ND	50.61	59.11	117	50.61	58.60	116	1
Chlorobenzene	ND	50.61	59.21	117	50.61	56.28	111	5
QC LIMIT:								
1,1-DCE				59-172			59-172	22
Benzene				66-142			66-142	21
TCE				62-137			62-137	24
Toluene				59-139			59-139	21
Chlorobenzene				60-133			60-133	21

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S
CONTROL NO.: VOK0402L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 11/16/95

ACCESSION: 95K040 95K027

PARAMETER	TRUE VALUE (ug/kg)	FOUND VALUE (ug/kg)	LCS RECOVERY (%)
1,1-DCE	50.00	54.10	108
Benzene	50.00	53.90	108
TCE	50.00	54.30	109
Toluene	50.00	55.20	110
Chlorobenzene	50.00	53.70	107

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/20/95
SAMPLE ID:	DD-4-1/P-14	DATE ANALYZED:	11/22/95
CONTROL NO.:	K040-01	MATRIX:	SOIL
% MOISTURE:	18.0	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	402	3-Nitroaniline	ND	976
Pyridine	ND	402	Acenaphthene	ND	402
Aniline	ND	402	2,4-Dinitrophenol	ND	976
Phenol	ND	402	4-Nitrophenol	ND	976
bis(2-Chloroethyl)ether	ND	402	Dibenzofuran	ND	402
2-Chlorophenol	ND	402	2,4-Dinitrotoluene	ND	402
1,3-Dichlorobenzene	ND	402	Diethylphthalate	ND	402
1,4-Dichlorobenzene	ND	402	4-Chlorophenyl-phenylether	ND	402
Benzyl Alcohol	ND	402	Fluorene	ND	402
1,2-Dichlorobenzene	ND	402	1,2-Diphenylhydrazine	ND	976
2-Methylphenol	ND	402	4-Nitroaniline	ND	976
2,2'-oxybis(1-Chloropropane)	ND	402	4,6-Dinitro-2-methylphenol	ND	976
4-Methylphenol (2)	ND	402	N-Nitrosodiphenylamine (1)	ND	402
N-Nitroso-di-n-propylamine	ND	402	4-Bromophenyl-phenylether	ND	402
Hexachloroethane	ND	402	Hexachlorobenzene	ND	402
Nitrobenzene	ND	402	Pentachlorophenol	ND	976
Isophorone	ND	402	Benzidine	ND	976
2-Nitrophenol	ND	402	Phenanthrene	ND	402
2,4-Dimethylphenol	ND	402	Anthracene	ND	402
Benzoic Acid	ND	976	Carbazole	ND	402
bis(2-Chloroethoxy)methane	ND	402	Di-n-butylphthalate	ND	402
2,4-Dichlorophenol	ND	402	Fluoranthene	ND	402
1,2,4-Trichlorobenzene	ND	402	4,4'-Methylene Dianiline	ND	976
[illegible]thalene	ND	402	Pyrene	ND	402
[illegible]loroaniline	ND	402	Bisphenol-A	ND	402
[illegible]chloro-1,3-butadiene	ND	402	Butylbenzylphthalate	ND	402
4-Chloro-3-methylphenol	ND	402	3,3'-Dichlorobenzidine	ND	402
2-Methylnaphthalene	ND	402	Benzo(a)anthracene	ND	402
Hexachlorocyclopentadiene	ND	402	Chrysene	ND	402
2,4,6-Trichlorophenol	ND	402	bis(2-Ethylhexyl)phthalate	ND	402
2,4,5-Trichlorophenol	ND	976	Di-n-octylphthalate	ND	402
2-Chloronaphthalene	ND	402	Benzo(b)fluoranthene	ND	402
1-Chloronaphthalene	ND	402	Benzo(k)fluoranthene	ND	402
2-Nitroaniline	ND	976	Benzo(a)pyrene	ND	402
Dimethylphthalate	ND	402	Indeno(1,2,3-cd)pyrene	ND	402
Acenaphthylene	ND	402	Dibenzo(a,h)anthracene	ND	402
2,6-Dinitrotoluene	ND	402	Benzo(g,h,i)perylene	ND	402

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	63	23-120
2-Fluorobiphenyl	59	30-115
Terphenyl-d14	59	18-137
Phenol-d5	59	24-113
2-Fluorophenol	53	25-121
2,4,6-Tribromophenol	35	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
LAB NO.:	95K040	DATE EXTRACTED:	11/20/95
SAMPLE ID:	DD-4-1/P-18	DATE ANALYZED:	11/22/95
CONTROL NO.:	K040-02	MATRIX:	SOIL
% MOISTURE:	19.2	DILUTION FACTOR:	1

PARAMETERS	(ug/kg) RESULT	RL	PARAMETERS	(ug/kg) RESULT	RL
N-Nitrosodimethylamine	ND	408	3-Nitroaniline	ND	990
Pyridine	ND	408	Acenaphthene	ND	408
Aniline	ND	408	2,4-Dinitrophenol	ND	990
Phenol	ND	408	4-Nitrophenol	ND	990
bis(2-Chloroethyl)ether	ND	408	Dibenzofuran	ND	408
2-Chlorophenol	ND	408	2,4-Dinitrotoluene	ND	408
1,3-Dichlorobenzene	ND	408	Diethylphthalate	ND	408
1,4-Dichlorobenzene	ND	408	4-Chlorophenyl-phenylether	ND	408
Benzyl Alcohol	ND	408	Fluorene	ND	408
1,2-Dichlorobenzene	ND	408	1,2-Diphenylhydrazine	ND	990
2-Methylphenol	ND	408	4-Nitroaniline	ND	990
2,2'-oxybis(1-Chloropropane)	ND	408	4,6-Dinitro-2-methylphenol	ND	990
4-Methylphenol (2)	ND	408	N-Nitrosodiphenylamine (1)	ND	408
N-Nitroso-di-n-propylamine	ND	408	4-Bromophenyl-phenylether	ND	408
Hexachloroethane	ND	408	Hexachlorobenzene	ND	408
Nitrobenzene	ND	408	Pentachlorophenol	ND	990
Isophorone	ND	408	Benzidine	ND	990
2-Nitrophenol	ND	408	Phenanthrene	ND	408
2,4-Dimethylphenol	ND	408	Anthracene	ND	408
Benzoic Acid	ND	990	Carbazole	ND	408
bis(2-Chloroethoxy)methane	ND	408	Di-n-butylphthalate	ND	408
2,4-Dichlorophenol	ND	408	Fluoranthene	ND	408
1,2,4-Trichlorobenzene	ND	408	4,4'-Methylene Dianiline	ND	990
[illegible]thalene	ND	408	Pyrene	ND	408
[illegible]loroaniline	ND	408	Bisphenol-A	ND	408
[illegible]chloro-1,3-butadiene	ND	408	Butylbenzylphthalate	ND	408
4-Chloro-3-methylphenol	ND	408	3,3'-Dichlorobenzidine	ND	408
2-Methylnaphthalene	ND	408	Benzo(a)anthracene	ND	408
Hexachlorocyclopentadiene	ND	408	Chrysene	ND	408
2,4,6-Trichlorophenol	ND	408	bis(2-Ethylhexyl)phthalate	ND	408
2,4,5-Trichlorophenol	ND	990	Di-n-octylphthalate	ND	408
2-Chloronaphthalene	ND	408	Benzo(b)fluoranthene	ND	408
1-Chloronaphthalene	ND	408	Benzo(k)fluoranthene	ND	408
2-Nitroaniline	ND	990	Benzo(a)pyrene	ND	408
Dimethylphthalate	ND	408	Indeno(1,2,3-cd)pyrene	ND	408
Acenaphthylene	ND	408	Dibenzo(a,h)anthracene	ND	408
2,6-Dinitrotoluene	ND	408	Benzo(g,h,i)perylene	ND	408

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	59	23-120
2-Fluorobiphenyl	58	30-115
Terphenyl-d14	59	18-137
Phenol-d5	53	24-113
2-Fluorophenol	45	25-121
2,4,6-Tribromophenol	31	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
LAB NO.:	95K040	DATE EXTRACTED:	11/20/95
SAMPLE ID:	DD-4-1/P-22	DATE ANALYZED:	11/22/95
CONTROL NO.:	K040-03	MATRIX:	SOIL
% MOISTURE:	19.6	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	410	3-Nitroaniline	ND	995
Pyridine	ND	410	Acenaphthene	ND	410
Aniline	ND	410	2,4-Dinitrophenol	ND	995
Phenol	ND	410	4-Nitrophenol	ND	995
bis(2-Chloroethyl)ether	ND	410	Dibenzofuran	ND	410
2-Chlorophenol	ND	410	2,4-Dinitrotoluene	ND	410
1,3-Dichlorobenzene	ND	410	Diethylphthalate	ND	410
1,4-Dichlorobenzene	ND	410	4-Chlorophenyl-phenylether	ND	410
Benzyl Alcohol	ND	410	Fluorene	ND	410
1,2-Dichlorobenzene	ND	410	1,2-Diphenylhydrazine	ND	995
2-Methylphenol	ND	410	4-Nitroaniline	ND	995
2,2'-oxybis(1-Chloropropane)	ND	410	4,6-Dinitro-2-methylphenol	ND	995
4-Methylphenol (2)	ND	410	N-Nitrosodiphenylamine (1)	ND	410
N-Nitroso-di-n-propylamine	ND	410	4-Bromophenyl-phenylether	ND	410
Hexachloroethane	ND	410	Hexachlorobenzene	ND	410
Nitrobenzene	ND	410	Pentachlorophenol	ND	995
Isophorone	ND	410	Benzidine	ND	995
2-Nitrophenol	ND	410	Phenanthrene	ND	410
2,4-Dimethylphenol	ND	410	Anthracene	ND	410
Benzoic Acid	ND	995	Carbazole	ND	410
bis(2-Chloroethoxy)methane	ND	410	Di-n-butylphthalate	ND	410
2,4-Dichlorophenol	ND	410	Fluoranthene	ND	410
1,2,4-Trichlorobenzene	ND	410	4,4'-Methylene Dianiline	ND	995
Naphthalene	ND	410	Pyrene	ND	410
4-Chloroaniline	ND	410	Bisphenol-A	ND	410
Hexachloro-1,3-butadiene	ND	410	Butylbenzylphthalate	ND	410
4-Chloro-3-methylphenol	ND	410	3,3'-Dichlorobenzidine	ND	410
2-Methylnaphthalene	ND	410	Benzo(a)anthracene	ND	410
Hexachlorocyclopentadiene	ND	410	Chrysene	ND	410
2,4,6-Trichlorophenol	ND	410	bis(2-Ethylhexyl)phthalate	ND	410
2,4,5-Trichlorophenol	ND	995	Di-n-octylphthalate	ND	410
2-Chloronaphthalene	ND	410	Benzo(b)fluoranthene	ND	410
1-Chloronaphthalene	ND	410	Benzo(k)fluoranthene	ND	410
2-Nitroaniline	ND	995	Benzo(a)pyrene	ND	410
Dimethylphthalate	ND	410	Indeno(1,2,3-cd)pyrene	ND	410
Acenaphthylene	ND	410	Dibenzo(a,h)anthracene	ND	410
2,6-Dinitrotoluene	ND	410	Benzo(g,h,i)perylene	ND	410

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	59	23-120
2-Fluorobiphenyl	55	30-115
Terphenyl-d14	58	18-137
Phenol-d5	53	24-113
2-Fluorophenol	46	25-121
2,4,6-Tribromophenol	34	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95K040	DATE EXTRACTED:	11/20/95
SAMPLE ID:	MBLK1S	DATE ANALYZED:	11/22/95
CONTROL NO.:	SVK015SB	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	(ug/kg) RESULT	RL	PARAMETERS	(ug/kg) RESULT	RL
N-Nitrosodimethylamine	ND	(330)	3-Nitroaniline	ND	(800)
Pyridine	ND	(330)	Acenaphthene	ND	(330)
Aniline	ND	(330)	2,4-Dinitrophenol	ND	(800)
Phenol	ND	(330)	4-Nitrophenol	ND	(800)
bis(2-Chloroethyl)ether	ND	(330)	Dibenzofuran	ND	(330)
2-Chlorophenol	ND	(330)	2,4-Dinitrotoluene	ND	(330)
1,3-Dichlorobenzene	ND	(330)	Diethylphthalate	ND	(330)
1,4-Dichlorobenzene	ND	(330)	4-Chlorophenyl-phenylether	ND	(330)
Benzyl Alcohol	ND	(330)	Fluorene	ND	(330)
1,2-Dichlorobenzene	ND	(330)	1,2-Diphenylhydrazine	ND	(800)
2-Methylphenol	ND	(330)	4-Nitroaniline	ND	(800)
2,2'-oxybis(1-Chloropropane)	ND	(330)	4,6-Dinitro-2-methylphenol	ND	(800)
4-Methylphenol (2)	ND	(330)	N-Nitrosodiphenylamine (1)	ND	(330)
N-Nitroso-di-n-propylamine	ND	(330)	4-Bromophenyl-phenylether	ND	(330)
Hexachloroethane	ND	(330)	Hexachlorobenzene	ND	(330)
Nitrobenzene	ND	(330)	Pentachlorophenol	ND	(800)
Isophorone	ND	(330)	Benzidine	ND	(800)
2-Nitrophenol	ND	(330)	Phenanthrene	ND	(330)
2,4-Dimethylphenol	ND	(330)	Anthracene	ND	(330)
Benzoic Acid	ND	(800)	Carbazole	ND	(330)
bis(2-Chloroethoxy)methane	ND	(330)	Di-n-butylphthalate	ND	(330)
2,4-Dichlorophenol	ND	(330)	Fluoranthene	ND	(330)
1,2,4-Trichlorobenzene	ND	(330)	4,4'-Methylene Dianiline	ND	(800)
Naphthalene	ND	(330)	Pyrene	ND	(330)
4-Chloroaniline	ND	(330)	Bisphenol-A	ND	(330)
Hexachloro-1,3-butadiene	ND	(330)	Butylbenzylphthalate	ND	(330)
4-Chloro-3-methylphenol	ND	(330)	3,3'-Dichlorobenzidine	ND	(330)
2-Methylnaphthalene	ND	(330)	Benzo(a)anthracene	ND	(330)
Hexachlorocyclopentadiene	ND	(330)	Chrysene	ND	(330)
2,4,6-Trichlorophenol	ND	(330)	bis(2-Ethylhexyl)phthalate	ND	(330)
2,4,5-Trichlorophenol	ND	(800)	Di-n-octylphthalate	ND	(330)
2-Chloronaphthalene	ND	(330)	Benzo(b)fluoranthene	ND	(330)
1-Chloronaphthalene	ND	(330)	Benzo(k)fluoranthene	ND	(330)
2-Nitroaniline	ND	(800)	Benzo(a)pyrene	ND	(330)
Dimethylphthalate	ND	(330)	Indeno(1,2,3-cd)pyrene	ND	(330)
Acenaphthylene	ND	(330)	Dibenzo(a,h)anthracene	ND	(330)
2,6-Dinitrotoluene	ND	(330)	Benzo(g,h,i)perylene	ND	(330)

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	73	23-120
2-Fluorobiphenyl	62	30-115
Terphenyl-d14	60	18-137
Phenol-d5	63	24-113
2-Fluorophenol	61	25-121
2,4,6-Tribromophenol	52	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
MS/MSD ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
'OD: EPA 8270
X: SOIL
STURE: 4.3

BATCH NO.: 95K040
SAMPLE ID: NR0001541
CONTROL NO.: K069-03

DATE RECEIVED: NA
DATE EXTRACTED: 11/20/95
DATE ANALYZED: 11/22/95

ACCESSION: 95K040 95K044 95K048 95K069 95K075

PARAMETER	SMPL RSLT (ug/kg)	SPIKE AMT (ug/kg)	MS RSLT (ug/kg)	MS % REC	SPIKE AMT (ug/kg)	MSD RSLT (ug/kg)	MSD % REC	RPD %	QC LIMIT %	RPD LIMIT %
Phenol	ND	5225.00	3370.00	65	5225.00	3240.00	62	4	26-90	35
2-Chlorophenol	ND	5225.00	3068.00	59	5225.00	2898.00	55	6	25-102	50
1,4-Dichlorobenzene	ND	3483.00	2274.00	65	3483.00	2130.00	61	7	28-104	27
N-Nitroso-di-n-propyl.	ND	3483.00	3080.00	88	3483.00	2968.00	85	4	41-126	38
1,2,4-Trichlorobenzene	ND	3483.00	2198.00	63	3483.00	2232.00	64	2	38-107	23
4-Chloro-3-Methylphenol	ND	5225.00	3366.00	64	5225.00	3392.00	65	1	26-103	33
Acenaphthene	ND	3483.00	2326.00	67	3483.00	2259.00	65	3	31-137	19
4-Nitrophenol	ND	5225.00	3398.00	65	5225.00	3536.00	68	4	11-114	50
2,4-Dinitrotoluene	ND	3483.00	2356.00	68	3483.00	2322.00	67	1	28-89	47
Pentachlorophenol	ND	5225.00	3168.00	61	5225.00	3138.00	60	1	17-109	47
Pyrene	ND	3483.00	1945.00	56	3483.00	1832.00	53	6	35-142	36

SURROGATE PARAMETER	SPIKE AMT (ug/kg)	MS RSLT (ug/kg)	MS % REC	SPIKE AMT (ug/kg)	MSD RSLT (ug/kg)	MSD % REC	QC LIMIT %
Nitrobenzene	3483.00	2579.00	74	3483.00	2760.00	79	23-120
2-Fluorobiphenyl	3483.00	2057.00	59	3483.00	1995.00	57	30-115
enyl-d14	3483.00	1757.00	50	3483.00	1786.00	51	18-137
-d5	5225.00	3409.00	65	5225.00	3418.00	65	24-113
rophenol	5225.00	3292.00	63	5225.00	3282.00	63	25-121
2,4,6-Tribromophenol	5225.00	2439.00	47	5225.00	2541.00	49	19-122

CKY QUALITY CONTROL DATA
LCS ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8270
MATRIX: SOIL
MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: SVK015SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 11/20/95
DATE ANALYZED: 11/22/95

ACCESSION: 95K040 95K044 95K048 95K069 95K075

PARAMETER	BLNK RSLT (ug/kg)	SPIKE AMT (ug/kg)	LCS RSLT (ug/kg)	LCS % REC	QC LIMIT (%)
Phenol	ND	5000.00	3051.00	61	5-112
2-Chlorophenol	ND	5000.00	2815.00	56	23-134
1,4-Dichlorobenzene	ND	3333.00	1999.00	60	20-124
N-Nitroso-di-n-propyl.	ND	3333.00	2668.00	80	D-230
1,2,4-Trichlorobenzene	ND	3333.00	1953.00	59	44-142
4-Chloro-3-Methylphenol	ND	5000.00	3030.00	61	22-147
Acenaphthene	ND	3333.00	2224.00	67	47-145
4-Nitrophenol	ND	5000.00	3122.00	62	D-1320
2,4-Dinitrotoluene	ND	3333.00	2267.00	68	39-139
Pentachlorophenol	ND	5000.00	3418.00	68	14-179
Pyrene	ND	3333.00	2389.00	72	52-115

SURROGATE PARAMETER	SPIKE AMOUNT (ug/kg)	LCS RESULT (ug/kg)	LCS % REC	QC LIMIT %
Nitrobenzene	3333.00	2199.00	66	23-120
2-Fluorobiphenyl	3333.00	2005.00	60	30-115
Terphenyl-d14	3333.00	2105.00	63	18-137
Phenol-d5	5000.00	3042.00	61	24-113
2-Fluorophenol	5000.00	2871.00	57	25-121
2,4,6-Tribromophenol	5000.00	2591.00	52	19-122

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
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CERTIFICATE OF ANALYSIS

Job No. 511029 **Date:11-17-95**

This is the Certificate of Analysis for the following samples:

Client :	CKY Incorporated
Project No.:	Metro Rail
Date Received:	11-15-95
Number of Samples:	3
Sample Type:	Soil

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY NUMBER
95K040-1	511029-01A
95K040-2	511029-02A
95K040-3	511029-03A

Reviewed and Approved:

Michael C.C. Lu
Laboratory Director

CHEMTEK
inc.

ENVIRONMENTAL
LABORATORIES

14140 E. Alondra Boulevard
Suite A Santa Fe Springs
California 90670

Telephone 310-926-9848
Telefax 310-926-8324

Client: CKY Incorporated
Project: Metro Rail
Job No: 511029 **Date:** 11-17-95

Analysis: Organic Lead

Sample ID: See below
Lab Job No.: See below
Sample Date: 11-15-95
Analysis Date: 11-16-95

Sample ID	Lab Sample ID	Results (ppm)	Detection Limit (mg/kg)
95K040-1	01A	<0.05	0.05
95K040-2	02A	<0.05	0.05
95K040-3	03A	<0.05	0.05

COMMENTS: 'ND' INDICATES THAT THE COMPOUND IS NOT DETECTED AT THE SPECIFIED LIMIT.

EPA METHOD 9030
TOTAL SULFIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	NA
MATRIX:	SOIL	DATE ANALYZED:	11/17/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	30.49	1	18.0	.24
DD-4-1/P-18	K040-02	13.37	1	19.2	.25
DD-4-1/P-22	K040-03	13.43	1	19.6	.25
MBLK1S	SDK001SB	ND	1	NA	.2

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 376.1
MATRIX: SOIL
% MOISTURE: 19.2

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-18
CONTROL NO.: K040-02

DATE RECEIVED: 11/13/95
DATE EXTRACTED: NA
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	SAMPLE (mg/kg)	DUP. SAMPLE (mg/kg)	RPD (%)
Sulfide	13.37	13.37	0
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 376.1
MATRIX: SOIL
% MOISTURE: 19.2

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-18
CONTROL NO.: K040-02

DATE RECEIVED: 11/13/95
DATE EXTRACTED: NA
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Sulfide	13	217	214	93

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 376.1
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S
CONTROL NO.: SDK001SL

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	TRUE VALUE (mg/kg)	FOUND VALUE (mg/kg)	LCS RECOVERY (%)
Sulfide	1272	1155	91

QC LIMIT: 85-115

EPA METHOD 300
CHLORIDE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/21/95
MATRIX:	SOIL	DATE ANALYZED:	11/22/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	180	5	18.0	1.22
DD-4-1/P-18	K040-02	150	5	19.2	1.24
DD-4-1/P-22	K040-03	210	5	19.6	1.24
MBLK1S	ICK003WB	ND	1	NA	.2

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: 19.6

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-22
CONTROL NO.: K040-03

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/21/95
DATE ANALYZED: 11/22/95

ACCESSION: 95K040

PARAMETER	SAMPLE (mg/kg)	DUP. SAMPLE (mg/kg)	RPD (%)
Chloride	211	224	6
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: 19.6

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-22
CONTROL NO.: K040-03

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/21/95
DATE ANALYZED: 11/22/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Chloride	211	622	933	116
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S
CONTROL NO.: ICK003WL

DATE RECEIVED: NA
DATE EXTRACTED: 11/21/95
DATE ANALYZED: 11/22/95

ACCESSION: 95K040

PARAMETER	TRUE VALUE (mg/kg)	FOUND VALUE (mg/kg)	LCS RECOVERY (%)
Chloride	100	97	97
QC LIMIT:			85-115

EPA METHOD 300
SULFATE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	12/08/95
MATRIX:	SOIL	DATE ANALYZED:	12/11/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	940	1	18.0	1.22
DD-4-1/P-18	K040-02	690	1	19.2	1.24
DD-4-1/P-22	K040-03	800	1	19.6	1.24
MBLK1S	ICL003SB	ND	1	NA	1

MDL : Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 12/08/95
DATE ANALYZED: 12/11/95

ACCESSION: 95K040

PARAMETER	SAMPLE (mg/kg)	DUP. SAMPLE (mg/kg)	RPD (%)
Sulfate	939	939	0
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 12/08/95
DATE ANALYZED: 12/11/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Sulfate	939	244	1224	117
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 300
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S
CONTROL NO.: ICL003SL

DATE RECEIVED: NA
DATE EXTRACTED: 12/08/95
DATE ANALYZED: 12/11/95

ACCESSION: 95K040

PARAMETER	TRUE VALUE (mg/kg)	FOUND VALUE (mg/kg)	LCS RECOVERY (%)
Sulfate	200	177	89
QC LIMIT:			85-115

EPA METHOD 413.2
OIL & GREASE

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/16/95
MATRIX:	SOIL	DATE ANALYZED:	11/16/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	ND	1	18.0	12.2
DD-4-1/P-18	K040-02	ND	1	19.2	12.4
DD-4-1/P-22	K040-03	ND	1	19.6	12.4
MBLK1S	OGK001SB	ND	1	NA	10

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 413.2
MATRIX: SOIL
MOISTURE: 18.0

BATCH NO.: 95K040 DATE RECEIVED: 11/13/95
SAMPLE ID: DD-4-1/P-14 DATE EXTRACTED: 11/16/95
CONTROL NO.: K040-01 DATE ANALYZED: 11/16/95

ACCESSION: 95K040

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	MS CONC (mg/kg)	MS % REC	SPIKE ADDED (mg/kg)	MSD CONC (mg/kg)	MSD % REC	% RPD
TROG	ND	183	206	113	183	207	113	1
QC LIMIT:				70-130			70-130	30

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 413.2
MATRIX: SOIL
MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: OGK001SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 11/16/95
DATE ANALYZED: 11/16/95

ACCESSION: 95K040

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
TROG	ND	150	158	105	150	160	107	1
QC LIMIT:				75-125			75-125	

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/17/95
SAMPLE ID:	DD-4-1/P-14	DATE ANALYZED:	11/21/95
CONTROL NO.:	K040-01	MATRIX:	SOIL
% MOISTURE:	18.0	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	7.32	ND
Arsenic	12.2	ND
Barium	1.22	207
Beryllium	.61	ND
Cadmium	.61	ND
Chromium	1.22	32.6
Cobalt	1.22	9.83
Copper	1.22	32.9
Lead	12.2	ND
Molybdenum	6.1	ND
Nickel	2.44	25.7
Selenium	24.4	ND
Silver	1.22	ND
Thallium	61	ND
Vanadium	1.22	43.8
Zinc	1.22	75.6

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/17/95
SAMPLE ID:	DD-4-1/P-18	DATE ANALYZED:	11/21/95
CONTROL NO.:	K040-02	MATRIX:	SOIL
% MOISTURE:	19.2	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	7.43	ND
Arsenic	12.4	13.2
Barium	1.24	189
Beryllium	.62	ND
Cadmium	.62	ND
Chromium	1.24	34.9
Cobalt	1.24	8.9
Copper	1.24	30.5
Lead	12.4	ND
Molybdenum	6.19	ND
Nickel	2.48	26.5
Selenium	24.8	ND
Silver	1.24	ND
Thallium	61.9	ND
Vanadium	1.24	43
Zinc	1.24	72.8

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/17/95
SAMPLE ID:	DD-4-1/P-22	DATE ANALYZED:	11/21/95
CONTROL NO.:	K040-03	MATRIX:	SOIL
% MOISTURE:	19.6	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	7.46	ND
Arsenic	12.4	ND
Barium	1.24	187
Beryllium	.62	ND
Cadmium	.62	ND
Chromium	1.24	34.7
Cobalt	1.24	9.03
Copper	1.24	33.9
Lead	12.4	ND
Molybdenum	6.22	ND
Nickel	2.49	26.4
Selenium	24.9	ND
Silver	1.24	ND
Thallium	62.2	ND
Vanadium	1.24	44.9
Zinc	1.24	75.7

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95K040	DATE EXTRACTED:	11/17/95
SAMPLE ID:	MBLK1S	DATE ANALYZED:	11/21/95
CONTROL NO.:	IPK020SB	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	6	ND
Arsenic	10	ND
Barium	1	ND
Beryllium	.5	ND
Cadmium	.5	ND
Chromium	1	ND
Cobalt	1	ND
Copper	1	ND
Lead	10	ND
Molybdenum	5	ND
Nickel	2	ND
Selenium	20	ND
Silver	1	ND
Thallium	50	ND
Vanadium	1	ND
Zinc	1	ND

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 3050/6010
MATRIX: SOIL
MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/21/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	DUP SAMPLE RESULT (mg/kg)	RPD RESULT (%)
Antimony	ND	ND	0
Arsenic	ND	ND	0
Barium	207	203	2
Beryllium	ND	ND	0
Cadmium	ND	ND	0
Chromium	32.6	32.2	1
Cobalt	9.83	9.31	5
Copper	32.9	31.9	3
Lead	ND	ND	0
Molybdenum	ND	ND	0
Nickel	25.7	25.5	1
Selenium	ND	ND	0
Silver	ND	ND	0
Thallium	ND	ND	0
Vanadium	43.8	43.2	1
Zinc	75.6	72.6	4
QC LIMIT:			30

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 3050/6010
MATRIX: SOIL
% MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/21/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Antimony	ND	61	23.3	38+
Arsenic	ND	122	119	97
Barium	207	122	315	89
Beryllium	ND	122	106	87
Cadmium	ND	122	108	89
Chromium	32.6	122	139	87
Cobalt	9.83	122	112	84
Copper	32.9	122	141	88
Lead	ND	122	115	95
Molybdenum	ND	122	102	83
Nickel	25.7	122	130	86
Selenium	ND	122	111	91
Silver	ND	122	114	94
Thallium	ND	122	107	88
Vanadium	43.8	122	154	90
Zinc	75.6	122	179	85

QC LIMIT: 75-125
+ Outside the QC limit probably due to matrix interferences.

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 3050/6010
MATRIX: SOIL

BATCH NO.: 95K040
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: IPK020SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/21/95

ACCESSION: 95K040

PARAMETER	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
Antimony	ND	50.00	47.56	95	50.00	46.02	92	3
Arsenic	ND	100.00	91.69	92	100.00	91.60	92	0
Barium	ND	100.00	97.10	97	100.00	95.10	95	2
Beryllium	ND	100.00	94.42	94	100.00	92.48	92	2
Cadmium	ND	100.00	92.57	93	100.00	91.06	91	2
Chromium	ND	100.00	96.22	96	100.00	94.22	94	2
Cobalt	ND	100.00	94.71	95	100.00	93.03	93	2
Copper	ND	100.00	95.63	96	100.00	96.44	96	1
Lead	ND	100.00	93.57	94	100.00	93.08	93	1
Molybdenum	ND	100.00	94.53	95	100.00	93.29	93	1
Nickel	ND	100.00	96.00	96	100.00	94.58	95	1
Selenium	ND	100.00	93.02	93	100.00	95.58	96	3
Silver	ND	100.00	86.48	86	100.00	76.99	77	12
Thallium	ND	100.00	95.46	95	100.00	93.34	93	2
Vanadium	ND	100.00	95.17	95	100.00	93.35	93	2
Zinc	ND	100.00	93.53	94	100.00	93.10	93	0
QC LIMIT:				75-125			75-125	30

EPA METHOD 7471
MERCURY BY COLD VAPOR

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	11/11/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	11/13/95
BATCH NO.:	95K040	DATE EXTRACTED:	11/17/95
MATRIX:	SOIL	DATE ANALYZED:	11/17/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-4-1/P-14	K040-01	ND	1	18.0	.12
DD-4-1/P-18	K040-02	.12	1	19.2	.12
DD-4-1/P-22	K040-03	ND	1	19.6	.12
MBLK1S	HGK020SB	ND	1	NA	.1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL
% MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	SAMPLE (mg/kg)	DUP. SAMPLE (mg/kg)	RPD (%)
Mercury	ND	ND	0
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL
% MOISTURE: 18.0

BATCH NO.: 95K040
SAMPLE ID: DD-4-1/P-14
CONTROL NO.: K040-01

DATE RECEIVED: 11/13/95
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Mercury	ND	2.54	2.74	108
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL
% MOISTURE: NA

BATCH NO.: 95K040
SAMPLE ID: LCS1S
CONTROL NO.: HGK020SL

DATE RECEIVED: NA
DATE EXTRACTED: 11/17/95
DATE ANALYZED: 11/17/95

ACCESSION: 95K040

PARAMETER	TRUE VALUE (mg/kg)	FOUND VALUE (mg/kg)	LCS RECOVERY (%)
Mercury	13.10	13.36	102
QC LIMIT:			85-115

C K Y incorporated
Analytical Laboratories

Date: 12-27-1995
CKY Batch No.: 95L065

Attn.: Bill Lu

Earth Technology Corp.
2121 Alton Parkway, Suite 100
Irvine, CA 92714

Subject: Laboratory Report
Project: Metro Redline Eastside Extens.

Enclosed is the Laboratory report for samples received on 12/12/95. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported include :

Sample ID	Control No.	Matrix	Analysis
DD-65 E-17	L065-01	Soil	EPA 8270 EPA M8015 (CCID)
DD-65 E-20	L065-02	Soil	EPA 8260 EPA M8015 (CCID) Metals Mercury
DD-65 E-24	L065-03	Soil	EPA 8260 EPA M8015 (CCID)

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Kam Y. Pang, Ph.D.
Laboratory Director

P.S. - All analyses requested for the above referenced project have been completed. Therefore, unless instructed, the remaining portions of the samples will be disposed after fifteen (15) days from the date of this report.

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	12/15/95
SAMPLE ID:	DD-65 E-17	DATE ANALYZED:	12/17/95
CONTROL NO.:	L065-01	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	330	3-Nitroaniline	ND	800
Pyridine	ND	330	Acenaphthene	ND	330
Aniline	ND	330	2,4-Dinitrophenol	ND	800
Phenol	ND	330	4-Nitrophenol	ND	800
bis(2-Chloroethyl)ether	ND	330	Dibenzofuran	ND	330
2-Chlorophenol	ND	330	2,4-Dinitrotoluene	ND	330
1,3-Dichlorobenzene	ND	330	Diethylphthalate	ND	330
1,4-Dichlorobenzene	ND	330	4-Chlorophenyl-phenylether	ND	330
Benzyl Alcohol	ND	330	Fluorene	650	330
1,2-Dichlorobenzene	ND	330	1,2-Diphenylhydrazine	ND	800
2-Methylphenol	ND	330	4-Nitroaniline	ND	800
2,2'-oxybis(1-Chloropropane)	ND	330	4,6-Dinitro-2-methylphenol	ND	800
4-Methylphenol (2)	ND	330	N-Nitrosodiphenylamine (1)	ND	330
N-Nitroso-di-n-propylamine	ND	330	4-Bromophenyl-phenylether	ND	330
Hexachloroethane	ND	330	Hexachlorobenzene	ND	330
Nitrobenzene	ND	330	Pentachlorophenol	ND	800
Isophorone	ND	330	Benzidine	14000	800
2-Nitrophenol	ND	330	Phenanthrene	620	330
2,4-Dimethylphenol	ND	330	Anthracene	ND	330
Benzoic Acid	ND	800	Carbazole	ND	330
bis(2-Chloroethoxy)methane	ND	330	Di-n-butylphthalate	ND	330
2,4-Dichlorophenol	ND	330	Fluoranthene	ND	330
1,2,4-Trichlorobenzene	ND	330	4,4'-Methylene Dianiline	ND	800
Naphthalene	2000	330	Pyrene	ND	330
4-Chloroaniline	ND	330	Bisphenol-A	ND	330
Hexachloro-1,3-butadiene	ND	330	Butylbenzylphthalate	ND	330
4-Chloro-3-methylphenol	ND	330	3,3'-Dichlorobenzidine	ND	330
2-Methylnaphthalene	510	330	Benzo(a)anthracene	ND	330
Hexachlorocyclopentadiene	ND	330	Chrysene	ND	330
2,4,6-Trichlorophenol	ND	330	bis(2-Ethylhexyl)phthalate	ND	330
2,4,5-Trichlorophenol	ND	800	Di-n-octylphthalate	ND	330
2-Chloronaphthalene	ND	330	Benzo(b)fluoranthene	ND	330
1-Chloronaphthalene	ND	330	Benzo(k)fluoranthene	ND	330
2-Nitroaniline	ND	800	Benzo(a)pyrene	ND	330
Dimethylphthalate	ND	330	Indeno(1,2,3-cd)pyrene	ND	330
Acenaphthylene	380	330	Dibenzo(a,h)anthracene	ND	330
2,6-Dinitrotoluene	ND	330	Benzo(g,h,i)perylene	ND	330

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	66	23-120
2-Fluorobiphenyl	63	30-115
Terphenyl-d14	44	18-137
Phenol-d5	73	24-113
2-Fluorophenol	59	25-121
2,4,6-Tribromophenol	63	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

EPA METHOD 3550/8270
SEMI VOLATILE ORGANICS BY GC/MS

ENT:	Earth Technology Corp.	DATE COLLECTED:	NA
ECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
CH NO.:	95L065	DATE EXTRACTED:	12/15/95
SAMPLE ID:	MBLK1S	DATE ANALYZED:	12/17/95
CONTROL NO.:	SVL021SB	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULT (ug/kg)	RL (ug/kg)	PARAMETERS	RESULT (ug/kg)	RL (ug/kg)
N-Nitrosodimethylamine	ND	330	3-Nitroaniline	ND	800
Pyridine	ND	330	Acenaphthene	ND	330
Aniline	ND	330	2,4-Dinitrophenol	ND	800
Phenol	ND	330	4-Nitrophenol	ND	800
bis(2-Chloroethyl)ether	ND	330	Dibenzofuran	ND	330
2-Chlorophenol	ND	330	2,4-Dinitrotoluene	ND	330
1,3-Dichlorobenzene	ND	330	Diethylphthalate	ND	330
1,4-Dichlorobenzene	ND	330	4-Chlorophenyl-phenylether	ND	330
Benzyl Alcohol	ND	330	Fluorene	ND	330
1,2-Dichlorobenzene	ND	330	1,2-Diphenylhydrazine	ND	800
2-Methylphenol	ND	330	4-Nitroaniline	ND	800
2,2'-oxybis(1-Chloropropane)	ND	330	4,6-Dinitro-2-methylphenol	ND	800
4-Methylphenol (2)	ND	330	N-Nitrosodiphenylamine (1)	ND	330
N-Nitroso-di-n-propylamine	ND	330	4-Bromophenyl-phenylether	ND	330
Hexachloroethane	ND	330	Hexachlorobenzene	ND	330
Nitrobenzene	ND	330	Pentachlorophenol	ND	800
Isophorone	ND	330	Benzidine	ND	800
2-Nitrophenol	ND	330	Phenanthrene	ND	330
2,4-Dimethylphenol	ND	330	Anthracene	ND	330
Benzoic Acid	ND	800	Carbazole	ND	330
bis(2-Chloroethoxy)methane	ND	330	Di-n-butylphthalate	ND	330
2,4-Dichlorophenol	ND	330	Fluoranthene	ND	330
,4-Trichlorobenzene	ND	330	4,4'-Methylene Dianiline	ND	800
thalene	ND	330	Pyrene	ND	330
loroaniline	ND	330	Bisphenol-A	ND	330
Hexachloro-1,3-butadiene	ND	330	Butylbenzylphthalate	ND	330
4-Chloro-3-methylphenol	ND	330	3,3'-Dichlorobenzidine	ND	330
2-Methylnaphthalene	ND	330	Benzo(a)anthracene	ND	330
Hexachlorocyclopentadiene	ND	330	Chrysene	ND	330
2,4,6-Trichlorophenol	ND	330	bis(2-Ethylhexyl)phthalate	ND	330
2,4,5-Trichlorophenol	ND	800	Di-n-octylphthalate	ND	330
2-Chloronaphthalene	ND	330	Benzo(b)fluoranthene	ND	330
1-Chloronaphthalene	ND	330	Benzo(k)fluoranthene	ND	330
2-Nitroaniline	ND	800	Benzo(a)pyrene	ND	330
Dimethylphthalate	ND	330	Indeno(1,2,3-cd)pyrene	ND	330
Acenaphthylene	ND	330	Dibenzo(a,h)anthracene	ND	330
2,6-Dinitrotoluene	ND	330	Benzo(g,h,i)perylene	ND	330

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
Nitrobenzene-d5	70	23-120
2-Fluorobiphenyl	69	30-115
Terphenyl-d14	49	18-137
Phenol-d5	80	24-113
2-Fluorophenol	67	25-121
2,4,6-Tribromophenol	72	19-122

RL : Reporting Limit
(1): Cannot be separated from Diphenylamine
(2): Cannot be separated from 3-Methylphenol

CKY QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: Earth Technology Corp.
JECT: Metro Redline Eastside Extens.
D: EPA 8270
X: SOIL
% MOISTURE: NA

BATCH NO.: 95L065
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: SVL021SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 12/15/95
DATE ANALYZED: 12/22/95

ACCESSION: 95L065 95L071 95L080

PARAMETER	BLNK RSLT (ug/kg)	SPIKE AMT (ug/kg)	BS RSLT (ug/kg)	BS % REC	SPIKE AMT (ug/kg)	BSD RSLT (ug/kg)	BSD % REC	RPD %	QC LIMIT %	RPD LIMIT %
Phenol	ND	5000.00	3010.00	60	5000.00	2790.00	56	7	5-112	35
2-Chlorophenol	ND	5000.00	3090.00	62	5000.00	2940.00	59	5	23-134	50
1,4-Dichlorobenzene	ND	3330.00	2070.00	62	3330.00	1980.00	59	5	20-124	27
N-Nitroso-di-n-propyl.	ND	3330.00	2380.00	71	3330.00	2150.00	65	10	D-230	38
1,2,4-Trichlorobenzene	ND	3330.00	2130.00	64	3330.00	2000.00	60	6	44-142	23
4-Chloro-3-Methylphenol	ND	5000.00	3340.00	67	5000.00	2870.00	58	15	22-147	33
Acenaphthene	ND	3330.00	2180.00	65	3330.00	1970.00	59	10	47-145	19
4-Nitrophenol	ND	5000.00	4050.00	81	5000.00	3170.00	63	24	D-1320	50
2,4-Dinitrotoluene	ND	3330.00	2150.00	64	3330.00	1850.00	56	15	39-139	47
Pentachlorophenol	ND	5000.00	4250.00	85	5000.00	3160.00	63	29	14-179	47
Pyrene	ND	3330.00	2280.00	68	3330.00	1860.00	56	21	52-115	36

SURROGATE PARAMETER	SPIKE AMT (ug/kg)	BS RSLT (ug/kg)	BS % REC	SPIKE AMT (ug/kg)	BSD RSLT (ug/kg)	BSD % REC	QC LIMIT %
robenzene	3330.00	1840.00	55	3330.00	1730.00	52	23-120
orobiphenyl	3330.00	2020.00	60	3330.00	1970.00	59	30-115
enyl-d14	3330.00	2090.00	63	3330.00	1900.00	57	18-137
ol-d5	5000.00	2740.00	55	5000.00	2700.00	54	24-113
2-Fluorophenol	5000.00	2500.00	50	5000.00	2550.00	51	25-121
2,4,6-Tribromophenol	5000.00	3430.00	69	5000.00	3100.00	62	19-122

EPA METHOD M8015
TOTAL PETROLEUM HYDROCARBONS BY EXTRACTION

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	12/14/95
MATRIX:	SOIL	DATE ANALYZED:	12/15/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	H-C RANGE	% RECOVERY SURR1	% RECOVERY SURR2	DL FACTOR	MDL (mg/kg)
DD-65 E-17	L065-01	46	C11-C30	90	107	1	2
DD-65 E-20	L065-02	35	C11-C30	93	110	1	2
DD-65 E-24	L065-03	38	C11-C30	92	107	1	2
MBLK1S	DSL017SB	ND	NA	96	99	1	2

QC LIMIT: 60-140 55-150

SURR1 : Bromobenzene
SURR2 : Hexacosane
MDL : Method Detection Limit

Chromatograms were not of typical diesel or motoroil fuel pattern. They were quantitated against diesel standard.

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA M8015
MATRIX: SOIL
% MOISTURE: 5.7

BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: 030-001-EX-014-017A DATE EXTRACTED: 12/14/95
CONTROL NO.: L071-02 DATE ANALYZED: 12/15/95

ACCESSION: 95L065 95L071

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	MS CONC (mg/kg)	MS % REC	SPIKE ADDED (mg/kg)	MSD CONC (mg/kg)	MSD % REC	% RPD
Diesel	ND	265	229	86	265	239	90	4
Bromobenzene	ND	53.02	43.75	83	53.02	42.69	81	2
Hexacosane	ND	53.02	52.18	98	53.02	51.55	97	1
QC LIMIT:				60-140			60-140	40
SURROGATE QC LIMITS:								
Bromobenzene				60-140			60-140	
Hexacosane				55-150			55-150	

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA M8015
MATRIX: SOIL

BATCH NO.: 95L065
SAMPLE ID: LCS1S/LCS1SD
CONTROL NO.: DSL017SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 12/14/95
DATE ANALYZED: 12/15/95

ACCESSION: 95L065 95L071

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
Diesel	ND	250	214	86	250	210	84	2
Bromobenzene	ND	50.00	40.13	80	50.00	40.58	81	1
Hexacosane	ND	50.00	47.77	96	50.00	48.11	96	1
QC LIMIT:				60-140			60-140	40
SURROGATE QC LIMITS:								
Bromobenzene				60-140			60-140	
Hexacosane				55-150			55-150	

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	NA
SAMPLE ID:	DD-65 E-20	DATE ANALYZED:	12/13/95
CONTROL NO.:	L065-02	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	5

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	25
Benzene	5	5
Bromodichloromethane	ND	5
Bromoform	ND	10
Bromomethane	ND	5
2-Butanone	ND	25
Carbon Disulfide	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	5
2-Chloroethyl Vinyl Ether	ND	25
Chloroform	ND	5
Chloromethane	ND	10
Dibromomethane	ND	5
Dichlorodifluoromethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	27	5
2-Hexanone	ND	5
Methylene Chloride	ND	25
4-Methyl-2-pentanone	ND	5
Styrene	ND	5
1,1,2,2-Tetrachloroethane	ND	25
Tetrachloroethene	ND	5
Toluene	ND	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	25
Trichloroethene	ND	5
Trichlorofluoromethane	ND	10
Vinyl Acetate	ND	25
Vinyl Chloride	ND	10
Xylenes (total)	23	5

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	107	70-121
Toluene-d8	107	81-117
Bromofluorobenzene	102	74-121

MDL: Method Detection Limit

Presence of high Naphthalene at ppm level was detected.

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	NA
SAMPLE ID:	DD-65 E-24	DATE ANALYZED:	12/13/95
CONTROL NO.:	L065-03	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	7	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	23	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	29	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	104	70-121
Toluene-d8	112	81-117
Bromofluorobenzene	103	74-121

MDL: Method Detection Limit

Presence of Naphthalene at ppm level was detected.

EPA METHOD 5030/8240
VOLATILE ORGANICS BY GC/MS

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95L065	DATE EXTRACTED:	NA
SAMPLE ID:	MBLK1S	DATE ANALYZED:	12/13/95
CONTROL NO.:	VOL1603B	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

PARAMETERS	RESULTS (ug/kg)	MDL (ug/kg)
Acetone	ND	5
Benzene	ND	1
Bromodichloromethane	ND	1
Bromoform	ND	2
Bromomethane	ND	1
2-Butanone	ND	5
Carbon Disulfide	ND	1
Carbon Tetrachloride	ND	1
Chlorobenzene	ND	1
Chlorodibromomethane	ND	1
Chloroethane	ND	1
2-Chloroethyl Vinyl Ether	ND	5
Chloroform	ND	1
Chloromethane	ND	2
Dibromomethane	ND	1
Dichlorodifluoromethane	ND	1
1,1-Dichloroethane	ND	1
1,2-Dichloroethane	ND	1
1,1-Dichloroethene	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethylbenzene	ND	1
2-Hexanone	ND	1
Methylene Chloride	ND	5
4-Methyl-2-pentanone	ND	1
Styrene	ND	1
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	1
Toluene	ND	1
1,1,1-Trichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	5
Trichloroethene	ND	1
Trichlorofluoromethane	ND	2
Vinyl Acetate	ND	5
Vinyl Chloride	ND	2
Xylenes (total)	ND	1

SURROGATE PARAMETER	% RECOVERY	QC LIMIT
1,2 Dichloroethane-d4	101	70-121
Toluene-d8	110	81-117
Bromofluorobenzene	102	74-121

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
SPIKE/SPIKE DUPLICATE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL
% MOISTURE: 2.9

BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: 030-001-EX-014-018 DATE EXTRACTED: NA
CONTROL NO.: K128-20 DATE ANALYZED: 12/13/95

ACCESSION: 95K128 95L002 95L048 95L065

Parameter	SAMPLE CONC (ug/kg)	SPIKE ADDED (ug/kg)	MS CONC (ug/kg)	MS % REC	SPIKE ADDED (ug/kg)	MSD CONC (ug/kg)	MSD % REC	% RPD
1,1-DCE	ND	51.49	52.83	103	51.49	52.21	101	1
Benzene	ND	51.49	54.89	107	51.49	56.23	109	2
TCE	ND	51.49	52.01	101	51.49	54.27	105	4
Toluene	ND	51.49	59.11	115	51.49	61.07	119	3
Chlorobenzene	ND	51.49	57.36	111	51.49	58.29	113	2
QC LIMIT:								
1,1-DCE				59-172			59-172	22
Benzene				66-142			66-142	21
TCE				62-137			62-137	24
Toluene				59-139			59-139	21
Chlorobenzene				60-133			60-133	21

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 8240
MATRIX: SOIL

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BATCH NO.: 95L065
SAMPLE ID: LCS1S
CONTROL NO.: VOL1603L

DATE RECEIVED: NA
DATE EXTRACTED: NA
DATE ANALYZED: 12/13/95

ACCESSION: 95L065

PARAMETER	TRUE VALUE (ug/kg)	FOUND VALUE (ug/kg)	LCS RECOVERY (%)
1,1-DCE	20.00	20.20	101
Benzene	20.00	21.30	107
TCE	20.00	21.30	107
Toluene	20.00	22.80	114
Chlorobenzene	20.00	22.70	114

QC LIMIT:

1,1-DCE	51-150
Benzene	64-136
TCE	67-134
Toluene	75-126
Chlorobenzene	66-134

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	12/13/95
SAMPLE ID:	DD-65 E-20	DATE ANALYZED:	12/13/95
CONTROL NO.:	L065-02	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	6	ND
Arsenic	10	ND
Barium	1	52.3
Beryllium	.5	ND
Cadmium	.5	ND
Chromium	1	4.11
Cobalt	1	3.22
Copper	1	7.7
Lead	10	ND
Molybdenum	5	ND
Nickel	2	3.08
Selenium	20	ND
Silver	1	ND
Thallium	50	ND
Vanadium	1	13
Zinc	1	41.4

Note: Trace level of Zinc was detected in the method blank. There was no corrective action since Zinc level in the sample was more than 10x of detected level.

EPA METHOD 3050/6010
CAM METALS BY ICP

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	NA
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	NA
BATCH NO.:	95L065	DATE EXTRACTED:	12/13/95
SAMPLE ID:	IBLK1S	DATE ANALYZED:	12/13/95
CONTROL NO.:	IPL019SB	MATRIX:	SOIL
% MOISTURE:	NA	DILUTION FACTOR:	1

Element	Det Limit (mg/kg)	RESULT (mg/kg)
Antimony	6	ND
Arsenic	10	ND
Barium	1	ND
Beryllium	.5	ND
Cadmium	.5	ND
Chromium	1	ND
Cobalt	1	ND
Copper	1	ND
Lead	10	ND
Molybdenum	5	ND
Nickel	2	ND
Selenium	20	ND
Silver	1	ND
Thallium	50	ND
Vanadium	1	ND
Zinc	1	1.24

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 3050/6010
MATRIX: SOIL
% MOISTURE: 2.4

BATCH NO.: 95L065
SAMPLE ID: NR0000289
CONTROL NO.: L057-02

DATE RECEIVED: NA
DATE EXTRACTED: 12/13/95
DATE ANALYZED: 12/13/95

ACCESSION: 95L057 95L065

PARAMETER	SAMPLE RESULT (mg/kg)	DUP SAMPLE RESULT (mg/kg)	RPD RESULT (%)
Antimony	ND	ND	0
Arsenic	ND	ND	0
Barium	25.9	26.9	4
Beryllium	ND	ND	0
Cadmium	ND	ND	0
Chromium	5.57	5.83	5
Cobalt	2.62	2.71	4
Copper	6.82	7.33	7
Lead	ND	ND	0
Molybdenum	ND	ND	0
Nickel	3.1	3.49	12
Selenium	ND	ND	0
Silver	ND	ND	0
Thallium	ND	ND	0
Vanadium	16.4	16.8	2
Zinc	25.2	25.3	0
LIMIT:			30

CKY QUALITY CONTROL DATA
SPIKE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 3050/6010
MATRIX: SOIL
% MOISTURE: 2.4

BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: NR0000289 DATE EXTRACTED: 12/13/95
CONTROL NO.: L057-02 DATE ANALYZED: 12/13/95

ACCESSION: 95L057 95L065

PARAMETER	SAMPLE RESULT (mg/kg)	SPIKE CONC. (mg/kg)	SPIKE RESULT (mg/kg)	SPIKE RECRY. (%)
Antimony	ND	512	388	76
Arsenic	ND	102	95.6	93
Barium	25.9	102	125	97
Beryllium	ND	102	99	97
Cadmium	ND	102	96.9	95
Chromium	5.57	102	106	98
Cobalt	2.62	102	101	96
Copper	6.82	102	107	98
Lead	ND	102	99.3	97
Molybdenum	ND	102	95.9	94
Nickel	3.1	102	103	98
Selenium	ND	102	98.8	96
Silver	ND	102	100	98
Thallium	ND	102	97.2	95
Vanadium	16.4	102	116	97
Zinc	25.2	102	120	93
QC LIMIT:				75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
JECT: Metro Redline Eastside Extens.
IOD: EPA 3050/6010
RIX: SOIL

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BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: LCS1S/LCS1SD DATE EXTRACTED: 12/13/95
CONTROL NO.: IPL019SL/C DATE ANALYZED: 12/13/95

ACCESSION: 95L057 95L065

PARAMETER	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
Antimony	ND	500.00	457.40	91	500.00	460.31	92	1
Arsenic	ND	100.00	92.98	93	100.00	92.77	93	0
Barium	ND	100.00	98.30	98	100.00	98.91	99	1
Beryllium	ND	100.00	95.84	96	100.00	96.20	96	0
Cadmium	ND	100.00	93.33	93	100.00	93.90	94	1
Chromium	ND	100.00	97.59	98	100.00	97.65	98	0
Cobalt	ND	100.00	95.88	96	100.00	96.17	96	0
Copper	ND	100.00	97.38	97	100.00	97.52	98	0
Lead	ND	100.00	94.86	95	100.00	96.16	96	1
Molybdenum	ND	100.00	94.71	95	100.00	95.14	95	0
Nickel	ND	100.00	96.42	96	100.00	97.47	97	1
Selenium	ND	100.00	97.22	97	100.00	92.64	93	5
Silver	ND	100.00	96.38	96	100.00	96.48	96	0
Thallium	ND	100.00	93.67	94	100.00	96.38	96	3
Vanadium	ND	100.00	96.40	96	100.00	96.86	97	0
Zinc	1.24	100.00	96.58	95	100.00	96.10	95	1
IMIT:				75-125			75-125	30

EPA METHOD 7471
MERCURY BY COLD VAPOR

CLIENT:	Earth Technology Corp.	DATE COLLECTED:	12/08/95
PROJECT:	Metro Redline Eastside Extens.	DATE RECEIVED:	12/12/95
BATCH NO.:	95L065	DATE EXTRACTED:	12/13/95
MATRIX:	SOIL	DATE ANALYZED:	12/13/95

SAMPLE ID	CONTROL NO	RESULT (mg/kg)	DL FACTOR	MOIST (%)	MDL (mg/kg)
DD-65 E-20	L065-02	ND	1	NA	.1
MBLK1S	HGL016SB	ND	1	NA	.1

MDL: Method Detection Limit

CKY QUALITY CONTROL DATA
DUPLICATE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL

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BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: 028-002-EX-014-003 DATE EXTRACTED: 12/13/95
CONTROL NO.: L001-03 DATE ANALYZED: 12/13/95

ACCESSION: 95L001 95L057 95L065

PARAMETER	Sample (mg/kg)	Dup. Sample (mg/kg)	RPD (%)
Mercury	ND	ND	0
QC LIMIT:			20

CKY QUALITY CONTROL DATA
SPIKE SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL

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BATCH NO.: 95L065 DATE RECEIVED: NA
SAMPLE ID: 028-002-EX-014-003 DATE EXTRACTED: 12/13/95
CONTROL NO.: L001-03 DATE ANALYZED: 12/13/95

ACCESSION: 95L001 95L057 95L065

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	MS CONC (mg/kg)	MS % REC
Mercury	ND	2.08	2.11	101

QC LIMIT: 75-125

CKY QUALITY CONTROL DATA
LABORATORY CONTROL SAMPLE ANALYSIS

CLIENT: Earth Technology Corp.
PROJECT: Metro Redline Eastside Extens.
METHOD: EPA 7471
MATRIX: SOIL

BATCH NO.: 95L065
SAMPLE ID: LCS01/LCS01D
CONTROL NO.: HGL016SL/C

DATE RECEIVED: NA
DATE EXTRACTED: 12/13/95
DATE ANALYZED: 12/13/95

ACCESSION: 95L001 95L057 95L065

Parameter	SAMPLE CONC (mg/kg)	SPIKE ADDED (mg/kg)	LCS CONC (mg/kg)	LCS % REC	SPIKE ADDED (mg/kg)	LCSD CONC (mg/kg)	LCSD % REC	% RPD
Mercury	ND	13.10	14.86	113	13.10	13.57	104	9
QC LIMIT:				85-115			85-115	20

APPENDIX D

SUMMARIES OF FIELD AND LABORATORY PROGRAMS AND RESULTS

STAGE II ENVIRONMENTAL SITE ASSESSMENT EASTSIDE EXTENSION

METRO RED LINE PROJECT

Remarks

The following tables provide summaries of field observations and chemical laboratory test results obtained during Stage II environmental site assessment of the entire Eastside alignment. Borings/monitoring wells located within the project area include EB-18, EB-20 to EB-25, EB-27, EB-28, PE-18, and PE-29 to PE-31.

TABLE D-1. FIELD EXPLORATION PROGRAM - BORINGS AND MONITORING WELLS

Boring Number	Approximate Stationing[1]	Location	Approximate Ground Surface Elevation[1] (ft)	Approximate Tunnel/Station Invert Depth[1] (ft)	Total Penetration Depth (ft)	Monitoring Well Installation
EB-1		Whittier/Atlantic[3]	191	71	31.5	
EB-2		Whittier/Woods[3]	191	71	75.0	
EB-3		Whittier/Eastern[3]	195	52	26.4	
EB-4		Whittier/Eastern[3]	196	53	35.4	
EB-5		Whittier/Eastern[3]	196	52	26.5	
EB-6		Whittier/Brannick[3]	209	60	48.0	
EB-7		Whittier/Downey[3]	212	59	30.5	
EB-8D		Whittier/Eastman[3]	223	61	73.3	
EB-8F		Whittier/Eastman	222	61	75.5	
EB-9		Indiana/5th[3]	300	107	31.5	
EB-10	201+65	Indiana/1st	320	105	31.0	
EB-10B		Third/Alma[3]	319	115	31.5	
EB-11	197+35	Velasco/First	311	93	31.0	
EB-12A	169+35	First/Julian	300	56	80.0	Monitoring well
EB-13A	139+85	Alley (near Soto)/Brooklyn	345	67	81.0	Monitoring well
EB-14A	120+15[2]	Alley (near Brooklyn) /Cummings	335	79	41.0	
EB-15	100+22	Boyle/First	311	85	86.0	
EB-16	70+99	Mission/Artemus	260	88	30.8	
EB-18	43+20	Santa Fe/Third	265	70	25.9	
EB-20	CL 28+59	Center/Jackson	270	75	86.0	
EB-21	19+00	Center/Commercial	275	55	64.5	
EB-22	22+60	Center/DuCommun	270	60	65.0	Nested Well
EB-23	28+94	Center/Temple	270	75	85.5	
EB-24	14+90	Fwy 101/Vignes	275	43	60.5	

TABLE D-1. FIELD EXPLORATION PROGRAM - BORINGS AND MONITORING WELLS

Boring Number	Approximate Stationing[1]	Location	Approximate Ground Surface Elevation[1] (ft)	Approximate Tunnel/Station Invert Depth[1] (ft)	Total Penetration Depth (ft)	Monitoring Well Installation
EB-25	14+50	Gateway Center Construction Site/Fwy 101	275	42	51.5	
EB-27	CL16+40	Fwy 101/Vignes	275	48	55.0	
EB-28	CL19+66	Center/Commercial	275	58	69.5	

Notes:
1. Stationing, ground surface elevation, and tunnel/station invert depth based on Eastside Extension Tunnel Line Section drawings provided by EMC in October and December 1995.
2. Projected about 215 feet southeastly to the centerline of CL track.
3. Located along the planned future tunnel alignment of the Eastside Extension.

TABLE D-2. SUMMARY OF SIGNIFICANT FIELD OBSERVATIONS

Boring/Monitoring Well Number	Date of Drilling/Water Sampling	Depth to Groundwater[1] (ft)	Depth to Bedrock (ft)	Field Observations	
				Odor	Instrument Readings[2] Above Background (ppm)
EB-4	01/04/94	--	--	Gasoline odor in soil samples @ 5′ and 10′	- 118 @ 5′ - 128 @ 10′ - 24 @ 25′
EB-5	01/04/94	--	--	Hydrocarbon odor in soil sample @ 5′	- 26 @ 5′
EB-8D	01/05/94	--	--	Hydrocarbon odor in soil samples @ 25′ and 30′	- 34 @ 55′ - 32 @ 60′ - 112 @ 65′ - 108 @ 70′
PE-8	12/02/93	- 55 on 12/02/93 - dry on 12/21/93	--	Strong gasoline odor in water	- 163 near the well head
EB-8F	01/10/94	--	--	Strong hydrocarbon odor in soil sample @ 24′	- >1,000 @ 24′ - 119 (PID) @ 24′ - >100 in general from 29′-74′ - 19 (PID) @ 49′
EB-12A	01/05/94 - 01/06/94	48.0	--	--	- 210 @ 65′ - 270 @ 70′ - 20 @ 75′
	01/22/94	--	--	--	- >1,000 near the well head
EB-20	01/08/94 - 01/13/94	33.0	75.0	Sulfur odor in soil samples from 40′-70′	- 130 @ 55′ - >1,000 @ 60′ - >1,000 @ 65′ - 154 @ 70′ - >1,000 @ 75′ - 894 @ 80′ - 814 @ 85′
PE-31	12/15/93 12/16/93	38.3	73.0	Sulfur odor in water	- 355 near water sample - 11.5 (H_2S) near water sample
EB-21	01/15/94	36.0	--	Sulfur odor from 29′-39′	- >100 from 39′-54′ - 41 @ 59′
PE-30	12/14/93 - 12/15/93	36.5	73.0	Sulfur odor in water	- 135 near water sample - 2.9 (H_2S) near water sample

TABLE D-2. SUMMARY OF SIGNIFICANT FIELD OBSERVATIONS

Boring/Monitoring Well Number	Date of Drilling/Water Sampling	Depth to Groundwater[1] (ft)	Depth to Bedrock (ft)	Field Observations	
				Odor	Instrument Readings[2] Above Background (ppm)
EB-22	01/11/94 - 01/12/94	34.5	--	Strong sulfur odor in soil samples from 35'-60'	- >200 from 35'-60' - 394 @ 50' - 30 (H_2S) @ 35' - 24 (H_2S) @ 45'
EB-22/1	01/22/94	34.5	--	Strong sulfur odor in water Well casing under pressure	- >1,000 near the wall head - 4 (H_2S) near the well head after ventilation
PE-29	12/13/93	35.0	70.0	Sulfur odor in water	- 135 near water sample - 46 (H_2S) near water sample
EB-23	01/15/94	42.0	45.0	--	- >80 @ 45' - 47 @ 50' - 70 @ 55' - >200 from 60'-84' - 880 @ 84'
EB-24	01/15/94	37.0	--	Sulfur odor from 24'-60'	- 61 @ 20' - 99 @ 24' - >100 from 44'-60' - 416 @ 44'
EB-25	12/29/93	38.5	--	Very faint sulfur odor from 45'-50'	- 24 @ 45'
EB-27	01/15/94	37.0	--	--	- 490 @ 9' - 410 @ 14' - 35 @ 19' - >100 from 29' - 54' - >1,000 @ 39'
EB-28	12/22/93	30.0	--	Sulfur odor in soil samples from 34'-55'	--

Notes: 1. Measured in monitoring wells or observed in hollow-stem auger borings.
2. All instrument readings are FID readings unless otherwise specified.

TABLE D-3. SUMMARY OF GROUNDWATER LEVEL READINGS

Monitoring Well Number	Location	Approximate Stationing[1]	Approximate Ground Surface Elevation[1] (ft)	Well Screen Interval (ft)	Approximate Tunnel/Station Invert Depth[1] (ft)	Depth to Groundwater Below Ground Surface (ft)	Approximate Groundwater Elevation (ft)	Measurement Date
PE-8[2]	Whittier/Eastern[3]		222	35.0-65.0	63	DRY	-	01/11/94
EB-12A	First/Jullien	CR 169+35	300	65.0-80.0	56	45.1	254.9	01/22/94
PE-16	Michigan/Santoga	CR 154+80[4]	313	64.5-95.5	55	51.8	261.2	01/11/94
EB-13A	Alley (near Soto)/Brooklyn	CR 139+85	345	42.0-62.0	67	47.8	297.2	01/23/94
PE-23	Third/Clarence	CR 82+62[5]	257	25.0-85.0	70	54.2	202.8	01/11/94
PE-18	Third/Santa Fe	CR 42+90	265	24.0-84.0	70	79.2	185.8	01/11/94
PE-31	Center/Jackson	CL 28+50	270	20.0-80.0	75	38.3	231.7	01/11/94
PE-30	Center/Commercial	CR 19+26	275	17.5-78.0	56	36.5	238.5	01/11/94
EB-22/1	Center/DuCommun	CR 22+60	270	39.5-64.5	60	34.3	235.7	01/22/94
PE-29	Center/DuCommun	CR 22+50	270	20.0-80.0	60	34.9	235.1	01/11/94

Notes:
1. Stationing ground surface elevation and tunnel/station invert depth based on Eastside Extension Tunnel Line Section drawings provided by EMC in October and December 1995.
2. On December 2, 1993, the groundwater level reading was 55.0 feet below ground surface in Monitoring Well PE-8.
3. Located along the planned future tunnel alignment of the Eastside Extension.
4. Projected about 100 feet northeastly to the centerline of the CR track.
5. Projected about 250 feet northwestly to the centerline of the CR track.

TABLE D-4. FIELD SCREENING OF GAS SAMPLES

Monitoring Well No.	Date	PID (ppm)	FID (ppm)	H_2S (ppm)
		Reading/Background Reading	Reading/Background Reading	Reading/Background Reading
PE-29	01/26/94	0/0	>1,000/25	0.3/0.3
	02/01/94	0/0	>1,000/6	0.3/0.3
PE-30	01/26/94	0/0	>1,000/20	0/0
	02/01/94	0/0	>1,000/6	0.3/0.3
PE-31	01/26/94	0/0	100/10	0/0
	02/01/94	0/0	20/3	0.3/0.3
EB-22/1 (screened below the groundwater table)	01/26/94	0/0	>1,000/25	133/0
	02/01/94	5/0	>1,000/6	129/0.2
EB-22/2 (screened above the groundwater table)	01/26/94	0/0	27/25	1.0/1.0
	02/01/94	0/0	10/6	0.2/0.2

Notes:
1. All the readings were obtained at the end of the hose which was connected to the stop-cock on top of the well heads.
2. FID and PID give combined concentrations of various organic and inorganic gases. FID and PID are used only as field screening tools.

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-1	EB-1/3	15	ND[3]	BTEX (ND) [4]		--[5]		--	--
	EB-1/5	25	ND	ND[6]		Di-n-butylphthalate (500)[7]	NAL[8]	ND	ND
	EB-1/6	30	ND	BTEX (ND)		--		--	--
EB-2	EB-2/3	14	ND	BTEX (ND)		--		--	--
	EB-2/6	29	ND	ND		Di-n-butylphthalate (660)[7]	NAL	ND	ND
	EB-2/10	49	ND	BTEX (ND)		--		--	--
	EB-2/13	64	ND	BTEX (ND)		--		--	--
EB-3	EB-3/2	10	ND	BTEX (ND)		--		--	--
	EB-3/5	25	ND	ND		Di-n-butylphthalate (1,100)[7]	NAL	ND	ND
EB-4	EB-4/1	5	ND	BTEX (ND)		--		--	--
	EB-4/2	10	ND	ND		ND		ND	ND
	EB-4/5	25	ND	BTEX (ND)		--		-	--
	EB-4/6	30	--	BTEX (ND)		--		--	--
	EB-4/7	35	--	BTEX (ND)		--		--	--
EB-5	EB-5/1	5	ND	ND		ND		ND	ND
	EB-5/4	20	ND	BTEX (ND)		--		--	--
	EB-5/5	25	C10-C14 (28)[9]	Benzene (ND) Toluene (5.2) Ethylbenzene (11) Xylenes (40)	 300 1,000 1,750	--		--	--
EB-6	EB-6/1	5	ND	BTEX (ND)		--		--	--
	EB-6/5	25	ND	BTEX (ND)		--		--	--
EB-6	EB-6/9	45	ND	ND		ND		ND	ND

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-7	EB-7/1	5	ND	BTEX (ND)		--		--	--
	EB-7/3	15	ND	ND		ND		ND	ND
	EB-7/6	30	ND	BTEX (ND)		--		--	--
EB-8D	EB-8D/5	25	ND	BTEX (ND)		--		--	--
	EB-8D/9	45	ND	BTEX (ND)		--		--	--
	EB-8D/11	55	ND	BTEX (ND)		--		--	--
	EB-8D/12	60	ND	Benzene (11)	300	--		--	--
	EB-8D/13	65	ND	ND		ND		ND	ND
	EB-8D/14	70	ND	Benzene (120) Toluene (7)	300 300	--		--	--
	EB-8D/15	73	ND	BTEX (ND)		--		--	--
EB-8F	EB-8F/5	24	ND	Benzene (29) Toluene (180) Ethylbenzene (40) Xylenes (170)	300 300 1,000 1,750	Di-n-butylphthalate (1,200)[7] --	NAL	ND	ND
	EB-8F/8	39	ND	Benzene (150) Toluene (290) Ethylbenzene (28) Xylenes (140)	300 300 1,000 1,750	--		--	--
	EB-8F/10	49	ND	Benzene (370) Toluene (370) Ethylbenzene (25) Xylenes (110)	300 300 1,000 1,750	 --		--	--
	EB-8F/12	57	ND	Benzene (160) Toluene (9.6)	300 300	--		--	--

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-8F	EB-8F/14	68	ND	Benzene (520) Toluene (440) Ethylbenzene (9.8) Xylenes (99)	300 300 1,000 1,750	--		--	--
EB-9	EB-9/1	5	ND	BTEX (ND)		--		--	--
	EB-9/2	10	ND	ND		Di-n-butylphthalate (660)[7]	NAL	ND	ND
	EB-9/4	20	ND	BTEX (ND)		--		--	--
EB-10	EB-10/2	10	ND	BTEX (ND)		--		--	--
	EB-10/3	15	ND	ND		Di-n-butylphthalate (640)[7]	NAL	ND	ND
	EB-10/5	25	ND	BTEX (ND)		--		--	--
EB-10B	EB-10B/2	10	ND	BTEX (ND)		--		--	--
	EB-10B/4	20	ND	ND		ND		ND	ND
	EB-10B/6	30	ND	BTEX (ND)		--		--	--
EB-11	EB-11/1	5	ND	BTEX (ND)		--		--	--
	EB-11/3	15	ND	BTEX (ND)		--		--	--
	EB-11/4	20	ND	ND		Di-n-butylphthalate (1,500)[7]	NAL	ND	ND
EB-12A (EB-12)	EB-12A/2	10	ND	BTEX (ND)		--		--	--
	EB-12A/10	50	ND	BTEX (ND)		ND		ND	ND
	EB-12A/13	65	ND	BTEX (ND)		--		--	--
	EB-12A/14	70	ND	ND		Di-n-butylphthalate (520)[7]	NAL	ND	ND
EB-12A	EB-12A/15	75	ND	BTEX (ND)		--		--	--
EB-13A	EB-13A/2	10	ND	BTEX (ND)		--		--	--

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-13A	EB-13A/4	20	ND	ND		Di-n-butylphthalate (380)[7]	NAL	ND	ND
	EB-13A/8	40	ND	BTEX (ND)		--		--	--
	EB-13A/9	50	ND	BTEX (ND)		--		--	--
EB-14A	EB-14A/1	5	ND	BTEX (ND)		--		--	--
	EB-14A/4	20	ND	ND		ND		ND	ND
	EB-14A/8	40	ND	BTEX (ND)		--		--	--
EB-15	EB-15/3	15	ND	BTEX (ND)		--		--	--
	EB-15/7	35	ND	BTEX (ND)		--		--	--
	EB-15/10	50	ND	BTEX (ND)		--		--	--
	EB-15/13	65	ND	ND		ND		ND	ND
EB-16	EB-16/1	5	ND	BTEX (ND)				--	--
	EB-16/3	15	ND	BTEX (ND)				--	--
	EB-16/5	25	ND	ND		ND		ND	ND
EB-18	EB-18/1	5	ND	BTEX (ND)				--	--
	EB-18/2	10	ND	ND		Di-n-butylphthalate (470)[7]	NAL	ND	ND
	EB-18/4	20	ND	BTEX (ND)				--	--
EB-20	EB-20/7	34	ND	BTEX (ND)		--			
	EB-20/8	39	ND	BTEX (ND)		--		--	--
	EB-20/9	44	ND	BTEX (ND)		--		--	--

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-20	EB-20/11	54	ND	Benzene (18) Ethylbenzene (15) Xylenes (6) Carbon Disulfide (8)	1.0 680 1,750 700[10]	Di-n-butylphthalate (480)[7]	NAL	ND	ND
	EB-20/15	75	ND	Carbon Disulfide (9)	700[10]	Di-n-butylphthalate (1,100)[7]	NAL	--	ND
EB-21	EB-21/6	29	ND	BTEX (ND)		--	--	--	--
	EB-21/8	39	ND	ND		Di-n-butylphthalate (2,500)[7]	NAL	ND	ND
	EB-21/9	44	ND	BTEX (ND)		--	--	--	--
	EB-21/11	54	ND	BTEX (ND)		--	--	--	--
EB-22	EB-22/3	9	ND	BTEX (ND)		--	--	--	--
	EB-22/8	35	ND	Benzene (5) Carbon Disulfide (8)	1.0 700[10]	Di-n-butylphthalate (450)[7] --	NAL	ND	ND
	EB-22/11	50	ND	BTEX (ND)				--	--
EB-23	EB-23/7	34	ND	BTEX (ND)					
	EB-23/9	44	C11-C22(36)	Benzene (150) Ethylbenzene (1,900) Toluene (260) Xylenes (950) Carbon Disulfide (37)	1.0 680 100[11] 1,750 700[10]	Naphthalene (8,000) 2-Methylnaphthalene (400) Acenaphthylene (4,750) Acenapthene (3,200) Fluorene (5,000) Phenanthrene (5,000) Anthracene (7,000) Di-n-butylphthalate (2,400)[7] Fluoroanthene (9,000) Pyrene (11,000) Benzo(a) anthracene (8,000)	20[13] NAL 0.0028[15] 20[14] 0.0028[15]/1,300[12] 0.0028[15] 0.0028[15]/2,100[10] NAL 42[15]/300[12] 0.0028[15]/210[10] 0.0028[15]/0.1[16]	ND	ND

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-23	EB-23/9 (cont'd.)	44	C11-C22(36)			Chrysene (8,000) Benzo(a)pyrene (10,000) Indeno(1,2,3-cd)pyrene (3,400) Dibenzo (a,h) anthracene (700) Benzo (g,h,i)perylene (3,500)	0.0028[15]/0.2[16] 0.0028[15]0.2[16] 0.0028[15]/0.4[16] 0.0028[15]/0.3[16] 0.0028[15]	ND	ND
	EB-23/10	49	ND	BTEX (ND)	--	--	--	--	--
	EB-23/12	59	ND	BTEX (ND)	--	--	--	--	--
	EB-23/13	64	ND	BTEX (ND)	--	--	--	--	--
EB-24	EB-24/3	14	C16-C26 (29)	BTEX (ND)		--	--	--	--
	EB-24/5	24	ND	ND		Di-n-butylphthalate (1,400)[7]	NAL	ND	ND
	EB-24/7	34	ND	BTEX (ND)		--	--	--	--
	EB-24/9	44	ND	BTEX (ND)		--	--	--	--
	EB-24/11	54	ND	BTEX (ND)		--	--	--	--
EB-25	EB-25/6	30	ND	BTEX (ND)		--	--	--	--
	EB-25/8	40	ND	BTEX (ND)		--	--	--	--
	EB-25/9	45	ND	ND		ND	--	ND	ND
EB-27	EB-27/3	14	C25-C26(10)	BTEX (ND)		--	--	--	--
	EB-27/5	29	C10-C22(43)	Acetone (100) Carbon Disulfide (38) Ethylbenzene (26) Xylenes (24)	70,000[10] 70,000[10] 1,000 1,750	Acenaphthylene (400) Di-n-butylphthalate (500)[7] Fluoroanthene (900) Pyrene (1,700) Benzo(a)pyrene (900) Indeno (1,2,3-cd) pyrene (440) Benzo(g,h,i)perylene (1,200)	0.28[15] NAL 4,200[15]/30,000[12] 21,000[10]/0.28[15] 0.28[15]/20[16] 0.28[15]/40[16] 0.28[15]	110	ND
	EB-27/6	34	ND	BTEX (ND)		--		--	--
EB-27	EB-27/7	39	ND	ND		--		--	--

TABLE D-5. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR ORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Petroleum Hydrocarbons[1] (mg/kg)	Volatile Organics (μg/kg)		Semi-Volatile Organics (μg/kg)		Oil and Grease (mg/kg)	Organic Lead (mg/kg)
				Compound (Concentration)	Threshold Level[2]	Compound (Concentration)	Threshold Level[2]		
EB-28	EB-28/6	24	ND	BTEX (ND)		--		--	--
	EB-28/8	34	ND	BTEX (ND)		--		--	--
	EB-28/10	44	ND	BTEX (ND)		--			--
	EB-28/14	65	ND	Carbon Disulfide (7) Ethylbenzene (13) Xylenes (6)	700[10] 680 1,750	Naphthalene (800) Fluorene (370) Phenanthrene (1,000)	20[13] 0.0028[15]/1,300[12] .0028[15]	ND	ND
	EB-28/15	69	ND	BTEX (ND)		--	--	--	--

Notes:
(1) An appropriate threshold or action level has to be negotiated with appropriate agencies on a case by case basis. Generally accepted threshold level of TPH in water is 0.1 mg/L
(2) California Department of Health Services (CDHS) Maximum Contaminant Level (MCL) for drinking water. For soil samples above the water table, LUFT (RWQCB, 1989) manual levels were used for BTE and California MCL is used for X. For other contaminants, an environmental attenuation factor of 100 was used to compute the threshold levels used in this table. For soil samples at or below the water table, 100 percent solubility was assumed and California MCL's for drinking water were used when available.
(3) ND = Not detected
(4) Only tested for Benzene (B), Toluene (T), Ethylbenzene (E) and Xylenes (X)
(5) -- = Not analyzed
(6) Not detected for all VOC's under test method EPA 8240.
(7) Common residual laboratory contaminant detected at low levels, hence not considered significant
(8) NAL = No published action level.
(9) Carbon chains
(10) U.S. EPA Integrated Risk Information System (IRIS) reference dose as a water quality criterion
(11) CDHS Action Level for Toxicity
(12) U.S. EPA National Ambient Water Quality Criteria for Health and Welfare Protection (Non-Cancer Public Health Effects)
(13) Suggested No Adverse Response Level (SNARL) for toxicity other than cancer risk per EPA.
(14) U.S. EPA National Ambient Water Quality Criteria for Health and Welfare Protection (Taste and Odor or Welfare)
(15) California Inland Surface Waters Plan Numerical Water Quality Objective for Human Health Protection (30 day average) for sources of drinking water.
(16) U.S. EPA Maximum Contaminant Levels (MCL) for drinking water.

TABLE D-6. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR INORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Sulfide (mg/kg)	Sulfate (mg/kg)	Chloride (mg/kg)	Metals (mg/kg)	
						Compound Concentrations	Threshold Level[1]
EB-1	EB-1/5	25	ND[2]	2.8	1.3	--(3)	
EB-2	EB-2/1	4	--	--	--	Barium (103) Beryllium (0.68) Cadmium (0.64) Chromium (24.1) Cobalt (10.1) Copper (16.7) Mercury (0.08) Nickel (16.4) Vanadium (46.2) Zinc (52.5)	10,000 75 100 2,500 8,000 2,500 20 2,000 2,400 5,000
	EB-2/6	29	ND	4.7	2.2	--	
EB-3	EB-3/5	25	ND	26.2	13.3	--	
EB-4	EB-4/2	10	ND	ND	3.4	--	
EB-5	EB-5/1	5	ND	ND	6.4	--	
EB-6	EB-6/1	45	ND	25.0	42.0	--	
EB-7	EB-7/3	15	ND	19.4	0.8	--	
EB-8D	EB-8D/13	65	ND	8.6	7.6	--	
EB-8F	EB-8F/1	4	--	--	--	Barium (197) Beryllium (1.04) Cadmium (0.79) Chromium (29.1) Cobalt (24.3) Copper (18.3) Lead (6.03) Mercury (0.19) Nickel (23.6) Vanadium (56.6) Zinc (60.9)	10,000 75 100 2,500 8,000 2,500 1,000 20 2,000 2,400 5,000
	EB-8F/5	24	ND	ND	4.0	--	
EB-9	EB-9/2	10	ND	4.2	6.7	--	

TABLE D-6. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR INORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Sulfide (mg/kg)	Sulfate (mg/kg)	Chloride (mg/kg)	Metals (mg/kg)	
						Compound Concentrations	Threshold Level[1]
EB-10	EB-10/3	15	ND	1.6	1.7	--	
EB-10B	EB-10/B/4	20	ND	8.4	3.2	--	
EB-11	EB-11/4	20	ND	8.2	3.2	--	
EB-12A (EB-12)	EB-12A/10	50	ND	78	19	--	
	EB-12A/14	70	ND	17.3	18.7	--	
EB-13A	EB-13A/1	5	--	--	--	Barium (116) Chromium (41.4) Cobalt (4.69) Copper (33.9) Lead (15.2) Mercury (0.07) Nickel (12.2) Vanadium (27.8) Zinc (67.9)	10,000 2,500 8,000 2,500 1,000 20 2,000 2,400 5,000
	EB-13A/4	20	ND	31	16		
EB-14A	EB-14A/4	20	ND	102	19.2		
EB-15	EB-15/1	6	--	--	--	Barium (102) Chromium (16.8) Cobalt (7.25) Copper (35.2) Lead (6.85) Nickel (11.7) Vanadium (27.7) Zinc (48.2)	10,000 2,500 8,000 2,500 1,000 2,000 2,400 5,000
	EB-15/13	65	ND	26	14		
EB-16	EB-16/5	25	ND	4.3	0.87	--	

TABLE D-6. SUMMARY OF LABORATORY TEST RESULTS OF SOIL SAMPLES FOR INORGANIC CONSTITUENTS

Boring No.	Sample No.	Depth Below Ground Surface (ft)	Total Sulfide (mg/kg)	Sulfate (mg/kg)	Chloride (mg/kg)	Metals (mg/kg)	
						Compound Concentrations	Threshold Level[1]
EB-18	EB-18/1	5	--	--	--	Barium (84.7) Chromium (11.9) Cobalt (6.92) Copper (11.8) Mercury (0.08) Nickel (8.97) Vanadium (30.5) Zinc (44.2)	10,000 2,500 8,000 2,500 20 2,000 2,400 5,000
	EB-18/2	10	ND	24	2.5	--	
EB-20	EB-20/11	54	81	13	67	--	
EB-21	EB-21/8	39	3.2	36.1	17.5	--	
EB-22	EB-22/8	35	ND	21.0	16	--	
EB-23	EB-23/9	44	1.8	17.2	39	--	
EB-24	EB-24/5	24	0.9	111	2.8	--	
EB-25	EB-25/8	40	--	55.4	17.0	--	
	EB-25/9	45	7.7	--	--	--	
EB-27	EB-27/5	29	5.4	24.5	12	--	
EB-28	EB-28/14	65	4.1	18.7	17.2		

Notes:
(1) Total Threshold Limit Concentration (TTLC) value from the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 11, Section 66699
(2) ND = Not Detected
(3) -- = Not Analyzed
Metals not reported were not detected above laboratory detection limits.

TABLE D-7. LABORATORY TEST PROGRAM FOR GROUNDWATER SAMPLES

Test Type	Number of Tests	Test Procedure
Total Petroleum Hydrocarbons (with carbon chain identification)	9	Modified EPA[1] 8015
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	7	EPA 8020
Volatile Organic Compounds	9	EPA 8240
Semi-volatile Organic Compounds	9	EPA 8270
Oil and Grease	2	EPA 413.2
Organic Lead	2	DHS[2] Method
Inorganic Analysis (Arsenic)	4	EPA 7060
Inorganic Analysis (Selenium)	4	EPA 7740
Inorganic Analysis (Mercury)	4	EPA 7470
Inorganic Analysis (Dissolved CAM[3] Metals)	3	EPA 7471
Inorganic Analysis (CAM Metals by ICP)	6	EPA 3005/6010/ICP[4]
Total Sulfide	9	EPA 376.1, 376.2
Sulfate and Chloride	9	EPA 300, 325.3, 375.3

Notes: (1) EPA = U.S. Environmental Protection Agency
(2) DHS = California Department of Health Services
(3) CAM = California (Title 22) Metals
(4) ICP = Inductively Coupled Argon Plasma

TABLE D-8. SUMMARY OF ANALYTICAL TESTS ON GROUNDWATER SAMPLES

Sample No.	Total Petroleum Hydrocarbons (mg/L)	Volatile Organics (μg/L)		Semi-volatile Organics (μg/L)		Oil and Grease (mg/L)	Organic Lead (mg/L)	Metals (mg/L)		Total Sulfides (mg/L)	Sulfate (mg/L)	Chloride (mg/L)
		Compound (Concentration)	Threshold Level[1]	Compound (Concentration)	Threshold Level[1]			Compound (Concentration)	Threshold Level[1]			
PE-8	0.33	Benzene (7,450)	1	ND[2]		--	--	Barium (0.13)	1.0	ND	174	86.9
		Toluene (780)	100[3]					Zinc (0.15)	2.0[4]			
		Ethylbenzene (520)	680					Vanadium (0.007)	0.02[4]			
		Xylenes (1,070)	1,750									
		Acetone (140)	700[5]									
EB-12A	ND	ND		ND		ND	ND	Barium (0.0853)	1.0	ND	ND	354
								Copper (0.0102)	1.0			
PE-16	ND	ND		Dimethylphthalate[6] (12)	313,000[7]	--	--	Arsenic (0.0046)	0.05	ND	351	166
				bis (2-Ethylhexyl)[6] phthalate (12)	4			Barium (0.076)	1.0			
								Zinc (0.09)	2.0[4]			
EB-13A	ND	ND		ND		ND	ND	Barium (0.0699)	1.0	ND	293	107
								Zinc (0.0628)	2.0[4]			
PE-23	ND	ND		ND		--	--	Barium (0.11)	1.0	ND	303	168
								Molybdenum (0.011)	0.04[4]			
								Selenium (0.0026)	0.01			
								Zinc (0.028)	2.0[4]			
PE-18	ND	ND		ND		--	--	Barium (0.1)	1.0	ND	232	161
								Copper (0.01)	1.0			
								Selenium (0.0059)	0.01			
								Zinc (0.07)	2.0[4]			
PE-29	8.4	Benzene (250)	1.0	Phenol (16)	4,000[4]			Barium (1.24)	1.0	150	25	280

TABLE D-8. SUMMARY OF ANALYTICAL TESTS ON GROUNDWATER SAMPLES

Sample No.	Total Petroleum Hydrocarbons (mg/L)	Volatile Organics (μg/L)		Semi-volatile Organics (μg/L)		Oil and Grease (mg/L)	Organic Lead (mg/L)	Metals (mg/L)		Total Sulfides (mg/L)	Sulfate (mg/L)	Chloride (mg/L)
		Compound (Concentration)	Threshold Level[1]	Compound (Concentration)	Threshold Level[1]			Compound (Concentration)	Threshold Level[1]			
PE-29 (cont'd.)		Toluene (54)	100[3]	4-methylphenol (13)	35[5]	--	--					
		Ethylbenzene (920)	680	Naphthalene (600)	20[4]							
		Xylenes (320)	1,750	2-methylnapthalene (12)	NAL[8]							
		Vinyl Acetate (24)	NAL[8]	Acenaphthene (33)	20[9]							
		Vinyl Chloride (270)	0.5									
PE-30	10	Benzene (45)	1.0	Naphthalene (2,900)	20[4]	--	--	Barium (0.684)	1.0	54	246	241
		Toluene (210)	100	2-methylnapthalene (26)	NAL[8]			Zinc (0.104)	2.0[4]			
		Ethylbenzene (1,200)	680	Acenaphthene (18)	20[9]							
		Xylenes (950)	1,750									
		cis-1,2-dichloroethene (5)	6									
PE-31	ND[2]	Benzene (130)	1.0	ND		--	--	Barium (0.0765)	1.0	10.5	361	191
		Toluene (2.4)	100									
		Ethylbenzene (5.4)	680									
		Xylenes (4.5)	1,750									
		cis-1,2-dichloroethene (100)	6									

TABLE D-8. SUMMARY OF ANALYTICAL TESTS ON GROUNDWATER SAMPLES

Sample No.	Total Petroleum Hydrocarbons (mg/L)	Volatile Organics (μg/L)		Semi-volatile Organics (μg/L)		Oil and Grease (mg/L)	Organic Lead (mg/L)	Metals (mg/L)		Total Sulfides (mg/L)	Sulfate (mg/L)	Chloride (mg/L)
		Compound (Concentration)	Threshold Level[1]	Compound (Concentration)	Threshold Level[1]			Compound (Concentration)	Threshold Level[1]			
PE-31 (cont'd.)		Trichloroethene (3)	5									
		Vinyl chloride (13)	0.5									

Notes: (1) California Department of Health Services (CDHS) Maximum Contaminant Level (MCL) for drinking water.
(2) ND = Not Detected
(3) California Department of Health Services (CDHS) Action Level for Toxicity
(4) Suggested No Adverse Response Level (SNARL) for toxicity other than cancer risk per EPA
(5) U.S. EPA Integrated Risk Information System (IRIS) reference dose as a water quality criterion
(6) Common residual laboratory contaminant detected at low levels, hence not considered significant.
(7) U.S. EPA National Ambient Water Quality Criteria for Health and Welfare Protection (Non-Cancer Public Health Effects)
(8) NAL = No published action level
(9) U.S. EPA National Ambient Water Quality Criteria for Health and Welfare Protection (Taste and Odor or Welfare)

μg/L - micrograms per liter, mg/L - milligrams per liter
-- Not Analyzed.

TABLE D-9. LABORATORY TEST PROGRAM FOR GAS SAMPLES

Test Type	Number of Tests	Test Method
Methane	8	GC[1]/FID[2]
Hydrogen Sulfide	6	GC/FPD[3]
Gas Composition	1	GC/FID and GC/TCD[4]
Volatile Organics Compounds	4	GC/MS[5]
Carbon and Hydrogen Isotopes of Methane	1	Vacuum line separation and isotope MS
Carbon Isotope of Carbon Dioxide	1	Vacuum line separation and isotope MS
Sulfur Isotope of Hydrogen Sulfide	1	Precipitation, vacuum line separation and isotope MS
Sulfur Isotope of Dissolved Sulfate in Water	1	Precipitation, vacuum line separation and isotope MS
Carbon Isotope of Bicarbonate in Water	1	Precipitation, vacuum line separation and isotope MS

Notes: (1) GC = Gas chromatography
(2) FID = Flame Ionization Detector
(3) FPD = Flame Photometric Detector
(4) TCD = Thermal Conductivity Detector
(5) MS = Mass Spectrometry

TABLE D-10. SUMMARY OF LABORATORY TEST RESULTS OF GAS SAMPLES[1]

Monitoring Well No.	Date Sampled[2]	Methane (ppmv)[3]	Hydrogen Sulfide (ppmv)	Volatile Organics (ppmv) Compound (Concentration)
PE-29	01/26/94 02/01/94	55,000 110,000	--[4] ND	ND[5] --
PE-30	01/26/94 02/01/94	26,000 360,000	-- ND	ND --
PE-31	01/26/94 02/01/94	57 --	-- ND	ND --
EB-22/1 (screened below the groundwater table)	01/26/94 02/01/94 02/01/94[7]	20,000 720,000 670,000	11,000 19,000 10,600	Benzene (2.8)[6] Vinyl Chloride (2.3)[6] -- --
EB-22/2 (screened above the groundwater table)	02/01/94	8.2	ND	--

Notes:
(1) All the samples were analyzed by Del Mar Analytical unless otherwise specified.
(2) Well heads of PE-29, PE-30 and PE-31 modified for gas sampling on 01/24/94. Well heads of EB-22/1 and EB-22/2 modified on 01/26/94.
(3) ppmv = parts per million by volume
(4) -- = Not Analyzed
(5) ND = Not Detected
(6) Laboratory detection limits for benzene and vinyl chloride were 1.5 ppmv and 1.9 ppmv, respectively.
(7) Analyzed by Global Geochemistry Corporation.

TABLE D-11. GAS COMPOSITION OF A SAMPLE[1] COLLECTED FROM NESTED WELL EB-22/1

Compound	Concentration (percent by volume)
Methane	67.0
Ethane	0.003
Propane	ND[2]
Iso-Butane	ND
n-Butane	ND
Iso-Pentane	ND
n-Pentane	ND
Carbon Dioxide	7.16
Oxygen + Argon	4.10
Nitrogen	20.1
Helium	ND
Hydrogen	0.005
Hydrogen Sulfide	1.06

Notes: (1) Sampled on 02/01/94
(2) ND = Not detected.

APPENDIX E

EARTHWORK GUIDELINES

APPENDIX E
EARTHWORK GUIDELINES

Earthwork and site preparation activities will encompass clearing and grubbing, subgrade preparation for pavement and structural support, excavation for foundations, utility line relocations, and fill placement. The following guidelines are provided for earthwork associated with the Little Tokyo Station.

Clearing and Grubbing

Fill material, trash and any vegetation shall be removed from the site area to be graded. Subsurface conditions at the site may differ from those observed in the borings and, therefore, a qualified geotechnical engineer shall inspect and approve the prepared area prior to the placement of fill.

Excavations

Minor excavations at the site will include those for utility lines and near-surface foundations. Major excavations will be for the main station housing the rail facilities. Recommendations for major temporary excavations are presented in Section 5.5 of this report. Temporary shallow excavations to a depth of 5 feet can be expected to remain stable with 1H:1V (one horizontal to one vertical) slopes for short periods. Temporary excavations deeper than 5 feet shall be shored or sloped back no steeper than 1-1/2H:1V. Recommendations for sloped excavations deeper than 5 feet are presented in Section 5.5 of this report. Due to the granular nature of th alluvium, raveling and running conditions should be anticipated.

Fill Materials and Placement

Fill materials shall consist of excavated onsite granular soils or approved clean granular soils free of expansive materials, debris, organic contaminants or rock fragments larger than 6 inches.

All areas that are to receive compacted fill shall be observed and approved by a qualified geotechnical engineer.

Prior to fill placement, exposed soil surfaces shall be scarified to a minimum of 6 inches, moisture conditioned as necessary and compacted to a minimum dry density of 90 percent of the maximum dry density as determined by procedure ASTM D1557

All fill materials shall be placed in horizontal lifts not exceeding 8 inches in thickness, moisture conditioned to a moisture content 1 to 3 percent above optimum moisture content and mechanically compacted to at least, 90 percent of the maximum dry density as determined by ASTM procedure D1557. Each lift should be compacted before the next life is placed.

A geotechnical engineer or an experienced soils technician shall observe fill placement and compaction and conduct in-place field density tests on the compacted fill to check the adequacy of compaction. If the dry density of the compacted layer is less than 90 percent of the maximum dry density, soils shall be moisture conditioned as necessary and reworked/recompacted as necessary until a minimum 90 percent of the maximum dry density is attained.

In deep fill areas and structure foundation subgrade areas, the compaction requirement shall be increased to 95 percent or higher of the maximum dry density, as directed by a qualified geotechnical engineer.

Subgrade Preparation

Subgrade for shallow footings shall be overexcavated to a minimum depth equal to the footing width and replaced with properly compacted fill. Overexcavation shall extend a minimum distance equal to half the width or 2 feet, whichever is larger, beyond the perimeter of the footing. Fill shall be compacted to at least 95 percent of the maximum dry density as determined by ASTM Procedure D-1557.

In the absence of specific information on loads, dimensions and locations of structures, Figure 5-6 is provided as a general guideline for foundation support needs. Structure specific foundation recommendations should be provided when such information becomes available.

The mat foundation shall be underlain by a minimum 2-foot-thick dense granular material with an in situ density of at least 95 percent of maximum dry density as per ASTM D1557. In granular alluvium this may be achieved by proof rolling the excavated subgrade with a heavy vibratory roller or by overexcavating

and compacting in layers, the 2-foot zone below the foundations. In fine grained alluvium, the exposed subgrade shall be overexcavated at least 2 feet below the design grade and replaced with fill compacted to project specification. If the mat is directly placed on the native materials, rock fragments larger than 6 inches should not be allowed in the exposed subgrade. The compacted fill blanket should extend a minimum of 5 feet beyond the foundation perimeter.

Overexcavations and subgrade preparation shall be observed by the Geotechnical Engineer. Based on exposed field conditions, overexcavation depths may be increased by the Geotechnical Engineer.

Site Drainage

Adequate positive drainage shall be provided away from the surface structures to prevent water from ponding and to reduce water percolation into subsoils. If there is any granular backfill directly underneath the area of surface drainage, the backfill shall be covered or capped with at least 18 inches of relatively impervious compacted clayey soils.