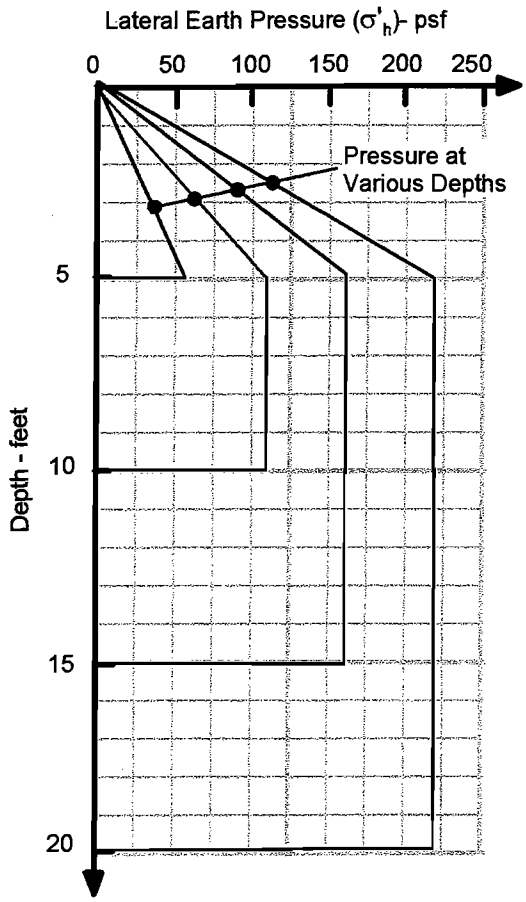
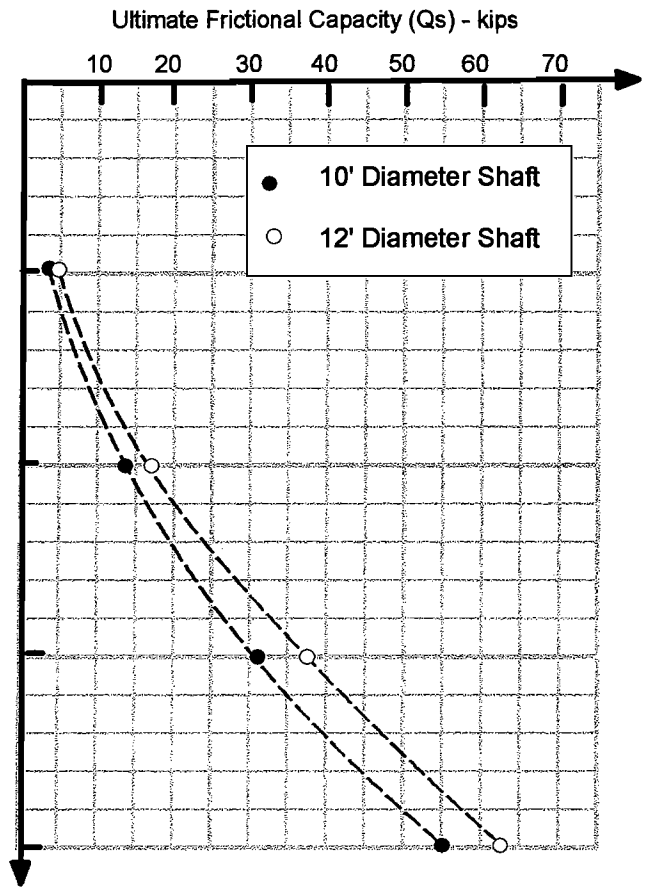
PHOTOS FROM TRENCHING
T106-Fairchild and Los Olivos
Los Osos Wastewater Project
San Luis Obispo County, California

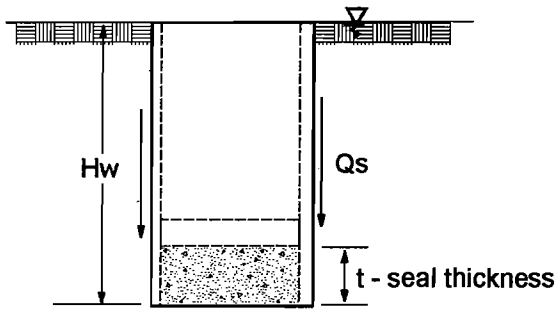
PHOTOS FROM TRENCHING
T107-Ramona and 7th Street
Los Osos Wastewater Project
San Luis Obispo County, California

PLATE 10g





Case Analyzed:



Notes:

1. The lateral earth pressure can be interpolated between the depths shown. The earth pressures are only applicable to cylindrical structures below the water table.

2. Water pressure should be added to the estimated earth pressure at the rate of 62.4 pcf x Hw, in psf. The lateral earth pressure can be doubled, and the water pressure can be neglected, to check non-submerged backfill conditions.

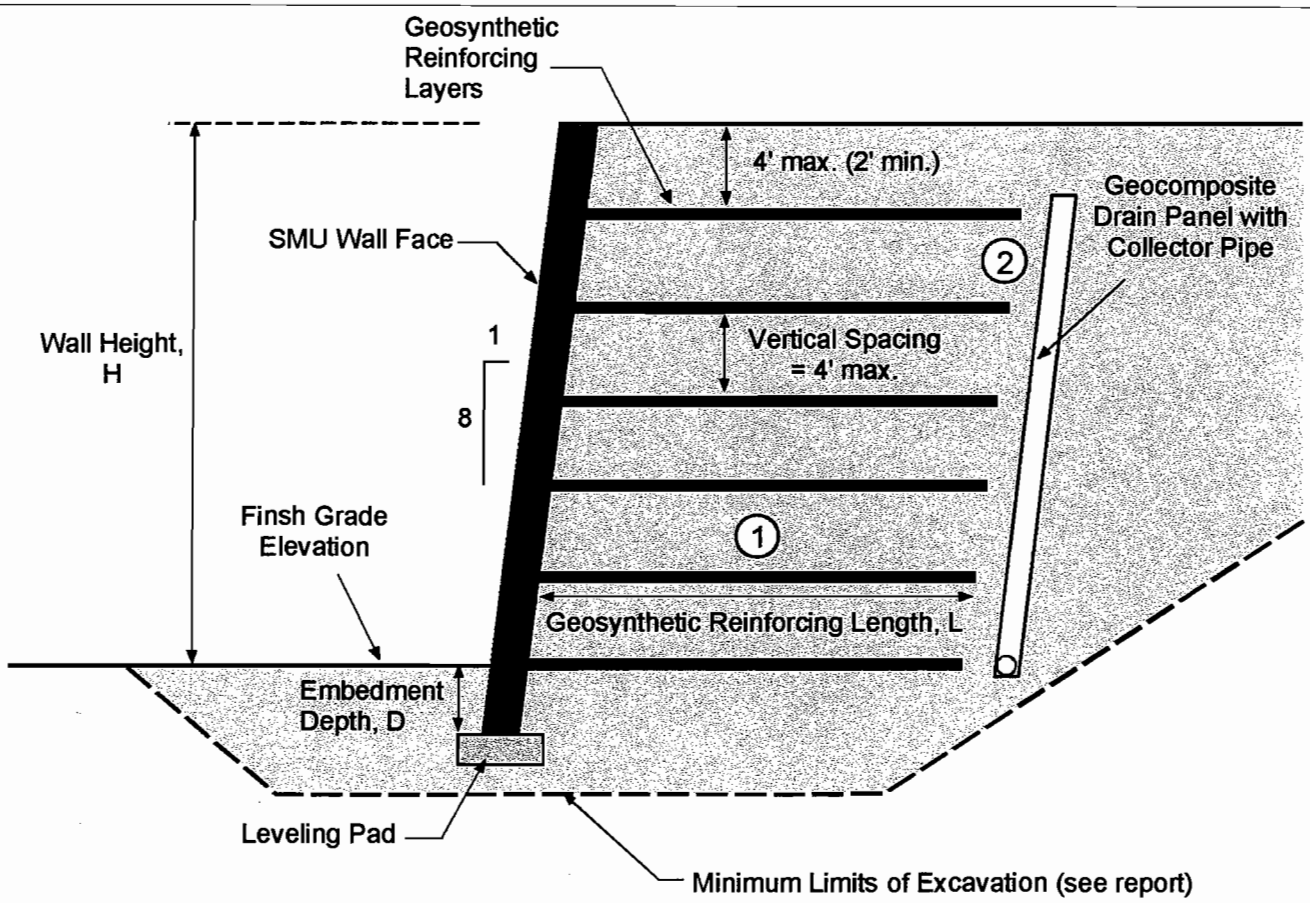
3. No factor of safety is applied to either the lateral earth pressures or frictional capacity. Structures should have a factor of safety of at least 1.25 against uplift.

3. Thickness of seal (t) in feet, without friction, can be estimated as 62.4 pcf x Hw / 150 pcf with Hw in feet. Friction and bouyant dead weight can be added resist buoyancy forces.

LATERAL PRESSURE ON CYLINDRICAL BURIED STRUCTURES

Los Osos Wastewater Project

Los Osos, California



Notes:

1. Geosynthetic reinforcing layers have variable lengths depending on H. Place first reinforcing layer at finish grade elevation.

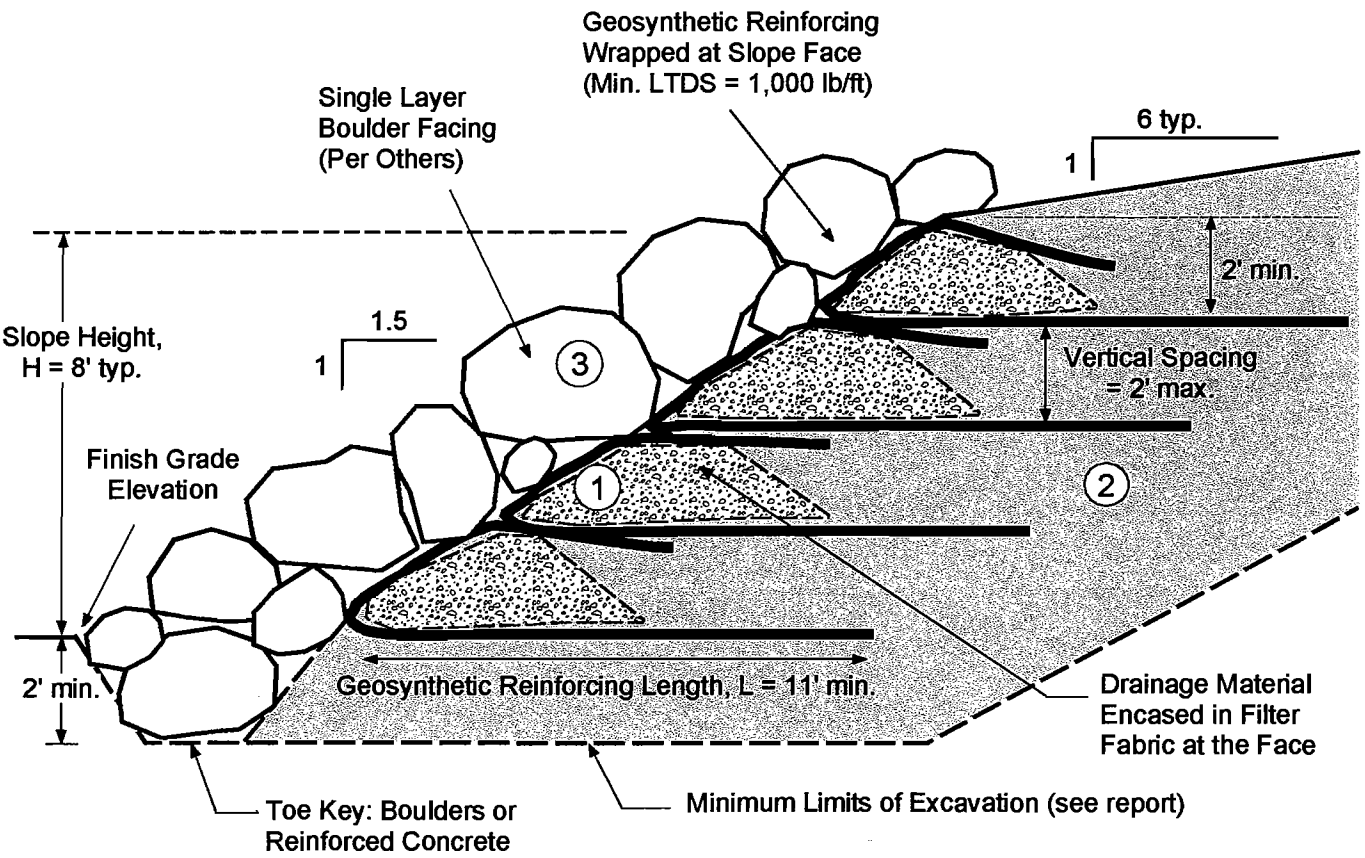
2. Use Retaining Wall Backfill within and behind the geosynthetic reinforced area. Compact backfill to at least 95 percent relative compaction.

Wall Height Range (ft)	Minimum Embedment Depth, D (ft)	Min. Geosynthetic Reinforcement Length, L (ft)	Min. Geosynthetic Reinforcement LTDS (lb/ft)
0 – 5 *	2.0	—	—
5 – 10	2.0	8	5,000
10 – 15	2.0	10	5,000
15 – 20	3.0	14	5,000
20 – 25	3.0	18	5,000

* - Depending on wall height, geosynthetic reinforcing may not be needed. Wall contractor should submit shop draawings for SMU walls for review by the Geotechnical Engineer prior to construction.

TYPICAL DETAIL FOR SMU RETAINING WALLS
Los Osos Wastewater Project
Los Osos, California

PLATE 12a



Notes:

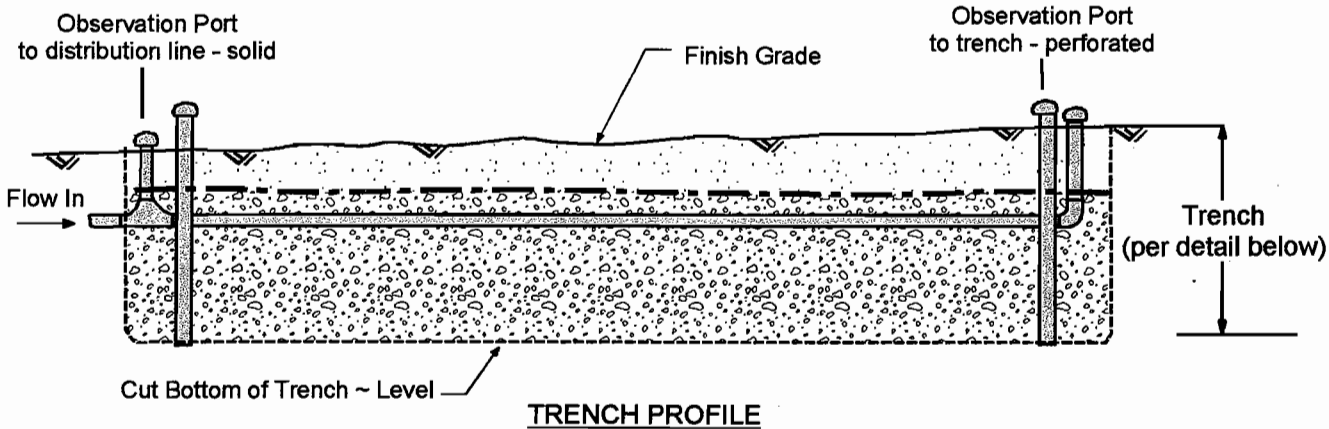
1. Wrap geosynthetic reinforcing layers with 3' min. overlap. Include drainage material encased in filter fabric within the geosynthetic reinforcing. Use min. 1 cubic foot of drainage material per square foot of slope face.

2. Backfill should consist of Retaining Wall Backfill (SE>20) per recommendations of report.

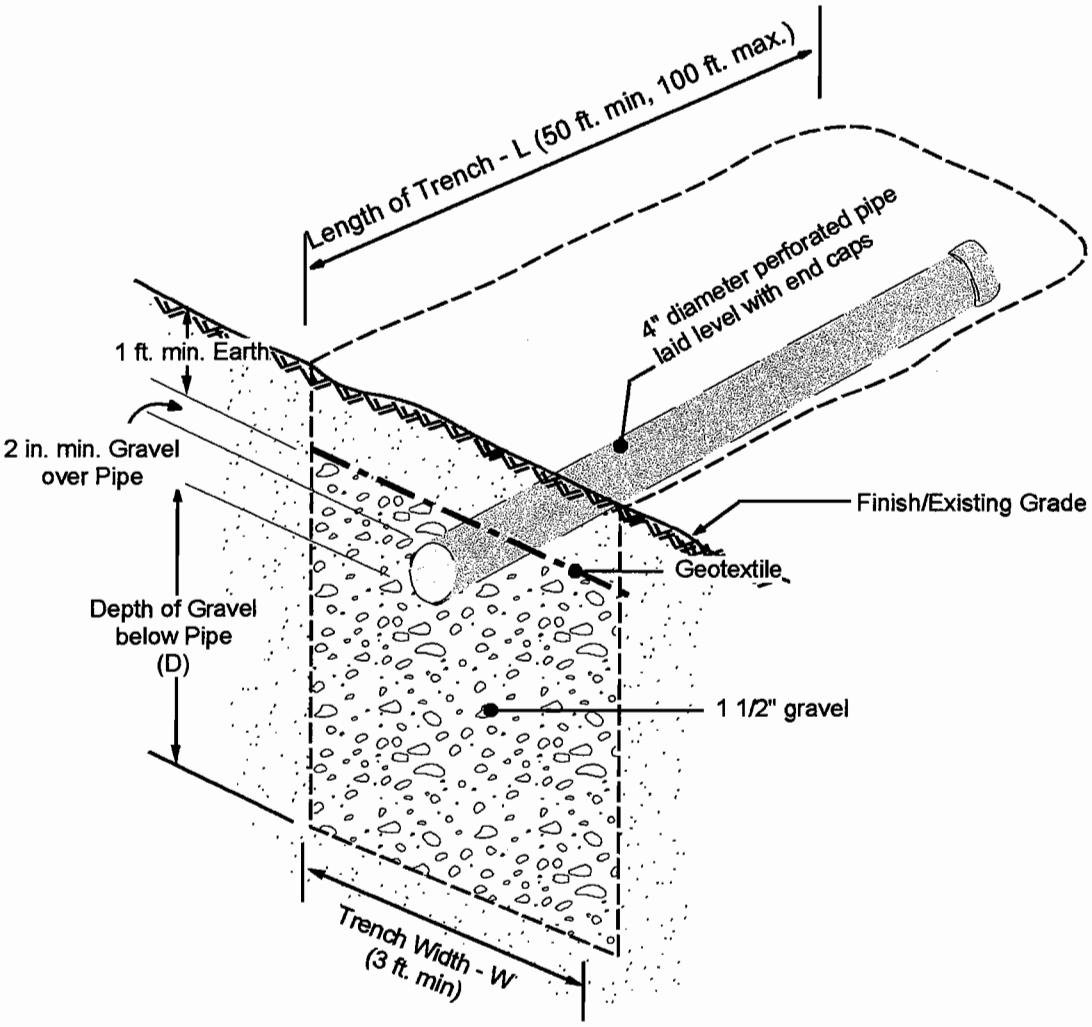
3. Boulders at slope face should be placed and keyed individually to provide interlocking support for each unit. Boulder facing should be initiated in toe key, and placed progressing from the bottom to top of slope. Boulder facing units should completely cover the slope and exposed geosynthetic reinforcing.

TYPICAL DETAIL FOR SEDIMENTATION BASIN SLOPES
Los Osos Wastewater Project
Los Osos, California

PLATE 12b



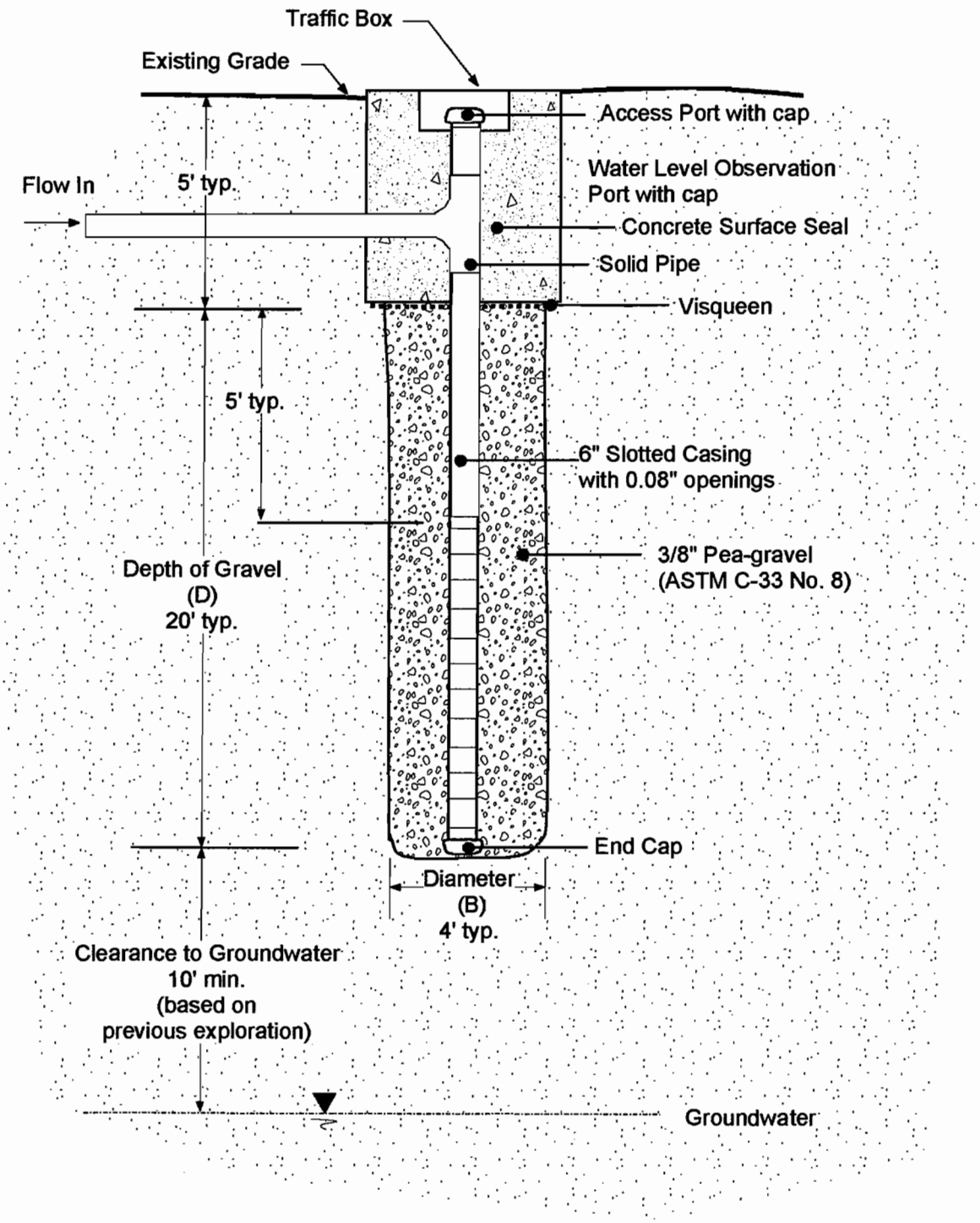
TRENCH PROFILE
N.T.S.



TRENCH SECTION
N.T.S.

TYPICAL PERCOLATION LINE DETAIL
Los Osos Wastewater Project
Los Osos, California

PLATE 13a

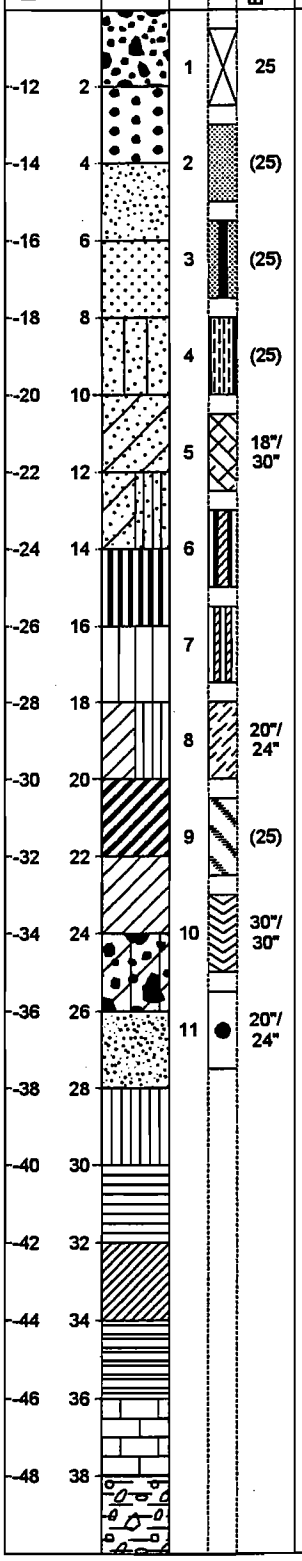


TYPICAL DRYWELL DETAIL
Los Osos Wastewater Project
San Luis Obispo County, California

PLATE 13b

APPENDIX A

LOCATION: The drill hole location referencing local landmarks or coordinates
SURFACE EL: Using local, MSL, MLLW or other datum



MATERIAL DESCRIPTION	
Well graded GRAVEL (GW)	COARSE GRAINED
Poorly graded GRAVEL (GP)	COARSE GRAINED
Well graded SAND (SW)	COARSE GRAINED
Poorly graded SAND (SP)	COARSE GRAINED
Silty SAND (SM)	COARSE GRAINED
Clayey SAND (SC)	COARSE GRAINED
Silty, Clayey SAND (SC-SM)	COARSE GRAINED
Elastic SILT (MH)	FINE GRAINED
SILT (ML)	FINE GRAINED
Silty CLAY (CL-ML)	FINE GRAINED
Fat CLAY (CH)	FINE GRAINED
Lean CLAY (CL)	FINE GRAINED
CONGLOMERATE	ROCK
SANDSTONE	ROCK
SILTSTONE	ROCK
MUDSTONE	ROCK
CLAYSTONE	ROCK
SHALE	ROCK
LIMESTONE	ROCK
Paving and/or Base Materials	

General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

Symbol for:

1 SPT Sampler, driven 1 3/8" ID, 2" OD
2 CA Liner Sampler, driven 2 3/8" ID, 3" OD
3 CA Liner Sampler, disturbed 2 3/8" ID, 3" OD
4 Thin-walled Tube, pushed 2 7/8" ID, 3" OD
5 Bulk Bag Sample (from cuttings)
6 Hand Auger Sample
7 CME Core Sample
8 Lexan Sample
9 Pitcher Sample
10 Vibracore Sample
11 No Sample Recovered

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30-in. to drive sampler 1-ft. after seating sampler 6-in.; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
86/11"	After driving sampler the initial 6" of seating, 36 blows drove sampler through the second 6" interval, and 50 blows drove the sampler 5" into the third interval
50/6"	50 blows drove sampler 6" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

Initial or perched water level
Final ground water level
Seepages encountered

Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 4 inches divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

LOCATION: Intersection of 4th St., and Santa Lucia Ave.

SURFACE EL: 20.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				DUNE SAND DEPOSITS (Qs)							
18	2	1	(11)	Silty fine SAND (SM): loose, brown to dark brown, dry	103	101	3				
16	4	2	11	Poorly graded SAND (SP): medium dense, red-yellow, moist			3	1			
14	6										
12	8	A									
10	10	3	(37)		131	127	4				
8	12										
6	14	4	18	- wet below 13.5'							
4	16										
2	18										
0	20	5	(18)		132	108	22				
				- Water added to augers to reduce the potential for sand to flow up into augers							
				ESTUARINE DEPOSITS (Qoe)							
-2	22										
-4	24	6	(32)	Sand with clay (SP-SC): medium dense, light brown with dark orange iron oxide stains, wet, with lenses of lean CLAY (CL)	128	106	21				
-6	26										
-8	28										
-10	30	7	5	- loose							
-12	32										
-14	34	8	(18)	Silty SAND (SM): medium dense, gray to dark gray, wet, with lean CLAY (CL) pockets			25				
-16	36										
-18	38										
-20	40	9	15								
-22	42			Hole caved below 12 feet after augers were removed.							
-24	44										
-26	46										
-28	48										
-30	50										

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: 13.5 ft
BACKFILLED WITH: Slurry
DRILLING DATE: August 11, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-401

Los Osos Wastewater Project
Los Osos, California

LOCATION: 8th St., 200' north of Santa Ysabel Ave.

SURFACE EL: 28.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						DUNE SAND DEPOSITS (Qs)							
26	2					Silty SAND (SM): loose, to medium dense, red-brown, dry							
24	4		1	X	14								
22	6												
20	8												
18	10		2		(29)	Poorly graded SAND (SP): medium dense, red-yellow, moist	108	106	2				
16	12												
14	14		3	X	18				7	2			
12	16												
10	18												
8	20		4		(38)	- wet below 19', brown	131	109	20				
6	22												
4	24		5	X	29	- Water added to augers to reduce the potential for sand to flow up into augers							
2	26												
0	28												
-2	30		6	X	28	- yellow-brown							
-4	32												
-6	34		7	X	28								
-8	36												
-10	38												
-12	40		8	X	38	- dense							
-14	42					Hole caved below 18' after augers were removed.							
-16	44												
-18	46												
-20	48												
-22	50												

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: 19 ft
BACKFILLED WITH: Slurry
DRILLING DATE: August 11, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-402

Los Osos Wastewater Project
Los Osos, California

LOCATION: 13th St., 200' north of Santa Ysabel Ave.

SURFACE EL: 81.5 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af)							
80	2		1		(21)	3.25" Asphalt concrete over 8" of base consisting of silty SAND (SM): dense, light brown, dry	108	106	2				
						DUNE SAND DEPOSITS (Qs)							
78	4		2		13	Sand with silt (SP-SM): medium dense, red-brown, dry, fine							
76	6												
74	8												
72	10		3		(26)	Poorly graded SAND (SP): medium dense, red-yellow, moist	107	104	3				
70	12		A										
68	14		4		19								
66	16												
64	18												
62	20		5		(49)	- dense, light brown	108	103	5				
60	22												
58	24		6		31								
56	26												
54	28												
52	30		7		(40)	- medium dense							
50	32												
48	34		8		30								
46	36												
44	38												
42	40		9		(85)	- very dense, wet							
40	42					Hole caved below 37 feet after augers were removed.							
38	44												
36	46												
34	48												
32	50												
30													

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: 39 ft
BACKFILLED WITH: Slurry/concrete cap
DRILLING DATE: August 11, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-403

Los Osos Wastewater Project
Los Osos, California

LOCATION: Paso Robles Ave., 40' east of 3rd St.

SURFACE EL: 20.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						DUNE SAND DEPOSITS (Qs)							
18	2		1		(15)	Poorly graded SAND with silt (SP-SM): loose, to medium dense, red-yellow, dry	104	103	2				
16	4		2		11	- moist		100	8				
			A										
14	6		3		(21)		111	106	5				
12	8												
10	10		4		23	- wet			19	9			
8	12												
6	14		5		(49)	- dense, water added to augers to reduce the potential for sand to flow up into augers	130	107	21				
4	16												
2	18												
0	20		6		47								
-2	22												
-4	24		7		(50/5")								
-6	26												
-8	28												
-10	30		8		n/a								
-12	32												
-14	34												
-16	36					Hole terminated at 34 feet due to sand flowing up into augers and binding between center bit and augers. Hole caved below 12 feet after augers were removed.							
-18	38												
-20	40												
-22	42												
-24	44												
-26	46												
-28	48												
-30	50												

COMPLETION DEPTH: 34.0 ft
DEPTH TO WATER: 9.5 ft
BACKFILLED WITH: Slurry
DRILLING DATE: August 12, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-404

Los Osos Wastewater Project
Los Osos, California

LOCATION: Maintenance yard at the intersection of Nipomo Ave. and South Bay Blvd.

SURFACE EL: 107.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
106						**DUNE SAND DEPOSITS (Qs)**							
	2					Poorly graded SAND (SP): loose, to medium dense, red-yellow, dry, fine							
104			1		(14)		106	102	4				
	4		A		10	- moist		100	7				
102			2										
	6												
100													
	8		3		(24)		109	104	5				
98													
	10		4		17								
96													
	12												
94													
	14												
92			5		(46)	- dense, with faint iron oxide stains	116	108	8				
	16												
90													
	18												
88													
	20		6		24	- medium dense							
86													
	22												
84						**PASO ROBLES FORMATION (Qtp)**							
	24					Poorly graded SAND (SP): dense, red-yellow, wet							
82			7		(47)								
	26												
80													
	28												
78													
	30		8		(88/11")	- with pockets of brown lean CLAY (CL)							
76													
	32												
74													
	34												
72			9		59								
	36												
70													
	38												
68													
	40		10		(31)	Sandy lean CLAY with gravel (CL): stiff, to very stiff, red-yellow, wet							
66						Hole caved below 25 feet after augers were removed.							
	42												
64													
	44												
62													
	46												
60													
	48												
58													
	50												
56													

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: 23.5 ft
BACKFILLED WITH: Slurry
DRILLING DATE: August 12, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-405

Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Santa Ynez Ave., and Mountain View Ave.

SURFACE EL: 100.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af)							
						3" Asphalt concrete over 6" of aggregate base							
98	2		1		(14)	DUNE SAND DEPOSITS (Qs) Silty SAND (SM): loose, red-brown, moist, fine:	108	105	4				
96	4		2		6	Sand with silt (SP-SM: loose, light brown, moist, fine:							
94	6												
92	8												
90	10		3		(25)	- medium dense, with iron oxide stains	131	119	9				
88	12												
86	14		4		32	- red-yellow, with black specs							
84	16												
82	18												
80	20		5		(50)	PASO ROBLES FORMATION (Qtp) Clayey SAND (SC): very dense, red-brown, moist, with black specs, sand partings	118	107	11	25			
78	22												
76	24		6		22	Sandy lean CLAY (CL): very stiff, red-brown, moist, with sand partings			20		34	27	
74	26												
72	28												
70	30		7		(68)	- hard, with layers of SAND with clay and gravel (SP-SC)	140	122	15	11			
68	32												
66	34		8		30				18		39	19	
64	36												
62	38												
60	40		9		(56)	- with layers of SAND with gravel (SP)							
58	42												
56	44												
54	46												
52	48												
50	50												

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: Not Enconutered
BACKFILLED WITH: Slurry
DRILLING DATE: August 12, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-406

Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Bay Oaks Dr., and Crest Ave.

SURFACE EL: 182.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		af				**ARTIFICIAL FILL (af)**							
180	2		1		(24)	4" Asphalt concrete over 8" aggregate base	108	104	3				
						DUNE SAND DEPOSITS (Qs)							
178	4					Poorly graded SAND (SP): medium dense, red-yellow, moist							
			2		15								
176	6												
174	8												
172	10		3		(29)		108	103	4				
			A										
170	12												
168	14												
			4		17	- light brown							
166	16												
164	18												
162	20		5		(30)		107	101	6				
160	22					Hole caved below 18.5 feet after augers were removed.							
158	24												
156	26												
154	28												
152	30												
150	32												
148	34												
146	36												
144	38												
142	40												
140	42												
138	44												
136	46												
134	48												
132	50												

COMPLETION DEPTH: 20.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings/concrete cap
DRILLING DATE: August 13, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-408

Los Osos Wastewater Project
Los Osos, California

LOCATION: Bay View Heights Dr., 75' north of Bay Oaks Dr.

SURFACE EL: 136.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) 4" Asphalt concrete over 20" aggregate base consisting of lean CLAY with gravel (CL): very stiff, brown, moist							
134	2		1		10				5	2			
						DUNE SAND DEPOSITS (Qs) Poorly graded SAND (SP): medium dense, red-brown, moist, fine							
132	4		2		(20)		108	103	5				
130	6												
128	8												
126	10		3 A		19	- red-yellow							
124	12												
122	14		4		(48)		108	103	4				
120	16												
118	18												
116	20		5		46								
						Hole caved below 18.5 feet after augers were removed.							
114	22												
112	24												
110	26												
108	28												
106	30												
104	32												
102	34												
100	36												
98	38												
96	40												
94	42												
92	44												
90	46												
88	48												
86	50												

COMPLETION DEPTH: 20.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings/concrete cap
DRILLING DATE: August 13, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-409

Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Lilac Dr. and Palisades Ave.

SURFACE EL: 145.5 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
144	2		1		18	**ARTIFICIAL FILL (af)** 4" Asphalt concrete over 16" aggregate base							
142	4		2		(24)	**DUNE SAND DEPOSITS** Silty SAND (SM): medium dense, red-brown, dry, fine	101	98	3				
140	6												
138	8												
136	10		3 A		23	SAND with silt (SP-SM): medium dense, yellow-brown, moist, fine							
134	12												
132	14												
130	16		4		(44)	Poorly-graded SAND (SP): medium dense, yellow-brown, moist, with few SILT (ML) pockets	107	104	3				
128	18												
126	20		5		38	- dense							
124	22					Hole cave below 16.5 feet after augers were removed.							
122	24												
120	26												
118	28												
116	30												
114	32												
112	34												
110	36												
108	38												
106	40												
104	42												
102	44												
100	46												
98	48												
96	50												
94													

COMPLETION DEPTH: 20.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings/concrete cap
DRILLING DATE: August 13, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-410

Los Osos Wastewater Project
Los Osos, California

Montgomery Watson Harza
Project No. 3055.001

LOCATION: Lilac Dr., 50' east of Broderson Ave.

SURFACE EL: 143.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
142						**ARTIFICIAL FILL (af)**							
						4.5" Asphalt concrete over 10.5" aggregate base							
140	2		1		(13)	**DUNE SAND DEPOSITS (Qs)**	99	97	2	3			
	4		2		8	Poorly graded SAND (SP): loose to medium dense, red-brown, dry			2				
138			A										
	6					- light brown							
136													
	8					- red-yellow							
134			3		(32)		106	103	3				
	10												
132													
	12												
130													
	14		4		20								
128													
	16												
126													
	18												
124			5		21								
	20												
122													
	22												
120													
	24												
118													
	26												
116													
	28												
114													
	30												
112													
	32												
110													
	34												
108													
	36												
106													
	38												
104													
	40												
102													
	42												
100													
	44												
98													
	46												
96													
	48												
94													
	50												
92													

COMPLETION DEPTH: 20.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings/concrete cap
DRILLING DATE: August 13, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Testing
LOGGED BY: NJDerbidge
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-411

Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Santa Maria Ave and 18th St.

SURFACE EL: 120.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	PIEZOMETER	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Gravel, Aggregate base, and pieces of asphalt concrete:					1			
-118	2					**DUNE SAND DEPOSITS (Qs)** SAND with silt (SP-SM): medium dense, light brown, dry, moist below 3'								
-116	4					Poorly-graded SAND (SP): medium dense, light brown, moist, fine								
-114	6													
-112	8													
-110	10													
-108	12													
-106	14													
-104	16													
-102	18													
-100	20													
-98	22													
-96	24													
-94	26					Note: Hole reamed to 4' diameter to a depth of 23'. Drywell installed in hole.								
-92	28													
-90	30													
-88	32													
-86	34													
-84	36													
-82	38													
-80	40													
-78	42													
-76	44													
-74	46													
-72	48													
-70	50													

COMPLETION DEPTH: 26.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: drywell
DRILLING DATE: September 25, 2003

DRILLING METHOD: 36-in. dia. Bucket Auger
HAMMER TYPE: none
DRILLED BY: Tri-Valley Drilling
LOGGED BY: CLLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. DW-1
Los Osos Wastewater Project
Los Osos, California

LOCATION: South side of Lupine, 50' west of Donna Ave.

SURFACE EL: 13.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
12						**ARTIFICIAL FILL (af)/DUNE SAND DEPOSITS (Qs)**							
	2		1			SAND with silt (SP-SM): loose to medium dense, light brown, dry, with fine roots		97	9				
10			A			**ALLUVIUM (Qal)/ESTUARINE DEPOSITS (Qoe)**	105	102	3				
	4		2			SAND with silt (SP-SM): medium dense, red-brown, moist, with fine roots							
8						Sand with silt (SP-SM): medium dense, light gray, wet							
	6												
6													
	8					Fat CLAY (CH): medium stiff, light gray with brown mottles, moist to wet			32		57	35	
4			3										
	10												
2													
	12												
0													
	14												
-2													
	16												
-4													
	18												
-6													
	20												
-8													
	22												
-10													
	24												
-12													
	26												
-14													
	28												
-16													
	30												
-18													
	32												
-20													
	34												
-22													
	36												
-24													
	38												
-26													
	40												
-28													
	42												
-30													
	44												
-32													
	46												
-34													
	48												
-36													
	50												
-38													

COMPLETION DEPTH: 9.0 ft
DEPTH TO WATER: 5.5 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 7, 2003

DRILLING METHOD: 4-in. dia. Hand Auger
HAMMER TYPE: Hand
DRILLED BY: Fugro
LOGGED BY: CLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. HA-401

Los Osos Wastewater Project
Los Osos, California

LOCATION: 65' west of 3rd St., 300' south of El Morro Ave.

SURFACE EL: 12.5 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
12						**ARTIFICIAL FILL (af)** Silty SAND with gravel (SM): medium dense, light brown, moist							
10	2		A			**ALLUVIUM (Qal)/ESTUARINE DEPOSITS (Qoe)** Poorly graded SAND (SP): loose to medium dense, light brown, wet - seepage							
8	4												
6	6												
4	8												
2	10												
0	12												
-2	14												
-4	16												
-6	18												
-8	20												
-10	22												
-12	24												
-14	26												
-16	28												
-18	30												
-20	32												
-22	34												
-24	36												
-26	36												
-28	40												
-30	42												
-32	44												
-34	46												
-36	48												
-38	50												

COMPLETION DEPTH: 12.5 ft
DEPTH TO WATER: 4 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 8, 2003

DRILLING METHOD: 4-in. dia. Hand Auger
HAMMER TYPE: Hand
DRILLED BY: Fugro
LOGGED BY: CLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. HA-402
Los Osos Wastewater Project
Los Osos, California

LOCATION: 155' south of El Morro Ave., 90' east of 8th St.

SURFACE EL: 26.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			A			**ARTIFICIAL FILL (af)** Mix of silty SAND (SM) and GRAVEL (GP)		98	6				
24	2		1			**DUNE SAND DEPOSITS (Qs)**	109	103	6				
22	4					SAND with silt (SP-SM): medium dense, moderate brown, moist							
20	6					- dark gray, wet - caving and sloughing noted							
18	8												
16	10												
14	12												
12	14												
10	16												
8	18												
6	20												
4	22												
2	24												
0	26												
-2	28												
-4	30												
-6	32												
-8	34												
-10	36												
-12	36												
-14	40												
-16	42												
-18	44												
-20	46												
-22	48												
-24	50												

COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: 5.5 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 8, 2003

DRILLING METHOD: 4-in. dia. Hand Auger
HAMMER TYPE: Hand
DRILLED BY: Fugro
LOGGED BY: CLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. HA-403
Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Santa Maria Ave and 18th St.

SURFACE EL: 120.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	DRYWELL	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Gravel, Aggregate base, and pieces of asphalt concrete:					1			
-118	2													
						DUNE SAND DEPOSITS (Qs) SAND with silt (SP-SM): medium dense, light brown, dry, moist below 3'								
-116	4													
-114	6					Poorly-graded SAND (SP): medium dense, light brown, moist, fine								
-112	8													
-110	10													
-108	12													
-106	14													
-104	16													
-102	18													
-100	20													
-98	22													
-96	24													
-94	26					Note: Hole reamed to 4' diameter to a depth of 23'. Drywell installed in hole.								
-92	28													
-90	30													
-88	32													
-86	34													
-84	36													
-82	38													
-80	40													
-78	42													
-76	44													
-74	46													
-72	48													
-70	50													

COMPLETION DEPTH: 26.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: drywell
DRILLING DATE: September 25, 2003

DRILLING METHOD: 36-in. dia. Bucket Auger
HAMMER TYPE: none
DRILLED BY: Tri-Valley Drilling
LOGGED BY: CLLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. DW-1

Los Osos Wastewater Project
Los Osos, California

LOCATION: Intersection of Santa Maria and 18th St. 11' north of DW-1.

SURFACE EL.: 120.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						DUNE SAND DEPOSITS (Qs) Sand with silt (SP-SM): medium dense, light brown, dry							
118	2												
116	4					Grades to poorly-graded SAND (SP): medium dense, light brown, moist							
			1		(20)	- orange brown	110	106	4				
114	6												
112	8												
110	10		2		17								
108	12												
106	14												
			3		(40)	- light brown to tan	113	108	4				
104	16												
102	18												
100	20		4		29				4	3			
98	22												
96	24												
			5		(55)	- dense, very few pockets of light gray/buff, dry silty SAND (SM) from 24.5 ft to 25 ft	114	108	5				
94	26												
92	28												
90	30		6		29	- very few nodules (0.25 inch diameter) of light gray/buff silty SAND (SM) to sandy SILT (ML)							
88	32												
86	34												
			7		(51)		108	102	6				
84	36												
82	38												
80	40		8		48				5	3			
78	42												
76	44												
			9		(34)	- with 0.25 inch diameter pockets of sandy SILT (ML) to silty SAND (SM), slightly cemented, light gray/buff	106	103	3				
74	46												
72	48												
70	50		10		82				5	3			
						2" steel casing installed; backfilled with native sand.							

COMPLETION DEPTH: 51.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: September 26, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: CLLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. HP-1

Los Osos Wastewater Project
Los Osos, California

LOCATION: 18th St. approximately 50' North of Santa Maria Ave.

SURFACE EL: 113.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
112	2					**ARTIFICIAL FILL (af)**							
						Aggregate base:							
110						**DUNE SAND DEPOSITS (Qs)**							
						Sand with silt (SP-SM): loose, light brown, dry							
108	4		1		(17)	Grades to poorly-graded SAND (SP): medium dense, light brown, dry	113	108	5				
	6					- medium dense, orange brown to brown, moist							
106													
104	8												
	10		2		18								
102													
	12												
100													
98	14		3		(34)	- with pockets of light brown to light gray/buff sandy SILT (ML) from 14 ft to 24 ft, dry	113	108	4				
	16												
96													
	18												
94	20		4		22								
92													
	22												
90													
88	24		5		(34)		109	103	6				
	26												
86													
	28												
84	30		6		32								
82													
	32												
80													
78	34		7		(58)	- dense	113	108	5				
	36												
76													
	38												
74	40		8		50								
72													
	42												
70													
68	44		9		(50/6")		108	102	6				
	46												
66													
	48												
64	50		10		41				4	2			
62						2" steel casing installed; backfilled with native sand.							

COMPLETION DEPTH: 51.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: September 26, 2003

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: CLLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. HP-2
Los Osos Wastewater Project
Los Osos, California

LOCATION: 16 feet north of Prototype Percolation Line

SURFACE EL: 197.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	PIEZOMETER	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
196						**DUNE SAND DEPOSITS (Qds)**								
	2					Sand with silt (SP-SM): loose, dark brown, moist, with roots down to 3.5 feet								
194						- moderate brown below 3 feet								
	4					- dark brown below 4 feet								
192														
	6					- medium dense below 5.5 feet								
190						- brown below 6.5 feet								
	8													
188														
	10		1			Sand (SP) to SAND with silt (SP-SM): medium dense to dense, light brown, dry to moist, with nodules of weakly cemented SAND with silt (SP-SM) to silty SAND (SM)								
186						- drive sample was not recovered; grab sample obtained								
	12													
184														
	14					Installed 1-inch PVC pipe monitoring well with 12" perforated section.								
182														
	16													
180														
	18													
178														
	20													
176														
	22													
174														
	24													
172														
	26													
170														
	28													
168														
	30													
166														
	32													
164														
	34													
162														
	36													
160														
	38													
158														
	40													
156														
	42													
154														
	44													
152														
	46													
150														
	48													
148														
	50													
146														

COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Monitoring Well
DRILLING DATE: March 26, 2003

DRILLING METHOD: 4-in. dia. Hand Auger
HAMMER TYPE: Hand
DRILLED BY: Fugro
LOGGED BY: CLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. MW-3

Los Osos Wastewater Project
Los Osos, California

LOCATION: Terminus of Alexander into Highland

SURFACE EL: 182.0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	PIEZOMETER	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af)								
180	2					4" of SAND with silt and gravel (SP-SM): brown, dry								
						DUNE SAND (Qds)								
178	4					Silty SAND (SW): medium dense, dark brown to black, moist								
176	6					- loose below 2 feet								
174	8					Sand with silt (SP-SM): loose, moderate brown, moist								
172	10					SAND (SP): medium dense, light yellowish brown, moist								
170	12					grading to silty SAND with clay (SW): medium dense, to dense, light brown with reddish brown mottles, moist								
168	14					Installed 1-inch PVC monitoring well with 18-inch perforated section at bottom.								
166	16													
164	18													
162	20													
160	22													
158	24													
156	26													
154	28													
152	30													
150	32													
148	34													
146	36													
144	38													
142	40													
140	42													
138	44													
136	46													
134	48													
132	50													

COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Monitoring Well
DRILLING DATE: March 26, 2003

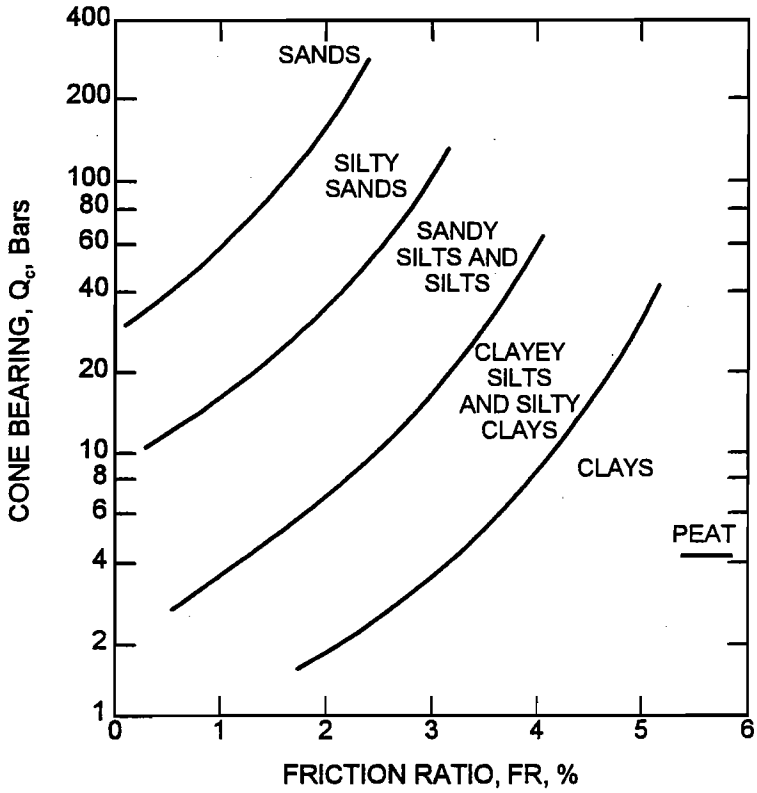
DRILLING METHOD: 4-in. dia. Hand Auger
HAMMER TYPE: Hand
DRILLED BY: Fugro
LOGGED BY: CLovato
CHECKED BY: JDBlanchard

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF NO. MW-4

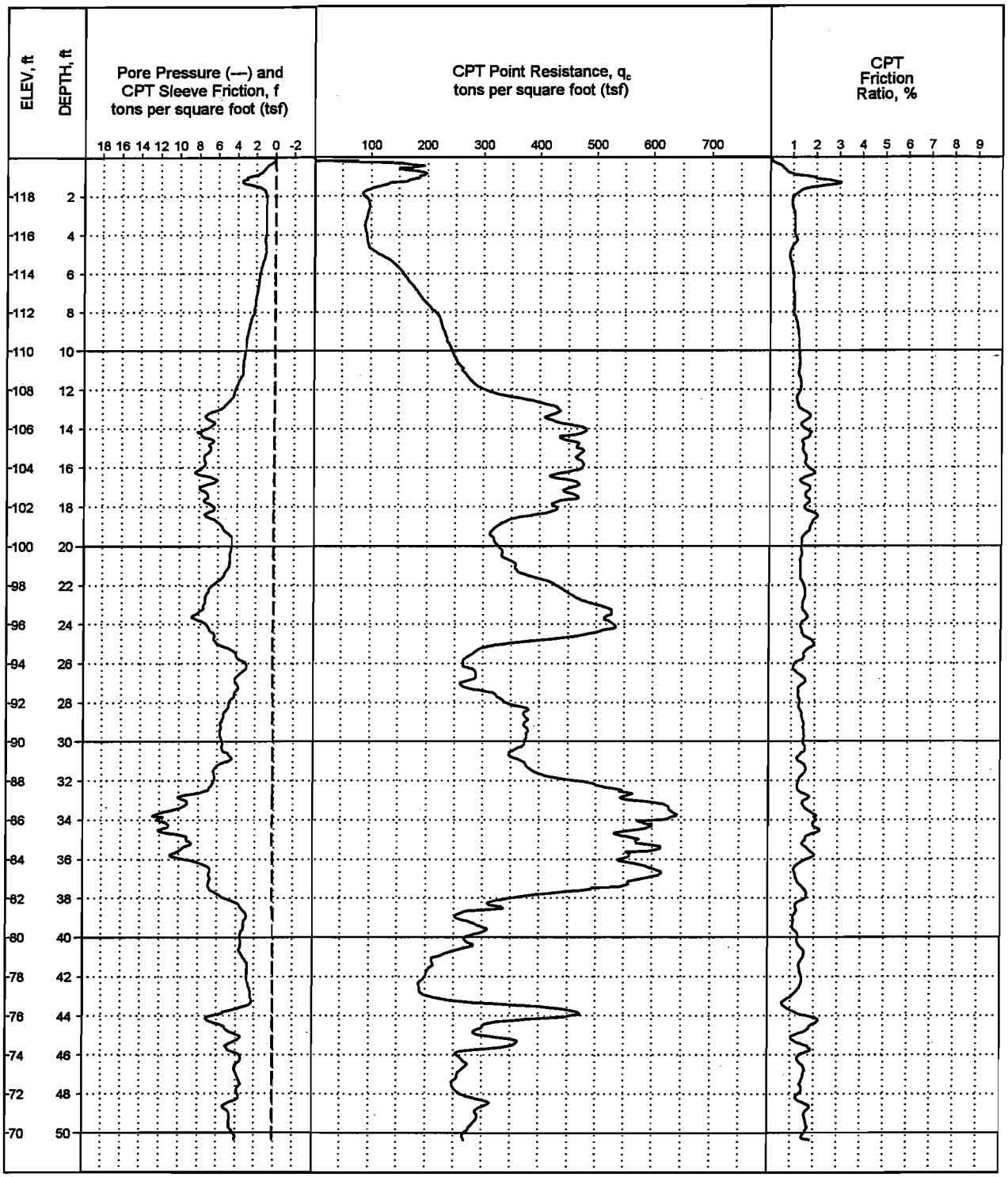
Los Osos Wastewater Project
Los Osos, California

1 BAR = 100 KPA = 1.02 KG/CM^2



CAMPANELLA AND ROBERTSON CLASSIFICATION CHART

SOIL CLASSIFICATION CHART
Los Osos Wastewater Project
Los Osos, California

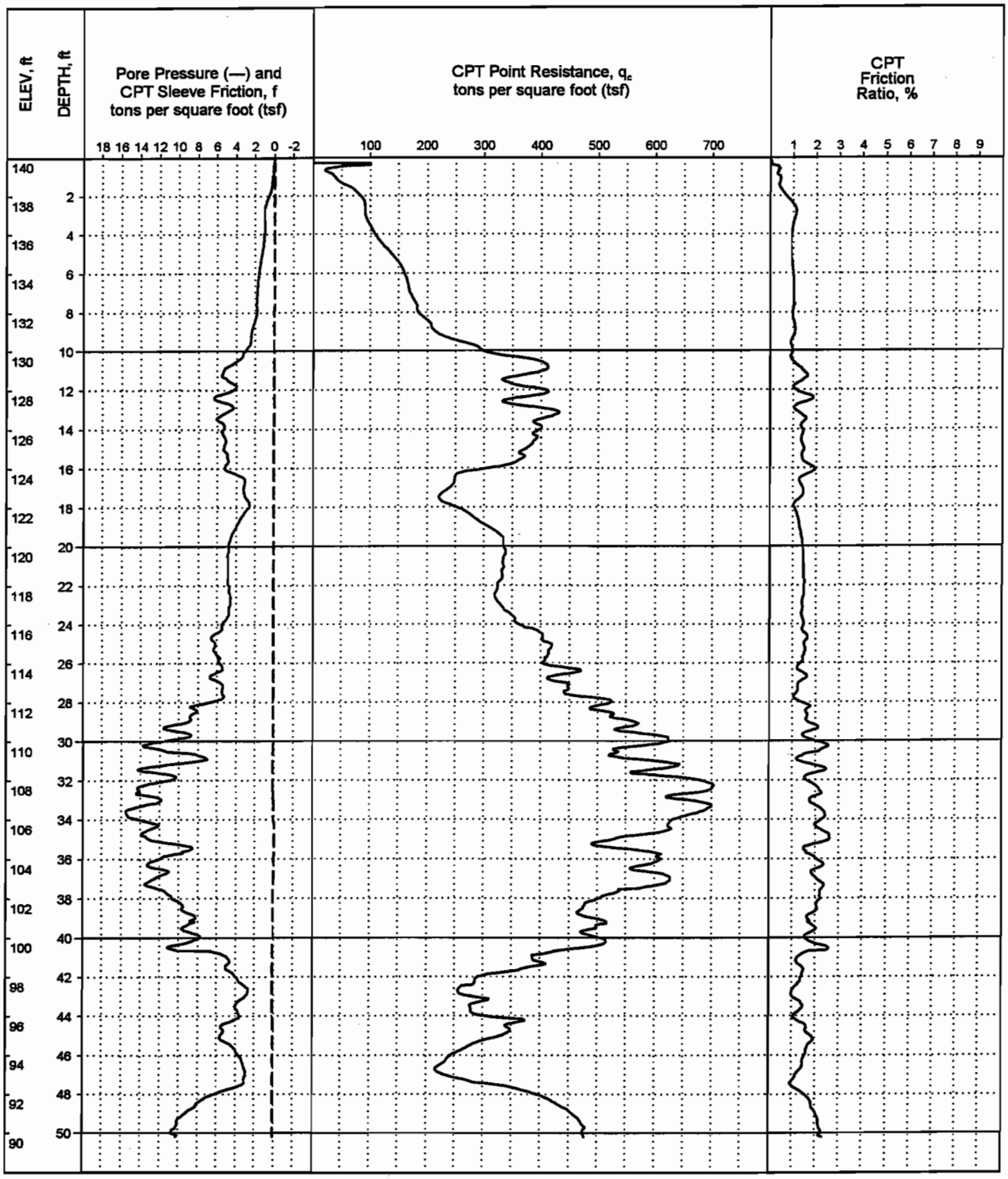


LOCATION: Santa Maria Ave., 125' east of 13th St.
SURFACE EL: 120 ft +/- (rel. MSL datum)
COMPLETION DEPTH: 50.3 ft
EXPLORATION DATE: August 6, 2003
DEPTH TO WATER: Not Encountered

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro Geosciences
REVIEWED BY: JDBlanchard

LOG OF CPT NO: CPT-401

Los Osos Wastewater Project
Los Osos, California



LOCATION: Santa Maria Ave., 120' west of 16th St.
SURFACE EL: 141 ft +/- (rel. MSL datum)
COMPLETION DEPTH: 50.2 ft
EXPLORATION DATE: August 6, 2003
DEPTH TO WATER: Not Encountered

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro Geosciences
REVIEWED BY: JDBlanchard

LOG OF CPT NO: CPT-402

Los Osos Wastewater Project
Los Osos, California