

**GEOLABS, INC.**  
Geotechnical Engineering

**Soil Log Legend**

**UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)**

MAJOR DIVISIONS			USCS		TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS  LESS THAN 5% FINES		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES  MORE THAN 12% FINES		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	SANDS	CLEAN SANDS  LESS THAN 5% FINES		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES  MORE THAN 12% FINES		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SM	SILTY SANDS, SAND-SILT MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS  
**LEGEND**

	(2-INCH) O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT (NP=NON-PLASTIC)
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX (NP=NON-PLASTIC)
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	GRAB SAMPLE	PEN	POCKET PENETROMETER (tsf)
	CORE SAMPLE	UC	UNCONFINED COMPRESSION (ksf)
	WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING	TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)
	WATER LEVEL OBSERVED IN BORING AFTER DRILLING		
	WATER LEVEL OBSERVED IN BORING OVERNIGHT		

Plate  
A-0.1



**GEOLABS, INC.**  
Geotechnical Engineering

**Soil Classification Log Key**  
(with deviations from ASTM D2488)

**GEOLABS, INC. CLASSIFICATION\***

GRANULAR SOIL (- #200 <50%)	COHESIVE SOIL (- #200 ≥50%)
<ul style="list-style-type: none"><li>• <b>PRIMARY</b> constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., <b>GRAVEL, SAND</b>)</li><li>• <b>SECONDARY</b> constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (<b>SILTY</b> or <b>CLAYEY</b>); otherwise, a granular constituent is used (<b>GRAVELLY</b> or <b>SANDY</b>) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., <b>SANDY GRAVEL, CLAYEY SAND</b>) and precede the primary constituent.</li><li>• <b>accessory descriptions</b> compose of the following: with some: &gt;12% with a little: 5 - 12% with traces of: &lt;5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY GRAVEL with a little sand)</li></ul>	<ul style="list-style-type: none"><li>• <b>PRIMARY</b> constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., <b>CLAY, SILT</b>)</li><li>• <b>SECONDARY</b> constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., <b>SANDY CLAY, SILTY CLAY, CLAYEY SILT</b>) and precede the primary constituent.</li><li>• <b>accessory descriptions</b> compose of the following: with some: &gt;12% with a little: 5 - 12% with traces of: &lt;5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY CLAY with some sand)</li></ul>
<b>EXAMPLE:</b> Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: <b>SILTY GRAVEL</b> with some sand	

**RELATIVE DENSITY / CONSISTENCY**

Granular Soils			Cohesive Soils		
N-Value (Blows/Foot)	Relative Density		N-Value (Blows/Foot)	PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS	
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4	Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	Very Stiff
			> 30	> 55	Hard

**MOISTURE CONTENT DEFINITIONS**

Dry: Absence of moisture, dry to the touch
Moist: Damp but no visible water
Wet: Visible free water, usually soil is below water table

**ABBREVIATIONS**

WOH: Weight of Hammer
WOR: Weight of Drill Rods
SPT: Standard Penetration Test Split-Spoon Sampler
MCS: Modified California Sampler
PP: Pocket Penetrometer

\*Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).

Plate  
A-0.2

**GRAIN SIZE DEFINITION**

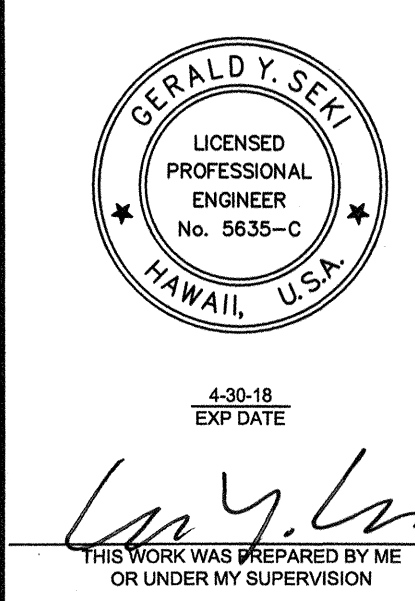
Description	Sieve Number and / or Size
Boulders	> 12 inches (305-mm)
Cobbles	3 to 12 inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-inch to 3/4-inch (75-mm to 19-mm)
Fine Gravel	3/4-inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-O-01-15	2016	14	52

**NOTE:**  
1. See Sheets C-02, C-03, and C-06 for approximate locations of borings.

ORIGINAL PLAN  
DATE  
DRAWN BY  
CHECKED BY  
NO.

LOG LEGEND FOR SOIL 7138-00.GPJ GEOLABS.GDT 8/24/15



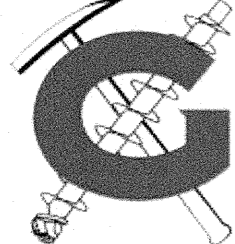
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION


**BORING LOGS - 1**

MISCELLANEOUS PERMANENT  
BEST MANAGEMENT PRACTICES, PHASE 2A  
Project No. HWY-0-01-15

Scale: None Date: April 2016

SHEET No. B-01 OF 3 SHEETS



		<b>GEOLABS, INC.</b> Geotechnical Engineering		OAHU MISCELLANEOUS BMPs SITES 5 (PID 111091), 4 (PID 200526), 6 (PID 505421), & 7 (PID 106997) KANE OHE, OAHU, HAWAII		Log of Boring <b>101</b>	
Laboratory		Field		Approximate Ground Surface Elevation (feet MSL): 228 *		Description	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)
LL=56 PI=26 Direct Shear UC	50	63			12	1.5	0
	46				6		1
	81	50			7	1.8	5
	80				2		10
	73	55			7	2.5	15
	89				4		20
						Boring terminated at 21.5 feet	
						* Elevations estimated from Google Earth Pro (2015).	
						25	
						30	
Date Started: March 31, 2015		Water Level: ∇ Not Encountered		Plate			
Date Completed: March 31, 2015				A - 1			
Logged By: J. Turban		Drill Rig: CME-45C TRUCK (Energy Transfer Ratio = 76.6%)					
Total Depth: 21.5 feet		Drilling Method: 4" Solid-Stem Auger					
Work Order: 7136-00		Driving Energy: 140 lb. wt., 30 in. drop					

		<b>GEOLABS, INC.</b> Geotechnical Engineering		OAHU MISCELLANEOUS BMPs SITES 5 (PID 111091), 4 (PID 200526), 6 (PID 505421), & 7 (PID 106997) KANE OHE, OAHU, HAWAII		Log of Boring <b>102</b>	
Laboratory		Field		Approximate Ground Surface Elevation (feet MSL): 233 *		Description	
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)
LL=61 PI=22  UC	6	117			24		0
	32				9		1
					13	1.5	5
	24				50/5"		10
	26	83			11		15
	43				6		20
						Boring terminated at 21.5 feet	
						25	
						30	
Date Started: March 31, 2015		Water Level: ∇ Not Encountered		Plate			
Date Completed: March 31, 2015				A - 2			
Logged By: J. Turban		Drill Rig: CME-45C TRUCK (Energy Transfer Ratio = 76.6%)					
Total Depth: 21.5 feet		Drilling Method: 4" Solid-Stem Auger					
Work Order: 7136-00		Driving Energy: 140 lb. wt., 30 in. drop					

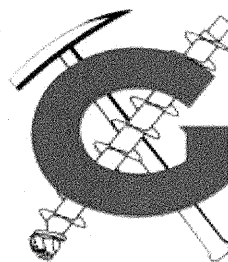
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-O-01-15	2016	15	52


SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

T:\Drafting\Completed\7136-00\_Oahu\MiscellaneousBMPs\Bld Package 1\B-02 Boring Logs-2.dwg  
BORING LOG 7136-00.GPJ GEOLABS.GDT 6/24/15

 4-30-16 EXP DATE  THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <b>BORING LOGS - 2</b> MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES, PHASE 2A Project No. HWY-0-01-15 Scale: None Date: April 2016 SHEET No. B-02 OF 3 SHEETS
--	---

**NOTE:**  
1. See Sheets C-02, C-03, and C-06 for approximate locations of borings.

		<b>GEOLABS, INC.</b> Geotechnical Engineering		OAHU MISCELLANEOUS BMPs SITES 5 (PID 111091), 4 (PID 200526), 6 (PID 505421), & 7 (PID 106997) KANEEOHE, OAHU, HAWAII		Log of Boring <b>401</b>		
Laboratory		Field		Approximate Ground Surface Elevation (feet MSL): 264 *		Description		
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)			Pocket Pen. (tsf)
LL=91 PI=49	7	109			26/6" +21/0" Ref. 19	2.5	3-inch <b>ASPHALTIC CONCRETE</b> 39-inch Gray <b>GRAVELLY SAND</b> with a little silt, medium dense, moist (base course)	
	45							
	54	64			16		5	Brown <b>CLAYEY SILT</b> with a little sand, stiff, dry to moist (older alluvium)
Direct Shear	53				5		grades to medium stiff	
	60	64			8	1.5	15	Brown with reddish brown mottling <b>SILTY CLAY</b> with a little sand and decomposed gravel, medium stiff, moist
	61				6		20	Boring terminated at 21.5 feet
						30		
Date Started: April 1, 2015		Water Level: ∇ Not Encountered		Plate		A - 7		
Date Completed: April 1, 2015								
Logged By: J. Turban		Drill Rig: CME-45C TRUCK (Energy Transfer Ratio = 76.6%)						
Total Depth: 21.5 feet		Drilling Method: 4" Solid-Stem Auger						
Work Order: 7136-00		Driving Energy: 140 lb. wt., 30 in. drop						


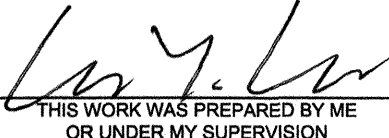
		<b>GEOLABS, INC.</b> Geotechnical Engineering		OAHU MISCELLANEOUS BMPs SITES 5 (PID 111091), 4 (PID 200526), 6 (PID 505421), & 7 (PID 106997) KANEEOHE, OAHU, HAWAII		Log of Boring <b>402</b>		
Laboratory		Field		Approximate Ground Surface Elevation (feet MSL): 250 *		Description		
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)			Pocket Pen. (tsf)
LL=72 PI=37	8				43		7-inch <b>CONCRETE</b> Gray <b>GRAVELLY SAND</b> , medium dense to dense, dry (base course)	
	16	107			26	1.3	5	grades with a little clay
	29				6		10	Brown <b>CLAYEY SILT</b> with some gravel, stiff, dry to moist (older alluvium)
UC					8	0.5	15	grades to medium stiff
	34				17		20	Dark grayish brown <b>SILTY CLAY</b> with some sand and gravel (basaltic), very stiff, moist (saprolite) Boring terminated at 21.5 feet
							30	
Date Started: April 1, 2015		Water Level: ∇ Not Encountered		Plate		A - 8		
Date Completed: April 1, 2015								
Logged By: J. Turban		Drill Rig: CME-45C TRUCK (Energy Transfer Ratio = 76.6%)						
Total Depth: 21.5 feet		Drilling Method: 4" Solid-Stem Auger						
Work Order: 7136-00		Driving Energy: 140 lb. wt., 30 in. drop						

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-O-01-15	2016	16	52

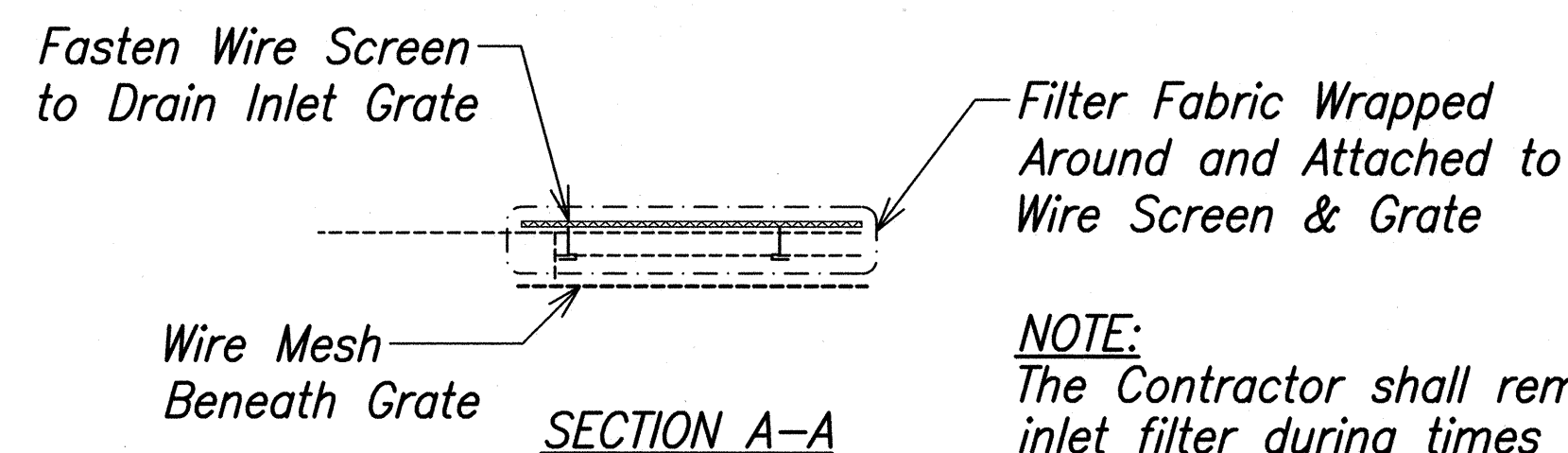
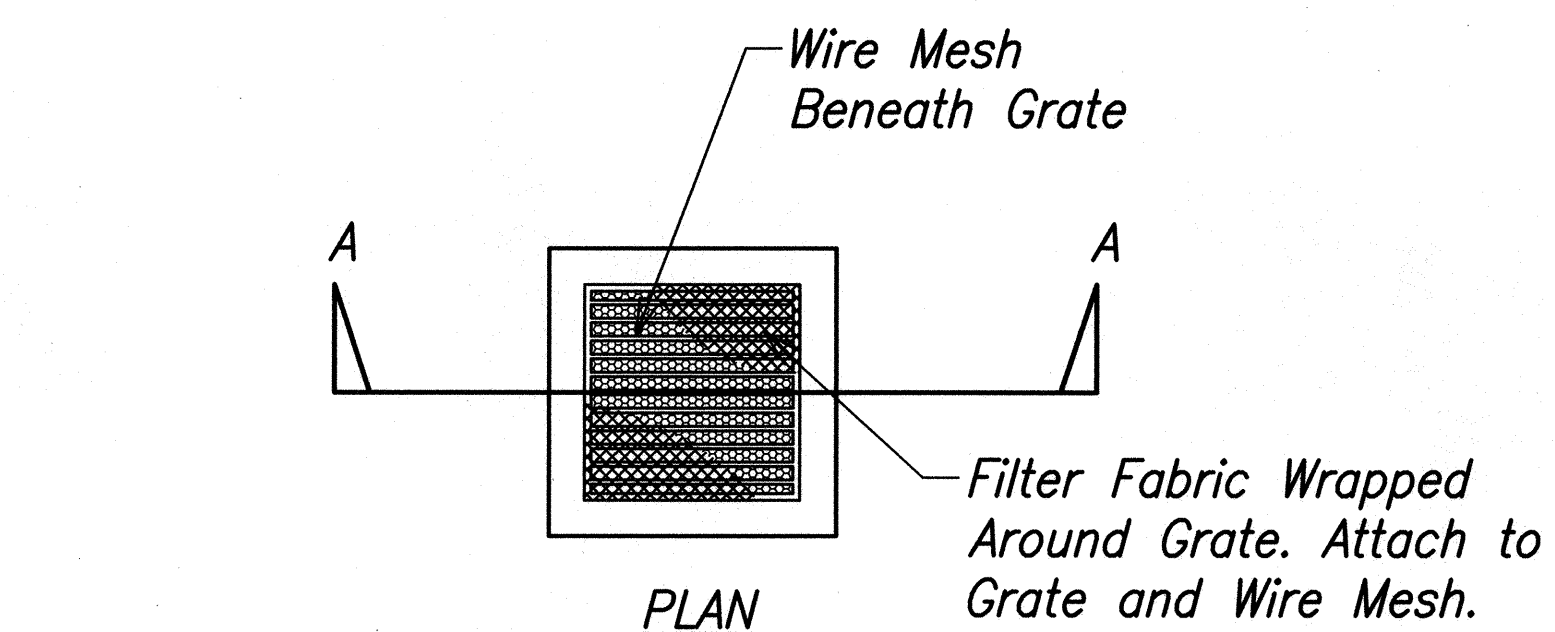
**NOTE:**  
1. See Sheets C-02, C-03, and C-06 for approximate locations of borings.

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

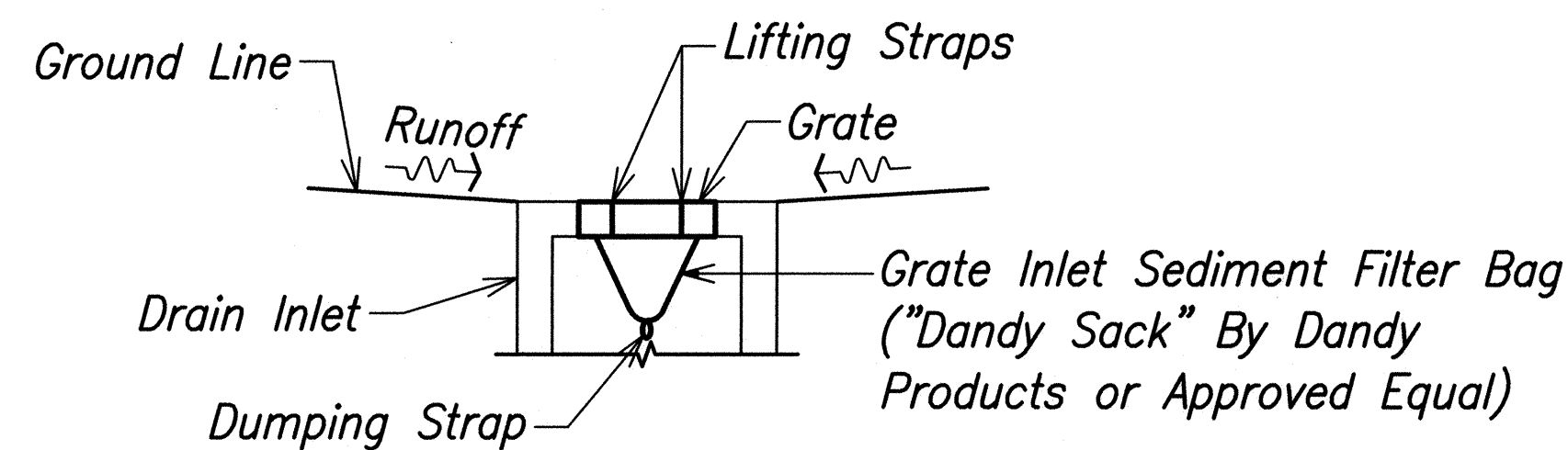
T:\Drilling\Completed\47136-00\_Oahu\MiscellaneousBMPs\Bid Package 1\B-03 Boring Logs-3.dwg  
BORING LOG 7136-00.GPJ GEOLABS.GDT 6/24/15

 4-30-16 EXP DATE  THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION <b>BORING LOGS - 3</b> <b>MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES, PHASE 2A</b> Project No. HWY-0-01-15 Scale: None Date: April 2016 SHEET No. B-03 OF 3 SHEETS
--	---

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-O-01-15	2016	17	52

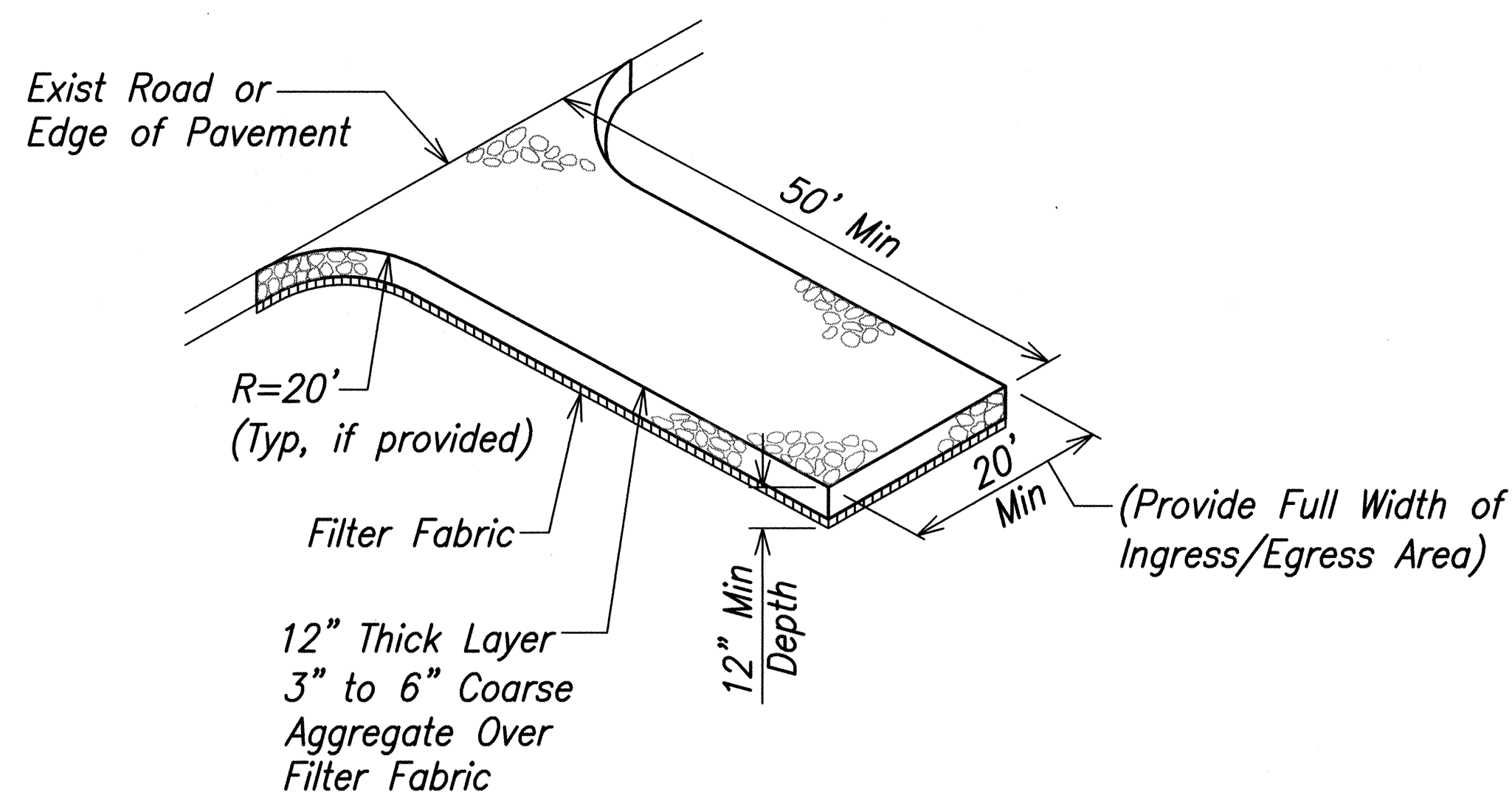


**NOTE:**  
The Contractor shall remove the inlet filter during times of above normal rainfall events and shall replace them when the event has passed.

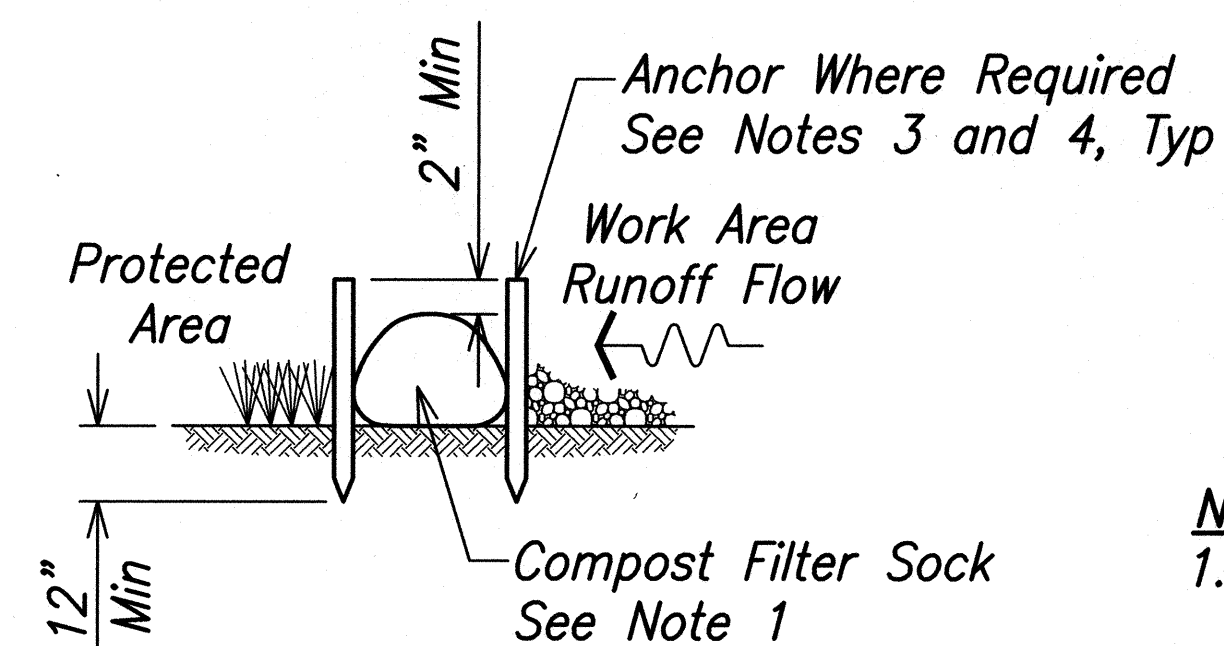


#### ALTERNATE INLET PROTECTION

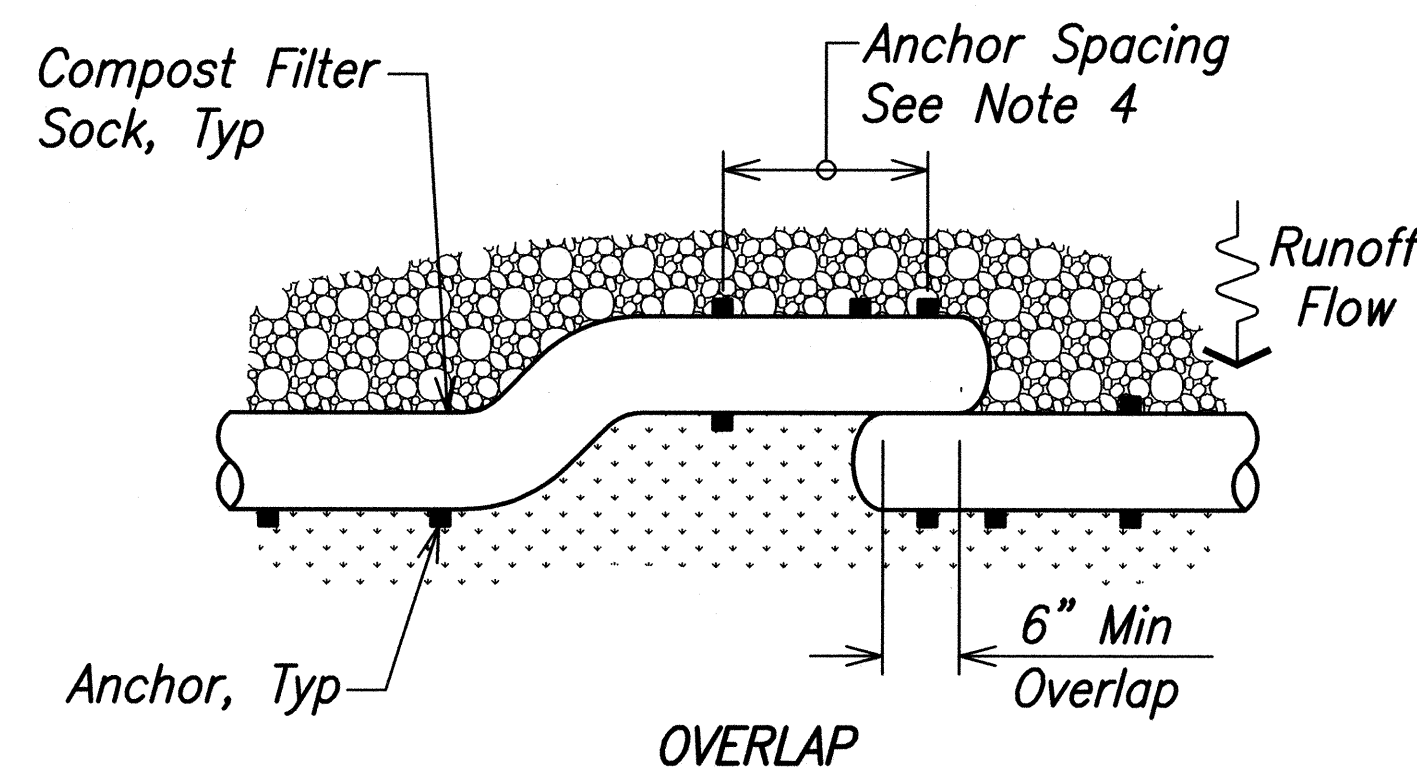
**DRAIN INLET PROTECTION DETAIL**  
NOT TO SCALE  
C-02 C-01 C-05



**STABILIZED CONSTRUCTION ENTRANCE/EXIT DETAIL**  
NOT TO SCALE  
C-02 C-01



#### SECTION

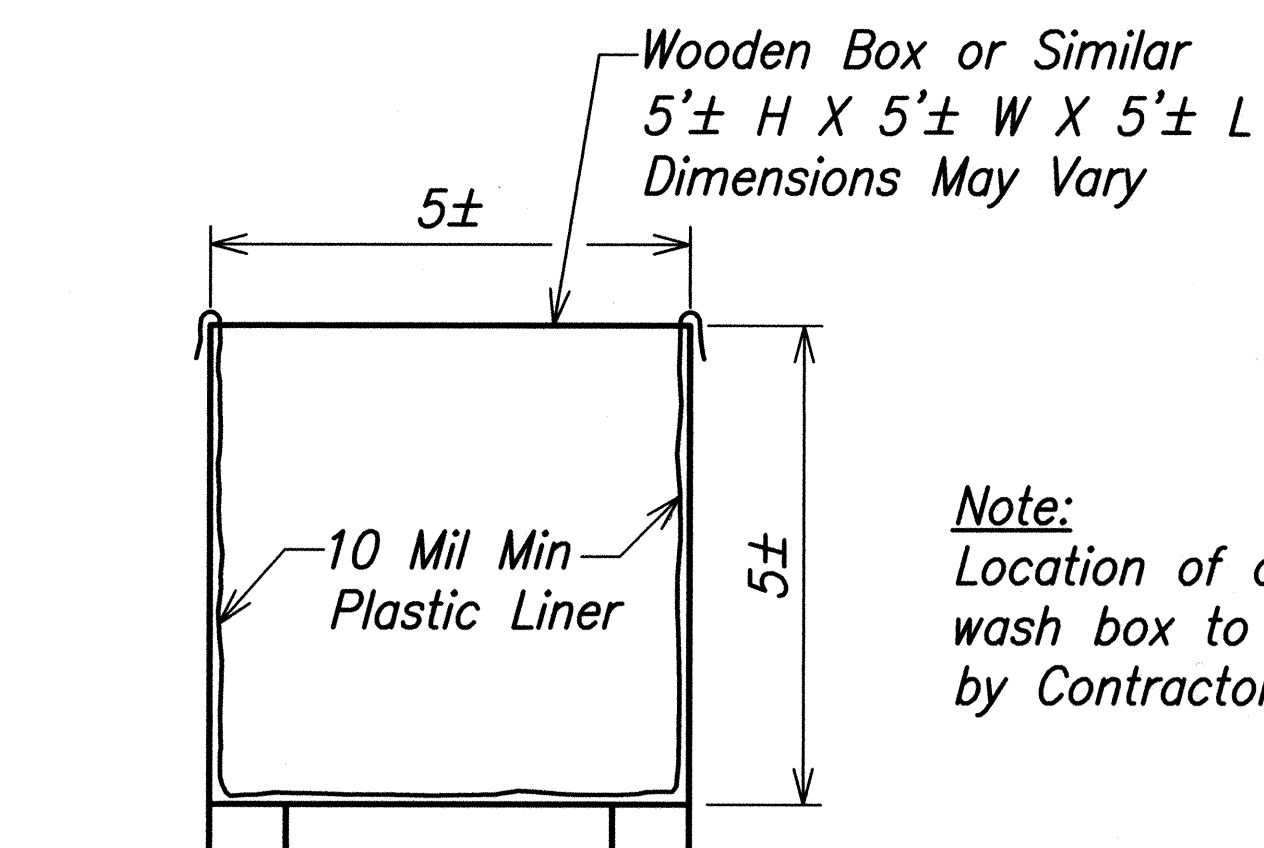


#### OVERLAP

**COMPOST FILTER SOCK DETAIL**  
NOT TO SCALE  
C-02 C-01 C-05

#### NOTES:

1. Compost filter sock shall be 12" nominal diameter. Compost filter sock material shall be biodegradable, free of biosolids, and consistent with the State of Hawaii, Department of Transportation, Highways Division Construction Best Management Practices Field Manual, January 2008.
2. Remove sediment from the upslope side of the compost filter sock when accumulation has reached 1/2 of the effective height of the compost filter sock.
3. 3/4"x3/4"x16" minimum wooden stake.
4. On < 4:1 slope, no stake anchor required.  
On 4:1 to 3:1 slope, stake at 10 ft on center.  
On 3:1 to 2:1 slope, stake at 5 ft to 10 ft on center.



#### Note:

Location of concrete truck wash box to be determined by Contractor.

**CONCRETE TRUCK WASH BOX**  
NOT TO SCALE  
C-01 C-01

DATE	_____
DESIGNED BY	_____
TRACED BY	_____
NOTE BOOK	_____
QUANTITIES BY	_____
CHECKED BY	_____
No.	_____

\\hawaii\shared\civil\dot highway\2013\0400\oahu\_miscellaneous\pmp\04\_graphics\CD\Sheets\Bd Package\1\C-01 Temporary Erosion Control Details.dwg

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TEMPORARY EROSION CONTROL DETAILS**

MISCELLANEOUS PERMANENT  
BEST MANAGEMENT PRACTICES, PHASE 2A

Project No. HWY-O-01-15

Scale: None Date: April 2016

SHEET No. C-01 OF 22 SHEETS