

P.M.: STY  
CURRENT OPR: rki  
PREV. OPR:  
CURRENT TIME: May 09, 2003 - 2:20pm  
LAST SAVED BY:  
LAST MODIFIED: Thu, 08 May 2003 - 10:06am

PREFIX: G:\DOTH9601A\ACAD\  
FILE: FGE1.DWG  
BEGIN: 12/01/99  
SCALE: 1=1

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
NOTEBOOK	DRAWN BY _____	" _____
	TRACED BY _____	" _____
	DESIGNED BY _____	" _____
	QUANTITIES BY _____	" _____
	CHECKED BY _____	" _____
No. _____		

- After the site has been cleared and grubbed, the lower areas on the western side of the road alignment, between the existing paved roadway and the slopes rising up to the west, should be overexcavated to a depth of 3 feet below the finish road grade, to remove the uncompacted fill in this area. The overexcavation of uncompacted fill will likely be required throughout the new traffic lane area from about Road Sta. 10+00 to Sta. 35+00. The excavated materials may be stockpiled for re-use as fill provided all over-sized material, organics, rubbish, and other deleterious materials are removed in accordance with the Grading recommendations.

- The majority of the excavations required for the retaining wall construction can probably be accomplished with conventional earthmoving equipment. The occasional use of rock excavating equipment, such as hoerams or large, ripper-equipped dozers, should be anticipated to facilitate the removal of massive tuff near the intersection of Salt Lake Boulevard, and random seams of cemented cinders and moderately weathered tuff in the remaining areas.*

*The exposed subgrade in areas to receive fill or structural units, including the overexcavated area resulting from the removal of the uncompacted fill, should be scarified, moisture-conditioned to within 3 percent of the optimum moisture content, and uniformly compacted to at least 90 percent of the soil's maximum dry density as by Laboratory Compaction Test AASHTO T-180, for a minimum depth of 6 inches prior to any fill placement or future construction. Where the exposed subgrade is within 3 feet of the planned finish pavement level, it should be compacted to at least 95 percent relative compaction prior to any fill placement.*

*Fill and backfill should be placed in uniform lifts of no more than 8 inches in loose thickness, moisture-conditioned to within 3 percent of the optimum moisture content, and uniformly compacted to at least 95 percent relative compaction as determined by the above-referenced test.*

*Temporary excavations within the cinders which will be required for the retaining wall construction should be sloped back no steeper than 1.5H:1.0V for heights*

3. *Retaining Wall* – We believe that the proposed retaining wall can be adequately supported on a continuous strip footing bearing upon properly compacted fill, the medium dense to dense cinders, or the weathered tuff where it may be designed for an allowable bearing capacity of 4,500 p.s.f. This value may be increased by one-third for short-term seismic and wind loads.

*A friction factor of 0.55 may be used at the contact surface between the bottom of the foundations and the on-site soils to resist sliding.*

*The bottom of the footing excavations should be recompacted to at least 95 percent relative compaction as determined by Laboratory Compaction test AASHTO T-180, prior to the placement of concrete and reinforcing steel. Any soft spots encountered in the foundation excavations should be removed and cleaned out to hard natural ground or compacted fill and the resulting depression backfilled in accordance with the Grading recommendations.*

*The retaining wall backfill should consist of a well-graded granular fill similar to the on-site cinders. Should imported fill be used as backfill behind the retaining walls, it should conform to the requirements for Aggregate Subbase in Section 703.17 of the Standard Specifications.*

*The earth pressures exerted against the wall will depend on the type and slope of the backfill behind the wall. For wall backfill consisting of the on-site cinders or imported fill conforming to the above recommendation, the estimated active earth pressures are summarized in the following table for various slope conditions.*

*The above earth pressures are given in terms of equivalent fluid pressures and do not include surcharge, foundation, or hydrostatic pressures which must be added, where appropriate.*

A. Transverse drains should consist of perforated pipe surrounded by 6 inches of filter gravel, or AASHTO M43 No. 57 Gravel wrapped in non-woven filter fabric.

*C. Filter Gravel should conform to Section 703.18 of the Standard Specifications. Non-woven filter fabric should conform to Section 716.03 of the Standard Specifications.*

*Estimated total settlements of 0.8 inch and estimated differential settlements exceeding 0.3 inch per 20 feet of wall length are not anticipated for foundations designed and constructed in accordance with these recommendations. The wall and its foundations should be designed to tolerate these estimated settlements.*

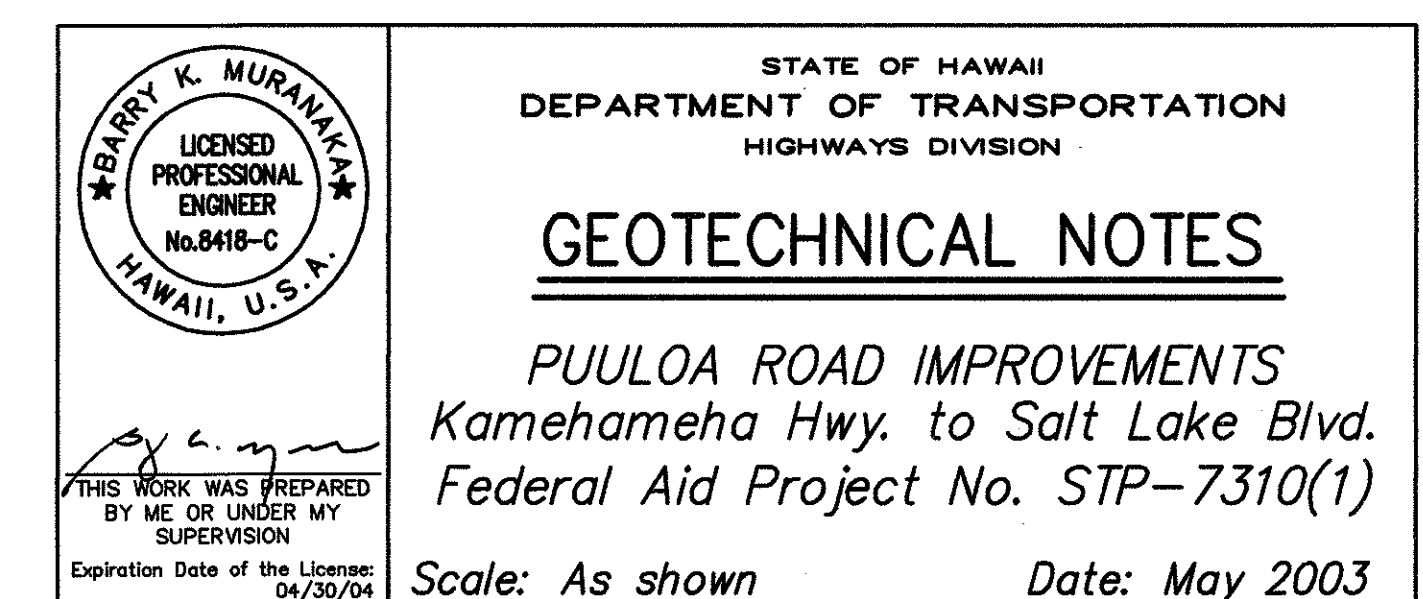
- Utility and similar site excavations should be sloped back, or shored and braced, by the contractor in accordance with DOSH or other applicable governmental regulations. The design of temporary excavations and shoring systems shall be the responsibility of the contractor.*

Groundwater was encountered at depths corresponding to about Elev. 2 and Elev. 3 in Borings 6 through 9 of this investigation. Dewatering will be required for utility trenches extending below this level. The design of the dewatering system shall be the responsibility of the contractor.

*Moderately weathered tuff and cemented cinders will likely be encountered within portions of the deeper utility trench excavations. The occasional use of rock excavating equipment should be anticipated to facilitate the removal of the tuff and cemented cinders.*

*Utilities may be founded in the properly compacted fill, the medium dense to dense cinders, or the tuff. Where soft spots are encountered at the bottom of utility excavations, they should be removed down to compacted fill or the dense cinders or tuff and the resulting depression replaced with fill compacted in accordance with the grading recommendations. Should boulders or intact tuff be encountered at the pipe invert level, they should be removed in accordance with the Standard Specifications to allow placement of the required Bed Course Material. The Bed Course Material should conform to Section 703.16 of the Standard Specifications.*

5. *Miscellaneous* – Positive drainage provisions should be provided to channel surface waters away from the retaining walls and pavements and preclude the ponding of water adjacent to or beneath the retaining wall, its foundations, and the road pavements. The on-site soils are highly susceptible to erosion. Erosion protection, such as seeding, hydro-mulching, or erosion mats, should be provided as soon as practical after the completion of the grading to minimize erosion within the graded slopes.





P.M.: STY  
CURRENT OPR: rki  
PREV OPR:  
BEGIN: 12/01/99  
SCALE: 1"=1'  
LAST MODIFIED: Thu, 08 May 2003 - 10:06am

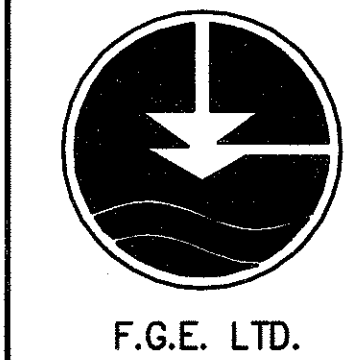
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	



BORING: 1  
PROJECT: PUULOA ROAD WIDENING  
LOCATION: MAPUNAPUNA, OAHU, HAWAII  
SURFACE ELEVATION: 33' ±  
DEPTH TO WATER: NONE ENCOUNTERED  
DATE COMPLETED: 3-6-97

FILE: 1600.01  
PROJECT ENGINEER: TC  
FIELD ENGINEER: TSK  
DRAFTED BY: MD  
DATE OF DRAWING:

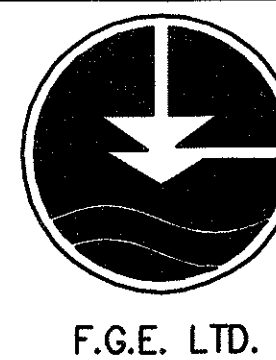
LAB TEST RESULTS	MOIST CONT. %	DRY DEN. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
GRADATION: 48% GRAVEL 40% SAND 12% SILT/CLAY S.E.=62	9		53	1	0	REDDISH BROWN SILTY GRAVEL (GM) WITH SAND, MEDIUM DENSE, DRY (FILL)
	9	123	48	2	5	
PH=8.5			55	3	10	DARK GRAY SILTY SAND (SM) WITH GRAVEL, MEDIUM DENSE TO DENSE, DRY (CINDERS)
			96%REC 52%RQD	NX CORE	10	
					15	GRAYISH BROWN MODERATELY WEATHERED TUFF (WM), HARD, OCCASIONALLY BROKEN BOH @ 13.5'
					20	



BORING: 2  
PROJECT: PUULOA ROAD WIDENING  
LOCATION: MAPUNAPUNA, OAHU, HAWAII  
SURFACE ELEVATION: 27' ±  
DEPTH TO WATER: NONE ENCOUNTERED  
DATE COMPLETED: 3-6-97

FILE: 1600.01  
PROJECT ENGINEER: TC  
FIELD ENGINEER: TSK  
DRAFTED BY: MD  
DATE OF DRAWING:

LAB TEST RESULTS	MOIST CONT. %	DRY DEN. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
S.E.=14	39	72	32	1	0	BROWN CLAYEY SILT (MH) WITH GRAVEL, STIFF, MOIST (FILL)
GRADATION: 59% GRAVEL 30% SAND 11% SILT/CLAY	24		12	2	5	BROWN SILTY GRAVEL (GM) WITH SAND, LOOSE, MOIST (FILL)
DIRECT SHEAR: O=320 C=850 PSF 0.8% SWELL LL=49, PI=22 PH=8.1	24	97	17	3	10	
			23	4	15	
	26	93	33	5	20	GRAYISH BROWN CLAYEY SILT (ML-CL) WITH SAND AND GRAVEL, VERY STIFF TO HARD, DAMP (WEATHERED CINDERS) BOH @ 15.0'



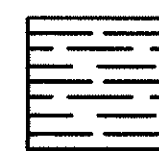
BORING: 3  
PROJECT: PUULOA ROAD WIDENING  
LOCATION: MAPUNAPUNA, OAHU, HAWAII  
SURFACE ELEVATION: 25' ±  
DEPTH TO WATER: NONE ENCOUNTERED  
DATE COMPLETED: 3-5-97

FILE: 1600.01  
PROJECT ENGINEER: TC  
FIELD ENGINEER: TSK  
DRAFTED BY: MD  
DATE OF DRAWING:

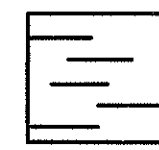
LAB TEST RESULTS	MOIST CONT. %	DRY DEN. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
GRADATION: 25% GRAVEL 59% SAND 16% SILT/CLAY NON-PLASTIC GRADATION: 7% GRAVEL 80% SAND 13% SILT/CLAY PH=8.0	38		15	1	0	GRAYISH BROWN SILTY SAND (SM) WITH GRAVEL, LOOSE TO MEDIUM DENSE, MOIST (CINDERS)
	34		34	2	5	
	51	79	46	3	10	BROWN CLAYEY SILT (ML-CL) WITH SAND, HARD, MOIST (WEATHERED CINDERS)
			39/6"	4	15	
				5	20	GRAYISH BROWN HIGHLY WEATHERED TUFF (WH), SOFT BOH @ 15.0'

#### LEGEND

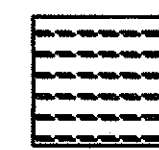
##### MAJOR ROCK TYPES



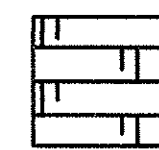
BASALT



TUFF

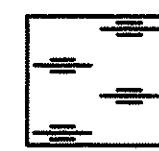


DECOMPOSED ROCK

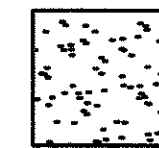


CORAL

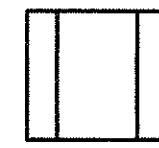
##### SECONDARY CLASSIFICATION



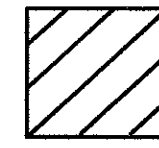
GRAVELLY



SANDY



SILTY

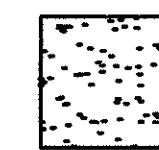


CLAYEY

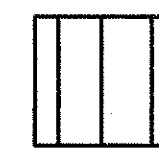
##### MAJOR SOIL TYPES



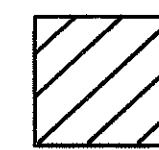
GRAVEL



SAND



SILT

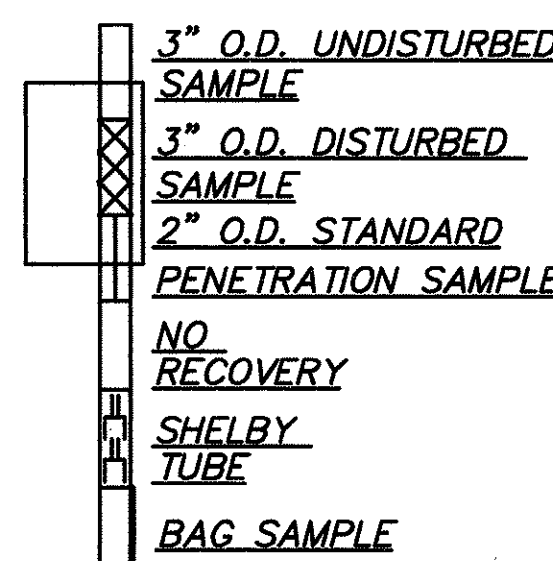


CLAY



PEAT/ORGANICS

##### SAMPLING SYMBOLS



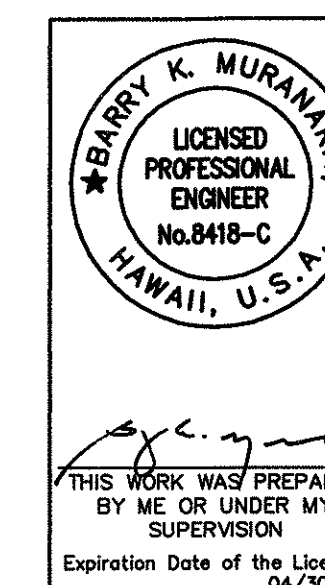
WATER LEVEL



BORING: 4  
PROJECT: PUULOA ROAD WIDENING  
LOCATION: MAPUNAPUNA, OAHU, HAWAII  
SURFACE ELEVATION: 33' ±  
DEPTH TO WATER: NONE ENCOUNTERED  
DATE COMPLETED: 3-3-97

FILE: 1600.01  
PROJECT ENGINEER: TC  
FIELD ENGINEER: TSK  
DRAFTED BY: MD  
DATE OF DRAWING:

LAB TEST RESULTS	MOIST CONT. %	DRY DEN. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
NON-PLASTIC	17		17	1	0	BROWN SILTY GRAVEL (GM) WITH SAND, LOOSE, DAMP (CINDERS)
DIRECT SHEAR: O=360 C=200 PSF 0.1% SWELL	4	109	30/6" R 8%REC 5%RQD	2	5	
				NX CORE	5	
					10	GRAYISH BROWN SILTY SAND (SM) WITH GRAVEL AND OCCASIONAL COBBLES, DENSE, DRY
S.E.=63	24		40	3	15	GRADES TO MOIST
					20	
	27	83	50/6" R	4	25	(CINDERS)
					30	
DIRECT SHEAR: O=450 C=200 PSF 2.0% SWELL	73	55	49	5	35	GRAYISH BROWN CLAYEY SILT (ML-CL), HARD, MOIST (COMPLETELY WEATHERED TUFF) BOH @ 25.0'



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**BORING LOGS**  
PUULOA ROAD IMPROVEMENTS  
Kamehameha Hwy. to Salt Lake Blvd.  
Federal Aid Project No. STP-7310(1)  
Scale: As shown Date: May 2003  
SHEET NO. 8 OF 193 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
	DRAWN BY _____	"
	TRACED BY _____	"
NOTEBOOK	DESIGNED BY _____	"
	QUANTITIES BY _____	"
No. _____	CHECKED BY _____	"