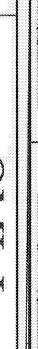


SISI RISSEARCH DRIVE

FAX (256) 837 7677

JOB NO:6759
DATE: 10-30-2013
SCALE: 1°= 400°
DRAWN BY: CCT
SHEET 3 OF 3



W-B-29

FW-B-39

FW-B-39

FW-B-36

FW-B-34

FW-B-36

FUTURE FINISH WATER MAIN IN HWY 431 RIGHT-OF-WAY

ÚS HÍGHWAY NO. 431

LEGEND

⊘-BORING LOCATION

NOTE: THIS DRAWING WAS REDRAWN FROM A DRAWING PROVIDED BY TETRA TECH, HUNTSVILLE, ALABAMA

	OMI, Inc. 5151 Research Drive, N.W. Huntsville, AL 35805													
					-	35805								
JOB N	NO.: <u>67</u>	<u>759</u> JOB: _	SE WTP Water Main	18	LOG OF	BORING:		RW	<u>-B-1</u>	<u> </u>				
JOB I	OCAT	ION:	Marshall County, Alabama		BORING	LOCATIO	N:							
DEPTH, FT	SYMBOL	DESCR	RIPTION OF MATERIAL		BLOMS FER FT	natoral Moistore	POCKET PENT TSF	Pp (tsf) "N" values blow WATER CONTENT, PL — 20			LL			
0		TOPSOIL			13	16	0.75	4						
<u> </u>		nodules, 30°	TY CLAY with trace oxid % fine sand, 70% fines, l ddish brown, stiff, moist,	low	13	19	2.0		•					
5		residuum, C SANDY SIL	L TY CLAY, 35% sand, 65	5%	16	23	4.0				!			
		∖stiff, moist, r	lasticity, red and tan mot esiduum, CH TY CLAY with chert, 30%		18	30	4.5)			
10		sand, 70% fi	nes, high plasticity, orar y stiff, moist, residuum, (nge	18	31	4.25				<u>.</u>			
			RMINATED AT 10-FT						:					
15 ~					:									
20 -														
_														
25 -		!							:					
30 -														
35 -														
		1												
40 -														
COMP	LETIO	N DEPTH: 10 10/18/13	DEPTH TO WATERINITIAL: DEPTH TO WATERFINAL: DE		RY ON 10/21/13	OMI,Inc. Page 1 of	1	<u> </u>		<u>.</u>				

						OMI, In	C.								
					1 Research D	-	Huntsvil	le, AL	35805						
JOB N	IO.: <u>67</u>	59	JOB: _	SE	WTP Water N	flains	го	G OF	BORING:			RW-	·B-2		
JOB L	OCAT	101	N:	Marshall Co	unty, Alabam	a	ВО	RING	LOCATIO	N:					
ОЕРТН, FT	SYMBOL	SAMPLES	DESCR	IPTION OF	F MATERI.	AL	BLOWS PER FT		natural Moisture	POCKET PENT TSF	WATER C	ues blow ONTENT,	*	3 4 	LL 0
0		\vdash	TOPSOIL				7		14	2.5	A •		•		
			SANDY SILT	6 sand, 70	% fines, lo	w	14		14	2.25	1		<u> </u>		
- 5			plasticity, ora residuum, CL SANDY SILT	<u> </u>			19		21	4.5	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				
			fines, low pla stiff, moist, re	sticity, ora esiduum, C	nge, tan a L	nd gray,	19		24	3.25		1		≠	
		h	SANDY SILT fines, low pla				17	_	30	3.0		7			
- 10			stiff, moist, re			iay, very	.,								
· ·· · · -			SANDY SILT			of chert									
			and oxide no												
			high plasticity moist, residu		and gray, v	ery stiπ,									
- 15 -		┞	BORING TEI		O AT 10-F	Т									
									ı						
- 20 -															
- 25 -															
- 30 -															
- 35 -															
- 40 -															
COMP DATE:		N I	DEPTH: 10 10/18/13	DEPTH TO V	VATERINITIAI VATERFINAL:	L: DRY TO 7.	DRY 5-FT ON	10/21/	OMI,inc.	1					

						OMI, In	ic.								
						Drive, N.W.	Huntsvi								
JOB N	10.: <u>67</u>	59	JOB: _	<u>S</u>	E WTP Wate	r Mains	LC	OG OF	BORING:			RW-	B-3_		
JOB L	OCATI	ON	:	Marshall C	ounty, Alaba	ma	во	ORING	LOCATIO	N:				-	
DEPTB, FT	SYMBOL		DESCR	RIPTION C	F MATER	RIAL	BLOWS PER FT		NATURAL MOISTURE	POCKET PENT TSF		+-		3 4 + 0 8	
0	7777		TOPSOIL				8	·	15	2.75	A •				
			SANDY SIL nodules, 309	% sand, 70	0% fines,	low	19		14	3.0	•		\		
- 5 -		ון ני	plasticity, ora	<u>L</u>			18	-	20	4.5)			\
			SANDY SILT fines, low pla moist, residu	asticity, or ium, CL	ange, ver	y stiff,	23	i	18	4.5	•)			_
- 10 -			SANDY SIL ⁻ 30% sand, 7 orange and (0% fines,	low plasti	city,	18	}	22	2.5	<u></u>		•		<u> </u>
		$\ \mathbf{U} \ $	residuum, C BORING TE	<u>L</u>							:			ı	
15 -															
														i	
20 -															: !
															: 1
25															
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35															
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40 -					_										
COMP DATE:	LETIO		EPTH: <u>10</u> 10/18/13	DEPTH TO	WATERINITI WATERFINA	AL: L: DRY TO 8-	DRY FT ON 10)/21/ <u>1</u> 3	OMI,Inc. Page 1 of	1					

	OMI, Inc. 5151 Research Drive, N.W. Huntsville, AL 35805 OB NO.: 6759 JOB: SE WTP Water Mains LOG OF BORING: RW-B-4													
						.W. 1								
JOB I	NO.: <u>6</u>	759	JOB:	SE V	VTP Water Mains		LOG O	BORING:		RV	V-B-4			
JOB I	OCAT	ΓIΟN	l:	Marshall Cou	nty, Alabama		BORING	G LOCATIO	N:					
Ta 'BIGEO	SYMBOL	SAMPLES	DESCF	RIPTION OF	MATERIAL		BLOWS PER FT	NATURAL	POCKET PENT TSF	Pp (tsf) 1 "N" values bl WATER CONTENT PL + -		· +	LL 10	
0			TOPSOIL				16	22	4.5	Δ.				
			nodules, 30	% sand, 70%			22	14	3.5	1				
- 5 -			residuum, (ery stiff, moist	i, ———	31	14	4.25	• >			•	
			oxides, 35% plasticity, or	sand, 65%	fines, low ay mottled, ver	У	17	25	4.5	•			1	
- 10 -		7 n	SANDY SIL		traces of cher	t,	23	20	4.5	•\	<u> </u>		-	
		\			very stiff, mois	st,							ļ	
		╟┖	residuum, C	<u>L</u> RMINATED	AT 10 ET									
			DORING I	RIVIINATED	AT 10-FT									
15 -														
						į							-	
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25 -														
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35 -														
40							<u> </u>					<u> </u>		
COMP DATE:			EPTH: 10 10/18//13	_ DEPTH TO WA _ DEPTH TO WA	TERINITIAL: TERFINAL: DRY		RY ΓΟΝ 10/21/1:	OMI,Inc. Page 1 of	1					

- 30				OMI,	nc.							
DESCRIPTION OF MATERIAL DESCRIPTION OF MATERI	JOB I	NO.: <u>67</u> 8	59 JOB: _		=				FW-I	B-1 _		
DESCRIPTION OF MATERIAL DESCRIPTION OF MATERI	JOB	LOCATION	ON:	Marshall County, Alabama	BORING	G LOCATIO	N:	··-				
SANDY SILTY CLAY, 25% sand, 75% fines, low plasticity, tan, stiff, moist, residuum, CL SANDY SILTY CLAY, 40% fine sand, 60% fines, low plasticity, orange and gray, very stiff to hard, moist, residuum, CL SANDY SILTY CLAY, 35% coarse to fine sand, 65% fines, low plasticity, orange and gray mottled, very stiff, moist, residuum, CL SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT		SYMBOL		IPTION OF MATERIAL		NATURAL	POCKET PENT TSF	"N" valu	es blow		3 	LL 0
Inces, low plasticity, tan, stiff, moist, residuum, CL SANDY SILTY CLAY, 40% fine sand, 60% fines, low plasticity, orange and gray, very stiff to hard, moist, residuum, CL SANDY SILTY CLAY, 35% coarse to fine sand, 65% fines, low plasticity, orange and gray mottled, very stiff, moist, residuum, CL SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT	0		•		8	14	2.5	4,9		<u> </u>		
SANDY SILTY CLAY, 40% fine sand, 60% fines, low plasticity, orange and gray, very stiff to hard, moist, residuum, CL SANDY SILTY CLAY, 35% coarse to fine sand, 65% fines, low plasticity, orange and gray mottled, very stiff, moist, residuum, CL SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT			ackslashfines, low pla	sticity, tan, stiff, moist,	22	10	1.0					
SANDY SILTY CLAY, 35% coarse to fine sand, 65% fines, low plasticity, orange and gray mottled, very stiff, moist, residuum, CL SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT	- 5 -		SANDY SILT fines, low pla	Y CLAY, 40% fine sand, 60° sticity, orange and gray, ver	^{/0}	13	0.75			<u>`</u>	/	>
gray mottled, very stiff, moist, residuum, CL SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT			SANDY SILT	Y CLAY, 35% coarse to fine		15	4.5			,		~
SANDY SILTY CLAY, 40% sand, 60% fines, low plasticity, orange and gray, stiff, moist, residuum, CL BORING TERMINATED AT 10-FT	- 10 -		∖gray mottled,			20	2.0		•			
BORING TERMINATED AT 10-FT 20 25 30 35 36 COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.			SANDY SILT fines, low pla	sticity, orange and gray, stiff	,							
20 - 25 - 25 - 25 - 26 - 26 - 26 - 26 - 26					-							
25 - 30 - 335 - 35 - 35 - 36 - 37 - 38 - 38 - 38 - 38 - 38 - 38 - 38	- 15 -		DOMINO PER	WINALED AT 10-1 I								
25 - 30 - 335 - 35 - 35 - 36 - 37 - 38 - 38 - 38 - 38 - 38 - 38 - 38												
25 - 30 - 335 - 35 - 35 - 36 - 37 - 38 - 38 - 38 - 38 - 38 - 38 - 38												
30 - 35 - 35 - 36 - 36 - 36 - 36 - 36 - 36	- 20 -											
30 - 35 - 35 - 36 - 36 - 36 - 36 - 36 - 36												
30 - 35 - 35 - 36 - 36 - 36 - 36 - 36 - 36												
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.	- 25 -											
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.												
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.	- 30 -											
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.												
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.												
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.	- 35 -											
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.												
COMPLETION DEPTH: 10 DEPTH TO WATERINITIAL: DRY OMI,Inc.												
	- 40 ~											
							1					

										/II, Ind	С.							
				_				rch Dr	-	I.W.			. 35805			 -		
JOB N	O.: <u>67</u>	759	JC)B:		SE V	VTP W	/ater M	lains		[OG OF	BORING:			FW-	·B-2	
JOB L	OCAT	ION:			Marsha	li Cour	nty, A	labama	a		E	ORING	LOCATIO	N:				
рзети, гт	ZAMBOL	SAMPLES	DES	6CRIF	MOIT	I OF	MAT	ΓERI	AL			BLONG FER FT	NATURAL	POCKET PENT TSF	WATER C	ues blov ONTENT,	• - •	LL. O
0		7 1	ANDY								1	1	12	3.0	7		ار	
			5% san nd red,							ın	1	6	18	1.5	1	P		
			ANDY												']		
- 5 -		p	odules, lasticity	, dark						<u> </u>	<u>'</u>	5	21	1.5		•		
		¦ s	SANDY :	SILTY							1	5	23	1.75	1)		
			0% san ray and								1	4	19	1.5		4		
10			L ORING	TER	MINA	TED	<u>Α</u> Τ ·	10-F1										
		-	, C1 (111 C	, ,			, , ,		•									
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30 -																		
35																	!	
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40 -																		
COMP DATE:			PTH:		DEPTH DEPTH						DRY N 10/21	/13	OMI,Inc.					

		OMI, Ir	IC.						
		5151 Research Drive, N.W.	Huntsville, AL	35805					
JOB N	10.: <u>67</u>	759 JOB: SE WTP Water Mains	LOG OF	BORING:		FW-	B-3_		
JOB I	OCAT	ION: Marshall County, Alabama	BORING	LOCATIO	N:				
DEPTB, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLOWS PER PT	NATURAL MOISTURE	POCKET PENT TSF	PD (tsf) "N" values blow WATER CONTENT, PL — 20 44	* - • 	(LL 0
0	"	TOPSOIL	15	15	4.5	ę		Ď	
		SANDY SILTY CLAY, 30% sand, 70% fines, low plasticity, orange and tan, stiff, moist, residuum, CL	20	14	2.0		r		
- 5 -		SANDY SILTY CLAY with oxide nodules, 35% sand, 65% fines, low to medium	17	31	2.75) - - 		
		plasticity, orange, tan and gray, very stiff to hard, moist, residuum, CL	20	17	2.5			11/16	
10 -			100+	18	4.25	•			` <u> </u>
		BORING TERMINATED AT 10-FT							
									į
15 -									
20 -									
25 -									
30 -									
35 -									
· · ·									
40 -									
COMP DATE:		N DEPTH: 10 DEPTH TO WATERINITIAL: 10/18//13 DEPTH TO WATERFINAL: DRY TO 7-	DRY FT ON 10/21/13	OMI,Inc.	1	<u>. </u>			 ,

	OMI, Inc. 5151 Research Drive, N.W. Huntsville, AL 35805 B NO.: 6759 JOB: SE WTP Water Mains LOG OF BORING: FW-B-4													
JOB N	10.: 67					FW-B-4								
		ION: Marshall County, Alabama		LOCATIO										
рерта, ут	.1	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL HOI STURE	POCKET PENT TSF	Pp (tsf) 2 3 4 "N" values blows/ft A WATER CONTENT, % - PL								
0		TOPSOIL	8	10	2.5	4 .								
		SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, orangish tan, stiff, moist, residuum, CL	10		2.1									
5		<u></u>	8		2.0									
		SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, yellowish tan, firm to stiff, moist, residuum, CL	5	20 18	0.5									
10 -			3	10	1.0									
		SANDY SILTY CLAY, 30% fine sand, 70%	22											
15	//	fines, high plasticity, yellowish tan, very stiff, moist, residuum, CH			-									
		BORING TERMINATED AT 15-FT												
20														
25 -														
30 -														
35 -														
40 -				_										
COMP DATE:		N DEPTH: 15 DEPTH TO WATERINITIAL: DEPTH TO WATERINAL: DRY TO 10	DRY)-FT ON 10/21/	OMI,Inc. Page 1 of	1									

	OMI, Inc. 5151 Research Drive, N.W. Huntsville, AL 35805													
	NO.: <u>67</u>			SE WT	P Water Mains			BORING:			FW-B-	<u> </u>		
JOB I	LOCATI	ON:		Marshall County	/, Alabama	ВО	RING	LOCATIO	N:					
DEPTB, FT	SYMBOL		DESCR	IPTION OF M	IATERIAL	BLOWS PER FT		NATURAL MOISTURE	POCKET PENT ISF	Pp (ts 1 think the state of the	2 blows/fi	- •		LL
0					6 medium to fine	14	-	8	1.5	Q A	* [<u> </u>
				nes, low plast st, residuum,	icity, brownish CL	13		13	4.0					i
- 5 -		┤ ;	35% medium	to fine sand,	oxide nodules, 65% fines, low	15		15	2.25	• +	+ =<			
			olasticity, yel moist, residu		iff to very stiff,	14		19	4.5	1				,
- 10 -		-				14		19	4.5	1				<u> </u>
										\				
					6 medium to fine	22			4.25	7				1
- 15 -	7771				icity, gray and list, residuum,									
-		117	ÇL			-								
		'	SURING LE	RMINATED A	.1 15-F1									
20 -														
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40 -														
	LETION		PTH: <u>15</u> 0/14/13	DEPTH TO WATE	ERINITIAL:ERFINAL:DRY TO 1	DRY 1-FT ON 1	0/21/	OMI,Inc.	1		l	!		

						OMI, Inc								ı
JOB N	IO.: <u>67</u>	759	JOB: _		Research Drive WTP Water Mair		Huntsville, AL LOG OF	35805 BORING:			FW-	B-6		
JOB L	OCAT	ION	·	Marshall Co	unty, Alabama		BORING	LOCATIO	N:					
DEPTH, FT	SYMBOL	SAMPLES	DESCR	IPTION OF	MATERIAL		BLOWS PER FT	natoral Moistore	POCKET PENT TSF	WATER C	ues blow		3 4 	LL 0
0		, ,	SANDY SILT sand, 70% fi				13		4.5					
			tan, stiff, mo	ist, residuu	m, CL		9	19	2.0	<i>\(\frac{f}{f} \)</i>	•			
- 5			SANDY SILT sand, 65% fi tan, stiff to v	nes, low pla	asticity, oran	gish	13	13	2.25	$\frac{1}{2}$		• • •		
							15	16	2.0		I	, ,	, ,	_
10			SANDY SILT sand, 65% fi				20	15	4.5	• 7		_	<u></u>	`•
		$\ \ $	yellowish tar	n and red, v										
			residuum, C BORING TE		AT 10-FT									
45							:							
15														
												:		
20														
										:				
25														
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35														
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COMP DATE:			EPTH: <u>10</u> 10/14/13	DEPTH TO W	/ATERINITIAL: _ /ATERFINAL: <u>D</u>		DRY T ON 10/21/13	OMI,Inc.	1					

			OMI, In	C.							
JOB N	10.: <u>6</u>	759	5151 Research Drive, N.W. JOB: SE WTP Water Mains	Huntsville, AL				FW-	B-7		
JOB L	OCAT	101	i: Marshall County, Alabama	BORING	LOCATIO	N:					
DEPTH, FT		SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER PT	NATURAL MOLSTURE	POCKET PENT TSF	WATER C	ues blow		- + o s	LL
0	*****	1	TOPSOIL	16		2.75	A				
			SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, orange,	24	15	4.5	•	4		` ` ` `	\
- 5 -			very stiff, moist, residuum, CL SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, gray, red,	26	15	4.5	•	}	_		•
			and orange mottled, very stiff, moist, residuum, CL	22	21	4.5					
10			SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, orange and		23	4.5				!	
		L	gray, very stiff, moist, residuum, CL								
			BORING TERMINATED AT 10-FT								
15											
-											
20 -											
25 -											
					8						
30 -											
35 -											
40 -											
COMF DATE		N I	DEPTH: 10 DEPTH TO WATERINITIAL: DEPTH TO WATERFINAL: DRY TO 8-	DRY FT ON 10/21/1:	OMI,Inc.	: 1					

						OMI, In	C.							
					l Research Dr	-	Huntsville,							
JOB N	IO.: <u>67</u>	59	JOB: _	<u>SE</u>	WTP Water M	ains	LOG	OF BORING:			FW	-B-8_		
JOB L	OCATI	ON	:	Marshall Co	unty, Alabama	1	BORI	ING LOCATIO	N:					
ОЕРТН, FT	SYMBOL	1	DESCF	RIPTION OF	MATERIA	AL.	BLOWS PER FT	NATURAL MOI STURE	POCKET PENT ISF	"N" val WATER C	ONTENT,	2 :- *** ** - ***		LL O
0	777	\vdash	TOPSOIL				12		4.5	A		=		
. 5 -			SANDY SIL sand, 70% f tan, stiff, mo SANDY SIL 35% mediur	ines, low pla bist, residuul TY CLAY w	asticity, brom, CL ith oxide n	ownish odules,		13	3.0	+		•	•	
		\bigcap	plasticity, gr moist, residu SANDY SIL	ay and oran uum, CL	igish tan, v	ery stiff,	18	15	3.0			-+ !	1	
		74 I	nodules, 30°				20	28	2.5		•	4		
10 15 20 25 30 40			fines, high p tan, very stif SANDY SIL sand, 65% f gray, very st BORING TE	lasticity, gra f, moist, res TY CLAY, 3 ines, high p tiff, moist, re	ay and orar siduum, CH 5% mediu lasticity, ta esiduum, C	ngish I m to fine nnish H								
COMP					ATERINITIAL:		DRY	OMI,Inc.		1		<u> </u>		
DATE:			10/14/13	DEPTH TO W	ATERFINAL:	DRY TO 6-	T ON 10/21	//13 Page 1 of	F 1					

	OMI,							
JOB NO.: 67	5151 Research Drive, N.W. 59 JOB: SE WTP Water Mains		35805 BORING:		FW-	.R.9		
JOB LOCATI			LOCATIO		1 40-	<u>D-0</u> _		
L	DESCRIPTION OF MATERIAL	BLOWS PER FT	natural Moisture	POCKET PENT TSF	Pp (tof) 1 "N" values blowater content, PL	· - •	3 4 +	LL
0 7777	TOPSOIL	12		2.5	A .	•		
	SANDY SILTY CLAY with oxide nodules 35% medium to fine sand, 65% fines, lov plasticity, gray, red, and orangish tan			3.0		``	\ \	
5	mottled, stiff to very stiff, moist, residuum	17	20	3.25	+	/)	
	SANDY SILTY CLAY with oxide nodules 30% medium to fine sand, 70% fines, low	v ''	17	2.5		,		
//	plasticity, gray and orangish tan, very stitem of the plant of the pla	16	37	1.25				
10	SANDY SILTY CLAY with trace chert,							
	30% coarse to fine sand, 70% fines, high	ו						
	plasticity, gray, tan, and orangish red, very stiff, wet, residuum, CH							
	BORING TERMINATED AT 10-FT							
15 -								
20 -								
25 -								
30 -								
35								
40								
COMPLETIO	N DEPTH: 10 DEPTH TO WATERINITIAL:	8-FT	OMI,Inc.					<u></u>
DATE:	10/14/13 DEPTH TO WATERINAL: 6-F	T ON 10/21/13	Page 1 or					

			OMI, In								
IOD A		750		Huntsville, AL				5 \4.6	5 40		
			JOB: SE WTP Water Mains					FVV-	B-10 _		
JOB L	-OCA1	rioi TT	l: Marshall County, Alabama	BORING	LOCATIO	N:	 -				
DEPTH, FT	TOBIALS	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL MOISTURE	POCKET PENT TSF	"N" val	ONTENT,	#8/ft Å % - ●	•——	
0		7	TOPSOIL	14		4.5	Ā	-	-		•
			SANDY SILTY CLAY with trace chert, 35% coarse to fine sand, 65% fines, low	25		4.5	,	*			<u> </u>
- 5 -			plasticity, gray, yellowish tan and red mottled, stiff to very stiff, moist, residuum, CL	27	27	4.5		•			-
				25	25	4.5		<u> </u>			
10 -			SANDY SILTY CLAY with oxide nodules, 30% medium to fine sand, 70% fines, low	21	21	3.5		1		•	
			plasticity, gray, tan and orange mottled, very stiff, moist, residuum, CL								
		-	BORING TERMINATED AT 10-FT								
15											
20 -											
25 -											
		E									
30 -											
35 -											
40											
COMP DATE:		N E	EPTH: 10 DEPTH TO WATERINITIAL: 10/14/13 DEPTH TO WATERFINAL: DRY TO 8-	DRY FT ON 10/21/13	OMI,Inc.	1					

		OMI,			
JOB N	NO.: 6	5151 Research Drive, N.W 5759 JOB: SE WTP Water Mains	•		:FW-B-11
ŀ	- OCA1-				ON:
о рерти, гт	SYMBOL	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL	Pp
		GRAVEL SANDY SILTY CLAY, 35% fine sand, 75 fines, high plasticity, dark tan, very stiff,	% 14	34	4.0
- 5 -		moist ,residuum, CH	20	25	4.0
			18	24	3.0
- 10 -			20	23	2.5
- 15 -		SANDY SILTY CLAY, 35% medium to fir sand, 65% fines, low plasticity, tan, stiff, moist, residuum, CL	ne 7	23	1.5
20 -			8	22	1.5
25 -		SANDY SILTY CLAY, 35% medium to fir sand, 65% fines, low plasticity, tan, soft, wet, residuum, CL	ne 4	22	0.0
		AUGER REFUSAL AT 28-FT			
30 -					
35 -					
40 -					
COMP DATE:		DEPTH: 28 DEPTH TO WATERINITIAL: 10/17/13 DEPTH TO WATERFINAL: 10-F	18-FT T ON 10/21/13	OMI,Inc. Page 1 of	

		OMI, Inc	C.						
			Huntsville, AL						
		9 JOB: <u>SE WTP Water Mains</u>				FW-	B-12_		
JOB I	LOCATIO	N: Marshall County, Alabama	BORING	LOCATIO	N:				
та 'нтазо	SYMBOL	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL	POCKET PENT TSF	Pp (tef) 1 "N" values blow WATER CONTENT, PL - 20 4	* - • 	3 4 	LL 0
0	***	TOPSOIL	10	25	2.5	Α Ψ			
		SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, dark brown, stiff,	12	26	2.5		<u> </u>		
- 5 -		moist, FILL, CL	11	21	2.0		<u>′</u>		
			10	20	2.0		\		
- 10 -		SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, dark brown, very stiff, moist, residuum, CL	17	24	3.0	1	1		
		moist, residuditi, OL					; ; ;		
- 15 -			16	25	2.5	1	\		
			20	22	3.5		\	\ \ \	
- 20 -			2					1	
- 25 -			18	25	4.0			/	_
								/	
- 30 -		SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, yellowish tan, very stiff, moist, residuum, CL	20	22	3.0			/	
			100+	23	2.5			\	/
- 35 -			100.		2.0		_		
		BORING TERMINATED AT 38-FT							
- 40 -				<u> </u>					
			30-FT ON 10/21/13	OMI,inc. Page 1 or					

			OMI, In	C.					
				Huntsville, AL					
JOB N	10.: <u>67</u>	759 JOB: <u>SE WTP W</u>	ater Mains	LOG OF	BORING:		FW-	B-13	
JOB L	OCAT	ION: Marshall County, Al	abama	BORING	LOCATIO	N:			
T3 'HLGEO	SYMBOL	DESCRIPTION OF MAT	ERIAL	BLOWS PER FT	NATURAL	POCKET PENT TSF	Pp 1(tsf) "N" values blo WATER CONTENT, PL 20	8 - ●	4 + LL 80
0	XXX	TOPSOIL		14		4.0	A		
		SANDY SILTY CLAY, 30% fill fines, low plasticity, brown, subject of FILL, CL				3.0	4	/	
5 -		SANDY SILTY CLAY, 30% fill fines, low plasticity, orangish	tan, stiff to	12	23	3.0		•	
		very stiff, moist, residuum, Cl	_	13	24	3.0		•	
				16	22	4.0) \ \		`\
10 -		BORING TERMINATED AT 1	IO-FT		_				
	[
- 15 -									
20 -									
						į			
25 -									
					!				
30 -									
			į						
35									
40 -									
COMP DATE:		N DEPTH: 10 DEPTH TO WATERIN 10/19/13 DEPTH TO WATERF		DRY T ON 10/21/13	OMI,Inc. Page 1 of	1			

				OMI,	nc.								
				5151 Research Drive, N.W.	Hunt	tsville, AL							
	•			SE WTP Water Mains			BORING:			FVV-I	<u> 3-14</u>		
JOB L	OCAT	101	l:	Marshall County, Alabama		BORING	LOCATIO	N:					
DEPTB, FT	SYMBOL	Samples	DESCR	IPTION OF MATERIAL		BLOWS PER FT	NATURAL MOISTURE	POCKET PENT TSF	WATER C	ues blow			LL
0		\vdash	TOPSOIL			20		3.5				•	
				ΓΥ CLAY, 30% fine sand, 70º asticity, orangish tan, very esiduum, CL	%	22		4.0		\			l -
- 5 -		4				26	20	4.0		<u> </u>	_	,	<u> </u>
				TY CLAY, 30% fine sand, 70 ^o asticity, orangish tan, very esiduum, CL	6	22	21	4.5					
- 10 -						25	21	4.5		λ	_		<u> </u>
			BORING TE	RMINATED AT 10-FT									
15 -												ı	
											:	1	
												ı	
20	:												
												ı	
												ı	
25													:
25													l
												,	1
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30 -													
													l
													l
35 -													
40													
COMP DATE:			EPTH: 10 10/19/13	DEPTH TO WATERINITIAL: DEPTH TO WATERFINAL: DRY TO	DRY 6-FT OI		OMI,Inc.	1					

			OMI, In							
100 4	10 - 0	750	5151 Research Drive, N.W.	Huntsville, AL						
			JOB: SE WTP Water Mains				FW	-B-15		
JOB I	OCAT	101	N: Marshall County, Alabama	BORING	LOCATIO	N:				
DEPTB, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL	POCKET PENT TSF	Pp (tsf) 1 "N" values bl WATER CONTENT PL	-)	LL 30
0		/ -	TOPSOIL	10		4.0	A .	<u> </u>		•
			SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, gray and yellowish tan, stiff to very stiff, moist,			4.25				\ \
5 -			residuum, CL	16		3.5			, p	
			SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, brownish tan and yellowish tan, very stiff, moist,	16	17	2.75	•			
		/	residuum, CL	23	20	4.5	•7			-
10 -	////		SANDY SILTY CLAY, 35% medium to fine sand, 65% fines, low plasticity, gray,							
			yellowish tan and red, very stiff, moist, residuum, CL							
		┞	BORING TERMINATED AT 10-FT		!				•	
15					•					
20 -										
25 -										
30										
35 -										
40										
COMP DATE:			DEPTH: 10 DEPTH TO WATERINITIAL: DEPTH TO WATERINAL: DRY TO 7-1	DRY T ON 10/21/13	OMI,Inc.	. 1	·1			

				OMI, in								
IOD N	0 - ^ -	,,,			Huntsville, AL				FW-E	1.40		
				P Water Mains	 ,	BORING:			LAA-E	<u> </u>		
JOB LO	OCAT		: Marshall County	, Alabama	BORING	LOCATIO	N:					
£.		S)			£	H B	ENT	Pp ■	(tsf)			
ОЕРТН, БТ	SYMBOL	SAMPLES	DESCRIPTION OF M	ATERIAL	BLOWS PER	NATORAL	POCKET PENT TSF	"N" valu	(tsf)	s/ft Å	4	1
DES	S	S			BLOW	22 05	POCI	WATER CO	онтент, — —	* - • 		LL
0 }	****		TOPSOIL				4.05	20) 4	0 _60	80	<u> </u>
	***//		SANDY SILTY CLAY with	oxide nodules.	12		4.25	1				
			35% medium to fine sand,	65% fines, low	14		2.5	<u>†</u>		7	ļ	
			plasticity, orangish red, sti	ff to very stiff,	14	26	2.25		•	<u>'</u>		
. 5			moist, residuum, CL		•••					1 1		
					16	26	2.25					
							0	\		``	`	
		\vdash	SANDY SILTY CLAY with	abundant oxide	24	28	4.5		7	-		` `•
10	///		nodules, 35% medium to f									
			fines, low plasticity, orangi									
		└	very stiff, moist, residuum BORING TERMINATED A									
			501(11/0) [[11/1/11/11/11/11/11/11/11/11/11/11/11/1									
15 -												
								:		1		
20												
								!				
25 -												
										İ		
30 -												
- 35 -												
- 40 -			····					<u> </u>	<u> </u>			
COMP DATE:			DEPTH: 10 DEPTH TO WAT 10/14/13 DEPTH TO WAT	ERINITIAL:	DRY FT ON 10/21/1:	OMI,Inc. Page 1 of	Ē 1					

			OMI, I	1C.							
IOP N	IO - 6-	750 IOD	5151 Research Drive, N.W.					EVA/ E	17		
			SE WTP Water Mains		F BORING: G LOCATIO						
JOB L	OCAT	ION:	Marshall County, Alabama	T BOKIN	GEOCATIO	·	<u> </u>				
DEPTH, FT	SYMBOL	DESC	CRIPTION OF MATERIAL	BLOWS PER FT	NATURAL	POCKET PENT TSF	Pp (t	s blows	· - •	+ 0 8	LL
0	7777	TOPSOIL		18	-	3.5	1		, <u>.</u>	•	
		SANDY SI fines, low	LTY CLAY, 30% fine sand, 70% plasticity, tan, very stiff, moist,			4.0					•
- 5 -			LTY CLAY, 30% fine sand, 70% plasticity, tan with red	25		4.0					
			very stiff, residuum, CL	26	21						
				26	23		1				
10		BORING T	ERMINATED AT 10-FT								
15 -											
20 -											
20											
25 -											
30 -											
- 35 -											
	,										
40 -											
COMP		N DEPTH: 10 10/14/13	DEPTH TO WATERINITIAL: DEPTH TO WATERFINAL: DRY TO	DRY 7-FT ON 10/21/	OMI,Inc.	£ 1	1				

			OMI, Inc	3 .							
JOB I	NO.: <u>6</u>	759	5151 Research Drive, N.W. JOB: SE WTP Water Mains	Huntsville, AL LOG OF				FW-	B-18		
JOB	OCAT	ION	N: Marshall County, Alabama	BORING	LOCATIO	N:					
DEPTH, FT	STABOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL	POCKET PENT TSF	WATER C	ues blom			LL 0
0	777	\vdash	TOPSOIL	10		4.5					
		\uparrow	SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, tannish brown, stiff,	16		1.5	1	T			
- 5 -		$\left\{ \left\{ \cdot \right\} \right\}$	moist, residuum, CL SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, tannish brown, very	15	20	2.0)			
			stiff, moist, residuum, CL SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, tan and black, stiff to	14	18	3.0	4				
10		$\int V$	very stiff, moist, residuum, CL	13	21	2.0		• 1	ſ		
			SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, yellowish tan, stiff,								
			moist, residuum, CL								
		-	BORING TERMINATED AT 10-FT								
15 -											
-											
20 -											
25 -											
				:							
30 -											
	Ì										
35 -											
40 -											
				DRY 1 10/21/13	OMI,inc.	1				<u>, </u>	

						OMI, In	C.								
					51 Research D		Huntsville								
JOB N	10.: <u>6</u> :	759	JOB: _	SI	E WTP Water N	Mains	LOG	OF I	BORING:			FW-	B-19_		
JOB L	OCAT	ION	l:	Marshall Co	ounty, Alabam	a	BOR	RING	LOCATIO	N:					
DEPTH, FT	SYMBOL	SAMPLES	DESCR	RIPTION O	F MATERI	AL	BLOWS PER FT		natural Moisture	POCKET PENT TSF	WATER C	ues blow	* - • 	3 4 +	LL
0	7777	\vdash	TOPSOIL				11			3.25	2	0 4	0 6	0 80	
		$\uparrow \setminus$	SANDY SILT	asticity, tar			18	-	·	4.5	7				—
- 5 -			residuum, C SANDY SIL ⁻ 30% sand, 7	TY CLAY v		•	20	ŀ	25	4.5		•			
			orange, red, residuum, C	and tan, v			17		23	3.0	1				
10			SANDY SIL ⁻ sand, 60% fi	nes, low p			17		28	4.0	•	•			I .
		1	∖ <u>moist, residu</u> BORING TE		D AT 10 E										
		İ	DOKING IE	KIVIINAIE	DAI IU-F	I									
	ļ														
15 -														!	
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20 -								•							
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35										:					
40 -												:			
COMP DATE:			EPTH: 10 10/18/13		WATERINITIAL WATERFINAL:		DRY FT ON 10/2	1/13	OMI,inc.	1			<u></u>		

			OMI, In	C.						
			5151 Research Drive, N.W.	Huntsville, AL						
JOB N	۷O.: <u>6</u>	759	JOB: SE WTP Water Mains	LOG OF	BORING:		FW	-B-20_		
JOB I	.OCA1	ΓΙΟΝ	l: Marshall County, Alabama	BORING	LOCATIO	N:		_		
DEPTB, FT	STMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER ET	NATURAL MOISTURE	POCKET PENT TSF	Pp (tsf) "N" values blo WATER CONTENT PL 20	* - •	3 4 +	LL O
0	777	1	TOPSOIL	4		N.S.		-	-	
			SANDY SILTY CLAY, 35% fine sand, 65% fines, low plasticity, brownish tan, soft to			4.0	\		1	•
- 5			stiff, moist, residuum, CL SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, yellowish tan, very	16	20	4.0	1		,	
_			stiff, moist, residuum, CL SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, tan, gray and black,	17	20	3.5			_	
- 10 -			very stiff, moist, residuum, CL BORING TERMINATED AT 10-FT	18	23	2.0	77			
			BORING TERMINATED AT 10-FT							
- 15 -										
			<u>.</u>							
					:					
- 20 -										
25										
- 30 -										
35										
40										
				DRY N 10/21/13	OMI,inc.	: 1	<u> </u>	. 	1	

l					OMI, In	c.								
				1 Research	Drive, N.W.	Huntsvil	le, AL	35805						
JOB NO.: <u>6</u>	759	JOB: _	SE	WTP Water	Mains	го	G OF I	BORING:			FW-E	3-21 __		
JOB LOCAT	TION:		Marshall Co	unty, Alabar	na	BC	RING	LOCATION	N:					
<u>a</u>	SAMPLES	DESCR	IPTION O	- MATER	NAL	BLOWS PER FT		NATURAL MOISTURE	POCKET PENT TSF		Les blow ONTENT,	• - • 	4 	LL
0 11/1/		OPSOIL				16	_		4.5	A				
	∄ fi	SANDY SILT nes, low pla	sticity, bro			16			3.5	<u> </u>			_ 🖍	
5 -	S fi	noist, residu SANDY SILT nes, low pla	Y CLAY, 2 sticity, bro			6	_	19	0.5					
	∄ s	noist, residu SANDY SILT nes, low pla	Y CLAY,			17		21	3.5				~ *	
10		esiduum, CL		y Othii, iiic	JIOL,	17		21	4.0	Ā			`	l
20 -		SORING TE	RMINATE	O AT 10-F	- T									
COMPLETIC	U DF	PTH: 10	DEPTH TO V	VATERINIT!	 AL:	DRY	-	OMI,Inc.				_	<u> </u>	
DATE:		0/18/13	DEPTH TO	VATERFINA	L: DRY TO 7		/21/13		1					

			OMI, Inc	C.						
				Huntsville, AL						
			JOB: SE WTP Water Mains		BORING:		FW	-B-22		
JOB	LOCA	ΓΙΟ	N: Marshall County, Alabama	BORING	LOCATIO	N:				
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL MOISTURE	POCKET PENT TSF	Pp (tsf) "N" values bl WATER CONTENT PL 20			LL 0
0	777	1	TOPSOIL	10		4.25				_
			SANDY SILTY CLAY with traces of gravel, 35% sand, 65% fines, low plasticity,	17		3.5	1		\	
- 5		7	orange and tan, stiff to very stiff, moist, residuum, CL SANDY SILTY CLAY, 30% sand, 70%	21	15	3.75	•		4	
			fines, low plasticity, orange and light gray to dark gray, very stiff, moist, residuum,	21	17	4.5				
- 10 -		7	SANDY SILTY CLAY, 30% sand, 70% fines, low plasticity, orange and tan, very	20	18	1.75		r		
			stiff, moist, residuum, CL							<u> </u>
-			BORING TERMINATED AT 10-FT							
- 15 -										
20 -										
25 -										
30 -										
0.5										
35 -										
-										
40 -										
COMP DATE:		N I		DRY N 10/21/13	OMI,Inc.	1	•			

					OMI, I								
JOB NO.: <u>6</u>	6759	JOB:		151 Researd SE WTP Wa	ch Drive, N.W. ter Mains			35805 BORING:			_FW-I	3-23_	 <u></u>
JOB LOCA	TION:		Marshall	County, Ala	oama	В.	ORING	LOCATIO	N:				
DEPTH, FT	SAMPLES	DESC	RIPTION	OF MATE	ERIAL	BLOWS PER FT		NATURAL MOISTURE	POCKET PENT TSF	"N" val WATER C	(tsf) 1 ues blow ONTENT,		4 LL 30
0 777	TC	PSOIL				8			4.25	A			 -
	🔏 fine	es, low p	TY CLAY			8		23	0.5	 	, — —		
5	SA		TY CLAY		nd, 70% d tan, stiff,	9		21	0.75	•			
			luum, CL		,,	14	ļ	19	0.5			/	
10	/ F I		TY CLAY		es of chert,	100)+	14	0.5	1			
	∐∖ora	inge and	tan, hard										
	CL		EMRINAT	ED AT 10	\	4							
-		KING II		EDALIC) - -								
15 -													
20 -													
25 -													
30 -													
35 -													
40 -													
COMPLETIC DATE:		H: <u>10</u> 8/13		WATERINI WATERFIN	TIAL: DRY TO	DRY 8-FT ON 16	0/21/13	OMI,inc. Page 1 of	1	L	L		1

				OMI, Inc.	1						
JOB N	NO.: <u>675</u>	59 JOB: _	5151 Research Driv SE WTP Water Ma	untsville, AL LOG OF	35805 BORING:		FW-	B-24_			
JOB I	OCATIO	ON:	Marshall County, Alabama		BORING	LOCATIO	N:				
DEPTH, FT	SYMBOL	DESCR	RIPTION OF MATERIA	L	BLOWS PER FT	natural Moisture	POCKET PENT TSF	Pp (tsf) "N" values blo WATER CONTENT, PL + 20		3 4 	
0 -		TOPSOIL			12		3.5	A	_	•	
		30% sand, 7	TY CLAY with traces of '0% fines, low plasticity stiff to very stiff, moist	/, tan	18		4.5				`
5 -		residuum, C		,	20	29	4.5			,	<u> </u>
		fines, low pla	TY CLAY, 35% sand, 6 asticity, orange and gra esiduum, CL		24	31	3.75			•	
		5till, 111010t, 1	oolaaam, oe		24	23	4.25	4			_
10 -		BORING TE	RMINATED AT 10-FT								
15 -											
20 -											
25 -											
										!	
30 -											
35 -											
40 -											
COMP	LETION	I DEPTH: 10 10/18/13	DEPTH TO WATERINITIAL:		RY ON 10/21/13	OMI,inc.	1	<u> </u>	1	1	

	OMI, Inc. 5151 Research Drive, N.W. Huntsville, AL 35805											
	5151 Research Drive, N.W. Huntsville, AL 35805 OB NO.: 6759 JOB: SE WTP Water Mains LOG OF BORING: FW-B-25											
JOB N	IO.: <u>67</u>	759 JOB: SE WTP Water Mains	LOG OF	BORING:		FW-	B-25					
JOB I	OCAT	ION: Marshall County, Alabama	BORING	LOCATIO	N:		<u>_</u>					
DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL MOI STURE	POCKET PENT TSF	Pp (tsf) 1 "N" values blo WATER CONTENT, PL +	* - • 		LL			
0	7777	TOPSOIL	8		2.0	20	10 60	80				
		SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, yellowish tan, stiff, moist, residuum, CL			2.5		L					
5 -		SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, red and tan, very stiff,	16	16	4.0				I			
		moist, residuum, ČL	23	23	3.0			.'				
10 -			26	23	3.0	<u>↓</u>	•					
20 - 25 - 30 - 35 - 40 -		BORING TERMINATED AT 10-FT										
COMP DATE:		N DEPTH: 10 DEPTH TO WATERINITIAL: DEPTH TO WATERFINAL: DRY TO 8-1	DRY T ON 10/21/13	OMI,Inc. Page 1 of	1							

			OMI, In	С.								
	5151 Research Drive, N.W. Huntsville, AL 35805 OB NO.: 6759 JOB: SE WTP Water Mains LOG OF BORING: FW-B-26											
JOB N	IO.: <u>67</u>											
JOB L	OCAT	ON: Marshall County	y, Alabama	BORING	LOCATION	N:						
DEPTB, FT	SYMBOL	DESCRIPTION OF N	1ATERIAL	BLOWS PER FT	NATORAL MOISTORE	POCKET PENT TSF	Pp (tsf) "N" values blow WATER CONTENT, PL ————————————————————————————————————		,—+ ₈	LL		
0		TOPSOIL		12		3.5		-				
		SANDY SILTY CLAY, 30% fines, low plasticity, tannis moist, residuum, CL				4.0	<u> </u>			ı		
5 -		SANDY SILTY CLAY, 30% fines, low plasticity, tan, ve		16	19	3.0	+					
		\residuum, CL SANDY SILTY CLAY, 30% fines, low plasticity, red ar		20	21	4.5) / /		
10 -		moist, residuum, CL		26	21	4.0	b \(\)			í		
20 - 25 - 30 - 40 -		BORING TERMINATED A										
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0	777	$\overline{}$	TOPSOIL	18		4.5	A			.#
			SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, tannish gray, very stiff, moist, residuum, CL		17	2.5	•	P		
- 5 -			moist, residuam, oc	20	20	2.5		•		
			SANDY SILTY CLAY, 30% fine sand, 70% fines, high plasticity, gray with tan inclusions, very stiff to hard, moist,	26	14	4.0	*			
10 -			residuum, CL	29	12	4.0	4)	.	<u> </u>	•
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		SANDY SILTY CLAY with trace amount chert, 30% fine sand, 70% fines, low plasticity, reddish tan, stiff to very stiff,	10		2.0				
5 -		moist, residuum, CL	21	21	2.5		•		
			17	15	2.5				
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5151 Research Drive, N.W. Huntsville, AL 35805 JOB NO.: 6759 JOB: SE WTP Water Mains LOG OF BORING: FW-B-29											
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0 7//	/ F `	TOPSOIL			8		2.0	A .	•		
			TY CLAY, 30% fine asticity, tannish browns.		10		2.0		<u></u>		
5	/]	SANDY SILT	TY CLAY, 25% fine asticity, tan, stiff to		16	31	1.5) /			
		moist, residu		·	9	34	1.0				
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0			TOPSOIL	12	13	3.0	9			j	
			SANDY SILTY CLAY, 35% fine sand, 65% fines, low plasticity, reddish tan, stiff,	8	17	1.5	4	P			
- 5			moist, FILL, CL SANDY SILTY CLAY, 25% fine sand, 75% fines, low plasticity, yellowish tan, stiff,	11	18	1.5	1		_		
			moist, residuum, CL SANDY SILTY CLAY, 30% fine sand, 70% fines, low plasticity, tan, very stiff to hard,	16	19	3.0	۸.		+)		
10			moist, residuum, CL	100+	18	2.0	+	\			
									<i> </i> 		
45		/		100+	14	2.5	•		7		
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JOB NO.:	6759	JOB: _	SE W	TP Water Mair	18	LOG	OF B	ORING:			FW-I	3-31 __		
JOB LOCA	TION	:	Marshall Coun	ty, Alabama		BOF	RING L	OCATION	N:					
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0 💥	\$	TOPSOIL				10		10	2.0	۹.				
		SANDY SILT fines, low pla FILL, CL				22		18	2.0		<u> </u>	•		
5 -		SANDY SILT 30% fine san				17		11	2.0	• 4	•	! \ \	-	
	AT 1	yellowish tan CL	ı, very stiff, m	noist, residi	uum,	18		15	2.5	•4			, , ,	
10	\mathcal{H}^{-}	SANDY SILT fines, high pl residuum, Cl	asticity, tan,			26		17	4.5	•	1			+
		, ooi aaa iii, oo						•						
15			<u>.</u>			25			4.5		<u>*</u>			
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оветн, гт	SYMBOL	0	IPTION OF MATE	RIAL	BLOWS PER FT	nrtural Moisture	POCKET PENT TSF	WATER C	ues blow ONTENT,		3 4 +	LL 0
0	777	TOPSOIL			14	21	2.5	A (•			
:		fines, low pla	TY CLAY, 30% fine asticity, grayish tan,		8	23	2.5	4	•			
5 -		very sun, mo	ist, residuum, CL		14	23	3.0		•		l	
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			SANDY SILT fines, low place very stiff, more	asticity, reddi	sh tan, stif		17		2.5	>		<u> </u>		
5 -			SANDY SILT fines, high pl	ΓΥ CLAY, 30	% fine san		11	25	2.0		• •	(ļ	
			very stiff, mo	oist, residuun	n, CH		20	25	2.5	\ 	,		_	
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0 🛠	***	TOPSOIL		9		2.5			0 6				
		SANDY SIL fines, low pl stiff, moist,		7		1.5	4						
- 5 -		fines, low pl	TY CLAY, 20% fine sand, 80% asticity, dark gray, firm to stiff,		23	1.0	1				_		
			uum, CL .TY CLAY, 30% fine sand, 70% plasticity, yellowish tan, stiff,	_ 16 p	24	1.5	1						
10		moist, resid	uum, CH	17	26	2.5	1	•	``•				
20 -		DOMING IL	ERMINATED AT 10-FT										
COMPLE			DEPTH TO WATERINITIAL:	DRY	OMI,Inc.					L			
DATE: _		10/19/13	DEPTH TO WATERFINAL: DRY TO 7	-FT ON 10/21/13	Page 1 of	1							

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	_	·	Huntsville, AL			P)4(P. 0.5				
		59 JOB: SE WTP Water Mains								
JOB L	OCAT	ON: Marshall County, Alabama	BORING	LOCATION	l:					
DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLOWS PER FT	NATURAL MOI STURE	POCKET PENT TSF	Pp ■ (tsf) 1 2 3 4 "N" values blows/ft ▲ WATER CONTENT, \$ - ● PL + + LL 20 40 60 80				
0	XXXX	TOPSOIL	10	21	4.0	A 9				
		SANDY SILTY CLAY, 35% fine sand, 65% fines, low plasticity, reddish tan, stiff,		21	2.0					
5 -		moist, FILL, CL SANDY SILTY CLAY, 25% fine sand, 75% fines, high plasticity, grayish tan, firm to	6	32	1.0					
		stiff, moist, residuum, CH	10	18	1.5					
10			12	24	1.5					
15		SANDY SILTY CLAY, 25% fine sand, 75% fines, high plasticity, grayish tan, very stiff,		24	2.0					
		moist, residuum, CH BORING TERMINATED AT 15-FT								
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COMP		N DEPTH: 15 DEPTH TO WATERINITIAL: 10/19/13 DEPTH TO WATERFINAL: DRY TO 9	DRY FT ON 10/21/13	OMI,Inc.	1	I have				

	OMI, Inc.									
5151 Research Drive, N.W. Huntsville, AL										
		759 JOB: SE WTP Water Mains		BORING:						
JOB L	OCAT	TON: Marshall County, Alabama	BORING	LOCATION	N:					
DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL	BLOMS PER FT	NATURAL MOISTURE	POCKET PENT TSF	Pp (tsf) 1 2 3 4 "N" values blows/ft A WATER CONTENT, \$ - 0 PL + + LL 20 40 60 80				
0		TOPSOIL	12	19	3.0	20 40 60 80				
		SANDY SILTY CLAY, 30% fine sand, 70 fines, high plasticity, tan, very stiff, moist	%	28	2.0					
- 5 -		residuum, CH	13	18	2.0					
		SANDY SILTY CLAY, 30% fine sand, 70 fines, high plasticity, yellowish tan, very	% 17	23	2.5	1 1 - 1				
10 -		stiff, moist, residuum, CH	22	24	3.0					
15			26	27	2.5	 				
20 -		BORING TERMINATED AT 15-FT								
40	, , , , , ,	AL DEDTIL AF DEDTIL TO HE TENNET A	DBY	OMU						
	COMPLETION DEPTH: 15 DEPTH TO WATERINITIAL: DRY OMI,Inc. DATE: 10/19/13 DEPTH TO WATERFINAL: DRY TO 8-FT ON 10/21/13 Page 1 of 1									

BORING LEGEND

SOIL SYMBOLS

MAJOR DIVISIONS					ROUP MBOLS	TYPICAL NAMES	
	SIEVE	COARSE D ON	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	NO. 200	GRAVELS MORE OF IN RETAINE #4 SIEVE	CLI	强盟	GP	POORLY GRADED GRAVELS AND GRAVEL—SAND MIXTURES, LITTLE OR NO FINES	
V SOILS	N _O	OR MC CTION *4	ELS 'H 3S		GM	SILTY GRAVELS, GRAVEL—SAND— SILT MIXTURES	
COARSE GRAIN SOILS	RETAINED	50% FR/	GRAVEL WITH FINES		GC	CLAYEY GRAVELS, GRAVEL— SAND—CLAY MIXTURES	
COARSI	50% RE	0% OF TION SIEVE	CLEAN		SW	WELL-GRADED SANDS AND GRAVELLY SANDS, LITTLE OR NO FINES	
	MORE THAN	SANDS THAN 50 SE FRAC] J &		SP	POORLY GRADED SANDS AND GRAVELLY SANDS, LITTLE OR NO FINES	
	MORE	ORE THE PASSES	ANDS WITH		SM	SILTY SANDS, SAND-SILT MIXTURES	
		≥ 000	SANDS WITH FINES		SC	CLAYEY SANDS, SAND-CLAY MIXTURES	
	SIEVE	AYS	S		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS	
S	200	TS AND CLAYS	50% OR LESS		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
FINE GRAIN SOILS	PASSES NO.	SILTS	50%		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
FINE GR	MORE PAS	CLAYS	4N 50%		мн	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS	
	OR MO	TS AND CLA	T. T.		СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	50% (SILTS	GREATER THAN		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY	
HIGHLY ORGANIC SOILS					PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS	
POCK SYMBOLS							

ABBREVIATIONS:

SS- SPLIT SPOON SAMPLE

UD- UNDISTURBED SAMPLE

REC-SAMPLE RECOVERY

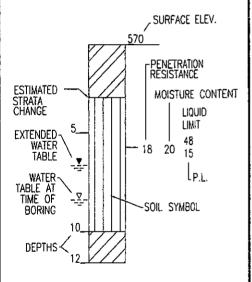
USC-VISUAL UNIFIED SOIL CLASSIFICATION

POCKET PENET- POCKET PENETROMETER READING, TSF

RQD-ROCK QUALITY DESIGNATION

FF- FRACTURE FREQUENCY
PER FOOT OF CORE

KEY TO BORING RECORDS OR PROFILES



ROCK SYMBOLS



SANDSTONE



SHALE



GNEISS OR SCHIST

0 0 d

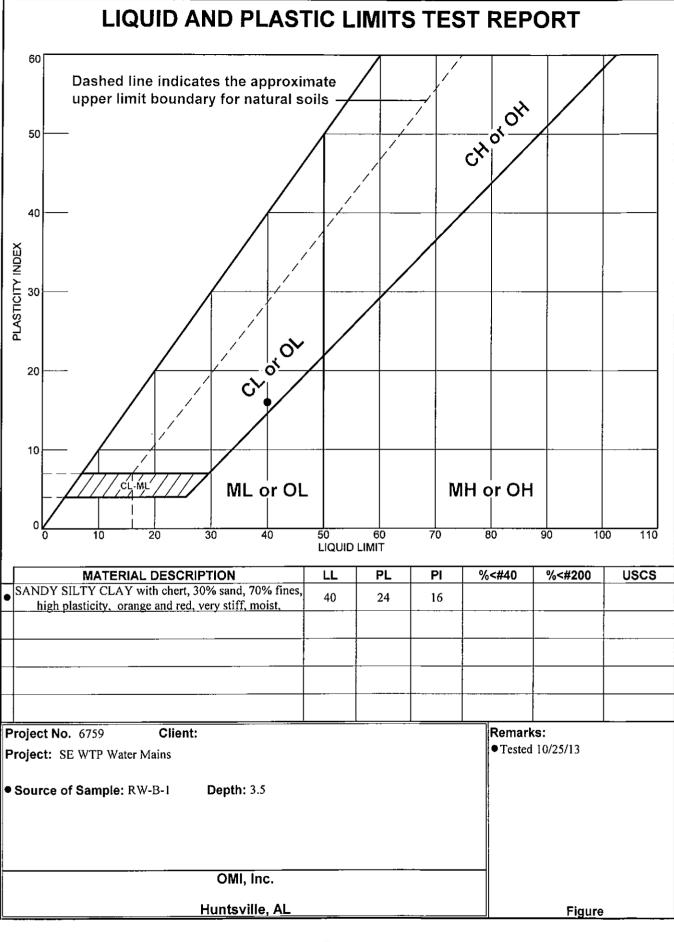
CONGLOMERATE

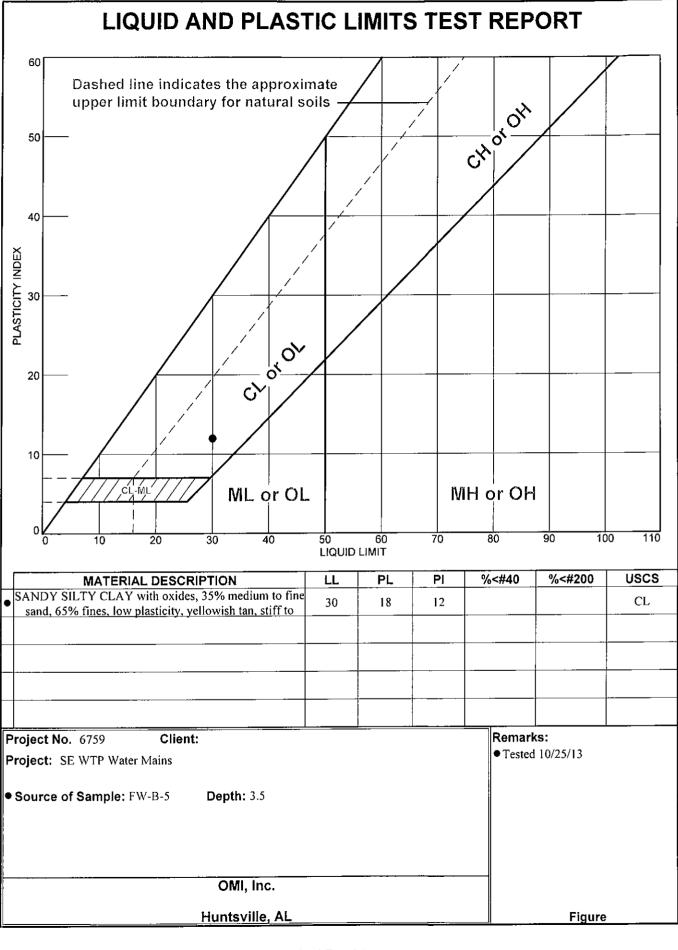


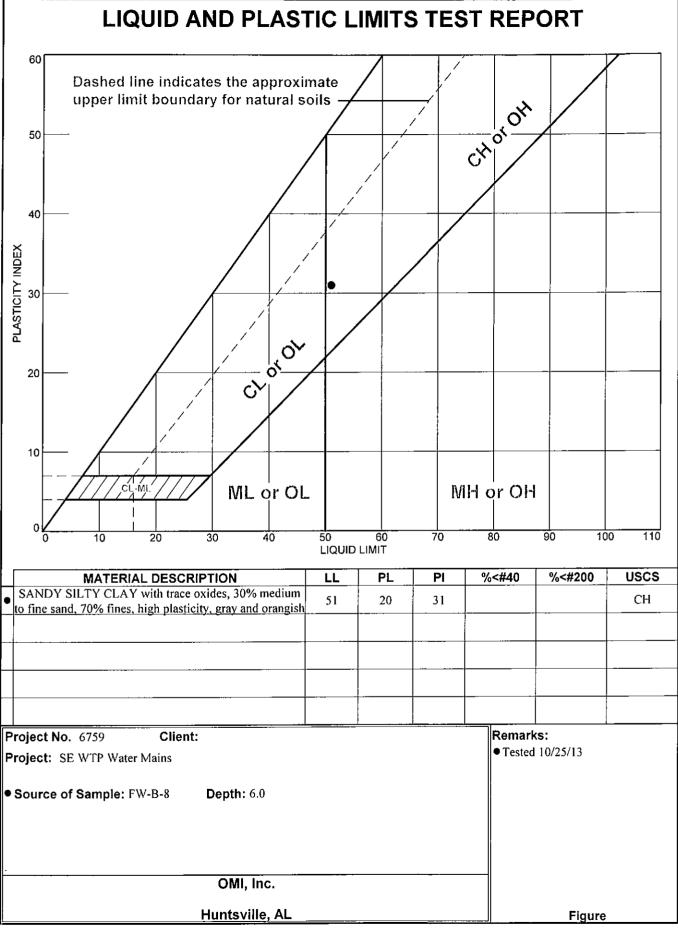
LIMESTONE OR DOLOMITE

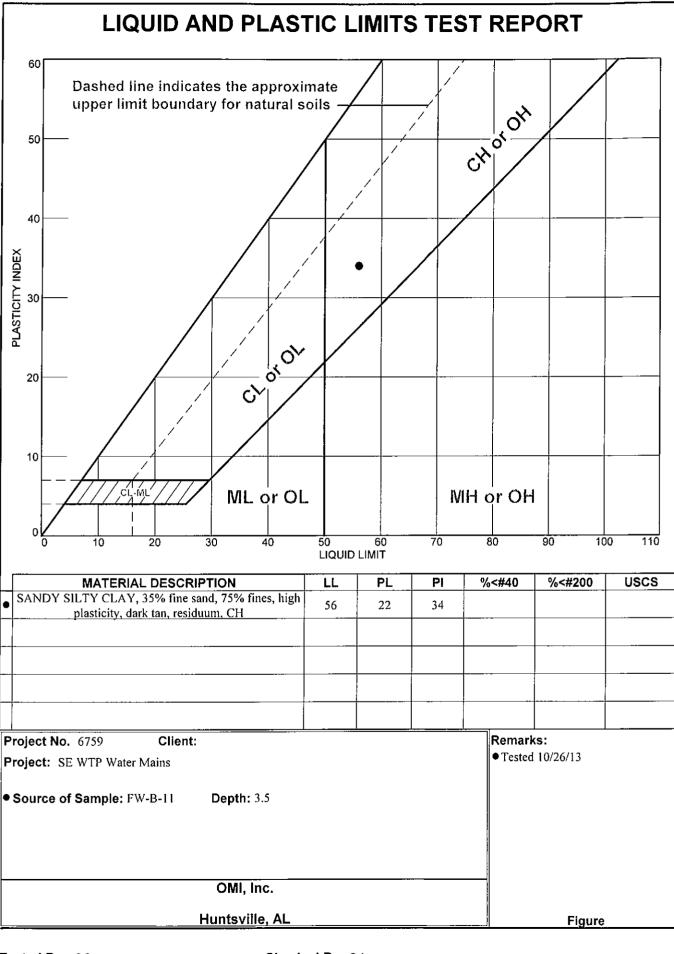
OMI,INC.

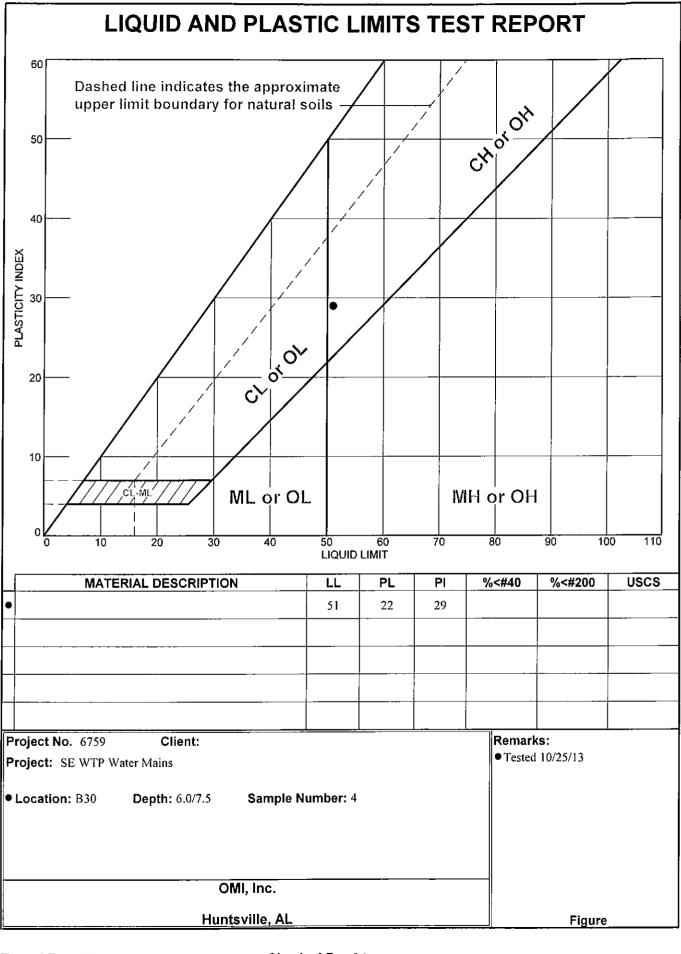
5151 Research Drive Huntsville, AL 35805

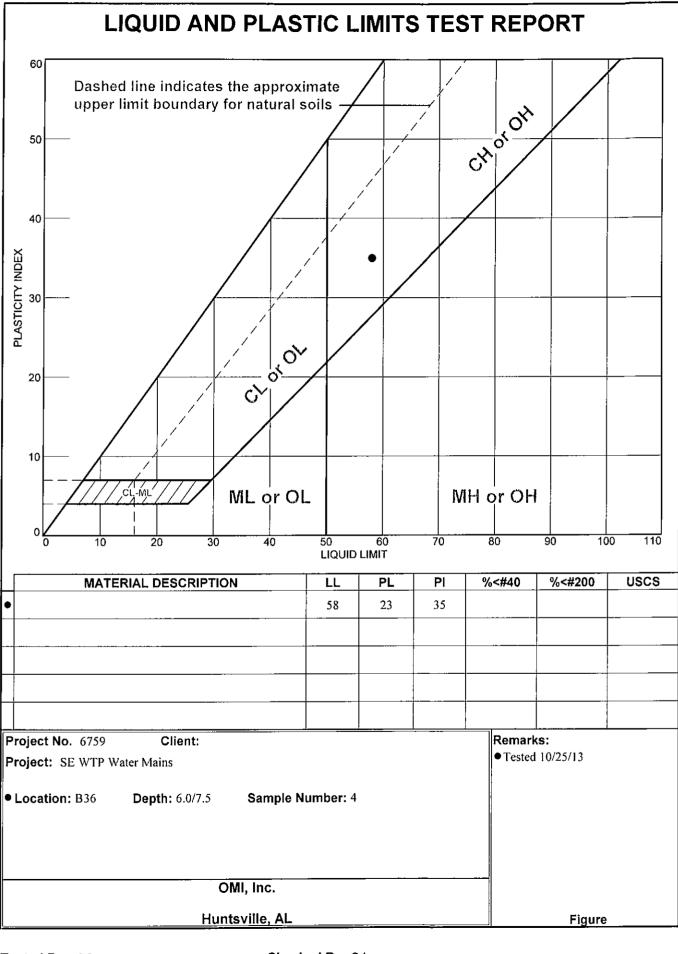












FIELD TEST PROCEDURES

OMI, Inc., generally follows field and laboratory testing procedures as outlined by the American Society for Testing and Materials (ASTM) and the U. S. Army Corps of Engineers. Field procedures are outlined and an overview description is provided in ASTM Standard D-420, "Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes." This document is a guide to the selection of various standards for investigating soil, rock, and ground water for earth related construction. Applicable procedures include geophysical, in-situ, and boring methods. A summary of each procedure used during this study is presented below.

SOIL DRILLING PROCEDURES

Several techniques are used to advance borings for collection of soil, rock, or ground water samples. Different techniques are used, depending on the samples desired and the soil and water conditions. Depths for sample intervals, strata changes, and boring termination or refusal are recorded to the nearest 1/10 of a foot. The project utilized the following.

Soil Borings

- A) Solid stem continuous flight augers (ASTM D-1452)
- B) Hollow stem continuous flight augers (ASTM D-1452)
- C) Rotary drilling techniques using roller cone bits or drag bits and water with or without drilling mud or other additives to flush the hole
- D) Hand augers
- E) Backhoes or other excavating equipment.

Rock Borings

- A) Core borings with diamond bits with double or triple core barrels (ASTM D-2113)
- B) Rock borings with roller cone bit
- C) Rotary hammer drilling.

Hollow and Solid Stem Auger: An auger is a center post with a continuous spiral flange wrapped around it. The post is called the stem. Augers are usually constructed in 5-foot long sections that can be coupled together. As the auger is turned and advanced into the ground; the soil "cuttings" are brought to the surface. Solid stem augers have a solid core and have to be removed from the boring to allow access for sampling tools. Hollow stem augers have the spiral flange connected to a hollow tube (stem). Sampling tools can access the bottom of the boring without removing the augers from the hole.

Rotary Borings: Rotary drilling involves the use of roller cone or drag type drill bits attached to the end of hollow drill rods. A flushing medium, normally water or bentonite slurry, is pumped through the rods to clear the cuttings from the bit face and flush them to the surface. Casing is sometimes set behind the advancing bit to prevent the hole from collapsing and to restrict the penetration of the drilling fluid into the surrounding soils. Cuttings returned to the surface by the drilling fluid are usually collected in a settling tank to allow the fluid to be re-circulated.

Hand Auger Borings: Hand auger borings are advanced by manually twisting a 4-inch diameter steel bucket auger into the ground and withdrawing it when filled to observe the sample collected. Other equipment such as post-hole diggers is sometimes used in lieu of augers to obtain shallow soil samples. Occasionally, these hand auger borings are used for driving 3-inch diameter steel tubes to obtain intact soil samples.

Test Pits: A backhoe or other construction equipment is sometimes used to excavate into soils to observe the soil and collect samples.

Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemented soil, weathered rock, coarse gravel or boulders, thin rock seams, or sound continuous rock. Material which cannot be penetrated by auger or rotary soil drilling methods at a reasonable rate is designated as "refusal material." Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D-2113 using a diamond bit fastened to the end of a hollow, double, or triple tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core is brought to the surface, recovery is measured, and the core is sequentially placed in boxes and transported to our laboratory for review and storage.

SAMPLING AND TESTING IN BOREHOLES

Several techniques are used to obtain samples and data in soils; however, the following methods were utilized in this project:

- A) Standard Penetration Testing
- B) Undisturbed Sampling
- C) Dynamic Cone Penetration Testing
- D) Pocket Penetrometer Testing
- E) Hand-Held Static Cone Penetrometer
- F) Water Level Readings.

These procedures are presented below. Any additional testing techniques employed during this exploration are contained in other sections of the Appendix.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples are obtained with a standard 2-inch diameter split tube or "split spoon" sampler connected to a drill rod. The sampler is first seated 6 inches to penetrate any loose cuttings then driven an additional 12 inches with blows of a 140 pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, defined in blows per foot (bpf). The split spoon sampler is designed to retain the soil penetrated so it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split spoon sample are placed in jars, sealed, and transported to the laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D-1586. The depths and N-values of standard penetration tests are shown on the Boring Records. Split spoon samples are suitable for visual observation and classification tests, but generally are not sufficiently intact for quantitative laboratory testing.

Undisturbed Sampling: Relatively undisturbed samples are obtained by pushing 3 inch outside diameter (OD), 30 inch long steel tubes with hydraulic pressure supplied by the drill rig into the soil at the desired sampling levels (ASTM Standard D-1587). These tubes are also known as Shelby tubes. Each tube, together with the encased soil, is removed from the ground, sealed, and transported to the laboratory. Locations and depths of undisturbed samples are shown on the Boring Records.

Dynamic Cone Penetrometer: The dynamic cone is a hand-operated penetrometer used in hand auger borings and observation pits. This test is intended to provide data that can be correlated to the standard penetration test. A 1.5-inch OD cone is seated to penetrate any loose cuttings, and then driven for 3 intervals of 1.75 inch with blows from a 15-pound weight falling 20 inches. The average number of blows required to drive the cone over 1 increment is an index to soil strength and compressibility.

Pocket Penetrometer Testing: The pocket penetrometer is a hand operated penetrometer used in test pits and on split spoon and undisturbed samples. This test is intended to provide data that can be correlated to the unconfined compressive strength test. A 1/4-in diameter shaft is pressed into the soil 1/4-in deep. The shaft pushes against a spring with a constant of 12 pounds per inch to provide a compressive strength value in tons per square foot. The penetrometer is capable of providing readings between 0.25 tons per square foot and 4.5 tons per square foot.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of the field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short-term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water level reported on the Boring Records is determined by field crews immediately after the drilling tools are removed, and again several hours after the borings are completed, if possible. The time lag is

intended to permit stabilization of the ground water table which may have been disrupted by the drilling operation.

Occasionally, the borings will cave in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Records.

BORING RECORDS

The subsurface conditions encountered during drilling are reported on a Boring Record. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of ground water. It also contains the driller's and the geotechnical engineer's interpretation of soil conditions between samples. Therefore, these boring records contain both factual and interpretative information. A geotechnical engineer visually classifies the soil samples and prepares the Boring Records which are the basis for all evaluations and recommendations.

LABORATORY TEST PROCEDURES

OMI, Inc., generally follows laboratory testing procedures as outlined by the American Society for Testing and Materials (ASTM), the U. S. Army Corps of Engineers, and other applicable procedures. All work is initiated and supervised by qualified engineers. Laboratory tests are performed by technicians trained to perform the work according to the appropriate procedures. The equipment is well maintained and inspected and calibrated annually or as specified by ASTM.

A description of the procedures used during this exploration or study are included in this Appendix.

SOIL CLASSIFICATION

Classification of soils provides a record and general guide to the engineering properties of the soils encountered during this study. Samples obtained during the field testing (drilling) operations are visually examined and classified by the geotechnical engineer. OMI, Inc., generally follows ASTM procedure No. D-2488 "Visual-Manual Procedure for Classifying Soils." Soil consistency and relative density is based on the number of blows from the standard penetration test. Representative or special samples are then selected for laboratory testing. Soil Boring Records are developed which present the data from the field testing as well as the soil description, water level information, and other data.

MOISTURE CONTENT

Moisture content values, when used in conjunction with other data, can be a useful and inexpensive tool to the engineer as an indicator of the engineering characteristics and parameters of the soil when compared to other data. Moisture content is performed by weighing a moist sample, drying, then re-weighing the dry sample. The moisture content is expressed as a percent of the dry weight of the soil. ASTM Method D-2216 is used to determine the moisture content of soil.

ATTERBERG LIMITS

Atterberg limits include the liquid limit (LL), plastic limit (PL), and shrinkage limit (SL) tests. These tests are performed to aid in the classification of soils and to determine the plasticity and volume change characteristics of the soil. The liquid limit is the minimum moisture content at which the soil will flow as a heavy viscous fluid. The plastic limit is the minimum moisture content at which the soil behaves as a plastic material. The shrinkage limit is the moisture content below which no further volume change will occur with continued drying. The plasticity index (Pl) is the difference between the liquid limit and the plastic limit. The PI is the range of moisture at which the soil remains plastic. Many engineering characteristics have been correlated to the Atterberg limits. These are ASTM procedures D-4318, D-4943, and D-427.

STANDARD PROCTOR COMPACTION TEST

This test is used to establish a curve that predicts the effect of moisture and compactive effort on the dry density of the soil sample. It is useful as a comparative value in monitoring contractors' efforts during fill placement and compaction during construction. Also, correlations of engineering parameters such as strength, compressibility, and permeability are related to the percent compaction and soil type.

A representative sample of the proposed fill material (soil or stone) is collected. The sample is divided into four or more samples. Each sample is then brought to a different moisture content about 2% apart. Each sample is then placed in a standard 4-inch diameter mold in 3 equal layers with each layer being compacted with 25 blows from a 5.5-pound hammer falling 12 inches. The sample is trimmed to a known volume of 1/30 cubic foot then weighed. The moisture content of the sample is determined and the dry density is calculated. A graph of dry density (pcf) versus moisture content is developed. The maximum density and its corresponding moisture content known as the optimum moisture content are derived from the curve. A graph of the moisture-density relationship is given in the Appendix. ASTM D-698 describes the procedure.

UNCONFINED COMPRESSION TESTS - ROCK CORES

The strength of rock is important in many engineering applications. This strength is usually desired and reported as the unconfined or simple shear strength. Selected samples of rock cores are cut using a diamond saw. The cores are usually cut to a length equal to about twice the core diameter. The capped length and diameter of each core is measured and recorded. The cores are then loaded to failure in a compression machine. The unconfined compressive strength is calculated by dividing the cross-sectional area of the core

into the maximum load required to crush the sample. If the length to diameter ratio is less than 2.0, then the maximum strength is adjusted mathematically. The results are reported in psi. This procedure is similar to ASTM D-2938.

CONSOLIDATION TESTING

The consolidation test provides data for estimating the settlement and time rate of settlement of the soil in response to the applied loads. Representative soil samples are collected from undisturbed samples, trimmed into a disk about 2.5 inches in diameter and 1 inch thick, then placed in the consolidometer. The disk is confined in a brass ring and sandwiched by porous stones on the top and bottom. The sample ring and stones are placed in a testing device, inundated, then loaded in increments. The sample height is measured as each load caused it to compress. The resulting loads and deformations are reduced to a graph which is presented in the Appendix. These results may be presented in load versus percent strain or load versus void ration. This procedure is described in ASTM D-2435.