

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT



SUBSURFACE INVESTIGATION

STATE JOB NO. 090342

FEDERAL AID PROJECT NO. NHPP-0045(24)

MILL CREEK STR. & APPRS. (S)

STATE HIGHWAY 14 SECTION 3

IN MARION COUNTY

LETTING OF SEPTEMBER 21, 2016

The information contained herein was obtained by the Department for design and estimating purposes only. It is being furnished with the express understanding that said information does not constitute a part of the Proposal or Contract and represents only the best knowledge of the Department as to the location, character and depth of the materials encountered. The information is only included and made available so that bidders may have access to subsurface information obtained by the Department and is not intended to be a substitute for personal investigation, interpretation and judgment of the bidder. The bidder should be cognizant of the possibility that conditions affecting the cost and/or quantities of work to be performed may differ from those indicated herein.

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

March 20, 2014

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 090342
Mill Creek Str. & Apprs. (S)
Route 14 Section 3
Marion County

Transmitted herewith is the requested Soil Survey, Strength Data and Resilient Modulus test results for the above referenced job. The project consists of replacing the existing bridge crossing Mill Creek on Highway 14 on new location. Samples were obtained in the travel lanes, ditch line and along the new alignment. Locations were measured from centerline of construction and should be noted as such on the logs.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of sandy clay with varying amounts of dolomite fragments. Isolated locations of highly plastic clay were encountered within the project limits. Subgrade soils are expected to provide a stable working platform with conventional processing if the weather is favorable during construction. Rock was encountered at stations 901+00 23 feet left of centerline at a depth of 2.5 feet, and at 913+00 10 feet right of centerline at a depth of 3.2 feet.


Cut slope recommendations will be made after the subsurface investigation has been completed.

Between stations 917+00 to 918+00 is a proposed embankment of approximately 35 feet in height. Based on current cross-sections the toe of the slope will encroach into Mill Creek. It is recommended that the embankment be constructed using material meeting the Rock Fill Special Provision dated 2/27/2014. These slopes can be constructed utilizing a 1.5:1 slope configuration. The remaining embankments may be constructed with locally available unspecified material using a 3:1 slope configuration.

Listed below is the additional information requested for use in developing the plans:

1. The Qualified Products List (QPL) indicates that Aggregate Base Course (Class CL-7) is available from commercial producers located in the vicinity of Mountain Home.
2. Asphalt Concrete Hot Mix

<u>Type</u>	<u>Asphalt Cement %</u>	<u>Mineral Aggregate %</u>
Surface Course	5.3	94.7
Binder Course	4.2	95.8
Base Course	4.0	96.0


Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. – Master File Copy
District 9 Engineer
Transportation Planning and Policy Div.
G. C. File

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION
MICHAEL BENSON, MATERIALS ENGINEER
*** SOIL SURVEY STRENGTH TEST REPORT ***

DATE - 03/13/2014
JOB NUMBER - 090342

SEQUENCE NO. - 1
MATERIAL CODE - SSRVPS
SPEC. YEAR - 2003
SUPPLIER ID. - 1
COUNTY/STATE - 45
DISTRICT NO. - 09

JOB NAME - MILL CREEK STR. & APPRS. (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB 8

RESILIENT MOCULUS
STA. 913+00 8708

REMARKS -

-
AASHTO TESTS : T190

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

**AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED SAMPLES**

Job No.	090342	Material Code	SSRVPS
Date Sampled:	3/11/14	Station No.:	913+00
Date Tested:	March 11, 2014	Location:	10'RT
Name of Project:	MILL CREEK STR. & APPRS.(S)		
County:	Code: 45	Name: MARION	
Sampled By:	FAULKNER	Depth:	0-5
Lab No.:	20140595	AASHTO Class:	A-6(7)
Sample ID:	RV204	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.97
Middle	3.97
Bottom	3.98
Average	3.97
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.03
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.03
Initial Area, Ao (sq. in):	12.33
Initial Volume, AoLo (cu. in):	99.02

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3244.80
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4. Soil Properties:

Optimum Moisture Content (%):	13.8
Maximum Dry Density (pcf):	111.2
95% of MDD (pcf):	105.6
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3244.80
Compaction Moisture content (%):	13.8
Compaction Wet Density (pcf):	124.86
Compaction Dry Density (pcf):	109.72
Moisture Content After Mr Test (%):	13.5

6. Quick Shear Test (Y=Yes, N=No, N/A=Not Applicable):

#VALUE!

7. Resilient Modulus, Mr:

10315(Sc)^{-0.20870}(S3)^{0.36523}

8. Comments

9. Tested By:

DEB _____

Date: March 11, 2014 _____

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

**AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED SAMPLES**

Job No. 090342 **Material Code** SSRVPS
Date Sampled: 3/11/14 **Station No.:** 913+00
Date Tested: March 11, 2014 **Location:** 10'RT
Name of Project: MILL CREEK STR. & APPRS.(S)
County: Code: 45 **Name:** MARION
Sampled By: FAULKNER **Depth:** 0-5
Lab No.: 20140595 **AASHTO Class:** A-6(7)
Sample ID: RV204 **Material Type (1 or 2):** 2
LATITUDE: **LONGITUDE:**

PARAMETER	Chamber Confining Pressure	Nominal Axial Stress	Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVD1 and 2	Resilient Strain	Resilient Modulus
	S ₃ psi	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.3	22.6	2.6	2.0	1.8	0.2	0.00083	0.00010	17,785
Sequence 2	6.0	4.0	47.5	44.9	2.6	3.9	3.6	0.2	0.00179	0.00022	16,333
Sequence 3	6.0	6.0	70.3	66.7	3.6	5.7	5.4	0.3	0.00291	0.00036	14,925
Sequence 4	6.0	8.0	93.8	87.6	6.2	7.6	7.1	0.5	0.00433	0.00054	13,168
Sequence 5	6.0	10.0	116.5	107.8	8.7	9.4	8.7	0.7	0.00594	0.00074	11,820
Sequence 6	4.0	2.0	25.2	22.4	2.8	2.0	1.8	0.2	0.00102	0.00013	14,285
Sequence 7	4.0	4.0	47.0	44.2	2.8	3.8	3.6	0.2	0.00222	0.00028	12,986
Sequence 8	4.0	6.0	68.4	65.6	2.8	5.5	5.3	0.2	0.00358	0.00045	11,948
Sequence 9	4.0	8.0	91.7	86.4	5.3	7.4	7.0	0.4	0.00506	0.00063	11,115
Sequence 10	4.0	10.0	115.0	107.3	7.8	9.3	8.7	0.6	0.00671	0.00084	10,414
Sequence 11	2.0	2.0	25.0	22.3	2.7	2.0	1.8	0.2	0.00128	0.00016	11,379
Sequence 12	2.0	4.0	46.3	43.5	2.7	3.8	3.5	0.2	0.00273	0.00034	10,388
Sequence 13	2.0	6.0	67.0	64.3	2.7	5.4	5.2	0.2	0.00436	0.00054	9,606
Sequence 14	2.0	8.0	88.9	84.5	4.4	7.2	6.9	0.4	0.00604	0.00075	9,111
Sequence 15	2.0	10.0	111.5	104.6	6.9	9.0	8.5	0.6	0.00782	0.00097	8,708

TESTED BY _____ **DATE** March 11, 2014
REVIEWED BY _____ **DATE** _____

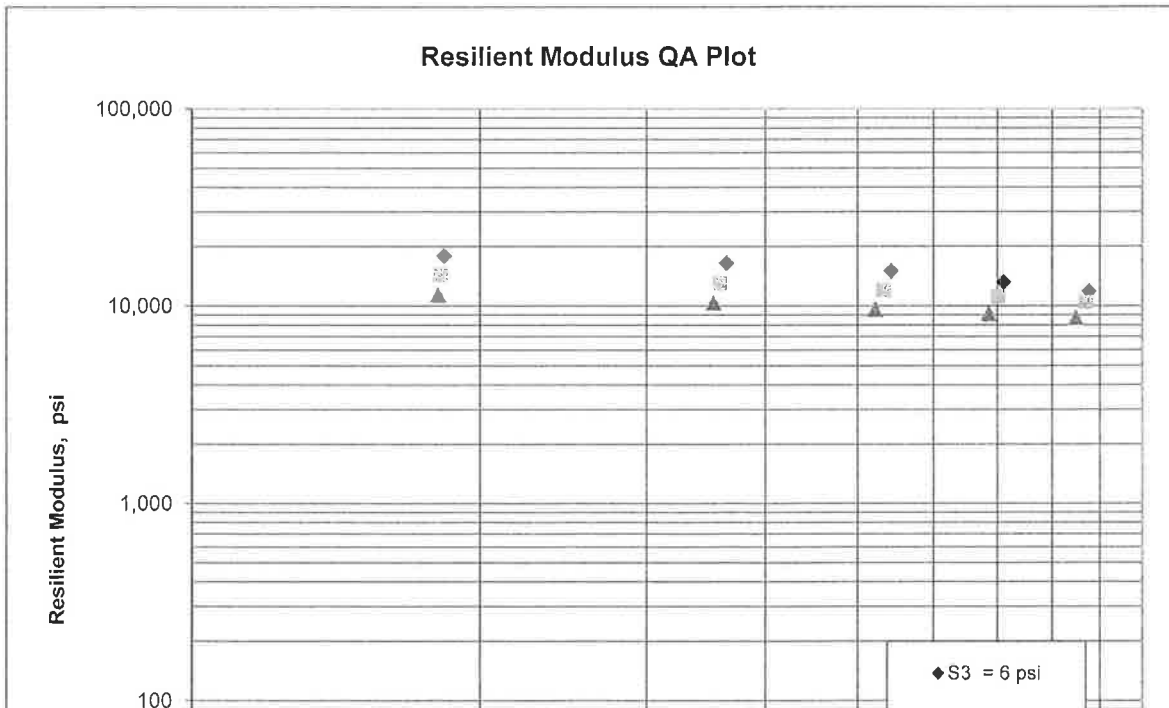
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

**AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES**

Job No.	090342	Material Code	SSRVPS
Date Sampled:	3/11/14	Station No.:	913+00
Date Tested:	March 11, 2014	Location:	10'RT
Name of Project:	MILL CREEK STR. & APPRS.(S)		
County:	Code: 45	Name:	MARION
Sampled By:	FAULKNER	Depth:	0-5
Lab No.:	20140595	AASHTO Class:	A-6(7)
Sample ID:	RV204	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

$$M_R = K_1 (S_c)^{K_2} (S_3)^{K_5}$$

$K_1 = 10,315$
 $K_2 = -0.20870$
 $K_5 = 0.36523$
 $R^2 = 0.96$



JOB: 090342

Arkansas State Highway Transportation Department

JOB NAME: MILL CREEK STR. & APPRS. (S)

Materials Division

COUNTY NO. 45 DATE TESTED 3/10/2014

Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR	#4	#10	#40	#80	#200	L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				S	I	E	V	E					
913+00	10t	0-3.2Z	BROWN	95	93	83	73	63	29	14	A-6(7)	RV204	
901+00	05lt	0-5	BR/GR	83	71	61	51	45	29	15	A-6(3)	S199	20.5
901+00	08lt	0-5	BR/GR	93	84	71	60	53	23	7	A-4(1)	S200	16.8
901+00	23lt	0-2.5Z	BR/GR	99	93	93	85	80	49	31	A-7-6(25)	S201	20.9
913+00	10t	0-5	BROWN	100	99	97	75	72	23	10	A-4(4)	S202	20.7
917+00	06t	0-5	BROWN	96	88	76	65	63	17	4	A-4(0)	S203	8

comments: LOCATIONS MEASURED FROM CENTERLINE OF EXISTING ROADWAY
Z=AUGER REFUSAL, W=MULTIPLE LAYERS

Thursday, March 13, 2014

PAVEMENT SOUNDINGS

STA.#	LOC.	ACHMSC	8.5W	ACHMSC	AGG.BASE CRS.CL-7	6
901+00	05lt	ACHMSC	8.5W	ACHMSC	AGG.BASE CRS.CL-7	6
901+00	08lt	ACHMSC	2.5	ACHMSC	AGG.BASE CRS.CL-7	10
901+00	23lt	ACHMSC	---	ACHMSC	AGG.BASE CRS.CL-7	---
913+00	10rt	ACHMSC	---	ACHMSC	AGG.BASE CRS.CL-7	---
917+00	06rt	ACHMSC	7.25W	ACHMSC	AGG.BASE CRS.CL-7	6

comments: LOCATIONS MEASURED FROM CENTERLINE OF EXISTING ROADWAY
 Z=AUGER REFUSAL, W=MULTIPLE LAYERS

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE - 03/13/14	SEQUENCE NO. - 1
JOB NUMBER - 090342	MATERIAL CODE - SSRVPS
FEDERAL AID NO. - TO BE ASSIGNED	SPEC. YEAR - 2003
PURPOSE - SOIL SURVEY SAMPLE	SUPPLIER ID. - 1
SPEC. REMARKS - NO SPECIFICATION CHECK	COUNTY/STATE - 45
SUPPLIER NAME - STATE	DISTRICT NO. - 09
NAME OF PROJECT - MILL CREEK STR. & APPRS. (S)	
PROJECT ENGINEER - NOT APPLICABLE	
PIT/QUARRY - ARKANSAS	
LOCATION - MARION COUNTY	DATE SAMPLED - 02/20/14
SAMPLED BY - FAULKNER/BOUGHNER	DATE RECEIVED - 02/21/14
SAMPLE FROM - TEST HOLE	DATE TESTED - 03/10/14
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS	

LAB NUMBER	-	20140590	-	20140591	-	20140592
SAMPLE ID	-	S199	-	S200	-	S201
TEST STATUS	-	INFORMATION ONLY	-	INFORMATION ONLY	-	INFORMATION ONLY
STATION	-	901+00	-	901+00	-	901+00
LOCATION	-	051t	-	081t	-	231t
DEPTH IN FEET	-	0-5	-	0-5	-	0-2.5Z
MAT'L COLOR	-	BR/GR	-	BR/GR	-	BR/GR
MAT'L TYPE	-	-	-	-	-	-
LATITUDE DEG-MIN-SEC	-	36 11 24.40	-	36 11 24.40	-	36 11 24.30
LONGITUDE DEG-MIN-SEC	-	92 40 40.70	-	92 40 40.80	-	92 40 40.90
% PASSING						
	2	IN.	-		-	
	1 1/2	IN.	-		-	
	3/4	IN.	-	100	-	
	3/8	IN.	-	98	-	100
	NO. 4		-	83	-	99
	NO. 10		-	71	-	98
	NO. 40		-	61	-	95
	NO. 80		-	51	-	85
	NO. 200		-	45	-	80
LIQUID LIMIT	-	29	-	23	-	49
PLASTICITY INDEX	-	15	-	7	-	31
AASHTO SOIL	-	A-6(3)	-	A-4(1)	-	A-7-6(25)
UNIFIED SOIL	-	-	-	-	-	-
% MOISTURE CONTENT	-	20.5	-	16.8	-	20.9
ACHMSC	(IN)	8.5W	-	2.5	-	----
AGG. BASE CRS. CL-7	(IN)	6	-	10	-	----
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-

REMARKS - LOCATIONS MEASURED FROM CENTERLINE OF EXISTING ROADWAY
- Z=AUGER REFUSAL, W=MULTIPLE LAYERS

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE	- 03/10/14	SEQUENCE NO.	- 2
JOB NUMBER	- 090342	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2003
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 45
SUPPLIER NAME	- STATE	DISTRICT NO.	- 09
NAME OF PROJECT	- MILL CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MARION COUNTY	DATE SAMPLED	- 02/20/14
SAMPLED BY	- FAULKNER/BOUGHNER	DATE RECEIVED	- 02/21/14
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/10/14
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20140593	- 20140594	-
SAMPLE ID	- S202	- S203	-
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	-
STATION	- 913+00	- 917+00	-
LOCATION	- 10rt	- 06rt	-
DEPTH IN FEET	- 0-5	- 0-5	-
MAT'L COLOR	- BROWN	- BROWN	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 36 11 35.50	- 36 11 37.30	-
LONGITUDE DEG-MIN-SEC	- 92 40 43.90	- 92 40 39.60	-
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	- 100	-
	3/8 IN.	- 99	-
	NO. 4	- 96	-
	NO. 10	- 88	-
	NO. 40	- 75	-
	NO. 80	- 68	-
	NO. 200	- 63	-
LIQUID LIMIT	- 23	- 17	-
PLASTICITY INDEX	- 10	- 4	-
AASHTO SOIL	- A-4 (4)	- A-4 (0)	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 20.7	- 8.0	-
AACHMSC	(IN) - ----	- 7.25W	-
AGG. BASE CRS. CL-7	(IN) - ----	- 6	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
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	-	-	-
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	-	-	-
	-	-	-
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	-	-	-

REMARKS - LOCATIONS MEASURED FROM CENTERLINE OF EXISTING ROADWAY
- Z=AUGER REFUSAL, W=MULTIPLE LAYERS

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE	- 03/10/14	SEQUENCE NO.	- 1
JOB NUMBER	- 090342	MATERIAL CODE	- RV
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2003
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 45
SUPPLIER NAME	- STATE	DISTRICT NO.	- 09
NAME OF PROJECT	- MILL CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS	DATE SAMPLED	- 02/20/14
LOCATION	- MARION COUNTY	DATE RECEIVED	- 02/21/14
SAMPLED BY	- FAULKNER/BOUGHNER	DATE TESTED	- 03/10/14
SAMPLE FROM	- TEST HOLE		
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	-	20140595	-	-
SAMPLE ID	-	RV204	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	913+00	-	-
LOCATION	-	10rt	-	-
DEPTH IN FEET	-	0-3.2Z	-	-
MAT'L COLOR	-	BROWN	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	36 11 35.50	-	-
LONGITUDE DEG-MIN-SEC	-	92 40 43.90	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	-	100
	3/8	IN.	-	97
	NO. 4		-	95
	NO. 10		-	93
	NO. 40		-	88
	NO. 80		-	74
	NO. 200		-	69
LIQUID LIMIT	-	29	-	-
PLASTICITY INDEX	-	14	-	-
AASHTO SOIL	-	A-6(7)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS - LOCATIONS MEASURED FROM CENTERLINE OF EXISTING ROADWAY
- Z=AUGER REFUSAL, W=MULTIPLE LAYERS