ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. 012326

FEDERAL AID PROJECT NO. ACSTPF-0472(10)

HWY. 412 – HWY. 112 (SPRINGDALE BYPASS) (F)

STATE HIGHWAY 612 **SECTION** 1 & 2

IN BENTON & WASHINGTON **COUNTY**

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 DEPARTMENT OF TRANSPORTATION
ArDOT.gov | IDriveArkansas.com | Lorie H. Tudor, P.E., Director
MATERIALS DIVISION
11301 West Baseline Road | P.O. Box 2261 | Little Rock, AR 72203-2261 | Phone: 501.569.2185 | Fax: 501.569.2368

February 6, 2023

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 012326
Hwy. 412 – Hwy. 112 (Springdale Bypass) (S)
Route 612 Section 1
Washington County

This report is to provide supplemental information to the original subsurface investigation for Brush Creek Bridge coordinated by Garver Engineering. The planned bridge has been extended by 240 feet to meet hydraulic requirements. This investigation provides information for the additional length. Foundation recommendations were not requested, only the verification of subsurface conditions and confirmation of the suitability of spread footings.

A subsurface investigation was requested on August 16, 2022 by Bridge Division to verify subsurface conditions shown on the proposed bridge plans. The results of field investigation are presented in Attachment A. These include a Plan of Borings showing the boring locations, boring logs, a legend interpreting the boring logs, and rock core pictures from the borings.

The laboratory test results of uniaxial compressive tests on rock cores are presented in Attachment B. Geological Strength Index (GSI) and Rock Mass Rating (RMR) of the rock cores, as evaluated by licensed Professional Geologists, are also included in Attachment B. Selected pictures of the job site are included as Attachment C.

The project alignment is located in the mapped outcrop of the Boone Formation. The Boone Formation consists of gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. Some sections may be predominantly limestone or chert. The cherts are dark in color in the lower part of the sequence and light in the upper part. The quantity of chert varies considerably both vertically and horizontally. The Boone Formation is well known for dissolutional features, such as sinkholes, caves, and enlarged fissures; however, none were encountered at the job site. The thickness of the Boone Formation is 300 to 350 feet in most of northern Arkansas, but as much as 390 feet has been reported.

A regolith of unconsolidated rock material forms a mantle over the Boone at various localities. This regolith is comprised of a sequence of thin to thick intervals of chert and cherty beds of clay and is created by the weathering of the Boone Formation. The clay is typically red to red-orange in color, while the chert is predominately white in color. Most of the weathered clay of the regolith exhibits relict bedding interbedded with beds of white chert and cherty fragments. The regolith varies in thickness, but can be up to 40 feet thick in some areas.

At the job site, rock was encountered at depths ranging from 5.1 to 9.1 feet below ground level. The soil overlying the rock may be regolith as described above. The rock encountered in borings consists primarily of calcareous chert with some limestone. Chert can be a very abrasive rock.

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To aid in visualizing subsurface conditions, a generalized subsurface profile is included in Attachment D. Due to the natural variations in stratigraphy and subsurface conditions, slight deviation from those illustrated on the profile should be anticipated.

Based on the average subsurface conditions as revealed by the borings, a **Seismic Site Class B (Rock Profile)** is calculated for the project site. Utilizing the Seismic Site Class B and the approximate GPS coordinates of the project site, the following design peak ground acceleration coefficient (A_S), design short-period spectral acceleration coefficient (S_{DS}), as well as design long-period spectral acceleration coefficient (S_{D1}), are determined. These seismic coefficients are summarized in Table 1. Design Response Spectrum is presented in Attachment E.

Table 1: Summary of Design Ground Motion Acceleration Response Coefficients

Design Acceleration Coefficient	Value, g
A_S (Site PGA)	0.05
S_{DS} (0.2 sec)	0.119
S_{D1} (1 sec)	0.051

For the design long-period spectral acceleration coefficient (S_{D1}) of 0.051, a **Seismic Performance Zone 1** is considered applicable to the project site.

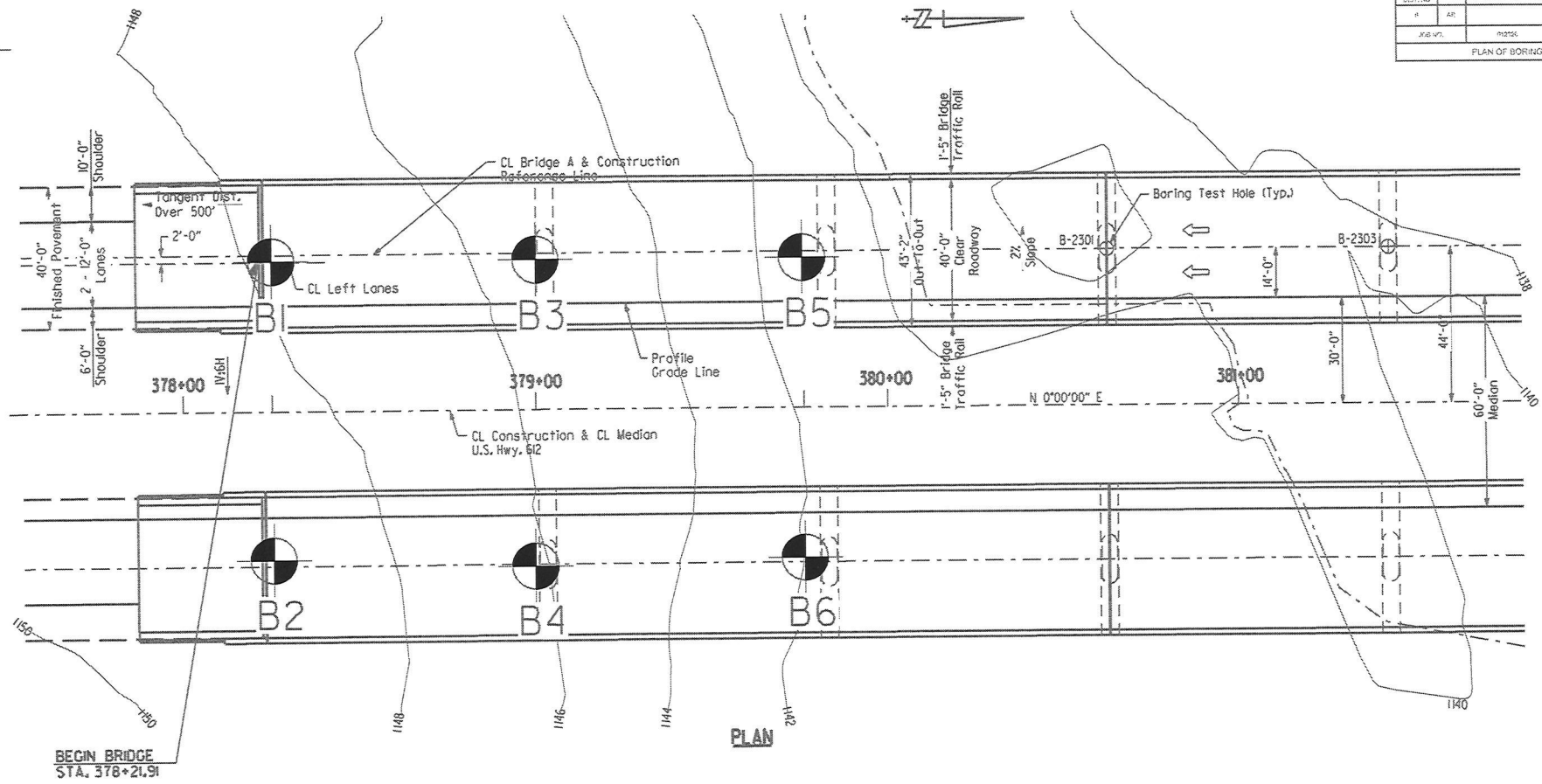
Based on the results of the borings, spread footing embedded in competent rock (zone 3 of the subsurface profile, Attachment D) are suitable to support the foundation loads of Bents 1 through 3. Steel H piles driven to refusal is suitable at Bent 1. Pre-boring to achieve minimum tip elevations should be expected.

Paul Tinsley
Materials Engineer

RPT:yz:mlg:bjj
cc: State Construction Engineer
District 4 Engineer
District 9 Engineer
G. C. File

Attachment A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
8	AR.			
JOB NO.	012326			
PLAN OF BORINGS				



BRUSH CREEK			
BORING	STATION	OFFSET	ELEVATION
B1	378+25	44 LT	
B2	378+25	44 RT	
B3	379+00	44 LT	
B4	379+00	44 RT	
B5	379+75	44 LT	
B6	379+75	44 RT	

PLAN OF BORINGS

HWY. 412 - HWY. 112 (SPRINGDALE BYPAS) (S)
ROUTE 612, SECTION 1
WASHINGTON COUNTY
FED. AID PROJECT

JOB NO. 012326 | SHEET 1/1

SCALE: 1"=20'

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 1
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 378+25
LOCATION: 44' Left of Construction Centerline
LOGGED BY: Don McCollum and Stanley Bates

DATE: November 28, 2022
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 19

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1151.5	SOIL GROUP	MOISTURE CONTENT (%) PL 10 20 30 40 50 60 70 LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Medium Dense, Reddish Brown Clayey Gravel with Sand		•		7 12-7		
			Moist, Very Hard, Reddish Brown Gravelly Clay with Sand		•		30 (1")		
			CHERT - Highly Weathered to Weathered, Moderately Hard, Light Gray					46	24
10			CHERT WITH OCCASIONAL LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					97	66
			LIMESTONE - Unweathered, Moderately Hard, Gray						
15			CHERT WITH OCCASIONAL LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					100	82
20			Boring Terminated						
25									
30									
35									

REMARKS: 36.206570, -94.251572

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 2
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 378+25
LOCATION: 44' Right of Construction Centerline
LOGGED BY: Don McCollum and Stanley Bates

DATE: November 29, 2022
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 19.1

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1149.0	SOIL GROUP	MOISTURE CONTENT (%) PL — LL (10 20 30 40 50 60 70)	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Medium Dense, Reddish Brown Clayey Gravel with Sand		•		7 11-10		
			Moist, Very Dense, Reddish Brown Clayey Gravel with Sand		•		9 35 (4")		
			CHERT - Highly Weathered, Moderately Hard to Hard, Light Gray					34	0
10			LIMESTONE - Slightly Weathered, Moderately Hard, Gray						
			CHERT WITH FREQUENT LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					97	90
15			LIMESTONE - Slightly Weathered, Moderately Hard, Gray						
			CHERT WITH FREQUENT LIMESTONE LAYERS - Unweathered, Moderately Hard to Hard, Light Gray					100	70
20			CHERT - Unweathered, Hard, Light Gray Boring Terminated						
25									
30									
35									

REMARKS: 36.206586, -94.251309

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 3
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 379+00
LOCATION: 44 Left of Construction Centerline
LOGGED BY: Don McCollum

DATE: November 30, 2022
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 19

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1145.4	SOIL GROUP	MOISTURE CONTENT (%) PL — LL (10 20 30 40 50 60 70)	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Very Dense, Light Brown Gravel with Sand				9 29-60 (11")		
			Moist, Dense, Light Brown Sandy Gravel				17 22-10		
			Moist, Reddish Brown Sandy Clay with Some Gravel				30 (6")	100	30
10			CHERT WITH FREQUENT LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					100	84
15			CHERT WITH FREQUENT LIMESTONE LAYERS - Unweathered, Moderately Hard to Hard, Light Gray					100	70
20			Boring Terminated						
25									
30									
35									

REMARKS: 36.206790, -94.251590

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 4
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 379+00
LOCATION: 44' Right of Construction Centerline
LOGGED BY: Don McCollum

DATE: November 29, 2022
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 19.7

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1145.6	SOIL GROUP	MOISTURE CONTENT (%) PL — LL (10 20 30 40 50 60 70)	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5		X	Moist, Dense, Light Brown Gravel with Sand		•		20 24-16		
		X	Moist, Medium Dense, Light Brown Gravel with Sand*		•		3 2-15		
10			CHERT WITH FREQUENT LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					100	67
15			CHERT WITH OCCASIONAL LIMESTONE LAYERS - Slightly Weathered, Moderately Hard to Hard, Light Gray					100	95
20			CHERT WITH FREQUENT LIMESTONE LAYERS - Unweathered, Moderately Hard to Hard, Light Gray					100	76
25			Boring Terminated						
30									
35									

REMARKS: * Auger refusal at 7.0' Below Ground Level.
36.206824, -94.251301

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 5
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 379+75
LOCATION: 44' Left of Construction Centerline
LOGGED BY: Don McCollum

DATE: December 6, 2022
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 19.5

SURFACE ELEVATION: 1140.5

DEPTH FT.	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) PL 10 20 30 40 50 60 70 LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
0	Moist, Medium Dense, White Gravel and Sand				3 8-21		
5	Moist, Very Dense, Brown and White Gravel and Sand with Clay Seams				19 43-41		
	Wet, Very Dense, White Gravel with Sand				30 (5")		
	CHERT - Highly Weathered, Moderately Hard, Light Gray					81	45
10	LIMESTONE INTERBEDDED WITH CHERT - Slightly Weathered, Moderately Hard (Limestone) and Hard (Chert), Light Gray					100	45 82
15	CHERT WITH FREQUENT LIMESTONE LAYERS - Unweathered, Hard, Light Gray						
	CHERT WITH OCCASIONAL LIMESTONE LAYERS - Unweathered, Hard, Light Gray					99	79
20	Boring Terminated						
25							
30							
35							

REMARKS: 36.207002, -94.251603

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SECTION

BORING NO. 6
PAGE 1 OF 1

JOB NO. 012326 Washington County
JOB NAME: Hwy 612 Over Brush Creek (Springdale) (S)
Route 612, Section 1
STATION: 379+80
LOCATION: 44' Righft of Construction Centerline
LOGGED BY: Don McCollum

DATE: December 5, 2022
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1

HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 23.7

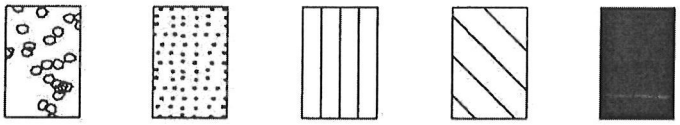
DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1141.2	SOIL GROUP	MOISTURE CONTENT (%) PL 10 20 30 40 50 60 70 LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Dense, Brown and White Gravel with Sand				2 22-21		
5			Moist, Dense, Light Gray Gravel with Sand Interbedded with Hard, Reddish Brown Clay				14 14-17		
			Wet, Very Dense, Brown Gravel with Sand and Clay Seams				13 15-36		
10			CHERT - Weathered with Occasional Highly Weathered Seams, Hard, Light Gray					95	56
			CHERT WITH OCCASIONAL LIMESTONE LAYERS - Unweathered, Hard, Light Gray						
15			CHERT - Unweathered, Hard, Light Gray					100	67
20			LIMESTONE - Unweathered, Moderately Hard, Gray					100	100
			CHERT - Unweathered, Hard, Light Gray						
25			Boring Terminated						
30									
35									

REMARKS: 36.207055, -94.251288

LEGEND

SOIL TYPES

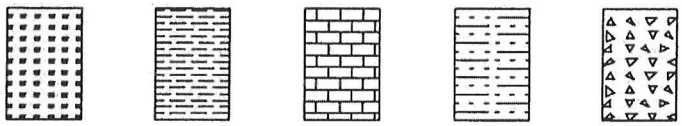
(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



GRAVEL | SAND | SILT | CLAY | ORGANIC MATTER

ROCK TYPES

(SHOWN IN SYMBOL COLUMN)

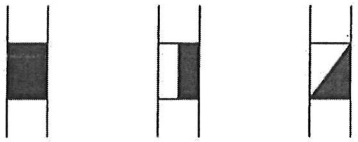


SANDSTONE | SHALE or SILTSTONE | LIMESTONE or DOLOMITE | ALTERNATING LAYERS of SHALE and SANDSTONE | OTHER

SAMPLER TYPES

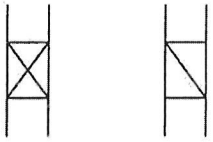
(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE



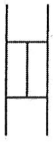
UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

SPLIT SPOON



SAMPLE RECOVERY | NO RECOVERY

ROCK CORING



% RECOVERY INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
'N' Value	Density	'N' Value	Consistency	'N' Value	Consistency	'N' Value	Consistency
0-4	Very Loose	0-1	Very Soft	0-1	Very Soft		
5-10	Loose	2-4	Soft	2-4	Soft	31-60	Soft
11-30	Medium Dense	5-8	Medium Stiff	5-8	Medium Stiff	Over 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2'	
Over 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
		31-60	Hard	31-60	Hard	in 60 Blows:	Medium Hard
		Over 60	Very Hard	Over 60	Very Hard	Less than 2'	
						Penetration	
						in 60 Blows:	Hard

1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

Standard Penetration Test – Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and performing the test are recorded for each 6 inches of penetration on the drill log. The field "N" Value (N_f) can be obtained by adding the bottom two numbers for example: $\frac{6}{8-9} \Rightarrow 8+9=17 blows/ft$. The "N" Value corrected to 60% efficiency (N_{60}) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 378+25, 44 Lt. (Boring 1)
Depth, ft: 5.1 - 14.0

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 378+25, 44 Lt. (Boring 1)
Depth, ft: 14.0 - 19.0

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 378+25, 44 Rt. (Boring 2)
Depth, ft: 5.9 - 14.1

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 378+25, 44 Rt. (Boring 2)
Depth, ft: 14.1 - 19.1

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+00, 44 Lt. (Boring 3)
Depth, ft: 7.5 - 14.0

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+00, 44 Lt. (Boring 3)
Depth, ft: 14.0 - 19.0

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+00, 44 Rt. (Boring 4)
Depth, ft: 7.0 - 14.7

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+00, 44 Rt. (Boring 4)
Depth, ft: 14.7 - 19.7

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+75, 44 Lt. (Boring 5)
Depth, ft: 7.4 - 14.5

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+75, 44 Lt. (Boring 5)
Depth, ft: 14.5 - 19.5

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+75, 44 Rt. (Boring 6)
Depth, ft: 8.8 - 18.7

ROCK CORE PHOTO

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Station and Offset, ft: Sta. 379+75, 44 Rt. (Boring 6)
Depth, ft: 18.7 - 23.7

Attachment B

GSI = 80

ROCK MASS RATING SUMMARY

JOB # 012326

SAMPLE #1

Station/Location	378+25/44 Lt
Depth (ft)	6.5
	Relative Rating
Uniaxial Compressive Strength	7
RQD	8
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	*67*
Class Number	II
Description	GOOD ROCK

SAMPLE #2

Station/Location	378+25/44 Rt
Depth (ft)	9.5
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	*73*
Class Number	II
Description	GOOD ROCK

SAMPLE #3

Station/Location	378+25/44 Rt
Depth (ft)	12.0
	Relative Rating
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*71*
Class Number	II
Description	GOOD ROCK

SAMPLE #4

Station/Location	379+00/44' Lt
Depth (ft)	8.5
	Relative Rating
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*71*
Class Number	II
Description	GOOD ROCK

SAMPLE #5

Station/Location	379+00/44' Rt
Depth (ft)	8.5
	Relative Rating
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*68*
Class Number	II
Description	GOOD ROCK

SAMPLE #6

Station/Location	379+75/44' Lt
Depth (ft)	8.0
	Relative Rating
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*64*
Class Number	II
Description	GOOD ROCK

SAMPLE #7

Station/Location	379+75/44' Lt
Depth (ft)	14.0
	Relative Rating
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*68*
Class Number	II
Description	GOOD ROCK

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

Rock Core Unconfined Compression Test Summary

Project Number: 012326
Project Name: Hwy. 412 - Hwy. 112 (Springdale Bypass) (S)
Date Tested:

Station	Location	Sample No.	Depth (ft.)	Diameter (in)	Height (in)	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
378+25	44' Lt	1	6.5	1.76	3.52	27,480	1.00	11,295	
378+25	44' Rt	2	9'-10'	1.76	3.52	16,100	1.00	6,618	
378+25	44' Rt	3	12'-12.5'	1.76	3.52	24,570	1.00	10,099	
379+00	44' Lt	4	8.5'-9'	1.75	3.50	26,450	1.00	10,997	
379+00	44' Rt	5	8.5'-9'	1.75	3.50	17,320	1.00	7,201	
379+75	44' Lt	6	8'-8.5'	1.75	3.50	16,060	1.00	6,677	
379+75	44' Lt	7	14'-14.5'	1.75	3.29	17,560	1.00	7,301	

* Please note any broken samples, fractures or other characteristics of sample in Remarks.

Attachment C

SITE PICTURES

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Looking West - Scour undercutting north bank (December 2022)

SITE PICTURES

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

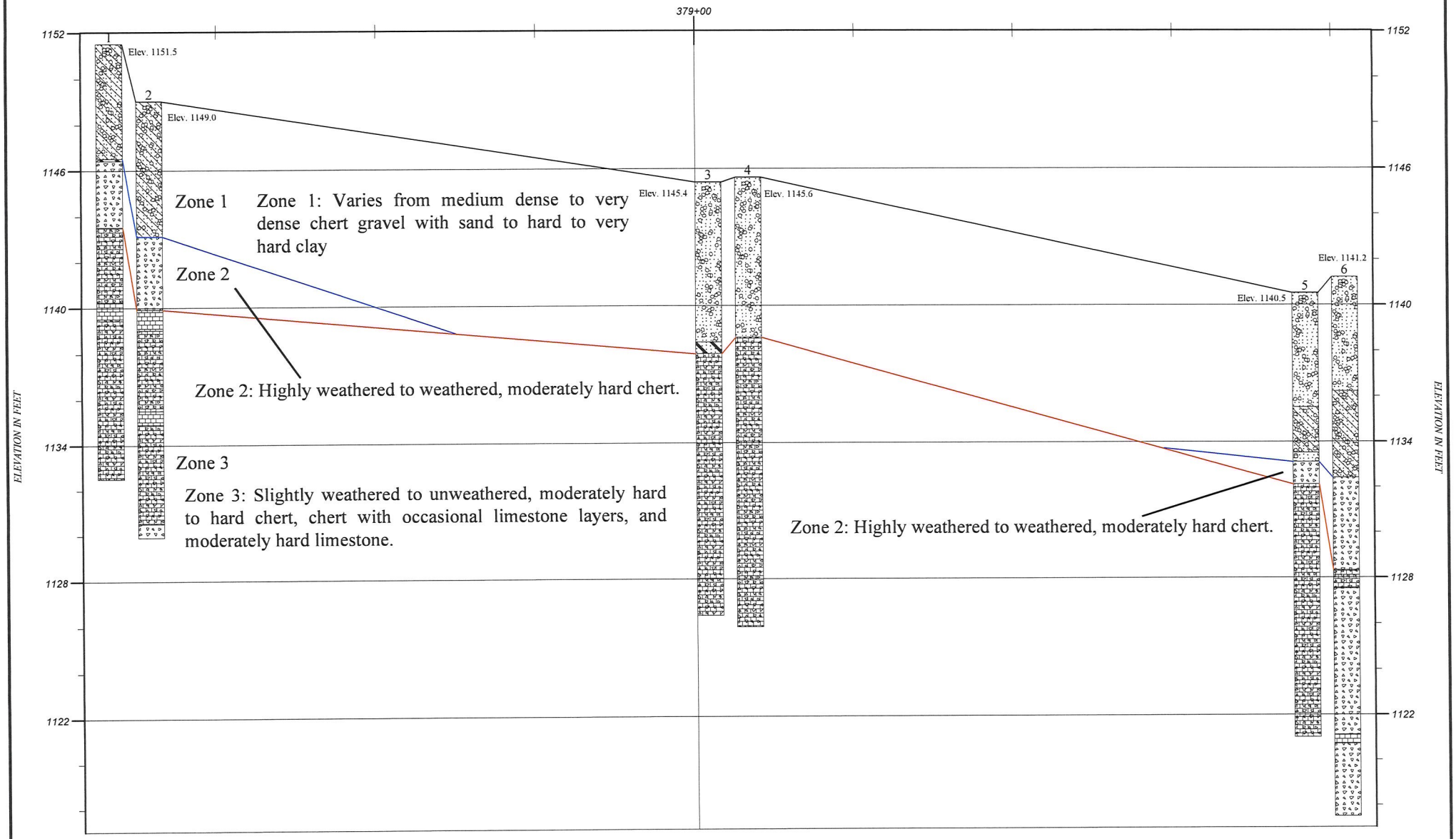
Looking South across Channel (December 2022) - Note gravel pushed into field due to flooding

SITE PICTURES

Job No.: 012326
Job Name: Hwy 612 Over Brush Creek (Springdale) (S)

Looking west (December 2022) note channel shift from left to right due to gravel infilling

Attachment D



Plan View

Strata symbols

- clayey sand and gravel
- sandy clay with gravel
- Chert
- Limestone with occasional to frequent Chert Layers
- limestone/dolomite
- sand and gravel
- sandy clay

GENERALIZED SUBSURFACE PROFILE

HORIZONTAL SCALE: Not to scale	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: Not to scale		2/3/2023

Hwy 612 Over Brush Creek (Springdale) (S)

Route 612, Section 1

PROJECT NO. 012326

Washington County

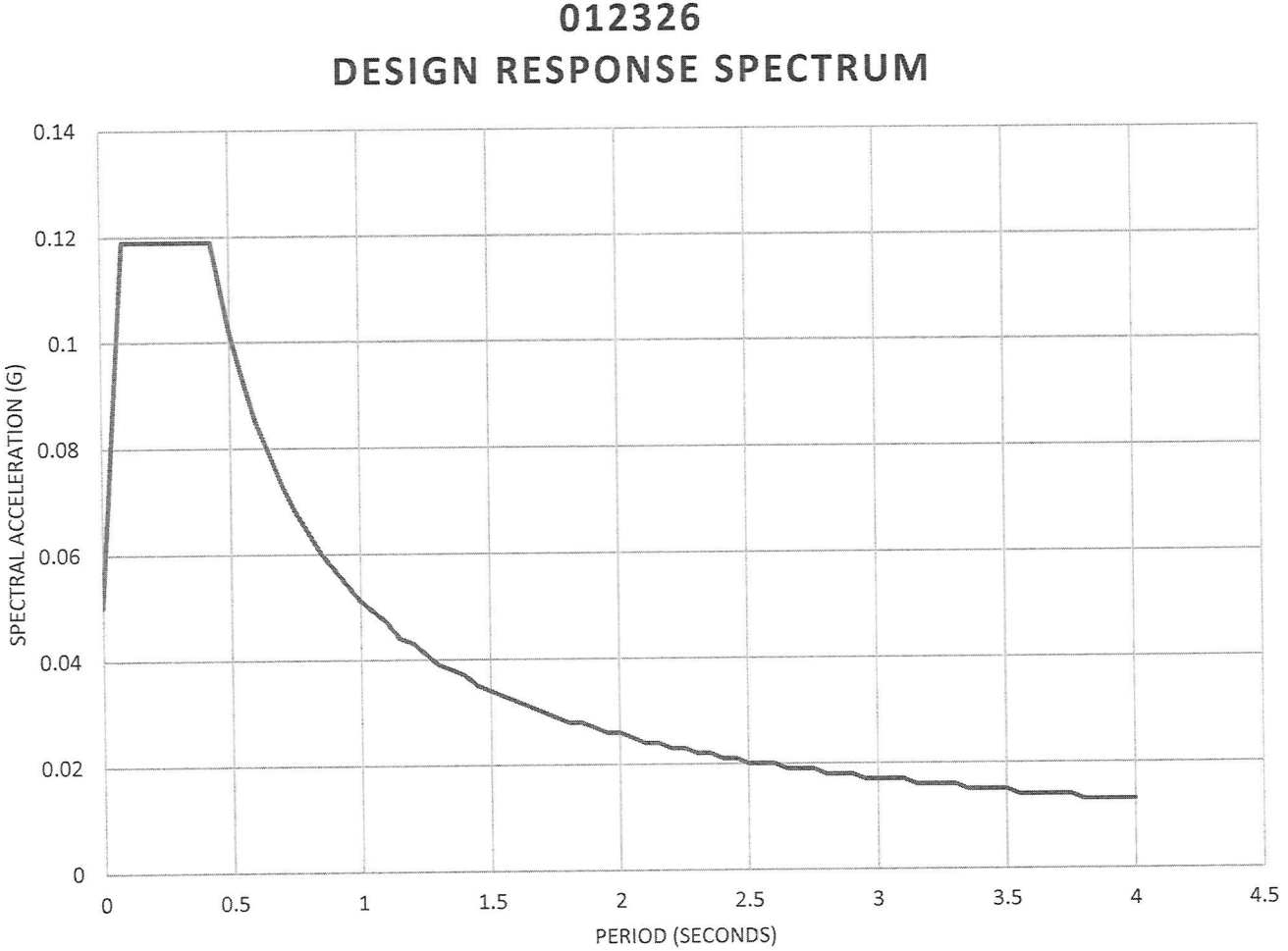
FIGURE NUMBER

Attachment E

Title:	012326
Latitude:	36.2066667
Longitude:	-94.251667
Site Class	B

Get USGS Data

PGA:	0.05
F_{PGA}:	1
A_S:	0.05
S_S:	0.119
F_A:	1
S_{DS}:	0.119
S_1:	0.051
F_V:	1
S_{D1}:	0.051
S_{Dc}:	A
T_S:	0.429
T_0:	0.086



Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

P.O. Box 30970
Little Rock, Arkansas 72260-0970
#1 Trigon Place 72209
(501) 455-2536
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February 25, 2023
Job No. 19-118

Garver LLC
4701 Northshore Dr
North Little Rock, Arkansas 72118

Attn: Mr. Adam Wierciak, P.E.

RESULTS of GEOTECHNICAL INVESTIGATION
ARDOT JOB 090069 / 012326
XNA ACCESS ROAD RAMP 1 BRIDGE OVER HIGHWAY 612
BENTON COUNTY, ARKANSAS

INTRODUCTION

Submitted herein are the results of the geotechnical investigation performed for the XNA Access Road Ramp 1 bridge over Highway 612 in Benton County, Arkansas. This project is one facet of Job 090069: Northwest Arkansas Regional Airport Access (Benton Co) (F). The Ramp 1 facet (and Ramp 2 as well) will be constructed as ARDOT Job 012326. This geotechnical investigation was authorized by the Garver, LCC Subconsultant Agreement for Task Order No. 061 on August 27, 2019. Notice to proceed with the field studies was received on August 30, 2019.

We understand the new Ramp 1 bridge will be a continuous plate girder structure with three (3) bents, two (2) spans, and a total length of approximately 212 feet. We also understand that a foundation system utilizing steel piles is planned for all bents. Foundation loads of the new bridge are anticipated to be moderate. The bridge end embankments will utilize MSE walls at bridge abutments and simple slopes at 3-horizontal to 1-vertical (3H:1V) configurations at the embankment sides. Site grading is expected to include up about 28 ft of fill. A preliminary bridge layout is provided in Appendix A.

The purposes of this study were to explore subsurface conditions in the bridge alignment and to develop recommendations to guide design and construction of foundations. These purposes have been achieved by a multi-phased study that has included the following.

- Drilling sample and core borings at the planned bridge location to evaluate subsurface conditions and obtain samples of the subgrade and foundation soil and rock for laboratory testing.

- Performing laboratory tests to evaluate pertinent engineering properties of the foundation and subgrade strata.
- Analyzing field and laboratory data to develop recommendations for seismic site class, seismic performance zone/seismic design category, foundation and subgrade support, slope stability, and construction considerations.

The relationship of these factors to design and construction of the new bridge has been considered in developing the recommendations and considerations discussed in the following report sections.

SUBSURFACE EXPLORATION

Subsurface conditions at the Ramp 1 bridge location were investigated by drilling eleven (11) sample and core borings to depths of 25 to 80 feet. The site vicinity is shown on Plate 1. The approximate boring locations are shown on the bridge layout drawing on Plate 2. The subsurface exploration program is summarized in Table 1 below.

Table 1: Summary of Exploration Program

Boring No.	Approx Sta	Approx Offset, ft	Approx Surf El, ft	Completion Depth, ft
RP1	470+40	CL	1272	80
RP2	471+50	CL	1275	60
RP3	472+50	CL	1279	60
RP4	470+20	60 Lt	1271	25
RP5	470+45	30 Lt	1271	25
RP6	470+45	30 Rt	1273	25
RP7	470+20	60 Rt	1274	25
RP8	472+70	65 Lt	1283	25
RP9	472+45	30 Lt	1280	25
RP10	472+45	30 Rt	1278	25
RP11	472+75	65 Rt	1280	25

The boring logs, presenting descriptions of the soil and rock strata encountered in the borings and the results of the field and laboratory tests, are included as Plates 3 through 16. The centerline station and offset of the boring locations and approximate ground surface elevation, as inferred from the topographic information provided by the Engineer (Garver, LLC) or as inferred from available topographic information, are also shown on the logs. It must be recognized that the surface elevations shown are approximate and actual elevations may vary. Keys to the terms and symbols used on the logs are presented as Plates 17 and 18.

The borings were drilled with a track-mounted CME 55 rotary-drilling rig using a combination of dry-auger and rotary-wash drilling methods. Samples were typically obtained at 2-ft intervals to 10-ft depth and at 5-ft intervals thereafter. Samples were recovered using a 2-in.-diameter split-barrel sampler driven into the strata by blows of a 140-lb automatic hammer with 30-in. drop in accordance with Standard Penetration Test (SPT) procedures. The number of blows required to drive the standard split-barrel sampler the final 12 in. of an 18-in. total drive, or a portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the boring logs in the "Blows Per Ft" column.

Representative samples of the limestone bedrock were obtained using a 5-ft-long NQ_{WL}-size double-tube core barrel with a diamond bit. For each core run, the percent recovery was determined as the ratio of recovery to total length of core run. Rock Quality Designation (RQD) was also determined for the core run as the sum of intact, sound rock core greater than 4-in. length divided by the total length of the run and expressed in percent. Both these values are presented in the right-hand columns of the log forms, opposite the corresponding core run. Photographs of the recovered rock cores are provided in Appendix B.

All samples were removed from sampling tools in the field, examined and visually classified by the field geologist. Samples were then placed in appropriate containers to prevent moisture loss and/or change in condition during transfer to our laboratory for further examination and testing.

The borings were advanced using dry-auger procedures to the extent possible to facilitate evaluation of shallow groundwater conditions. Observations regarding groundwater levels are noted in the lower-right portion of each log and are discussed in subsequent sections of this report. All boreholes were backfilled after obtaining the final water level readings.

LABORATORY TESTING

Laboratory testing was performed to evaluate subgrade and foundation plasticity and to confirm visual classification. The testing program included natural water content determinations (AASHTO T 265), liquid and plastic (Atterberg) limit determinations (AASHTO T 89 and T 90), and sieve analyses through the No. 200 sieve (AASHTO T 88). Soil shear strength was estimated in the field using SPT results.

A total of 97 natural water content determinations were performed to develop information on *in-situ* soil water content for each boring. Water content results are plotted on the boring log

forms in accordance with the scale and symbols shown in the legend located in the upper-right corner of the logs.

To verify field classification and to evaluate soil plasticity, 23 liquid and plastic limit (Atterberg limits) determinations and 23 sieve analyses were performed on selected representative samples. The Atterberg limits are plotted on the logs as pluses inter-connected with a dashed line using the water content scale. The percentage of soil passing through the No. 200 Sieve is noted in the "- No. 200 %" column on the appropriate log forms. Classification test results, along with soil classification by the Unified Soil Classification System and AASHTO designations, are summarized in Appendix C.

GENERAL SITE and SUBSURFACE CONDITIONS

Site Conditions

The general alignment of the XNA Access Road extends about a length of about 4 miles from the Northwest Arkansas Airport (XNA) southeast to the planned terminus at Highways 70 and 71. The Ramp 1 bridge site crosses an unnamed farm access road approximately 1200 ft north of Marchant Road. The site locale is presently open agricultural land with some scattered mature trees. A farm pond with some mature trees and thick underbrush is immediately southeast of the south bent (Bent 1). The site terrain slopes gently from the northwest to the southeast. Surface drainage is considered fair.

Site Geology

The project alignment is located in the mapped exposure of the Boone Formation. The early and middle Mississippian Period Boone consists of fine- to coarse-grained limestone interbedded with chert. The chert content can vary widely, both horizontally and vertically, and limestone or chert may be predominant. The Boone Formation is known for dissolutional features such as sinkholes, caves, and enlarged fissures. Typically, the limestone/cherty limestone units of the Boone decompose (weather) to erratic blends of chert fragments and clay/silty clay. The residual soil mantle may extend to significant depths on higher terrain and may contain hard chert seams and/or layers. The thickness of the Boone Formation is reported to be 300 to 350 ft in northern Arkansas. The Boone is generally disconformable to the underlying Chattanooga Shale and St. Joe Limestone member, with some areas having a conformable contact.

Seismic Conditions

In light of the results of the borings, a Seismic Site Class C (very dense soil and soft rock profile) is considered applicable for the site with respect to the criteria of the AASHTO LRFD Bridge Design Specifications Seventh Edition 2014[1].

Given the location and AASHTO code-based values, the 1.0-sec period spectral acceleration coefficient for Site Class C (S_1) is 0.051 and the 1.0-sec period spectral acceleration coefficient (S_{D1}) value for Site Class C is 0.087. Utilizing these parameters, Table 3.10.6-1[2] indicates that a Seismic Performance Zone 1 is fitting for the Ramp 2 bridge site. In reference to the 2011 edition of the AASHTO Guide Specifications, the Peak Ground Acceleration (PGA) having a 7 percent chance of exceedance in 75 years (or mean return period of approximately 1000 years) is predicted to be 0.05 for a Seismic Site Class C for the bridge location. The liquefaction potential is considered negligible for the predominantly cohesive overburden soils and underlying rock units encountered in the borings drilled for this study.

Subsurface Conditions

Based on the results of the borings, the subsurface stratigraphy may be generalized into four (4) primary strata as follows.

Stratum I: The surface and near-surface soils to depths of 1 to 6 ft below existing grades are comprised of very loose to dense tan, brown, and brownish tan silt and soft to very stiff brown to reddish tan clayey silt with chert and limestone fragments. The silt and clayey silt exhibit low plasticity, moderate to high compressibility, and very low to low shear strength. The silty surface soils are moisture-sensitive and will lose considerable strength with reduced stability when saturated.

Stratum II: Below the surficial stratum of silty soils is stiff to very stiff red, tan, reddish brown, reddish tan, and gray clay, silty clay, and clayey silt with variable amounts of cherty limestone and chert fragments and discontinuous chert seams and layers. This thick stratum of overburden soils extends to 42- to 48-ft depth. The clay and silty clay are residual in origin and have weathered from the underlying cherty limestone bedrock. The clay and silty clay have variable low to high plasticity, low to moderate shear strength, and moderate to low compressibility. The potential for volume change with changes in water content is considered low due to the presence of numerous limestone and chert fragments.

Stratum III: The overburden soils are underlain by low hardness to moderately hard gray, light gray, tan, and reddish tan highly weathered to slightly weathered

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1 AASHTO LRFD Bridge Design Specifications, 7th Edition; AASHTO; 2014

2 AASHTO LRFD Bridge Design Specification, AASHTO; 2012

limestone and cherty limestone extending to 50- to 65-ft depth (±El 1207 to ±El 1229). The weathered limestone/cherty limestone exhibits differential weathering with frequent silty clay laminations, seams, and layers which represent zones of completely weathered limestone. The highly weathered limestone/cherty limestone has very poor rock quality but moderate to high shear strength.

Stratum IV: The basal stratum encountered in the borings moderately hard to hard gray and light gray slightly weathered to fresh limestone and cherty limestone. The limestone/cherty limestone is flat bedded. Rock core recovery values range from 55 to 100 percent and rock quality designation (RQD) values ranging from 0 to 82 percent. These RQD values are indicative of very poor to fair rock quality.

To aid in visualizing subsurface conditions, a generalized subsurface profile is presented in Appendix D. It should be recognized that the stratigraphy illustrated by the profile has been inferred between discrete boring locations. In view of the natural variations in stratigraphy and conditions, variations from the stratigraphy illustrated by the profile should be anticipated. Additionally, the natural transition between strata is generally gradual, and the stratigraphy described in the sections above may vary.

Groundwater Conditions

Groundwater was not encountered within the exploration range of the borings in October 2022 and January 2023. It has been our experience in the area that localized shallow perched groundwater can be present in the silty overburden soils and fractured zones of the cherty limestone. Groundwater levels will vary, depending on seasonal precipitation, surface runoff and infiltration, and water levels in nearby drainage features.

ANALYSES and RECOMMENDATIONS

Foundation Design

Foundations for the new bridge must satisfy two (2) basic and independent design criteria: a) foundations must have an acceptable factor of safety against bearing failure under maximum design loads, and b) foundation movement due to consolidation or swelling of the underlying strata should not exceed tolerable limits for the structures. Construction factors, such as installation of foundations, excavation procedures and surface and groundwater conditions, must also be considered.

Based on the results of the borings performed at the Ramp 1 bridge location and our understanding of the project, we recommend that foundation loads at the abutments and interior

bents be supported on steel piles. Recommendations for steel piles are discussed in the following report sections.

Piling Foundations

We recommend that the foundation loads of the bridge be supported on steel HP12x53 or HP14x73 piles. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through any new embankment fill, the natural overburden soils Strata I and II), and any zones of highly weathered limestone/cherty limestone (Stratum III) to develop safe bearing capacity in the competent moderately hard to hard slightly weathered to fresh limestone/cherty limestone (Stratum IV). End-bearing piles should be driven to practical refusal in the moderately hard to hard limestone/cherty limestone. We recommend that all steel piles be fitted with rock points.

Steel piles driven to refusal should be designed for the structural capacity of the pile, as per applicable AASHTO Load and Resistance Factor Design (LRFD) procedures[3]. An effective resistance factor (φ_c) of 0.50 is recommended for structural determination of factored bearing capacities. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

For determination of bearing capacities of steel piles driven to refusal we recommend that nominal (ultimate) resistance (P_n) of HP piles be determined based on the yield strength of steel H piles (f_y) and the net end area (A_{net}) of the section. It has been our experience that allowable pile capacities of 96 tons for HP12x53 piles and 133 tons for HP14x73 piles are typical for f_y = 50 ksi steel pile sections. These capacities are based on allowable stress design (ASD). However, the appropriate factored bearing capacity should be confirmed by the Engineer. Post-construction settlement of piles driven to refusal will be negligible.

The nominal axial capacities are based on single, isolated foundations. Piles spaced closer than three (3) pile widths may develop lower individual capacity due to group effects. The potential for group capacity reductions should be evaluated for pile spacing closer than three (3) widths (center to center).

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[3] Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures, Publication No. FHWA HI-98-032, National Highway Institute, May 2001.

Estimated pile tip elevations are summarized in Table 2 below.

Estimated Tip Elevations of Steel Piles Driven to Refusal

Bent No.	Estimated Pile Tip Elevation, ft	Comments
1 (South Bridge End)	1208	Refusal in moderately hard limestone/cherty limestone
2 (Approx Sta 471+50)	1221	Refusal in moderately hard limestone/cherty limestone
3 (North Bridge End)	1237	Refusal in moderately hard limestone/cherty limestone

It should be noted that the tip elevations shown in the table above are an estimate only based on the results of the relevant borings and the inferred surface elevations at the particular locations. Pile refusal and final depth must be field verified.

Piles should be installed in compliance with Standard Specifications for Highway Construction, 2014 Edition, Section 805. However, we recommend a hammer delivering a minimum energy of 22,000 ft-lbs per blow. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer prior to hammer acceptance and start of driving. We recommend that all piles be fitted with rock points.

A minimum pile length of 10 ft is recommended. Preboring is not expected to be required for pile installation. However, some preboring could be required where resistant chert layers are encountered at shallow depth. As a minimum, safe bearing capacity of piles should be determined by ARDOT Standard Specifications Section 805.09, Method A. Driving records should be available for review by the Engineer during pile installation. Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may be defined as a penetration of 0.5 in. or less for the final 10 blows. Driving records should be available for review by the Engineer during pile installation.

MSE Walls

The project includes mechanically stabilized earth (MSE) retaining walls on both bridge ends of Ramp 1. Plan wall heights vary from a nominal 2 ft to 20 ft, with the maximum height of the walls near the center of the wall alignment and the height tapering out away from the bridge ends and parallel to the roadway.

Design of MSE walls must include consideration of both internal and external stability. Design with respect to internal stability must be performed by the specific wall designer based on

final plans and configurations. Analyses have been performed to verify external (global) stability and bearing capacity.

MSE Wall Bearing

The subgrade and foundation soils in the wall alignment generally consist of stiff to very stiff clay and fine sandy clay with numerous chert fragments. These soils exhibit moderate shear strength and low compressibility. Depending on final grading plans, some undercut and replacement will be required to improve bearing capacity and to limit settlement. MSE wall bearing recommendations are summarized below.

1. Bent 1 – South bridge end
    a. Undercut as needed to stiff to very stiff clay with chert fragments.
        i. Localized undercuts on the order of 2 ft, more or less, could be required to develop suitable bearing.
        ii. Backfill any undercut with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).
        iii. Nominal bearing on stiff to very stiff clay: 15,400 lbs per sq ft
2. Bent 3 – North bridge end
    a. Undercut as needed to bear in stiff to very stiff sandy clay and/or clayey silt with chert fragments.
        i. Localized undercuts on the order of 2 ft, more or less, could be required to develop suitable bearing.
        ii. Backfill any undercut with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).
        iii. Nominal bearing on stiff to very stiff sandy clay and clayey silt: 15,400 lbs per sq ft
3. Resistance factor (φ_b) for bearing resistance: 0.65
4. Resistance to sliding: 0.35
5. Resistance factor (φ_τ) for sliding resistance: 1.0

The MSE wall leveling pads and reinforced zones should bear as recommended above and at a minimum depth of 2 ft below lowest adjacent grade. A minimum wall embedment of 2 ft and a minimum reinforcement length of 0.7H or 8 ft, whichever is greater, is recommended. Subgrade and foundation preparation in the wall locations and under all embankments must include stripping all organics and thorough proof-rolling.

The suitability of the MSE wall bearing stratum must be field verified by the Engineer at the time of construction. Where undercuts are warranted, these should extend a minimum horizontal distance determined by a 1-horizontal to 1 -vertical (1H:1V) projection beyond the reinforced zone to the undercut bottom.

Where seepage into undercuts is apparent or positive drainage cannot be assured, Select Granular Backfill should be fully encapsulated in a filter fabric geotextile complying with ARDOT Standard Specifications Subsection 625.02, Type 2.

Stability analyses results are summarized and presented graphically in Appendix E. The results of the stability analyses indicate that plan configurations of the MSE walls are acceptable with respect to stability of all loading conditions evaluated.

Embankment Slopes

The bridge end embankments will utilize MSE walls at the bridge abutments and simple slopes at 3-horizontal to 1-vertical (3H:1V) configurations on the embankment sides. The bridge embankments will have maximum heights of about 28 feet.

To evaluate suitability of the end MSE walls and the side slope plan configurations, slope stability analyses have been performed. A 250 lbs per sq ft uniform surcharge from vehicles was included for the purposes of stability analyses. Stability analyses were performed using the computer program SLOPE/W 2020[4] and utilizing a Morgenstern-Price analysis. For the embankment slopes, three (3) general loading conditions were evaluated, i.e., End of Construction, Long Term, and Seismic Conditions For analysis of the seismic condition, a horizontal seismic acceleration coefficient (k_h) of one-half the peak acceleration (A_s) was used, a value of 0.025.

Stability analyses results are summarized and presented graphically in Appendix E. The results of the stability analyses indicate that plan configurations of the embankment end MSE walls and side slopes are acceptable with respect to stability of all loading conditions evaluated.

Subgrade Support

The results of the borings indicate the on-site subgrade soils generally consist of silt, clay and silty clay with chert fragments (AASHTO A-2-6, A-2-7, A-4, A-6, and A-7-6). Given the anticipated new embankment, the approach roadway subgrade is likely to consist of embankment fill. Locally-available borrow, which is likely to be used as unclassified embankment fill, is expected to have similar classification.

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[4] Slope/W 2020; GEO-SLOPE International; 2020.

We recommend that any soils classifying as A-7-5 or A-7-6 soils be excluded from use as subgrade within 18 in. of the plan subgrade elevation. The top 18 in. of subgrade soils should have a maximum plasticity index (PI) of 18. The as-built pavement subgrade should be evaluated by the Engineer. Areas of unstable or otherwise unsuitable subgrade should be improved by undercut and replacement or treatment with additives approved by the Engineer.

Based on the results of the borings and laboratory tests for the silty clay with chert fragments subgrade and correlation with the AASHTO classification, we recommend the following parameters for use in design of pavements.

- CBR value: 8.3
- Resilient Modulus (M_R): 3260 lbs per sq in.
- R value: 13
- Modulus of Subgrade Reaction (k): 100 lbs per cu in.

Site Grading and Subgrade Preparation

As noted, the silty surface soils are moisture-sensitive. Though presently stable, at elevated water contents the silt and clayey silt subgrade is likely to be soft and unstable. Consequently, site grading operations will be significantly easier to perform during dry seasons of the year.

Site preparation will require localized clearing and grubbing and stripping the zone of organic-containing soils. The depth of stripping will be variable, with deeper stripping depths in wooded areas, and less stripping required in open land. In general, the stripping depth is estimated to be about 6 to 9 inches in clear areas but may be 18 to 24 in. or more in the localized areas where trees and thick underbrush are present. The zone of organic surface soils should be completely stripped in the embankment footprint areas and at least 5 ft beyond the projected embankment toes. Particular care must be taken to muck out all saturated and/or organic-laden soils in the existing pond or existing drainage features.

Following stripping and prior to fill placement, the extent of weak and unsuitable soils should be determined. Thorough proof-rolling should be performed to verify subgrade stability. Proof-rolling should be performed with a loaded tandem-wheel dump truck or similar equipment. Unstable soils exhibiting a tendency to rut and/or pump should be undercut and replaced with suitable fill. Care should be taken that undercuts, stump holes, and other excavations or low areas resulting from subgrade preparation are properly backfilled with compacted fill.

Depending on seasonal conditions, localized undercuts of about 2 ft below existing grades, more or less, could be required. Deeper undercuts may be required in wet seasons. General undercuts for site grading may be backfilled with unclassified borrow used for embankment fill.

Undercuts under MSE wall foundations should be backfilled with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).

In lieu of undercutting and replacing unsuitable soils in roadway areas, consideration may be given to using additives to improve soil workability and to stabilize weak areas. Hydrated lime, quick lime, Portland cement, fly ash, or suitable alternate materials may be used as verified by appropriate testing and approved by the Engineer. Additives can be effective where the depth of unstable soils is relatively shallow. Treatment will be less effective in areas where the zone of unstable soils is deep. The optimum application rate of stabilization additive must be determined by specific laboratory tests performed on the alignment subgrade soils. We recommend a minimum treatment depth of 8 inches.

Subgrade preparation and mass undercuts should extend at least 5 ft beyond the embankment toes to the extent possible. Subgrade preparation in roadway areas should extend at least 3 ft outside pavement shoulder edges to the extent possible.

Fill and backfill may consist of unclassified borrow free of organics and other deleterious materials as per ARDOT Standard Specifications Subsection 210.06. Where A-7-5 or A-7-6 soils are encountered at the subgrade elevation, we recommend that these soils be undercut as required to provide at least 18 in. of low-plasticity subgrade soils. Granular soils must be protected from erosion with a minimum 18-in.-thick armor of clayey soil.

Subgrade preparation should comply with ARDOT Standard Specifications Section 212. Embankments should be constructed in accordance with ARDOT criteria (ARDOT Standard Specifications Section 210). Fill and backfill should be placed in nominal 6- to 10-in.-thick loose lifts. All fill and backfill must be placed in horizontal lifts. The in-place density and water content should be determined for each lift and should be tested to verify compliance with the specified density and water content prior to placement of subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Groundwater and Seepage Control

Positive surface drainage should be established at the start of the work, be maintained during construction and following completion of the work to prevent surface water ponding and subsequent saturation of subgrade soils. Density and water content of all earthwork should be maintained until embankments, bridge work, and pavements are completed.

Groundwater was not encountered in the borings in October 2022 and January 2023. Shallow perched groundwater may be encountered in the near-surface soils in wet seasons. Seepage into excavations and cuts can typically be controlled by ditching or sump-and-pump methods. If seepage infiltration cannot be controlled, construction of drains and/or the use of Select Granular Backfill (AASHTO M 43 No. 57), stone backfill (ARDOT Standard Specifications Section 207), or approved alternates to an elevation above the inflow of seepage will be warranted. In areas of seepage infiltration, the granular fill should be encapsulated with a filter fabric complying with ARDOT Standard Specifications Subsection 625.02, Type 2 and vented to positive discharge. Where surface seeps or springs are encountered during site grading, we recommend the seepage be directed via French drains or blanket drains to positive discharge at daylight or to storm drainage lines.

Piling

Piles should be installed in compliance with ARDOT Standard Specifications, Section 805. Piles should be carefully examined prior to driving and piles with structural defects should be rejected. Any splices in steel piles should develop the full cross-sectional capacity of un-spliced piles. Pile installation should be monitored by qualified personnel to maintain specific and complete driving records and observe pile installation procedures. Safe bearing capacity of production piles should be determined by ARDOT Standard Specifications Section 805.09, Method A. Driving records should be available for review by the Engineer during pile installation. For driving steel piles on this project, we recommend a minimum hammer energy of 22,000 ft-lbs per blow. Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may be defined as a penetration of 0.5 in. or less for the final 10 blows.

CLOSURE

The Engineer or a designated representative thereof should monitor site preparation, grading work and foundation and pavement construction. Subsurface conditions significantly at variance with those encountered in the borings should be brought to the attention of the Geotechnical Engineer. The conclusions and recommendations of this report should then be reviewed in light of the new information.

The following illustrations are attached and complete this submittal.

Plate 1	Site Vicinity
Plate 2	Plan of Borings
Plates 3 through 16	Boring Logs
Plates 17 and 18	Keys to Terms and Symbols
Appendix A	Preliminary Bridge Layout
Appendix B	Rock Core Photographs
Appendix C	Laboratory Test Results
Appendix D	Generalized Subsurface Profile
Appendix E	Stability Analyses Results

* * * * *

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, or if we may be of additional assistance, please call on us.

Sincerely,

GRUBBS, HOSKYN,
BARTON &WYATT, INC.

Velleta M. Scott, P.E.
Sr. Project Engineer

Mark E. Wyatt, P.E.
President

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 7791 MARK E. WYATT

VMS/MEW:jw

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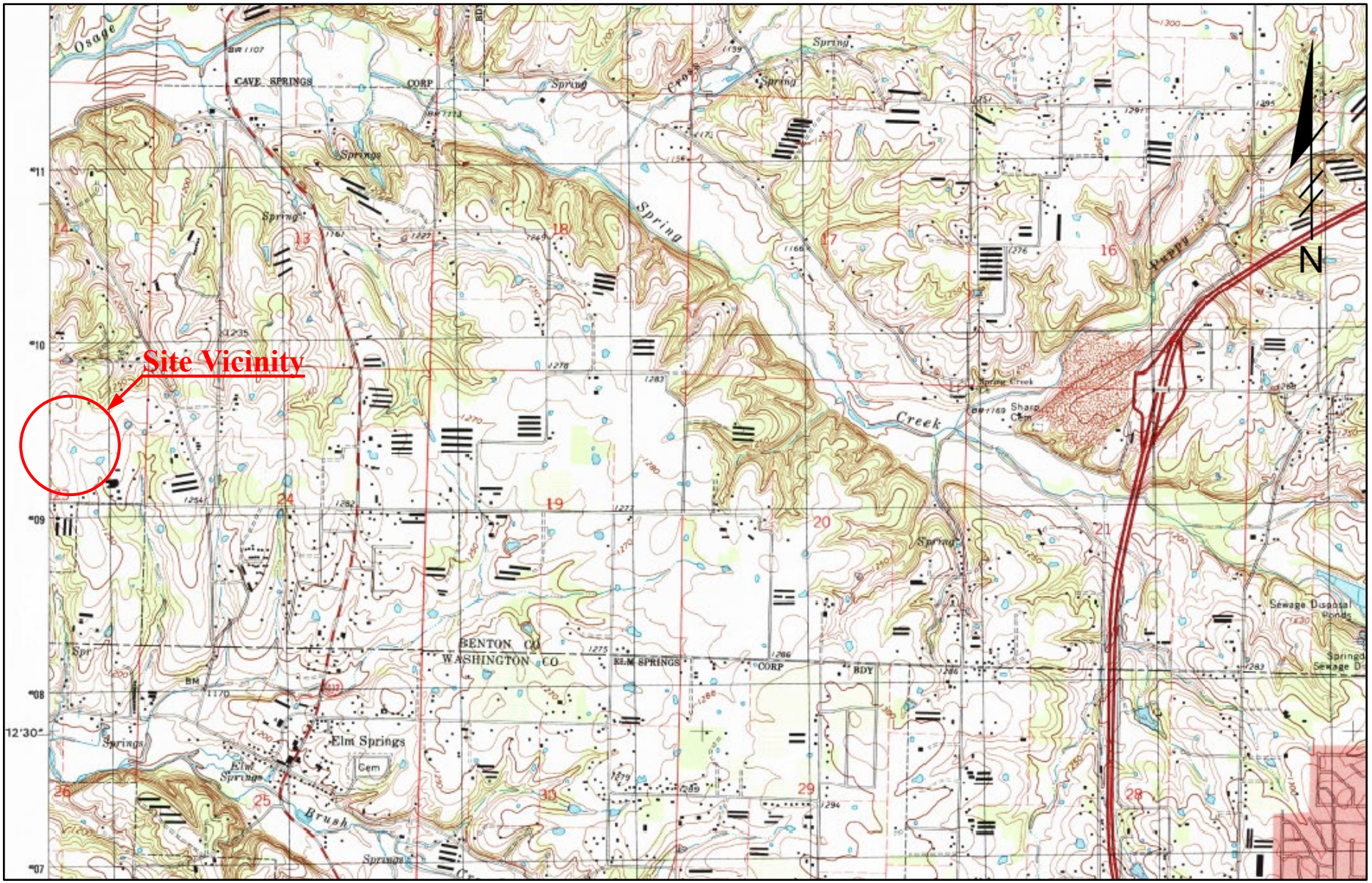
Attn: Mr. John H. Ruddell, P.E., S.E. (1-email)
Attn: Mr. Joel Skinner P.E. (1-email)

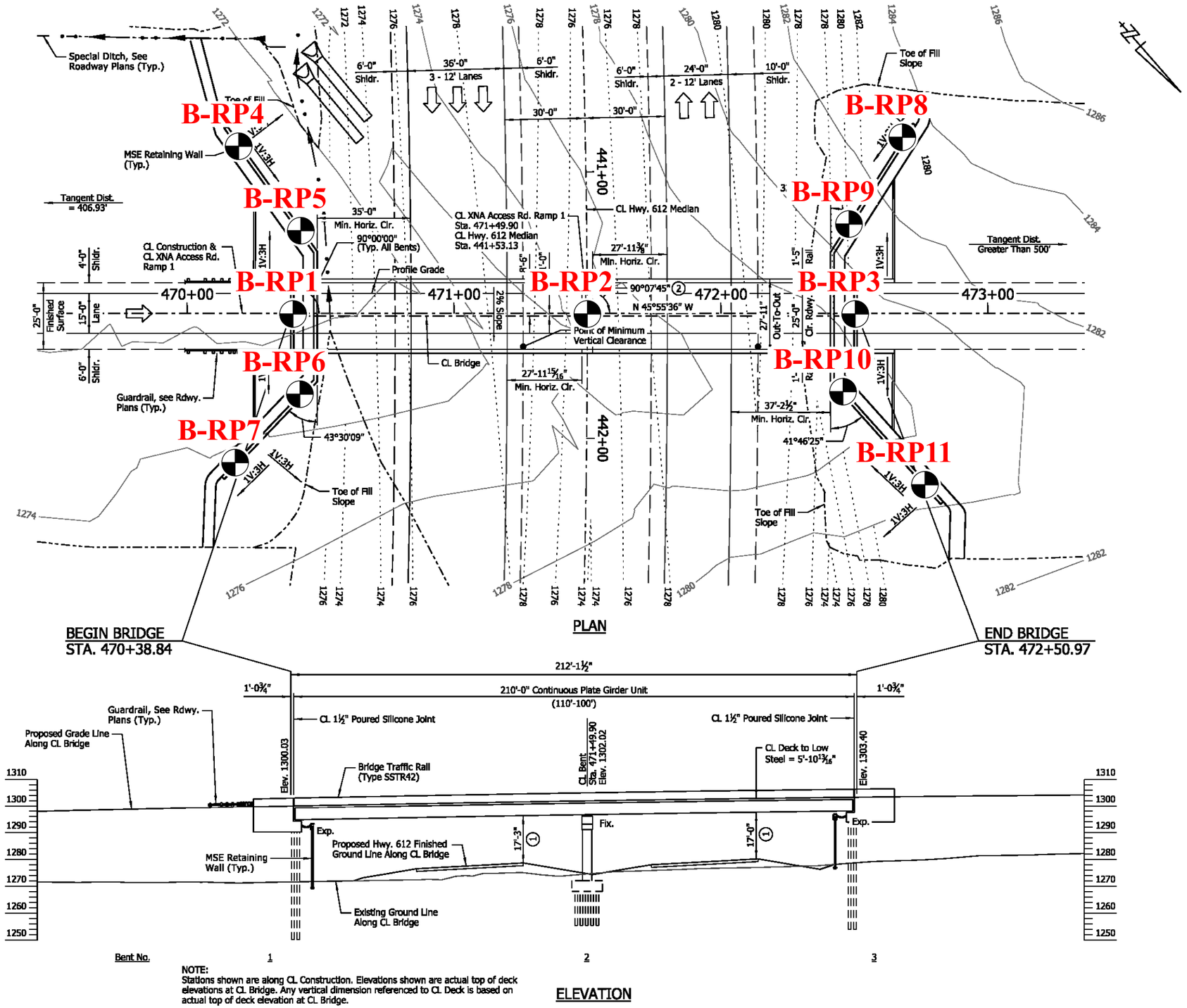


Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

SITE VICINITY MAP
090069 XNA Access Road – Ramp 1 over Hwy 612
Benton County, Arkansas

Job No. 19-118

Plate 1



NOTE:
Stations shown are along CL Construction. Elevations shown are actual top of deck elevations at CL Bridge. Any vertical dimension referenced to CL Deck is based on actual top of deck elevation at CL Bridge.

Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

PLAN of BORINGS

090069 XNA Access Road – Ramp 1 over Hwy. 612
Benton County, Arkansas

Scale: As shown

Job No. 19-118

PLATE 2

19-118

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP1

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 470+40, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1272±						
5			Stiff tan clayey silt w/ numerous chert and limestone fragments - very stiff below 2 ft	22 31 50/9"			59		
10			Very stiff reddish brown clay w/numerous chert and limestone fragments and discontinuous chert seams and layers	50/11" 50/11"					
15				47			43		
20				30					
25			Stiff reddish tan and tan silty clay, sandy w/chert and limestone fragments	15					
30				11			50		
35				24					
40			- chert layer at 39 ft	50/11"					
				21					

COMPLETION DEPTH: 80.0 ft
DATE: 10-19-22

DEPTH TO WATER IN BORING: Dry to 15 ft

DATE: 10/18/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP1

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 470+40, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			(continued)						
50			Low hardness light tan gray w/reddish tan highly weathered limestone w/silty clay seams and layers	27					
55				25					
60				23					
65			Moderately hard light gray and gray cherty limestone w/very close rehealed fractures	50/3"					
70								100	82
75			- vertical shear at 73.8 to 74.3 ft					62	23
80									
85									

COMPLETION DEPTH: 80.0 ft
DATE: 10-19-22

DEPTH TO WATER
IN BORING: Dry to 15 ft

DATE: 10/18/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP2

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 471+50, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1275±				
			Dense tan silt w/chert and limestone fragments, dry	31			
			Very stiff reddish tan w/reddish brown silty clay w/numerous chert and limestone fragments	25			
5				29			
				32			
10			- chert layer at 9 to 9.5 ft	50/7"			
			- stiff at 13 to 18 ft	18			36
20			- very stiff with more limestone fragments below 18 ft	27			
			Stiff reddish tan and tan silty clay, sandy w/chert and limestone fragments	12			
25							
30				16			
35				19			29
40				21			
				17			

COMPLETION DEPTH: 60.0 ft
DATE: 10-17-22

DEPTH TO WATER IN BORING: Dry to 15 ft

DATE: 10/17/2022

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP2

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 471+50, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			(continued)				
50			Low hardness light gray highly weathered cherty limestone, heavily fractured w/some silty clay seams and clay filled fractures	25			
55			Moderately hard gray weathered cherty limestone with close silty clay seams	50/3"			
60				50/3"			
65							
70							
75							
80							
85							

COMPLETION DEPTH: 60.0 ft
DATE: 10-17-22

DEPTH TO WATER
IN BORING: Dry to 15 ft

DATE: 10/17/2022

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP3

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 472+50, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1279±						
			Medium dense tan silt, slightly clayey w/chert and limestone fragments	27			52		
			- with numerous chert fragments below 2.5 ft	50/7"					
5				50/6"					
			Very stiff reddish brown silty clay w/chert fragments and discontinuous chert seams and layers	31					
10				17			90		
			- with more silt and chert fragments below 12 ft	34					
15									
20				36					
				31					
25									
30				36					
			Stiff light reddish tan clayey silt w/clay seams and layers (completely weathered limestone)	21			75		
35									
40				18					
			Moderately hard light gray slightly weathered cherty limestone	50/4"					

COMPLETION DEPTH: 60.0 ft
DATE: 10-18-22

DEPTH TO WATER IN BORING: Dry to 15 ft

DATE: 10/18/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP3

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 15 ft /Wash

LOCATION: Approx Sta 472+50, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			(continued)						
50			Moderately hard to hard light gray cherty limestone					55	50
55			- slightly weathered with very close multi-directional fractures below 53 ft					65	0
60									
65									
70									
75									
80									
85									

COMPLETION DEPTH: 60.0 ft
DATE: 10-18-22

DEPTH TO WATER
IN BORING: Dry to 15 ft

DATE: 10/18/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP4

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 470+20, 60 Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1271±				
			Soft brown clayey silt w/chert fragments	5			
			Very stiff reddish brown clay w/numerous chert fragments and discontinuous chert seams and layers	50/9"			
5				44			35
				50/11"			
10				42			
15				50/11"			
20				50/9"			
25				50/4"			

COMPLETION DEPTH: 25.0 ft
DATE: 1-12-23

DEPTH TO WATER IN BORING: Dry

DATE: 1/12/2023

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 2-8-23

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP5

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 470+45, 30 Lt

SURF. EL: 1271±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	Firm to stiff brown clayey silt w/chert fragments	10		
	Very stiff reddish brown clay w/numerous chert fragments and discontinuous chert seams and layers	44		45
5		33		
		44		25
10		50/6"		
15		50/11"		
20		50/9"		
25		36		

COHESION, TON/SQ FT
0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT
10 20 30 40 50 60 70

COMPLETION DEPTH: 25.0 ft
DATE: 1-12-23

DEPTH TO WATER IN BORING: Dry

DATE: 1/12/2023

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 2-8-23

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP6

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 470+45, 30 Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1273±				
			Soft brown clayey silt w/chert fragments	6			
			Stiff to very stiff reddish brown silty clay w/chert fragments	23			81
5			- with more chert fragments and discontinuous chert seams and layers below 4 ft	50/9"			
				35			26
10				50			
				22			
15							
				20			
20							
				50/11"			
25							

COMPLETION DEPTH: 25.0 ft
DATE: 1-12-23

DEPTH TO WATER IN BORING: Dry

DATE: 1/12/2023

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 2-8-23

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP7

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger LOCATION: Approx Sta 470+20, 60 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1274±				
			Firm brown clayey silt w/occasional cherty limestone fragments	8			
			Firm to stiff reddish tan silty clay w/some chert fragments				
			Very stiff reddish brown silty clay w/chert fragments and discontinuous chert seams and layers	29			63
5				50/7"			
				50/9"			
10				50/10"			
15				35			37
			- with more chert fragments from 18 to 22 ft				
20				50/11"			
25				44			

COMPLETION DEPTH: 25.0 ft
DATE: 1-13-23

DEPTH TO WATER IN BORING: Dry

DATE: 1/12/2023

LGBNEW 19-118_RAMP 1 OVER HWY 612.GPJ 2-8-23

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP8

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 472+70, 65 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1283±						
			Stiff brownish tan clayey silt w/numerous chert and limestone fragments	16					
			- with chert cobbles at 2.5 to 3.5 ft	50/10"			21		
5			Very stiff reddish brown fine sandy clay w/numerous chert and limestone fragments and discontinuous chert seams	50/11"					
			Very stiff reddish brown silty clay w/numerous chert fragments and discontinuous chert seams and layers	50/10"			42		
10				46					
15				40					
20				50/2"					
25				25					

COMPLETION DEPTH: 25.0 ft
DATE: 10-28-22

DEPTH TO WATER IN BORING: Dry

DATE: 10/28/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP9

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 472+45, 30 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1280±						
			Medium dense brownish tan silt, slightly clayey w/cherty limestone and chert fragments	18			44		
			- reddish brown below 2 ft	50/11"					
5			Very stiff reddish brown fine sandy clay w/numerous chert and limestone fragments and discontinuous chert seams and layers	50/10"			36		
				50/6"					
10				50/11"					
			Very stiff reddish brown silty clay w/chert fragments						
15				44					
20				40					
			Moderately hard light gray w/reddish tan weathered cherty limestone						
25				50/11"					

COMPLETION DEPTH: 25.0 ft
DATE: 10-28-22

DEPTH TO WATER IN BORING: Dry

DATE: 10/28/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP10

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 472+45, 30 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1278±						
			Very loose to loose tan silt w/cherty limestone fragments	4					
			Very stiff reddish brown fine sandy clay w/numerous chert and limestone fragments	26					
5				26			54		
			- with discontinuous chert seams below 6 ft	37					
10				48			27		
15				26					
			Very stiff reddish tan silty clay w/numerous cherty limestone fragments (completely weathered cherty limestone)	31					
20									
			Very stiff reddish brown fine sandy clay w/numerous chert and limestone fragments						
			- with weathered limestone seams below 23 ft	50/10"					
25									

COMPLETION DEPTH: 25.0 ft
DATE: 10-27-22

DEPTH TO WATER IN BORING: Dry

DATE: 10/27/2022

RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP11

090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 472+75, 65 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1280±						
			Very loose to loose tan silt w/chert and limestone fragments	4					
			Very stiff reddish brown fine sandy clay w/numerous chert fragments	50/9"			28		
5				50/6"					
			Very stiff reddish brown silty clay w/chert and limestone fragments and discontinuous chert seams and layers	49			74		
				50/10"					
10									
				50/10"					
15									
			Stiff reddish tan silty clay w/numerous chert and limestone fragments (completely weathered cherty limestone)	16					
20									
				17					
25									

COMPLETION DEPTH: 25.0 ft
DATE: 10-27-22

DEPTH TO WATER IN BORING: Dry

DATE: 10/27/2022

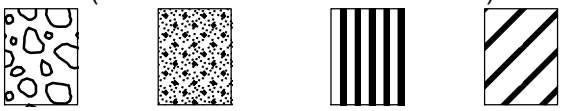
RECRQDN200-2 19-118_RAMP 1 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)

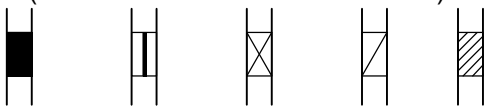


Gravel Sand Silt Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)



Shelby Tube | Rock Core | Split Spoon | No Recovery | Cutting

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (I) Clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	N-VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0-15%
LOOSE	4-10	15-35%
MEDIUM DENSE	10-30	35-65%
DENSE	30-50	65-85%
VERY DENSE	50 and above	85-100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) Inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FT.
VERY SOFT	Less than 0.25
SOFT	0.25-0.50
FIRM	0.50-1.00
STIFF	1.00-2.00
VERY STIFF	2.00-4.00
HARD	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.
FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
LAMINATED - composed of thin layers of varying color and texture.
INTERBEDDED - composed of alternate layers of different soil types.
CALCAREOUS - containing appreciable quantities of calcium carbonate.
WELL GRADED - having a wide range in grain sizes and substantial amounts of all intermediate particle sizes.
POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

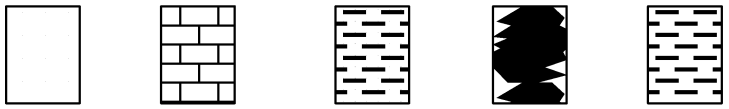
Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

KEY 3-14-12

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

BORING LOG TERMS – ROCK

ROCK TYPES
(SHOWN IN SYMBOLS COLUMN)



Sandstone Limestone Siltstone Coal Shale

Joint Characteristics –

Spacing	
Very Close	0.75 to 2.5 in.
Close	2.5 to 8 in.
Moderately Close	8 to 24 in.
Wide	2 to 6 ft
Very Wide	More than 6 ft

Bedding Characteristics –

Very Thin	0.75 to 2.5 in.
Thin	2.5 to 8 in.
Medium	8 to 24 in.
Thick	2 to 6 ft
Massive	More than 6 ft

Lithologic Characteristics –

Clayey
Shaly
Calcareous (limy)
Siliceous
Sandy (Arenaceous)
Silty
Plastic Seams

Parting – Less than 1/1 6inch
Seam – 1 /1 6o 1 /2inch
Layer – 1 /2to 1 2inches
Stratum – Greater than 1 2inches

Hardness–

Soft (S) – Reserved for plastic material alone.

Friable (F) – Easily crumbled by hand, pulverized or reduced to powder and is too soft to be cut with a pocket knife.

Low Hardness (LH) – Can be gouged deeply or carved with a pocket knife.

Moderately Hard (MH) – Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.

Hard (H) – Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.

Very hard (VH) – Cannot be scratched with a pocket knife. Knife steel marks left on surface.

Texture –

Fine – Barely seen with naked eye
Medium – Barely seen up to 1/8 in.
Coarse – 1 /8in. to 1 /4 in.

Structure –

Bedding
- Flat – 0° – 5°
- Gently Dipping – 5° – 35°
- Moderately Dipping – 55° – 85°
- Steeply Dipping – 55° – 85°

Fractures, scattered
- Open
- Cemented or Tight

Fractures, closely spaced
- Open
- Cemented or Tight

Brecciated (Sheared and Fragmented)
- Open
- Cemented or Tight

Joints
- Faulted
- Slickensides

Degree of Weathering –

Fresh – No visible signs of decomposition or discoloration. Rings under hammer impact.

Slighty Weathered – Slight discoloration inwards from open fractures, otherwise similar to fresh.

Moderately Weathered – Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock, but cores cannot be broken by hand or scraped by knife. Texture preserved.

Highly Weathered – Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric

Completely Weathered – Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.

Residual Soil – Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Solution and Void Conditions –

Solid, contains no voids
Vuggy (pitted)
Vesicular (igneous)
Porous
Cavities
Cavernous

Swelling Properties –

Nonswelling
Swelling

Slaking Properties –

Nonslaking
Slakes slowly on exposure
Slakes readily on exposure

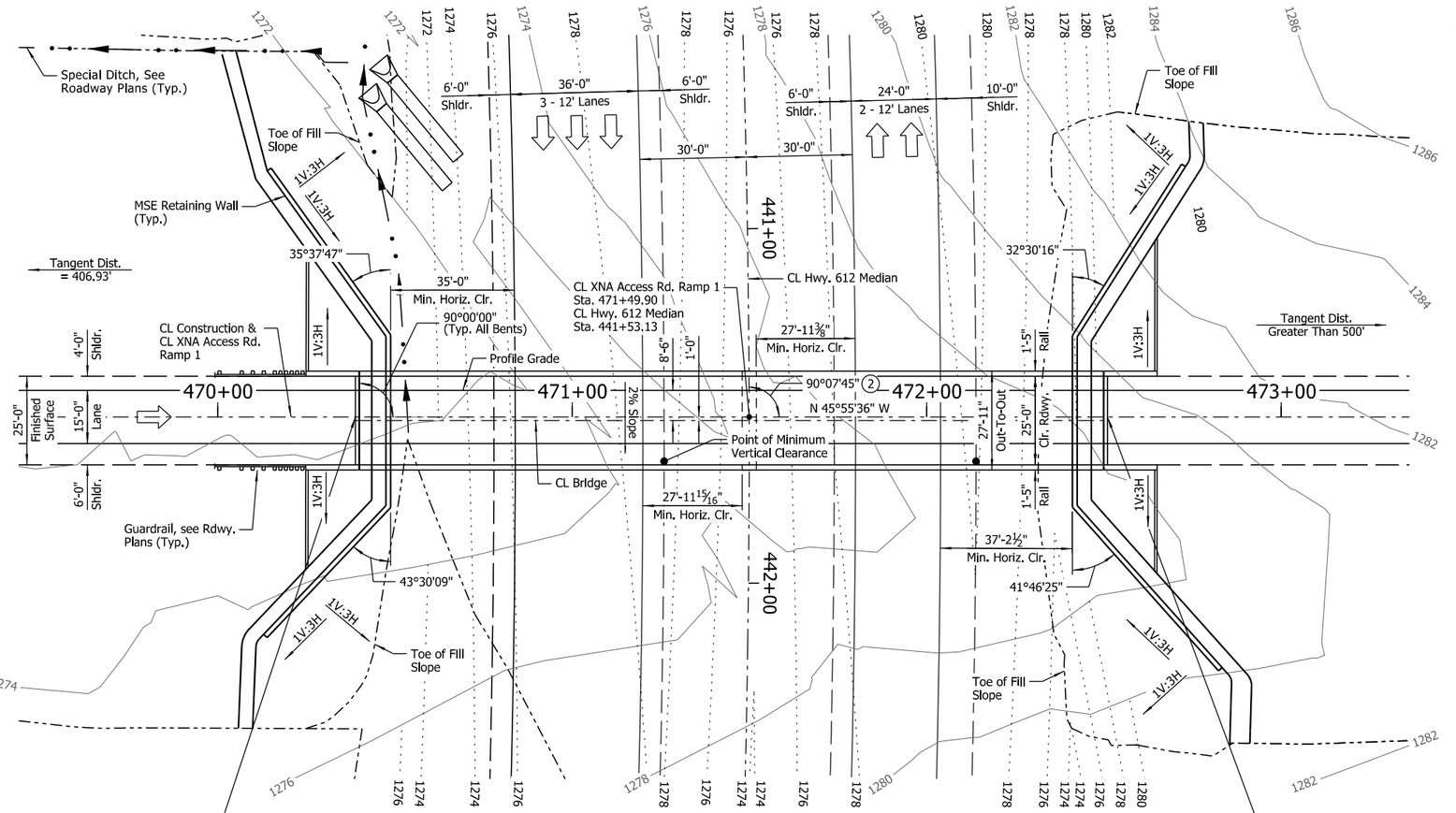
Rock Quality Designation (RQD) –

RQD (Percent)	Diagnostic Description
Greater than 90	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
Less than 25	Very Poor

KEYROCK FHWA 3-2-12

APPENDIX A

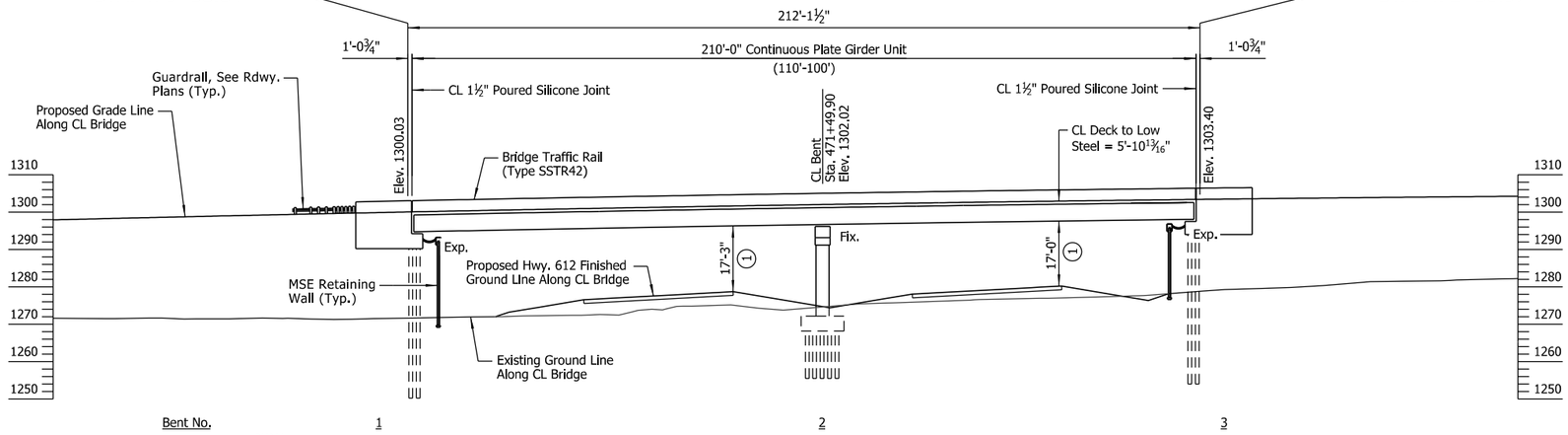
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		090069	$SN1101$	ST
				(1) $BN01$		LAYOUT		$DN1101$



PLAN

BEGIN BRIDGE
STA. 470+38.84

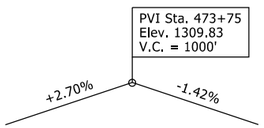
END BRIDGE
STA. 472+50.97



ELEVATION

NOTE:
Stations shown are along CL Construction. Elevations shown are actual top of deck elevations at CL Bridge. Any vertical dimension referenced to CL Deck is based on actual top of deck elevation at CL Bridge.

FOR R/W DATA, SEE ROADWAY PLANS



VERTICAL CURVE DATA
XNA Access Rd. Ramp 1
(Profile Grade 8.5' Left of CL Bridge)

LEGEND
XXXX = Existing Contours
XXXX = Job 012326 Proposed Contours

(1) Point of Minimum Vertical Clearance

(2) Angle measured between a line tangent to CL Hwy. 612 Median and CL XNA Access Rd. Ramp 1

PRELIMINARY NOT FOR CONSTRUCTION

BRIDGE ENGINEER

LAYOUT OF BRIDGE
XNA ACCESS RD. RAMP 1 OVER HWY. 612
NORTHWEST ARKANSAS
NATIONAL AIRPORT ACCESS (F)
BENTON COUNTY
ROUTE RT SEC. SC

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: CSW DATE: AUG. 2021 FILENAME: b090069x1_L1.dgn
CHECKED BY: JES DATE: SEPT. 2021 SCALE: 1" = 20'-0"
DESIGNED BY: CSW DATE: AUG. 2021
BRIDGE NO. $BN01$ DRAWING NO. $DN1101$

JESkilmer 9/30/2021 4:14:28 PM
WORKSPACE: ARDOT Bridge (2019)
L:\2017\17017600 - XNA Access - NEPA\Drawings\b090069x1_S101_LO.dgn
REVISED DATE:

APPENDIX B

19-118
RR-1
RUN1: 70-75'
RUN2: 75-80'
Grubbs, Hoskyn, Barton & Wyatt INC.
CONSULTING ENGINEERS

19-118
RP-3
RUN 1: 50-55'
RUN 2: 55-60'
Grubbs, Hoskyn, Barton & Wyatt INC.
CONSULTING ENGINEERS

APPENDIX C

SUMMARY of CLASSIFICATION TEST RESULTS

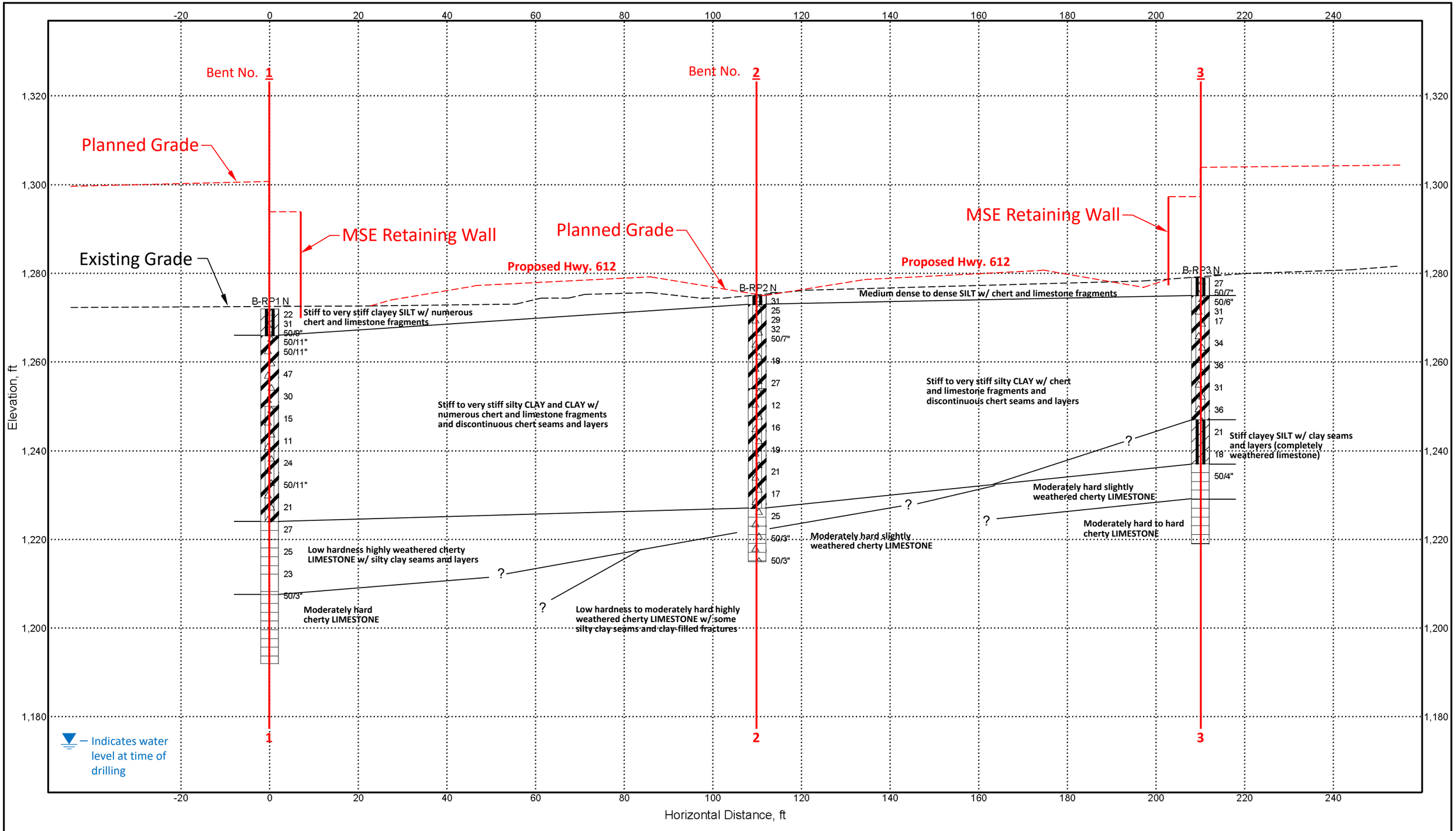
PROJECT: 090069 XNA Access Road - Ramp 1 over Hwy 612

LOCATION: Benton County, Arkansas

GHBW JOB NUMBER: 19-118

BORING No.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS PERCENT PASSING		USCS CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	#4	#200		
RP1	2.5-3.5	8	27	21	6	85	59	ML-CL	A-4
RP1	14-15	30	58	29	29	69	43	GC	A-7-6
RP1	29-30	53	53	42	11	80	50	MH	A-7-5
RP2	14-15	37	53	33	20	76	36	GM	A-7-5
RP2	34-35	30	56	31	25	50	29	GM	A-2-7
RP3	0.5-1.5	5	28	26	2	75	52	ML	A-4
RP3	9-10	36	62	37	25	97	90	MH	A-7-5
RP3	34-35	42	40	33	7	94	75	ML	A-4
RP4	4.5-5.5	19	50	23	27	73	35	SC	A-2-7
RP5	2.5-3.5	18	34	25	9	79	45	SM	A-4
RP5	6.5-7.5	20	63	37	26	54	25	GM	A-2-7
RP6	2.5-3.5	21	32	20	12	99	81	CL	A-6
RP6	6.5-7.5	25	39	28	11	55	26	GM	A-2-6
RP7	2.5-3.5	20	28	20	8	83	63	CL	A-4
RP7	14-15	36	53	36	17	86	37	SM	A-7-5
RP8	2.5-3.5	8	26	21	5	49	21	GM-GC	A-1-b
RP8	6.5-7.5	28	64	34	30	74	42	SM	A-7-5
RP9	0.5-1.5	15	23	20	3	60	44	GM	A-4
RP9	4.5-5.5	16	49	24	25	54	36	GC	A-7-6
RP10	4.5-5.5	35	47	26	21	74	54	CL	A-7-6
RP10	9-10	30	58	35	23	67	27	SM	A-2-7
RP11	2.5-3.5	12	35	19	16	55	28	GC	A-2-6
RP11	6.5-7.5	36	52	30	22	88	74	MH	A-7-5

APPENDIX D



Grubbs, Hoskyn, Barton & Wyatt, Inc.

NOTES:
1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
2. Ground surface approximate.

SCALE:
1" = 20' Horizontal
1" = 20' Vertical

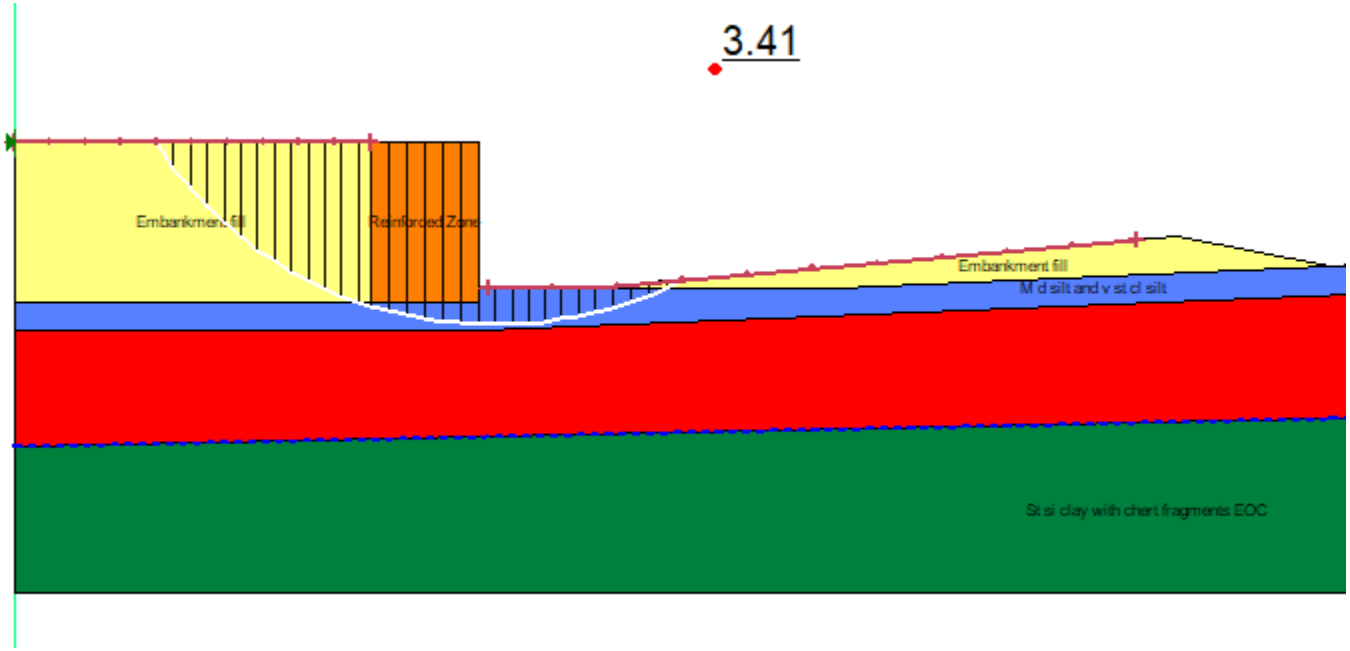
Generalized Subsurface Profile
090069 XNA Access Road - Ramp 1 over Hwy 612
Benton Co., Arkansas

Project Number: 19-118

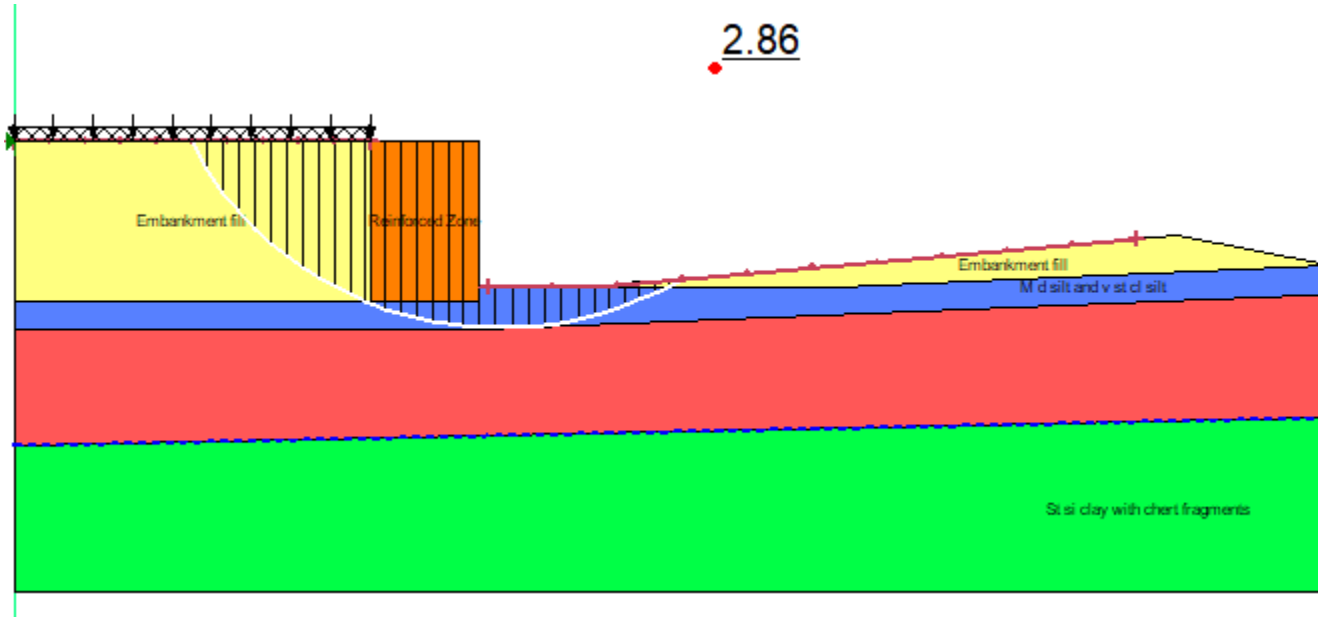
APPENDIX E

Summary of Stability Analysis Results
090069 XNA Access Road – Ramp 1 over Highway 612
GHBW Job No. 19-118
Benton County, Arkansas

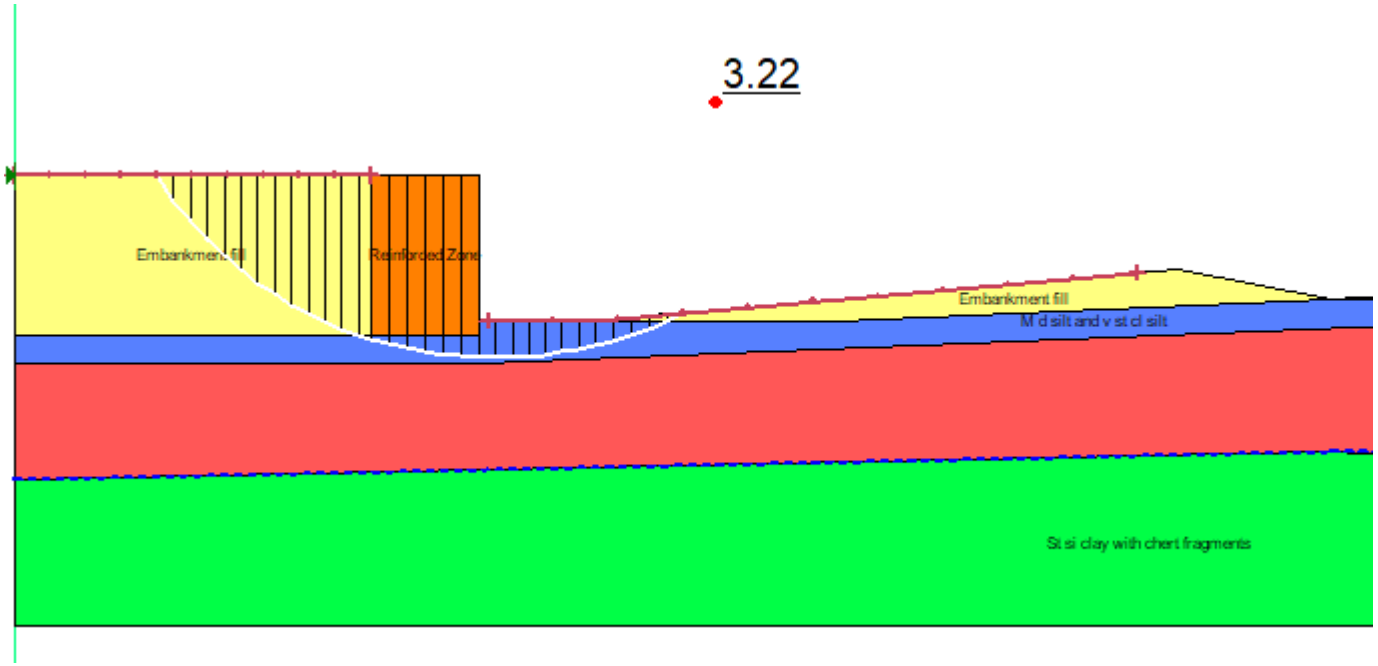
	Design Loading Condition	Calculated Minimum Factor of Safety
South MSE Wall Bent 1	End of Construction	3.41
	Long Term	2.86
	Seismic ($k_h = A_S/2 = 0.025$)	3.22
South Side Slope Bent 1 (3H:1V)	End of Construction	3.91
	Long Term	3.11
	Seismic ($k_h = A_S/2 = 0.025$)	3.07
North MSE Wall Bent 3	End of Construction	4.72
	Long Term	2.98
	Seismic ($k_h = A_S/2 = 0.025$)	3.43
North Side Slope Bent 3 (3H:1V)	End of Construction	4.55
	Long Term	3.27
	Seismic ($k_h = A_S/2 = 0.025$)	3.25



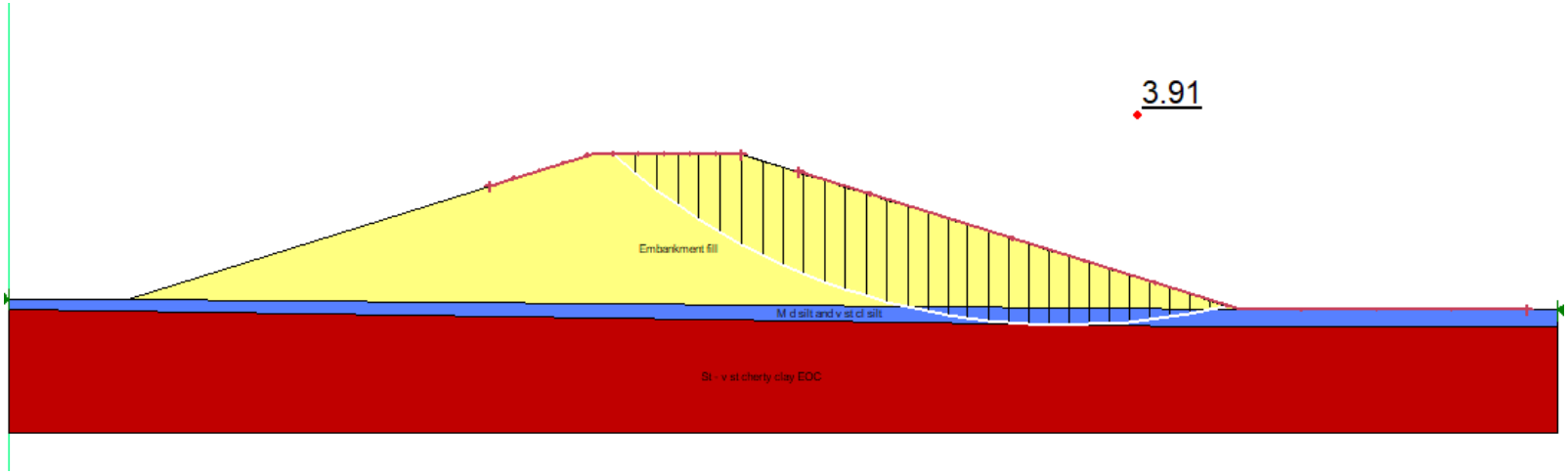
Results of Stability Analyses – End of Construction
Bent 1 - South MSE Wall
H=20 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



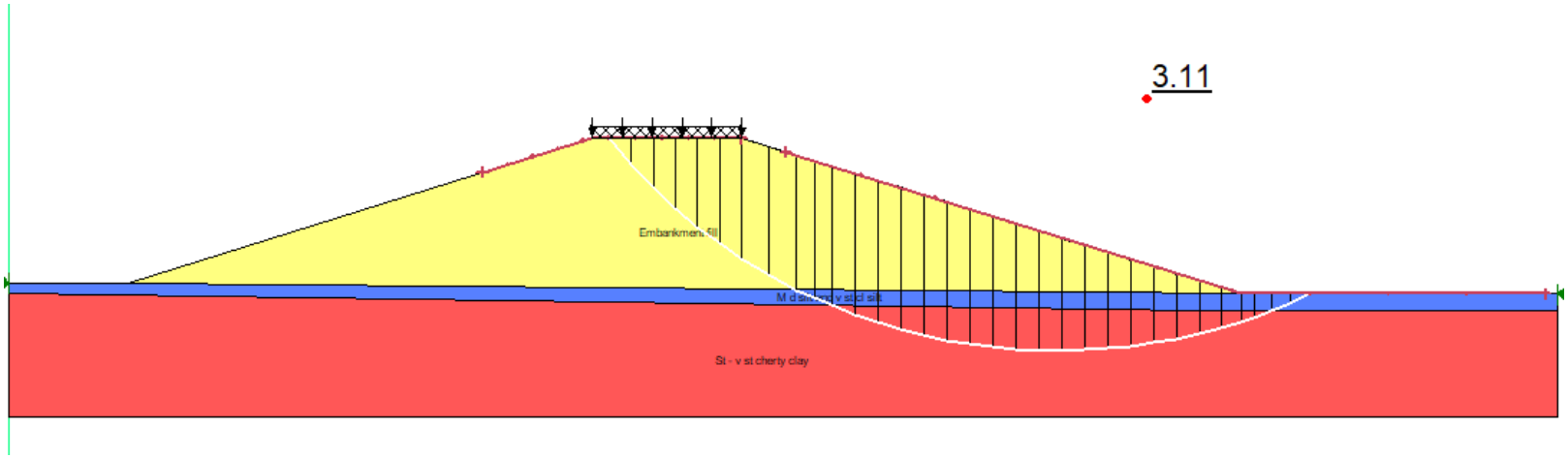
Results of Stability Analyses – Long Term Condition
Bent 1 - South MSE Wall
H=20 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



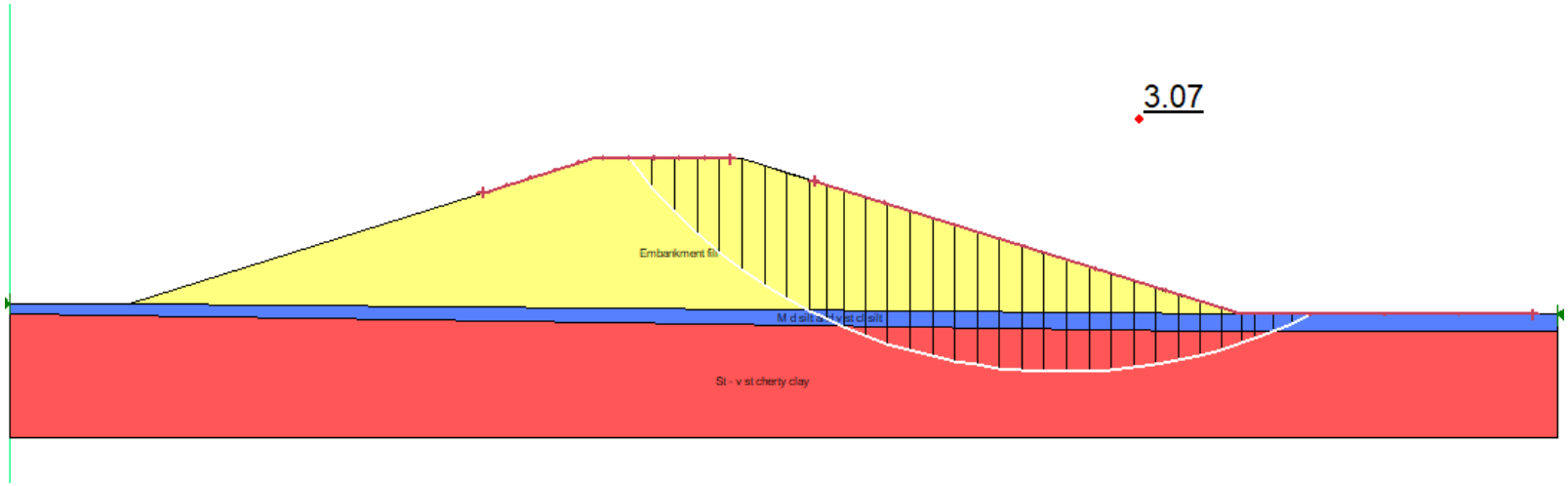
Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 1 - South MSE Wall
H=20 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



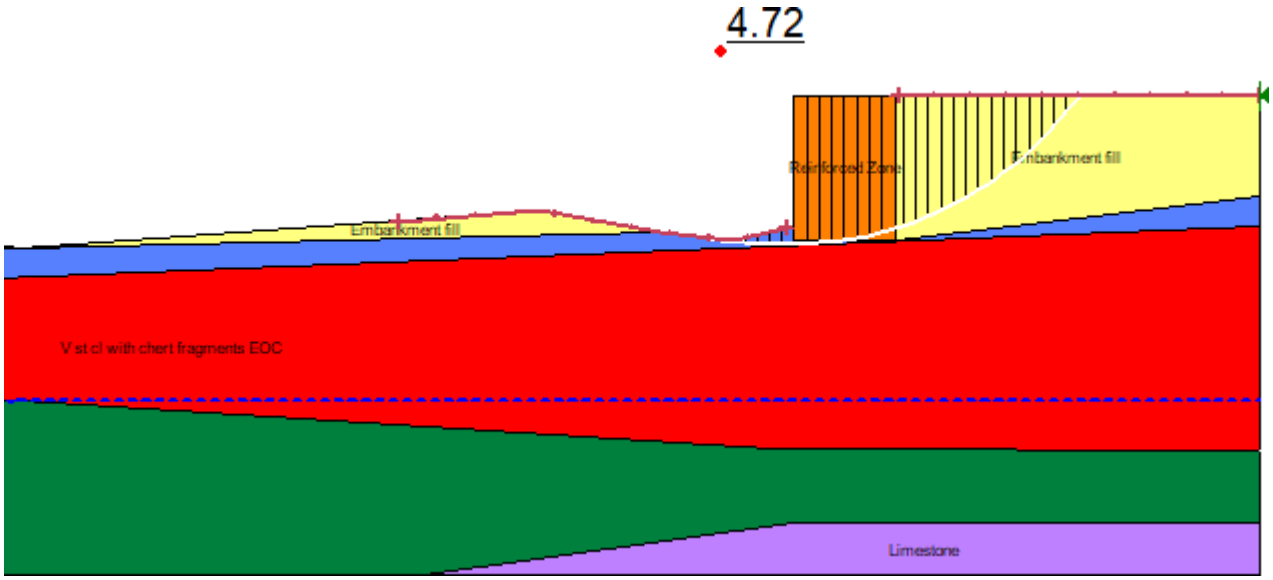
Results of Stability Analyses – End of Construction
Bent 1 - South Side Slope
3H:1V Slope, H=28 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



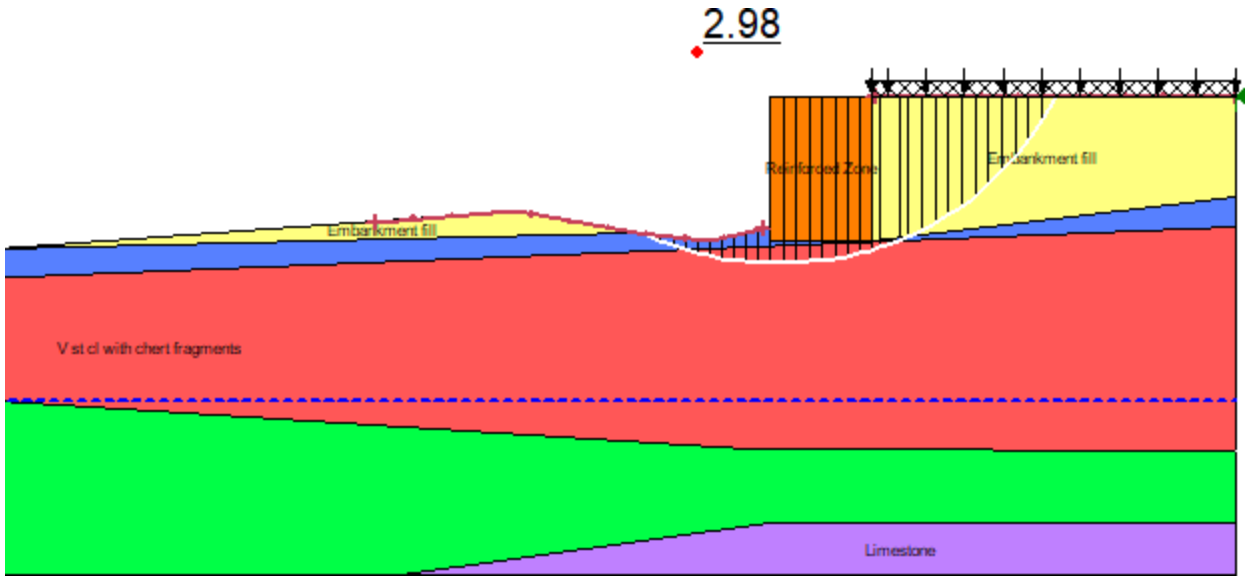
Results of Stability Analyses – Long Term Condition
Bent 1 - South Side Slope
3H:1V Slope, H=28 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



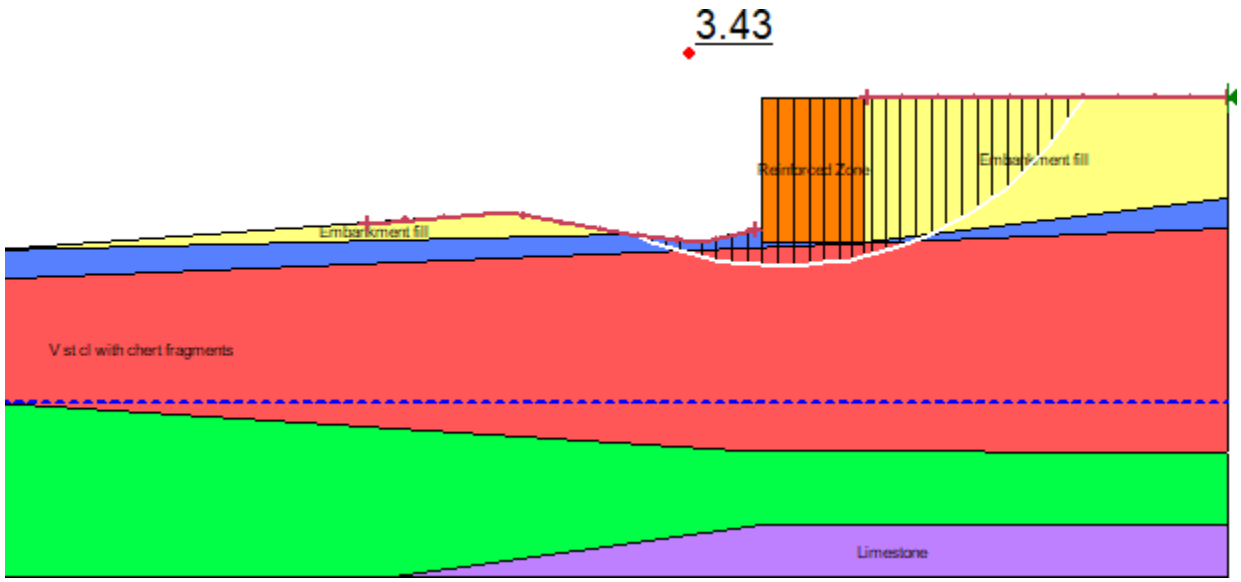
Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 1 - South Side Slope
3H:1V Slope, H=28 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



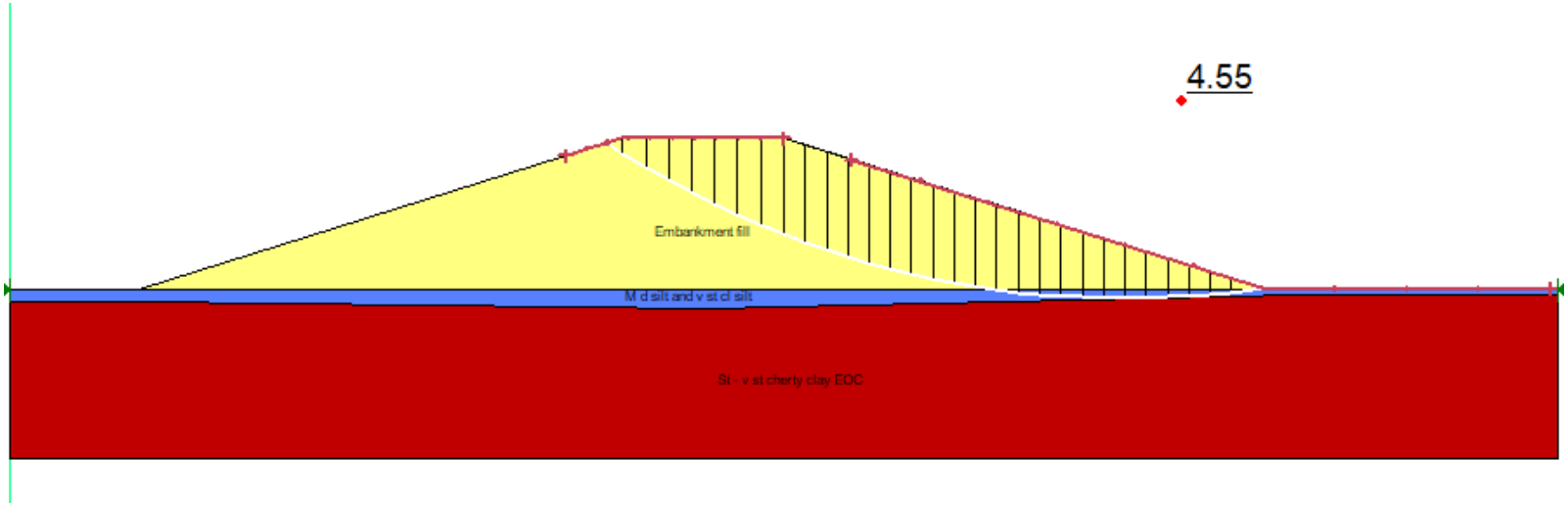
Results of Stability Analyses – End of Construction
Bent 3 – North MSE Wall
H=18 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



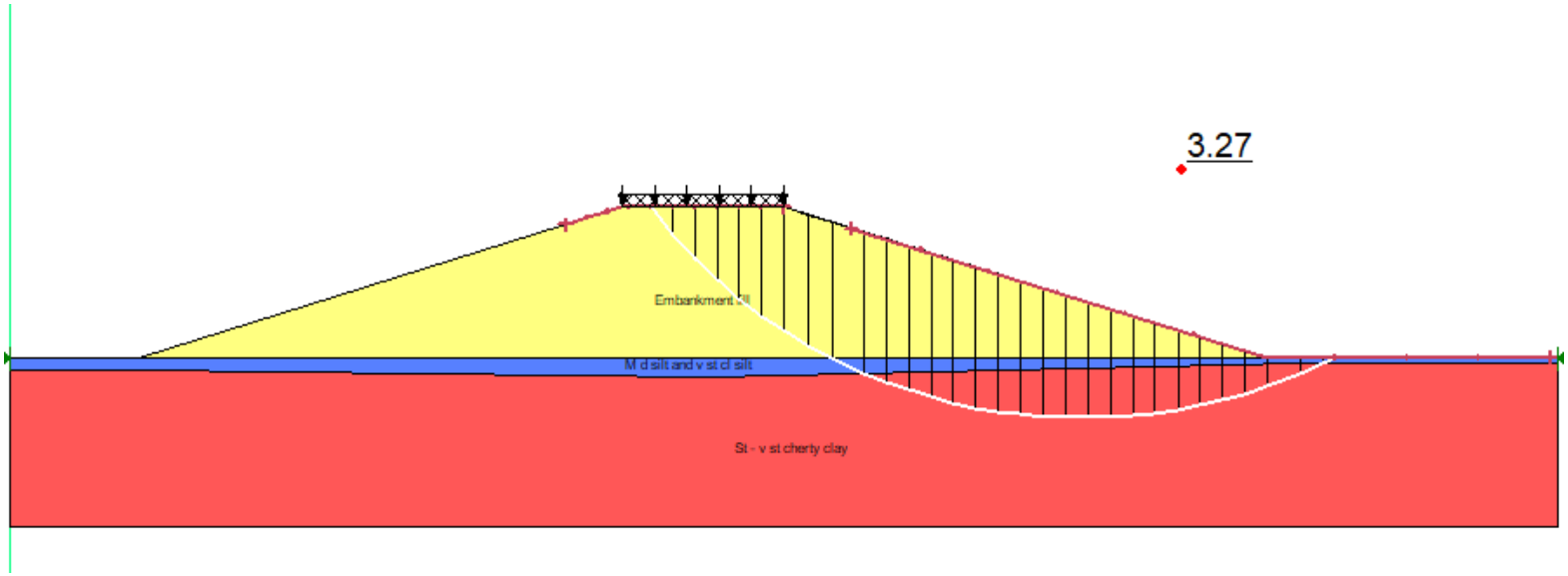
Results of Stability Analyses – Long Term Condition
Bent 3 – North MSE Wall
H=18 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



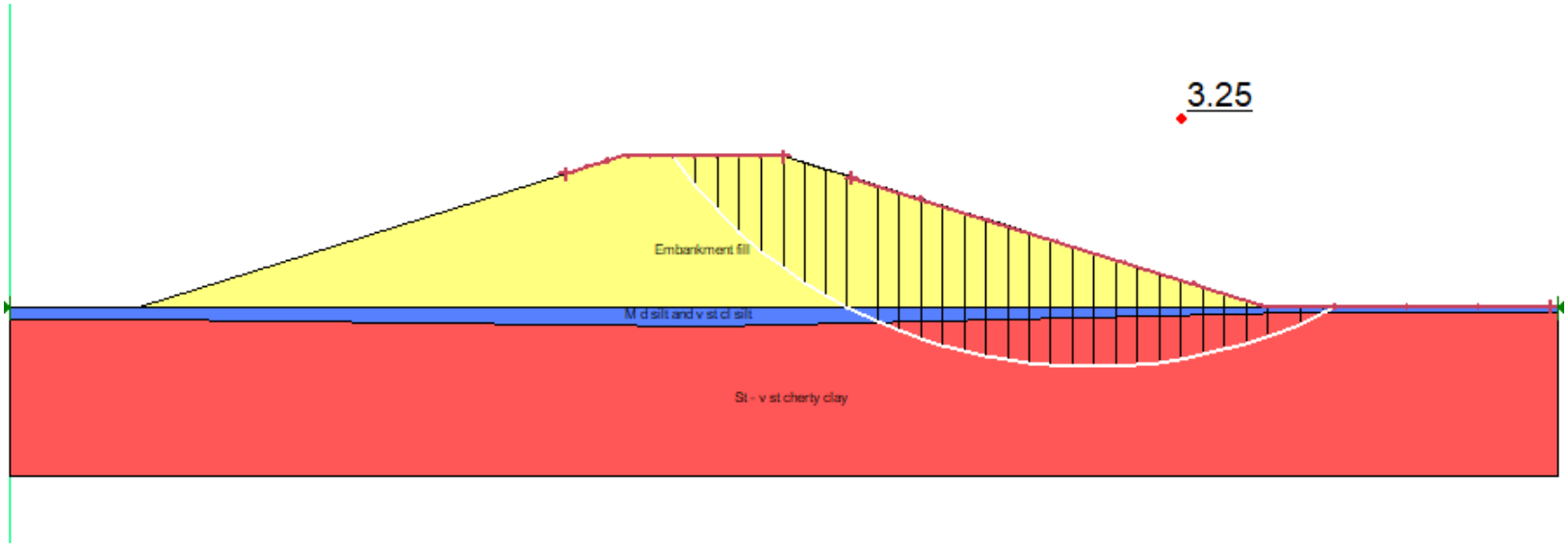
Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 3 – North MSE Wall
H=18 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



Results of Stability Analyses – End of Construction
Bent 3 - North Side Slope
3H:1V Slope, H=27 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



Results of Stability Analyses – Long Term Condition
Bent 3 - North Side Slope
3H:1V Slope, H=27 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612



Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 3 - North Side Slope
3H:1V Slope, H=27 ft ±
19-118 - 090069 XNA Access Road – Ramp 1 over Hwy. 612

Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

P.O. Box 30970
Little Rock, Arkansas 72260-0970
#1 Trigon Place 72209
(501) 455-2536
FAX (501) 455-4137

February 25, 2023
Job No. 19-118

Garver LLC
4701 Northshore Drive
North Little Rock, Arkansas 72118

Attn: Mr. Adam Wierciak, P.E.

RESULTS of GEOTECHNICAL INVESTIGATION
ARDOT JOB 090069 / 012326
XNA ACCESS ROAD RAMP 2 BRIDGE OVER HIGHWAY 612
BENTON COUNTY, ARKANSAS

INTRODUCTION

This report provides the results of the geotechnical investigation performed for the XNA Access Road Ramp 2 bridge over Highway 612 in Benton County, Arkansas. This project is part of the Job 090069 Northwest Arkansas Regional Airport Access (Benton Co) (F). The Ramp 2 project facet (and Ramp 1 as well) will be constructed as ARDOT Job 012326. This geotechnical investigation was authorized by the Garver, LCC Subconsultant Agreement for Task Order No. 061 on August 27, 2019. Notice to proceed with the field studies was received on August 30, 2019.

We understand the Ramp 2 bridge will be a continuous plate girder structure with three (3) bents, two (2) spans, and a total length of approximately 221.3 feet. We also understand that a foundation system consisting of steel H-piles is planned. Foundation loads of the new bridge are anticipated to be moderate. The bridge end embankments will utilize MSE walls at bridge abutments and simple slopes at 3-horizontal to 1-vertical (3H:1V) configurations at the embankment sides. Site grading is expected to include up to 7 ft of cut and 20 ft of fill. A preliminary bridge layout is provided in Appendix A.

The purposes of this study were to explore subsurface conditions in the bridge alignment and to develop recommendations to guide design and construction of foundations. These purposes have been achieved by a multi-phased study that included the following.

- Drilling sample borings at the planned bridge location to evaluate subsurface conditions and obtain samples of the subgrade and foundation soil and rock for laboratory testing.
- Performing laboratory tests to evaluate pertinent engineering properties of the foundation and subgrade strata.

- Analyzing field and laboratory data to develop recommendations for seismic site class, seismic performance zone/seismic design category, foundation and subgrade support, slope stability, and construction considerations.

The relationship of these factors to design and construction of the new bridge has been considered in developing the recommendations and considerations discussed in the following report sections.

SUBSURFACE EXPLORATION

At the Ramp 2 bridge location subsurface conditions were investigated by drilling 12 sample and core borings to depths of 15 to 74 feet. The site vicinity is shown on Plate 1. The approximate boring locations are shown on the bridge layout drawing on Plate 2. The subsurface exploration program is summarized in Table 1 below.

Table 1: Summary of Exploration Program

Boring No.	Approx Sta	Approx Offset, ft	Approx Surf El, ft	Completion Depth, ft
RP12	428+55	CL	1286	49
RP13	429+60	CL	1283	65
RP13A	429+55	CL	1283	74
RP14	430+75	CL	1282	49
RP15	428+10	50 Lt	1286	25
RP16	428+45	30 Lt	1284	25
RP17	428+75	30 Rt	1286	25
RP18	428+65	55 Rt	1288	25
RP19	430+75	60 Lt	1278	25
RP20	430+60	25 Lt	1280	25
RP21	430+80	25 Rt	1283	15
RP22	431+25	50 Rt	1284	25

The boring logs, presenting descriptions of the soil and rock strata encountered in the borings and the results of the field and laboratory tests, are included as Plates 3 through 18. The centerline station and offset of the boring locations and approximate ground surface elevation, as inferred from the topographic information provided by the Engineer (Garver, LLC) or as inferred from available topographic information, are also shown on the logs. It must be recognized that the surface elevations shown are approximate and actual elevations may vary. Keys to the terms and symbols used on the logs are presented as Plates 19 and 20.

The borings were drilled with a track-mounted CME 55 rotary-drilling rig using a combination of dry-auger and rotary-wash drilling methods. Samples were typically obtained at 2-ft intervals to 10-ft depth and at 5-ft intervals thereafter. Samples were recovered using a 2-in.-diameter split-barrel sampler driven into the strata by blows of a 140-lb automatic hammer with 30-in. drop in accordance with Standard Penetration Test (SPT) procedures. The number of blows required to drive the standard split-barrel sampler the final 12 in. of an 18-in. total drive, or a portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the boring logs in the "Blows Per Ft" column.

Representative samples of the limestone bedrock were obtained using a 5-ft-long NQ_{WL}-size double-tube core barrel with a diamond bit. For each core run, the percent recovery was determined as the ratio of recovery to total length of core run. Rock Quality Designation (RQD) was also determined for the core run as the sum of intact, sound rock core greater than 4-in. length divided by the total length of the run and expressed in percent. Both these values are presented in the right-hand columns of the log forms, opposite the corresponding core run. Photographs of the recovered rock cores are provided in Appendix B.

All samples were removed from sampling tools in the field, examined and visually classified by the field geologist. Samples were then placed in appropriate containers to prevent moisture loss and/or change in condition during transfer to our laboratory for further examination and testing.

The borings were advanced using dry-auger procedures to the extent possible to facilitate evaluation of shallow groundwater conditions. Observations regarding groundwater levels are noted in the lower-right portion of each log and are discussed in subsequent sections of this report. All boreholes were backfilled after obtaining the final water level readings.

LABORATORY TESTING

Laboratory testing was performed to evaluate subgrade and foundation plasticity and to confirm visual classification. The testing program included natural water content determinations (AASHTO T 265), liquid and plastic (Atterberg) limit determinations (AASHTO T 89 and T 90), and sieve analyses through the No. 200 sieve (AASHTO T 88). Soil shear strength was estimated in the field using SPT results.

A total of 105 natural water content determinations were performed to develop information on *in-situ* soil water content for each boring. Water content results are plotted on the boring log

forms in accordance with the scale and symbols shown in the legend located in the upper-right corner of the logs.

To verify field classification and to evaluate soil plasticity, 17 liquid and plastic limit (Atterberg limits) determinations and 17 sieve analyses were performed on selected representative samples. The Atterberg limits are plotted on the logs as pluses inter-connected with a dashed line using the water content scale. The percentage of soil passing the No. 200 Sieve is noted in the "-No. 200 %" column on the appropriate log forms. Classification test results, along with soil classification by the Unified Soil Classification System and AASHTO designations, are summarized in Appendix C. Grain-size distribution curves are also included in Appendix C.

GENERAL SITE and SUBSURFACE CONDITIONS

Site Conditions

The XNA Access Road alignment extends from the Northwest Arkansas Airport (XNA) about a length of about 4 miles southeast to the planned terminus at Highways 70 and 71. The Ramp 2 over Highway 612 bridge site is located approximately 900 ft north of Marchant Road and 200 ft west of an unnamed farm access road. The site locale is open agricultural land. A residential house and barn are present southeast of the bridge location. The site terrain slopes gently from the northwest to the southeast. Surface drainage is considered fair.

Site Geology

The project alignment is located in the mapped exposure of the Boone Formation. The early and middle Mississippian Period Boone consists of fine- to coarse-grained limestone interbedded with chert. The chert content can vary widely, both horizontally and vertically, and limestone or chert may be predominant. The Boone Formation is known for dissolutional features such as sinkholes, caves, and enlarged fissures. Typically, the limestone/cherty limestone units of the Boone decompose (weather) to erratic blends of chert fragments and clay/silty clay. The residual soil mantle may extend to significant depths on higher terrain and may contain hard chert seams and/or layers. The thickness of the Boone Formation is reported to be 300 to 350 ft in northern Arkansas. The Boone is generally disconformable to the underlying Chattanooga Shale and St. Joe Limestone member, with some areas having a conformable contact.

Seismic Conditions

In light of the results of the borings, a Seismic Site Class C (very dense soil and soft rock profile) is considered applicable for the site with respect to the criteria of the AASHTO LRFD Bridge Design Specifications Seventh Edition 2014[1].

Given the location and AASHTO code-based values, the 1.0-sec period spectral acceleration coefficient for Site Class C (S_1) is 0.051 and the 1.0-sec period spectral acceleration coefficient (S_{D1}) value for Site Class C is 0.087. Utilizing these parameters, Table 3.10.6-1[2] indicates that a Seismic Performance Zone 1 is fitting for the Ramp 2 bridge site. In reference to the 2011 edition of the AASHTO Guide Specifications, the Peak Ground Acceleration (PGA) having a 7 percent chance of exceedance in 75 years (or mean return period of approximately 1000 years) is predicted to be 0.05 for a Seismic Site Class C for the bridge location. The liquefaction potential is considered negligible for the predominantly cohesive overburden soils and underlying rock units encountered in the borings drilled for this study.

Subsurface Conditions

Based on the results of the borings, the subsurface stratigraphy may be generalized into three (3) primary strata as follows.

Stratum I: The soils are comprised of tan loose to dense tan fine sandy silt and soft to firm brown to reddish tan clayey silt with chert fragments and organics to depths of 2 to 4 ft below existing grades. The fine sandy silt and clayey silt exhibit low plasticity, moderate to high compressibility, and low shear strength. The silty soils are moisture-sensitive and will lose considerable strength when saturated.

Stratum II: Below the predominantly weak surface and near-surface silty soils of Stratum I to 40- to 67-ft depth is stiff to very stiff red, reddish brown, and gray clay and silty clay with a variable content limestone and chert fragments and discontinuous chert seams and layers. The clay and silty are residual in origin and have weathered from the underlying cherty limestone bedrock. There are occasional and discontinuous weak soil zones at the base of this stratum. This weak zone is considered to represent a mix of poorly consolidated clay and completely weathered limestone. The clay and silty clay have low to high plasticity, low to moderate shear strength, and low compressibility. The potential for volume change with changes in water content is considered low due to the presence of numerous limestone and chert fragments.

Stratum III: The overburden soils are underlain by moderately hard to hard gray arenaceous limestone and cherty limestone. The arenaceous limestone/cherty

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1 AASHTO LRFD Bridge Design Specifications, 7th Edition; AASHTO; 2014

2 AASHTO LRFD Bridge Design Specification, AASHTO; 2012

limestone is flat bedded with occasional chert nodules and stylolitic joints. Rock core recovery values range from 97 to 100 percent and rock quality designation (RQD) values ranging from 63 to 100 percent. These RQD values are indicative of fair to good rock quality.

To aid in visualizing subsurface conditions, a generalized subsurface profile is presented in Appendix D. It should be recognized that the stratigraphy illustrated by the profile has been inferred between discrete boring locations. In view of the natural variations in stratigraphy and conditions, variations from the stratigraphy illustrated by the profile should be anticipated. Additionally, the natural transition between strata is generally gradual, and the stratigraphy described in the sections above may vary.

Groundwater Conditions

Groundwater was not encountered within the exploration range of the borings in August and September 2022. It has been our experience in the area that localized shallow perched groundwater can be present in the silty overburden soils and fractured zones of the cherty limestone. Groundwater levels will vary, depending on seasonal precipitation, surface runoff and infiltration, and water levels in nearby drainage features.

ANALYSES and RECOMMENDATIONS

Foundation Design

Foundations for the new bridge must satisfy two (2) basic and independent design criteria: a) foundations must have an acceptable factor of safety against bearing failure under maximum design loads, and b) foundation movement due to consolidation or swelling of the underlying strata should not exceed tolerable limits for the structures. Construction factors, such as installation of foundations, excavation procedures and surface and groundwater conditions, must also be considered.

Based on the results of the borings performed at the Ramp 2 bridge site and our understanding of the project, we recommend that foundation loads at the abutments and interior bents be supported on steel piling. Recommendations for steel piles are discussed in the following report sections.

Piling Foundations

We recommend that the foundation loads of the bridge be supported on steel HP12x53 or HP14x73 piles. Other pile sizes or types may be evaluated if desired. Point-bearing steel piles driven to refusal should extend through any new embankment fill, the natural overburden soils

(Strata I and II), and any zones of highly weathered limestone to develop safe bearing capacity in the competent moderately hard to hard arenaceous limestone/cherty limestone. End-bearing piles should be driven to practical refusal in the moderately hard to hard limestone. We recommend that all steel piles be fitted with rock points.

Steel piles driven to refusal should be designed for the structural capacity of the pile, as per applicable AASHTO Load and Resistance Factor Design (LRFD) procedures[3]. An effective resistance factor (φ_c) of 0.50 is recommended for structural determination of factored bearing capacities. This effective resistance factor for steel piles has been based on the assumption of severe driving conditions.

For determination of bearing capacities of steel piles driven to refusal we recommend that nominal (ultimate) resistance (P_n) of HP piles be determined based on the yield strength of steel H piles (f_y) and the net end area (A_{net}) of the section. It has been our experience that allowable pile capacities of 96 tons for HP12x53 piles and 133 tons for HP14x73 piles are typical for f_y = 50 ksi steel pile sections. These capacities are based on allowable stress design (ASD). However, the appropriate factored bearing capacity should be confirmed by the Engineer. Post-construction settlement of piles driven to refusal will be negligible.

The nominal axial capacities are based on single, isolated foundations. Piles spaced closer than three (3) pile widths may develop lower individual capacity due to group effects. The potential for group capacity reductions should be evaluated for pile spacing closer than three (3) widths (center to center).

Estimated pile tip elevations are summarized below in Table 2.

Estimated Tip Elevations of Steel Piles Driven to Refusal

Bent No.	Estimated Pile Tip Elevation, ft	Comments
1 (North Bridge End)	1244	Refusal in hard limestone
2 (Approx Sta 429+61)	1216	Refusal in moderately hard limestone
3 (South Bridge End)	1239	Refusal in moderately hard limestone

It should be noted that the tip elevations shown in the table above are an estimate only based on the results of the relevant borings and the inferred surface elevations at the particular locations. Pile refusal and final depth must be field verified.

[3] Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures, Publication No. FHWA HI-98-032, National Highway Institute, May 2001.

Piles should be installed in compliance with Standard Specifications for Highway Construction, 2014 Edition, Section 805. We recommend a hammer delivering a minimum energy of 22,000 ft-lbs per blow. A specific review and analysis of the pile-hammer system proposed by the Contractor should be performed by the Engineer prior to hammer acceptance and start of driving. We recommend that all piles be fitted with rock points.

A minimum pile length of 10 ft is recommended. Preboring is not generally expected to be required for pile installation. However, some preboring could be required where resistant chert layers are encountered at shallow depth. As a minimum, safe bearing capacity of piles should be determined by ARDOT Standard Specifications Section 805.09, Method A. Driving records should be available for review by the Engineer during pile installation. Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may be defined as a penetration of 0.5 in. or less for the final 10 blows. Driving records should be available for review by the Engineer during pile installation.

MSE Walls

The project includes mechanically stabilized earth (MSE) retaining walls on both bridge ends of Ramp 2. Plan wall height varies from a nominal 2 ft to 19 ft, with the maximum height of the walls near the center of the wall alignment and the height tapering out away from the bridge ends and parallel to the roadway. Design of MSE walls must include consideration of both internal and external stability. Design with respect to internal stability must be performed by the specific wall designer based on final plans and configurations. Analyses have been performed to verify external (global) stability and bearing capacity.

MSE Wall Bearing

The subgrade and foundation soils in the wall alignment generally consists of stiff to very stiff clay and silty clay with numerous chert fragments. These soils exhibit moderate shear strength and low compressibility. Depending on final grading plans, some undercut and replacement will be required to improve bearing capacity and to limit settlement. MSE wall bearing recommendations are summarized below.

1. Bent 1 – North bridge end
    a. Undercut as needed to stiff to very stiff clay with chert fragments
        i. Localized undercuts on the order of 2 ft, more or less, could be required to develop suitable bearing.

ii. Backfill any undercut with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).

iii. Nominal bearing on stiff to very stiff clay: 15,400 lbs per sq ft

2. Bent 3 – South bridge end

   a. Undercut as needed to stiff to very stiff clay with chert fragments

      i. Localized undercuts on the order of 2 ft, more or less, could be required to develop suitable bearing.

      ii. Backfill any undercut with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).

      iii. Nominal bearing on stiff to very stiff clay: 15,400 lbs per sq ft

3. Resistance factor (φ_b) for bearing resistance: 0.65
4. Resistance to sliding: 0.35
5. Resistance factor (φ_τ) for sliding resistance: 1.0

The MSE wall leveling pads and reinforced zones should bear as recommended above and at a minimum depth of 2 ft below lowest adjacent grade. A minimum wall embedment of 2 ft and a minimum reinforcement length of 0.7H or 8 ft, whichever is greater, is recommended. Subgrade and foundation preparation in the wall locations and under all embankments must include stripping all organics and thorough proof-rolling.

The suitability of the MSE wall bearing stratum must be field verified by the Engineer at the time of construction. Where undercuts are warranted, these should extend a minimum horizontal distance determined by a 1-horizontal to 1 -vertical (1H:1V) projection beyond the reinforced zone to the undercut bottom.

Where seepage into undercuts is apparent or positive drainage cannot be assured, Select Granular Backfill should be fully encapsulated in a filter fabric geotextile complying with ARDOT Standard Specifications Subsection 625.02, Type 2.

Stability analyses results are summarized and presented graphically in Appendix E. The results of the stability analyses indicate that plan configurations of the MSE walls are acceptable with respect to stability of all loading conditions evaluated.

Embankment Slopes

The bridge end embankments will utilize MSE walls at the bridge abutments and simple slopes at 3-horizontal to 1-vertical (3H:1V) configurations on the embankment sides. The bridge embankments will have maximum heights of about 27 feet.

To evaluate suitability of the end MSE walls and the side slope plan configurations, slope stability analyses have been performed. A 250 lbs per sq ft uniform surcharge from vehicles was included for the purposes of stability analyses. Stability analyses were performed using the computer program SLOPE/W 2020[4] and utilizing a Morgenstern-Price analysis. For the embankment slopes, three (3) general loading conditions were evaluated, i.e., End of Construction, Long Term, and Seismic Conditions For analysis of the seismic condition, a horizontal seismic acceleration coefficient (k_h) of one-half the peak acceleration (A_s) was used, a value of 0.025.

Stability analyses results are summarized and presented graphically in Appendix E. The results of the stability analyses indicate that plan configurations of the embankment end MSE walls and side slopes are acceptable with respect to stability of all loading conditions evaluated.

Subgrade Support

The results of the borings indicate the on-site subgrade soils generally consist of clay and silty clay with chert fragments (AASHTO A-2-6, A-2-7, A-4, A-6, A-7-5, and A-7-6). Given the anticipated new embankment, the approach roadway subgrade is likely to consist of embankment fill. Locally-available borrow, which is likely to be used as unclassified embankment fill, is expected to have similar classification.

We recommend that any soils classifying as A-7-5 or A-7-6 and soils with a plasticity index (PI) in excess of 18 be excluded from use as subgrade within 18 in. of the plan subgrade elevation. The as-built pavement subgrade should be evaluated by the Engineer. Areas of unstable or otherwise unsuitable subgrade should be improved by undercut and replacement or treatment with additives approved by the Engineer.

Based on the results of the borings and laboratory tests for the silty clay with chert fragments subgrade and correlation with the AASHTO classification, we recommend the following parameters for use in design of pavements.

- CBR value: 8.3
- Resilient Modulus (M_R): 3260 lbs per sq in.
- R value: 13
- Modulus of Subgrade Reaction (k): 100 lbs per cu in.

Site Grading and Subgrade Preparation

Site grading and site preparation in the project alignment should include necessary clearing and stripping of the organic-containing surface soils in work areas. In general, the stripping depth

[4] Slope/W 2020; GEO-SLOPE International; 2020.

is estimated to be about 6 to 9 inches. The zone of organic surface soils should be completely stripped in the embankment footprint areas and at least 5 ft beyond the projected embankment toe.

Following stripping and prior to fill placement, the extent of weak and unsuitable soils should be determined. Thorough proof-rolling should be performed to verify subgrade stability. Proof-rolling should be performed with a loaded tandem-wheel dump truck or similar equipment. Unstable soils exhibiting a tendency to rut and/or pump should be undercut and replaced with suitable fill. Care should be taken that undercuts, stump holes, and other excavations or low areas resulting from subgrade preparation are properly backfilled with compacted fill.

Based on the results of the borings, the zone of weak surface soils extends to a depth of about 2 ft below existing grades, more or less. General undercuts for site grading may be backfilled with unclassified borrow used for embankment fill. Undercuts under MSE wall foundations should be backfilled with ARDOT Standard Specifications Section 303, Class 7 crushed stone aggregate base or Select Granular Backfill (AASHTO M43 No. 57).

In lieu of undercutting and replacing unsuitable soils in roadway areas, consideration may be given to using additives to improve soil workability and to stabilize weak areas. Hydrated lime, quick lime, Portland cement, fly ash, or suitable alternate materials may be used as verified by appropriate testing and approved by the Engineer. Additives can be effective where the depth of unstable soils is relatively shallow. Treatment will be less effective in areas where the zone of unstable soils is deep. The optimum application rate of stabilization additive must be determined by specific laboratory tests performed on the alignment subgrade soils. We recommend a minimum treatment depth of 8 inches.

Subgrade preparation and mass undercuts should extend at least 5 ft beyond the embankment toes to the extent possible. Subgrade preparation in roadway areas should extend at least 3 ft outside pavement shoulder edges to the extent possible.

Fill and backfill may consist of unclassified borrow free of organics and other deleterious materials as per ARDOT Standard Specifications Subsection 210.06. Where A-7-5 or A-7-6 soils are encountered at the subgrade elevation, we recommend that these soils be undercut as required to provide at least 18 in. of suitable low-plasticity subgrade soils, i.e., with a maximum PI of 18, or approved “hillside” cherty clay with a maximum of 35 percent passing the No. 200 sieve. Alternatively, stabilization additives may be utilized to develop a stable subgrade with a PI of 18 or less. Granular soils must be protected from erosion with a minimum 18-in.-thick armor of clayey soil.

Subgrade preparation should comply with ARDOT Standard Specifications Section 212. Embankments should be constructed in accordance with ARDOT criteria (ARDOT Standard Specifications Section 210). Fill and backfill should be placed in nominal 6- to 10-in.-thick loose lifts. All fill and backfill must be placed in horizontal lifts. The in-place density and water content should be determined for each lift and should be tested to verify compliance with the specified density and water content prior to placement of subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Groundwater and Seepage Control

Positive surface drainage should be established at the start of the work, be maintained during construction and following completion of the work to prevent surface water ponding and subsequent saturation of subgrade soils. Density and water content of all earthwork should be maintained until embankments, bridge work, and pavements are completed.

Groundwater was not encountered in the borings in August and September 2022. Shallow perched groundwater may be encountered in the near-surface soils in wet seasons. Seepage into excavations and cuts can typically be controlled by ditching or sump-and-pump methods. If seepage infiltration cannot be controlled, construction of drains and/or the use of Select Granular Backfill (AASHTO M 43 No. 57), stone backfill (ARDOT Standard Specifications Section 207), or approved alternates to an elevation above the inflow of seepage will be warranted. In areas of seepage infiltration, the granular fill should be encapsulated with a filter fabric complying with ARDOT Standard Specifications Subsection 625.02, Type 2 and vented to positive discharge. Where surface seeps or springs are encountered during site grading, we recommend the seepage be directed via French drains or blanket drains to positive discharge at daylight or to storm drainage lines.

Piling

Piles should be installed in compliance with ARDOT Standard Specifications, Section 805. Piles should be carefully examined prior to driving and piles with structural defects should be rejected. Any splices in steel piles should develop the full cross-sectional capacity of un-spliced piles. Pile installation should be monitored by qualified personnel to maintain specific and complete driving records and observe pile installation procedures. Safe bearing capacity of production piles should be determined by ARDOT Standard Specifications Section 805.09, Method A. Driving records should be available for review by the Engineer during pile installation. For driving steel piles on this project, we recommend a minimum hammer energy of 22,000 ft-lbs

per blow. Blow counts on steel piles should be limited to about 20 blows per inch. Practical pile refusal may be defined as a penetration of 0.5 in. or less for the final 10 blows.

CLOSURE

The Engineer or a designated representative thereof should monitor site preparation, grading work and foundation and pavement construction. Subsurface conditions significantly at variance with those encountered in the borings should be brought to the attention of the Geotechnical Engineer. The conclusions and recommendations of this report should then be reviewed in light of the new information.

The following illustrations are attached and complete this submittal.

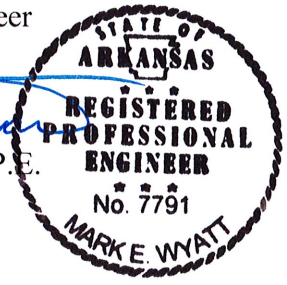
Plate 1	Site Vicinity
Plate 2	Plan of Borings
Plates 3 through 18	Boring Logs
Plates 19 and 20	Keys to Terms and Symbols
Appendix A	Preliminary Bridge Layout
Appendix B	Rock Core Photographs
Appendix C	Laboratory Test Results
Appendix D	Generalized Subsurface Profile
Appendix E	Stability Analyses Results

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, or if we may be of additional assistance, please call on us.

Sincerely,

GRUBBS, HOSKYN,
BARTON &WYATT, INC.

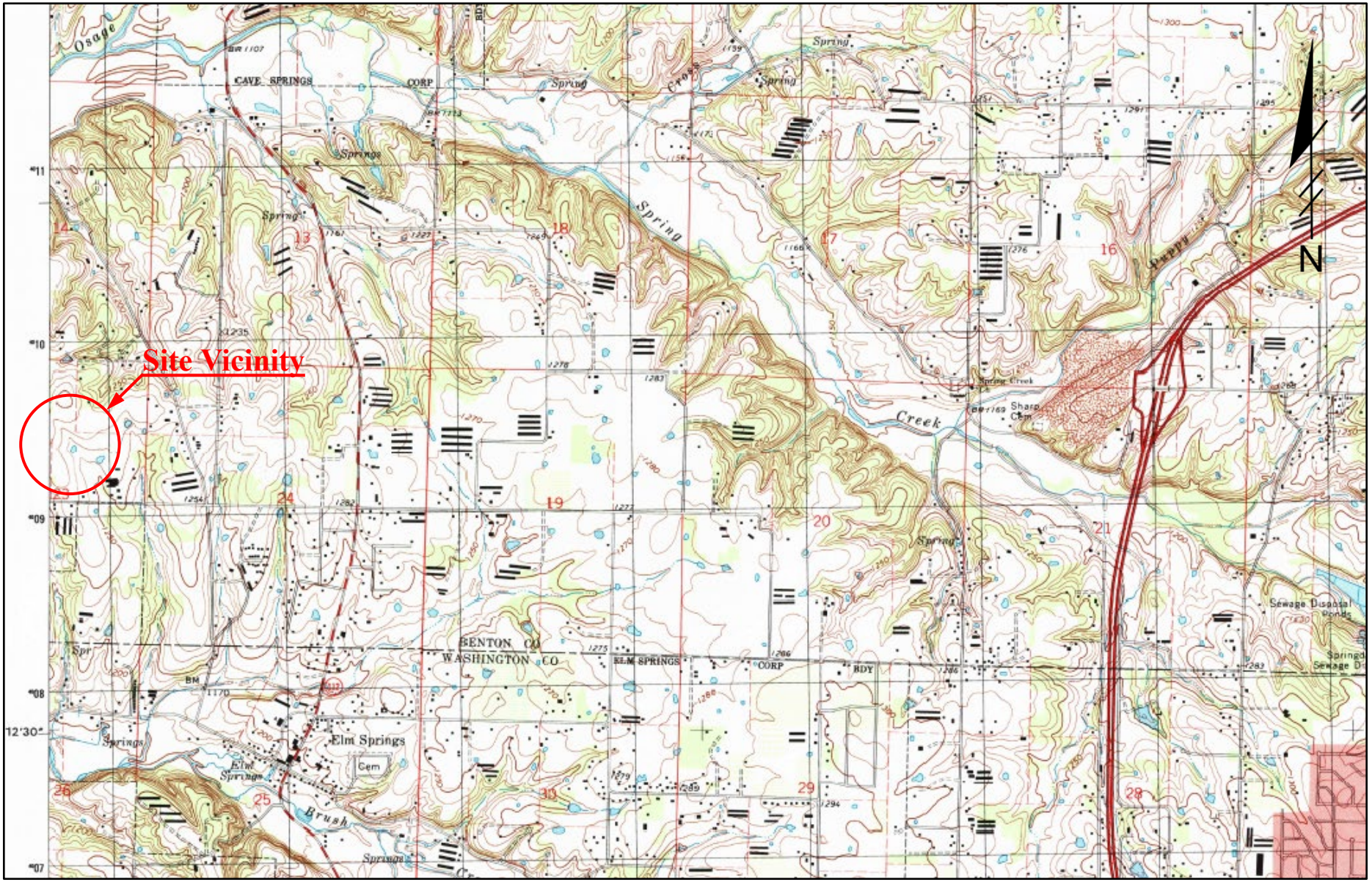
Velleta M. Scott, P.E.
Sr. Project Engineer



Mark E. Wyatt, P.E.
President

VMS/MEW:jw

Copies Submitted: Garver LLC
Attn: Mr. Adam Wierciak, P.E. (1-email)
Attn: Mr. John H. Ruddell, P.E., S.E. (1-email)
Attn: Mr. Joel Skinner P.E. (1-email)



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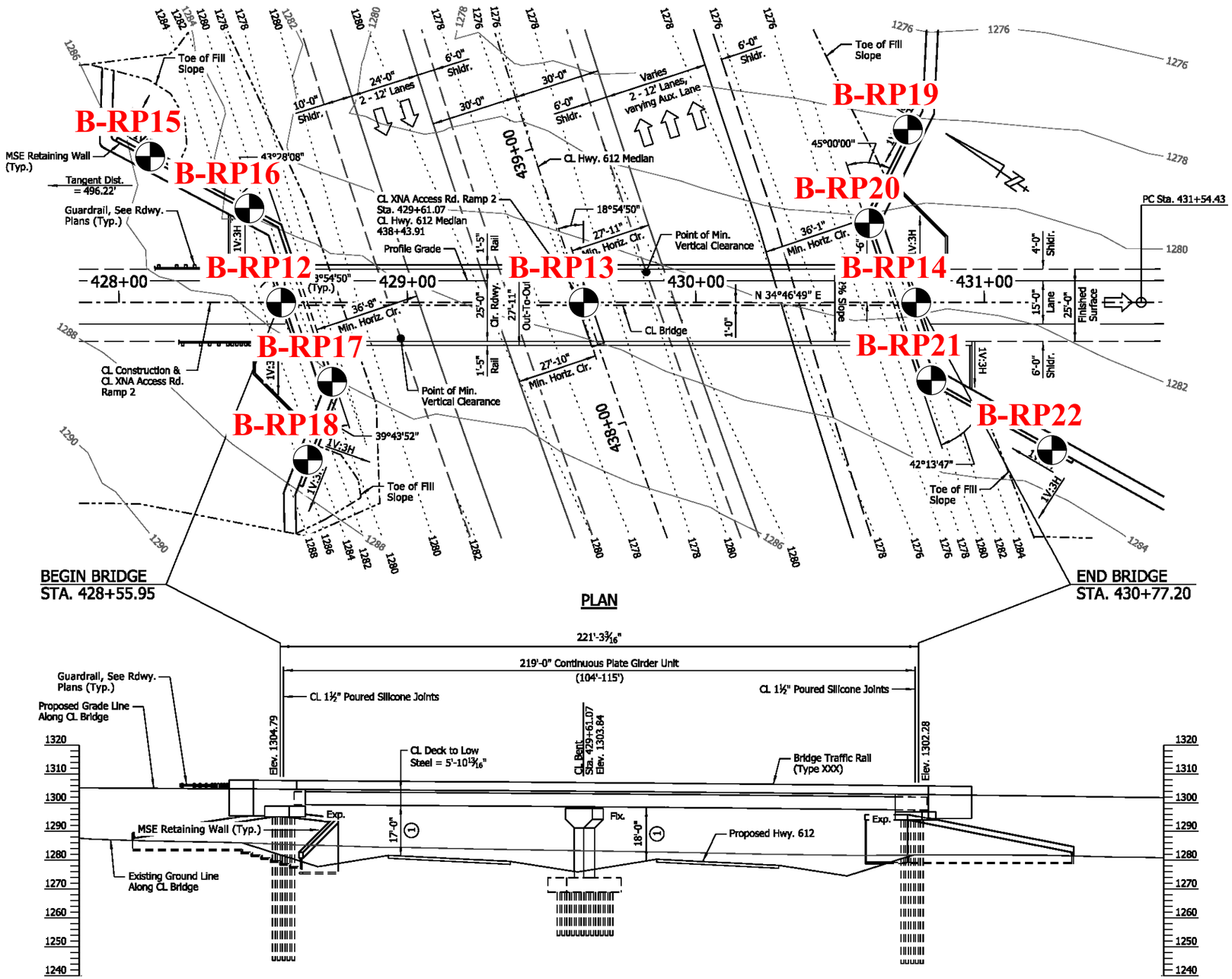
CONSULTING ENGINEERS

SITE VICINITY MAP
090069 XNA Access Road – Ramp 2 over Hwy 612
Benton County, Arkansas

Job No. 19-118

Plate 1



NOTE:
Stations shown are along CL Construction. Elevations shown are actual top of deck elevations at CL Bridge. Any vertical dimension referenced to CL Deck is based on actual top of deck elevation at CL Bridge.

20 0 20 40 ft

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PLAN of BORINGS
090069 XNA Access Road – Ramp 2 over Hwy. 612
Benton County, Arkansas

Scale: As shown

Job No. 19-118

PLATE 2

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LOG OF BORING NO. RP12

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 8.5 ft /Wash

LOCATION: Approx Sta 428+55, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1286±						
			Medium dense tan fine sandy silt w/chert fragments	19					
5			Very stiff reddish brown clay w/numerous chert nodules and fragments and discontinuous chert seams and layers	50/11"					
				50/8"					
				50/5"					
				50/4"					
10									
				50			29		
15									
				37					
20									
				50/9"					
25									
				26					
30									
				27					
35									
				37					

COMPLETION DEPTH: 49.0 ft
DATE: 9-30-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/30/2022

RECRQDN200-2 19-118_RAMP 2 OVER HWY 612.GPJ 12-16-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP12

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 8.5 ft /Wash

LOCATION: Approx Sta 428+55, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			(continued)						
			Hard gray limestone, arenaceous w/occasional chert nodules					100	100
45			- with close stylolites below 43 ft					97	63
50									
55									
60									
65									
70									
75									

COMPLETION DEPTH: 49.0 ft
DATE: 9-30-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/30/2022

RECRQDN200-2 19-118_RAMP 2 OVER HWY 612.GPJ 12-16-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP13

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 50 ft /Wash

LOCATION: Approx Sta 429+60, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1283±				
			Firm tan clayey silt w/chert fragments	7			
			Very stiff reddish brown clay w/numerous chert and limestone nodules and fragments	50/9"			
5				50/9"			
				50/8"			
				49			
10							
				40			29
15							
				36			
20							
				31			
25							
				42			
30							
				36			
35							
				43			
40							
			- stiff at 42 to 47 ft				
				15			

COMPLETION DEPTH: 65.0 ft
DATE: 8-22-22

DEPTH TO WATER
IN BORING: Dry to 50 ft
DATE: 8/22/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP13

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 50 ft /Wash

LOCATION: Approx Sta 429+60, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			(continued)				
50			- stiff to very stiff below 48 ft	36			
55			- with more chert fragments and close chert beds below 52 ft, 100% water loss	50/9"			
60				17			
65				50/3"			
			NOTE: Boring caving at 54 ft, abandoned at 65 ft on apparent fractured limestone. 100% fluid loss.				
70							
75							
80							
85							

COMPLETION DEPTH: 65.0 ft
DATE: 8-22-22

DEPTH TO WATER
IN BORING: Dry to 50 ft

DATE: 8/22/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP13A

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 30 ft /Wash

LOCATION: Approx Sta 429+55, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1283±				
			Firm to stiff tan clayey silt, sandy w/chert fragments				
5			Very stiff reddish brown and red clay w/numerous chert fragments	50/11"			
				42			
10							
				23			
15							
				34			
20							
				25			47
25							
				20			
30							
			- with discontinuous fractured chert seams and layers below 33.5 ft	50/9"			
35							
			- with close weathered chert seams and layers below 38.5 ft	26			
40							
			- stiff below 43 ft	13			

COMPLETION DEPTH: 75.0 ft
DATE: 9-29-22

DEPTH TO WATER
IN BORING: Dry to 30 ft

DATE: 9/29/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP13A

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 30 ft /Wash

LOCATION: Approx Sta 429+55, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			(continued)				
50			- 100% water loss at 51 ft	10			
55				25			
60			- firm at 58.5 to 63 ft	7			
65			- very stiff below 63 ft	30			
70			Moderately hard gray limestone, arenaceous w/ chert nodules	25/0"			
75			- (core barrel plugged - no core recovery)	25/0"			
80							
85							

COMPLETION DEPTH: 75.0 ft
DATE: 9-29-22

DEPTH TO WATER
IN BORING: Dry to 30 ft

DATE: 9/29/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-21-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP14

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 39 ft /Wash

LOCATION: Approx Sta 430+75, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			SURF. EL: 1282±						
			Soft tan clayey silt w/some chert fragments and rootlets	6					
			Very stiff reddish brown silty clay w/numerous chert fragments and nodules and occasional discontinuous chert seams and layers	39					
5				50/11"			35		
				45					
10				28					
			- stiff to very stiff below 13 ft						
15				22					
20				35					
				21			27		
25									
30				19					
				28					
35									
40				50/7"					
			Moderately hard gray weathered limestone, arenaceous w/some chert nodules - near-vertical fracture at 40.8 to 41.3 ft					98	77

COMPLETION DEPTH: 49.0 ft
DATE: 9-13-22

DEPTH TO WATER IN BORING: Dry to 39 ft

DATE: 9/13/2022

RECRQDN200-2 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP14

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger to 39 ft /Wash

LOCATION: Approx Sta 430+75, CL

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %	% Recovery	% RQD
			(continued)						
			Moderately hard to hard gray limestone, arenaceous w/occasional stylolites					100	100
50									
55									
60									
65									
70									
75									
80									
85									

COMPLETION DEPTH: 49.0 ft
DATE: 9-13-22

DEPTH TO WATER
IN BORING: Dry to 39 ft

DATE: 9/13/2022

RECRQDN200-2 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP15

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 428+10, 50 ft Lt

SURF. EL: 1286±

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	Firm tan silty clay w/occasional chert fragments	7		76
	Stiff reddish brown and gray silty clay w/numerous chert nodules and fragments	22		
5	- very stiff with discontinuous chert seams and layers below 4 ft	50/8"		
		50		
10		50/10"		
		50/8"		53
15				
		50/8"		
20				
		50/7"		
25				

COHESION, TON/SQ FT
0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT
10 20 30 40 50 60 70

COMPLETION DEPTH: 25.0 ft
DATE: 9-15-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/15/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP16

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 428+45, 30 ft Lt

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No. 200 %
	SURF. EL: 1284±			
	Firm tan clayey silt w/occasional chert fragments	8		
	Very stiff reddish brown silty clay w/numerous chert nodules and fragments	44		32
	- with discontinuous chert seams and layers at 4 to 13 ft	50/7"		
5				
		50/9"		
		50/10"		
10				
	- less silty below 13 ft			
		32		71
15				
		37		
20				
		36		
25				

COHESION, TON/SQ FT
0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT
10 20 30 40 50 60 70

COMPLETION DEPTH: 25.0 ft
DATE: 9-15-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/15/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-1-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP17

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 428+75, 30 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1286±				
			Medium dense tan silt w/occasional rootlets and chert fragments	11			
			- dense, clayey below 2 ft	49			47
5			Very stiff reddish brown clay w/numerous chert nodules and fragments	37			57
			- with discontinuous chert seams and layers at 6 to 18 ft	50/7"			
10				50/11"			
15				50/6"			
20				31			
			- stiff below 22 ft				
25				12			

COMPLETION DEPTH: 25.0 ft
DATE: 9-14-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/14/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-1-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP18

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 428+65, 55 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1288±				
			Loose to medium dense tan silt	10			
			Very stiff reddish brown clay w/chert nodules and fragments and discontinuous chert seams and layers	50/9"			
5				50/10"			
				50/10"			
10				27			76
15				50/6"			
20				29			
25				38			

COMPLETION DEPTH: 25.0 ft
DATE: 9-15-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/15/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP19

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 430+75, 60 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1278±				
			Loose tan silt w/occasional rootlets and chert fragments	7			
			Very stiff reddish brown clay w/numerous chert nodules and fragments	47			
5				27			53
			- with discontinuous chert seams and layers below 6 ft	50/8"			
10				50/6"			
15				50/7"			
20				30			
25				44			

COMPLETION DEPTH: 25.0 ft
DATE: 9-14-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/14/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP20

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 430+60, 25 ft Lt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1280±				
			Medium dense tan silt w/numerous chert fragments and occasional rootlets	14			
			- dense with more chert fragments below 2 ft	40			
5			Very stiff reddish brown clay w/numerous chert nodules and fragments and discontinuous chert seams and layers	50/10"			
				49			
10				50/1"			
15				25			41
20				38			
25				39			

COMPLETION DEPTH: 25.0 ft
DATE: 9-14-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/14/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-2-22

PLATE 26

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP21

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 430+80, 25 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1283±				
			Firm tan clayey silt w/chert fragments	8			66
			Very stiff reddish brown silty clay w/numerous chert nodules and fragments	50			31
5			- with discontinuous chert seams and layers at 4 to 8 ft	50/4"			
				50/6"			
10				44			
				41			
15							
20							
25							

COMPLETION DEPTH: 15.0 ft
DATE: 8-23-22

DEPTH TO WATER IN BORING: Dry

DATE: 8/23/2022

LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-1-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

LOG OF BORING NO. RP22

090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

TYPE: Auger

LOCATION: Approx Sta 431+25, 50 ft Rt

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL: 1284±				
			Loose tan silt w/occasional rootlets and chert fragments	9			
			- dense with more chert fragments below 2 ft	50/10"			
5			Very stiff reddish brown silty clay w/numerous chert fragments	32			53
				42			
10				24			
			- w/ chert seams at 14 to 16 ft	50/11"			
15			- stiff below 16 ft				
				19			
20							
				19			
25							

COMPLETION DEPTH: 25.0 ft
DATE: 9-14-22

DEPTH TO WATER IN BORING: Dry

DATE: 9/14/2022

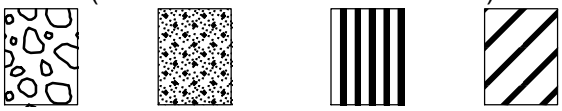
LGBNEW 19-118_RAMP 2 OVER HWY 612.GPJ 12-1-22

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)

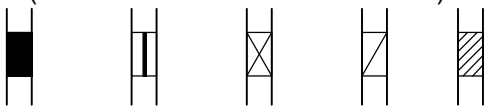


Gravel Sand Silt Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)



Shelby Tube | Rock Core | Split Spoon | No Recovery | Cutting

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (I) Clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	N-VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0-15%
LOOSE	4-10	15-35%
MEDIUM DENSE	10-30	35-65%
DENSE	30-50	65-85%
VERY DENSE	50 and above	85-100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) Inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FT.
VERY SOFT	Less than 0.25
SOFT	0.25-0.50
FIRM	0.50-1.00
STIFF	1.00-2.00
VERY STIFF	2.00-4.00
HARD	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.
FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
LAMINATED - composed of thin layers of varying color and texture.
INTERBEDDED - composed of alternate layers of different soil types.
CALCAREOUS - containing appreciable quantities of calcium carbonate.
WELL GRADED - having a wide range in grain sizes and substantial amounts of all intermediate particle sizes.
POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

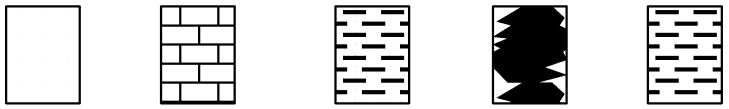
Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

KEY 3-14-12

Grubbs, Hoskyn, Barton & Wyatt, Inc.
Consulting Engineers

BORING LOG TERMS – ROCK

ROCK TYPES (SHOWN IN SYMBOLS COLUMN)



Sandstone | Limestone | Siltstone | Coal | Shale

Joint Characteristics –

Spacing	
Very Close	0.75 to 2.5 in.
Close	2.5 to 8 in.
Moderately Close	8 to 24 in.
Wide	2 to 6 ft
Very Wide	More than 6 ft

Bedding Characteristics –

Very Thin	0.75 to 2.5 in.
Thin	2.5 to 8 in.
Medium	8 to 24 in.
Thick	2 to 6 ft
Massive	More than 6 ft

Lithologic Characteristics –

Clayey
Shaly
Calcareous (limy)
Siliceous
Sandy (Arenaceous)
Silty
Plastic Seams

Parting – Less than 1/1 6inch
Seam – 1 /1 6o 1 /2inch
Layer – 1 /2to 1 2inches
Stratum – Greater than 1 2inches

Hardness–

Soft (S) – Reserved for plastic material alone.

Friable (F) – Easily crumbled by hand, pulverized or reduced to powder and is too soft to be cut with a pocket knife.

Low Hardness (LH) – Can be gouged deeply or carved with a pocket knife.

Moderately Hard (MH) – Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.

Hard (H) – Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.

Very hard (VH) – Cannot be scratched with a pocket knife. Knife steel marks left on surface.

Texture –

Fine – Barely seen with naked eye
Medium – Barely seen up to 1/8 in.
Coarse – 1 /8in. to 1 /4 in.

Structure –

Bedding
- Flat – 0° – 5°
- Gently Dipping – 5° – 35°
- Moderately Dipping – 55° – 85°
- Steeply Dipping – 55° – 85°

Fractures, scattered
- Open
- Cemented or Tight

Fractures, closely spaced
- Open
- Cemented or Tight

Brecciated (Sheared and Fragmented)
- Open
- Cemented or Tight

Joints
- Faulted
- Slickensides

Degree of Weathering –

Fresh – No visible signs of decomposition or discoloration. Rings under hammer impact.

Slighty Weathered – Slight discoloration inwards from open fractures, otherwise similar to fresh.

Moderately Weathered – Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock, but cores cannot be broken by hand or scraped by knife. Texture preserved.

Highly Weathered – Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric

Completely Weathered – Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.

Residual Soil – Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Solution and Void Conditions –

Solid, contains no voids
Vuggy (pitted)
Vesicular (igneous)
Porous
Cavities
Cavernous

Swelling Properties –

Nonswelling
Swelling

Slaking Properties –

Nonslaking
Slakes slowly on exposure
Slakes readily on exposure

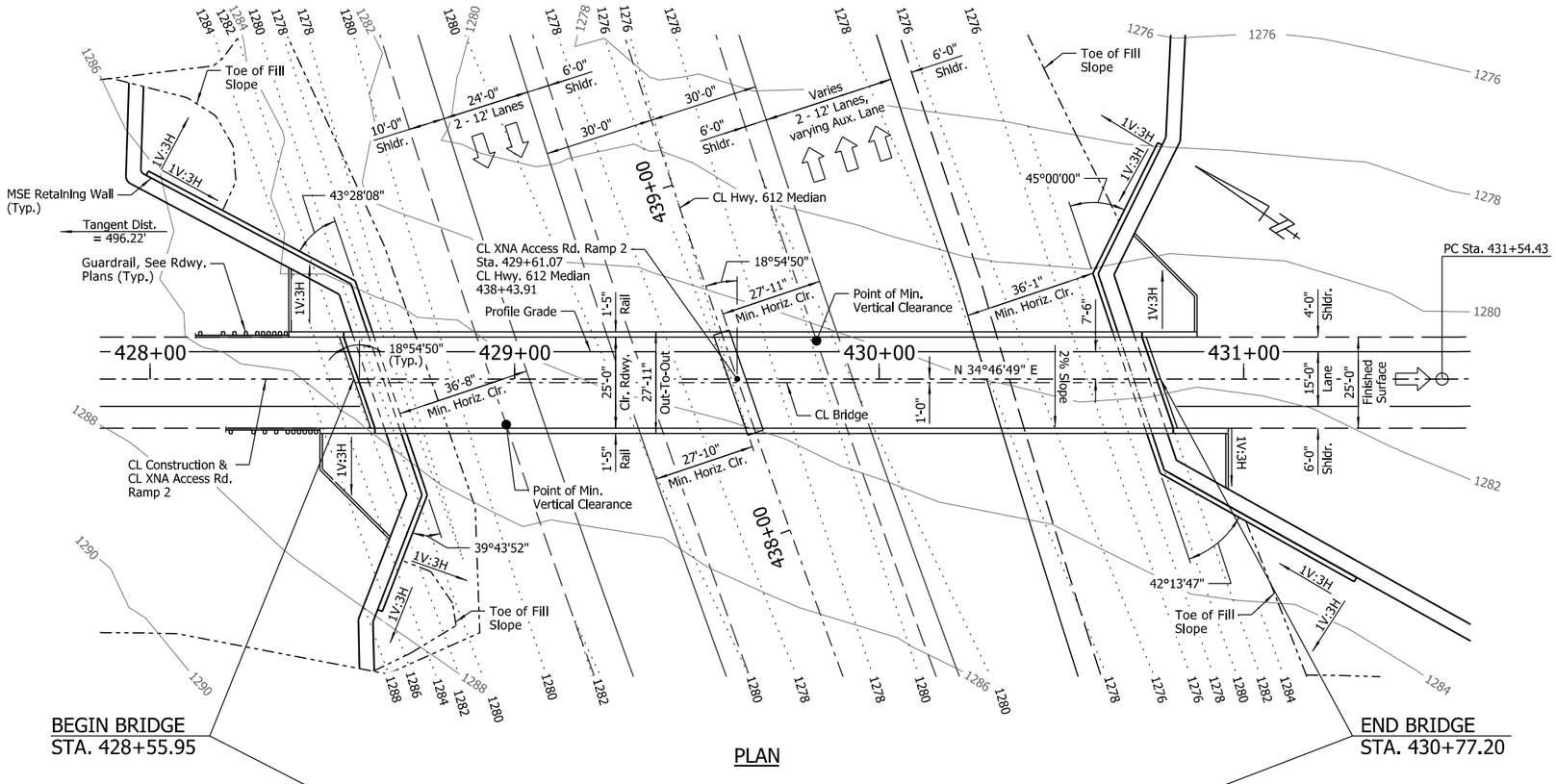
Rock Quality Designation (RQD) –

RQD (Percent)	Diagnostic Description
Greater than 90	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
Less than 25	Very Poor

KEYROCK FHWA 3-2-12

APPENDIX A

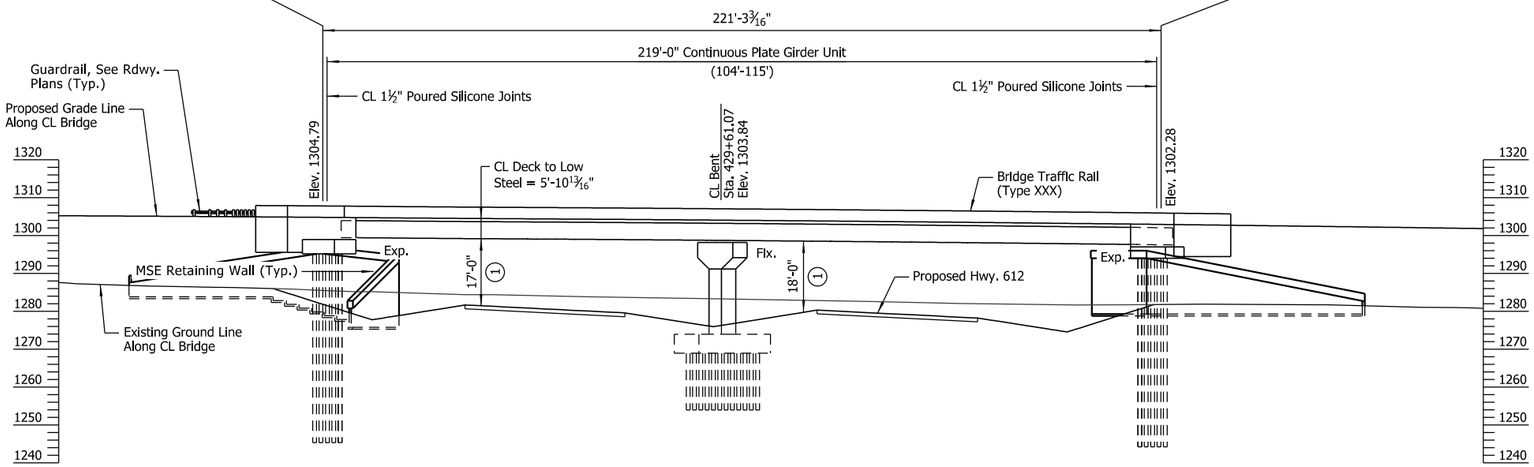
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		090069 $SN2101$ ST		
				(1) $BN02$		LAYOUT		$DN2101$



BEGIN BRIDGE
STA. 428+55.95

END BRIDGE
STA. 430+77.20

PLAN



Bent No,	1	2	3

NOTE:
Stations shown are along CL Construction. Elevations shown are actual top of deck elevations at CL Bridge. Any vertical dimension referenced to CL Deck is based on actual top of deck elevation at CL Bridge.

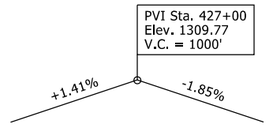
ELEVATION

428+00 | 429+00 | 430+00 | 431+00

FOR R/W DATA, SEE ROADWAY PLANS

LEGEND

XXXX = Existing Contours (——)
XXXX = Job 012326 Proposed Contours (· · · ·)



VERTICAL CURVE DATA

XNA Access Rd. Ramp 2
(Profile Grade 8.5' Left of CL Bridge)

(1) Point of Minimum Vertical Clearance

PRELIMINARY NOT FOR CONSTRUCTION

BRIDGE ENGINEER

LAYOUT OF BRIDGE
XNA ACCESS RD. RAMP 2 OVER HWY. 612
NORTHWEST ARKANSAS
NATIONAL AIRPORT ACCESS (F)
BENTON COUNTY

ROUTE RT SEC. SC

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: CSW DATE: AUG. 2021 FILENAME: b090069x2_LO1.dgn
CHECKED BY: JES DATE: SEPT. 2021 SCALE: 1" = 20'-0"
DESIGNED BY: CSW DATE: AUG. 2021
BRIDGE NO. $BN02$ DRAWING NO. $DN2101$

JESkinner 9/30/2021 4:14:29 PM
WORKSPACE: ARDOT Bridge (2019)
L:\2017\1701600 - XNA Access - NEPA\Drawings\b090069x2_S101_LO.dgn
REVISED DATE:

APPENDIX B

19-118
B RP12
42-49.5'
Grubbs, Hoskyn, Barton & Wyatt INC
CONSULTING ENGINEERS
RUN1. 42-47'
RUN2. 47-49.5'

19-118
B-RP14
40-49'
Grubbs, Hoskyn, Barton & Wyatt INC.
CONSULTING ENGINEERS
RUN1. 40-45'
RUN2. 45-49'

APPENDIX C

SUMMARY of CLASSIFICATION TEST RESULTS

PROJECT: 090069 XNA Access Road - Ramp 2 over Hwy 612
Ramp 2 Bridge over Highway 612
LOCATION: Benton County, Arkansas
GHBW JOB NUMBER: 19-118

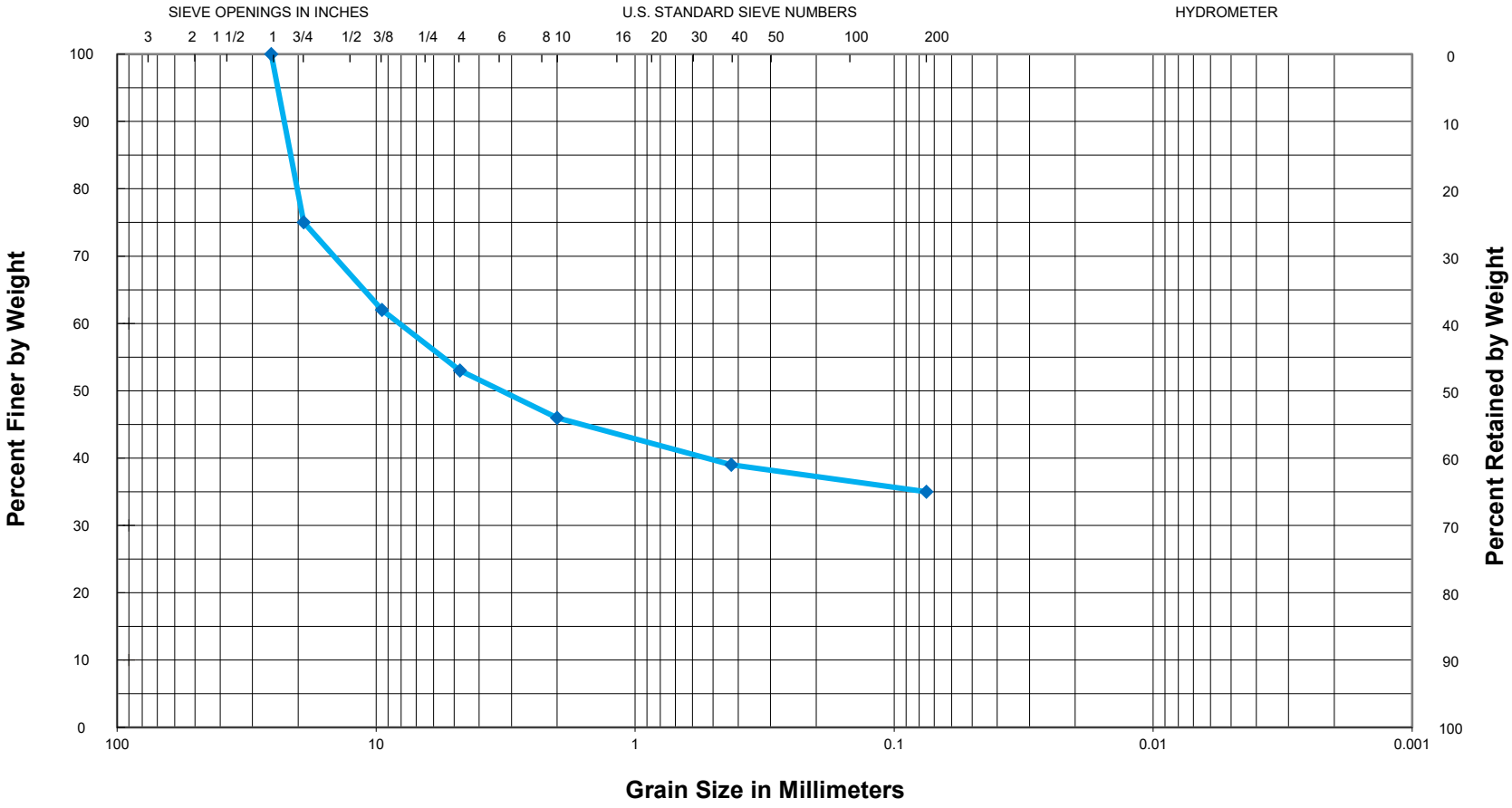
BORING No.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			SIEVE ANALYSIS PERCENT PASSING								USCS CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	2 in.	1 in.	3/4 in.	3/8 in.	#4	#10	#40	#200		
RP12	14-15	23	51	24	27	---	---	---	---	50	---	---	29	GC	A-2-7
RP13	14-15	22	51	29	22	---	---	---	---	49	---	---	29	GM	A-2-7
RP13A	24-25	30	67	30	37	---	---	---	---	66	---	---	47	GC	A-7-5
RP14	2.5-3.5	15	36	19	17	100	100	75	62	53	46	39	35	GC	A-2-6
RP14	24-25	32	47	30	17	---	---	---	---	60	---	---	27	GM	A-2-7
RP15	0.5-1.5	17	34	20	14	---	---	---	---	92	---	---	76	CL	A-6
RP15	14-15	22	48	21	27	---	---	---	---	77	---	---	53	CL	A-7-6
RP16	2.5-3.5	14	28	20	8	---	---	---	---	58	---	---	32	GC	A-2-4
RP16	14-15	25	53	26	27	---	---	---	---	80	---	---	71	CH	A-7-6
RP17	2.5-3.5	18	30	21	9	---	---	---	---	74	---	---	47	SC	A-4
RP17	4.5-5.5	25	53	28	25	---	---	---	---	76	---	---	57	CH	A-7-6
RP18	9-10	30	67	33	34	---	---	---	---	89	---	---	76	MH	A-7-5
RP19	4.5-5.5	19	63	32	31	---	---	---	---	63	---	---	53	MH	A-7-5
RP20	14-15	31	61	37	24	---	---	---	---	69	---	---	41	GM	A-7-5
RP21	0.5-1.5	17	28	21	7	---	---	---	---	77	---	---	66	ML-CL	A-4
RP21	2.5-3.5	16	36	24	12	---	---	---	---	56	---	---	31	GC	A-2-6
RP22	4.5-5.5	21	39	20	19	---	---	---	---	68	---	---	53	CL	A-6

Grubbs, Hoskyn,
Barton & Wyatt, Inc.
CONSULTING ENGINEERS

19-118

GRAIN SIZE CURVE

Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS

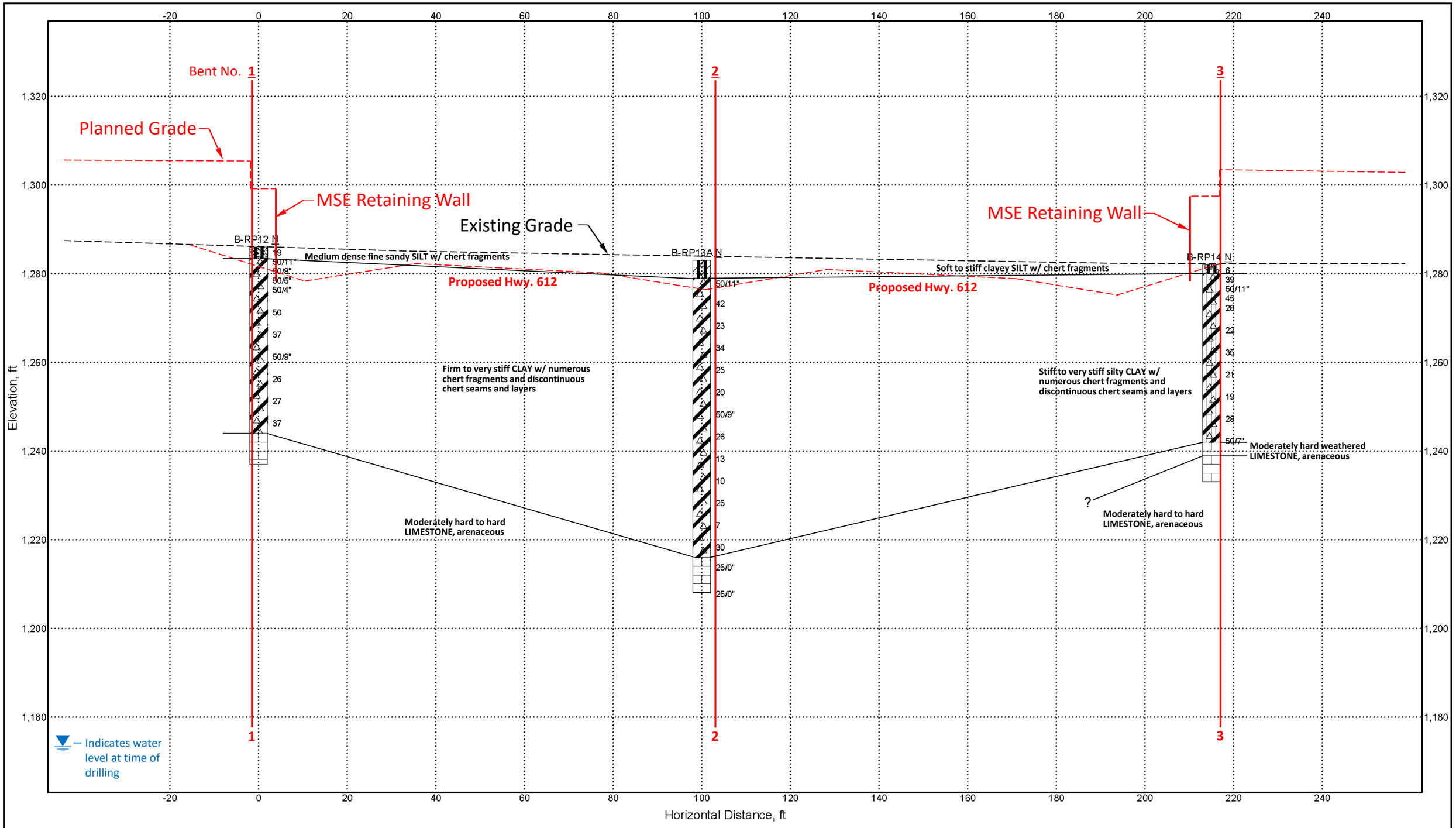


GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

Sample: Boring RP14, 2.5-3.5 ft; LL=36, PL=19, PI=17
Description: Reddish brown silty CLAY w/ numerous chert nodules and fragments

USCS Classification = GC
AASHTO Classification = A-2-6

APPENDIX D



Grubbs, Hoskyn,
Barton & Wyatt, Inc.

NOTES:
1. Subsurface conditions have been inferred between discrete boring locations. Actual conditions may vary.
2. Ground surface approximate.

SCALE:
1" = 20' Horizontal
1" = 20' Vertical

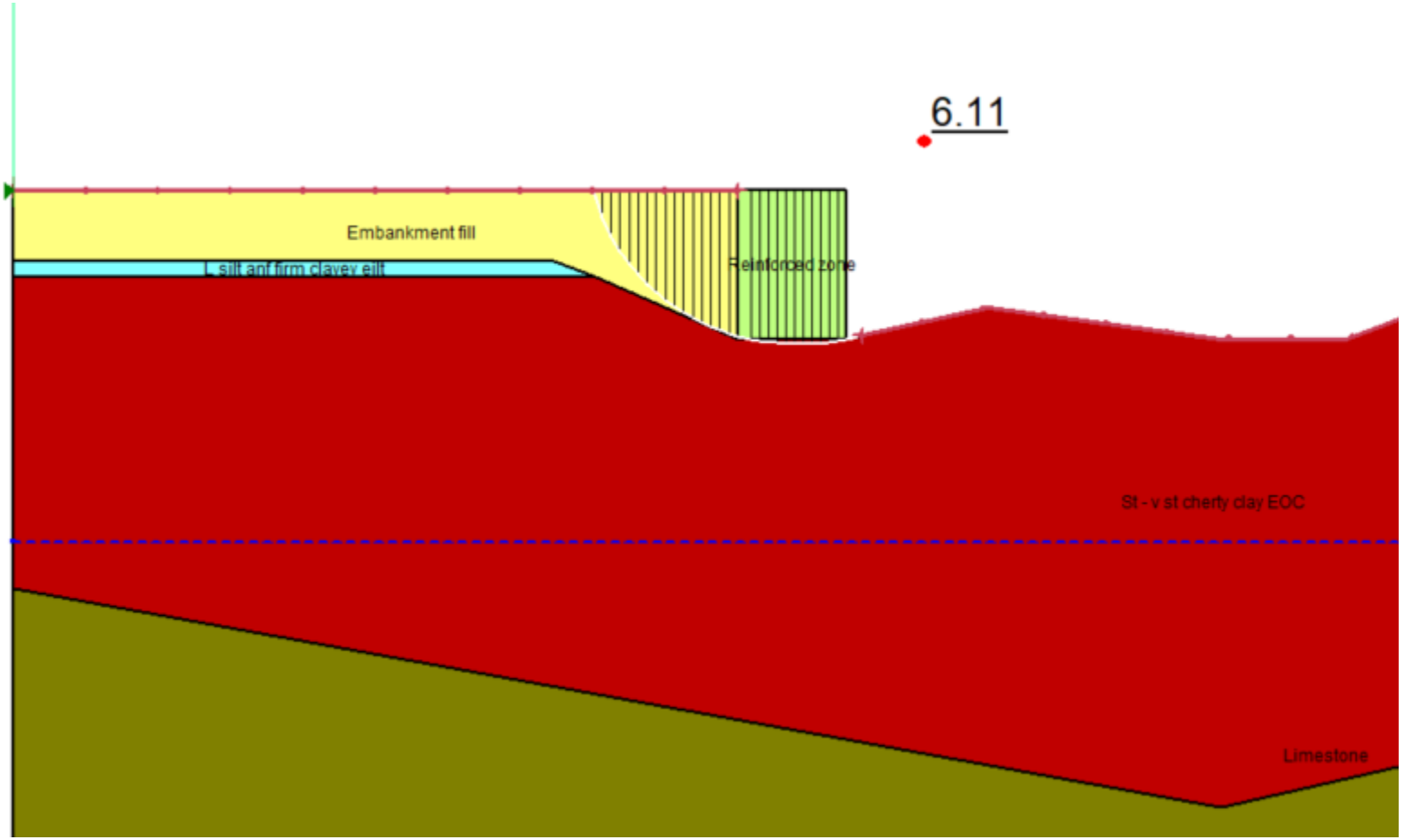
Generalized Subsurface Profile
090069 XNA Access Road - Ramp 2 over Hwy 612
Benton Co., Arkansas

Project Number: 19-118

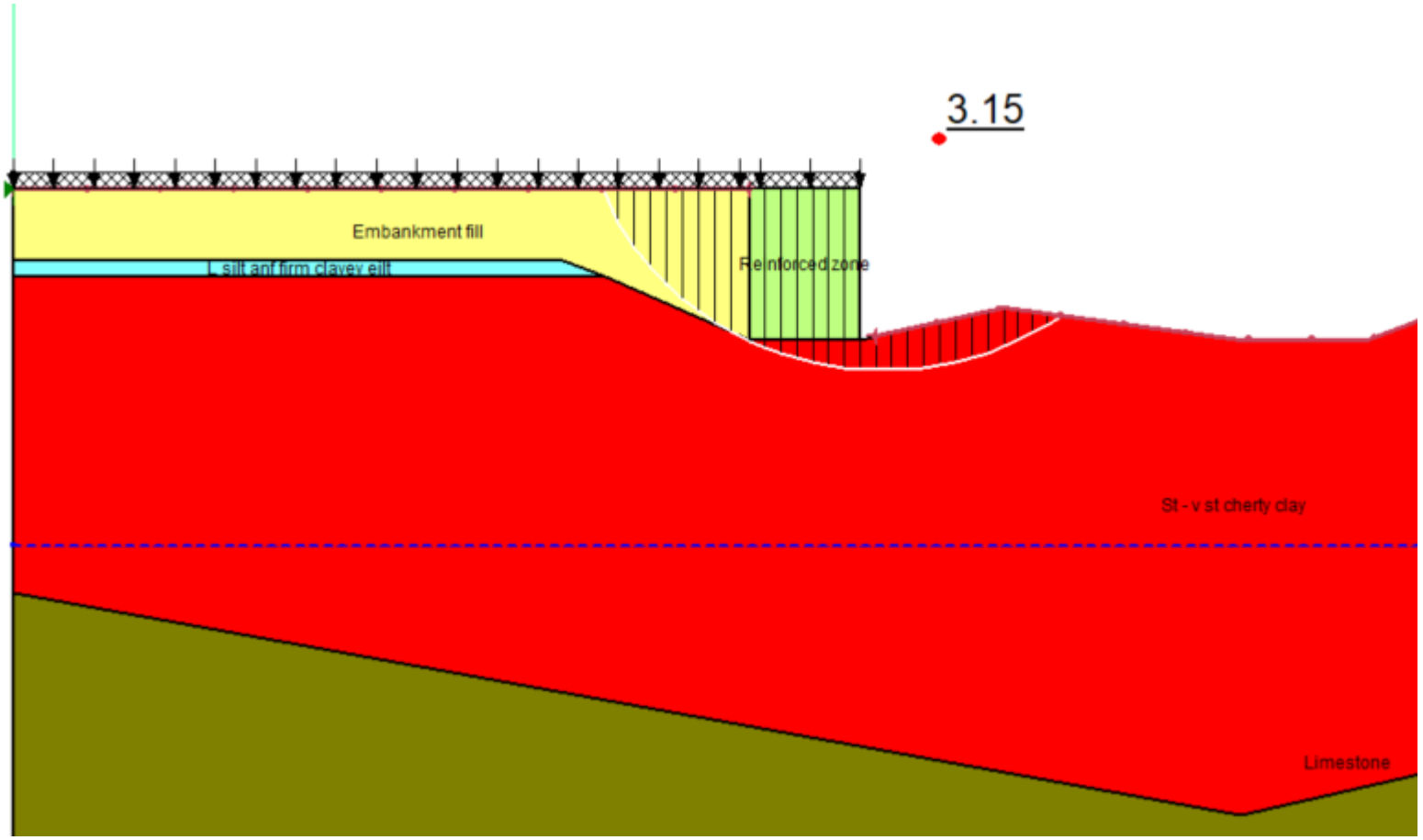
APPENDIX E

Summary of Stability Analysis Results
090069 XNA Access Road – Ramp 2 over Highway 612
GHBW Job No. 19-118
Benton County, Arkansas

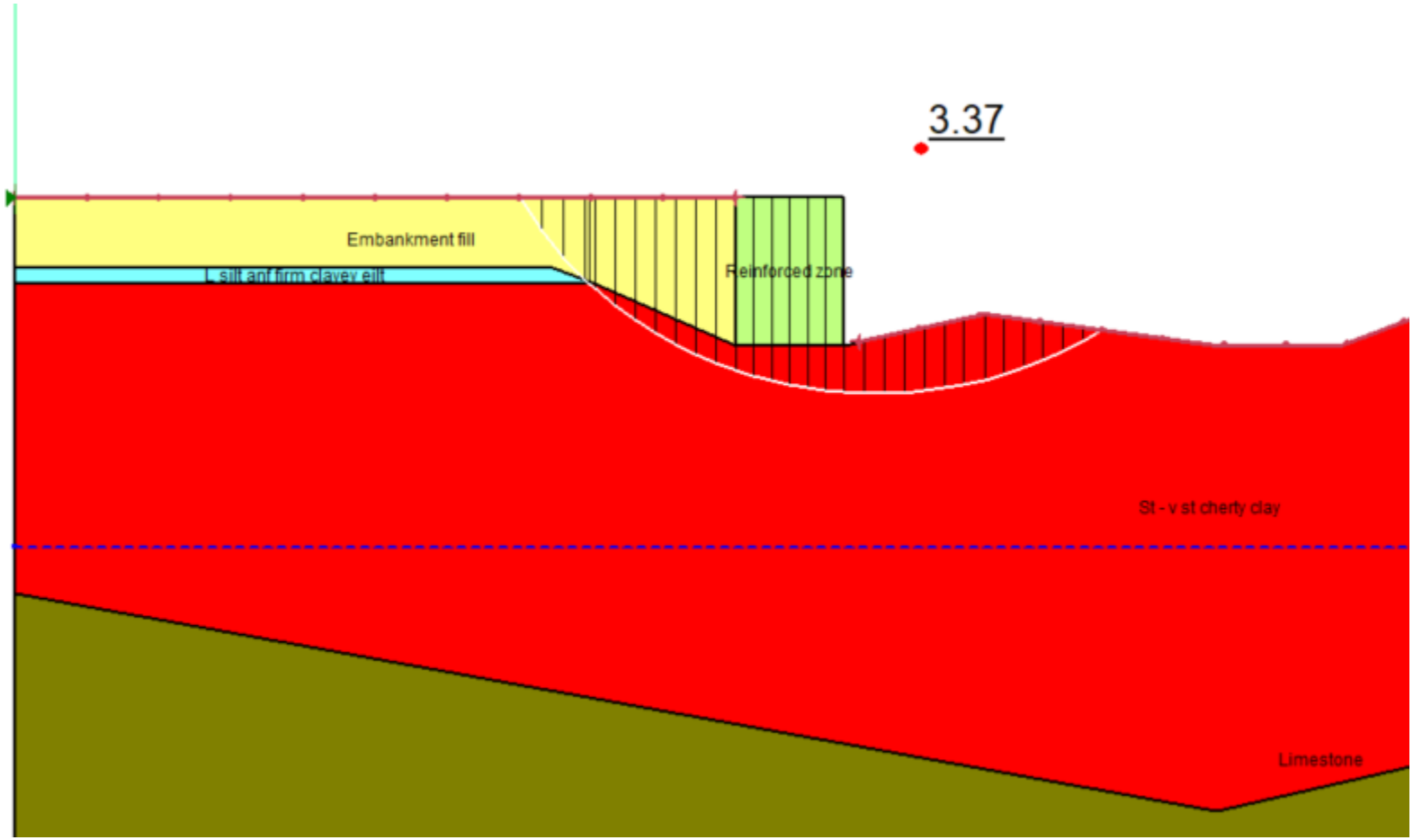
	Design Loading Condition	Calculated Minimum Factor of Safety
North MSE Wall Bent 1	End of Construction	6.1
	Long Term	3.2
	Seismic ($k_h = A_S/2 = 0.025$)	3.4
North Side Slope Bent 1 (3H:1V)	End of Construction	3.6
	Long Term	3.2
	Seismic ($k_h = A_S/2 = 0.025$)	3.2
South MSE Wall Bent 3	End of Construction	5.5
	Long Term	2.7
	Seismic ($k_h = A_S/2 = 0.025$)	2.9
South Side Slope Bent 3 (3H:1V)	End of Construction	3.6
	Long Term	3.2
	Seismic ($k_h = A_S/2 = 0.025$)	3.2



Results of Stability Analyses – End of Construction
Bent 1 - North MSE Wall
H=19 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612

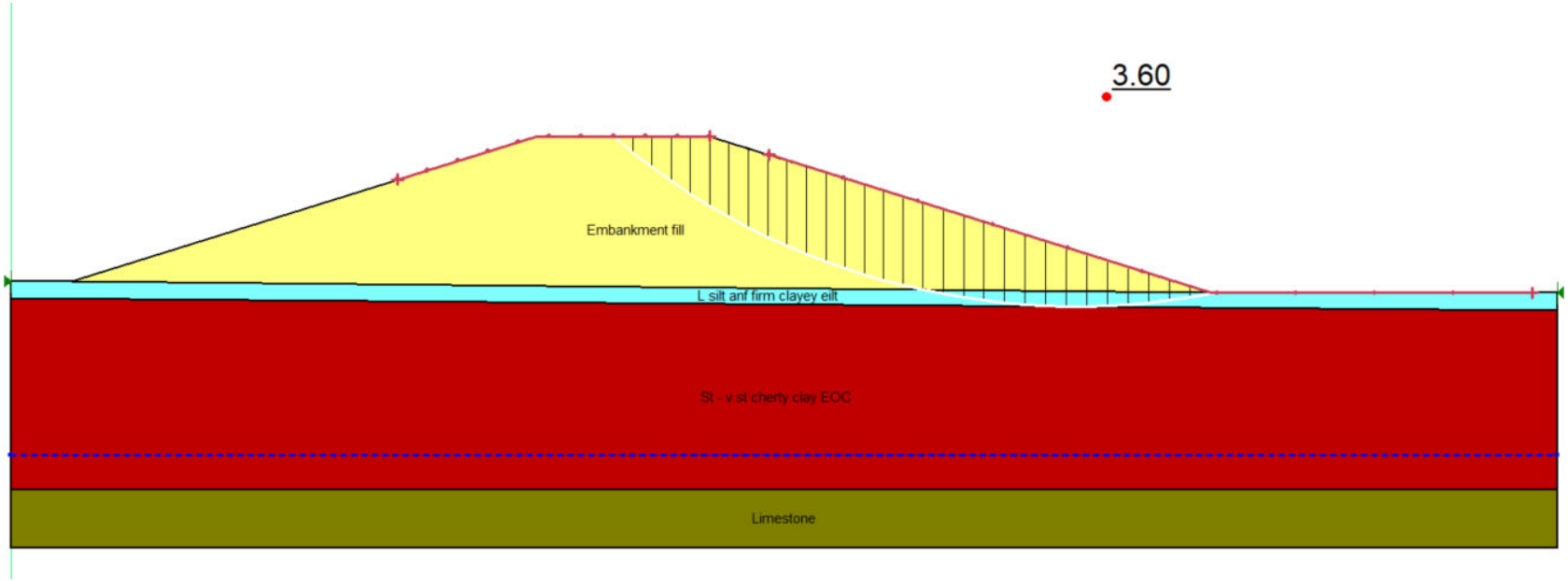


Results of Stability Analyses – Long Term Condition
Bent 1 - North MSE Wall
H=19 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612

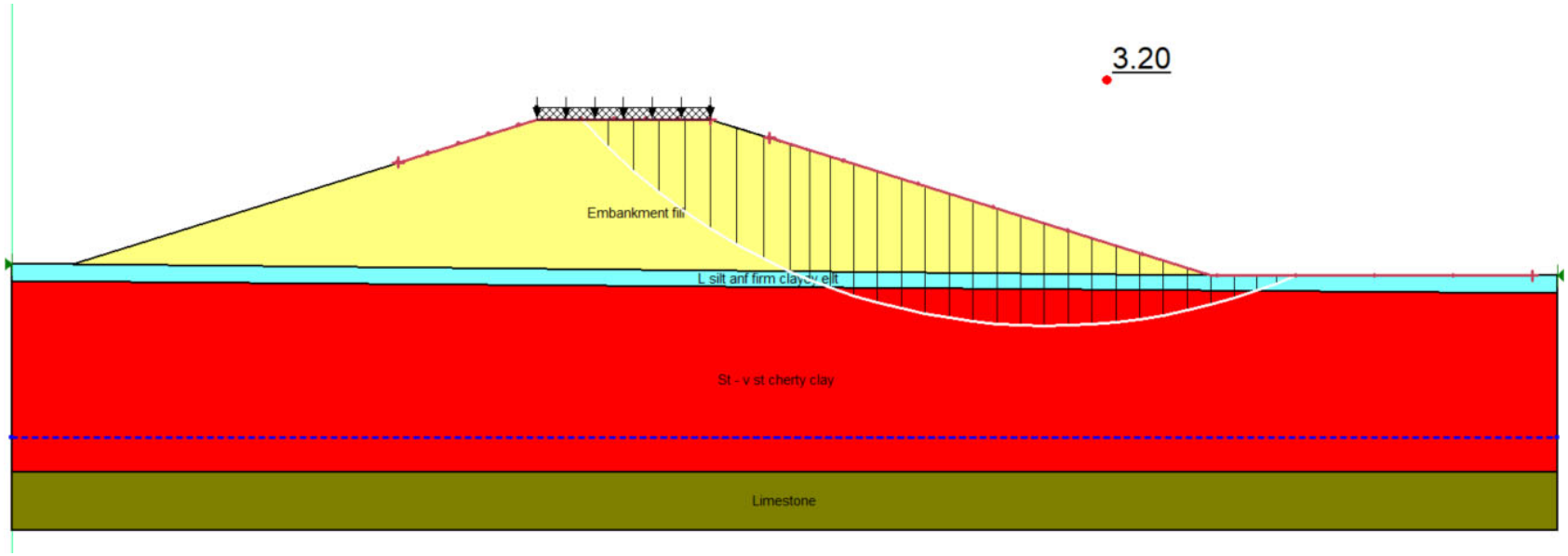


Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 1 - North MSE Wall
H=19 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612

Grubbs, Hoskyn, Barton & Wyatt, INC.
CONSULTING ENGINEERS



Results of Stability Analyses – End of Construction
Bent 1 - North Side Slope
3H:1V Slope, H=27 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612



Results of Stability Analyses – Long Term Condition
Bent 1 - North Side Slope
3H:1V Slope, H=27 ft ±
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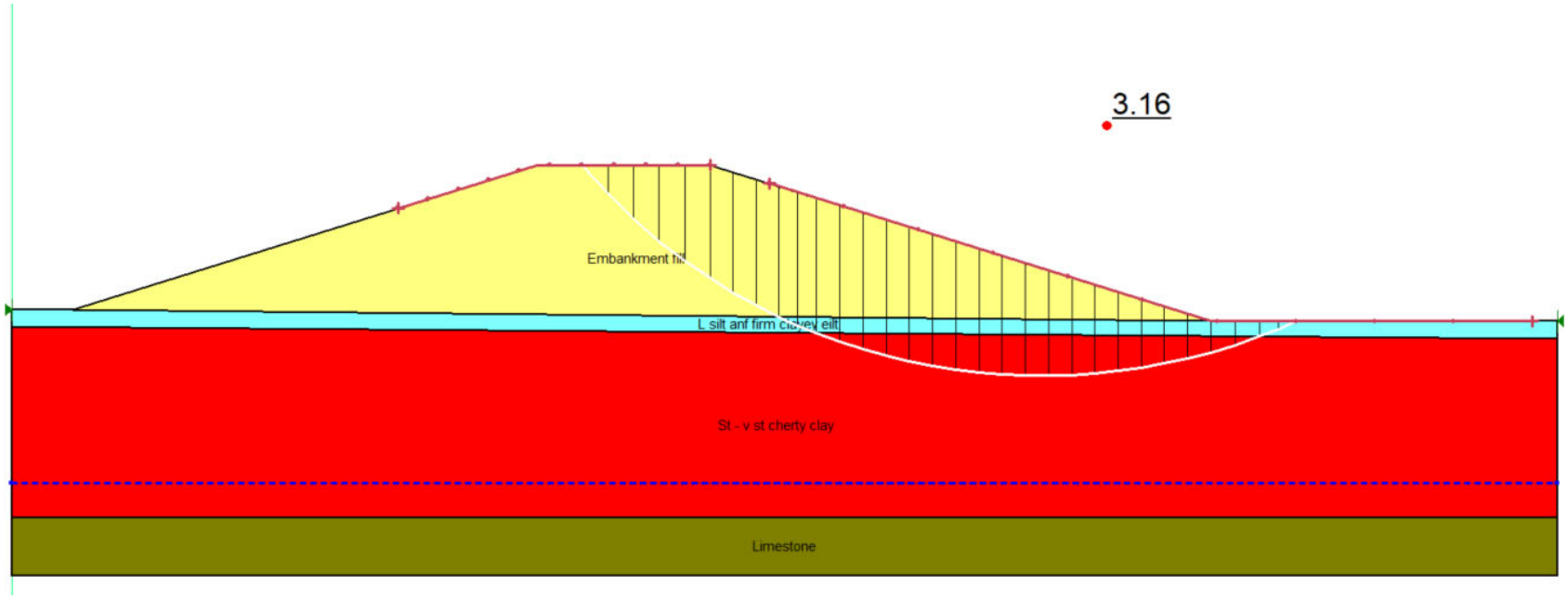
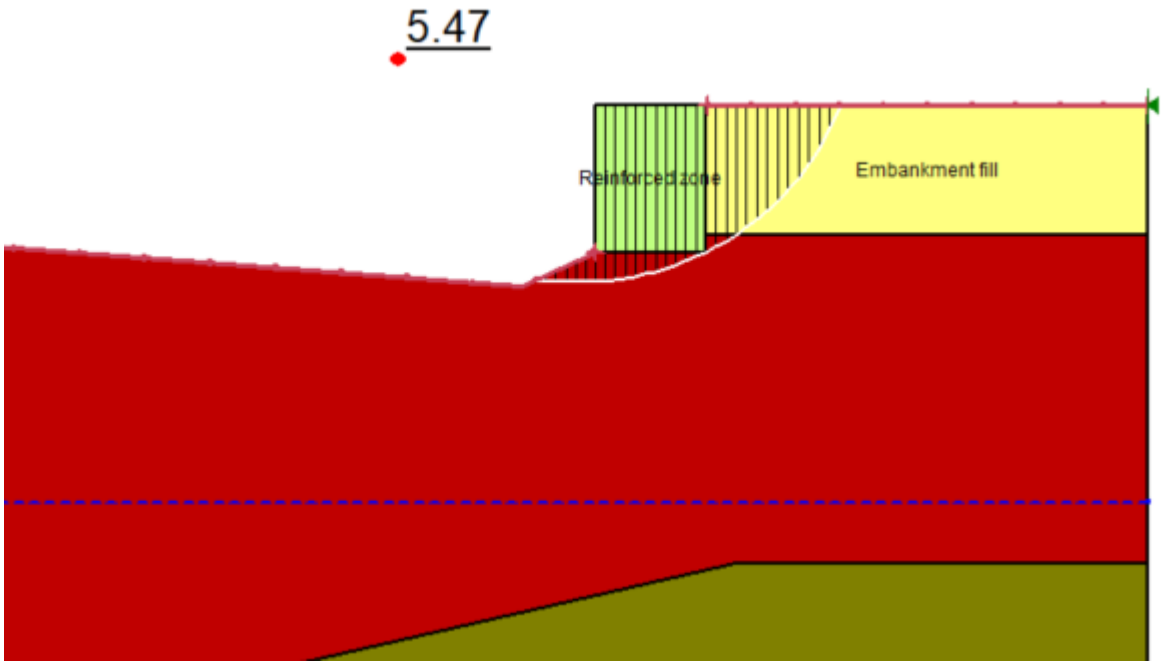


Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 1 - North Side Slope
3H:1V Slope, H=27 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612



Results of Stability Analyses – End of Construction
Bent 3 - South MSE Wall
H=17 ft ±
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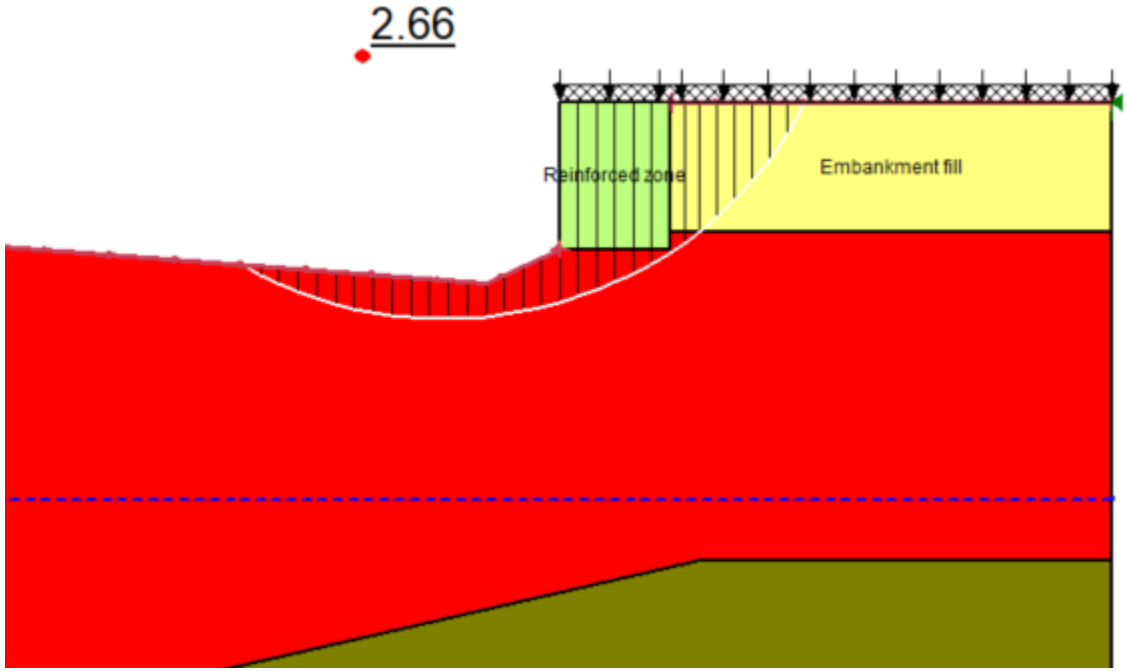
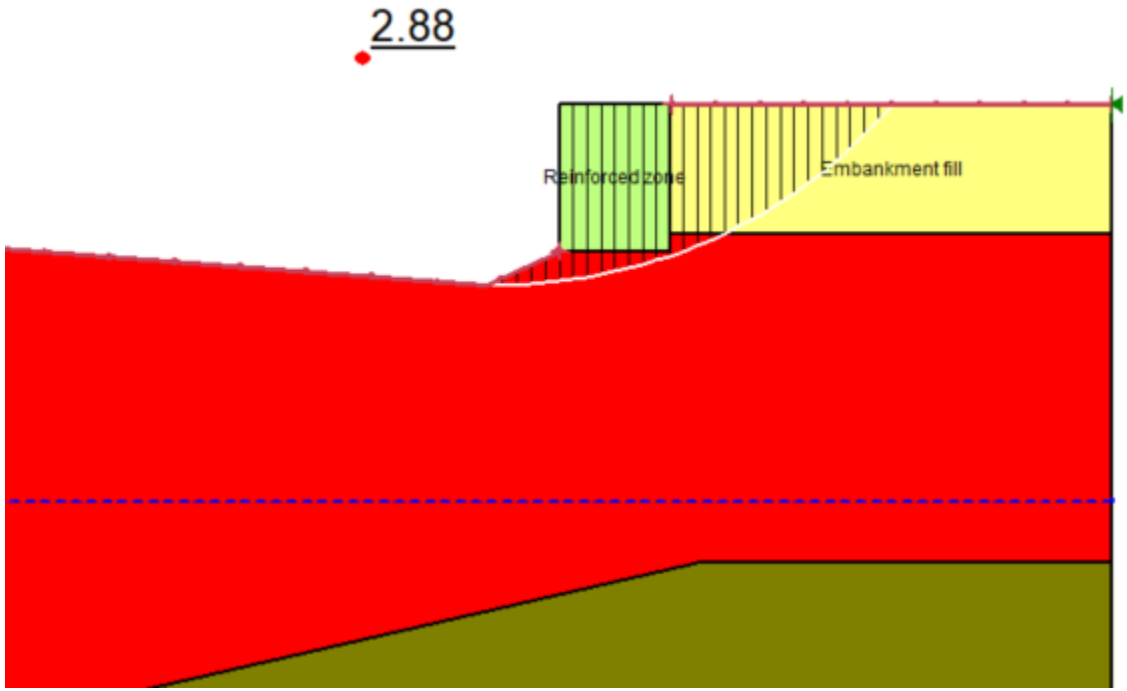
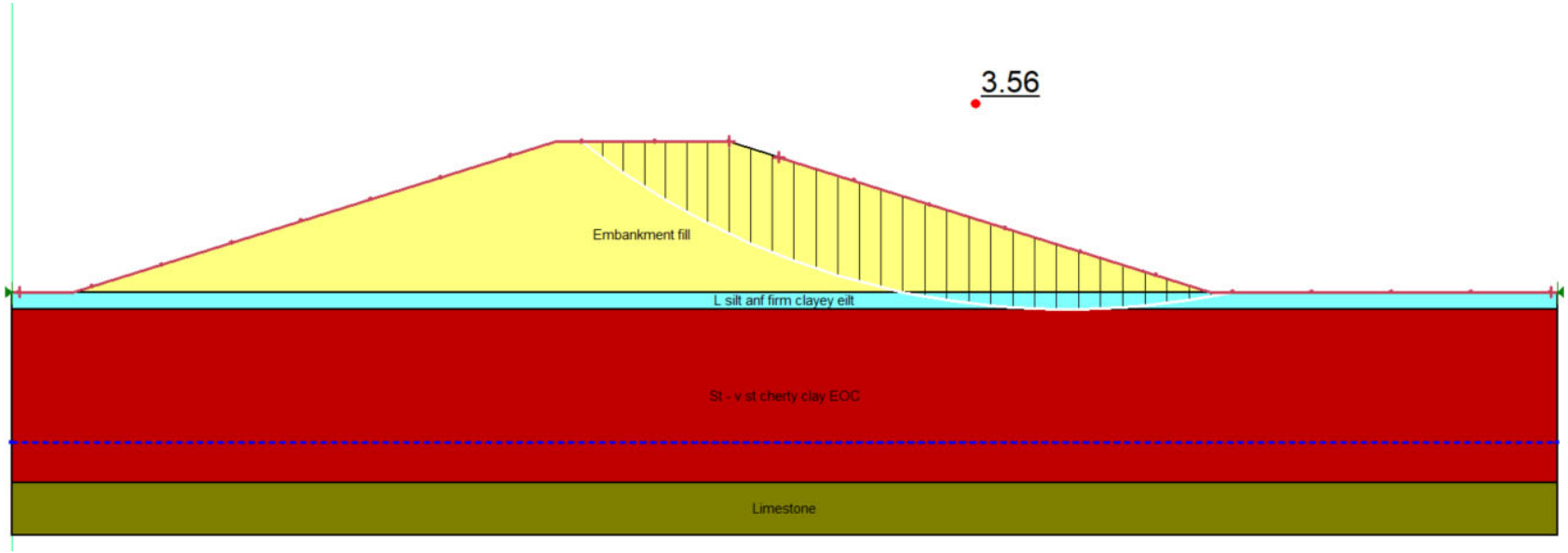


Results of Stability Analyses – Long Term Condition
Bent 3 - South MSE Wall
H=17 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612



Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 3 - South MSE Wall
H=17 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612



Results of Stability Analyses – End of Construction
Bent 3 - South Side Slope
3H:1V Slope, H=26 ft ±
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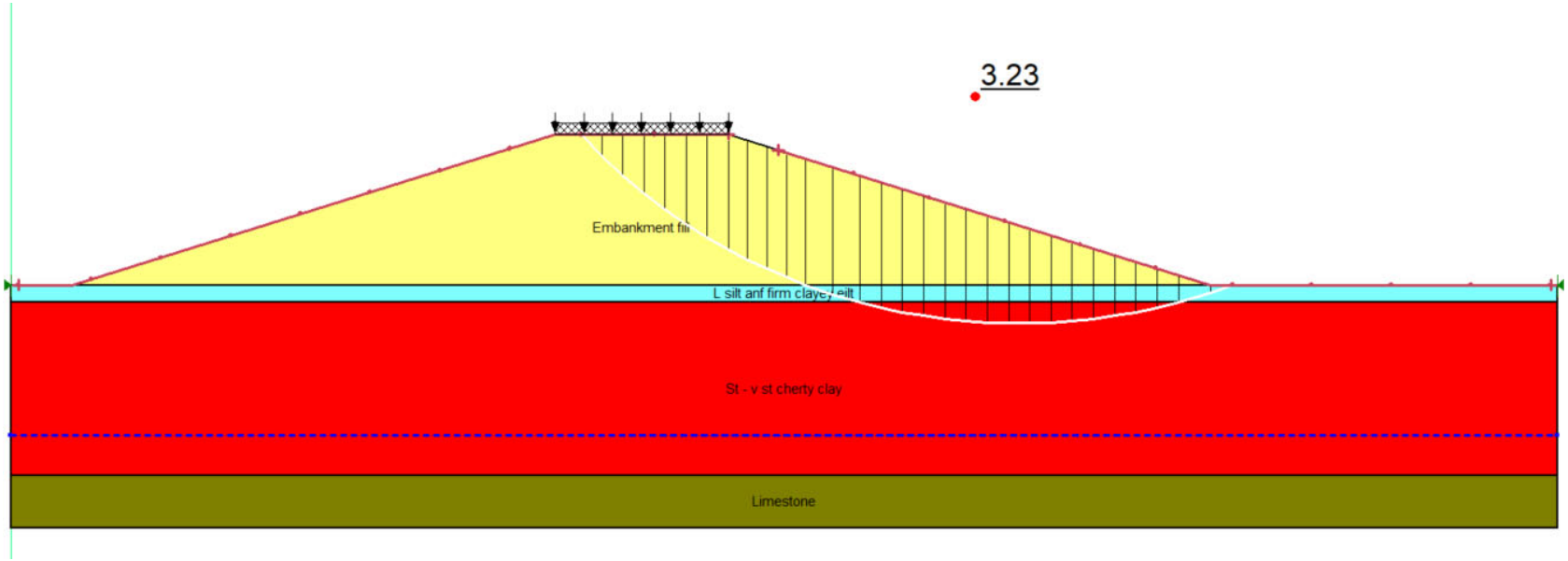
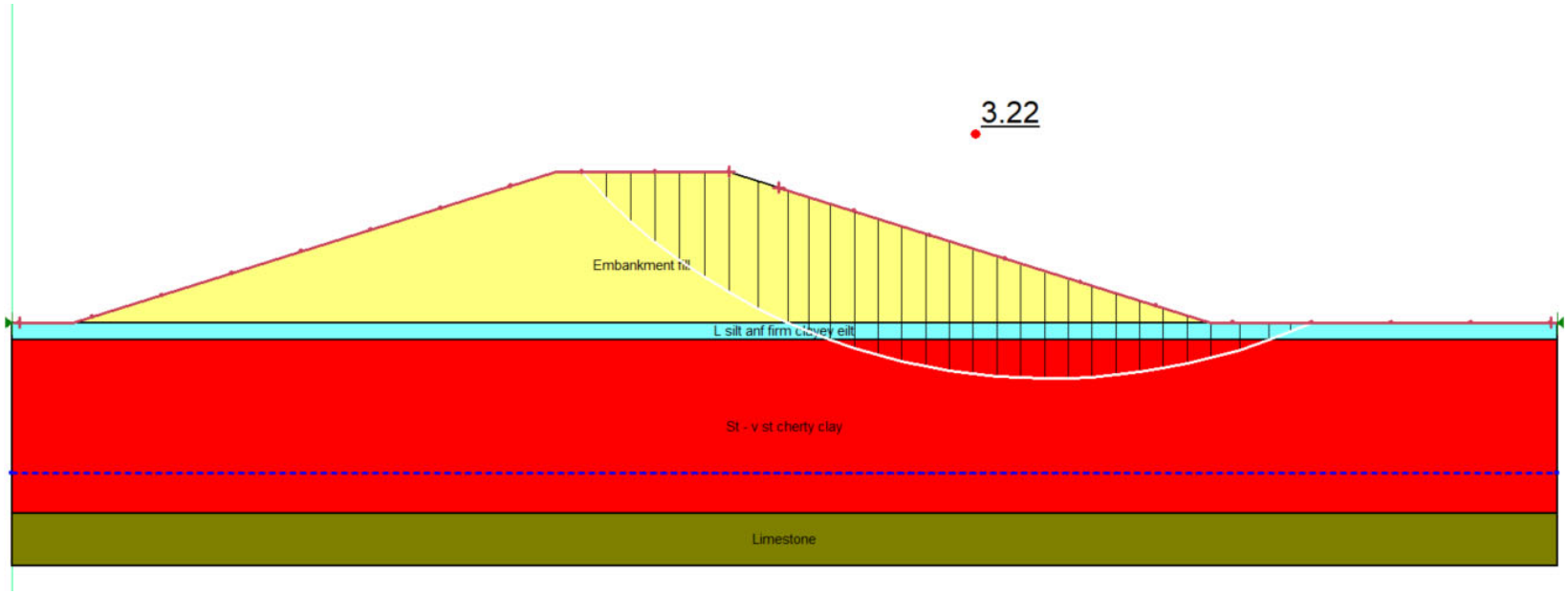


Results of Stability Analyses – Long Term Condition
Bent 3 - South Side Slope
3H:1V Slope, H=26 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612



Results of Stability Analyses – Seismic Condition ($k_h = A_S /2 = 0.025$)
Bent 3 - South Side Slope
3H:1V Slope, H=26 ft ±
19-118 - 090069 XNA Access Road – Ramp 2 over Hwy. 612

Subsurface Investigation

FINAL GEOTECHNICAL BRIDGE AND RETAINING WALL REPORT

SPRINGDALE NORTHERN BYPASS (US 412 RELOCATED)
BENTON & WASHINGTON COUNTIES, ARKANSAS

July 2012

Prepared For

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

Presented By

Florence & Hutcheson
An ICA Company

flohut.com

Florence & Hutcheson
An ICA Company

July 17, 2012

Mrs. Jennifer Williams
Consultant Coordinator
Arkansas State Highway and Transportation Department
P. O. Box 2261
Little Rock, AR 72203

Subject: Job No. 001966 – FINAL Bridges and Retaining Walls Geotechnical Report
Springdale Northern Bypass (US 412 Relocated)
Benton & Washington Counties

Dear Mrs. Williams:

We have completed the Final Revised Geotechnical Report for the referenced project. With this report, we have revised the previously submitted two reports, included additional MSE retaining walls, and updated all of the bridges. This report and discussion reflects the latest geotechnical data as it relates to the current bridge and retaining wall layouts for the final phase of the proposed improvements to the Springdale Northern Bypass (US 412 relocated).

Thank you for the opportunity to provide geotechnical services to the Arkansas State Highway and Transportation Department. Please call at your convenience if you have questions or comments.

Sincerely,

FLORENCE & HUTCHESON, INC.

Devin L. Chittenden, P.E.
Geotechnical Engineer

Anil K. Varri, P.E.
Geotechnical Engineer

g:/06127/docs/Final Report with Retaining Walls 2012.doc

2550 Irvin Cobb Drive • Paducah, KY 42003 • (270) 444-9691 • fax (270) 443-3943

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FINAL GEOTECHNICAL BRIDGE AND RETAINING WALL REPORT

SPRINGDALE NORTHERN BYPASS (US 412 RELOCATED) – BENTON & WASHINGTON COUNTIES, ARKANSAS

I. INTRODUCTION

The proposed 11.2± mile realignment of Springdale Northern Bypass (U.S. 412 Relocated), including ramps, crossroads and retaining walls, extends from the end of the existing four-lane segment of U.S. 412 west of Springdale to near the I-540 interchange. The proposed roadway will provide a four lane template with the following nine sets of dual bridges:

Springdale Northern Bypass (U.S. 412 Relocated) over Ramp 4
Springdale Northern Bypass (U.S. 412 Relocated) over Old Highway 68
Springdale Northern Bypass (U.S. 412 Relocated) over Javello Road
Springdale Northern Bypass (U.S. 412 Relocated) over Marchant Road
Springdale Northern Bypass (U.S. 412 Relocated) over Robbins Road
Springdale Northern Bypass (U.S. 412 Relocated) over Puppy Creek
Springdale Northern Bypass (U.S. 412 Relocated) over Brush Creek and Brush Creek Road
Springdale Northern Bypass (U.S. 412 Relocated) over Spring Creek
Springdale Northern Bypass (U.S. 412 Relocated) over East Wagon Wheel Road

In addition, the following five sets of single bridges along ramp alignments connecting Springdale Northern Bypass (U.S. 412 Relocated) to I-540 are included:

Ramp EN over Puppy Creek
Ramp EN over Springdale Northern Bypass (U.S. 412 Relocated)
Ramp NW over Springdale Northern Bypass (U.S. 412 Relocated)
Ramp EN over Silent Grove Road
Ramp SE over Goad Springs Road

Additional five cross road bridges over Springdale Northern Bypass (U.S. 412 Relocated) with MSE wall at End Bents are included:

Liberty Road over Springdale Northern Bypass (U.S. 412 Relocated)
Highway 112 over Springdale Northern Bypass (U.S. 412 Relocated)
Grimsley Road over Springdale Northern Bypass (U.S. 412 Relocated)
Spring Creek Road over Springdale Northern Bypass (U.S. 412 Relocated)
Zion Road over Springdale Northern Bypass (U.S. 412 Relocated)

In addition, the following five MSE retaining walls along Springdale Northern Bypass (U.S. 412 Relocated) and I-540 interchange are included:

Wall 1 at Springdale Northern Bypass (U.S. 412 Relocated) Station 182+25 to Station 184+00
Wall 12 at Springdale Northern Bypass (U.S. 412 Relocated) Station 712+20 to Station 715+73
Wall 13 at Springdale Northern Bypass (U.S. 412 Relocated) Station 717+47 to Station 719+82
Wall 14 at Ramp NW Station 726+05 to Station 728+78
Wall 15 at Ramp EN Station 727+71 to Station 729+92

The project corridor crosses terrain described as primarily gently rolling with hilly intervals and relatively steep sided, flat bottom drainage courses cut downward into the upland surfaces. Existing subdivisions, subdivisions under development, pasture areas and heavy woods were encountered along the proposed alignments with scattered low lying wet areas and ponds.

II. GEOLOGY

The proposed bridges and retaining walls are located within the Ozark Plateau Geomorphic Province, Springfield Plateau Section. Published geologic mapping, *Arkansas State Geologic Map* (Haley, et. al., 1993) and various unpublished geologist's proofs (Glick 1970-1972), indicates underlying the relatively thick, generally cherty clay and chert rubble residual soils is weathered chert residuum and limestone interbedded with chert of the Mississippian Boone Formation. The quantities of limestone and chert within the formation are vertically and horizontally widely variable. The Boone Formation is noted for the development of sinkholes, caves and dissolution enhanced fractures. Drilling and sampling operations revealed the presence of relatively thin alluvium, composed primarily of reworked chert and weathered limestone sand to gravel size particles, within the floodplains of the creeks spanned by several of the bridges and ramps. Site specific geologic interpretations are provided within each detailed proposed bridge or retaining wall site narrative.

Published mapping indicates the Ozark Plateau Province regional structural formation dip is relatively flat but locally variable. Faulting, as indicated on the previously cited maps, trends generally northeast-southwest. Faulting is not indicated within the limits of the subject bridges and retaining walls. Examination of recovered soil and rock samples suggested no "direct" evidence of faulting at the proposed bridges or retaining walls.

III. SEISMIC CONDITIONS

Because earthquake hazards are considered to be significant in portions of Arkansas, seismic ground motion is a design factor for this project. For this project, the proposed peak ground acceleration (PGA) having a 7% probability of exceedance in 75 years (or mean return period of approximately 1,000 years) is equal to 0.050g and the horizontal response spectral acceleration value at a 1.0 second period is equal to 0.052g. These values were provided by the United States Geology Survey (USGS). Based on the Site Class being a D for this project, the PGA value is then multiplied by the site factor of 1.6 as shown in Table 3.10.3.2-1 in the AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications. Also, the horizontal response spectral acceleration value is then multiplied by the site factor of 2.4 as shown in Table 3.10.3.2-3 for a Site Class D. For design purposes this gives the peak seismic ground acceleration value of 0.080g and a Seismic Zone of 1.

IV. DISCUSSION OF FIELD AND LABORATORY PROCEDURES

Bridge and retaining wall borings were advanced utilizing a CME 45-C trailer mounted, CME 54-C track mounted and CME 550 truck drill rigs using 3¼" I.D. hollow stem augers. Standard penetration testing (ASTM D1586) were performed in these borings, followed by rock coring operations using NQ2 wireline tooling. Collected samples were delivered to the Florence & Hutcheson, Inc. laboratory for further testing and analysis. Laboratory testing included natural moisture content, liquid limit, plastic limit, grain size analysis, Unified and AASHTO soil classification and rock unconfined compression. Results of the laboratory testing can be found in Appendix II. Advanced core borings recorded core recovery (REC) ranging from 0% to 100% and rock quality designation (RQD) ranging from 0% to 100%. Detailed core descriptions can be found in Appendix I. In addition, some of the borings that were advanced during the roadway investigation were also utilized.

V. DISCUSSION OF DATA AND RECOMMENDATIONS

The roadway investigation was discussed and summarized in the Final Geotechnical Roadway Report which has a date of March 2009. In that report, we recommended all material used for embankment construction have a maximum Plasticity Index of 15 or less, or a cherty clay material with a minimum of 55 percent retained on the No. 4 sieve prior to compaction will be allowed.

Also, muck and poor quality soils from pond/wet area stabilization ***shall not be utilized*** within embankment limits and shall be used for final dressing of slopes or be wasted.

Furthermore, we recommend some embankments be constructed using a minimum 5' thick drainage/stabilizing layer comprised of durable Limestone or Chert from roadway excavation (or borrow) or Type I granular material meeting a size requirement range of 1.5" to 30". However, to ensure the successful advancement of piles through embankment areas, rock fill or soil material containing boulders or large stones shall not be placed at the bridge abutments due to proposed pile driving operations. Proposed fill materials within pile foundation areas (typically abutments) shall consist of particles no larger than the Class 7 size per the Standard Specifications for Highway Construction. Where the drainage/stabilizing layer is proposed along with pile driving operations, Class 7 aggregate is not required, but the size of the embankment particles shall be limited to the size of Class 7 or smaller to ensure piling can be advanced. This 5' layer shall be overlain with 6 inches of choke stone or geotextile fabric to prevent the migration of fines into the drainage layer. The drainage/stabilizing layer will ensure adequate drainage of seepage zones to reduce the potential for saturated embankments, it will promote positive movement of free water during consolidation of foundation soils and allow pore pressures to dissipate, it will increase the factor of safety for embankment stability, and it will provide an excellent working platform during construction. We recommend the 5' drainage/stabilizing layer be placed in the following intervals:

Station 182+00 to Beginning of Bridge Over Ramp 4
End of Bridge Over Ramp 4 to Beginning of Bridge Over Old Highway 68
End of Bridge Over Old Highway 68 to Station 195+00
Station 230+00 to Station 245+00
Station 252+00 to Station 253+00
Station 276+00 to Station 279+50
Station 291+00 to Beginning of Bridge Over Javello Road
End of Bridge Over Javello Road to Station 300+00
Station 309+00 to Station 320+00
Station 377+00 to Beginning of Bridge Over Brush Creek and Brush Creek Road
End of Bridge Over Brush Creek and Brush Creek Road to Station 392+00
Station 425+00 to Beginning of Bridge Over Marchant Road
End of Bridge Over Marchant Road to Station 432+00
End of Bridge Over Robbins Road to Station 481+00
Station 691+00 to Beginning of Bridge Over Puppy Creek
End of Bridge Over Puppy Creek to Station 706+00
Musteen Road Station 28+00 to Station 34+00
Puppy Creek Road Station 30+00 to Station 32+00
Ramp SW Station 715+00 to Station 721+00
Ramp SW Station 725+00 to Station 728+00

For embankments located within the station limits of Station 254+00 to Station 256+50, Ramp EN Station 693+00 to Beginning of Bridge Over Puppy Creek, and End of Bridge Over Puppy Creek to Ramp EN Station 703+00, we recommend a 10' drainage/stabilizing layer be utilized in order to achieve a minimum slope stability safety factor. For embankments located within the station limits of Station 573+00 to Beginning of Bridge Over Spring Creek**,** End of Bridge Over Spring Creek to Station 592+00, and Ramp SW Station 722+00 to Station 724+00, we recommend a 20' drainage/stabilizing layer be utilized in order to achieve a minimum slope stability safety factor. Also, a minimum 5' 12H:1V bench shall be utilized, along with 2H:1V design slopes from the embankment bench down to the toe (within the granular materials) for the embankments with the 20' drainage/stabilizing layer.

For embankments located within Ramp NW Station 726+00 to Station 731+50, we recommend clay material used for the embankment construction have a minimum cohesion of 1000 PSF in order to achieve a minimum slope stability safety factor. This was assumed in our analysis in this section. All other roadway recommendations can be found in the Final Geotechnical Roadway Report.

A special provision should be included in the bridge plans for exploratory holes. The holes are 1 ½" minimum diameter holes that are drilled after excavation is completed to either the bottom of footing elevation for the interior bents or the top of the leveling pad for the end bents. The exploratory holes on this project will be used to determine the amount of pre-drilling required at specified bents.

Dual Bridges on U.S. 412 Relocated over Ramp 4

The new alignment of U.S. Highway 412 extends over Ramp 4 on a three span dual structure arrangement. Eight (8) sample borings were advanced for the Bridge on U.S. Highway 412 over Ramp 4. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 5 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates silt loam and very gravelly silt loam as predominant surface materials.

The proposed site for the dual bridges is underlain by four (4) major, relatively distinct weathered in place (residual) unconsolidated soil and moderate to severely weathered rock layers exhibiting widely variable to relatively uniform

characteristics within each layer. Thinner sublayers were combined to form the major layers and are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths ranging from 6.2 feet to 28.3 feet (absent in Boring 1007), gravel sized chert and weathered limestone fragments and fractions of sand bound by medium plasticity clay were penetrated. The underlying layer, consisting of smaller diameter chert and weathered limestone gravel and sand with high plasticity interstitial clay, exhibits relatively uniform fractions within the bridge footprints. This layer was penetrated, in all borings, to depths from 18.3 feet to 38.3 feet. A widely varying layer composed of non-plastic sand, gravel and silt grading to highly plastic clay was next penetrated beneath the dual bridges. This horizontally and vertically variable layer was penetrated to SPT and/or auger refusal at depths ranging from 40.0 feet to 55.0 feet. Severely to moderately weathered limestone was next encountered and penetrated, first with SPT and augers then finally core barrel, to boring termination within each advanced boring. The limestone was predominately fine grain, broken and chalky due to weathering, fossiliferous in parts and exhibiting stylolites, vugular texture and other dissolution features.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the eight (8) borings, measured and described. Core recovery (REC) ranged from 38% to 100% and cored rock quality determination (RQD) ranged from 0% to 25% with the majority of runs recording 0% RQD. Recorded fractures fell into groupings of 15°-30°, 50°-60° and 80°-90° apparent dip with a few values outside of these ranges. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1219.4 for Boring 1002 to 1212.4 for Boring 1006 with all other boring values between these elevations.

The lab testing indicates the soils are clayey sands with gravel, clayey gravels with sand, silty sands with gravel, chert and rock fragments. Moisture contents range from 9.3% to 70.8%. Auger refusal was encountered in each of the borings at depths ranging from 40.3’ to 55.3’. Recovered rock core consisted of predominately severely weathered white to light gray limestone, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 50.0’ to 66.0’.

Stability analysis was performed for the proposed 3H:1V abutment slopes. The short term, long term, and seismic factors of safety were 2.2, 1.8, and 1.4, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 4") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 1.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, weathered zones, residuum and to assist with pile penetration and seating into weathered bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided in Table 1. Pre-drilling will be required at all Bents to ensure the piles reach the estimated tip elevations.

Table 1
Summary of Recommendations for:
Bridge on US Highway 412 over Ramp 4

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1216' (Left Side) 1219' (Right Side)
2	HP 12x53 Steel Piles	1217' (Left Side) 1215' (Right Side)
3	HP 12x53 Steel Piles	1218' (Left Side) 1212' (Right Side)
4	HP 12x53 Steel Piles	1216' (Left Side) 1217' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples suggests groundwater elevations ranging from 1232 to 1223. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over Old Highway 68

The new alignment of U.S. Highway 412 extends over Old Highway 68 on a three span dual structure arrangement. Eight (8) sample borings were advanced for the Bridge on U.S. Highway 412 over Old Highway 68. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 10 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very to extremely gravelly silt loam and silt loam as predominant surface materials.

The proposed site for the dual bridges is underlain by five (5) major, relatively distinct, weathered in place (residual), unconsolidated soil and fresh to severely weathered rock layers exhibiting widely variable to relatively uniform characteristics within each layer. Thinner sublayers were combined to form the major layers for discussion purposes and are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths ranging from 5.8 feet to 31.0 feet (absent in Borings 1105, 1106, 1107 and 1108), fractions of sand and gravel bound by medium plasticity clay, weathered limestone fragments and chert fragments were penetrated. The underlying layer, consisting of highly plastic clay with gravel and sand, exhibits relatively uniform gradation fractions within the bridge footprints. This layer was penetrated at the surface in Borings 1105, 1106, 1107 and 1108 and deeper in all other borings, to depths ranging from 8.3 feet to 48.3 feet. Further advancement of each boring penetrated a layer composed primarily of gravel size weathered chert and limestone fragments with some sand bound by medium plasticity clay. This layer was penetrated to depths of 28.3 feet to 56.4 feet. Borings 1101, 1102, 1103, 1104, 1105, 1106 and 1108 next encountered materials exhibiting widely variable fractions of gravel size chert fragments and sand with medium to high plasticity clays grading into sand and gravel with low plasticity silt. These borings, with the exception of Boring 1105 were terminated within this major layer at depths ranging from 60.5 feet to 67.9 feet. Boring 1105 encountered chalky to cherty, moderately to completely weathered limestone at a depth of 61.5 feet. The boring was advanced through this weathered rock to a depth 71.0 feet where the boring was terminated. Boring

1107 encountered slightly weathered to fresh cherty limestone at a depth of 30.3 feet. Boring 1107 is evidence of pinnacle development within the Boone Formation as competent rock was encountered at an elevation of 1240.4 while adjacent Boring 1105 encountered rock at an elevation of 1210.2 and adjacent Boring 1108 did not encounter rock at termination elevation of 1203.3.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from four (4) of the eight (8) borings (1101, 1102, 1105, 1107) then measured and described. Core recovery (REC) ranged from 3% to 100% and cored rock quality determination (RQD) ranged from 0% to 93%. Recorded fractures fell into groupings of 20°, 50° and 70°-85° apparent dip with a few values outside of these ranges. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1240.4 for Boring 1107 to 1210.2 for Boring 1105 as noted above. All other borings did not penetrate competent rock although termination elevations ranged from 1212.1 to 1200.0.

The lab testing indicates the soils are clayey sands with gravel, sandy fat clays with gravel, clayey gravels with sand, silty sands with gravel, chert and rock fragments. Moisture contents range from 10.5% to 73.3%. Auger refusal was encountered in each of the borings at depths ranging from 8.8’ to 61.3’. Recovered rock core consisted of predominately slightly to severely weathered interlayered white to gray limestone and white to gray chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 60.5’ to 71.0’.

Stability analysis was performed for the proposed 2½H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.3, 1.8, and 1.5, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1” to 4”) and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 2.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically

limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated pile tip elevations are provided below in Table 2. Pre-drilling will be required at all Bents to ensure the piles reach the estimated tip elevations.

Table 2
Summary of Recommendations for:
Bridge on US Highway 412 over Old Highway 68

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1212' (Left Side) 1208' (Right Side)
2	HP 12x53 Steel Piles	1212' (Left Side) 1202' (Right Side)
3	HP 12x53 Steel Piles	1210' (Left Side) 1200' (Right Side)
4	HP 12x53 Steel Piles	1218' (Left Side) 1203' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and/or weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples and driller's log descriptions suggests groundwater elevations ranging from 1239 to 1214. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Liberty Road Bridge over U.S. 412 Relocated (with MSE Wall at End Bents)

The new alignment of Liberty Road extends over U.S. Highway 412 on a two span, single arrangement. Three (3) sample borings were advanced for the Bridge on Liberty Road over U.S. Highway 412. An additional four (4) sample borings were advanced for the mechanically stabilized earth retaining walls at the abutments of the proposed bridge. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 6 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates silty loam as the predominant surface material.

The proposed site for the bridge is underlain by three (3) relatively distinct, weathered in place (residual), unconsolidated soil and severely weathered rock layers exhibiting relatively uniform characteristics within each layer. These layers are discussed below and are depicted on the accompanying bridge sheet. Extending from the existing ground surface to depths ranging from 7.0 feet to 8.3 feet in Borings 1402 and 1403 medium plasticity clay with fine grain sand was penetrated. Extending from the existing ground surface to a depth of 10.0 feet in Boring 1401 and from 8.3 feet to 15.3 feet in Boring 1402 sand and high plasticity clay with gravel size chert was encountered. Underlying these two (2) layers, advanced borings encountered sand to cobble size, moderately to severely weathered chert with clay infilling. This layer contained lenses of clay with chert fragments in Borings 1401 & 1402, and sand with clay and chert gravel in Boring 1402. Borings 1401, 1402 and 1403 were terminated within this layer at depths of 25.8 feet, 41.0 feet and 25.5 feet respectively. Interpreted top of rock elevations of 1264.7, 1259.2 and 1267.7 for Borings 1401, 1402 and1403 respectively indicate moderately to severely weathered chert above or near the proposed Relocated 412 grade passing under the bridge. The advanced borings did not encounter unweathered chert or limestone prior to boring termination.

The four (4) additional borings, advanced for the retaining wall investigation, appear to collaborate the soil and rock strata descriptions presented above. Medium plasticity clay with traces of fine grain sand and high plasticity clay with sand and gravel size chert were encountered to depths ranging from 3.6 feet to 8.3 feet (Borings 2601 and 2602) at the west abutment retaining wall. Medium plasticity clay with traces of fine grain sand overlying clayey sand with gravel in Boring 2603 and medium plasticity clay with traces of fine grain sand in Boring 2604 were encountered at the east abutment retaining wall. Underlying these layers, at each retaining wall, moderately to

severely weathered chert with clay infilling similar in description to the bridge borings was penetrated. All retaining wall borings were terminated within this layer at depths ranging from 20.7 feet to 40.6 feet. Interpreted top of rock elevations of 1258.7, 1261.8, 1265.9 and 1254.3 for Borings 2601, 2602, 2603 and 2604 respectively indicate moderately to severely weathered chert above or near the proposed retaining wall footing grade.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed in each of the borings advanced. Rock core was removed from all three (3) of the bridge borings and all four (4) of the retaining wall borings then measured and described. Core recovery (REC) ranged from 13% to 82% and cored rock quality determination (RQD) ranged from 0% to 55%. Recorded fractures were reported as primarily 90° apparent dip with a few values differing from this value. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1267.7 for Boring 1403 to 1254.3 for Boring 2604 as noted above.

The lab testing indicates the soils are clayey sands and lean clays with sand. Moisture contents range from 28.4% to 37.7%. Auger refusal was encountered in each of the borings at depths ranging from 7.0' to 15.8'. Recovered rock core consisted of predominately intensely weathered, interlayered, white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 25.5' to 41.0'.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 3.

> **Bents 1 through 3:** Steel HP 12x53 piles driven to practical refusal on bedrock or chert residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, chert residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated pile tip elevations are provided below in Table 3. For all bents, pre-drilling will be required. Also, exploratory holes should be used at Bent 2 to determine the depth to top of rock below the bottom of the footing/leveling pad.

Table 3 **Summary of Recommendations for:** ***Bridge on Liberty Road over U.S. Highway 412***		
Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1241’
2	HP 12x53 Steel Piles	1240’
3	HP 12x53 Steel Piles	1243’

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained in accordance with Section 805 of the Standard Specifications for Highway Construction.

One (1) static (24 hour) groundwater reading was recorded directly from the advanced borings. An elevation of 1262.7 was noted from within Boring 1401. Additionally, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

The MSE wall arrangements for Liberty Road over U.S. Highway 412 will be utilized to retain the proposed embankment slopes at the proposed bridge abutments. The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement.

Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation rock for the proposed west and east walls is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed west and east MSE walls have maximum heights of approximately 25 feet and 22 ½ feet and an estimated lengths of approximately 184 and 165 feet respectively. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the

factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the west wall is based on the maximum height of the wall and is estimated to be 17.5 feet. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the east wall is based on the maximum height of the wall and is estimated to be 16 feet. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall, we anticipate the majority of this settlement should occur during the construction of the wall.

Dual Bridges on U.S. 412 Relocated over Javello Road

The new alignment of U.S. Highway 412 extends over Javello Road on a three span dual structure arrangement. Four (4) sample borings were advanced for the Bridge on U.S. Highway 412 over Javello Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 15 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates extremely gravelly silt loam and gravelly soils as predominant surface materials.

The proposed site for the dual bridges is underlain by three (3) major, relatively distinct, weathered in place (residual), unconsolidated soil layers and two (2) fresh to slightly weathered interbedded rock types. These layers

are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths ranging from 9.2 feet to 11.0 feet, Borings 1301 and 1302 encountered sand and low plasticity clay with gravel sized chert. Borings 1303 and 1304 encountered gravel size fragments of chert and medium plasticity clay with some sand from the existing ground surface to depths of 8.8 feet to 21.5 feet. Underlying the unconsolidated soils each boring intercepted interbedded fresh to slightly weathered, cherty limestone and fresh to slightly weathered, fossiliferous chert at depths ranging from 8.8 feet to 21.5 feet. Each boring was terminated within interbedded limestone and chert at 20.0 feet, 21.0 feet, 18.8 feet and 32.0 feet for Borings 1301, 1302, 1303 and 1304 respectively.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the four (4) borings then measured and described. Core recovery (REC) ranged from 94% to 100% and cored rock quality determination (RQD) ranged from 9% to 85%. Recorded fractures fell into groupings of 0°-15°, 30° and 45° apparent dip. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1150.5 for boring 1304 to 1143.3 for Boring 1301. Borings 1302 and 1303 recorded top of rock elevations were 1145.0 and 1147.2 respectively.

The lab testing indicates the soils are sands with gravel, clayey gravels with sand, and clayey sands with gravel. Moisture contents range from 21.6% to 32.8%. Auger refusal was encountered in each of the borings at depths ranging from 6.5’ to 21.5’. Recovered rock core consisted of predominately severely weathered interlayered white to gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 18.8’ to 32.0’.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.5, 1.4, and 1.3, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (½” to 2”) and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 4.

Bents 1 and 4: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 4.

Bents 2 and 3: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 and Bent 3 are provided below in Table 4. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 4
Summary of Recommendations for:
Bridge on US Highway 412 over Javello Road

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1143’ (Left Side) 1145’ (Right Side)
2	Spread Foundations	1143’ (Left Side) 1143’ (Right Side)
3	Spread Foundations	1145’ (Left Side) 1144’ (Right Side)
4	HP 12x53 Steel Piles	1147’ (Left Side) 1150’ (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Static groundwater readings were recorded for Borings 1301, 1302 and 1303 with elevations ranging from 1149 to 1152. Boring 1304 was recorded as dry however examination of the natural moisture content values of collected samples and driller's log descriptions suggests wet soils were encountered at an elevation of 1152. Additionally, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over Brush Creek and Brush Creek Road

The new alignment of U.S. Highway 412 extends over Brush Creek and Brush Creek Road on a nine span, dual structure arrangement. Eighteen (18) sample borings were advanced for the Bridge on U.S. Highway 412 over Brush Creek and Brush Creek Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 3 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly silt loam within the Brush Creek floodplain with very to extremely gravelly silt loam as predominant surface materials on the upland surfaces.

The proposed site for the dual bridges is underlain by three (3) intermingled sediment types interpreted as alluvium, except within Borings 2317 and 2318, overlying thin isolated layers of weathered chert and limestone residuum and fresh to moderately weathered, interlayered chert and limestone. Boring 2317 is interpreted to penetrate upland residual soils while Boring 2318 intercepts a mix of alluvium and residual soils. The sediments, soils and rock layers are discussed below and are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths ranging from 6.4 feet to 14.5 feet discontinuous deposits of medium plastic, gravelly clay and clayey gravel with minor fractions of sand and non-plastic, poorly sorted gravel, sand and silt were penetrated. The underlying unconsolidated chert and limestone residuum with clay seams was encountered within Borings 2301, 2303, 2308, 2309 and 2312 with thickness of 0.1 feet to 2.8 feet. Further advancement of each boring penetrated consolidated, fresh to moderately weathered, fractured chert with thin limestone beds or fresh to moderately weathered, fractured limestone with chert nodules and chert beds. Boring 2317 is interpreted to penetrate medium plastic, clayey gravel with minor fractions of sand overlying severely weathered chert fragments with clay seams with Boring 2318 penetrating only the medium plastic clayey gravel. These weathered in place materials overlie

consolidated, fresh to moderately weathered chert with limestone beds. The depth to competent rock within the Brush Creek floodplain appears to be relatively uniform ranging from an elevation of 1132.6 to an elevation of 1125.1. Depth to competent rock in upland Borings 2317 and 2318 was interpreted as elevation 1146.8 and elevation 1133.2 respectively.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the eighteen (18) borings then measured and described. Core recovery (REC) ranged from 52% to 100% and cored rock quality determination (RQD) ranged from 0% to 100%. Recorded fractures fell into groupings of 0°-15°, 30°, 45° and 70° apparent dip. Average discontinuity spacing calculated from the cored intervals ranged from 0.29 feet to 0.53 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions base of weathered rock elevations were determined and are summarized in the table below.

Table 5
Summary of Competent Rock Elevations for:
Bridge on US Highway 412 over Brush Creek and Brush Creek Road

BORING	BASE OF WEATHERED ROCK / TOP COMPETENT ROCK ELEVATION
B 2301	1132.4
B 2302	1132.6
B 2303	1130.9
B 2304	1131.8
B 2305	1130.1
B 2306	1130.3
B 2307	1125.1
B 2308	1128.4
B 2309	1126.7
B 2310	1125.8
B 2311	1126.7
B 2312	1124.9
B 2313	1126.9
B 2314	1128.1
B 2315	1127.4
B 2316	1128.1
B 2317	1153.2
B 2318	1133.2

The lab testing indicates the soils are gravelly lean clays, clayey gravels with sand, well-graded gravels with silt and sand, and chert and rock fragments. Moisture contents range from 16.1% to 30.2%. Auger refusal was encountered

in each of the borings at depths ranging from 6.4' to 14.5'. Recovered rock core consisted of predominately fresh to moderately weathered white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 16.0' to 24.5'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. For the beginning of the bridge, the short term, long term, and seismic factors of safety were 1.5, 1.4, and 1.2, respectively. For the end of the bridge, the short term, long term, and seismic factors of safety were 1.6, 2.1, and 1.7, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 5") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 6.

Bents 1 and 10: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, gravelly alluvium, chert and limestone residuum and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations for Bents 1 and 10 are provided below in Table 6. For Bent 1, pre-drilling will be required to ensure a minimum 10 ft pile embedment into original ground.

Bents 2 through 9: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 through Bent 9 are shown in Table 6. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 6 **Summary of Recommendations for:** ***Bridge on US Highway 412 over Brush Creek and Brush Creek Road***		
Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1129' (Left Side) 1130' (Right Side)
2	Spread Foundations	1129' (Left Side) 1130' (Right Side)
3	Spread Foundations	1128' (Left Side) 1128' (Right Side)
4	Spread Foundations	1123' (Left Side) 1126' (Right Side)
5	Spread Foundations	1125' (Left Side) 1124' (Right Side)
6	Spread Foundations	1125' (Left Side) 1123' (Right Side)
7	Spread Foundations	1125' (Left Side) 1126' (Right Side)
8	Spread Foundations	1125' (Left Side) 1126' (Right Side)
9	Spread Foundations	1145' (Left Side) 1131' (Right Side)
10	HP 12x53 Steel Piles	1147' (Left Side) 1133' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples and driller's log descriptions from the advanced bridge borings as well as nearby roadway borings suggests groundwater elevations ranging from 1135 to 1130. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during

wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over Marchant Road

The new alignment of U.S. Highway 412 extends over Marchant Road on a three span dual structure arrangement. Four (4) sample borings were advanced for the Bridge on U.S. Highway 412 over Marchant Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 7 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very gravelly silt loam as the predominant surface material.

The proposed site for the dual bridges is underlain by embankment fill, weathered in place (residual), unconsolidated soil layers and severely weathered to fresh interbedded rock. These soil and rock layers are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths of 8.3 feet Borings 1502 and 1503 encountered low plasticity silt interpreted as embankment fill. Boring 1501encountered low plasticity silty sand with gravel size fragments of chert at the surface and extending to 13.3 feet in depth. Borings 1502 and 1503 encountered similar materials underlying the embankment fill to depths of 13.3 feet and 18.0 feet respectively. Boring 1504 encountered silty, gravel size chert fragments with sand at the ground surface and extending to 13.3 feet. Subsequent discontinuous layers of high plasticity clay with sand, clayey sand with gravel size chert fragments, gravelly silt with sand, slity gravel with sand and silty sand with gravel were intercepted in each of the four (4) borings to depths of 21.2 feet to 31.6 feet. Borings 1501, 1502, 1503 and 1504 next penetrated moderately to severely weathered chert with clay infill to depths of 36.3 feet (Elevation 1203.6), 36.0 feet (Elevation 1211.7), 41.0 feet (Elevation 1206.5) and 36.0 feet (Elevation 1210.4) respectively. Borings 1502, 1503 and 1504 were terminated within this chert residuum. Boring 1501 intercepted interbedded, fresh to slightly weathered, chert and limestone at 36.3 feet with continued penetration to a termination depth of 46.0 feet (Elevation 1193.9).

Upon reaching intervals where auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the four (4) borings then measured and described. Core recovery (REC) ranged from 32% to 100% and cored rock quality determination (RQD) ranged from 0% to 76%. Observed fracturing suggests

0°-60° apparent dip however significant portions of the rock and soil infill were absent. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1223.3 for boring 1504 to 1208.3 for Boring 1501. Borings 1502 and 1503 recorded top of rock elevations were 1221.7 and 1219.1 respectively. Reported top of rock elevations indicate the top of chert residuum, unweathered to slightly weathered rock was intercepted within Boring 1501 only at an elevation of 1203.6.

The lab testing indicates the soils are silty sands with gravel, clayey sands with gravel, silty gravels with sand, silts, gravelly fat clays with sand, gravelly silts with sand, chert and rock fragments. Moisture contents range from 11.2% to 41.7%. Auger refusal was encountered in each of the borings at depths ranging from 21.2' to 31.6'. Recovered rock core consisted of predominately intensely weathered light gray chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 36.0' to 46.0'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.6, 1.5, and 1.3, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 3") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 7.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal in chert residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, residuum and weathered zones and to assist with pile penetration and seating into chert residuum. The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 7. Pre-drilling will be required at Bents 2 and 3 (left) to ensure the piles reach the estimated tip elevations.

Table 7 **Summary of Recommendations for:** ***Bridge on US Highway 412 over Marchant Road***		
Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1226' (Left Side) 1208' (Right Side)
2	HP 12x53 Steel Piles	1226' (Left Side) 1219' (Right Side)
3	HP 12x53 Steel Piles	1225' (Left Side) 1219' (Right Side)
4	HP 12x53 Steel Piles	1222' (Left Side) 1220' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples suggests wet soils were encountered at elevations ranging from 1231 to 1225. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over Robbins Road

The new alignment of U.S. Highway 412 extends over Robbins Road on a three span dual structure arrangement. Four (4) sample borings were advanced for the Bridge on U.S. Highway 412 over Robbins Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging

from 4 to 91 blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very gravelly silt loam as the predominant surface material.

The proposed site for the dual bridges is underlain by weathered in place (residual), unconsolidated soil layers, severely weathered chert residuum and fresh to slightly weathered interbedded limestone and chert. These soil and rock layers are depicted on the accompanying bridge sheets. Extending from the existing ground surface to depths of 8.3 feet to 13.3 feet, Borings 1601, 1602, 1603 and 1604 encountered gravel size chert and limestone fragments in roughly equal proportion with silt exhibiting medium plastic characteristics. A slightly smaller proportion of sand size fragments were also noted within the fractional breakdown. The four (4) borings next intercepted 5.0 feet to 15.0 feet of equally proportioned sand, silt and gravel size weathered chert and limestone fragments exhibiting low plasticity. Borings 1602 and 1603 encountered auger refusal within this material at depths of 22.6 feet (Elevation 1216.4) and 19.7 feet (Elevation 1214.3) respectively. Underlying the equally proportioned soil layer Boring 1601 encountered gravel with smaller, relatively equal fractions of sand and silt, exhibiting medium plasticity, to a depth of 38.3 feet. Boring 1601 next intercepted 9.4 feet of gravel size chert fragments with medium plastic clay and a small fraction of sand. Boring 1604 intercepted 19.9 feet of similar soils including an interpreted clay seam exhibiting low SPT "N" values from 33.0 feet to 41.5 feet. Boring 1601 and 1604 reached auger refusal while still within this soil interval at depths of 47.7 feet (Elevation 1194.9) and 47.2 feet (Elevation 1202.5). Each boring intercepted fresh to slightly weathered limestone with interbedded chert at depths ranging from 19.7 feet to 47.7 feet. Borings 1602 and 1603 encountered 1.2 feet (top Elevation 1209.6) and 0.6 feet (top Elevation 1213.5) voids respectively within the limestone intervals. Boring 1601 was terminated in chert at a depth of 58.0 feet (Elevation 1184.6). Borings 1602, 1603 and 1604 were terminated in limestone at depths of 30.7 feet (Elevation 1208.3), 30.0 feet (Elevation 1204.0) and 58.0 feet (Elevation 1191.7) respectively.

Upon reaching intervals where auger advancement recorded refusal rock coring operations were performed. Rock core was removed from each of the four (4) borings then measured and described. Core recovery (REC) ranged from 60% to 100% and cored rock quality determination (RQD) ranged from 33% to 100%. Observed fracturing suggests 0°-15° apparent dip with scattered vertical (90°) fractures encountered. Apparent bedding plane dip was not readily observable due to the nodular contacts between chert and limestone however the relatively flat regional

dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-rock elevations were determined to range from 1216.4 for Boring 1602 to 1194.9 for Boring 1601. Borings 1603 and 1604 recorded top-of-rock elevations were 1214.3 and 1202.5 respectively. Reported top-of-rock elevations indicate the top of unweathered, competent rock.

The lab testing indicates the soils are silty gravels with sand, and chert and rock fragments. Moisture contents range from 12.6% to 65.1%. Auger refusal was encountered in each of the borings at depths ranging from 19.7' to 47.7'. Recovered rock core consisted of predominately fresh to slightly weathered white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 30.0' to 58.0'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 2.0, 1.8, and 1.5, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 3") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 8.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 8.

Table 8 **Summary of Recommendations for:** ***Bridge on US Highway 412 over Robbins Road***		
Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1195' (Left Side) 1200' (Right Side)
2	HP 12x53 Steel Piles	1204' (Left Side) 1216' (Right Side)
3	HP 12x53 Steel Piles	1214' (Left Side) 1209' (Right Side)
4	HP 12x53 Steel Piles	1206' (Left Side) 1202' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples suggests wet soils were encountered at elevations ranging from 1213 to 1211. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Highway 112 over U.S. 412 Relocated (with MSE Wall at End Bents)

The new alignment of Highway 112 extends over U.S. Highway 412 on a two span, single structure arrangement. Three (3) initial borings were advanced within the footprint of the bridge. F&H returned to the bridge site advancing three (3) additional borings along the proposed centerline of the bridge to gain a better understanding of the subsurface conditions. An additional six (6) sample borings were advanced for the mechanically stabilized earth

retaining walls at the abutments of the proposed bridge. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 2 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly to very gravelly silt loam as the predominant surface material.

The proposed site for the bridge is underlain by three (3) relatively distinct, weathered in place (residual), unconsolidated soil with severely weathered chert layers exhibiting relatively similar gradation, average grain size and cohesion characteristics within each layer. Extending from the existing ground surface to depths ranging from 3.0 feet to 18.3 feet in Borings 1701, 1702, 1703, 5000, 5001 and 5002 gravel size chert fragments and low plasticity silt with fine to coarse grain sand size particles were penetrated. Underlying this surface layer, advanced borings encountered an increasing percentage, with depth, of dense to very dense, non-plastic to low plastic gravel to sand size chert fragments with silt, and soft to medium stiff (low SPT value) material interpreted to represent scattered clay/silt seams. This layer was encountered to depths ranging from 53.3 feet to 64.4 feet with Boring 1702 terminated at 30.0 feet (Elevation 1223.3) still within the layer. Borings 5000, 5001 and 5002 penetrated this layer, both with SPT sampling and rock coring to interpreted base of weathered rock depths of 62.3 feet (Elevation 1188.7), 57.2 feet (Elevation 1197.9), and 64.4 feet (Elevation 1192.8) respectively. Borings 1701 and 1703 next penetrated non-plastic gravel size chert fragments with sand size fragments and silt/clay seams. This layer exhibited a larger average grain size and higher percentage of gravel size particles than other previously penetrated material layers. Borings 1701 and 1703 were terminated within this unit at 68.0 feet (Elevation 1179.1) and 81.5 feet (Elevation 1176.3) respectively. Auger refusal was encountered in Boring 1701.

Upon reaching intervals where auger refusal was encountered coring operations were attempted. Rock core recovered from borings 5000, 5001 and 5002 was removed from each boring, measured and described. Core recovery (REC) ranged from 0% to 98% with rock quality designation (RQD) ranging from 0% to 88 %. Coring operations revealed interbedded fine to coarse grain and very fine to fine grain, fossiliferous limestone, fresh with moderately severe weathered intervals, cherty intervals and scattered stylolites.

Unconfined compression testing (qU) was performed on four (4) recovered specimens, two (2) each from boring 5000 and boring 5001. The reported values were 7,477psi and 7,964 psi (boring 5000) and 10,898 psi and 3,572 psi (boring 5001) for very fine to fine grain/fine to coarse grain/coarsely crystalline/coarsely crystalline to mega-grain, fossiliferous, cherty limestone exhibiting fresh to moderately weathered condition.

The six (6) additional borings, advanced for the retaining wall investigation, appear to collaborate with the soil and rock strata descriptions presented above with one additional layer. Gravel size chert fragments and low plasticity silt with fine grain sand size particles were penetrated to a depth of 8.3 feet in Boring 1701 which is at the face of the north abutment retaining wall. Borings 1801, 1802 and 1803 encountered non-plastic gravel size chert with silt and sand at the surface then penetrated the layer to depths of 23.3 feet, 28.3 feet and 23.3 feet respectively. Boring 1701 penetrated this layer to 53.3 feet as previously discussed. A layer exhibiting nearly equal fractions of gravel size chert and silt with a lesser fraction of sand was penetrated within Borings 1801, 1802 and 1803. Borings 1802 and 1803 were terminated within this unit at depths of 40.0 feet (Elevation 1212.9) and 40.0 feet (Elevation 1213.0) respectively. Boring 1801 next encountered non-plastic, predominately gravel size chert with sand and silt. Boring 1801 was terminated within this layer at 40.0 feet (Elevation 1215.3). Borings 1804, 1805 and 1806 were advanced along the east side of the south abutment (retaining) wall. Isolated pockets of gravel size chert fragments and low plasticity silt with fine grain sand size particles were inferred as penetrated, near the surface, within Boring 1805 due to the layer's presence in nearby Boring 1703. Borings 1804 and 1806 encountered non-plastic gravel size chert with silt and sand at the surface then penetrated the layer to depths of 33.3 feet. Boring 1805 penetrated the same material layer to a depth of 38.3 feet. A layer exhibiting nearly equal fractions of gravel size chert and silt with a lesser fraction of sand was penetrated within Borings 1804 to a depth of 43.3 feet and to termination in Boring 1806 at 50.0 feet (Elevation 1210.5). Borings 1804 and 1805 next encountered non-plastic, predominately gravel size chert with sand and silt and were terminated within this layer at 50.0 feet (Elevation 1210.5) and 50.0 feet (Elevation 1207.9) respectively. No indication for top of rock elevation was evidenced in any of the six (6) retaining wall borings advanced. Strata encountered by the advanced borings indicate moderately to severely weathered chert fragments with varying fractions of silt and clay above or at the proposed Relocated 412 grade passing between the subject retaining walls. The lab testing indicates the soils are silty gravels with sand. Moisture contents range from

7.2% to 48.4%. Auger refusal was not encountered in the borings. The borings were terminated at depths ranging from 30.0' to 81.5'.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 9.

Bents 1 through 3: Steel HP 12x53 piles driven to practical refusal on bedrock or chert residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 9. For Bent 3, pre-drilling will be required to ensure piles reach the estimated tip elevation.

Table 9
Summary of Recommendations for:
Bridge on Highway 112 over U.S. Highway 412

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1190'
2	HP 12x53 Steel Piles	1200'
3	HP 12x53 Steel Piles	1193'

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement could require hard driving through dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained in accordance with Section 805 of the Standard Specifications for Highway Construction.

Natural moisture content values suggest groundwater elevation levels of 1182 to 1178. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months

or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

The MSE wall arrangement for Highway 112 over U.S. Highway 412 will be utilized to retain the proposed embankment slopes at the proposed bridge abutments. The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for the proposed walls is 8000 PSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed north and south MSE walls have maximum heights of approximately 20 ½ feet and 25 ½ feet and an estimated lengths of approximately 183 feet and 208 feet, respectively. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims

LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the north wall is based on the maximum height of the wall and is estimated to be 15 feet. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the south wall is based on the maximum height of the wall and is estimated to be 18 feet. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall, we anticipate the majority of this settlement should occur during the construction of the wall.

Grimsley/Miller Road Bridge over U.S. 412 Relocated (with MSE Wall at End Bents)

The new alignment of Grimsley/Miller Road extends over U.S. Highway 412 on a two span, single arrangement. Four (4) sample borings, including one (1) replacement boring, were advanced for the Bridge on Grimsley/Miller Road over U.S. Highway 412. An additional two (2) sample borings were advanced for the mechanically stabilized earth retaining walls at the abutments of the proposed bridge. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 3 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates silt loam to gravelly silt loam as the predominant surface materials.

The proposed site for the bridge is underlain by relatively distinct, weathered in place (residual), unconsolidated soils and severely weathered chert layers with the soils exhibiting relatively similar gradation, average grain size and cohesion characteristics within each layer. These layers are discussed below and are depicted on the accompanying bridge sheet. Extending from the existing ground surface to depths ranging from 5.3 feet to 9.4 feet in Borings 1201, 1201A, 1202 and 1203 gravel size chert fragments and medium plasticity clay with some fine grain sand size particles were penetrated. Layered, severely weathered chert was next encountered in Borings 1201 and 1203 to depths of 13.0 feet and 8.8 feet respectively with Boring 1201 terminated within this material due to mechanical problems. Discontinuous layers of high plasticity clay with some gravel size chert fragments (Boring 1201A) and clay seams with sand to gravel size fragments (Boring 1203) were intercepted underlying the previously detailed layers. Equal fractions of gravel size chert fragments, medium plasticity clay and sand size fragments composed the next underlying layer. This layer, intercepted across the site in Borings 1201A, 1202 and 1203 was penetrated to depths of 23.3 feet (Elevation 1256.1), 18.3 feet (Elevation 1260.5) and 26.0 feet (Elevation 1254.0). Underlying this layer, advanced borings encountered gravel size chert fragments with fine to coarse grain sand, silt, clay and scattered dissolution cavities. Boring 1203 was terminated within this layer at 31.0 feet (Elevation 1249.0) while Borings 1201A and 1202 fully penetrated the layer to depths of 56.8 feet (Elevation 1222.6) and 47.1 feet (Elevation 1231.7) respectively. Auger refusal was encountered within Borings 1201A and 1202 at these depths and elevations then the borings were advanced by coring into interbedded chert and limestone. Chert recovered from within the two (2) borings was generally described as fresh, with weathering and staining on fracture faces and containing limestone beds. Limestone, from recovered cores, was described as fresh, microcrystalline to medium grain,

stylolitic with chert layers and nodules. Top of rock elevations and base of weathered rock elevations were interpreted to be 1222.6 for Boring 1201A and 1231.7 for Boring 1202. Strata encountered by the advanced borings indicate moderately to severely weathered chert fragments with varying fractions of silt and clay and very stiff silt with gravel size chert fragments above or at the proposed Bypass 412 grade passing under the subject bridge.

The two (2) additional borings, advanced for the retaining wall investigation, appear to collaborate with the soil strata descriptions presented above with one additional layer. Gravel size chert fragments and medium plasticity clay with some fine grain sand size particles were penetrated to a depth of 23.3 feet in Boring 2701, north abutment retaining wall and 13.3 feet in Boring 2702, south abutment retaining wall. This layer was interrupted within Boring 2701 by a residual, resistant chert layer penetrated between 11.8 feet and 12.4 feet. Boring 2702 intercepted equal fractions of gravel size chert fragments, medium plasticity clay and sand fragments underlying the surface strata to a depth of 33.3 feet. Each of the two (2) borings then intercepted gravel size chert fragments with low plasticity silt/clay and sand while penetrating this layer to termination depth. Auger refusal was not encountered prior to reaching boring termination depths of 36.5 feet (Elevation 1240.9) for Boring 2701 and 36.5 feet (Elevation 1242.5) for Boring 2702. Strata encountered by the advanced retaining wall borings, like the strata encountered by the bridge borings, indicate moderately to severely weathered chert fragments with varying fractions of silt, clay and sand above or at the proposed Bypass 412 grade between the subject retaining walls.

The lab testing indicates the soils are clayey gravels, fat clays with gravel, clayey gravels with sand, silty gravels with sand, chert and rock fragments. Moisture contents range from 16.1% to 37.9%. Auger refusal was encountered in each of the borings at depths ranging from 9.4’ to 56.8’. Recovered rock core consisted of predominately intensely weathered to fresh interlayered white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 13.0’ to 66.0’.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 10.

> **Bents 1 through 3:** Steel HP 12x53 piles driven to practical refusal on bedrock or chert residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard

Specifications for Highway Construction. The estimated tip elevations are provided below in Table 10. At Bent 3, pre-drilling will be required to ensure 10 ft of pile embedment below leveling pad.

Table 10
Summary of Recommendations for:
Bridge on Grimsley/Miller Road over U.S. Highway 412

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1222’
2	HP 12x53 Steel Piles	1231’
3	HP 12x53 Steel Piles	1254’

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Groundwater conditions within Borings 1201, 1201A and 1202 were dry or not reported. The Boring 1203 driller’s log reported a static (24 hour) water level of 1.5 feet below existing ground (Elevation 1278.5). Natural moisture content values and driller’s soil descriptions suggest groundwater elevation levels of 1259 to 1244. Additionally, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

The MSE wall arrangements for Grimsley/Miller Road over U.S. Highway 412 will be utilized to retain the proposed embankment slopes at the proposed bridge abutments. The reinforced soil that will be used for the MSE

wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for the proposed wall is 7000 PSF. If rock is present, the factored bearing resistance of the foundation materials for proposed walls is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed north and south MSE walls have maximum heights of approximately 23 feet and 22½ feet and estimated lengths of approximately 178 feet and 173.5 feet, respectively. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes.

Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the north and south walls is based on the maximum height of the wall and is estimated to be 16 feet. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall at this site, we anticipate the majority of this settlement should occur during the construction of the wall. Also, based on some of the borings, rock could be encountered near the bottom of the proposed wall. If rock is encountered near the bottom of the proposed wall, we recommend that a slip joint or some other mechanism be utilized in the facing panels to prevent any kind of differential settlement between the wall bearing on soil and the wall bearing on rock.

Dual Bridges on U.S. 412 Relocated over Spring Creek

The new alignment of U.S. Highway 412 extends over Spring Creek on a nine span, dual structure arrangement. Twenty (20) sample borings were advanced for the Bridge on U.S. Highway 412 over Spring Creek. Standard

Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 4 to 100+ blows per foot.

The proposed site for the dual bridges is underlain by three (3) distinct sediment types, interpreted as alluvium, overlying thin locally extensive to isolated layers of weathered chert residuum resting on fresh to moderately weathered, interlayered chert and limestone in some borings. In other borings alluvium rests directly upon fresh to moderately weathered, interlayered chert and limestone. Borings 2417, 2419 and 2420 are interpreted to penetrate upland residual soils while Borings 2415 and 2418 are interpreted to encounter fill overlying alluvium prior to intercepting weathered and unweathered rock. The sediments, soils and rock layers are discussed below and are depicted on the accompanying bridge sheets.

Extending from the existing ground surface to a depth of 9.2 feet in Boring 2415 and 12.0 feet in Boring 2418 isolated bodies of gravel, sand and clay interpreted as non-engineered fill were encountered. Upland Borings 2417, 2419 and 2420 encountered non-plastic silty gravel with sand, interpreted as residual soils, at the existing ground surface then extending to depths of 5.2 feet (Elevation 1147.8), 9.4 feet (Elevation 1148.6) and 9.4 feet (Elevation 1148.6) respectively. Auger refusal was encountered at these elevations with the soils resting upon fresh limestone or chert as determined by coring. Boring 2412, located within the Spring Creek floodplain encountered an isolated pocket of non-plastic silty gravel with sand, interpreted as alluvium, to a depth of 6.6 feet (Elevation 1132.4). Auger refusal was recognized at this elevation with underlying fresh chert recovered from coring operations. Gravel and sand, composed predominately of chert fragments, with a small fraction of silt, was intercepted at the ground surface in Borings 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410 and 2411 to depths ranging from 5.4 feet to 13.2 feet. This material was interpreted as alluvium, was non-plastic and overlies either thin discontinuous layers of weathered chert, fresh to slightly weathered thin limestone beds or fresh to slightly weathered chert as described within recovered cores. Borings 2413, 2414, 2415, 2416 and 2418 encountered moderately well sorted gravel size chert fragments with sand and clay fractions at the ground surface or underlying fill, as discussed within Boring 2418, to depths of 9.2 feet to 18.0 feet. This material is interpreted as alluvium, exhibited medium plasticity properties and overlies either thin discontinuous layers of weathered chert, fresh to slightly weathered thin limestone beds or fresh to slightly weathered chert as described within recovered cores. Chert recovered from within the

advanced borings was typically described as white, light gray to gray, pebbly to angular fragmented or nodular appearance with intermittent light gray to gray limestone beds, scattered vugs and pits, very porous in intervals, traces of fossil molds and numerous joints and/or fracture surfaces stained light tan and slightly to moderately weathered. Limestone recovered from advanced core borings, when encountered, was described as light gray to gray, fine grain, discontinuities fresh to moderately weathered with some clay infilling, scattered pits and white, light gray to gray intermittent chert beds. The depth to competent rock within the Spring Creek floodplain appears to be relatively uniform ranging from an elevation of 1138.6 to an elevation of 1129.6. Depth to competent rock, in upland Borings 2417, 2419 and 2420, ranges from elevation 1148.6 to elevation 1142.8.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the twenty (20) borings then measured and described. Core recovery (REC) ranged from 27% to 100% however most runs ranged from 80% to 100%. Cored rock quality determination (RQD) ranged from 0% to 100% however most runs ranged from 30% to 70%. Recorded fractures fell into groupings of 0°-30°, 45°, 60°-70° and 80°-90° apparent dip. Average discontinuity spacing calculated from the cored intervals ranged from 0.20 feet to 0.58 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions base of weathered rock elevations (top of competent rock) were determined and are summarized in the table below.

Table 11 Summary of Competent Rock Elevations for: *Bridge on US Highway 412 over Spring Creek*	
BORING	**BASE OF WEATHERED ROCK / TOP COMPETENT ROCK ELEVATION**
B 2401	1132.3
B 2402	1130.5
B 2403	1133.9
B 2404	1135.7
B 2405	1138.0
B 2406	1138.6
B 2407	1138.3
B 2408	1137.8
B 2409	1133.5
B 2410	1133.5
B 2411	1132.9
B 2412	1132.4
B 2413	1132.0
B 2414	1131.4
B 2415	1129.8
B 2416	1130.2
B 2417	1142.6
B 2418	1133.5
B 2419	1148.6
B 2420	1148.6

The lab testing indicates the soils are silty gravels with sand, poorly graded gravels with silt and sand, poorly graded gravels with clay and sand, and chert and rock fragments. Moisture contents range from 20.2% to 47.0%. Auger refusal was encountered in each of the borings at depths ranging from 5.2’ to 18.0’. Recovered rock core consisted of predominately moderately weathered white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 15.4’ to 28.0’.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.4, 1.4, and 1.2, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1” to 3”) and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 12.

Bents 1 and 10: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, gravelly alluvium and residuum and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 12.

Bents 2 through 9: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 through Bent 9 are shown below in Table 12. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 12
Summary of Recommendations for:
Bridge on US Highway 412 over Spring Creek

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1135’ (Left Side) 1132’ (Right Side)
2	Spread Foundations	1131’ (Left Side) 1133’ (Right Side)
3	Spread Foundations	1134’ (Left Side) 1134’ (Right Side)
4	Spread Foundations	1136’ (Left Side) 1131’ (Right Side)
5	Spread Foundations	1132’ (Left Side) 1132’ (Right Side)
6	Spread Foundations	1129’ (Left Side) 1127’ (Right Side)
7	Spread Foundations	1128’ (Left Side) 1128’ (Right Side)
8	Spread Foundations	1128’ (Left Side) 1128’ (Right Side)
9	Spread Foundations	1132’ (Left Side) 1131’ (Right Side)
10	HP 12x53 Steel Piles	1148’ (Left Side) 1148’ (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples and driller's log descriptions from the advanced bridge borings as well as nearby roadway borings suggests groundwater elevations ranging from 1153 (upland) to 1134 (floodplain). However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over East Wagon Wheel Road

The new alignment of U.S. Highway 412 extends over Wagon Wheel Road on a three span, dual structure arrangement. Eight (8) sample borings were advanced for the Bridge on U.S. Highway 412 over Wagon Wheel Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 4 to 91 blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very gravelly silt loam as the predominant surface material.

The proposed site for the dual bridges is underlain by weathered in place (residual), unconsolidated soil layers, isolated pockets of severely weathered chert residuum and fresh to slightly weathered interbedded limestone and chert. These soil and rock layers are depicted on the accompanying bridge sheets.

Extending from the existing ground surface to depths of 7.8 feet to 12.9 feet Borings 2501, 2502, 2504, 2505 and 2506 encountered gravel size chert fragments and sand with clay exhibiting medium plasticity characteristics. Relatively equally proportioned gravel and sand size weathered chert and limestone fragments and clay, exhibiting low plasticity, were encountered from the surface to 6.7 feet and 13.0 feet in Borings 2508 and 2507 respectively. Correlative soils were recognized within Boring 2506 at depths of 7.8 feet to 12.8 feet. Non-plastic, silty, gravel size chert fragments with sand was logged at the surface in Boring 2503 extending to a depth of 12.1 feet.

Correlative soils were also intercepted within Borings 2502, 2504, 2505, 2506 and 2507 with thickness ranging from 2.1 feet to 11.2 feet. Borings 2502, 2504, 2505 and 2508 encountered auger refusal on competent chert or limestone underlying these soil layers at depths of 14.3 feet (Elevation 1150.4), 15.0 feet (Elevation 1151.0), 19.0 feet (Elevation 1152.9) and 6.7 feet (Elevation 1183.2) respectively. Borings 2501, 2503, 2506 and 2507 encountered auger refusal on weathered and fractured limestone and/or chert fragments exhibiting surface staining, dissolution pitting and dissolution etching underlying the previously discussed soil layers. Borings 2501, 2503, 2506 and 2507 penetrated this material layer to interception of competent chert or limestone at depths of 12.5 feet (Elevation 1150.7), 16.2 feet (Elevation 1148.2), 24.0 feet (Elevation 1152.9) and 27.5 feet (Elevation 1155.4) respectively. Borings 2506 and 2508 encountered 1.4 feet to 9.3 feet of fresh to moderately weathered, microcrystalline, medium grain limestone with chert nodules and chert beds interpreted as competent rock. Boring 2508 was terminated within limestone at a depth of 16.0 feet (Elevation 1173.9). Boring 2506 next intercepted fresh chert with limestone beds, fracturing and dissolution pits and vugs to boring termination at a depth of 30.6 feet (Elevation 1146.3). Borings 2501, 2503, 2504, 2505 also intercepted and reached boring termination in competent chert as described above at depths of 22.0 (Elevation 1141.2), 22.1 feet (Elevation 1142.3), 25.0 feet (Elevation 1141.0) and 29.0 feet (Elevation 1142.9) respectively. Borings 2502 and 2507 were terminated within fine to medium grain limestone at depths of 24.3 feet (Elevation 1140.4) and 35.8 feet (Elevation 1147.1).

Upon reaching intervals where auger advancement recorded refusal rock coring operations were performed. Rock core was removed from each of the eight (8) borings then measured and described. Core recovery (REC) ranged from 44% to 100% and cored rock quality determination (RQD) ranged from 0% to 88%. Observed fracturing suggests 0°-30° range apparent dips with scattered individual 60°, 70° and 80° fractures encountered. Apparent bedding plane dip was not readily observable due to the nodular contacts between chert and limestone however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions elevations at the top of competent rock were determined to range from 1183.2 for Boring 2508 to 1148.2 for Boring 2503. The following table details the elevations at the top of competent rock for each boring.

Table 13 **Summary of Competent Rock Elevations for:** ***Bridge on US Highway 412 over Wagon Wheel Road***	
BORING	**BASE OF WEATHERED ROCK / TOP COMPETENT ROCK ELEVATION**
B 2501	1151.2
B 2502	1150.4
B 2503	1148.4
B 2504	1151.0
B 2505	1152.9
B 2506	1152.9
B 2507	1155.4
B 2508	1183.2

The lab testing indicates the soils are silty gravels with sand, and chert and rock fragments. Moisture contents range from 12.6% to 65.1%. Auger refusal was encountered in each of the borings at depths ranging from 19.7' to 47.7'. Recovered rock core consisted of predominately highly weathered to fresh, white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 30.0' to 58.0'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.5, 1.5, and 1.3, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 3") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 14.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal on bedrock or chert residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 14. At Bents 2 and 4 (Right), pre-drilling will be required to achieve a minimum of 10' of pile embedment. Also, exploratory holes should be used at Bent 2 to determine the depth to top of rock below the bottom of footing.

Table 14 **Summary of Recommendations for:** ***Bridge on US Highway 412 over Wagon Wheel Road***		
Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1151’ (Left Side) 1150’ (Right Side)
2	HP 12x53 Steel Piles	1148’ (Left Side) 1149’ (Right Side)
3	HP 12x53 Steel Piles	1150’ (Left Side) 1155’ (Right Side)
4	HP 12x53 Steel Piles	1159’ (Left Side) 1176’ (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

One immediate reading was recorded indicating dry conditions to elevation 1173.9 in Boring 2508. Examination of the natural moisture content values of collected samples suggests wet soils were encountered at elevations ranging from 1173 to 1155. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Zion Road over U.S. 412 Relocated (with MSE Wall at End Bents)

The new alignment of Zion Road extends over U.S. Highway 412 on a two span, single structure arrangement. Three (3) sample borings were advanced for the Bridge on Zion Road over U.S. Highway 412. An additional four

(4) sample borings were advanced for the mechanically stabilized earth retaining walls at the abutments of the proposed bridge. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 5 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly silt loam to very gravelly silt loam as the predominant surface materials.

The proposed site for the bridge is underlain by relatively distinct, weathered in place (residual), unconsolidated soils and severely weathered chert layers with the soils exhibiting relatively similar gradation, average grain size and cohesion characteristics within each layer. The layers, are generally laterally discontinuous beneath the bridge site. These layers are discussed below and are depicted on the accompanying bridge sheet. Extending from the existing ground surface to a depth of 13.3 feet, within Boring 2103, gravel size chert fragments and an equal fraction of fine to coarse grain sand combine with a small fraction of medium plasticity clay to form a discontinuous stratum. This layer overlies 5.0 feet of equal fractions of gravel size chert fragments, fine grain to coarse grain sand and low to medium plasticity silt, also found at the surface to 8.3 feet and 13.3 feet in Borings 2101 and 2102 respectively. Underlying this relatively continuous stratum a discontinuous layer of fine grain to coarse grain sand with some gravel size chert fragments and abundant low plasticity silt was penetrated within Boring 2101. Within the limits of the bridge borings gravel size chert fragments with fine grain to coarse grain sand and silt comprise a relatively continuous succeeding layer within Borings 2101, 2102 and 2103. This layer varies in thickness from 10.0 feet to 20.0 feet across the bridge site. Medium plasticity clay with fine grain to coarse grain sand and some gravel size chert fragments was next intercepted within Borings 2101, 2102 and 2103 beneath the proposed bridge site. The base of the relatively continuous layer was interpreted at elevations of 1228.9, 1225.9 and 1232.4. The clay overlies gravel size chert fragments and equal fractions of non-plastic silt and fine grain to coarse grain sand size fragments which extend downward to weathered chert residuum or fresh chert. This layer, intercepted across the site in Borings 2101, 2102 and 2103 was penetrated to depths of 47.6 feet, 50.5 feet and 48.9 feet but was split within Boring 2101 by a lens of fine grain to coarse grain sand with some gravel size chert fragments and abundant low plasticity silt. Auger refusal was encountered at the base of this stratum in each bridge boring however refusal did not necessarily indicate the top of competent rock as additional weathered material was encountered in Borings 2101 and 2103. Underlying auger refusal, Borings 2101 and 2103 encountered severely weathered, stained chert fragments with core loss interpreted to represent clay/silt seams. The top of competent rock or base of weathered

rock was intercepted immediately beneath this residuum in Boring 2101 at 48.5 feet (Elevation 1213.7) and in Boring 2103 at 52.3 feet (Elevation 1213.4). The top of competent rock or base of weathered rock was intercepted in Boring 2102 immediately beneath the deepest soil layer at 50.5 feet (Elevation 1213.7). Chert recovered from within the three (3) bridge borings was generally described as fresh to slightly weathered with some staining and containing intermittent limestone beds. Limestone, from recovered cores, was described as fresh to slightly weathered, microcrystalline to medium grain, fossiliferous and containing chert layers and nodules.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the three (3) borings then measured and described. Core recovery (REC) ranged from 40% to 100% while cored rock quality determination (RQD) ranged from 14% to 90%. Recorded fractures fell into groupings of 0°-15° apparent dip however individual apparent dip values of 45° were recorded. Average discontinuity spacing calculated from the cored intervals ranged from 0.36 feet to 0.83 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings.

The four (4) additional borings, advanced for the retaining wall investigation, appear to affirm the discontinuous nature of the soil strata beneath the bridge/retaining wall site. Gravel size chert fragments and fine grain to medium grain sand, in equal fractions combine with medium plasticity clay to form the surface layer in Borings 2201, 2203 and 2204. This layer appears laterally gradational with the surface layer described for bridge Boring 2103. Gravel size chert fragments combined with lesser but equal fractions of fine grain to coarse grain sand size particles and low plasticity silt were encountered at the surface within Boring 2202 and underlying the previously described surface layer in Borings 2201, and 2204. This layer varied in thickness from 8.3 feet to 15.0 feet and grades into 12.8 feet of gravel size chert fragments with sand and abundant medium plasticity silt within Boring 2203. Boring 2203 next encountered intensely weathered, highly fragmented/fractured chert with red and orange clay seams and traces of limestone fragments correlative with gravel size chert fragments with fine grain to coarse grain sand and silt encountered within bridge Borings 2101 and 2103. Boring 2203 was terminated within this material at 31.1 feet (Elevation 1236.5). The remaining investigated depths of Borings 2201, 2202 and 2204 penetrated gravel size chert fragments, fine grain to coarse grain sand, medium plasticity clay and low plasticity silt with varying fractions to

depths of 46.5 feet (Elevation 1219.5), 46.5 feet (Elevation 1212.7) and 43.7 feet (Elevation1218.3) respectively. Auger refusal was not encountered prior to reaching boring termination in Borings 2201 and 2202 however refusal was reached within Boring 2204 at the termination depth and elevation indicated above. Auger refusal does not necessarily indicate the top of competent rock as additional weathered material was encountered below refusal within other advanced borings at the site.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from one (1) of the four (4) borings then measured and described. Core recovery (REC) ranged from 16% to 30% while cored rock quality determination was recorded as 0%. Fracture values and average discontinuity spacing values were not calculated due to the severely weathered rock character.

The lab testing indicates the soils are well-graded gravels with clay and sand, silty gravels with sand, silty sands with gravel, sandy lean clays, clayey gravels with sand, and chert and rock fragments. Moisture contents range from 20.5% to 61.5%. Auger refusal was encountered in four of the borings at depths ranging from 17.1' to 50.5'. Recovered rock core consisted of predominately slightly weathered interlayered white to gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 31.1' to 60.5'.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 15.

Bents 1 through 3: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 15. For Bents 1 and 3, pre-drilling will be required to ensure pile reach the estimated tip elevation.

Table 15
Summary of Recommendations for:
Bridge on Zion Road over U.S. Highway 412

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1214'
2	HP 12x53 Steel Piles	1213'
3	HP 12x53 Steel Piles	1216'

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained in accordance with Section 805 of the Standard Specifications for Highway Construction.

The groundwater condition within Boring 2101 was reported as dry. The Boring 2102 and 2103 driller's logs reported immediate water levels of Elevation 1224 and Elevation 1221 respectively. Examination of the natural moisture contents for soil samples recovered from retaining wall borings suggest saturated soils at elevations of 1241 to 1234. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

The MSE wall arrangement for Zion Road over U.S. Highway 412 will be utilized to retain the proposed embankment slopes at the proposed bridge abutments. The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for the proposed walls is 8000 PSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed north and south MSE walls have maximum heights of approximately 26 ½ feet and 25 ½ feet and estimated lengths of approximately 240 feet and 260 feet, respectively. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the north wall is based on the maximum height of the wall and is estimated to be 19 feet. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the south wall is based on the maximum height of the wall and is estimated to be 18 feet. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the potential shallow nature of overburden, we anticipate the majority of this settlement should occur during the construction of the wall.

Spring Creek Street over U.S. 412 Relocated (with MSE Wall at End Bents)

The new alignment of Spring Creek Street extends over U.S. Highway 412 on a two span, single structure arrangement. Three (3) sample borings were advanced for the Bridge on Spring Creek Street over U.S. Highway 412. An additional four (4) sample borings were advanced for the mechanically stabilized earth retaining walls at the abutments of the proposed bridge. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 3 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates silt loam to very gravelly silt loam as the predominant surface materials.

The proposed site for the bridge is underlain by relatively distinct artificial fill, weathered in place (residual), unconsolidated soils and severely weathered chert layers with the fill and soils exhibiting relatively similar gradation, average grain size and cohesion characteristics within each layer. The layers vary from laterally discontinuous to continuous beneath the bridge site. These layers are discussed below and are depicted on the accompanying bridge sheet. Extending from the existing ground surface to a depth of 8.3 feet, within Boring 2004, fine to coarse grain sand and an equal fraction of silt combines with gravel to form a localized unit of artificial fill.

Extending from the ground surface to a depth of 8.3 feet to 12.7 feet, surrounding Borings 1901 and 1903, medium plasticity clay with fine to coarse grain sand and gravel size chert fragments was penetrated. This layer grades laterally into high plasticity clay with gravel size chert fragments and sand within Boring 2001where it was penetrated to 13.3 feet. Resting in a similar lateral setting Borings 2002, 2003 and 2004 intercepted fine grain to coarse grain sand, silt and gravel size chert from the existing ground surface to a depth of 18.3 feet within each of the three (3) borings. These discontinuous strata overlie 4.6 feet to 16.3 feet of gravel size chert fragments with fine grain to coarse grain sand and non-plastic silt within all advanced borings except Boring 2004. This layer overlies fresh to weathered limestone and chert at each boring site with exception of Borings 1903 and 2004. At these two (2) boring sites drilling operations penetrated 17.8 feet to 24.5 feet of gravel size chert fragments with medium plasticity clay and fine grain to coarse grain sand prior to intercepting weathered limestone (Boring 1903) or auger refusal (Boring 2004). Auger refusal was encountered, after penetrating layers as described above, at depths ranging from 16.3 feet to 42.8 feet on fresh limestone or chert, Borings 1902, 2001 and 2002, or weathered limestone, Borings 1901, 1903 and 2003. Boring 2004 encountered refusal but core sampling was not advanced to determine the underlying stratum. Based upon recovered core auger refusal did not necessarily indicate the top of competent rock or base of weathered rock. Borings 1901, 1903 and 2003 each recovered 10.0 feet, 0.7 feet and 1.6 feet of weathered and fractured limestone and clay seams before intercepting the base of weathered rock. Elevations corresponding to the interpreted base of weathered rock were reported as 1264.2, Boring 1902; 1240.2, Boring 1903; 1269.9, Boring 2001; 1267.3, Boring 2002 and 1266.7, Boring 2003. Boring 1901 penetrated to elevation 1258.5 and Boring 2204 penetrated to elevation 1228.9 without intercepting the base of weathered rock. Chert, recovered from within the three (3) bridge borings and three (3) of the four (4) retaining wall borings, was generally described as fresh to slightly weathered with some staining on fractures and containing intermittent limestone beds. Limestone, from recovered cores, was described as fresh to slightly weathered, microcrystalline to macrocrystalline, fine grain to medium grain, fossiliferous, fractured and containing chert layers and nodules.

Strata encountered by the advanced borings indicate a relatively thick accumulation of medium dense sand, very stiff silt with gravel size chert fragments and loose to very dense, moderately to severely weathered chert fragments with varying fractions of silt and clay above or at the proposed Bypass 412 grade passing under the subject bridge and between the proposed retaining walls. It is anticipated that these materials may be excavated utilizing

conventional techniques however fresh limestone may be encountered above grade near Borings 2001, 2002 and 2003 at the north abutment wall. This limestone may require chipping or blasting to reach proposed grade and/or retaining wall footing elevations. Removal of overburden soils for the Bypass 412 template will allow for the installation of spread footing foundations on competent rock at the Bent 2 locations but will require rock excavation to reach bottom of socket elevations.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the three (3) bridge borings and three (3) of four (4) retaining wall borings then measured and described. Core recovery (REC) ranged from 46% to 100% with most runs ranging from 80% to 100% while cored rock quality determination (RQD) ranged from 0% to 86% with values widely scattered. Recorded fractures fell into groupings of 0°-30° apparent dip however individual apparent dip values of 70°, 80° and 90° were recorded. Average discontinuity spacing calculated from the cored intervals ranged from 0.23 feet to 0.50 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings.

The lab testing indicates the soils are sandy lean clays with gravel, silty gravels with sand, clayey gravels with sand , gravelly fat clays with sand, silty sands with gravel, chert and rock fragments. Moisture contents range from 7.0% to 53.4%. Auger refusal was encountered in each of the borings at depths ranging from 16.3’ to 42.8’. Recovered rock core consisted of predominately fresh to severely weathered, interlayered white to gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 30.2’ to 50.2’.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 16.

> **Bents 1 and 3:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert and limestone residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 16. For Bent 1, pre-drilling will be required to achieve a minimum of 10 ft of pile embedment below the bottom of the leveling pad.
>
> **Bent 2:** Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevation for Bent 2 is shown in Table

16. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 16
Summary of Recommendations for:
Bridge on Spring Creek Street over U.S. Highway 412

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1256’
2	Spread Foundations	1262’
3	HP 12x53 Steel Piles	1240’

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained in accordance with Section 805 of the Standard Specifications for Highway Construction.

Natural moisture content values determined for the advanced borings suggest the presence of saturated soils at elevation levels of 1283 to 1232. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

The MSE wall arrangement for Spring Creek Street over U.S. Highway 412 will be utilized to retain the proposed embankment slopes at the proposed bridge abutments. The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28

degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for the proposed walls is 6500 PSF. If rock is present, the factored bearing resistance of the foundation materials for the proposed north wall is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed north and south MSE walls have maximum heights of approximately 25 feet and 22 feet and estimated lengths of approximately 203 feet and 172 feet, respectively. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability

case. MSEW 3.0 uses the term “Capacity Demand Ratio” (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the north wall is based on the maximum height of the wall and is estimated to be 17 ½ feet. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for the south wall is based on the maximum height of the wall and is estimated to be 15 ½ feet. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1”. However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the potential shallow nature of overburden, we anticipate the majority of this settlement should occur during the construction of the wall.

Single Bridge on Ramp EN over Puppy Creek

The new alignment of Ramp EN extends over Puppy Creek on a five span, single structure arrangement. Six (6) sample borings were advanced for the Bridge on Ramp EN extending over Puppy Creek. Standard Penetration Testing (ASTM D1586) was performed at 5’ intervals in each boring and produced N values ranging from 8 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly silt loam within the Puppy Creek floodplain and on terraces as the predominant surface material.

The proposed site for the bridge is underlain by one (1) distinct unconsolidated sediment type, interpreted as intermixed alluvium and terrace deposits, overlying isolated layers of weathered chert residuum resting on fresh to slightly weathered chert or limestone with some dissolution activity noted. The sediments and rock layers are discussed below and are depicted on the accompanying bridge sheets.

Extending from the existing ground surface to a depth of 8.1 feet to 11.7 feet clayey gravel with sand, in varying fractional disbursement and exhibiting medium plasticity characteristics, was intercepted in each of the six (6) advanced borings. These interpreted alluvium and terrace deposits are composed of weathered gravel to sand size chert and limestone fragments bound with clay. Auger refusal was encountered at the base of the alluvium/terrace deposits at elevations ranging from 1222.9 to 1203.7. Borings 3002 and 3003 encountered weathered, highly fractured chert fragments or weathered limestone fragments underlying the alluvium/terrace deposits to depths ranging from 13.1 feet to 16.1 feet. A high-angle fracture swarm zone was recognized within Boring 3002 (10.8 feet to 15.0 feet) with chert and limestone lithologies both affected. The weathered and fractured fragments from both borings exhibited staining and remnants of clay seams. These two (2) borings then intercepted fresh to slightly weathered limestone. Borings 3001, 3004, 3005 and 3006 encountered fresh to slightly weathered limestone or chert immediately underlying the alluvium/terrace deposits. Fresh to slightly weathered chert recovered from within the advanced borings was typically described as white, light gray to gray with intermittent light gray to gray limestone beds, scattered vugs, pits and stylolites and traces of staining on fracture surfaces. Unweathered limestone recovered from advanced core borings was described as white, light gray to gray, microcrystalline to medium grain with discontinuities exhibiting fresh to moderately weathered surfaces with some clay infilling, scattered pits, stylolites and intermittent chert nodules. Borings 3005 and 3006 encountered core loss intervals within limestone interpreted as dissolution cavities. Elevations of the cavity in Boring 3005 were noted as 1209.0 to 1204.9 and in Boring 3006 noted as 1206.7 to 1206.0. The depth to competent rock or base of weathered rock within the Puppy Creek floodplain is variable beneath the proposed bridge footprint ranging from an elevation of 1222.9 to an elevation of 1201.9.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the six (6) borings then measured and described. Core recovery

(REC) ranged from 33% to 100% however most runs ranged from 80% to 100%. Cored rock quality determination (RQD) ranged from 7% to 100% however most runs ranged from 60% to 90%. Recorded fractures fell into groupings of 0°-20° apparent dip however the fracture swarm previously described contained fractures of 70° and 80° apparent dip. Average discontinuity spacing calculated from the cored intervals ranged from 0.40 feet to 1.20 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions base of weathered rock elevations (top of competent rock) were determined and are summarized in the table below.

Table 17
Summary of Competent Rock Elevations for:
Bridge on Ramp EN over Puppy Creek

BORING	BASE OF WEATHERED ROCK/TOP OF COMPETENT ROCK ELEVATION
B 3001	1222.7
B 3002	1211.9
B 3003	1201.9
B 3004	1204.3
B 3005	1212.8
B 3006	1211.3

The lab testing indicates the soils are clayey gravels with sand and chert and rock fragments. Moisture contents range from 16.3% to 35.5%. Auger refusal was encountered in each of the borings at depths ranging from 8.1' to 11.7'. Recovered rock core consisted of predominately moderately weathered white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 19.3' to 25.5'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.4, 1.5, and 1.2, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (2" to 6") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 18.

> **Bents 1 and 6:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile

points are recommended for tip protection as the piles are advanced through the embankment fill, gravelly alluvium and terrace deposits and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevation for Bent 1 and Bent 6 are provided below in Table 18.

Bents 2 through 5: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bents 2 through 5 are shown below in Table 18. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 18
Summary of Recommendations for:
Bridge on Ramp EN over Puppy Creek

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1222’
2	Spread Foundations	1210’
3	Spread Foundations	1200’
4	Spread Foundations	1202’
5	Spread Foundations	1202’
6	HP 12x53 Steel Piles	1211’

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples as well as nearby roadway borings suggests groundwater elevations ranging from 1228 to 1224 for borings located at higher elevations on the terraces. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet

winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Dual Bridges on U.S. 412 Relocated over Puppy Creek

The new alignment of U.S. Highway 412 extends over Puppy Creek on a five span, dual structure arrangement. Twelve (12) sample borings were advanced for the Bridge on U.S. Highway 412 over Puppy Creek. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 5 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly silt loam within the Puppy Creek floodplain and on terraces as the predominant surface material.

The proposed site for the dual bridges is underlain by one (1) distinct unconsolidated sediment type, interpreted as intermixed alluvium and terrace deposits, overlying thin, isolated layers of weathered chert and limestone residuum resting on fresh to moderately weathered, chert or limestone. The sediments and rock layers are discussed below and are depicted on the accompanying bridge sheets.

Extending from the existing ground surface to a depth of 7.5 feet to 13.0 feet clayey gravel with sand, in varying fractional disbursement and exhibiting medium plasticity characteristics, was intercepted in each of the twelve (12) advanced borings. The interpreted alluvium and terrace deposits contained relatively soft clay seams within the more extensive, thicker deposits evidenced by the clay intercepted within Boring 2908 between 9.8 feet and 11.3 feet. Auger refusal was encountered at the base of the alluvium/terrace deposits at elevations ranging from 1229.5 to 1197.3. Borings 2901, 2902, 2904, 2908, 2909 and 2910 encountered weathered, fractured chert fragments or weathered limestone underlying the alluvium/terrace deposits to depths ranging from 9.8 feet to 16.1 feet. The weathered fragments exhibited staining and remnants of clay seams or interstitial clay. These borings then intercepted fresh to slightly weathered limestone or chert. Borings 2903, 2905, 2906, 2907, 2911 and 2912 encountered fresh to slightly weathered limestone or chert immediately underlying the alluvium/terrace deposits. Fresh to slightly weathered chert recovered from within the advanced borings was typically described as white, light gray to gray with intermittent light gray to gray limestone beds, scattered vugs, pits and stylolites and traces of staining on fracture surfaces. Unweathered limestone recovered from advanced core borings was described as

white, light gray to gray, microcrystalline to medium grain with discontinuities exhibiting fresh to moderately weathered surfaces with some clay infilling, scattered pits, stylolites and intermittent chert nodules. The depth to competent rock or base of weathered rock within the Puppy Creek floodplain is variable beneath the dual bridge footprints ranging from an elevation of 1225.8 to an elevation of 1197.3.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the twelve (12) borings then measured and described. Core recovery (REC) ranged from 38% to 100% however most runs ranged from 90% to 100%. Cored rock quality determination (RQD) ranged from 0% to 100% however most runs ranged from 50% to 90%. Recorded fractures fell into groupings of 0°-30° apparent dip with scattered individual fractures of 70° and 90° apparent dip. Average discontinuity spacing calculated from the cored intervals ranged from 0.41 feet to 0.73 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions base of weathered rock elevations (top of competent rock) were determined and are summarized in the table below.

Table 19
Summary of Competent Rock Elevations for:
Bridge on US Highway 412 over Puppy Creek

BORING	BASE OF WEATHERED ROCK / TOP OF COMPETENT ROCK ELEVATION
B 2901	1225.8
B 2902	1222.2
B 2903	1215.9
B 2904	1220.7
B 2905	1204.4
B 2906	1197.3
B 2907	1202.7
B 2908	1201.5
B 2909	1204.0
B 2910	1202.2
B 2911	1204.7
B 2912	1210.8

The lab testing indicates the soils are clayey gravels with sand and chert and rock fragments. Moisture contents range from 15.4% to 54.0%. Auger refusal was encountered in each of the borings at depths ranging from 7.5’ to 13.0’. Recovered rock core consisted of predominately moderately weathered white to light gray limestone and

chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 20.2' to 23.0'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.3, 1.4, and 1.2, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 4") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 20.

Bents 1 and 6: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, gravelly alluvium and terrace deposits, residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations for Bent 1 and Bent 6 are provided below in Table 20. For Bents 1 and 6, pre-drilling will be required to ensure a minimum 10 ft pile embedment into original ground.

Bents 2 through 5: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 through Bent 5 are shown in Table 20. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 20
Summary of Recommendations for:
Bridge on US Highway 412 over Puppy Creek

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1226' (Left Side) 1222' (Right Side)
2	Spread Foundation	1212' (Left Side) 1213' (Right Side)
3	Spread Foundation	1201' (Left Side) 1195' (Right Side)
4	Spread Foundation	1200' (Left Side) 1199' (Right Side)
5	Spread Foundation	1201' (Left Side) 1200' (Right Side)
6	HP 12x53 Steel Piles	1204' (Left Side) 1210' (Right Side)

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples as well as nearby roadway borings suggests groundwater elevations ranging from 1227 to 1204. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Single Bridge on I-540 Interchange Ramp NW over U.S. 412 Relocated

The new alignment of Ramp NW extends over I-540 on a eight span, single structure arrangement. Eleven (11) sample borings were advanced for the Bridge on Ramp NW over I-540. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 10 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates gravelly to very gravelly silt loam as predominant surface materials.

The proposed site for the bridge is underlain by five (5) relatively distinct, weathered in place (residual), unconsolidated soil layers exhibiting relatively uniform characteristics within each layer overlying fresh to moderately weathered limestone and chert. Extending from the existing ground surface to depths ranging from 8.3 feet to 13.3 feet Borings 3101, 3104, 3106, 3107 and 3109 intercepted approximately equal fractions of gravel size chert fragments and fine to coarse grain sand bound by a lesser fraction of medium plasticity clay. The succeeding underlying layer, consisting of highly plastic clay with traces of sand was also encountered at the surface within

Borings 3102, 3103, 3105, 3108, 3110 and 3111. The base of this highly plastic clay varies from 7.9 feet to 18.9 feet across the bridge site however the unit is not present within Borings 3106 or 3109. Two (2) layers exhibiting relatively similar properties but differing mainly in percentage of gravel size chert fragments extend across the proposed bridge site underlying the materials detailed previously. These layers consist generally of gravel and sand size, weathered chert and limestone fragments with some silt. The layers exhibited non-plastic properties and extended to depths of 13.3 feet to 28.3 feet however were not intercepted within Borings 3102 and 3103. The final intercepted soil strata was a discontinuous layer of gravel size chert and limestone fragments with medium plasticity clay and some fine to coarse grain sand intercepted to depths of 22.0 feet to 25.8 feet in Borings 3104, 3108, 3110 and 3111. Auger refusal was encountered within each boring advanced along the proposed bridge alignment. Refusal depths, while not indicative of competent, unweathered rock, varied across the site with elevations of 1294.0 to 1279.1 noted. Underlying auger refusal depths coring operations penetrated a variety of weathered chert and limestone fragments, interlayered fresh rock and clay seams, clay and fragment in-filled cavities and fractured intervals with depths to the base of weathered rock (top of competent rock) varying from 14.1 feet to 30.4 feet. Fresh to slightly weathered, microcrystalline to medium grain limestone and fresh to moderately weathered chert were encountered within each boring however weathering, in the form of dissolution activity along fractures, was noted to boring termination in each advanced borehole. Borings were terminated in either limestone or chert at depths ranging from 23.3 feet to 38.3 feet.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the eleven (11) borings then measured and described. Core recovery (REC) ranged from 22% to 100% with most runs ranging from 60% to 80% while cored rock quality determination (RQD) ranged from 0% to 88% with most runs ranging from 0% to 60%. Recorded fractures fell into groupings of 0°-30° apparent dip values with individual 70°-90° apparent dip values noted. Fractures were noticeably affected by dissolution activity with pitting, etching, staining and clay accumulation along the fracture faces. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-competent rock (base of weathered rock) elevations were determined to range from 1297.5 for Boring 3109 to 1275.0 for Boring 3103. All other borings did penetrate competent rock although weathering and fracturing was still evident to boring

termination at elevations ranging from 1288.3 to 1267.6. The base of weathered rock elevations (top-of-competent rock) are summarized in the table below.

Table 21
Summary of Competent Rock Elevations for:
Bridge on Ramp NW

BORING	BASE OF WEATHERED ROCK / TOP OF COMPETENT ROCK ELEVATION
B 3101	1278.6
B 3102	1277.7
B 3103	1275.0
B 3104	1281.5
B 3105	1281.2
B 3106	1278.9
B 3107	1287.5
B 3108	1280.6
B 3109	1297.5
B 3110	1289.0
B 3111	1282.6

The lab testing indicates the soils are clayey gravels with sand, fat clays with sand, silty gravels with sand, and chert and rock fragments. Moisture contents range from 10.5% to 62.1%. Auger refusal was encountered in each of the borings at depths ranging from 11.7' to 28.3'. Recovered rock core consisted of predominately moderately weathered, fractured, white to light gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 23.3' to 38.3'.

Stability analysis was performed for the proposed 2:5H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.5, 1.5, and 1.2, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 5") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 22.

> **Bents 1, 5 through 7, and 9:** Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty clay soils, cavity infill, chert and limestone residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone and chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 22. For Bents 6 and 7, pre-drilling will be required to ensure the

piles reach the estimated tip elevations. Also, exploratory should be used at Bent 6 to determine the depth to top of rock below the bottom of footing.

Bents 2 through 4 and 8: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 18 KSF using a resistance factor of 0.45. The estimated foundation elevations at Bent 2, Bent 3, Bent 4 and Bent 8 are provided below in Table 22. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 22
Summary of Recommendations for:
Bridge on Ramp NW over I-540

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1286’
2	Spread Foundations	1273’
3	Spread Foundations	1273’
4	Spread Foundations	1274’
5	HP 12x53 Steel Piles	1279’
6	HP 12x53 Steel Piles	1287’
7	HP 12x53 Steel Piles	1282’
8	Spread Foundations	1296’
9	HP 12x53 Steel Piles	1294’

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Groundwater readings recorded immediately after drilling operations were completed for each advanced boring indicate dry conditions to elevations ranging from 1288 to 1268. However, we anticipate perched groundwater

levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Single Bridge on I 540 Interchange Ramp EN over U.S. 412 Relocated

The new alignment of Ramp EN extends over US 412 on a five span, single structure arrangement. Seven (7) sample borings were advanced for the Bridge on Ramp EN over US 412. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 3 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very gravelly silt loam as the predominant surface material.

The proposed site for the bridge is underlain by five (5) relatively distinct, weathered in place (residual), unconsolidated soil layers, exhibiting relatively uniform characteristics within each layer, overlying intervals of severely weathered and fractured chert with clay and fresh to slightly weathered limestone and chert. Extending from the existing ground surface to depths ranging from 8.3 feet to 18.3 feet Borings 3201, 3202, 3203 and 3207 intercepted gravel size chert fragments with lesser fractions of fine to coarse grain sand and silt. Hard, medium plasticity clay with some fine to coarse grain sand was encountered at the surface in Borings 3205 and 3206 and penetrated to 8.3 feet and 3.7 feet respectively. A correlative soil was also encountered from 8.3 feet to 14.3 feet in Boring 3207 underlying the previously detailed surface unit. Two (2) layers exhibiting relatively similar gradations but differing in plasticity characteristics extend discontinuously across the proposed bridge site underlying the materials detailed previously. The combined layers consist generally of relatively equal fractions of gravel size weathered chert and limestone fragments and clay with a significant amount of fine to coarse grain sand. The layers exhibited low to medium plasticity properties and extended to depths of 18.3 feet to 27.3 feet with the same unit encountered on the surface in Boring 3204. The combined layers were not intercepted within Borings 3202, 3206 or 3207. The final intercepted soil strata was a discontinuous layer of equal fractions gravel size chert and limestone fragments, non-plastic silt and fine to coarse grain sand intercepted to depths of 23.7 feet to 33.0 feet in Borings 3202, 3203, 3204 and 3205. Auger refusal was encountered within each boring advanced along the proposed bridge alignment. Refusal depths, while not indicative of competent, unweathered rock, varied significantly across the site with elevations of 1304.3 to 1276.0 noted. Underlying auger refusal depths coring operations penetrated a variety of

weathered chert and limestone fragments, interlayered fresh rock and clay seams, clay and fragment in-filled cavities and fractured intervals with depths to the base of weathered rock (top of competent rock) varying from 22.6 feet (Elevation 1296.0) to 33.0 feet (Elevation 1276.0). Fresh to slightly weathered, microcrystalline to medium grain limestone and fresh to moderately weathered chert were encountered within each boring however weathering, in the form of dissolution activity along fractures causing core loss intervals, was noted to boring termination in each advanced borehole. Borings were terminated in either limestone or chert at depths ranging from 28.7 feet to 43.0 feet.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the seven (7) borings then measured and described. Core recovery (REC) ranged from 0% to 100% with most runs ranging from 80% to 100% while cored rock quality determination (RQD) ranged from 0% to 78% with most runs ranging from 50% to 70%. Recorded fractures fell into groupings of 0°-15° apparent dip values with individual 45° and 80° apparent dip values noted. Fractures were noticeably affected by dissolution activity with pitting, etching, staining and clay accumulation along the fracture faces. Apparent bedding plane dip was not readily observable however the relatively flat to locally variable regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-competent rock (base of weathered rock) elevations were determined to range from 1296.0 for Boring 3207 to 1276.0 for Boring 3202. All other borings did penetrate competent rock although weathering and fracturing was still evident to boring termination at elevations ranging from 1289.3 to 1266.0. The base of weathered rock elevations (top-of-competent rock) are summarized in the table below.

Table 23
Summary of Competent Rock Elevations for:
Bridge on Ramp EN over US Highway 412

BORING	BASE OF WEATHERED ROCK / TOP OF COMPETENT ROCK ELEVATION
B 3201	1278.2
B 3202	1276.0
B 3203	1284.2
B 3204	1285.8
B 3205	1289.2
B 3206	1293.9
B 3207	1296.0

The lab testing indicates the soils are silty gravels with sand, sandy lean clays with gravel, clayey gravels with sand, and chert and rock fragments. Moisture contents range from 10.0% to 58.6%. Auger refusal was encountered in each of the borings at depths ranging from 3.7' to 33.0'. Recovered rock core consisted of predominately moderately weathered light gray to gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 28.7' to 43.0'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.7, 1.5, and 1.3, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 3") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 24.

Bents 1, 5, and 6: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert and limestone residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically chert). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations for Bent 1, Bent 5 and Bent 6 are provided below in Table 24. For Bents 5 and 6, pre-drilling will be required to ensure the piles reach the estimated tip elevations.

Bents 2 through 4: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 through Bent 4 are shown below in Table 24. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 24
Summary of Recommendations for:
Bridge on Ramp EN over US 412

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1277'
2	Spread Foundation	1271'
3	Spread Foundation	1279'
4	Spread Foundation	1284'
5	HP 12x53 Steel Piles	1289'
6	HP 12x53 Steel Piles	1298'

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Groundwater readings recorded immediately after drilling operations were completed for Borings 3203, 3204 and 3205 indicate dry conditions to elevations ranging from 1280 to 1274. Examination of the natural moisture content values of collected samples suggests the scattered presence of perched groundwater in saturated soils at elevations ranging from 1293 to 1284. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Single Bridge on I 540 Interchange Ramp EN over Silent Grove Road

The new alignment of Ramp EN extends over Silent Grove Road on a four span, single structure arrangement. Four (4) sample borings were advanced for the Bridge on Ramp EN over Silent Grove Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 10 to 100+ blows per foot. Published soils mapping, *NRCS Web Soil Survey, 2008* indicates very gravelly silt loam as the predominant surface material.

The proposed site for the bridge is underlain by one (1) distinct unconsolidated soil layer, interpreted as weathered in place (residual) material, overlying severely weathered and fractured chert and fresh to slightly weathered limestone and chert. The soil and rock layers are discussed below and are depicted on the accompanying bridge sheets.

Extending from the existing ground surface to a depth of 7.3 feet to 13.8 feet gravel size chert fragments with fine to coarse grain sand and silt, in varying fractional combinations was intercepted in each of the four (4) advanced borings. Auger refusal, while not necessarily indicative of competent, unweathered rock, was encountered beneath these soils at varied elevations across the site ranging from 1292.5 to 1280.5. Borings 3301 and 3302 encountered weathered, highly fractured chert fragments and clay remnants underlying the surface soils to depths of 15.8 feet and 14.6 feet respectively. These two (2) borings then intercepted fresh to moderately weathered chert. Borings 3303 and 3304 encountered fresh to slightly weathered limestone or fresh to moderately weathered chert immediately underlying the surface soils. Fresh to moderately weathered chert recovered from within the advanced borings was typically described as white, light gray to gray, with intermittent light gray to gray limestone beds and traces of staining on fracture surfaces. Fresh to slightly weathered limestone recovered from advanced core borings was described as white, light gray to gray, microcrystalline to medium grain with discontinuities exhibiting slightly weathered surfaces, scattered pits, stylolites and intermittent chert nodules. All four borings encountered interbedded limestone and chert to termination at elevations ranging from 1280.1 to 1270.5. The depth to competent rock or base of weathered rock is variable beneath the proposed bridge footprint with elevations of 1290.5, 1285.4, 1280.5 and 1288.1 interpreted for Borings 3301, 3302, 3303 and 3304 respectively.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the four (4) borings then measured and described. Core recovery (REC) ranged from 26% to 100% however most runs ranged from 90% to 100%. Cored rock quality determination (RQD) ranged from 0% to 100% however most runs ranged from 50% to 90%. Recorded fractures fell into groupings of 0°-30° apparent dip however individual apparent dip values of 45°, 60° and 70° were recorded. Average discontinuity spacing calculated from the cored intervals ranged from 0.33 feet to 0.63 feet. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings.

The lab testing indicates the soils are silty gravels with sand and chert and rock fragments. Moisture contents range from 13.8% to 22.5%. Auger refusal was encountered in each of the borings at depths ranging from 7.3’ to 13.8’. Recovered rock core consisted of predominately fresh to slightly weathered white to gray limestone and chert,

interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 17.3' to 26.2'.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.6, 1.5, and 1.4, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1/2" to 1") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 25.

Bents 1 and 5: Steel HP 12x53 piles driven to practical refusal on bedrock are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, chert residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations for Bent 1 and Bent 5 are provided below in Table 25.

Bents 2 through 4: Spread foundations seated a minimum of 2.0 feet into competent limestone or chert is recommended. The factored bearing resistance for foundations seated on competent limestone or chert is 22 KSF using a resistance factor of 0.45. The estimated foundation elevations for Bent 2 through Bent 4 are shown below in Table 25. Inspection of the excavated foundations by qualified geotechnical personnel is recommended prior to placement of steel reinforcement and concrete to ensure that adequate bearing material has been exposed.

Table 25
Summary of Recommendations for:
Bridge on Ramp EN Over Silent Grove Road

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1290'
2	Spread Foundation	1275'
3	Spread Foundation	1277'
4	Spread Foundation	1278'
5	HP 12x53 Steel Piles	1280'

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples suggests groundwater within soils or weathered rock was not encountered within the advanced borings. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

Single Bridge on I 540 Interchange Ramp SE over Goad Springs Road

The new alignment of Ramp EN extends over Goad Springs Road on a three span, single structure arrangement. Four (4) sample borings were advanced for the Bridge on Ramp SE over Goad Springs Road. Standard Penetration Testing (ASTM D1586) was performed at 5' intervals in each boring and produced N values ranging from 7 to 100+ blows per foot.

The proposed site for the bridge is underlain by relatively distinct, weathered in place (residual), unconsolidated soil layers exhibiting nearly uniform characteristics within each layer and severely weathered chert residuum overlying fresh to moderately weathered limestone and chert. Extending from the existing ground surface to a depth of 8.3 feet Boring 3403 intercepted gravel size chert fragments with fine to coarse grain sand and a lesser fraction of silt. The succeeding underlying layer, extending to 13.3 feet and consisting of highly plastic clay with some fine to coarse grain sand, was also encountered at the surface within Borings 3401and 3402. The base of this highly plastic clay varies from 12.7 feet to 13.9 feet within these borings however the unit was not present within Boring 3404. A layer of gravel size chert fragments with fine to coarse grain sand and silt extends across the proposed bridge site underlying the materials detailed previously and overlying fresh limestone and chert. This layer ranges in thickness from 7.3 feet to 16.0 feet in Borings 3401, 3403 and 3404 but is absent in Boring 3402. At a correlative position Boring 3402 encountered moderate to severely weathered, fragmented and stained chert, with indications of clay seams, from 13.9 feet to 22.9 feet overlying fresh limestone and chert. Auger refusal was encountered within each

boring advanced along the proposed bridge alignment. Refusal depths, while not necessarily indicative of competent, unweathered rock, varied across the site with elevations of 1282.9, 1289.0, 1279.9 and 1280.2 noted for Borings 3401, 3402, 3403 and 3404 respectively. Underlying auger refusal depths coring operations penetrated a variety of moderate to severely weathered chert and limestone fragments as detailed above within Boring 3402 while the other three(3) borings encountered the top of competent rock / base of weathered rock at auger refusal. Depths to the base of weathered rock (top of competent rock) varied from 16.0 feet to 22.9 feet across the bridge site. Fresh to slightly weathered, microcrystalline to macrocrystalline, fine to medium grain limestone and fresh to slightly weathered chert were encountered within each boring prior to reaching termination depth. Borings 3401, 3402, 3403 and 3404 were terminated in either limestone or chert at depths of 30.9 feet (Elevation 1273.1), 33.0 feet (Elevation 1269.9), 31.1 feet (Elevation 1269.4) and 26.0 feet (Elevation 1270.2) respectively.

Upon reaching intervals where SPT testing and auger advancement recorded refusal coring operations were performed. Rock core was removed from each of the four (4) borings then measured and described. Core recovery (REC) ranged from 18% to 100% with most runs ranging from 90% to 100% while cored rock quality determination (RQD) ranged from 0% to 95% with most runs ranging from 80% to 95%. Recorded fractures fell into groupings of 0°-30° apparent dip values. Fractures were affected by dissolution activity with pitting, etching, staining and clay accumulation along some of the fracture faces. Apparent bedding plane dip was not readily observable however the relatively flat regional dip seems to be reflected in the advanced borings. Based upon core inspection and descriptions top-of-competent rock (base of weathered rock) elevations were determined as 1282.9 (Boring 3401), 1280.0 (Boring 3402), 1279.9 (Boring 3403) and 1280.2 (Boring 3404).

The lab testing indicates the soils are fat clays with sand, silty gravels with sand and chert and rock fragments. Moisture contents range from 15.9% to 57.6%. Auger refusal was encountered in each of the borings at depths ranging from 13.9’ to 21.1’. Recovered rock core consisted of predominately fresh light gray to gray limestone and chert, interpreted as Boone Formation (Mississippian). The borings were then terminated at depths ranging from 26.0’ to 33.0’.

Stability analysis was performed for the proposed 2H:1V abutment slopes. The short term, long term, and seismic factors of safety were 1.5, 1.5, and 1.2, respectively. Furthermore, subsurface conditions indicate the potential for settlement at the proposed bridge site is low (1" to 4") and the majority of embankment settlement will likely occur during construction.

We recommend the following bridge foundations. A summary of recommendations is depicted in Table 26.

> **Bents 1 through 4:** Steel HP 12x53 piles driven to practical refusal on bedrock or limestone residuum are recommended with a factored resistance capacity of 140 tons using a resistance factor of 0.50 for severe driving conditions. Pile points are recommended for tip protection as the piles are advanced through the embankment fill, cherty soils, limestone residuum and weathered zones and to assist with pile penetration and seating into bedrock (typically limestone). The piles shall be installed in accordance with the Standard Specifications for Highway Construction. The estimated tip elevations are provided below in Table 26. For Bents 1 and 2, pre-drilling will be required to ensure the piles reach the estimated tip elevations.

Table 26
Summary of Recommendations for:
Bridge on Ramp SE Over Goad Springs Road

Bent Number	***Foundation Type***	***Estimated Pile Tip/Footing Elevation***
1	HP 12x53 Steel Piles	1283'
2	HP 12x53 Steel Piles	1280'
3	HP 12x53 Steel Piles	1280'
4	HP 12x53 Steel Piles	1280'

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples. Adjustments to the estimated elevations listed above may be required during construction to ensure the bridge foundations are seated in competent materials.

Pile advancement will require hard driving through very dense soils and weathered rock materials near the estimated pile tip elevations. We recommend the pile hammer be sized adequately to attain the required capacity without overstressing the piles. The pile tip elevations and the pile capacity calculations are based upon the boring data, and each pile shall be driven until the required design capacity has been obtained.

Examination of the natural moisture content values of collected samples suggests the scattered presence of groundwater, possibly perched, in saturated soils with elevations ranging from 1293 to 1285. However, we anticipate perched groundwater levels at the surface could occur if construction is staged during wet winter and spring months or during rain events. Any excavation below the existing groundline may encounter seepage water due to seasonal variations in rainfall.

MSE Retaining Wall 1 at U.S. 412 Relocated and Ramp 4

The MSE wall arrangement for Wall 1 will be located adjacent to the proposed Ramp 4 and will be utilized to retain the embankment slopes of US 412 bridge. Two (2) new borings were advanced along the proposed retaining wall alignment. Also, two (2) other borings were utilized that were advanced near the wall face during the Ramp 4 investigation. Standard penetration testing (ASTM D1586) and rock core recovery were performed in three (3) of the four (4) borings at indicated locations on the boring logs. The new borings were advanced to depths of 18.0' and 35.0' while existing borings were advanced to 61.0 feet and 66.0 feet. Laboratory analysis, visual examination and geologic interpretation were utilized to prepare an interpretation of the subsurface strata.

The proposed site for the retaining wall appears to be on terrain described as relatively flat uplands with gentle to steep side hill slopes falling into incised, flat bottom drainage courses. The site is located in pasture with a few widely scattered trees. Extending from the existing ground surface to termination depth or auger refusal each of the four (4) borings intercepted gravel to sand sized weathered chert and weathered limestone fragments bound by medium to high plasticity clay, exhibiting medium dense to very dense conditions. Within this residual soil mass, two (2) significantly different materials were encountered. Soils with relatively equal fractions of gravel/sand size fragments and medium plasticity clay were intercepted within boring 4000 from 5.5 feet to 8.0 feet and boring 4001 from 11.8 feet to 16.8 feet. Dense to very dense conditions were revealed by SPT advancement for this layer. The third soil layer consisted of relatively equal fractions of sand size, weathered chert and weathered limestone fragments and low plasticity silt encountered between 23.3 feet and 33.2 feet within boring 1001 and between 38.3 feet and 43.3 feet within boring 1003. A relatively small fraction of gravel size fragments were encountered within this layer. Medium dense to very dense conditions for this layer were revealed by SPT advancement. SPT and/or auger refusal was reported at 8.0 feet within boring 4000, at 55.3 feet within boring 1001 and at 51.5 feet within

boring 1003 below which rock coring was performed in three (3) boreholes. Boring 4001 was advanced to 35.0 feet but did not encounter auger refusal.

Typically poor core recoveries (REC) ranging from 52% to 60% (one short run of 100% REC) and very poor rock quality designation (RQD) values ranging from 0% to 22% indicate that the base of weathered rock was not intercepted prior to boring termination within any of the three (3) cored borings. Examination of the recovered rock core confirm severely weathered, fine grain, chalky, cherty limestone with numerous clay infilled discontinuities and intervals of core loss. Top of rock elevations were noted at elevation 1271.4, elevation 1218.8 and elevation 1217.1 for borings 4000, 1001 and 1003 respectively. Further examination of the recovered rock core suggests the "rock surface" may exhibit highly variable elevations within short lateral distances.

The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for the proposed walls is 7500 PSF. If rock is present, the factored bearing resistance of the foundation materials for the proposed wall is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing

resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed MSE wall has a maximum height of approximately 23' and an estimated length of approximately 178'. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for this wall is based on the maximum height of the wall and is estimated to be 19.5'. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 2". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the depth to bedrock at this site, we anticipate the majority of this settlement should occur during the construction of the wall. Also, based on some of the borings, rock could be encountered near the bottom of the proposed wall. If rock is encountered near the bottom of the proposed wall, we recommend that a slip joint or some other mechanism be utilized in the facing panels to prevent any kind of differential settlement between the wall bearing on soil and the wall bearing on rock.

Groundwater was not intercepted (dry readings recorded) within the advanced borings for the subject wall. Dry readings were also recorded for borings B-1001 and B-1003 advanced during the adjacent bridge investigation. Groundwater levels recorded for other structure investigations nearby suggest groundwater elevations ranging from 1234.4 feet to 1222.5 feet, however higher perched elevation may be encountered.

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

MSE Retaining Wall 12 at U.S. 412 Relocated and Ramp NW

The MSE wall arrangement for Wall 12 is located adjacent to the US 412 Springdale bypass main line and will be utilized to retain the proposed embankment slopes of the proposed Ramp NW. Three (3) borings were advanced along the proposed retaining wall alignment. Also, two (2) other borings were utilized that were advanced near the wall face during the roadway and Ramp NW investigation. Sampling consisted of standard penetration testing (SPT) and rock coring and were advanced to depths of 27.0 to 35.0 feet. Laboratory analysis, visual examination and geologic interpretation were utilized to prepare an interpretation of the subsurface strata.

Extending from the existing ground surface to depths of 3.0 feet gravel to sand sized weathered chert and weathered limestone fragments bound by sparse low plasticity clay and exhibiting very dense conditions were penetrated in borings 4002 and 4003 respectively. From the existing ground surface to 5.5 feet in boring 4004 and existing

ground surface to 11.7 feet in boring 3103 medium to high plasticity clay with widely varying fractions of sand to gravel sized weathered chert and weathered limestone fragments were penetrated. This layer exhibited medium stiff grading to dense conditions as clay fractions decreased with depth and the layer became granular. The succeeding underlying layer, consisting predominately of weathered chert and weathered limestone gravel size and sand size fragments with high plasticity interstitial clay, was penetrated to depths of 17.0 feet in boring 4002, 19.0 feet in boring 4003, 16.8 feet in boring 4004, 13.1 feet in boring 227 and 27.6 feet in boring 3103. SPT values indicate very dense conditions for this soil layer (SPT refusal was encountered on several chert beds within this layer) although thin, loose to dense intervals were also encountered within each of the four (4) borings. Similar material was recovered by rock coring equipment advancement within boring 3103 between the depths of 11.7 feet and 27.6 feet. Seams and intervals of loose to medium dense, silty, sand size chert and limestone fragments with gravel size fragments were recognized within boring 4004, from 16.8 feet to 21.0 feet, and boring 227 from 13.1 feet to 30.3 feet. Auger refusal was reported at 17.0 feet within boring 4002, 19.0 feet within boring 4003, 21.0 feet within boring 4004, 30.3 feet within boring 227 and 11.7 feet in boring 3103 below which rock coring equipment was advanced within each boring.

Upon reaching intervals where auger refusal was encountered coring operations were attempted. Rock core was removed from each boring, measured and described. Core recovery (REC) ranged from 0% to 100% and cored rock quality determination (RQD) ranged from 0% to 100%. Coring operations revealed fresh to moderately weathered with severely weathered intervals, finely crystalline, cherty, occasionally fossiliferous limestone with beds of coarse grain calcite fragments in sparry cement and beds of fresh to severely weathered chert. Intervals of severe weathering and/or chert fragments and clay were encountered or interpreted from 22.5 feet to 27.0 feet in boring 4002 and 21.0 feet to 26.8 feet in boring 4004. Solution surfaces exhibited moderately severe to severe weathering. Advancement of boring 3103 below auger refusal with rock coring encountered weathered chert and weathered limestone gravel size and sand size fragments with high plasticity interstitial clay, as described above, grading into slightly to moderately weathered, porous, fossiliferous chert. The chert then grades into limestone similar to the other borings described earlier. Top of rock elevations were recorded as 1280.5 feet in boring 4002, 1285.2 in boring 4003, 1282.9 feet in boring 4004, 1270.5 feet in boring 227 and 1290.9 in boring 3103. Base of weathered rock elevations were recorded as elevation 1280.5 feet in boring 4002, 1285.0 feet in boring 4003 and 1277.1 feet in

boring 4004, 1270.5 feet in boring 227 and 1275.0 feet in boring 3103. Base of weathered rock elevations noted above suggest the potential for highly variable elevations within short lateral distances along the residuum/rock interface.

Unconfined compression testing (qU) was performed on three (3) recovered limestone specimens, one (1) from each of the newly advanced borings (4002, 4003 and 4004). Values ranged from 6,915 psi to 7,578 psi with an average of 7,266 psi for lithographic to fine grain limestone, cherty in parts and exhibiting a fresh to slightly weathered condition

The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2’ wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4” pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for this proposed wall is 10 KSF. If rock is present, the factored bearing resistance of the foundation materials for the proposed wall is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are

encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed MSE wall has a maximum height of approximately 37' and an estimated length of approximately 360'. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for this wall is based on the maximum height of the wall and is estimated to be 30.5'. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 1". However, based on the amount of cohesionless soils encountered

below the bottom of the proposed wall and the depth to bedrock at this site, we anticipate the majority of this settlement should occur during the construction of the wall. Also, based on some of the borings, rock could be encountered near the bottom of the proposed wall. If rock is encountered near the bottom of the proposed wall, we recommend that a slip joint or some other mechanism be utilized in the facing panels to prevent any kind of differential settlement between the wall bearing on soil and the wall bearing on rock.

Groundwater was not intercepted (dry readings recorded) within the advanced borings for the subject wall. Groundwater observations from ramp/bridge borings near the proposed retaining wall suggest groundwater elevations ranging from 1301.0 feet to 1287.3 feet, however, higher perched elevations may be encountered. Indications of perched groundwater are evidenced by highly variable elevations where ground water was intercepted beneath the upland sections of the alignment during the roadway, ramp and bridge investigations.

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

MSE Retaining Wall 13 at U.S. 412 Relocated and Ramp EN

The MSE wall arrangement for Wall 13 is located adjacent to the US 412 Springdale Bypass mainline and will be utilized to retain the proposed embankment slopes of Ramps EN and NW. Two (2) new boring was advanced along the proposed retaining wall alignment. Also, one (1) other boring was utilized that was advanced during the Ramp NW investigation. Sampling for the new boring consisted of standard penetration testing (SPT) and rock coring. Laboratory analysis, visual examination and geologic interpretation were utilized to prepare an interpretation of the subsurface strata.

Extending from the existing ground surface to depths of 3.0 feet medium plasticity clay and silt with trace to small fractions of sand to gravel size weathered chert and weathered limestone fragments, exhibiting soft to stiff consistency, were penetrated in borings 4008 and 4009 respectively. Underlying the surface layer to depths of 16.8 feet and 26.8 feet borings 4008 and 4009 intercepted high plasticity clay with a nearly equal combined fraction of

sand to gravel size weathered chert and weathered limestone fragments. The same layer was also intercepted within boring 3105 from the existing ground surface to 13.3 feet. The layer exhibited very stiff to hard consistency. Within this soil layer a thin seam of stiff, low plasticity silt and clay with a significant fraction of sand to gravel size weathered chert and weathered limestone was encountered between 5.5 feet and 8.0 feet in boring 4008. A discontinuous layer of predominately gravel to sand sized weathered chert and weathered limestone fragments bound by low plasticity clay was penetrated within boring 4008, between 16.8 feet and 21.8 feet, and within boring 4009 between 26.8 feet and auger refusal. This layer exhibited loose to medium dense conditions when penetrated by SPT tools prior to STP refusal on bedded chert within boring 4009. This soil layer is truncated vertically within boring 4008, from 21.8 feet to auger refusal and truncated laterally within boring 3105 from 13.3 feet to auger refusal by medium dense to very dense, non-plastic gravel and sand size weathered chert and weathered limestone with scattered interstitial silt. Similar material persists 0.2 foot below auger refusal in boring 3105 and 0.8 foot below auger refusal in boring 4008, recovered by advancement of rock core tools.

Upon reaching a depth where auger refusal was encountered coring operations were attempted in all the borings. Rock core was removed, measured and described. Core recovery (REC) ranged from 76% to 100% and cored rock quality determination (RQD) ranged from 62% to 78%. Coring operations revealed very fine to fine grain and microcrystalline to macrocrystalline, fossiliferous limestone with chert beds, stylolites, and solution activity along discontinuities. Broken and severely weathered intervals and high angle fractures were noted in all three (3) borings. Core advancement penetrated limestone to termination depth within borings 4008 and 4009 at 40.0 feet and 50.0 feet respectively. Boring 3105 intercepted freshly weathered chert from a depth of 32.6 feet to boring termination at a depth of 37.3 feet.

Unconfined compression testing (qU) was performed on two (2) recovered specimens, one each from boring 4008 and boring 4009. The reported values were 3,370 psi and 5,987 psi for lithographic to fine grain, cherty limestone exhibiting healed fractures and fresh to moderately severe weathering condition

The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a

minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for this proposed wall is 7000 PSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed MSE wall has a maximum height of approximately 27' and an estimated length of approximately 229'. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5^{h} Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used

in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for this wall is based on the maximum height of the wall and is estimated to be 29.5'. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Slope stability for Wall 13 was analyzed for the global situation including both the proposed wall and ramps on the embankment. Our global stability analysis is shown in Appendix III and has acceptable factors of safety.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 4". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the depth to bedrock at this site, we anticipate the majority of this settlement should occur during the construction of the wall.

Groundwater was not intercepted (dry readings recorded) within the advanced borings for the subject wall. Groundwater observations from ramp/bridge borings near the proposed retaining wall suggest groundwater elevations to be approximately 1290.0± feet, however, higher perched elevations may be encountered. Indications of perched groundwater are evidenced by highly variable elevations where ground water was intercepted beneath the upland sections of the alignment during the roadway, ramp and bridge investigations.

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

MSE Retaining Wall 14 at U.S. Highway I 540 and Ramp NW

The MSE retaining wall 14 arrangement is located adjacent to the existing Hwy I-540 and will be utilized to retain the proposed embankment slopes of Ramp NW. Three (3) borings were advanced along the proposed retaining wall alignment. Also, one (1) other boring was utilized that was advanced during the Ramp NW investigation. Sampling consisted of standard penetration testing (SPT) and rock coring performed in two (2) of the four (4) total borings. Laboratory analysis, visual examination and geologic interpretation were utilized to prepare an interpretation of the subsurface strata.

Extending from the existing ground surface to depths of 3.0 feet gravel to sand sized weathered chert and weathered limestone fragments bound by sparse low plasticity silt and exhibiting dense to very dense conditions were penetrated in borings 4005, 4006 and 4007 respectively. From the existing ground surface to 8.3 feet in boring 3109 gravel to sand sized weathered chert and weathered limestone fragments bound by sparse low plasticity clay was penetrated. This layer exhibited dense conditions when penetrated by SPT tools. Underlying the surface layer borings 4005, 4006 and 4007 encountered medium plasticity clay and silt with equal fractions of gravel/sand fragments consisting of weathered chert and weathered limestone. This layer exhibited stiff to hard consistency and was penetrated to depths of 26.8 feet in boring 4005, 31.8 feet in boring 4006 and 20.0 feet in boring 4007. SPT refusal was encountered on several cherty beds within this layer. Boring 4007 was terminated at 20.0 feet within this layer without intercepting auger refusal. Beneath the surface layer in boring 3109 gravel size fragments composed predominately of weathered chert and weathered limestone with lesser but relatively equal fractions of sand size fragments and silt/clay were encountered between 8.3 feet and auger refusal at 13.3 feet. Similar material was recovered by rock coring equipment advancement between 13.3 feet and 14.1 feet within the boring. This layer grades laterally into gravel to sand size weathered chert and weathered limestone fragments with interstitial silt/clay between depths of 26.8 feet and 30.0 feet within boring 4005 and 31.8 feet and 38.0 feet within boring 4006. Boring 4006 was terminated within this layer when auger refusal was encountered at 38.0 feet. Boring 4005 also encountered auger refusal at 30.0 feet however penetration continued by advancing rock core tools

Upon reaching intervals where auger refusal was encountered coring operations were attempted in Borings B-3109, and B-4005. Rock core was removed from each boring, measured and described. Core recovery (REC) ranged from

64% to 100% and cored rock quality determination (RQD) ranged from 20% to 78%. Coring operations revealed fresh to highly weathered chert grading vertically into fresh microcrystalline to medium grain, stylolitic, fossiliferous, cherty limestone. Intervals of severe weathering and broken fragments with clay and voids were encountered or interpreted from 18.4 feet to 19.5 feet in boring 3109 and 37.1 feet to 37.3 feet and 39.0 feet to 39.1 feet in boring 4005. Discontinuities exhibited moderately severe to severe weathering along walls. Top of rock elevations were recorded as 1298.3 feet in boring 3109 and 1284.1 in boring 4005. Base of weathered rock elevations were recorded as 1297.5 feet in boring 3109 and 1284.1 feet in boring 4005.

Unconfined compression testing (qU) was performed on one (1) recovered specimen from boring 4005. The reported value was 6,265 psi for finely crystalline, cherty limestone exhibiting healed high angle fractures, small vugs and slightly weathered condition.

The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2’ wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4” pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for this proposed wall is 9500 PSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing

resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed MSE wall has a maximum height of approximately 29' and an estimated length of approximately 272'. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for this wall is based on the maximum height of the wall and is estimated to be 25.5'. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 3". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the depth to bedrock at this site, we anticipate the majority of this settlement should occur during the construction of the wall.

Groundwater levels were not recorded for the advanced borings. Groundwater levels recorded for other structure investigations nearby suggest groundwater elevations will be deeper than 1285.0 feet however higher, perched elevations may be encountered. It is anticipated that groundwater levels will vary based on seasonal fluctuations.

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

MSE Retaining Wall 15 at Silent Grove Road and Ramp EN

The MSE retaining wall 15 arrangement is located adjacent to the existing Silent Grove road and will be utilized to retain the proposed embankment slopes of the Ramp EN. Three (3) new borings were advanced along the proposed retaining wall alignment. Also, one (1) other boring was utilized that was advanced during the Ramp EN investigation. Sampling consisted of standard penetration testing (SPT) and rock coring. Laboratory analysis, visual examination and geologic interpretation were utilized to prepare an interpretation of the subsurface strata.

The proposed site for the retaining wall appears to be underlain by five (5) relatively distinct, weathered in place (residual), unconsolidated soils overlying fragmented to fresh limestone and interbedded chert with each soil layer exhibiting generally uniform characteristics. Extending from the existing ground surface to depths of 11.8 feet, 3.7 feet, 3.0 feet and 5.5 feet medium plasticity clay and silt with trace to small fractions of sand to gravel size weathered chert and weathered limestone fragments, exhibiting medium stiff to hard consistency, were penetrated in borings 4010, 3206, 4011 and 4012 respectively. Penetration of this layer resulted in auger refusal within boring 3206 at 3.7 feet.

Underlying the surface layer to depths of 13.7 feet, 8.0 feet and 11.8 feet borings 3206, 4011 and 4012 intercepted sand to gravel size weathered chert and weathered limestone fragments with evidence of silty clay infilling between fragments. The layer exhibited dense to very dense conditions except for boring 3206 where the interval was cored. Borings 4010, 4011 and 4012 next encountered high plasticity clay to depths of 19.0 feet, 16.8 feet and 16.8 feet respectively. The high plasticity clay exhibited hard consistency throughout the layer. The layer was truncated by moderately to severely weathered chert cored within boring 3206 between 13.7 feet and 23.0 feet. Indications of clay between the fragment faces were noted on the core log. Similar soils were recovered from SPT sampling and/or coring within borings 4010, 4011 and 4012 to depths of 24.3 feet, 24.4 feet and 21.8 feet respectively. Within this soil layer SPT values indicated very dense conditions. Auger refusal was encountered within this layer at 19.0 feet (boring 4010) and 24.0 feet (boring 4011). Boring 4012 encountered hard, medium plasticity clay between 21.8 feet and auger refusal at 25.0 feet. Auger refusal elevations corresponding to depths indicated above are 1297.2 (boring 4010), 1313.2 (boring 3206), 1293.1 (boring 4011) and 1291.4 (boring 4012).

Upon reaching intervals where auger refusal was encountered coring operations were attempted. Rock core was removed from each boring, measured and described. Core recovery (REC) ranged from 0% to 100% and cored rock quality determination (RQD) ranged from 0% to 88%. Coring operations revealed moderately to severely weathered, fragmented, fractured chert overlying interbedded moderately weathered to fresh, very fine to fine grain and microcrystalline to macrocrystalline, fossiliferous limestone with chert beds, stylolites, and solution activity along discontinuities. Limestone was described as white, light gray, and gray exhibiting severe weathering. Core advancement penetrated cherty limestone to termination depth within borings 4010, 3206, 4011 and 4012 at 30.0 feet (elevation 1286.2), 28.7 feet (elevation 1288.2), 34.0 feet (elevation 1283.1) and 35.0 feet (elevation 1281.4) respectively. Base of weathered rock elevations, not to be confused with auger refusal, recorded for borings 4010, 3206, 4011 and 4012 were 1291.9 feet, 1293.9 feet, 1293.1 feet, and 1290.9 feet respectively. Base of weathered rock elevations suggest the potential for variable elevations within short lateral distances along the chert residuum/rock interface.

Unconfined compression testing was performed on three (3) recovered specimens, one each from boring 4010, boring 4011 and boring 4012. The reported values were 7,855 psi, 5,700 psi and 7,679 psi for fine to coarsely

crystalline or lithographic, fossiliferous limestone exhibiting healed fractures and fresh to moderately weathered condition.

The reinforced soil that will be used for the MSE wall shall meet the minimum requirements set forth in the Special Provision. In general, these requirements suggest the material shall be granular with no cohesion, and possess a minimum angle of internal friction greater than 28 degrees. Aggregate Base Course (Class 7) or Selected Material (SM-1) meets this minimum requirement. Regardless of the material selected for the reinforcement zone, the Contractor shall produce test results that prove the design material parameters utilized by the selected wall system designer are obtained. These values are typically higher than the minimum requirements set forth in the Special Provision. All fill material shall be placed and compacted in accordance with the minimum requirements set forth in the Standard Specifications for Highway Construction.

Furthermore, a 2' wedge of porous crushed stone backfill shall be placed immediately behind the wall along with a 4" pipe underdrain and Type II filter fabric to ensure positive drainage and prevent additional hydrostatic pressures on the retaining system. The factored bearing resistance of the foundation soils for this proposed wall is 10 KSF. If rock is present, the factored bearing resistance of the foundation materials for the proposed wall is 22 KSF. However, this estimated factored bearing resistance is provided for informational purposes only. The actual factored bearing resistance will be determined by the Contractor based on the actual wall design and then evaluated by the Department. At this time based on the current wall layout, undercutting and backfill with select material is not anticipated. However, undercutting and backfilling with select material may be required to satisfy factored bearing resistance requirements during construction based on the finalized wall layout or if soft, saturated soil conditions are encountered during construction. This select material should be comprised of SM-1 or concrete aggregate with a maximum size of 3".

The proposed MSE wall has a maximum height of approximately 31' and an estimated length of approximately 281'. External stability calculations were performed using a software program, MSEW 3.0, in accordance with AASHTO 5th Edition with 2010 Interims LRFD Bridge Design Specifications for both static and seismic conditions. Our analysis was done under the assumption that the inclusions would be steel strip reinforcements. MSEW 3.0 can

be used to design and analyze MSE walls by either using ASD or LRFD methodology. For this wall, we analyzed the failure modes by using the LRFD design methodology. This method of analysis does not use factors of safety for each of the failure modes. Rather, the loads (demands) are increased by a load factor and the resistances (capacity) are decreased by prescribed minimum factors. The factored resistance of the designed structure must match or exceed the factored load for each stability case. MSEW 3.0 uses the term "Capacity Demand Ratio" (CDR) for performing LRFD MSE wall analysis to serve somewhat the same purpose that factors of safety are used in ASD. That is, if the CDR is greater than 1, then the factored resistance is greater than the factored load. So, for both external stability (sliding, overturning about toe, bearing capacity and global stability) and internal stability (pullout resistance and steel strips tensile strength) the factored resistance must match or exceed the factored load for each stability case or the CDR must be greater than or equal to 1. Also, for external stability, the eccentricity has to be less than or equal to L/6.

The inclusions for these walls shall typically consist of steel strip reinforcements. Based on the minimum CDR values being greater than 1 for the preliminary external stability analysis, the minimum length of reinforcement for this wall is based on the maximum height of the wall and is estimated to be 24'. However, these values are only estimates and the actual strap lengths and layout will be determined by the wall designer based upon the finalized wall design and its subsequent approval by the Department. Also, temporary shoring may be required in the excavation for construction of the proposed wall.

Subsurface conditions indicate there is potential for settlement below the proposed wall. Estimated settlement beneath the MSE walls could range up to 4". However, based on the amount of cohesionless soils encountered below the bottom of the proposed wall and the depth to bedrock at this site, we anticipate the majority of this settlement should occur during the construction of the wall. Also, based on some of the borings, rock could be encountered near the bottom of the proposed wall. If rock is encountered near the bottom of the proposed wall, we recommend that a slip joint or some other mechanism be utilized in the facing panels to prevent any kind of differential settlement between the wall bearing on soil and the wall bearing on rock.

Groundwater measurements were not recorded for the advanced borings. Groundwater level measurements and natural moisture contents generated from ramp borings near the proposed retaining wall and the new wall borings suggest groundwater elevations may range from 1293.0± feet to 1274.0± feet however higher, perched elevations may be encountered. It is anticipated that groundwater levels will vary based on seasonal fluctuations.

Soil descriptions and indicated boundaries discussed and depicted herein are based upon engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

APPENDIX I

BORING LOGS

Florence & Hutcheson
An ICA Company

BORING NO.: 227
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X713+00
LOCATION: 89' Lt.
LATITUDE: 36.23971 ° LONGITUDE: 94.16207 °

DATE: 8/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 35.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, white & red, clayey sand with gravel.								
5.0						14.3			33,50/0.5		
10.0						33.3			10,20,50/0.2		
			13.1'								
			Brown, beige & white, silty sand with gravel.								
15.0						45.8			4,7,7		
20.0					34	43.4	37		5,5,6		
25.0						28.6			3,5,4		
30.0			30.3'			26.8			50/0.3	100	67
			Auger Refusal @ 30.3' (Elev. 1270.5). Begin Coring in Limestone.								
			Limestone: White, light gray & gray, cryptocrystalline w/fine grained fragments, cherty & chert nodules, fresh w/mod. to sev. weathering on dissolution surfaces, scattered fossiliferous, scattered stylolites, intervals porous. 35.0'							100	95
35.0			Boring Terminated @ 35.0' (Elev. 1265.8).								
40.0											
45.0											
50.0											

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BORING NO.: 1001
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 183+73
LOCATION: 66' Lt.
LATITUDE: 36.17828 ° LONGITUDE: 94.29639 °

DATE: 8/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 61.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark tan, very dense, clayey sand with gravel.								
5.0						34.6			8,50/0.3		
			7.9'								
			Dark tan & reddish brown, dense to very dense, clayey gravel with sand.								
10.0						19.0			13,13,24		
15.0					24	30.2	59		15,16,17		
20.0						21.0			10,25,45		
			23.3'								
			Tan, yellowish orange, reddish brown & reddish, dense to very dense, silty sand with gravel.								
25.0						29.1			5,15,20		
30.0						15.2			8,16,50/0.3		
			33.2'								
			Brown, tan, light gray, light brown, white, gray & dark brown, medium dense to very dense, clayey gravel with sand.								
35.0						20.4			3,15,13		
40.0					21	13.2	39		9,26,24		
45.0						44.7			9,7,9		
50.0											

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BORING NO.: 1001
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 183+73
LOCATION: 66' Lt.
LATITUDE: 36.17828 ° LONGITUDE: 94.29639 °

DATE: 8/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 61.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						39.0			7,8,9		
55.0			55.3'			22.8			50/0.3	100	0
			Auger Refusal @ 55.3' (Elev. 1216.8). Begin Coring in limestone. Limestone: White, fine grain, chalky, sev. weathered, fossiliferous,red/brown stain & clay remnants; 30°-50° fracs. at 55.7' & 56.5', numerous completely weathered intervals w/depth unknown.							52	11
60.0			61.0'								
			Boring Terminated @ 61.0' (Elev. 1211.1).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1002
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+03
LOCATION: 66' Rt.
LATITUDE: 36.17804 ° LONGITUDE: 94.29583 °

DATE: 8/27/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 50.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown & copper, very dense, clayey gravel with sand.								
5.0					17	17.5	33		12,50/0.2		
			7.9'								
			Tan & dark tan, very dense, clayey sand with gravel.								
10.0						35.4			12,22,43		
15.0						19.2			50/0.3		
			17.7'								
			Reddish brown & dark brown, medium dense to very dense, clayey gravel with sand.								
20.0						22.0			12,45,24		
25.0						25.0			10,13,25		
30.0						64.1			4,5,6		
			33.3'								
			Dark brown, tan & light gray, medium dense to very dense, silty sand with gravel.								
35.0					31	38.4	41		7,5,6		
40.0						44.7			7,50/0.4		
			40.9'								
			Auger Refusal @ 40.9' (Elev. 1219.4). Begin Coring in limestone.								
45.0			Limestone: White with some red/brown tint, light gray, fine grain, chalky, sev. weathered, fossiliferous, vugular texture in parts, red/brown stain & clay remnants; 50° & 90° fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							58	0
										46	0
50.0											

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BORING NO.: 1002
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+03
LOCATION: 66' Rt.
LATITUDE: 36.17804 ° LONGITUDE: 94.29583 °

DATE: 8/27/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 50.9 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			50.9'							46	0
			Boring Terminated @ 50.9' (Elev. 1209.4).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1003
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 184+32
LOCATION: 58' Lt.
LATITUDE: 36.17831 ° LONGITUDE: 94.29619 °

DATE: 8/29/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 66.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark beige & dark tan, very dense, clayey gravel with sand.								
5.0						9.3			50/0.5		
			7.8'								
			Tan & black, dense to very dense, clayey sand with gravel.								
10.0						22.3			7,23,25		
			13.3'								
			Brown & tan, medium dense to dense, clayey gravel with sand.								
15.0						17.5			12,21,37		
20.0					20	19.4	47		12,18,20		
25.0						19.1			10,15,12		
			28.3'								
			Brown, dark brown & copper, loose to medium dense, clayey gravel with sand.								
30.0						33.8			3,4,10		
35.0						21.7			3,4,4		
			38.3'								
			Brown & tan, medium dense, silty sand with gravel.								
40.0						42.3			4,8,9		
			43.3'								
			Dark brown & tan, loose to very dense, clayey gravel with sand.								
45.0						43.9			3,2,3		
50.0											

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BORING NO.: 1003
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 184+32
LOCATION: 58' Lt.
LATITUDE: 36.17831 ° LONGITUDE: 94.29619 °

DATE: 8/29/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 66.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			51.5'			26.1			15,27,25		
55.0			Auger Refusal @ 51.5' (Elev. 1218.6). Begin Coring in limestone. Limestone: White with some red/brown tint, white to light gray, fine grain, chalky with intervals more indurated, predominately sev. weathered, fossiliferous, vugular texture in parts, red/brown stain & clay remnants in upper 1.8' of recovery; 15° to 30° fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							50	17
60.0										56	22
65.0			66.0'							60	7
			Boring Terminated @ 66.0' (Elev. 1204.1).								
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1004
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+48
LOCATION: 58' Rt.
LATITUDE: 36.17810 ° LONGITUDE: 94.29570 °

DATE: 8/27/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 50.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1256.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown & tan, very dense, clayey sand with gravel.								
5.0					21	18.7	41		11,30,45		
10.0						31.4			22,35,40		
			13.3'								
			Dark tan, very dense, clayey gravel with sand.								
15.0						28.8			20,30,37		
20.0						28.9			20,50/0.2		
			22.9'								
			Brown, dark brown & white, dense to very dense, clayey gravel with sand.								
25.0						24.7			14,28,40		
30.0						30.0			10,24,20		
			33.3'								
			Dark brown & tan, very dense, clayey gravel with sand.								
35.0						24.8			50/0.4		
40.0			40.3'			33.6			50/0.3		
			Auger Refusal @ 40.3' (Elev. 1215.7). Begin Coring in limestone.								
			Limestone: Predominately white to light gray, some red/brown tint, fine grain, chalky with intervals more indurated, predominately sev. weathered, vugular texture in parts, fossiliferous, red/brown stain in parts, scattered manganese dendrites; 15° and 80° fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							49	0
45.0										54	0
50.0			50.0'								

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BORING NO.: 1004
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+48
LOCATION: 58' Rt.
LATITUDE: 36.17810 ° LONGITUDE: 94.29570 °

DATE: 8/27/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 50.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1256.0								
			Boring Terminated @ 50.0' (Elev. 1206.0).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1005
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+66
LOCATION: 58' Lt.
LATITUDE: 36.17842 ° LONGITUDE: 94.29577 °

DATE: 8/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 55.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish brown & brown, medium dense to very dense, clayey gravel with sand.								
5.0					25	18.6	45		15,50/0.4		
10.0						38.8			9,9,18		
			13.3'								
			Dark brown & brown, dense, clayey gravel with sand.								
15.0						27.0			8,17,18		
20.0						21.1			12,16,17		
			23.3'								
			Brown, copper, dark reddish, tan & black, loose to very dense, silty sand with gravel.								
25.0						21.5			7,10,12		
30.0						22.8			10,40,25		
35.0						56.6			3,4,4		
40.0						69.1			2,4,5		
			44.5'								
45.0			Auger Refusal @ 44.5' (Elev. 1218.9). Begin Coring in limestone.							64	0
			Limestone: White to light gray with some red/brown tint, fine grain, chalky, sev. weathered, fossiliferous, traces vugular texture in parts, red/brown stain in parts; 50° to							56	0
50.0											

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BORING NO.: 1005
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 185+66
LOCATION: 58' Lt.
LATITUDE: 36.17842 ° LONGITUDE: 94.29577 °

DATE: 8/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 55.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			70° fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							56	0
55.0			55.9'							64	0
			Boring Terminated @ 55.9' (Elev. 1207.5).								
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1006
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+70
LOCATION: 58' Rt.
LATITUDE: 36.17822 ° LONGITUDE: 94.29530 °

DATE: 8/25/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark beige, tan, dark brown & beige, medium dense to very dense, clayey gravel with sand.								
5.0						14.8			50/0.4		
10.0						25.8			14,38,37		
15.0						38.6			7,11,19		
			18.3'								
			Tan, brown & dark brown, dense to very dense, clayey gravel with sand.								
20.0						28.4			12,33,30		
25.0						37.2			4,12,32		
30.0						34.5			12,30,20		
			33.3'								
			Brown, very dense, silty sand with gravel.								
35.0						19.7			20,38,22		
			38.3'								
			Light brown, dense to very dense, silty sand with gravel.								
40.0					NP	36.9	NP		10,28,6		
45.0						30.2			6,50/0.3		
50.0			50.0'								

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BORING NO.: 1006
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+70
LOCATION: 58' Rt.
LATITUDE: 36.17822 ° LONGITUDE: 94.29530 °

DATE: 8/25/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Auger Refusal @ 50.0' (Elev. 1212.5). Begin Coring in limestone.							75	0
55.0			Limestone: White to light gray with some red/brown tint, fine grain, chalky, sev. weathered with intervals mod. weathered, fossiliferous, vugular texture in parts, red/brown stain and clay remnants in parts; 20° to 30° fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							38	11
60.0			60.4'							88	25
			Boring Terminated @ 60.4' (Elev. 1202.1).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1007
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+40
LOCATION: 66' Lt.
LATITUDE: 36.17851 ° LONGITUDE: 94.29555 °

DATE: 8/24/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.2 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown, tan & brown, medium dense to very dense, clayey gravel with sand.								
5.0						20.2			9,26,32		
10.0					25	20.7	60		11,21,28		
15.0						31.4			12,11,12		
			18.3'								
20.0			Brown, tan, dark brown, dark yellowish orange, beige, copper & black, medium dense to very dense, silty sand with gravel.			34.3			15,12,50/0.3		
25.0						19.3			14,40,17		
30.0						25.6			8,15,13		
35.0						36.7			8,10,6		
			38.3'								
40.0			Light beige, white, light gray, brown & tan, very dense, silty sand with gravel.			28.7			15,43,27		
45.0						24.9			25,50/0.5		
			46.5'								
50.0			Auger Refusal @ 46.5' (Elev. 1216.8). Begin Coring in limestone. Limestone: White with some red/brown tint grading to							49	0

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BORING NO.: 1007
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+40
LOCATION: 66' Lt.
LATITUDE: 36.17851 ° LONGITUDE: 94.29555 °

DATE: 8/24/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0			light gray, fine grain, chalky to cherty in part, sev. weathered, fossiliferous, traces vugular texture in parts, red/brown stain and clay remnants in parts; 20° and 90° intersecting fracs. at unknown depths, numerous completely weathered intervals w/depth unknown.							44	7
60.0			60.2'							80	0
			Boring Terminated @ 60.2' (Elev. 1203.1).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1008
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 187+54
LOCATION: 66' Rt.
LATITUDE: 36.17829 ° LONGITUDE: 94.29502 °

DATE: 8/26/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan, very dense, clayey gravel with sand.								
5.0						26.6			10,44,50/0.2		
			8.1'								
			Dark brown & brown, medium dense to very dense, clayey gravel with sand.								
10.0						29.0			8,18,33		
15.0						44.9			7,12,8		
			18.3'								
			Light brown, copper, reddish, brown & beige, loose to dense, silty sand with gravel.								
20.0						37.7			7,23,13		
25.0					27	26.6	40		9,23,20		
30.0						37.6			8,15,13		
35.0						45.4			7,5,4		
			38.3'								
40.0			Dark reddish brown & dark brown, stiff to very hard, gravelly fat clay.		31	70.8	73		6,4,50/0.5		
45.0						64.2			4,7,2		
50.0			49.7'								

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BORING NO.: 1008
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 187+54
LOCATION: 66' Rt.
LATITUDE: 36.17829 ° LONGITUDE: 94.29502 °

DATE: 8/26/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0			Auger Refusal @ 49.7' (Elev. 1217.7). Begin Coring in limestone. Limestone: White to light gray with some red/brown tint, fine grain, chalky to cherty, sev. weathered with thin intervals mod. weathered, fossiliferous, vugular texture in parts, red/brown stain and clay remnants in parts, stylolite; 60° frac. at 50.0', numerous completely weathered intervals w/depth unknown.							46	0
60.0			60.5'							48	0
			Boring Terminated @ 60.5' (Elev. 1206.9).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1101
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+37
LOCATION: 66' Lt.
LATITUDE: 36.17906 ° LONGITUDE: 94.29404 °

DATE: 9/6/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 61.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark reddish brown, reddish brown & tan, very dense, clayey sand with gravel.								
5.0						26.9			7,50/0.2		
10.0					22	29.3	44		6,50/0.4		
15.0						23.9			14,34,50/0.3		
			17.0'								
20.0			Auger Refusal @ 17.0' (Elev. 1256.9). Begin Coring in limestone and chert fragments.							80	0
			Limestone and Chert Fragments: White, light gray, sev. weathered, red/brown clay as matrix and fracture in-fill, limestone sev. pitted, chert fragments angular; 50° and 80°-85° fracs. with clay in-fill - depth unknown.							30	7
25.0											
30.0										3	0
			31.0'								
			Coring Terminated @ 31.0' (Elev. 1242.9). Reddish brown, very stiff to hard, sandy fat clay with gravel.								
35.0						23.8			13,14,14		
40.0						30.9			5,30,20		
45.0						26.2			7,12,9		
			48.4'								
50.0			Reddish brown, medium dense, clayey gravel with sand.								

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BORING NO.: 1101
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+37
LOCATION: 66' Lt.
LATITUDE: 36.17906 ° LONGITUDE: 94.29404 °

DATE: 9/6/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 61.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						32.9			7,9,9		
			53.3'								
55.0			Reddish brown, tan & brown, dense to very dense, clayey gravel with sand.			12.4			21,40,19		
60.0						16.6			20,20,18		
			61.8'								
			Auger Refusal & Boring Terminated @ 61.8' (Elev. 1212.1).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1102
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+67
LOCATION: 66' Rt.
LATITUDE: 36.17878 ° LONGITUDE: 94.29374 °

DATE: 9/12/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish brown & tan, very dense, clayey sand with gravel.								
5.0		X				32.9			14,22,50		
			8.8'								
10.0	△ △ △		Auger Refusal @ 8.8' (Elev. 1259.9). Begin Coring in chert fragments. 10.6'							33	0
			Chert Fragments: Light gray, yellow, yellow/orange stain, mod. to sli. weathered, hard, angular, red/brown clay on frac. faces; 80° frac. faces on pieces.								
15.0		X	Coring Terminated @ 10.6' (Elev. 1258.1). Reddish brown & tan, very dense, clayey sand with gravel.			24.5			16,44,37		
			18.3'								
20.0		X	Reddish brown, hard, sandy fat clay with gravel.			21.0			7,24,28		
			23.3'								
25.0		X	Reddish brown & light reddish brown, medium dense to very dense, clayey gravel with sand.			14.5			24,37,32		
30.0		X				44.6			8,5,13		
			33.3'								
35.0		X	Dark reddish brown, reddish brown & tan, medium dense to very dense, clayey gravel with sand.			27.3			5,15,17		
40.0		X			19	17.6	56		13,14,18		
45.0		X				12.0			30,48,50		
50.0											

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BORING NO.: 1102
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+67
LOCATION: 66' Rt.
LATITUDE: 36.17878 ° LONGITUDE: 94.29374 °

DATE: 9/12/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						35.9			5,10,15		
			53.3'								
55.0			Reddish brown & tan, medium dense to very dense, silty sand with gravel.		28	33.2	32		5,12,32		
60.0			60.5'			21.9			50/0.3		
			Auger Refusal & Boring Terminated @ 60.5' (Elev. 1208.2).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1103
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+92
LOCATION: 58' Lt.
LATITUDE: 36.17911 ° LONGITUDE: 94.29387 °

DATE: 9/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 61.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			White, tan & reddish brown, very dense, clayey sand with gravel.								
5.0						27.2			9,50/0.4		
			8.0'								
			White, light reddish tan & brownish red, very hard, sandy fat clay with gravel.								
10.0						22.3			7,50/0.4		
			13.0'								
			White, reddish tan & reddish brown, dense to very dense, clayey gravel with sand.								
15.0						31.2			8,18,24		
20.0					19	19.4	40		17,24,50/0.4		
25.0						14.5			5,29,24		
			28.3'								
			White, reddish brown, tan, brownish red, dark brownish red & grayish white, medium dense to very dense, clayey gravel with sand.								
30.0						16.3			3,12,23		
35.0						10.5			3,18,16		
40.0						21.1			7,10,14		
45.0						33.6			3,18,49		
50.0											

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BORING NO.: 1103
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+92
LOCATION: 58' Lt.
LATITUDE: 36.17911 ° LONGITUDE: 94.29387 °

DATE: 9/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 61.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						18.7			8,18,11		
			53.3'								
55.0			Dark brownish red, tan & grayish white, very dense, clayey gravel with sand.			73.3			1,11,44		
60.0			61.5'			33.1			11,14,50/0.2		
			Auger Refusal & Boring Terminated @ 61.5' (Elev. 1212.1).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1104
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 192+19
LOCATION: 58' Rt.
LATITUDE: 36.17887 ° LONGITUDE: 94.29359 °

DATE: 9/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 66.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish brown & dark brown, very dense, clayey sand with gravel.								
5.0						23.8			17,50/0.3		
			7.9'								
			Dark reddish brown, reddish brown & dark brown, very stiff to very hard, sandy fat clay with gravel.								
10.0					20	38.2	58		5,9,10		
15.0						23.8			10,50/0.4		
			18.0'								
			Reddish brown & dark brown, meddium dense to very dense, clayey gravel with sand.								
20.0						18.1			9,30,35		
25.0						25.1			1,9,13		
30.0						21.0			6,10,13		
			33.3'								
			Reddish brown, medium dense to dense, clayey gravel with sand.								
35.0						24.5			6,14,14		
40.0						14.9			7,16,20		
			43.3'								
			Dark reddish brown & dark brown, medium dense, clayey gravel with sand.								
45.0						19.6			7,8,18		
50.0											

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BORING NO.: 1104
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 192+19
LOCATION: 58' Rt.
LATITUDE: 36.17887 ° LONGITUDE: 94.29359 °

DATE: 9/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 66.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
					19	19.0	55		9,16,7		
55.0						33.4			3,9,15		
			58.3'								
60.0			Tan & reddish brown, loose to very dense, sand with gravel.			39.7			9,1,9		
65.0						28.6			7,18,50/0.3		
			66.3'								
			Auger Refusal & Boring Terminated @ 66.3' (Elev. 1202.4).								
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1105
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 192+88
LOCATION: 58' Lt.
LATITUDE: 36.17924 ° LONGITUDE: 94.29359 °

DATE: 9/19/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 71.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brownish red & brown, hard, sandy fat clay with gravel.								
5.0						39.3			8,22,23		
			8.3'								
			White, reddish tan, reddish brown & beige, dense to very dense, clayey sand with gravel.								
10.0						27.7			5,40,43		
15.0					19	17.5	39		8,26,50/0.4		
20.0						29.1			10,14,26		
			23.3'								
			Grayish white, reddish brown, tan, white, dark reddish brown & reddish tan, medium dense to dense, clayey gravel with sand.								
25.0						19.1			8,20,24		
30.0						16.3			8,12,15		
35.0						50.4			3,6,6		
40.0						15.5			6,12,14		
45.0						22.4			3,15,15		
			48.3'								
50.0			Brownish red, brown & beige, medium dense to very								

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BORING NO.: 1105
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 192+88
LOCATION: 58' Lt.
LATITUDE: 36.17924 ° LONGITUDE: 94.29359 °

DATE: 9/19/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 71.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			dense, clayey gravel with sand.			22.5			3,20,25		
55.0					20	24.9	41		5,13,9		
60.0						38.2			3,7,50/0.3		
			61.5' Auger Refusal @ 61.5' (Elev. 1210.2). Begin Coring in limestone. Limestone: White to light gray with red/brown stain, fine grain, chalky to cherty, sev. to mod. weathered with intervals completely weathered, clay in-filled fracs. in parts; 20° and 70° fracs. at 62.2'-62.4' and 67.3'.							71	0
65.0											
70.0			71.0' Boring Terminated @ 71.0' (Elev. 1200.7).							80	7
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1106
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+23
LOCATION: 58' Rt.
LATITUDE: 36.17902 ° LONGITUDE: 94.29328 °

DATE: 10/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 67.9 ft.
GROUNDWATER @

SURFACE ELEVATION: 1267.9

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Red, very stiff to very hard, sandy fat clay with gravel.								
5.0						27.0			6,22,50/0.2		
10.0						29.4			11,50/0.3		
15.0						38.3			4,12,12		
20.0						44.2			8,10,8		
25.0						34.6			25,33,17		
			28.3'								
30.0			Red & brown, dense to very dense, clayey sand with gravel.			18.1			4,19,50/0.3		
35.0						35.1			10,33,50/0.3		
40.0						18.8			8,22,47		
45.0						33.7			5,10,28		
			48.3'								
50.0			Brown & white, very dense, clayey gravel with sand.								

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BORING NO.: 1106
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+23
LOCATION: 58' Rt.
LATITUDE: 36.17902 ° LONGITUDE: 94.29328 °

DATE: 10/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 67.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						17.3			8,25,34		
55.0						13.8			9,38,50/0.4		
			58.2' Brown & white, medium dense to dense, clayey gravel with sand.								
60.0						31.4			6,24,11		
65.0						27.8			26,16,11		
			67.9' Auger Refusal & Boring Terminated @ 67.9' (Elev. 1200.0).								
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1107
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+39
LOCATION: 36' Lt.
LATITUDE: 36.17926 ° LONGITUDE: 94.29340 °

DATE: 9/20/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 61.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Light and dark brownish red & gray, hard to very hard, sandy fat clay with gravel.								
5.0						31.6			6,25,50/0.4		
10.0						31.5			20,16,15		
			13.3'								
15.0			Grayish white & reddish tan, very dense, clayey sand with gravel.			12.9			24,34,50/0.4		
			18.2'								
20.0			White, reddish brown, reddish tan, brown & grayish white, dense to very dense, clayey gravel with sand.			25.0			12,48,26		
25.0					17	16.5	39		11,22,18		
30.0			30.3'			15.0			50/0.3	93	93
			Auger Refusal @ 30.3' (Elev. 1240.4). Begin Coring in limestone.								
35.0			Limestone: White to medium gray, alternating lithographic to coarsely crystalline and fine grain, chert laminations and nodules, sli. weathered to fresh, clay on horizontal weathering surfaces and in stylolites; 90° frac. at 37.1'-37.5'.							96	70
			37.5'								
40.0			Core loss interval: White to light gray, severely weathered limestone fragments with red/brown clay remnants; interpreted as sev. to completely weathered interval filled with rock fragments and soil.							30	12
45.0										4	0
50.0										4	0

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BORING NO.: 1107
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+39
LOCATION: 36' Lt.
LATITUDE: 36.17926 ° LONGITUDE: 94.29340 °

DATE: 9/20/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 61.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										4	0
			52.4'								
55.0			Limestone: Light gray to medium gray, white, gray/brown, fine grain with coarse crystalline inclusions, fossil fragments and pellets, intervals medium grain and fossiliferous with finely crystalline cement, stylolites, sli. weathered to fresh, clay on stylolite surface 57.6'; 90° intersecting fracs. at 52.4'-53.0'.							72	52
60.0			61.0'							100	76
			Boring Terminated @ 61.0' (Elev. 1209.7).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1108
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+72
LOCATION: 66' Rt.
LATITUDE: 36.17907 ° LONGITUDE: 94.29313 °

DATE: 9/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 66.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1269.7								
			Topsoil 0.3'								
			Red, white, light reddish tan, gray & reddish brown, hard to very hard, sandy fat clay with gravel.								
5.0						28.2			13,28,50/0.2		
10.0					22	12.3	54		48,50/0.4		
15.0						37.9			8,14,23		
			18.3'								
20.0			Reddish tan, reddish brown & gray, medium dense to dense, clayey sand with gravel.			33.4			8,23,15		
25.0						20.4			8,24,18		
30.0						25.3			3,11,15		
			33.3'								
35.0			Reddish tan, gray, brown, white, dark reddish brown & beige, medium dense to very dense, clayey gravel with sand.			18.7			3,15,30		
40.0						21.0			50/0.4		
45.0						24.0			4,15,23		
50.0											

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BORING NO.: 1108
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 193+72
LOCATION: 66' Rt.
LATITUDE: 36.17907 ° LONGITUDE: 94.29313 °

DATE: 9/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 66.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1269.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						39.2			3,6,8		
			53.3'								
55.0			Brownish red, white, beige, dark brownish red & light reddish tan, dense to very dense, clayey gravel with sand.			30.5			15,26,32		
60.0						22.1			3,23,19		
65.0						55.4			3,8,50/0.4		
			66.4'								
70.0			Auger Refusal & Boring Terminated @ 66.4' (Elev. 1203.3).								
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1201
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+87 Grimsley/West Miller Rd.
LOCATION: 30' Lt.
LATITUDE: 36.22722 ° LONGITUDE: 94.21813 °

DATE: 12/3/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 13.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Tan, gray & yellowish orange, very dense, clayey gravel.		22	16.1	36		7,22,33		
			9.4'								
10.0			Auger Refusal @ 9.4' (Elev. 1270.0). Begin Coring in Chert.							11	0
			Chert: White, lt. gray, highly fractured/fragmented, angular to subangular, weathered w/red, brown, orange stains, core loss interpreted as dissolutioning, clay. 13.0'								
15.0			Boring Terminated @ 13.0' (Elev. 1266.4).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1201A
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+87 Grimsley/West Miller Rd.
LOCATION: 32' Lt.
LATITUDE: 36.22721 ° LONGITUDE: 94.21814 °

DATE: 12/3/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 66.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & white, very stiff, fat clay with gravel.								
5.0											
10.0						37.9			5,20,8		
			13.3'								
			Brown & tan, medium dense to dense, clayey gravel with sand.		34	36.7	79		5,22,8		
15.0											
20.0						20.0			12,10,32		
			23.3'								
			Tan, white, light gray, brown, black & beige, dense to very dense, silty gravel with sand.			12.0			13,11,21		
25.0											
30.0					25	27.6	38		13,38,46		
35.0						43.3			14,7,28		
40.0						40.6			14,18,21		
			43.3'								
			Gray, dark beige & light gray, very loose to very dense, clayey gravel with sand.			9.5			1,25,50/0.4		
45.0											
50.0											

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BORING NO.: 1201A
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+87 Grimsley/West Miller Rd.
LOCATION: 32' Lt.
LATITUDE: 36.22721 ° LONGITUDE: 94.21814 °

DATE: 12/3/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 66.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0						22.0 32.7			5,15,32 1,0,3		
			56.8' Auger Refusal @ 56.8' (Elev. 1222.6). Begin Coring in Limestone.								
			58.8' Limestone: Light gray, gray, fresh, slight staining, trace fossiliferous, styolites, intermittent chert, white, lt. gray.							89	29
60.0			Chert: White, lt. gray, gray, fresh, slight staining on discontinuities, trace fossiliferous, intermittent limestone, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, styolites.							100	86
65.0			65.5' 66.0' Limestone: Light gray, trace chert.								
			Boring Terminated @ 66.0' (Elev. 1213.4).								
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1202
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Grimsley/West Miller Rd.
LOCATION: 14' Rt.
LATITUDE: 36.22690 ° LONGITUDE: 94.21830 °

DATE: 12/4/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 56.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1278.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark brown & dark gray, very dense, clayey gravel.								
5.0						7.8			15,50/0.4		
			8.0'								
			Brown & light gray, medium dense to dense, clayey gravel with sand.								
10.0					24	33.5	46		7,10,20		
15.0						30.5			5,13,19		
			18.3'								
			Light brown, beige, brown & light tan, medium dense to dense, silty gravel with sand.								
20.0						46.0			5,14,9		
25.0						28.3			5,20,13		
30.0						24.5			7,22,16		
			33.3'								
			Light beige, brown, light gray, tan, olive gray & gray, dense to very dense, clayey gravel with sand.								
35.0						24.1			7,16,15		
40.0					22	26.9	37		17,50/0.4		
45.0						37.9			3,16,17		
			47.1'								
	△ △ △		Auger Refusal @ 47.1' (Elev. 1231.7). Begin Coring in Chert.								
50.0	△ △ △		Chert: White, lt. gray, gray, fresh, slight staining on							97	85

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BORING NO.: 1202
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Grimsley/West Miller Rd.
LOCATION: 14' Rt.
LATITUDE: 36.22690 ° LONGITUDE: 94.21830 °

DATE: 12/4/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 56.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1278.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			discontinuities, trace fossiliferous, intermittent limestone, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, styolites. 51.3'							97	85
55.0			Limestone: Light gray, gray, fresh, slight staining, fossiliferous, styolites, intermittent chert, white, lt. gray. 56.0'							98	74
			Boring Terminated @ 56.0' (Elev. 1222.8).								
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1203
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+91 Grimsley/West Miller Rd.
LOCATION: 14' Lt.
LATITUDE: 36.22665 ° LONGITUDE: 94.21821 °

DATE: 12/1/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 26.0 ft.
GROUNDWATER @ 1.5 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Gray, dark tan & yellowish orange, very dense, clayey gravel. 6.3'			16.1			5,21,50/0.3		
			Auger Refusal @ 6.3' (Elev. 1273.7). Begin Coring in Chert.								
			Chert: White, lt. gray, intensely weathered, highly fragmented/fractured with maximum intact recovery 0.3', subangular to subrounded, stained red, clay seams/infilling. 8.8'							98	0
10.0			Clay with sand/gravel, dark red, brown. 10.6'								
			Chert: White, lt. gray, intensely weathered, highly fragmented/fractured with maximum intact recovery 0.2', discontinuity orientation varies from horz. to vert., subangular to subrounded, stained red, fossiliferous, clay seams/infilling.							40	0
15.0											
										24	0
20.0											
										34	0
25.0											
										48	0
30.0			31.0'								
			Boring Terminated @ 31.0' (Elev. 1249.0).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1301
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 293+96
LOCATION: 44' Lt.
LATITUDE: 36.19140 ° LONGITUDE: 94.26677 °

DATE: 11/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 20.0 ft.
GROUNDWATER @ 4.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1152.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Copper & dark beige, medium dense, sand with gravel.								
5.0		X				28.7			5,17,9		
			9.2'								
10.0			Auger Refusal @ 9.2' (Elev. 1143.7). Begin Coring in Limestone.							100	38
			Limestone: White, lt. gray, fresh to slightly weathered, trace stains, fine to medium grain, trace pits, intermittent chert, white, lt. gray. 12.4'							100	57
15.0			Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, trace pits, intermittent limestone, lt. gray, gray, fine to medium grain, styolites.							100	64
20.0			20.0'								
			Boring Terminated @ 20.0' (Elev. 1132.9).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1302
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 294+96
LOCATION: 44' Rt.
LATITUDE: 36.19118 ° LONGITUDE: 94.26641 °

DATE: 11/28/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.0 ft.
GROUNDWATER @ 4.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1156.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Dark brown & copper, medium dense, clayey sand with gravel.								
5.0					21	23.0	29		3,6,9		
10.0			11.0			20.2			7,50/0.5		
			Auger Refusal @ 11.0' (Elev. 1145.0). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, slightly weathered, slight staining, trace pits, intermittent limestone, lt. gray, gray, fine to medium grain, styolites. 14.8							100	66
15.0			Limestone: White, lt. gray, fresh to slightly weathered, microcrystalline to macrocrystalline, fine to medium grain, trace pits, intermittent chert, white, lt. gray. 17.6							94	76
20.0			Chert: White, lt. gray, fresh to slightly weathered, trace pits, trace fossiliferous, intermittent limestone, lt. gray, gray, fine to medium grain, styolites. 21.0								
			Boring Terminated @ 21.0' (Elev. 1135.0).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1303
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 295+58
LOCATION: 44' Lt.
LATITUDE: 36.19143 ° LONGITUDE: 94.26622 °

DATE: 11/29/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.8 ft.
GROUNDWATER @ 6.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1156.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil (0.6')								
			Dark reddish brown & copper, medium dense, clayey gravel with sand.								
5.0						22.9			5,13,12		
			(8.8')								
10.0			Auger Refusal @ 8.8' (Elev. 1147.2). Begin Coring in Chert. (9.8')							100	85
			Chert: White, lt. gray, fresh to slightly weathered, trace pits, intermittent limestone, lt. gray, gray, fine. (11.2')							100	62
15.0			Limestone: White, lt. gray, fresh to slightly weathered, macrocrystalline, medium grain, trace pits, intermittent chert, white, lt. gray. (14.6')								
			Chert: White, lt. gray, intermittent limestone. (16.1')							100	47
			Limestone: White, lt. gray, fresh, macrocrystalline, medium grain, trace pits. (18.8')								
20.0			Chert: White, lt. gray, fresh to slightly weathered, trace pits, intermittent limestone with limestone bed at base, 18.5'-18.8'.								
			Boring Terminated @ 18.8' (Elev. 1137.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1304
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 296+67
LOCATION: 44' Rt.
LATITUDE: 36.19121 ° LONGITUDE: 94.26583 °

DATE: 11/29/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 32.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1172.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, tan, dark tan & copper, medium dense to very dense, clayey gravel with sand.								
5.0					23	12.1	36		10,36,50/0.3		
10.0						34.4			9,10,9		
			13.3'								
			Tan, white & light gray, dense to very dense, clayey gravel with sand.								
15.0					23	35.9	37		7,20,30		
20.0						29.6			30,7,50/0.4		
			21.5'								
			Auger Refusal @ 21.5' (Elev. 1150.5). Begin Coring in Chert.								
25.0			Chert: White, lt. gray, fresh to weathered, trace pits, intermittent limestone, lt. gray, gray, fine to medium grain.							100	9
			26.1'								
			Limestone: White, lt. gray, fresh to slightly weathered, macrocrystalline, medium grain, trace pits, intermittent chert, white, lt. gray. 27.9'							100	68
30.0			Chert: White, lt. gray, fresh to slightly weathered, trace pits, fossiliferous, styolites, intermittent limestone, lt. gray, gray, fine to medium grain. 32.0'							100	42
			Boring Terminated @ 32.0' (Elev. 1140.0).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1401
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+95 Liberty Rd.
LOCATION: 14' Rt.
LATITUDE: 36.18457 ° LONGITUDE: 94.28820 °

DATE: 12/1/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 25.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Gray, dark brown, dark gray & brown, medium dense to very dense, clayey sand.								
5.0						29.0			8,19,9		
10.0			10.4			32.4			50/0.4	100	0
			Auger Refusal @ 10.4' (Elev. 1264.7). Begin Coring in Chert. 10.8								
			Chert: White, lt. gray, moderately weathered, fractured, discontinuities stained orange, red, brown. 12.1							62	0
15.0			Clay, red, brown, w/chert fragments up to 0.1', white, stained.								
			Chert: White, lt. gray, moderately to severely weathered, highly fragmented/fractured with maximum intact recovery 0.5', angular to subrounded, stained red, orange, pitted, porous, clay seams/infilling, red, trace limestone fragments, lt. gray.							68	0
20.0											
25.0			25.8							52	0
			Boring Terminated @ 25.8' (Elev. 1249.3).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1402
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Liberty Rd.
LOCATION: 14' Lt.
LATITUDE: 36.18464 ° LONGITUDE: 94.28784 °

DATE: 11/30/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 41.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark gray & brown, medium stiff, lean clay with sand.								
5.0						27.2			2,3,3		
			8.3'								
			Brown, dark gray, yellowish orange, tan & black, medium dense to very dense, clayey sand.								
10.0					26	38.0	53		2,11,15		
15.0			15.8'			37.4			5,50/0.3	100	0
			16.3' Auger Refusal @ 15.8' (Elev. 1259.2). Begin Coring in Chert.								
			17.3' Chert: Light gray, slightly to intensely weathered, fractured, fragmented, longest intact piece 0.6', fragments stained red, orange, tan, subangular to subrounded, pitted, porous, with clay seams and dissolution infilling, core loss attributed to dissolution, clay.							54	12
20.0			16.3'-17.3' Clay, red, brown, with chert fragments and sand size particles, grades coarser with depth							30	0
25.0			26.0' Chert: Light gray, slightly to intensely weathered, fractured, fragmented, longest intact piece 0.6', fragments stained red, orange, tan, subangular to subrounded, pitted, porous, with clay seams and dissolution infilling, core loss attributed to dissolution, clay.							58	0
30.0			30.6' Sand, brown, red, grades coarser at depth, with clay and chert gravel, subangular to subrounded.							58	0
35.0			Chert: White, lt. gray, slightly to intensely weathered, fractured, fragmented, longest intact piece 0.4', fragments/discontinuity surfaces stained red, orange, tan, subangular to subrounded, pitted, porous, with clay seams and dissolution infilling, core loss attributed to dissolution, clay.							58	8
40.0			41.0' Boring Terminated @ 41.0' (Elev. 1234.0).								
45.0											
50.0											

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BORING NO.: 1403
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+00 Liberty Rd.
LOCATION: 14' Rt.
LATITUDE: 36.18456 ° LONGITUDE: 94.28751 °

DATE: 11/30/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 25.5 ft.
GROUNDWATER @ 12.0

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1274.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, stiff, lean clay with sand.								
5.0			7.0'		19	28.4	35		3,3,6		
			Auger Refusal @ 7.0' (Elev. 1267.7). Begin Coring in Chert.							33	0
10.0			Chert: Light gray, slightly to severely weathered, fractured, fragmented, longest intact piece 0.6', fragments stained red, orange, tan, subangular to subrounded, pitted, porous, with clay seams and dissolution infilling, core loss attributed to dissolution, clay.								
										37	0
15.0											
										82	0
20.0											
										76	0
25.0			25.5'								
			Boring Terminated @ 25.5' (Elev. 1249.2).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1501
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 426+88
LOCATION: 44' Rt.
LATITUDE: 36.21985 ° LONGITUDE: 94.25098 °

DATE: 12/16/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1239.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Tan, medium dense to very dense, silty sand with gravel.								
5.0					30	21.8	31		17,28,50/0.4		
10.0						34.6			15,12,12		
			13.3'								
			Copper & dark brown, medium dense to dense, clayey sand with gravel.								
15.0						40.8			3,15,13		
20.0						21.3			6,12,10		
			23.3'								
			Dark brown, very dense, silty gravel with sand.								
25.0						13.7			50/0.4		
			27.7'								
			Brown & light brown, very dense, silty sand with gravel.								
30.0					38	41.7	38		16,11,49		
			31.6'								
			Auger Refusal @ 31.6' (Elev. 1208.3). Begin Coring in Chert.								
35.0			Chert: White, lt. gray, highly fractured/fragmented, angular to subrounded, discontinuity orientation varies from horizontal to vertical, vugs, pits, moderately to							66	0
			36.3'								
			intensely weathered w/red, brown, orange stains, fracture filling and coatings, numerous fractures present, longest intact core 0.3', core loss interpreted as dissolutioning, clay.							76	64
40.0			40.6'								
			Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, trace fossiliferous, intermittent limestone, lt. gray, gray, fine to medium grain.								
			41.8'							100	76
45.0			Limestone: Light gray, gray, fresh, styolites, intermittent chert.								
			46.0'								
			Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, trace fossiliferous, intermittent limestone, lt. gray, gray, fine to medium grain.								
50.0			Boring Terminated @ 46.0' (Elev. 1193.9).								

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BORING NO.: 1502
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 427+86
LOCATION: 44' Lt.
LATITUDE: 36.22018 ° LONGITUDE: 94.25116 °

DATE: 12/16/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 36.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Copper, medium stiff, silt.								
5.0					23	29.1	25		3,4,4		
			8.3'								
			Dark tan, medium dense, silty sand with gravel.								
10.0						31.4			5,9,7		
			13.3'								
			Brown & tan, very dense, clayey sand with gravel.								
15.0					20	28.8	41		5,9,50/0.4		
			18.2'								
			Dark brown, very dense, silty gravel with sand.								
20.0						11.2			9,50/0.4		
			21.2'								
			Auger Refusal @ 21.2' (Elev. 1226.6). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, highly fractured/fragmented, angular to subrounded, discontinuity orientation varies from horizontal to vertical, vugs, pits, moderately to intensely weathered w/red, brown, orange stains, fracture filling and coatings, numerous fractures present, longest intact core 0.3', core loss interpreted as dissolutioning, clay.							50	0
25.0											
										70	0
30.0											
										32	0
35.0											
			36.0'								
			Boring Terminated @ 36.0' (Elev. 1211.7).								
40.0											
45.0											
50.0											

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BORING NO.: 1503
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 428+27
LOCATION: 44' Rt.
LATITUDE: 36.22020 ° LONGITUDE: 94.25083 °

DATE: 12/17/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 41.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Copper & tan, medium stiff, silt.								
5.0						19.1			1,4,3		
			8.3'								
			Brown & tan, medium dense to very dense, silty sand with gravel.								
10.0						39.3			4,11,9		
15.0						26.3			5,50/0.4		
			18.0'								
			Brown, loose, clayey sand with gravel.								
20.0						38.2			4,4,5		
			23.3'								
			Dark brown & light gray, medium dense, silty gravel with sand.								
25.0						32.8			5,13,11		
			28.1'								
30.0			Auger Refusal @ 28.1' (Elev. 1219.4). Begin Coring in Chert.							69	0
			Chert: White, lt. gray, gray, highly fractured/fragmented, angular to subrounded, discontinuity orientation varies from horizontal to vertical, vugs, pits, moderately to intensely weathered w/red, brown, orange stains, clay infilling and coating, clay seams, numerous fractures present, longest intact core 0.5', core loss interpreted as dissolutioning, clay.							74	18
35.0											
										68	0
40.0			41.0'								
			Boring Terminated @ 41.0' (Elev. 1206.5).								
45.0											
50.0											

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BORING NO.: 1504
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 429+29
LOCATION: 44' Lt.
LATITUDE: 36.22055 ° LONGITUDE: 94.25099 °

DATE: 12/4/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 36.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1246.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, tan & dark tan, dense silty, gravel with sand.								
5.0						20.1			10,16,25		
10.0						17.9			19,15,18		
			13.3'								
			Brown, very stiff, gravelly fat clay with sand.								
15.0					26	31.2	50		10,11,14		
			18.3'								
			Tan & brown, very stiff, gravelly silt with sand.								
20.0						34.9			49,15,5		
			23.1'								
25.0			Auger Refusal @ 23.1' (Elev. 1223.3). Begin Coring in Chert.							34	0
			Chert: White, lt. gray, gray, highly fractured/fragmented, angular to subrounded, discontinuity orientation varies from horizontal to vertical, vugs, pits, moderately to intensely weathered w/red, brown, orange stains, clay infilling and coating, clay seams, numerous fractures present, longest intact core 0.3', core loss interpreted as dissolutioning, clay.							74	6
30.0											
										72	6
35.0			36.0'								
			Boring Terminated @ 36.0' (Elev. 1210.4).								
40.0											
45.0											
50.0											

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BORING NO.: 1601
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 462+68
LOCATION: 44' Lt.
LATITUDE: 36.22676 ° LONGITUDE: 94.24297 °

DATE: 12/13/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 58.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, very dense, silty gravel with sand.								
5.0						15.7			12,45,46		
10.0						19.4			20,23,29		
			13.3'								
			Brown & beige, very dense, silty sand with gravel.								
15.0						16.3			8,30,32		
			18.3'								
			Dark brown, tan & brown, loose to dense, silty gravel with sand.								
20.0						36.0			3,13,12		
25.0					34	24.6	42		8,16,15		
30.0						50.5			1,4,7		
35.0						46.0			2,5,5		
			38.3'								
			Tan, dark brown, copper & light beige, medium dense, clayey gravel with sand.								
40.0						39.1			5,8,13		
45.0						40.3			5,7,13		
			47.7'								
			Auger Refusal @ 47.7' (Elev. 1194.9). Begin Coring in Limestone.							97	97
50.0											

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BORING NO.: 1601
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 462+68
LOCATION: 44' Lt.
LATITUDE: 36.22676 ° LONGITUDE: 94.24297 °

DATE: 12/13/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 58.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Limestone: White, lt. gray, gray, microcrystraline to macrocrystalline, fine to med. grain, fresh w/slight weathering on some discontinuities, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray.							97	97
55.0										100	88
			56.6'								
	△ △ △		Chert: White, lt. gray, fresh, trace fossiliferous, styolites, intermittent limestone beds, lt. gray. 58.0'							100	100
60.0			Boring Terminated @ 58.0' (Elev. 1184.6).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1602
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 463+46
LOCATION: 44' Rt
LATITUDE: 36.22659 ° LONGITUDE: 94.24263 °

DATE: 12/13/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1239.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brownish gray, tan & brown, very dense, silty gravel with sand.								
5.0					25	16.0	34		8,26,46		
10.0						29.7			13,32,22		
			13.3'								
			Brown, light beige & copper, loose to medium dense, silty sand with gravel.								
15.0						22.0			4,9,9		
20.0						21.8			5,8,2		
			22.6'								
25.0			Auger Refusal @ 22.6' (Elev. 1216.4). Begin Coring in Limestone.							94	94
			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh w/slight weathering on discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							76	34
30.0			30.7'								
			Boring Terminated @ 30.7' (Elev. 1208.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1603
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 463+95
LOCATION: 44' Lt.
LATITUDE: 36.22687 ° LONGITUDE: 94.24255 °

DATE: 12/14/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1234.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Tan, dense, silty gravel with sand.			27.5			8,26,15		
			8.3'								
10.0			Light beige & copper, medium dense, silty sand with gravel.		28	17.1	30		6,11,10		
15.0						24.1			4,5,7		
20.0			19.7'								
			Auger Refusal @ 19.7' (Elev. 1214.3). Begin Coring in Limestone.							60	33
25.0			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh w/slight weathering on discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							100	70
			28.4'							100	84
30.0			Chert: White, lt. gray, gray, fresh to slightly weathered on discontinuities, fossiliferous, intermittent limestone beds, lt. gray, gray. 29.8' 30.0'								
			Limestone.								
35.0			Boring Terminated @ 30.0' (Elev. 1204.0).								
40.0											
45.0											
50.0											

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BORING NO.: 1604
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+79
LOCATION: 44' Rt.
LATITUDE: 36.22687 ° LONGITUDE: 94.24255 °

DATE: 12/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 58.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1249.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & tan, dense to very dense, silty gravel with sand.								
5.0						13.3			12,39,44		
10.0						16.6			17,19,24		
			12.3'								
			Dark brown, white & brown, medium dense to dense, silty sand with gravel.								
15.0						18.8			11,14,21		
20.0						12.6			5,14,11		
25.0						15.7			6,12,10		
			27.3'								
			Copper, dark brown & light brown, very loose to medium dense, clayey gravel with sand.								
30.0						12.2			3,4,6		
35.0					22	21.1	44		1,2,2		
40.0						65.1			3,3,2		
45.0						41.8			9,7,4		
			47.2'								
50.0			Auger Refusal @ 47.2' (Elev. 1202.5). Begin Coring in Limestone. Limestone: White, lt. gray, gray, microcrystalline to							100	86

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BORING NO.: 1604
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+79
LOCATION: 44' Rt.
LATITUDE: 36.22687 ° LONGITUDE: 94.24255 °

DATE: 12/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 58.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1249.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0			macrocrystalline, fine to med. grain, fresh w/slight weathering on discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							100	100
			55.6' Chert: White, lt. gray, gray, fresh, fossiliferous, intermittent limestone beds, lt gray, gray.							100	60
60.0			57.7' 58.0' Limestone bed. Boring Terminated @ 58.0' (Elev. 1191.7).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1701
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+04 Hwy 112
LOCATION: 21' Rt.
LATITUDE: 36.22733 ° LONGITUDE: 94.23077 °

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 69.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, medium dense, silty gravel with sand.								
5.0		X				34.3			3,9,15		
			8.3'								
			Red, medium dense to dense, silty gravel with sand.								
10.0		X				24.9			46,30,15		
15.0		X				25.4			11,15,16		
20.0		X				28.4			9,11,8		
25.0		X				21.3			3,15,16		
30.0		X				31.8			5,12,9		
35.0		X				22.5			5,13,11		
			38.3'								
			Brown, loose to medium dense, silty gravel with sand.								
40.0		X				29.2			9,9,20		
45.0		X				42.9			4,3,7		
50.0											

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BORING NO.: 1701
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+04 Hwy 112
LOCATION: 21' Rt.
LATITUDE: 36.22733 ° LONGITUDE: 94.23077 °

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 69.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						24.8			2,7,13		
			53.3'								
55.0			Brown, very loose to medium dense, silty gravel with sand.			19.0			7,10,13		
60.0						28.5			2,2,3		
65.0						26.2			0,3,0		
			69.0'								
70.0			Auger Refusal & Boring Terminated @ 69.0' (Elev. 1178.1).								
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1702
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Hwy 112
LOCATION: 16' Rt.
LATITUDE: 36.22707 ° LONGITUDE: 94.23072 °

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1253.3								
			Topsoil 0.6'								
			Brown, medium dense to dense, silty gravel with sand.								
5.0		X				40.5			3,6,12		
10.0		X			32	35.8	36		22,22,17		
15.0		X				30.3			12,16,20		
			18.3'								
20.0		X	Brown, very dense, silty gravel with sand.			29.9			14,25,42		
25.0		X				28.2			14,17,50/0.4		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1223.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1703
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+96 Hwy. 112
LOCATION: 21' Lt.
LATITUDE: 36.22683 ° LONGITUDE: 94.23053 °

DATE: 4/15/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 81.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1757.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very dense, silty gravel with sand.								
5.0						31.7			5,10,50/0.4		
			8.2'								
			Brown, medium dense to very dense, silty gravel with sand.								
10.0						11.5			12,33,27		
15.0						14.8			17,27,32		
20.0						20.0			4,14,21		
25.0						26.2			3,9,9		
30.0						24.0			8,8,9		
35.0						38.2			6,5,10		
40.0						48.4			4,5,14		
			43.3'								
			Brown, loose to medium dense, silty gravel with sand.								
45.0						41.2			12,10,8		
50.0											

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BORING NO.: 1703
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+96 Hwy. 112
LOCATION: 21' Lt.
LATITUDE: 36.22683 ° LONGITUDE: 94.23053 °

DATE: 4/15/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 81.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1757.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						41.5			2,2,3		
55.0						25.1			2,2,3		
60.0						22.8			5,10,5		
			63.3' Brown & gray, very loose to loose, silty gravel with sand.								
65.0						33.8			2,4,6		
70.0						26.3			2,2,4		
75.0						28.1			0,1,2		
80.0						37.6			0,0,2		
			81.5' No Refusal & Boring Terminated @ 81.5' (Elev. 1676.3).								
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1801
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+95 Hwy 112
LOCATION: 56' Lt.
LATITUDE: 36.22739 ° LONGITUDE: 94.23052 °

DATE: 4/30/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 41.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, loose to very dense, silty gravel with sand.								
5.0						32.3			25,30,50/0.4		
10.0						27.7			9,15,32		
15.0						15.0			18,50/0.5		
20.0						26.1			15,20,18		
			23.3'								
25.0			Red, dense to very dense, silty gravel with sand.			28.2			9,18,50/0.4		
30.0						33.2			12,9,27		
			33.3'								
35.0			Red, dense, silty gravel with sand.			21.9			8,15,20		
40.0						31.4			10,18,25		
			41.5'								
			No Refusal & Boring Terminated @ 41.5' (Elev. 1213.8).								
45.0											
50.0											

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BORING NO.: 1802
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+10 Hwy 112
LOCATION: 21' Lt.
LATITUDE: 36.22733 ° LONGITUDE: 94.23063 °

DATE: 4/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1252.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense to dense, silty gravel with sand.								
5.0						39.5			4,5,15		
10.0						36.7			4,7,20		
15.0						24.0			5,17,20		
20.0						25.5			5,17,20		
			23.3'								
25.0			Brown, medium dense, silty gravel with sand.			29.2			5,8,11		
			28.3'								
30.0			Brown & white, dense to very dense, silty gravel with sand.			18.7			17,50/0.3		
35.0						13.7			17,31,12		
40.0			40.0'								
			No Refusal & Boring Terminated @ 40.0' (Elev. 1212.9).								
45.0											
50.0											

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BORING NO.: 1803
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+78 Hwy 112
LOCATION: 54' Rt.
LATITUDE: 36.22743 ° LONGITUDE: 94.23055 °

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, dense, silty gravel with sand.								
5.0						38.8			15,22,12		
			8.3'								
			Brown, dense to very dense, silty gravel with sand.								
10.0						17.9			15,22,42		
15.0						23.7			15,20,15		
20.0						24.0			15,22,45		
			23.3'								
			Brown, medium dense to dense, silty gravel with sand.								
25.0						36.6			8,10,5		
30.0						38.2			5,6,13		
35.0						22.8			10,17,14		
40.0			40.0'								
			No Refusal & Boring Terminated @ 40.0' (Elev. 1213.0).								
45.0											
50.0											

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BORING NO.: 1804
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+22 Hwy 112
LOCATION: 48' Lt.
LATITUDE: 36.22677 ° LONGITUDE: 94.23043 °

DATE: 4/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 50.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red & brown, medium dense to dense, silty gravel with sand.								
5.0		X				33.6			2,12,18		
10.0		X				31.2			15,20,17		
15.0		X				17.2			11,20,17		
			18.3'								
			Brown, medium dense to very dense, silty gravel with sand.								
20.0		X				27.2			9,10,50/0.4		
25.0		X				27.7			6,10,14		
30.0		X				39.2			15,14,6		
			33.3'								
			Brown, medium dense, silty gravel with sand.								
35.0		X				31.1			2,8,10		
40.0		X				17.1			14,5,12		
			43.3'								
			Brown, medium dense, silty gravel with sand.								
45.0		X				17.6			10,9,15		
50.0			50.0'								

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BORING NO.: 1804
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+22 Hwy 112
LOCATION: 48' Lt.
LATITUDE: 36.22677 ° LONGITUDE: 94.23043 °

DATE: 4/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 50.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1260.5								
			No Refusal & Boring Terminated @ 50.0' (Elev. 1210.5).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1805
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+90 Hwy 112
LOCATION: 21' Rt.
LATITUDE: 36.22684 ° LONGITUDE: 94.23054 °

DATE: 1/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1257.9								
			Topsoil 0.6'								
			Tan, reddish brown & white, dense to very dense, silty gravel with sand.								
5.0		X				24.6			6,17,34		
10.0		X				23.0			7,17,16		
15.0		X				14.4			8,21,28		
20.0		X				22.9			3,17,24		
			23.3'								
25.0		X	Reddish tan, reddish brown, tan & beige, loose to medium dense, silty gravel with sand.			29.4			4,10,8		
30.0		X				29.2			2,8,6		
35.0		X				47.0			3,4,5		
			38.3'								
40.0		X	Brown, medium dense to dense, silty gravel with sand.			28.2			4,6,9		
45.0		X				18.4			12,19,25		
50.0											

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BORING NO.: 1805
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+90 Hwy 112
LOCATION: 21' Rt.
LATITUDE: 36.22684 ° LONGITUDE: 94.23054 °

DATE: 1/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			51.5'			23.7			5,5,6		
			No Refusal & Boring Terminated @ 51.5' (Elev. 1206.4).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1806
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+10 Hwy 112
LOCATION: 56' Rt.
LATITUDE: 36.22682 ° LONGITUDE: 94.23041 °

DATE: 4/15/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 50.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, medium dense to very dense, silty gravel with sand.								
5.0						40.8			4,8,10		
10.0						16.7			37,42,14		
15.0						32.1			23,26,42		
20.0						22.0			17,23,24		
			23.3'								
25.0			Red, medium dense to dense, silty gravel with sand.			28.1			6,14,8		
30.0						18.4			9,17,17		
			33.3'								
35.0			White & tan, medium dense to very dense, silty gravel with sand.			7.2			50/0.5		
40.0						32.8			4,8,8		
45.0						28.7			5,5,8		
50.0			50.0'								

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BORING NO.: 1806
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+10 Hwy 112
LOCATION: 56' Rt.
LATITUDE: 36.22682 ° LONGITUDE: 94.23041 °

DATE: 4/15/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 50.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1260.5								
			No Refusal & Boring Terminated @ 50.0' (Elev. 1210.5).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 1901
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+98 Spring Creek St.
LOCATION: 16' Lt
LATITUDE: 36.23980 ° LONGITUDE: 94.17303 °

DATE: 5/9/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 34.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1292.8								
			Topsoil 0.4'								
			Red, very stiff to very hard, sandy lean clay with gravel.								
5.0					17	11.2	34		50/0.4		
10.0						40.0			8,11,18		
			12.7'								
			Red, very loose to medium dense, silty gravel with sand.								
15.0						31.8			2,18,10		
20.0						21.0			1,1,2		
			24.3'								
25.0			Auger Refusal @ 24.3' (Elev. 1268.5). Begin Coring in Limestone.							46	0
30.0			Limestone: White, lt. gray, gray, microcrystalline to fine grain, highly fractured/jointed, weathered with clay seams, discontinuities stained tan, red, lt. brown, scattered vugs/pits, fossiliferous.							46	14
			34.3'								
35.0			Boring Terminated @ 34.3' (Elev. 1258.5).								
40.0											
45.0											
50.0											

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BORING NO.: 1902
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Spring Creek St.
LOCATION: CL
LATITUDE: 36.23952 ° LONGITUDE: 94.17309 °

DATE: 5/9/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 30.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, dense to very dense, silty gravel with sand.								
5.0						7.0			20,30,46		
10.0						12.8			10,17,21		
15.0						16.9			8,21,50/0.2		
			16.3'								
			Auger Refusal @ 16.3' (Elev. 1264.2). Begin Coring in Chert. 17.3'							97	62
20.0			Chert: White, lt. gray, gray, fresh to slightly weathered, intermittent limestone beds, lt. gray, gray.								
			Limestone: White, lt. gray, gray, microcrystalline to fine grain, fresh to slightly weathered with clay seams, scattered pits, intermittent chert beds. 21.5'							100	60
25.0			Chert: White, lt. gray, gray, fresh to slightly weathered, fractures stained, intermittent limestone beds, lt gray, gray. 25.2'								
			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, fresh to slightly weathered, intermittent chert beds.							90	48
30.0			30.2'								
			Boring Terminated @ 30.2' (Elev. 1250.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 1903
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+13 Spring Creek St.
LOCATION: 16' Rt.
LATITUDE: 36.23921 ° LONGITUDE: 94.17315 °

DATE: 5/9/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 40.7 ft
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1271.6								
			Topsoil 0.4'								
			Brown, very stiff, sandy lean clay with gravel.								
5.0						17.0			6,7,12		
			8.3'								
			Brown, very dense, silty gravel with sand.								
10.0						8.3			28,50/0.2		
			12.9'								
			Brown & red, medium dense to very dense, clayey gravel with sand.								
15.0						17.9			5,13,9		
20.0					16	16.1	30		5,9,9		
25.0						31.2			10,17,9		
30.0						19.8			8,50/0.2		
			30.7'								
			Auger Refusal @ 30.7' (Elev. 1240.9). Begin Coring in Limestone.								
			Limestone: Grades gray to lt. gray, white, microcrystalline to fine grain, fresh w/slight weathering on some discontinuities, trace vugs, trace fossiliferous, styolites, intermittent chert beds, lt. gray, gray. Clay infilling 30.8'-31.4'.							96	72
35.0										98	80
40.0			39.8'								
			Chert: Light gray, gray, fresh to severely weathered and stained on fracture faces. 40.7'								
			Boring Terminated @ 40.7' (Elev. 1230.9).								
45.0											
50.0											

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BORING NO.: 2001
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+78 Spring Creek St.
LOCATION: 35' Lt.
LATITUDE: 36.23985 ° LONGITUDE: 94.17297 °

DATE: 12/18/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1293.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, very stiff, gravelly fat clay with sand.								
5.0						33.4			6,12,13		
10.0						24.4			6,10,12		
			13.3'								
15.0			Brown, tan & light gray, loose to dense, silty gravel with sand.			31.2			6,18,14		
20.0						53.6			4,3,4		
			24.3'								
25.0			Auger Refusal @ 24.3' (Elev. 1269.1). Begin Coring in Limestone. 24.8'							86	21
			Limestone: High angle fracture 80°.								
			Chert: White, lt. gray, gray, weathered, highly fragmented intervals, lt. tan to brown staining on joint/fracture surfaces, intermittent limestone, lt. gray. 28.6' 29.5'							96	46
30.0			Limestone: Light gray, fresh, styolites, trace chert.								
			Chert: White, lt. gray, gray, slightly to moderately weathered, joints/fractures surfaces lt. tan to fresh, styolites, intermittent limestone beds, lt. gray, gray.							100	86
35.0											
										94	36
40.0			40.7'								
			Boring Terminated @ 40.7' (Elev. 1252.7).								
45.0											
50.0											

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BORING NO.: 2002
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+08 Spring Creek St.
LOCATION: 16' Rt.
LATITUDE: 36.23977 ° LONGITUDE: 94.17314 °

DATE: 5/7/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 50.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1291.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Light red, medium dense to very dense, silty sand with gravel.								
5.0						30.4			24,38,50/0.4		
10.0						38.2			12,20,34		
15.0						45.8			2,7,9		
			18.3'								
20.0			Light red, medium dense, silty gravel with sand.			24.7			4,6,6		
			24.0'								
25.0			Auger Refusal @ 24.0' (Elev. 1267.3). Begin Coring in Limestone.							100	67
			25.7' Limestone: White, lt. gray, microcrystalline, fine to medium grain, slight to moderate weathering on discontinuities, red, trace clay, trace vugs, intermittent chert, lt. gray, gray.							100	16
30.0			Chert: White, lt. gray, gray, surfaces slightly to moderately weathered, trace clay, pitted, porous, fossiliferous, intermittent limestone, lt. gray, highly fractured and fragmented.							100	28
35.0											
										80	8
40.0											
										32	0
45.0											
										100	56
50.0											

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BORING NO.: 2002
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+08 Spring Creek St.
LOCATION: 16' Rt.
LATITUDE: 36.23977 ° LONGITUDE: 94.17314 °

DATE: 5/7/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 50.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1291.3								
			Boring Terminated @ 50.2' (Elev. 1241.1). 50.2								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2003
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+03 Spring Creek St.
LOCATION: 45' Rt.
LATITUDE: 36.23978 ° LONGITUDE: 94.17324 °

DATE: 5/5/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 41.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1293.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Light red, medium dense to very dense, silty sand with gravel.								
5.0						23.5			9,27,50/0.5		
10.0						33.6			12,38,22		
15.0						44.4			5,6,11		
			18.3'								
20.0			Light red, dense to very dense, silty gravel with sand.			25.9			16,28,15		
25.0						20.6			37,50/0.2		
			26.3'								
			Auger Refusal @ 26.3' (Elev. 1267.2). Begin Coring in Limestone.								
30.0			Limestone: Light gray, gray, microcrystalline to macrocrystalline, fine grain to med. grain, fresh to slightly weathered, fractures/joints fresh to stained tan, scattered pits, trace fossiliferous, intermittent chert beds, white, lt. gray. 31.7'							78	42
35.0			Chert: White, lt. gray, gray, fresh to moderately weathered, discontinuities stained red, orange, scattered pits, vugs, trace fossiliferous, intermittent limestone beds, lt. gray, gray.							66	26
40.0										88	52
			41.3'								
			Boring Terminated @ 41.3' (Elev. 1252.2).								
45.0											
50.0											

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BORING NO.: 2004
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+33 Spring Creek St.
LOCATION: 35' Rt.
LATITUDE: 36.23915 ° LONGITUDE: 94.17321 °

DATE: 12/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 42.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Copper, tan & dark brown, medium dense, silty sand with gravel.								
5.0						10.8			4,9,13		
10.0						35.5			4,12,12		
15.0						27.1			4,10,13		
			18.3'								
20.0			Copper, brown, dark brown & beige, loose to medium dense, clayey gravel with sand.			17.0			5,9,13		
25.0						20.8			2,6,7		
30.0						26.0			6,7,4		
35.0						23.3			1,4,4		
40.0						53.4			10,18,11		
			42.8'								
45.0			Auger Refusal & Boring Terminated @ 42.8' (Elev. 1228.9).								
50.0											

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BORING NO.: 2101
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+80 Zion Rd.
LOCATION: 25' Lt.
LATITUDE: 36.23606 ° LONGITUDE: 94.18833 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 55.6 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very dense, silty gravel with sand.								
5.0		X				41.4			14,18,50/0.3		
			8.3'								
			Red, dense to very dense, silty sand with gravel.								
10.0		X			27	26.2	36		19,28,50/0.1		
15.0		X				31.4			7,14,25		
			18.3'								
			Red, dense, silty gravel with sand.								
20.0		X				22.6			14,28,12		
25.0		X				31.2			17,18,20		
			28.3'								
			Red, hard, sandy lean clay.								
30.0		X				28.5			30,31,29		
			33.3'								
			Beige, medium dense to dense, silty gravel with sand.								
35.0		X				59.4			8,10,10		
40.0		X			29	43.4	29		6,10,12		
45.0		X				32.0			11,14,18		
			47.6'								
50.0	△ △ △ △ △ △		Auger Refusal @ 47.6' (Elev. 1214.6). Begin Coring in Chert.							83	70

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BORING NO.: 2101
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+80 Zion Rd.
LOCATION: 25' Lt.
LATITUDE: 36.23606 ° LONGITUDE: 94.18833 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 55.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Chert: White, lt. gray, gray, fresh to weathered, slight staining, intermittent limestone, lt. gray, gray, fine to medium grain. Core loss 47.6'-48.1'. (50.6)							83	70
			Limestone: Light gray, gray, fresh to slightly weathered, trace stains, styolites, intermittent chert. (53.5)							100	90
55.0			Chert: White, lt. gray, gray, fresh, intermittent limestone beds. (55.6)								
			Boring Terminated @ 55.6' (Elev. 1206.6).								
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2102
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Zion Rd.
LOCATION: 25' Rt.
LATITUDE: 36.23579 ° LONGITUDE: 94.18861 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, very dense, silty gravel with sand.								
5.0					27	30.9	38		18,29,41		
10.0						22.1			27,31,38		
			13.3'								
			Red, medium dense to very dense, silty gravel with sand.								
15.0						20.5			26,24,17		
20.0						21.0			16,22,30		
25.0						25.0			17,28,21		
30.0						24.5			11,10,8		
			33.3'								
			Red, very stiff, sandy lean clay.								
35.0					22	30.2	38		9,10,12		
			38.3'								
			Beige, medium dense to very dense, silty gravel with sand.								
40.0						33.0			10,8,9		
45.0						29.1			11,13,8		
50.0											

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BORING NO.: 2102
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Zion Rd.
LOCATION: 25' Rt.
LATITUDE: 36.23579 ° LONGITUDE: 94.18861 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 60.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			50.5'			27.6			50/0.5		
			Auger Refusal @ 50.5' (Elev. 1213.7). Begin Coring in Chert. 51.3'								
			Chert: White, lt. gray, gray, fresh, slight staining, intermittent limestone. 52.3'							100	64
55.0			Limestone: Light gray, gray, fresh to slightly weathered, w/chert.								
			Chert: White, lt. gray, gray, slight staining, intermittent limestone. 57.8'							90	44
60.0			Limestone: Light gray, gray, fresh to slightly weathered, w/chert. 60.5'								
			Boring Terminated @ 60.5' (Elev. 1203.7).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2103
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+32 Zion Rd.
LOCATION: 25' Lt.
LATITUDE: 36.23540 ° LONGITUDE: 94.18859 °

DATE: 5/31/08
TYPE OF DRILLING: CS/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 58.9 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1265.7								
			Topsoil 0.4'								
			Red, dense to very dense, well-graded gravel with clay and sand.								
5.0		X			25	24.6	41		20,28,31		
10.0		X				44.0			17,21,27		
			13.3'								
			Red, dense, silty gravel with sand.								
15.0		X				61.5			23,17,16		
			18.3'								
			Red, dense, silty gravel with sand.								
20.0		X			28	25.3	28		24,27,21		
25.0		X				22.2			17,23,15		
			28.3'								
			Red, very stiff, sandy lean clay.								
30.0		X				46.6			10,18,12		
			33.3'								
			Red, loose to very dense, clayey gravel with sand.								
35.0		X				42.8			7,8,9		
40.0					20	24.1	43		50/0.2		
45.0		X				31.0			2,3,2		
			48.9'								
50.0	△ △ △		Auger Refusal @ 48.9' (Elev. 1216.8). Begin Coring in							40	14

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BORING NO.: 2103
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+32 Zion Rd.
LOCATION: 25' Lt.
LATITUDE: 36.23540 ° LONGITUDE: 94.18859 °

DATE: 5/31/08
TYPE OF DRILLING: CS/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 58.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Chert. Chert: Fragmented, intensely weathered, stained red, orange, subangular to subrounded, 3.0' core loss due to weathering, dissolution, clay. 52.3'							40	14
55.0			Chert: White, lt. gray, gray, fresh to moderately weathered, trace fossiliferous, stained, red, orange, intermittent limestone, lt. gray, styolites. 54.2'							98	46
60.0			Limestone: Light gray, gray, fresh to slightly weathered, trace stains, styolites, fossiliferous, fine to medium grain, intermittent chert, white, lt. gray. 58.9' Boring Terminated @ 58.9' (Elev. 1206.8).								
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2201
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+25
LOCATION: 45' Lt.
LATITUDE: 36.23618 ° LONGITUDE: 94.18820 °

DATE: 5/30/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 46.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1266.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, medium dense, clayey gravel with sand.								
5.0						43.4			18,12,14		
			8.3'								
			Red, medium dense to very dense, silty gravel with sand.								
10.0						28.5			18,26,50/0.2		
15.0					26	40.7	34		10,17,9		
20.0						23.6			11,14,10		
			23.3'								
25.0			Red, medium dense, silty gravel with sand.			53.2			10,17,12		
			28.3'								
30.0			Red, loose to very dense, clayey gravel with sand.			57.4			4,5,5		
35.0						28.1			10,17,21		
40.0						23.3			14,23,36		
			43.3'								
45.0			Light beige, very dense, silty gravel with sand.			33.2			17,28,24		
			46.5'								
50.0			No Refusal & Boring Terminated @ 46.5' (Elev. 1219.5).								

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BORING NO.: 2202
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+00 Zion Rd.
LOCATION: 50' Rt.
LATITUDE: 36.23607 ° LONGITUDE: 94.18859 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 46.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1259.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, very dense, silty gravel with sand.								
5.0						23.6			27,50/0.3		
10.0						25.2			21,32,41		
			13.3'								
			Red, medium dense to very dense, silty gravel with sand.								
15.0						27.0			10,50/0.4		
20.0						43.0			10,12,11		
25.0						50.6			10,20,26		
			28.3'								
			Red, very dense, clayey gravel with sand.								
30.0						29.7			17,21,42		
			33.3'								
			Light beige, very dense, silty gravel with sand.								
35.0						35.6			22,27,38		
40.0					26	29.5	34		26,31,40		
45.0						32.9			23,27,38		
			46.5'								
			No Refusal & Boring Terminated @ 46.5' (Elev. 1212.7).								
50.0											

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BORING NO.: 2203
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+13 Zion Rd.
LOCATION: 50' Lt.
LATITUDE: 36.23543 ° LONGITUDE: 94.18849 °

DATE: 5/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 31.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
5.0		X	Red, very dense, clayey gravel with sand.			30.1			8,28,38		
			8.3'								
10.0		X	Red, medium dense to very dense, silty gravel with sand.		26	30.4	40		8,28,36		
15.0		X				30.7			9,10,9		
			17.1'								
20.0	△ △ △		Auger Refusal @ 17.1' (Elev. 1250.5). Begin Coring in Chert. Chert: White, lt. gray, gray, intensely weathered, highly fragmented/fractured with maximum intact recovery 0.3', subangular to subrounded, stained red, orange, pitted, porous, clay seams/infilling, red, trace limestone fragments, lt. gray.							30	0
25.0	△ △ △									26	0
30.0	△ △ △									16	0
			31.1'								
			Boring Terminated @ 31.1' (Elev. 1236.5).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2204
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+81 Zion Rd.
LOCATION: 43' Rt.
LATITUDE: 36.23533 ° LONGITUDE: 94.18886 °

DATE: 5/30/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 43.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, dense to very dense, clayey gravel with sand.								
5.0					21	26.4	39		18,27,38		
10.0						29.8			21,18,17		
			13.3'								
			Red, dense, silty gravel with sand.								
15.0						30.3			20,19,17		
20.0						23.8			16,22,24		
25.0						31.1			18,23,27		
			28.3'								
			Red, medium dense to dense, clayey gravel with sand.								
30.0						27.6			13,11,11		
35.0					21	38.4	42		18,14,17		
40.0						35.7			23,16,18		
			43.7'								
45.0			Auger Refusal & Boring Terminated @ 43.7' (Elev. 1218.3).								
50.0											

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BORING NO.: 2301
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 380+62
LOCATION: 44' Lt.
LATITUDE: 36.20723 ° LONGITUDE: 94.25162 °

DATE: 5/16/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 17.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, stiff, gravelly lean clay.								
5.0					16	22.0	34		4,7,4		
			7.1'								
			Auger Refusal @ 7.1' (Elev. 1132.4). Begin Coring in Chert.								
10.0			Chert: White, lt. gray, gray, fresh to slightly weathered, trace fossiliferous, trace pits, styolites, intermittent limestone beds, lt. gray, gray, microcrystalline to fine grain, styolites.							92	67
15.0										100	64
			17.1'							100	64
			Auger Refusal @ 17.1' (Elev. 1122.4).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2302
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 380+62
LOCATION: 44' Rt.
LATITUDE: 36.20723 ° LONGITUDE: 94.25132 °

DATE: 5/15/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 16.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1140.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, medium dense, well-graded gravel with silt and sand. 7.9'			26.2			6,12,9		
10.0			Auger Refusal @ 7.9' (Elev. 1132.6). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to slightly weathered, trace fossiliferous, trace vugs and pits, styolites, intermittent limestone beds, lt. gray, gray, microcrystalline to fine grain. 16.0'							97	29
15.0										96	72
			Boring Terminated @ 16.0' (Elev. 1124.5).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2303
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 381+43
LOCATION: 44' Lt.
LATITUDE: 36.20746 ° LONGITUDE: 94.25162 °

DATE: 5/15/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 18.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose, clayey gravel with sand.								
5.0						20.4			7,4,6		
			8.0'								
			Auger Refusal @ 8.0' (Elev. 1131.0). Begin Coring in Limestone. 8.7'							87	57
10.0			Limestone: Light gray, gray, fine to med grain, stains, styolites.								
			Chert: White, lt. gray, gray, fresh to slightly weathered, trace fossiliferous, trace vugs and pits, styolites, intermittent limestone beds, lt. gray, gray, microcrystalline to fine grain.							100	50
15.0											
			18.0'							100	85
			Boring Terminated @ 18.0' (Elev. 1121.0).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2304
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 381+43
LOCATION: 44' Rt.
LATITUDE: 36.20746 ° LONGITUDE: 94.25133 °

DATE: 5/15/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 16.7 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1138.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, clayey gravel with sand.								
5.0		X				22.3			3,4,7		
			6.7'								
			Auger Refusal @ 6.7' (Elev. 1131.8). Begin Coring in Limestone.								
			Limestone: Light gray, gray, microcrystalline to macrocrystalline, fine to med. grain, scattered vugs/pits, styolites, fossiliferous, intermittent chert beds, nodules, white, lt. gray. 9.9'							100	55
10.0			Chert: White, lt. gray, gray, porous in areas, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain.							94	66
15.0			16.7'							100	100
			Boring Terminated @ 16.7' (Elev. 1121.8).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2305
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 382+23
LOCATION: 44' Lt.
LATITUDE: 36.20767 ° LONGITUDE: 94.25163 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 16.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1136.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, medium dense, well-graded gravel with silt and sand. 6.7'		NP	25.0	NP		2,5,10		
10.0			Auger Refusal @ 6.7' (Elev. 1130.1). Begin Coring in Chert. Chert: White, lt. gray, gray, portions fragmented, porous in areas, fossil molds, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain.							86	65
15.0			16.0'							100	44
			Boring Terminated @ 16.0' (Elev. 1120.8).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2306
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 382+23
LOCATION: 44' Rt.
LATITUDE: 36.20768 ° LONGITUDE: 94.25133 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 18.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0		X	Brown, stiff, gravelly lean clay.			25.2			3,6,4		
			8.7'								
10.0			Auger Refusal @ 8.7' (Elev. 1130.3). Begin Coring in Chert.							91	30
			Chert: White, lt. gray, gray, portions fragmented, porous in areas, fossil molds, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							100	44
15.0										100	59
			18.7'								
20.0			Boring Terminated @ 18.7' (Elev. 1120.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2307
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 383+03
LOCATION: 44' Lt.
LATITUDE: 36.20789 ° LONGITUDE: 94.25164 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 20.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1136.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, medium dense, clayey gravel with sand. 7.8'			17.5			5,6,7		
10.0			Brown, medium dense, well-graded gravel with silt & sand. 11.3'			21.0			8,14,12		
15.0			Auger Refusal @ 11.3' (Elev. 1125.1). Begin Coring in Chert. 12.9' Chert: White, lt. gray, gray, slightly weathered w/ stains, fossiliferous, highly fractured 11.6' to 11.8'.							98	45
20.0			Limestone: White, lt. gray, gray, microcrystalline to fine grain, slightly weathered, scattered vugs/pits, styolites, fossiliferous, intermittent chert beds, nodules. 18.5' Chert: White, lt. gray, gray, w/intermittent limestone. 20.7'							98	74
25.0			Boring Terminated @ 20.7' (Elev. 1115.7).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2308
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 383+03
LOCATION: 44' Rt.
LATITUDE: 36.20790 ° LONGITUDE: 94.25134 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 18.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1136.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, loose, clayey gravel with sand.			22.6			2,3,6		
			8.5'								
10.0			Auger Refusal @ 8.5' (Elev. 1128.4). Begin Coring in Chert.							96	28
			Chert: White, lt. gray, gray, porous in areas, fossil molds, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain.							100	74
15.0			14.6'								
			Limestone: White, lt. gray, gray, fresh, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray, nodules. 16.5'							100	72
			Chert: White, lt. gray, gray, fresh, w/intermittent limestone, lt. gray, gray. 18.5'								
20.0			Boring Terminated @ 18.5' (Elev. 1118.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2309
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 383+83
LOCATION: 44' Lt.
LATITUDE: 36.20811 ° LONGITUDE: 94.25164 °

DATE: 5/16/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 19.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1135.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
5.0			Topsoil 0.6' Brown, loose, well-graded gravel with silt and sand. 9.0'			21.3			3,6,2		
10.0			Auger Refusal @ 9.0' (Elev. 1126.7). Begin Coring in Chert.							95	20
15.0			Chert: White, lt. gray, gray, areas fragmented, porous in areas, fresh to mod. weathered discontinuities, trace pits, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							100	76
			19.0'							97	27
20.0			Boring Terminated @ 19.0' (Elev. 1116.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2310
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 383+83
LOCATION: 44' Rt.
LATITUDE: 36.20812 ° LONGITUDE: 94.25134 °

DATE: 5/13/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 20.1 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1135.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense to very dense, well-graded gravel with silt and sand.								
5.0						20.9			3,5,6		
10.0			10.1'						50/0.3	78	33
			Auger Refusal @ 10.1' (Elev. 1125.8). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, areas fragmented, porous in areas, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							100	92
15.0											
20.0			20.1'							100	66
			Boring Terminated @ 20.1' (Elev. 1115.8).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2311
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 384+63
LOCATION: 44' Lt.
LATITUDE: 36.20833 ° LONGITUDE: 94.25165 °

DATE: 5/13/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 19.2 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1135.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
0			Topsoil 0.6'								
			Brown, loose, silty gravel with sand.								
5.0			9.2'						3,4,5		
10.0			Auger Refusal @ 9.2' (Elev. 1126.7). Begin Coring in Chert.							88	0
			Chert: White, lt. gray, gray, porous in areas, fresh to mod. weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							96	52
15.0										100	70
20.0			19.2' Boring Terminated @ 19.2' (Elev. 1116.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2312
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 384+63
LOCATION: 44' Rt.
LATITUDE: 36.20834 ° LONGITUDE: 94.25135 °

DATE: 5/13/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 17.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1135.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, well-graded gravel with silt and sand.								
5.0						30.1			3,6,5		
			7.7'								
			Auger Refusal @ 7.7' (Elev. 1128.2). Begin Coring in Limestone.								
10.0			Limestone: White, lt. gray, gray, highly fractured, jointed 10.5'							52	15
			Limestone: White, gray to lt. gray, microcrystalline to fine grain, fresh w/slight weathering on some discontinuities, trace vugs, trace fossiliferous, styolites, intermittent chert beds, lt. gray, gray.							100	50
15.0			17.7'							100	35
			Auger Refusal @ 17.7' (Elev. 1118.2).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2313
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 385+43
LOCATION: 44' Lt.
LATITUDE: 36.20855 ° LONGITUDE: 94.25165 °

DATE: 5/12/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 23.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, clayey gravel with sand.								
5.0					17	22.8	30		2,6,9		
10.0						22.2			7,7,8		
			13.0'								
15.0			Auger Refusal @ 13.0' (Elev. 1126.9). Begin Coring in Chert.							96	46
			Chert: White, lt. gray, gray, porous in areas, fossil molds, fresh to slightly weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							100	76
20.0										50	27
			23.0'								
			Boring Terminated @ 23.0' (Elev. 1116.9).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2314
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 385+43
LOCATION: 44' Rt.
LATITUDE: 36.20855 ° LONGITUDE: 94.25136 °

DATE: 5/18/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 17.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1135.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, well-graded gravel with silt and sand.								
5.0						25.9			6,7,6		
			7.8'								
			Auger Refusal @ 7.8' (Elev. 1128.1). Begin Coring in Chert.								
10.0			Chert: White, lt. gray, gray, porous in areas, fresh to slightly weathered discontinuities, styolites, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain, styolites.							100	59
15.0			15.1'							100	32
			Limestone: Light gray, gray, microcrystalline to fine grain, fresh w/slight weathering on discontinuities, trace fossiliferous, styolites, chert beds, lt. gray. 16.9' 17.8'							100	44
			Chert: White, lt. gray, gray, porous, fresh.								
20.0			Boring Terminated @ 17.8' (Elev. 1118.1).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2315
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 386+23
LOCATION: 44' Lt.
LATITUDE: 36.20877 ° LONGITUDE: 94.25166 °

DATE: 5/12/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 24.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1141.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, soft, gravelly lean clay.								
5.0						24.7			1,1,2		
			7.9'								
			Gray, medium dense, well-graded gravel with silt and sand.								
10.0						24.7			8,10,9		
			14.5'								
15.0			Auger Refusal @ 14.5' (Elev. 1127.4). Begin Coring in Limestone.							100	73
			Limestone: White, lt. gray, gray, mottled, microcrystalline to fine grain, fresh w/slight weathering on some discontinuities, trace pits, fossiliferous, styolites, several intermittent chert beds, white, lt. gray, gray.							100	84
20.0										100	71
			24.5'								
25.0			Boring Terminated @ 24.5' (Elev. 1117.4).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2316
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 386+23
LOCATION: 44' Rt.
LATITUDE: 36.20877 ° LONGITUDE: 94.25136 °

DATE: 5/12/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 23.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1141.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to medium dense, clayey gravel with sand.								
5.0									2,2,4		
10.0						16.1			6,6,9		
			13.8'								
15.0			Auger Refusal @ 13.8' (Elev. 1128.1). Begin Coring in Limestone.							100	77
			Limestone: White, lt. gray, gray, microcrystalline to fine grain, fresh w/slight weathering on some discontinuities, trace pits, fossiliferous, styolites, intermittent chert beds.							98	58
20.0										71	71
			23.8'								
25.0			Auger Refusal @ 23.8' (Elev. 1118.1).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2317
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 387+18
LOCATION: 59' Lt.
LATITUDE: 36.20903 ° LONGITUDE: 94.25172 °

DATE: 5/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 17.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1159.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Beige, very dense, clayey gravel with sand.			22.9			10,37,50/0.3		
5.0			6.4'								
			Auger Refusal @ 6.4' (Elev. 1153.2). Begin Coring in Chert.							84	9
10.0			Chert: White, lt. gray, gray, fresh to intensely weathered, stained orange, red, areas fragmented and highly fractured, discontinuities stained, clay seams, trace fossiliferous, porous in areas, scattered pits, intermittent limestone beds, lt. gray, gray.							48	24
			13.8'								
15.0			Chert: White, lt. gray, gray, fresh to moderately weathered, trace fossiliferous, scattered pits, intermittent limestone.							100	33
			17.0'								
			Boring Terminated @ 17.0' (Elev. 1142.6).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2318
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 387+18
LOCATION: 44' Rt.
LATITUDE: 36.20904 ° LONGITUDE: 94.25137 °

DATE: 5/31/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 22.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1145.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to medium dense, clayey gravel with sand.								
5.0						28.5			2,4,7		
10.0						30.2			2,3,4		
			12.1'								
15.0			Auger Refusal @ 12.1' (Elev. 1133.2). Begin Coring in Chert.							97	50
			Chert: White, lt. gray, gray, surfaces fresh to slightly weathered, fossiliferous, trace stains, trace pits, trace styolites, intermittent limestone beds, lt. gray, gray, fine to medium grain.							100	88
20.0											
			22.1'							100	83
			Boring Terminated @ 22.1' (Elev. 1123.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2401
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 579+49
LOCATION: 44' Lt.
LATITUDE: 36.23050 ° LONGITUDE: 94.20468 °

DATE: 4/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 24.1 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1147.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, silty gravel with sand.								
5.0						21.7			12,11,13		
			8.3'								
			Brown, medium dense, poorly graded gravel with silt and sand.								
10.0						21.2			8,16,13		
			11.7'								
			Auger Refusal @ 11.7' (Elev. 1135.3). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, highly fractured, 0.3' max length, weathered, lt. tan to brown staining on joint/fracture surfaces. 14.7'							73	24
15.0											
			Chert: White, lt. gray, gray, scattered vugs and pits, joints/fractures surfaces lt. tan, slightly to moderately weathered, styolites, intermittent limestone beds, lt. gray, gray.							100	63
20.0											
										100	76
			24.1'								
25.0			Boring Terminated @ 24.1' (Elev. 1122.9).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2402
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 579+49
LOCATION: 44' Rt.
LATITUDE: 36.23031 ° LONGITUDE: 94.20450 °

DATE: 4/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 26.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1148.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, poorly graded gravel with silt and sand.								
5.0					NP	21.3	NP		12,17,13		
10.0						21.3			12,13,11		
			13.2'								
15.0			Auger Refusal @ 13.2' (Elev. 1134.8). Begin Coring in Chert. Chert: White, lt. tan, highly broken with fragments up to 0.15'.							27	0
			17.5'								
20.0			Chert: White, lt. gray, gray, scattered vugs and pits, joints/fractures surfaces lt. tan, slightly to moderately weathered, styolites, intermittent limestone beds, lt. gray, gray.							87	38
25.0										100	72
			26.0'								
			Boring Terminated @ 26.0' (Elev. 1122.0).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2403
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 580+60
LOCATION: 44' Lt.
LATITUDE: 36.23069 ° LONGITUDE: 94.20439 °

DATE: 4/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1145.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, medium dense, poorly graded gravel with silt and sand. 7.0'			22.5			5,7,11		
10.0			Auger Refusal @ 7.0' (Elev. 1138.0). Begin Coring in Chert. Chert: White, lt. gray, fragments up to 0.3', mod. weathered, joint/fractures stained lt. tan, brown. 11.1'							63	0
15.0			Limestone: White, lt. gray, gray, microcrystraline to med. grain, fresh w/trace slight weathering on some discontinuities, trace vugs, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray. 17.0'							100	72
										100	0
20.0			Boring Terminated @ 17.0' (Elev. 1128.0).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2404
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 580+60
LOCATION: 44' Rt.
LATITUDE: 36.23050 ° LONGITUDE: 94.20420 °

DATE: 4/27/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1145.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, poorly graded gravel with silt and sand.								
5.0						20.8			5,8,15		
			8.8'								
10.0			Auger Refusal @ 8.8' (Elev. 1136.2). Begin Coring in Chert.							95	14
			Chert: White, lt. gray, gray, fresh to weathered, joints/fractures slightly to moderately weathered, stained, styolites, trace fossiliferous, scattered vugs/pits, intermittent limestone beds, lt. gray, gray, fine to medium grained, styolites.							100	36
15.0										100	93
			18.8'								
20.0			Boring Terminated @ 18.8' (Elev. 1126.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2405
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 581+70
LOCATION: 44' Lt.
LATITUDE: 36.23087 ° LONGITUDE: 94.20410 °

DATE: 4/27/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 16.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1144.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			White, very dense, silty gravel with sand.								
5.0			6.0'			23.0			50/0.3		
			Auger Refusal @ 6.0' (Elev. 1138.0). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, fresh to mod. weathered, joints/fractures slightly to moderately weathered, stained, styolites, trace fossiliferous, scattered vugs/pits.							100	42
10.0											
										100	72
			14.3'								
15.0			Limestone: White, lt. gray, gray, fine to med. grain, fresh, trace fossiliferous, intermittent chert beds, lt. gray, gray. 16.0'								
			Boring Terminated @ 16.0' (Elev. 1128.0).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2406
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 581+70
LOCATION: 44' Rt.
LATITUDE: 36.23069 ° LONGITUDE: 94.20391 °

DATE: 4/27/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1144.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			White, very dense, silty gravel with sand.								
5.0			5.4'		NP	24.3	NP		50/0.4		
			Auger Refusal @ 5.4' (Elev. 1138.6). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to moderately weathered, joints/fractures stained tan, orange, red, pits, porous, trace fossiliferous, styolites, intermittent limestone beds.							100	30
10.0			13.0'							100	52
			Limestone: Light gray, gray, fine to med. grain, fresh, trace fossiliferous, intermittent chert bed. 14.3'								
15.0			15.4' Chert: White, lt. gray, gray, pits, intermittent limestone.								
			Boring Terminated @ 15.4' (Elev. 1128.6).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2407
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 582+80
LOCATION: 44' Lt.
LATITUDE: 36.23106 ° LONGITUDE: 94.20380 °

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1144.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
5.0			White, very dense, silty gravel with sand. 5.7			28.9			50/0.3		
10.0			Auger Refusal @ 5.7' (Elev. 1138.3). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to moderately weathered, joints/fractures stained orange, red, scattered pits, areas porous, fossiliferous, styolites, intermittent limestone beds, lt gray, gray.							100	26
15.0			15.7							100	34
			Boring Terminated @ 15.7' (Elev. 1128.3).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2408
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 582+80
LOCATION: 44' Rt.
LATITUDE: 36.23087 ° LONGITUDE: 94.20362 °

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1145.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6' Brown, medium dense, silty gravel with sand.								
5.0			7.2'			21.8			12,15,14		
10.0			Auger Refusal @ 7.2' (Elev. 1137.8). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to moderately weathered, joints/fractures stained orange, red, scattered pits, fossiliferous, styolites, intermittent limestone beds, lt. gray, gray.							100	44
15.0										100	40
			17.2'							82	0
			Boring Terminated @ 17.2' (Elev. 1127.8).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2409
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 584+05
LOCATION: 44' Lt.
LATITUDE: 36.23127 ° LONGITUDE: 94.20344 °

DATE: 4/24/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1141.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6' Dark brown, loose, silty gravel with sand.								
5.0			7.5'			25.3			1,2,5		
			Auger Refusal @ 7.5' (Elev. 1133.5). Begin Coring in Chert.							100	50
10.0			Chert: White, lt. gray, gray, scattered pits, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray, scattered pits and vugs.							100	64
15.0			17.5'							100	50
			Boring Terminated @ 17.5' (Elev. 1123.5).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2410
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 584+05
LOCATION: 44' Rt.
LATITUDE: 36.23108 ° LONGITUDE: 94.20329 °

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1142.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, medium dense, silty gravel with sand.								
5.0						23.5			5,8,8		
			8.5'								
10.0			Auger Refusal @ 8.5' (Elev. 1133.5). Begin Coring in Chert.							88	40
			Chert: White, lt. gray, gray, scattered pits, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray, scattered pits and vugs.							96	64
15.0										100	44
			18.5'								
20.0			Boring Terminated @ 18.5' (Elev. 1123.5).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2411
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 585+15
LOCATION: 44' Lt.
LATITUDE: 36.23145 ° LONGITUDE: 94.20316 °

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1141.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark brown, medium dense, poorly graded gravel with silt and sand.								
5.0						27.2			5,7,12		
			8.1'								
			Auger Refusal @ 8.1' (Elev. 1132.9). Begin Coring in Chert. 8.8'							97	28
10.0			Fragmented chert, angular, slight staining. 10.1'								
			Limestone: Light gray, gray, fresh to slightly weathered.							100	44
15.0			Chert: White, lt. gray, gray, pebbly and angular fragmented appearance, scattered pits, porous, trace fossiliferous, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							100	19
			18.1'								
20.0			Boring Terminated @ 18.1' (Elev. 1122.9).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2412
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 585+09
LOCATION: 44' Rt.
LATITUDE: 36.23126 ° LONGITUDE: 94.20299 °

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 16.6 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			White, medium dense, silty gravel with sand. 6.6'			47.0			5,2,17		
10.0			Auger Refusal @ 6.6' (Elev. 1132.4). Begin Coring in Chert. Chert: White, lt. gray, gray, pebbly and angular fragmented appearance, scattered vugs and pits, very porous in areas, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							95	55
15.0			16.6'							100	62
										100	0
			Boring Terminated @ 16.6' (Elev. 1122.4).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2413
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 586+19
LOCATION: 44' Lt.
LATITUDE: 36.23163 ° LONGITUDE: 94.20285 °

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1143.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Brown & dark brown, loose to very dense, poorly graded gravel with clay and sand.								
5.0						25.2			1,2,3		
10.0			11.0			27.0			7,50/0.5		
			Auger Refusal @ 11.0' (Elev. 1132.0). Begin Coring in Limestone.								
15.0			Limestone: Grades gray to lt. gray, white, microcrystalline to fine grain, fresh w/slight weathering on some discontinuities, trace vugs, trace fossiliferous, intermittent chert beds, lt. gray, gray. 14.7							95	40
20.0			Chert: White, lt. gray, gray, pebbly and angular fragmented appearance, scattered pits, porous in areas, trace fossil molds, joints/fractures surfaces lt. tan, slightly weathered, intermittent limestone beds, lt. gray, gray. 21.0							100	72
			Boring Terminated @ 21.0' (Elev. 1122.0).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2414
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 586+25
LOCATION: 44' Rt.
LATITUDE: 36.23143 ° LONGITUDE: 94.20268 °

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1143.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark brown & brown, loose to dense, poorly graded gravel with clay and sand.								
5.0						25.3			1,2,3		
10.0			11.6'			23.2			8,13,20		
			Auger Refusal @ 11.6' (Elev. 1131.4). Begin Coring in Chert.								
15.0			Chert: White, lt. gray, gray, lt. tan, scattered pits, porous, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							100	57
20.0										100	48
			21.6'							100	100
			Boring Terminated @ 21.6' (Elev. 1121.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2415
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 587+35
LOCATION: 44' Lt.
LATITUDE: 36.23180 ° LONGITUDE: 94.20254 °

DATE: 4/29/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 27.2 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1147.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, dark brown & brown, very loose to medium dense, poorly graded gravel with clay and sand.								
5.0						24.4			2,2,2		
10.0					18	24.6	32		3,6,8		
15.0						29.6			3,2,1		
			17.2'								
20.0			Auger Refusal @ 17.2' (Elev. 1129.8). Begin Coring in Chert.							100	66
25.0			Chert: White, lt. gray, gray, pebbly and angular fragmented appearance, scattered vugs and pits, very porous in areas, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, several intermittent limestone beds, lt gray, gray.							100	92
			27.2'							100	100
			Boring Terminated @ 27.2' (Elev. 1119.8).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2416
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 587+35
LOCATION: 44' Rt.
LATITUDE: 36.23159 ° LONGITUDE: 94.20238 °

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1142.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark brown, loose, silty gravel with sand.								
5.0						27.3			1,2,3		
			7.6'								
			Brown & beige, loose, poorly graded gravel with clay and sand.								
10.0						20.2			7,8,2		
			11.8'								
			12.4' Auger Refusal @ 11.8' (Elev. 1130.2). Begin Coring in Limestone and Chert Fragments. Limestone and chert fragments: Highly fractured, surfaces slightly stained.							95	30
15.0			16.1' Limestone: Light gray, gray, fine grain, discontinuities fresh to moderately weathered, clay infilling, scattered pits, intermittent chert beds, white, lt. gray, gray.							100	52
20.0			Chert: White, lt. gray, gray, fresh to slightly weathered on joints/fractures, scattered pits, trace fossiliferous, intermittent limestone, lt. gray, gray. 20.8' 21.8'							100	100
			Limestone: Light gray, gray, fine grain, fresh, intermittent chert beds.								
25.0			Boring Terminated @ 21.8' (Elev. 1120.2).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2417
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 588+51
LOCATION: 44' Lt.
LATITUDE: 36.23196 ° LONGITUDE: 94.20222 °

DATE: 4/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1153.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, very dense, silty gravel with sand.								
5.0			5.2'		NP	26.2	NP		8,50/0.2	100	0
			Auger Refusal @ 5.2' (Elev. 1147.8). Begin Coring in Limestone. 6.4'								
			Limestone: Light gray, gray, fresh w/ slight weathering on fractures.							60	16
10.0			Chert: White, lt. gray, gray, scattered pits, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							98	38
15.0			15.4'								
			Boring Terminated @ 15.4' (Elev. 1137.6).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2418
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 588+45
LOCATION: 44' Rt.
LATITUDE: 36.23176 ° LONGITUDE: 94.20207 °

DATE: 4/29/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 28.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1151.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & dark brown, loose to medium dense, poorly graded gravel with clay and sand.								
5.0						25.6			1,2,3		
10.0						25.1			1,2,3		
15.0						20.0			12,11,12		
			18.0'								
20.0			Auger Refusal @ 18.0' (Elev. 1133.5). Begin Coring in Chert.							80	23
			Chert: White, lt. gray, gray, scattered pits, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							96	80
25.0										100	65
			28.0'								
			Boring Terminated @ 28.0' (Elev. 1123.5).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2419
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 589+56
LOCATION: 44' Lt.
LATITUDE: 36.23212 ° LONGITUDE: 94.20190 °

DATE: 4/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1158.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
5.0			Topsoil 0.6' Brown, medium dense, silty gravel with sand.			30.3			8,13,10		
10.0			9.4' Auger Refusal @ 9.4' (Elev. 1148.6). Begin Coring in Limestone. 10.2'							82	50
15.0			Limestone: Light gray, gray, trace fossiliferous. Chert: White, lt. gray, gray, scattered pits, trace fossil molds, joints/fractures surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							88	26
20.0			19.5' Boring Terminated @ 19.5' (Elev. 1138.5).							100	10
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2420
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 589+62
LOCATION: 44' Rt.
LATITUDE: 36.23192 ° LONGITUDE: 94.20175 °

DATE: 4/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1158.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, silty gravel with sand.								
5.0		X				41.6			13,4,8		
			9.4'								
10.0			Auger Refusal @ 9.4' (Elev. 1148.6). Begin Coring in Chert.							92	33
			Chert: White, lt. gray, gray, slightly to mod. weathered, trace fossil molds, shallower joint/fracture surfaces lt. tan, slightly to moderately weathered, intermittent limestone beds, lt. gray, gray.							100	33
15.0										98	33
			19.4'								
20.0			Boring Terminated @ 19.4' (Elev. 1138.6).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2501
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 592+28
LOCATION: 44' Lt.
LATITUDE: 36.23250 ° LONGITUDE: 94.20110 °

DATE: 5/6/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 22.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1163.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, dense to very dense, clayey gravel with sand.								
5.0						22.0			15,25,31		
10.0						33.9			6,32,14		
			12.0'								
	△ △ △		Auger Refusal @ 12.0' (Elev. 1151.2). Begin Coring in Chert.							93	10
15.0	△ △ △		Cher: White, lt. gray, gray, tan, trace vugs and pits, fresh to mod. weathered on joint/fracture surfaces, portions friable, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.							96	30
20.0	△ △ △									100	70
			22.0'								
			Boring Terminated @ 22.0' (Elev. 1141.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2502
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 592+44
LOCATION: 44' Rt.
LATITUDE: 36.23230 ° LONGITUDE: 94.20091 °

DATE: 5/8/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 24.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1164.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very dense, clayey gravel with sand.								
5.0		X				22.1			27,31,29		
			7.8'								
			Red, very dense, silty gravel with sand.								
10.0		X				41.2			1,13,50/0.3		
			14.3'								
15.0			Auger Refusal @ 14.3' (Elev. 1150.4). Begin Coring in Chert.							100	0
			Chert: White, lt. gray, gray, tan, trace vugs and pits, fresh to highly weathered on joint/fracture surfaces, portions friable, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.							100	44
20.0											
			23.0'							97	61
			Limestone: Light gray, gray, fine to med. grain, intermittent chert beds. 24.3'								
25.0			Boring Terminated @ 24.3' (Elev. 1140.4).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2503
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 592+78
LOCATION: 44' Lt.
LATITUDE: 36.23256 ° LONGITUDE: 94.20094 °

DATE: 5/6/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 22.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1164.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, loose to dense, silty gravel with sand.								
5.0					NP	20.1	NP		18,26,21		
10.0						52.3			12,2,4		
			12.1'								
15.0			Auger Refusal @ 12.1' (Elev. 1152.3). Begin Coring in Chert. Chert: White, lt. gray, gray, tan, trace vugs and pits, fresh to highly weathered on joint/fracture surfaces, portions friable, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.							44	10
20.0										100	38
			22.1'							100	0
			Boring Terminated @ 22.1' (Elev. 1142.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2504
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 592+96
LOCATION: 44' Rt.
LATITUDE: 36.23237 ° LONGITUDE: 94.20075 °

DATE: 5/6/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 25.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1166.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very dense, clayey gravel with sand.								
5.0					17	21.7	34		25,27,31		
10.0						23.0			10,15,44		
			13.2' Red, very dense, silty gravel with sand.								
15.0			15.0' Auger Refusal @ 15.0' (Elev. 1151.0). Begin Coring in Chert.			28.4			50/0.2	80	0
			Chert: White, lt. gray, gray, tan, trace vugs and pits, fresh to weathered on joint/fracture surfaces, portions friable, porous, trace fossiliferous. 17.5' 19.1'							100	60
20.0			Limestone: Light gray, gray, fine to med. grain, chert beds.								
			Chert: White, lt. gray, gray, tan, pits, trace vugs, fresh to weathered on joint/fracture surfaces, portions friable, porous, trace fossiliferous, intermittent limestone beds, gray, limestone bed (0.1') recovered on bottom. 25.0'							100	45
25.0			Boring Terminated @ 25.0' (Elev. 1141.0).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2505
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 593+74
LOCATION: 44' Lt.
LATITUDE: 36.23268 ° LONGITUDE: 94.20066 °

DATE: 5/10/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 29.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1171.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, medium dense, clayey gravel with sand.								
5.0		X				22.4			5,7,8		
			7.8'								
			Red, medium dense to dense, silty gravel with sand.								
10.0		X			NP	19.9	NP		10,10,16		
15.0		X				29.6			10,17,21		
			19.0'								
20.0	△ △		Auger Refusal @ 19.0' (Elev. 1152.9). Begin Coring in Chert.							87	31
	△ △ △		Chert: White, lt. gray, gray, tan, vugs and pits, fresh to weathered on joint/fracture surfaces, portions friable, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to med. grain.							100	46
25.0	△ △ △									100	62
	△ △ △		29.0'								
30.0			Boring Terminated @ 29.0' (Elev. 1142.9).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2506
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 593+91
LOCATION: 44' Rt.
LATITUDE: 36.23249 ° LONGITUDE: 94.20047 °

DATE: 5/10/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 30.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1176.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, medium dense, clayey gravel with sand.								
5.0						19.4			11,10,12		
			7.8'								
			Red, loose, clayey gravel with sand.								
10.0						28.4			4,4,6		
			12.8'								
			Red, dense, sily gravel with sand.								
15.0						18.4			15,15,19		
			17.8'								
			Red, very dense, silty gravel with sand.								
20.0			20.2'			55.2			3,50/0.2		
			Auger Refusal @ 20.2' (Elev. 1156.7). Begin Coring in Limestone. Limestone: Light gray, gray, fresh to mod. weathered.							57	31
25.0			25.4'								
			Chert: White, lt. gray, gray, tan, fresh to highly weathered, porous, pits, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.							100	70
30.0			30.6'								
			Boring Terminated @ 30.6' (Elev. 1146.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2507
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 594+33
LOCATION: 44' Lt.
LATITUDE: 36.23276 ° LONGITUDE: 94.20047 °

DATE: 5/11/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 35.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1182.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very loose to medium dense, clayey gravel with sand.								
5.0					19	29.0	40		4,9,6		
10.0						55.6			0,1,2		
			13.0'								
			Red, medium dense, silty gravel with sand.								
15.0						31.1			8,10,15		
20.0						38.1			8,7,6		
			23.3'								
25.0			Auger Refusal @ 23.3' (Elev. 1159.6). Begin Coring in Chert.							48	0
			Chert: Light gray, gray, weathered, highly fractured and fragmented, surface stains, red, brown, black, orange, vugs, pits, porous. 27.5'							66	0
30.0			Chert: White, lt. gray, gray, tan, trace vugs and pits, fresh to highly weathered on joint/fracture surfaces, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.							94	74
35.0			35.4'								
			Limestone: Light gray, fresh, fine grain. 35.8'								
			Boring Terminated @ 35.8' (Elev. 1147.1).								
40.0											
45.0											
50.0											

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BORING NO.: 2508
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 594+53
LOCATION: 44' Rt.
LATITUDE: 36.23256 ° LONGITUDE: 94.20028 °

DATE: 5/11/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 16.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1189.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Light red, very dense, clayey gravel with sand.								
5.0			6.7'			38.3			9,50/0.4		
			Auger Refusal @ 6.7' (Elev. 1183.2). Begin Coring in Limestone.								
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, w/chert, fresh w/slight weathering and stains on discontinuities, styolites, fossiliferous, trace pits.							98	74
10.0											
										96	88
15.0			16.0'								
			Boring Terminated @ 16.0' (Elev. 1173.9).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2601
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+00 Liberty Rd.
LOCATION: 23' Lt.
LATITUDE: 36.18468 ° LONGITUDE: 94.28830 °

DATE: 5/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 25.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, stiff, lean clay.								
5.0		X			18	22.1	38		2,7,7		
			8.3'								
			Beige, very stiff, sandy fat clay.								
10.0		X				30.3			2,8,8		
15.0			14.7'								
			Auger Refusal @ 14.7' (Elev. 1258.7). Begin Coring in Chert.							73	55
			Chert: White, lt. gray, slightly to intensely weathered, fragmented with max. intact core recovered length of 0.8', fragments subangular to subrounded, pitted, porous, stained, red, clay seams, red, lt. brown, w/fragments, core loss attributed to clay, dissolutioning.							58	16
20.0											
										54	8
25.0			25.8'								
			Boring Terminated @ 25.8' (Elev. 1247.6).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2602
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+66 Liberty Rd.
LOCATION: 25' Rt.
LATITUDE: 36.18455 ° LONGITUDE: 94.28830 °

DATE: 5/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.7 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray & brown, clayey sand. 3.6'								
5.0			Auger Refusal @ 3.6' (Elev. 1268.9). Begin Coring in Chert. 4.7'		25	41.5	57		4,8,18	27	0
			Chert: Light gray, weathered, pitted, clay seam, lt. brown, chert fragments, core loss attributed to clay, dissolutioning.								
			Beige, very stiff, sandy fat clay. 8.6'								
10.0			Auger Refusal @ 8.6' (Elev. 1263.9). Begin Coring in Chert.							29	0
			Chert: White, lt. gray, moderate to intense weathering, highly fragmented and jointed with maximum intact recovered length of 0.3', fragments subangular to subrounded, stained red, orange, pitted, porous, clay seams, red, trace limestone fragments.							82	0
15.0											
										74	0
20.0			20.7'								
			Boring Terminated @ 20.7' (Elev. 1251.8).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2603
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+98 Liberty Rd.
LOCATION: 36' Rt.
LATITUDE: 36.18449 ° LONGITUDE: 94.28752 °

DATE: 5/29/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.9 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, very stiff, lean clay.								
5.0		X				39.2			2,9,8		
			9.1'								
10.0	△ △ △		Auger Refusal @ 9.1' (Elev. 1265.9). Begin Coring in Chert.							56	0
	△ △ △		Chert: White, lt. gray, moderate to intense weathering, highly fragmented and jointed with maximum intact recovered length of 0.6', fragments subangular to subrounded, stained red, orange, scattered pits/vugs, porous, clay seams, red, orange, black.							68	0
15.0	△ △ △										
	△ △ △									56	20
20.0	△ △ △		20.9'								
			Boring Terminated @ 20.9' (Elev. 1254.1).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2604
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+07 Liberty Rd.
LOCATION: 20' Lt.
LATITUDE: 36.18465 ° LONGITUDE: 94.28748 °

DATE: 5/29/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 40.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray, very stiff, lean clay.								
5.0						27.7			1,4,15		
			8.3'								
			Gray, dense to very dense, clayey sand with gravel.								
10.0					21	41.2	41		13,11,25		
15.0						28.7			37,50/0.1		
			18.9'								
20.0			Auger Refusal @ 18.9' (Elev. 1254.3). Begin Coring in Chert.							82	0
			Chert: White, lt. gray, moderate to intense weathering, highly fragmented with maximum intact recovery 0.3', subangular to subrounded, stained red, orange, pitted, porous, clay seams, red, trace limestone fragments, lt. gray.							67	0
25.0											
										13	0
30.0											
										36	0
35.0											
										22	0
40.0			40.6'								
			Boring Terminated @ 40.6' (Elev. 1232.6).								
45.0											
50.0											

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BORING NO.: 2701
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+66 Grimsley/West Miller Rd.
LOCATION: 56' Rt.
LATITUDE: 36.22727 ° LONGITUDE: 94.21843 °

DATE: 5/10/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1277.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Brown & red, very dense, clayey gravel with sand.								
5.0						12.5			4,35,50/0.5		
10.0					16	18.2	35		25,50/0.5		
			11.8'								
			Auger Refusal @ 11.8' (Elev. 1265.6). Begin Coring in Chert. 12.4'								
			Chert: White, lt. gray, gray, trace pits, porous.							42	12
15.0			Red, lt. brown, plastic clay w/sand, gravel, intermittent chert beds, core loss attributed to clay								
			16.8'								
			Brown & red, very dense, clayey gravel with sand.								
20.0						21.9			18,31,46		
			23.3'								
			Red, dense to very dense, clayey gravel with sand.								
25.0						12.0			20,34,41		
30.0					19	14.7	26		18,31,43		
35.0						19.1			14,21,18		
			36.5'								
			No Auger Refusal & Boring Terminated @ 36.5' (Elev. 1240.9).								
40.0											
45.0											
50.0											

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BORING NO.: 2702
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+10 Grimsley/West Miller Rd.
LOCATION: 52' Rt.
LATITUDE: 36.22660 ° LONGITUDE: 94.21844 °

DATE: 5/10/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Brown & red, very dense, clayey gravel with sand.								
5.0						16.2			50/0.5		
10.0						13.0			17,50/0.4		
			13.0'								
			Red, dense to very dense, silty sand with gravel.								
15.0						31.0			19,29,39		
20.0						26.0			9,25,23		
25.0						20.8			24,29,50/0.5		
30.0						29.2			27,34,48		
			33.3'								
			Red, clayey gravel with sand.								
35.0						24.5			6,14,12		
			36.5'								
			No Auger Refusal & Boring Terminated @ 36.5' (Elev. 1242.5).								
40.0											
45.0											
50.0											

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BORING NO.: 2801
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 735+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23611 ° LONGITUDE: 94.16165 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 57.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1299.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, stiff to very stiff, gravelly fat clay with sand.								
5.0					26	34.7	50		6,8,20		
10.0						43.2			3,9,6		
			13.3'								
			Red & beige, medium dense to very dense, silty sand with gravel.								
15.0						16.0			7,21,35		
20.0						29.6			6,9,16		
25.0						27.7			3,17,12		
			27.0'								
			Auger Refusal @ 27.0' (Elev. 1272.7). Begin Coring in Limestone.								
30.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, trace pits, fossiliferous, styolites, intermittent chert, lt. gray.							74	70
35.0			34.8'							100	82
			Chert: White, lt. gray, gray, scattered pits, fresh to slightly weathered on joint/fracture surfaces, porous, trace fossiliferous, intermittent limestone, fine grain. 37.7'								
40.0			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh w/slight weathering on some discontinuities, trace pits, scattered fossils, styolites, intermittent chert, white, lt. gray.							100	66
45.0										100	82
50.0										100	58

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BORING NO.: 2801
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 735+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23611 ° LONGITUDE: 94.16165 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 57.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1299.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										100	58
55.0										100	96
			57.0'								
			Boring Terminated @ 57.0' (Elev. 1242.7).								
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2802
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 737+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23628 ° LONGITUDE: 94.16100 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 55.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1315.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red & brown, dense to very dense, clayey sand with gravel.								
5.0						21.9			50/0.3		
10.0					21	26.5	30		45,38,19		
15.0						15.9			4,24,19		
			18.3'								
20.0			Red, loose, silty sand with gravel.			35.9			3,5,3		
			21.8'								
25.0			Auger Refusal @ 21.8' (Elev. 1293.4). Begin Coring in Limestone. 23.7' Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, trace pits, trace fossiliferous, trace chert, lt. gray.							44	24
30.0			Chert fragments: Light gray, angular to subrounded, stained red, orange, clay (0.4' core length), red, tan, total core loss 6.6' attributed to dissolution, clay, mud. 31.4'							24	8
35.0			Chert: White, lt. gray, gray, scattered pits, fresh to moderately weathered on joint/fracture surfaces, porous, trace fossiliferous, styolites, intermittent limestone beds, lt. gray, fine grain.							100	70
40.0										98	46
45.0										98	64
50.0										100	78

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BORING NO.: 2802
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 737+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23628 ° LONGITUDE: 94.16100 °

DATE: 5/14/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 55.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1315.2								
										100	78
										100	87
55.0			55.0'								
			Boring Terminated @ 55.0' (Elev. 1260.2).								
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 2803
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 739+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23644 ° LONGITUDE: 94.16035 °

DATE: 5/15/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 32.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1322.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very hard, gravelly fat clay with sand.								
5.0						20.3			16,33,50/0.2		
			8.1'								
			Red, very dense, clayey sand with gravel.								
10.0						19.2			15,22,33		
			13.3'								
			Red, dense, silty sand with gravel.								
15.0					NP	24.1	NP		15,19,17		
			17.6'								
			Auger Refusal @ 17.6' (Elev. 1304.7). Begin Coring in Limestone. 19.3'								
20.0			Limestone: Light gray, gray, fine to med. grain, fresh w/slight to mod. weathering on discontinuities, intermittent chert beds, white, lt. gray.							72	40
			Chert: White, lt. gray, gray, fresh to moderate weathering on discontinuities, stained, porous, scattered pits/vugs, trace fossiliferous, intermittent limestone beds, lt. gray, gray.							96	50
25.0											
30.0										98	84
			32.6'								
			Boring Terminated @ 32.6' (Elev. 1289.7).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2804
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 740+93 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23654 ° LONGITUDE: 94.15972 °

DATE: 5/17/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 26.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, hard to very hard, gravelly fat clay with sand.								
5.0						29.5			15,21,28		
10.0						16.5			23,31,34		
			13.3'								
			White, loose, poorly graded sand with silt and gravel.		NP	44.6	NP		3,4,3		
15.0			16.5'								
			Auger Refusal @ 16.5' (Elev. 1300.2). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, fresh to moderate weathering on discontinuities, stained, porous, trace pits, intermittent limestone beds, lt. gray, gray, 16.5 ' to 17.5' core loss 1.0							80	42
20.0			19.5'								
			Limestone: Light gray, gray, fine to med. grain, fresh w/slight to mod. weathering on discontinuities, intermittent chert beds, white, lt. gray.							98	70
25.0			22.8'								
			Chert: White, lt. gray, gray, fresh to moderate weathering on discontinuities, stained, porous, trace pits, intermittent limestone beds, lt. gray, gray.								
			26.5'								
			Boring Terminated @ 26.5' (Elev. 1290.2).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2806
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 745+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23653 ° LONGITUDE: 94.15837 °

DATE: 6/23/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 19.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
5.0		X	Red, medium dense, clayey sand with gravel.			20.0			7,10,14		
10.0			9.6'								
			Auger Refusal @ 9.6' (Elev. 1306.5). Begin Coring in Limestone. Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, fossiliferous, styolites, intermittent chert.							96	84
15.0										96	72
20.0			19.6'								
			Boring Terminated @ 19.6' (Elev. 1296.5).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2807
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 747+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23641 ° LONGITUDE: 94.15772 °

DATE: 6/23/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 20.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1323.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, medium dense, clayey sand with gravel.								
5.0		X				38.1			7,12,14		
10.0			10.0'								
			Auger Refusal @ 10.0' (Elev. 1313.4). Begin Coring in Clay Infilling.								
			Clay infilling with chert and limestone fragments: Core loss (1.7') attributed to dissolutioning and clay. 12.3'							66	34
15.0			Chert: White, lt. gray, gray, fresh to moderate weathering on discontinuities, staining, tan, red, brown, intermittent limestone beds. 15.0'								
			Limestone: White, lt. gray, gray, fine to med. grain, fresh, styolites, intermittent chert, white, lt. gray.							94	94
20.0			20.0'								
			Boring Terminated @ 20.0' (Elev. 1303.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2808
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 749+00 Ramp NE
LOCATION: 20' Rt.
LATITUDE: 36.23623 ° LONGITUDE: 94.15708 °

DATE: 6/24/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 22.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1327.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Light red & light brown, medium dense to dense, clayey sand with gravel.								
5.0						25.5			4,8,16		
10.0						16.0			12,18,21		
			12.3'								
			Auger Refusal @ 12.3' (Elev. 1315.6). Begin Coring in Clay Infilling.								
15.0			Clay infilling with chert and limestone fragments: Core loss (2.3') attributed to dissolutioning and clay. 15.3'							54	22
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, fossiliferous, styolites, intermittent chert.								
20.0										68	46
			22.3'								
			Boring Terminated @ 22.3' (Elev. 1305.6).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2901
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 696+26
LOCATION: 48' Lt
LATITUDE: 36.24042 ° LONGITUDE: 94.16773 °

DATE: 5/20/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, medium dense, clayey gravel with sand. 7.5'			18.6			12,19,11		
10.0			Auger Refusal @ 7.5' (Elev. 1229.5). Begin Coring in Chert. Chert: White, lt. tan, red, brown, weathered and highly broken with fragments up to 0.15', clay seams. 11.2'							38	0
15.0			Chert: White, lt. gray, gray, scattered vugs and pits, a few joints/fractures surfaces lt. tan, slightly to moderately weathered, styolites, intermittent limestone beds, lt. gray, gray.							100	82
20.0			20.7'							97	58
			Boring Terminated @ 20.7' (Elev. 1216.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2902
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 696+17
LOCATION: 44' Rt.
LATITUDE: 36.24016 ° LONGITUDE: 94.16776 °

DATE: 5/20/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, loose, clayey gravel with sand.			43.5			2,4,4		
			7.6'								
10.0			Auger Refusal @ 7.6' (Elev. 1224.4). Begin Coring in Chert. 9.8'							63	18
			Chert: White, lt. gray, weathered w/tan to red stains on surfaces, fragments to 0.25'.								
15.0			Chert: White, lt. gray, gray, trace vugs and pits, a few joints/fractures surfaces lt. tan, red, slightly to moderately weathered, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain, pebbly appearance on some surfaces.							100	72
20.0			20.8'							98	73
			Boring Terminated @ 20.8' (Elev. 1211.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2903
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 697+03
LOCATION: 48' Lt.
LATITUDE: 36.24042 ° LONGITUDE: 94.16747 °

DATE: 5/20/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 21.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1226.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, dense to very dense, clayey gravel with sand.								
5.0					18	36.4	35		5,24,14		
10.0			10.3'			45.2			50/0.4	100	100
			Auger Refusal @ 10.3' (Elev. 1215.9). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, trace vugs and pits, fresh to mod. weathered on joint/fracture surface, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain, styolites. 16.3'							95	62
15.0											
			Limestone: Light gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray. 21.0'							97	77
20.0											
			Boring Terminated @ 21.0' (Elev. 1205.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2904
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 696+90
LOCATION: 44' Rt.
LATITUDE: 36.24106 ° LONGITUDE: 94.16751 °

DATE: 5/21/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 23.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1231.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, dense, clayey gravel with sand.								
5.0		X				29.9			7,14,24		
			9.5'								
10.0	△ △ △		Auger Refusal @ 9.5' (Elev. 1222.1). Begin Coring in Chert. 10.9'							25	0
			Chert: White, angular fragments.							97	80
15.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering on discontinuities, some fractures/joints surfaces slightly stained, styolites, intermittent chert beds, trace fossiliferous.							93	55
20.0			23.0'							100	80
			Boring Terminated @ 23.0' (Elev. 1208.6).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2905
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 697+83
LOCATION: 48' Lt.
LATITUDE: 36.24041 ° LONGITUDE: 94.16719 °

DATE: 5/18/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 23.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1217.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to medium dense, clayey gravel with sand.								
5.0						22.0			2,3,3		
10.0						18.9			8,13,14		
			13.0'								
15.0			Auger Refusal @ 13.0' (Elev. 1204.4). Begin Coring in Limestone.							92	67
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, fractures/joints surfaces slightly stained, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray.							100	93
20.0										92	75
			23.0'								
			Boring Terminated @ 23.0' (Elev. 1194.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2906
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 697+72
LOCATION: 44' Rt.
LATITUDE: 36.24014 ° LONGITUDE: 94.16677 °

DATE: 5/18/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 22.6 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1209.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to medium dense, clayey gravel with sand.								
5.0					15	24.7	35		2,3,3		
10.0						21.4			8,14,13		
			12.6'								
15.0			Auger Refusal @ 12.6' (Elev. 1197.3). Begin Coring in Limestone. Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on discontinuities, some fractures/joints surfaces slightly stained, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray.							90	50
20.0										100	83
			22.6'							100	90
			Boring Terminated @ 22.6' (Elev. 1187.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2907
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 698+60
LOCATION: 48' Lt.
LATITUDE: 36.24040 ° LONGITUDE: 94.16693 °

DATE: 5/17/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 21.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1214.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, loose to medium dense, clayey gravel with sand.								
5.0						18.1			10,12,11		
10.0			11.8'			41.2			2,4,6		
			Auger Refusal @ 11.8' (Elev. 1202.7). Begin Coring in Limestone.								
15.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, trace fossiliferous, intermittent chert beds, lt. gray, gray.							91	79
20.0										100	93
			21.8'							100	75
			Boring Terminated @ 21.8' (Elev. 1192.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2908
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 698+34
LOCATION: 44' Rt.
LATITUDE: 36.24015 ° LONGITUDE: 94.16703 °

DATE: 5/17/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1213.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose, clayey gravel with sand.								
5.0						22.6			3,5,5		
10.0						54.0			1,1,4		
			11.8'								
			Auger Refusal @ 11.8' (Elev. 1201.9). Begin Coring in Chert. 12.6'								
15.0			Chert: White, lt. gray, gray, slightly to mod. weathered, some gravel-size fragments, angular to subangular, staining, red, brown.							91	75
20.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering and stains on discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							100	85
			21.3'							100	0
			Auger Refusal @ 21.3' (Elev. 1192.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2909
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 699+38
LOCATION: 48' Lt.
LATITUDE: 36.24039 ° LONGITUDE: 94.16666 °

DATE: 5/17/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 23.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1220.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, medium dense, clayey gravel with sand.								
5.0		X				23.5			4,8,9		
			8.1'								
			Red, very dense, clayey gravel with sand.								
10.0		X				43.2			2,2,50/0.4		
			11.2'								
			Auger Refusal @ 11.2' (Elev. 1208.8). Begin Coring in Limestone.								
15.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering on some discontinuities, clay infilling, trace pits, fossiliferous, styolites, minor chert. Total core loss of 2.9 ft. (13.1'-16.0') in Core 1 attributed to dissolutioning.							36	26
										100	80
20.0											
			23.0'							95	95
			Boring Terminated @ 23.0' (Elev. 1197.0).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2910
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 699+07
LOCATION: 44' Rt.
LATITUDE: 36.24014 ° LONGITUDE: 94.16679 °

DATE: 5/19/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 22.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1216.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to medium dense, clayey gravel with sand.								
5.0						38.9			3,5,9		
10.0						39.6			2,4,4		
			12.3'								
			Auger Refusal @ 12.3' (Elev. 1204.6). Begin Coring in Chert.							56	16
15.0			Chert: White, lt. gray, gray, weathered, fragments, angular to subangular, staining, red, brown. 14.7'								
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering and stains on discontinuities, styolites, fossiliferous, intermittent chert beds, lt. gray, gray.							100	83
20.0										100	88
			22.3'								
			Boring Terminated @ 22.3' (Elev. 1194.6).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2911
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 700+16
LOCATION: 48' Lt.
LATITUDE: 36.24038 ° LONGITUDE: 94.16640 °

DATE: 5/19/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1216.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, loose, clayey gravel with sand.			23.6			4,4,5		
			8.0'								
10.0			Brown, loose, clayey gravel with sand. 11.3'			42.9			3,6,4		
15.0			Auger Refusal @ 11.3' (Elev. 1204.7). Begin Coring in Limestone. Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering and stains on discontinuities, styolites, fossiliferous, intermittent chert beds, lt. gray, gray.							100	76
20.0			20.8'							100	87
			Boring Terminated @ 20.8' (Elev. 1195.2).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 2912
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 699+79
LOCATION: 44' Rt
LATITUDE: 36.24013 ° LONGITUDE: 94.16654 °

DATE: 5/19/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 20.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1219.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0		X	Brown, dense, clayey gravel with sand.			15.4			14,23,16		
			9.1'								
10.0			Auger Refusal @ 9.1' (Elev. 1210.8). Begin Coring in Limestone.							83	83
			Limestone: White w/gray banding, microcrystalline to med. grain, fresh w/moderate weathering on dissolution surfaces infilled w/red, brown clay, styolites, intermittent chert beds, trace fossiliferous.							68	33
15.0											
										100	85
20.0			20.2'								
			Boring Terminated @ 20.2' (Elev. 1199.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3001
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 695+92 Ramp EN
LOCATION: CL
LATITUDE: 36.23999 ° LONGITUDE: 94.16781 °

DATE: 5/20/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 19.3 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, loose, clayey gravel with sand.			35.5			4,4,5		
			9.3'								
10.0			Auger Refusal @ 9.3' (Elev. 1222.9). Begin Coring in Chert.							100	82
			Chert: White, lt. gray, gray, trace vugs and pits, fresh to mod. weathered on joint/fracture surface, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain, styolites.							100	60
15.0										100	85
			19.3'								
20.0			Boring Terminated @ 19.3' (Elev. 1212.9).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3002
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 696+65 Ramp EN
LOCATION: 10' Lt.
LATITUDE: 36.23999 ° LONGITUDE: 94.16756 °

DATE: 5/21/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 22.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1228.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Brown, loose to very dense, clayey gravel with sand.								
5.0					19	34.7	34		3,3,5		
10.0			10.2			24.2			10,50/0.2	100	83
			Auger Refusal @ 10.2' (Elev. 1217.8). Begin Coring in Limestone. 11.3								
			Limestone: White w/gray banding, microcrystalline to med. grain, fresh w/moderate weathering on dissolution surfaces, fracture surfaces stained, styolites, intermittent chert beds, trace fossiliferous. High angle fracture (70°) 10.8 to 11.3. 16.1							70	7
15.0											
			Chert: White, lt. gray, gray, w/tan, red, brown staining on joint/fractures, weathered and highly broken with fragments up to 0.25', clay seams infill some discontinuities.							82	73
20.0											
			Limestone: White w/gray banding, microcrystraline to med. grain, fresh w/slight to moderate weathering on dissolution surfaces, some fractures/joints surfaces slightly stained, styolites, trace fossiliferous. 22.0							100	100
25.0			Auger Refusal @ 22.0' (Elev. 1206.0).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3003
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 697+44 Ramp EN
LOCATION: CL
LATITUDE: 36.23992 ° LONGITUDE: 94.16730 °

DATE: 5/18/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.3 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1215.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose to dense, clayey gravel with sand.								
5.0					16	20.4	35		2,3,7		
10.0						22.5			12,27,14		
			11.3'								
			Auger Refusal @ 11.3' (Elev. 1203.7). Begin Coring in Chert. 12.3'								
15.0			Chert: White, lt. gray, gray, weathered, fragmented, angular to subangular, staining, red, brown.							83	34
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering and stains on some discontinuities, styolites, fossiliferous, intermittent chert beds, lt. gray, gray.							100	82
20.0			21.3'							69	69
			Boring Terminated @ 21.3' (Elev. 1193.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3004
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 698+11 Ramp EN
LOCATION: CL
LATITUDE: 36.23988 ° LONGITUDE: 94.16708 °

DATE: 5/18/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1213.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, loose, clayey gravel with sand.			24.9			4,5,5		
10.0			9.5'							89	89
			Auger Refusal @ 9.5' (Elev. 1204.3). Begin Coring in Limestone. Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							92	53
15.0										98	81
20.0			19.5'								
			Boring Terminated @ 19.5' (Elev. 1194.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3005
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 698+83 Ramp EN
LOCATION: CL
LATITUDE: 36.23984 ° LONGITUDE: 94.16684 °

DATE: 5/19/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 20.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1220.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, loose, clayey gravel with sand.								
5.0		X							2,3,5		
			8.1'								
			Auger Refusal @ 8.1' (Elev. 1212.8). Begin Coring in Limestone.								
10.0			Limestone: Light gray, gray, microcrystalline to med. grain, fresh w/slight to mod. weathering and stains on discontinuities, styolites, fossiliferous, intermittent chert beds, lt. gray, gray. 11.9'							94	94
			Core loss: Dissolution cavity from 11.9' to 16.1', 0.1' clay infilling recovered, dark brown, plastic, w/sand and gravel. 16.1'							33	30
15.0			Chert: White, lt. tan, weathered, stained, porous, vugs, pits. 16.4'								
			Limestone: Light gray, gray, microcrystraline to med. grain, fresh w/slight to mod. weathering and stains on discontinuities, styolites, fossiliferous, intermittent chert beds, lt. gray, gray. 20.4'							87	70
20.0			Boring Terminated @ 20.4' (Elev. 1200.5).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3006
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 699+56 Ramp EN
LOCATION: CL
LATITUDE: 36.23978 ° LONGITUDE: 94.16661 °

DATE: 5/19/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 25.5 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1223.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, medium dense, clayey gravel with sand.								
5.0						16.3			7,8,9		
10.0						24.9			4,5,7		
			11.7'								
			Auger Refusal @ 11.7' (Elev. 1211.3). Begin Coring in Limestone.								
15.0			Limestone: White w/gray banding, microcrystalline to med. grain, fresh w/slight to moderate weathering on dissolution surfaces, some fractures/joints surfaces slightly stained, styolites, intermittent chert beds, trace fossiliferous.							96	79
20.0										85	60
25.0										98	94
			25.5'								
			Boring Terminated @ 25.5' (Elev. 1197.5).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3101
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 714+33 Ramp NW
LOCATION: CL
LATITUDE: 36.23992 ° LONGITUDE: 94.16171 °

DATE: 5/16/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 33.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1303.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, dense, clayey gravel with sand.								
5.0		X				35.3			15,23,17		
			8.3'								
			Red, very stiff, fat clay with sand.								
10.0		X				41.2			8,13,17		
			13.3'								
			Red, medium dense to dense, silty gravel with sand.								
15.0		X			NP	20.4	NP		23,21,12		
20.0		X				31.5			8,16,12		
			23.0'								
			Auger Refusal @ 23.0' (Elev. 1280.5). Begin Coring in Limestone. 24.0'							100	0
25.0			Limestone: Light gray, slightly weathered, styolites, trace fossiliferous, chert. 24.9'							82	54
			Clay, red, brown, w/sand and gravel.								
30.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							100	65
			33.0'								
			Boring Terminated @ 33.0' (Elev. 1270.5).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3102
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 715+03 Ramp NW
LOCATION: CL
LATITUDE: 36.23980 ° LONGITUDE: 94.16152 °

DATE: 5/16/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 28.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1302.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very stiff to hard, fat clay with sand.								
5.0						38.5			14,21,26		
10.0					24	34.9	60		9,14,12		
15.0						35.5			24,26,22		
			18.7'								
20.0			Auger Refusal @ 18.7' (Elev. 1283.3). Begin Coring in Limestone. 19.9'								
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/weathering on discontinuities.							30	8
			Chert, limestone fragments, core loss. 24.3'								
25.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/weathering on discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray.							88	68
			28.7'								
30.0			Boring Terminated @ 28.7' (Elev. 1273.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3103
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 716+83 Ramp NW
LOCATION: CL
LATITUDE: 36.23944 ° LONGITUDE: 94.16111 °

DATE: 5/16/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 35.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1302.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, hard to very hard, fat clay with sand.								
5.0						19.1			26,21,24		
10.0						15.4			20,50/0.4		
			11.7'								
			Auger Refusal @ 11.7' (Elev. 1290.9). Begin Coring in Chert Fragments.							42	0
15.0			Chert fragments: Angular to subrounded, white, lt. gray, gray, tan, highly weathered, stained, red, orange, clay seams, infilling, trace fossiliferous core loss attributed to clay/mud and dissolutioning.							28	0
20.0										22	0
25.0										62	30
			27.6'								
30.0			Chert: White, lt. gray, gray, tan, slight to moderately weathered, stained, porous, fossiliferous. 28.6'							100	88
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on discontinuities, styolites, trace pits, trace fossiliferous, intermittent chert beds, white, lt. gray, gray.								
35.0			35.0'								
			Boring Terminated @ 35.0' (Elev. 1267.6).								
40.0											
45.0											
50.0											

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BORING NO.: 3104
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 718+73 Ramp NW
LOCATION: CL
LATITUDE: 36.23899 ° LONGITUDE: 94.16078 °

DATE: 6/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 35.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1307.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very dense, clayey gravel with sand.								
5.0						13.7			17,27,30		
			8.3'								
			Red, hard, fat clay with sand.								
10.0						28.5			10,17,20		
			13.3'								
			Red & brown, medium dense, silty gravel with sand.								
15.0						25.4			4,7,7		
20.0						39.9			5,8,9		
			23.3'								
			Red, very dense, clayey gravel with sand.								
25.0			25.8'			20.9			4,50/0.3		
			Auger Refusal @ 25.8' (Elev. 1281.5). Begin Coring in Limestone.								
			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh to slightly weathered, trace stains, styolites, with intermittent chert beds, lt. gray, white.							88	56
30.0			33.2'								
			Chert: White, lt. gray, intermittent limestone, lt. gray.							90	40
35.0			35.8'								
			Boring Terminated @ 35.8' (Elev. 1271.5).								
40.0											
45.0											
50.0											

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BORING NO.: 3105
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 720+25 Ramp NW
LOCATION: CL
LATITUDE: 36.23860 ° LONGITUDE: 94.16062 °

DATE: 6/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 37.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1308.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, dense to very dense, fat clay with sand.								
5.0						16.8			20,24,32		
10.0						12.0			14,17,21		
			13.3'								
			Red & brown, medium dense, silty gravel with sand.								
15.0						30.8			7,10,8		
20.0						41.0			4,6,7		
			23.3'								
			Red, dense, silty gravel with sand.								
25.0						24.5			4,7,28		
			27.3'								
			Auger Refusal @ 27.3' (Elev. 1281.4). Begin Coring in Limestone.								
30.0			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh, styolites, with intermittent chert beds, lt. gray, white.							94	78
			32.6'								
			Chert: White, lt. gray, gray, fresh, intermittent limestone beds, lt. gray, gray.								
35.0										76	66
			37.3'								
			Boring Terminated @ 37.3' (Elev. 1271.4).								
40.0											
45.0											
50.0											

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BORING NO.: 3106
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 721+35 Ramp NW
LOCATION: CL
LATITUDE: 36.23830 ° LONGITUDE: 94.16056 °

DATE: 6/30/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 38.3 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1307.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, dense to very dense, clayey gravel with sand.								
5.0					18	10.5	31		17,50/0.3		
10.0						12.2			16,21,27		
			13.3'								
			Red, dense, silty gravel with sand.								
15.0						30.2			23,17,18		
			18.3'								
			Red & brown, medium dense, silty gravel with sand.								
20.0						36.1			7,6,6		
25.0						29.8			5,6,5		
			28.3'								
30.0			Auger Refusal @ 28.3' (Elev. 1279.1). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, fresh to slightly weathered, slightly stained, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, core loss attributed to dissolutioning and clay. 32.8'							66	36
35.0			Limestone: Gray, fresh, slightly stained, fossiliferous, styolites, intermittent chert beds, white, lt. gray.							82	66
			38.3'								
40.0			Boring Terminated @ 38.3' (Elev. 1269.1).								
45.0											
50.0											

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BORING NO.: 3107
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 722+73 Ramp NW
LOCATION: CL
LATITUDE: 36.23792 ° LONGITUDE: 94.16056 °

DATE: 5/17/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 29.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1307.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
5.0			Brown, medium dense, clayey gravel with sand.			17.7			14,14,12		
			8.3'								
10.0			Brown, hard, fat clay with sand.			45.5			9,10,30		
			13.3'								
15.0			Brown, medium dense, silty gravel with sand.			44.6			7,9,11		
20.0			19.8'								
			Auger Refusal @ 19.8' (Elev. 1287.5). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, fresh to moderately weathered, slightly stained, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray. 23.2'							80	52
25.0			Limestone: Gray, fresh to weathered, slightly stained, fossiliferous, styolites, intermittent chert beds, white, lt. gray.							76	48
30.0			29.8'								
			Boring Terminated @ 29.8' (Elev. 1277.5).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3108
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 724+14 Ramp NW
LOCATION: CL
LATITUDE: 36.23754 ° LONGITUDE: 94.16064 °

DATE: 5/11/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 34.2 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1310.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, hard, fat clay with sand.								
5.0						14.7			15,18,22		
			8.3'								
			Red, dense, silty gravel with sand.								
10.0					18	23.7	33		12,14,26		
			13.3'								
			Red, medium dense, clayey gravel with sand.								
15.0						25.1			9,15,13		
20.0						23.2			5,8,13		
			24.2'								
25.0			Auger Refusal @ 24.2' (Elev. 1285.9). Begin Coring in Clay. Clay: Brown, moist, plastic, w/sand, roots.							30	0
			28.3'								
			Limestone: Gray, pebbly, weathered, stained, fossiliferous, joints infilled with tar-like material, black, core loss attributed to clay/mud. 29.2' 29.5'								
30.0			Clay: Light brown, tan, moist, plastic, w/sand, gravel.							80	38
			Chert: White, lt. gray, gray, tan, fresh to moderately weathered, stained, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray; ; fractured & core loss interval 30.5'-32.2. 34.2'								
35.0			Boring Terminated @ 34.2' (Elev. 1275.9).								
40.0											
45.0											
50.0											

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BORING NO.: 3109
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 725+84 Ramp NW
LOCATION: CL
LATITUDE: 36.23710 ° LONGITUDE: 94.16084 °

DATE: 5/13/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 23.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1311.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, dense, clayey gravel with sand.								
5.0		X				20.4			12,24,25		
			8.3'								
			Brown, dense, silty gravel with sand.								
10.0		X				16.3			6,8,34		
			13.3'								
			Auger Refusal @ 13.3' (Elev. 1298.3). Begin Coring in Chert Fragments. 14.1'								
15.0			Chert fragments and core loss. 16.2'							64	36
			Chert: White, lt. gray, gray, tan, fresh to highly weathered, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain; clay layer 14.5'-14.9'; avg. discontinuity spacing = NA; due to core loss, fragments. 18.4' 19.5'								
20.0										78	36
			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, fossiliferous, intermittent chert beds, white, lt. gray, gray. 23.3'								
25.0			Fragments & void.								
			Limestone: Average discontinuity spacing = NA; due to core loss, fragments								
30.0			Boring Terminated @ 23.3' (Elev. 1288.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3110
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 727+22 Ramp NW
LOCATION: CL
LATITUDE: 36.23678 ° LONGITUDE: 94.16108 °

DATE: 5/11/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 32.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very hard, fat clay with sand.								
5.0						22.9			24,50/0.3		
			8.3'								
			Red, dense, silty gravel with sand.								
10.0						33.8			12,21,11		
			13.3'								
			Red, loose to medium dense, clayey gravel with sand.								
15.0						62.1			10,4,6		
20.0						47.3			3,11,13		
			22.0'								
			22.2' Auger Refusal @ 22.0' (Elev. 1294.0). Begin Coring in Chert.								
			Chert: White, highly weathered, porous.							22	8
25.0			Dissolution cavity w/traces weathered chert fragments and clay. 26.1'								
			27.0'								
			Chert: White, lt. gray, gray, tan, fresh to highly weathered, clay seams, highly fractured and fragmented, porous, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain. 28.7'							66	36
30.0			32.0' Core loss interpreted as dissolution features, clay seams & cavity.								
			Chert: White, lt. gray, gray, tan, fresh to mod. weathered, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain.								
35.0			Boring Terminated @ 32.0' (Elev. 1284.0).								
40.0											
45.0											
50.0											

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BORING NO.: 3111
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 728+33 Ramp NW
LOCATION: CL
LATITUDE: 36.23654 ° LONGITUDE: 94.16132 °

DATE: 5/12/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 34.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1313.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very hard, fat clay with sand.								
5.0						17.7			8,30,50		
			8.3'								
			Red, dense to very dense, silty gravel with sand.								
10.0					NP	14.8	NP		23,50/0.4		
15.0						26.8			12,23,15		
			18.3'								
			Red, medium dense, clayey gravel with sand.								
20.0						34.0			4,7,4		
25.0			24.8'								
			Auger Refusal @ 24.8' (Elev. 1288.2). Begin Coring in Chert. 26.0'								
			Chert: White, lt. gray, gray, tan, weathered, stained red, orange, brown, clay seams, fractured/fragmented, porous, trace fossiliferous, core loss attributed to dissolution, clay/mud. 30.4'							24	0
30.0			Core loss interpreted as dissolution features, clay seams & cavities. 32.4'							88	54
			Limestone: White, lt. gray, gray, fresh to weathered on discontinuities, trace fossiliferous, intermittent chert beds. 34.8'								
35.0			Chert: White, lt. gray, gray, weathered, areas fragmented.								
			Boring Terminated @ 34.8' (Elev. 1278.2).								
40.0											
45.0											
50.0											

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BORING NO.: 3201
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 717+99 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.16069 °

DATE: 6/27/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 37.3 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1305.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, dense to very dense, silty gravel with sand.								
5.0						10.0			6,50/0.2		
10.0						12.6			17,12,21		
15.0					NP	16.9	NP		18,39,17		
			18.3'								
20.0			Red, medium dense, clayey gravel with sand.		20	31.2	31		5,8,7		
			23.3'								
25.0			Red, loose, clayey gravel with sand.			22.2			4,3,3		
			27.3'								
30.0			Auger Refusal @ 27.3' (Elev. 1278.2). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, tan, red, brown, trace fossiliferous, intermittent limestone, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, styolites. 32.6'							100	64
35.0			Limestone: Light gray, gray, fresh, styolites, fine to medium grain, intermittent chert, white, lt. gray. 37.3'							82	58
40.0			Boring Terminated @ 37.3' (Elev. 1268.2).								
45.0											
50.0											

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BORING NO.: 3202
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 719+41 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.16021 °

DATE: 6/27/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 43.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1309.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, dense to very dense, silty gravel with sand.								
5.0						15.9			20,17,14		
10.0						22.3			20,24,35		
15.0						31.2			21,26,17		
			18.3'								
			Red, brown & light gray, very loose to medium dense, silty gravel with sand.								
20.0						39.2			10,9,8		
25.0					NP	58.6	NP		4,3,3		
30.0						34.8			2,2,1		
			33.0'								
35.0			Auger Refusal @ 33.0' (Elev. 1276.0). Begin Coring in Chert. Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, trace fossiliferous, trace vugs, intermittent limestone, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, styolites.							100	52
40.0										100	46
			43.0'								
45.0			Boring Terminated @ 43.0' (Elev. 1266.0).								
50.0											

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BORING NO.: 3203
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 721+89 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.15936 °

DATE: 6/6/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1310.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, very dense, silty gravel with sand.								
5.0						13.1			21,32,50/0.2		
10.0						15.4			17,38,50/0.2		
			13.3'								
			Red, medium dense, clayey gravel with sand.								
15.0						17.1			10,10,8		
			18.3'								
			Red, medium dense, clayey gravel with sand.								
20.0					20	25.6	31		7,8,6		
			23.3'								
			Red, very dense, silty gravel with sand.								
25.0						41.2			4,3,50/0.0		
			26.3'								
			Auger Refusal @ 26.3' (Elev. 1284.2). Begin Coring in Chert.								
30.0			Chert: White, lt. gray, gray, fresh to slightly weathered, slight staining, trace fossiliferous, intermittent limestone, lt. gray, gray, microcrystalline to macrocrystalline, fine to medium grain, styolites. Core loss scattered throughout interval.							82	64
										100	78
35.0			34.8'								
			Limestone: Light gray, gray, fresh, styolites, intermittent chert. 36.3'								
			Boring Terminated @ 36.3' (Elev. 1274.2).								
40.0											
45.0											
50.0											

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BORING NO.: 3204
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 724+28 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.15855 °

DATE: 6/6/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 34.8 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1311.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red & light brown, loose to very dense, clayey gravel with sand.								
5.0						24.9			7,10,11		
10.0					20	15.9	46		34,50/0.2		
15.0						32.6			4,4,5		
			18.3'								
20.0			Light brown, loose, silty gravel with sand.			49.5			4,3,4		
25.0			24.8'								
			Auger Refusal @ 24.8' (Elev. 1286.3). Begin Coring in Chert.								
			Chert: White, lt. gray, gray, fresh to weathered, slight staining, intermittent limestone, lt. gray, gray, fine to medium grain. 27.0'							92	66
30.0			Limestone: Light gray, gray, fresh, fossiliferous, styolites, intermittent chert, white, lt. gray. 30.7'								
			Chert: White, lt. gray, gray, fresh, slight staining, intermittent limestone, lt. gray, gray, fine to medium grain.							100	56
35.0			34.8'								
			Boring Terminated @ 34.8' (Elev. 1276.3).								
40.0											
45.0											
50.0											

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BORING NO.: 3205
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 726+48 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.15781 °

DATE: 6/5/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 33.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1313.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, hard, lean clay with gravel.								
5.0					20	19.8	44		17,21,34		
			8.3'								
			Red, very dense, clayey gravel with sand.								
10.0						16.7			38,50/0.2		
15.0						18.4			41,50/0.3		
			17.9'								
			Red, medium dense, silty gravel with sand.								
20.0						40.6			4,10,11		
			23.7'								
25.0			24.1' Auger Refusal @ 23.7' (Elev. 1289.7). Begin Coring. Core not recovered.								
			Chert: White, lt. gray, gray, fresh to weathered, slight staining, intermittent limestone, lt. gray, gray, fine to medium grain.							92	60
30.0			30.1'								
			Limestone: Light gray, gray, fresh, trace fossiliferous, intermittent chert, white, lt. gray.							90	50
			33.7'								
35.0			Boring Terminated @ 33.7' (Elev. 1279.7).								
40.0											
45.0											
50.0											

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BORING NO.: 3206
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 728+21 Ramp EN
LOCATION: CL
LATITUDE: 36.23837 ° LONGITUDE: 94.15722 °

DATE: 6/27/08
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 28.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Overburden 3.7'								
5.0			Auger Refusal @ 3.7' (Elev. 1313.2). Begin Coring in Chert. Chert: White, lt. gray, moderately to intensely weathered, highly fragmented/fractured with maximum intact recovered length of 0.2', fragments subangular to subrounded, stained red, orange, clay infilling of joints/dissolution features, trace limestone. Core loss interpreted as dissolutioning and clay.							26	0
10.0										26	0
			13.7'								
15.0			Core loss attributed to dissolutioning and clay.							0	0
			18.7'								
20.0			Chert: White, lt. gray, moderately to intensely weathered, highly fragmented/fractured, fragments subangular to subrounded, slightly stained, trace limestone. Core loss interpreted as dissolutioning and clay. 23.0'							26	8
25.0			Limestone: Light gray, gray, fresh to moderately weathered, pitted, trace stains, styolites, fossiliferous, fine to medium grain, chert, white, lt. gray. 28.7'							72	58
30.0			Boring Terminated @ 28.7' (Elev. 1288.2).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3207
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 729+60 Ramp EN
LOCATION: CL
LATITUDE: 36.23838 ° LONGITUDE: 94.15675 °

DATE: 6/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 29.3 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1318.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
5.0			Red, very dense, silty gravel with sand.		20	12.3	44		38,50/0.4		
			8.3'								
10.0			Red, hard, sandy lean clay with gravel.			29.5			25,31,27		
			14.3'								
15.0			Auger Refusal @ 14.3' (Elev. 1304.3). Begin Coring in Chert. Chert: White, lt. gray, moderately to intensely weathered, highly fragmented/fractured with maximum intact recovered length of 0.1', fragments subangular to subrounded, stained red, orange, clay infilling of joints/dissolution features, trace limestone. Core loss interpreted as dissolutioning and clay.							60	0
20.0			22.6'							56	12
			Chert: White, lt. gray, fresh, trace stains. 23.2'								
25.0			Limestone: Light gray, gray, fresh to slightly weathered, trace stains, styolites, fossiliferous, fine to medium grain, intermittent chert, white, lt. gray.							80	70
			29.3'								
30.0			Boring Terminated @ 29.3' (Elev. 1289.3).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3301
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 736+71 Ramp EN
LOCATION: CL
LATITUDE: 36.23933 ° LONGITUDE: 94.15477 °

DATE: 6/5/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 26.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1304.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, dense, silty gravel with sand.								
5.0						14.0			5,21,29		
10.0						22.5			32,15,21		
			13.8'								
15.0			Auger Refusal @ 13.8' (Elev. 1290.6). Begin Coring in Chert. 15.8'							38	17
			Chert: White, lt. gray, weathered, stained, red, orange, fractured, subangular, core loss (1.5') attributed to dissolution, clay.							96	72
20.0			Limestone: Light gray, gray, fresh to slightly weathered, minimal staining, fine to medium grain, trace fossiliferous styolites, intermittent chert beds, white, lt. gray. 20.8'								
25.0			Chert: White, lt. gray, fresh, trace fossiliferous, intermittent limestone beds, lt. gray, gray, fine to medium grain, styolites, trace fossiliferous. 26.2'							100	70
			Boring Terminated @ 26.2' (Elev. 1278.2).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3302
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 737+50 Ramp EN
LOCATION: CL
LATITUDE: 36.23952 ° LONGITUDE: 94.15464 °

DATE: 6/5/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 25.1 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1292.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
5.0			Topsoil 0.6' Brown, very dense, silty gravel with sand. 7.8'			13.8			4,12,50/0.4		
10.0			Auger Refusal @ 7.8' (Elev. 1284.3). Begin Coring in Chert.							39	0
15.0			Chert: White, lt. gray, weathered, stained, red, orange, fragmented/fractured, angular, clay (0.2') recovered, dark red, brown, core loss (5.1') attributed to dissolution, clay. 14.6'							26	0
20.0			Chert: White, lt. gray, surfaces fresh to moderately weathered, weathering diminishes below 14.6', trace fossiliferous, intermittent limestone beds, lt. gray, gray, styolites, trace fossiliferous. 20.1'							100	70
25.0			Limestone: Light gray, gray, fresh, fine to medium grain, trace fossiliferous, styolites, intermittent chert beds, white, lt. gray. 25.1'							100	88
30.0			Boring Terminated @ 25.1' (Elev. 1267.0).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3303
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 738+81 Ramp EN
LOCATION: CL
LATITUDE: 36.23984 ° LONGITUDE: 94.15444 °

DATE: 6/4/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6 Brown, loose, silty gravel with sand.								
5.0			7.3'			18.3			7,4,6		
			Auger Refusal @ 7.3' (Elev. 1278.7). Begin Coring in Chert. 8.2' Chert: White, lt. gray, gray, fresh to slightly weathered.							100	61
10.0			Limestone: White, lt. gray, gray, microcrystalline to med. grain, fresh w/slight weathering on some discontinuities, styolites, fossiliferous, intermittent chert, white, lt. gray, gray. 12.9'							98	54
15.0			Chert: White, lt. gray, gray, fresh to slightly weathered on joint/fracture surface, trace fossiliferous, intermittent limestone beds, lt. gray, gray, microcrystalline to medium grain, styolites. 16.1' 17.3'							100	100
20.0			Limestone: Light gray, gray, microcrystalline to med. grain, fresh, slightly weathered fracture surface, scattered pits, styolites, intermittent chert, white, lt. gray, gray.								
			Boring Terminated @ 17.3' (Elev. 1268.7).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3304
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 739+97 Ramp EN
LOCATION: CL
LATITUDE: 36.24012 ° LONGITUDE: 94.15425 °

DATE: 6/4/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, dense, silty gravel with sand.								
5.0		X				21.4			8,21,15		
			9.3'								
10.0			Auger Refusal @ 9.3' (Elev. 1280.4). Begin Coring in Limestone.							100	100
			Limestone: Light gray, gray, microcrystalline to macrocrystalline, scattered pits, fine to med. grain, fresh, styolites, fossiliferous. 11.6'							100	52
15.0			Chert: White, lt. gray, gray, fresh to slightly weathered on surfaces, trace stains, trace fossiliferous, intermittent limestone, lt. gray, gray. 14.2'								
			Limestone: Light gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh w/slight weathering on some discontinuities, styolites, fossiliferous, w/chert, lt. gray, gray. 17.1'							97	65
20.0			Chert: White, lt. gray, gray, fresh to slightly weathered on joint/fracture surface, stains, trace fossiliferous, intermittent limestone, lt. gray, gray. 19.3'								
			Boring Terminated @ 19.3' (Elev. 1270.4).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3401
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 708+88 Ramp SE
LOCATION: CL
LATITUDE: 36.24142 ° LONGITUDE: 94.15480 °

DATE: 6/3/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 30.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1304.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, hard to very hard, fat clay with sand.								
5.0						24.6			7,35,17		
10.0						20.7			50/0.3		
			12.7'								
			Red, very dense, silty gravel with sand.								
15.0						17.8			12,40,50/0.4		
20.0						28.0			5,4,50/0.3		
			21.1'								
			Auger Refusal @ 21.1' (Elev. 1282.9). Begin Coring in Limestone.								
25.0			Limestone: Light gray, gray, fresh with trace stains, fine to med. grain, styolites, trace fossiliferous, trace pits, intermittent chert, varies from beds to nodules, white, lt. gray, gray.							100	79
30.0										100	90
			30.9'								
			Boring Terminated @ 30.9' (Elev. 1273.1).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3402
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 709+49 Ramp SE
LOCATION: CL
LATITUDE: 36.24132 ° LONGITUDE: 94.15500 °

DATE: 6/2/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Hertter

COMPLETION DEPTH: 33.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1302.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, hard to very hard, fat clay with sand.								
5.0						24.7			22,30,16		
10.0						43.3			11,50/0.3		
			13.9'								
15.0			Auger Refusal @ 13.9' (Elev. 1289.0). Begin Coring in Chert.							62	0
			Chert: White, lt. gray, moderate to intense weathering, highly fragmented with maximum intact recovery 0.4', subangular to subrounded, stained red, orange, black, pitted, porous, clay seams, red, trace limestone fragments, lt. gray.							18	0
20.0			22.9'								
			Chert: White, lt. gray, fresh to slightly weathered, scattered pits, porous, slight staining on discontinuities. 24.0'							70	46
25.0			Limestone: Light gray, gray, fine to med. grain, fresh, scattered pits, styolites, intermittent chert, white, lt. gray, gray.							100	92
30.0			33.0'							100	95
			Boring Terminated @ 33.0' (Elev. 1269.9).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 3403
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 710+50 Ramp SE
LOCATION: 6' Rt.
LATITUDE: 36.24118 ° LONGITUDE: 94.15526 °

DATE: 6/3/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 31.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, very dense, silty gravel with sand.								
5.0						15.9			11,27,35		
			8.3'								
			Red, very stiff, fat clay with sand.								
10.0						34.9			5,11,17		
			13.3'								
			Red, loose to very dense, silty gravel with sand.								
15.0						57.6			5,6,3		
20.0						27.9			3,50/0.1	100	80
			20.6' 21.0' Auger Refusal @ 20.6' (Elev. 1279.9). Begin Coring in Chert.								
			Chert: White, lt. gray, fresh to slightly weathered, trace stain.							100	84
25.0											
			Limestone: Light gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh, styolites, trace fossiliferous, intermittent chert, white, lt. gray, gray, beds, nodules. 26.0'								
			28.8' 29.8' Chert: White, lt. gray, fresh, scattered pits, styolites, trace fossiliferous, porous areas, intermittent limestone beds, lt. gray, fine to medium grain. 31.1'							98	68
30.0											
			Limestone: Light gray, gray, styolites, fine to med. grain.								
			Chert: White, lt. gray, fresh, intermittent limestone beds, lt. gray.								
35.0											
			Boring Terminated @ 31.1' (Elev. 1269.4).								
40.0											
45.0											
50.0											

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BORING NO.: 3404
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 711+12 Ramp SE
LOCATION: CL
LATITUDE: 36.24108 ° LONGITUDE: 94.15543 °

DATE: 6/4/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 26.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1296.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, loose to dense, silty gravel with sand.								
5.0						16.2			12,10,24		
10.0						41.7			5,9,4		
15.0						40.0			3,4,3		
			16.0'								
			Auger Refusal @ 16.0' (Elev. 1280.2). Begin Coring in Chert. 17.0'								
			Chert: White, lt. gray, fresh to slightly weathered.							100	63
20.0			Limestone: Light gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh, styolites, trace fossiliferous, intermittent chert, white, lt. gray, gray, beds, nodules. 20.8'								
			23.4'							100	84
25.0			Chert: White, lt. gray, fresh, fragmented 22.1' to 22.2', styolites, trace fossiliferous, porous areas, intermittent limestone beds, lt. gray, fine to medium grain. 26.0'							89	89
			Limestone: White, lt. gray, gray, microcrystalline to macrocrystalline, fine to med. grain, fresh, intermittent chert, white, lt. gray, gray, beds, nodules.								
30.0			Boring Terminated @ 26.0' (Elev. 1270.2).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4000
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 182+25 Ramp 4
LOCATION: 91' Lt.
LATITUDE: 36.17891 ° LONGITUDE: 94.29674 °

DATE: 3/23/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 18.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, dense to very dense, clayey gravel with sand.			19.5			4,19,27		
						14.7			17,50/0.5		
5.0			5.5'								
			Orange & brown, very dense, clayey gravel with sand.		22	25.7	42		14,25,26		
			8.0'						50/0.0		
			Auger Refusal @ 8' (Elev. 1271.4) Begin Coring in Chert Fragments & Clay.							10	0
10.0			Gray, mod sev. to sev. weathered, vugular, chert frags. w/sli. weathered chert nodule all in clay matrix.							30	12
15.0										33	0
			18.0'								
			Boring Terminated @ 18' (Elev. 1261.4).								
20.0											
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4001
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 183+14 Ramp 4
LOCATION: 92' Lt.
LATITUDE: 36.17888 ° LONGITUDE: 94.29640 °

DATE: 3/23/12
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 35.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1278.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, very dense, clayey gravel with sand.			16.5			11,50/0.4		
					21	14.2	39		33,50/0.4		
5.0						21.6			6,39,44		
						20.0			14,23,50/0.5		
10.0			11.8'								
			Orange & brown, very dense, clayey gravel with sand.			31.4			11,22,50/0.5		
15.0			16.8'								
			Orange & brown, medium dense to dense, clayey gravel with sand.			25.3			6,10,26		
20.0											
					23	16.6	53		5,16,22		
25.0											
						17.9			11,17,18		
30.0											
						31.4			14,8,8		
35.0			35.0'								
			No Auger Refusal & Boring Terminated @ 35' (Elev. 1243.5).								
40.0											
45.0											
50.0											

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BORING NO.: 4002
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 712+21
LOCATION: 109' Lt.
LATITUDE: 36.23996 ° LONGITUDE: 94.15500 °

DATE: 3/24/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 27.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1297.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, very dense, silty gravel with sand.		22	14.4	26		20,29,27		
			3.0'								
5.0			Orange & brown, loose to very dense, clayey gravel with sand.			17.2			50/0.5,0,0		
						25.6			50/0.5,0,0		
10.0						45.6			4,3,5		
15.0						38.1			4,7,4		
			17.0'								
20.0			Auger Refusal @ 17' (Elev. 1280.5) Begin Coring in Limestone.							63	13
			Liht gray-lt. brown, lt. brown, red-orange-brown, sli. weathered w/intervals mod. to sev. weathered, f. crystalline to lithographic w/grains foss. frags. & calcite frags., intervals vugular, porous chert or v. cherty w/clay.							58	26
			22.5' ADS = 0.2' (17.0'-18.8'), 0°-20°; core loss 18.8'-19.9'								
25.0			Chert: Light brown-white, sev. weathered, vugular, porous w/clay.							0	0
			25.0' interpreted core loss below 23.0'								
			27.0' No recovery								
			Boring Terminated @ 27' (Elev. 1270.5).								
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4003
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 713+91
LOCATION: 94' Lt.
LATITUDE: 36.23975 ° LONGITUDE: 94.16163 °

DATE: 3/24/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 29.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1304.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, very dense, silty gravel with sand.			12.8			18,47,20		
			3.0'								
5.0			Orange & brown, dense to very dense, clayey gravel with sand.			20.3			8,21,12		
					27	26.7	63		7,28,50/0.5		
						19.0			13,31,14		
10.0											
						28.9			6,50/0.5		
15.0											
			19.0'						50/0.0		
20.0			Auger Refusal @ 19' (Elev. 1285.2) Begin Coring in Limestone.							90	40
			White, lt. gray, gray, trcs. lt. brown & orange, fresh w/intervals sli. to mod. sev. weathered, interbedded v.f. to f. grain matrix w/foss., calcite & chert frags., cse. grain calcite w/sparry cement & lithographic texture w/frags., chert nodules, scat. stylolites.							100	82
25.0			ADS = 0.4', 0°-20°, 70°; broken & sev. wthd. 21.3'-22.6'; sev. wthd. 23.9'-24.0'							100	71
			29.0'								
30.0			Boring Terminated @ 29.0' (Elev. 1275.2).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4004
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 714+82
LOCATION: 94' Lt.
LATITUDE: 36.23965 ° LONGITUDE: 94.16134 °

DATE: 3/25/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 31.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1303.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, medium stiff, lean clay with sand.		15	21.2	29		1,2,4		
			3.0'								
			Orange & brown, dense, clayey sand with gravel.		18	19.1	33		4,10,35		
5.0			5.5'								
			Orange & brown, dense to very dense, clayey gravel with sand.			16.5			18,50/0.5,0		
						17.5			50/0.5,0,0		
10.0											
						23.4			8,19,19		
15.0			16.8'								
			Orange & brown, loose, silty sand with gravel.		34	44.3	34		6,2,7		
20.0			21.0'								
			Auger Refusal @ 21.0' (Elev. 1282.9) Begin Coring in Chert Fragments & Clay. Light brown, red-brown-orange, porous, vugular, sli. calcareous chert frags. w/clay matrix.							15	0
25.0			26.8'								
			Limestone: Light brown-white, lt. gray, lt. brown-gray, red-orange, mod. weathered grading to fresh, f. grain to amorphous, v. cherty grading into cse. to mega-grain calcite w/sparry cement, healed dissolution surfaces & 75° frac. ADS = 0.5', 0°-10°							66	42
30.0			31.0'							100	100
			Boring Terminated @ 31.0' (Elev. 1272.9).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4005
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 726+83 Ramp NW
LOCATION: 53' Rt.
LATITUDE: 36.23706 ° LONGITUDE: 94.16102 °

DATE: 3/26/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1314.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Red & brown, dense, silty gravel with sand.			16.3			6,23,16		
			3.0'								
			Red & brown, stiff to very hard, sandy lean clay with gravel.			30.9			12,23,50/0.5		
5.0						40.3			4,6,7		
			8.0'								
			Red & brown, loose to medium dense, silty sand with gravel.			34.1			3,4,9		
10.0											
					28	51.3	48		2,2,10		
15.0											
						38.6			9,6,4		
20.0											
						37.3			4,6,3		
25.0											
			26.8'								
			Red & brown, very dense, silty gravel with sand.			32.7			2,50/0.5		
30.0			30.0'								
			Auger Refusal @ 30.0' (Elev. 1284.1) Begin coring in Limestone.								
			White, lt. gray-lt. brown, orange-red stain, sli. weathered w/ intervals sev. weathered & broken, f. crystalline to lithographic w/some intervals foss. frags., stylolites, cherty w/vugular-porous texture, 80°-90° healed fracs. w/vugs.							100	78
35.0											
			ADS = 0.3', 0°-25°, 35°; 17 0° discontinuities (fracs.) w/iron stain & sev. wthd walls on some, hard walls on some; 11 25° fracs. w/mod. sev. to sev. wthd. walls; 1 35° frac. w/sev. wthd. walls; sev. wthd. & broken 37.1'-37.3', 39.0'-39.1'; assumed core loss 39.4'-40.0'							88	20
40.0			40.0'								
			Boring Terminated @ 40.0' (Elev. 1274.1).								
45.0											
50.0											

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BORING NO.: 4006
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 727+74 Ramp NW
LOCATION: 98' Rt.
LATITUDE: 36.23696 ° LONGITUDE: 94.16131 °

DATE: 3/26/12
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 38.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1312.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Red & brown, dense, silty gravel with sand.		21	15.8	40		4,12,32		
			3.0'								
			Red & brown, very hard, sandy lean clay with gravel.			13.8			14,50/0.2		
5.0						28.4			8,50/0.5		
			8.0'								
			Red & brown, medium dense to dense, silty sand with gravel.			30.6			9,15,23		
10.0											
						31.1			3,23,27		
15.0											
						42.7			6,9,7		
20.0											
						45.0			3,5,7		
25.0											
						45.7			8,9,12		
30.0											
			31.8'								
			Brown, medium dense, silty gravel with sand.			34.1			7,5,6		
35.0											
			38.0'								
			Auger Refusal & boring Terminated @ 38.0' (Elev. 1274.6).								
40.0											
45.0											
50.0											

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BORING NO.: 4007
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 728+78 Ramp NW
LOCATION: 143' Rt.
LATITUDE: 36.23680 ° LONGITUDE: 94.16156 °

DATE: 3/26/12
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 20.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1308.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Red & brown, very dense, silty gravel with sand.		17	11.1	19		5,42,50/0.5		
			3.0'								
			Red & brown, very hard, sandy lean clay with gravel.			23.1			7,50/0.5		
5.0						10.1			50/0.5		
						12.8			50/0.5		
10.0			11.8'								
			Red & brown, medium dense to dense, silty sand with gravel.			22.9			13,18,25		
15.0											
						40.2			3,7,13		
20.0			20.0'								
			No Auger Refusal @ 20.0' (Elev. 1288.3).								
25.0											
30.0											
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4008
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 717+48
LOCATION: 110' Rt.
LATITUDE: 36.23884 ° LONGITUDE: 94.16081 °

DATE: 3/25/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1308.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orannge & brown, stiff, lean clay with sand.		11	19.6	32		2,3,6		
			3.0'								
			Orange & brown, very hard, gravelly fat clay with sand.			16.1			17,35,33		
5.0			5.5'								
			Orange & brown, stiff, gravelly lean clay with sand.		22	20.1	31		5,7,8		
			8.0'								
			Orange & brown, hard, gravelly fat clay with sand.			28.3			8,11,40		
10.0											
						24.7			6,25,21		
15.0			16.8'								
			Orange & brown, loose, silty gravel with sand.			58.2			3,3,4		
20.0			21.8'								
			Orange & brown, medium dense to very dense, silty gravel with sand.		29	31.7	29		10,9,20		
25.0											
						21.3			33,50/0.1		
30.0			30.0'								
			Auger Refusal @ 30.0' (Elev. 1278.4) Begin Coring in Limestone. White, lt. gray, gray, trcs. lt. brown & orange, fresh w/intervals along discontinuities sli. to mod. sev. weathered, interbedded v.f. to f. grain matrix w/foss., calcite & chert frags., med. crystalline & lithographic texture w/frags., cherty, scat. stylolites, trcs. vugs developed along healed fracs. ADS = 0.4', 0°-10°, 25°-35°, 90°							94	74
35.0											
										100	78
40.0			40.0'								
			Boring Terminated @ 40.0' (Elev. 1268.4).								
45.0											
50.0											

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BORING NO.: 4009
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 719+82
LOCATION: 110' Rt.
LATITUDE: 36.23855 ° LONGITUDE: 94.16012 °

DATE: 3/26/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 50.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1309.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, soft, lean clay with sand.			18.9			2,1,2		
			3.0'								
			Orange & brown, very stiff to very hard, gravelly fat clay with sand.			15.9			12,50/0.5		
5.0						14.7			14,29,50/0.4		
					26	28.0	61		9,14,29		
10.0											
						22.4			11,12,20		
15.0											
						52.1			6,4,15		
20.0											
						40.4			9,7,9		
25.0											
			26.8'								
			Brown, loose to very dense, silty gravel with sand.			34.3			6,6,3		
30.0											
					31	48.5	41		2,7,13		
35.0											
						55.3			50/0.2		
40.0			40.0'								
			Auger Refusal @ 40.0' (Elev. 1269.2) Begin coring in Limestone. White, lt. gray, scat. lt. brown-gray, fresh w/mod. sev. to sev. weathered intervals, lithographic w/v.f. grain, foss. seams, cherty, thin beds cse. to mega-grain calcite w/sparry cement, stylolites.							88	62
45.0											
			ADS = 0.4'; 0°, 30°, 70°-85°; 85° frac., broken, sev. weath. 40.8'-41.9'; broken & sev. weath. 45.2'-45.3'							100	78
50.0			50.0'								

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BORING NO.: 4009
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 719+82
LOCATION: 110' Rt.
LATITUDE: 36.23855 ° LONGITUDE: 94.16012 °

DATE: 3/26/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 50.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1309.2								
			Boring Terminated @ 50.0' (Elev. 1259.2).								
55.0											
60.0											
65.0											
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 4010
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 727+62 Ramp EN
LOCATION: 55' Rt.
LATITUDE: 36.23834 ° LONGITUDE: 94.15728 °

DATE: 3/24/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, medium stiff to hard, lean clay with sand.			21.1			2,3,5		
					19	21.7	37		3,4,8		
5.0						20.4			6,11,23		
									7,15,18		
10.0			10.5'								
			Orange & brown, very hard, elastic silt with gravel.								
						37.0			50/0.5		
15.0											
			19.0'						50/0.0		
20.0			Auger Refusal @ 19.0' (Elev. 1297.2) Begin coring in Chrt Fragments & Clay.							20	0
			Light gray, white, lt. brown, scat. red-orange, sev. weathered, vugular & porous to impermeable chert frags. w/clay.							24	7
25.0			24.3'								
			Limestone: Light gray-lt. brown, scat. white, mod. weathered grading to fresh, interlayered f. crystalline martix w/cse. to mega-grain foss. frags./calcite frags./pellets, f. crystalline matrix w/scat. foss. frags., & lithographic texture, all cherty in parts, scat. stylolites. ADS = 0.5', 0°-10°, 25°; 10 0°-10° discontinuities w/solution activity on some; 1 25° discontinuity w/solution activity & sev. wthd. walls; solution cavity 28.1'-28.2'							100	88
30.0			30.0'								
			Boring Terminated @ 30.0' (Elev. 1286.2).								
35.0											
40.0											
45.0											
50.0											

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BORING NO.: 4011
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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 729+09 Ramp EN
LOCATION: 60' Lt.
LATITUDE: 36.23866 ° LONGITUDE: 94.15679 °

DATE: 3/23/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 34.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1317.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, medium stiff, lean clay with sand.			22.4			2,2,5		
			3.0'								
5.0			Orange & brown, dense to very dense, clayey gravel with sand.			15.0			50/0.3		
						31.8			12,15,28		
			8.0'								
			Orange & brown, hard to very hard, elastic silt with gravel.		37	39.7	73		3,38,17		
10.0											
						46.4			3,50/0.5		
15.0											
			16.8'								
			Orange & brown, medium dense to very dense, poorly graded gravel with silt and sand.			14.1			49,7,5		
20.0											
			24.0'						50/0.0		
25.0			Auger Refusal @ 24.0' (Elev. 1293.1) Begin coring in Limestone.							60	60
			Limestone: Gray, lt. gray-lt. brown, white, fresh to sli. weathered w/seams sev. weathered, interlayered cse. grain foss. frags./calcite grains/pellets in sparry cement & f. crystalline w/scattered frags., cherty, 90° healed frac., solution surfaces.							100	88
30.0			ADS = 0.6', 0°-10°, 30°; sev. wthd. 27.9'; 16 discontinuities 0°-10° w/sev. wthd. walls or solution activity; 1 30° frac. w/sev wthd. walls							80	76
			34.0'								
35.0			Boring Terminated @ 34.0' (Elev. 1283.1).								
40.0											
45.0											
50.0											

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BORING NO.: 4012
PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 729+83 Ramp EN
LOCATION: 91' Lt.
LATITUDE: 36.23875 ° LONGITUDE: 94.15656 °

DATE: 3/23/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 35.0 ft
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
5.0			Orange & brown, medium stiff to stiff, lean clay with sand.			18.8			2,3,4		
						21.6			3,4,6		
			5.5'								
			Orange & brown, very dense, clayey gravel with sand.		19	14.9	36		24,41,50/0.5		
10.0						22.4			10,50/0.4		
			11.8'								
			Orange & brown, hard, elastic silt with gravel.			47.6			5,26,16		
15.0			16.8'								
			Orange & brown, very dense, poorly graded gravel with silt and sand.			9.3			46,50/0.5		
20.0			21.8'								
			Orange & brown, very dense, sandy lean clay.		27	48.3	49		6,50/0.5		
25.0			25.0'								
			Auger Refusal @ 25.0' (Elev. 1291.4) Begin coring in Limestone. White, gray, fresh w/few sev. weathered seams, f. crystalline matrix w/foss. frags. & f. to cse. crystalline matrix w/cse. to mega-grains of foss. & calcite, v. cherty to chert nodules & layers.							92	68
30.0			ADS = 0.4', 0°-15°; 26 discontinuities 0°-15° w/sev. wthd walls & solution pitting on some; sev. wthd. 30.8', 31.1'-31.2',							100	70
35.0			35.0'								
			Boring Terminated @ 35.0' (Elev. 1281.4).								
40.0											
45.0											
50.0											

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An ICA Company

BORING NO.: 5000
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+01 Hwy 112
LOCATION: CL
LATITUDE: 36.22747 ° LONGITUDE: 94.23057 °

DATE: 3/8/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 75.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Orange & brown, medium dense, clayey gravel with sand.			22.0			2,10,13		
			3.0'								
			Orange & brown, medium dense to very dense, silty gravel with sand.			39.2			3,18,21		
5.0						34.8			4,12,22		
						36.0			5,16,40		
10.0											
						21.0			15,50/0.2		
15.0											
						29.3			7,8,15		
20.0											
					30	39.2	43		8,12,18		
25.0											
						45.2			3,8,11		
30.0											
						31.9			28,22,15		
35.0											
						38.9			16,20,21		
40.0											
						42.1			10,12,12		
45.0											
						32.4			8,11,12		
50.0											

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BORING NO.: 5000
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+01 Hwy 112
LOCATION: CL
LATITUDE: 36.22747 ° LONGITUDE: 94.23057 °

DATE: 3/8/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 75.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0			55.0'			31.8			11,11,19		
60.0			Auger Refusal @ 55.0' (Elev. 1196.0) Begin coring in Chert Fragments. Light brown-white, lt. gray, red-orange-brown, sev. weathered, vugular, porous chert frags. w/interpreted clay. 22 0°-15° fracs. w/mod. sev to sev. wthd walls, iron oxide stain on some, solution activity on some. 62.3'							6	0
										0	0
65.0			Limestone: Gray-lt. brown, intervals white, fresh w/intervals mod. sev. to sev. weathering, f. to cse. crystalline w/f. to cse. grains of foss. frags & calcite, intervals v.f. to f. grain w/foss., scat. stylolites. ADS = 0.6', 0°-15°; sev. wthd. & core loss 64.9'-65.0'; sev. wthd. & core loss 68.6'-68.9'; sev. wthd. 71.0'-71.2', 71.6'; interp. core loss 74.7'-75.0'							65	60
70.0										96	80
75.0			75.0'							94	72
80.0			Boring Terminated @ 75.0' (Elev. 1176.0).								
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 5001
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Hwy 112
LOCATION: CL
LATITUDE: 36.22720 ° LONGITUDE: 94.23052 °

DATE: 3/5/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 70.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Red, dense, clayey gravel with sand.		21	22.7	34		11,28,17		
			3.0'								
			Red, dense to very dense, silty gravel with sand.			42.2			12,12,26		
5.0						31.3			8,20,29		
						33.2			17,27,23		
10.0											
						27.0			5,50/0.3		
15.0											
						21.2			10,25,26		
20.0											
						29.3			7,10,30		
25.0											
						27.1			11,26,37		
30.0											
						28.4			49,18,18		
35.0			35.0'								
			Auger Refusal @ 35.0' (Elev. 1220.1) Begin coring in Chert. White, tan, lt. gray, red-orange, sev. weathered, vugular, scat. foss. molds, iron staining & clay remants.							14	0
40.0											
										8	0
45.0											
										18	0
50.0											

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BORING NO.: 5001
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+00 Hwy 112
LOCATION: CL
LATITUDE: 36.22720 ° LONGITUDE: 94.23052 °

DATE: 3/5/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 70.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
55.0										8	0
			57.2'							64	42
60.0			Limestone: Light brown-gray, gray, white, fresh w/mod. sev. weathered intervals, cse. to mega-grain calcite w/sparry cement, intervals v.f. to f. grain w/foss, cherty, stylolites. ADS = 0.5'; 0°-20°; core loss 64.3'-64.4'; broken, sev. weathered & core loss 66.1'-66.3'							96	88
65.0											
										98	72
70.0			70.0'								
			Boring Terminated @ 70.0' (Elev. 1185.1).								
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

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BORING NO.: 5002
PAGE: 1 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+99 Hwy 112
LOCATION: CL
LATITUDE: 36.22693 ° LONGITUDE: 94.23047 °

DATE: 3/4/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 65.0 ft. GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Red & brown, dense, clayey gravel with sand.			23.2			9,32,15		
			3.0'								
			Red & brown, dense to very dense, silty gravel with sand.			40.1			8,12,50/0.5		
5.0											
						39.2			6,10,43		
						26.1			12,36,27		
10.0											
						32.6			25,17,29		
15.0											
						28.9			23,17,19		
20.0											
						28.9			12,50/0.3		
25.0			25.0'								
	△		Auger Refusal @ 25.0' (Elev. 1232.2) Begin coring in Chert Fragments & Clay.							16	0
30.0			White, lt. gray, lt. brown, red-orange, sev. weathered, vugular, porous chert fragments w/clay, trcs. fossil molds.								
										12	0
35.0											
										8	0
40.0											
										18	0
45.0											
										45	0
										7	0
50.0											

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BORING NO.: 5002
PAGE: 2 of 2

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 20+99 Hwy 112
LOCATION: CL
LATITUDE: 36.22693 ° LONGITUDE: 94.23047 °

DATE: 3/4/12
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 550
LOGGED BY: Total Depth Drilling

COMPLETION DEPTH: 65.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										15	0
										13	0
55.0											
										14	0
60.0											
										26	0
			64.4' 65.0'							73	33
65.0			Limestone: Gray, fresh, f. to cse. crystalline, foss, stylolites. assumed core loss 64.9'-65.0'								
			Boring Terminated @ 65.0' (Elev. 1192.2).								
70.0											
75.0											
80.0											
85.0											
90.0											
95.0											
100.0											

APPENDIX II

LABORATORY DATA

Florence & Hutcheson
CONSULTING ENGINEERS

Moisture Data

(AASHTO T255-T265 / ASTM C566-D2216)

Project Name : Springdale By-Pass
Location : Washington/Benton County, Arkansas
Job Number : 06127
Project Job No. : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1	4000	182+25 @ 91' Lt	SS-1	1.0	2.5	Orange & Brown Clayey Gravel with Sand		19.5
1			SS-2	3.5	5.0	Orange & Brown Clayey Gravel with Sand		14.7
2			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		25.7
1	4001	183+14 @ 92' Lt	SS-1	1.0	2.5	Orange & Brown Clayey Gravel with Sand		16.5
1			SS-2	3.5	5.0	Orange & Brown Clayey Gravel with Sand		14.2
1			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		21.6
1			SS-4	8.5	10.0	Orange & Brown Clayey Gravel with Sand		20.0
2			SS-5	13.5	15.0	Orange & Brown Clayey Gravel with Sand		31.4
3			SS-6	18.5	20.0	Orange & Brown Clayey Gravel with Sand		25.3
3			SS-7	23.5	25.0	Orange & Brown Clayey Gravel with Sand		16.6
3			SS-8	28.5	30.0	Orange & Brown Clayey Gravel with Sand		17.9
3			SS-9	33.5	35.0	Orange & Brown Clayey Gravel with Sand		31.4
4	4002	712+21 @ 94' Lt	SS-1	1.0	2.5	Orange & Brown Silty Gravel with Sand		14.4
5			SS-2	3.5	5.0	Orange & Brown Clayey Gravel with Sand		17.2
5			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		25.6
5			SS-4	8.5	10.0	Orange & Brown Clayey Gravel with Sand		45.6
5			SS-5	13.5	15.0	Orange & Brown Clayey Gravel with Sand		38.1
4	4003	713+91 @ 94' Lt	SS-1	1.0	2.5	Orange & Brown Silty Gravel with Sand		12.8
5			SS-2	3.5	5.0	Orange & Brown Clayey Gravel with Sand		20.3
5			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		26.7
5			SS-4	8.5	10.0	Orange & Brown Clayey Gravel with Sand		19.0
5			SS-5	13.5	15.0	Orange & Brown Clayey Gravel with Sand		28.9
6	4004	714+82 @ 94' Lt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		21.2
7			SS-2	3.5	5.0	Orange & Brown Clayey Sand with Gravel		19.1
5			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		16.5
5			SS-4	8.5	10.0	Orange & Brown Clayey Gravel with Sand		17.5
5			SS-5	13.5	15.0	Orange & Brown Clayey Gravel with Sand		23.4
8			SS-6	18.5	20.0	Orange & Brown Silty Sand with Gravel		44.3
9	4005	726+83 @ 83' Rt	SS-1	1.0	2.5	Red & Brown Silty Gravel with Sand		16.3
10			SS-2	3.5	5.0	Red & Brown Sandy Lean Clay with Gravel		30.9
10			SS-3	6.0	7.5	Red & Brown Sandy Lean Clay with Gravel		40.3
11			SS-4	8.5	10.0	Red & Brown Silty Sand with Gravel		34.1
11			SS-5	13.5	15.0	Red & Brown Silty Sand with Gravel		51.3
11			SS-6	18.5	20.0	Red & Brown Silty Sand with Gravel		38.6
11			SS-7	23.5	25.0	Red & Brown Silty Sand with Gravel		37.3
12			SS-8	28.5	30.0	Red & Brown Silty Gravel with Sand		32.7
9	4006	727+74 @ 128' Rt	SS-1	1.0	2.5	Red & Brown Silty Gravel with Sand		15.8
10			SS-2	3.5	5.0	Red & Brown Sandy Lean Clay with Gravel		13.8
10			SS-3	6.0	7.5	Red & Brown Sandy Lean Clay with Gravel		28.4
11			SS-4	8.5	10.0	Red & Brown Silty Sand with Gravel		30.6
11			SS-5	13.5	15.0	Red & Brown Silty Sand with Gravel		31.1
11			SS-6	18.5	20.0	Red & Brown Silty Sand with Gravel		42.7
11			SS-7	23.5	25.0	Brown Silty Sand with Gravel		45.0
11			SS-8	28.5	30.0	Brown Silty Sand with Gravel		45.7
12			SS-9	33.5	35.0	Brown Silty Gravel with Sand		34.1
9	4007	728+78 @ 163' Rt	SS-1	1.0	2.5	Red & Brown Silty Gravel with Sand		11.1
10			SS-2	3.5	5.0	Red & Brown Sandy Lean Clay with Gravel		23.1
10			SS-3	6.0	7.5	Red & Brown Sandy Lean Clay with Gravel		10.1
10			SS-4	8.5	10.0	Red & Brown Sandy Lean Clay with Gravel		12.8

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e-mail: fhcorporate@flohut.com

11			SS-5	13.5	15.0	Red & Brown Silty Sand with Gravel		22.9
11			SS-6	18.5	20.0	Red & Brown Silty Sand with Gravel		40.2
13	4008	717+48 @ 110' Rt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		19.6
14			SS-2	3.5	5.0	Orange & Brown Gravelly Fat Clay with Sand		16.1
15			SS-3	6.0	7.5	Orange & Brown Gravelly Lean Clay with Sand		20.1
14			SS-4	8.5	10.0	Orange & Brown Gravelly Fat Clay with Sand		28.3
14			SS-5	13.5	15.0	Orange & Brown Gravelly Fat Clay with Sand		24.7
16			SS-6	18.5	20.0	Orange & Brown Silty Gravel with Sand		58.2
17			SS-7	23.5	25.0	Orange & Brown Silty Gravel with Sand		31.7
17			SS-8	28.5	30.0	Orange & Brown Silty Gravel with Sand		21.3
13	4009	719+82 @ 110' Rt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		18.9
14			SS-2	3.5	5.0	Orange & Brown Gravelly Fat Clay with Sand		15.9
14			SS-3	6.0	7.5	Orange & Brown Gravelly Fat Clay with Sand		14.7
14			SS-4	8.5	10.0	Orange & Brown Gravelly Fat Clay with Sand		28.0
14			SS-5	13.5	15.0	Orange & Brown Gravelly Fat Clay with Sand		22.4
14			SS-6	18.5	20.0	Brown Gravelly Fat Clay with Sand		52.1
14			SS-7	23.5	25.0	Brown Gravelly Fat Clay with Sand		40.4
16			SS-8	28.5	30.0	Brown Silty Gravel with Sand		34.3
16			SS-9	33.5	35.0	Brown Silty Gravel with Sand		48.5
16			SS-10	38.5	40.0	Brown Silty Gravel with Sand		55.3
18	4010	727+72 @ 55' Rt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		21.1
18			SS-2	3.5	5.0	Orange & Brown Lean Clay with Sand		21.7
18			SS-3	6.0	7.5	Orange & Brown Lean Clay with Sand		20.4
			SS-4	8.5	10.0	No Recovery		
20			SS-5	13.5	15.0	Orange & Brown Elastic Silt with Gravel		37.0
			SS-6	18.5	20.0	No Recovery		
18	4011	728+99 @ 60' Rt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		22.4
19			SS-2	3.5	5.0	Orange & Brown Clayey Gravel with Sand		15.0
19			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		31.8
20			SS-4	8.5	10.0	Orange & Brown Elastic Silt with Gravel		39.7
20			SS-5	13.5	15.0	Orange & Brown Elastic Silt with Gravel		46.4
21			SS-6	18.5	20.0	Orange & Brown Poorly Graded Gravel with Silt and Sand		14.1
18	4012	729+93 @ 91' Lt	SS-1	1.0	2.5	Orange & Brown Lean Clay with Sand		18.8
18			SS-2	3.5	5.0	Orange & Brown Lean Clay with Sand		21.6
19			SS-3	6.0	7.5	Orange & Brown Clayey Gravel with Sand		14.9
19			SS-4	8.5	10.0	Orange & Brown Clayey Gravel with Sand		22.4
20			SS-5	13.5	15.0	Orange & Brown Elastic Silt with Gravel		47.6
21			SS-6	18.5	20.0	Orange & Brown Poorly Graded Gravel with Silt and Sand		9.3
22			SS-7	23.5	25.0	Orange & Brown Sandy Lean Clay		48.3
23	5000	19+01 @ CL	SS-1	1.0	2.5	Orange & Brown Clayey Gravel with Sand		22.0
24			SS-2	3.5	5.0	Orange & Brown Silty Gravel with Sand		39.2
24			SS-3	6.0	7.5	Orange & Brown Silty Gravel with Sand		34.8
24			SS-4	8.5	10.0	Orange & Brown Silty Gravel with Sand		36.0
24			SS-5	13.5	15.0	Orange & Brown Silty Gravel with Sand		21.0
24			SS-6	18.5	20.0	Orange & Brown Silty Gravel with Sand		29.3
24			SS-7	23.5	25.0	Orange & Brown Silty Gravel with Sand		39.2
24			SS-8	28.5	30.0	Orange & Brown Silty Gravel with Sand		45.2
24			SS-9	33.5	35.0	Orange & Brown Silty Gravel with Sand		31.9
24			SS-10	38.5	40.0	Orange & Brown Silty Gravel with Sand		38.9
24			SS-11	43.5	45.0	Orange & Brown Silty Gravel with Sand		42.1
24			SS-12	48.5	50.0	Orange & Brown Silty Gravel with Sand		32.4
24			SS-13	53.5	55.0	Orange & Brown Silty Gravel with Sand		31.8
23	5001	20+00 @ CL	SS-1	1.0	2.5	Red Clayey Gravel with Sand		22.7
24			SS-2	3.5	5.0	Red Silty Gravel with Sand		42.2
24			SS-3	6.0	7.5	Red Silty Gravel with Sand		31.3
24			SS-4	8.5	10.0	Red Silty Gravel with Sand		33.2
24			SS-5	13.5	15.0	Red Silty Gravel with Sand		27.0
24			SS-6	18.5	20.0	Red Silty Gravel with Sand		21.2
24			SS-7	23.5	25.0	Red Silty Gravel with Sand		29.3
24			SS-8	28.5	30.0	Red Silty Gravel with Sand		27.1
24			SS-9	33.5	35.0	Red Silty Gravel with Sand		28.4

23	5002	20+99 @ CL	SS-1	1.0	2.5	Red & Brown Clayey Gravel with Sand		23.2
24			SS-2	3.5	5.0	Red & Brown Silty Gravel with Sand		40.1
24			SS-3	6.0	7.5	Red & Brown Silty Gravel with Sand		39.2
24			SS-4	8.5	10.0	Red & Brown Silty Gravel with Sand		26.1
24			SS-5	13.5	15.0	Red & Brown Silty Gravel with Sand		32.6
24			SS-6	18.5	20.0	Red & Brown Silty Gravel with Sand		28.9
24			SS-7	23.5	25.0	Red & Brown Silty Gravel with Sand		28.9
139	227	X713+00 @ 89' Lt.	SS-1	5.0	6.0	Brown & White Silty Gravel with Sand		14.3
139			SS-2	10.0	11.2	Red Silty Gravel with Sand		33.3
140			SS-3	15.0	16.5	Brown Silty Gravel with Sand		45.8
140			SS-4	20.0	21.5	Beige & White Silty Gravel with Sand		43.4
140			SS-5	25.0	26.5	Brown Silty Gravel with Sand		28.6
140			SS-6	30.0	30.3	Brown Silty Gravel with Sand		26.8

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
	Bridge Over Ramp 4							
1002	1001	183+73 @ 66' Lt.	SS-1	5.0	5.8	Dark Tan Clayey Sand with Gravel		34.6
1004			SS-2	10.0	11.5	Dark Tan Clayey Gravel with Sand		19.0
1004			SS-3	15.0	16.5	Dark Tan Clayey Gravel with Sand		30.2
1004			SS-4	20.0	21.5	Reddish Brown Clayey Gravel with Sand		21.0
1005			SS-5	25.0	26.5	Tan, Yellowish Orange & Reddish Brown Silty Sand with Gravel		29.1
1005			SS-6	30.0	31.3	Reddish & Tan Silty Sand with Gravel		15.2
1006			SS-7	35.0	36.5	Brown Clayey Gravel with Sand		20.4
1006			SS-8	40.0	41.5	Tan & Light Gray Clayey Gravel with Sand		13.2
1006			SS-9	45.0	46.5	Brown, Light Brown & White Clayey Gravel with Sand		44.7
1006			SS-10	50.0	51.5	Brown & Gray Clayey Gravel with Sand		39.0
1006			SS-11	55.0	55.3	Dark Brown & Gray Clayey Gravel with Sand		22.8
1001	1002	185+03 @ 66' Rt.	SS-1	5.0	5.7	Dark Brown & Copper Clayey Gravel with Sand		17.5
1002			SS-2	10.0	11.5	Tan & Dark Tan Clayey Sand with Gravel		35.4
1002			SS-3	15.0	15.3	Dark Tan Clayey Sand with Gravel		19.2
1004			SS-4	20.0	21.5	Reddish Brown Clayey Gravel with Sand		22.0
1004			SS-5	25.0	26.5	Dark Brown Clayey Gravel with Sand		25.0
1004			SS-6	30.0	31.5	Dark Brown Clayey Gravel with Sand		64.1
1005			SS-7	35.0	36.5	Dark Brown & Tan Silty Sand with Gravel		38.4
1005			SS-8	40.0	40.9	Tan & Light Gray Silty Sand with Gravel		44.7
1001	1003	184+32 @ 58' Lt.	SS-1	5.0	5.5	Dark Beige & Dark Tan Clayey Gravel with Sand		9.3
1002			SS-2	10.0	11.5	Tan & Black Clayey Sand with Gravel		22.3
1003			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		17.5
1003			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		19.4
1003			SS-5	25.0	26.5	Brown & Tan Clayey Gravel with Sand		19.1
1004			SS-6	30.0	31.5	Brown Clayey Gravel with Sand		33.8
1004			SS-7	35.0	36.5	Dark Brown & Copper Clayey Gravel with Sand		21.7
1005			SS-8	40.0	41.5	Brown & Tan Silty Sand with Gravel		42.3
1006			SS-9	45.0	46.5	Dark Brown Clayey Gravel with Sand		43.9
1006			SS-10	50.0	51.5	Dark Brown & Tan Clayey Gravel with Sand		26.1
1002	1004	185+48 @ 58' Rt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		18.7
1002			SS-2	10.0	11.5	Brown & Tan Clayey Sand with Gravel		31.4
1003			SS-3	15.0	16.5	Dark Tan Clayey Gravel with Sand		28.8
1003			SS-4	20.0	20.7	Dark Tan Clayey Gravel with Sand		28.9
1004			SS-5	25.0	26.5	Brown Clayey Gravel with Sand		24.7
1004			SS-6	30.0	31.5	Dark Brown & White Clayey Gravel with Sand		30.0
1006			SS-7	35.0	35.4	Dark Brown Clayey Gravel with Sand		24.8
1006			SS-8	40.0	40.3	Dark Brown & Tan Clayey Gravel with Sand		33.6
1007	1005	185+66 @ 58' Lt.	SS-1	5.0	5.9	Reddish Brown Clayey Gravel with Sand		18.6
1007			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		38.8
1008			SS-3	15.0	16.5	Dark Brown Clayey Gravel with Sand		27.0
1008			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		21.1
1009			SS-5	25.0	26.5	Brown Silty Sand with Gravel		21.5
1009			SS-6	30.0	31.5	Copper & Dark Reddish Silty Sand with Gravel		22.8
1009			SS-7	35.0	36.5	Brown & Tan Silty Sand with Gravel		56.6
1009			SS-8	40.0	41.5	Brown & Black Silty Sand with Gravel		69.1
1007	1006	186+70 @ 58' Rt.	SS-1	5.0	5.4	Dark Beige Clayey Gravel with Sand		14.8
1007			SS-2	10.0	11.5	Tan Clayey Gravel with Sand		25.8
1007			SS-3	15.0	16.5	Dark Brown & Beige Clayey Gravel with Sand		38.6
1008			SS-4	20.0	21.5	Tan Clayey Gravel with Sand		28.4
1008			SS-5	25.0	26.5	Brown & Tan Clayey Gravel with Sand		37.2
1008			SS-6	30.0	31.5	Dark Brown & Tan Clayey Gravel with Sand		34.5
1009			SS-7	35.0	36.5	Brown Silty Sand with Gravel		19.7
1010			SS-8	40.0	41.5	Light Brown Silty Sand with Gravel		36.9
1010			SS-9	45.0	45.8	Light Brown Silty Sand with Gravel		30.2
1008	1007	186+40 @ 58' Lt.	SS-1	5.0	6.5	Dark Brown & Tan Clayey Gravel with Sand		20.2
1008			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		20.7
1008			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		31.4
1009			SS-4	20.0	21.3	Brown & Tan Silty Sand with Gravel		34.3
1009			SS-5	25.0	26.5	Dark Brown & Dark Yellowish Orange Silty Sand with Gravel		19.3
1009			SS-6	30.0	31.5	Brown & Beige Silty Sand with Gravel		25.6
1009			SS-7	35.0	36.5	Dark Brown, Copper & Black Silty Sand with Gravel		36.7

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1010			SS-8	40.0	41.5	Light Beige & White Silty Sand with Gravel		28.7
1010			SS-9	45.0	46.0	Light Gray, Brown & Tan Silty Sand with Gravel		24.9
1007	1008	187+54 @ 66' Rt.	SS-1	5.0	6.2	Tan Clayey Gravel with Sand		26.6
1008			SS-2	10.0	11.5	Dark Brown Clayey Gravel with Sand		29.0
1008			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		44.9
1009			SS-4	20.0	21.5	Light Brown Silty Sand with Gravel		37.7
1009			SS-5	25.0	26.5	Copper & Reddish Silty Sand with Gravel		26.6
1009			SS-6	30.0	31.5	Brown & Beige Silty Sand with Gravel		37.6
1009			SS-7	35.0	36.5	Brown Silty Sand with Gravel		45.4
1011			SS-8	40.0	41.0	Dark Reddish Brown Gravelly Fat Clay		70.8
1011			SS-9	45.0	46.5	Dark Brown Gravelly Fat Clay		64.2
		Bridge Over Old Highway 68						
1012	1101	191+37 @ 66' Lt.	SS-1	5.0	5.7	Dark Reddish Brown Clayey Sand with Gravel		26.9
1012			SS-2	10.0	10.9	Reddish Brown & Tan Clayey Sand with Gravel		29.3
1012			SS-3	15.0	16.3	Reddish Brown & Tan Clayey Sand with Gravel		23.9
1013			SS-4	35.0	36.5	Reddish Brown Sandy Fat Clay with Gravel		23.8
1013			SS-5	40.0	41.5	Reddish Brown Sandy Fat Clay with Gravel		30.9
1013			SS-6	45.0	46.5	Reddish Brown Sandy Fat Clay with Gravel		26.2
1014			SS-7	50.0	51.5	Reddish Brown Clayey Gravel with Sand		32.9
1015			SS-8	55.0	56.5	Reddish Brown & Tan Clayey Gravel with Sand		12.4
1015			SS-9	60.0	61.5	Brown Clayey Gravel with Sand		16.6
1012	1102	191+67 @ 66' Rt.	SS-1	5.0	6.5	Reddish Brown & Tan Clayey Sand with Gravel		32.9
1012			SS-2	15.0	16.5	Reddish Brown & Tan Clayey Sand with Gravel		24.5
1013			SS-3	20.0	21.5	Reddish Brown Sandy Fat Clay with Gravel		21.0
1014			SS-4	25.0	26.5	Reddish Brown Clayey Gravel with Sand		14.5
1014			SS-5	30.0	31.5	Light and Dark Reddish Brown Clayey Gravel with Sand		44.6
1015			SS-6	35.0	36.5	Dark Reddish Brown Clayey Gravel with Sand		27.3
1015			SS-7	40.0	41.5	Reddish Brown Clayey Gravel with Sand		17.6
1015			SS-8	45.0	46.5	Reddish Brown Clayey Gravel with Sand		12.0
1015			SS-9	50.0	51.5	Reddish Brown & Tan Clayey Gravel with Sand		35.9
1017			SS-10	55.0	56.5	Reddish Brown & Tan Silty Sand with Gravel		33.2
1017			SS-11	60.0	60.3	Reddish Brown Silty Sand with Gravel		21.9
1012	1103	191+92 @ 58' Rt.	SS-1	5.0	5.9	White, Tan & Reddish Brown Clayey Sand with Gravel		27.2
1013			SS-2	10.0	10.9	White, Light Reddish Tan & Brownish Red Sandy Fat Clay with Gravel		22.3
1014			SS-3	15.0	16.5	White & Reddish Tan Clayey Gravel with Sand		31.2
1014			SS-4	20.0	21.4	White & Reddish Tan Clayey Gravel with Sand		19.4
1014			SS-5	25.0	26.5	Reddish Brown & White Clayey Gravel with Sand		14.5
1015			SS-6	30.0	31.5	White & Reddish Brown Clayey Gravel with Sand		16.3
1015			SS-7	35.0	36.5	White, Reddish Brown & Tan Clayey Gravel with Sand		10.5
1015			SS-8	40.0	41.5	Reddish Brown & White Clayey Gravel with Sand		21.1
1015			SS-9	45.0	46.5	Brownish Red & White Clayey Gravel with Sand		33.6
1015			SS-10	50.0	51.5	Dark Brownish Red & Grayish White Clayey Gravel with Sand		18.7
1016			SS-11	55.0	56.5	Dark Brownish Red Clayey Gravel with Sand		73.3
1016			SS-12	60.0	61.2	Dark Brownish Red, Tan & Grayish White Clayey Gravel with Sand		33.1
1012	1104	192+19 @ 58' Rt.	SS-1	5.0	5.8	Reddish Brown & Dark Brown Clayey Sand with Gravel		23.8
1013			SS-2	10.0	11.5	Dark Reddish Brown Sandy Fat Clay with Gravel		38.2
1013			SS-3	15.0	15.9	Reddish Brown & Dark Brown Sandy Fat Clay with Gravel		23.8
1014			SS-4	20.0	21.5	Reddish Brown Clayey Gravel with Sand		18.1
1014			SS-5	25.0	26.5	Reddish Brown & Dark Brown Clayey Gravel with Sand		25.1
1014			SS-6	30.0	31.5	Reddish Brown & Dark Brown Clayey Gravel with Sand		21.0
1015			SS-7	35.0	36.5	Reddish Brown Clayey Gravel with Sand		24.5
1015			SS-8	40.0	41.5	Reddish Brown Clayey Gravel with Sand		14.9
1016			SS-9	45.0	46.5	Dark Reddish Brown & Dark Brown Clayey Gravel with Sand		19.6
1016			SS-10	50.0	51.5	Dark Reddish Brown & Dark Brown Clayey Gravel with Sand		19.0
1016			SS-11	55.0	56.5	Dark Reddish Brown & Dark Brown Clayey Gravel with Sand		33.4
1017			SS-12	60.0	61.5	Tan & Reddish Brown Silty Sand with Gravel		39.7
1017			SS-13	65.0	66.3	Tan Silty Sand with Gravel		28.6
1018	1105	192+88 @ 58' Lt.	SS-1	5.0	6.5	Brownish Red & Brown Sandy Fat Clay with Gravel		39.3
1019			SS-2	10.0	11.5	White & Reddish Tan Clayey Sand with Gravel		27.7
1019			SS-3	15.0	16.4	Reddish Tan & White Clayey Sand with Gravel		17.5
1019			SS-4	20.0	21.5	Reddish Brown & Beige Clayey Sand with Gravel		29.1
1020			SS-5	25.0	26.5	Grayish White, Reddish Brown & Tan Clayey Gravel with Sand		19.1

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Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1020			SS-6	30.0	31.5	White & Dark Reddish Brown Clayey Gravel with Sand		16.3
1020			SS-7	35.0	36.5	Reddish Tan Clayey Gravel with Sand		50.4
1020			SS-8	40.0	41.5	Grayish White & Reddish Brown Clayey Gravel with Sand		15.5
1020			SS-9	45.0	46.5	Reddish Brown & Grayish White Clayey Gravel with Sand		22.4
1021			SS-10	50.0	51.5	Reddish Tan & Gray Clayey Gravel with Sand		22.5
1021			SS-11	55.0	56.5	Brownish Red, Brown & Beige Clayey Gravel with Sand		24.9
1021			SS-12	60.0	61.3	Brownish Red & Beige Clayey Gravel with Sand		38.2
1018	1106	193+23 @ 58' Rt.	SS-1	5.0	6.2	Red Sandy Fat Clay with Gravel		27.0
1018			SS-2	10.0	10.8	Red Sandy Fat Clay with Gravel		29.4
1018			SS-3	15.0	16.5	Red Sandy Fat Clay with Gravel		38.3
1018			SS-4	20.0	21.5	Red Sandy Fat Clay with Gravel		44.2
1018			SS-5	25.0	26.5	Red Sandy Fat Clay with Gravel		34.6
1019			SS-6	30.0	31.3	Red Clayey Sand with Gravel		18.1
1019			SS-7	35.0	36.3	Red Clayey Sand with Gravel		35.1
1019			SS-8	40.0	41.5	Red Clayey Sand with Gravel		18.8
1019			SS-9	45.0	46.5	Brown Clayey Sand with Gravel		33.7
1020			SS-10	50.0	51.5	Brown & White Clayey Gravel with Sand		17.3
1020			SS-11	55.0	56.4	Brown & White Clayey Gravel with Sand		13.8
1021			SS-12	60.0	61.5	Brown Clayey Gravel with Sand		31.4
1021			SS-13	65.0	66.5	White Clayey Gravel with Sand		27.8
1018	1107	193+39 @ 36' Lt.	SS-1	5.0	6.4	Light and Dark Brownish Red & Gray Sandy Fat Clay with Gravel		31.6
1018			SS-2	10.0	11.5	Light and Dark Brownish Red Sandy Fat Clay with Gravel		31.5
1019			SS-3	15.0	16.4	Grayish White & Reddish Tan Clayey Sand with Gravel		12.9
1020			SS-4	20.0	21.5	White & Reddish Brown Clayey Gravel with Sand		25.0
1020			SS-5	25.0	26.5	White, Reddish Tan & Brown Clayey Gravel with Sand		16.5
1020			SS-6	30.0	30.3	Reddish Brown & Grayish White Clayey Gravel with Sand		15.0
1018	1108	193+72 @ 66' Rt.	SS-1	5.0	6.2	Red & White Sandy Fat Clay with Gravel		28.2
1018			SS-2	10.0	10.9	Light Reddish Tan, Red & Gray Sandy Fat Clay with Gravel		12.3
1018			SS-3	15.0	16.5	Reddish Tan & Reddish Brown Sandy Fat Clay with Gravel		37.9
1019			SS-4	20.0	21.5	Reddish Tan & Reddish Brown Clayey Sand with Gravel		33.4
1019			SS-5	25.0	26.5	Reddish Tan & Reddish Brown Clayey Sand with Gravel		20.4
1019			SS-6	30.0	31.5	Reddish Tan, Reddish Brown & Gray Clayey Sand with Gravel		25.3
1020			SS-7	35.0	36.5	Reddish Tan, Gray & Brown Clayey Gravel with Sand		18.7
1020			SS-8	40.0	40.4	Reddish Tan, White & Brown Clayey Gravel with Sand		21.0
1020			SS-9	45.0	46.5	Reddish Tan, White & Brown Clayey Gravel with Sand		24.0
1020			SS-10	50.0	51.5	Dark Reddish Brown, Brown & Beige Clayey Gravel with Sand		39.2
1021			SS-11	55.0	56.5	Brownish Red & White Clayey Gravel with Sand		30.5
1021			SS-12	60.0	61.5	Beige, White and Dark Brownish Red Clayey Gravel with Sand		22.1
1021			SS-13	65.0	66.4	Beige & Light Reddish Tan Clayey Gravel with Sand		55.4
	Bridge Over US Highway 412 On Grimsley Road							
1022	1201	18+87 @ 30' Lt.	SS-1	5.0	6.5	Tan, Gray & Yellowish Orange Clayey Gravel		16.1
1023	1201A	18+87 @ 32' Lt.	SS-2	10.0	11.5	Brown & White Fat Clay with Gravel		37.9
1024			SS-3	15.0	16.5	Brown & Tan Clayey Gravel with Sand		36.7
1024			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		20.0
1025			SS-5	25.0	26.5	Tan & White Silty Gravel with Sand		12.0
1025			SS-6	30.0	31.5	Light Gray, Brown & Black Silty Gravel with Sand		27.6
1025			SS-7	35.0	36.5	Beige Silty Gravel with Sand		43.3
1025			SS-8	40.0	41.5	Beige & Brown Silty Gravel with Sand		40.6
1026			SS-9	45.0	46.4	Gray & Dark Beige Clayey Gravel with Sand		9.5
1026			SS-10	50.0	51.5	Gray & Dark Beige Clayey Gravel with Sand		22.0
1026			SS-11	55.0	56.5	Dark Beige & Light Gray Clayey Gravel with Sand		32.7
1022	1202	20+00 @ 14' Rt.	SS-1	5.0	5.9	Dark Brown & Dark Gray Clayey Gravel		7.8
1024			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		33.5
1024			SS-3	15.0	16.5	Brown & Light Gray Clayey Gravel with Sand		30.5
1025			SS-4	20.0	21.5	Light Brown & Beige Silty Gravel with Sand		46.0
1025			SS-5	25.0	26.5	Beige Silty Gravel with Sand		28.3
1025			SS-6	30.0	31.5	Brown & Light Tan Silty Gravel with Sand		24.5
1026			SS-7	35.0	36.5	Light Beige & Brown Clayey Gravel with Sand		24.1
1026			SS-8	40.0	40.9	Light Gray & Tan Clayey Gravel with Sand		26.9
1026			SS-9	45.0	46.5	Olive Gray & Gray Clayey Gravel with Sand		37.9
1022	1203	20+91 @ 14' Lt.	SS-1	5.0	6.3	Gray, Dark Tan & Yellowish Orange Clayey Gravel		16.1

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
		Bridge Over Javello Road On U.S. Highway 412						
1028	1301	293+96 @ 44' Lt.	SS-1	5.0	6.5	Copper & Dark Beige Clayey Sand with Gravel		28.7
1028	1302	294+96 @ 44' Rt.	SS-1	5.0	6.5	Dark Brown Clayey Sand with Gravel		23.0
1028			SS-2	10.0	11.0	Copper Clayey Sand with Gravel		20.2
1027	1303	295+58 @ 44' Lt.	SS-1	5.0	6.5	Dark Reddish Brown & Copper Clayey Gravel with Sand		22.9
1027	1304	296+59 @ 44' Rt.	SS-1	5.0	6.3	Brown & Tan Clayey Gravel with Sand		12.1
1027			SS-2	10.0	11.5	Dark Tan & Copper Clayey Gravel with Sand		34.4
1029			SS-3	15.0	16.5	Tan & White Clayey Gravel with Sand		35.9
1029			SS-4	20.0	21.4	Light Gray Clayey Gravel with Sand		29.6
		Bridge Over U.S. Highway 412 On Liberty Road						
1031	1401	18+95 @ 14' Rt.	SS-1	5.0	6.5	Gray & Dark Brown Clayey Sand		29.0
1031			SS-2	10.0	10.4	Dark Gray & Brown Clayey Sand		32.4
1030	1402	20+00 @ 14' Lt.	SS-1	5.0	6.5	Dark Gray & Brown Lean Clay with Sand		27.2
1031			SS-2	10.0	11.5	Brown, Dark Gray & Yellowish Orange Clayey Sand		38.0
1031			SS-3	15.0	15.8	Tan & Black Clayey Sand		37.4
1030	1403	21+00 @ 14' Rt.	SS-1	5.0	6.5	Gray Lean Clay with Sand		28.4
		Bridge Over Marchant Road On U.S. Highway 412						
1036	1501	426+88 @ 44' Rt.	SS-1	5.0	6.4	Tan Silty Sand with Gravel		21.8
1036			SS-2	10.0	11.5	Tan Silty Sand with Gravel		34.6
1037			SS-3	15.0	16.5	Copper & Dark Brown Clayey Sand with Gravel		40.8
1037			SS-4	20.0	21.5	Dark Brown Clayey Sand with Gravel		21.3
1038			SS-5	25.0	25.4	Dark Brown Silty Gravel with Sand		13.7
1039			SS-6	30.0	31.5	Brown & Light Brown Silty Sand with Gravel		41.7
1035	1502	427+86 @ 44' Lt.	SS-1	5.0	6.5	Copper Silt		29.1
1036			SS-2	10.0	11.5	Dark Tan Silty Sand with Gravel		31.4
1037			SS-3	15.0	16.4	Brown & Tan Clayey Sand with Gravel		28.8
1038			SS-4	20.0	20.9	Dark Brown Silty Gravel with Sand		11.2
1035	1503	428+27 @ 44' Rt.	SS-1	5.0	6.5	Copper & Tan Silt		19.1
1036			SS-2	10.0	11.5	Brown Silty Sand with Gravel		39.3
1036			SS-3	15.0	15.9	Tan & Brown Silty Sand with Gravel		26.3
1037			SS-4	20.0	21.5	Brown Clayey Sand with Gravel		38.2
1038			SS-5	25.0	26.5	Dark Brown & Light Gray Silty Gravel with Sand		32.8
1032	1504	429+29 @ 44' Lt.	SS-1	5.0	6.5	Brown & Tan Silty Gravel with Sand		20.1
1032			SS-2	10.0	11.5	Dark Tan Silty Gravel with Sand		17.9
1033			SS-3	15.0	16.5	Brown Gravelly Fat Clay with Sand		31.2
1034			SS-4	20.0	21.5	Tan & Brown Gravelly Silt with Sand		34.9
		Bridge Over Robbins Road On U.S. Highway 412						
1040	1601	462+68 @ 44' Lt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		15.7
1040			SS-2	10.0	11.5	Brown Silty Gravel with Sand		19.4
1041			SS-3	15.0	16.5	Brown & Beige Silty Sand with Gravel		16.3
1042			SS-4	20.0	21.5	Dark Brown & Tan Silty Gravel with Sand		36.0
1042			SS-5	25.0	26.5	Tan Silty Gravel with Sand		24.6
1042			SS-6	30.0	31.5	Tan Silty Gravel with Sand		50.5
1042			SS-7	35.0	36.5	Tan & Brown Silty Gravel with Sand		46.0
1043			SS-8	40.0	41.5	Tan & Dark Brown Clayey Gravel with Sand		39.1
1043			SS-9	45.0	46.5	Copper & Light Beige Clayey Gravel with Sand		40.3
1040	1602	463+46 @ 44' Rt.	SS-1	5.0	6.5	Brownish Gray & Tan Silty Gravel with Sand		16.0
1040			SS-2	10.0	11.5	Brown Silty Gravel with Sand		29.7
1041			SS-3	15.0	16.5	Brown & Light Beige Silty Sand with Gravel		22.0
1041			SS-4	20.0	21.5	Brown & Copper Silty Sand with Gravel		21.8
1040	1603	463+98 @ 44' Lt.	SS-1	5.0	6.5	Tan Silty Gravel with Sand		27.5
1041			SS-2	10.0	11.5	Light Beige Silty Sand with Gravel		17.1
1041			SS-3	15.0	16.5	Copper Silty Sand with Gravel		24.1

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1040	1604	464+79 @ 44' Rt.	SS-1	4.0	5.5	Brown & Tan Silty Gravel with Sand		13.3
1040			SS-2	9.0	10.5	Brown & Tan Silty Gravel with Sand		16.6
1041			SS-3	14.0	15.5	Dark Brown & White Silty Sand with Gravel		18.8
1041			SS-4	19.0	20.5	Brown Silty Sand with Gravel		12.6
1041			SS-5	24.0	25.5	Brown Silty Sand with Gravel		15.7
1043			SS-6	29.0	30.5	Copper Clayey Gravel with Sand		12.2
1043			SS-7	34.0	35.5	Dark Brown Clayey Gravel with Sand		21.1
1043			SS-8	39.0	40.3	Dark Brown & Light Brown Clayey Gravel with Sand		65.1
1043			SS-9	44.0	45.5	Copper Clayey Gravel with Sand		41.8
		Highway 112 0ver U.S. Highway 412						
1044	1701	19+04 @ 21' Rt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		34.3
1045			SS-2	10.0	11.5	Red Silty Gravel with Sand		24.9
1045			SS-3	15.0	16.5	Red Silty Gravel with Sand		25.4
1045			SS-4	20.0	21.5	Red Silty Gravel with Sand		28.4
1045			SS-5	25.0	26.5	Red Silty Gravel with Sand		21.3
1045			SS-6	30.0	31.5	Red Silty Gravel with Sand		31.8
1045			SS-7	35.0	36.5	Red Silty Gravel with Sand		22.5
1046			SS-8	40.0	41.5	Brown Silty Gravel with Sand		29.2
1046			SS-9	45.0	46.5	Brown Silty Gravel with Sand		42.9
1046			SS-10	50.0	51.5	Brown Silty Gravel with Sand		24.8
1047			SS-11	55.0	56.5	Brown Silty Gravel with Sand		19.0
1047			SS-12	60.0	61.5	Brown Silty Gravel with Sand		28.5
1047			SS-13	65.0	66.5	Brown Silty Gravel with Sand		26.2
1044	1702	20+00 @ 16' Rt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		40.5
1044			SS-2	10.0	11.5	Brown Silty Gravel with Sand		35.8
1044			SS-3	15.0	16.5	Brown Silty Gravel with Sand		30.3
1045			SS-4	20.0	21.5	Brown Silty Gravel with Sand		29.9
1045			SS-5	25.0	26.4	Brown Silty Gravel with Sand		28.2
1044	1703	20+96 @ 21' Lt.	SS-1	5.0	6.4	Red Silty Gravel with Sand		31.7
1045			SS-2	10.0	11.5	Brown Silty Gravel with Sand		11.5
1045			SS-3	15.0	16.5	Brown Silty Gravel with Sand		14.8
1045			SS-4	20.0	21.5	Brown Silty Gravel with Sand		20.0
1045			SS-5	25.0	26.5	Brown Silty Gravel with Sand		26.2
1045			SS-6	30.0	31.5	Brown Silty Gravel with Sand		24.0
1045			SS-7	35.0	36.5	Brown Silty Gravel with Sand		38.2
1045			SS-8	40.0	41.5	Brown Silty Gravel with Sand		48.4
1046			SS-9	45.0	46.5	Brown Silty Gravel with Sand		41.2
1046			SS-10	50.0	51.5	Brown Silty Gravel with Sand		41.5
1046			SS-11	55.0	56.5	Brown Silty Gravel with Sand		25.1
1046			SS-12	60.0	61.5	Brown Silty Gravel with Sand		22.8
1047			SS-13	65.0	66.5	Brown & Gray Silty Gravel with Sand		33.8
1047			SS-14	70.0	71.5	Brown & Gray Silty Gravel with Sand		26.3
1047			SS-15	75.0	76.5	Brown & Gray Silty Gravel with Sand		28.1
1047			SS-16	80.0	81.5	Brown & Gray Silty Gravel with Sand		37.6
		Retaining Walls for Highway 112 Over U.S. Highway 412						
1049	1801	18+95 @ 56' Lt.	SS-1	5.0	6.4	Red Silty Gravel with Sand		32.3
1049			SS-2	10.0	11.5	Red Silty Gravel with Sand		27.7
1049			SS-3	15.0	16.0	Red Silty Gravel with Sand		15.0
1049			SS-4	20.0	21.5	Red Silty Gravel with Sand		26.1
1050			SS-5	25.0	26.4	Red Silty Gravel with Sand		28.2
1050			SS-6	30.0	31.5	Red Silty Gravel with Sand		33.2
1051			SS-7	35.0	36.5	Red Silty Gravel with Sand		21.9
1051			SS-8	40.0	41.5	Red Silty Gravel with Sand		31.4
1048	1802	19+10 @ 21' Lt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		39.5
1048			SS-2	10.0	11.5	Brown Silty Gravel with Sand		36.7
1048			SS-3	15.0	16.5	Brown Silty Gravel with Sand		24.0
1048			SS-4	20.0	21.5	Brown Silty Gravel with Sand		25.5
1049			SS-5	25.0	26.5	Brown Silty Gravel with Sand		29.2
1050			SS-6	30.0	30.8	Brown & White Silty Gravel with Sand		18.7
1050			SS-7	35.0	36.5	Brown & White Silty Gravel with Sand		13.7
1048	1803	18+78 @ 54' Lt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		38.8
1049			SS-2	10.0	11.5	Brown Silty Gravel with Sand		17.9

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1049			SS-3	15.0	16.5	Brown Silty Gravel with Sand		23.7
1049			SS-4	20.0	21.5	Brown Silty Gravel with Sand		24.0
1050			SS-5	25.0	26.5	Brown Silty Gravel with Sand		36.6
1050			SS-6	30.0	31.5	Brown Silty Gravel with Sand		38.2
1050			SS-7	35.0	36.5	Brown Silty Gravel with Sand		22.8
1048	1804	21+22 @ 48' Lt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		33.6
1048			SS-2	10.0	11.5	Brown Silty Gravel with Sand		31.2
1048			SS-3	15.0	16.5	Brown Silty Gravel with Sand		17.2
1049			SS-4	20.0	21.4	Brown Silty Gravel with Sand		27.2
1049			SS-5	25.0	26.5	Brown Silty Gravel with Sand		27.7
1049			SS-6	30.0	31.5	Brown Silty Gravel with Sand		39.2
1050			SS-7	35.0	36.5	Brown Silty Gravel with Sand		31.1
1050			SS-8	40.0	41.5	Brown Silty Gravel with Sand		17.1
1051			SS-9	45.0	46.5	Brown Silty Gravel with Sand		17.6
1049	1805	20+90 @ 21' Rt.	SS-1	5.0	6.5	Tan Silty Gravel with Sand		24.6
1049			SS-2	10.0	11.5	Tan Silty Gravel with Sand		23.0
1049			SS-3	15.0	16.5	Reddish Brown & White Silty Gravel with Sand		14.4
1049			SS-4	20.0	21.5	Reddish Brown Silty Gravel with Sand		22.9
1050			SS-5	25.0	26.5	Reddish Tan Silty Gravel with Sand		29.4
1050			SS-6	30.0	31.5	Reddish Brown Silty Gravel with Sand		29.2
1050			SS-7	35.0	36.5	Tan & Beige Silty Gravel with Sand		47.0
1051			SS-8	40.0	41.5	Brown Silty Gravel with Sand		28.2
1051			SS-9	45.0	46.5	Brown Silty Gravel with Sand		18.4
1051			SS-10	50.0	51.5	Brown Silty Gravel with Sand		23.7
1048	1806	21+10 @ 56' Rt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		40.8
1048			SS-2	10.0	11.5	Red Silty Gravel with Sand		16.7
1048			SS-3	15.0	16.5	Red Silty Gravel with Sand		32.1
1048			SS-4	20.0	21.5	Red Silty Gravel with Sand		22.0
1049			SS-5	25.0	26.5	Red Silty Gravel with Sand		28.1
1049			SS-6	30.0	31.5	Red Silty Gravel with Sand		18.4
1050			SS-7	35.0	35.5	White Silty Gravel with Sand		7.2
1050			SS-8	40.0	41.5	Tan Silty Gravel with Sand		32.8
1050			SS-9	45.0	46.5	Tan Silty Gravel with Sand		28.7
		Spring Creek Street 0ver U.S. Highway 412						
1056	1901	18+98 @ 16' Lt.	SS-1	4.4	4.8	Red Sandy Lean Clay with Gravel		11.2
1056			SS-2	9.4	10.9	Red Sandy Lean Clay with Gravel		40.0
1057			SS-3	14.4	15.9	Red Silty Gravel with Sand		31.8
1057			SS-4	19.4	20.9	Red Silty Gravel with Sand		21.0
1057	1902	20+00 @ CL	SS-1	5.0	6.5	Red Silty Gravel with Sand		7.0
1057			SS-2	10.0	11.5	Red Silty Gravel with Sand		12.8
1057			SS-3	15.0	16.2	Red Silty Gravel with Sand		16.9
1056	1903	21+13 @ 16' Rt.	SS-1	5.0	6.5	Brown Sandy Lean Clay with Gravel		17.0
1057			SS-2	10.0	10.7	Brown Silty Gravel with Sand		8.3
1058			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		17.9
1058			SS-4	20.0	21.5	Red Clayey Gravel with Sand		16.1
1058			SS-5	25.0	26.5	Red Clayey Gravel with Sand		31.2
1058			SS-6	30.0	30.7	Brown Clayey Gravel with Sand		19.8
		Retaining Walls for Spring Creek Street Over U.S. Highway 412						
195	2001	18+78 @ 35' Lt.	SS-1	5.0	6.5	Brown Gravelly Fat Clay with Sand		33.4
195			SS-2	10.0	11.5	Brown Gravelly Fat Clay with Sand		24.4
197			SS-3	15.0	16.5	Brown & Tan Silty Gravel with Sand		31.2
197			SS-4	20.0	21.5	Brown, Tan & Light Gray Silty Gravel with Sand		53.6
196	2002	19+08 @ 16' Rt.	SS-1	5.0	6.4	Light Red Silty Sand with Gravel		30.4
196			SS-2	10.0	11.5	Light Red Silty Sand with Gravel		38.2
196			SS-3	15.0	16.5	Light Red Silty Sand with Gravel		45.8
197			SS-4	20.0	21.5	Light Red Silty Gravel with Sand		24.7
196	2003	19+03 @ 45' Rt.	SS-1	5.0	6.5	Light Red Silty Sand with Gravel		23.5
196			SS-2	10.0	11.5	Light Red Silty Sand with Gravel		33.6
196			SS-3	15.0	16.5	Light Red Silty Sand with Gravel		44.4

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
197			SS-4	20.0	21.5	Light Red Silty Gravel with Sand		25.9
197			SS-5	25.0	25.7	Light Red Silty Gravel with Sand		20.6
196	2004	21+33 @ 35'Rt.	SS-1	5.0	6.5	Copper Silty Sand with Gravel		10.8
196			SS-2	10.0	11.5	Tan Silty Sand with Gravel		35.5
196			SS-3	15.0	16.5	Dark Brown & Tan Silty Sand with Gravel		27.1
198			SS-4	20.0	21.5	Copper & Brown Clayey Gravel with Sand		17.0
198			SS-5	25.0	26.5	Dark Brown, Copper & Beige Clayey Gravel with Sand		20.8
198			SS-6	30.0	31.5	Dark Beige & Brown Clayey Gravel with Sand		26.0
198			SS-7	35.0	36.5	Copper & Brown Clayey Gravel with Sand		23.3
198			SS-8	40.0	41.5	Brown Clayey Gravel with Sand		53.4
	Zion Road Over US Highway 412							
1071	2101	18+80 @ 25' Lt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		41.4
1072			SS-2	10.0	11.1	Red Silty Sand with Gravel		26.2
1072			SS-3	15.0	16.5	Red Silty Sand with Gravel		31.4
1073			SS-4	20.0	21.5	Red Silty Gravel with Sand		22.6
1073			SS-5	25.0	26.5	Red Silty Gravel with Sand		31.2
1074			SS-6	30.0	31.5	Red Sandy Lean Clay		28.5
1075			SS-7	35.0	36.5	Beige Silty Gravel with Sand		59.4
1075			SS-8	40.0	41.5	Beige Silty Gravel with Sand		43.4
1075			SS-9	45.0	46.5	Beige Silty Gravel with Sand		32.0
1071	2102	20+00 @ 25' Rt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		30.9
1071			SS-2	10.0	11.5	Red Silty Gravel with Sand		22.1
1073			SS-3	15.0	16.5	Red Silty Gravel with Sand		20.5
1073			SS-4	20.0	21.5	Red Silty Gravel with Sand		21.0
1073			SS-5	25.0	26.5	Light Brown Silty Gravel with Sand		25.0
1073			SS-6	30.0	31.5	Red Silty Gravel with Sand		24.5
1074			SS-7	35.0	36.5	Red Sandy Lean Clay		30.2
1075			SS-8	40.0	41.5	Red Silty Gravel with Sand		33.0
1075			SS-9	45.0	46.5	Light Brown Silty Gravel with Sand		29.1
1075			SS-10	50.0	50.5	Red & Brown Silty Gravel with Sand		27.6
1070	2103	21+32 @ 25' Lt.	SS-1	5.0	6.5	Red Well-Graded Gravel with Clay and Sand (and(or Silty Clay and Sand)		24.6
1070			SS-2	10.0	11.5	Red Well-Graded Gravel with Clay and Sand (and(or Silty Clay and Sand)		44.0
1071			SS-3	15.0	16.5	Red Silty Gravel with Sand		61.5
1073			SS-4	20.0	21.5	Red Silty Gravel with Sand		25.3
1073			SS-5	25.0	26.5	Red Silty Gravel with Sand		22.2
1074			SS-6	30.0	31.5	Red Sandy Lean Clay		46.6
1076			SS-7	35.0	36.5	Red Clayey Gravel with Sand		42.8
1076			SS-8	40.0	40.2	Red Clayey Gravel with Sand		24.1
1076			SS-9	45.0	46.5	Red & Brown Clayey Gravel with Sand		31.0
	Retaining Walls for Zion Road Over U.S. Highway 412							
1077	2201	18+25 @ 45' Lt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		43.4
1078			SS-2	10.0	11.5	Red Silty Gravel with Sand		28.5
1078			SS-3	15.0	16.5	Red Silty Gravel with Sand		40.7
1078			SS-4	20.0	21.5	Red Silty Gravel with Sand		23.6
1079			SS-5	25.0	26.5	Red Silty Gravel with Sand		53.2
1080			SS-6	30.0	31.5	Red Clayey Gravel with Sand		57.4
1080			SS-7	35.0	36.5	Red Clayey Gravel with Sand		28.1
1080			SS-8	40.0	41.5	Red Clayey Gravel with Sand		23.3
1081			SS-9	45.0	46.5	Red & Brown Silty Gravel with Sand		33.2
1078	2202	19+00 @ 50' Rt.	SS-1	5.0	5.8	Red Silty Gravel with Sand		23.6
1078			SS-2	10.0	11.5	Red Silty Gravel with Sand		25.2
1079			SS-3	15.0	15.9	Red Silty Gravel with Sand		27.0
1079			SS-4	20.0	21.5	Light Brown Silty Gravel with Sand		43.0
1079			SS-5	25.0	26.5	Red Silty Gravel with Sand		50.6
1080			SS-6	30.0	31.5	Light Beige Clayey Gravel with Sand		29.7
1081			SS-7	35.0	36.5	Light Beige Silty Gravel with Sand		35.6
1081			SS-8	40.0	41.5	Light Beige Silty Gravel with Sand		29.5
1081			SS-9	45.0	46.5	Light Beige Silty Gravel with Sand		32.9
1077	2203	21+13 @ 50' Lt.	SS-1	5.0	6.5	Light Red Clayey Gravel with Sand		30.1
1079			SS-2	10.0	11.5	Red Silty Gravel with Sand		30.4
1079			SS-3	15.0	16.5	Red Silty Gravel with Sand		30.7

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1077	2204	21+81 @ 43' Rt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		26.4
1077			SS-2	10.0	11.5	Red Clayey Gravel with Sand		29.8
1078			SS-3	15.0	16.5	Red Silty Gravel with Sand		30.3
1078			SS-4	20.0	21.5	Red Silty Gravel with Sand		23.8
1078			SS-5	25.0	26.5	Red Silty Gravel with Sand		31.1
1080			SS-6	30.0	31.5	Red Clayey Gravel with Sand		27.6
1080			SS-7	35.0	36.5	Red Clayey Gravel with Sand		38.4
1080			SS-8	40.0	41.5	Red Clayey Gravel with Sand		35.7
	US Highway 412 Over Brush Creek & Brush Creek Rd.							
1059	2301	380+62 @ 44' Lt.	SS-1	4.9	6.4	Gray Gravelly Lean Clay		22.0
1061	2302	380+62 @ 44' Rt.	SS-1	4.9	6.4	Brown Well-Graded Gravel with Silt and Sand		26.2
1060	2303	381+43 @ 44' Lt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		20.4
1060	2304	381+43 @ 44' Rt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		22.3
1061	2305	382+23 @ 44' Lt.	SS-1	4.9	6.4	Brown Well-Graded Gravel with Silt and Sand		25.0
1059	2306	382+23 @ 44' Rt.	SS-1	4.0	5.5	Gray Gravelly Lean Clay		25.2
1060	2307	383+03 @ 44' Lt.	SS-1	4.5	6.0	Brown Clayey Gravel with Sand		17.5
1061			SS-2	9.5	11.0	Brown Well-Graded Gravel with Silt and Sand		21.0
1060	2308	383+03 @ 44' Rt.	SS-1	4.8	6.3	Brown Clayey Gravel with Sand		22.6
1061	2309	383+83 @ 44' Lt.	SS-1	4.8	6.3	Brown Well-Graded Gravel with Silt and Sand		21.3
1061	2310	383+83 @ 44' Rt.	SS-1	4.8	6.3	Brown Well-Graded Gravel with Silt and Sand		20.9
1061	2312	384+63 @ 44' Rt.	SS-1	5.0	6.5	Brown Well-Graded Gravel with Silt and Sand		30.1
1060	2313	385+43 @ 44' Lt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		22.8
1060			SS-2	9.7	11.2	Brown Clayey Gravel with Sand		22.2
1061	2314	385+43 @ 44' Rt.	SS-1	4.8	6.3	Brown Well-Graded Gravel with Silt and Sand		25.9
1059	2315	386+23 @ 44' Lt.	SS-1	4.6	6.1	Gray Gravelly Lean Clay		24.7
1061			SS-2	9.6	11.1	Gray Well-Graded Gravel with Silt and Sand		24.7
1060	2316	386+23 @ 44' Rt.	SS-2	9.8	11.3	Brown Clayey Gravel with Sand		16.1
1060	2317	387+18 @ 59' Lt.	SS-1	3.4	4.9	Beige Clayey Gravel with Sand		22.9
1060	2318	387+18 @ 44' Rt.	SS-1	4.9	6.4	Brown Clayey Gravel with Sand		28.5
1060			SS-2	9.9	11.4	Brown Clayey Gravel with Sand		30.2
	US Highway 412 Over Spring Creek							
1052	2401	579+49 @ 44' Lt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		21.7
1054			SS-2	10.0	11.5	Brown Poorly Graded Gravel with Silt and Sand		21.2
1054	2402	580+60 @ 44' Rt.	SS-1	5.0	6.5	Brown Poorly Graded Gravel with Silt and Sand		21.3
1054			SS-2	10.0	11.5	Brown Poorly Graded Gravel with Silt and Sand		21.3
1054	2403	580+60 @ 44' Lt.	SS-1	5.0	6.5	Brown Poorly Graded Gravel with Silt and Sand		22.5
1054	2404	580+60 @ 44' Rt.	SS-1	5.0	6.5	Brown Poorly Graded Gravel with Silt and Sand		20.8
1052	2405	581+70 @ 44' Lt.	SS-1	5.0	5.3	White Silty Gravel with Sand		23.0
1052	2406	581+70 @ 44' Rt.	SS-1	5.0	5.5	White Silty Gravel with Sand		24.3
1052	2407	582+80 @ 44' Lt.	SS-1	5.0	5.3	White Silty Gravel with Sand		28.9
1052	2408	582+80 @ 44' Rt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		21.8

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1052	2409	584+05 @ 44' Lt.	SS-1	5.0	6.5	Dark Brown Silty Gravel with Sand		25.3
1052	2410	584+05 @ 44' Rt.	SS-1	5.0	6.5	Gray Silty Gravel with Sand		23.5
1054	2411	585+15 @ 44' Lt.	SS-1	5.0	6.5	Dark Brown Poorly Graded Gravel with Silt and Sand		27.2
1053	2412	585+09 @ 44' Rt.	SS-1	5.0	6.5	White Silty Gravel with Sand		47.0
1055	2413	586+19 @ 44' Lt.	SS-1	5.0	6.5	Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		25.2
1055			SS-2	10.0	11.0	Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		27.0
1055	2414	586+25 @ 44' Rt.	SS-1	5.0	6.5	Dark Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		25.3
1055			SS-2	10.0	11.5	Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		23.2
1055	2415	587+35 @ 44' Lt.	SS-1	5.0	6.5	Red Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		24.4
1055			SS-2	10.0	11.5	Dark Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		24.6
1055			SS-3	15.0	16.5			29.6
1053	2416	587+35 @ 44' Rt.	SS-1	4.8	6.3	Dark Brown Silty Gravel with Sand		27.3
1055			SS-2	9.8	11.3	Brown & Beige Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		20.2
1053	2417	588+51 @ 44' Lt.	SS-1	4.2	4.9	Brown Silty Gravel with Sand		26.2
1055	2418	588+45 @ 44' Rt.	SS-1	5.0	6.5	Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		25.6
1055			SS-2	10.0	11.5	Dark Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		25.1
1055			SS-3	15.0	16.5	Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		20.0
1053	2419	589+56 @ 44' Lt.	SS-1	4.8	6.3	Brown Silty Gravel with Sand		30.3
1053	2420	589+62 @ 44' Rt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		41.6
	US Highway 412 Over Wagon Wheel Road							
1062	2501	592+28 @ 44' Lt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		22.0
1062			SS-2	9.7	11.2	Brown Clayey Gravel with Sand		33.9
1062	2502	592+44 @ 44' Lt.	SS-1	4.5	6.0	Red Clayey Gravel with Sand		22.1
1064			SS-2	9.5	10.8	Red Silty Gravel with Sand		41.2
1065	2503	592+78 @ 44' Lt.	SS-1	4.7	6.2	Red Silty Gravel with Sand		20.1
1065			SS-2	9.7	11.2	Red Silty Gravel with Sand		52.3
1062	2504	592+96 @ 44' Rt.	SS-1	4.7	6.2	Red Clayey Gravel with Sand		21.7
1062			SS-2	9.7	11.2	Red Clayey Gravel with Sand		23.0
1064			SS-3	14.7	14.9	Red Silty Gravel with Sand		28.4
1062	2505	593+74 @ 44' Lt.	SS-1	4.5	6.0	Red Clayey Gravel with Sand		22.4
1064			SS-2	9.5	11.0	Red Silty Gravel with Sand		19.9
1064			SS-3	14.5	16.0	Red Silty Gravel with Sand		29.6
1062	2506	593+91 @ 44' Rt.	SS-1	4.5	6.0	Red Clayey Gravel with Sand		19.4
1063			SS-2	9.5	11.0	Red Clayey Gravel with Sand		28.4
1064			SS-3	14.5	16.0	Red Silty Gravel with Sand		18.4
1065			SS-4	19.5	20.2	Red Silty Gravel with Sand		55.2
1063	2507	594+33 @ 44' Lt.	SS-1	4.7	6.2	Red Clayey Gravel with Sand		29.0
1063			SS-2	9.7	11.2	Red Clayey Gravel with Sand		55.6
1065			SS-3	14.7	16.2	Red Silty Gravel with Sand		31.1
1065			SS-4	19.7	21.2	Red Silty Gravel with Sand		38.1
1063	2508	594+53 @ 44' Rt.	SS-1	4.5	5.4	Light Red Clayey Gravel with Sand		38.3
	Retaining Walls for Liberty Road Over U.S. Highway 412							
1082	2601	19+00 @ 23' Lt.	SS-1	5.0	6.5	Gray Lean Clay		22.1
1083			SS-2	10.0	11.5	Gray Sandy Fat Clay		30.3
1083	2602	18+66 @ 25' Rt.	SS-1	4.7	6.2	Beige Sandy Fat Clay		41.5
1082	2603	20+98 @ 36' Rt.	SS-1	4.8	6.3	Brown Lean Clay		39.2

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1082	2604	21+07 @ 20' Lt.	SS-1	4.4	5.9	Gray Lean Clay		27.7
1084			SS-2	9.4	10.9	Gray Clayey Sand with Gravel		41.2
1084			SS-3	14.4	15.0	Gray Clayey Sand with Gravel		28.7
	Retaining Walls for Grimsley Road Over U.S. Highway 412							
199	2701	18+66 @ 56' Rt.	SS-1	5.0	6.5	Brown & Red Clayey Gravel with Sand		12.5
199			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		18.2
199			SS-3	20.0	21.5	Red Clayey Gravel with Sand		21.9
201			SS-4	25.0	26.5	Red Silty, Clayey Gravel with Sand		12.0
201			SS-5	30.0	31.5	Red Silty, Clayey Gravel with Sand		14.7
201			SS-6	35.0	36.5	Red Silty, Clayey Gravel with Sand		19.1
199	2702	21+10 @ 52' Rt.	SS-1	5.0	5.5	Brown Clayey Gravel with Sand		16.2
199			SS-2	10.0	10.9	Brown & Red Clayey Gravel with Sand		13.0
200			SS-3	15.0	16.5	Red Silty Sand with Gravel		31.0
200			SS-4	20.0	21.5	Red Silty Sand with Gravel		26.0
200			SS-5	25.0	26.5	Red Silty Sand with Gravel		20.8
200			SS-6	30.0	31.5	Red Silty Sand with Gravel		29.2
201			SS-7	35.0	36.5	Red Silty, Clayey Gravel with Sand		24.5
	US Highway 412 Over Puppy Creek							
1066	2901	696+26 @ 48' Lt.	SS-1	4.4	5.9	Brown Clayey Gravel with Sand		18.6
1066	2902	696+17 @ 44' Rt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		43.5
1066	2903	697+03 @ 48' Lt.	SS-1	4.8	6.3	Brown Clayey Gravel with Sand		36.4
1066			SS-2	9.8	10.3	Brown Clayey Gravel with Sand		45.2
1066	2904	696+90 @ 44' Rt.	SS-1	4.8	6.3	Brown Clayey Gravel with Sand		29.9
1067	2905	697+83 @ 48' Lt.	SS-1	4.9	6.4	Brown Clayey Gravel with Sand		22.0
1067			SS-2	9.9	11.4	Brown Clayey Gravel with Sand		18.9
1067	2906	697+72 @ 44' Rt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		24.7
1067			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		21.4
1067	2907	698+60 @ 48' Lt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		18.1
1067			SS-2	10.0	11.5	Red Clayey Gravel with Sand		41.2
1067	2908	698+34 @ 44' Rt.	SS-1	4.8	6.3	Brown Clayey Gravel with Sand		22.6
1067			SS-2	9.8	11.3	Brown Clayey Gravel with Sand		54.0
1066	2909	699+38 @ 48' Lt.	SS-1	4.8	6.3	Red Clayey Gravel with Sand		23.5
1067			SS-2	9.8	10.7	Red Clayey Gravel with Sand		43.2
1067	2910	699+07 @ 44' Rt.	SS-1	4.2	5.7	Brown Clayey Gravel with Sand		38.9
1067			SS-2	9.2	10.7	Brown Clayey Gravel with Sand		39.6
1066	2911	700+16 @ 48' Lt.	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		23.6
1067			SS-2	9.7	11.2	Brown Clayey Gravel with Sand		42.9
1066	2912	699+79 @ 44' Rt.	SS-1	4.1.	5.6	Brown Clayey Gravel with Sand		15.4
	Ramp EN Over Puppy Creek							
1068	3001	695+92 @ CL	SS-1	4.7	6.2	Brown Clayey Gravel with Sand		35.5
1068	3002	696+65 @ 10' Lt.	SS-1	4.5	6.0	Brown Clayey Gravel with Sand		34.7
1068			SS-2	9.5	10.2	Brown Clayey Gravel with Sand		24.2
1069	3003	697+44 @ CL	SS-1	4.5	6.0	Brown Clayey Gravel with Sand		20.4
1069			SS-2	9.5	11.0	Brown Clayey Gravel with Sand		22.5
1069	3004	698+11 @ CL	SS-1	4.8	6.3	Brown Clayey Gravel with Sand		24.9
1068	3006	699+56 @ CL	SS-1	4.4	5.9	Brown Clayey Gravel with Sand		16.3
1068			SS-2	9.4	10.9	Brown Clayey Gravel with Sand		24.9

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
	I-540 Interchange Ramp NW							
1085	3101	714+33 @ CL	SS-1	5.0	6.5	Red Clayey Gravel with Sand		35.3
1086			SS-2	10.0	11.5	Red Fat Clay with Sand		41.2
1087			SS-3	15.0	16.5	Red Silty Gravel with Sand		20.4
1087			SS-4	20.0	21.5	Red Silty Gravel with Sand		31.5
1086	3102	715+03 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		38.5
1086			SS-2	10.0	11.5	Red Fat Clay with Sand		34.9
1086			SS-3	15.0	16.5	Red Fat Clay with Sand		35.5
1086	3103	716+83 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		19.1
1086			SS-2	10.0	10.9	Red Fat Clay with Sand		15.4
1085	3104	718+73 @ CL	SS-1	5.0	6.5	Red Clayey Gravel with Sand		13.7
1086			SS-2	10.0	11.5	Red Fat Clay with Sand		28.5
1087			SS-3	15.0	16.5	Red Silty Gravel with Sand		25.4
1087			SS-4	20.0	21.5	Red & Brown Silty Gravel with Sand		39.9
1089			SS-5	25.0	25.8	Red Clayey Gravel with Sand		20.9
1086	3105	720+25 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		16.8
1086			SS-2	10.0	11.5	Red Fat Clay with Sand		12.0
1087			SS-3	15.0	16.5	Red Silty Gravel with Sand		30.8
1087			SS-4	20.0	21.5	Red & Brown Silty Gravel with Sand		41.0
1088			SS-5	25.0	26.5	Red Silty Gravel with Sand		24.5
1085	3106	721+35 @ CL	SS-1	5.0	5.8	Red Clayey Gravel with Sand		10.5
1085			SS-2	10.0	11.5	Red Clayey Gravel with Sand		12.2
1087			SS-3	15.0	16.5	Red Silty Gravel with Sand		30.2
1088			SS-4	20.0	21.5	Red & Brown Silty Gravel with Sand		36.1
1088			SS-5	25.0	25.8	Red Silty Gravel with Sand		29.8
1085	3107	722+73 @ CL	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		17.7
1086			SS-2	10.0	11.5	Brown Fat Clay with Sand		45.5
1087			SS-3	15.0	16.5	Brown Silty Gravel with Sand		44.6
1086	3108	724+14 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		14.7
1088			SS-2	10.0	11.5	Red Silty Gravel with Sand		23.7
1089			SS-3	15.0	16.5	Red Clayey Gravel with Sand		25.1
1089			SS-4	20.0	21.5	Red Clayey Gravel with Sand		23.2
1085	3109	725+84 @ CL	SS-1	5.0	6.5	Red Clayey Gravel with Sand		20.4
1088			SS-2	10.0	11.5	Brown Silty Gravel with Sand		16.3
1086	3110	727+22 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		22.9
1087			SS-2	10.0	11.5	Red Silty Gravel with Sand		33.8
1089			SS-3	15.0	16.5	Red Clayey Gravel with Sand		62.1
1089			SS-4	20.0	21.5	Red Clayey Gravel with Sand		47.3
1086	3111	728+33 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		17.7
1088			SS-2	10.0	10.9	Red Silty Gravel with Sand		14.8
1088			SS-3	15.0	16.5	Red Silty Gravel with Sand		26.8
1089			SS-4	20.0	21.5	Red Clayey Gravel with Sand		34.0
	I-540 Interchange Ramp EN Over US Highway 412							
1090	3201	717+99 @ CL	SS-1	5.0	5.7	Red Silty Gravel with Sand		10.0
1090			SS-2	10.0	11.5	Red Silty Gravel with Sand		12.6
1090			SS-3	15.0	16.5	Red Silty Gravel with Sand		16.9
1092			SS-4	20.0	21.5	Red Clayey Gravel with Sand		31.2
1093			SS-5	25.0	26.5	Red Clayey Gravel with Sand		22.2
1090	3202	719+41 @ CL	SS-1	5.0	6.5	Red Silty Gravel with Sand		15.9
1090			SS-2	10.0	11.5	Red Silty Gravel with Sand		22.3
1090			SS-3	15.0	16.5	Red Silty Gravel with Sand		31.2
1094			SS-4	20.0	21.5	Red Silty Gravel with Sand		39.2
1094			SS-5	25.0	26.5	Brown Silty Gravel with Sand		58.6
1094			SS-6	30.0	31.5	Light Gray Silty Gravel with Sand		34.8
1090	3203	721+89 @ CL	SS-1	5.0	6.5	Red Silty Gravel with Sand		13.1

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
1090			SS-2	10.0	11.5	Red Silty Gravel with Sand		15.4
1092			SS-3	15.0	16.5	Red Clayey Gravel with Sand		17.1
1093			SS-4	20.0	21.5	Red Clayey Gravel with Sand		25.6
1094			SS-5	25.0	26.5	Red Silty Gravel with Sand		41.2
1092	3204	724+28 @ CL	SS-1	5.0	6.5	Red Clayey Gravel with Sand		24.9
1092			SS-2	10.0	10.7	Red Clayey Gravel with Sand		15.9
1092			SS-3	15.0	16.5	Light Brown Clayey Gravel with Sand		32.6
1094			SS-4	20.0	21.5	Light Brown Silty Gravel with Sand		49.5
1091	3205	726+48 @ CL	SS-1	5.0	6.5	Red Sandy Lean Clay with Gravel		19.8
1092			SS-2	10.0	10.7	Red Clayey Gravel with Sand		16.7
1092			SS-3	15.0	15.8	Red Clayey Gravel with Sand		18.4
1094			SS-4	20.0	21.5	Red Silty Gravel with Sand		40.6
1090	3207	729+60 @	SS-1	5.0	6.5	Red Silty Gravel with Sand		12.3
1091			SS-2	10.0	11.5	Red Sandy Lean Clay with Gravel		29.5
		Ramp EN Over Silent Grove Road						
1087	3301	736+71 @	SS-1	5.0	6.5	Red Silty Gravel with Sand		14.0
1087			SS-2	10.0	11.5	Red Silty Gravel with Sand		22.5
1087	3302	737+50 @	SS-1	5.0	6.5	Brown Silty Gravel with Sand		13.8
1088	3303	738+81 @	SS-1	5.0	6.5	Brown Silty Gravel with Sand		18.3
1088	3304	740+12 @	SS-1	5.0	6.5	Red Silty Gravel with Sand		21.4
		I-540 Interchange Ramp SE Over Goad Springs Road						
1086	3401	708+88 @ CL	SS-1	5.0	6.5	Red Fat Clay with Sand		24.6
1086			SS-2	10.0	10.3	Red Fat Clay with Sand		20.7
1088			SS-3	15.0	16.4	Red Silty Gravel with Sand		17.8
1088			SS-4	20.0	21.1	Red Silty Gravel with Sand		28.0
1086	3402	709+49 @ CL	SS-1	4.7	6.2	Red Fat Clay with Sand		24.7
1086			SS-2	9.7	11.2	Red Fat Clay with Sand		43.3
1087	3403	710+50 @ CL	SS-1	5.0	6.5	Red Silty Gravel with Sand		15.9
1086			SS-2	10.0	11.5	Red Fat Clay with Sand		34.9
1088			SS-3	15.0	16.5	Red Silty Gravel with Sand		57.6
1088			SS-4	20.0	20.6	Red Silty Gravel with Sand		27.9
1088	3404	711+12 @ CL	SS-1	4.3	5.8	Red Silty Gravel with Sand		16.2
1088			SS-2	9.3	10.8	Red Silty Gravel with Sand		41.7
1088			SS-3	14.3	15.8	Red Silty Gravel with Sand		40.0

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Clayey Gravel with Sand

Sample No. : SS-1 to 4
Sample Loc. : Boring No. B-4001
Sample Depth : 1.0' to 10.0'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	66.6
1/4		6.3	mm	
No.4		4.75	mm	55.6
No.6		3.35	mm	
No.10		2	mm	43.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.9
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0285	mm	31.8
Hyd. Rd.	# 2	0.0182	mm	30.5
Hyd. Rd.	# 3	0.0108	mm	28.3
Hyd. Rd.	# 4	0.0077	mm	26.2
Hyd. Rd.	# 5	0.0056	mm	24.3
Hyd. Rd.	# 6	0.0028	mm	22.0
Hyd. Rd.	# 7	0.0012	mm	18.7

D_{50} = 3.2139 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 18.1
Liquid Limit (AASHTO T89) : 39
Plastic Limit (AASHTO T90) : 21
Plasticity Index : 18
Liquidity Index : -0.14
Activity : 0.87
Sp. Gr. (AASHTO T100) : 2.731
AASHTO Classification: M145 : A-2-6 (2)
ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 56.8
Coarse Sand (-No.10 + No.40) : 5.1
Fine Sand (-No.40 + No.200) : 4.2
Silt (-No.200 + 0.002mm) : 13.2
Clay (-0.002mm + 0.001mm) : 3.4
Colloids (-0.001mm) : 17.3

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 14.9
Fine Gravel (-3/4in. + No.4) : 29.5
Coarse Sand (-No.4 + No.10) : 12.4
Medium Sand (-No.10 + No.40) : 5.1
Fine Sand (-No.40 + No.200) : 4.2
Silt (-No.200 + 0.005mm) : 9.9
Clay (-0.005mm + 0.001mm) : 6.7
Colloids (-0.001mm) : 17.3

Approved By : KEW

Soil No. 1

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-3
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4000
Project State	: Arkansas	Sample Depth	: 6.0' to 7.5'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Orange & Brown Clayey Gravel with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.9
3/4	in.	19	mm	90.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	81.2
1/4		6.3	mm	
No.4		4.75	mm	70.8
No.6		3.35	mm	
No.10		2	mm	57.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.5
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0292	mm	40.7
Hyd. Rd.	# 2	0.0191	mm	36.0
Hyd. Rd.	# 3	0.0111	mm	33.7
Hyd. Rd.	# 4	0.0080	mm	32.5
Hyd. Rd.	# 5	0.0057	mm	31.3
Hyd. Rd.	# 6	0.0029	mm	27.7
Hyd. Rd.	# 7	0.0012	mm	23.7

D_{50} = 0.5357 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.7
Liquid Limit (AASHTO T89) : 42
Plastic Limit (AASHTO T90) : 22
Plasticity Index : 20
Liquidity Index : 0.18
Activity : 0.77
Sp. Gr. (AASHTO T100) : 2.689
AASHTO Classification: M145 : A-7-6 (4)
ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 42.6
Coarse Sand (-No.10 + No.40)	: 8.7
Fine Sand (-No.40 + No.200)	: 6.2
Silt (-No.200 + 0.002mm)	: 16.5
Clay (-0.002mm + 0.001mm)	: 4.3
Colloids (-0.001mm)	: 21.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 9.4
Fine Gravel (-3/4in. + No.4)	: 19.8
Coarse Sand (-No.4 + No.10)	: 13.4
Medium Sand (-No.10 + No.40)	: 8.7
Fine Sand (-No.40 + No.200)	: 6.2
Silt (-No.200 + 0.005mm)	: 11.9
Clay (-0.005mm + 0.001mm)	: 8.9
Colloids (-0.001mm)	: 21.7

Approved By : KEW

Soil No. 2

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-6 to 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4001
Project State	: Arkansas	Sample Depth	: 18.5' to 35.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Orange & Brown Clayey Gravel with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.1
3/4	in.	19	mm	88.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.3
1/4		6.3	mm	
No.4		4.75	mm	50.2
No.6		3.35	mm	
No.10		2	mm	39.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.2
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0295	mm	26.0
Hyd. Rd.	# 2	0.0189	mm	24.5
Hyd. Rd.	# 3	0.0110	mm	23.6
Hyd. Rd.	# 4	0.0078	mm	23.1
Hyd. Rd.	# 5	0.0057	mm	21.0
Hyd. Rd.	# 6	0.0028	mm	19.8
Hyd. Rd.	# 7	0.0012	mm	17.8

D_{50} = 4.6745 mm

CBR	: NA
Dry Dens.	: NA
Opt. Moist.	: NA

Natural Moisture (%) (AASHTO T265)	: 22.8
Liquid Limit (AASHTO T89)	: 53
Plastic Limit (AASHTO T90)	: 23
Plasticity Index	: 30
Liquidity Index	: -0.01
Activity	: 1.58
Sp. Gr. (AASHTO T100)	: 2.720
AASHTO Classification: M145	: A-2-7 (4)
ASTM Classification: D2487	: GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 60.6
Coarse Sand (-No.10 + No.40)	: 7.5
Fine Sand (-No.40 + No.200)	: 4.7
Silt (-No.200 + 0.002mm)	: 8.2
Clay (-0.002mm + 0.001mm)	: 2.5
Colloids (-0.001mm)	: 16.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 11.3
Fine Gravel (-3/4in. + No.4)	: 38.5
Coarse Sand (-No.4 + No.10)	: 10.8
Medium Sand (-No.10 + No.40)	: 7.5
Fine Sand (-No.40 + No.200)	: 4.7
Silt (-No.200 + 0.005mm)	: 6.4
Clay (-0.005mm + 0.001mm)	: 4.3
Colloids (-0.001mm)	: 16.5

Approved By : KEW

Soil No. 3

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Silty Gravel with Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-4002
Sample Depth : 1.0' to 2.5'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.1
3/4	in.	19	mm	84.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.9
1/4		6.3	mm	
No.4		4.75	mm	48.9
No.6		3.35	mm	
No.10		2	mm	37.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0325	mm	16.6
Hyd. Rd.	# 2	0.0210	mm	14.4
Hyd. Rd.	# 3	0.0124	mm	11.8
Hyd. Rd.	# 4	0.0089	mm	10.2
Hyd. Rd.	# 5	0.0064	mm	8.2
Hyd. Rd.	# 6	0.0032	mm	7.1
Hyd. Rd.	# 7	0.0014	mm	4.9

D_{50} = 5.0159 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.4
Liquid Limit (AASHTO T89) : 26
Plastic Limit (AASHTO T90) : 22
Plasticity Index : 4
Liquidity Index : -1.89
Activity : 0.68
Sp. Gr. (AASHTO T100) : 2.657
AASHTO Classification: M145 : A-1-b (0)
ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 62.6
Coarse Sand (-No.10 + No.40) : 11.1
Fine Sand (-No.40 + No.200) : 6.0
Silt (-No.200 + 0.002mm) : 14.4
Clay (-0.002mm + 0.001mm) : 1.6
Colloids (-0.001mm) : 4.3

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 15.1
Fine Gravel (-3/4in. + No.4) : 36.0
Coarse Sand (-No.4 + No.10) : 11.5
Medium Sand (-No.10 + No.40) : 11.1
Fine Sand (-No.40 + No.200) : 6.0
Silt (-No.200 + 0.005mm) : 12.5
Clay (-0.005mm + 0.001mm) : 3.6
Colloids (-0.001mm) : 4.3

Approved By : KEW

Soil No. 4

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-2 to 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4003
Project State	: Arkansas	Sample Depth	: 3.5' to 15.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Orange & Brown Clayey Gravel with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	97.3
3/4	in.	19	mm	93.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	77.0
1/4		6.3	mm	
No.4		4.75	mm	61.2
No.6		3.35	mm	
No.10		2	mm	47.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.4
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0289	mm	33.1
Hyd. Rd.	# 2	0.0187	mm	31.2
Hyd. Rd.	# 3	0.0108	mm	30.2
Hyd. Rd.	# 4	0.0077	mm	29.7
Hyd. Rd.	# 5	0.0055	mm	27.6
Hyd. Rd.	# 6	0.0028	mm	26.2
Hyd. Rd.	# 7	0.0012	mm	25.3

D_{50} = 2.401 mm

CBR	: NA
Dry Dens.	: NA
Opt. Moist.	: NA

Natural Moisture (%) (AASHTO T265)	: 23.7
Liquid Limit (AASHTO T89)	: 63
Plastic Limit (AASHTO T90)	: 27
Plasticity Index	: 36
Liquidity Index	: -0.08
Activity	: 1.39
Sp. Gr. (AASHTO T100)	: 2.732
AASHTO Classification: M145	: A-2-7 (5)
ASTM Classification: D2487	: GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 53.0
Coarse Sand (-No.10 + No.40)	: 11.0
Fine Sand (-No.40 + No.200)	: 2.6
Silt (-No.200 + 0.002mm)	: 7.5
Clay (-0.002mm + 0.001mm)	: 2.2
Colloids (-0.001mm)	: 23.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 6.6
Fine Gravel (-3/4in. + No.4)	: 32.2
Coarse Sand (-No.4 + No.10)	: 14.2
Medium Sand (-No.10 + No.40)	: 11.0
Fine Sand (-No.40 + No.200)	: 2.6
Silt (-No.200 + 0.005mm)	: 6.0
Clay (-0.005mm + 0.001mm)	: 3.7
Colloids (-0.001mm)	: 23.7

Approved By : KeW

Soil No. 5

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-1
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4004
Project State	: Arkansas	Sample Depth	: 1.0' to 2.5'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Orange & Brown Lean Clay with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.3
1/4		6.3	mm	
No.4		4.75	mm	94.8
No.6		3.35	mm	
No.10		2	mm	88.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.9
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0251	mm	82.6
Hyd. Rd.	# 2	0.0196	mm	48.0
Hyd. Rd.	# 3	0.0118	mm	38.0
Hyd. Rd.	# 4	0.0084	mm	36.3
Hyd. Rd.	# 5	0.0060	mm	32.5
Hyd. Rd.	# 6	0.0030	mm	23.5
Hyd. Rd.	# 7	0.0013	mm	17.8

D_{50} = 0.02 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.2
Liquid Limit (AASHTO T89) : 29
Plastic Limit (AASHTO T90) : 15
Plasticity Index : 14
Liquidity Index : 0.44
Activity : 0.68
Sp. Gr. (AASHTO T100) : 2.711
AASHTO Classification: M145 : A-6 (8)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 11.2
Coarse Sand (-No.10 + No.40)	: 5.6
Fine Sand (-No.40 + No.200)	: 11.3
Silt (-No.200 + 0.002mm)	: 51.2
Clay (-0.002mm + 0.001mm)	: 4.7
Colloids (-0.001mm)	: 15.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.2
Coarse Sand (-No.4 + No.10)	: 6.0
Medium Sand (-No.10 + No.40)	: 5.6
Fine Sand (-No.40 + No.200)	: 11.3
Silt (-No.200 + 0.005mm)	: 41.8
Clay (-0.005mm + 0.001mm)	: 14.1
Colloids (-0.001mm)	: 15.9

Approved By : KEW

Soil No. 6

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-2
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4004
Project State	: Arkansas	Sample Depth	: 3.5' to 5.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Orange & Brown Clayey Sand with Gravel		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	99.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.3
1/4		6.3	mm	
No.4		4.75	mm	77.5
No.6		3.35	mm	
No.10		2	mm	65.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0301	mm	40.8
Hyd. Rd.	# 2	0.0195	mm	36.8
Hyd. Rd.	# 3	0.0117	mm	30.8
Hyd. Rd.	# 4	0.0084	mm	27.5
Hyd. Rd.	# 5	0.0060	mm	24.8
Hyd. Rd.	# 6	0.0030	mm	19.8
Hyd. Rd.	# 7	0.0013	mm	16.5

D_{50} = 0.0901 mm

CBR	: NA
Dry Dens.	: NA
Opt. Moist.	: NA

Natural Moisture (%) (AASHTO T265)	: 19.1
Liquid Limit (AASHTO T89)	: 33
Plastic Limit (AASHTO T90)	: 18
Plasticity Index	: 15
Liquidity Index	: 0.10
Activity	: 0.82
Sp. Gr. (AASHTO T100)	: 2.703
AASHTO Classification: M145	: A-6 (4)
ASTM Classification: D2487	: SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 35.0
Coarse Sand (-No.10 + No.40)	: 9.1
Fine Sand (-No.40 + No.200)	: 6.6
Silt (-No.200 + 0.002mm)	: 31.1
Clay (-0.002mm + 0.001mm)	: 3.4
Colloids (-0.001mm)	: 14.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 1.0
Fine Gravel (-3/4in. + No.4)	: 21.5
Coarse Sand (-No.4 + No.10)	: 12.5
Medium Sand (-No.10 + No.40)	: 9.1
Fine Sand (-No.40 + No.200)	: 6.6
Silt (-No.200 + 0.005mm)	: 25.9
Clay (-0.005mm + 0.001mm)	: 8.6
Colloids (-0.001mm)	: 14.8

Approved By : KEW

Soil No. 7

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Silty Sand with Gravel

Sample No. : SS-6
Sample Loc. : Boring No. B-4004
Sample Depth : 18.5' to 20.0'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.7
3/4	in.	19	mm	92.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.3
1/4		6.3	mm	
No.4		4.75	mm	83.1
No.6		3.35	mm	
No.10		2	mm	73.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.2
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0307	mm	43.5
Hyd. Rd.	# 2	0.0200	mm	38.4
Hyd. Rd.	# 3	0.0119	mm	32.3
Hyd. Rd.	# 4	0.0085	mm	29.3
Hyd. Rd.	# 5	0.0062	mm	23.3
Hyd. Rd.	# 6	0.0031	mm	15.7
Hyd. Rd.	# 7	0.0013	mm	11.0

D_{50} = 0.1365 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 44.3
Liquid Limit (AASHTO T89) : 34
Plastic Limit (AASHTO T90) : 34
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : 2.671
AASHTO Classification: M145 : A-4 (0)
ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 26.6
Coarse Sand (-No.10 + No.40) : 14.3
Fine Sand (-No.40 + No.200) : 13.9
Silt (-No.200 + 0.002mm) : 32.0
Clay (-0.002mm + 0.001mm) : 3.4
Colloids (-0.001mm) : 9.8

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 7.6
Fine Gravel (-3/4in. + No.4) : 9.3
Coarse Sand (-No.4 + No.10) : 9.7
Medium Sand (-No.10 + No.40) : 14.3
Fine Sand (-No.40 + No.200) : 13.9
Silt (-No.200 + 0.005mm) : 24.3
Clay (-0.005mm + 0.001mm) : 11.1
Colloids (-0.001mm) : 9.8

Approved By : KEW

Soil No. 8

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Red & Brown Silty Gravel with Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-4007
Sample Depth : 1.0' to 2.5'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.9
3/4	in.	19	mm	85.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.6
1/4		6.3	mm	
No.4		4.75	mm	53.0
No.6		3.35	mm	
No.10		2	mm	38.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	27.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.1
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0322	mm	17.9
Hyd. Rd.	# 2	0.0214	mm	12.6
Hyd. Rd.	# 3	0.0126	mm	10.2
Hyd. Rd.	# 4	0.0091	mm	7.9
Hyd. Rd.	# 5	0.0065	mm	6.3
Hyd. Rd.	# 6	0.0032	mm	4.3
Hyd. Rd.	# 7	0.0014	mm	2.7

D_{50} = 3.9861 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 11.1
Liquid Limit (AASHTO T89) : 19
Plastic Limit (AASHTO T90) : 17
Plasticity Index : 2
Liquidity Index : -3.05
Activity : 0.59
Sp. Gr. (AASHTO T100) : 2.676
AASHTO Classification: M145 : A-1-b (0)
ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 61.8
Coarse Sand (-No.10 + No.40) : 10.4
Fine Sand (-No.40 + No.200) : 6.7
Silt (-No.200 + 0.002mm) : 17.7
Clay (-0.002mm + 0.001mm) : 1.0
Colloids (-0.001mm) : 2.3

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 14.5
Fine Gravel (-3/4in. + No.4) : 32.5
Coarse Sand (-No.4 + No.10) : 14.8
Medium Sand (-No.10 + No.40) : 10.4
Fine Sand (-No.40 + No.200) : 6.7
Silt (-No.200 + 0.005mm) : 15.6
Clay (-0.005mm + 0.001mm) : 3.2
Colloids (-0.001mm) : 2.3

Approved By : KeW

Soil No. 9

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4006
Project State	: Arkansas	Sample Depth	: 3.5' to 7.5'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Red & Brown Sandy Lean Clay with Gravel		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.9
1/4		6.3	mm	
No.4		4.75	mm	77.4
No.6		3.35	mm	
No.10		2	mm	67.2

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	60.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0286	mm	50.9
Hyd. Rd.	# 2	0.0186	mm	46.2
Hyd. Rd.	# 3	0.0111	mm	40.8
Hyd. Rd.	# 4	0.0080	mm	37.9
Hyd. Rd.	# 5	0.0058	mm	33.6
Hyd. Rd.	# 6	0.0029	mm	30.1
Hyd. Rd.	# 7	0.0012	mm	24.5

D_{50} = 0.0263 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.1
Liquid Limit (AASHTO T89) : 40
Plastic Limit (AASHTO T90) : 21
Plasticity Index : 19
Liquidity Index : -0.01
Activity : 0.69
Sp. Gr. (AASHTO T100) : 2.695
AASHTO Classification: M145 : A-6 (7)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 32.8
Coarse Sand (-No.10 + No.40)	: 7.2
Fine Sand (-No.40 + No.200)	: 5.7
Silt (-No.200 + 0.002mm)	: 26.6
Clay (-0.002mm + 0.001mm)	: 5.3
Colloids (-0.001mm)	: 22.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 4.3
Fine Gravel (-3/4in. + No.4)	: 18.3
Coarse Sand (-No.4 + No.10)	: 10.2
Medium Sand (-No.10 + No.40)	: 7.2
Fine Sand (-No.40 + No.200)	: 5.7
Silt (-No.200 + 0.005mm)	: 21.5
Clay (-0.005mm + 0.001mm)	: 10.5
Colloids (-0.001mm)	: 22.3

Approved By : KEW

Soil No. 10

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-4 to 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4005
Project State	: Arkansas	Sample Depth	: 8.5' to 25.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Red & Brown Silty Sand with Gravel		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.9
1/4		6.3	mm	
No.4		4.75	mm	80.4
No.6		3.35	mm	
No.10		2	mm	68.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.7
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0298	mm	45.9
Hyd. Rd.	# 2	0.0191	mm	43.2
Hyd. Rd.	# 3	0.0113	mm	39.0
Hyd. Rd.	# 4	0.0081	mm	36.2
Hyd. Rd.	# 5	0.0058	mm	33.6
Hyd. Rd.	# 6	0.0030	mm	26.7
Hyd. Rd.	# 7	0.0013	mm	22.0

D_{50} = 0.0793 mm

CBR	: NA
Dry Dens.	: NA
Opt. Moist.	: NA

Natural Moisture (%) (AASHTO T265)	: 38.8
Liquid Limit (AASHTO T89)	: 48
Plastic Limit (AASHTO T90)	: 28
Plasticity Index	: 20
Liquidity Index	: 0.53
Activity	: 0.81
Sp. Gr. (AASHTO T100)	: 2.688
AASHTO Classification: M145	: A-7-6 (7)
ASTM Classification: D2487	: SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 32.0
Coarse Sand (-No.10 + No.40)	: 9.0
Fine Sand (-No.40 + No.200)	: 9.3
Silt (-No.200 + 0.002mm)	: 25.1
Clay (-0.002mm + 0.001mm)	: 4.6
Colloids (-0.001mm)	: 20.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 2.5
Fine Gravel (-3/4in. + No.4)	: 17.1
Coarse Sand (-No.4 + No.10)	: 12.4
Medium Sand (-No.10 + No.40)	: 9.0
Fine Sand (-No.40 + No.200)	: 9.3
Silt (-No.200 + 0.005mm)	: 17.7
Clay (-0.005mm + 0.001mm)	: 12.1
Colloids (-0.001mm)	: 20.0

Approved By : KEW

Soil No. 11

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-8
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4005
Project State	: Arkansas	Sample Depth	: 28.5' to 30.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Red & Brown Silty Gravel with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.5
1/4		6.3	mm	
No.4		4.75	mm	56.0
No.6		3.35	mm	
No.10		2	mm	43.4

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0252	mm	25.8
Hyd. Rd.	# 2	0.0162	mm	24.3
Hyd. Rd.	# 3	0.0096	mm	22.0
Hyd. Rd.	# 4	0.0069	mm	20.4
Hyd. Rd.	# 5	0.0049	mm	18.9
Hyd. Rd.	# 6	0.0025	mm	15.0
Hyd. Rd.	# 7	0.0011	mm	12.4

D_{50} = 3.1463 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 32.7
Liquid Limit (AASHTO T89) : NA
Plastic Limit (AASHTO T90) : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-1-b (0) *
ASTM Classification: D2487 : GM *
* Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 56.6
Coarse Sand (-No.10 + No.40)	: 11.5
Fine Sand (-No.40 + No.200)	: 8.6
Silt + Clay (-No.200)	: 23.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 44.0
Coarse Sand (-No.4 + No.10)	: 12.6
Medium Sand (-No.10 + No.40)	: 11.5
Fine Sand (-No.40 + No.200)	: 8.6
Silt + Clay (-No.200)	: 23.3

Approved By : KEW

Soil No. 12

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Lean Clay with Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-4008
Sample Depth : 1.0' to 2.5'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.0
1/4		6.3	mm	
No.4		4.75	mm	94.0
No.6		3.35	mm	
No.10		2	mm	87.3

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.8
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0281	mm	69.4
Hyd. Rd.	# 2	0.0181	mm	65.9
Hyd. Rd.	# 3	0.0107	mm	62.2
Hyd. Rd.	# 4	0.0076	mm	61.3
Hyd. Rd.	# 5	0.0055	mm	56.2
Hyd. Rd.	# 6	0.0028	mm	49.8
Hyd. Rd.	# 7	0.0012	mm	47.6

D_{50} = 0.0028 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.6
Liquid Limit (AASHTO T89) : 32
Plastic Limit (AASHTO T90) : 11
Plasticity Index : 21
Liquidity Index : 0.41
Activity : 0.43
Sp. Gr. (AASHTO T100) : 2.696
AASHTO Classification: M145 : A-6 (12)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 12.7
Coarse Sand (-No.10 + No.40) : 8.3
Fine Sand (-No.40 + No.200) : 6.2
Silt (-No.200 + 0.002mm) : 23.8
Clay (-0.002mm + 0.001mm) : 4.5
Colloids (-0.001mm) : 44.6

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 1.4
Fine Gravel (-3/4in. + No.4) : 4.6
Coarse Sand (-No.4 + No.10) : 6.7
Medium Sand (-No.10 + No.40) : 8.3
Fine Sand (-No.40 + No.200) : 6.2
Silt (-No.200 + 0.005mm) : 17.5
Clay (-0.005mm + 0.001mm) : 10.8
Colloids (-0.001mm) : 44.6

Approved By : KEW

Soil No. 13

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Gravelly Fat Clay with Sand

Sample No. : SS-2 to 7
Sample Loc. : Boring No. B-4009
Sample Depth : 3.5' to 25.0'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	97.9
3/4	in.	19	mm	92.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
1/4		6.3	mm	
No.4		4.75	mm	73.6
No.6		3.35	mm	
No.10		2	mm	60.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.2
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0294	mm	41.2
Hyd. Rd.	# 2	0.0197	mm	32.0
Hyd. Rd.	# 3	0.0118	mm	26.4
Hyd. Rd.	# 4	0.0084	mm	25.1
Hyd. Rd.	# 5	0.0060	mm	21.5
Hyd. Rd.	# 6	0.0030	mm	16.0
Hyd. Rd.	# 7	0.0013	mm	13.8

D_{50} = 0.067 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 28.9
Liquid Limit (AASHTO T89) : 61
Plastic Limit (AASHTO T90) : 26
Plasticity Index : 35
Liquidity Index : 0.08
Activity : 2.35
Sp. Gr. (AASHTO T100) : 2.724
AASHTO Classification: M145 : A-7-6 (14)
ASTM Classification: D2487 : CH

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 39.5
Coarse Sand (-No.10 + No.40) : 2.4
Fine Sand (-No.40 + No.200) : 6.9
Silt (-No.200 + 0.002mm) : 36.3
Clay (-0.002mm + 0.001mm) : 2.5
Colloids (-0.001mm) : 12.4

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 7.5
Fine Gravel (-3/4in. + No.4) : 18.9
Coarse Sand (-No.4 + No.10) : 13.1
Medium Sand (-No.10 + No.40) : 2.4
Fine Sand (-No.40 + No.200) : 6.9
Silt (-No.200 + 0.005mm) : 31.2
Clay (-0.005mm + 0.001mm) : 7.6
Colloids (-0.001mm) : 12.4

Approved By : KEW

Soil No. 14

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Gravelly Lean Clay with Sand

Sample No. : SS-3
Sample Loc. : Boring No. B-4008
Sample Depth : 6.0' to 7.5'
Date Tested : 05/23/12
Date Reported : 06/01/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.3
1/4		6.3	mm	
No.4		4.75	mm	77.5
No.6		3.35	mm	
No.10		2	mm	68.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0300	mm	44.3
Hyd. Rd.	# 2	0.0196	mm	38.7
Hyd. Rd.	# 3	0.0118	mm	30.4
Hyd. Rd.	# 4	0.0085	mm	27.7
Hyd. Rd.	# 5	0.0062	mm	20.8
Hyd. Rd.	# 6	0.0031	mm	17.2
Hyd. Rd.	# 7	0.0013	mm	12.6

D_{50} = 0.0483 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 20.1
Liquid Limit (AASHTO T89) : 31
Plastic Limit (AASHTO T90) : 22
Plasticity Index : 9
Liquidity Index : -0.22
Activity : 0.60
Sp. Gr. (AASHTO T100) : 2.682
AASHTO Classification: M145 : A-4 (3)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 31.3
Coarse Sand (-No.10 + No.40) : 6.1
Fine Sand (-No.40 + No.200) : 7.3
Silt (-No.200 + 0.002mm) : 40.4
Clay (-0.002mm + 0.001mm) : 3.6
Colloids (-0.001mm) : 11.2

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 22.5
Coarse Sand (-No.4 + No.10) : 8.8
Medium Sand (-No.10 + No.40) : 6.1
Fine Sand (-No.40 + No.200) : 7.3
Silt (-No.200 + 0.005mm) : 35.6
Clay (-0.005mm + 0.001mm) : 8.5
Colloids (-0.001mm) : 11.2

Approved By : KEW

Soil No. 15

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-8,9 & 10
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4009
Project State	: Arkansas	Sample Depth	: 28.5' to 40.0'
Laboratory No.	: 06127	Date Tested	: 05/23/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/01/12
Soil Type	: Brown Silty Gravel with Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.0
3/4	in.	19	mm	84.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.6
1/4		6.3	mm	
No.4		4.75	mm	50.2
No.6		3.35	mm	
No.10		2	mm	39.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.4
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0340	mm	21.1
Hyd. Rd.	# 2	0.0216	mm	19.9
Hyd. Rd.	# 3	0.0126	mm	17.9
Hyd. Rd.	# 4	0.0090	mm	15.9
Hyd. Rd.	# 5	0.0064	mm	13.4
Hyd. Rd.	# 6	0.0032	mm	11.3
Hyd. Rd.	# 7	0.0013	mm	9.6

D_{50} = 4.6738 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 46
Liquid Limit (AASHTO T89) : 41
Plastic Limit (AASHTO T90) : 31
Plasticity Index : 10
Liquidity Index : 1.45
Activity : 0.97
Sp. Gr. (AASHTO T100) : 2.674
AASHTO Classification: M145 : A-2-5 (0)
ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 60.5
Coarse Sand (-No.10 + No.40)	: 8.4
Fine Sand (-No.40 + No.200)	: 6.7
Silt (-No.200 + 0.002mm)	: 14.1
Clay (-0.002mm + 0.001mm)	: 1.9
Colloids (-0.001mm)	: 8.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 15.9
Fine Gravel (-3/4in. + No.4)	: 33.9
Coarse Sand (-No.4 + No.10)	: 10.7
Medium Sand (-No.10 + No.40)	: 8.4
Fine Sand (-No.40 + No.200)	: 6.7
Silt (-No.200 + 0.005mm)	: 11.8
Clay (-0.005mm + 0.001mm)	: 4.2
Colloids (-0.001mm)	: 8.5

Approved By : KEW

Soil No. 16

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Silty Gravel with Sand

Sample No. : SS-7 & 8
Sample Loc. : Boring No. B-4008
Sample Depth : 23.5' to 30.0'
Date Tested : 05/25/12
Date Reported : 06/07/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.8
3/4	in.	19	mm	78.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.6
1/4		6.3	mm	
No.4		4.75	mm	49.8
No.6		3.35	mm	
No.10		2	mm	38.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	18.8
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0324	mm	17.4
Hyd. Rd.	# 2	0.0210	mm	15.0
Hyd. Rd.	# 3	0.0124	mm	12.3
Hyd. Rd.	# 4	0.0089	mm	10.8
Hyd. Rd.	# 5	0.0064	mm	7.8
Hyd. Rd.	# 6	0.0032	mm	5.5
Hyd. Rd.	# 7	0.0014	mm	4.2

D_{50} = 4.8017 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 26.4
Liquid Limit (AASHTO T89) : 29
Plastic Limit (AASHTO T90) : 29
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : 2.651
AASHTO Classification: M145 : A-1-b (0)
ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 62.0
Coarse Sand (-No.10 + No.40) : 11.8
Fine Sand (-No.40 + No.200) : 7.4
Silt (-No.200 + 0.002mm) : 14.0
Clay (-0.002mm + 0.001mm) : 1.1
Colloids (-0.001mm) : 3.7

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 21.5
Fine Gravel (-3/4in. + No.4) : 28.7
Coarse Sand (-No.4 + No.10) : 11.8
Medium Sand (-No.10 + No.40) : 11.8
Fine Sand (-No.40 + No.200) : 7.4
Silt (-No.200 + 0.005mm) : 11.8
Clay (-0.005mm + 0.001mm) : 3.3
Colloids (-0.001mm) : 3.7

Approved By : KEW

Soil No. 17

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SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Lean Clay with Sand

Sample No. : SS-1, 2 & 3
Sample Loc. : Boring No. B-4010
Sample Depth : 1.0' to 7.5'
Date Tested : 05/25/12
Date Reported : 06/08/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.4
No.6		3.35	mm	
No.10		2	mm	96.5

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	93.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	83.3
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0296	mm	63.4
Hyd. Rd.	# 2	0.0194	mm	53.7
Hyd. Rd.	# 3	0.0115	mm	48.7
Hyd. Rd.	# 4	0.0082	mm	43.9
Hyd. Rd.	# 5	0.0059	mm	41.2
Hyd. Rd.	# 6	0.0029	mm	33.6
Hyd. Rd.	# 7	0.0012	mm	31.0

D_{50} = 0.0131 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.1
Liquid Limit (AASHTO T89) : 37
Plastic Limit (AASHTO T90) : 19
Plasticity Index : 18
Liquidity Index : 0.12
Activity : 0.56
Sp. Gr. (AASHTO T100) : 2.708
AASHTO Classification: M145 : A-6 (14)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 3.5
Coarse Sand (-No.10 + No.40) : 3.5
Fine Sand (-No.40 + No.200) : 9.7
Silt (-No.200 + 0.002mm) : 50.9
Clay (-0.002mm + 0.001mm) : 4.2
Colloids (-0.001mm) : 28.3

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.6
Coarse Sand (-No.4 + No.10) : 2.9
Medium Sand (-No.10 + No.40) : 3.5
Fine Sand (-No.40 + No.200) : 9.7
Silt (-No.200 + 0.005mm) : 43.9
Clay (-0.005mm + 0.001mm) : 11.1
Colloids (-0.001mm) : 28.3

Approved By : KEW

Soil No. 18

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SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Clayey Gravel with Sand

Sample No. : SS-3 & 4
Sample Loc. : Boring No. B-4012
Sample Depth : 6.0' to 10.0'
Date Tested : 05/25/12
Date Reported : 06/08/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.9
3/4	in.	19	mm	91.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.3
1/4		6.3	mm	
No.4		4.75	mm	59.8
No.6		3.35	mm	
No.10		2	mm	48.7

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	37.1
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0304	mm	29.2
Hyd. Rd.	# 2	0.0198	mm	25.4
Hyd. Rd.	# 3	0.0117	mm	22.3
Hyd. Rd.	# 4	0.0084	mm	20.3
Hyd. Rd.	# 5	0.0060	mm	18.4
Hyd. Rd.	# 6	0.0030	mm	16.4
Hyd. Rd.	# 7	0.0013	mm	14.2

D_{50} = 2.2132 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 17.2
Liquid Limit (AASHTO T89) : 36
Plastic Limit (AASHTO T90) : 19
Plasticity Index : 17
Liquidity Index : -0.11
Activity : 1.11
Sp. Gr. (AASHTO T100) : 2.685
AASHTO Classification: M145 : A-6 (2)
ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 51.3
Coarse Sand (-No.10 + No.40) : 5.1
Fine Sand (-No.40 + No.200) : 6.5
Silt (-No.200 + 0.002mm) : 21.7
Clay (-0.002mm + 0.001mm) : 2.5
Colloids (-0.001mm) : 12.8

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 8.3
Fine Gravel (-3/4in. + No.4) : 31.9
Coarse Sand (-No.4 + No.10) : 11.1
Medium Sand (-No.10 + No.40) : 5.1
Fine Sand (-No.40 + No.200) : 6.5
Silt (-No.200 + 0.005mm) : 19.2
Clay (-0.005mm + 0.001mm) : 5.1
Colloids (-0.001mm) : 12.8

Approved By : KeW

Soil No. 19

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Elastic Silt with Gravel

Sample No. : SS-4 & 5
Sample Loc. : Boring No. B-4011
Sample Depth : 8.5' to 15.0'
Date Tested : 05/25/12
Date Reported : 06/08/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.1
1/4		6.3	mm	
No.4		4.75	mm	84.3
No.6		3.35	mm	
No.10		2	mm	77.3

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.2
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0258	mm	69.4
Hyd. Rd.	# 2	0.0165	mm	67.9
Hyd. Rd.	# 3	0.0096	mm	66.2
Hyd. Rd.	# 4	0.0069	mm	64.7
Hyd. Rd.	# 5	0.0049	mm	62.4
Hyd. Rd.	# 6	0.0024	mm	61.0
Hyd. Rd.	# 7	0.0010	mm	58.9

D_{50} = 0.0007 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 42.5
Liquid Limit (AASHTO T89) : 73
Plastic Limit (AASHTO T90) : 37
Plasticity Index : 36
Liquidity Index : 0.14
Activity : 0.59
Sp. Gr. (AASHTO T100) : 2.818
AASHTO Classification: M145 : A-7-5 (28)
ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 22.7
Coarse Sand (-No.10 + No.40) : 3.8
Fine Sand (-No.40 + No.200) : 2.3
Silt (-No.200 + 0.002mm) : 10.6
Clay (-0.002mm + 0.001mm) : 2.3
Colloids (-0.001mm) : 58.2

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 1.7
Fine Gravel (-3/4in. + No.4) : 14.0
Coarse Sand (-No.4 + No.10) : 7.0
Medium Sand (-No.10 + No.40) : 3.8
Fine Sand (-No.40 + No.200) : 2.3
Silt (-No.200 + 0.005mm) : 8.7
Clay (-0.005mm + 0.001mm) : 4.3
Colloids (-0.001mm) : 58.2

Approved By : KEW

Soil No. 20

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-6
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4011
Project State	: Arkansas	Sample Depth	: 18.5' to 20.0'
Laboratory No.	: 06127	Date Tested	: 05/25/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/08/12
Soil Type	: Orange & Brown Poorly Graded Gravel with Silt and Sand		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.9
3/4	in.	19	mm	80.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.3
1/4		6.3	mm	
No.4		4.75	mm	42.8
No.6		3.35	mm	
No.10		2	mm	27.0

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	15.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	10.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.3175 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.1
Liquid Limit (AASHTO T89) : NA
Plastic Limit (AASHTO T90) : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-1-a (0) *
ASTM Classification: D2487 : GP-GM *
* Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 73.0
Coarse Sand (-No.10 + No.40)	: 11.9
Fine Sand (-No.40 + No.200)	: 4.3
Silt + Clay (-No.200)	: 10.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 19.8
Fine Gravel (-3/4in. + No.4)	: 37.4
Coarse Sand (-No.4 + No.10)	: 15.8
Medium Sand (-No.10 + No.40)	: 11.9
Fine Sand (-No.40 + No.200)	: 4.3
Silt + Clay (-No.200)	: 10.8

Approved By : KAW

Soil No. 21

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS-7
Project County	: Washington/Benton	Sample Loc.	: Boring No. B-4012
Project State	: Arkansas	Sample Depth	: 23.5' to 25.0'
Laboratory No.	: 06127	Date Tested	: 05/25/12
Submitted By	: Florence & Hutcheson	Date Reported	: 06/08/12
Soil Type	: Orange & Brown Sandy Lean Clay		

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.4
1/4		6.3	mm	
No.4		4.75	mm	95.7
No.6		3.35	mm	
No.10		2	mm	91.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	67.8
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0292	mm	62.4
Hyd. Rd.	# 2	0.0187	mm	59.6
Hyd. Rd.	# 3	0.0110	mm	55.0
Hyd. Rd.	# 4	0.0080	mm	49.4
Hyd. Rd.	# 5	0.0057	mm	45.8
Hyd. Rd.	# 6	0.0029	mm	38.5
Hyd. Rd.	# 7	0.0012	mm	32.3

D_{50} = 0.0083 mm

CBR	: NA
Dry Dens.	: NA
Opt. Moist.	: NA

Natural Moisture (%) (AASHTO T265)	: 48.3
Liquid Limit (AASHTO T89)	: 49
Plastic Limit (AASHTO T90)	: 27
Plasticity Index	: 22
Liquidity Index	: 0.98
Activity	: 0.61
Sp. Gr. (AASHTO T100)	: 2.723
AASHTO Classification: M145	: A-7-6 (14)
ASTM Classification: D2487	: CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10)	: 8.1
Coarse Sand (-No.10 + No.40)	: 13.1
Fine Sand (-No.40 + No.200)	: 11.0
Silt (-No.200 + 0.002mm)	: 31.9
Clay (-0.002mm + 0.001mm)	: 6.2
Colloids (-0.001mm)	: 29.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.)	: 1.4
Fine Gravel (-3/4in. + No.4)	: 2.9
Coarse Sand (-No.4 + No.10)	: 3.8
Medium Sand (-No.10 + No.40)	: 13.1
Fine Sand (-No.40 + No.200)	: 11.0
Silt (-No.200 + 0.005mm)	: 23.4
Clay (-0.005mm + 0.001mm)	: 14.7
Colloids (-0.001mm)	: 29.6

Approved By : KEW

Soil No. 22

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Red Clayey Gravel with Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-5001
Sample Depth : 1.0' to 2.5'
Date Tested : 05/25/12
Date Reported : 06/08/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.3
3/4	in.	19	mm	84.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.0
1/4		6.3	mm	
No.4		4.75	mm	60.2
No.6		3.35	mm	
No.10		2	mm	49.9

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	42.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	37.1
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0324	mm	34.7
Hyd. Rd.	# 2	0.0209	mm	30.5
Hyd. Rd.	# 3	0.0123	mm	25.5
Hyd. Rd.	# 4	0.0087	mm	24.7
Hyd. Rd.	# 5	0.0062	mm	20.6
Hyd. Rd.	# 6	0.0031	mm	13.7
Hyd. Rd.	# 7	0.0013	mm	11.6

D_{50} = 2.0169 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 22.7
Liquid Limit (AASHTO T89) : 34
Plastic Limit (AASHTO T90) : 21
Plasticity Index : 13
Liquidity Index : 0.15
Activity : 1.03
Sp. Gr. (AASHTO T100) : 2.687
AASHTO Classification: M145 : A-6 (1)
ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 50.1
Coarse Sand (-No.10 + No.40) : 7.9
Fine Sand (-No.40 + No.200) : 4.9
Silt (-No.200 + 0.002mm) : 24.5
Clay (-0.002mm + 0.001mm) : 2.3
Colloids (-0.001mm) : 10.3

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 15.7
Fine Gravel (-3/4in. + No.4) : 24.1
Coarse Sand (-No.4 + No.10) : 10.3
Medium Sand (-No.10 + No.40) : 7.9
Fine Sand (-No.40 + No.200) : 4.9
Silt (-No.200 + 0.005mm) : 18.7
Clay (-0.005mm + 0.001mm) : 8.0
Colloids (-0.001mm) : 10.3

Approved By : KEW

Soil No. 23

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Florence & Hutcheson

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name : Springdale By-Pass
Project No. : 06127
Project County : Washington/Benton
Project State : Arkansas
Laboratory No. : 06127
Submitted By : Florence & Hutcheson
Soil Type : Orange & Brown Silty Gravel with Sand

Sample No. : SS-2 to 13
Sample Loc. : Boring No. B-5000
Sample Depth : 3.5' to 55.0'
Date Tested : 05/25/12
Date Reported : 06/08/12

AASHTO T27 :

				% Passing
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.9
3/4	in.	19	mm	80.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.7
1/4		6.3	mm	
No.4		4.75	mm	54.3
No.6		3.35	mm	
No.10		2	mm	43.8

AASHTO T88

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	37.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.5
No.270		0.053	mm	
Hyd. Rd.	# 1	0.0295	mm	29.7
Hyd. Rd.	# 2	0.0189	mm	28.0
Hyd. Rd.	# 3	0.0111	mm	26.3
Hyd. Rd.	# 4	0.0080	mm	23.6
Hyd. Rd.	# 5	0.0058	mm	20.9
Hyd. Rd.	# 6	0.0029	mm	16.9
Hyd. Rd.	# 7	0.0012	mm	15.4

D_{50} = 3.3331 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 35
Liquid Limit (AASHTO T89) : 43
Plastic Limit (AASHTO T90) : 30
Plasticity Index : 13
Liquidity Index : 0.42
Activity : 0.80
Sp. Gr. (AASHTO T100) : 2.690
AASHTO Classification: M145 : A-2-7 (1)
ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145
Gravel (3in. + No.10) : 56.2
Coarse Sand (-No.10 + No.40) : 5.9
Fine Sand (-No.40 + No.200) : 5.4
Silt (-No.200 + 0.002mm) : 16.2
Clay (-0.002mm + 0.001mm) : 2.2
Colloids (-0.001mm) : 14.1

ASTM Composition of Total Sample: D2487
Coarse Gravel (3in. + 3/4in.) : 19.9
Fine Gravel (-3/4in. + No.4) : 25.8
Coarse Sand (-No.4 + No.10) : 10.5
Medium Sand (-No.10 + No.40) : 5.9
Fine Sand (-No.40 + No.200) : 5.4
Silt (-No.200 + 0.005mm) : 12.4
Clay (-0.005mm + 0.001mm) : 6.0
Colloids (-0.001mm) : 14.1

Approved By : KEW

Soil No. 24

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3 thru 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 227
Project State	: Arkansas	Sample Depth	: 15.0' to 30.3'
Laboratory No.	: 06127	Date Tested	: 11-15-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.8
3/4	in.	19	mm	92.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
No.4		4.75	mm	76.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.4098mm & D90 = 15.4556mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 36.2
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 34
		Plasticity Index	: 3
AASHTO Composition of Total Sample		Liquidity Index	: 0.73
Gravel (3in. + No.10)	: 34.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.5	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 40.7	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.2
Fine Gravel (-3/4in. + No.4)	: 16.0
Coarse Sand (-No.4 + No.10)	: 11.6
Medium Sand (-No.10 + No.40)	: 15.0
Fine Sand (-No.40 + No.200)	: 9.5
Silt + Clay (-No.200)	: 40.7

Approved By : DLC

Soil No. 140

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2001
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Gravelly Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.9
No.4		4.75	mm	79.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	74.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	64.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0175 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 28.9
Maximum Dry Density	:	NA	Liquid Limit	: 57
Optimum Moisture	:	NA	Plastic Limit	: 26
			Plasticity Index	: 31
			Liquidity Index	: 0.10
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	25.4	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	5.9	AASHTO Classification	: A-7-6 (19)
Fine Sand (-No.40 + No.200)	:	4.6	ASTM Classification	: CH
Silt + Clay (-No.200)	:	64.1		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.2
Fine Gravel (-3/4in. + No.4)	:	14.7
Coarse Sand (-No.4 + No.10)	:	4.5
Medium Sand (-No.10 + No.40)	:	5.9
Fine Sand (-No.40 + No.200)	:	4.6
Silt + Clay (-No.200)	:	64.1

Approved By : DC

Soil No. 195

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2003
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Light Red Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	94.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.2
No.4		4.75	mm	71.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	59.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.7735 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 33.8
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	40.8	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	15.0	AASHTO Classification	: A-6 (0)
Fine Sand (-No.40 + No.200)	:	9.1	ASTM Classification	: SM
Silt + Clay (-No.200)	:	35.1		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	5.5
Fine Gravel (-3/4in. + No.4)	:	23.1
Coarse Sand (-No.4 + No.10)	:	12.2
Medium Sand (-No.10 + No.40)	:	15.0
Fine Sand (-No.40 + No.200)	:	9.1
Silt + Clay (-No.200)	:	35.1

Approved By : DC

Soil No. 196

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2003
Project State	:	Arkansas	Sample Depth	: 20.0' to 25.7'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Light Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	79.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.5
No.4		4.75	mm	56.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	42.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.1305 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.3
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	57.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.1	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	22.3	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	20.9
Fine Gravel (-3/4in. + No.4)	:	22.4
Coarse Sand (-No.4 + No.10)	:	13.9
Medium Sand (-No.10 + No.40)	:	13.4
Fine Sand (-No.40 + No.200)	:	7.1
Silt + Clay (-No.200)	:	22.3

Approved By : _____ Soil No. 197

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4 thru 8
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2004
Project State	:	Arkansas	Sample Depth	: 20.0' to 41.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Copper & Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	80.2
3/4	in.	19	mm	78.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	57.1
No.4		4.75	mm	45.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	35.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.2154 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 31
Liquid Limit : 33
Plastic Limit : 19
Plasticity Index : 14
Liquidity Index : 0.88
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (1)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 64.3
Coarse Sand (-No.10 + No.40) : 6.6
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 24.8

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 21.8
Fine Gravel (-3/4in. + No.4) : 32.7
Coarse Sand (-No.4 + No.10) : 9.8
Medium Sand (-No.10 + No.40) : 6.6
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 24.8

Approved By : _____ Soil No. 198

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2701
Project State	:	Arkansas	Sample Depth	: 5.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown & Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.2
3/4	in.	19	mm	80.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.1
No.4		4.75	mm	54.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	34.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.2873 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.9
Maximum Dry Density	:	NA	Liquid Limit	: 35
Optimum Moisture	:	NA	Plastic Limit	: 16
			Plasticity Index	: 19
			Liquidity Index	: 0.48
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-6 (2)
			ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	55.4
Coarse Sand (-No.10 + No.40)	:	6.5
Fine Sand (-No.40 + No.200)	:	3.3
Silt + Clay (-No.200)	:	34.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	19.4
Fine Gravel (-3/4in. + No.4)	:	26.6
Coarse Sand (-No.4 + No.10)	:	9.4
Medium Sand (-No.10 + No.40)	:	6.5
Fine Sand (-No.40 + No.200)	:	3.3
Silt + Clay (-No.200)	:	34.8

Approved By : _____

Soil No. 199

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 3 thru 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2702
Project State	:	Arkansas	Sample Depth	: 15.0' to 31.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	79.7
No.4		4.75	mm	65.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.4505 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 26.8
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-4 (0)
			ASTM Classification	: SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	47.2
Coarse Sand (-No.10 + No.40)	:	13.5
Fine Sand (-No.40 + No.200)	:	9.1
Silt + Clay (-No.200)	:	30.2

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.9
Fine Gravel (-3/4in. + No.4)	:	27.8
Coarse Sand (-No.4 + No.10)	:	12.5
Medium Sand (-No.10 + No.40)	:	13.5
Fine Sand (-No.40 + No.200)	:	9.1
Silt + Clay (-No.200)	:	30.2

Approved By : _____

Soil No. 200

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4, 5 & 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2701
Project State	:	Arkansas	Sample Depth	: 25.0' to 36.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Silty, Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	88.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	77.6
No.4		4.75	mm	65.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	42.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.3195 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 15.3
Maximum Dry Density	:	NA	Liquid Limit	: 26
Optimum Moisture	:	NA	Plastic Limit	: 19
			Plasticity Index	: 7
			Liquidity Index	: -0.57
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-4 (0)
			ASTM Classification	: GC-GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	47.1
Coarse Sand (-No.10 + No.40)	:	10.8
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	35.6

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	11.4
Fine Gravel (-3/4in. + No.4)	:	23.3
Coarse Sand (-No.4 + No.10)	:	12.4
Medium Sand (-No.10 + No.40)	:	10.8
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	35.6

Approved By : DC

Soil No. 201

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 6127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1002
Project State	: Arkansas	Sample Depth	: 5.0' to 5.7'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Brown & Copper Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	78.2
3/4	in.	19	mm	70.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	52.7
No.4		4.75	mm	40.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	28.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	17.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 8.1591mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 17.5
Maximum Dry Density	: NA	Liquid Limit	: 33
Optimum Moisture	: NA	Plastic Limit	: 17
		Plasticity Index	: 16
		Liquidity Index	: 0.03
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 71.4	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	: 10.8	AASHTO Classification	: A-2-6 (1)
Fine Sand (-No.40 + No.200)	: 1.9	ASTM Classification	: GC
Silt + Clay (-No.200)	: 15.9		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 29.1
Fine Gravel (-3/4in. + No.4)	: 30.5
Coarse Sand (-No.4 + No.10)	: 11.8
Medium Sand (-No.10 + No.40)	: 10.8
Fine Sand (-No.40 + No.200)	: 1.9
Silt + Clay (-No.200)	: 15.9

Approved By : DC

Soil No. 1001

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1004
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.9
3/4	in.	19	mm	89.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.9
No.4		4.75	mm	64.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	48.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.2225mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 25.1
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 20
		Liquidity Index	: 0.21
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-7 (2)
		ASTM Classification	: SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 52.0
Coarse Sand (-No.10 + No.40)	: 19.9
Fine Sand (-No.40 + No.200)	: 4.0
Silt + Clay (-No.200)	: 24.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 10.7
Fine Gravel (-3/4in. + No.4)	: 24.9
Coarse Sand (-No.4 + No.10)	: 16.4
Medium Sand (-No.10 + No.40)	: 19.9
Fine Sand (-No.40 + No.200)	: 4.0
Silt + Clay (-No.200)	: 24.1

Approved By : DC

Soil No. 1002

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1003
Project State	: Arkansas	Sample Depth	: 20.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	88.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.8
No.4		4.75	mm	45.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	30.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	17.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 5.4220mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 19.3
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 27
		Liquidity Index	: -0.03
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 69.5	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	: 13.3	AASHTO Classification	: A-2-7 (3)
Fine Sand (-No.40 + No.200)	: 1.6	ASTM Classification	: GC
Silt + Clay (-No.200)	: 15.6		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 11.1
Fine Gravel (-3/4in. + No.4)	: 43.1
Coarse Sand (-No.4 + No.10)	: 15.3
Medium Sand (-No.10 + No.40)	: 13.3
Fine Sand (-No.40 + No.200)	: 1.6
Silt + Clay (-No.200)	: 15.6

Approved By : JC

Soil No. 1003

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2, 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1001
Project State	: Arkansas	Sample Depth	: 10.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Tan & Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.6
3/4	in.	19	mm	82.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.9
No.4		4.75	mm	59.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	48.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	37.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.2504mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 23.4
Maximum Dry Density	: NA	Liquid Limit	: 59
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 35
AASHTO Composition of Total Sample		Liquidity Index	: -0.02
Gravel (3in. + No.10)	: 51.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-2-7 (5)
Silt + Clay (-No.200)	: 33.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 17.7
Fine Gravel (-3/4in. + No.4)	: 22.8
Coarse Sand (-No.4 + No.10)	: 11.0
Medium Sand (-No.10 + No.40)	: 10.9
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 33.2

Approved By : PC

Soil No. 1004

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 7 & 8
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1002
Project State	: Arkansas	Sample Depth	: 35.0' to 40.9'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Tan & Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.6
3/4	in.	19	mm	93.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.2
No.4		4.75	mm	84.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	.
No.200		0.075	mm	43.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.3941mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 41.6
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 31
		Plasticity Index	: 10
AASHTO Composition of Total Sample		Liquidity Index	: 1.06
Gravel (3in. + No.10)	: 27.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 22.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.9	AASHTO Classification	: A-5 (2)
Silt + Clay (-No.200)	: 43.4	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.4
Fine Gravel (-3/4in. + No.4)	: 8.9
Coarse Sand (-No.4 + No.10)	: 12.4
Medium Sand (-No.10 + No.40)	: 22.0
Fine Sand (-No.40 + No.200)	: 6.9
Silt + Clay (-No.200)	: 43.4

Approved By : DC

Soil No. 1005

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 7 thru 11
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1001
Project State	: Arkansas	Sample Depth	: 30.0' to 55.3'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown & Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.3
3/4	in.	19	mm	90.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	73.7
No.4		4.75	mm	59.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	40.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	34.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.0932mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.0
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.39
Gravel (3in. + No.10)	: 50.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.8	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 34.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.5
Fine Gravel (-3/4in. + No.4)	: 31.5
Coarse Sand (-No.4 + No.10)	: 9.5
Medium Sand (-No.10 + No.40)	: 9.5
Fine Sand (-No.40 + No.200)	: 5.8
Silt + Clay (-No.200)	: 34.2

Approved By : DC

Soil No. 1006

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1005
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.3
3/4	in.	19	mm	95.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	77.0
No.4		4.75	mm	66.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	55.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	38.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.0188mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.7
Maximum Dry Density	: NA	Liquid Limit	: 45
Optimum Moisture	: NA	Plastic Limit	: 25
		Plasticity Index	: 20
AASHTO Composition of Total Sample		Liquidity Index	: 0.18
Gravel (3in. + No.10)	: 44.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.5	AASHTO Classification	: A-7-6 (3)
Silt + Clay (-No.200)	: 38.5	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.7
Fine Gravel (-3/4in. + No.4)	: 29.1
Coarse Sand (-No.4 + No.10)	: 10.8
Medium Sand (-No.10 + No.40)	: 12.4
Fine Sand (-No.40 + No.200)	: 4.5
Silt + Clay (-No.200)	: 38.5

Approved By : DC

Soil No. 1007

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1007
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	94.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	73.7
No.4		4.75	mm	57.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	42.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.1008mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.1
Maximum Dry Density	: NA	Liquid Limit	: 60
Optimum Moisture	: NA	Plastic Limit	: 25
		Plasticity Index	: 35
AASHTO Composition of Total Sample		Liquidity Index	: -0.03
Gravel (3in. + No.10)	: 57.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 2.9	AASHTO Classification	: A-2-7 (5)
Silt + Clay (-No.200)	: 27.8	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.2
Fine Gravel (-3/4in. + No.4)	: 37.7
Coarse Sand (-No.4 + No.10)	: 14.4
Medium Sand (-No.10 + No.40)	: 12.0
Fine Sand (-No.40 + No.200)	: 2.9
Silt + Clay (-No.200)	: 27.8

Approved By : _____ Soil No. 1008

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 thru 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1008
Project State	: Arkansas	Sample Depth	: 20.0' to 36.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown & Beige Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.9
3/4	in.	19	mm	93.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.6
No.4		4.75	mm	71.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.5400mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 36.8
Maximum Dry Density	: NA	Liquid Limit	: 40
Optimum Moisture	: NA	Plastic Limit	: 27
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.75
Gravel (3in. + No.10)	: 47.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 16.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.8	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 31.9	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.5
Fine Gravel (-3/4in. + No.4)	: 22.5
Coarse Sand (-No.4 + No.10)	: 18.3
Medium Sand (-No.10 + No.40)	: 16.0
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 31.9

Approved By : DC

Soil No. 1009

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 8 & 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1006
Project State	: Arkansas	Sample Depth	: 40.0' to 45.8'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Light Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.6
3/4	in.	19	mm	89.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.2
No.4		4.75	mm	81.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.8139mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.6
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
		Liquidity Index	: NA
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 34.5		
Coarse Sand (-No.10 + No.40)	: 26.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.8	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 30.0	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 10.4
Fine Gravel (-3/4in. + No.4)	: 7.8
Coarse Sand (-No.4 + No.10)	: 16.3
Medium Sand (-No.10 + No.40)	: 26.7
Fine Sand (-No.40 + No.200)	: 8.8
Silt + Clay (-No.200)	: 30.0

Approved By : DC

Soil No. 1010

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 8 & 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1008
Project State	: Arkansas	Sample Depth	: 40.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 10-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Brown Gravelly Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.0
3/4	in.	19	mm	91.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.0
No.4		4.75	mm	80.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	77.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0112mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 67.5
Maximum Dry Density	: NA	Liquid Limit	: 73
Optimum Moisture	: NA	Plastic Limit	: 31
		Plasticity Index	: 42
AASHTO Composition of Total Sample		Liquidity Index	: 0.87
Gravel (3in. + No.10)	: 22.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 1.8	AASHTO Classification	: A-7-5 (30)
Silt + Clay (-No.200)	: 70.1	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.0
Fine Gravel (-3/4in. + No.4)	: 10.3
Coarse Sand (-No.4 + No.10)	: 3.1
Medium Sand (-No.10 + No.40)	: 5.7
Fine Sand (-No.40 + No.200)	: 1.8
Silt + Clay (-No.200)	: 70.1

Approved By : DC

Soil No. 1011

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - ,1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1101
Project State	: Arkansas	Sample Depth	: 5.0' to 16.3'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown & Tan Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.9
3/4	in.	19	mm	88.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
No.4		4.75	mm	77.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.4250mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.7
Maximum Dry Density	: NA	Liquid Limit	: 44
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 22
		Liquidity Index	: 0.21
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-6 (5)
		ASTM Classification	: SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 34.6
Coarse Sand (-No.10 + No.40)	: 15.4
Fine Sand (-No.40 + No.200)	: 6.2
Silt + Clay (-No.200)	: 43.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 11.1
Fine Gravel (-3/4in. + No.4)	: 11.7
Coarse Sand (-No.4 + No.10)	: 11.8
Medium Sand (-No.10 + No.40)	: 15.4
Fine Sand (-No.40 + No.200)	: 6.2
Silt + Clay (-No.200)	: 43.8

Approved By : DC

Soil No. 1012

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1104
Project State	: Arkansas	Sample Depth	: 10.0' to 15.9'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown & Dark Brown Sandy Fat Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.5
3/4	in.	19	mm	93.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.9
No.4		4.75	mm	76.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	56.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0547mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.0
Maximum Dry Density	: NA	Liquid Limit	: 58
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 38
		Liquidity Index	: 0.29
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 33.9	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	: 10.1	AASHTO Classification	: A-7-6 (16)
Fine Sand (-No.40 + No.200)	: 3.5	ASTM Classification	: CH
Silt + Clay (-No.200)	: 52.5		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.8
Fine Gravel (-3/4in. + No.4)	: 16.5
Coarse Sand (-No.4 + No.10)	: 10.6
Medium Sand (-No.10 + No.40)	: 10.1
Fine Sand (-No.40 + No.200)	: 3.5
Silt + Clay (-No.200)	: 52.5

Approved By : DC

Soil No. 1013

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3, 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1103
Project State	: Arkansas	Sample Depth	: 15.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Tan & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.9
3/4	in.	19	mm	88.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	79.2
No.4		4.75	mm	64.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.0359mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 21.7
Maximum Dry Density	: NA	Liquid Limit	: 40
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.13
Gravel (3in. + No.10)	: 50.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.1	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 31.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 11.1
Fine Gravel (-3/4in. + No.4)	: 24.6
Coarse Sand (-No.4 + No.10)	: 14.6
Medium Sand (-No.10 + No.40)	: 12.9
Fine Sand (-No.40 + No.200)	: 5.1
Silt + Clay (-No.200)	: 31.7

Approved By : PC

Soil No. 1014

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 6 thru 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1102
Project State	: Arkansas	Sample Depth	: 35.0' to 51.5'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.9
3/4	in.	19	mm	81.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.2
No.4		4.75	mm	46.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	24.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 5.6023mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 23.2
Maximum Dry Density	: NA	Liquid Limit	: 56
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 37
AASHTO Composition of Total Sample		Liquidity Index	: 0.11
Gravel (3in. + No.10)	: 65.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.6	AASHTO Classification	: A-2-7 (5)
Silt + Clay (-No.200)	: 21.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 19.0
Fine Gravel (-3/4in. + No.4)	: 34.5
Coarse Sand (-No.4 + No.10)	: 12.1
Medium Sand (-No.10 + No.40)	: 9.6
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 21.2

Approved By : DC

Soil No. 1015

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 9, 10 & 11
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1104
Project State	: Arkansas	Sample Depth	: 45.0' to 56.5'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Brown & Dark Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	88.0
3/4	in.	19	mm	86.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.0
No.4		4.75	mm	59.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	46.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	33.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.4582mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.0
Maximum Dry Density	: NA	Liquid Limit	: 55
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 36
		Liquidity Index	: 0.14
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 53.1		
Coarse Sand (-No.10 + No.40)	: 13.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.4	AASHTO Classification	: A-2-7 (5)
Silt + Clay (-No.200)	: 28.1	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 13.7
Fine Gravel (-3/4in. + No.4)	: 26.4
Coarse Sand (-No.4 + No.10)	: 13.0
Medium Sand (-No.10 + No.40)	: 13.4
Fine Sand (-No.40 + No.200)	: 5.4
Silt + Clay (-No.200)	: 28.1

Approved By : DC

Soil No. 1016

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 10 & 11
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1102
Project State	: Arkansas	Sample Depth	: 55.0' to 60.3'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.6
3/4	in.	19	mm	95.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	84.0
No.4		4.75	mm	64.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	32.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.2902mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 30.9
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 28
		Plasticity Index	: 4
AASHTO Composition of Total Sample		Liquidity Index	: 0.72
Gravel (3in. + No.10)	: 52.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.7	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 27.6	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.4
Fine Gravel (-3/4in. + No.4)	: 31.6
Coarse Sand (-No.4 + No.10)	: 16.6
Medium Sand (-No.10 + No.40)	: 15.1
Fine Sand (-No.40 + No.200)	: 4.7
Silt + Clay (-No.200)	: 27.6

Approved By : DC

Soil No. 1017

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1108
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red & Reddish Tan Sandy Fat Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	91.9
No.4		4.75	mm	82.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	73.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0354mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.1
Maximum Dry Density	: NA	Liquid Limit	: 54
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 32
AASHTO Composition of Total Sample		Liquidity Index	: 0.13
Gravel (3in. + No.10)	: 26.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.9	AASHTO Classification	: A-7-6 (15)
Silt + Clay (-No.200)	: 56.4	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.6
Fine Gravel (-3/4in. + No.4)	: 14.9
Coarse Sand (-No.4 + No.10)	: 9.4
Medium Sand (-No.10 + No.40)	: 10.8
Fine Sand (-No.40 + No.200)	: 5.9
Silt + Clay (-No.200)	: 56.4

Approved By : DC

Soil No. 1018

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2, 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1105
Project State	: Arkansas	Sample Depth	: 10.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Tan & White Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	94.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.5
No.4		4.75	mm	62.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.5729mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.8
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 20
AASHTO Composition of Total Sample		Liquidity Index	: 0.29
Gravel (3in. + No.10)	: 55.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.9	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 25.0	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.3
Fine Gravel (-3/4in. + No.4)	: 31.8
Coarse Sand (-No.4 + No.10)	: 18.2
Medium Sand (-No.10 + No.40)	: 15.8
Fine Sand (-No.40 + No.200)	: 3.9
Silt + Clay (-No.200)	: 25.0

Approved By : DC

Soil No. 1019

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1107
Project State	: Arkansas	Sample Depth	: 20.0' to 30.3'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.3
3/4	in.	19	mm	92.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.2
No.4		4.75	mm	57.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.9149mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 18.8
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 17
		Plasticity Index	: 22
		Liquidity Index	: 0.08
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-6 (2)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 55.4
Coarse Sand (-No.10 + No.40)	: 13.7
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 26.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.2
Fine Gravel (-3/4in. + No.4)	: 35.8
Coarse Sand (-No.4 + No.10)	: 12.4
Medium Sand (-No.10 + No.40)	: 13.7
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 26.5

Approved By : DC

Soil No. 1020

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 10, 11 & 12
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1105
Project State	: Arkansas	Sample Depth	: 50.0' to 61.3'
Laboratory No.	: 06127	Date Tested	: 10-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brownish Red & Beige Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.6
3/4	in.	19	mm	95.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.1
No.4		4.75	mm	62.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	29.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.1334mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.5
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.40
Gravel (3in. + No.10)	: 51.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.0	AASHTO Classification	: A-2-7 (2)
Silt + Clay (-No.200)	: 29.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.4
Fine Gravel (-3/4in. + No.4)	: 33.2
Coarse Sand (-No.4 + No.10)	: 13.4
Medium Sand (-No.10 + No.40)	: 13.1
Fine Sand (-No.40 + No.200)	: 6.0
Silt + Clay (-No.200)	: 29.9

Approved By : DC

Soil No. 1021

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1201
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Tan, Gray & Yellowish Orange Clayey Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	90.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	57.5
No.4		4.75	mm	45.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 6.0919mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 16.1
Maximum Dry Density	: NA	Liquid Limit	: 36
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 14
		Liquidity Index	: -0.42
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-6 (1)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 61.5
Coarse Sand (-No.10 + No.40)	: 2.9
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 32.0

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.3
Fine Gravel (-3/4in. + No.4)	: 44.9
Coarse Sand (-No.4 + No.10)	: 7.3
Medium Sand (-No.10 + No.40)	: 2.9
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 32.0

Approved By : DC

Soil No. 1022

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1201A
Project State	: Arkansas	Sample Depth	: 10.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Brown & White Fat Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.5
No.4		4.75	mm	82.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	75.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	73.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0092mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 37.9
Maximum Dry Density	: NA	Liquid Limit	: 79
Optimum Moisture	: NA	Plastic Limit	: 34
		Plasticity Index	: 45
		Liquidity Index	: 0.09
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 19.0		
Coarse Sand (-No.10 + No.40)	: 5.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 2.1	AASHTO Classification	: A-7-5 (35)
Silt + Clay (-No.200)	: 73.2	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 17.3
Coarse Sand (-No.4 + No.10)	: 1.7
Medium Sand (-No.10 + No.40)	: 5.7
Fine Sand (-No.40 + No.200)	: 2.1
Silt + Clay (-No.200)	: 73.2

Approved By : DC

Soil No. 1023

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1202
Project State	: Arkansas	Sample Depth	: 10.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Brown & Light Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.4
3/4	in.	19	mm	85.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.3
No.4		4.75	mm	65.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	54.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	41.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.2326mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 32.0
Maximum Dry Density	: NA	Liquid Limit	: 46
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.36
Gravel (3in. + No.10)	: 46.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.8	AASHTO Classification	: A-2-7 (2)
Silt + Clay (-No.200)	: 33.4	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 14.7
Fine Gravel (-3/4in. + No.4)	: 19.4
Coarse Sand (-No.4 + No.10)	: 11.9
Medium Sand (-No.10 + No.40)	: 12.8
Fine Sand (-No.40 + No.200)	: 7.8
Silt + Clay (-No.200)	: 33.4

Approved By : DC

Soil No. 1024

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 5 thru 8
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1201A
Project State	: Arkansas	Sample Depth	: 25.0' to 41.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Beige & Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	82.1
3/4	in.	19	mm	72.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.6
No.4		4.75	mm	53.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.3875mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 30.9
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 25
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.45
Gravel (3in. + No.10)	: 55.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.4	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 27.6	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 27.2
Fine Gravel (-3/4in. + No.4)	: 19.4
Coarse Sand (-No.4 + No.10)	: 8.7
Medium Sand (-No.10 + No.40)	: 9.7
Fine Sand (-No.40 + No.200)	: 7.4
Silt + Clay (-No.200)	: 27.6

Approved By : DL

Soil No. 1025

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 7, 8 & 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1202
Project State	: Arkansas	Sample Depth	: 35.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Brown & Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	90.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	79.4
No.4		4.75	mm	57.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.1801mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 29.6
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 15
		Liquidity Index	: 0.51
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-6 (1)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 58.9
Coarse Sand (-No.10 + No.40)	: 12.5
Fine Sand (-No.40 + No.200)	: 5.8
Silt + Clay (-No.200)	: 22.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.8
Fine Gravel (-3/4in. + No.4)	: 32.5
Coarse Sand (-No.4 + No.10)	: 16.6
Medium Sand (-No.10 + No.40)	: 12.5
Fine Sand (-No.40 + No.200)	: 5.8
Silt + Clay (-No.200)	: 22.8

Approved By : DC

Soil No. 1026

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1304
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Tan Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.8
3/4	in.	19	mm	82.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.2
No.4		4.75	mm	57.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	46.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.6317mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 23.3
Maximum Dry Density	: NA	Liquid Limit	: 36
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.02
Gravel (3in. + No.10)	: 53.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.6	AASHTO Classification	: A-6 (1)
Silt + Clay (-No.200)	: 35.3	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 17.9
Fine Gravel (-3/4in. + No.4)	: 25.0
Coarse Sand (-No.4 + No.10)	: 10.4
Medium Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 35.3

Approved By : DC

Soil No. 1027

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1302
Project State	: Arkansas	Sample Depth	: 5.0' to 11.0'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Dark Brown & Copper Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	94.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	82.7
No.4		4.75	mm	70.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	59.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	46.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.6670mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 21.6
Maximum Dry Density	: NA	Liquid Limit	: 29
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 8
AASHTO Composition of Total Sample		Liquidity Index	: 0.08
Gravel (3in. + No.10)	: 40.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.0	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 36.1	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.5
Fine Gravel (-3/4in. + No.4)	: 24.4
Coarse Sand (-No.4 + No.10)	: 10.6
Medium Sand (-No.10 + No.40)	: 13.4
Fine Sand (-No.40 + No.200)	: 10.0
Silt + Clay (-No.200)	: 36.1

Approved By : DC

Soil No. 1028

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1304
Project State	: Arkansas	Sample Depth	: 15.0' to 21.4'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: White & Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	80.0
3/4	in.	19	mm	80.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.9
No.4		4.75	mm	41.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	26.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	18.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 6.3023mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 32.8
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 14
AASHTO Composition of Total Sample		Liquidity Index	: 0.70
Gravel (3in. + No.10)	: 73.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.1	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 15.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 20.0
Fine Gravel (-3/4in. + No.4)	: 38.2
Coarse Sand (-No.4 + No.10)	: 15.5
Medium Sand (-No.10 + No.40)	: 7.5
Fine Sand (-No.40 + No.200)	: 3.1
Silt + Clay (-No.200)	: 15.7

Approved By : DC

Soil No. 1029

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1403
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Gray Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	99.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	94.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	84.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0051mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.4
Maximum Dry Density	: NA	Liquid Limit	: 35
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.59
Gravel (3in. + No.10)	: 1.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.0	AASHTO Classification	: A-6 (13)
Silt + Clay (-No.200)	: 84.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.5
Coarse Sand (-No.4 + No.10)	: 0.5
Medium Sand (-No.10 + No.40)	: 5.0
Fine Sand (-No.40 + No.200)	: 10.0
Silt + Clay (-No.200)	: 84.0

Approved By : DC

Soil No. 1030

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1402
Project State	: Arkansas	Sample Depth	: 10.0' to 15.8'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Brown Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.1
No.4		4.75	mm	93.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	83.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	63.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	48.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0929mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 37.7
Maximum Dry Density	: NA	Liquid Limit	: 53
Optimum Moisture	: NA	Plastic Limit	: 26
		Plasticity Index	: 27
		Liquidity Index	: 0.43
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-6 (9)
		ASTM Classification	: SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 16.4
Coarse Sand (-No.10 + No.40)	: 20.1
Fine Sand (-No.40 + No.200)	: 15.4
Silt + Clay (-No.200)	: 48.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 6.7
Coarse Sand (-No.4 + No.10)	: 9.7
Medium Sand (-No.10 + No.40)	: 20.1
Fine Sand (-No.40 + No.200)	: 15.4
Silt + Clay (-No.200)	: 48.1

Approved By : DC

Soil No. 1031

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1504
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Tan Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	74.9
3/4	in.	19	mm	58.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	45.9
No.4		4.75	mm	34.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	26.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	19.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	14.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 11.9692mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 19.0
Maximum Dry Density	: NA	Liquid Limit	: NA
Optimum Moisture	: NA	Plastic Limit	: NA
		Plasticity Index	: NA
		Liquidity Index	: NA
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-1-a (0) *
		ASTM Classification	: GM *

* Visual Classification

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 73.1
Coarse Sand (-No.10 + No.40)	: 7.2
Fine Sand (-No.40 + No.200)	: 5.6
Silt + Clay (-No.200)	: 14.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 41.8
Fine Gravel (-3/4in. + No.4)	: 24.0
Coarse Sand (-No.4 + No.10)	: 7.3
Medium Sand (-No.10 + No.40)	: 7.2
Fine Sand (-No.40 + No.200)	: 5.6
Silt + Clay (-No.200)	: 14.1

Approved By : DC

Soil No. 1032

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1504
Project State	: Arkansas	Sample Depth	: 15.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 12-23-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Brown Gravelly Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.9
No.4		4.75	mm	67.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	61.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0589mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.2
Maximum Dry Density	: NA	Liquid Limit	: 50
Optimum Moisture	: NA	Plastic Limit	: 26
		Plasticity Index	: 24
AASHTO Composition of Total Sample		Liquidity Index	: 0.22
Gravel (3in. + No.10)	: 38.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.9	AASHTO Classification	: A-7-6 (9)
Silt + Clay (-No.200)	: 51.9	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 32.4
Coarse Sand (-No.4 + No.10)	: 6.0
Medium Sand (-No.10 + No.40)	: 5.8
Fine Sand (-No.40 + No.200)	: 3.9
Silt + Clay (-No.200)	: 51.9

Approved By : DC

Soil No. 1033

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1504
Project State	: Arkansas	Sample Depth	: 20.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 12-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 01-11-08
Soil Type	: Tan & Brown Gravelly Silt with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.0
No.4		4.75	mm	74.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	68.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	63.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	57.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0304mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 34.9
Maximum Dry Density	: NA	Liquid Limit	: NA
Optimum Moisture	: NA	Plastic Limit	: NA
		Plasticity Index	: NA
		Liquidity Index	: NA
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-4 (0) *
		ASTM Classification	: ML *

* Visual Classification

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 31.7
Coarse Sand (-No.10 + No.40)	: 5.1
Fine Sand (-No.40 + No.200)	: 5.3
Silt + Clay (-No.200)	: 57.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 25.6
Coarse Sand (-No.4 + No.10)	: 6.1
Medium Sand (-No.10 + No.40)	: 5.1
Fine Sand (-No.40 + No.200)	: 5.3
Silt + Clay (-No.200)	: 57.9

Approved By : DC

Soil No. 1034

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1502
Project State	:	Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Copper Silt		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.8
No.4		4.75	mm	97.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	95.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	94.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	86.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0046 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 29.1
Maximum Dry Density	:	NA	Liquid Limit	: 25
Optimum Moisture	:	NA	Plastic Limit	: 23
			Plasticity Index	: 2
AASHTO Composition of Total Sample			Liquidity Index	: 3.03
Gravel (3in. + No.10)	:	4.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	1.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.6	AASHTO Classification	: A-4 (1)
Silt + Clay (-No.200)	:	86.4	ASTM Classification	: ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	2.2
Coarse Sand (-No.4 + No.10)	:	1.9
Medium Sand (-No.10 + No.40)	:	1.9
Fine Sand (-No.40 + No.200)	:	7.6
Silt + Clay (-No.200)	:	86.4

Approved By : DC

Soil No. 1035

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1501
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Tan Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	88.5
3/4	in.	19	mm	88.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	84.9
No.4		4.75	mm	74.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	57.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.1078 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 28.2
Liquid Limit : 31
Plastic Limit : 30
Plasticity Index : 1
Liquidity Index : -1.35
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 42.6
Coarse Sand (-No.10 + No.40) : 19.4
Fine Sand (-No.40 + No.200) : 10.6
Silt + Clay (-No.200) : 27.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 11.5
Fine Gravel (-3/4in. + No.4) : 14.4
Coarse Sand (-No.4 + No.10) : 16.7
Medium Sand (-No.10 + No.40) : 19.4
Fine Sand (-No.40 + No.200) : 10.6
Silt + Clay (-No.200) : 27.4

Approved By : DC

Soil No. 1036

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1502
Project State	:	Arkansas	Sample Depth	: 15.0' to 16.4'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Brown & Tan Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.2
No.4		4.75	mm	80.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	68.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.2016 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 28.8
Maximum Dry Density	:	NA	Liquid Limit	: 41
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 21
			Liquidity Index	: 0.41
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	31.9	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	13.5	AASHTO Classification	: A-7-6 (5)
Fine Sand (-No.40 + No.200)	:	10.7	ASTM Classification	: SC
Silt + Clay (-No.200)	:	43.9		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	20.0
Coarse Sand (-No.4 + No.10)	:	11.9
Medium Sand (-No.10 + No.40)	:	13.5
Fine Sand (-No.40 + No.200)	:	10.7
Silt + Clay (-No.200)	:	43.9

Approved By : PC

Soil No. 1037

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1503
Project State	:	Arkansas	Sample Depth	: 25.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Dark Brown & Light Gray Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.7
3/4	in.	19	mm	92.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.0
No.4		4.75	mm	55.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	45.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.8721 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 32.8
Liquid Limit : NA
Plastic Limit : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0) *
ASTM Classification : GM *
* Visual Classification

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 54.1
Coarse Sand (-No.10 + No.40) : 10.1
Fine Sand (-No.40 + No.200) : 7.9
Silt + Clay (-No.200) : 27.9

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 7.3
Fine Gravel (-3/4in. + No.4) : 37.0
Coarse Sand (-No.4 + No.10) : 9.8
Medium Sand (-No.10 + No.40) : 10.1
Fine Sand (-No.40 + No.200) : 7.9
Silt + Clay (-No.200) : 27.9

Approved By : DC

Soil No. 1038

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1501
Project State	:	Arkansas	Sample Depth	: 30.0' to 31.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Brown & Light Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.8
No.4		4.75	mm	81.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	29.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.6768 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 41.7
Maximum Dry Density	:	NA	Liquid Limit	: 38
Optimum Moisture	:	NA	Plastic Limit	: 38
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-4 (0)
			ASTM Classification	: SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	33.7
Coarse Sand (-No.10 + No.40)	:	23.3
Fine Sand (-No.40 + No.200)	:	13.5
Silt + Clay (-No.200)	:	29.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	4.4
Fine Gravel (-3/4in. + No.4)	:	14.1
Coarse Sand (-No.4 + No.10)	:	15.2
Medium Sand (-No.10 + No.40)	:	23.3
Fine Sand (-No.40 + No.200)	:	13.5
Silt + Clay (-No.200)	:	29.5

Approved By : DL

Soil No. 1039

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1602
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.0
No.4		4.75	mm	61.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.0288 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 22.9
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 25
			Plasticity Index	: 9
AASHTO Composition of Total Sample			Liquidity Index	: -0.24
Gravel (3in. + No.10)	:	50.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.9	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	31.1	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	4.6
Fine Gravel (-3/4in. + No.4)	:	33.5
Coarse Sand (-No.4 + No.10)	:	12.1
Medium Sand (-No.10 + No.40)	:	11.8
Fine Sand (-No.40 + No.200)	:	6.9
Silt + Clay (-No.200)	:	31.1

Approved By : DC

Soil No. 1040

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1603
Project State	:	Arkansas	Sample Depth	: 10.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 03-04-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Light Beige & Copper Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.7
No.4		4.75	mm	66.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.5206 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 20.6
Maximum Dry Density	:	NA	Liquid Limit	: 30
Optimum Moisture	:	NA	Plastic Limit	: 28
			Plasticity Index	: 2
AASHTO Composition of Total Sample			Liquidity Index	: -3.63
Gravel (3in. + No.10)	:	47.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.8	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	32.5	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	4.8
Fine Gravel (-3/4in. + No.4)	:	28.9
Coarse Sand (-No.4 + No.10)	:	14.0
Medium Sand (-No.10 + No.40)	:	13.0
Fine Sand (-No.40 + No.200)	:	6.8
Silt + Clay (-No.200)	:	32.5

Approved By : DC

Soil No. 1041

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 thru 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1601
Project State	: Arkansas	Sample Depth	: 20.0' to 36.5'
Laboratory No.	: 06127	Date Tested	: 03-05-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Light Beige & Copper Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.4
3/4	in.	19	mm	83.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	66.7
No.4		4.75	mm	53.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.7273 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 39.3
Maximum Dry Density	: NA	Liquid Limit	: 42
Optimum Moisture	: NA	Plastic Limit	: 34
		Plasticity Index	: 8
AASHTO Composition of Total Sample		Liquidity Index	: 0.61
Gravel (3in. + No.10)	: 59.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.8	AASHTO Classification	: A-2-5 (0)
Silt + Clay (-No.200)	: 25.8	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 16.5
Fine Gravel (-3/4in. + No.4)	: 29.8
Coarse Sand (-No.4 + No.10)	: 13.2
Medium Sand (-No.10 + No.40)	: 9.9
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 25.8

Approved By : DC

Soil No. 1042

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 6 thru 9
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1604
Project State	:	Arkansas	Sample Depth	: 29.0' to 45.5'
Laboratory No.	:	06127	Date Tested	: 03-05-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Copper & Dark Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	82.9
3/4	in.	19	mm	82.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.7
No.4		4.75	mm	53.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.3405 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 35.1
Liquid Limit : 44
Plastic Limit : 22
Plasticity Index : 22
Liquidity Index : 0.59
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (2)
ASTM Classification : GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 55.1
Coarse Sand (-No.10 + No.40) : 5.4
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 35.2

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 17.1
Fine Gravel (-3/4in. + No.4) : 29.4
Coarse Sand (-No.4 + No.10) : 8.6
Medium Sand (-No.10 + No.40) : 5.4
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 35.2

Approved By : PC

Soil No. 1043

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1702
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.6
No.4		4.75	mm	66.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	56.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	47.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.6231 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 35.5
Maximum Dry Density	:	NA	Liquid Limit	: 36
Optimum Moisture	:	NA	Plastic Limit	: 32
			Plasticity Index	: 4
AASHTO Composition of Total Sample			Liquidity Index	: 0.96
Gravel (3in. + No.10)	:	43.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.2	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	:	41.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.2
Fine Gravel (-3/4in. + No.4)	:	26.9
Coarse Sand (-No.4 + No.10)	:	10.5
Medium Sand (-No.10 + No.40)	:	8.5
Fine Sand (-No.40 + No.200)	:	6.2
Silt + Clay (-No.200)	:	41.7

Approved By : DL

Soil No. 1044

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 thru 8
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1703
Project State	:	Arkansas	Sample Depth	: 10.0' to 41.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.8
No.4		4.75	mm	59.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	46.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.5481 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 26.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-4 (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	53.5
Coarse Sand (-No.10 + No.40)	:	11.0
Fine Sand (-No.40 + No.200)	:	7.0
Silt + Clay (-No.200)	:	28.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.4
Fine Gravel (-3/4in. + No.4)	:	33.6
Coarse Sand (-No.4 + No.10)	:	12.5
Medium Sand (-No.10 + No.40)	:	11.0
Fine Sand (-No.40 + No.200)	:	7.0
Silt + Clay (-No.200)	:	28.5

Approved By : DC

Soil No. 1045

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 8, 9 & 10
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1701
Project State	:	Arkansas	Sample Depth	: 40.0' to 51.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.4
No.4		4.75	mm	53.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.3426 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 32.3
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-4 (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	55.7
Coarse Sand (-No.10 + No.40)	:	9.1
Fine Sand (-No.40 + No.200)	:	5.2
Silt + Clay (-No.200)	:	30.0

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.7
Fine Gravel (-3/4in. + No.4)	:	38.4
Coarse Sand (-No.4 + No.10)	:	9.6
Medium Sand (-No.10 + No.40)	:	9.1
Fine Sand (-No.40 + No.200)	:	5.2
Silt + Clay (-No.200)	:	30.0

Approved By : DC

Soil No. 1046

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 13 thru 16
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1703
Project State	:	Arkansas	Sample Depth	: 65.0' to 81.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown & Gray Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	76.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	57.8
No.4		4.75	mm	45.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.1643 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 31.5
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	65.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.8	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	20.3	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	23.9
Fine Gravel (-3/4in. + No.4)	:	30.8
Coarse Sand (-No.4 + No.10)	:	10.6
Medium Sand (-No.10 + No.40)	:	8.6
Fine Sand (-No.40 + No.200)	:	5.8
Silt + Clay (-No.200)	:	20.3

Approved By : PC

Soil No. 1047

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 thru 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1802
Project State	:	Arkansas	Sample Depth	: 5.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.5
No.4		4.75	mm	54.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.5841 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 31.4
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-4 (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	58.7
Coarse Sand (-No.10 + No.40)	:	9.8
Fine Sand (-No.40 + No.200)	:	5.6
Silt + Clay (-No.200)	:	25.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	14.4
Fine Gravel (-3/4in. + No.4)	:	31.4
Coarse Sand (-No.4 + No.10)	:	12.9
Medium Sand (-No.10 + No.40)	:	9.8
Fine Sand (-No.40 + No.200)	:	5.6
Silt + Clay (-No.200)	:	25.9

Approved By : _____

Soil No. 1048

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 1 thru 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 1805
Project State	: Arkansas	Sample Depth	: 5.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 05/08/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	: Tan & Reddish Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.5
3/4	in.	19	mm	84.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	65.3
No.4		4.75	mm	55.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.7071 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 21.2
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
		Liquidity Index	: NA
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 52.8	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	: 8.0	AASHTO Classification	: A-2-4 (0)
Fine Sand (-No.40 + No.200)	: 7.0	ASTM Classification	: GM
Silt + Clay (-No.200)	: 32.2		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 15.8
Fine Gravel (-3/4in. + No.4)	: 29.0
Coarse Sand (-No.4 + No.10)	: 8.0
Medium Sand (-No.10 + No.40)	: 8.0
Fine Sand (-No.40 + No.200)	: 7.0
Silt + Clay (-No.200)	: 32.2

Approved By : DC

Soil No. 1049

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 5, 6 & 7
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1803
Project State	:	Arkansas	Sample Depth	: 25.0' to 36.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.5
3/4	in.	19	mm	83.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.8
No.4		4.75	mm	63.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	42.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.2292 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 32.5
Liquid Limit : NP
Plastic Limit : NP
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-4 (0)
ASTM Classification : GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 46.7
Coarse Sand (-No.10 + No.40) : 10.5
Fine Sand (-No.40 + No.200) : 6.5
Silt + Clay (-No.200) : 36.3

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 16.3
Fine Gravel (-3/4in. + No.4) : 20.4
Coarse Sand (-No.4 + No.10) : 10.0
Medium Sand (-No.10 + No.40) : 10.5
Fine Sand (-No.40 + No.200) : 6.5
Silt + Clay (-No.200) : 36.3

Approved By : DC

Soil No. 1050

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 8, 9 & 10
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1805
Project State	:	Arkansas	Sample Depth	: 40.0' to 51.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.9
3/4	in.	19	mm	75.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.8
No.4		4.75	mm	51.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.2761 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.4
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	59.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.6	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	24.2	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	24.4
Fine Gravel (-3/4in. + No.4)	:	24.3
Coarse Sand (-No.4 + No.10)	:	10.7
Medium Sand (-No.10 + No.40)	:	9.8
Fine Sand (-No.40 + No.200)	:	6.6
Silt + Clay (-No.200)	:	24.2

Approved By : _____ Soil No. 1051

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2406
Project State	:	Arkansas	Sample Depth	: 5.0' to 5.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	86.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.5
No.4		4.75	mm	44.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	30.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	19.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	13.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.9926 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.3
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	69.5	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	11.2	AASHTO Classification	: A-1-a (0)
Fine Sand (-No.40 + No.200)	:	6.3	ASTM Classification	: GM
Silt + Clay (-No.200)	:	13.0		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	13.4
Fine Gravel (-3/4in. + No.4)	:	42.4
Coarse Sand (-No.4 + No.10)	:	13.7
Medium Sand (-No.10 + No.40)	:	11.2
Fine Sand (-No.40 + No.200)	:	6.3
Silt + Clay (-No.200)	:	13.0

Approved By : DC

Soil No. 1052

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2417
Project State	:	Arkansas	Sample Depth	: 4.2' to 4.9'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.6
3/4	in.	19	mm	82.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.0
No.4		4.75	mm	53.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.6788 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 26.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	59.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.6	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	22.4	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	17.1
Fine Gravel (-3/4in. + No.4)	:	29.0
Coarse Sand (-No.4 + No.10)	:	13.2
Medium Sand (-No.10 + No.40)	:	11.7
Fine Sand (-No.40 + No.200)	:	6.6
Silt + Clay (-No.200)	:	22.4

Approved By : DC

Soil No. 1053

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2402
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 05/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Poorly Graded Gravel with Silt and Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.7
No.4		4.75	mm	45.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	30.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	17.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	10.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.7938 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 21.3
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	69.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.3	AASHTO Classification	: A-1-a (0)
Silt + Clay (-No.200)	:	10.8	ASTM Classification	: GP-GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.9
Fine Gravel (-3/4in. + No.4)	:	47.8
Coarse Sand (-No.4 + No.10)	:	14.8
Medium Sand (-No.10 + No.40)	:	13.4
Fine Sand (-No.40 + No.200)	:	6.3
Silt + Clay (-No.200)	:	10.8

Approved By : DC

Soil No. 1054

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 2415
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 05/08/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	: Red & Brown Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	54.1
No.4		4.75	mm	36.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	22.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	12.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	9.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 8.0908 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 26.2
Liquid Limit : 32
Plastic Limit : 18
Plasticity Index : 14
Liquidity Index : 0.61
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (1)
ASTM Classification : GP-GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 77.4
Coarse Sand (-No.10 + No.40)	: 9.7
Fine Sand (-No.40 + No.200)	: 3.0
Silt + Clay (-No.200)	: 9.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 14.1
Fine Gravel (-3/4in. + No.4)	: 49.5
Coarse Sand (-No.4 + No.10)	: 13.8
Medium Sand (-No.10 + No.40)	: 9.7
Fine Sand (-No.40 + No.200)	: 3.0
Silt + Clay (-No.200)	: 9.9

Approved By : DC

Soil No. 1055

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1901
Project State	:	Arkansas	Sample Depth	: 4.4' to 10.9'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.8
No.4		4.75	mm	80.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	63.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0444 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 25.6
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 17
			Plasticity Index	: 17
AASHTO Composition of Total Sample			Liquidity Index	: 0.52
Gravel (3in. + No.10)	:	28.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	8.9	AASHTO Classification	: A-6 (6)
Silt + Clay (-No.200)	:	54.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.2
Fine Gravel (-3/4in. + No.4)	:	13.6
Coarse Sand (-No.4 + No.10)	:	8.2
Medium Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	8.9
Silt + Clay (-No.200)	:	54.3

Approved By : DC

Soil No. 1056

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1902
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.2'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.0
3/4	in.	19	mm	80.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.0
No.4		4.75	mm	59.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	37.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.0697 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 12.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	50.4	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	11.8	AASHTO Classification	: A-2-4 (0)
Fine Sand (-No.40 + No.200)	:	9.3	ASTM Classification	: GM
Silt + Clay (-No.200)	:	28.5		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	19.7
Fine Gravel (-3/4in. + No.4)	:	20.6
Coarse Sand (-No.4 + No.10)	:	10.1
Medium Sand (-No.10 + No.40)	:	11.8
Fine Sand (-No.40 + No.200)	:	9.3
Silt + Clay (-No.200)	:	28.5

Approved By : PC

Soil No. 1057

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 3 thru 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 1903
Project State	:	Arkansas	Sample Depth	: 15.0' to 30.7'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown & Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	80.9
3/4	in.	19	mm	77.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.2
No.4		4.75	mm	51.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.8967 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 21.3
Maximum Dry Density	:	NA	Liquid Limit	: 30
Optimum Moisture	:	NA	Plastic Limit	: 16
			Plasticity Index	: 14
AASHTO Composition of Total Sample			Liquidity Index	: 0.39
Gravel (3in. + No.10)	:	56.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	7.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.5	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	:	30.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	22.1
Fine Gravel (-3/4in. + No.4)	:	26.0
Coarse Sand (-No.4 + No.10)	:	8.3
Medium Sand (-No.10 + No.40)	:	7.4
Fine Sand (-No.40 + No.200)	:	5.5
Silt + Clay (-No.200)	:	30.7

Approved By : DC

Soil No. 1058

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2301
Project State	:	Arkansas	Sample Depth	: 4.9' to 6.4'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Gray Gravelly Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	91.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.4
No.4		4.75	mm	72.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	58.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0289 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 22
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 16
			Plasticity Index	: 18
AASHTO Composition of Total Sample			Liquidity Index	: 0.33
Gravel (3in. + No.10)	:	32.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	3.7	AASHTO Classification	: A-6 (7)
Silt + Clay (-No.200)	:	58.4	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	8.9
Fine Gravel (-3/4in. + No.4)	:	19.1
Coarse Sand (-No.4 + No.10)	:	4.9
Medium Sand (-No.10 + No.40)	:	5.0
Fine Sand (-No.40 + No.200)	:	3.7
Silt + Clay (-No.200)	:	58.4

Approved By : DC

Soil No. 1059

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2313
Project State	:	Arkansas	Sample Depth	: 4.7' to 11.2'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.8
3/4	in.	19	mm	67.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	53.7
No.4		4.75	mm	41.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	33.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 7.7378 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 22.5
Maximum Dry Density	:	NA	Liquid Limit	: 30
Optimum Moisture	:	NA	Plastic Limit	: 17
			Plasticity Index	: 13
			Liquidity Index	: 0.39
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-2-6 (1)
			ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	66.6
Coarse Sand (-No.10 + No.40)	:	7.0
Fine Sand (-No.40 + No.200)	:	3.7
Silt + Clay (-No.200)	:	22.7

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	32.6
Fine Gravel (-3/4in. + No.4)	:	26.2
Coarse Sand (-No.4 + No.10)	:	7.8
Medium Sand (-No.10 + No.40)	:	7.0
Fine Sand (-No.40 + No.200)	:	3.7
Silt + Clay (-No.200)	:	22.7

Approved By : DC

Soil No. 1060

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2305
Project State	:	Arkansas	Sample Depth	: 4.9' to 6.4'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Well-Graded Gravel with Silt and Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.0
3/4	in.	19	mm	76.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	51.2
No.4		4.75	mm	33.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	20.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	9.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	6.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 9.0566 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 25
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-1-a (0)
			ASTM Classification	: GW-GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	79.9
Coarse Sand (-No.10 + No.40)	:	10.5
Fine Sand (-No.40 + No.200)	:	3.1
Silt + Clay (-No.200)	:	6.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	24.0
Fine Gravel (-3/4in. + No.4)	:	42.2
Coarse Sand (-No.4 + No.10)	:	13.7
Medium Sand (-No.10 + No.40)	:	10.5
Fine Sand (-No.40 + No.200)	:	3.1
Silt + Clay (-No.200)	:	6.5

Approved By : DC

Soil No. 1061

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2504
Project State	:	Arkansas	Sample Depth	: 4.7' to 11.7'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.4
3/4	in.	19	mm	81.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.5
No.4		4.75	mm	45.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	33.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.843 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 22.4
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 17
			Plasticity Index	: 17
AASHTO Composition of Total Sample			Liquidity Index	: 0.33
Gravel (3in. + No.10)	:	67.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.2	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	:	15.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	18.3
Fine Gravel (-3/4in. + No.4)	:	36.6
Coarse Sand (-No.4 + No.10)	:	12.1
Medium Sand (-No.10 + No.40)	:	11.9
Fine Sand (-No.40 + No.200)	:	5.2
Silt + Clay (-No.200)	:	15.9

Approved By : _____ Soil No. 1062

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2507
Project State	:	Arkansas	Sample Depth	: 4.7' to 11.2'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.1
3/4	in.	19	mm	92.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	73.0
No.4		4.75	mm	62.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	45.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.0048 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 42.3
Maximum Dry Density	:	NA	Liquid Limit	: 40
Optimum Moisture	:	NA	Plastic Limit	: 19
			Plasticity Index	: 21
AASHTO Composition of Total Sample			Liquidity Index	: 1.12
Gravel (3in. + No.10)	:	46.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	3.8	AASHTO Classification	: A-6 (4)
Silt + Clay (-No.200)	:	41.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.9
Fine Gravel (-3/4in. + No.4)	:	29.5
Coarse Sand (-No.4 + No.10)	:	9.0
Medium Sand (-No.10 + No.40)	:	8.1
Fine Sand (-No.40 + No.200)	:	3.8
Silt + Clay (-No.200)	:	41.7

Approved By : DC

Soil No. 1063

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2505
Project State	:	Arkansas	Sample Depth	: 9.5' to 16.0'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.9
3/4	in.	19	mm	86.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	58.5
No.4		4.75	mm	45.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	32.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.1203 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.8
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	67.4	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	11.4	AASHTO Classification	: A-1-b (0)
Fine Sand (-No.40 + No.200)	:	5.9	ASTM Classification	: GM
Silt + Clay (-No.200)	:	15.3		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	13.1
Fine Gravel (-3/4in. + No.4)	:	41.8
Coarse Sand (-No.4 + No.10)	:	12.5
Medium Sand (-No.10 + No.40)	:	11.4
Fine Sand (-No.40 + No.200)	:	5.9
Silt + Clay (-No.200)	:	15.3

Approved By : DC

Soil No. 1064

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2503
Project State	:	Arkansas	Sample Depth	: 4.7' to 11.2'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.4
No.4		4.75	mm	52.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	37.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	24.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	16.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.1123 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 36.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-1-b (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	62.5
Coarse Sand (-No.10 + No.40)	:	13.4
Fine Sand (-No.40 + No.200)	:	7.9
Silt + Clay (-No.200)	:	16.2

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	4.5
Fine Gravel (-3/4in. + No.4)	:	43.0
Coarse Sand (-No.4 + No.10)	:	15.0
Medium Sand (-No.10 + No.40)	:	13.4
Fine Sand (-No.40 + No.200)	:	7.9
Silt + Clay (-No.200)	:	16.2

Approved By : PC

Soil No. 1065

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2903
Project State	:	Arkansas	Sample Depth	: 4.8' to 10.3'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.0
3/4	in.	19	mm	70.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.7
No.4		4.75	mm	50.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.75 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 40.8
Maximum Dry Density	:	NA	Liquid Limit	: 35
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 17
			Liquidity Index	: 1.34
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	61.9	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	8.8	AASHTO Classification	: A-2-6 (1)
Fine Sand (-No.40 + No.200)	:	4.2	ASTM Classification	: GC
Silt + Clay (-No.200)	:	25.1		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	29.1
Fine Gravel (-3/4in. + No.4)	:	20.9
Coarse Sand (-No.4 + No.10)	:	11.9
Medium Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	4.2
Silt + Clay (-No.200)	:	25.1

Approved By : DC

Soil No. 1066

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2906
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	83.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.5
No.4		4.75	mm	46.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	27.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.5648 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.1
Maximum Dry Density	:	NA	Liquid Limit	: 35
Optimum Moisture	:	NA	Plastic Limit	: 15
			Plasticity Index	: 20
AASHTO Composition of Total Sample			Liquidity Index	: 0.40
Gravel (3in. + No.10)	:	65.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	7.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	4.3	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	:	22.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	16.2
Fine Gravel (-3/4in. + No.4)	:	37.5
Coarse Sand (-No.4 + No.10)	:	11.4
Medium Sand (-No.10 + No.40)	:	7.7
Fine Sand (-No.40 + No.200)	:	4.3
Silt + Clay (-No.200)	:	22.9

Approved By : _____ Soil No. 1067

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3002
Project State	:	Arkansas	Sample Depth	: 4.5' to 10.2'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.0
3/4	in.	19	mm	87.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	65.2
No.4		4.75	mm	51.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.8873 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 29.5
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 19
			Plasticity Index	: 15
			Liquidity Index	: 0.69
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	56.3	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	8.1	AASHTO Classification	: A-2-6 (1)
Fine Sand (-No.40 + No.200)	:	4.7	ASTM Classification	: GC
Silt + Clay (-No.200)	:	30.9		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	13.0
Fine Gravel (-3/4in. + No.4)	:	35.1
Coarse Sand (-No.4 + No.10)	:	8.2
Medium Sand (-No.10 + No.40)	:	8.1
Fine Sand (-No.40 + No.200)	:	4.7
Silt + Clay (-No.200)	:	30.9

Approved By : DC

Soil No. 1068

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3003
Project State	:	Arkansas	Sample Depth	: 4.5' to 11.0'
Laboratory No.	:	06127	Date Tested	: 05/28/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/10/08
Soil Type	:	Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	84.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.6
No.4		4.75	mm	57.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	29.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.4883 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 21.5
Liquid Limit : 35
Plastic Limit : 16
Plasticity Index : 19
Liquidity Index : 0.31
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (2)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 52.5
Coarse Sand (-No.10 + No.40) : 12.5
Fine Sand (-No.40 + No.200) : 6.0
Silt + Clay (-No.200) : 29.0

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 15.6
Fine Gravel (-3/4in. + No.4) : 27.0
Coarse Sand (-No.4 + No.10) : 9.9
Medium Sand (-No.10 + No.40) : 12.5
Fine Sand (-No.40 + No.200) : 6.0
Silt + Clay (-No.200) : 29.0

Approved By : DC

Soil No. 1069

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2103
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 06/17/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Well-Graded Gravel with Clay and Sand (and(or Silty Clay and Sand)		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	64.3
No.4		4.75	mm	52.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	22.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	8.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.1123 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 34.3
Maximum Dry Density	:	NA	Liquid Limit	: 41
Optimum Moisture	:	NA	Plastic Limit	: 25
			Plasticity Index	: 16
AASHTO Composition of Total Sample			Liquidity Index	: 0.55
Gravel (3in. + No.10)	:	61.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	15.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	13.7	AASHTO Classification	: A-2-7 (1)
Silt + Clay (-No.200)	:	8.9	ASTM Classification	: GW-GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.1
Fine Gravel (-3/4in. + No.4)	:	40.6
Coarse Sand (-No.4 + No.10)	:	13.8
Medium Sand (-No.10 + No.40)	:	15.9
Fine Sand (-No.40 + No.200)	:	13.7
Silt + Clay (-No.200)	:	8.9

Approved By : DC

Soil No. 1070

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2102
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.8
3/4	in.	19	mm	82.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.8
No.4		4.75	mm	63.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	41.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.4134 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 26.5
Maximum Dry Density	:	NA	Liquid Limit	: 38
Optimum Moisture	:	NA	Plastic Limit	: 27
			Plasticity Index	: 11
AASHTO Composition of Total Sample			Liquidity Index	: -0.06
Gravel (3in. + No.10)	:	47.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.4	AASHTO Classification	: A-2-6 (0)
Silt + Clay (-No.200)	:	33.6	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	18.0
Fine Gravel (-3/4in. + No.4)	:	18.3
Coarse Sand (-No.4 + No.10)	:	11.1
Medium Sand (-No.10 + No.40)	:	11.6
Fine Sand (-No.40 + No.200)	:	7.4
Silt + Clay (-No.200)	:	33.6

Approved By : PC

Soil No. 1071

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2101
Project State	:	Arkansas	Sample Depth	: 10.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.1
No.4		4.75	mm	78.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	53.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.2294 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 28.8
Maximum Dry Density	:	NA	Liquid Limit	: 36
Optimum Moisture	:	NA	Plastic Limit	: 27
			Plasticity Index	: 9
AASHTO Composition of Total Sample			Liquidity Index	: 0.15
Gravel (3in. + No.10)	:	32.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	14.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.0	AASHTO Classification	: A-4 (1)
Silt + Clay (-No.200)	:	44.2	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	3.4
Fine Gravel (-3/4in. + No.4)	:	18.4
Coarse Sand (-No.4 + No.10)	:	11.0
Medium Sand (-No.10 + No.40)	:	14.0
Fine Sand (-No.40 + No.200)	:	9.0
Silt + Clay (-No.200)	:	44.2

Approved By : DC

Soil No. 1072

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2103
Project State	:	Arkansas	Sample Depth	: 20.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.5
3/4	in.	19	mm	82.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.3
No.4		4.75	mm	52.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.0187 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.8
Maximum Dry Density	:	NA	Liquid Limit	: 28
Optimum Moisture	:	NA	Plastic Limit	: 28
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	59.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.8	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	20.8	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	17.6
Fine Gravel (-3/4in. + No.4)	:	30.1
Coarse Sand (-No.4 + No.10)	:	11.9
Medium Sand (-No.10 + No.40)	:	11.8
Fine Sand (-No.40 + No.200)	:	7.8
Silt + Clay (-No.200)	:	20.8

Approved By : DC

Soil No. 1073

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 7
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2102
Project State	:	Arkansas	Sample Depth	: 35.0' to 36.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.7
No.4		4.75	mm	86.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	73.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.075 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 30.2
Maximum Dry Density	:	NA	Liquid Limit	: 38
Optimum Moisture	:	NA	Plastic Limit	: 22
			Plasticity Index	: 16
AASHTO Composition of Total Sample			Liquidity Index	: 0.51
Gravel (3in. + No.10)	:	26.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	14.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.1	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	:	50.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	13.5
Coarse Sand (-No.4 + No.10)	:	13.4
Medium Sand (-No.10 + No.40)	:	14.0
Fine Sand (-No.40 + No.200)	:	9.1
Silt + Clay (-No.200)	:	50.0

Approved By : DC

Soil No. 1074

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 7, 8 & 9
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2101
Project State	:	Arkansas	Sample Depth	: 35.0' to 46.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Beige Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.4
3/4	in.	19	mm	77.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.6
No.4		4.75	mm	53.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	33.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.5602 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 44.9
Maximum Dry Density	:	NA	Liquid Limit	: 29
Optimum Moisture	:	NA	Plastic Limit	: 29
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	56.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	8.0	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	25.4	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	22.3
Fine Gravel (-3/4in. + No.4)	:	24.3
Coarse Sand (-No.4 + No.10)	:	10.2
Medium Sand (-No.10 + No.40)	:	9.8
Fine Sand (-No.40 + No.200)	:	8.0
Silt + Clay (-No.200)	:	25.4

Approved By : DC

Soil No. 1075

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 7, 8 & 9
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2103
Project State	:	Arkansas	Sample Depth	: 35.0' to 46.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.8
3/4	in.	19	mm	78.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	56.9
No.4		4.75	mm	42.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.7509 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 32.6
Maximum Dry Density	:	NA	Liquid Limit	: 43
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 23
AASHTO Composition of Total Sample			Liquidity Index	: 0.57
Gravel (3in. + No.10)	:	65.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	3.5	AASHTO Classification	: A-2-7 (3)
Silt + Clay (-No.200)	:	25.4	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	21.7
Fine Gravel (-3/4in. + No.4)	:	35.4
Coarse Sand (-No.4 + No.10)	:	8.3
Medium Sand (-No.10 + No.40)	:	5.7
Fine Sand (-No.40 + No.200)	:	3.5
Silt + Clay (-No.200)	:	25.4

Approved By : DC

Soil No. 1076

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2204
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.8
No.4		4.75	mm	73.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	64.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	46.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1609 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 28.1
Maximum Dry Density	:	NA	Liquid Limit	: 39
Optimum Moisture	:	NA	Plastic Limit	: 21
			Plasticity Index	: 18
AASHTO Composition of Total Sample			Liquidity Index	: 0.37
Gravel (3in. + No.10)	:	35.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.5	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	:	46.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.8
Fine Gravel (-3/4in. + No.4)	:	19.9
Coarse Sand (-No.4 + No.10)	:	9.0
Medium Sand (-No.10 + No.40)	:	10.1
Fine Sand (-No.40 + No.200)	:	7.5
Silt + Clay (-No.200)	:	46.7

Approved By : DC

Soil No. 1077

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2, 3 & 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2201
Project State	:	Arkansas	Sample Depth	: 10.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	80.4
3/4	in.	19	mm	73.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.5
No.4		4.75	mm	54.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	45.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	34.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.096 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 30.9
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 26
			Plasticity Index	: 8
AASHTO Composition of Total Sample			Liquidity Index	: 0.64
Gravel (3in. + No.10)	:	54.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.7	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	27.8	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	26.5
Fine Gravel (-3/4in. + No.4)	:	18.7
Coarse Sand (-No.4 + No.10)	:	9.7
Medium Sand (-No.10 + No.40)	:	10.6
Fine Sand (-No.40 + No.200)	:	6.7
Silt + Clay (-No.200)	:	27.8

Approved By : DC

Soil No. 1078

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2203
Project State	:	Arkansas	Sample Depth	: 10.0' to 15.9'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.0
3/4	in.	19	mm	89.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	77.1
No.4		4.75	mm	66.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	57.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.5812 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 30.5
Maximum Dry Density	:	NA	Liquid Limit	: 40
Optimum Moisture	:	NA	Plastic Limit	: 26
			Plasticity Index	: 14
AASHTO Composition of Total Sample			Liquidity Index	: 0.32
Gravel (3in. + No.10)	:	42.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	8.0	AASHTO Classification	: A-6 (2)
Silt + Clay (-No.200)	:	40.1	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	11.0
Fine Gravel (-3/4in. + No.4)	:	22.3
Coarse Sand (-No.4 + No.10)	:	9.2
Medium Sand (-No.10 + No.40)	:	9.4
Fine Sand (-No.40 + No.200)	:	8.0
Silt + Clay (-No.200)	:	40.1

Approved By : DC

Soil No. 1079

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 6, 7 & 8
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2204
Project State	:	Arkansas	Sample Depth	: 30.0' to 41.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.0
3/4	in.	19	mm	90.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.9
No.4		4.75	mm	63.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	42.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.2418 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 33.9
Maximum Dry Density	:	NA	Liquid Limit	: 42
Optimum Moisture	:	NA	Plastic Limit	: 21
			Plasticity Index	: 21
AASHTO Composition of Total Sample			Liquidity Index	: 0.64
Gravel (3in. + No.10)	:	46.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.2	AASHTO Classification	: A-7-6 (2)
Silt + Clay (-No.200)	:	35.6	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	10.0
Fine Gravel (-3/4in. + No.4)	:	26.6
Coarse Sand (-No.4 + No.10)	:	10.2
Medium Sand (-No.10 + No.40)	:	10.4
Fine Sand (-No.40 + No.200)	:	7.2
Silt + Clay (-No.200)	:	35.6

Approved By : DC

Soil No. 1080

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 7, 8 & 9
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2202
Project State	:	Arkansas	Sample Depth	: 35.0' to 46.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Light Beige Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.1
3/4	in.	19	mm	94.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	74.9
No.4		4.75	mm	55.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	25.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	18.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.608 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 32.7
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 26
			Plasticity Index	: 8
AASHTO Composition of Total Sample			Liquidity Index	: 0.89
Gravel (3in. + No.10)	:	61.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	12.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.5	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	18.8	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	5.9
Fine Gravel (-3/4in. + No.4)	:	38.6
Coarse Sand (-No.4 + No.10)	:	17.3
Medium Sand (-No.10 + No.40)	:	12.9
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	18.8

Approved By : DC

Soil No. 1081

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2601
Project State	:	Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Gray Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	98.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	97.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	96.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0031 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 22.1
Maximum Dry Density	:	NA	Liquid Limit	: 38
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 20
AASHTO Composition of Total Sample			Liquidity Index	: 0.20
Gravel (3in. + No.10)	:	1.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	0.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	1.7	AASHTO Classification	: A-6 (20)
Silt + Clay (-No.200)	:	96.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	0.6
Coarse Sand (-No.4 + No.10)	:	0.8
Medium Sand (-No.10 + No.40)	:	0.9
Fine Sand (-No.40 + No.200)	:	1.7
Silt + Clay (-No.200)	:	96.0

Approved By : DC

Soil No. 1082

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2602
Project State	:	Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Beige Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.1
No.4		4.75	mm	93.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	72.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	62.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0203 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 41.5
Maximum Dry Density	:	NA	Liquid Limit	: 57
Optimum Moisture	:	NA	Plastic Limit	: 25
			Plasticity Index	: 32
AASHTO Composition of Total Sample			Liquidity Index	: 0.53
Gravel (3in. + No.10)	:	14.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	10.5	AASHTO Classification	: A-7-6 (18)
Silt + Clay (-No.200)	:	62.3	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	6.8
Coarse Sand (-No.4 + No.10)	:	7.4
Medium Sand (-No.10 + No.40)	:	13.0
Fine Sand (-No.40 + No.200)	:	10.5
Silt + Clay (-No.200)	:	62.3

Approved By : DC

Soil No. 1083

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 2604
Project State	:	Arkansas	Sample Depth	: 10.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 06/18/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 06/24/08
Soil Type	:	Gray Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.4
No.4		4.75	mm	76.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	56.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1234 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 35
Maximum Dry Density	:	NA	Liquid Limit	: 41
Optimum Moisture	:	NA	Plastic Limit	: 21
			Plasticity Index	: 20
			Liquidity Index	: 0.69
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-7-6 (6)
			ASTM Classification	: SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	32.2
Coarse Sand (-No.10 + No.40)	:	11.1
Fine Sand (-No.40 + No.200)	:	9.4
Silt + Clay (-No.200)	:	47.3

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.8
Fine Gravel (-3/4in. + No.4)	:	15.7
Coarse Sand (-No.4 + No.10)	:	8.7
Medium Sand (-No.10 + No.40)	:	11.1
Fine Sand (-No.40 + No.200)	:	9.4
Silt + Clay (-No.200)	:	47.3

Approved By : DC

Soil No. 1084

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3106
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 07/07/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.7
No.4		4.75	mm	58.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.9394 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 11.4
Maximum Dry Density	:	NA	Liquid Limit	: 31
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 13
AASHTO Composition of Total Sample			Liquidity Index	: -0.50
Gravel (3in. + No.10)	:	56.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	14.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.9	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	:	21.8	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	14.6
Fine Gravel (-3/4in. + No.4)	:	26.8
Coarse Sand (-No.4 + No.10)	:	15.5
Medium Sand (-No.10 + No.40)	:	14.4
Fine Sand (-No.40 + No.200)	:	6.9
Silt + Clay (-No.200)	:	21.8

Approved By : DC

Soil No. 1085

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3102
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.6
No.4		4.75	mm	93.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.01 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 36.3
Maximum Dry Density	:	NA	Liquid Limit	: 60
Optimum Moisture	:	NA	Plastic Limit	: 24
			Plasticity Index	: 36
			Liquidity Index	: 0.34
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	12.8	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	8.8	AASHTO Classification	: A-7-6 (26)
Fine Sand (-No.40 + No.200)	:	6.5	ASTM Classification	: CH
Silt + Clay (-No.200)	:	71.9		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	6.7
Coarse Sand (-No.4 + No.10)	:	6.1
Medium Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	71.9

Approved By : DC

Soil No. 1086

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 3 & 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3101
Project State	:	Arkansas	Sample Depth	: 15.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.9
No.4		4.75	mm	55.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.4479 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 26
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-1-b (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	58.5
Coarse Sand (-No.10 + No.40)	:	13.0
Fine Sand (-No.40 + No.200)	:	7.3
Silt + Clay (-No.200)	:	21.2

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.3
Fine Gravel (-3/4in. + No.4)	:	38.7
Coarse Sand (-No.4 + No.10)	:	13.5
Medium Sand (-No.10 + No.40)	:	13.0
Fine Sand (-No.40 + No.200)	:	7.3
Silt + Clay (-No.200)	:	21.2

Approved By : DC

Soil No. 1087

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3111
Project State	:	Arkansas	Sample Depth	: 10.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	81.1
3/4	in.	19	mm	71.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	52.5
No.4		4.75	mm	43.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	24.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	19.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 7.7663 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 20.8
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	65.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.1	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	19.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	28.9
Fine Gravel (-3/4in. + No.4)	:	27.2
Coarse Sand (-No.4 + No.10)	:	9.7
Medium Sand (-No.10 + No.40)	:	9.4
Fine Sand (-No.40 + No.200)	:	5.1
Silt + Clay (-No.200)	:	19.7

Approved By : DC

Soil No. 1088

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 3 & 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3108
Project State	:	Arkansas	Sample Depth	: 15.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	83.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.4
No.4		4.75	mm	54.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.1799 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.2
Maximum Dry Density	:	NA	Liquid Limit	: 33
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 15
			Liquidity Index	: 0.44
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	55.2	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	5.3	AASHTO Classification	: A-2-6 (1)
Fine Sand (-No.40 + No.200)	:	9.1	ASTM Classification	: GC
Silt + Clay (-No.200)	:	30.4		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	16.2
Fine Gravel (-3/4in. + No.4)	:	29.3
Coarse Sand (-No.4 + No.10)	:	9.7
Medium Sand (-No.10 + No.40)	:	5.3
Fine Sand (-No.40 + No.200)	:	9.1
Silt + Clay (-No.200)	:	30.4

Approved By : DC

Soil No. 1089

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3201
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/10/08
Soil Type	:	Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	80.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.8
No.4		4.75	mm	45.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	33.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	23.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	18.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.7481 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 13.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	66.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.0	AASHTO Classification	: A-1-b (0)
Silt + Clay (-No.200)	:	18.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	19.1
Fine Gravel (-3/4in. + No.4)	:	35.0
Coarse Sand (-No.4 + No.10)	:	12.0
Medium Sand (-No.10 + No.40)	:	10.2
Fine Sand (-No.40 + No.200)	:	5.0
Silt + Clay (-No.200)	:	18.7

Approved By : DC

Soil No. 1090

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1 & 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3205 & 3207
Project State	:	Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/11/08
Soil Type	:	Red Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.5
No.4		4.75	mm	81.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	73.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	60.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0229 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.7
Maximum Dry Density	:	NA	Liquid Limit	: 44
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 24
AASHTO Composition of Total Sample			Liquidity Index	: 0.20
Gravel (3in. + No.10)	:	26.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	7.4	AASHTO Classification	: A-7-6 (12)
Silt + Clay (-No.200)	:	60.9	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	18.6
Coarse Sand (-No.4 + No.10)	:	7.5
Medium Sand (-No.10 + No.40)	:	5.6
Fine Sand (-No.40 + No.200)	:	7.4
Silt + Clay (-No.200)	:	60.9

Approved By : DC

Soil No. 1091

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3204
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/11/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	82.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.7
No.4		4.75	mm	62.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	55.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.651 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.5
Maximum Dry Density	:	NA	Liquid Limit	: 46
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 26
AASHTO Composition of Total Sample			Liquidity Index	: 0.18
Gravel (3in. + No.10)	:	45.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	6.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.0	AASHTO Classification	: A-7-6 (6)
Silt + Clay (-No.200)	:	43.1	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	17.2
Fine Gravel (-3/4in. + No.4)	:	20.2
Coarse Sand (-No.4 + No.10)	:	7.6
Medium Sand (-No.10 + No.40)	:	6.9
Fine Sand (-No.40 + No.200)	:	5.0
Silt + Clay (-No.200)	:	43.1

Approved By : DC

Soil No. 1092

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3201 & 3203
Project State	:	Arkansas	Sample Depth	: 20.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/11/08
Soil Type	:	Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.9
No.4		4.75	mm	62.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.0941 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.9
Maximum Dry Density	:	NA	Liquid Limit	: 31
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 11
AASHTO Composition of Total Sample			Liquidity Index	: 0.39
Gravel (3in. + No.10)	:	46.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	8.0	AASHTO Classification	: A-6 (0)
Silt + Clay (-No.200)	:	36.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	14.6
Fine Gravel (-3/4in. + No.4)	:	22.8
Coarse Sand (-No.4 + No.10)	:	8.9
Medium Sand (-No.10 + No.40)	:	9.5
Fine Sand (-No.40 + No.200)	:	8.0
Silt + Clay (-No.200)	:	36.2

Approved By : DC

Soil No. 1093

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: SS - 4, 5 & 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 3202
Project State	:	Arkansas	Sample Depth	: 20.0' to 31.5'
Laboratory No.	:	06127	Date Tested	: 07/08/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 07/11/08
Soil Type	:	Red, Brown & Gray Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	88.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	79.3
No.4		4.75	mm	66.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	55.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.0355 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 44.2
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
AASHTO Composition of Total Sample			Liquidity Index	: NA
Gravel (3in. + No.10)	:	44.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	12.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.2	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	33.9	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	11.7
Fine Gravel (-3/4in. + No.4)	:	21.7
Coarse Sand (-No.4 + No.10)	:	11.5
Medium Sand (-No.10 + No.40)	:	12.0
Fine Sand (-No.40 + No.200)	:	9.2
Silt + Clay (-No.200)	:	33.9

Approved By : DC

Soil No. 1094

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UNCONFINED COMPRESSION TEST (ROCK CORE)

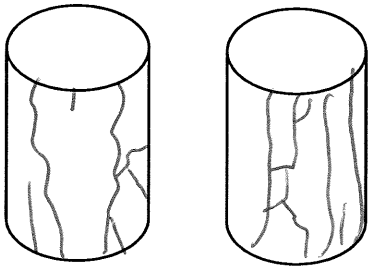
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-1
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-5001
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 57.8' to 58.2'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - v.f. to f. grain w/foss., cherty mod. Wthd.

Diameter :	1.85 in	Area :	2.68 in^2
Height :	3.12 in	Volume :	0.00484 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	200.41	lbs/$ft.^3$
Maximum Stress :	10898.1	psi
Elapsed Time :	13:10	min.
Strain :	2.34	%



Comments :

Approved By : KEW

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UNCONFINED COMPRESSION TEST (ROCK CORE)

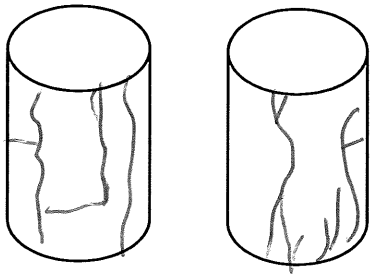
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-2
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-5001
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 63.2' to 63.5'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - cse. To mega-grain w/sparry cement, foss. Fresh

Diameter :	1.85 in	Area :	2.68 in^2
Height :	4.19 in	Volume :	0.0065 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	163.75	lbs/$ft.^3$
Maximum Stress :	3571.7	psi
Elapsed Time :	5:00	min.
Strain :	1.74	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

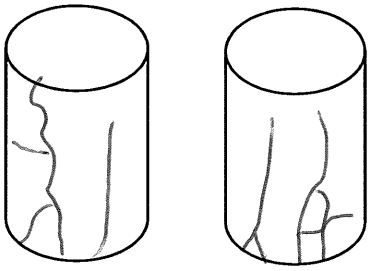
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-3
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4009
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 41.9' to 42.3'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - f. grain, foss, cherty mod. Sev. Wthd.

Diameter :	1.87 in	Area :	2.74 in^2
Height :	4.09 in	Volume :	0.00648 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	147.52	lbs/$ft.^3$
Maximum Stress :	5987.3	psi
Elapsed Time :	7:00	min.
Strain :	1.78	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

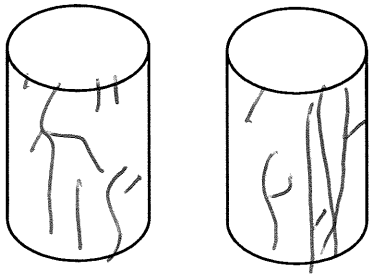
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-4
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4003
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 20.5' to 20.9'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - lithographic into v.f. to f. grain w/foss fresh to sli. Wthd.

Diameter :	1.86 in	Area :	2.73 in^2
Height :	4.12 in	Volume :	0.0065 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	155.84	lbs/$ft.^3$
Maximum Stress :	7304.4	psi
Elapsed Time :	7:52	min.
Strain :	1.77	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

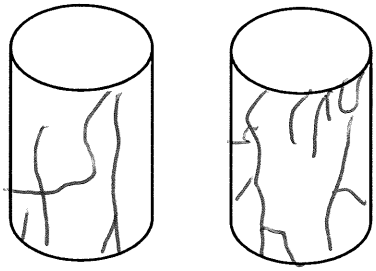
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-5
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4008
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 34.4' to 34.7'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Ls - lithographic tex w/mod. Sev. Wthd seam & healed 65 deg frac. Fresh

Diameter :	1.87 in	Area :	2.74 in^2
Height :	4.15 in	Volume :	0.0066 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	152.8	lbs/$ft.^3$
Maximum Stress :	3370.4	psi
Elapsed Time :	3:45	min.
Strain :	1.76	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

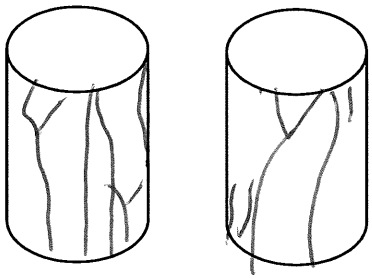
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-6
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4004
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 27.4' to 27.7'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - f. grain to amorphous, v. cherty mod. Wthd.

Diameter :	1.87 in	Area :	2.74 in^2
Height :	4.14 in	Volume :	0.00657 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	152.09	lbs/$ft.^3$
Maximum Stress :	6914.6	psi
Elapsed Time :	7:45	min.
Strain :	1.76	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

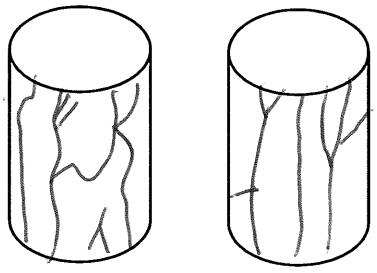
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-7
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-5000
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 64.0' to 64.4'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - cse. Crystalline w/f. crystalline seams, foss., fresh

Diameter :	1.85 in	Area :	2.69 in^2
Height :	4.14 in	Volume :	0.00645 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	166.1	lbs/$ft.^3$
Maximum Stress :	7476.6	psi
Elapsed Time :	7:19	min.
Strain :	1.76	%



Comments :

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CONSULTING ENGINEERS

UNCONFINED COMPRESSION TEST (ROCK CORE)

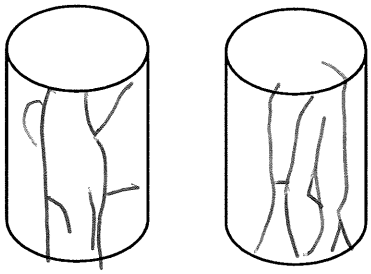
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-8
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-5000
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 71.7' to 72.0'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - f. to cse. Grain w/foss cherty sli. Wthd

Diameter :	1.86 in	Area :	2.71 in^2
Height :	4.12 in	Volume :	0.00646 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	157.68	lbs/$ft.^3$
Maximum Stress :	7964.3	psi
Elapsed Time :	7:44	min.
Strain :	1.77	%



Comments :

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UNCONFINED COMPRESSION TEST (ROCK CORE)

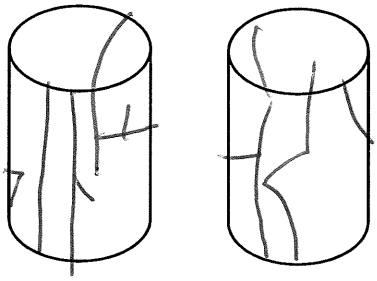
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-9
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4002
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 20.7' to 21.0'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - f. crystalline to lithographic sli. Wthd

Diameter :	1.86 in	Area :	2.72 in^2
Height :	4.07 in	Volume :	0.00641 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	166.11	lbs/$ft.^3$
Maximum Stress :	7577.9	psi
Elapsed Time :	7:25	min.
Strain :	1.79	%



Comments :

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CONSULTING ENGINEERS

UNCONFINED COMPRESSION TEST (ROCK CORE)

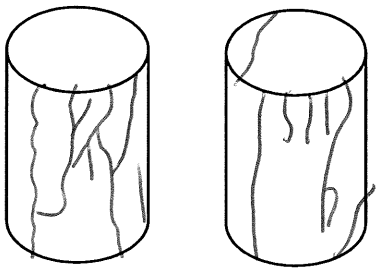
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-10
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4011
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 27.5' to 27.8'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : Limestone - f. to cse. Crystalline w/foss. Frags, healed frac. Fresh

Diameter :	1.86 in	Area :	2.72 in^2
Height :	4.10 in	Volume :	0.00645 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	165.23	lbs/$ft.^3$
Maximum Stress :	5700.4	psi
Elapsed Time :	6:27	min.
Strain :	1.78	%



Comments :

Approved By : KEW

P O Box 7267 • Paducah, KY 42002 • 2550 Irvin Cobb Drive • Paducah, KY 42003 • (270) 444-9691• fax (270) 443-3943
e-mail: fhcorporate@flohut.com

Florence & Hutcheson

CONSULTING ENGINEERS

UNCONFINED COMPRESSION TEST (ROCK CORE)

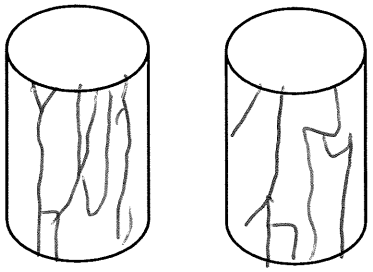
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-11
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4010
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 25.7' to 26.1'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : LS - f. crystalline matrix w/cse. Foss & lithographic tex mod. Wthd. fresh

Diameter :	1.86 in	Area :	2.73 in^2
Height :	4.06 in	Volume :	0.00642 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	166.03	lbs/$ft.^3$
Maximum Stress :	7854.5	psi
Elapsed Time :	8:10	min.
Strain :	1.80	%



Comments :

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Florence & Hutcheson

CONSULTING ENGINEERS

UNCONFINED COMPRESSION TEST (ROCK CORE)

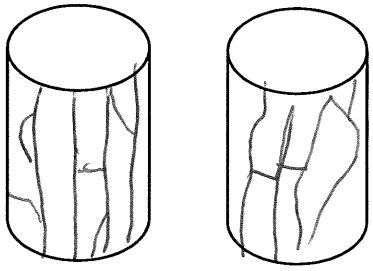
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-12
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4012
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 26.3' to 26.6'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : LS - f. crystalline matrix w/f. to cse. Crystalline matrix w/foss. Fresh

Diameter :	1.86 in	Area :	2.72 in^2
Height :	4.07 in	Volume :	0.00639 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	141.57	lbs/$ft.^3$
Maximum Stress :	7678.9	psi
Elapsed Time :	7:30	min.
Strain :	1.79	%



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Florence & Hutcheson
CONSULTING ENGINEERS

UNCONFINED COMPRESSION TEST (ROCK CORE)

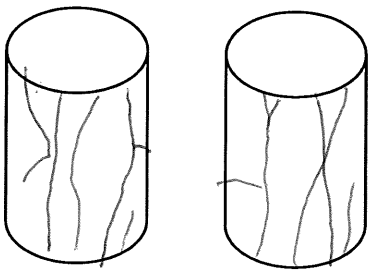
PROJECT NAME	: Springdale By-pass		
PROJECT NO.	: 06127	SAMPLE NO.	: RS-13
PROJECT COUNTY	: Pulaski	SAMPLE LOC.	: B-4005
PROJECT STATE	: Arkansas	SAMPLE DEPTH	: 30.8' to 31.2'
LABORATORY NO.	: 06127	DATE TESTED	: 4/18/2012
SUBMITTED BY	: Florence & Hutcheson	DATE REPORTED	: 4/23/2012

ROCK DESCRIPTION : LS - f. crystalline, cherty, healed o0-90 degree fracs. w/vugs sli. Wthd.

Diameter :	1.87 in	Area :	2.74 in^2
Height :	4.15 in	Volume :	0.00658 ft^3

RESULTS :

Moisture Air-Dry :	NA	
Air-Dry Density :	151	lbs/$ft.^3$
Maximum Stress :	6265.1	psi
Elapsed Time :	9:20	min.
Strain :	1.76	%



Comments :

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APPENDIX III

BRIDGE AND RETAINING WALL LAYOUT SHEETS AND SLOPE STABILITY ANALYSES

RAMP SE OVER GOAD SPRINGS ROAD

RAMP EN OVER HWY. 412

HWY. 412 OVER PUPPY CREEK

RAMP EN OVER PUPPY CREEK

SPRING CREEK STREET OVER HWY. 412

ZION ROAD OVER HWY. 412

RAMP EN OVER SILENT GROVE ROAD

HWY. 412 OVER WAGON WHEEL ROAD

RAMP NW OVER HWY. 412

HWY. 412 OVER SPRING CREEK

GRIMSLEY/MILLER ROAD OVER HWY. 412

HWY. 412 OVER ROBBINS ROAD

HWY. 412 OVER MARCHANT ROAD

HWY. 112 OVER HWY. 412

HWY. 412 OVER BRUSH CREEK AND BRUSH CREEK ROAD

HWY 412 OVER JAVELLO ROAD

LIBERTY ROAD OVER HWY. 412

HWY. 412 OVER OLD HWY. 68

HWY 412 OVER RAMP 4

GRAPHIC SCALE

0 500 1,000 2,000

Feet

Florence & Hutcheson, Inc.

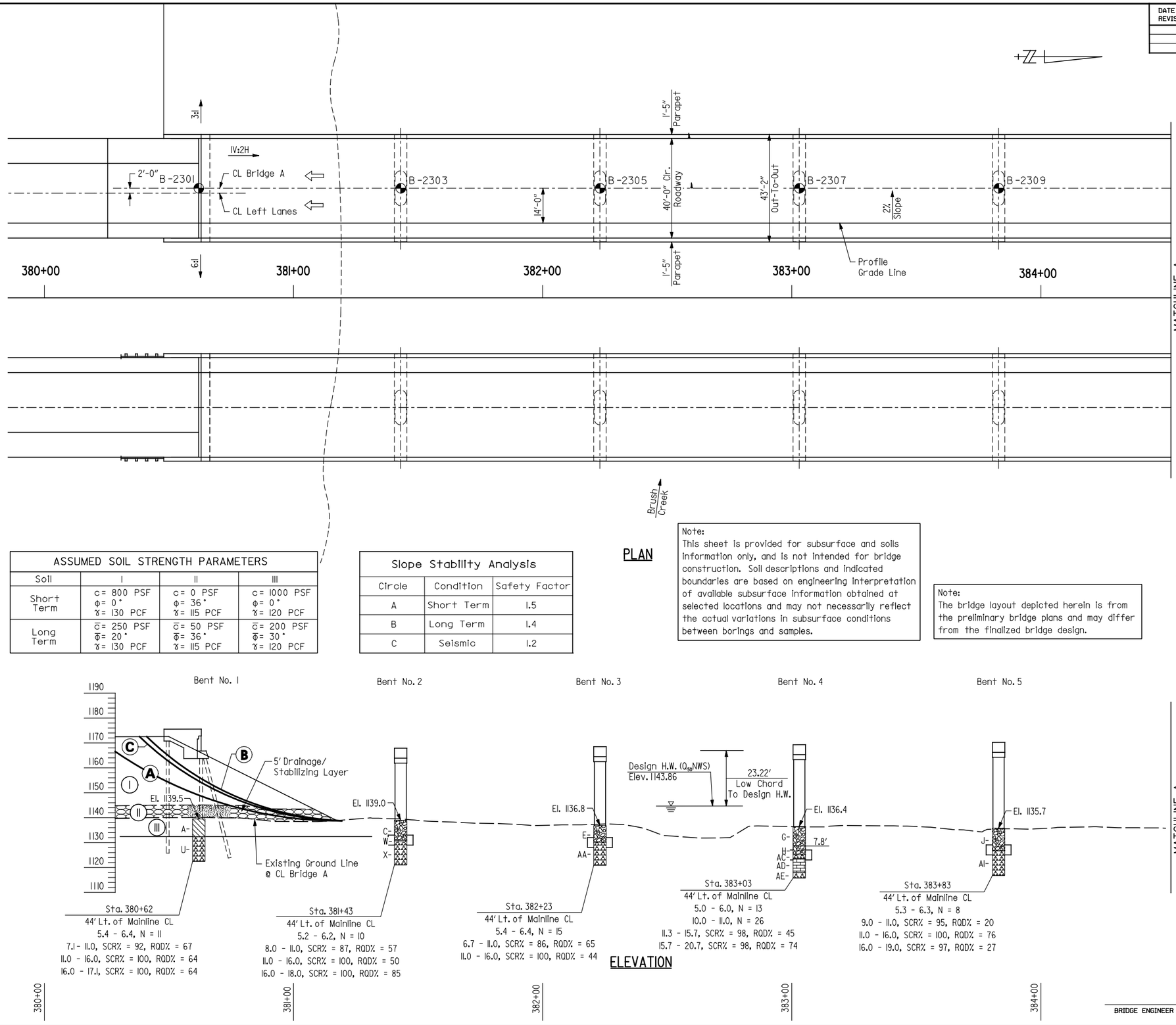
CONSULTING ENGINEERS

PROJECT LOCATION MAP

SPRINGDALE NORTHERN BYPASS
(US 412 RELOCATED)
JOB NO. 001966

7.5 MINUTE SERIES TOPOGRAPHIC QUADRANGLE
ARKANSAS - BENTON & WASHINGTON COUNTIES

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		



PLAN

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ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 1000 PSF Φ= 0° γ= 120 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 115 PCF	c̄= 200 PSF Φ̄= 30° γ= 120 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.5
B	Long Term	1.4
C	Seismic	1.2

Boring Legend

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ELEVATION

BRIDGE ENGINEER

SHEET 1 OF 4
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412
OVER BRUSH CREEK
WASHINGTON COUNTY

ROUTE SEC.

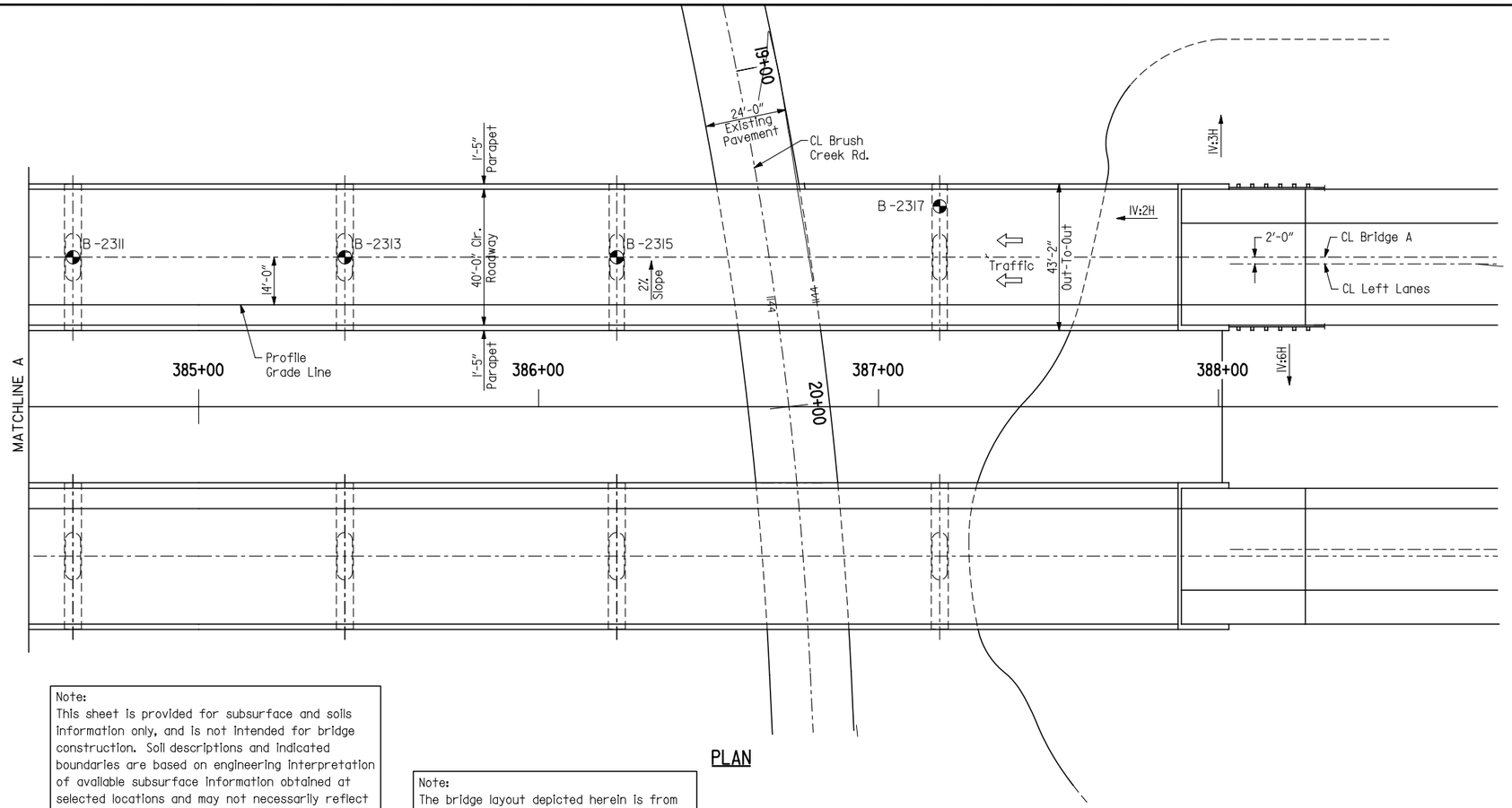
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

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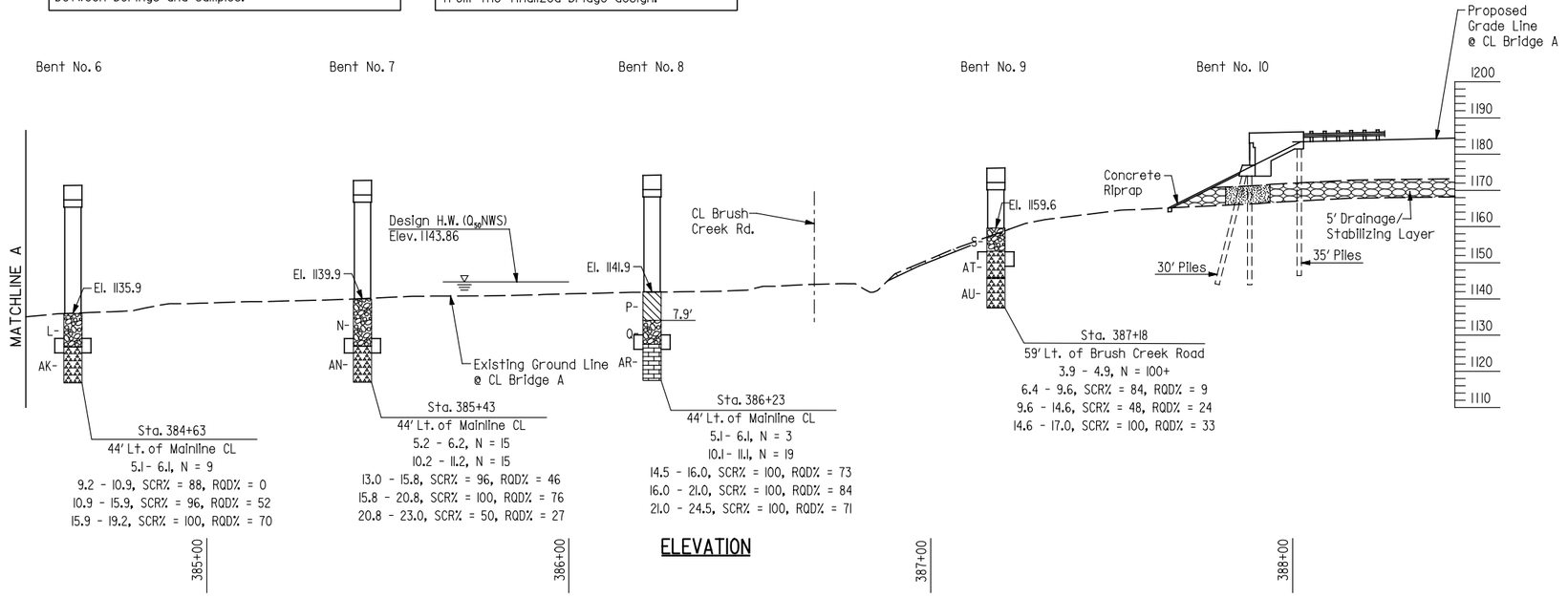

ELEVATION

Boring Legend

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SHEET 2 OF 4
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412
OVER BRUSH CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

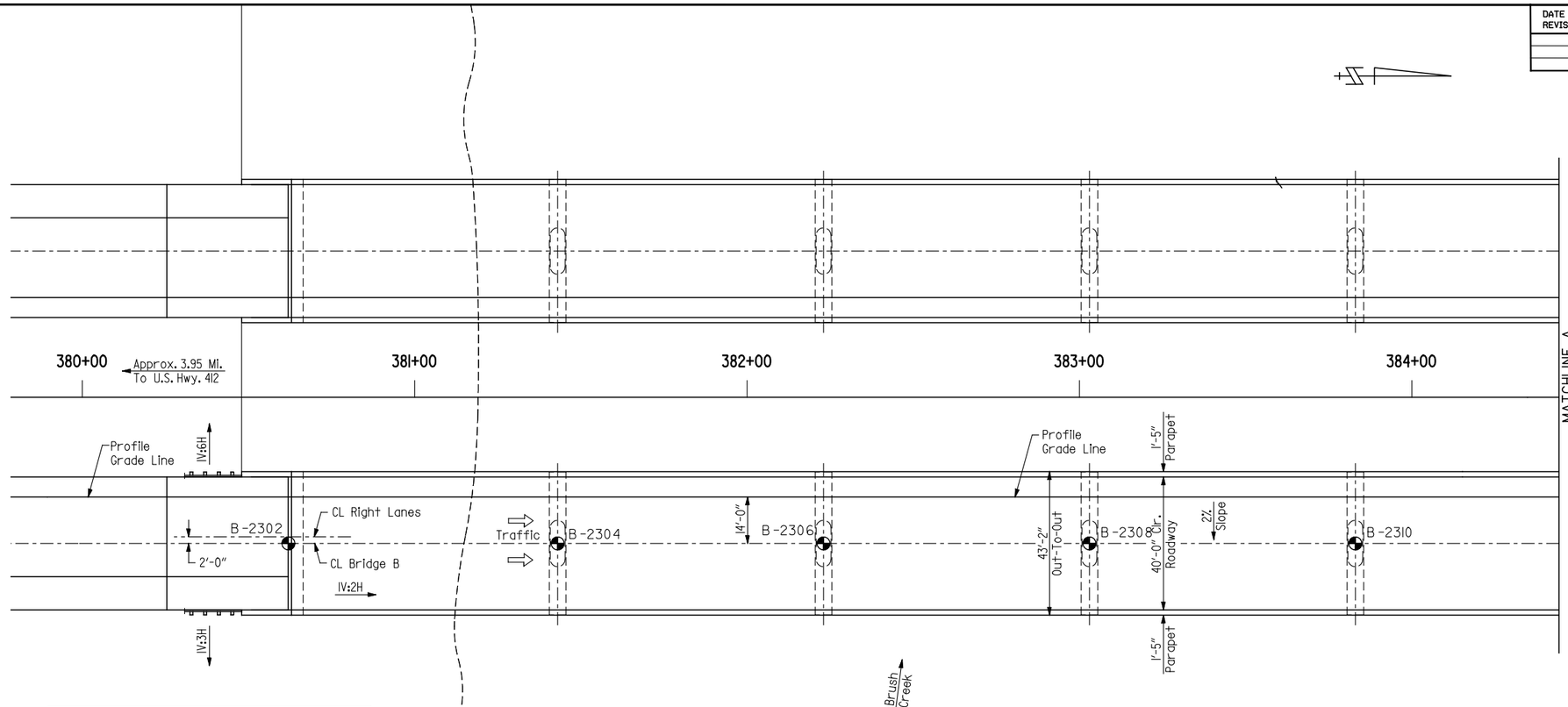
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

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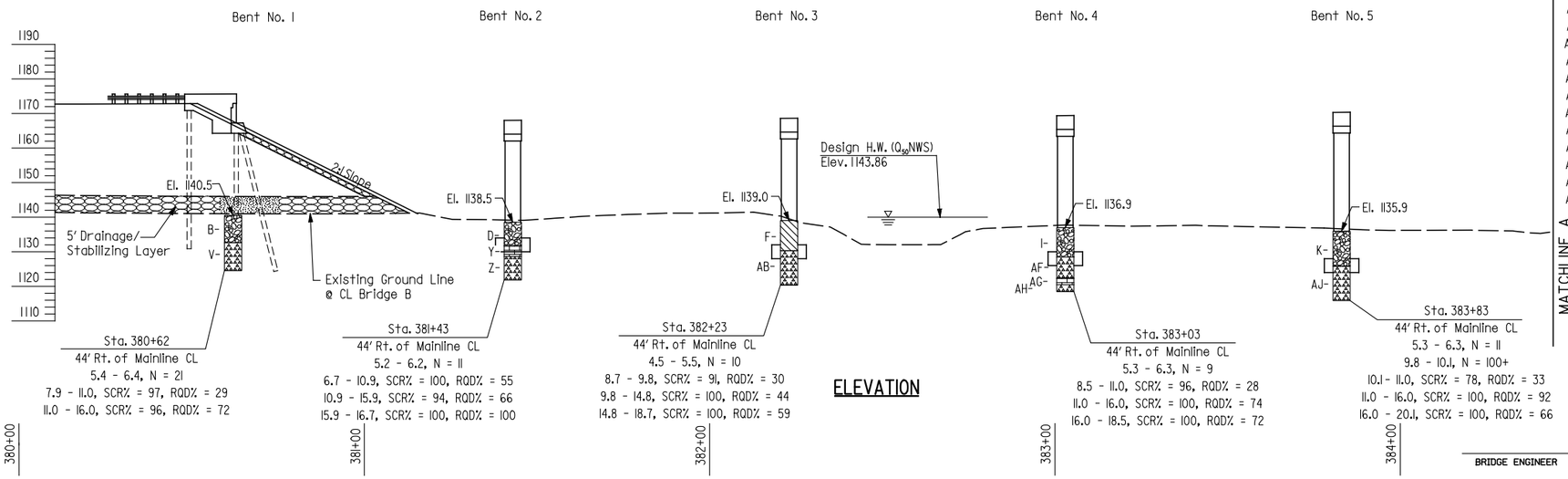

ELEVATION

MATCHLINE A

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MATCHLINE A

SHEET 3 OF 4
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412
OVER BRUSH CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

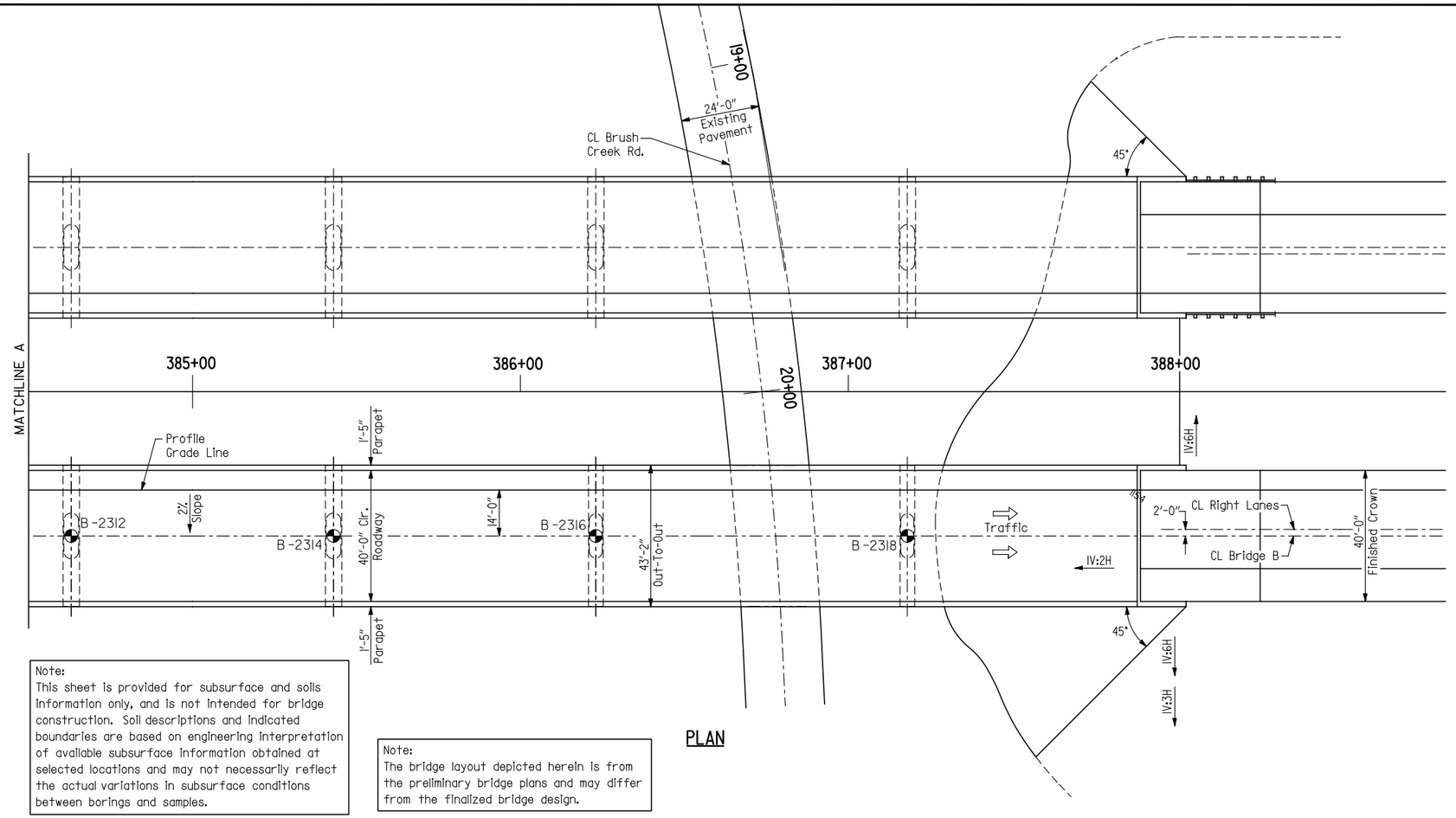
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. B DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

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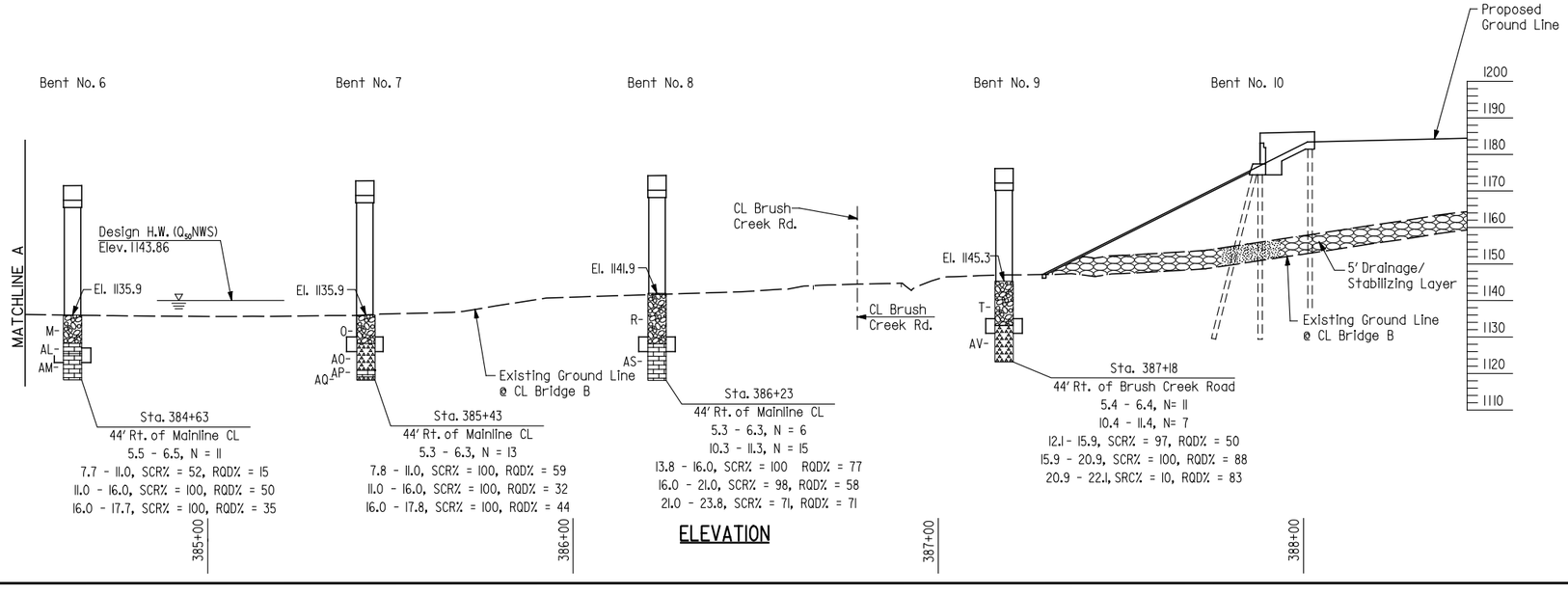

Sta. 384+63
44' Rt. of Mainline CL
5.5 - 6.5, N = 11
7.7 - 11.0, SCR% = 52, RQD% = 15
11.0 - 16.0, SCR% = 100, RQD% = 50
16.0 - 17.7, SCR% = 100, RQD% = 35

Sta. 385+43
44' Rt. of Mainline CL
5.3 - 6.3, N = 13
7.8 - 11.0, SCR% = 100, RQD% = 59
11.0 - 16.0, SCR% = 100, RQD% = 32
16.0 - 17.8, SCR% = 100, RQD% = 44

Sta. 386+23
44' Rt. of Mainline CL
5.3 - 6.3, N = 6
10.3 - 11.3, N = 15
13.8 - 16.0, SCR% = 100 RQD% = 77
16.0 - 21.0, SCR% = 98, RQD% = 58
21.0 - 23.8, SCR% = 71, RQD% = 71

Sta. 387+18
44' Rt. of Brush Creek Road
5.4 - 6.4, N= 11
10.4 - 11.4, N= 7
12.1 - 15.9, SCR% = 97, RQD% = 50
15.9 - 20.9, SCR% = 100, RQD% = 88
20.9 - 22.1, SRC% = 10, RQD% = 83

ELEVATION

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X - Chert: White, lt. gray, gray, fresh to slightly weathered.
Y - Limestone: Lt. gray, gray, fine to medium grain.
Z - Chert: White, lt. gray, gray, fresh to moderately weathered.
AA - Chert: White, lt. gray, gray, fresh to moderately weathered.
AB - Chert: White, lt. gray, gray, fresh to moderately weathered.
AC - Chert: White, lt. gray, gray, slightly weathered.
AD - Limestone: White, lt. gray, gray, fine grain, slightly weathered.
AE - Chert: White, lt. gray, gray, with intermittent limestone.
AF - Chert: White, lt. gray, gray, fresh to moderately weathered.
AG - Limestone: White, lt. gray, gray, fresh.
AH - Chert: White, lt. gray, gray, fresh.
AI - Chert: White, lt. gray, gray, fresh to moderately weathered.
AJ - Chert: White, lt. gray, gray, fresh to moderately weathered.
AK - Chert: White, lt. gray, gray, fresh to moderately weathered.
AL - Limestone: White, lt. gray, gray, jointed.
AM - Limestone: White, gray to lt. gray. fine grain, fresh with slight weathering.
AN - Chert: White, lt. gray, gray, fresh to slightly weathered.
AO - Chert: White, lt. gray, gray, fresh to slightly weathered.
AP - Limestone: Lt. gray, gray, fine grain, fresh with slight weathering.
AQ - Chert: White, lt. gray, gray, fresh.
AR - Limestone: White, lt. gray, gray, fine grain, fresh with slight weathering.
AS - Limestone: White, lt. gray, gray, fine grain, fresh with slight weathering.
AT - Chert: White, lt. gray, gray, fresh to intensely weathered.
AU - Chert: White, lt. gray, gray, fresh to moderately weathered.
AV - Chert: White, lt. gray, gray, fresh to slightly weathered.

SHEET 4 OF 4
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412
OVER BRUSH CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12
BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

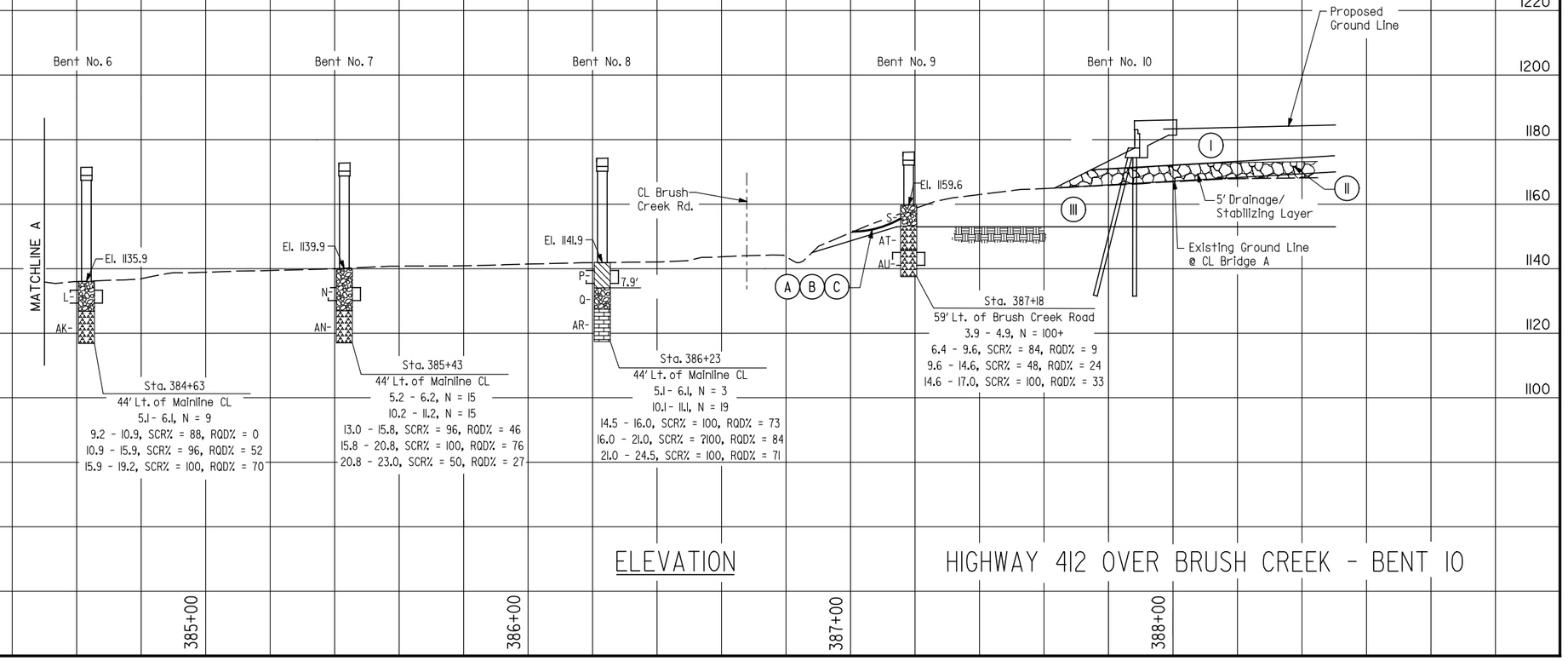
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.6
Long Term	B	2.1
Seismic	C	1.7

Boring Legend

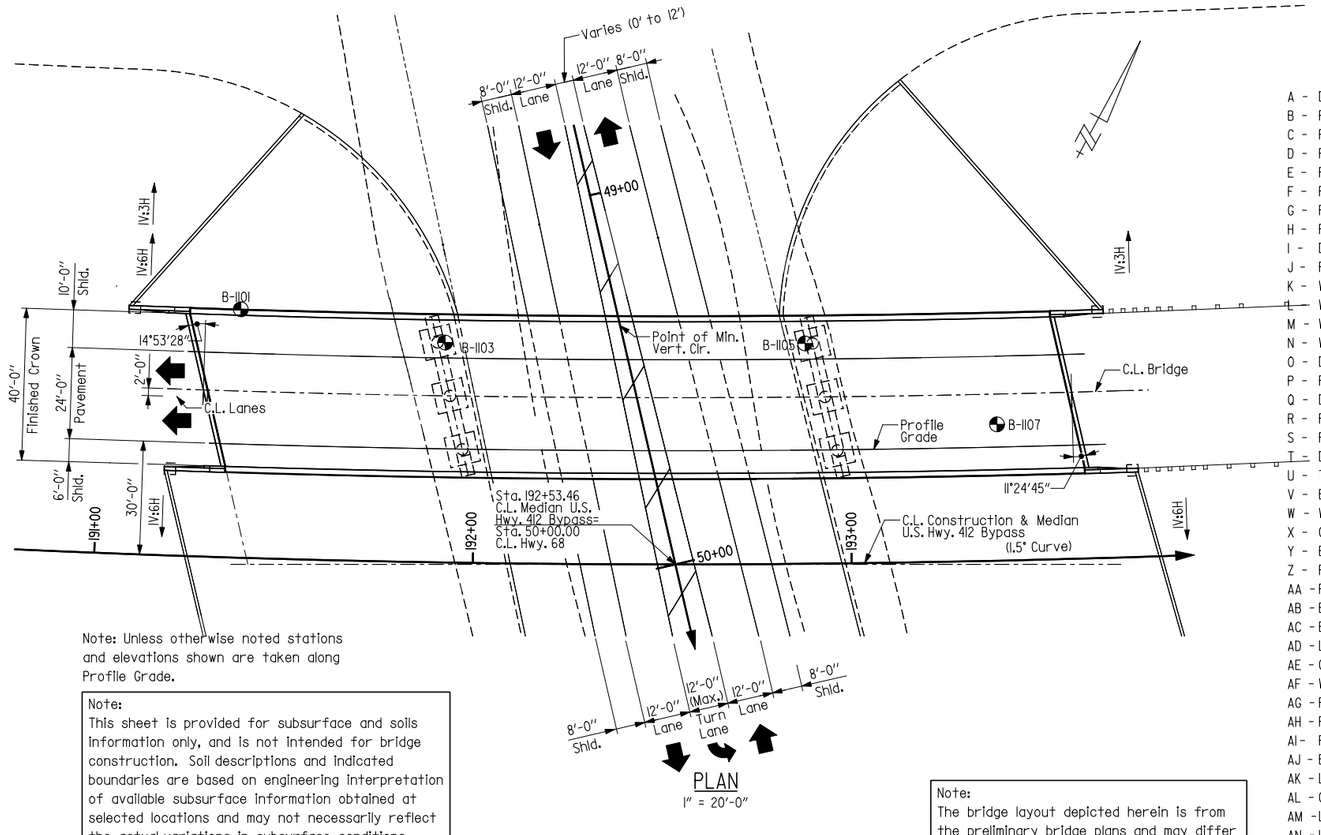
A - Gray, stiff, gravelly lean clay.
B - Brown, medium dense, well-graded gravel with silt and sand.
C - Brown, loose, clayey gravel with sand.
D - Brown, medium dense, clayey gravel with sand.
E - Brown, medium dense, well-graded gravel with silt and sand.
F - Brown, stiff, gravelly lean clay.
G - Brown, medium dense, clayey gravel with sand.
H - Brown, medium dense, well-graded gravel with silt and sand.
I - Brown, loose, clayey gravel with sand.
J - Brown, loose, well-graded gravel with silt and sand.
K - Brown, medium dense to very dense, well-graded gravel with silt and sand.
L - Brown, loose, well-graded gravel with silt and sand.
M - Brown, medium dense, well-graded gravel with silt and sand.
N - Brown, medium dense, clayey gravel with sand.
O - Brown, medium dense, well-graded gravel with silt and sand.
P - Gray, soft, gravelly lean clay.
Q - Gray, medium dense, well-graded gravel with silt and sand.
R - Brown, loose to medium dense, clayey gravel with sand.
S - Beige, very dense, clayey gravel with sand.
T - Beige, loose to medium dense, clayey gravel with sand.
U - Chert: White, lt. gray, gray, fresh to slightly weathered.
V - Chert: White, lt. gray, gray, fresh to slightly weathered.
W - Limestone: Lt. gray, gray, fine to medium grain.
X - Chert: White, lt. gray, gray, fresh to slightly weathered.
Y - Limestone: Lt. gray, gray, fine to medium grain.
Z - Chert: White, lt. gray, gray, fresh to moderately weathered.
AA - Chert: White, lt. gray, gray, fresh to moderately weathered.
AB - Chert: White, lt. gray, gray, fresh to moderately weathered.
AC - Chert: White, lt. gray, gray, slightly weathered.
AD - Limestone: White, lt. gray, gray, fine grain, slightly weathered.
AE - Chert: White, lt. gray, gray, with intermittent limestone.
AF - Chert: White, lt. gray, gray, fresh to moderately weathered.
AG - Limestone: White, lt. gray, gray, fresh.
AH - Chert: White, lt. gray, gray, fresh.
AI - Chert: White, lt. gray, gray, fresh to moderately weathered.
AJ - Chert: White, lt. gray, gray, fresh to moderately weathered.
AK - Chert: White, lt. gray, gray, fresh to moderately weathered.
AL - Limestone: White, lt. gray, gray, jointed.
AM - Limestone: White, gray to lt. gray. fine grain, fresh with slight weathering.
AN - Chert: White, lt. gray, gray, fresh to slightly weathered.
AO - Chert: White, lt. gray, gray, fresh to slightly weathered.
AP - Limestone: Lt. gray, gray, fine grain, fresh with slight weathering.
AQ - Chert: White, lt. gray, gray, fresh.
AR - Limestone: White, lt. gray, gray, fine grain, fresh with slight weathering.
AS - Limestone: White, lt. gray, gray, fine grain, fresh with slight weathering.
AT - Chert: White, lt. gray, gray, fresh to intensely weathered.
AU - Chert: White, lt. gray, gray, fresh to moderately weathered.
AV - Chert: White, lt. gray, gray, fresh to slightly weathered.



ELEVATION

HIGHWAY 412 OVER BRUSH CREEK - BENT 10

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				



PLAN
1" = 20'-0"

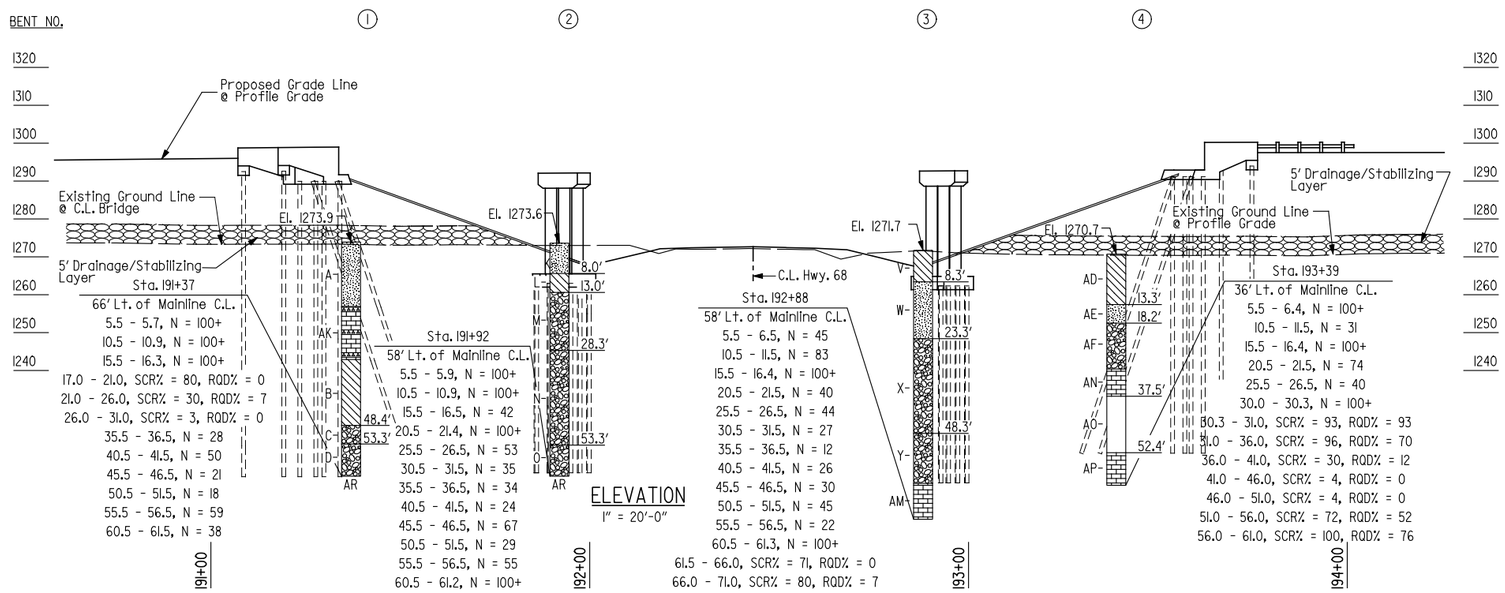
Note: Unless otherwise noted stations and elevations shown are taken along Profile Grade.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Dark reddish brown, reddish brown & tan, very dense clayey sand with gravel.
B - Reddish brown, very stiff to hard, sandy fat clay with gravel.
C - Reddish brown, medium dense clayey gravel with sand.
D - Reddish brown, tan & brown, dense to very dense clayey gravel with sand.
E - Reddish brown & tan, very dense clayey sand with gravel.
F - Reddish brown & tan, very dense clayey sand with gravel.
G - Reddish brown, hard, sandy fat clay with gravel.
H - Reddish brown & light reddish brown, medium dense to very dense clayey gravel with sand.
I - Dark reddish brown, reddish brown & tan, medium dense to very dense clayey gravel with sand.
J - Reddish brown & tan, medium dense to very dense silty sand with gravel.
K - White, tan & reddish brown, very dense clayey sand with gravel.
L - White, light reddish tan & brownish red, very hard sandy fat clay with gravel.
M - White, reddish tan & reddish brown, dense to very dense clayey gravel with sand.
N - White, reddish brown, tan, brownish red, dark brownish red & grayish white, medium dense to very dense clayey gravel with sand.
O - Dark brownish red, tan & grayish white, very dense clayey gravel with sand.
P - Reddish brown & dark brown, very dense clayey sand with gravel.
Q - Dark reddish brown, reddish brown & dark brown, very stiff to very hard sandy fat clay with gravel.
R - Reddish brown & dark brown, medium dense to very dense clayey gravel with sand.
S - Reddish brown, medium dense to dense clayey gravel with sand.
T - Dark reddish brown & dark brown, medium dense clayey gravel with sand.
U - Tan & reddish brown, loose to very dense sand with gravel.
V - Brownish red & brown, hard sandy fat clay with gravel.
W - White, reddish tan, reddish brown & beige, clayey sand with gravel.
X - Grayish white, reddish brown, tan, white, dark reddish brown & reddish tan, medium dense to dense clayey gravel with sand.
Y - Brownish red, brown & beige, medium dense to very dense, clayey gravel with sand.
Z - Red, very stiff to very hard sandy fat clay with gravel.
AA - Red & brown, dense to very dense clayey sand with gravel.
AB - Brown & white, very dense clayey gravel with sand.
AC - Brown & white, medium dense to dense clayey gravel with sand.
AD - Light and dark brownish red & gray, hard to very hard sandy fat clay with gravel.
AE - Grayish white & reddish tan, very dense clayey sand with gravel.
AF - White, reddish brown, reddish tan, brown & grayish white, dense to very dense clayey gravel with sand.
AG - Red, white, light reddish tan, gray & reddish brown, hard to very hard sandy fat clay with gravel.
AH - Reddish tan, reddish brown & gray, medium dense to dense clayey sand with gravel.
AI - Reddish tan, gray, brown, white, dark reddish brown & beige, medium dense to very dense clayey gravel with sand.
AJ - Brownish red, white, beige, dark brownish red & light reddish tan, dense to very dense clayey gravel with sand.
AK - Limestone and Chert Fragments: white, light gray, sev. weathered.
AL - Chert Fragments: light gray, yellow, yellow/orange stain, mod. to sli. weathered.
AM - Limestone: white to light gray with red/brown stain, sev. to mod. weathered with intervals completely weathered.
AN - Limestone: white to medium gray, alternating lithographic to coarsely crystalline and fine grain, sli. weathered to fresh.
AO - Core loss interval: white to light gray, severely weathered limestone fragments with red/brown clay remnants.
AP - Limestone: light gray to medium gray, white, gray/brown, fine grain with coarse crystalline inclusions, sli. weathered to fresh.



ELEVATION
1" = 20'-0"

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 1 OF 2
LAYOUT OF BRIDGE A
U.S. HWY. 412 BYPASS BRIDGE OVER
HWY. 68
U.S. 412 BYPASS STA. 192+53.46

ROUTE 412 SEC.

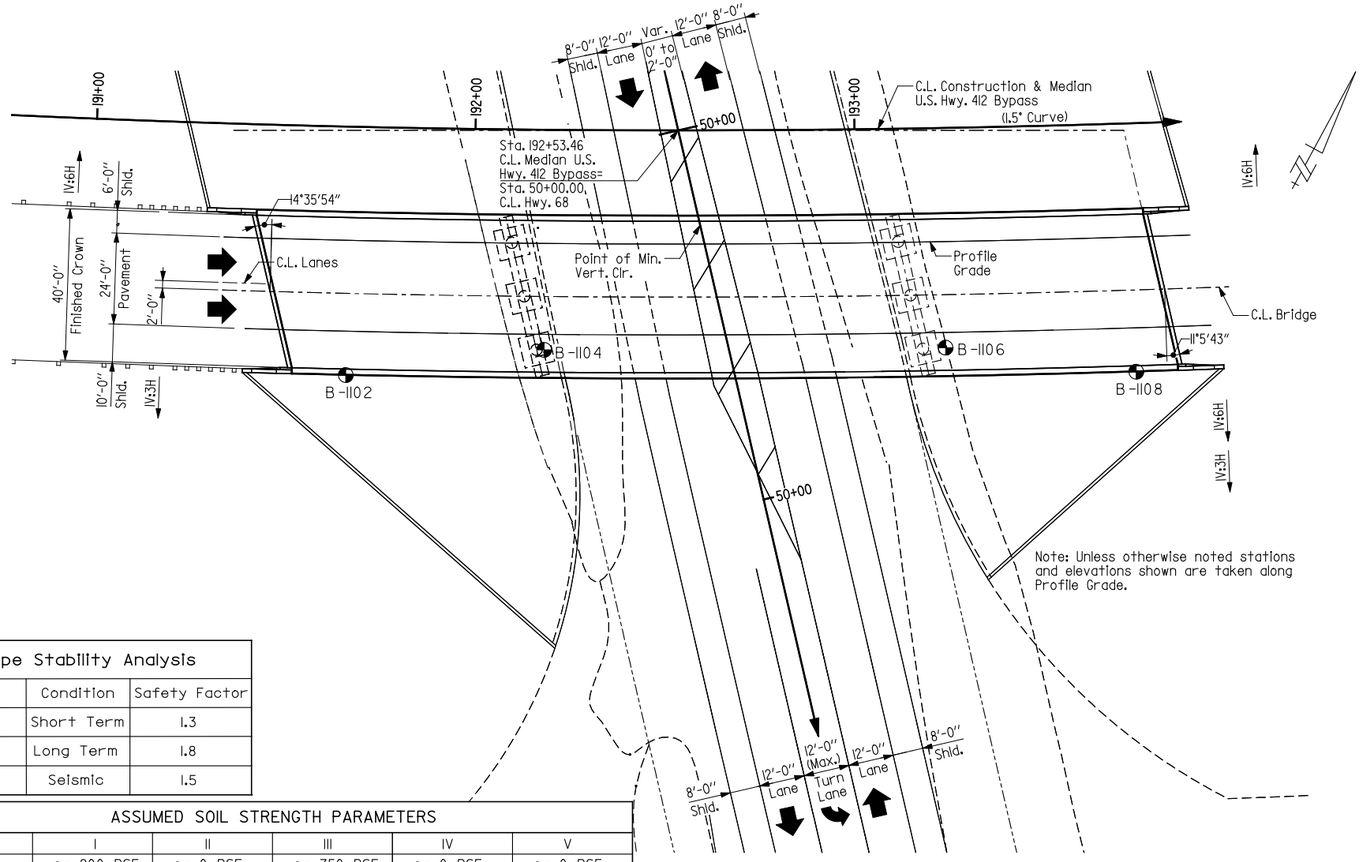
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

BRIDGE ENGINEER

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				

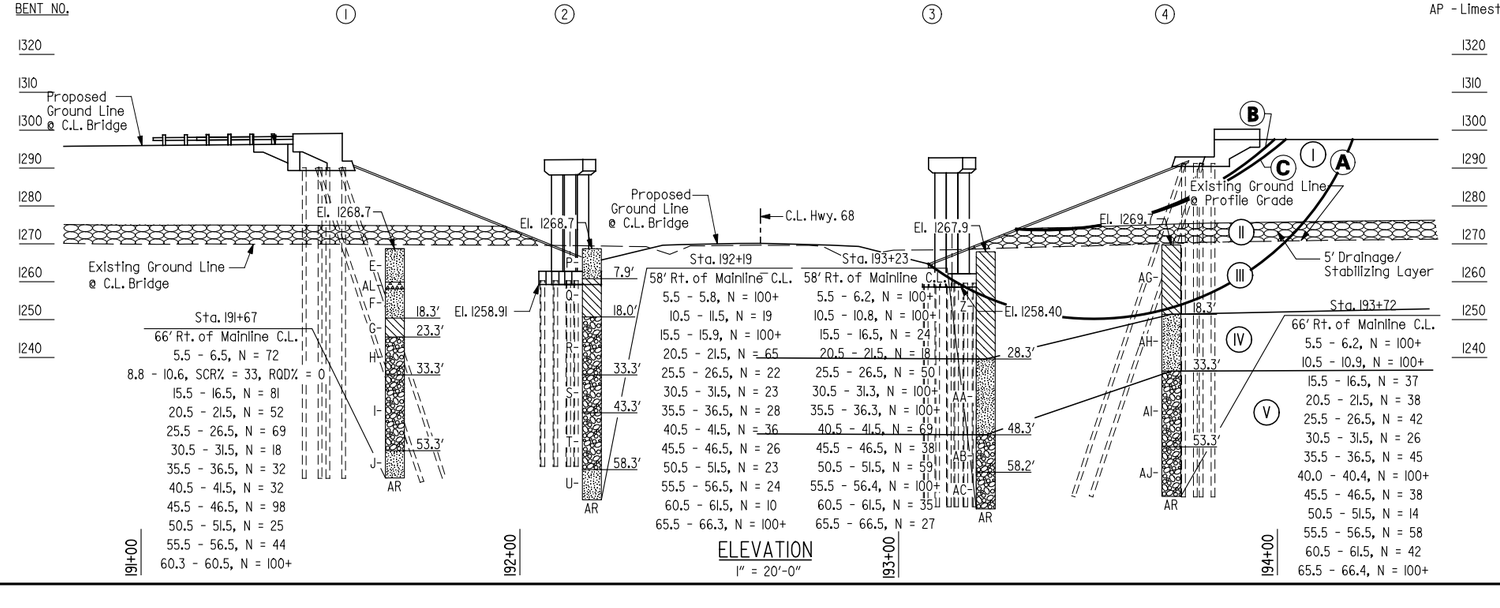


PLAN
1" = 20'-0"

Note: Unless otherwise noted stations and elevations shown are taken along Profile Grade.

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.3
B	Long Term	1.8
C	Seismic	1.5

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 750 PSF Φ= 0° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 150 PSF $\bar{\Phi}$= 30° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF



ELEVATION
1" = 20'-0"

Boring Legend

A - Dark reddish brown, reddish brown & tan, very dense clayey sand with gravel.
B - Reddish brown, very stiff to hard, sandy fat clay with gravel.
C - Reddish brown, medium dense clayey gravel with sand.
D - Reddish brown, tan & brown, dense to very dense clayey gravel with sand.
E - Reddish brown & tan, very dense clayey sand with gravel.
F - Reddish brown & tan, very dense clayey sand with gravel.
G - Reddish brown, hard, sandy fat clay with gravel.
H - Reddish brown & light reddish brown, medium dense to very dense clayey gravel with sand.
I - Dark reddish brown, reddish brown & tan, medium dense to very dense clayey gravel with sand.
J - Reddish brown & tan, medium dense to very dense silty sand with gravel.
K - White, tan & reddish brown, very dense clayey sand with gravel.
L - White, light reddish tan & brownish red, very hard sandy fat clay with gravel.
M - White, reddish tan & reddish brown, dense to very dense clayey gravel with sand.
N - White, reddish brown, tan, brownish red, dark brownish red & grayish white, medium dense to very dense clayey gravel with sand.
O - Dark brownish red, tan & grayish white, very dense clayey gravel with sand.
P - Reddish brown & dark brown, very dense clayey sand with gravel.
Q - Dark reddish brown, reddish brown & dark brown, very stiff to very hard sandy fat clay with gravel.
R - Reddish brown & dark brown, medium dense to very dense clayey gravel with sand.
S - Reddish brown, medium dense to dense clayey gravel with sand.
T - Dark reddish brown & dark brown, medium dense clayey gravel with sand.
U - Tan & reddish brown, loose to very dense sand with gravel.
V - Brownish red & brown, hard sandy fat clay with gravel.
W - White, reddish tan, reddish brown & beige, clayey sand with gravel.
X - Grayish white, reddish brown, tan, white, dark reddish brown & reddish tan, medium dense to dense clayey gravel with sand.
Y - Brownish red, brown & beige, medium dense to very dense, clayey gravel with sand.
Z - Red, very stiff to very hard sandy fat clay with gravel.
AA - Red & brown, dense to very dense clayey sand with gravel.
AB - Brown & white, very dense clayey gravel with sand.
AC - Brown & white, medium dense to dense clayey gravel with sand.
AD - Light and dark brownish red & gray, hard to very hard sandy fat clay with gravel.
AE - Grayish white & reddish tan, very dense clayey sand with gravel.
AF - White, reddish brown, reddish tan, brown & grayish white, dense to very dense clayey gravel with sand.
AG - Red, white, light reddish tan, gray & reddish brown, hard to very hard sandy fat clay with gravel.
AH - Reddish tan, reddish brown & gray, medium dense to dense clayey sand with gravel.
AI - Reddish tan, gray, brown, white, dark reddish brown & beige, medium dense to very dense clayey gravel with sand.
AJ - Brownish red, white, beige, dark brownish red & light reddish tan, dense to very dense clayey gravel with sand.
AK - Limestone and Chert Fragments: white, light gray, sev. weathered.
AL - Chert Fragments: light gray, yellow, yellow/orange stain, mod. to sil. weathered.
AM - Limestone: white to light gray with red/brown stain, sev. to mod. weathered with intervals completely weathered.
AN - Limestone: white to medium gray, alternating lithographic to coarsely crystalline and fine grain, sil. weathered to fresh.
AO - Core loss interval: white to light gray, severely weathered limestone fragments with red/brown clay remnants.
AP - Limestone: light gray to medium gray, white, gray/brown, fine grain with coarse crystalline inclusions, sil. weathered to fresh.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

SHEET 2 OF 2
LAYOUT OF BRIDGE B
U.S. HWY. 412 BYPASS BRIDGE OVER
HWY. 68
U.S. 412 BYPASS STA. 192+53.46

ROUTE 412 SEC.

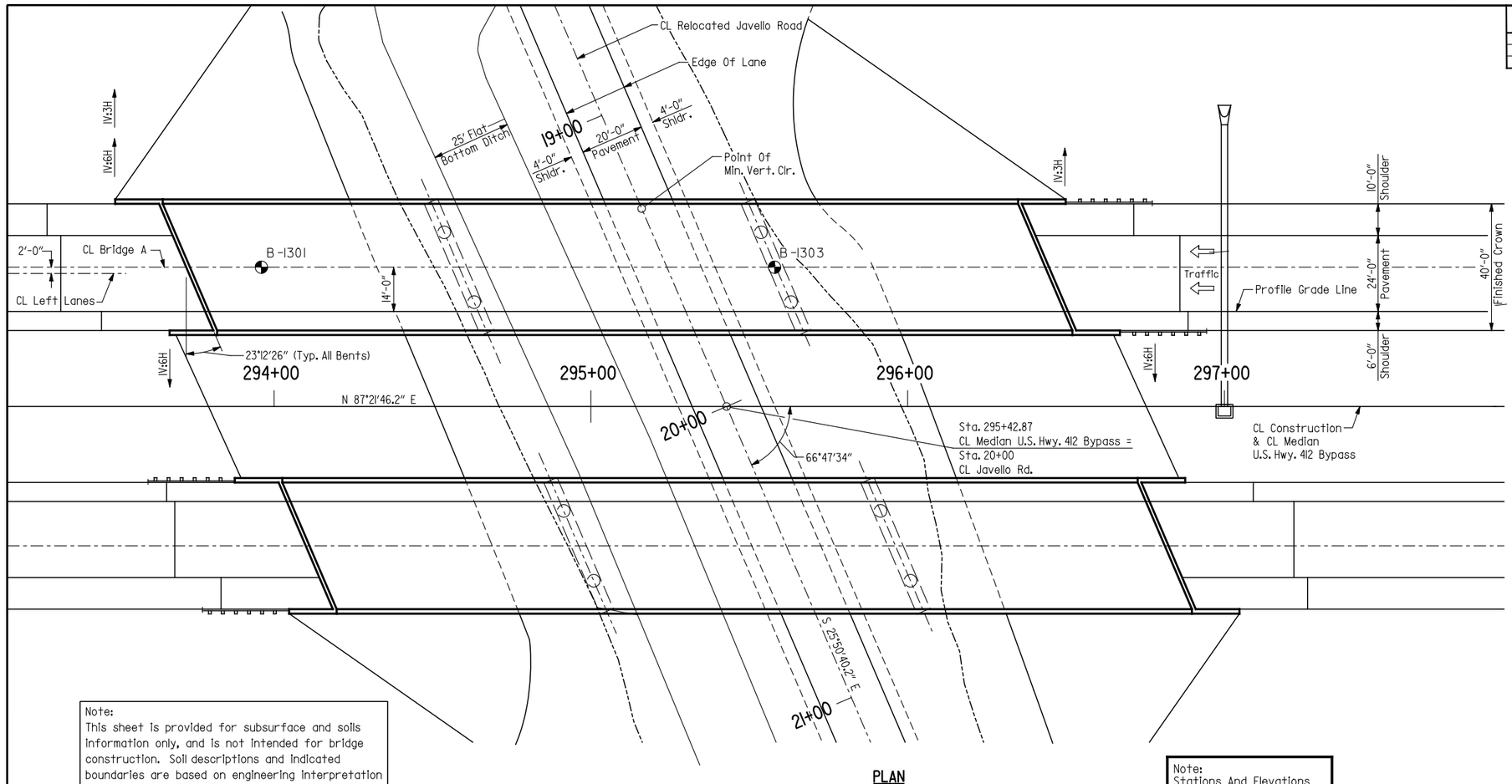
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12
BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		



PLAN

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
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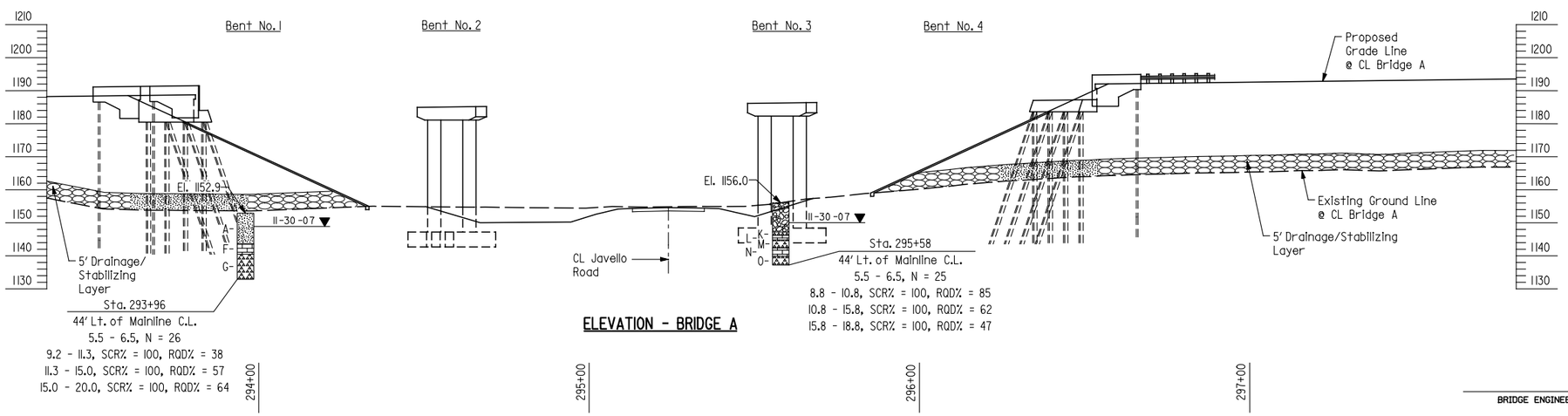
Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE A

Boring Legend

A - Copper & dark beige, medium dense sand with gravel.
B - Dark reddish brown & copper, medium dense clayey gravel with sand.
C - Dark brown & copper, medium dense clayey sand with gravel.
D - Brown, tan, dark tan & copper, medium dense to very dense clayey gravel with sand.
E - Tan, white & light gray, dense to very dense clayey gravel with sand.
F - Limestone: White, lt. gray, fresh to slightly weathered.
G - Chert: White, lt. gray, gray, fresh to slightly weathered.
H - Chert: White, lt. gray, gray, slightly weathered.
I - Limestone: White, lt. gray, fresh to slightly weathered.
J - Chert: White, lt. gray, fresh to slightly weathered.
K - Chert: White, lt. gray, fresh to slightly weathered.
L - Limestone: White, lt. gray, fresh to slightly weathered.
M - Chert: White, lt. gray, intermittent limestone.
N - Limestone: White, lt. gray, fresh, medium grain.
O - Chert: White, lt. gray, fresh to slightly weathered.
P - Chert: White, lt. gray, fresh to weathered.
Q - Limestone: White, lt. gray, fresh to slightly weathered.
R - Chert: White, lt. gray, fresh to slightly weathered.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SHEET 1 OF 2
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412
OVER JAVELLO ROAD
WASHINGTON COUNTY

ROUTE SEC.

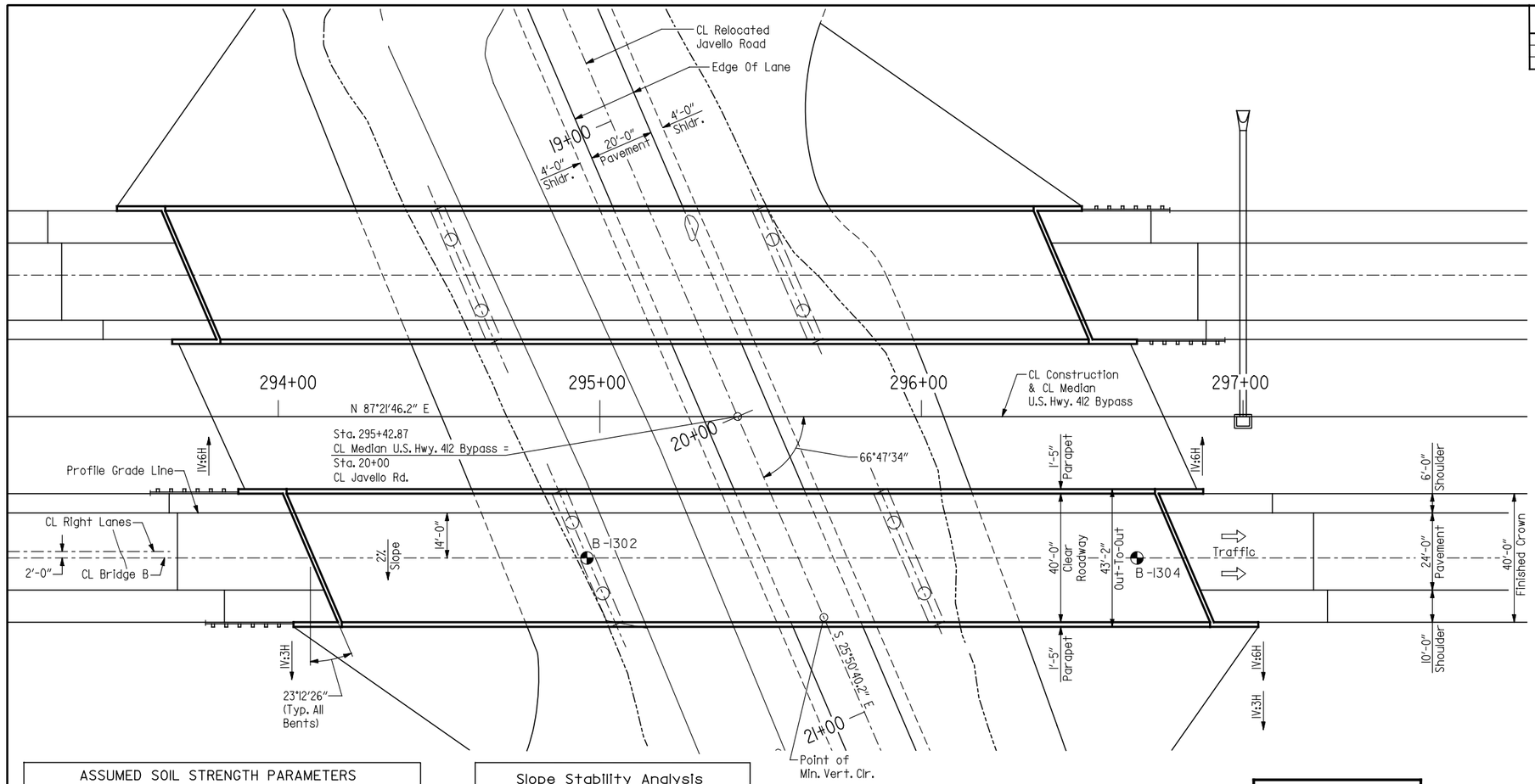
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		



PLAN

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF ϕ = 0° γ = 130 PCF	c = 0 PSF ϕ = 36° γ = 115 PCF	c = 0 PSF ϕ = 28° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 36° γ = 115 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 28° γ = 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.5
B	Long Term	1.4
C	Seismic	1.3

Note:
Stations And Elevations Shown Are Along CL Bridge

Boring Legend

A - Copper & dark beige, medium dense sand with gravel.
B - Dark reddish brown & copper, medium dense clayey gravel with sand.
C - Dark brown & copper, medium dense clayey sand with gravel.
D - Brown, tan, dark tan & copper, medium dense to very dense clayey gravel with sand.
E - Tan, white & light gray, dense to very dense clayey gravel with sand.
F - Limestone: White, lt. gray, fresh to slightly weathered.
G - Chert: White, lt. gray, gray, fresh to slightly weathered.
H - Chert: White, lt. gray, gray, slightly weathered.
I - Limestone: White, lt. gray, fresh to slightly weathered.
J - Chert: White, lt. gray, fresh to slightly weathered.
K - Chert: White, lt. gray, fresh to slightly weathered.
L - Limestone: White, lt. gray, fresh to slightly weathered.
M - Chert: White, lt. gray, intermittent limestone.
N - Limestone: White, lt. gray, fresh, medium grain.
O - Chert: White, lt. gray, fresh to slightly weathered.
P - Chert: White, lt. gray, fresh to weathered.
Q - Limestone: White, lt. gray, fresh to slightly weathered.
R - Chert: White, lt. gray, fresh to slightly weathered.

Note:
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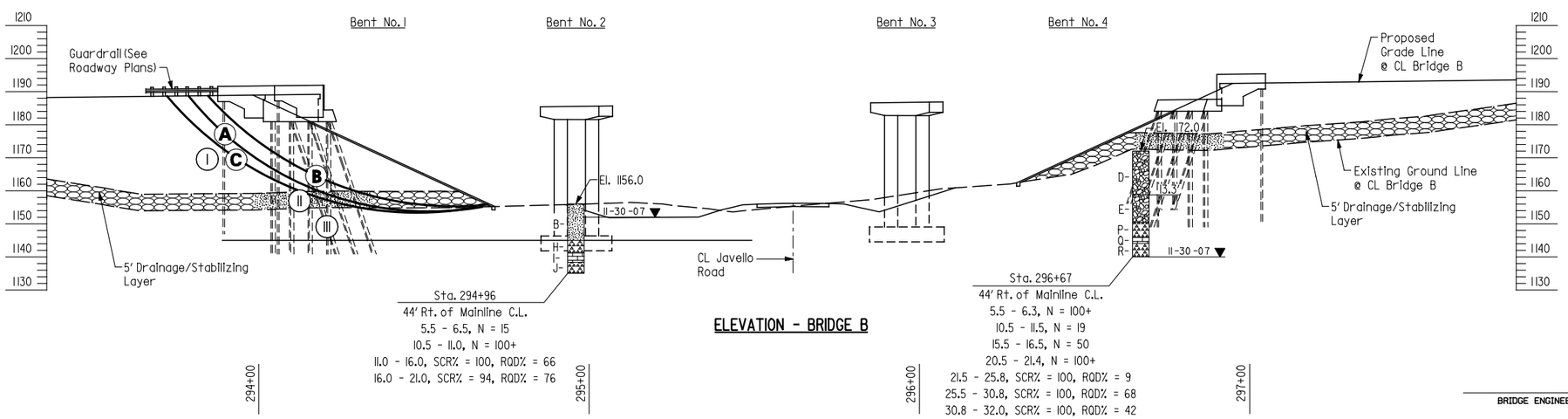


ELEVATION - BRIDGE B

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 2 OF 2
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412
OVER JAVELLO ROAD
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

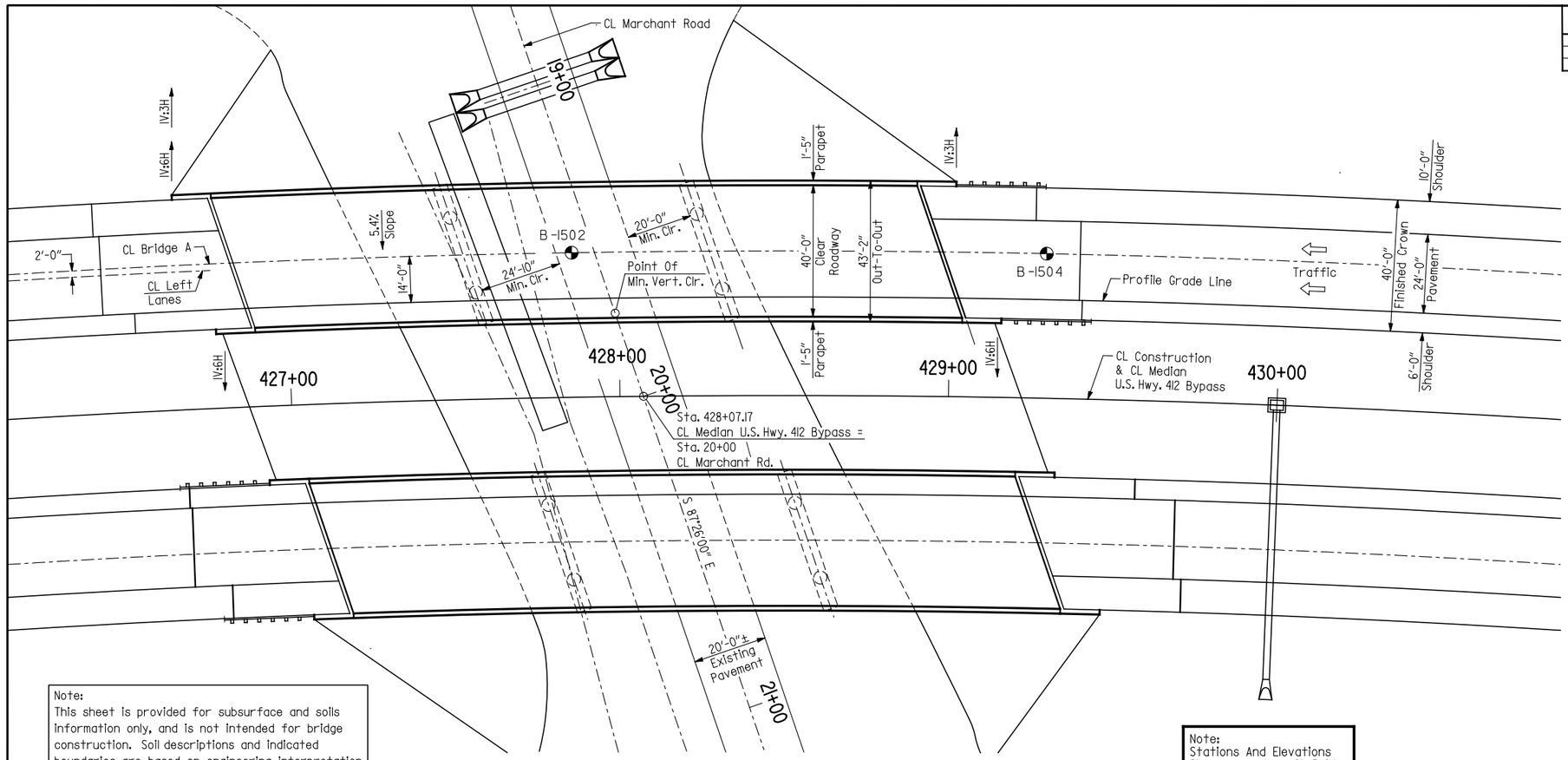
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

Note:
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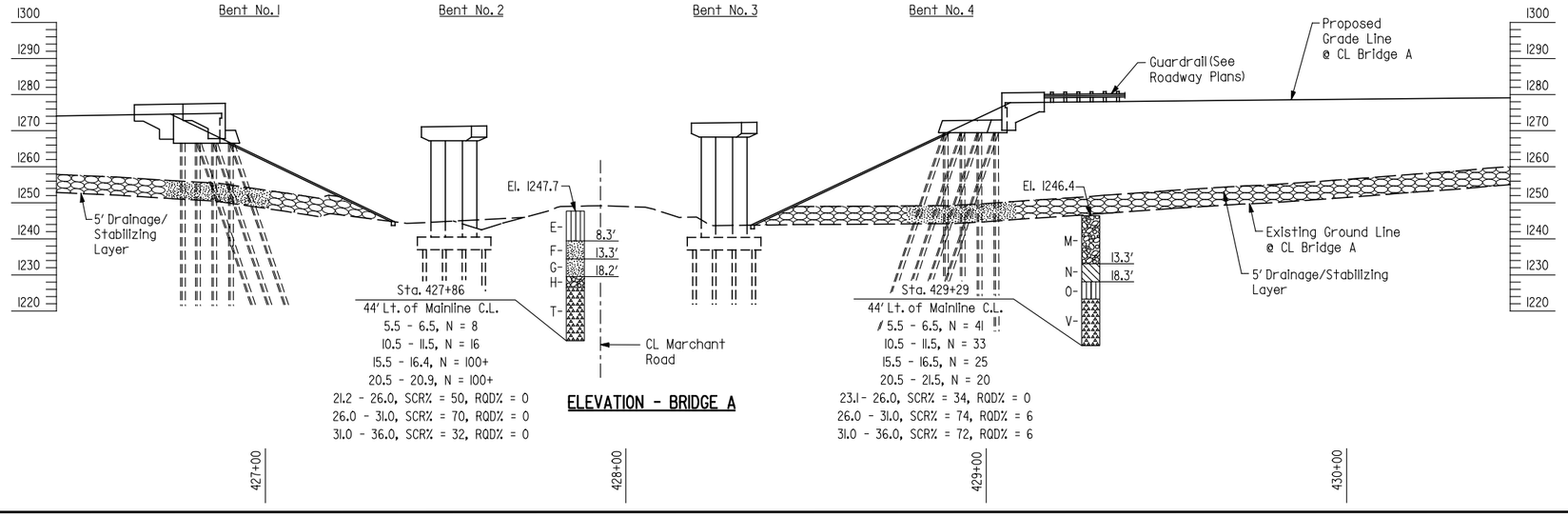
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE A

Boring Legend

A - Tan, Medium Dense to Very Dense Silty Sand with Gravel.
B - Copper & Dark Brown, Medium Dense to Dense Clayey Sand with Gravel.
C - Dark Brown, Very Dense Silty Gravel with Sand.
D - Brown & Light Brown, Very Dense Silty Sand with Gravel.
E - Copper, Medium Stiff Silt.
F - Dark Tan, Medium Dense Silty Sand with Gravel.
G - Brown & Tan, Very Dense Clayey Sand with Gravel.
H - Dark Brown, Very Dense Silty Gravel with Sand.
I - Copper & Tan, Medium Stiff Silt.
J - Brown & Tan, Medium Dense to Very Dense Silty Sand with Gravel.
K - Brown, Loose Clayey Sand with Gravel.
L - Dark Brown & Light Gray, Medium Dense Silty Gravel with Sand.
M - Brown, Tan & Dark Tan, Dense Silty Gravel with Sand.
N - Brown, Very Stiff Fat Clay with Sand.
O - Tan & Brown, Very Stiff Gravelly Silt with Sand.
P - Chert: White, lt. gray, moderately to intensely weathered.
Q - Chert: White, lt. gray, gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fresh.
S - Chert: White, lt. gray, gray, fresh to slightly weathered.
T - Chert: White, lt. gray, gray, moderately to intensely weathered.
U - Chert: White, lt. gray, gray, moderately to intensely weathered.
V - Chert: White, lt. gray, gray, moderately to intensely weathered.

SHEET 1 OF 2
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412
OVER MARCHANT ROAD
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

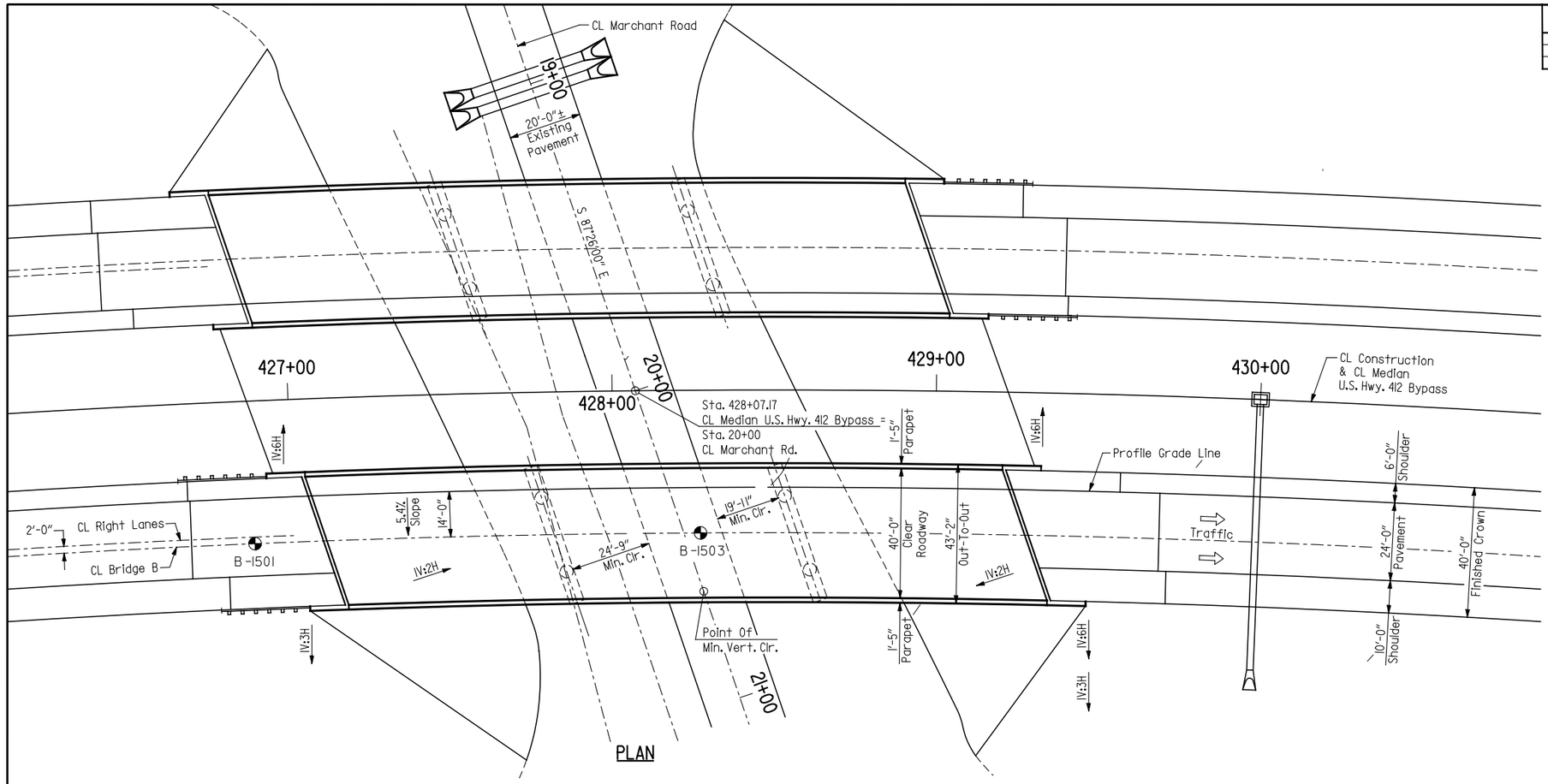
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

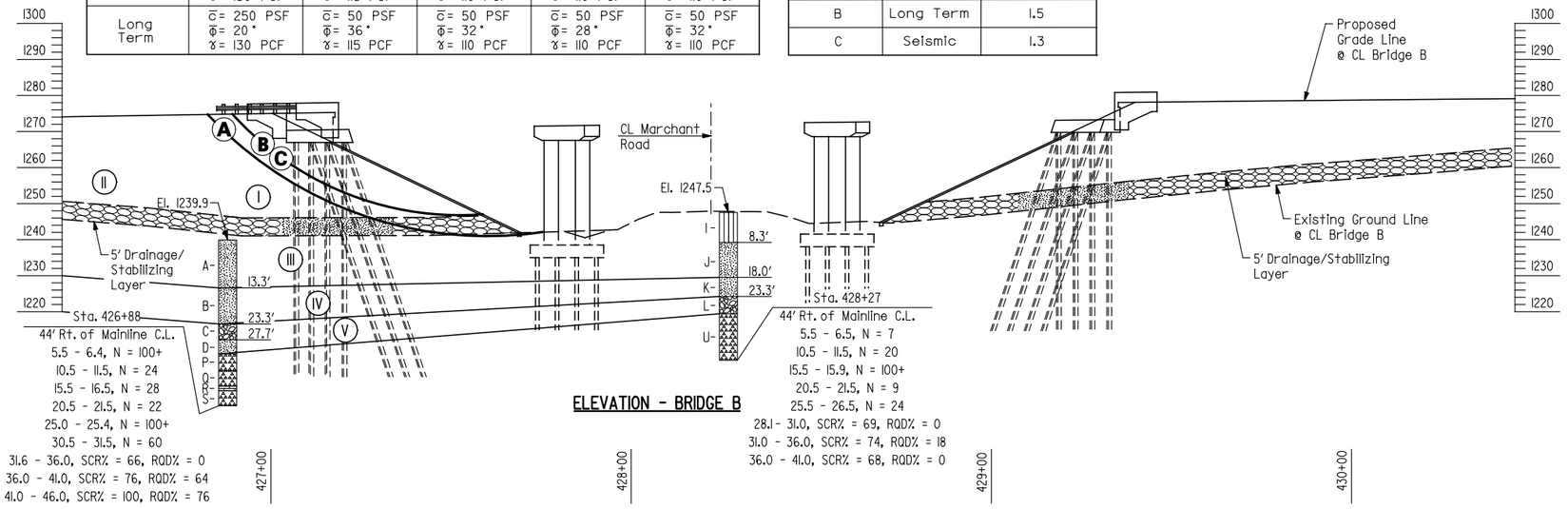
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001996		
				①				



PLAN

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 115 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.6
B	Long Term	1.5
C	Seismic	1.3



ELEVATION - BRIDGE B

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Tan, Medium Dense to Very Dense Silty Sand with Gravel.
B - Copper & Dark Brown, Medium Dense to Dense Clayey Sand with Gravel.
C - Dark Brown, Very Dense Silty Gravelwith Sand.
D - Brown & Light Brown, Very Dense Silty Sand with Gravel.
E - Copper, Medium Stiff Silt.
F - Dark Tan, Medium Dense Silty Sand with Gravel.
G - Brown & Tan, Very Dense Clayey Sand with Gravel.
H - Dark Brown, Very Dense Silty Gravelwith Sand.
I - Copper & Tan, Medium Stiff Silt.
J - Brown & Tan, Medium Dense to Very Dense Silty Sand with Gravel.
K - Brown, Loose Clayey Sand with Gravel.
L - Dark Brown & Light Gray, Medium Dense Silty Gravelwith Sand.
M - Brown, Tan & Dark Tan, Dense Silty Gravelwith Sand.
N - Brown, Very Stiff Fat Clay with Sand.
O - Tan & Brown, Very Stiff Gravelly Silt with Sand.
P - Chert: White, lt. gray, moderately to intensely weathered.
Q - Chert: White, lt. gray, gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fresh.
S - Chert: White, lt. gray, gray, fresh to slightly weathered.
T - Chert: White, lt. gray, gray, moderately to intensely weathered.
U - Chert: White, lt. gray, gray, moderately to intensely weathered.
V - Chert: White, lt. gray, gray, moderately to intensely weathered.

SHEET 2 OF 2
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412
OVER MARCHANT ROAD
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

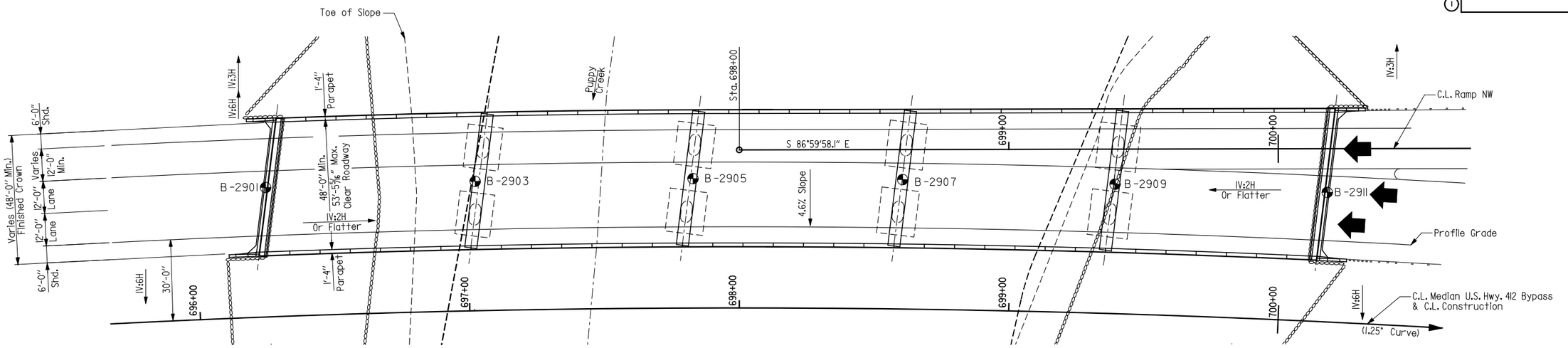
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. B DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

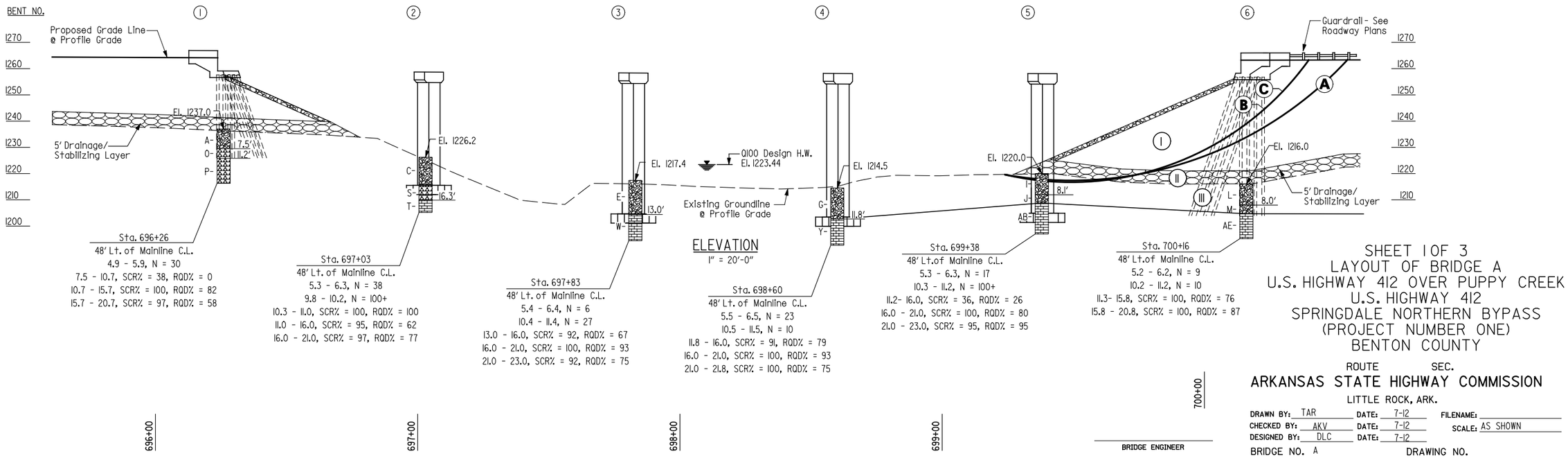
Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Bridge.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

PLAN
1" = 20'-0"

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF Φ = 0° ϒ = 130 PCF	c = 0 PSF Φ = 36° ϒ = 115 PCF	c = 0 PSF Φ = 28° ϒ = 110 PCF
Long Term	c̄ = 250 PSF Φ̄ = 20° ϒ = 130 PCF	c̄ = 50 PSF Φ̄ = 36° ϒ = 115 PCF	c̄ = 50 PSF Φ̄ = 28° ϒ = 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.3
B	Long Term	1.4
C	Seismic	1.2



ELEVATION
1" = 20'-0"

BRIDGE ENGINEER

SHEET 1 OF 3
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412 OVER PUPPY CREEK
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
BENTON COUNTY

ROUTE SEC.

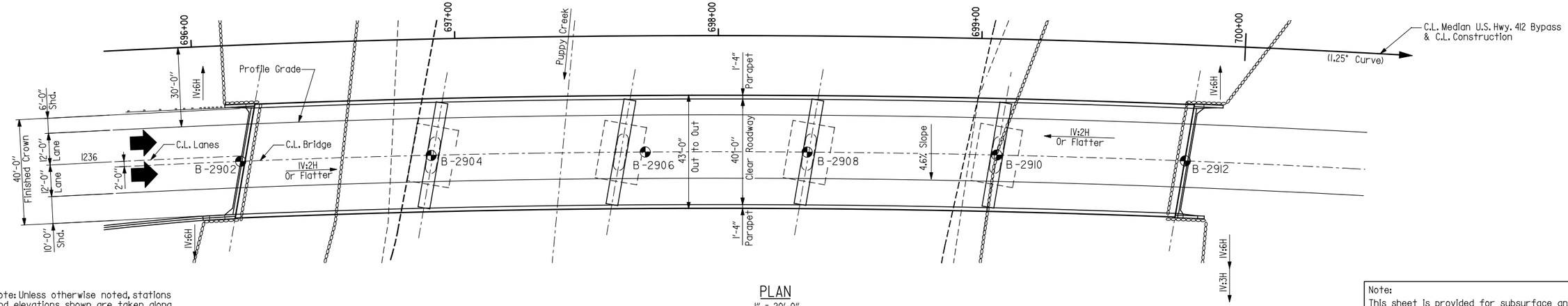
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				

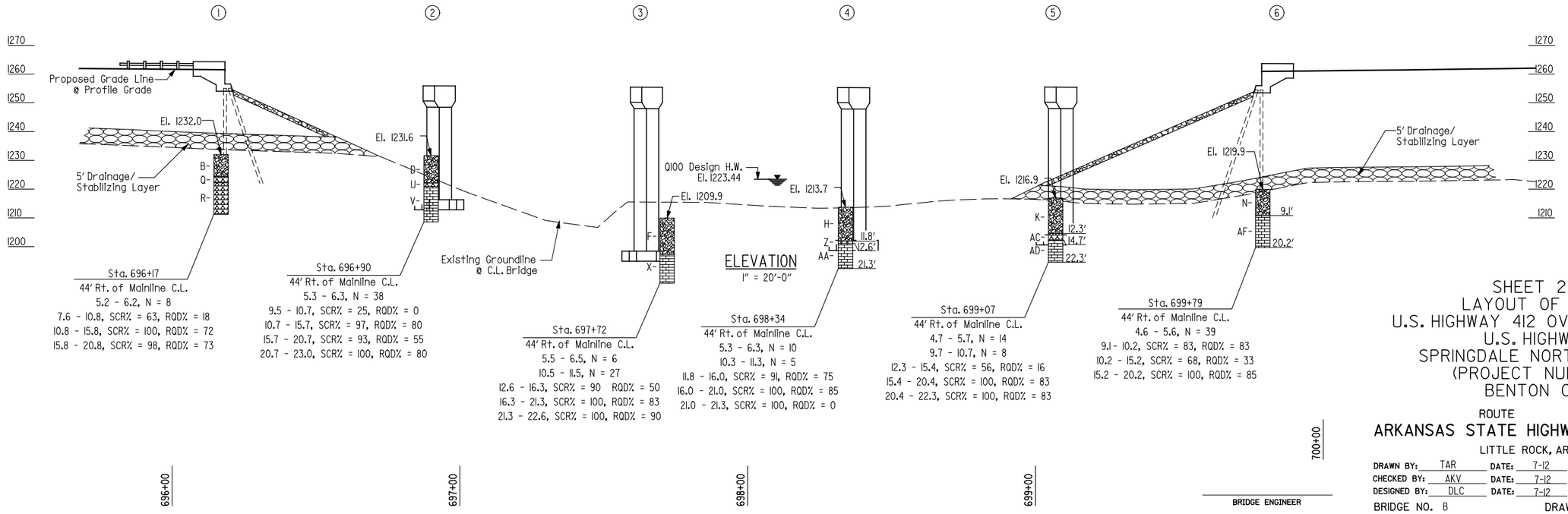


PLAN
1" = 20'-0"

Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Bridge.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.



ELEVATION
1" = 20'-0"

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 2 OF 3
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412 OVER PUPPY CREEK
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. B DRAWING NO.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
6	ARK.			
JOB NO.		001966		

(1)

Boring Legend

A - Brown, medium dense, clayey gravel with sand.
B - Brown, loose, clayey gravel with sand.
C - Brown, dense to very dense, clayey gravel with sand.
D - Brown, dense, clayey gravel with sand.
E - Brown, loose to medium dense, clayey gravel with sand.
F - Brown, loose to medium dense, clayey gravel with sand.
G - Red, loose to medium dense, clayey gravel with sand.
H - Brown, loose, clayey gravel with sand.
I - Red, medium dense, clayey gravel with sand.
J - Red, very dense, clayey gravel with sand.
K - Brown, loose to medium dense, clayey gravel with sand.
L - Brown, loose, clayey gravel with sand.
M - Brown, loose, clayey gravel with sand.
N - Brown, dense, clayey gravel with sand.
O - Chert: White, lt. tan, red, brown, weathered and highly broken.
P - Chert: White, lt. gray, gray, slightly to moderately weathered.
Q - Chert: White, lt. gray, gray, weathered.
R - Chert: White, lt. gray, gray, slightly to moderately weathered.
S - Chert: White, lt. gray, gray, fresh to moderately weathered.
T - Limestone: Lt. gray, gray, medium grain, fresh with slight weathering.
U - Chert: White, angular fragments.
V - Limestone: White, lt. gray, gray, medium grain, fresh with slight to moderate weathering.
W - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
X - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
Y - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
Z - Chert: White, lt. gray, gray, slightly to moderately weathered.
AA - Limestone: White, lt. gray, gray, medium grain, fresh with slight to moderate weathering.
AB - Limestone: White, lt. gray, gray, medium grain, fresh with slight to moderate weathering.
AC - Chert: White, lt. gray, gray, weathered.
AD - Limestone: White, lt. gray, gray, medium grain, fresh with slight to moderate weathering.
AE - Limestone: White, lt. gray, gray, medium grain, fresh with slight to moderate weathering.
AF - Limestone: White with gray banding, medium grain, fresh with moderate weathering.

Florence & Hutcheson, Inc.
Consulting Engineers

BRIDGE ENGINEER

SHEET 3 OF 3
BORING LEGEND
U.S. HIGHWAY 412 OVER PUPPY CREEK
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
BENTON COUNTY

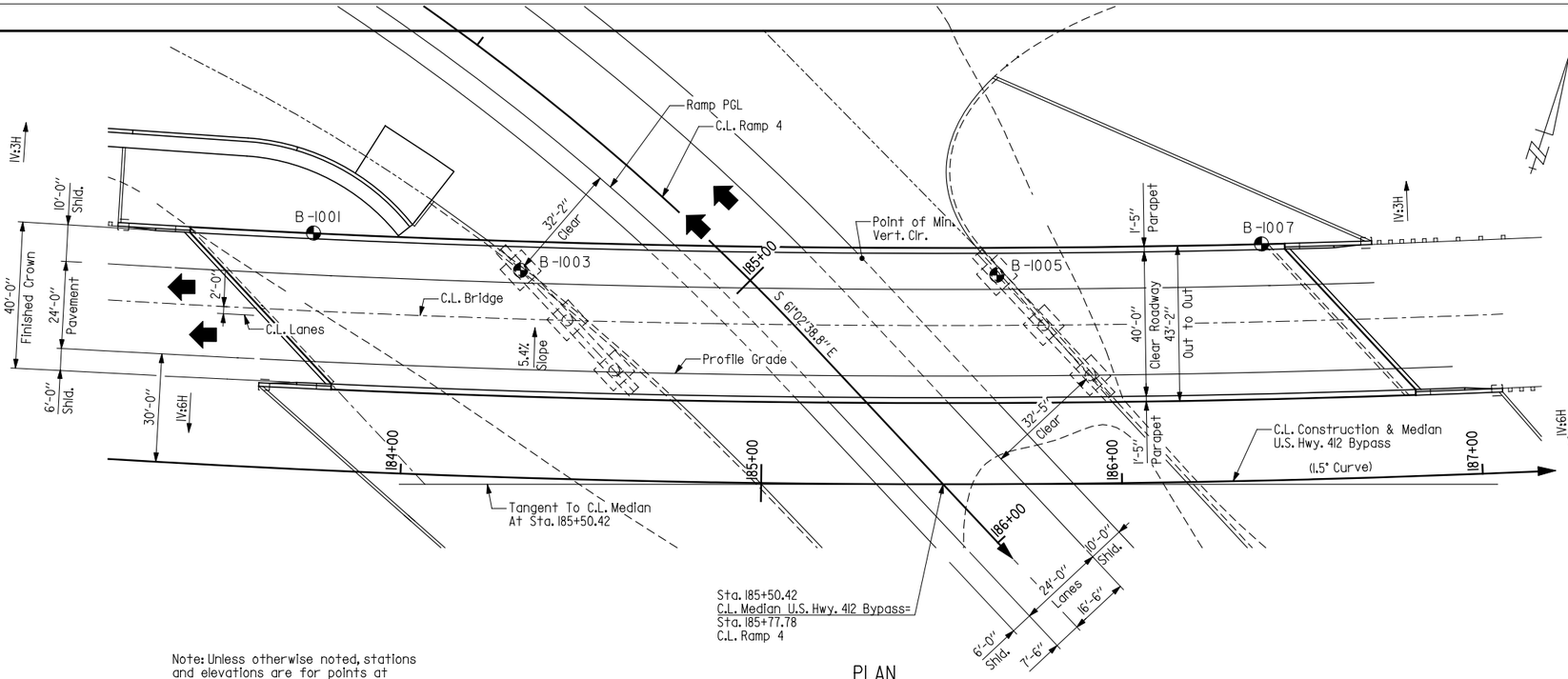
ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE:
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				

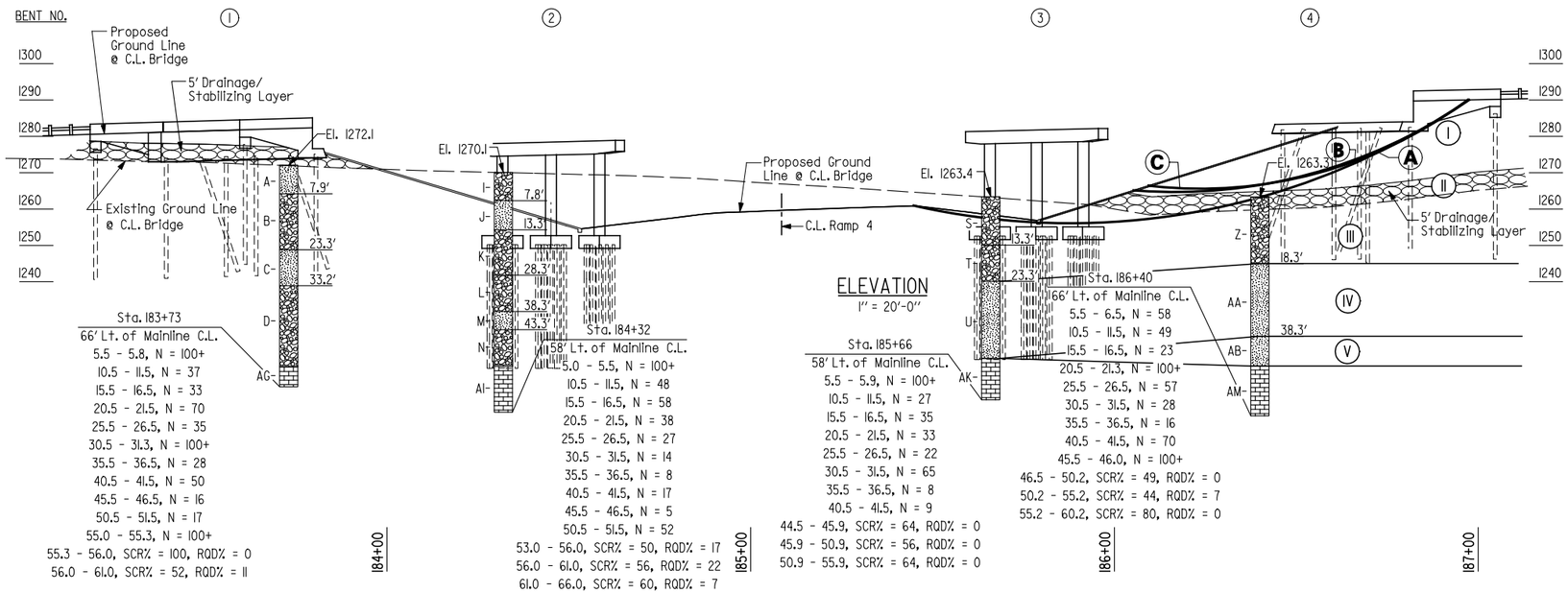


PLAN
1" = 20'-0"

Note: Unless otherwise noted, stations and elevations are for points at centerline of bridge.

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	2.2
B	Long Term	1.8
C	Seismic	1.4



ELEVATION
1" = 20'-0"

Sta. 183+73
66' Lt. of Mainline C.L.
5.5 - 5.8, N = 100+
10.5 - 11.5, N = 37
15.5 - 16.5, N = 33
20.5 - 21.5, N = 70
25.5 - 26.5, N = 35
30.5 - 31.3, N = 100+
35.5 - 36.5, N = 28
40.5 - 41.5, N = 50
45.5 - 46.5, N = 16
50.5 - 51.5, N = 17
55.0 - 55.3, N = 100+
55.3 - 56.0, SCR% = 100, RQD% = 0
56.0 - 61.0, SCR% = 52, RQD% = 11

Sta. 184+32
58' Lt. of Mainline C.L.
5.0 - 5.5, N = 100+
10.5 - 11.5, N = 48
15.5 - 16.5, N = 58
20.5 - 21.5, N = 38
25.5 - 26.5, N = 27
30.5 - 31.5, N = 14
35.5 - 36.5, N = 8
40.5 - 41.5, N = 17
45.5 - 46.5, N = 5
50.5 - 51.5, N = 52
53.0 - 56.0, SCR% = 50, RQD% = 17
56.0 - 61.0, SCR% = 56, RQD% = 22
61.0 - 66.0, SCR% = 60, RQD% = 7

Sta. 185+66
58' Lt. of Mainline C.L.
5.5 - 5.9, N = 100+
10.5 - 11.5, N = 27
15.5 - 16.5, N = 35
20.5 - 21.5, N = 33
25.5 - 26.5, N = 22
30.5 - 31.5, N = 65
35.5 - 36.5, N = 8
40.5 - 41.5, N = 9
44.5 - 45.9, SCR% = 64, RQD% = 0
45.9 - 50.9, SCR% = 56, RQD% = 0
50.9 - 55.9, SCR% = 64, RQD% = 0

Sta. 186+40
66' Lt. of Mainline C.L.
5.5 - 6.5, N = 58
10.5 - 11.5, N = 49
15.5 - 16.5, N = 23
20.5 - 21.3, N = 100+
25.5 - 26.5, N = 57
30.5 - 31.5, N = 28
35.5 - 36.5, N = 16
40.5 - 41.5, N = 70
45.5 - 46.0, N = 100+
46.5 - 50.2, SCR% = 49, RQD% = 0
50.2 - 55.2, SCR% = 44, RQD% = 7
55.2 - 60.2, SCR% = 80, RQD% = 0

Boring Legend

A - Dark tan, very dense clayey sand with gravel.
B - Dark tan & reddish brown, dense to very dense clayey gravel with sand.
C - Tan, yellowish orange, reddish brown & reddish, dense to very dense silty sand with gravel.
D - Brown, tan, light gray, light brown, white, gray & dark brown, medium dense to very dense clayey gravel with sand.
E - Dark brown & copper, very dense clayey gravel with sand.
F - Tan & dark tan, very dense clayey sand with gravel.
G - Reddish brown & dark brown, medium dense to very dense clayey gravel with sand.
H - Dark brown, tan & light gray, medium dense to very dense silty sand with gravel.
I - Dark beige & dark tan, very dense clayey gravel with sand.
J - Tan & black, dense to very dense clayey sand with gravel.
K - Brown & tan, medium dense to dense clayey gravel with sand.
L - Brown, dark brown & copper, loose to medium dense clayey gravel with sand.
M - Brown & tan, medium dense silty sand with gravel.
N - Dark brown & tan, loose to very dense clayey gravel with sand.
O - Brown & tan, very dense clayey sand with gravel.
P - Dark tan, very dense clayey gravel with sand.
Q - Brown, dark brown & white, dense to very dense clayey gravel with sand.
R - Dark brown & tan, very dense clayey gravel with sand.
S - Reddish brown & brown, medium dense to very dense clayey gravel with sand.
T - Dark brown & brown, dense clayey gravel with sand.
U - Brown, copper, dark reddish, tan & black, loose to very dense silty sand with gravel.
V - Dark beige, tan, dark brown & beige, medium dense to very dense clayey gravel with sand.
W - Tan, brown & dark brown, dense to very dense clayey gravel with sand.
X - Brown, very dense silty sand with gravel.
Y - Light brown, dense to very dense silty sand with gravel.
Z - Dark brown, tan & brown, medium dense to very dense clayey gravel with sand.
AA - Brown, tan, dark brown, dark yellowish orange, beige, copper & black, medium dense to very dense silty sand with gravel.
AB - Light beige, white, light gray, brown & tan, very dense silty sand with gravel.
AC - Tan, very dense clayey gravel with sand.
AD - Dark brown & brown, medium dense to very dense clayey gravel with sand.
AE - Light brown, copper, reddish, brown & beige, loose to dense silty sand with gravel.
AF - Dark reddish brown & dark brown, stiff to very hard gravelly fat clay.
AG - White, fine grain, chalky, severely weathered limestone.
AH - White & light gray, fine grain, chalky, severely weathered limestone.
AI - White to light gray, fine grain, chalky, predominately severely weathered limestone.
AJ - White to light gray, fine grain, chalky, predominately severely weathered limestone.
AK - White to light gray, fine grain, chalky, severely weathered limestone.
AL - White to light gray, fine grain, chalky, severely weathered limestone.
AM - White, fine grain, chalky to cherty, severely weathered limestone.
AN - White to light gray, fine grain, chalky to cherty, moderately to severely weathered limestone.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

BRIDGE ENGINEER

SHEET 1 OF 2
LAYOUT OF BRIDGE A
U.S. HIGHWAY 412 OVER W. INTERCHANGE RAMP 4
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
WASHINGTON COUNTY

ROUTE 412 SEC.

ARKANSAS STATE HIGHWAY COMMISSION

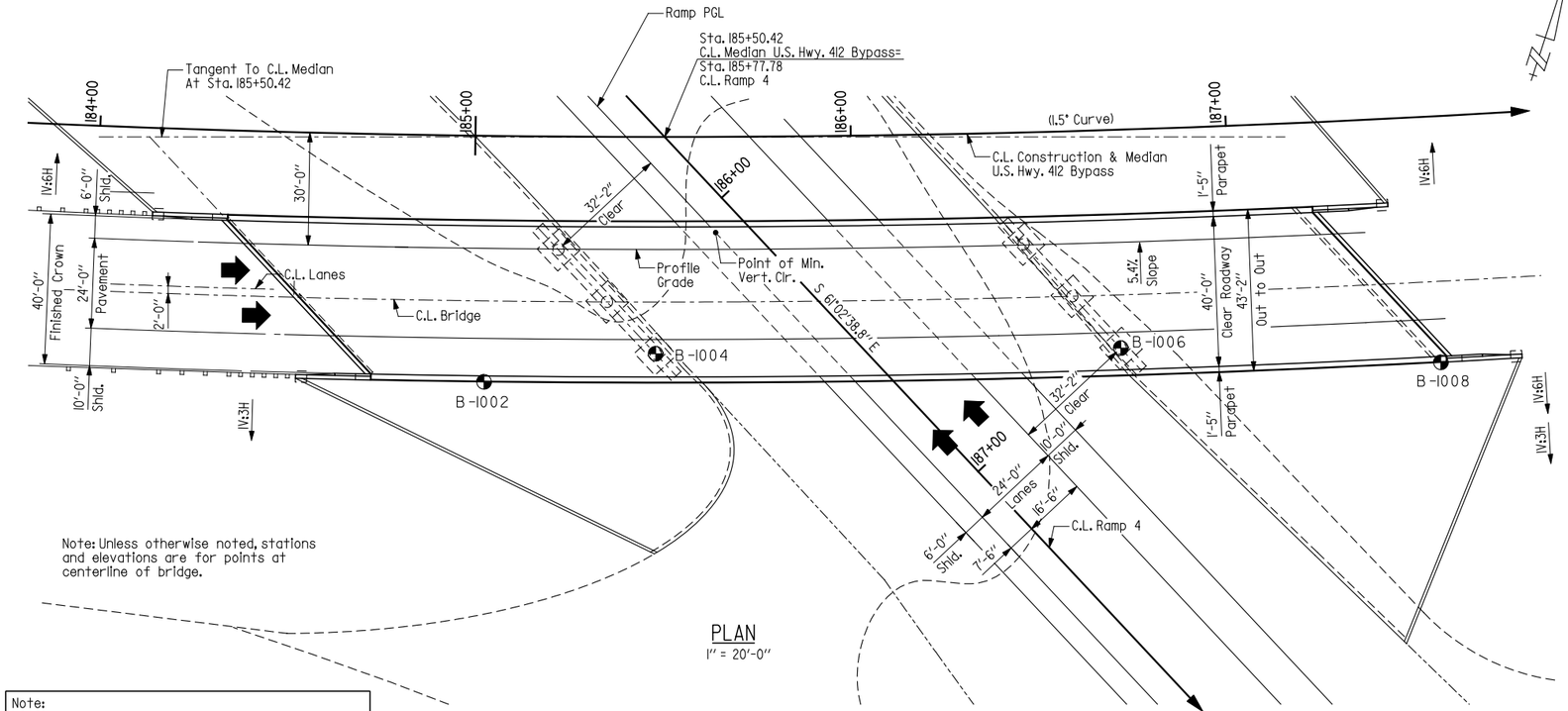
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				



PLAN
1" = 20'-0"

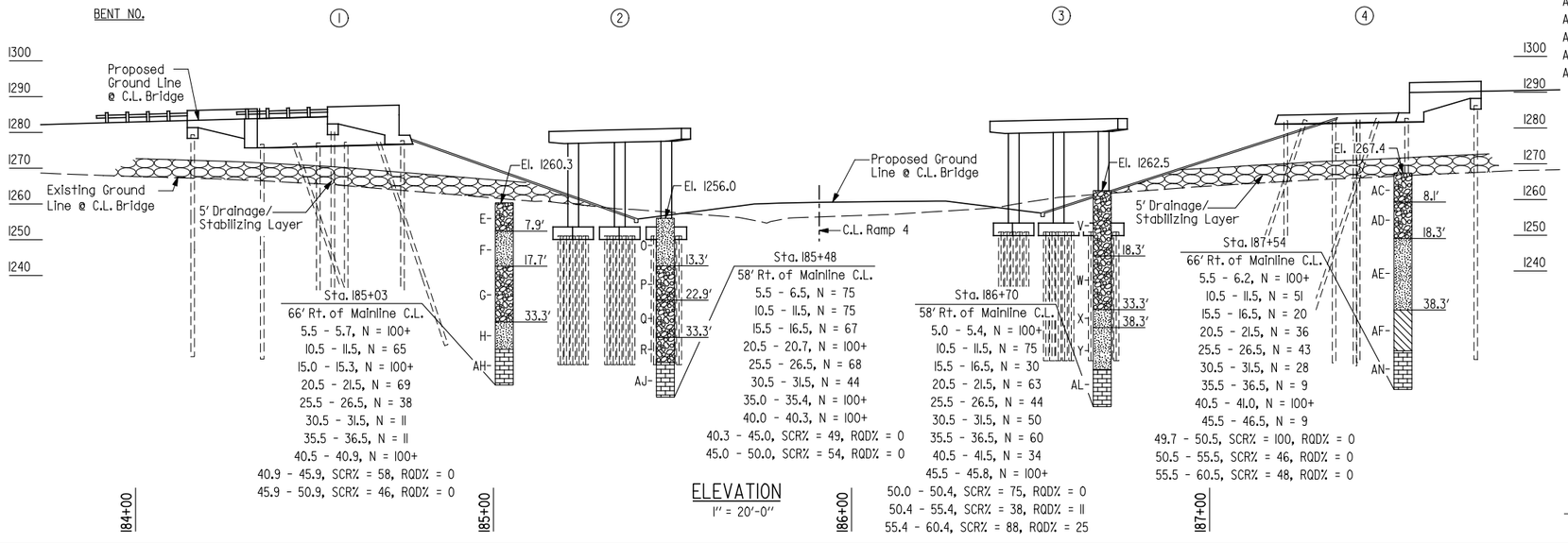
Note: Unless otherwise noted, stations and elevations are for points at centerline of bridge.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Dark tan, very dense clayey sand with gravel.
B - Dark tan & reddish brown, dense to very dense clayey gravel with sand.
C - Tan, yellowish orange, reddish brown & reddish, dense to very dense silty sand with gravel.
D - Brown, tan, light gray, light brown, white, gray & dark brown, medium dense to very dense clayey gravel with sand.
E - Dark brown & copper, very dense clayey gravel with sand.
F - Tan & dark tan, very dense clayey sand with gravel.
G - Reddish brown & dark brown, medium dense to very dense clayey gravel with sand.
H - Dark brown, tan & light gray, medium dense to very dense silty sand with gravel.
I - Dark beige & dark tan, very dense clayey gravel with sand.
J - Tan & black, dense to very dense clayey sand with gravel.
K - Brown & tan, medium dense to dense clayey gravel with sand.
L - Brown, dark brown & copper, loose to medium dense clayey gravel with sand.
M - Brown & tan, medium dense silty sand with gravel.
N - Dark brown & tan, loose to very dense clayey gravel with sand.
O - Brown & tan, very dense clayey sand with gravel.
P - Dark tan, very dense clayey gravel with sand.
Q - Brown, dark brown & white, dense to very dense clayey gravel with sand.
R - Dark brown & tan, very dense clayey gravel with sand.
S - Reddish brown & brown, medium dense to very dense clayey gravel with sand.
T - Dark brown & brown, dense clayey gravel with sand.
U - Brown, copper, dark reddish, tan & black, loose to very dense silty sand with gravel.
V - Dark beige, tan, dark brown & beige, medium dense to very dense clayey gravel with sand.
W - Tan, brown & dark brown, dense to very dense clayey gravel with sand.
X - Brown, very dense silty sand with gravel.
Y - Light brown, dense to very dense silty sand with gravel.
Z - Dark brown, tan & brown, medium dense to very dense clayey gravel with sand.
AA - Brown, tan, dark brown, dark yellowish orange, beige, copper & black, medium dense to very dense silty sand with gravel.
AB - Light beige, white, light gray, brown & tan, very dense silty sand with gravel.
AC - Tan, very dense clayey gravel with sand.
AD - Dark brown & brown, medium dense to very dense clayey gravel with sand.
AE - Light brown, copper, reddish, brown & beige, loose to dense silty sand with gravel.
AF - Dark reddish brown & dark brown, stiff to very hard gravelly fat clay.
AG - White, fine grain, chalky, severely weathered limestone.
AH - White & light gray, fine grain, chalky, severely weathered limestone.
AI - White to light gray, fine grain, chalky, predominately severely weathered limestone.
AJ - White to light gray, fine grain, chalky, predominately severely weathered limestone.
AK - White to light gray, fine grain, chalky, severely weathered limestone.
AL - White to light gray, fine grain, chalky, severely weathered limestone.
AM - White, fine grain, chalky to cherty, severely weathered limestone.
AN - White to light gray, fine grain, chalky to cherty, moderately to severely weathered limestone.



ELEVATION
1" = 20'-0"

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 2 OF 2
LAYOUT OF BRIDGE B
U.S. HIGHWAY 412 OVER
W. INTERCHANGE RAMP 4
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
WASHINGTON COUNTY

ROUTE 412 SEC.

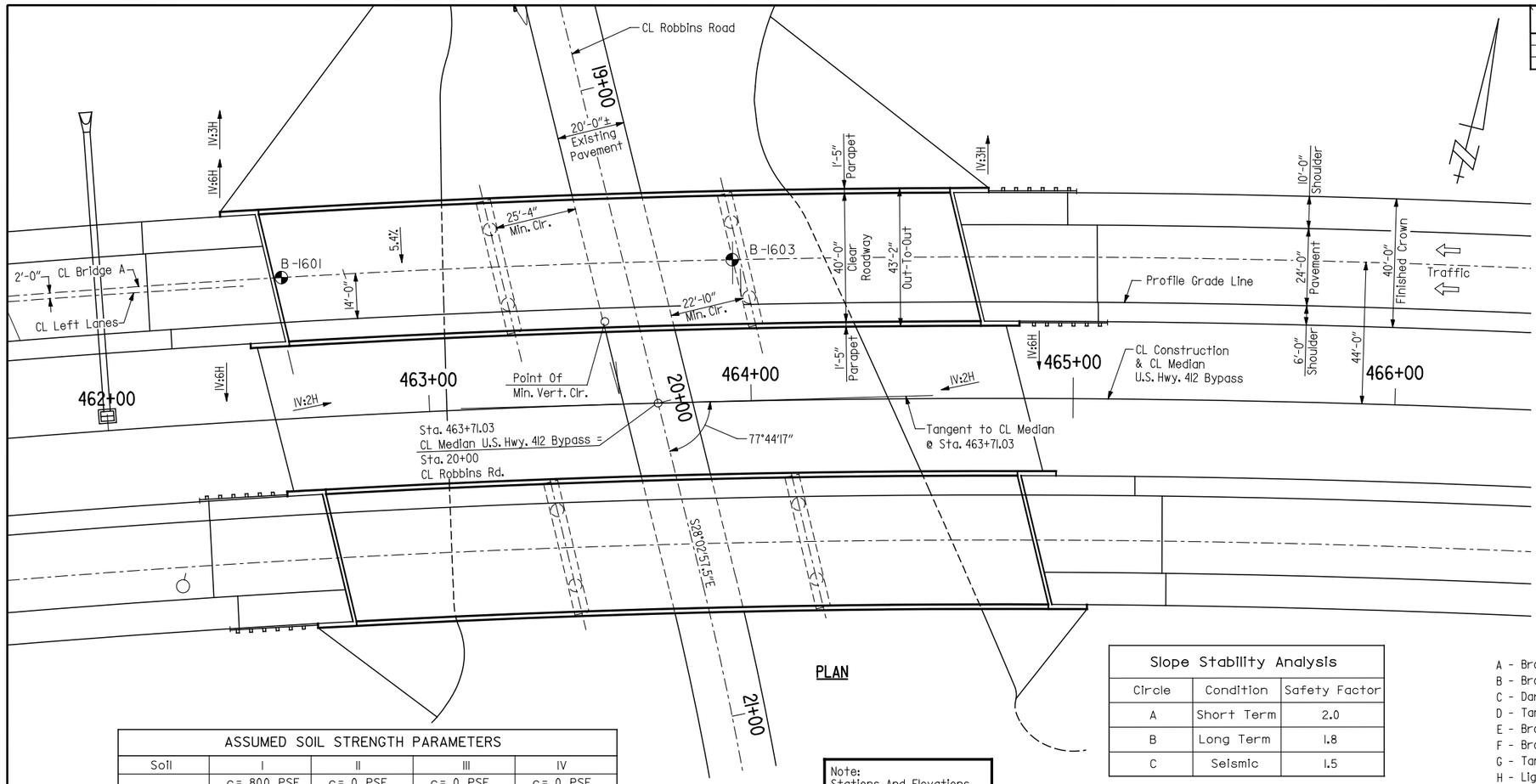
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				

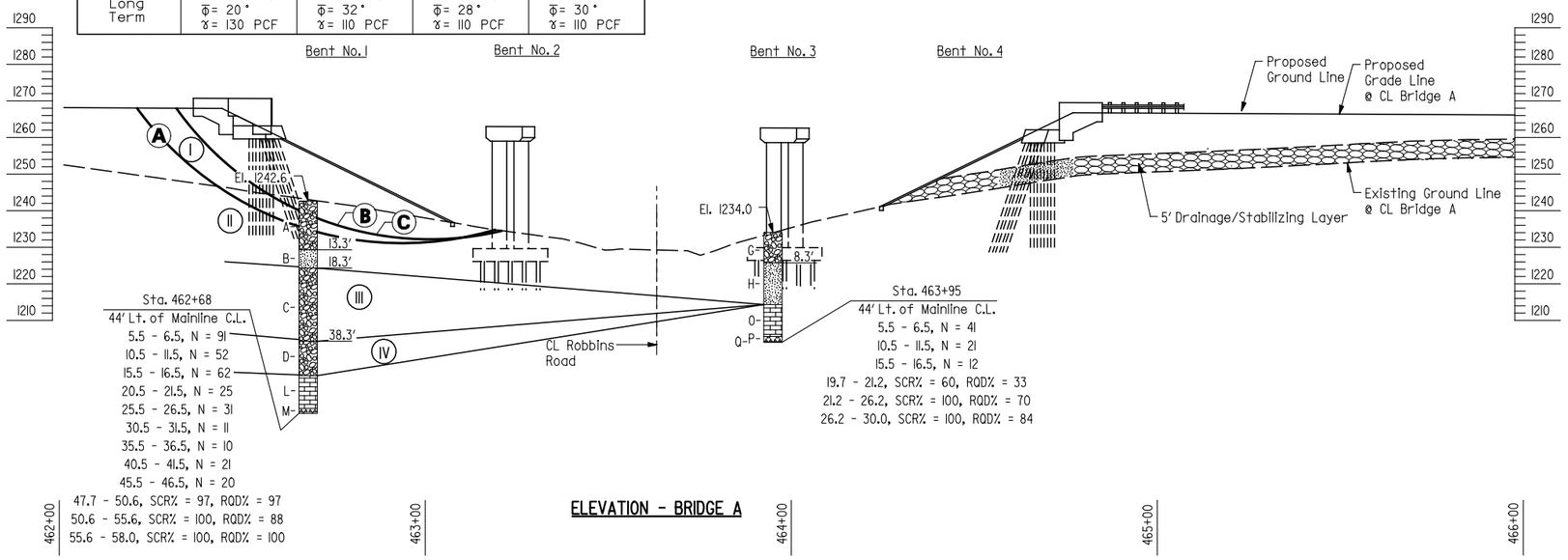


PLAN

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	2.0
B	Long Term	1.8
C	Seismic	1.5

Note:
Stations And Elevations Shown Are Along CL Bridge

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 32° γ= 110 PCF	c= 0 PSF ϕ= 28° γ= 110 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF



ELEVATION - BRIDGE A

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Brown, Very Dense Silty Gravel with Sand.
B - Brown & Beige, Very Dense Silty Sand with Gravel.
C - Dark Brown, Tan & Brown, Loose to Dense Silty Gravel with Sand.
D - Tan, Dark Brown, Copper & Light Beige, Medium Dense Clayey Gravel with Sand.
E - Brownish Gray, Tan & Brown, Very Dense Silty Gravel with Sand.
F - Brown, Light Beige & Copper, Loose to Medium Dense Silty Sand with Gravel.
G - Tan, Dense Silty Gravel with Sand.
H - Light Beige & Copper, Medium Dense Silty Sand with Gravel.
I - Brown & Tan, Dense to Very Dense Silty Gravel with Sand.
J - Dark Brown, White & Brown, Medium Dense to Dense Silty Sand with Gravel.
K - Copper, Dark Brown & Light Brown, Very Loose to Medium Dense Clayey Gravel with Sand.
L - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
M - Chert: White, lt. gray, fresh.
N - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
O - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone
R - Limestone: White, lt. gray, gray, fine to medium grain, fresh w slight weathering.
S - Chert: White, lt. gray, gray, fresh.
T - Limestone bed.

SHEET 1 OF 2
LAYOUT OF BRIDGE A
U.S. HWY. 412 OVER ROBBINS ROAD
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

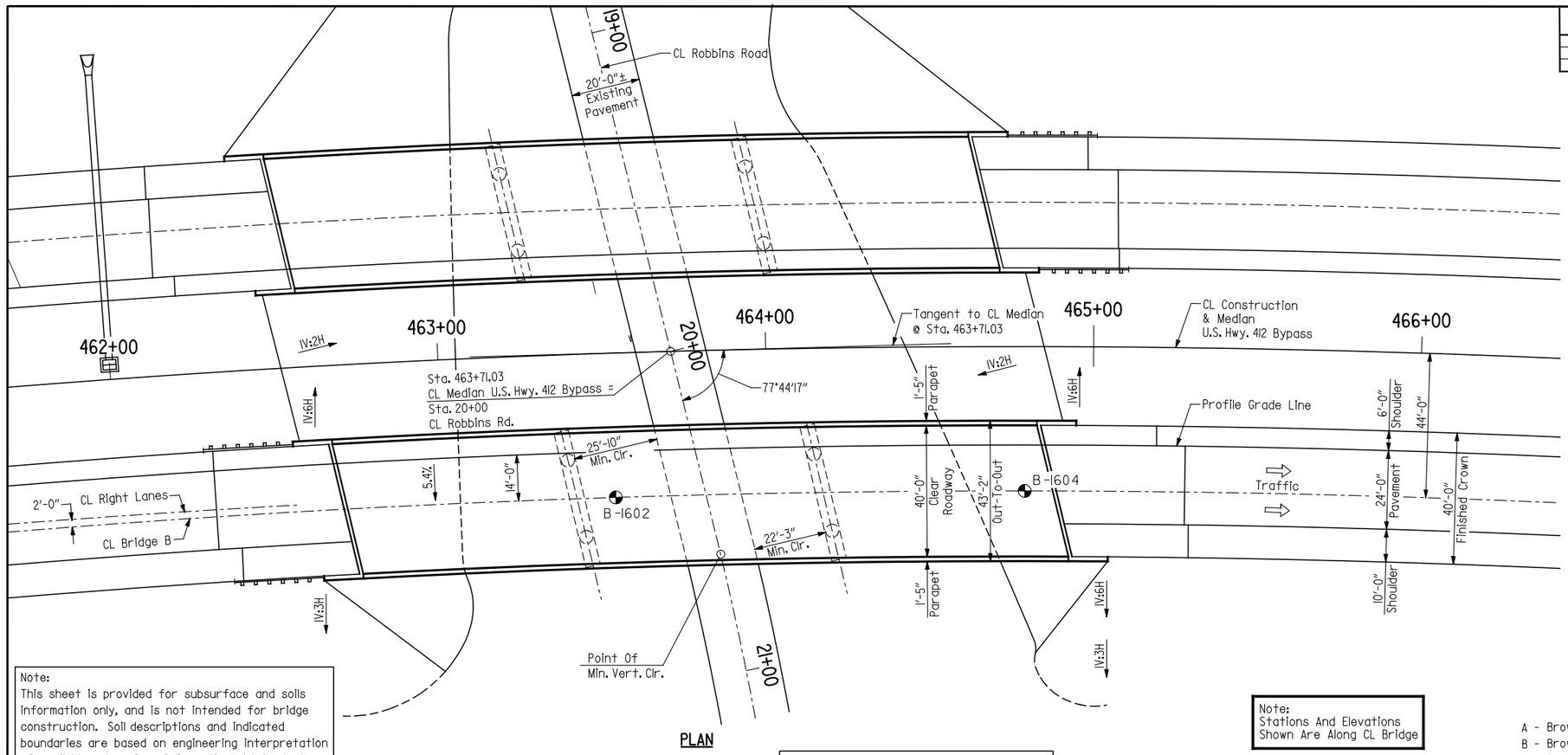
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

Note:
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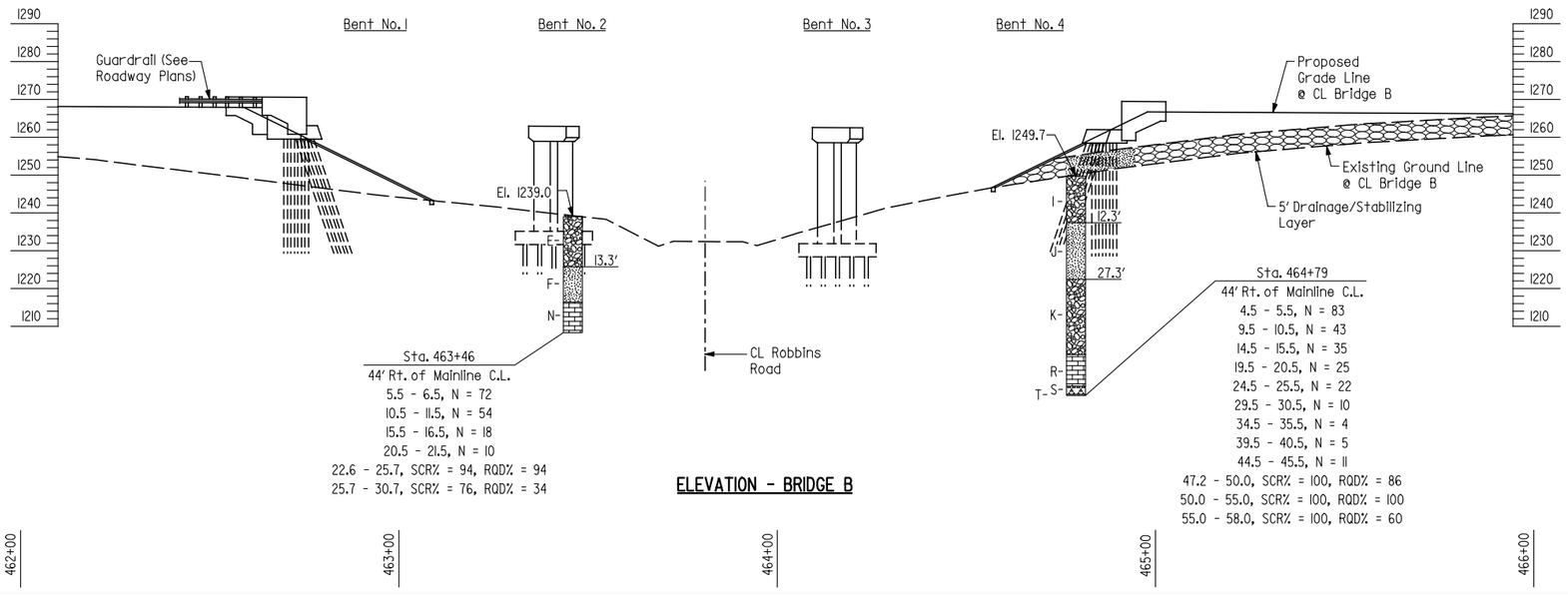
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE B

Boring Legend

A - Brown, Very Dense Silty Gravel with Sand.
B - Brown & Beige, Very Dense Silty Sand with Gravel.
C - Dark Brown, Tan & Brown, Loose to Dense Silty Gravel with Sand.
D - Tan, Dark Brown, Copper & Light Beige, Medium Dense Clayey Gravel with Sand.
E - Brownish Gray, Tan & Brown, Very Dense Silty Gravel with Sand.
F - Brown, Light Beige & Copper, Loose to Medium Dense Silty Sand with Gravel.
G - Tan, Dense Silty Gravel with Sand.
H - Light Beige & Copper, Medium Dense Silty Sand with Gravel.
I - Brown & Tan, Dense to Very Dense Silty Gravel with Sand.
J - Dark Brown, White & Brown, Medium Dense to Dense Silty Sand with Gravel.
K - Copper, Dark Brown & Light Brown, Very Loose to Medium Dense Clayey Gravel with Sand.
L - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
M - Chert: White, lt. gray, fresh.
N - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
O - Limestone: White, lt. gray, gray, fine to medium grain, fresh with slight weathering.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone
R - Limestone: White, lt. gray, gray, fine to medium grain, fresh w slight weathering.
S - Chert: White, lt. gray, gray, fresh.
T - Limestone bed.

SHEET 2 OF 2
LAYOUT OF BRIDGE B
U.S. HWY 412 OVER ROBBINS ROAD
US HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

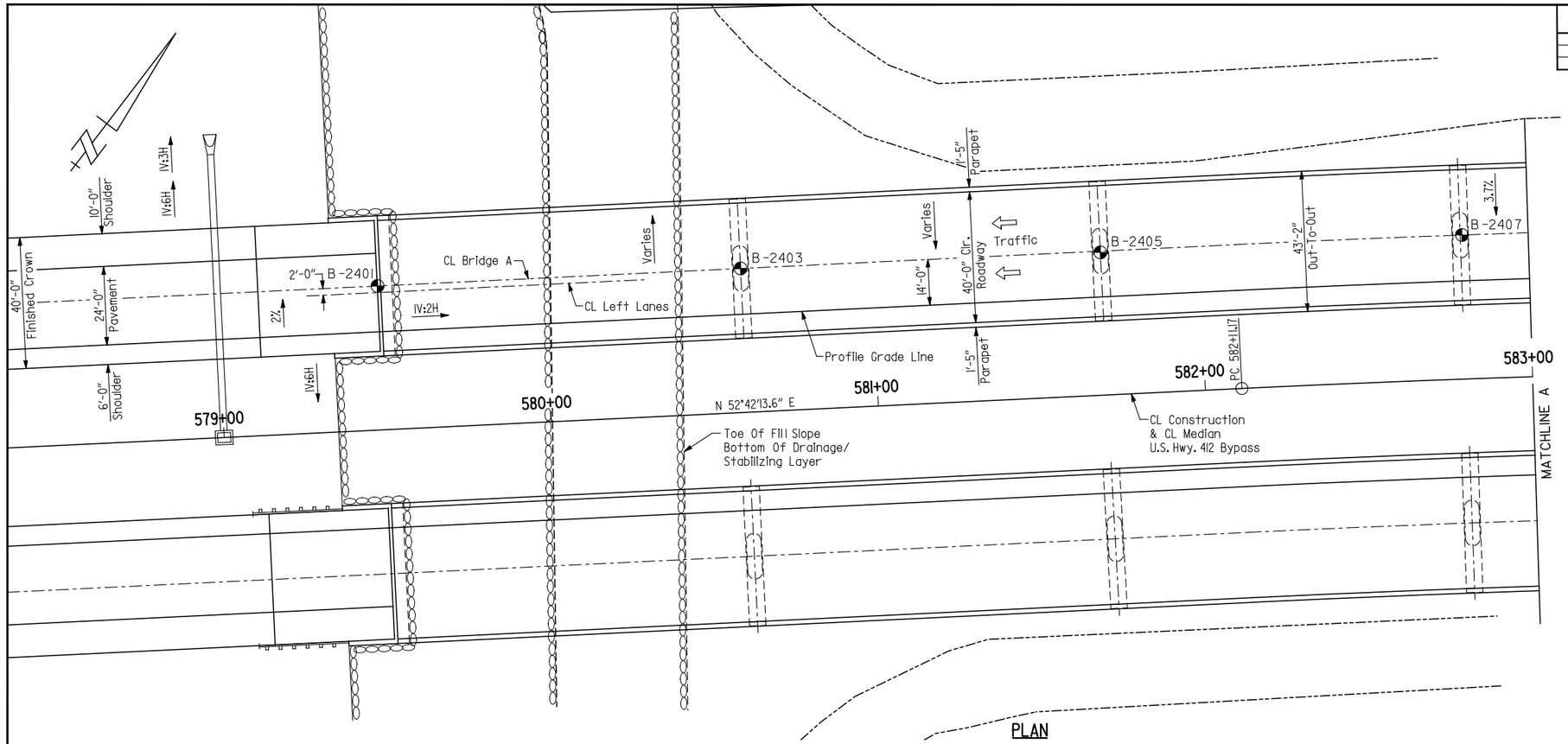
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 36° γ = 115 PCF	c = 0 PSF Φ = 30° γ = 110 PCF
Long Term	c̄ = 250 PSF Φ̄ = 20° γ = 130 PCF	c̄ = 50 PSF Φ̄ = 36° γ = 115 PCF	c̄ = 50 PSF Φ̄ = 30° γ = 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.4
B	Long Term	1.4
C	Seismic	1.2

Note:
Stations And Elevations
Shown Are Along CL Bridge

Note:
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Note:
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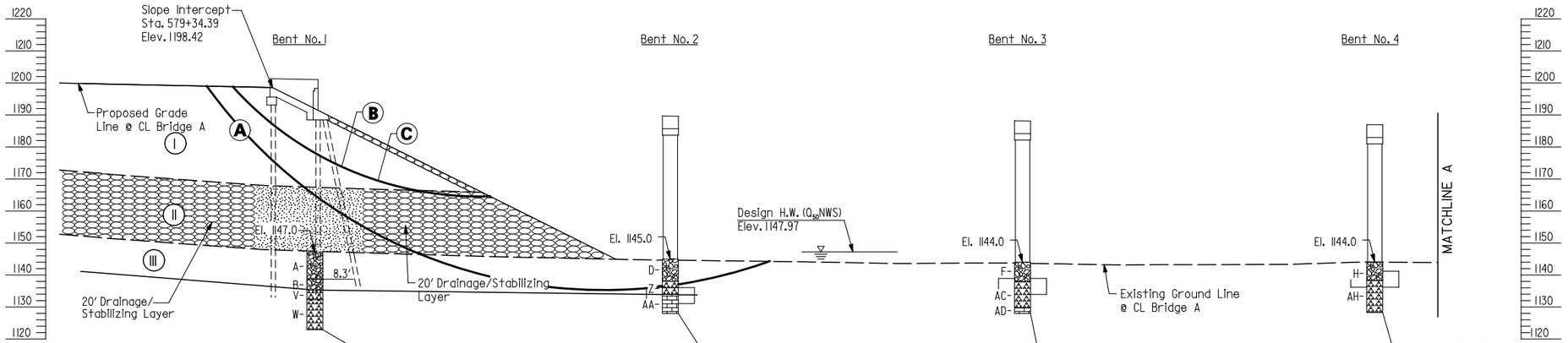


ELEVATION - BRIDGE A

BRIDGE ENGINEER

SHEET 1 OF 7
LAYOUT OF BRIDGE A
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

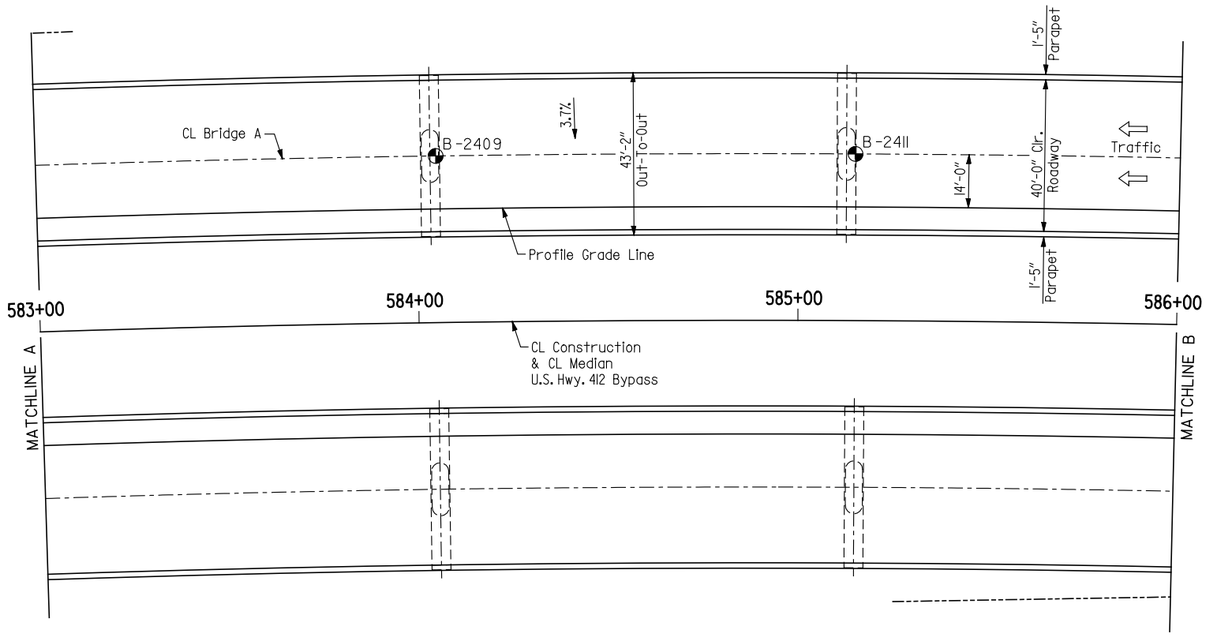
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE NO. A DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

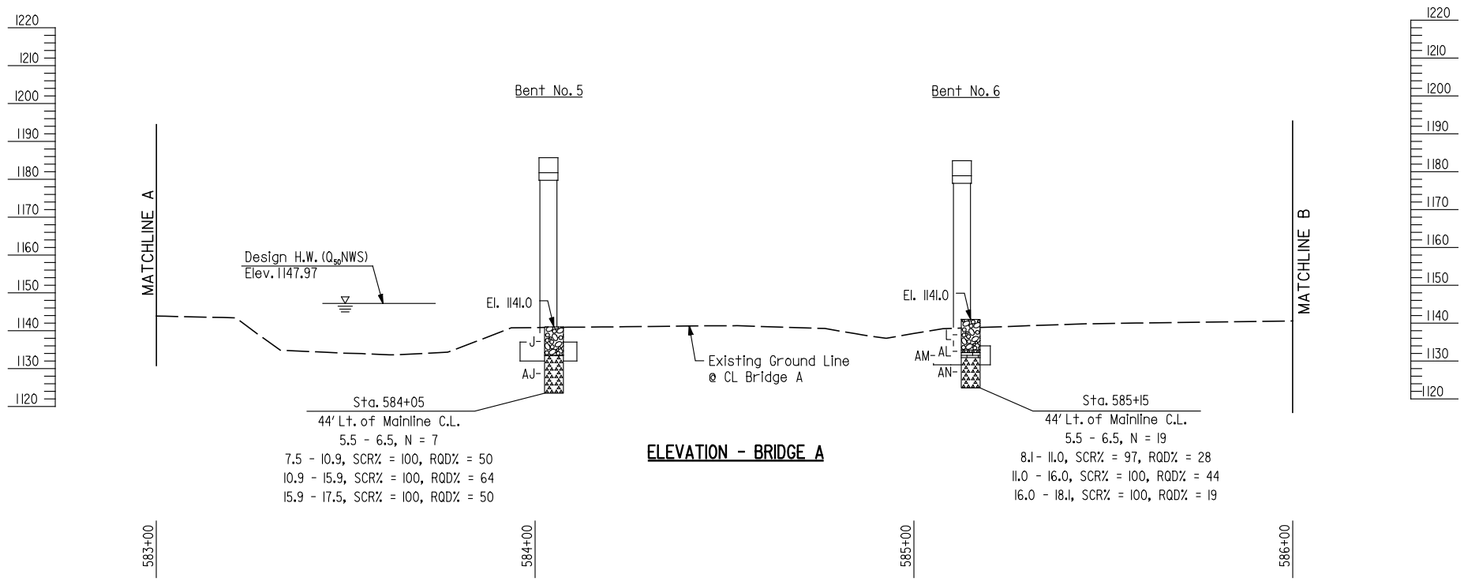
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				1				



PLAN

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE A

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 2 OF 7
LAYOUT OF BRIDGE A
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

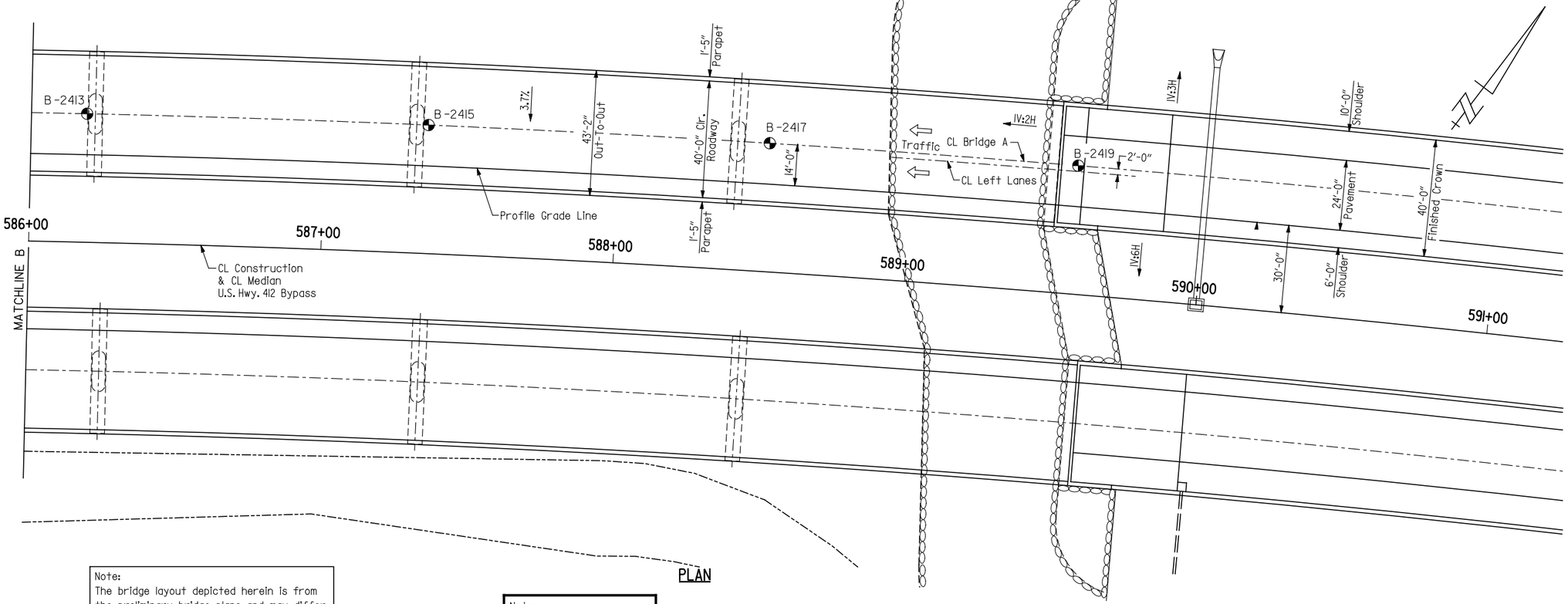
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

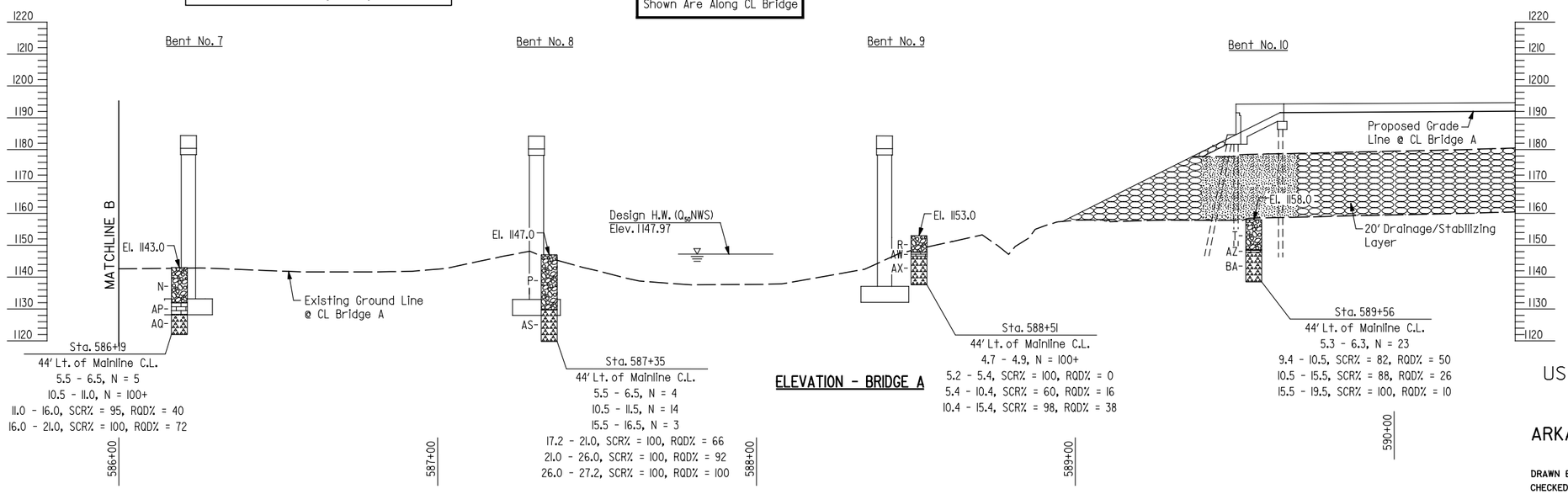
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



Sta. 586+19
44' Lt. of Mainline C.L.
5.5 - 6.5, N = 5
10.5 - 11.0, N = 100+
11.0 - 16.0, SCR% = 95, RQD% = 40
16.0 - 21.0, SCR% = 100, RQD% = 72

Sta. 587+35
44' Lt. of Mainline C.L.
5.5 - 6.5, N = 4
10.5 - 11.5, N = 14
15.5 - 16.5, N = 3
17.2 - 21.0, SCR% = 100, RQD% = 66
21.0 - 26.0, SCR% = 100, RQD% = 92
26.0 - 27.2, SCR% = 100, RQD% = 100

ELEVATION - BRIDGE A

Sta. 588+51
44' Lt. of Mainline C.L.
4.7 - 4.9, N = 100+
5.2 - 5.4, SCR% = 100, RQD% = 0
5.4 - 10.4, SCR% = 60, RQD% = 16
10.4 - 15.4, SCR% = 98, RQD% = 38

Sta. 589+56
44' Lt. of Mainline C.L.
5.3 - 6.3, N = 23
9.4 - 10.5, SCR% = 82, RQD% = 50
10.5 - 15.5, SCR% = 88, RQD% = 26
15.5 - 19.5, SCR% = 100, RQD% = 10

BRIDGE ENGINEER

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 3 OF 7
LAYOUT OF BRIDGE A
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

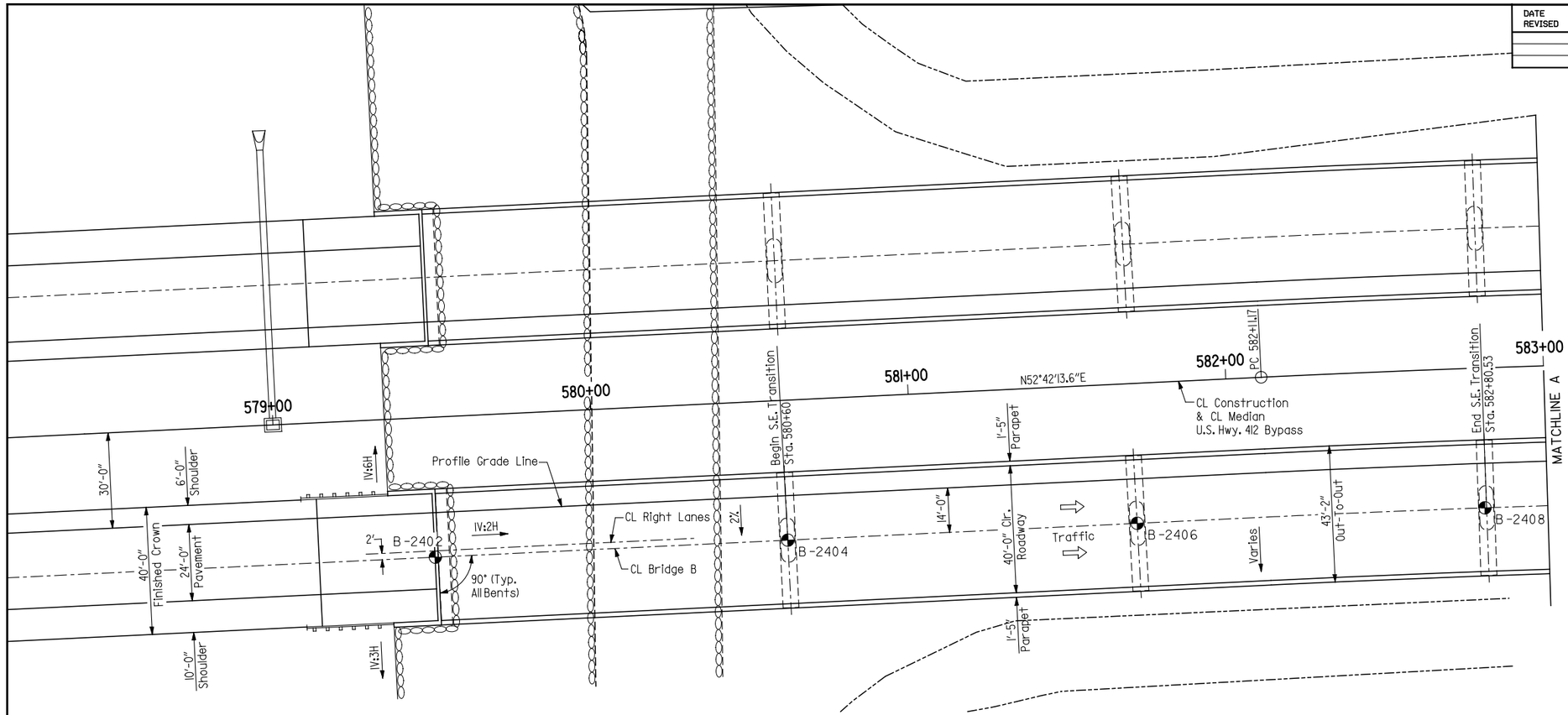
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE NO. A DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				1				

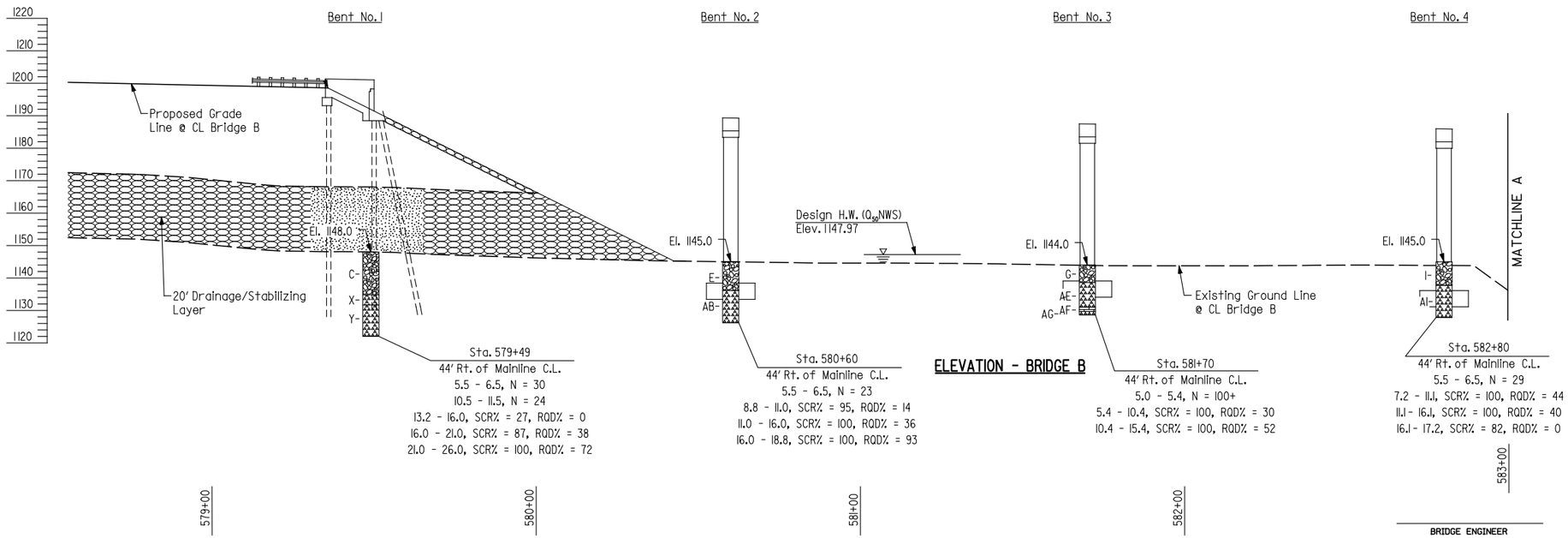


PLAN

Note:
Stations And Elevations Shown Are Along CL Bridge

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.



ELEVATION - BRIDGE B

Sta. 579+49
44' Rt. of Mainline C.L.
5.5 - 6.5, N = 30
10.5 - 11.5, N = 24
13.2 - 16.0, SCR% = 27, RQD% = 0
16.0 - 21.0, SCR% = 87, RQD% = 38
21.0 - 26.0, SCR% = 100, RQD% = 72

Sta. 580+60
44' Rt. of Mainline C.L.
5.5 - 6.5, N = 23
8.8 - 11.0, SCR% = 95, RQD% = 14
11.0 - 16.0, SCR% = 100, RQD% = 36
16.0 - 18.8, SCR% = 100, RQD% = 93

Sta. 581+70
44' Rt. of Mainline C.L.
5.0 - 5.4, N = 100+
5.4 - 10.4, SCR% = 100, RQD% = 30
10.4 - 15.4, SCR% = 100, RQD% = 52

Sta. 582+80
44' Rt. of Mainline C.L.
5.5 - 6.5, N = 29
7.2 - 11.1, SCR% = 100, RQD% = 44
11.1 - 16.1, SCR% = 100, RQD% = 40
16.1 - 17.2, SCR% = 82, RQD% = 0

583+00

BRIDGE ENGINEER

SHEET 4 OF 7
LAYOUT OF BRIDGE B
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

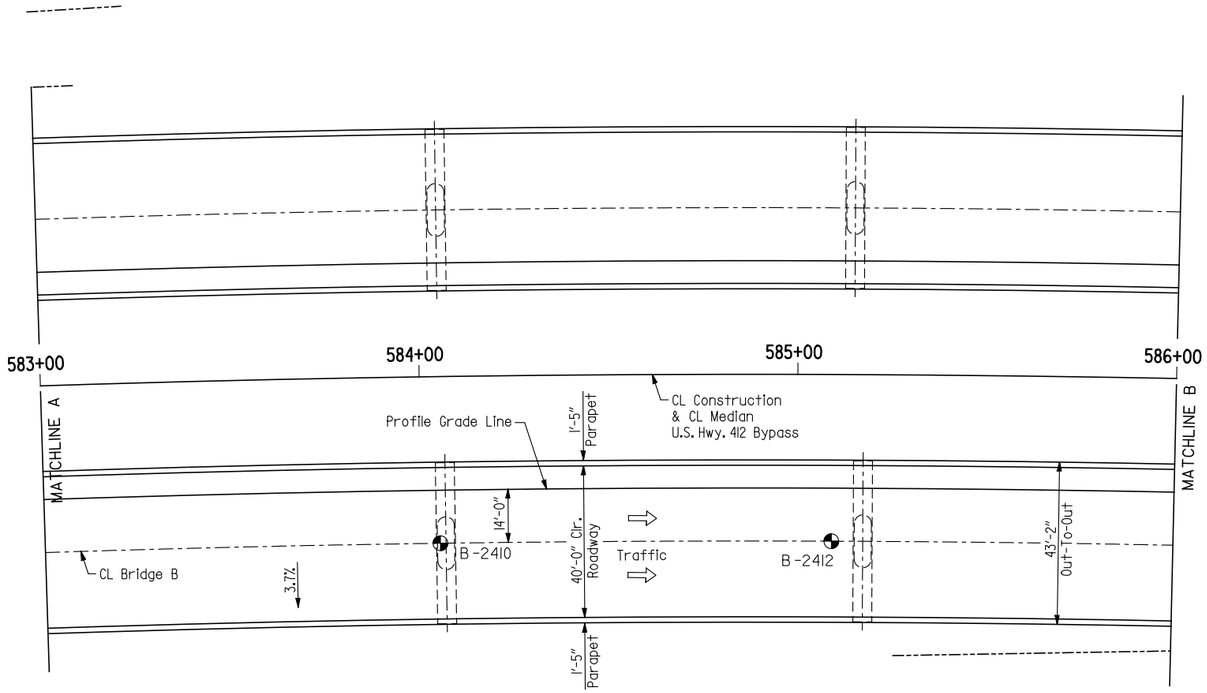
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. B DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

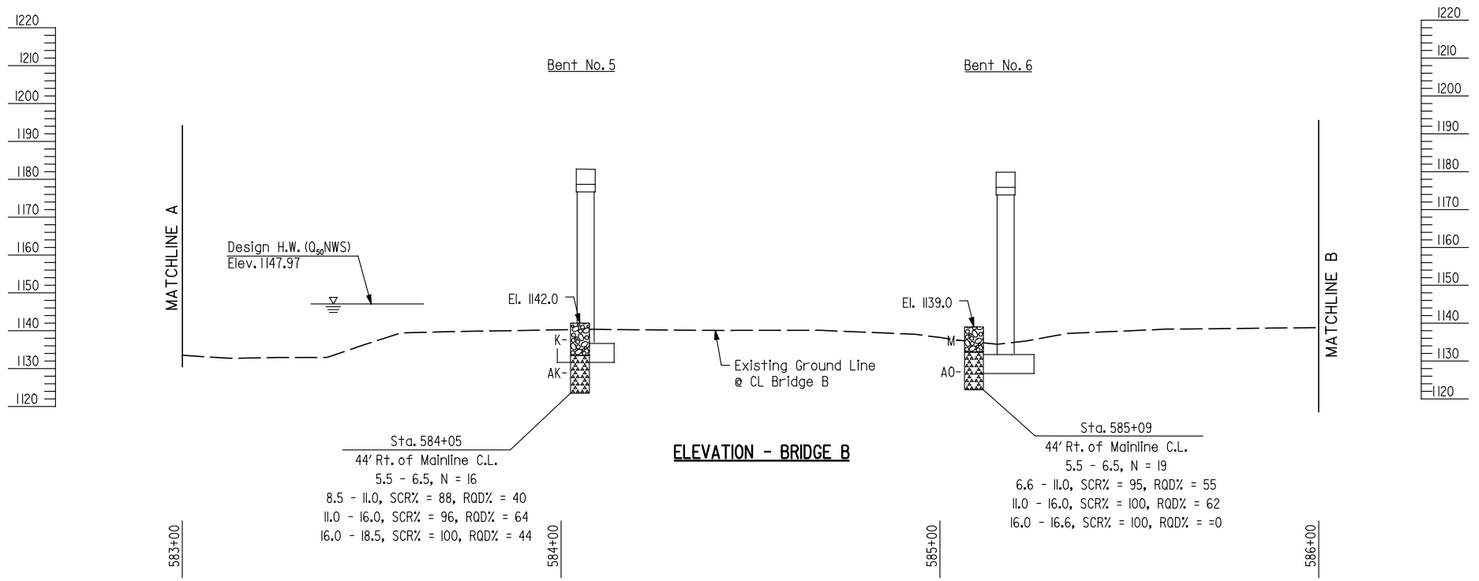
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				1				



PLAN

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE B

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 5 OF 7
LAYOUT OF BRIDGE B
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

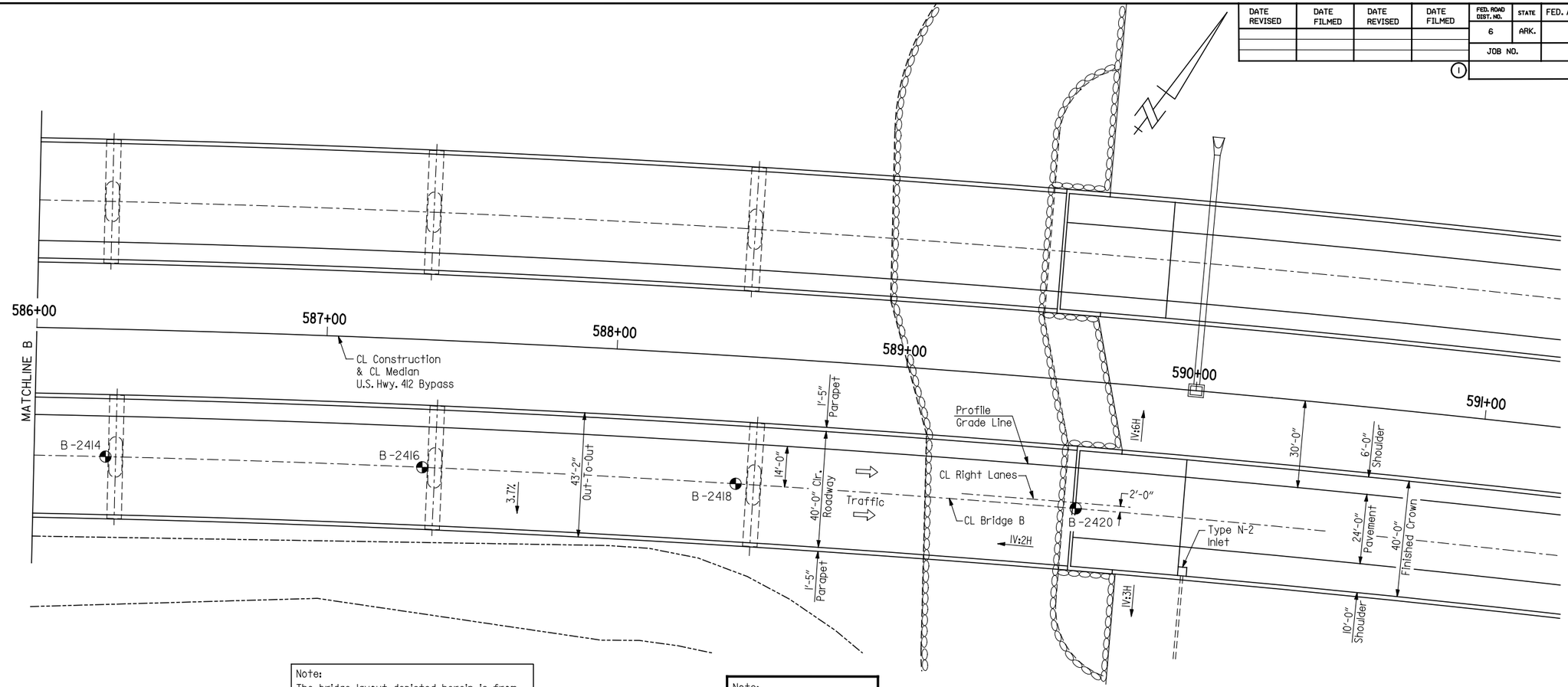
DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

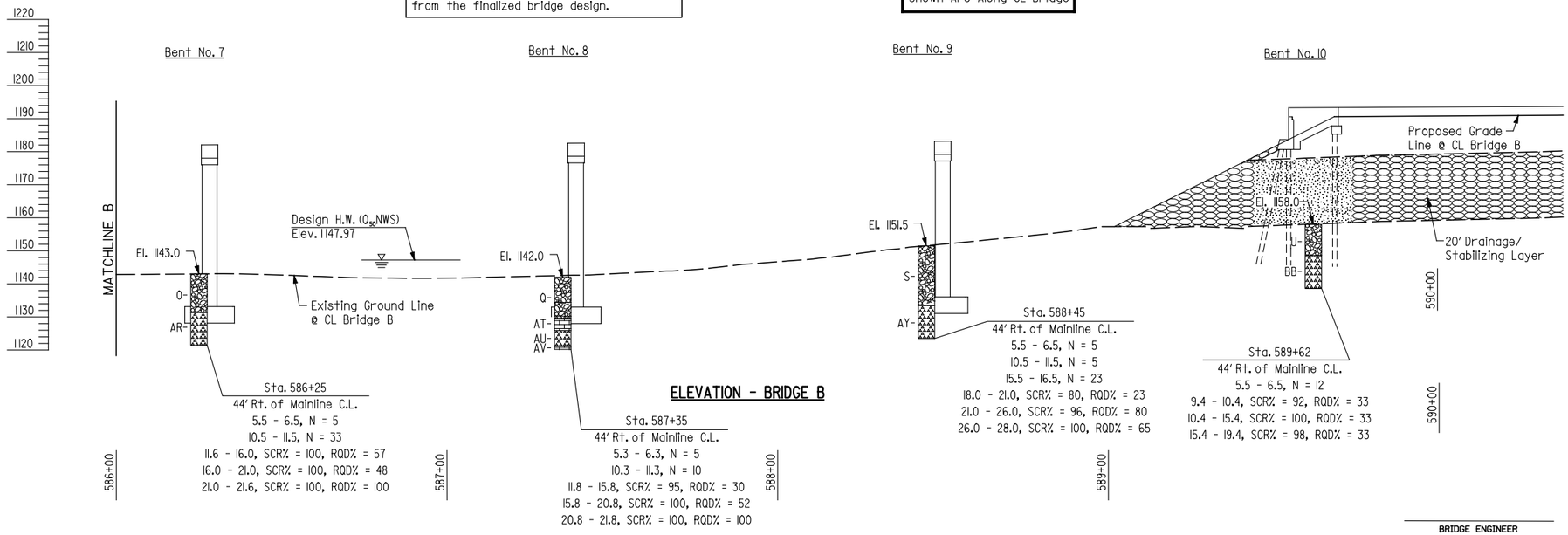
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		7-08		
				①				



Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION - BRIDGE B

BRIDGE ENGINEER

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 6 OF 7
LAYOUT OF BRIDGE B
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. B DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				

Boring Legend

A - Brown, medium dense, silty gravel with sand.
B - Brown, medium dense, poorly graded gravel with silt and sand.
C - Brown, medium dense, poorly graded gravel with silt and sand.
D - Brown, medium dense, poorly graded gravel with silt and sand.
E - Brown, medium dense, poorly graded gravel with silt and sand.
F - White, very dense, silty gravel with sand.
G - White, very dense, silty gravel with sand.
H - White, very dense, silty gravel with sand.
I - Brown, medium dense, silty gravel with sand.
J - Dark brown, loose, silty gravel with sand.
K - Gray, medium dense, silty gravel with sand.
L - Dark brown, medium dense, poorly graded gravel with silt and sand.
M - White, medium dense, silty gravel with sand.
N - Brown & dark brown, loose to very dense, poorly graded gravel with clay and sand.
O - Dark brown & brown, loose to dense, poorly graded gravel with clay and sand..
P - Red, dark brown & brown, very loose to medium dense, poorly graded gravel with clay and sand.
Q - Brown & beige, loose, poorly graded gravel with clay and sand.
R - Brown, very dense, silty gravel with sand.
S - Brown & dark brown, loose to medium dense, poorly graded gravel with clay and sand.
T - Brown, medium dense, silty gravel with sand.
U - Brown, medium dense, silty gravel with sand.
V - Chert: White, lt. gray, gray, weathered.
W - Chert: White, lt. gray, gray, slightly to moderately weathered.
X - Chert: White, lt. tan, highly broken.
Y - Chert: White, lt. gray, gray, slightly to moderately weathered.
Z - Chert: White, lt. gray, moderately weathered.
AA - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AB - Chert: White, lt. gray, gray, fresh to weathered.
AC - Chert: White, lt. gray, gray, fresh to moderately weathered.
AD - Limestone: White, lt. gray, gray, fine to medium grain, fresh.
AE - Chert: White, lt. gray, gray, fresh to moderately weathered.
AF - Limestone: Lt. gray, gray, fine to medium grain, fresh.
AG - Chert: White, lt. gray, gray.
AH - Chert: White, lt. gray, gray, fresh to moderately weathered.
AI - Chert: White, lt. gray, gray, fresh to moderately weathered.
AJ - Chert: White, lt. gray, gray, slightly to moderately weathered.
AK - Chert: White, lt. gray, gray, slightly to moderately weathered.
AL - Chert: Fragmented.
AM - Limestone: Lt. gray, gray, fresh to slightly weathered.
AN - Chert: White, lt. gray, gray, slightly to moderately weathered.
AO - Chert: White, lt. gray, gray, slightly to moderately weathered.
AP - Limestone: Gray to lt. gray, white, fine grain, fresh with slight weathering.
AQ - Chert: White, lt. gray, gray, slightly weathered.
AR - Chert: White, lt. gray, gray, slightly to moderately weathered.
AS - Chert: White, lt. gray, gray, slightly to moderately weathered.
AT - Limestone: Lt. gray, gray, fine grain, fresh to moderately weathered.
AU - Chert: White, lt. gray, gray, fresh to slightly weathered.
AV - Limestone: Lt. gray, gray, fine grain, fresh.
AW - Limestone: Lt. gray, gray, fresh with slight weathering.
AX - Chert: White, lt. gray, gray, slightly to moderately weathered.
AY - Chert: White, lt. gray, gray, slightly to moderately weathered.
AZ - Limestone: Lt. gray, gray.
BA - Chert: White, lt. gray, gray, slightly to moderately weathered.
BB - Chert: White, lt. gray, gray, slightly to moderately weathered.

SHEET 7 OF 7
BORING LEGEND
US HWY. 412 OVER SPRING CREEK
WASHINGTON COUNTY
ROUTE SEC.
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE:
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

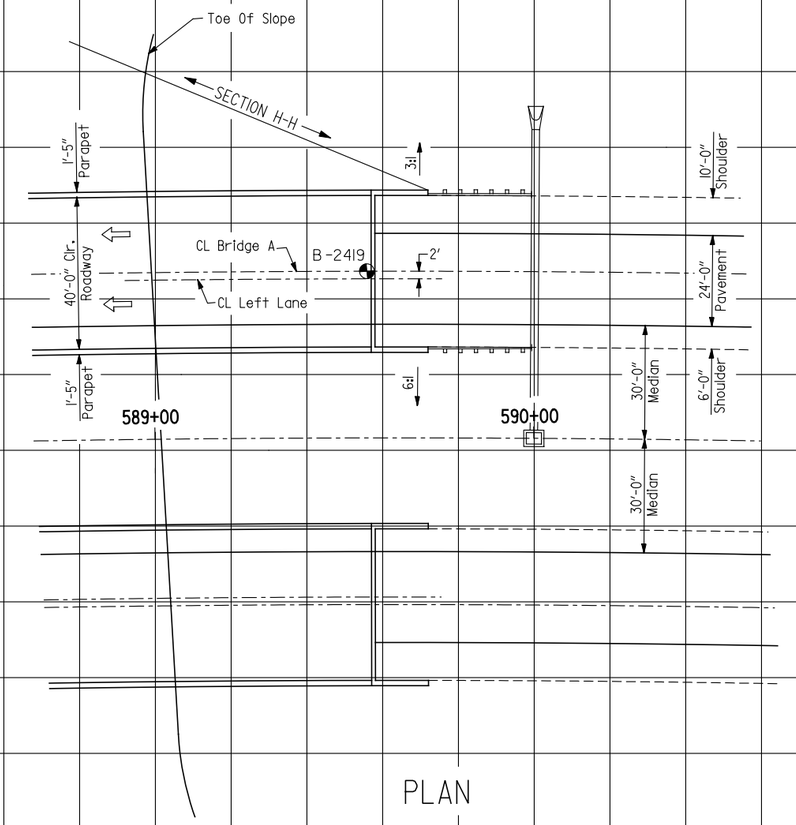
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

Boring Legend

A - Brown, medium dense, silty gravel with sand.
B - Brown, medium dense, poorly graded gravel with silt and sand.
C - Brown, medium dense, poorly graded gravel with silt and sand.
D - Brown, medium dense, poorly graded gravel with silt and sand.
E - Brown, medium dense, poorly graded gravel with silt and sand.
F - White, very dense, silty gravel with sand.
G - White, very dense, silty gravel with sand.
H - White, very dense, silty gravel with sand.
I - Brown, medium dense, silty gravel with sand.
J - Dark brown, loose, silty gravel with sand.
K - Gray, medium dense, silty gravel with sand.
L - Dark brown, medium dense, poorly graded gravel with silt and sand.
M - White, medium dense, silty gravel with sand.
N - Brown & dark brown, loose to very dense, poorly graded gravel with clay and sand.
O - Dark brown & brown, loose to dense, poorly graded gravel with clay and sand..
P - Red, dark brown & brown, very loose to medium dense, poorly graded gravel with clay and sand.
Q - Brown & beige, loose, poorly graded gravel with clay and sand.
R - Brown, very dense, silty gravel with sand.
S - Brown & dark brown, loose to medium dense, poorly graded gravel with clay and sand.
T - Brown, medium dense, silty gravel with sand.
U - Brown, medium dense, silty gravel with sand.

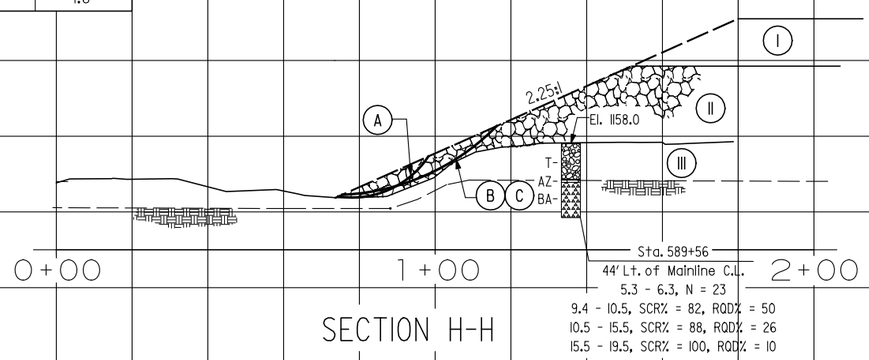
V - Chert: White, lt. gray, gray, weathered.
W - Chert: White, lt. gray, gray, slightly to moderately weathered.
X - Chert: White, lt. tan, highly broken.
Y - Chert: White, lt. gray, gray, slightly to moderately weathered.
Z - Chert: White, lt. gray, moderately weathered.
AA - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AB - Chert: White, lt. gray, gray, fresh to weathered.
AC - Chert: White, lt. gray, gray, fresh to moderately weathered.
AD - Limestone: White, lt. gray, gray, fine to medium grain, fresh.
AE - Chert: White, lt. gray, gray, fresh to moderately weathered.
AF - Limestone: Lt. gray, gray, fine to medium grain, fresh.
AG - Chert: White, lt. gray, gray.
AH - Chert: White, lt. gray, gray, fresh to moderately weathered.
AI - Chert: White, lt. gray, gray, fresh to moderately weathered.
AJ - Chert: White, lt. gray, gray, slightly to moderately weathered.
AK - Chert: White, lt. gray, gray, slightly to moderately weathered.
AL - Chert: Fragmented.
AM - Limestone: Lt. gray, gray, fresh to slightly weathered.
AN - Chert: White, lt. gray, gray, slightly to moderately weathered.
AO - Chert: White, lt. gray, gray, slightly to moderately weathered.
AP - Limestone: Gray to lt. gray, white, fine grain, fresh with slight weathering.
AQ - Chert: White, lt. gray, gray, slightly weathered.
AR - Chert: White, lt. gray, gray, slightly to moderately weathered.
AS - Chert: White, lt. gray, gray, slightly to moderately weathered.
AT - Limestone: Lt. gray, gray, fine grain, fresh to moderately weathered.
AU - Chert: White, lt. gray, gray, fresh to slightly weathered.
AV - Limestone: Lt. gray, gray, fine grain, fresh.
AW - Limestone: Lt. gray, gray, fresh with slight weathering.
AX - Chert: White, lt. gray, gray, slightly to moderately weathered.
AY - Chert: White, lt. gray, gray, slightly to moderately weathered.
AZ - Limestone: Lt. gray, gray.
BA - Chert: White, lt. gray, gray, slightly to moderately weathered.
BB - Chert: White, lt. gray, gray, slightly to moderately weathered.



PLAN

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 34° γ= 120 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 120 PCF

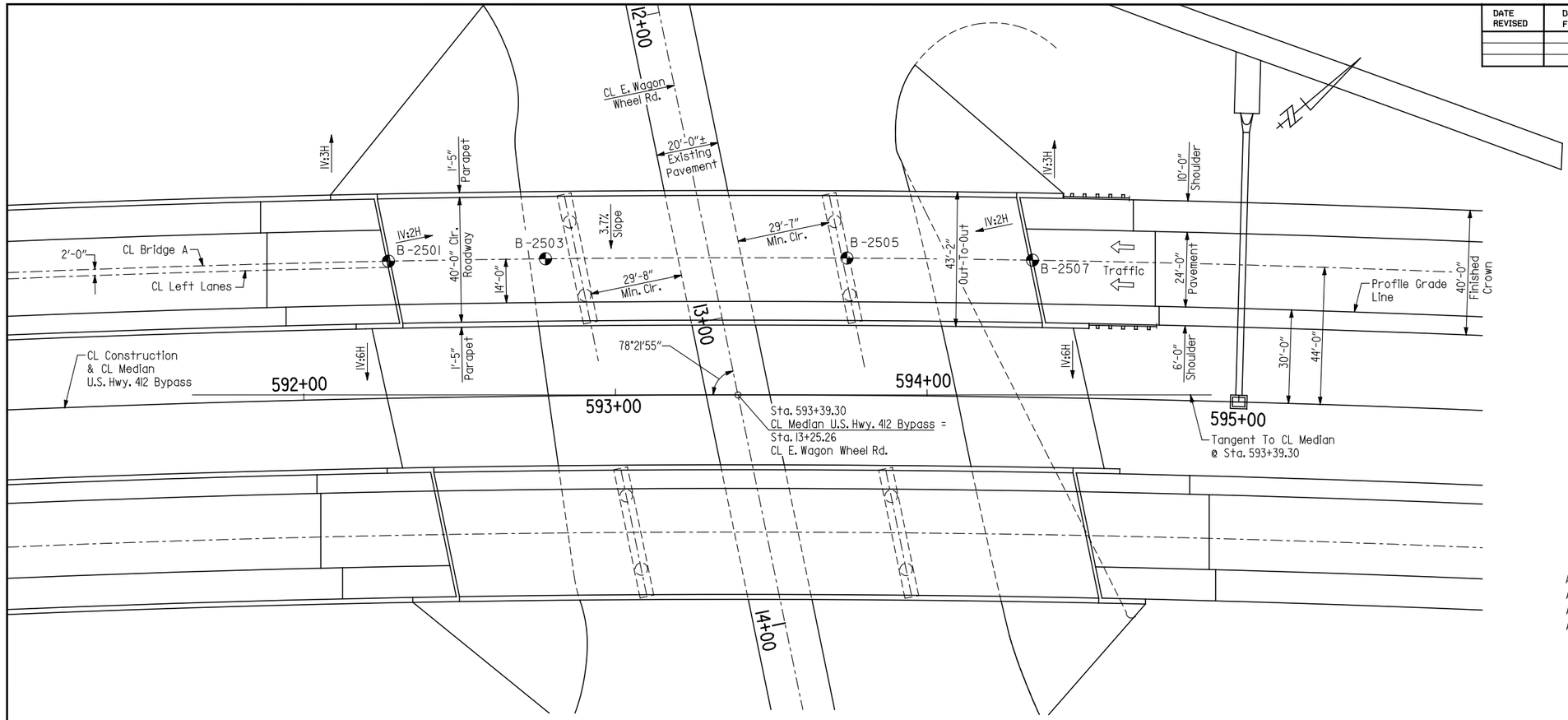
FACTORS OF SAFETY		
Short Term	A	1.3
Long Term	B	1.9
Seismic	C	1.6



SECTION H-H

SPRING CREEK BRIDGE A - BENT 10

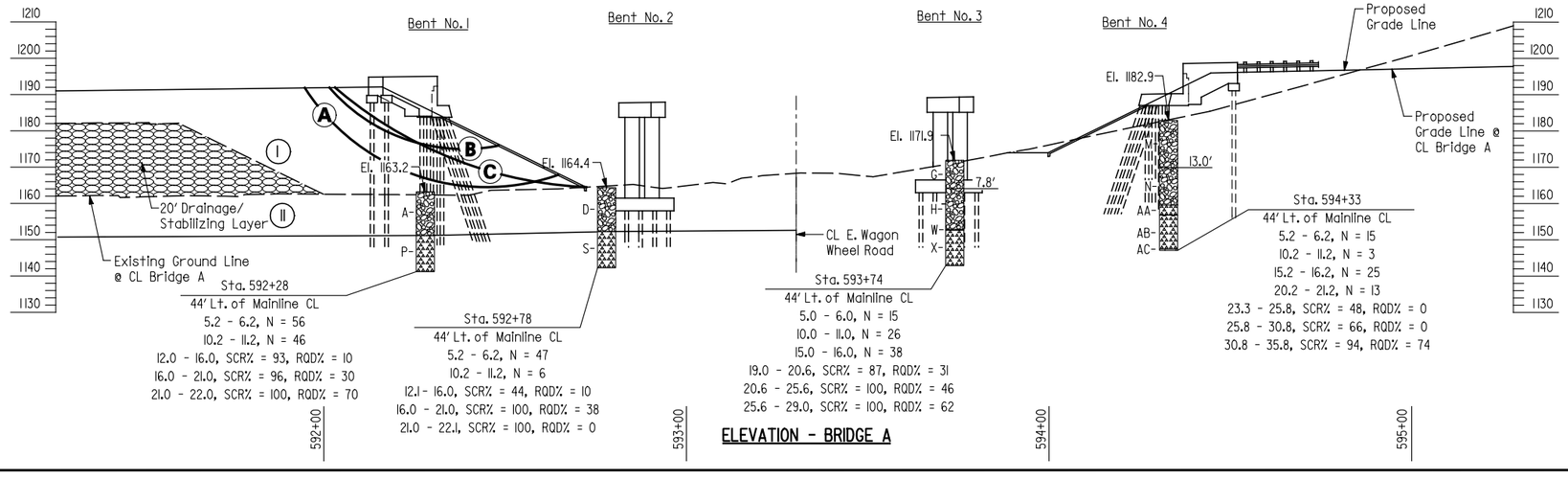
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		



PLAN

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.5
B	Long Term	1.5
C	Seismic	1.3



ELEVATION - BRIDGE A

Boring Legend

A - Brown, dense to very dense, clayey gravel with sand.
B - Red, very dense, clayey gravel with sand.
C - Red, very dense, silty gravel with sand.
D - Red, loose to dense, silty gravel with sand.
E - Red, very dense, clayey gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense, clayey gravel with sand.
H - Red, medium dense to dense, silty gravel with sand.
I - Red, medium loose, clayey gravel with sand.
J - Red, loose, clayey gravel with sand.
K - Red, dense, silty gravel with sand.
L - Red, very dense, silty gravel with sand.
M - Red, very loose to medium dense, clayey gravel with sand.
N - Red, medium dense, silty gravel with sand.
O - Light red, very dense, clayey gravel with sand.
P - Chert: White, lt. gray, gray, fresh to moderately weathered.
Q - Chert: White, lt. gray, gray, fresh to highly weathered.
R - Limestone: Lt. gray, gray, fine to medium grain.
S - Chert: White, lt. gray, gray, fresh to highly weathered.
T - Chert: White, lt. gray, gray, tan, fresh to weathered.
U - Limestone: Lt. gray, gray, fine to medium grain.
V - Chert: White, lt. gray, gray, tan, fresh to weathered.
W - Chert: Fragmented.
X - Chert: White, lt. gray, gray, tan, fresh to weathered.
Y - Limestone: Lt. gray, gray, fresh to moderately weathered.
Z - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AA - Chert: Lt. gray, gray, weathered.
AB - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AC - Limestone: Lt. gray, fresh, fine grain.
AD - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.

Note:
Stations And Elevations Shown Are Along CL Bridge

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 1 OF 2
LAYOUT OF BRIDGE A
US HIGHWAY 412 OVER
COUNTY ROAD 60 (E. WAGON WHEEL RD.)
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

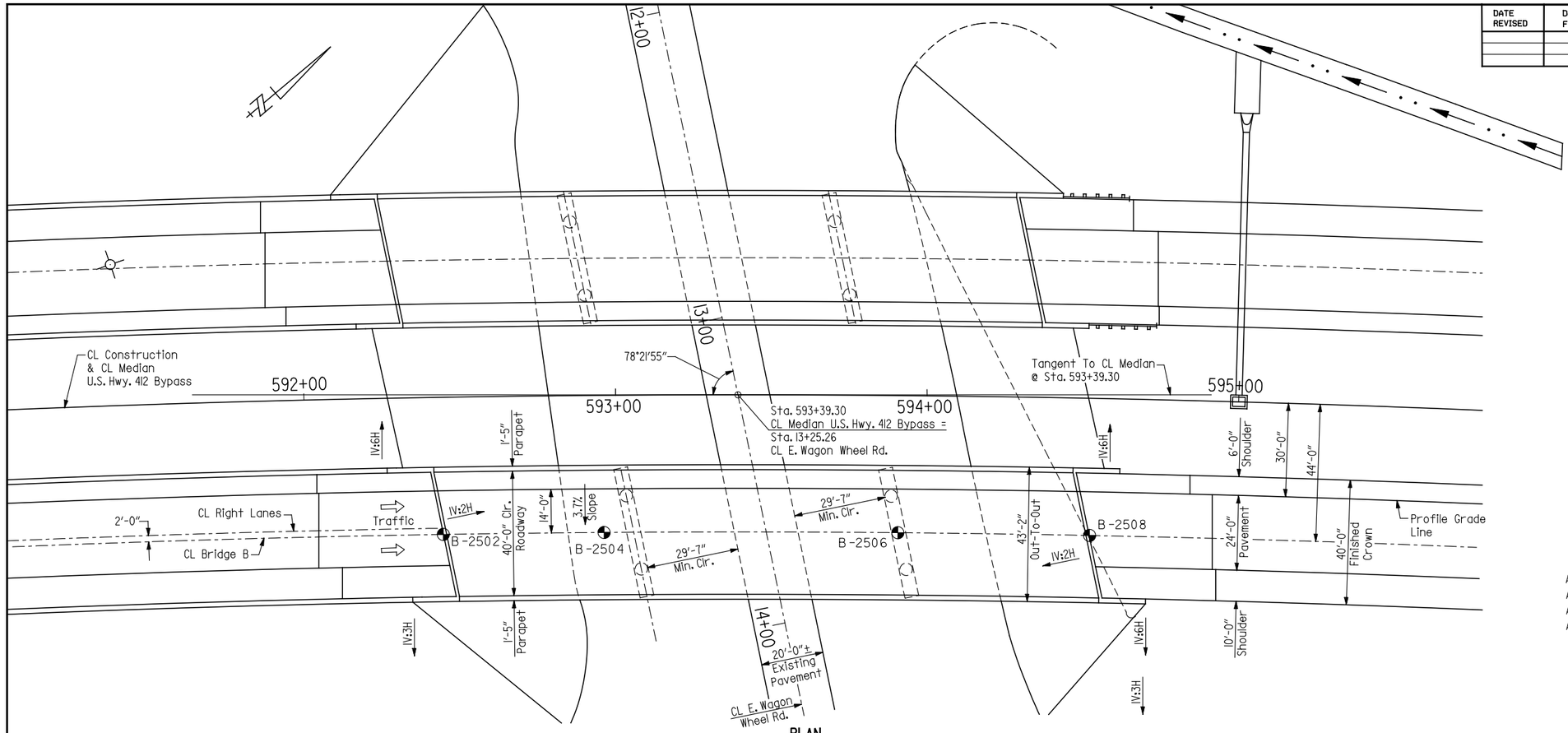
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. A DRAWING NO.

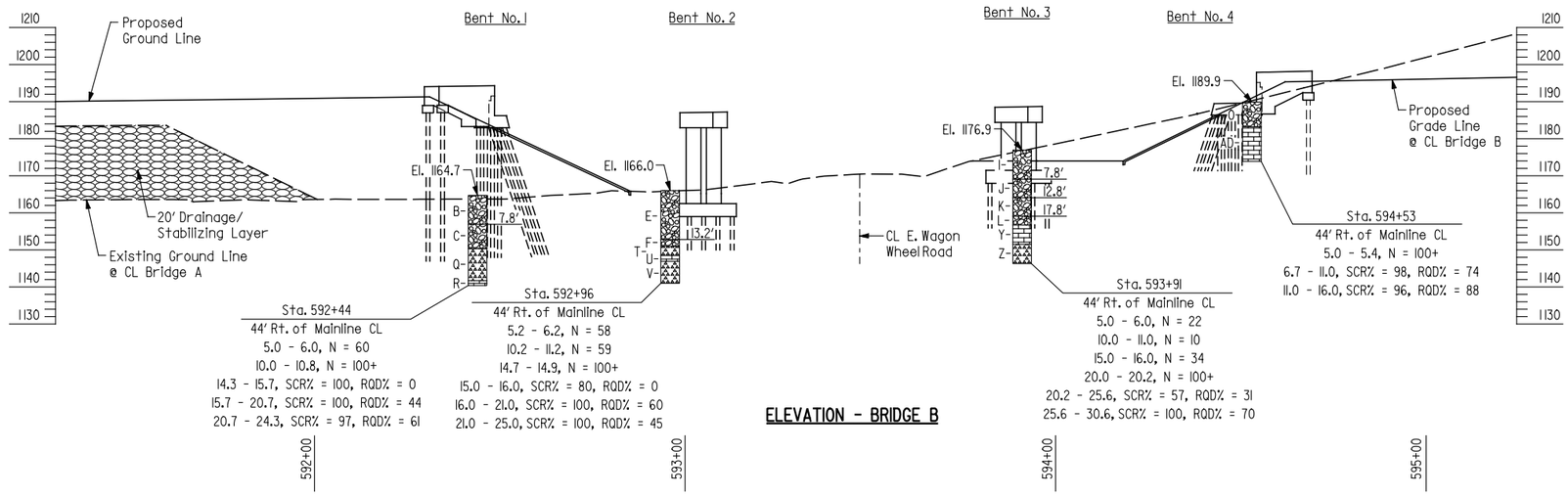
BRIDGE ENGINEER

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - BRIDGE B

Boring Legend

A - Brown, very dense, clayey gravel with sand.
B - Red, very dense, clayey gravel with sand.
C - Red, very dense, silty gravel with sand.
D - Red, loose to dense, silty gravel with sand.
E - Red, very dense, clayey gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense, clayey gravel with sand.
H - Red, medium dense to dense, silty gravel with sand.
I - Red, medium loose, clayey gravel with sand.
J - Red, loose, clayey gravel with sand.
K - Red, dense, silty gravel with sand.
L - Red, very dense, silty gravel with sand.
M - Red, very loose to medium dense, clayey gravel with sand.
N - Red, medium dense, silty gravel with sand.
O - Light red, very dense, clayey gravel with sand.
P - Chert: White, lt. gray, gray, fresh to moderately weathered.
Q - Chert: White, lt. gray, gray, fresh to highly weathered.
R - Limestone: Lt. gray, gray, fine to medium grain.
S - Chert: White, lt. gray, gray, fresh to highly weathered.
T - Chert: White, lt. gray, gray, tan, fresh to weathered.
U - Limestone: Lt. gray, gray, fine to medium grain.
V - Chert: White, lt. gray, gray, tan, fresh to weathered.
W - Chert: Fragmented.
X - Chert: White, lt. gray, gray, tan, fresh to weathered.
Y - Limestone: Lt. gray, gray, fresh to moderately weathered.
Z - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AA - Chert: Lt. gray, gray, weathered.
AB - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AC - Limestone: Lt. gray, fresh, fine grain.
AD - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.

Note:
Stations And Elevations Shown Are Along CL Bridge

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 2 OF 2
LAYOUT OF BRIDGE B
US HIGHWAY 412 OVER
COUNTY ROAD 60 (E. WAGON WHEEL RD.)
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE NO. B DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
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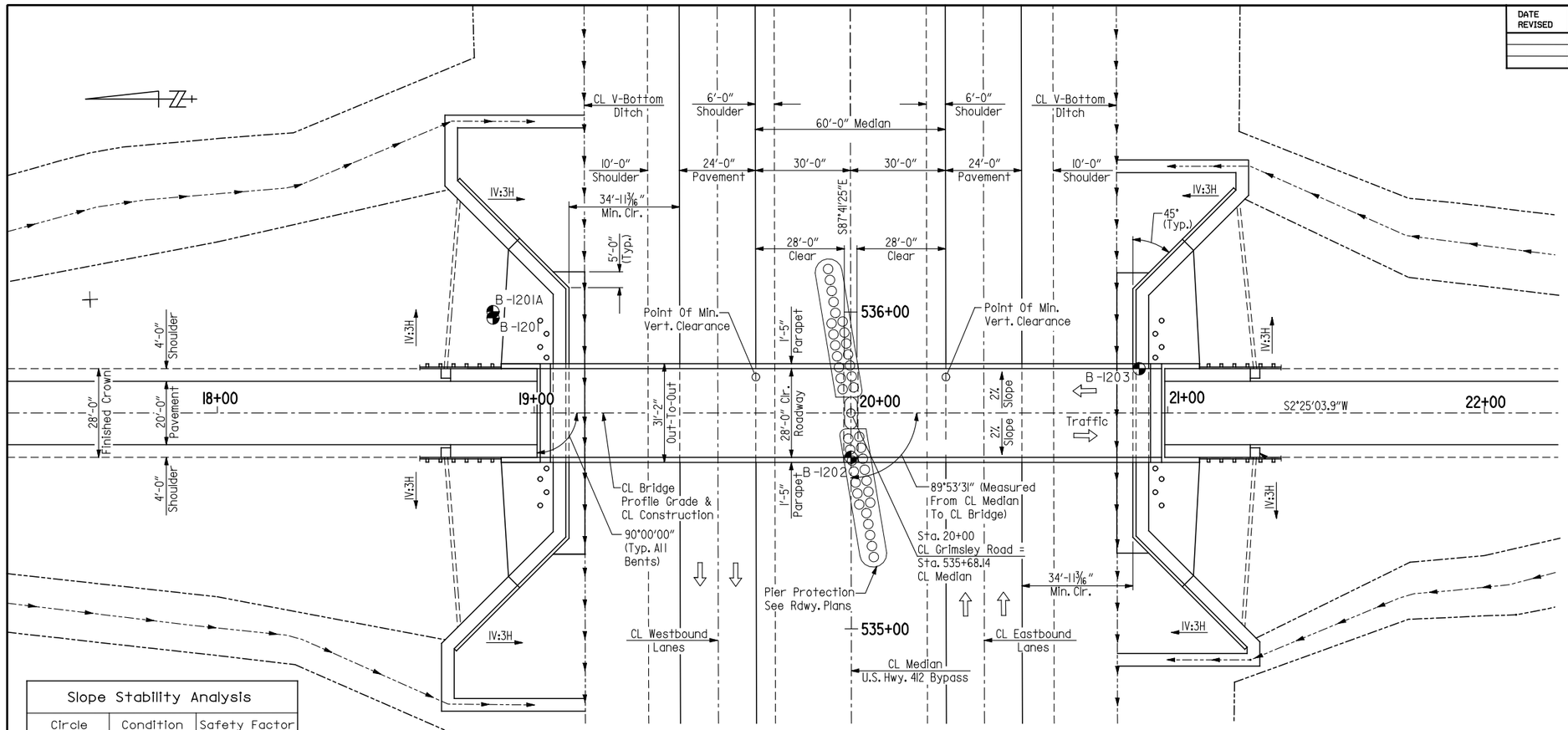


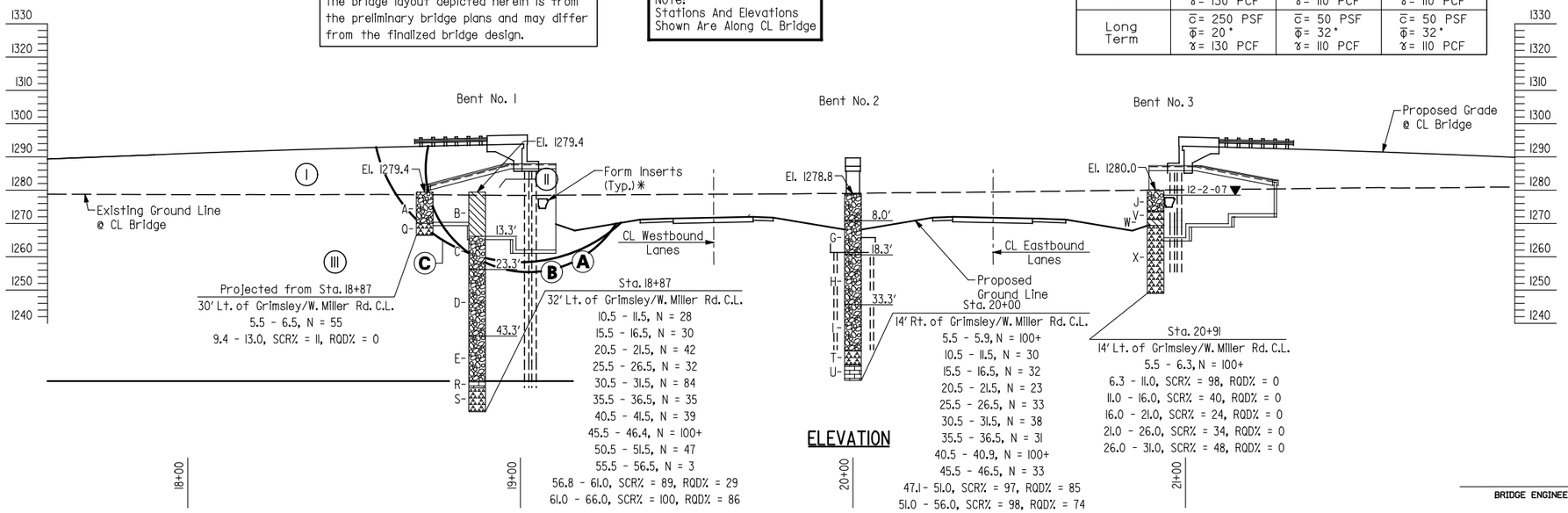
PLAN

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.6
B	Long Term	1.6
C	Seismic	1.5

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 32° γ = 110 PCF	c = 0 PSF Φ = 32° γ = 110 PCF
Long Term	c̄ = 250 PSF Φ̄ = 20° γ = 130 PCF	c̄ = 50 PSF Φ̄ = 32° γ = 110 PCF	c̄ = 50 PSF Φ̄ = 32° γ = 110 PCF



ELEVATION

Boring Legend

A - Tan, gray & yellowish orange, very dense clayey gravel.
B - Brown & white, very stiff fat clay with gravel.
C - Brown & tan, medium dense to dense clayey gravel with sand.
D - Tan, white, light gray, brown, black & beige, dense to very dense silty gravel with sand.
E - Gray, dark beige & light gray, very loose to very dense clayey gravel with sand.
F - Dark brown & dark gray, very dense clayey gravel.
G - Brown & light gray, medium dense to dense clayey gravel with sand.
H - Light brown, beige, brown & light tan, medium dense to dense silty gravel with sand.
I - Light beige, brown, light gray, tan, olive gray & gray, dense to very dense clayey gravel with sand.
J - Gray, dark tan & yellowish orange, very dense clayey gravel.
K - Brown & red, very dense, clayey gravel with sand.
L - Brown & red, very dense, clayey gravel with sand.
M - Red, dense to very dense, clayey gravel with sand.
N - Brown & red, very dense, clayey gravel with sand.
O - Red, dense to very dense, silty sand with gravel.
P - Red, clayey gravel with sand.
Q - Chert: White, lt. gray, weathered.
R - Limestone: Lt. gray, gray, fresh.
S - Chert: White, lt. gray, gray, fresh.
T - Chert: White, lt. gray, gray, fresh.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, intensely weathered.
W - Clay: Dark red, brown.
X - Chert: White, lt. gray, intensely weathered.
Y - Chert: White, lt. gray, gray, porous.
Z - Clay: Red, lt. brown, plastic.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 1 OF 3
LAYOUT OF BRIDGE
GRIMSLEY ROAD
OVER U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

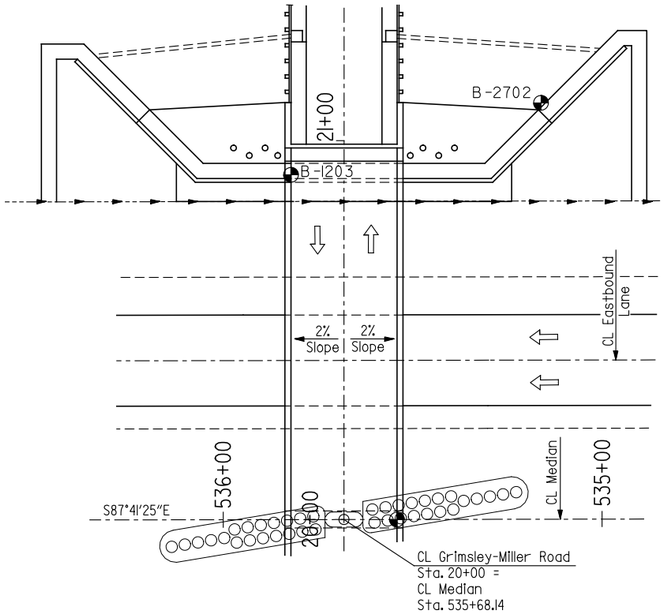
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

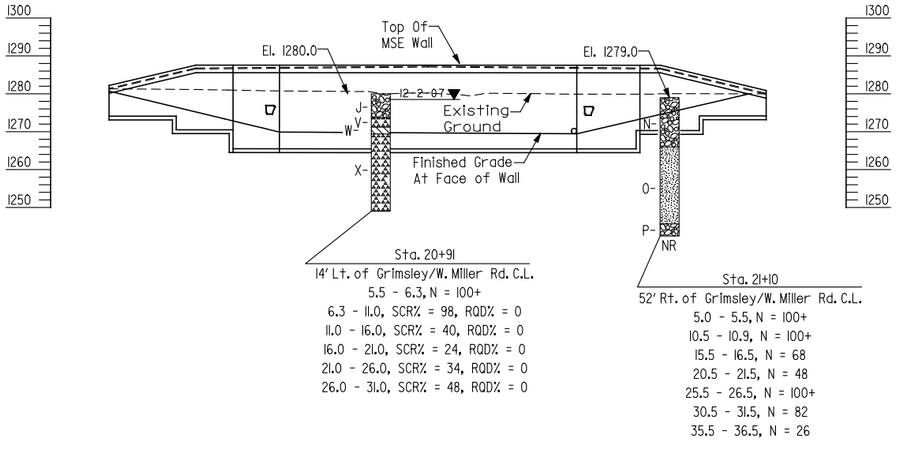
BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-South

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Tan, gray & yellowish orange, very dense clayey gravel.
B - Brown & white, very stiff fat clay with gravel.
C - Brown & tan, medium dense to dense clayey gravel with sand.
D - Tan, white, light gray, brown, black & beige, dense to very dense silty gravel with sand.
E - Gray, dark beige & light gray, very loose to very dense clayey gravel with sand.
F - Dark brown & dark gray, very dense clayey gravel.
G - Brown & light gray, medium dense to dense clayey gravel with sand.
H - Light brown, beige, brown & light tan, medium dense to dense silty gravel with sand.
I - Light beige, brown, light gray, tan, olive gray & gray, dense to very dense clayey gravel with sand.
J - Gray, dark tan & yellowish orange, very dense clayey gravel.
K - Brown & red, very dense, clayey gravel with sand.
L - Brown & red, very dense, clayey gravel with sand.
M - Red, dense to very dense, clayey gravel with sand.
N - Brown & red, very dense, clayey gravel with sand.
O - Red, dense to very dense, silty sand with gravel.
P - Red, clayey gravel with sand.
Q - Chert: White, lt. gray, weathered.
R - Limestone: Lt. gray, gray, fresh.
S - Chert: White, lt. gray, gray, fresh.
T - Chert: White, lt. gray, gray, fresh.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, intensely weathered.
W - Clay: Dark red, brown.
X - Chert: White, lt. gray, intensely weathered.
Y - Chert: White, lt. gray, gray, porous.
Z - Clay: Red, lt. brown, plastic.

SHEET 3 OF 3
DETAILS OF RETAINING WALL
GRIMSLEY ROAD
OVER U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
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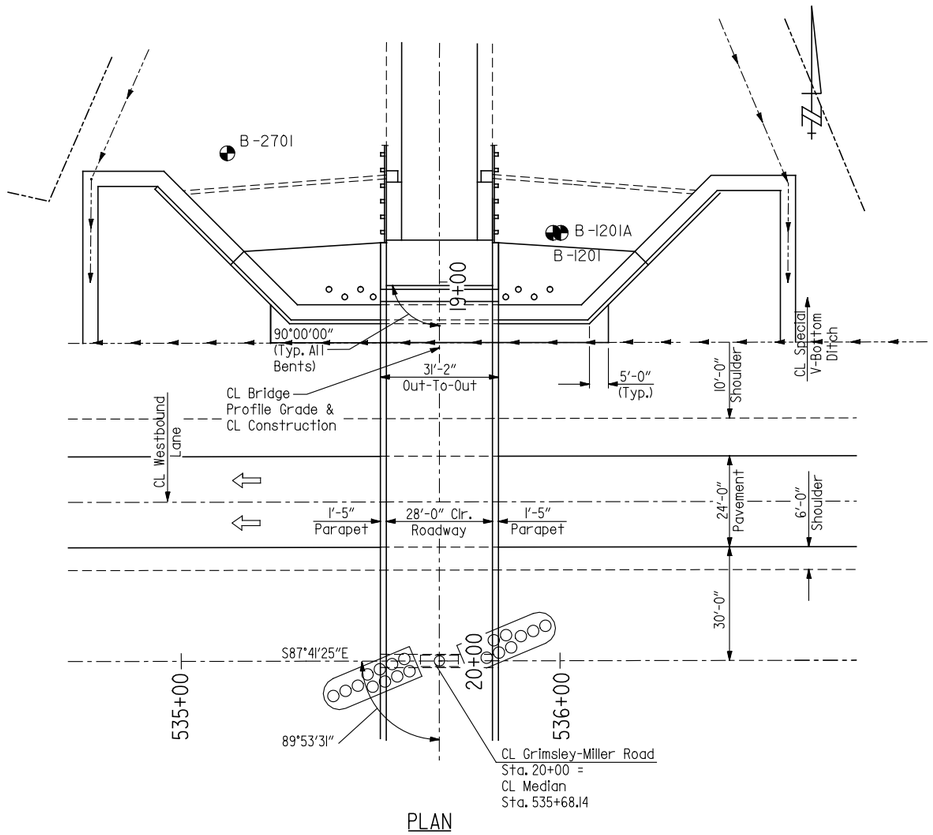
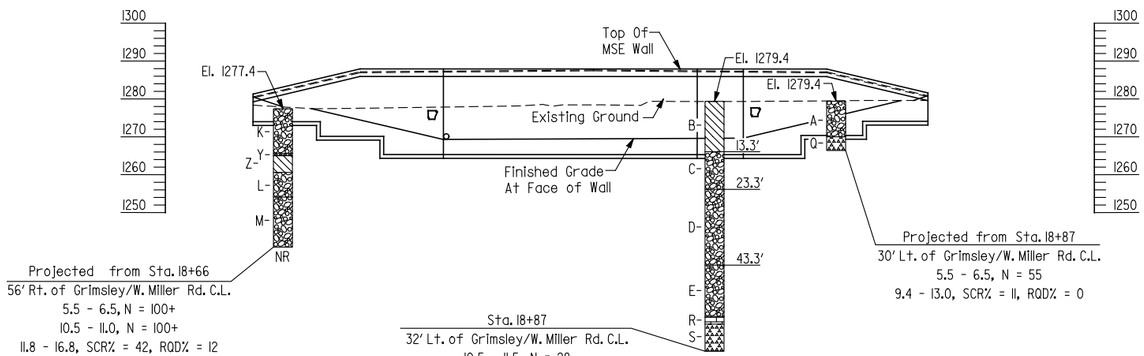
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-North

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Tan, gray & yellowish orange, very dense clayey gravel.
B - Brown & white, very stiff fat clay with gravel.
C - Brown & tan, medium dense to dense clayey gravel with sand.
D - Tan, white, light gray, brown, black & beige, dense to very dense silty gravel with sand.
E - Gray, dark beige & light gray, very loose to very dense clayey gravel with sand.
F - Dark brown & dark gray, very dense clayey gravel.
G - Brown & light gray, medium dense to dense clayey gravel with sand.
H - Light brown, beige, brown & light tan, medium dense to dense silty gravel with sand.
I - Light beige, brown, light gray, tan, olive gray & gray, dense to very dense clayey gravel with sand.
J - Gray, dark tan & yellowish orange, very dense clayey gravel.
K - Brown & red, very dense, clayey gravel with sand.
L - Brown & red, very dense, clayey gravel with sand.
M - Red, dense to very dense, clayey gravel with sand.
N - Brown & red, very dense, clayey gravel with sand.
O - Red, dense to very dense, silty sand with gravel.
P - Red, clayey gravel with sand.
Q - Chert: White, lt. gray, weathered.
R - Limestone: Lt. gray, gray, fresh.
S - Chert: White, lt. gray, gray, fresh.
T - Chert: White, lt. gray, gray, fresh.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, intensely weathered.
W - Clay: Dark red, brown.
X - Chert: White, lt. gray, intensely weathered.
Y - Chert: White, lt. gray, gray, porous.
Z - Clay: Red, lt. brown, plastic.

SHEET 2 OF 3
DETAILS OF MSE RETAINING WALL
GRIMSLEY ROAD
OVER U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
(PROJECT NUMBER ONE)
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

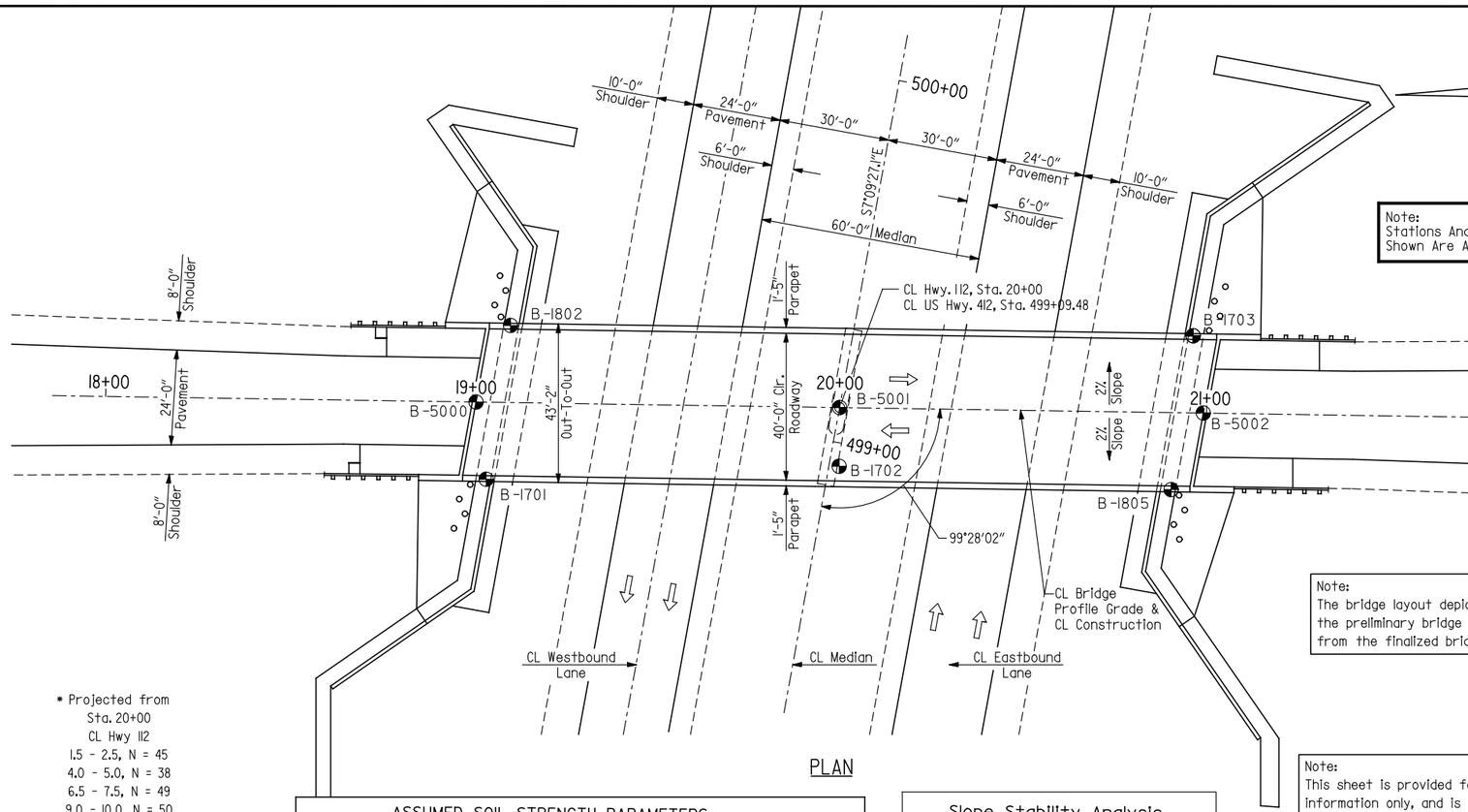
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		



PLAN

Note:
Stations And Elevations Shown Are Along CL Bridge

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

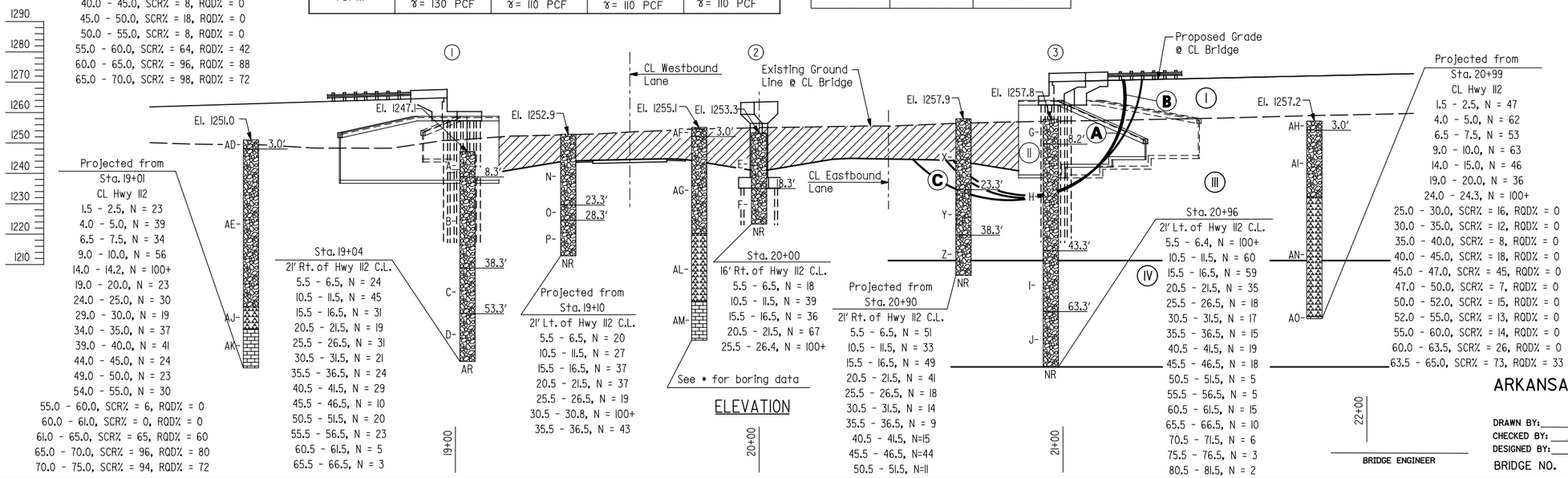
Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Boring Legend

A - Red, medium dense, silty gravel with sand.
B - Red, medium dense to dense, silty gravel with sand.
C - Brown, loose to medium dense, silty gravel with sand.
D - Brown, very loose to medium dense, silty gravel with sand.
E - Brown, medium dense to dense, silty gravel with sand.
F - Brown, very dense, silty gravel with sand.
G - Red, very dense, silty gravel with sand.
H - Brown, medium dense to very dense, silty gravel with sand.
I - Brown, loose to medium dense, silty gravel with sand.
J - Brown & gray, very loose to loose, silty gravel with sand.
K - Red, loose to very dense, silty gravel with sand.
L - Red, dense to very dense, silty gravel with sand.
M - Red, dense, silty gravel with sand.
N - Brown, medium dense to dense, silty gravel with sand.
O - Brown, medium dense, silty gravel with sand.
P - Brown & white, dense to very dense, silty gravel with sand.
Q - Brown, dense, silty gravel with sand.
R - Brown, dense to very dense, silty gravel with sand.
S - Brown, medium dense to dense, silty gravel with sand.
T - Red & brown, medium dense to dense, silty gravel with sand.
U - Brown, medium dense to very dense, silty gravel with sand.
V - Brown, medium dense, silty gravel with sand.
W - Brown, medium dense, silty gravel with sand.
X - Tan, reddish brown & white, dense to very dense, silty gravel with sand.
Y - Reddish tan, reddish brown, tan & beige, loose to medium dense, silty gravel with sand.
Z - Brown, medium dense to dense, silty gravel with sand.
AA - Red, medium dense to very dense, silty gravel with sand.
AB - Red, medium dense to dense, silty gravel with sand.
AC - White & tan, medium dense to very dense, silty gravel with sand.
AD - Orange & brown, medium dense, clayey gravel with sand.
AE - Orange & brown, medium dense to very dense, silty gravel with sand.
AF - Red, dense, clayey gravel with sand.
AG - Red, dense to very dense, silty gravel with sand.
AH - Red & brown, dense, clayey gravel with sand.
AI - Red & brown, dense to very dense, silty gravel with sand.
AJ - Chert Fragments: Light brown-white, lt. gray, red-orange-brown, sev. weathered, vugular.
AK - Limestone: Gray-lt. brown, white, fresh to sev. weathered.
AL - Chert: White, tan, lt. gray, red-orange, sev. weathered, vugular.
AM - Limestone: Light brown-gray, gray, white, fresh w/mod. sev. weathered intervals, stylolites.
AN - Chert Frags & Clay: White, lt. gray, lt. brown, red-orange, sev. weathered.
AO - Limestone: Gray, fresh, f. to cse. crystalline, fossiliferous, stylolites.

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 32° γ= 110 PCF	c= 0 PSF ϕ= 35° γ= 110 PCF	c= 0 PSF ϕ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 32° γ= 110 PCF	$\bar{c}$= 200 PSF $\bar{\phi}$= 35° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 28° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.8
B	Long Term	1.8
C	Seismic	1.6



ELEVATION

SHEET 1 OF 3
LAYOUT OF BRIDGE
HIGHWAY 112
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

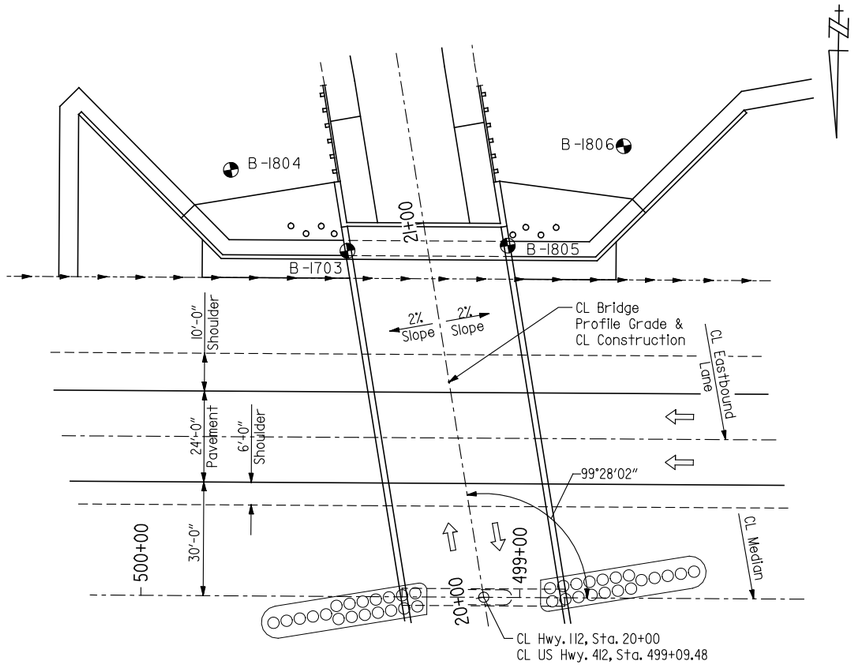
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

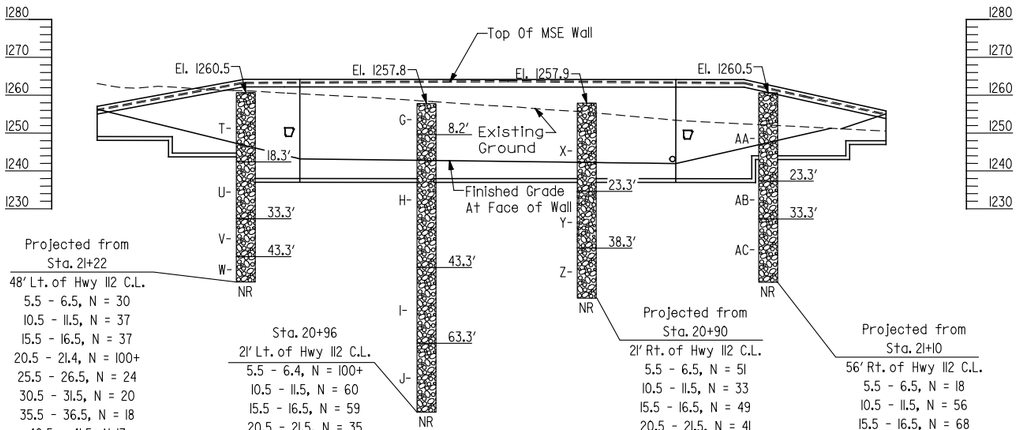
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-South

Note:
This sheet is provided for subsurface and soils information only, and is not intended for wall construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The retaining wall layout depicted herein is from the preliminary retaining wall plans and may differ from the finalized wall design.

Boring Legend

A - Red, medium dense, silty gravel with sand.
B - Red, medium dense to dense, silty gravel with sand.
C - Brown, loose to medium dense, silty gravel with sand.
D - Brown, very loose to medium dense, silty gravel with sand.
E - Brown, medium dense to dense, silty gravel with sand.
F - Brown, very dense, silty gravel with sand.
G - Red, very dense, silty gravel with sand.
H - Brown, medium dense to very dense, silty gravel with sand.
I - Brown, loose to medium dense, silty gravel with sand.
J - Brown & gray, very loose to loose, silty gravel with sand.
K - Red, loose to very dense, silty gravel with sand.
L - Red, dense to very dense, silty gravel with sand.
M - Red, dense, silty gravel with sand.
N - Brown, medium dense to dense, silty gravel with sand.
O - Brown, medium dense, silty gravel with sand.
P - Brown & white, dense to very dense, silty gravel with sand.
Q - Brown, dense, silty gravel with sand.
R - Brown, dense to very dense, silty gravel with sand.
S - Brown, medium dense to dense, silty gravel with sand.
T - Red & brown, medium dense to dense, silty gravel with sand.
U - Brown, medium dense to very dense, silty gravel with sand.
V - Brown, medium dense, silty gravel with sand.
W - Brown, medium dense, silty gravel with sand.
X - Tan, reddish brown & white, dense to very dense, silty gravel with sand.
Y - Reddish tan, reddish brown, tan & beige, loose to medium dense, silty gravel with sand.
Z - Brown, medium dense to dense, silty gravel with sand.
AA - Red, medium dense to very dense, silty gravel with sand.
AB - Red, medium dense to dense, silty gravel with sand.
AC - White & tan, medium dense to very dense, silty gravel with sand.

SHEET 3 OF 3
DETAILS OF MSE RETAINING WALL
HIGHWAY 112 OVER US HIGHWAY 412

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

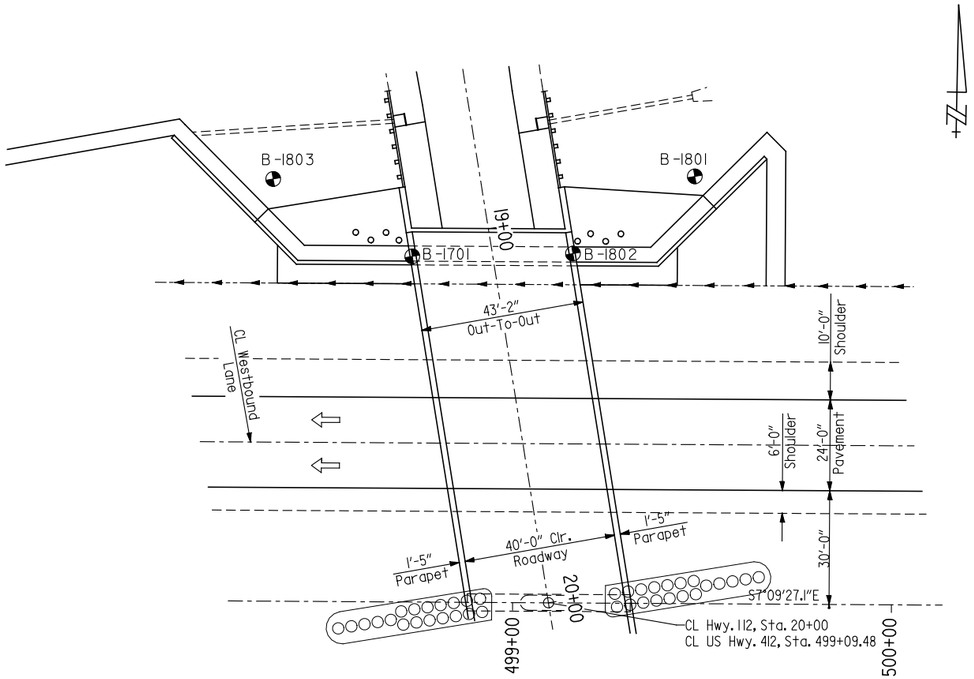
DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE ENGINEER

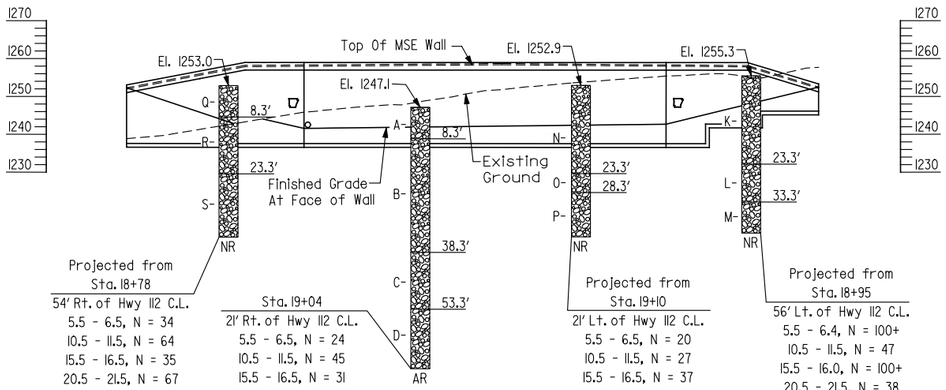
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-North

Note:
This sheet is provided for subsurface and soils information only, and is not intended for wall construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The retaining wall layout depicted herein is from the preliminary retaining wall plans and may differ from the finalized wall design.

Boring Legend

A - Red, medium dense, silty gravel with sand.
B - Red, medium dense to dense, silty gravel with sand.
C - Brown, loose to medium dense, silty gravel with sand.
D - Brown, very loose to medium dense, silty gravel with sand.
E - Brown, medium dense to dense, silty gravel with sand.
F - Brown, very dense, silty gravel with sand.
G - Red, very dense, silty gravel with sand.
H - Brown, medium dense to very dense, silty gravel with sand.
I - Brown, loose to medium dense, silty gravel with sand.
J - Brown & gray, very loose to loose, silty gravel with sand.
K - Red, loose to very dense, silty gravel with sand.
L - Red, dense to very dense, silty gravel with sand.
M - Red, dense, silty gravel with sand.
N - Brown, medium dense to dense, silty gravel with sand.
O - Brown, medium dense, silty gravel with sand.
P - Brown & white, dense to very dense, silty gravel with sand.
Q - Brown, dense, silty gravel with sand.
R - Brown, dense to very dense, silty gravel with sand.
S - Brown, medium dense to dense, silty gravel with sand.
T - Red & brown, medium dense to dense, silty gravel with sand.
U - Brown, medium dense to very dense, silty gravel with sand.
V - Brown, medium dense, silty gravel with sand.
W - Brown, medium dense, silty gravel with sand.
X - Tan, reddish brown & white, dense to very dense, silty gravel with sand.
Y - Reddish tan, reddish brown, tan & beige, loose to medium dense, silty gravel with sand.
Z - Brown, medium dense to dense, silty gravel with sand.
AA - Red, medium dense to very dense, silty gravel with sand.
AB - Red, medium dense to dense, silty gravel with sand.
AC - White & tan, medium dense to very dense, silty gravel with sand.

SHEET 2 OF 3
DETAILS OF MSE RETAINING WALL
HIGHWAY 112 OVER US HIGHWAY 412

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

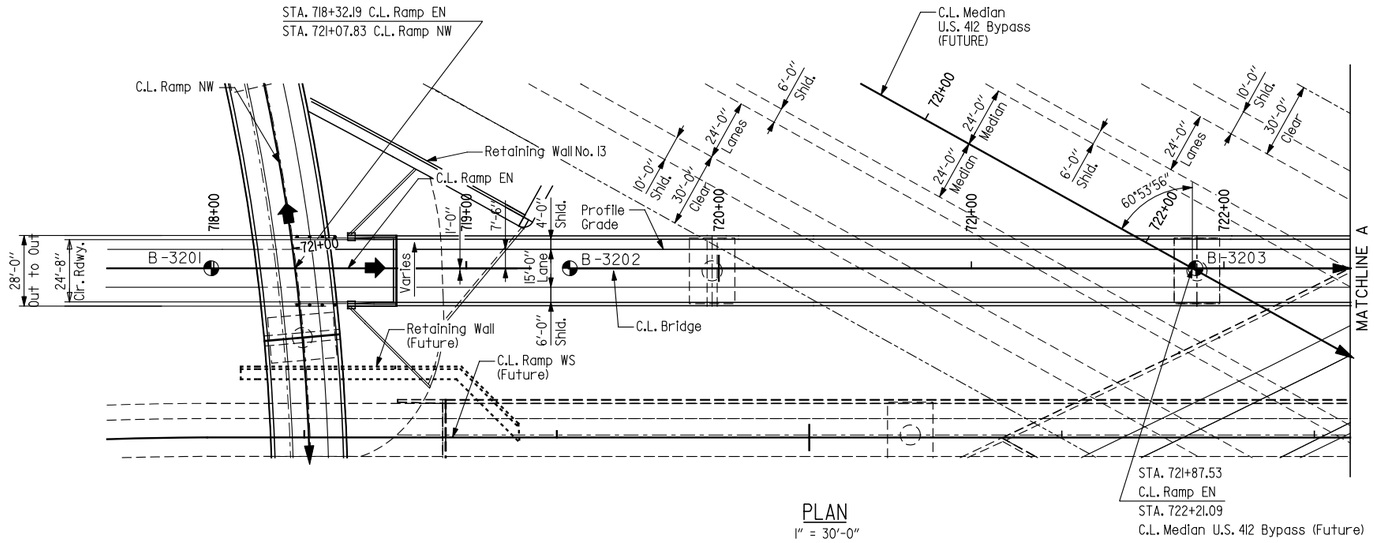
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

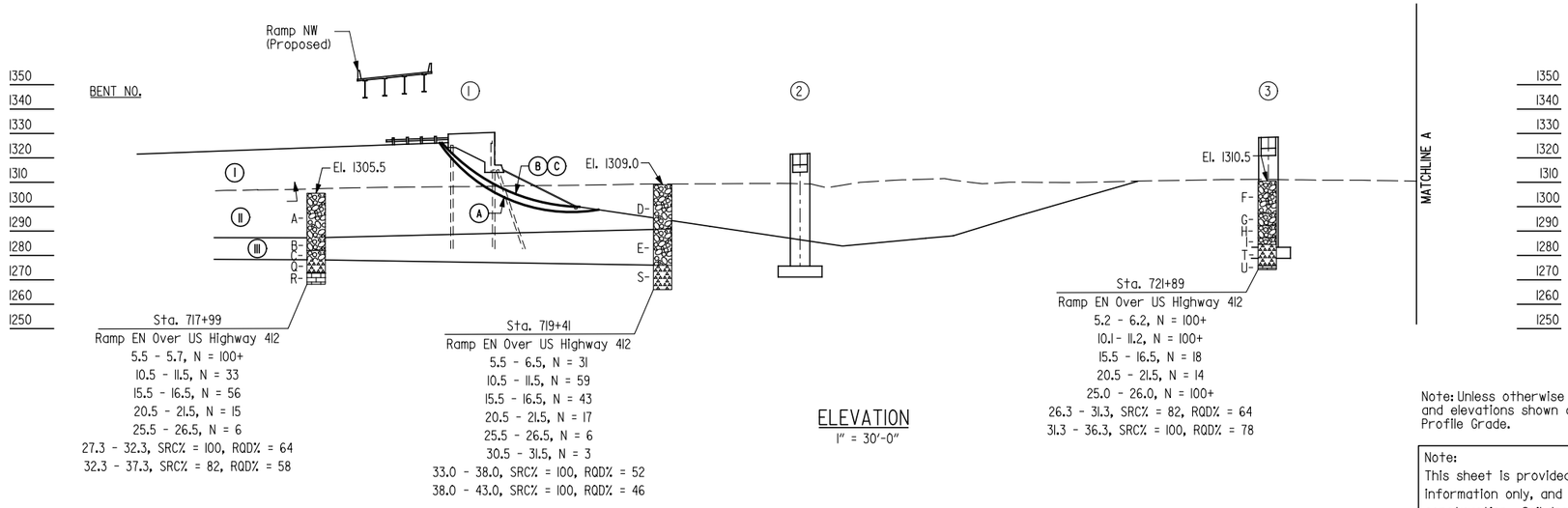
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN
1" = 30'-0"



ELEVATION
1" = 30'-0"

Boring Legend

A - Red, dense to very dense, silty gravel with sand.
B - Red, medium dense, clayey gravel with sand.
C - Red, loose, clayey gravel with sand.
D - Red, dense to very dense, silty gravel with sand.
E - Red, brown, lt. gray, very loose to medium dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense, clayey gravel with sand.
H - Red, medium dense, clayey gravel with sand.
I - Red. very dense, silty gravel with sand.
J - Red, lt. brown, loose to very dense, clayey gravel with sand.
K - Lt. brown, loose, silty gravel with sand.
L - Red, hard, sandy lean clay with gravel.
M - Red, very dense, clayey gravel with sand.
N - Red, medium dense, silty gravel with sand.
O - Red, very dense, silty gravel with sand.
P - Red, hard, sandy lean clay with gravel.
Q - Chert: White, lt. gray, gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fresh, fine to medium grain.
S - Chert: White, lt. gray, gray, fresh to slightly weathered.
T - Chert: White, lt. gray, gray, fresh to slightly weathered.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, gray, fresh to weathered.
W - Limestone: Lt. gray, gray, fresh.
X - Chert: White, lt. gray, gray, fresh, fine to medium grain.
Y - Chert: White, lt. gray, gray, fresh to weathered.
Z - Limestone: Lt. gray, gray, fresh.
AA - Chert: White, lt. gray, moderately to intensely weathered.
AB - Core loss.
AC - Chert: White, lt. gray, moderately to intensely weathered.
AD - Limestone: Lt. gray, gray, fresh to moderately weathered.
AE - Chert: White, lt. gray, moderately to intensely weathered.
AF - Chert: White, lt. gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to slightly weathered.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note: Unless otherwise noted, stations and elevations shown are taken along Profile Grade.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$ = 800 PSF $\bar{\phi}$ = 0° γ = 130 PCF	$\bar{c}$ = 0 PSF $\bar{\phi}$ = 32° γ = 110 PCF	$\bar{c}$ = 0 PSF $\bar{\phi}$ = 28° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 32° γ = 110 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 28° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	1.5
Seismic	C	1.3

717+00 718+00 719+00 720+00 721+00 722+00

BRIDGE ENGINEER

SHEET 1 OF 2
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP EN OVER U.S. 412 BYPASS
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

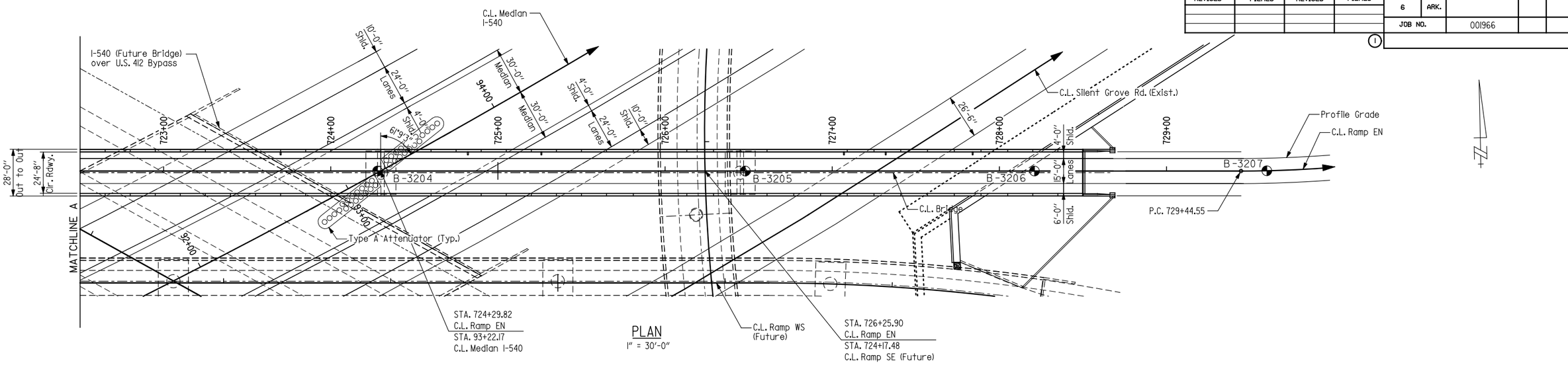
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1" = 30'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				



PLAN
1" = 30'-0"

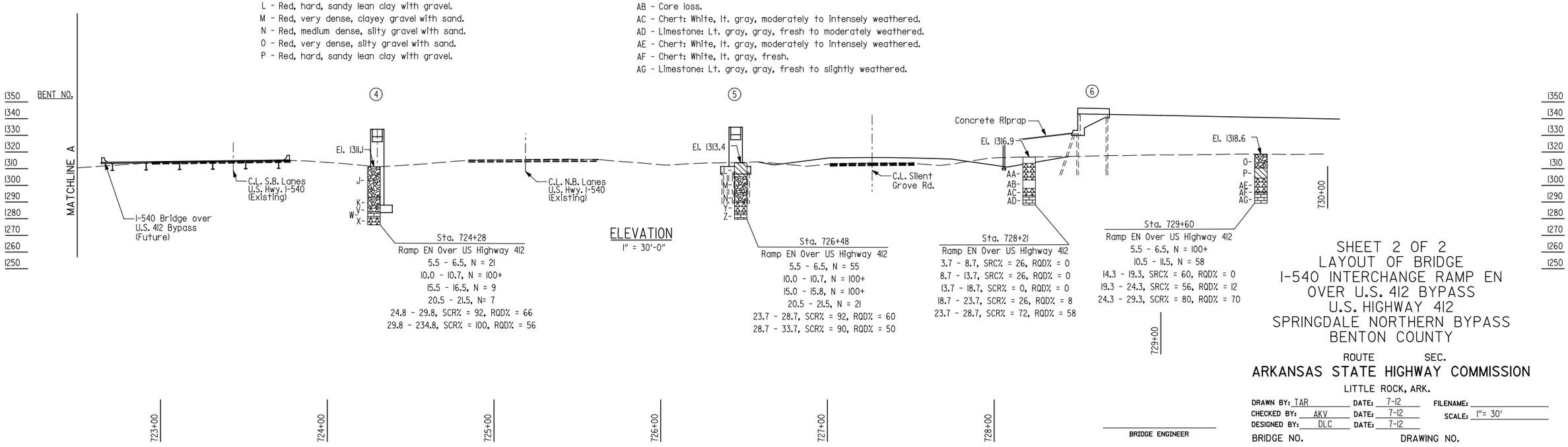
Boring Legend

A - Red, dense to very dense, silty gravel with sand.
B - Red, medium dense, clayey gravel with sand.
C - Red, loose, clayey gravel with sand.
D - Red, dense to very dense, silty gravel with sand.
E - Red, brown, lt. gray, very loose to medium dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense, clayey gravel with sand.
H - Red, medium dense, clayey gravel with sand.
I - Red. very dense, silty gravel with sand.
J - Red, lt. brown, loose to very dense, clayey gravel with sand.
K - Lt. brown, loose, silty gravel with sand.
L - Red, hard, sandy lean clay with gravel.
M - Red, very dense, clayey gravel with sand.
N - Red, medium dense, silty gravel with sand.
O - Red, very dense, silty gravel with sand.
P - Red, hard, sandy lean clay with gravel.
Q - Chert: White, lt. gray, gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fresh, fine to medium grain.
S - Chert: White, lt. gray, gray, fresh to slightly weathered.
T - Chert: White, lt. gray, gray, fresh to slightly weathered.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, gray, fresh to weathered.
W - Limestone: Lt. gray, gray, fresh.
X - Chert: White, lt. gray, gray, fresh, fine to medium grain.
Y - Chert: White, lt. gray, gray, fresh to weathered.
Z - Limestone: Lt. gray, gray, fresh.
AA - Chert: White, lt. gray, moderately to intensely weathered.
AB - Core loss.
AC - Chert: White, lt. gray, moderately to intensely weathered.
AD - Limestone: Lt. gray, gray, fresh to moderately weathered.
AE - Chert: White, lt. gray, moderately to intensely weathered.
AF - Chert: White, lt. gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to slightly weathered.

Note: Unless otherwise noted, stations and elevations shown are taken along Profile Grade.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.



ELEVATION
1" = 30'-0"

Sta. 724+28
Ramp EN Over US Highway 412
5.5 - 6.5, N = 21
10.0 - 10.7, N = 100+
15.5 - 16.5, N = 9
20.5 - 21.5, N= 7
24.8 - 29.8, SCR% = 92, RQD% = 66
29.8 - 234.8, SCR% = 100, RQD% = 56

Sta. 726+48
Ramp EN Over US Highway 412
5.5 - 6.5, N = 55
10.0 - 10.7, N = 100+
15.0 - 15.8, N = 100+
20.5 - 21.5, N = 21
23.7 - 28.7, SCR% = 92, RQD% = 60
28.7 - 33.7, SCR% = 90, RQD% = 50

Sta. 728+21
Ramp EN Over US Highway 412
3.7 - 8.7, SRC% = 26, RQD% = 0
8.7 - 13.7, SRC% = 26, RQD% = 0
13.7 - 18.7, SCR% = 0, RQD% = 0
18.7 - 23.7, SCR% = 26, RQD% = 8
23.7 - 28.7, SCR% = 72, RQD% = 58

Sta. 729+60
Ramp EN Over US Highway 412
5.5 - 6.5, N = 100+
10.5 - 11.5, N = 58
14.3 - 19.3, SRC% = 60, RQD% = 0
19.3 - 24.3, SRC% = 56, RQD% = 12
24.3 - 29.3, SCR% = 80, RQD% = 70

BRIDGE ENGINEER

SHEET 2 OF 2
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP EN OVER U.S. 412 BYPASS
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"= 30'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

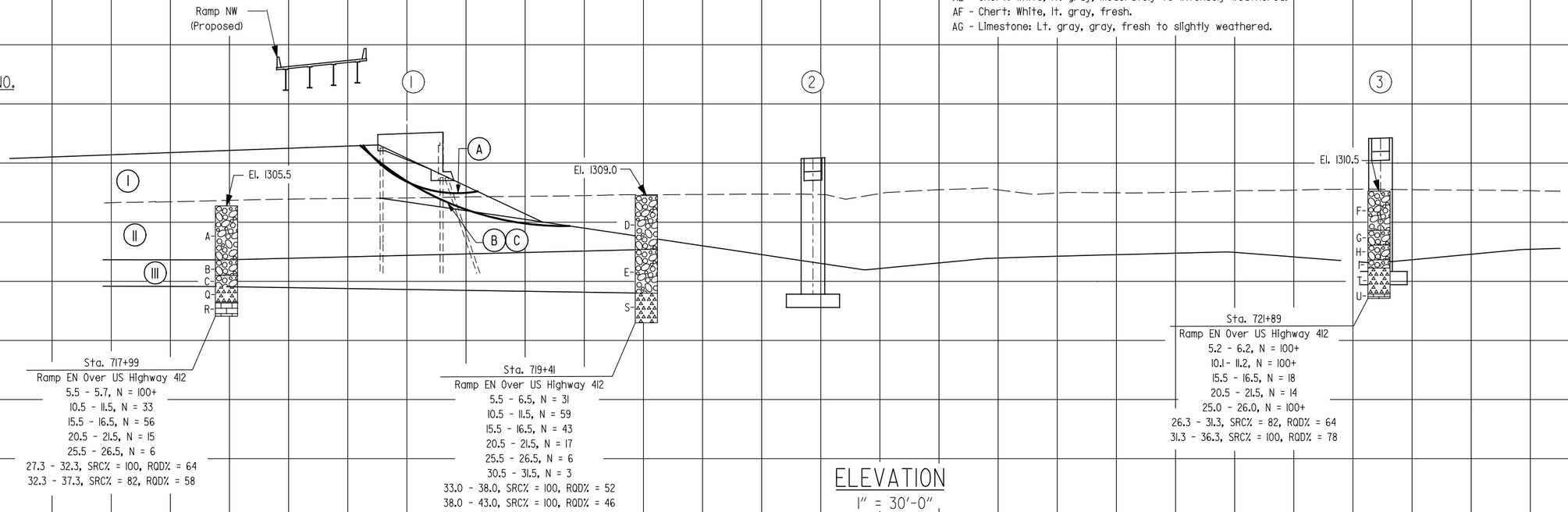
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$= 200 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF
Long Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.4
Seismic	C	1.2

Boring Legend

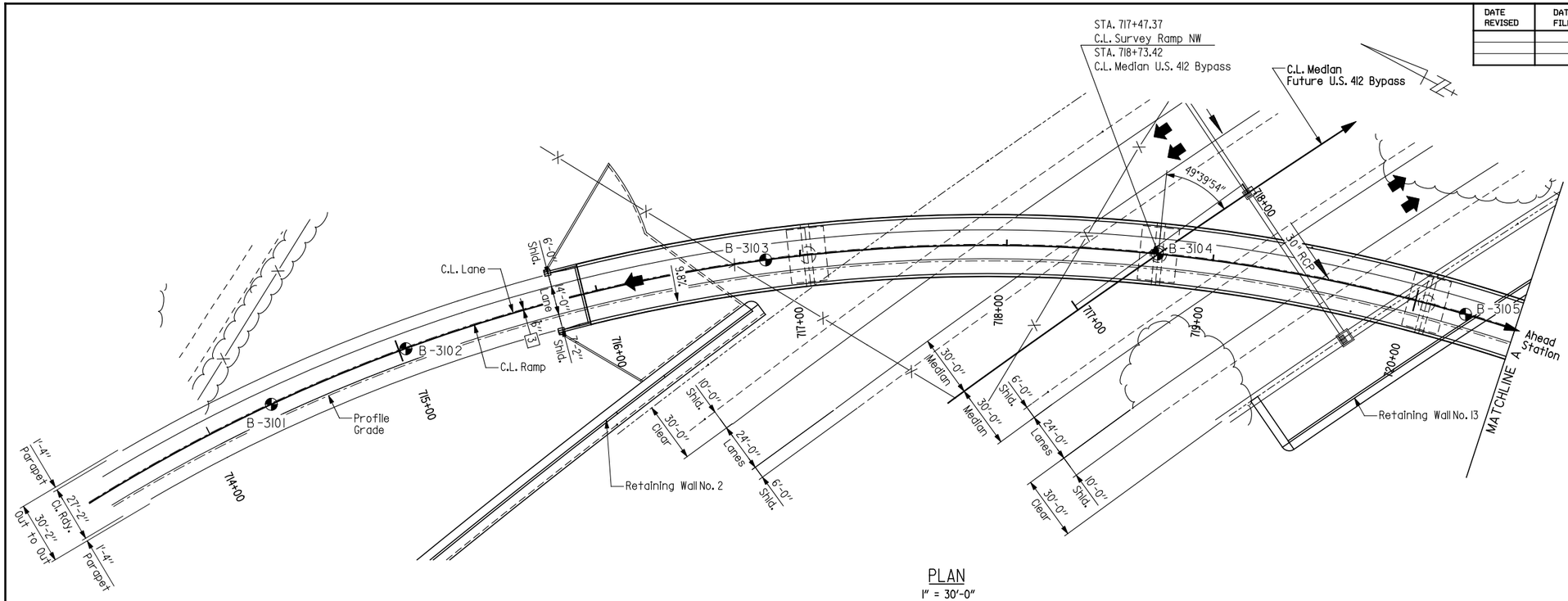
A - Red, dense to very dense, silty gravel with sand.
B - Red, medium dense, clayey gravel with sand.
C - Red, loose, clayey gravel with sand.
D - Red, dense to very dense, silty gravel with sand.
E - Red, brown, lt. gray, very loose to medium dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense, clayey gravel with sand.
H - Red, medium dense, clayey gravel with sand.
I - Red. very dense, silty gravel with sand.
J - Red, lt. brown, loose to very dense, clayey gravel with sand.
K - Lt. brown, loose, silty gravel with sand.
L - Red, hard, sandy lean clay with gravel.
M - Red, very dense, clayey gravel with sand.
N - Red, medium dense, silty gravel with sand.
O - Red, very dense, silty gravel with sand.
P - Red, hard, sandy lean clay with gravel.
Q - Chert: White, lt. gray, gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fresh, fine to medium grain.
S - Chert: White, lt. gray, gray, fresh to slightly weathered.
T - Chert: White, lt. gray, gray, fresh to slightly weathered.
U - Limestone: Lt. gray, gray, fresh.
V - Chert: White, lt. gray, gray, fresh to weathered.
W - Limestone: Lt. gray, gray, fresh.
X - Chert: White, lt. gray, gray, fresh, fine to medium grain.
Y - Chert: White, lt. gray, gray, fresh to weathered.
Z - Limestone: Lt. gray, gray, fresh.
AA - Chert: White, lt. gray, moderately to intensely weathered.
AB - Core loss.
AC - Chert: White, lt. gray, moderately to intensely weathered.
AD - Limestone: Lt. gray, gray, fresh to moderately weathered.
AE - Chert: White, lt. gray, moderately to intensely weathered.
AF - Chert: White, lt. gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to slightly weathered.



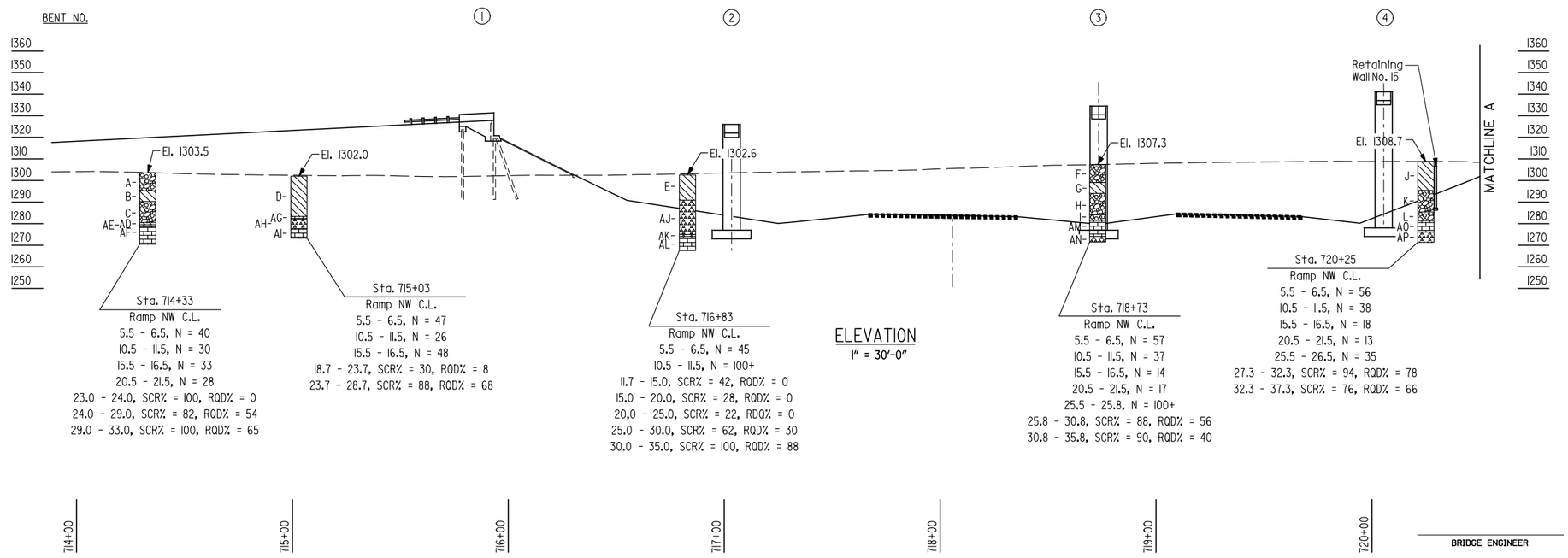
ELEVATION
1" = 30'-0"

RAMP EN OVER U.S. 412

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN
1" = 30'-0"



ELEVATION
1" = 30'-0"

BRIDGE ENGINEER

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note: All bents are radial to C.L. Ramp.

Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Ramp.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 1 OF 3
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP NW
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

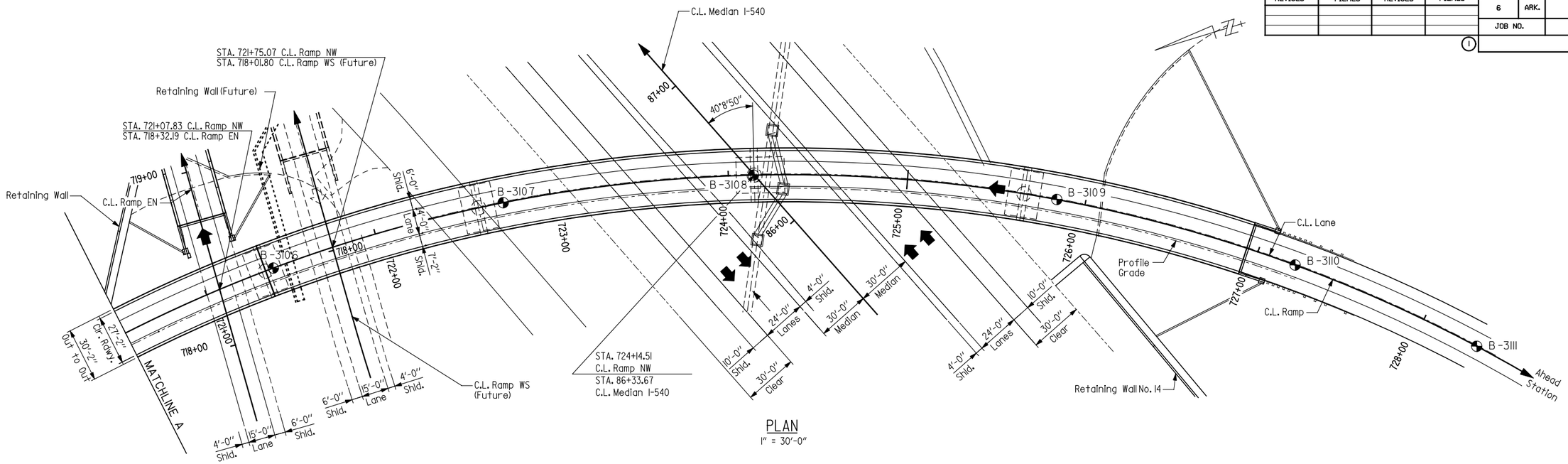
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1" = 30'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				1				



PLAN
1" = 30'-0"

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note: All bents are radial to C.L. Ramp.

Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Ramp.

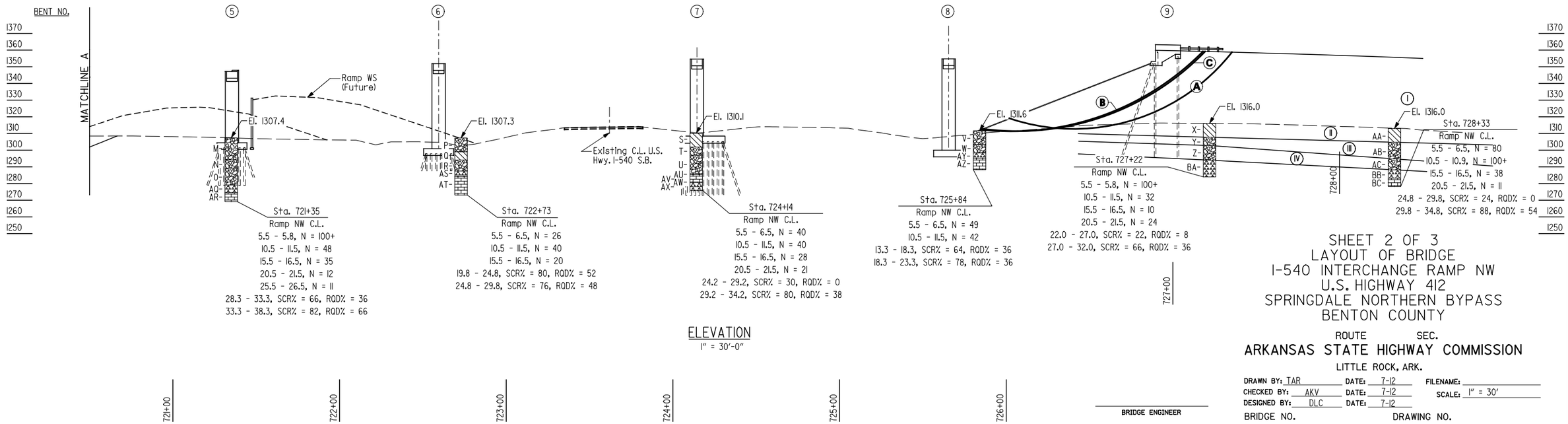
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

ASSUMED SOIL STRENGTH PARAMETERS

Soil	I	II	III	IV
Short Term	c= 1000 PSF Φ= 0° γ= 130 PCF	c= 2000 PSF Φ= 0° γ= 120 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 400 PSF $\bar{\Phi}$= 30° γ= 120 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF

Slope Stability Analysis

Circle	Condition	Safety Factor
A	Short Term	1.5
B	Long Term	1.5
C	Seismic	1.2



ELEVATION
1" = 30'-0"

SHEET 2 OF 3
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP NW
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1" = 30'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				(1)				

Boring Legend

A - Red, dense, clayey gravel with sand.
B - Red, very stiff, fat clay with sand.
C - Red, medium dense to dense, silty gravel with sand.
D - Red, very stiff to hard, fat clay with sand.
E - Red, hard to very hard, fat clay with sand.
F - Red, very dense, clayey gravel with sand.
G - Red, hard, fat clay with sand.
H - Red, red & brown, medium dense, silty gravel with sand.
I - Red, very dense, clayey gravel with sand.
J - Red, hard, fat clay with sand.
K - Red, red & brown, medium dense, silty gravel with sand.
L - Red, dense, silty gravel with sand.
M - Red, dense to very dense, clayey gravel with sand.
N - Red, dense, silty gravel with sand.
O - Red & brown, red, medium dense, silty gravel with sand.
P - Brown, medium dense, clayey gravel with sand.
Q - Brown, hard, fat clay with sand.
R - Brown, medium dense, silty gravel with sand.
S - Red, hard, fat clay with sand.
T - Red, dense, silty gravel with sand.
U - Red, medium dense, clayey gravel with sand.
V - Red, dense, clayey gravel with sand.
W - Brown, dense, silty gravel with sand.
X - Red, very hard, fat clay with sand.
Y - Red, dense, silty gravel with sand.
Z - Red, loose to medium dense, clayey gravel with sand.
AA - Red, very hard, fat clay with sand.
AB - Red, very dense, silty gravel with sand.
AC - Red, medium dense, clayey gravel with sand.
AD - Limestone: Lt. gray, slightly weathered.
AE - Clay: Red, brown, with sand and gravel.
AF - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AG - Limestone: White, lt. gray, gray, medium grain, fresh with weathering.
AH - Core loss.
AI - Limestone: White, lt. gray, gray, medium grain, fresh with weathering.
AJ - Chert: White, lt. gray, gray, tan, highly weathered.
AK - Chert: White, lt. gray, gray, tan, slightly to moderately weathered.
AL - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AM - Limestone: White, lt. gray, gray, fine to medium grain, fresh to slightly weathered.
AN - Chert: White, lt. gray, intermittent limestone.
AO - Limestone: White, lt, gray, gray, fine to medium grain, fresh.
AP - Chert: White, lt. gray, gray, fresh.
AQ - Chert: White, lt. gray, gray, fresh to slightly weathered.
AR - Limestone: Gray, fresh.
AS - Chert: White, lt. gray, gray, fresh to moderately weathered.
AT - Limestone: Gray, fresh to weathered.
AU - Clay: Brown, moist.
AV - Limestone: Gray, pebbly, weathered.
AW - Clay: Lt. brown, tan, moist.
AX - Chert: White, lt. gray, gray, tan, fresh to moderately weathered.
AY - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AZ - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
BA - Chert: White, lt, gray, gray, tan, fresh to highly weathered.
BB - Chert: White, lt. gray, gray, tan, weathered.
BC - Limestone: White, lt. gray, gray, fresh to weathered.

BRIDGE ENGINEER

SHEET 3 OF 3
BORING LEGEND
I-540 INTERCHANGE RAMP NW
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE:
DESIGNED BY: DLC DATE: 7-12

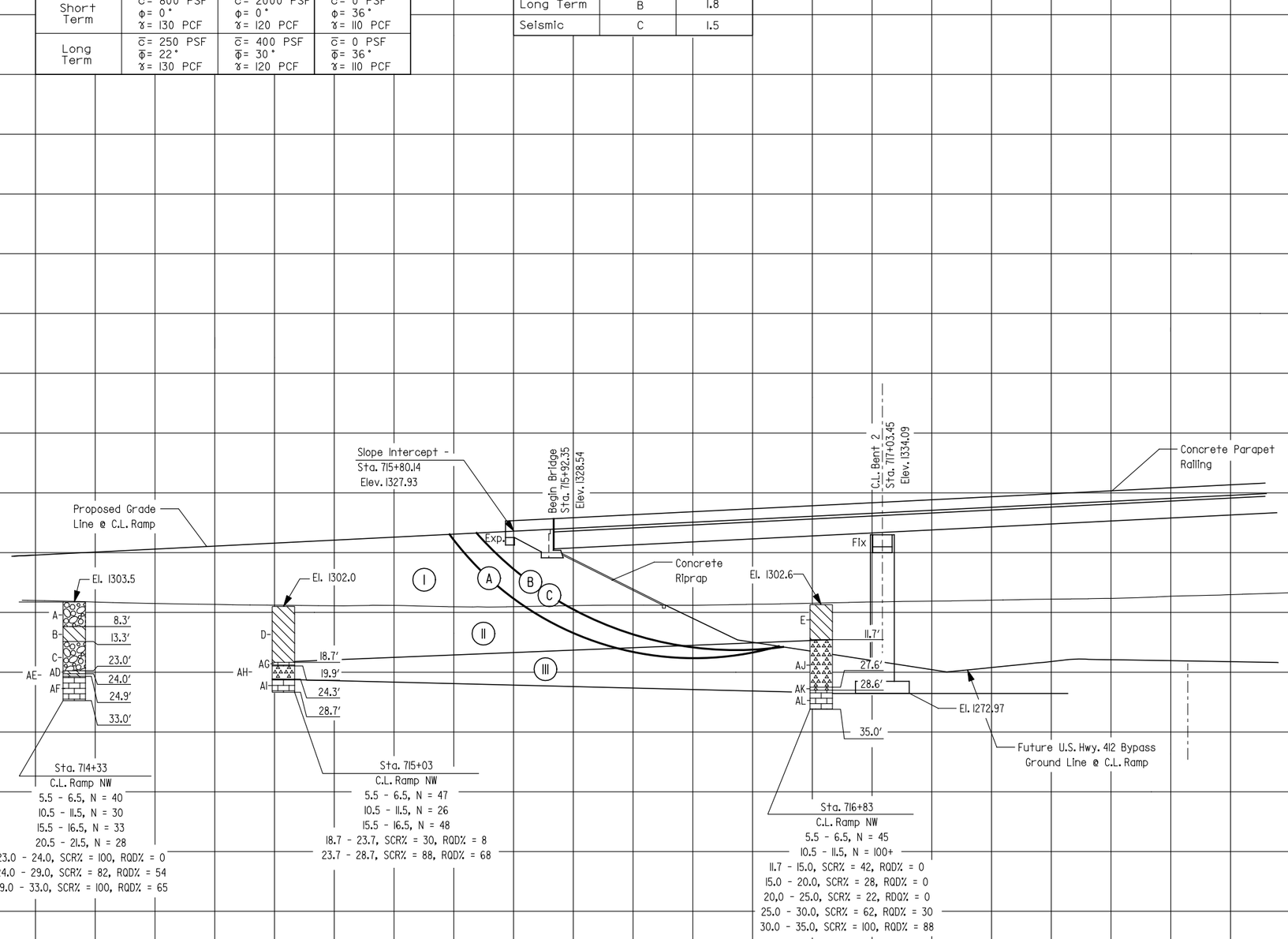
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 2000 PSF ϕ= 0° γ= 120 PCF	c= 0 PSF ϕ= 36° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 22° γ= 130 PCF	$\bar{c}$= 400 PSF $\bar{\phi}$= 30° γ= 120 PCF	$\bar{c}$= 0 PSF $\bar{\phi}$= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.8
Seismic	C	1.5



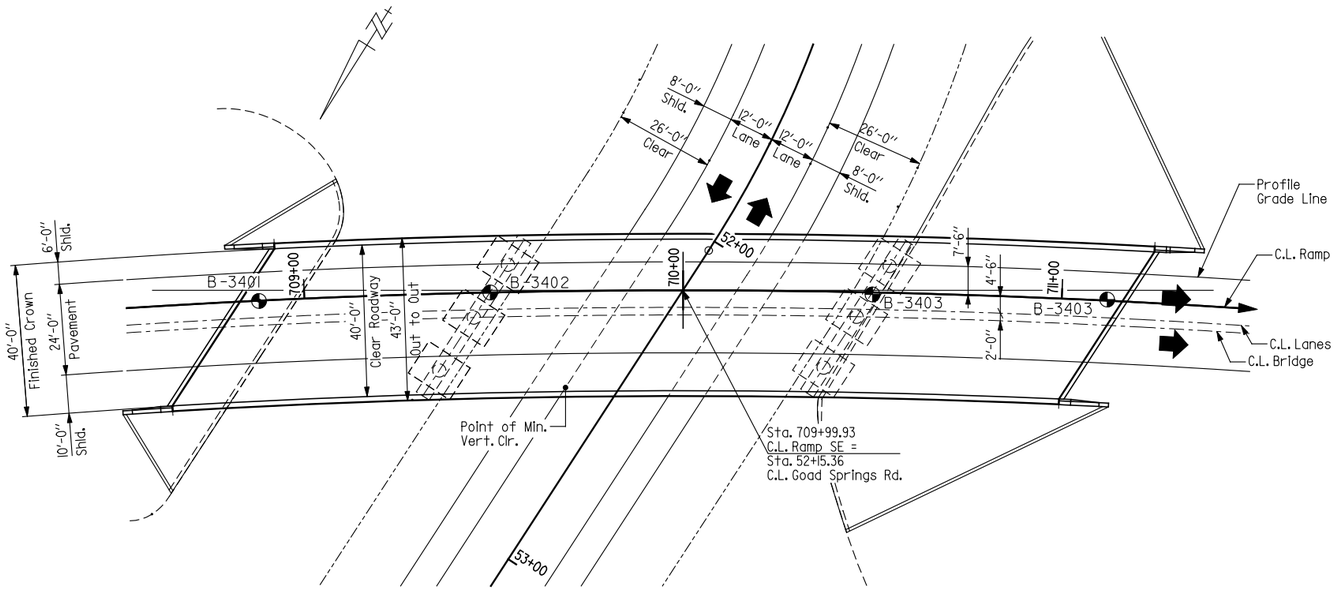
ELEVATION

RAMP NW - BENT I

Boring Legend

A - Red, dense, clayey gravel with sand.
B - Red, very stiff, fat clay with sand.
C - Red, medium dense to dense, silty gravel with sand.
D - Red, very stiff to hard, fat clay with sand.
E - Red, hard to very hard, fat clay with sand.
F - Red, very dense, clayey gravel with sand.
G - Red, hard, fat clay with sand.
H - Red, red & brown, medium dense, silty gravel with sand.
I - Red, very dense, clayey gravel with sand.
J - Red, hard, fat clay with sand.
K - Red, red & brown, medium dense, silty gravel with sand.
L - Red, dense, silty gravel with sand.
M - Red, dense to very dense, clayey gravel with sand.
N - Red, dense, silty gravel with sand.
O - Red & brown, red, medium dense, silty gravel with sand.
P - Brown, medium dense, clayey gravel with sand.
Q - Brown, hard, fat clay with sand.
R - Brown, medium dense, silty gravel with sand.
S - Red, hard, fat clay with sand.
T - Red, dense, silty gravel with sand.
U - Red, medium dense, clayey gravel with sand.
V - Red, dense, clayey gravel with sand.
W - Brown, dense, silty gravel with sand.
X - Red, very hard, fat clay with sand.
Y - Red, dense, silty gravel with sand.
Z - Red, loose to medium dense, clayey gravel with sand.
AA - Red, very hard, fat clay with sand.
AB - Red, very dense, silty gravel with sand.
AC - Red, medium dense, clayey gravel with sand.
AD - Limestone: Lt. gray, slightly weathered.
AE - Clay: Red, brown, with sand and gravel.
AF - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AG - Limestone: White, lt. gray, gray, medium grain, fresh with weathering.
AH - Core loss.
AI - Limestone: White, lt. gray, gray, medium grain, fresh with weathering.
AJ - Chert: White, lt. gray, gray, tan, highly weathered.
AK - Chert: White, lt. gray, gray, tan, slightly to moderately weathered.
AL - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
AM - Limestone: White, lt. gray, gray, fine to medium grain, fresh to slightly weathered.
AN - Chert: White, lt. gray, intermittent limestone.
AO - Limestone: White, lt, gray, gray, fine to medium grain, fresh.
AP - Chert: White, lt. gray, gray, fresh.
AQ - Chert: White, lt. gray, gray, fresh to slightly weathered.
AR - Limestone: Gray, fresh.
AS - Chert: White, lt. gray, gray, fresh to moderately weathered.
AT - Limestone: Gray, fresh to weathered.
AU - Clay: Brown, moist.
AV - Limestone: Gray, pebbly, weathered.
AW - Clay: Lt. brown, tan, moist.
AX - Chert: White, lt. gray, gray, tan, fresh to moderately weathered.
AY - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
AZ - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
BA - Chert: White, lt. gray, gray, tan, fresh to highly weathered.
BB - Chert: White, lt. gray, gray, tan, weathered.
BC - Limestone: White, lt. gray, gray, fresh to weathered.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN
1" = 20'-0"

Note: All bents are parallel.

Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Ramp.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

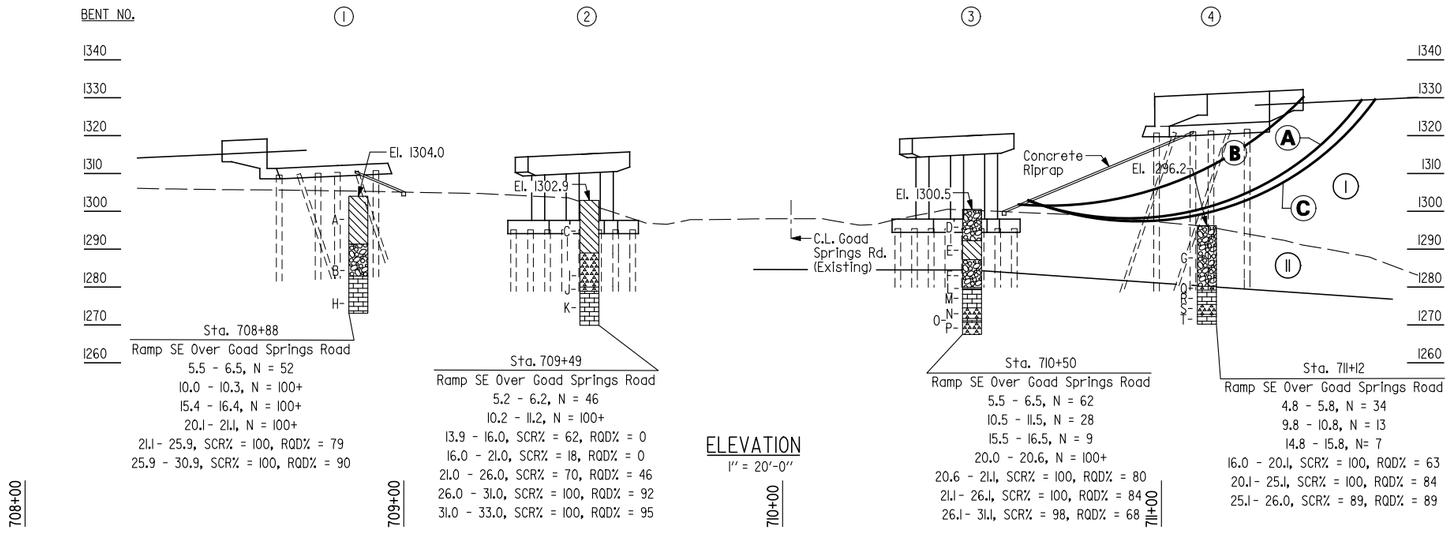
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Red, hard to very hard, fat clay with sand.
B - Red, very dense, silty gravel with sand.
C - Red, hard to very hard, fat clay with sand.
D - Red, very dense, silty gravel with sand.
E - Red, very stiff, fat clay with sand,
F - Red, loose to very dense, silty gravel with sand.
G - Red, loose to dense, silty gravel with sand.
H - Limestone: Lt. gray, gray, fresh, fine to medium grain.
I - Chert: White, lt. gray, moderate to intense weathering.
J - Chert: White, lt. gray, fresh to slightly weathered.
K - Limestone: Lt. gray, gray, medium to fine grain, fresh.
L - Chert: White, lt. gray, fresh to slightly weathered.
M - Limestone: Lt. gray, gray, fine to medium grain, fresh.
N - Chert: White, lt. gray, fresh, fine to medium grain.
O - Limestone: Lt. gray, gray, fine to medium grain.
P - Chert: White, lt. gray, fresh.
Q - Chert: White, lt. gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fine to medium grain, fresh.
S - Chert: White, lt. gray, fresh, fine to medium grain.
T - Limestone: White, lt. gray, gray, fine to medium grain, fresh.

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.5
B	Long Term	1.5
C	Seismic	1.2



ELEVATION
1" = 20'-0"

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 1 OF 1
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP SE
OVER GOAD SPRINGS ROAD
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

BRIDGE ENGINEER

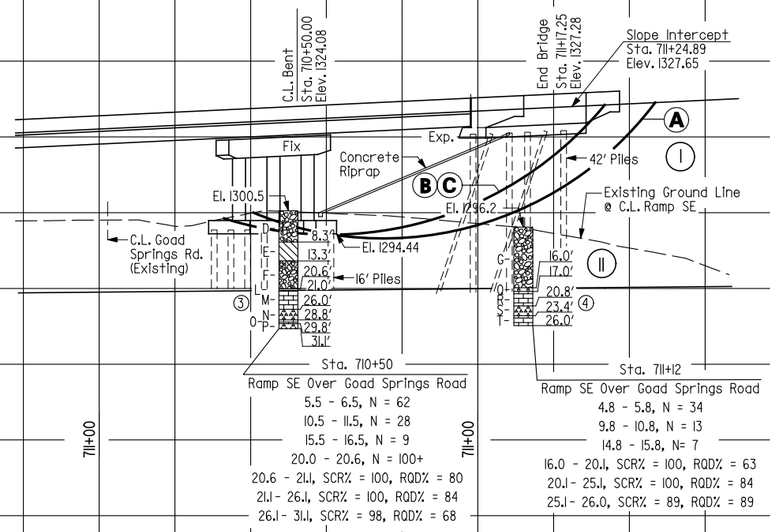
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c = 800 PSF ϕ = 0° γ = 130 PCF	c = 0 PSF ϕ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 30° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.3
Long Term	B	1.4
Seismic	C	1.1

Boring Legend

A - Red, hard to very hard, fat clay with sand.
B - Red, very dense, silty gravel with sand.
C - Red, hard to very hard, fat clay with sand.
D - Red, very dense, silty gravel with sand.
E - Red, very stiff, fat clay with sand,
F - Red, loose to very dense, silty gravel with sand.
G - Red, loose to dense, silty gravel with sand.
H - Limestone: Lt. gray, gray, fresh, fine to medium grain.
I - Chert: White, lt. gray, moderate to intense weathering.
J - Chert: White, lt. gray, fresh to slightly weathered.
K - Limestone: Lt. gray, gray, medium to fine grain, fresh.
L - Chert: White, lt. gray, fresh to slightly weathered.
M - Limestone: Lt. gray, gray, fine to medium grain, fresh.
N - Chert: White, lt. gray, fresh, fine to medium grain.
O - Limestone: Lt. gray, gray, fine to medium grain.
P - Chert: White, lt. gray, fresh.
Q - Chert: White, lt. gray, fresh to slightly weathered.
R - Limestone: Lt. gray, gray, fine to medium grain, fresh.
S - Chert: White, lt. gray, fresh, fine to medium grain.
T - Limestone: White, lt. gray, gray, fine to medium grain, fresh.



RAMP SE OVER GOAD SPRINGS ROAD - BENT 4

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		

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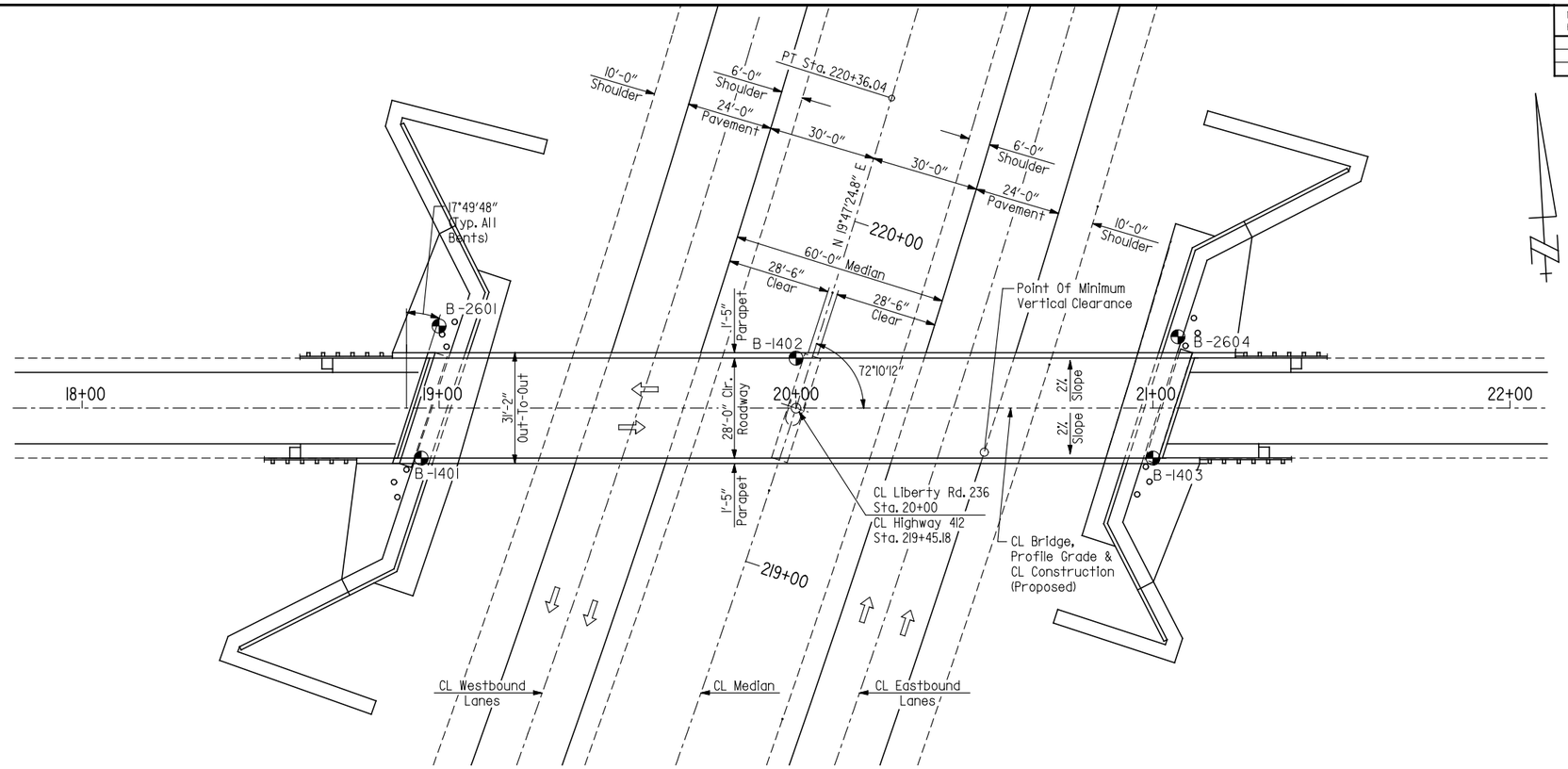


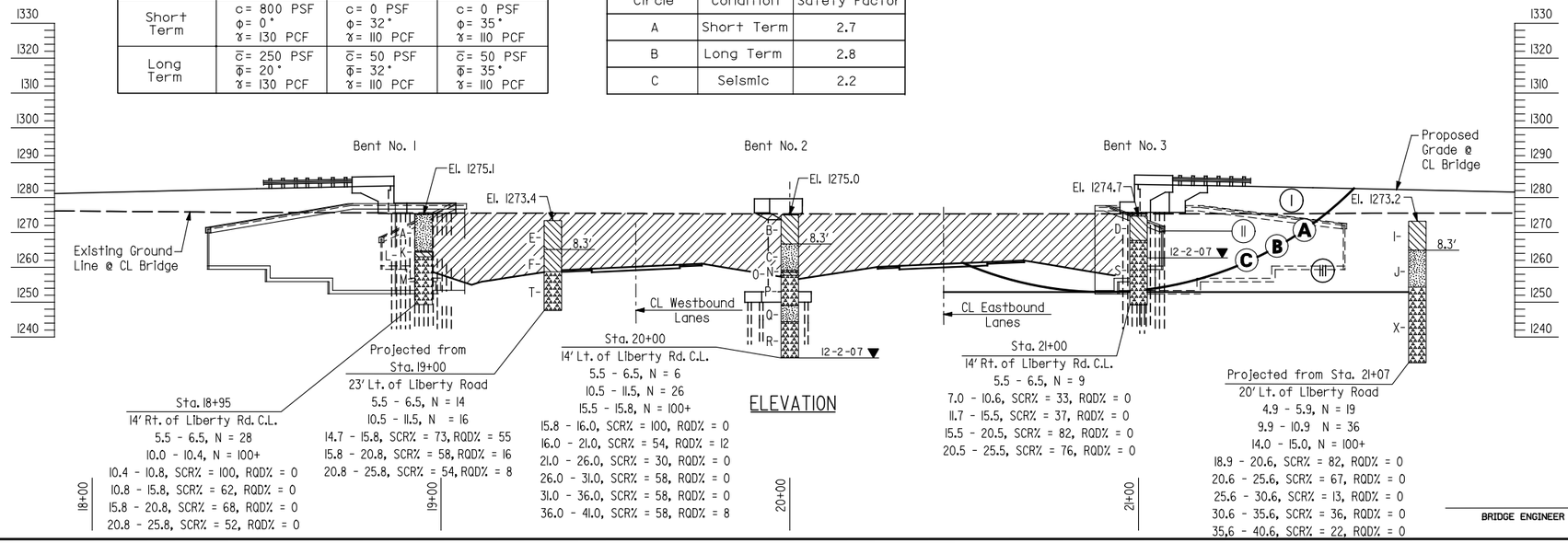
PLAN

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$c = 800$ PSF $\phi = 0°$ $\gamma = 130$ PCF	$c = 0$ PSF $\phi = 32°$ $\gamma = 110$ PCF	$c = 0$ PSF $\phi = 35°$ $\gamma = 110$ PCF
Long Term	$\bar{c} = 250$ PSF $\bar{\phi} = 20°$ $\gamma = 130$ PCF	$\bar{c} = 50$ PSF $\bar{\phi} = 32°$ $\gamma = 110$ PCF	$\bar{c} = 50$ PSF $\bar{\phi} = 35°$ $\gamma = 110$ PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	2.7
B	Long Term	2.8
C	Seismic	2.2

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Note:
Stations And Elevations Shown Are Along CL Bridge



ELEVATION

Boring Legend

A - Gray, dark brown, dark gray & brown, medium dense to very dense, clayey sand.
B - Dark gray & brown, medium stiff, lean clay with sand.
C - Brown, dark gray, yellowish orange, tan & black, medium dense to very dense, clayey sand.
D - Gray, stiff, lean clay with sand.
E - Gray, stiff, lean clay.
F - Beige, very stiff, sandy fat clay.
G - Beige, very stiff, sandy fat clay.
H - Gray, very stiff, lean clay.
I - Gray, very stiff, lean clay.
J - Gray, dense to very dense, clayey sand with gravel.
K - Chert: White, lt. gray, moderately weathered.
L - Clay: Red, brown, with chert fragments.
M - Chert: White, lt. gray, moderately to severely weathered.
N - Chert: Lt. gray, slightly to intensely weathered.
O - Clay: Red, brown, with chert fragments.
P - Chert: Lt. gray, slightly to intensely weathered.
Q - Sand: Brown, red, grades coarser at depth, with clay and chert gravel.
R - Chert: White, lt. gray, slightly to intensely weathered.
S - Chert: Lt. gray, slightly to severely weathered.
T - Chert: White, lt. gray, slightly to intensely weathered.
U - Chert: Lt. gray, weathered.
V - Chert: White, lt. gray, moderate to intense weathering.
W - Chert: White, lt. gray, moderate to intense weathering.
X - Chert: White, lt. gray, moderate to intense weathering.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

SHEET 1 OF 3
LAYOUT OF BRIDGE
COUNTY ROAD 904 (LIBERTY ROAD)
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

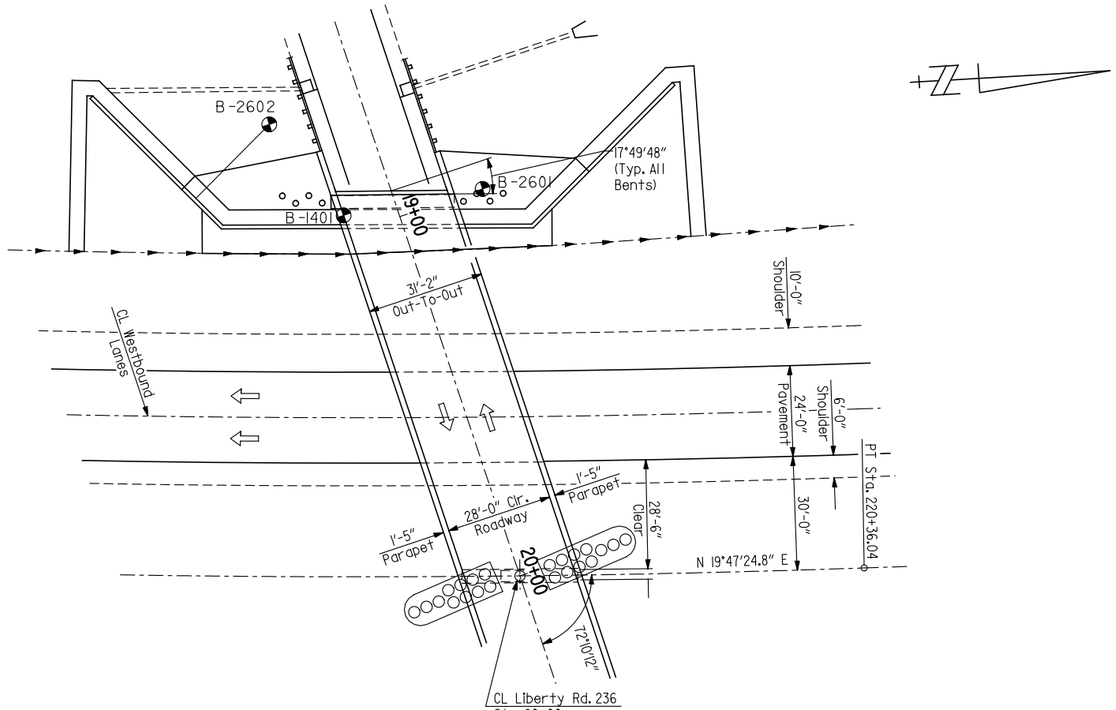
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

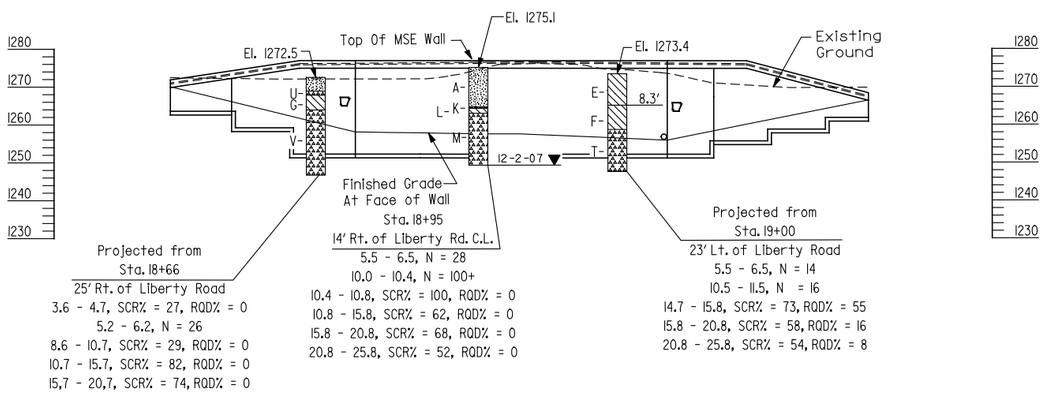
BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-West

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Gray, dark brown, dark gray & brown, medium dense to very dense, clayey sand.
B - Dark gray & brown, medium stiff, lean clay with sand.
C - Brown, dark gray, yellowish orange, tan & black, medium dense to very dense, clayey sand.
D - Gray, stiff, lean clay with sand.
E - Gray, stiff, lean clay.
F - Beige, very stiff, sandy fat clay.
G - Beige, very stiff, sandy fat clay.
H - Gray, very stiff, lean clay.
I - Gray, very stiff, lean clay.
J - Gray, dense to very dense, clayey sand with gravel.
K - Chert: White, lt. gray, moderately weathered.
L - Clay: Red, brown, with chert fragments.
M - Chert: White, lt. gray, moderately to severely weathered.
N - Chert: Lt. gray, slightly to intensely weathered.
O - Clay: Red, brown, with chert fragments.
P - Chert: Lt. gray, slightly to intensely weathered.
Q - Sand: Brown, red, grades coarser at depth, with clay and chert gravel.
R - Chert: White, lt. gray, slightly to intensely weathered.
S - Chert: Lt. gray, slightly to severely weathered.
T - Chert: White, lt. gray, slightly to intensely weathered.
U - Chert: Lt. gray, weathered.
V - Chert: White, lt. gray, moderate to intense weathering.
W - Chert: White, lt. gray, moderate to intense weathering.
X - Chert: White, lt. gray, moderate to intense weathering.

SHEET 2 OF 3
DETAILS OF MSE RETAINING WALL
COUNTY ROAD 904 (LIBERTY ROAD)
OVER US HIGHWAY 412

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

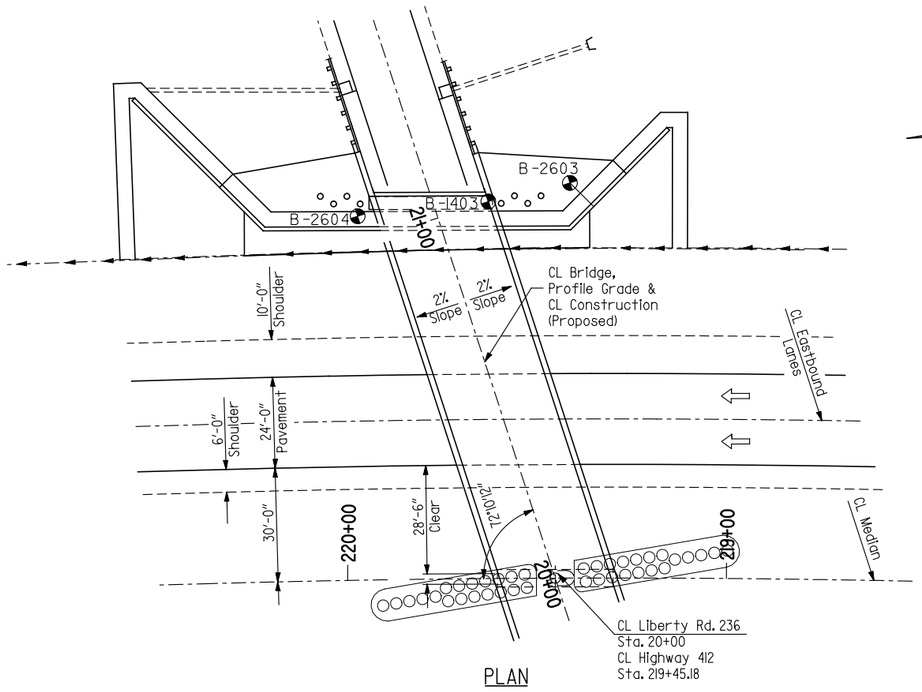
DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: 1"=20'

BRIDGE ENGINEER

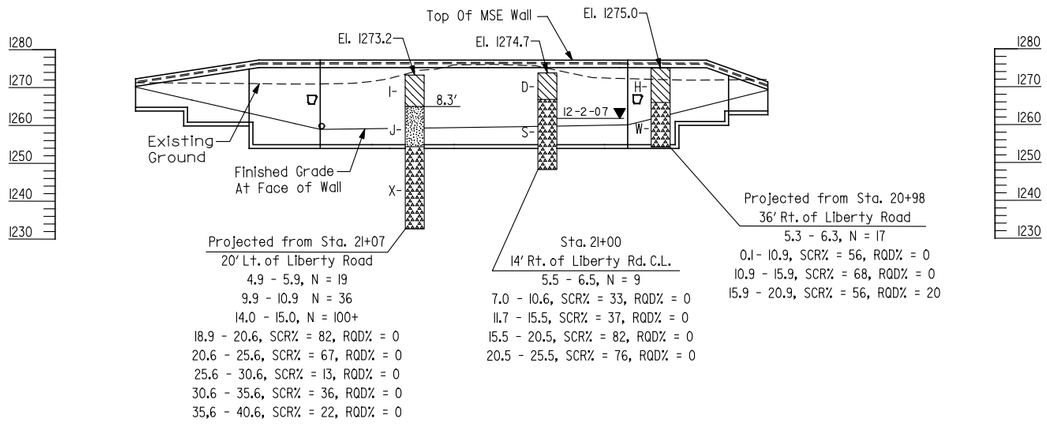
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-East

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Gray, dark brown, dark gray & brown, medium dense to very dense, clayey sand.
B - Dark gray & brown, medium stiff, lean clay with sand.
C - Brown, dark gray, yellowish orange, tan & black, medium dense to very dense, clayey sand.
D - Gray, stiff, lean clay with sand.
E - Gray, stiff, lean clay.
F - Beige, very stiff, sandy fat clay.
G - Beige, very stiff, sandy fat clay.
H - Gray, very stiff, lean clay.
I - Gray, very stiff, lean clay.
J - Gray, dense to very dense, clayey sand with gravel.
K - Chert: White, lt. gray, moderately weathered.
L - Clay: Red, brown, with chert fragments.
M - Chert: White, lt. gray, moderately to severely weathered.
N - Chert: Lt. gray, slightly to intensely weathered.
O - Clay: Red, brown, with chert fragments.
P - Chert: Lt. gray, slightly to intensely weathered.
Q - Sand: Brown, red, grades coarser at depth, with clay and chert gravel.
R - Chert: White, lt. gray, slightly to intensely weathered.
S - Chert: Lt. gray, slightly to severely weathered.
T - Chert: White, lt. gray, slightly to intensely weathered.
U - Chert: Lt. gray, weathered.
V - Chert: White, lt. gray, moderate to intense weathering.
W - Chert: White, lt. gray, moderate to intense weathering.
X - Chert: White, lt. gray, moderate to intense weathering.

SHEET 3 OF 3
DETAILS OF MSE RETAINING WALL
COUNTY ROAD 904 (LIBERTY ROAD)
OVER US HIGHWAY 412

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

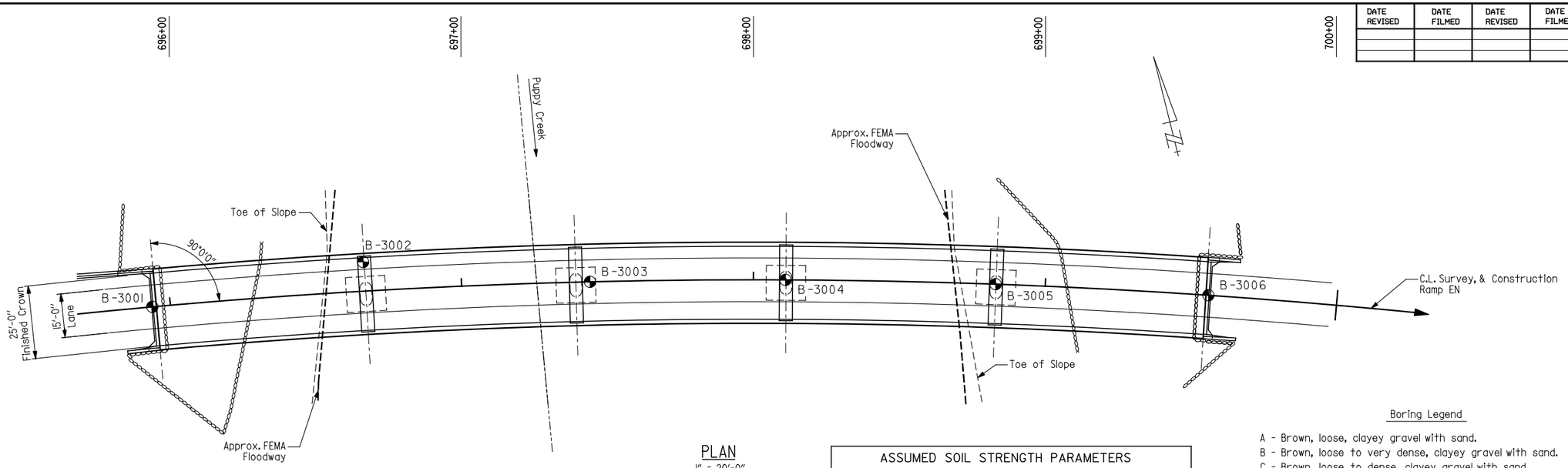
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN
1" = 20'-0"

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

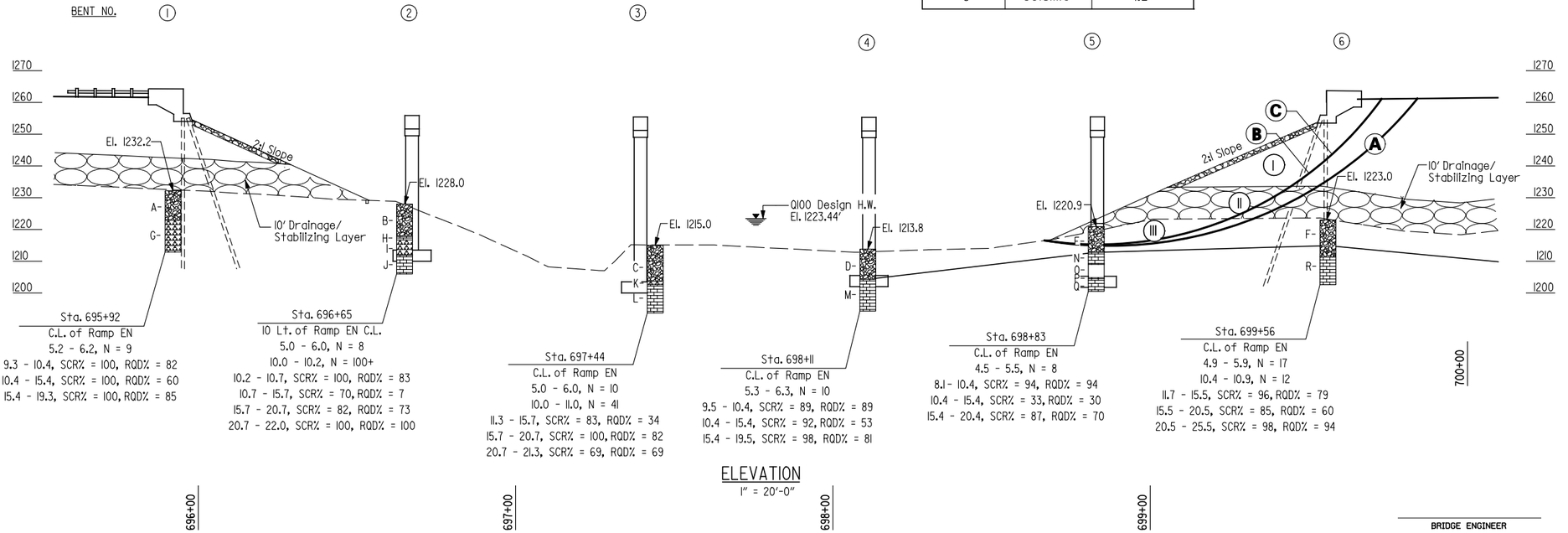
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.4
B	Long Term	1.5
C	Seismic	1.2

Boring Legend

A - Brown, loose, clayey gravel with sand.
B - Brown, loose to very dense, clayey gravel with sand.
C - Brown, loose to dense, clayey gravel with sand.
D - Brown, loose, clayey gravel with sand.
E - Brown. loose, clayey gravel with sand.
F - Brown, medium dense, clayey gravel with sand.
G - Chert: White, lt. gray, gray, fresh to moderately weathered.
H - Limestone: White with gray banding, medium grain, fresh with moderate weathering.
I - Chert: White, lt. gray, gray, weathered.
J - Limestone: White with gray banding, medium grain, fresh with slight to moderate weathering.
K - Chert: White, lt. gray, gray, weathered.
L - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
M - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
N - Limestone: Lt. gray, gray, medium grain, fresh with slight to moderate weathering.
O - Core Loss
P - Chert: White, lt. tan, weathered.
Q - Limestone: Lt. gray, gray, medium grain, fresh with slight to moderate weathering.
R - Limestone: White with gray banding, medium grain, fresh with slight to moderate weathering.



ELEVATION
1" = 20'-0"

Note: Unless otherwise noted, stations and elevations shown are taken along C.L. Ramp.

SHEET 1 OF 1
LAYOUT OF BRIDGE
RAMP EN OVER PUPPY CREEK
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS
BENTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

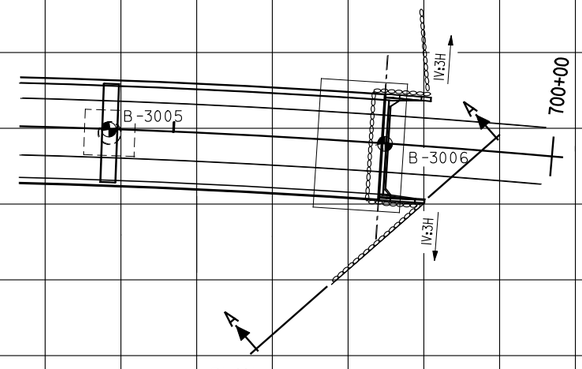
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	c̄= 250 PSF ϕ̄= 20° γ= 130 PCF	c̄= 50 PSF ϕ̄= 36° γ= 115 PCF	c̄= 50 PSF ϕ̄= 30° γ= 110 PCF

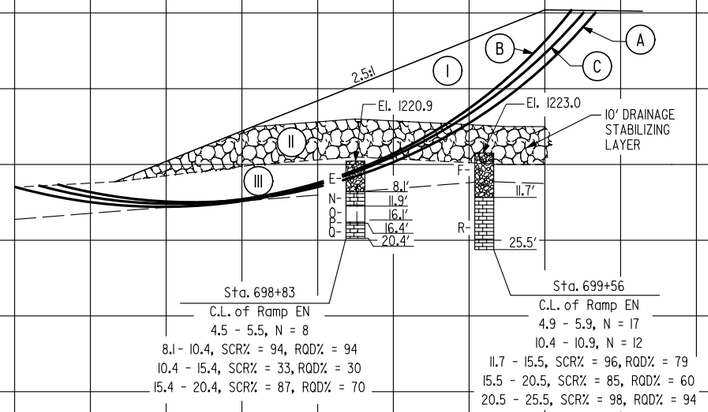
FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.6
Seismic	C	1.3

Boring Legend

A - Brown, loose, clayey gravel with sand.
B - Brown, loose to very dense, clayey gravel with sand.
C - Brown, loose to dense, clayey gravel with sand.
D - Brown, loose, clayey gravel with sand.
E - Brown. loose, clayey gravel with sand.
F - Brown, medium dense, clayey gravel with sand.
G - Chert: White, lt. gray, gray, fresh to moderately weathered.
H - Limestone: White with gray banding, medium grain, fresh with moderate weathering.
I - Chert: White, lt. gray, gray, weathered.
J - Limestone: White with gray banding, medium grain, fresh with slight to moderate weathering.
K - Chert: White, lt. gray, gray, weathered.
L - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
M - Limestone: White, lt. gray, gray, medium grain, fresh with slight weathering.
N - Limestone: Lt. gray, gray, medium grain, fresh with slight to moderate weathering.
O - Core Loss
P - Chert: White, lt. tan, weathered.
Q - Limestone: Lt. gray, gray, medium grain, fresh with slight to moderate weathering.
R - Limestone: White with gray banding, medium grain, fresh with slight to moderate weathering.



PLAN

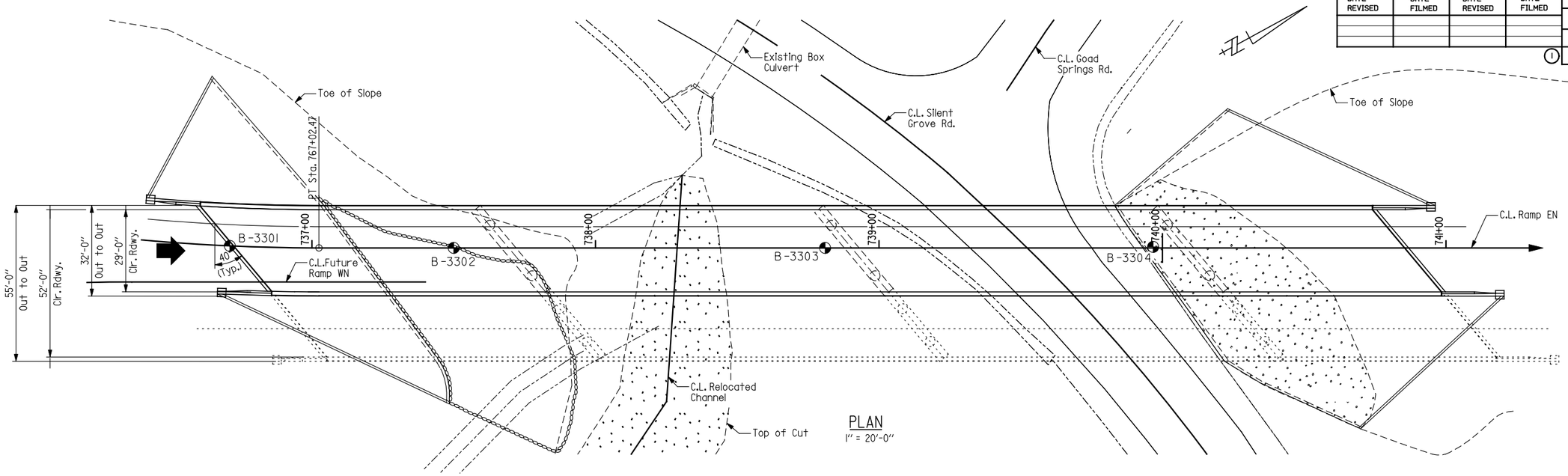


SECTION A-A

RAMP EN OVER PUPPY CREEK - BENT 4

1320 1300 1280 1260 1240 1220 1200 1180 1160 1140

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN
1" = 20'-0"

Boring Legend

A - Red, dense, silty gravel with sand.
B - Brown, very dense, silty gravel with sand.
C - Brown, loose, silty gravel with sand.
D - Red, dense, silty gravel with sand.
E - Chert: White, lt. gray, weathered.
F - Limestone: Lt. gray, gray, fresh to slightly weathered.
G - Chert: White, lt. gray, fresh.
H - Chert: White, lt. gray, weathered.
I - Chert: White, lt. gray, fresh to moderately weathered.
J - Limestone: Lt. gray, gray, fresh, fine to medium grain.
K - Chert: White, lt. gray, gray, fresh to slightly weathered.
L - Limestone: White, lt. gray, gray, medium grain, fresh to slight weathering.
M - Chert: White, lt. gray, gray, fresh to slightly weathered.
N - Limestone: Lt. gray, gray, medium grain, fresh, slightly weathered.
O - Limestone: Lt. gray, gray, fine to medium grain, fresh.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone: Lt. gray, gray, fine to medium grain, fresh with slight weathering.
R - Chert: White, lt. gray, gray, fresh to slightly weathered.

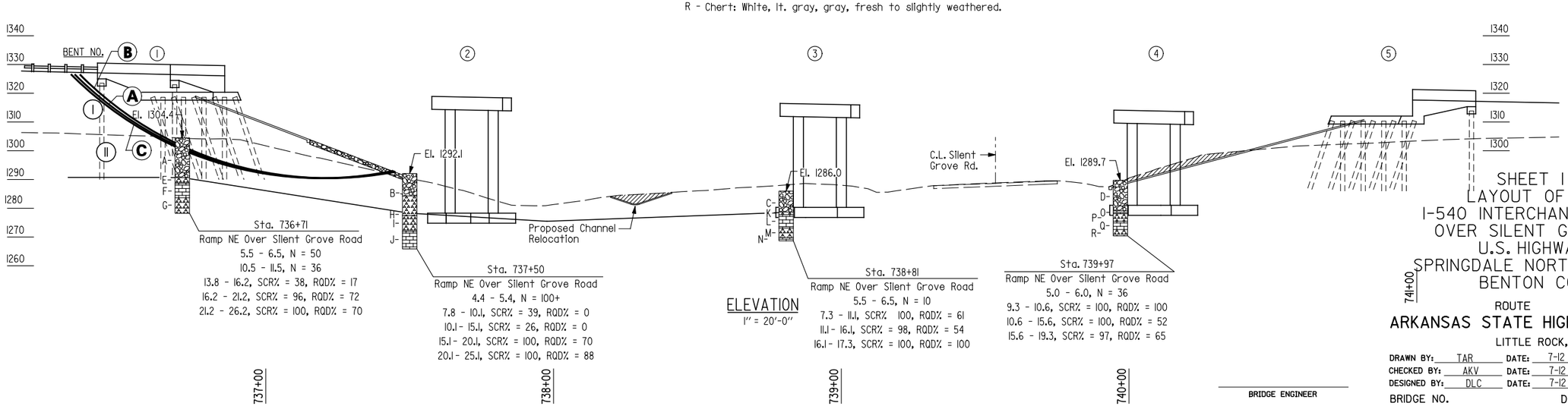
Note: Unless otherwise noted, stations and elevations shown are taken along Profile Grade.

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c = 800 PSF φ = 0° γ = 130 PCF	c = 0 PSF φ = 32° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\phi}$ = 32° γ = 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.6
B	Long Term	1.5
C	Seismic	1.4



ELEVATION
1" = 20'-0"

BRIDGE ENGINEER

SHEET 1 OF 1
LAYOUT OF BRIDGE
I-540 INTERCHANGE RAMP EN OVER SILENT GROVE ROAD U.S. HIGHWAY 412 SPRINGDALE NORTHERN BYPASS BENTON COUNTY

ROUTE SEC.

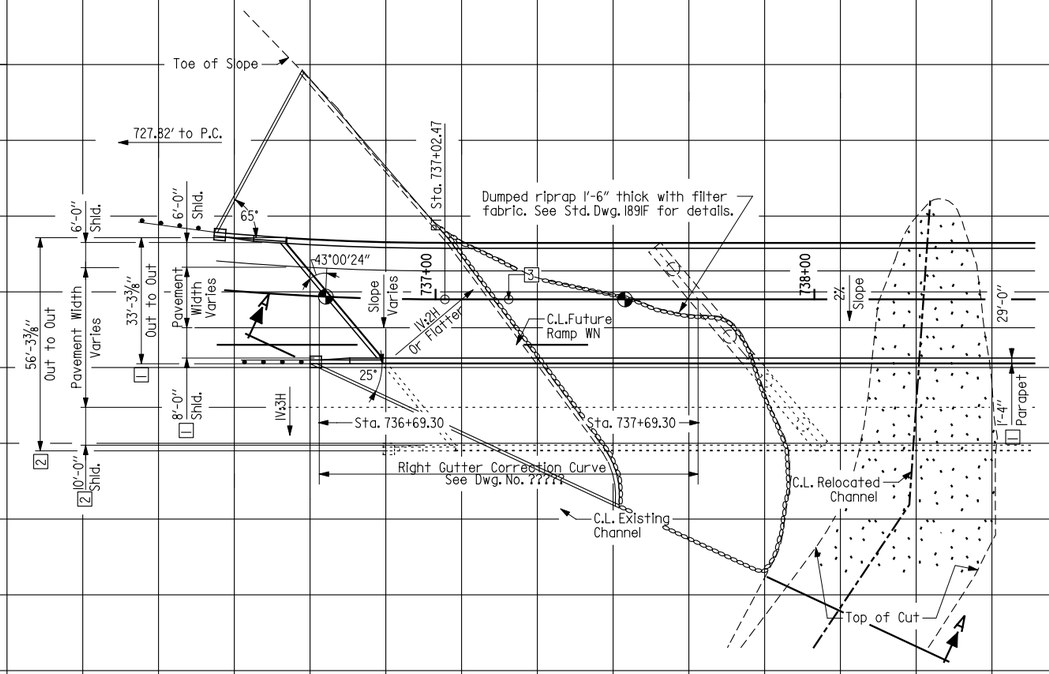
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: As Shown

BRIDGE NO. DRAWING NO.

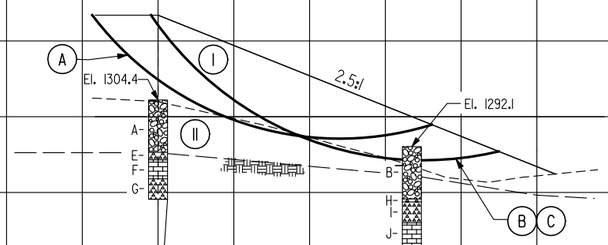
Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	c̄= 250 PSF ϕ̄= 20° γ= 130 PCF	c̄= 50 PSF ϕ̄= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	1.7
Seismic	C	1.4



Sta. 736+71
Ramp NE Over Silent Grove Road
5.5 - 6.5, N = 50
10.5 - 11.5, N = 36
13.8 - 16.2, SCR% = 38, RQD% = 17
16.2 - 21.2, SCR% = 96, RQD% = 72
21.2 - 26.2, SCR% = 100, RQD% = 70

Sta. 737+50
Ramp NE Over Silent Grove Road
4.4 - 5.4, N = 100+
7.8 - 10.1, SCR% = 39, RQD% = 0
10.1 - 15.1, SCR% = 26, RQD% = 0
15.1 - 20.1, SCR% = 100, RQD% = 70
20.1 - 25.1, SCR% = 100, RQD% = 88

Boring Legend

A - Red, dense, silty gravel with sand.
B - Brown, very dense, silty gravel with sand.
C - Brown, loose, silty gravel with sand.
D - Red, dense, silty gravel with sand.
E - Chert: White, lt. gray, weathered.
F - Limestone: Lt. gray, gray, fresh to slightly weathered.
G - Chert: White, lt. gray, fresh.
H - Chert: White, lt. gray, weathered.
I - Chert: White, lt. gray, fresh to moderately weathered.
J - Limestone: Lt. gray, gray, fresh, fine to medium grain.
K - Chert: White, lt. gray, gray, fresh to slightly weathered.
L - Limestone: White, lt. gray, gray, medium grain, fresh to slight weathering.
M - Chert: White, lt. gray, gray, fresh to slightly weathered.
N - Limestone: Lt. gray, gray, medium grain, fresh, slightly weathered.
O - Limestone: Lt. gray, gray, fine to medium grain, fresh.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone: Lt. gray, gray, fine to medium grain, fresh with slight weathering.
R - Chert: White, lt. gray, gray, fresh to slightly weathered.

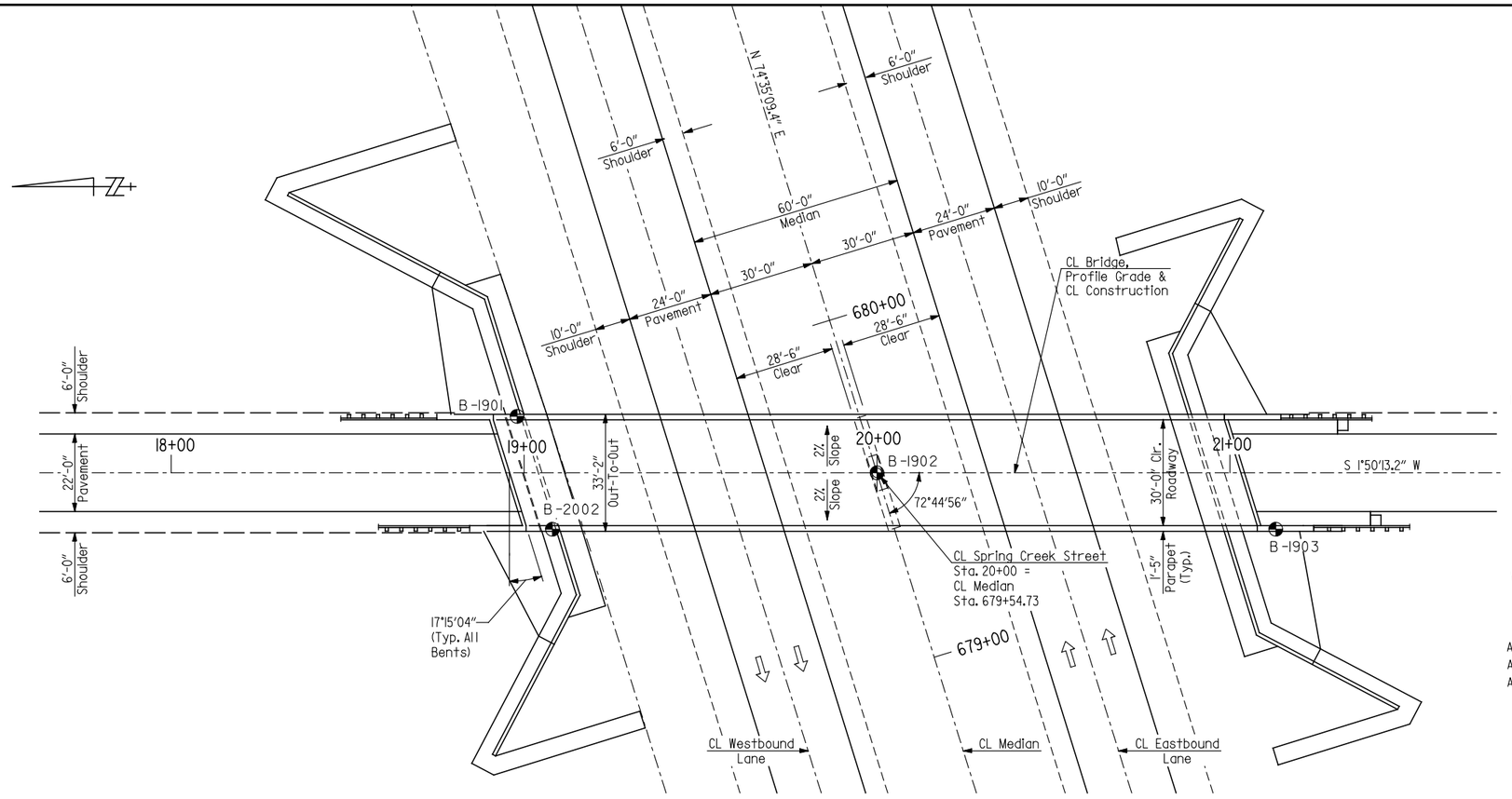
1380
1360
1340
1320
1300
1280
1260
1240
1220
1200

0
100
200

RAMP EN OVER SILENT GROVE ROAD - BENT 1

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		

①



PLAN

Boring Legend

A - Red, very stiff to very hard, sandy lean clay with gravel.
B - Red, very loose to medium dense, silty gravel with sand.
C - Red, dense to very dense, silty gravel with sand.
D - Brown, very stiff, sandy lean clay with gravel.
E - Brown, very dense, silty gravel with sand.
F - Brown & red, medium dense to very dense, clayey gravel with sand.
G - Brown, very stiff, gravelly fat clay with sand.
H - Brown, tan & light gray, loose to dense, silty gravel with sand.
I - Light red, medium dense to very dense, silty sand with gravel.
J - Light red, medium dense, silty gravel with sand.
K - Light red, medium dense to very dense, silty sand with gravel.
L - Light red, dense to very dense, silty gravel with sand.
M - Copper, tan & dark brown, medium dense, silty sand with gravel.
N - Copper, brown, dark brown & beige, loose to medium dense, clayey gravel with sand.
O - Limestone: White, lt. gray, gray, fine grain, highly fractured, weathered with clay seams.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone: White, lt. gray, gray, fine grain, slightly weathered with clay seams.
R - Chert: White, lt. gray, gray, fresh to slightly weathered.
S - Limestone: White, lt. gray, gray, fine to medium grain, fresh to slightly weathered.
T - Limestone: Gray to lt. gray, white, fine grain, fresh with slight weathering.
U - Chert: Lt. gray, gray.
V - Limestone: High angle fracture.
W - Chert: White, lt. gray, gray, weathered.
X - Limestone: Lt. gray, fresh.
Y - Chert: White, lt. gray, gray, slightly to moderately weathered.
Z - Limestone: White, lt. gray, fine to medium grain, slight to moderate weathering.
AA - Chert: White, lt. gray, gray, slightly to moderately weathered.
AB - Limestone: Lt. gray, gray, fine to medium grain, fresh to slightly weathered.
AC - Chert: White, lt. gray, gray, fresh to moderately weathered.

Note:
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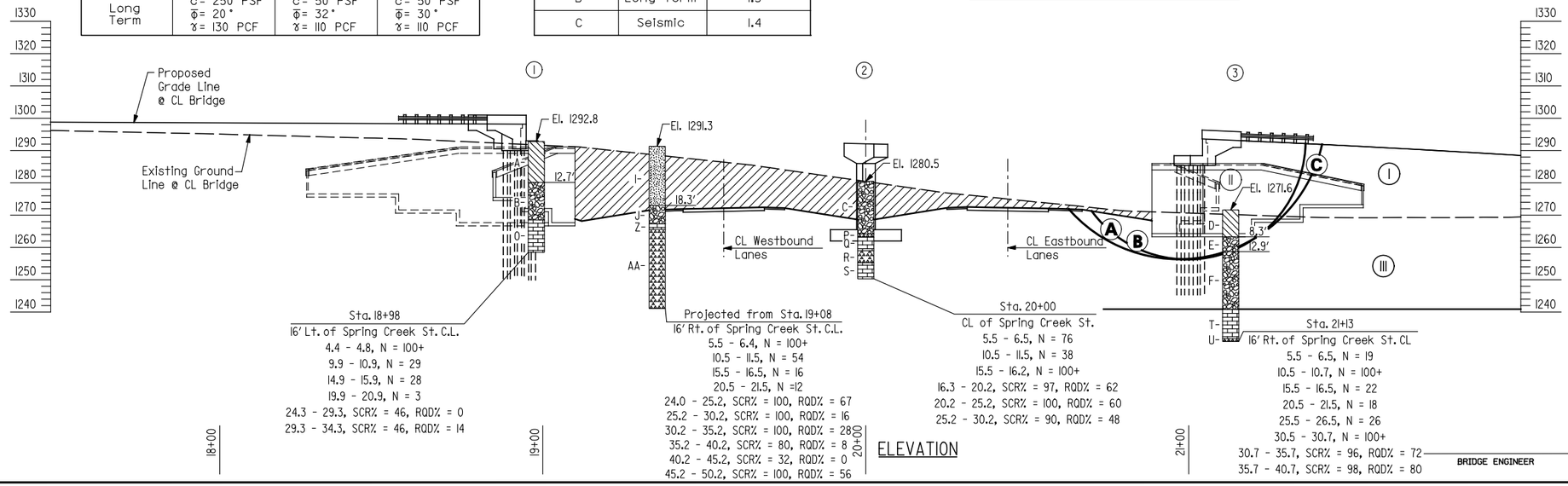
ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.6
B	Long Term	1.5
C	Seismic	1.4

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.



ELEVATION

BRIDGE ENGINEER

SHEET 1 OF 3
LAYOUT OF BRIDGE
SPRING CREEK STREET
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

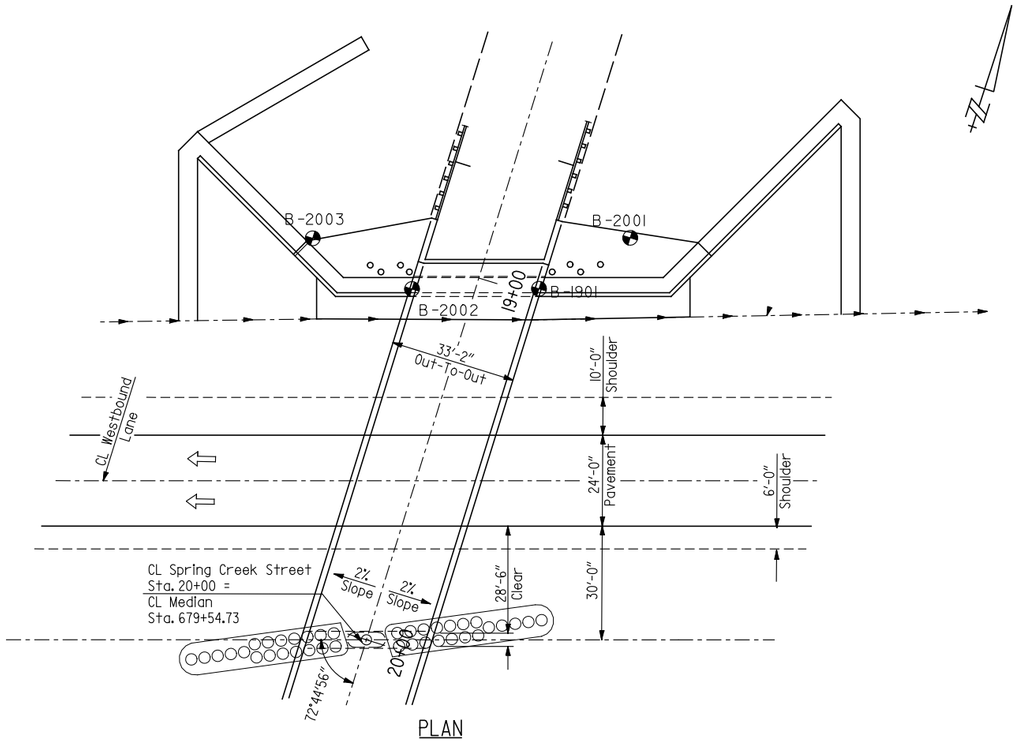
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

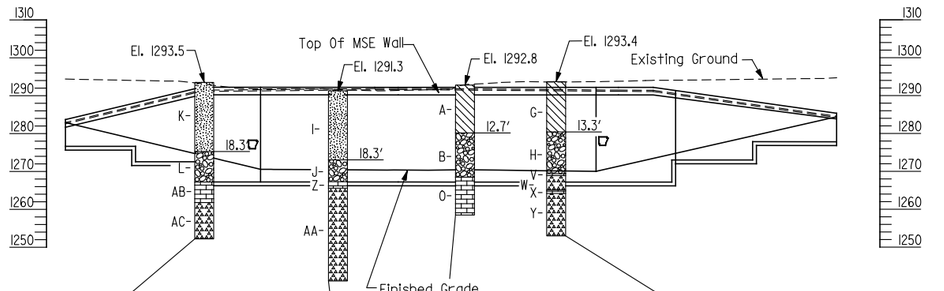
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



Projected from Sta. 19+03
45' Rt. of Spring Creek St. C.L.
5.5 - 6.5, N = 100+
10.5 - 11.5, N = 60
15.5 - 16.5, N = 17
20.5 - 21.5, N = 43
25.5 - 25.7, N = 100+
26.3 - 31.3, SCR% = 78, RQD% = 42
31.3 - 36.3, SCR% = 66, RQD% = 26
36.3 - 41.3, SCR% = 88, RQD% = 52

Projected from Sta. 19+08
16' Rt. of Spring Creek St. C.L.
5.5 - 6.4, N = 100+
10.5 - 11.5, N = 54
15.5 - 16.5, N = 16
20.5 - 21.5, N =12
24.0 - 25.2, SCR% = 100, RQD% = 67
25.2 - 30.2, SCR% = 100, RQD% = 16
30.2 - 35.2, SCR% = 100, RQD% = 28
35.2 - 40.2, SCR% = 80, RQD% = 8
40.2 - 45.2, SCR% = 32, RQD% = 0
45.2 - 50.2, SCR% = 100, RQD% = 56

Sta. 18+98
16' Lt. of Spring Creek St. C.L.
4.4 - 4.8, N = 100+
9.9 - 10.9, N = 29
14.9 - 15.9, N = 28
19.9 - 20.9, N = 3
24.3 - 29.3, SCR% = 46, RQD% = 0
29.3 - 34.3, SCR% = 46, RQD% = 14

Projected from Sta. 18+78
35' Lt. of Spring Creek St. C.L.
5.5 - 6.5, N = 25
10.5 - 11.5, N = 32
15.5 - 16.5, N = 32
20.5 - 21.5, N = 7
24.3 - 25.7, SCR% = 86, RQD% = 21
25.7 - 30.7, SCR% = 96, RQD% = 46
30.7 - 35.7, SCR% = 100, RQD% = 86
35.7 - 40.7, SCR% = 94, RQD% = 36

ELEVATION - MSE Wall-North

0+00 1+00 2+00

Note:
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Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Red, very stiff to very hard, sandy lean clay with gravel.
B - Red, very loose to medium dense, silty gravel with sand.
C - Red, dense to very dense, silty gravel with sand.
D - Brown, very stiff, sandy lean clay with gravel.
E - Brown, very dense, silty gravel with sand.
F - Brown & red, medium dense to very dense, clayey gravel with sand.
G - Brown, very stiff, gravelly fat clay with sand.
H - Brown, tan & light gray, loose to dense, silty gravel with sand.
I - Light red, medium dense to very dense, silty sand with gravel.
J - Light red, medium dense, silty gravel with sand.
K - Light red, medium dense to very dense, silty sand with gravel.
L - Light red, dense to very dense, silty gravel with sand.
M - Copper, tan & dark brown, medium dense, silty sand with gravel.
N - Copper, brown, dark brown & beige, loose to medium dense, clayey gravel with sand.
O - Limestone: White, lt. gray, gray, fine grain, highly fractured, weathered with clay seams.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone: White, lt. gray, gray, fine grain, slightly weathered with clay seams.
R - Chert: White, lt. gray, gray, fresh to slightly weathered.
S - Limestone: White, lt. gray, gray, fine to medium grain, fresh to slightly weathered.
T - Limestone: Gray to lt. gray, white, fine grain, fresh with slight weathering.
U - Chert: Lt. gray, gray.
V - Limestone: High angle fracture.
W - Chert: White, lt. gray, gray, weathered.
X - Limestone: Lt. gray, fresh.
Y - Chert: White, lt. gray, gray, slightly to moderately weathered.
Z - Limestone: White, lt. gray, fine to medium grain, slight to moderate weathering.
AA - Chert: White, lt. gray, gray, slightly to moderately weathered.
AB - Limestone: Lt. gray, gray, fine to medium grain, fresh to slightly weathered.
AC - Chert: White, lt. gray, gray, fresh to moderately weathered.

SHEET 2 OF 3
DETAILS OF MSE RETAINING WALL
SPRING CREEK STREET
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

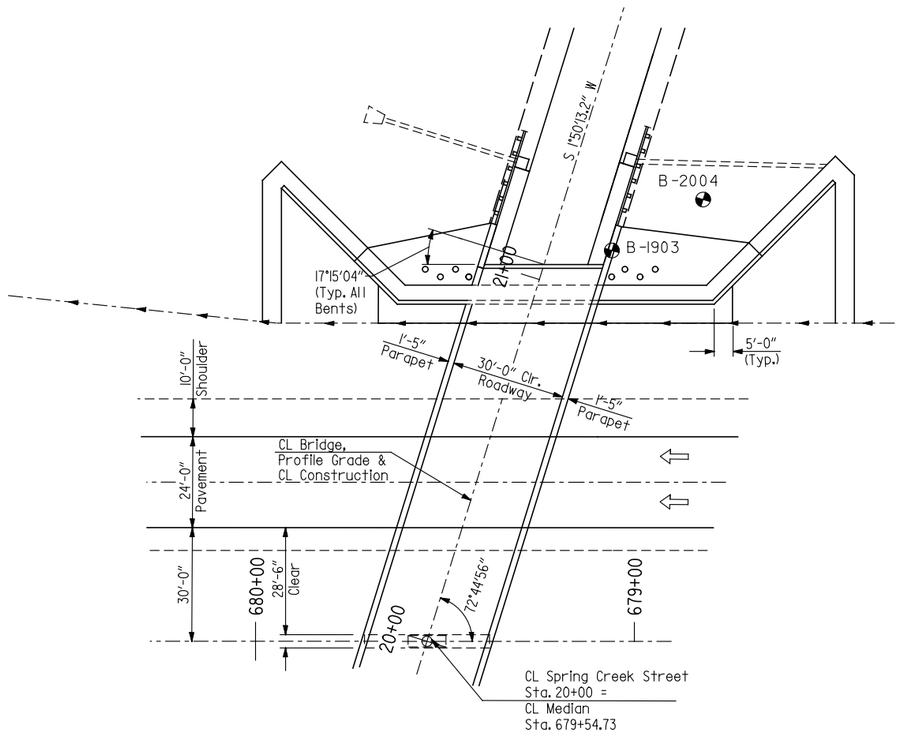
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

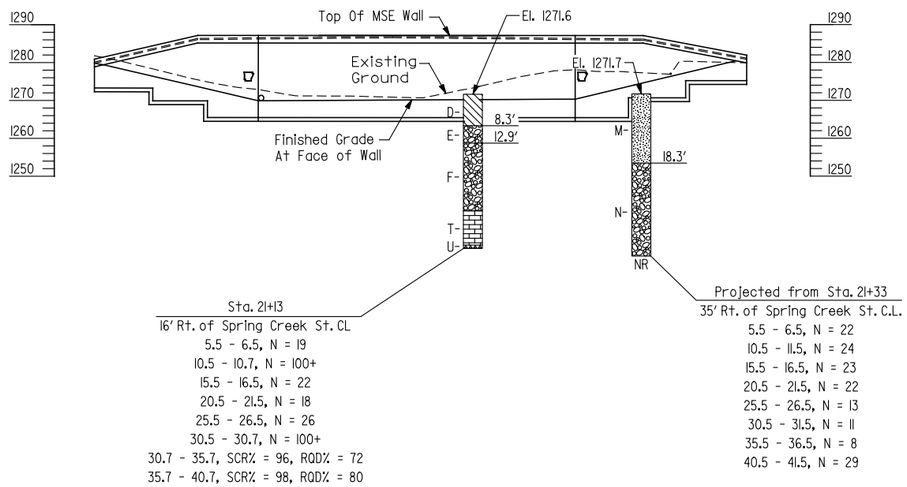
BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN



ELEVATION - MSE Wall-South

Note:
This sheet is provided for subsurface and soils information only, and is not intended for bridge construction. Soil descriptions and indicated boundaries are based on engineering interpretation of available subsurface information obtained at selected locations and may not necessarily reflect the actual variations in subsurface conditions between borings and samples.

Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Red, very stiff to very hard, sandy lean clay with gravel.
B - Red, very loose to medium dense, silty gravel with sand.
C - Red, dense to very dense, silty gravel with sand.
D - Brown, very stiff, sandy lean clay with gravel.
E - Brown, very dense, silty gravel with sand.
F - Brown & red, medium dense to very dense, clayey gravel with sand.
G - Brown, very stiff, gravelly fat clay with sand.
H - Brown, tan & light gray, loose to dense, silty gravel with sand.
I - Light red, medium dense to very dense, silty sand with gravel.
J - Light red, medium dense, silty gravel with sand.
K - Light red, medium dense to very dense, silty sand with gravel.
L - Light red, dense to very dense, silty gravel with sand.
M - Copper, tan & dark brown, medium dense, silty sand with gravel.
N - Copper, brown, dark brown & beige, loose to medium dense, clayey gravel with sand.
O - Limestone: White, lt. gray, gray, fine grain, highly fractured, weathered with clay seams.
P - Chert: White, lt. gray, gray, fresh to slightly weathered.
Q - Limestone: White, lt. gray, gray, fine grain, slightly weathered with clay seams.
R - Chert: White, lt. gray, gray, fresh to slightly weathered.
S - Limestone: White, lt. gray, gray, fine to medium grain, fresh to slightly weathered.
T - Limestone: Gray to lt. gray, white, fine grain, fresh with slight weathering.
U - Chert: Lt. gray, gray.
V - Limestone: High angle fracture.
W - Chert: White, lt. gray, gray, weathered.
X - Limestone: Lt. gray, fresh.
Y - Chert: White, lt. gray, gray, slightly to moderately weathered.
Z - Limestone: White, lt. gray, fine to medium grain, slight to moderate weathering.
AA - Chert: White, lt. gray, gray, slightly to moderately weathered.
AB - Limestone: Lt. gray, gray, fine to medium grain, fresh to slightly weathered.
AC - Chert: White, lt. gray, gray, fresh to moderately weathered.

SHEET 3 OF 3
DETAILS OF MSE RETAINING WALL
SPRING CREEK STREET
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

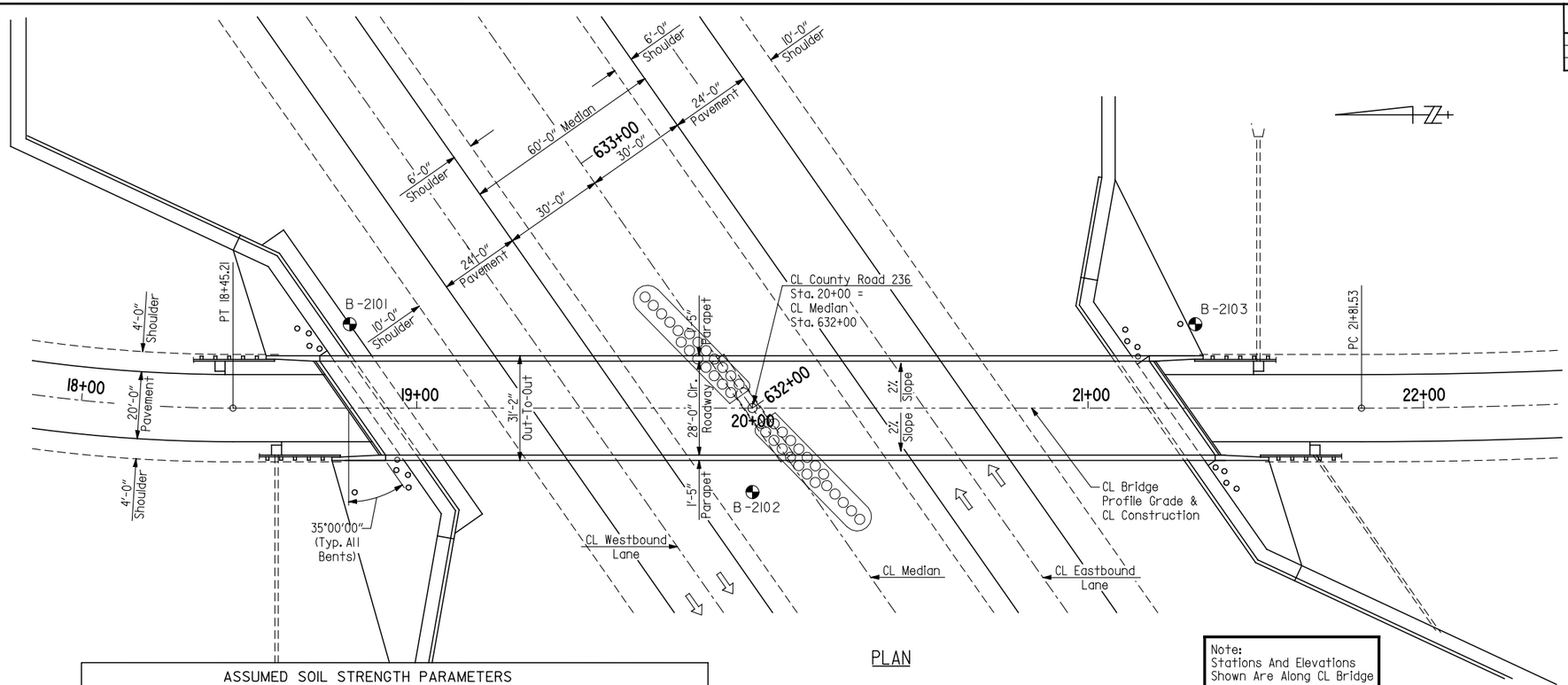
DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

BRIDGE ENGINEER

Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

Note:
Stations And Elevations Shown Are Along CL Bridge

Note:
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Boring Legend

A - Red, very dense, silty gravel with sand.
B - Red, dense to very dense, silty gravel with sand.
C - Red, dense, silty gravel with sand.
D - Red, hard, sandy lean clay.
E - Beige, medium dense to dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense to very dense, silty gravel with sand.
H - Red, very stiff, sandy lean clay.
I - Beige, medium dense to very dense, silty gravel with sand.
J - Red, dense to very dense, well-graded gravel with clay and sand.
K - Red, dense, silty gravel with sand.
L - Red, dense, silty gravel with sand.
M - Red, very stiff, sandy lean clay.
N - Red, loose to very dense, clayey gravel with sand.
O - Red, medium dense, clayey gravel with sand.
P - Red, medium dense to very dense, silty gravel with sand.
Q - Red, medium dense, silty gravel with sand.
R - Red, loose to very dense, clayey gravel with sand.
S - Light beige, very dense, silty gravel with sand.
T - Red, very dense, silty gravel with sand.
U - Red, medium dense to very dense, silty gravel with sand.
V - Red, very dense, clayey gravel with sand.
W - Light beige, very dense, silty gravel with sand.
X - Red, very dense, clayey gravel with sand.
Y - Red, medium dense to very dense, silty gravel with sand.
Z - Red, dense to very dense, clayey gravel with sand.
AA - Red, dense, silty gravel with sand.
AB - Red, medium dense to dense, clayey gravel with sand.
AC - Chert: White, lt. gray, gray, fresh to weathered.
AD - Limestone: Lt. gray, gray, fresh to slightly weathered.
AE - Chert: White, lt. gray, gray, fresh.
AF - Chert: White, lt. gray, gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to sightly weathered.
AH - Chert: White, lt. gray, gray, slightly staining.
AI - Limestone: Lt. gray, gray, fresh to slightly weathered.
AJ - Chert: Fragmented, intensely weathered.
AK - Chert: White, lt. gray, gray, fresh to moderately weathered.
AL - Limestone: Lt. gray, gray, fresh to slightly weathered.
AM - Chert: White, lt. gray, gray, intensely weathered.

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 1500 PSF Φ= 0° γ= 120 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	c= 250 PSF Φ= 20° γ= 130 PCF	c= 50 PSF Φ= 32° γ= 110 PCF	c= 50 PSF Φ= 32° γ= 110 PCF	c= 300 PSF Φ= 30° γ= 120 PCF	c= 50 PSF Φ= 32° γ= 110 PCF

Slope Stability Analysis		
Circle	Condition	Safety Factor
A	Short Term	1.7
B	Long Term	1.8
C	Seismic	1.5

Note:
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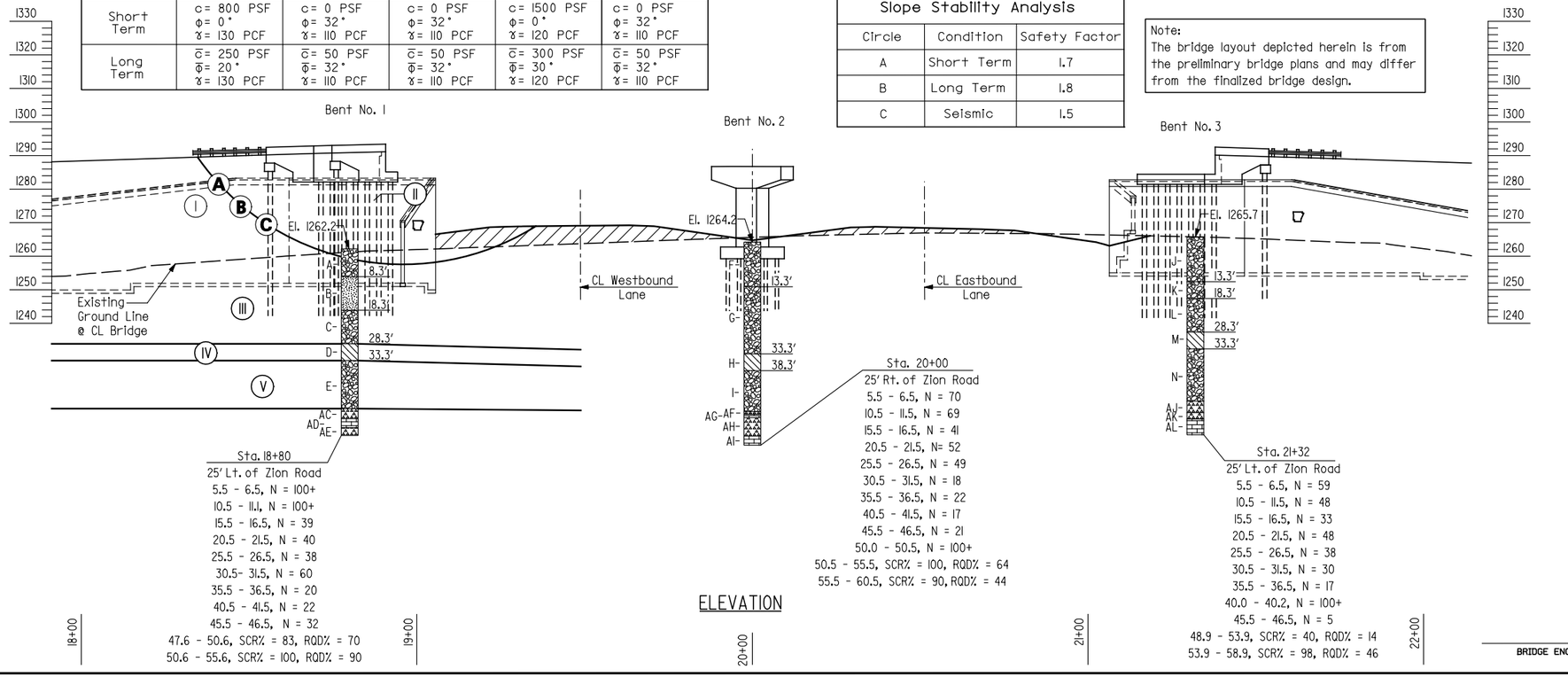


ELEVATION

BRIDGE ENGINEER

SHEET 1 OF 3
LAYOUT OF BRIDGE
COUNTY ROAD 236 (ZION RD.)
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

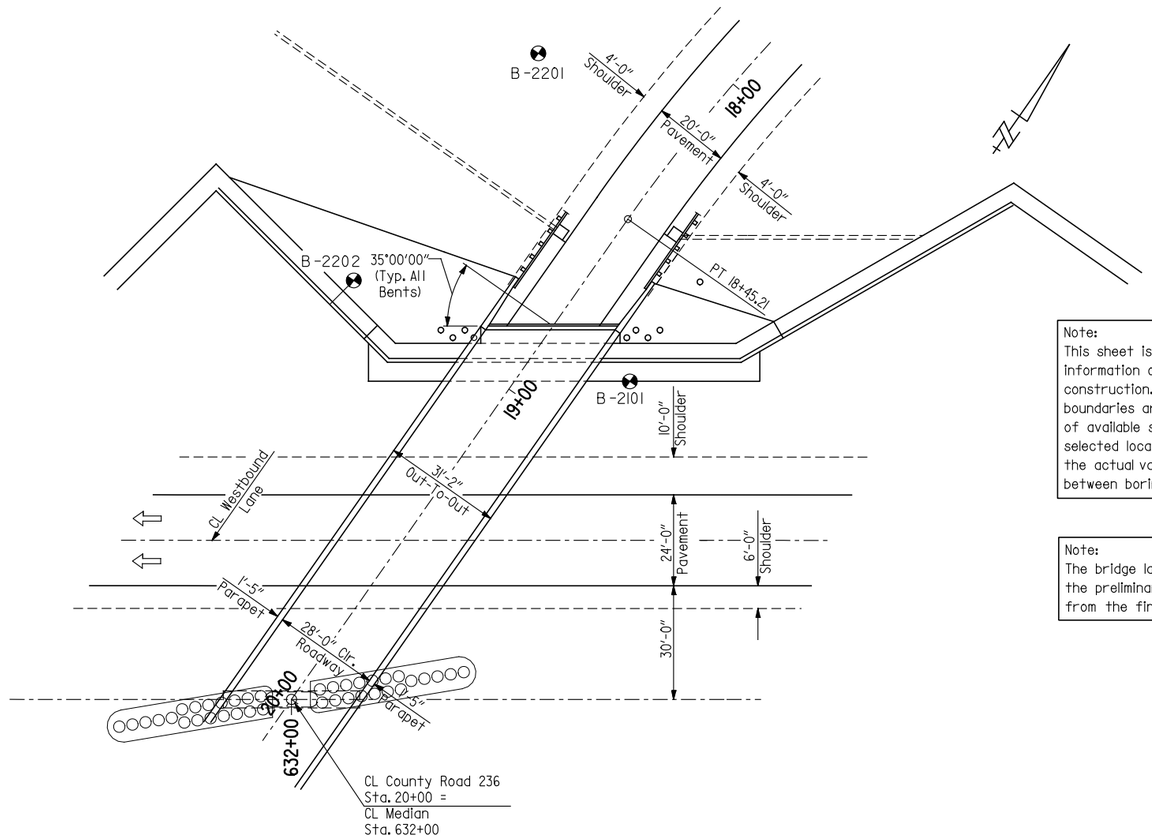
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE NO. DRAWING NO.

Florence & Hutcheson, Inc.
Consulting Engineers

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

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Note:
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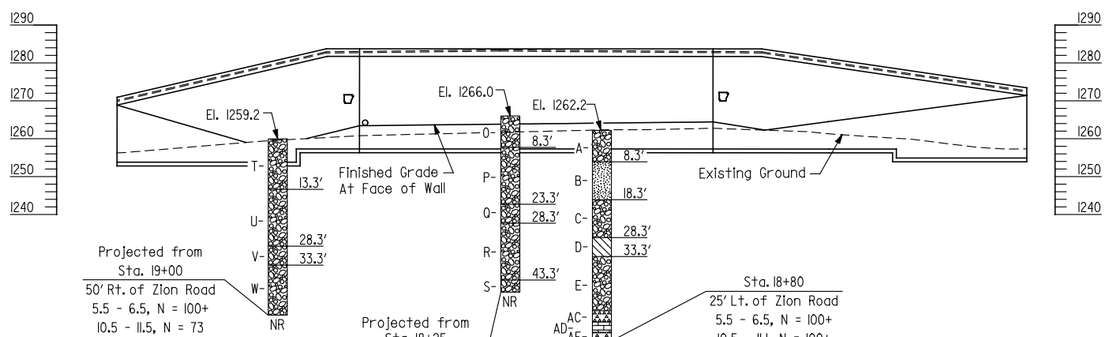


ELEVATION - MSE Wall-North

Boring Legend

A - Red, very dense, silty gravel with sand.
B - Red, dense to very dense, silty gravel with sand.
C - Red, dense, silty gravel with sand.
D - Red, hard, sandy lean clay.
E - Beige, medium dense to dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense to very dense, silty gravel with sand.
H - Red, very stiff, sandy lean clay.
I - Beige, medium dense to very dense, silty gravel with sand.
J - Red, dense to very dense, well-graded gravel with clay and sand.
K - Red, dense, silty gravel with sand.
L - Red, dense, silty gravel with sand.
M - Red, very stiff, sandy lean clay.
N - Red, loose to very dense, clayey gravel with sand.
O - Red, medium dense, clayey gravel with sand.
P - Red, medium dense to very dense, silty gravel with sand.
Q - Red, medium dense, silty gravel with sand.
R - Red, loose to very dense, clayey gravel with sand.
S - Light beige, very dense, silty gravel with sand.
T - Red, very dense, silty gravel with sand.
U - Red, medium dense to very dense, silty gravel with sand.
V - Red, very dense, clayey gravel with sand.
W - Light beige, very dense, silty gravel with sand.
X - Red, very dense, clayey gravel with sand.
Y - Red, medium dense to very dense, silty gravel with sand.
Z - Red, dense to very dense, clayey gravel with sand.
AA - Red, dense, silty gravel with sand.
AB - Red, medium dense to dense, clayey gravel with sand.
AC - Chert: White, lt. gray, gray, fresh to weathered.
AD - Limestone: Lt. gray, gray, fresh to slightly weathered.
AE - Chert: White, lt. gray, gray, fresh.
AF - Chert: White, lt. gray, gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to sightly weathered.
AH - Chert: White, lt. gray, gray, slightly staining.
AI - Limestone: Lt. gray, gray, fresh to slightly weathered.
AJ - Chert: Fragmented, intensely weathered.
AK - Chert: White, lt. gray, gray, fresh to moderately weathered.
AL - Limestone: Lt. gray, gray, fresh to slightly weathered.
AM - Chert: White, lt. gray, gray, intensely weathered.

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 2 OF 3
DETAILS OF MSE RETAINING WALL
COUNTY ROAD 236 (ZION RD.)
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

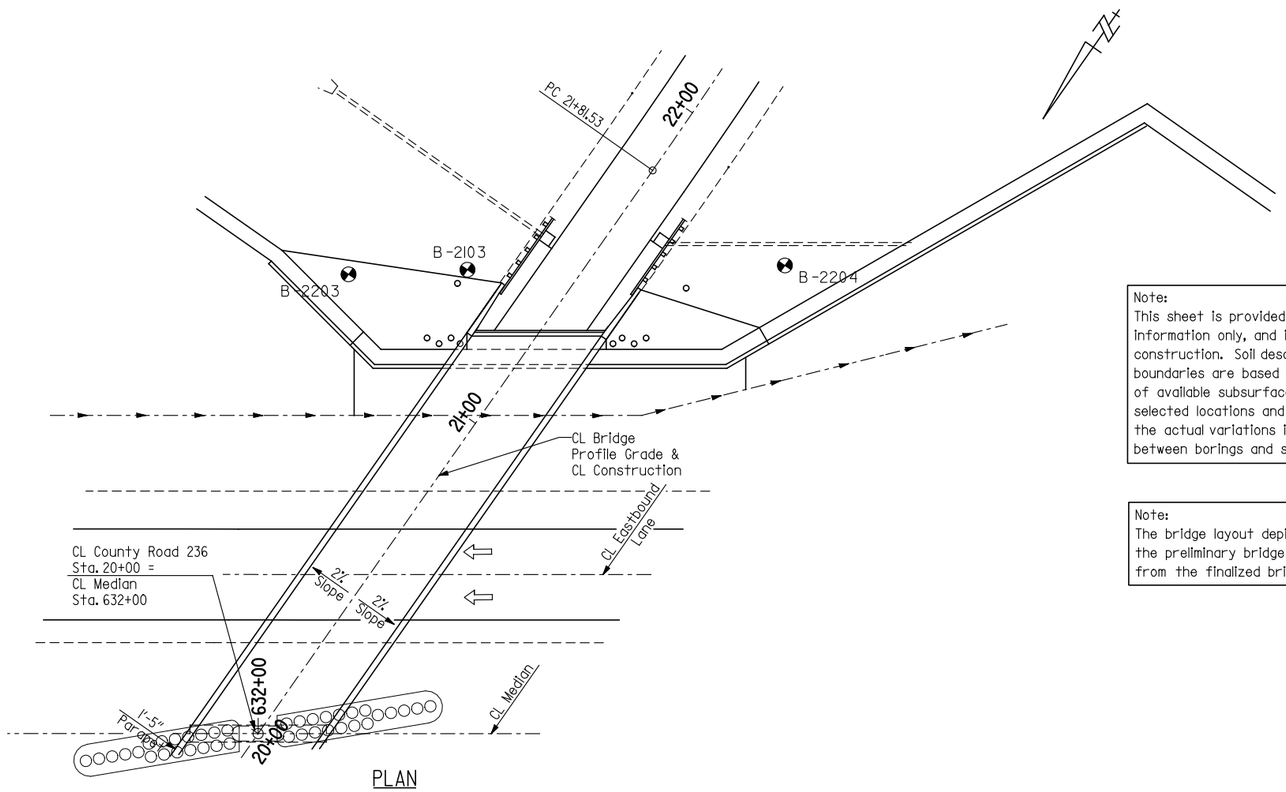
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①				



PLAN

Note:
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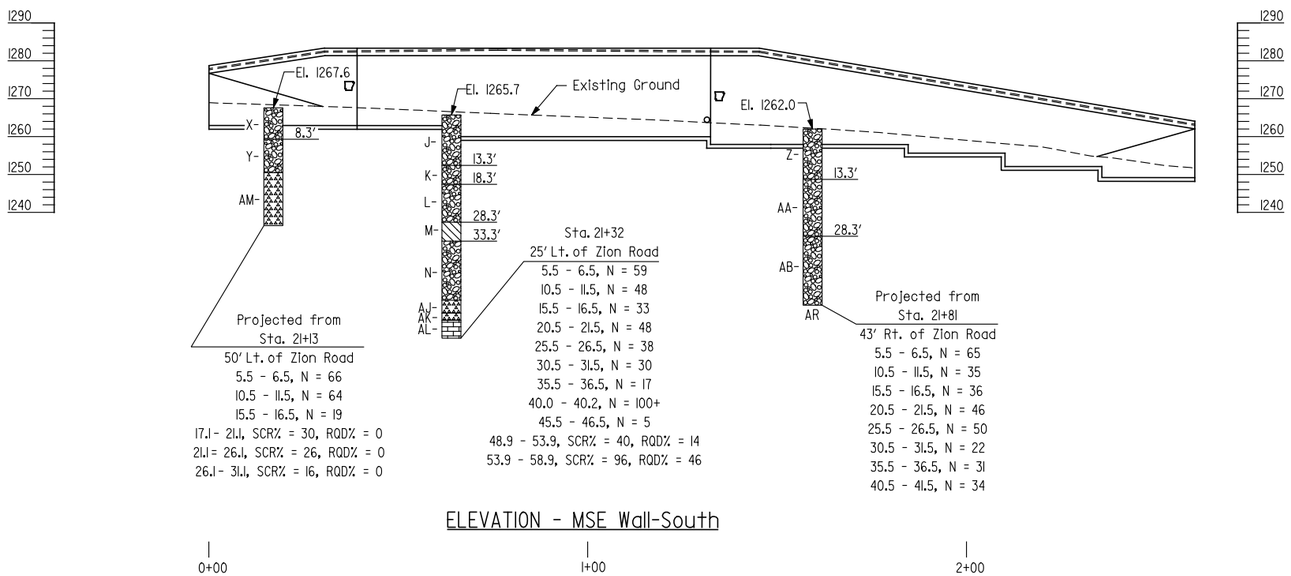
Note:
The bridge layout depicted herein is from the preliminary bridge plans and may differ from the finalized bridge design.

Boring Legend

A - Red, very dense, silty gravel with sand.
B - Red, dense to very dense, silty gravel with sand.
C - Red, dense, silty gravel with sand.
D - Red, hard, sandy lean clay.
E - Beige, medium dense to dense, silty gravel with sand.
F - Red, very dense, silty gravel with sand.
G - Red, medium dense to very dense, silty gravel with sand.
H - Red, very stiff, sandy lean clay.
I - Beige, medium dense to very dense, silty gravel with sand.
J - Red, dense to very dense, well-graded gravel with clay and sand.
K - Red, dense, silty gravel with sand.
L - Red, dense, silty gravel with sand.
M - Red, very stiff, sandy lean clay.
N - Red, loose to very dense, clayey gravel with sand.
O - Red, medium dense, clayey gravel with sand.
P - Red, medium dense to very dense, silty gravel with sand.
Q - Red, medium dense, silty gravel with sand.
R - Red, loose to very dense, clayey gravel with sand.
S - Light beige, very dense, silty gravel with sand.
T - Red, very dense, silty gravel with sand.
U - Red, medium dense to very dense, silty gravel with sand.
V - Red, very dense, clayey gravel with sand.
W - Light beige, very dense, silty gravel with sand.
X - Red, very dense, clayey gravel with sand.
Y - Red, medium dense to very dense, silty gravel with sand.
Z - Red, dense to very dense, clayey gravel with sand.
AA - Red, dense, silty gravel with sand.
AB - Red, medium dense to dense, clayey gravel with sand.
AC - Chert: White, lt. gray, gray, fresh to weathered.
AD - Limestone: Lt. gray, gray, fresh to slightly weathered.
AE - Chert: White, lt. gray, gray, fresh.
AF - Chert: White, lt. gray, gray, fresh.
AG - Limestone: Lt. gray, gray, fresh to slightly weathered.
AH - Chert: White, lt. gray, gray, slightly staining.
AI - Limestone: Lt. gray, gray, fresh to slightly weathered.
AJ - Chert: Fragmented, intensely weathered.
AK - Chert: White, lt. gray, gray, fresh to moderately weathered.
AL - Limestone: Lt. gray, gray, fresh to slightly weathered.
AM - Chert: White, lt. gray, gray, intensely weathered.



ELEVATION - MSE Wall-South

Florence & Hutcheson, Inc.
Consulting Engineers

SHEET 3 OF 3
DETAILS OF MSE RETAINING WALL
COUNTY ROAD 236 (ZION RD.)
OVER US HIGHWAY 412
WASHINGTON COUNTY

ROUTE SEC.

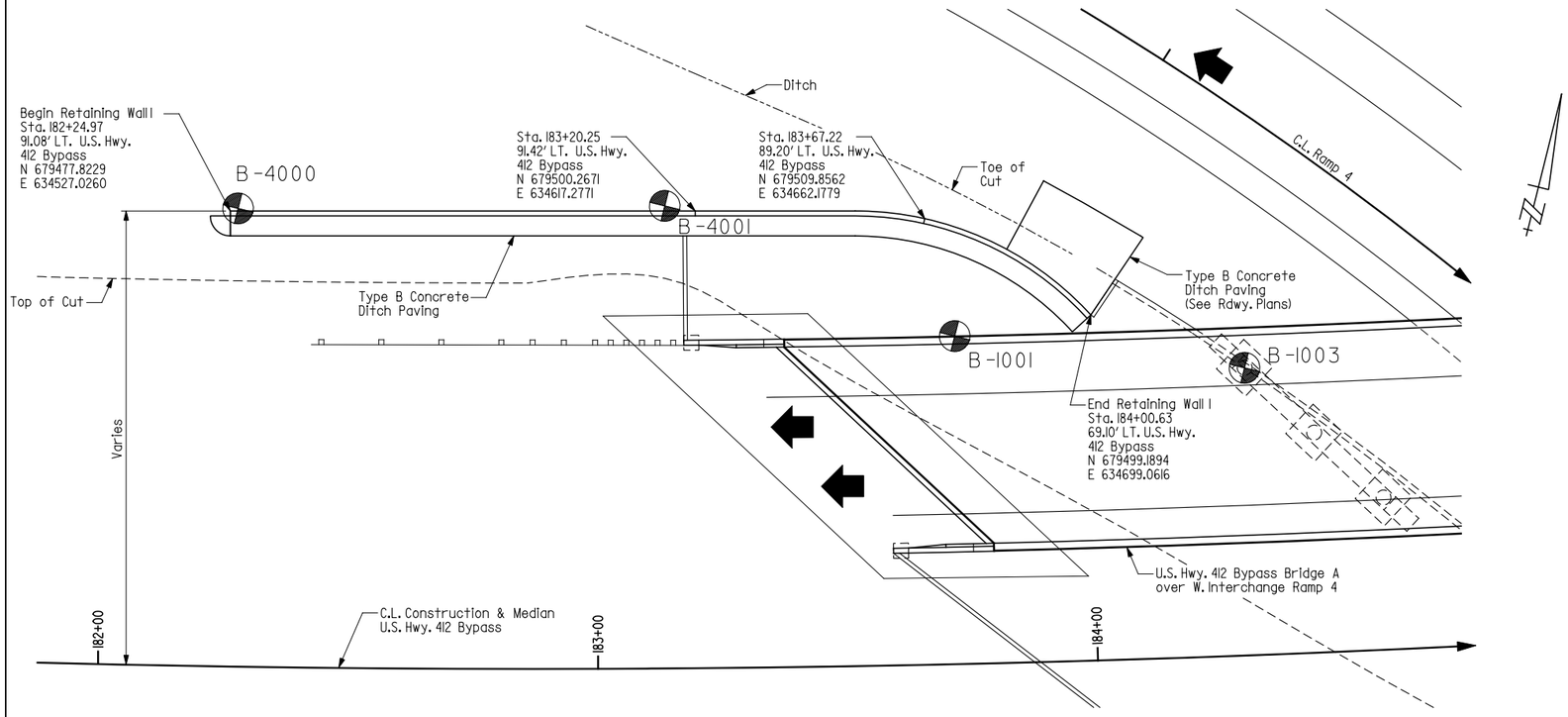
ARKANSAS STATE HIGHWAY COMMISSION
LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: 1"=20'
DESIGNED BY: DLC DATE: 7-12

BRIDGE ENGINEER

BRIDGE NO. DRAWING NO.

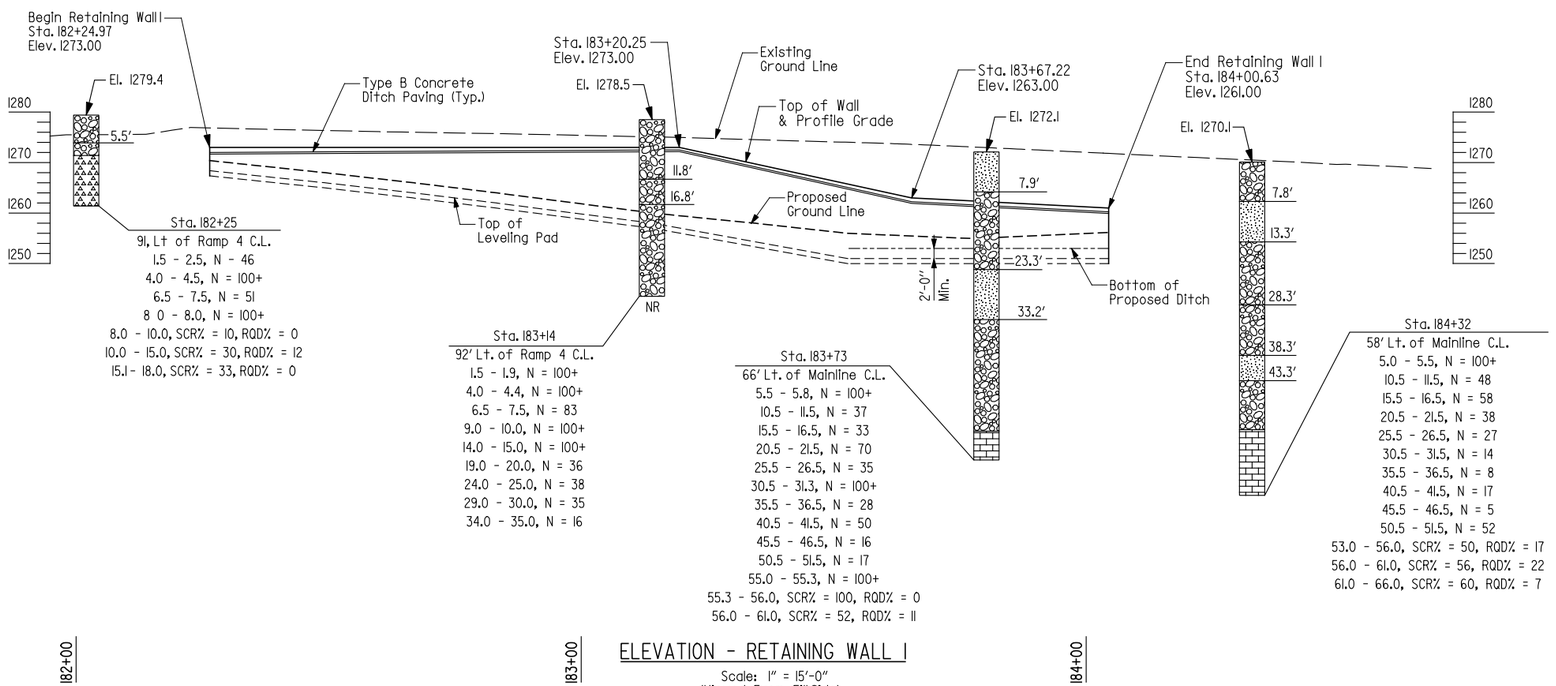
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①		RETAINING WALLS		



Note: Controlpoint stations and offsets in PLAN VIEW are measured to the outside vertical face of retaining wall and are radial to C.L. Median U.S. Hwy. 412 Bypass.

PLAN - RETAINING WALL I

Scale: 1" = 15'-0"



ELEVATION - RETAINING WALL I

Scale: 1" = 15'-0"
(Viewed From Fill Side)

Boring Legend

A - Orange & brown, dense to very dense, clayey gravel with sand.
B - Orange & brown, very dense, clayey gravel with sand.
C - Orange & brown, very dense, clayey gravel with sand.
D - Orange & brown, very dense, clayey gravel with sand.
E - Orange & brown, medium dense to dense, clayey gravel with sand.
F - Dark tan, very dense, clayey sand with gravel.
G - Dark tan & reddish brown, dense to very dense, clayey gravel with sand.
H - Tan, yellowish orange, reddish brown & reddish, dense to very dense, silty sand with gravel.
I - Brown, tan, light gray, light brown, white, gray & dark brown, medium dense to very dense, clayey gravel with sand.
J - Dark beige & dark tan, very dense, clayey gravel with sand.
K - Tan & black, dense to very dense, clayey sand with gravel.
L - Brown & tan, medium dense to dense, clayey gravel with sand.
M - Brown, dark brown & copper, loose to medium dense, clayey gravel with sand.
N - Brown & tan, medium dense, silty sand with gravel.
O - Dark brown & tan, loose to very dense, clayey gravel with sand.
P - Chert Fragments in Clay: Gray, moderately to severely weathered, vugular.
Q - Limestone: White, fine grain, chalky, severely weathered, fossiliferous.
R - Limestone: White to light gray, fine grain, chalky, severely weathered, fossiliferous.

PRELIMINARY
NOT FOR
CONSTRUCTION

??-??-10
DATE
BRIDGE ENGINEER

DETAILS OF MSE RETAINING WALL NO. I
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

ROUTE 412 SEC. 2

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12
FILENAME:
SCALE: AS SHOWN

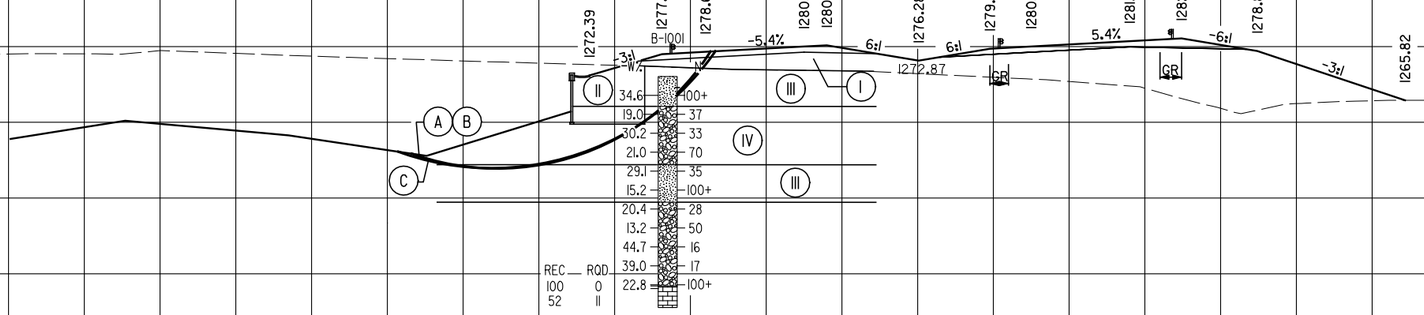
BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.6
Long Term	B	1.7
Seismic	C	1.4



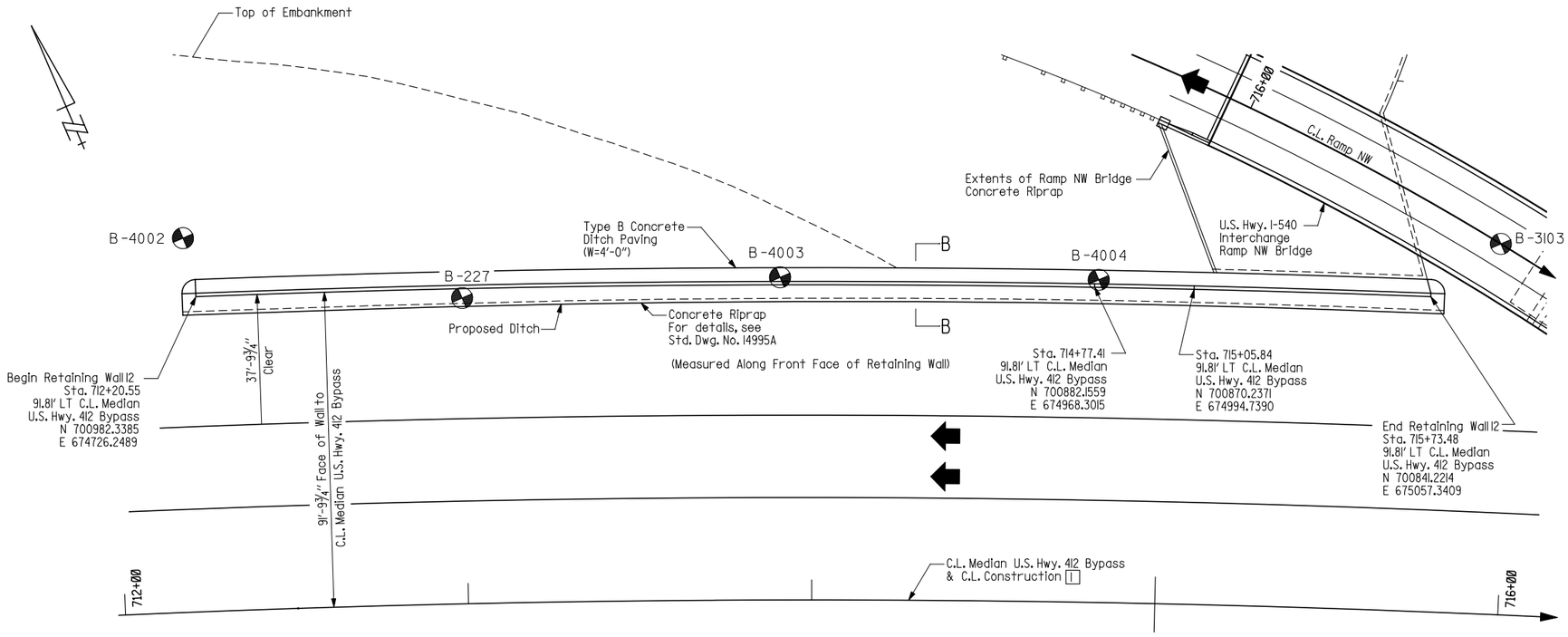
183+00.00

RETAINING WALL NO. 1
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

1420 1400 1380 1360 1340 1320 1300 1280 1260 1240

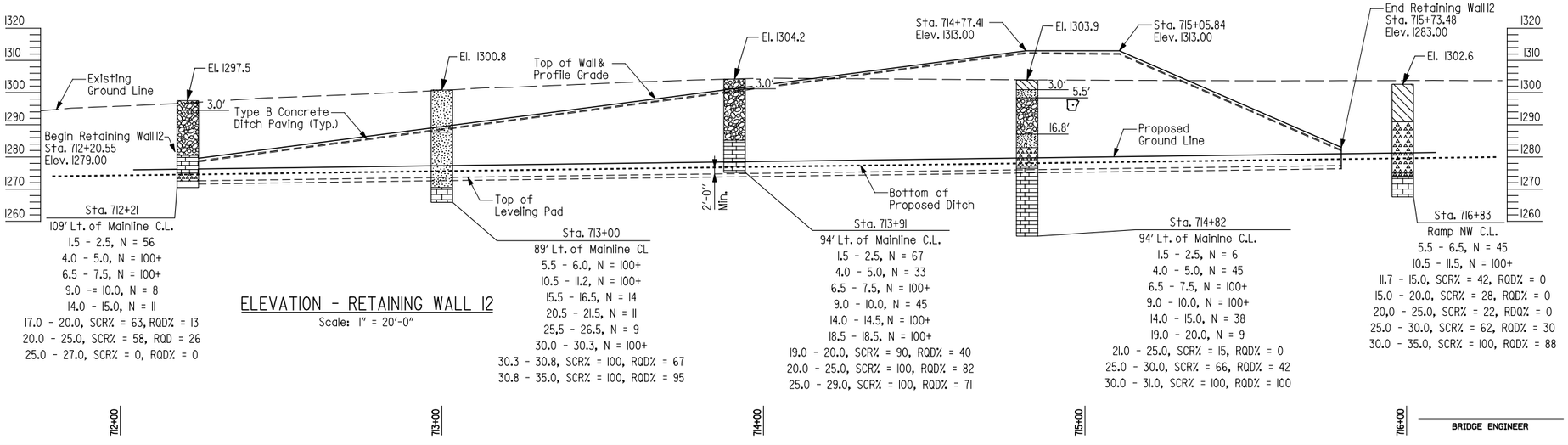
-220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①		RETAINING WALLS		



PLAN - RETAINING WALL 12

Scale: 1" = 20'-0"



ELEVATION - RETAINING WALL 12

Scale: 1" = 20'-0"

Boring Legend

A - Orange & brown, very dense, silty gravel with sand.
B - Orange & brown, loose to very dense, clayey gravel with sand.
C - Brown, white & red, clayey sand with gravel.
D - Brown, beige & white, silty sand with gravel.
E - Orange & brown, very dense, silty gravel with sand.
F - Orange & brown, dense to very dense, clayey gravel with sand.
G - Orange & brown, medium stiff, lean clay with sand.
H - Orange & brown, dense, clayey sand with gravel.
I - Orange & brown, dense to very dense, clayey gravel with sand.
J - Orange & brown, loose, silty sand with gravel.
K - Red, hard to very hard, fat clay with sand.
L - Limestone: Light gray-lt. brown, lt. brown, red-orange-brown, slightly to severely weathered, f. crystalline to lithographic.
M - Chert: Light brown-white, severely weathered, vugular.
N - Limestone: White, gray, cryptocrystalline, moderately to severely weathered.
O - Limestone: White, gray, brown & orange, slightly to moderately weathered.
P - Chert Fragments in Clay: Light brown, red-brown-orange, pouous, vugular.
Q - Limestone: Light brown-white, gray, red-orange, moderately weathered.
R - Chert Fragments: Angular to subrounded, white, gray, tan, highly weathered, clay seams.
S - Chert: White, gray, tan, slightly to moderately weathered.
T - Limestone: White, gray, microcrystalline to medium grain, fresh w/slight weathering on discontinuities, styolites.

PRELIMINARY NOT FOR CONSTRUCTION

??-??-10
DATE

BRIDGE ENGINEER

DETAILS OF MSE RETAINING WALL NO. 12
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

ROUTE 412 SEC. 2

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

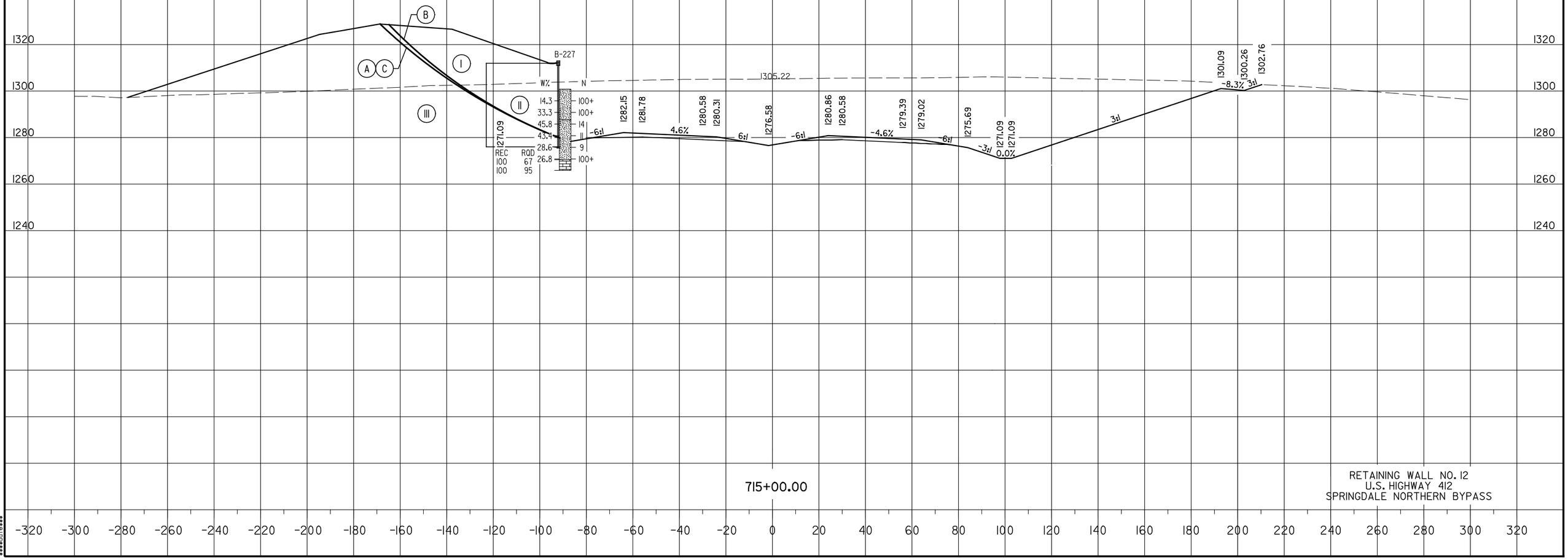
BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

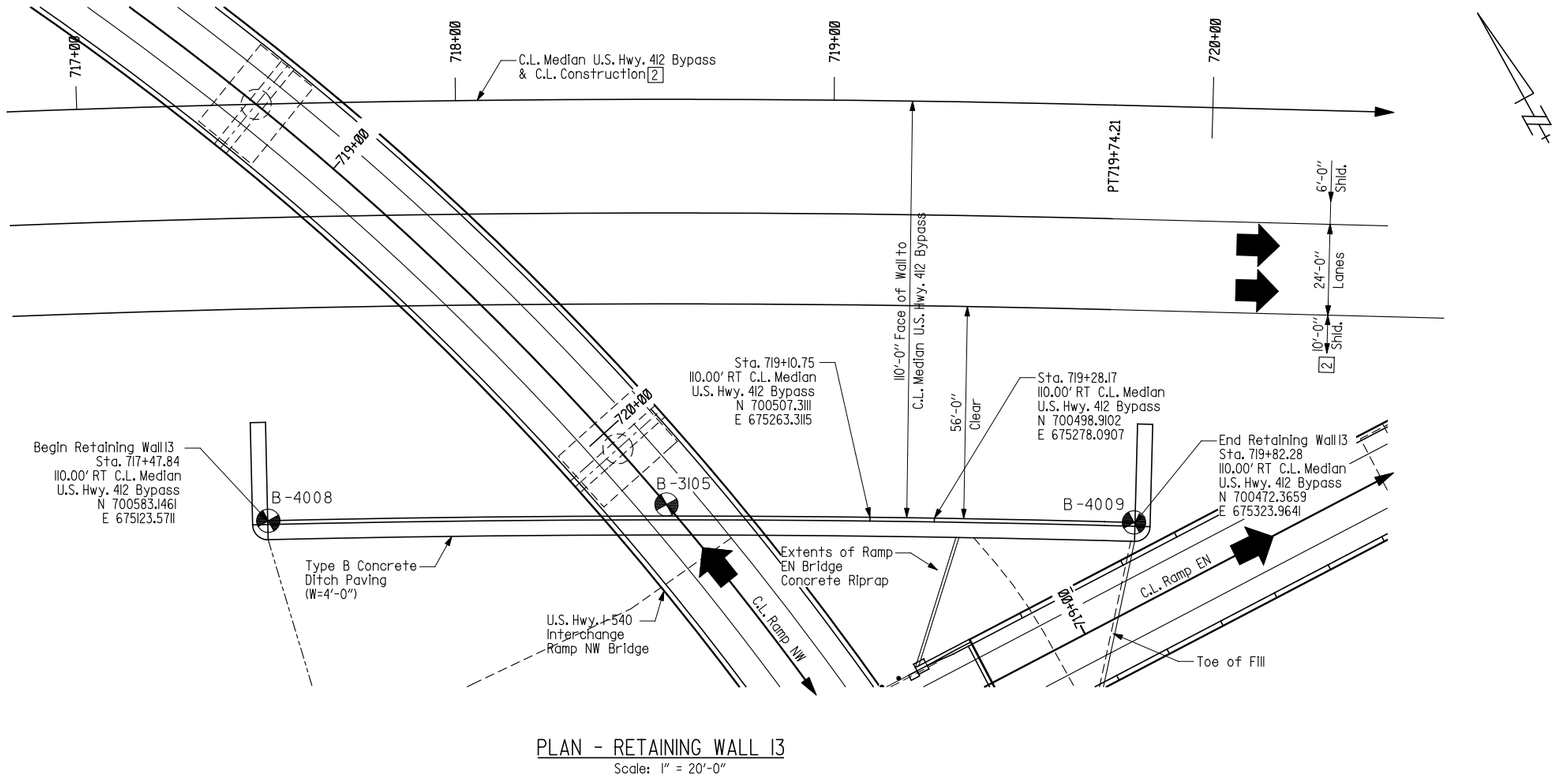
ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.5
Seismic	C	1.3

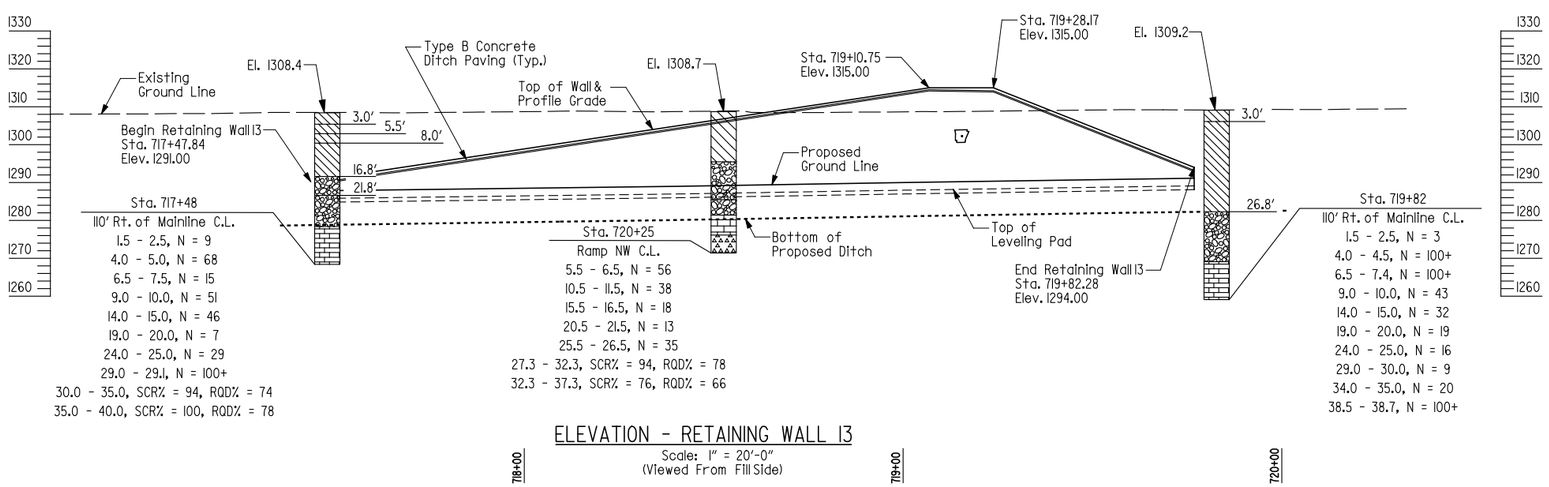


RETAINING WALL NO. 12
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①		RETAINING WALLS		



PLAN - RETAINING WALL 13
Scale: 1" = 20'-0"



ELEVATION - RETAINING WALL 13
Scale: 1" = 20'-0"
(Viewed From Fill Side)

Boring Legend

A - Orange & brown, stiff, lean clay with sand.
B - Orange & brown, very hard, gravelly fat clay with sand.
C - Orange & brown, stiff, gravelly lean clay with sand.
D - Orange & brown, hard, gravelly fat clay with sand.
E - Orange & brown, loose, silty gravel with sand.
F - Orange & brown, medium dense to very dense, silty gravel with sand.
G - Red, dense to very dense, fat clay with sand.
H - Red & brown, medium dense, silty gravel with sand.
I - Red, dense, silty gravel with sand.
J - Orange & brown, soft, lean clay with sand.
K - Orange & brown, very stiff to very hard, gravelly fat clay with sand.
L - Brown, loose to very dense, silty gravel with sand.
M - Limestone: White, gray, trcs. brown & orange, slightly to moderately severely weathered.
N - Limestone: White, gray, microcrystalline to macrocrystalline.
O - Chert: White, gray, fresh, intermittent limestone beds.
P - Limestone: White, gray, moderately severe to severely weathered.

PRELIMINARY NOT FOR CONSTRUCTION

??-??-10
DATE
BRIDGE ENGINEER

DETAILS OF MSE RETAINING WALL NO. 13
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

ROUTE 412 SEC. 2

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

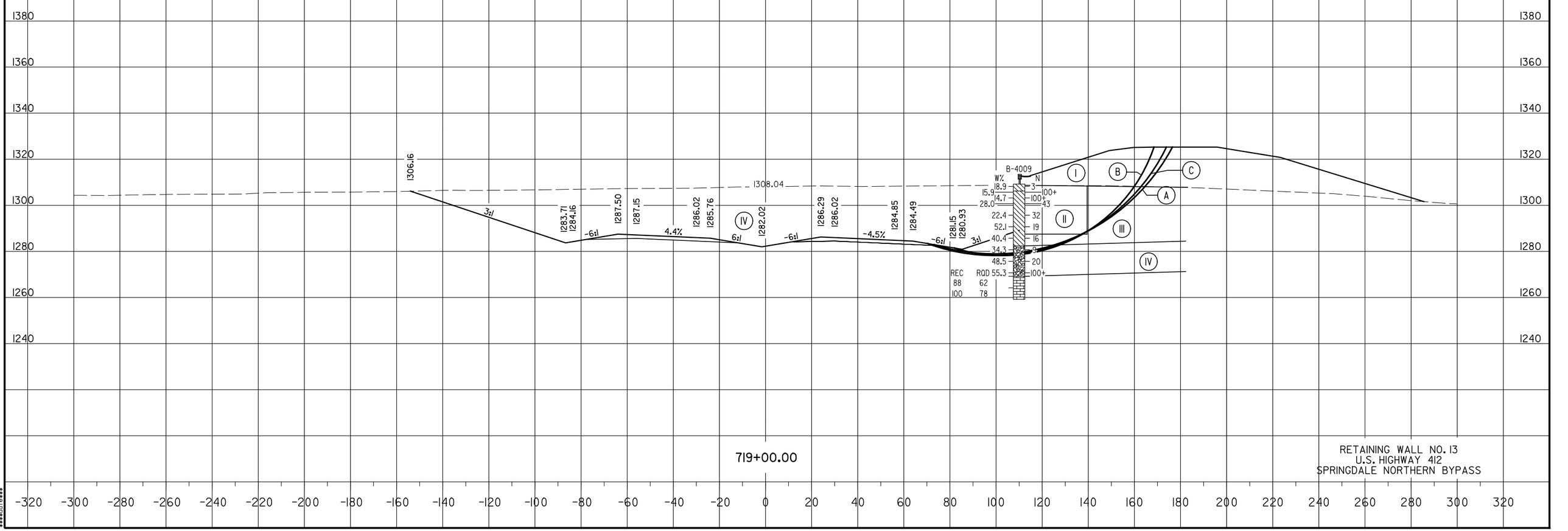
BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

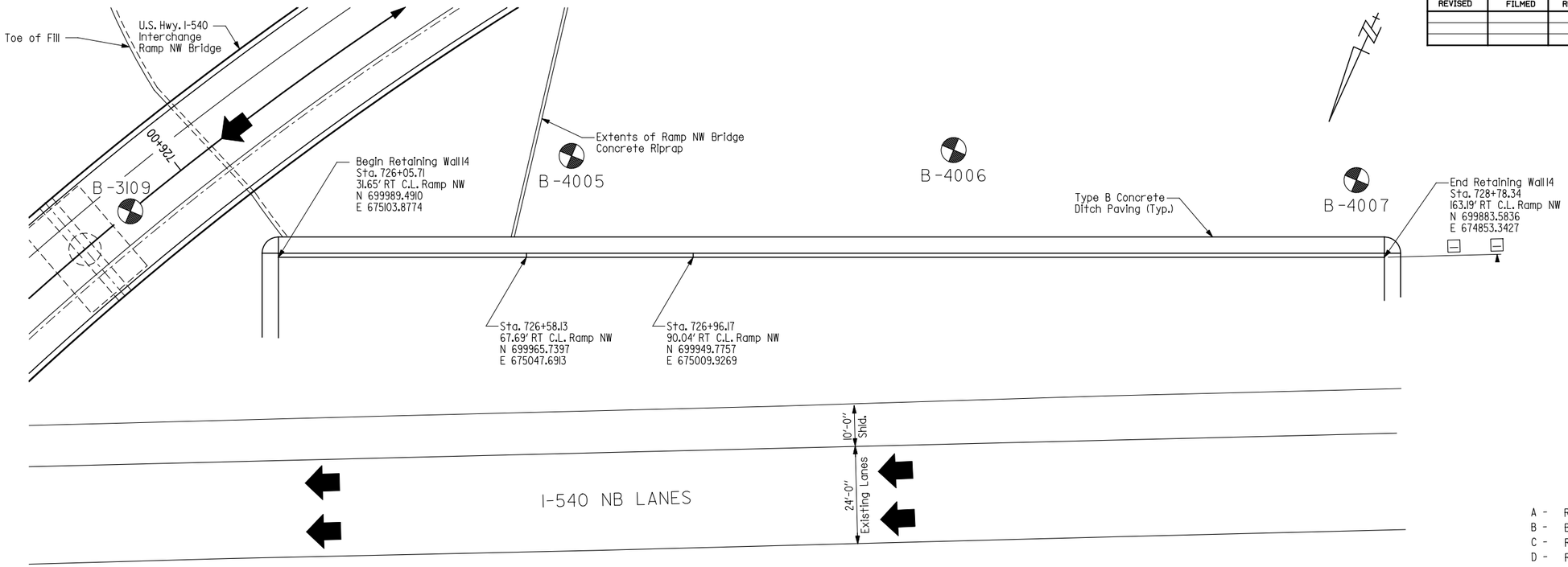
ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 2000 PSF Φ= 0° γ= 120 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 400 PSF $\bar{\Phi}$= 30° γ= 120 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.6
Long Term	B	1.6
Seismic	C	1.4

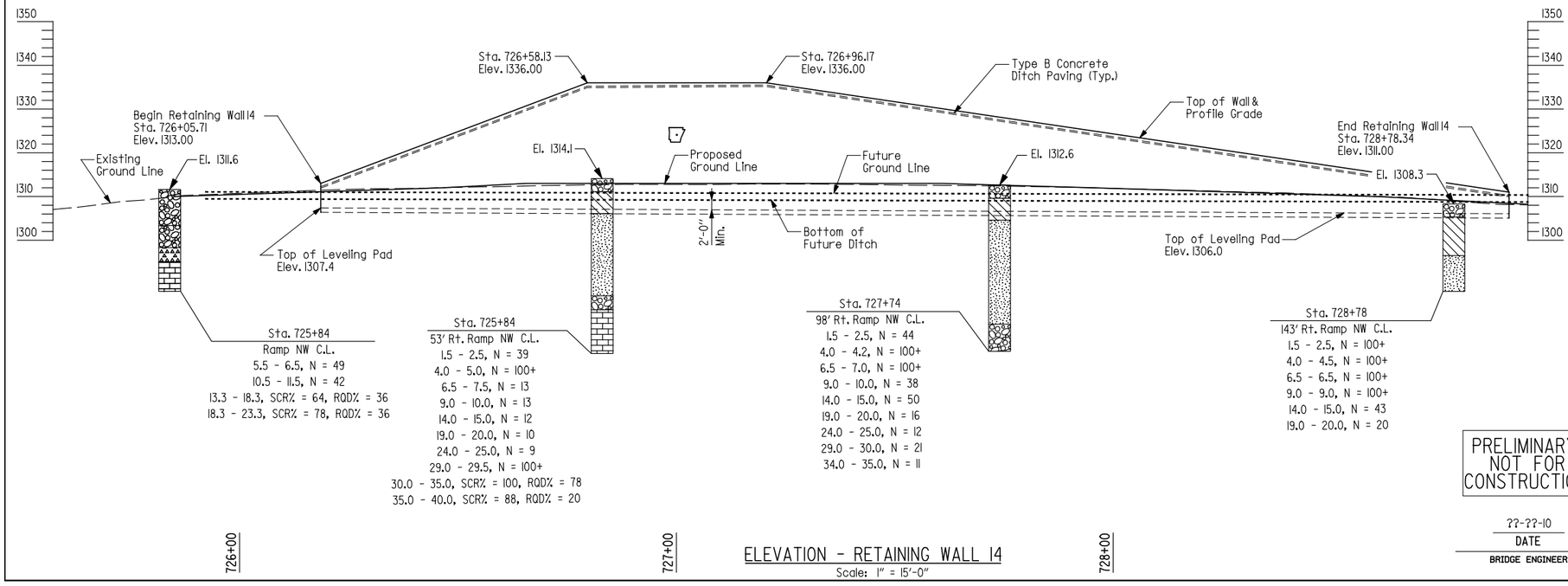


RETAINING WALL NO. 13
U.S. HIGHWAY 412
SPRINGDALE NORTHERN BYPASS

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①		RETAINING WALLS		



PLAN - RETAINING WALL 14
Scale: 1" = 15'-0"



ELEVATION - RETAINING WALL 14
Scale: 1" = 15'-0"

Boring Legend

- A - Red, dense, clayey gravel with sand.
- B - Brown, dense, silty gravel with sand.
- C - Red & brown, dense, silty gravel with sand.
- D - Red & brown, stiff to very hard, sandy lean clay with gravel.
- E - Red & brown, loose to medium dense, silty sand with gravel.
- F - Red & brown, very dense, silty gravel with sand.
- G - Red & brown, dense, silty gravel with sand.
- H - Red & brown, very hard, sandy lean clay with gravel.
- I - Red & brown, medium dense to dense, silty sand with gravel.
- J - Brown, medium dense, silty gravel with sand.
- K - Red & brown, very dense, silty gravel with sand.
- L - Red & brown, very hard, sandy lean clay with gravel.
- M - Red & brown, medium dense to dense, silty sand with gravel.
- N - Chert Fragments: Chert fragments and core loss.
- O - Chert: White, gray, tan, fresh to highly weathered.
- P - Limestone: White, gray, microcrystalline to medium grain.
- Q - Limestone: Core loss, fragments.
- R - Limestone: White, gray, brown, orange-red, slightly weathered to severely weathered & broken.

PRELIMINARY NOT FOR CONSTRUCTION

??-??-10
DATE
BRIDGE ENGINEER

DETAILS OF MSE RETAINING WALL NO. 14
U.S. HIGHWAY I-540
SPRINGDALE NORTHERN BYPASS

ROUTE 412 SEC. 2

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12 FILENAME:
CHECKED BY: AKV DATE: 7-12 SCALE: AS SHOWN
DESIGNED BY: DLC DATE: 7-12

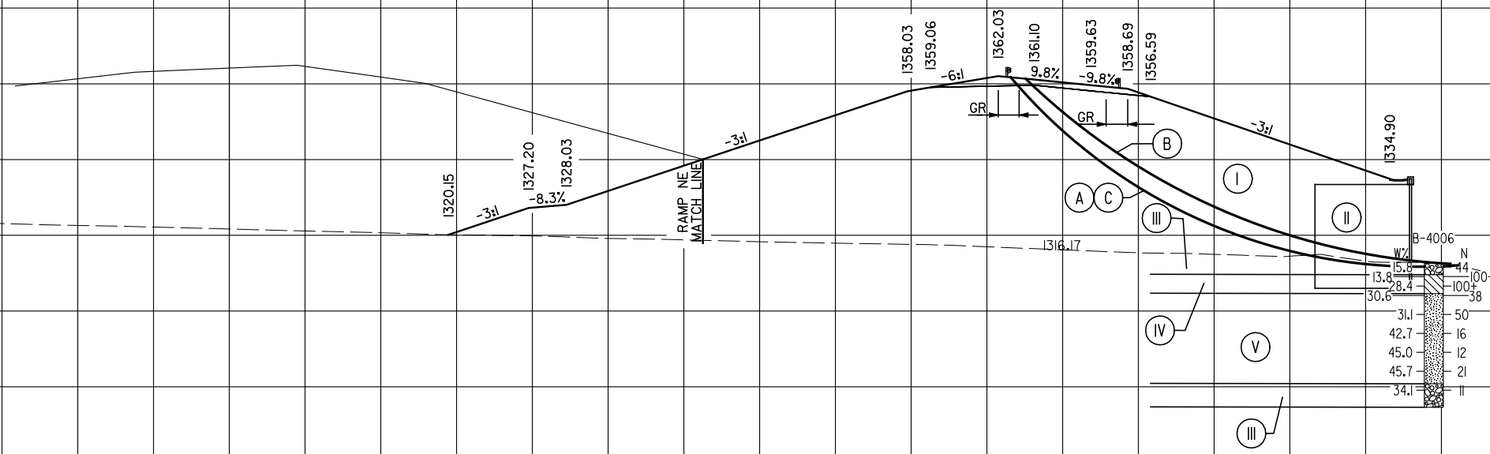
BRIDGE NO. DRAWING NO.

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 1000 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 2000 PSF Φ= 0° γ= 120 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 400 PSF $\bar{\Phi}$= 30° γ= 120 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.3
Long Term	B	1.5
Seismic	C	1.2



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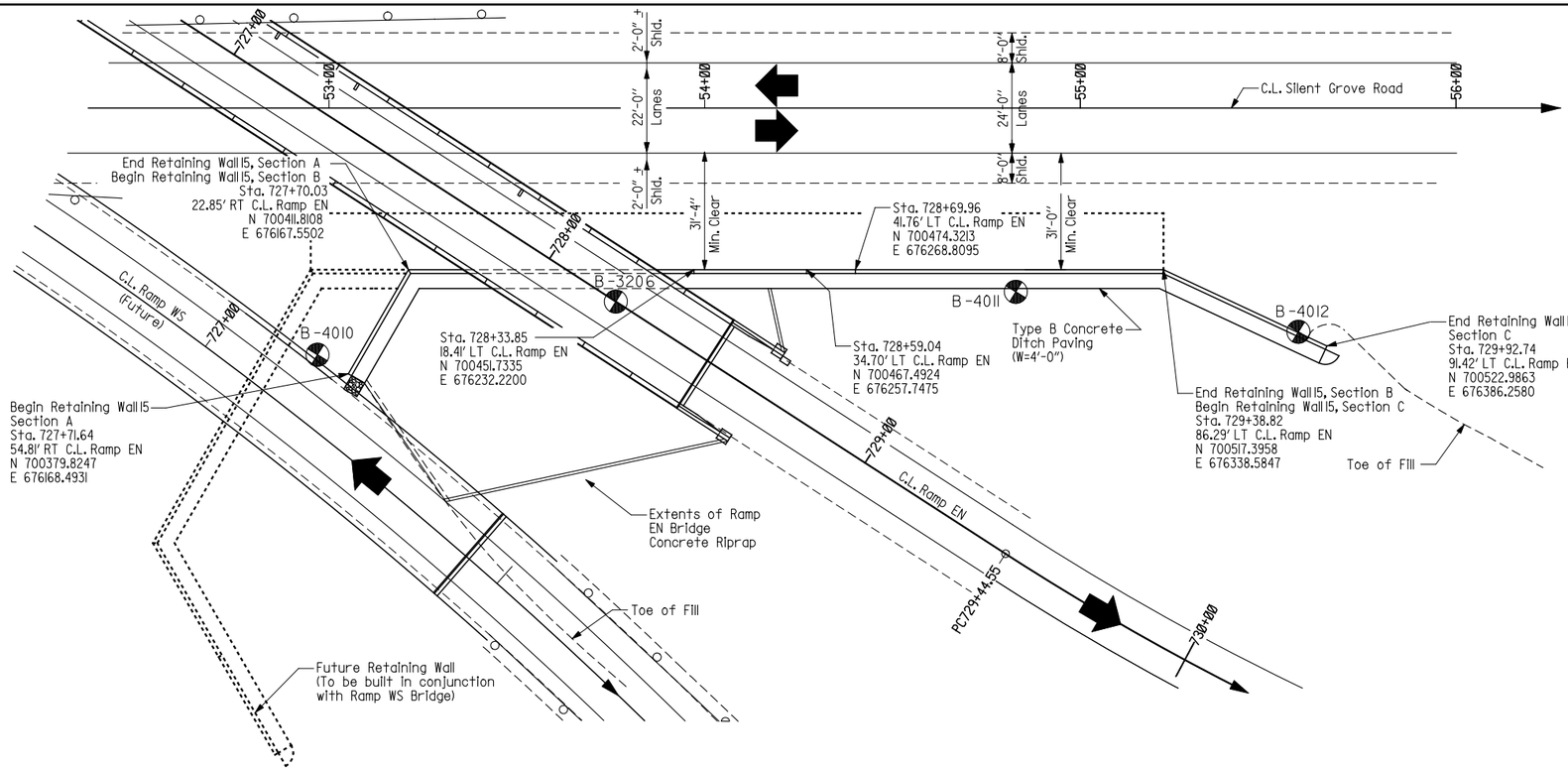
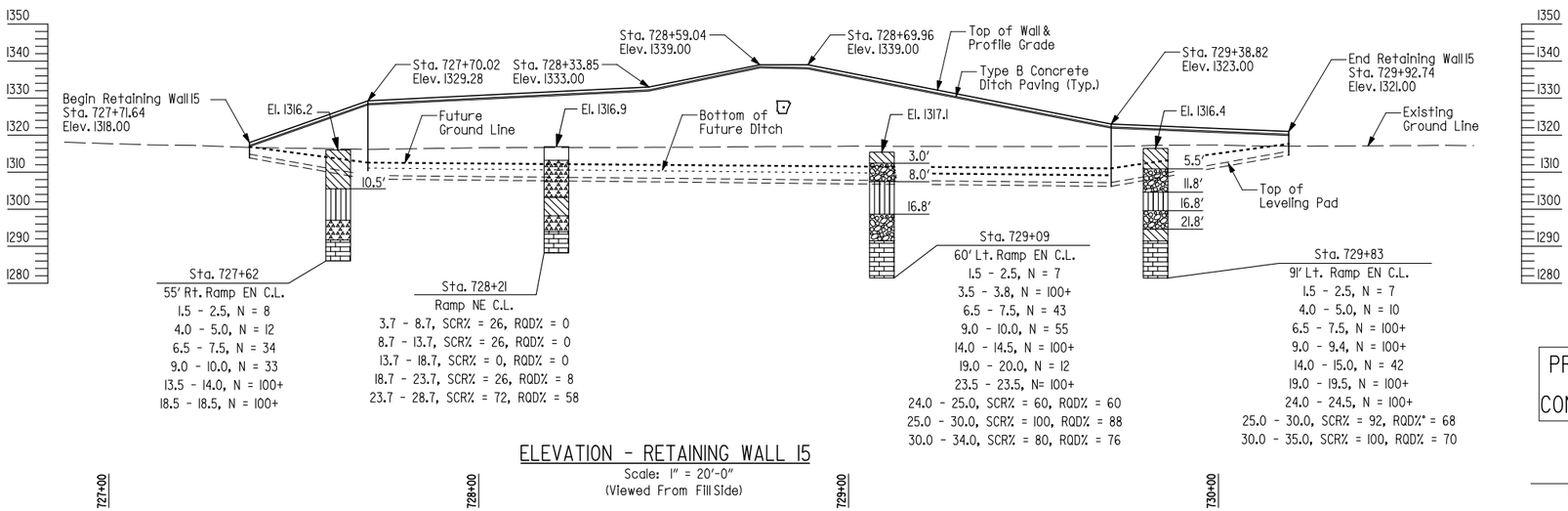
RETAINING WALL NO. 14
U.S. HIGHWAY I-540
SPRINGDALE NORTHERN BYPASS



PLAN - RETAINING WALL 15

Scale: 1" = 20'-0"



ELEVATION - RETAINING WALL 15

Scale: 1" = 20'-0"
(Viewed From Fill Side)

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		001966		
				①		RETAINING WALLS		

Boring Legend

A - Orange & brown, medium stiff to hard, lean clay with sand.
B - Orange & brown, very hard, elastic silt with gravel.
C - Orange & brown, medium stiff, lean clay with sand.
D - Orange & brown, dense to very dense, clayey gravel with sand.
E - Orange & brown, hard to very hard, elastic silt with gravel.
F - Orange & brown, medium dense to very dense, poorly graded gravel with silt and sand.
G - Orange & brown, medium stiff to stiff, lean clay with sand.
H - Orange & brown, very dense, clayey gravel with sand.
I - Orange & brown, hard, elastic silt with gravel.
J - Orange & brown, very dense, poorly graded gravel with silt and sand.
K - Orange & brown, very dense, sandy lean clay.
L - Chert Fragments & Clay: Light gray, white, lt. brown, severely weathered.
M - Limestone: Light gray, lt. brown, moderately weathered.
N - Chert: White, lt. gray, moderately to intensely weathered.
O - Core loss attributed to dissolutioning and clay.
P - Chert: White, lt. gray, moderately to intensely weathered.
Q - Limestone: Light gray, gray, fresh to moderately weathered.
R - Limestone: Gray, lt. gray-lt. brown, white, fresh to slightly weathered.
S - Limestone: White, gray, fresh w/few severely weathered seams.

PRELIMINARY
NOT FOR
CONSTRUCTION

??-??-10
DATE

BRIDGE ENGINEER

DETAILS OF MSE RETAINING WALL NO. 15
RAMP EN
SPRINGDALE NORTHERN BYPASS

ROUTE 412 SEC. 2

ARKANSAS STATE HIGHWAY COMMISSION

LITTLE ROCK, ARK.

DRAWN BY: TAR DATE: 7-12
CHECKED BY: AKV DATE: 7-12
DESIGNED BY: DLC DATE: 7-12

FILENAME:
SCALE: AS SHOWN

BRIDGE NO.

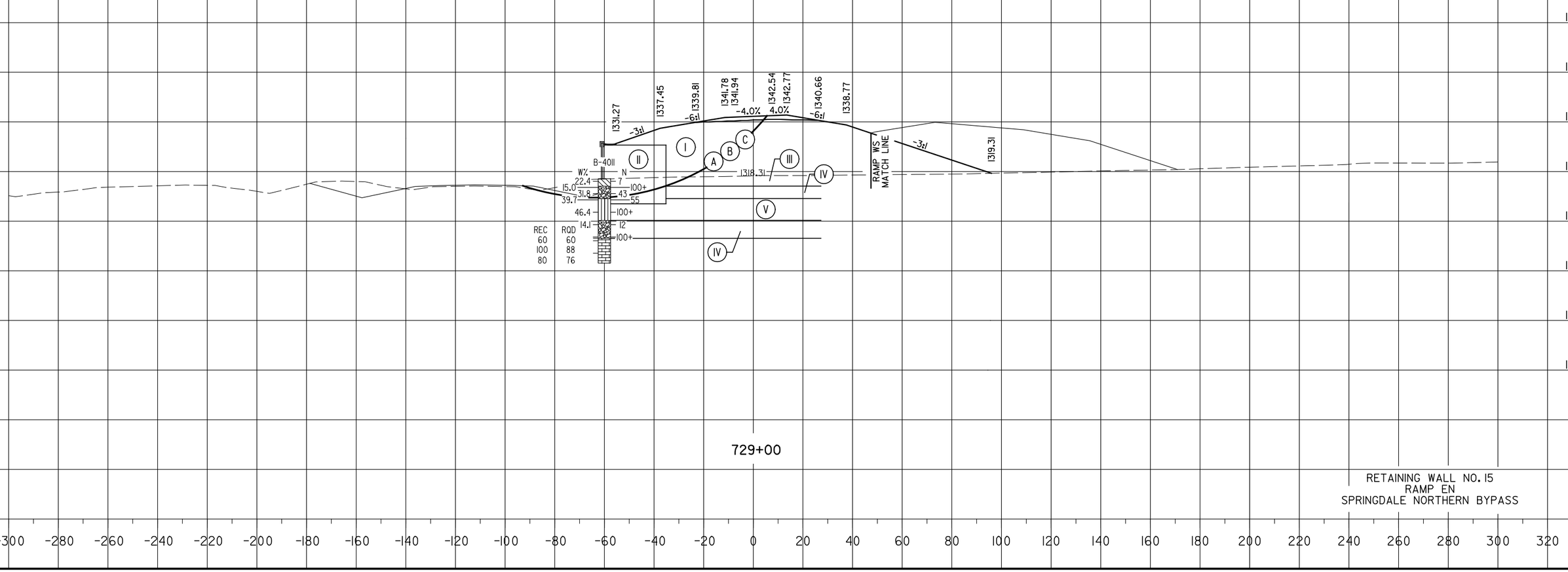
DRAWING NO.

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 1500 PSF Φ= 0° γ= 120 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 300 PSF $\bar{\Phi}$= 30° γ= 120 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.8
Long Term	B	1.8
Seismic	C	1.4



RETAINING WALL NO. 15
RAMP EN
SPRINGDALE NORTHERN BYPASS

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

P.O. Box 7267 • Paducah, Kentucky 42002-7267

2550 Irvin Cobb Drive • Paducah, Kentucky 42003

FINAL REVISED GEOTECHNICAL REPORT FOR PROPOSED ROADWAY

SPRINGDALE NORTHERN BYPASS (US 412 RELOCATED) BENTON & WASHINGTON COUNTIES, ARKANSAS

Job No. 001966

PREPARED FOR

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

MARCH 2009

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

March 18, 2009

Mrs. Jessie Jones, P.E.
Consultant Coordinator
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, AR 72203-2261

Re: Job No. 001966 – *FINAL REVISED* Geotechnical Roadway Report
Springdale Northern Bypass (US 412 Relocated)
Benton and Washington Counties

Dear Mrs. Jones:

We have completed the *FINAL REVISED* Geotechnical Roadway Report for the referenced project. This report was previously submitted as FINAL. With this report, we have revised the final report to reflect discussions and issues as well as comments received from Jon Annable. This report and discussion reflects the latest geotechnical data as it relates to the current alignment geometry.

Thank you for the opportunity to provide geotechnical services to the Arkansas State Highway and Transportation Department. Please call at your convenience if you have questions or comments.

Sincerely,

FLORENCE & HUTCHESON, INC.

Devin Chittenden, P.E.
Project Engineer

g:\06127\docs\Reports\Final Revised Roadway Report.doc

P.O. Box 7267 • Paducah, Kentucky 42002-7267 • 2550 Irvin Cobb Drive • Paducah, Kentucky 42003 • (270) 444-9691 • fax (270) 443-3943

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APPENDIX I BORING LOGS

APPENDIX II LABORATORY DATA

APPENDIX III DESIGN CROSS SECTIONS

1. INTRODUCTION

This report defines subsurface conditions and provides geotechnical conclusions and recommendations for the design and construction of the proposed realignment of Springdale Northern Bypass (U.S. 412 Relocated) in Benton and Washington Counties, Arkansas. Test borings were advanced and soil and rock samples were collected and delivered to the Florence & Hutcheson laboratory for further testing and analysis. Geotechnical parameters are provided in this report resulting from the evaluation of the soil conditions along the proposed roadway alignment. Stability of cut/fill slopes and settlements of the proposed embankments are discussed. Recommendations for problematic areas along the alignment are included.

2. PROJECT DESCRIPTION

The proposed 11.2± mile realignment of Springdale Northern Bypass (U.S. 412 Relocated), including ramps and crossroads, extends from the end of the existing four-lane segment of U.S. 412 west of Springdale to near the I-540 interchange. The proposed roadway will provide a four lane template with the following 9 sets of dual bridges:

Springdale Northern Bypass (U.S. 412 Relocated) over Ramp 4
Springdale Northern Bypass (U.S. 412 Relocated) over Old Highway 68
Springdale Northern Bypass (U.S. 412 Relocated) over Javello Road
Springdale Northern Bypass (U.S. 412 Relocated) over Marchant Road
Springdale Northern Bypass (U.S. 412 Relocated) over Robbins Road
Springdale Northern Bypass (U.S. 412 Relocated) over Puppy Creek
Springdale Northern Bypass (U.S. 412 Relocated) over Brush Creek and Brush Creek Road
Springdale Northern Bypass (U.S. 412 Relocated) over Spring Creek
Springdale Northern Bypass (U.S. 412 Relocated) over East Wagon Wheel Road.

Additional cross road bridges over U.S. 412 Relocated include the following: Liberty Road, Highway 112, Grimsley Road, Spring Creek Road, and Zion Road.

In addition, the following five sets of single bridges along ramp alignments connecting Springdale Northern Bypass (U.S. 412 Relocated) to I-540 are included:

Ramp EN over Puppy Creek
Ramp EN over I-540
Ramp NW over I-540
Ramp EN over Silent Grove Road
Ramp SE over Goad Springs Road

Assessment of the subsurface conditions, as well as foundation recommendations for each of the proposed bridges, has been included in separate geotechnical bridge reports.

The project corridor crosses terrain described as primarily gently rolling with hilly intervals and relatively steep sided, flat bottom drainage courses cut downward into the upland surfaces. Existing subdivisions, subdivisions under development, pasture areas and heavy woods were encountered along the proposed alignments with scattered low lying wet areas and ponds.

3. FIELD AND LABORATORY PROCEDURES

Florence & Hutcheson performed test borings in order to evaluate the subsurface conditions and analyze the proposed cut and embankment slopes for stability as well as determine settlement relative to the proposed construction. Three hundred and forty-six (346) borings were advanced along the mainline, crossroad and ramp alignments for roadway design purposes. Bulk sampling, standard penetration testing and shelby tube sampling were performed at select locations. The borings were advanced to depths ranging from 5.0' to 61.0'. A CME 45-B trailer mounted drill rig, a CME 55 truck mounted drill rig and a CME 45-C track mounted drill rig were utilized to advance the borings using 3¼" I.D. hollow stem augers. Standard penetration testing (ASTM D1586) and shelby tube sampling (ASTM D1587) was performed in select borings, as well as rock coring using Longyear NQ2 wireline tooling. Auger refusal was encountered within the borings at various depths. Typical soils include lean clay, lean clay with sand, silty sand, clayey sand, sandy silt and sandy lean clay. Boring Logs are presented in Appendix I.

Collected samples were delivered to the Florence & Hutcheson laboratory for further testing and analysis. Laboratory tests performed on representative samples included natural moisture content, liquid limit, plastic limit, grain size analysis, California Bearing Ratio, moisture-density relationship (proctor), consolidation, unconfined compression and triaxial compression. Selected soil samples were tested to determine the AASHTO and Unified Soil Classification. Results of the laboratory testing are presented in Appendix II.

The soil groups encountered during the field investigation consist of a wide variety of AASHTO Classifications. Table 3.1 is a brief summary of the soil classifications within the project:

Table 3.1 Summary of Soil Classifications and Descriptions

A-1-a (0), SW-SM	Well graded sands with silt and gravel; Liquid Limit NP; Plasticity Index NP.
A-1-b (0), GM	Silty gravels with sand; Liquid Limit NP to 29; Plasticity Index NP to 6.
A-2-4 (0), GM, SM, and SC-SM	Silty gravels with sand, silty sands with gravel, and clayey sands with gravel; Liquid Limit range NP to 38; Plasticity Index range NP to 7.
A-2-6 (0-2), GC, GP-GC, GM, and SC	Clayey gravels with sand, clayey sands with gravel, poorly graded gravels with clay and sand; Liquid Limit range NP to 40; Plasticity Index NP to 21.
A-2-7 (2-6), GC and SC	Clayey gravels with sand, clayey sands with gravel, and clayey sands; Liquid Limit range 41 to 58; Plasticity Index range 22 to 39.
A-4 (0-2, and 5), GM, SM, SC, ML, CL, and CL-ML	Clayey sands with gravel, sandy silts, sandy lean clays, sandy silty clays, silty sands with gravel, gravelly silty clays with sand, gravelly silts with sands, silty gravels with sand; Liquid Limit range NP to 37; Plasticity Index range NP to 10.
A-5 (0), SM	Silty sands with gravel; Liquid Limit 41; Plasticity Index 7.
A-6 (1-13, and 17), GC, GM, SM, SC and CL	Lean clays, lean clays with sand, sandy lean clays, sandy lean clays with gravel, gravelly lean clays with sand, clayey sands, clayey sands with gravel, clayey gravels with sand, silty sands with gravel, silty gravels with sand; Liquid Limit range 30 to 40; Plasticity Index range 11 to 21.
A-7-5 (2-3), GC and SC	Clayey sands, clayey sands with gravel, clayey gravels with sand; Liquid Limit range 41 to 50; Plasticity Index range 22 to 29.
A-7-6 (3-5, 7-9, 11-18, 20, 22, 24, 26, and 30), GM, GC, SM, SC, CL, and CH	Lean clays, lean clays with sand, sandy lean clays, sandy lean clays with gravel, gravelly lean clays, gravelly fat clays, sandy fat clays with gravel, fat clays with sand, sandy fat clays, clayey sands, clayey sands with gravel, clayey gravels with sand, silty sands with gravel, silty gravels with sand; Liquid Limit range 41 to 67; Plasticity Index range 16 to 43.

4. SITE CONDITIONS

4.1 Geology

The Springdale Northern Bypass (U.S. 412 Relocated) alignment is located within the Ozark Geomorphic Province, Springfield Plateau Section. Topographic mapping indicates elevations ranging from approximately 1660 feet at the middle peak of Fitzgerald Mountain to 1140 feet in Brush Creek bottom. Elevations within the proposed alignment corridor range from 1360 feet near the End of Project to 1140 feet within Brush Creek and Spring Creek floodplains.

Underlying the generally cherty clay and chert rubble residual soils and thin creek valley alluvium throughout the proposed alignment corridor is weathered chert residuum and limestone interbedded with chert of the Mississippian Boone Formation. Local topographic features Callahan Mountain, Fitzgerald Mountain, Webber Mountain and

Price Mountain, located east of the project, are remnants of younger, resistant Mississippian units Batesville Sandstone, Fayetteville Shale and Pitkin Limestone in ascending order. Regional structural formation dip is relatively flat and locally variable. Faulting, as indicated on the *Arkansas State Geologic Map* (Haley, et. al., 1993) and on various unpublished geologist's proofs (Glick 1970-1972), trends generally northeast-southwest. Faulting is not indicated within the limits of the subject project alignment.

Residual soils developed upon the Boone Formation are composed primarily of unconsolidated clay, minor fractions of silt and widely variable fractions of sand, gravel and cobble size weathered chert fragments. The presence of chert fragments, bedded in some instances, resulted in false auger refusal throughout the proposed alignment making prediction of depth to consolidated rock difficult. Auger refusals suggest a depth to rock range of 3 feet to 12 feet however core borings suggest depths to consolidated rock or base of weathered rock to range from 25 feet to 50 feet or more. It is anticipated that the residuum may be excavated with conventional earthmoving equipment however the use of explosives may be required within some intervals and depths of residuum.

Alluvium, deposited within the floodplains of Brush Creek, Spring Creek and Puppy Creek, consisted of clay and silt fractions with varying fractions of sand and gravel. Visual inspection of the sediments indicated small bars of gravelly sediment but with the majority of the floodplain containing sufficient fine grain sediment to support vegetative growth. Sediments within this setting intercepted groundwater within 2.5 feet to 10 feet of the existing surface as reflected in driller's notes and by analysis of natural moisture content from recovered samples. Total thickness of alluvium ranges from 7.5 feet to 15.0 feet.

Core borings advanced along the proposed alignment penetrated into the chert residuum described above and in some cases through the residuum into limestone. Recovered limestone was described as white to light gray, cherty to chert nodules to interlayered with chert, moderately weathered to fresh, exhibiting weathering on dissolution surfaces and containing stylolites. Further examination of cored rock suggests the potential of pinnacle development at the weathered chert residuum/limestone interface. This surface may be highly variable within short lateral distances. Driller's notes indicated the presence of small voids, typically 1 foot or less, within the limestone. Recorded rock core recovery (REC) values ranged from 0% to 100% and recorded rock quality designation (RQD)

values ranged from 0% to 100%. Most core runs advanced thru chert residuum recorded RQD values of 0% with a few values reaching 10% within the chert. RQD values were much higher within limestone intervals.

Review of topographic maps, inspection of driller's logs and notes and review of published maps and reports indicate the presence of groundwater in saturated soil and chert rubble samples, measured immediate water level readings and documented springs at the head of or along the course of tributary streams. The majority of the observations were interpreted as perched water with the exception of observations described above in association with alluvium.

4.2 Soil and Groundwater Conditions

The soil stratigraphy along the roadway alignment suggest fine grained and coarse grained soils are present, as indicated by the soil boring logs. Advanced borings encountered approximately 0.4' to 0.8' of topsoil underlain primarily by clayey gravels with sand, clayey sands with gravel, lean clays, lean clays with sand, sandy lean clays, and sandy fat clays. Table 4.1 summarizes the results of the lab tests performed for each soil type. For the clay soils, plasticity index ranges from 5 to 43 indicating low to high plasticity. Natural moisture contents in these soils are higher, on average, than the optimum moisture contents. For the sand and gravel soils, plasticity index ranges from NP to 39 and natural moisture contents are higher, on average, than the optimum moisture contents. Strength characteristics generally increased with depth as indicated by standard penetration tests with blow counts of 1 to 100+ BPF in the clayey, sandy and gravelly soils.

TABLE 4.1- SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	PLASTICITY INDEX	NATURAL MOISTURE (%)	OPTIMUM MOISTURE (%)	MAX DRY UNIT WEIGHT (pcf)	C. B. R. Values
Lean clays	14-24	16.3-33.4	15-20	104-112	3, 6
Lean clays with sand	13-26	12.9-30.3	16-21	99-110	4, 5, 5, 6, 7, 9
Sandy lean clays	10-27	13.4-34.3	12-26	93-120	2, 3, 3, 5, 7, 8, 8, 8, 8, 9, 9, 9, 9, 10, 10, 10, 13
Sandy lean clays with gravel	16-21	12.1-35.2	13-19	103-116	8, 9, 12, 12, 13, 15
Gravelly lean clays	26	17.3	24	95	4

SOIL TYPE	PLASTICITY INDEX	NATURAL MOISTURE (%)	OPTIMUM MOISTURE (%)	MAX DRY UNIT WEIGHT (pcf)	C. B. R. Values
Gravelly lean clays with sand	11-16	18.9-20.7	13	114	8, 8
Gravelly fat clays	43	40.8	-	-	-
Fat clays with sand	31-43	26-34.9	24-25	94	5, 6
Gravelly lean clays with sand	11-16	18.9-20.7	13	114	8, 8
Fat clays with gravels	33	33.1	-	-	-
Sandy fat clays with gravel	33	38.4	-	-	-
Sandy fat clays	26-39	18.6-41.5	19-25	94-103	2, 4, 5, 5, 5, 5, 9
Clayey sands	18-23	17.9-43.6	15-17	106-114	6, 9
Clayey sands with gravel	6-25	12.1-36.6	15-17	100-111	3, 6, 6, 8, 12, 21
Clayey gravels with sand	NP-39	7.6-34.8	15-20	98-117	6, 7, 21
Silty sands with gravel	NP-19	18.7-49.8	-	-	-
Silty gravels with sand	NP-16	10.2-42.6	-	-	14
Sandy silts	2	21.4	15	119	6, 7
Sandy silty clays	5	18.3	-	-	-
Gravelly silty clays with sand	7	25.3	-	-	-
Gravelly silts with sand	NP	13.2	-	-	-
Well graded sand with silts and gravel	NP	27.3	-	-	-
Poorly graded gravels with sand and clay	17	29.1	-	-	-

The observed ground water levels discussed in the Geology Section above vary widely within the alignment corridor, seemingly dependent upon the strata unit. Observed groundwater levels varied from 2.5 feet to 11.5 feet beneath the existing ground surface in creek alluvium and are suggested by wet soils occurring from 5.0 feet to 16.5 feet in depth within tributary stream valleys. Indications of perched groundwater are evidenced by highly variable elevations where ground water is intercepted beneath the upland sections of the alignment. These vertically and horizontally localized saturated intervals generally are described as weathered rock (chert) or chert with a small amount of clay. Evaluation of the soil strata throughout the alignment corridor suggests the potential presence of numerous similar thin saturated layers. Overall, the recorded data suggests a moderate potential for groundwater

seepage from newly constructed cut faces that intercept these saturated groundwater layers, as well as potential instability of the cut slopes due to the presence of groundwater. Likewise, design of newly constructed embankments will require consideration of "near the surface" groundwater levels for consolidation, potential rapid drawdown during flooding, and long term slope stability. It is anticipated that groundwater levels will vary based on seasonal fluctuations. In addition, low wet areas and embankment construction across ponds will require additional stabilization techniques discussed below. Recommendations included within this report along with other possible remedial solutions shall be utilized as directed by the Engineer to ensure the long term success and stability of the slopes on this project.

4.3 Seismic Conditions

Because earthquake hazards are considered to be significant in portions of Arkansas, seismic ground motion is a design factor for this project. For this project, the proposed peak ground acceleration (PGA) having a 7% probability of exceedance in 75 years (or mean return period of approximately 1000 years) is equal to 0.050g and the horizontal response spectral acceleration value at a 1.0 second period is equal to 0.052g. These values were provided by the United States Geology Survey (USGS). Based on the Site Class being a D for this project, the PGA value is then multiplied by the site factor of 1.6 as shown in Table 3.10.3.2-1 in the AASHTO 4th Edition with 2008 Interims LRFD Bridge Design Specifications. Also, the horizontal response spectral acceleration value is then multiplied by the site factor of 2.4 as shown in Table 3.10.3.2-3 for a Site Class D. For design purposes this gives the peak seismic ground acceleration value of 0.080g and a Seismic Zone of 1.

5. ENGINEERING ANALYSIS AND RECOMMENDATIONS

5.1 General Discussion

At the writing of this report, preliminary estimates indicate approximately 6,289,000 cubic yards of material are available from cuts and 6,350,000 cubic yards of material are required for embankments for the portion of Springdale Northern Bypass (U.S. 412 Relocated) covered within this report. The net difference of 61,000 cubic yards will require a borrow operation during construction. These preliminary estimates have not been adjusted in consideration of the recommended shrink and swell factors discussed later in this report.

The native soils encountered during drilling operations along the alignment primarily consist of silty to clayey sand and fat and lean clay with gravel and sand. These soils have low to high plasticity. Significant volumes of highly plastic materials may be encountered within and along the project corridor. Highly plastic soils tend to shrink and swell with changes in moisture content, can be problematic during compaction, and could pose significant long term stability issues if placed within embankments. Therefore, we recommend any highly plastic soils ***not be utilized*** for embankment construction, irregardless of the source. Any highly plastic materials excavated from cuts shall be used for final dressing of slopes or be wasted. We recommend all embankment construction be performed in accordance with the Special Provision "Embankment Construction." In general, the Special Provision requires material placement in embankment areas shall have a plasticity index (PI) of 15 or less, or a cherty clay material with a minimum of 55 percent retained on the No. 4 sieve prior to compaction will be allowed. This requirement shall be imposed for all embankments, except where select material is specified. The embankment stability appears acceptable when parameters for these materials are applied for the analysis. Specific analysis and recommendations are discussed below. Furthermore, muck and poor quality soils from pond/wet area stabilization ***shall not be utilized*** within embankment limits and shall be used for final dressing of slopes or be wasted.

A small amount of rock excavation is anticipated. Rock fill or soil material containing boulders, iron oxide chunks, cemented layers and other similar bulky particles shall not be placed at the bridge abutments due to proposed pile foundations. Proposed fill materials shall be limited to a maximum size of Class 7 aggregate or smaller where pile foundations are recommended.

We recommend using a C.B.R. value of 3 and a resilient modulus of 4200 psi for the pavement designs on this project. We recommend all borrow material meet these minimum requirements as well as the requirements set forth in the Standard Specifications for Highway Construction. In addition, the borrow material must meet the requirement that the Maximum Plasticity Index cannot be greater than 15 to ensure the integrity and long term stability of the embankments, as indicated in the Special Provision, excluding the areas where Select Materials are specified. We suggest the higher plasticity soils be wasted first, allowing the lower plasticity materials that meet the Maximum Plasticity Index less than 15 criteria to be utilized for embankment construction.

The natural moisture content of the cohesive samples along the project corridor was typically above optimum values. The majority of earthwork operations will likely require drying of these materials to achieve the required compaction. However, wetting operations may be required when non-cohesive and cohesive soils are encountered which contain lower-than-optimum moisture contents.

For design purposes, we recommend a swell factor of 15% for limestone and 5% for chert. We further recommend a shrinkage factor of 18% for common materials (overburden).

5.2 Cut/Embankment Slopes

The roadway design cross sections indicate substantial amounts of excavation and fill are required to construct this project. Cut slopes extend as deep as 56' and embankment slopes are as high as 71', and individual recommendations are depicted on the attached critical cross sections. In general, soil cut slopes of 3H:1V have been utilized to develop roadway cross sections. When rock is encountered above grade, we recommend cut slopes of 3H:1V be utilized. When cut heights exceed 30', a 10 foot 12H:1V bench has been added at a height of 30', and 3H:1V slopes are then utilized to the top of the cut.

Furthermore, the interception of groundwater within cut sections will also create problematic conditions at the subgrade elevation. Saturated conditions, pumping, loose sands and other construction difficulties will likely occur as groundwater is encountered. To assist the Engineer with remedial treatment of these conditions, we recommend the proposed subgrade be undercut 3' and replaced with rock fill, meeting the minimum requirements set forth in this report for the drainage/stabilizing layer, or other approved alternates, per the Standard Specifications for Highway Construction as directed by the Engineer in the following intervals:

Highway 112 Ramp 1 Station 484+00 to Station 492+00

For embankments, we recommend soil slopes be constructed utilizing 3H:1V or flatter slopes, except those areas constructed of select materials which may use 2H:1V slopes as discussed below. When embankment heights exceed 30', a 10 foot 12H:1V bench has been added at a height of 30', and 3H:1V slopes are then utilized to the toe of the embankment. The embankment stability analysis is based upon construction of the fills using the minimum embankment material requirements and other recommendations within this report. It is imperative these

requirements be utilized to provide long term embankment stability as well as to reduce construction difficulties. If slopes steeper than 3H:1V are necessary in areas other than those specifically outlined in this report, Florence & Hutcheson shall be contacted to determine the slope stability on a case-by-case basis.

Some embankment intervals require construction across areas that have saturated conditions and/or wet soft soils at the time of construction. We recommend a minimum 5' thick drainage/stabilizing layer comprised of durable Limestone or Chert from roadway excavation (or borrow) or Type I granular material meeting a size requirement range of 1.5" to 30". However, to ensure the successful advancement of piles through embankment areas, rock fill or soil material containing boulders or large stones shall not be placed at the bridge abutments due to proposed pile driving operations. Proposed fill materials within pile foundation areas (typically abutments) shall consist of particles no larger than the Class 7 size per the Standard Specifications for Highway Construction. Where the drainage/stabilizing layer is proposed along with pile driving operations, Class 7 aggregate is not required, but the size of the embankment particles shall be limited to the size of Class 7 or smaller to ensure piling can be advanced. This 5' layer shall be overlain with 6 inches of choke stone or geotextile fabric to prevent the migration of fines into the drainage layer. The drainage/stabilizing layer will ensure adequate drainage of seepage zones to reduce the potential for saturated embankments, it will promote positive movement of free water during consolidation of foundation soils and allow pore pressures to dissipate, it will increase the factor of safety for embankment stability, and it will provide an excellent working platform during construction. We recommend the 5' drainage/stabilizing layer be placed in the following intervals:

Station 182+00 to Beginning of Bridge Over Ramp 4
End of Bridge Over Ramp 4 to Beginning of Bridge Over Old Highway 68
End of Bridge Over Old Highway 68 to Station 195+00
Station 230+00 to Station 245+00
Station 252+00 to Station 253+00
Station 276+00 to Station 279+50
Station 291+00 to Beginning of Bridge Over Javello Road
End of Bridge Over Javello Road to Station 300+00
Station 309+00 to Station 320+00
Station 377+00 to Beginning of Bridge Over Brush Creek and Brush Creek Road
End of Bridge Over Brush Creek and Brush Creek Road to Station 392+00
End of Bridge Over Marchant Road to Station 432+00
End of Bridge Over Robbins Road to Station 481+00
Station 691+00 to Beginning of Bridge Over Puppy Creek
End of Bridge Over Puppy Creek to Station 706+00
Musteen Road Station 28+00 to Station 34+00
Puppy Creek Road Station 30+00 to Station 32+00
Ramp SW Station 715+00 to Station 721+00 and Station 725+00 to Station 728+00

For embankments located within the station limits of Station 254+00 to Station 256+50, Ramp EN Station 693+00 to Beginning of Bridge Over Puppy Creek, and End of Bridge Over Puppy Creek to Ramp EN Station 703+00, we recommend a 10' drainage/stabilizing layer be utilized in order to achieve a minimum slope stability safety factor. For embankments located within the station limits of Station 573+00 to Beginning of Bridge Over Spring Creek**,** End of Bridge Over Spring Creek to Station 592+00, and Ramp SW Station 722+00 to Station 724+00, we recommend a 20' drainage/stabilizing layer be utilized in order to achieve a minimum slope stability safety factor. Also, a minimum 5' 12H:1V bench shall be utilized, along with 2H:1V design slopes from the embankment bench down to the toe (within the granular materials) for the embankments with the 20' drainage/stabilizing layer.

Furthermore, the contractor shall place the drainage/stabilizing layer in an effort to provide sufficient drainage away from the embankment by allowing the free outfall of drainage water on the downhill side of the slope. In addition, the contractor shall make provisions to block the entrance of surface drainage or seepage water into the drainage layer on the uphill side of the embankment slope. This will be accomplished by placement of an 18" layer of clay plating on the uphill side of the drainage/stabilizing layer, as shown on the plans.

The cut and embankment slopes discussed herein have acceptable factors of safety for stability. The calculated short term, long term, and seismic factors of safety for the analyzed sections are listed in Table 5.1 and are depicted on the stability cross sections in Appendix III. We further recommend suitable vegetation and/or erosion control measures be employed on final slopes as soon as practical during construction, as many of the soil horizons within project limits are susceptible to erosion. Appropriate erosion control procedures, roadway and drainage excavation as well as embankment benching shall be performed in accordance with the Standard Specifications for Highway Construction.

Table 5.1 – FACTORS OF SAFETY FOR SLOPE STABILITY

Location	Short Term	Long Term	Seismic
Mainline 186+00	2.1	2.1	1.7
Mainline 191+00	2.4	2.5	1.9
Mainline 196+00	2.4	2.2	1.7
Mainline 201+00	1.8	1.9	1.5
Mainline 206+00	2.5	2.2	1.8
Mainline 223+00	2.4	2.0	1.5
Mainline 239+00	2.7	2.6	2.0
Mainline 244+00	1.9	1.9	1.4
Mainline 247+00	2.9	2.5	1.9

Location	Short Term	Long Term	Seismic
Mainline 255+00	1.3	1.8	1.4
Mainline 261+00	2.5	2.1	1.7
Mainline 266+00	2.4	2.1	1.7
Mainline 269+00	2.0	2.0	1.6
Mainline 271+00	2.6	2.2	1.8
Mainline 279+00	1.5	1.9	1.5
Mainline 285+00	2.6	2.2	1.8
Mainline 296+00	2.1	2.2	1.7
Mainline 312+00	1.6	1.9	1.5
Mainline 317+00	1.8	1.9	1.5
Mainline 337+00	1.9	1.9	1.5
Mainline 347+00	4.9	4.1	2.8
Mainline 364+00	2.4	2.1	1.6
Mainline 400+00	1.9	1.4	1.1
Mainline 405+00	1.7	1.5	1.2
Mainline 421+00	2.4	2.2	1.8
Mainline 427+00	2.3	2.5	1.7
Mainline 431+00	2.7	2.3	2.0
Mainline 458+00	2.1	1.7	1.5
Mainline 464+00	2.1	2.1	1.6
Mainline 474+00	2.3	2.1	1.7
Mainline 487+00	2.1	1.8	1.4
Mainline 502+00	2.4	2.0	1.6
Mainline 509+00	2.2	2.1	1.7
Mainline 563+00	2.3	1.9	1.5
Mainline 570+00	2.2	1.9	1.5
Mainline 623+00	2.4	2.2	1.8
Mainline 666+00	3.9	3.0	2.3
Mainline 672+00	2.5	1.9	1.5
Mainline X683+00	2.2	1.8	1.4
Mainline X691+00	2.8	2.6	2.0
Mainline X701+00	1.7	1.9	1.5
Mainline X713+00	2.0	1.6	1.3
Mainline X723+00	2.0	1.7	1.4
Musteen Rd. 33+00	2.7	2.5	2.0
U.S. 412 Ramp 2 202+00	2.1	2.0	1.6
U.S. 412 Ramp 4 179+00	2.3	1.9	1.5
Javello Rd. 25+00	2.0	1.8	1.4
Javello Rd. 30+00	2.1	1.8	1.4
Javello Rd. 35+00	2.6	2.4	1.9
Highway 112 19+00	3.0	2.8	2.1
Highway 112 21+00	2.3	2.1	1.7
Highway 112 Ramp 1 487+00	2.0	1.7	1.3
Highway 112 Ramp 1 495+00	2.4	2.2	1.8
Highway 112 Ramp 2 508+00	2.0	1.9	1.5
Highway 112 Ramp 3 501+00	2.1	2.0	1.8
Highway 112 Ramp 3 509+00	2.1	2.0	1.6

Location	Short Term	Long Term	Seismic
Highway 112 Ramp 4 485+00	2.0	1.7	1.3
Highway 112 Ramp 4 488+00	2.3	1.9	1.5
Highway 112 Ramp 4 497+00	2.1	2.0	1.6
South Zion Rd. 19+00	2.0	2.0	1.5
South Zion Rd. 23+00	2.0	2.0	1.6
Ramp EN 694+00	2.2	2.3	1.8
Ramp EN 704+00	2.1	1.7	1.3
Ramp EN 709+00	1.6	1.9	1.4
Ramp EN 719+00	2.5	2.2	1.8
Ramp EN 729+00	2.2	2.1	1.6
Ramp EN 739+00	1.4	1.9	1.5
Ramp ES 704+00	2.1	1.7	1.3
Ramp NW 704+00	1.7	1.9	1.5
Ramp NW 728+00	1.5	1.9	1.5
Ramp SW 723+00	1.3	1.8	1.4
Ramp SW 728+00	1.5	1.9	1.5
Spring Creek St. 21+00	2.9	2.6	2.1
Puppy Creek Rd. 31+00	2.7	2.4	1.9

5.3 Settlements

Subsurface conditions indicate potential settlement for new embankment construction within the analyzed areas (stability sections) could range from 1'' to 6''. Cohesive soils are present beneath the alignment; however, the non-cohesive materials layered or laminated within the cohesive soils should allow the majority of this settlement to dissipate during the construction period. Overall, the non-cohesive material bodies contained within the cohesive soils should improve pore pressure dissipation and allow pore water drainage to occur during the construction period.

5.4 Ponds/Low wet areas

The project corridor has a number of small to medium size ponds and low, wet areas. We recommend these ponds and low lying wet areas be drained and stabilized. We recommend the saturated soft soils in these areas be undercut and replaced with rock fill, meeting the minimum requirements set forth in this report for the drainage/stabilizing layer, or other approved alternates, per the Standard Specifications for Highway Construction. This undercut shall typically extend 3' below the surface, unless additional excavation is directed by the Engineer. The replacement rock material shall be overlain with 6" of choke stone or geotextile fabric to prevent the migration of fines. The

muck and poor quality soils removed during this undercut process ***shall not be used*** within embankment limits and shall be used as final dressing on slopes or be wasted. Table 5.2 summarizes the areas that will require the nominal 3' undercut/replacement for construction of embankments over existing ponds and low, wet areas. Grading operations in these areas shall promote positive drainage away from embankment slopes and insure ponding water does not re-occur within ROW limits. Where undercut operations and the drainage layer are required, the undercut shall be in addition to the drainage layer requirement. Additional pockets of standing water in areas not listed below may be encountered during seasonal climatic fluctuations.

TABLE 5.2- EXISTING PONDS AND WET AREAS REQUIRING STABILIZATION

STATION	LOCATION	DESCRIPTION
230+00 to 245+00	Left to Right	Low Wet Area and Stream
252+00 to 256+50	Left to Right	Low Wet Area and Stream
276+00 to 277+00	Left to Right	Low Wet Area and Stream
278+50 to 279+50	Left to Right	Low Wet Area and Stream
291+00 to 291+50	Left to Right	Low Wet Area and Stream
301+50 to 302+00	Right	Pond
314+00	Left to Right	Stream
323+50	Left to Right	Stream
358+00	Left to Right	Stream
373+50	Left to Right	Low Wet Area and Stream
421+00 to 422+00	Left to Right	Pond
428+00 to 429+00	Left to Right	Stream
430+00 to 432+50	Left	Pond
464+00 to 468+00	Left	Stream
496+00	Left to Right	Stream
504+50 to 505+50	Left	Pond
509+00	Left to Right	Stream
512+00	Left to Right	Stream
519+50 to 520+00	Left to Right	Stream
666+00	Left to Right	Low Wet Area and Stream
Ramp 3 199+00 to 201+00	Left	Pond
Hwy 112 Ramp 1 495+00	Left to Right	Stream
Hwy 112 Ramp 1	Left to Right	Pond

STATION	LOCATION	DESCRIPTION
497+00 to 498+50		
Hwy 112 Ramp 2 508+00 to 510+00	Left to Right	Stream
Hwy 112 Ramp 3 508+50 to 509+00	Left to Right	Stream
Hwy 112 Ramp 3 519+00	Left to Right	Stream
Ramp EN 708+50 to 710+50	Left to Right	Low Wet Area and Stream
SW Ramp 716+50 to 717+50	Right	Pond
Javello Road 56+00	Left to Right	Stream
Javello Road 66+00 to 67+50	CL to Right	Pond
Javello Road 76+00 to 77+00	Left	Pond

APPENDIX I – BORING LOGS

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BORING NO.: 1

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 165+00

LOCATION: CL

LATITUDE: 36.17770 ^{0} LONGITUDE: 94.30262 ^{0}

DATE: 3/27/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1203.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		22	27.4	49				
			Brown, sandy lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1198.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 2

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 171+00

LOCATION: CL

LATITUDE: 36.17767 ^{0} LONGITUDE: 94.30059 ^{0}

DATE: 3/27/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1228.3								
			Topsoil 0.3'			24.8					
			Reddish brown, sandy lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1223.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 3

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 177+00
LOCATION: CL
LATITUDE: 36.17773 ^{0} LONGITUDE: 94.29856 ^{0}

DATE: 3/27/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Asphalt & gravel. 0.6			23.6					
			Reddish brown, sandy lean clay.								
			4.5								
5.0			Auger Refusal & Boring Terminated @ 4.5' (Elev. 1250.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 4

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 183+00

LOCATION: CL

LATITUDE: 36.17805 ^{0} LONGITUDE: 94.29657 ^{0}

DATE: 3/27/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark tan & beige, sandy lean clay.		19	24.8	38				
5.0			5.5' Auger Refusal & Boring Terminated @ 5.5' (Elev. 1267.4).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 189+00

LOCATION: CL

LATITUDE: 36.17861 ^{0} LONGITUDE: 94.29466 ^{0}

DATE: 3/27/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 13.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan & beige, sandy lean clay.			25.6					
5.0											
10.0			13.5'								
			Auger Refusal & Boring Terminated @ 13.5' (Elev. 1258.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 6

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 195+00
LOCATION: CL
LATITUDE: 36.17941 ^{0} LONGITUDE: 94.29288 ^{0}

DATE: 3/28/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'		19	23.3	37				
			Tan, sandy lean clay.								
5.0			6.6'								
			Auger Refusal & Boring Terminated @ 6.6' (Elev. 1264.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 201+00

LOCATION: CL

LATITUDE: 36.18042 ^{0} LONGITUDE: 94.29128 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 10 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Tan, sandy lean clay.			21.4					
5.0											
10.0			10.0'								
			Auger Refusal & Boring Terminated @ 10.0' (Elev. 1243.9).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 207+00

LOCATION: CL

LATITUDE: 36.18163 ^{0} LONGITUDE: 94.28990 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			14.3					
			Beige & tan, sandy lean clay. 3.0'								
			Auger Refusal & Boring Terminated @ 3.0' (Elev. 1264.9).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 8A

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 207+50

LOCATION: CL

LATITUDE: 36.18173 ^{0} LONGITUDE: 94.28979 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Overburden								
5.0			5.5'								
			Auger Refusal & Boring Terminated @ 5.5' (Elev. 1262.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 206+50

LOCATION: CL

LATITUDE: 36.18152 ^{0} LONGITUDE: 94.29000 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Overburden								
5.0			7.7'								
			Auger Refusal & Boring Terminated @ 7.7' (Elev. 1260.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 9

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 213+00
LOCATION: CL
LATITUDE: 36.18299 ^{0} LONGITUDE: 94.28876 ^{0}

DATE: 3/28/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		18	7.6	30				
5.0			Brown, clayey gravel with sand. 6.0'								
			No Refusal & Boring Terminated @ 6.0' (Elev. 1267.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 217+00

LOCATION: CL

LATITUDE: 36.18397 ^{0} LONGITUDE: 94.28816 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1274.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'			12.7					
			Dark beige, clayey gravel with sand. 2.0'								
			Auger Refusal & Boring Terminated @ 2.0' (Elev. 1272.8).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 221+00

LOCATION: CL

LATITUDE: 36.18500 ^{0} LONGITUDE: 94.28768 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.2' Dark gray & tan, lean clay.		18	19.9	32				
5.0			7.2'								
			No Refusal & Boring Terminated @ 7.2' (Elev. 1263.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 225+00

LOCATION: CL

LATITUDE: 36.18604 ^{0} LONGITUDE: 94.28725 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			14.1					
			Dark brown & tan, clayey gravel with sand. 2.0'								
			Auger Refusal & Boring Terminated @ 2.0' (Elev. 1277.1).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 229+00

LOCATION: CL

LATITUDE: 36.18709 ^{0} LONGITUDE: 94.28682 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 3.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3 Tan, gravelly lean clay with sand		19	21.0	35				
			3.7 Auger Refusal & Boring Terminated @ 3.7' (Elev. 1276.9).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 233+00

LOCATION: CL

LATITUDE: 36.18810 ^{0} LONGITUDE: 94.28631 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1239.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & tan, clayey gravel with sand.			11.9					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1234.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 239+00

LOCATION: CL

LATITUDE: 36.18937 ^{0} LONGITUDE: 94.28503 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1207.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.2' Dark tan & dark gray, gravelly lean clay with sand.			27.1					
5.0			4.4' Auger Refusal & Boring Terminated @ 4.4' (Elev. 1202.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 16

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 245+00
LOCATION: CL
LATITUDE: 36.19019 ^{0} LONGITUDE: 94.28328 ^{0}

DATE: 3/28/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1222.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark tan & beige, sandy lean clay.		20	19.8	40				
5.0			8.0'								
			No Refusal & Boring Terminated @ 8.0' (Elev. 1214.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 248+60

LOCATION: CL

LATITUDE: 36.19041 ^{0} LONGITUDE: 94.28209 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark tan & beige, sandy lean clay.			23.7					
5.0			6.2' Auger Refusal & Boring Terminated @ 6.2' (Elev. 1226.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 253+00

LOCATION: CL

LATITUDE: 36.19050 ^{0} LONGITUDE: 94.28061 ^{0}

DATE: 3/28/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1165.1								
			Topsoil 0.3'			21.1					
			Tan, sandy lean clay. 4.3'								
5.0			Auger Refusal & Boring Terminated @ 4.3' (Elev. 1160.8).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 259+00

LOCATION: CL

LATITUDE: 36.19061 ^{0} LONGITUDE: 94.27858 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 9.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1226.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan, sandy lean clay with gravel.		18	27.9	34				
5.0											
9.5'											
10.0			Auger Refusal & Boring Terminated @ 9.5' (Elev. 1217.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 263+00

LOCATION: CL

LATITUDE: 36.19069 ^{0} LONGITUDE: 94.27723 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1220.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Tan, sandy lean clay with gravel.			24.9					
5.0			6.4'								
			Auger Refusal & Boring Terminated @ 6.4' (Elev. 1214.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 267+00

LOCATION: CL

LATITUDE: 36.19076 ^{0} LONGITUDE: 94.27587 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1181.9								
			Topsoil 0.4'			25.9					
			Tan, sandy lean clay with gravel. 4.5'								
5.0			Auger Refusal & Boring Terminated @ 4.5' (Elev. 1177.4).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 273+00

LOCATION: CL

LATITUDE: 36.19088 ^{0} LONGITUDE: 94.27384 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1167.7								
			Topsoil 0.3'			20.4					
			Dark yellowish orange, sandy lean clay with gravel. 4.5'								
5.0			Auger Refusal & Boring Terminated @ 4.5' (Elev. 1163.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 278+70

LOCATION: CL

LATITUDE: 36.19098 ^{0} LONGITUDE: 94.27192 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 14.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1125.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'		18	25.7	39				
			Copper & dark beige, sandy lean clay with gravel.								
5.0											
						44.6					
10.0											
			14.4'								
15.0			Auger Refusal & Boring Terminated @ 14.4' (Elev. 1111.3).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 285+00

LOCATION: CL

LATITUDE: 36.19111 ^{0} LONGITUDE: 94.26978 ^{0}

DATE: 7/17/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 16.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1213.0								
			Topsoil 0.5'		22	23.3	43				
			Red, sandy lean clay.								
5.0											
10.0											
15.0			16.0'								
			No Refusal & Boring Terminated @ 16.0' (Elev. 1197.0).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 289+00

LOCATION: CL

LATITUDE: 36.19118 ^{0} LONGITUDE: 94.26843 ^{0}

DATE: 7/18/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 28.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1209.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			26.4					
			Red, sandy lean clay.								
5.0											
10.0											
15.0											
20.0											
25.0			28.0'								
			No Refusal & Boring Terminated @ 28.0' (Elev. 1181.3).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 293+00

LOCATION: CL

LATITUDE: 36.19126 ^{0} LONGITUDE: 94.26708 ^{0}

DATE: 10/20/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 12.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1166.7								
			Topsoil 0.3'			14.2					
5.0			Brown, sandy lean clay.								
10.0			12.0'								
			Auger Refusal & Boring Terminated @ 12.0' (Elev. 1154.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 299+00

LOCATION: CL

LATITUDE: 36.19137 ^{0} LONGITUDE: 94.26505 ^{0}

DATE: 10/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 13.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1187.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			31.0					
			Red, sandy lean clay.								
5.0											
10.0			13.0'								
			No Refusal & Boring Terminated @ 13.0' (Elev. 1174.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 305+00

LOCATION: CL

LATITUDE: 36.19149 ^{0} LONGITUDE: 94.26303 ^{0}

DATE: 3/30/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 3.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1220.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Copper, sandy lean clay with gravel. 3.3'			17.8					
			Auger Refusal & Boring Terminated @ 3.3' (Elev. 1216.7).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 309+00

LOCATION: CL

LATITUDE: 36.19165 ^{0} LONGITUDE: 94.26169 ^{0}

DATE: 3/30/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.6 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1189.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			12.0					
			Brown, clayey sand with gravel. 4.6'								
5.0			Auger Refusal & Boring Terminated @ 4.6' (Elev. 1184.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 30

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 315+00
LOCATION: CL
LATITUDE: 36.19210 ^{0} LONGITUDE: 94.25974 ^{0}

DATE: 3/30/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.2 ft.
GROUNDWATER @ 13 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1165.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		19	15.9	31				
			Dark brown & brown, clayey sand with gravel.								
5.0											
10.0						27.3					
15.0			15.2'								
			Auger Refusal & Boring Terminated @ 15.2' (Elev. 1149.8).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 31

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 321+00

LOCATION: CL

LATITUDE: 36.19280 ^{0} LONGITUDE: 94.25789 ^{0}

DATE: 3/30/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1215.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Brown, clayey sand with gravel. 4.0'			7.9					
5.0			Auger Refusal & Boring Terminated @ 4.0' (Elev. 1211.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 327+00

LOCATION: CL

LATITUDE: 36.19372 ^{0} LONGITUDE: 94.25621 ^{0}

DATE: 3/30/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1230.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'			9.9					
			Brown & beige, sandy lean clay with gravel.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1225.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 33

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 333+00

LOCATION: 25' Rt.

LATITUDE: 36.19480 ^{0} LONGITUDE: 94.25466 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'		18	20.2	31				
5.0			Reddish brown, clayey sand with gravel. 7.4'								
			Auger Refusal & Boring Terminated @ 7.4' (Elev. 1234.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 34

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 337+00
LOCATION: 9' Lt.
LATITUDE: 36.19570 ^{0} LONGITUDE: 94.25389 ^{0}

DATE: 3/30/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.1 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1195.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'			16.6					
5.0			Brown, clayey sand with gravel.								
			6.1'								
			Auger Refusal & Boring Terminated @ 6.1' (Elev. 1189.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 35

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 343+00
LOCATION: CL
LATITUDE: 36.19709 ^{0} LONGITUDE: 94.25279 ^{0}

DATE: 3/30/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 15 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1239.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			16.8					
			Tan, clayey sand with gravel.								
5.0											
10.0											
15.0			15.0'								
			Auger Refusal & Boring Terminated @ 15.0' (Elev. 1224.2).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 347+00

LOCATION: CL

LATITUDE: 36.19809 ^{0} LONGITUDE: 94.25223 ^{0}

DATE: 3/30/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1256.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		19	16.6	37				
5.0			Dark tan, sandy lean clay. 5.5'								
			Auger Refusal & Boring Terminated @ 5.5' (Elev. 1250.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 37

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 351+00
LOCATION: CL
LATITUDE: 36.19913 ^{0} LONGITUDE: 94.25180 ^{0}

DATE: 3/31/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1236.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5 Dark reddish brown, sandy lean clay.			9.1					
5.0			4.8 No Refusal & Boring Terminated @ 4.8' (Elev. 1231.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 355+00

LOCATION: CL

LATITUDE: 36.20020 ^{0} LONGITUDE: 94.25150 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1208.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5' Tan, sandy lean clay.			17.7					
			4.0' Auger Refusal & Boring Terminated @ 4.0' (Elev. 1204.5).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 361+00

LOCATION: CL

LATITUDE: 36.20184 ^{0} LONGITUDE: 94.25133 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 14.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1214.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan, sandy lean clay.		19	24.8	37				
5.0											
10.0											
			14.3'								
15.0			Auger Refusal & Boring Terminated @ 14.3' (Elev. 1199.9).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 40

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 365+00

LOCATION: CL

LATITUDE: 36.20294 ^{0} LONGITUDE: 94.25135 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 8.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1218.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan, sandy lean clay.			24.2					
5.0			8.3'								
			Auger Refusal & Boring Terminated @ 8.3' (Elev. 1210.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 41

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 369+00
LOCATION: CL
LATITUDE: 36.20404 ^{0} LONGITUDE: 94.25138 ^{0}

DATE: 3/31/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 18 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1198.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan & black, sandy lean clay.			23.8					
5.0											
10.0											
15.0			18.0'								
			No Refusal & Boring Terminated @ 18.0' (Elev. 1180.9).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 373+00

LOCATION: CL

LATITUDE: 36.20513 ^{0} LONGITUDE: 94.25141 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 17.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1148.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark brown, sandy lean clay.		19	22.3	37				
5.0											
10.0											
15.0			17.5' Auger Refusal & Boring Terminated @ 17.5' (Elev. 1131.0).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 379+00

LOCATION: CL

LATITUDE: 36.20678 ^{0} LONGITUDE: 94.25146 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.1 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1145.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'			16.3					
5.0			Dark beige, sandy lean clay. 7.1'								
			No Refusal & Boring Terminated @ 7.1' (Elev. 1138.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 385+00
LOCATION: CL
LATITUDE: 36.20843 ^{0} LONGITUDE: 94.25151 ^{0}

DATE: 3/31/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 10 ft.
GROUNDWATER @ 2.5 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1136.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		20	33.3	39				
5.0			Olive gray, clayey gravel with sand.								
10.0			10.0'								
			Auger Refusal & Boring Terminated @ 10.0' (Elev. 1126.6).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 391+00

LOCATION: CL

LATITUDE: 36.21008 ^{0} LONGITUDE: 94.25155 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1173.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'			19.0					
			Dark brown, clayey sand with gravel.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1168.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 395+00

LOCATION: CL

LATITUDE: 36.21118 ^{0} LONGITUDE: 94.25158 ^{0}

DATE: 3/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 33 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1214.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'			29.7					
			Dark tan, sandy lean clay.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0			33.0'								
			No Refusal & Boring Terminated @ 33.0' (Elev. 1181.7).								
35.0											

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BORING NO.: 47

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 399+00
LOCATION: CL
LATITUDE: 36.21227 ^{0} LONGITUDE: 94.25161 ^{0}

DATE: 3/31/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 34 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1227.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7		20	16.5	28				
			Tan, clayey sand with gravel.								
5.0											
10.0											
15.0											
20.0			22.0								
			Brown, sandy lean clay.		19	20.5	37				
25.0											
30.0											
			34.0								
35.0			No Refusal & Boring Terminated @ 34.0' (Elev. 1193.3).								

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 403+00
LOCATION: CL
LATITUDE: 36.21337 ^{0} LONGITUDE: 94.25165 ^{0}

DATE: 3/29/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 33 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1238.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Brown & dark tan, clayey sand with gravel.			19.3					
5.0											
10.0											
15.0			16.0'								
			Tan, sandy lean clay.			30.4					
20.0											
25.0											
30.0			33.0'								
			No Refusal & Boring Terminated @ 33.0' (Elev. 1205.2).								
35.0											

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BORING NO.: 49

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 407+00
LOCATION: CL
LATITUDE: 36.21447 ⁰ LONGITUDE: 94.25168 ⁰

DATE: 3/29/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 10.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1259.5								
			Topsoil 0.7'			20.2					
			Brown, sandy lean clay.								
5.0			5.5'								
			Tan, sandy lean clay.			28.1					
10.0			10.7'								
			Auger Refusal & Boring Terminated @ 10.7' (Elev. 1248.8).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 411+00
LOCATION: CL
LATITUDE: 36.21557 ^{0} LONGITUDE: 94.25171 ^{0}

DATE: 3/29/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 28 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	33.7	44				
			Dark brown, sandy lean clay.								
5.0											
10.0											
15.0			17.0'								
			Brown, sandy lean clay.		27	34.3	48				
20.0											
25.0			28.0'								
			No Refusal & Boring Terminated @ 28.0' (Elev. 1227.2).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 415+00

LOCATION: CL

LATITUDE: 36.21667 ^{0} LONGITUDE: 94.25174 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 17 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'			24.5					
			Tan, sandy lean clay.								
5.0											
10.0			10.5'								
			Dark tan, sandy lean clay.			33.6					
15.0			17.0'								
			No Refusal & Boring Terminated @ 17.0' (Elev. 1238.3).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 419+00

LOCATION: CL

LATITUDE: 36.21776 ^{0} LONGITUDE: 94.25167 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 8 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1252.4								
			Topsoil 0.6'			26.0					
			Tan, sandy lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1247.4).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 53

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 425+00
LOCATION: CL
LATITUDE: 36.21938 ^{0} LONGITUDE: 94.25130 ^{0}

DATE: 3/29/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 19 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1252.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'		21	30.3	47				
5.0			Brown, lean clay with sand.								
			7.0'								
			Dark tan, sandy lean clay.		24	31.5	47				
10.0											
15.0			19.0'								
20.0			No Refusal & Boring Terminated @ 19.0' (Elev. 1233.4).								
25.0											
30.0											
35.0											

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BORING NO.: 54

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 431+00
LOCATION: CL
LATITUDE: 36.22094 ^{0} LONGITUDE: 94.25063 ^{0}

DATE: 3/29/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 19 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1261.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			20.9					
5.0			Tan, lean clay with sand. 6.5'								
			Tan, sandy lean clay.			28.6					
10.0											
15.0			19.0'								
20.0			No Refusal & Boring Terminated @ 19.0' (Elev. 1242.5).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 437+00

LOCATION: CL

LATITUDE: 36.22239 ^{0} LONGITUDE: 94.24967 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 11 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1287.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7		20	13.3	41				
5.0			Brown, sandy lean clay with gravel.								
10.0			11.0								
			No Refusal & Boring Terminated @ 11.0' (Elev. 1276.6).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 441+00

LOCATION: CL

LATITUDE: 36.22328 ^{0} LONGITUDE: 94.24887 ^{0}

DATE: 3/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1276.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7			20.2					
			Brown, sandy lean clay with gravel.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1271.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y654+47

LOCATION: 171' Rt.

LATITUDE: 36.23709 ^{0} LONGITUDE: 94.18105 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark reddish brown & beige, lean clay with sand.			22.1					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1281.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y660+46

LOCATION: 133' Rt.

LATITUDE: 36.23767 ^{0} LONGITUDE: 94.17914 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4 Dark tan, lean clay with sand.		20	25.8	43				
5.0			4.7 Auger Refusal & Boring Terminated @ 4.7' (Elev. 1285.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y664+45

LOCATION: 107' Rt.

LATITUDE: 36.23805 ^{0} LONGITUDE: 94.17787 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.3 ft,

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1261.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark brown, lean clay with sand.			21.8					
5.0			7.3'								
			Auger Refusal & Boring Terminated @ 7.3' (Elev. 1254.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y670+44

LOCATION: 68' Rt.

LATITUDE: 36.23863 ^{0} LONGITUDE: 94.17596 ^{0}

DATE: 8/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 16.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1291.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Dark tan, clayey gravel with sand.			36.3					
5.0											
10.0											
15.0			16.0' No Refusal & Boring Terminated @ 16.0' (Elev. 1275.6).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y674+43
LOCATION: 43' Rt.
LATITUDE: 36.23900 ^{0} LONGITUDE: 94.17469 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 14 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		19	18.7	34				
			Copper & dark beige, clayey gravel with sand.								
5.0											
10.0			14.0'								
15.0			No Refusal & Boring Terminated @ 14.0' (Elev. 1272.2).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y678+42

LOCATION: 17' Rt.

LATITUDE: 36.23939 ^{0} LONGITUDE: 94.17342 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 3.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Beige, clayey gravel with sand. 3.3'			12.2					
5.0			Auger Refusal & Boring Terminated @ 3.3' (Elev. 1285.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X683+00

LOCATION: CL

LATITUDE: 36.23974 ^{0} LONGITUDE: 94.17214 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 3.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1293.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4 Dark tan, clayey gravel with sand. 3.7			17.0					
5.0			Auger Refusal & Boring Terminated @ 3.7' (Elev. 1290.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 64

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X687+00
LOCATION: CL
LATITUDE: 36.24002 ^{0} LONGITUDE: 94.17082 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 18 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1283.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'		20	23.8	37				
			Tan, sandy lean clay.								
5.0											
10.0			11.0'								
			Brown, sandy lean clay with gravel.		20	12.1	37				
15.0			18.0'								
			Auger Refusal & Boring Terminated @ 18.0' (Elev. 1265.4).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X691+00

LOCATION: CL

LATITUDE: 36.24019 ^{0} LONGITUDE: 94.16948 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 10.2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1245.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			18.4					
5.0			Dark brown, sandy lean clay.								
10.0			10.2'								
			Auger Refusal & Boring Terminated @ 10.2' (Elev. 1234.8).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 66

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X697+50
LOCATION: CL
LATITUDE: 36.24028 ^{0} LONGITUDE: 94.16728 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 13.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1212.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		18	13.7	31				
			Copper, clayey sand with gravel.								
5.0											
10.0			13.3'								
			No Refusal & Boring Terminated @ 13.3' (Elev. 1198.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X703+00

LOCATION: CL

LATITUDE: 36.24015 ^{0} LONGITUDE: 94.16543 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 9 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1248.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark tan & black, clayey sand with gravel.			17.3					
5.0			9.0'								
10.0			Auger Refusal & Boring Terminated @ 9.0' (Elev. 1239.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X709+00
LOCATION: CL
LATITUDE: 36.23981 ^{0} LONGITUDE: 94.16344 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1274.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'			27.2					
5.0			Tan & reddish brown, sandy lean clay. 8.0'								
			No Refusal & Boring Terminated @ 8.0' (Elev. 1266.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X713+00

LOCATION: CL

LATITUDE: 36.23947 ^{0} LONGITUDE: 94.16215 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 3.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8' Copper & dark brown, sandy lean clay. 3.3'			19.4					
			Auger Refusal & Boring Terminated @ 3.3' (Elev. 1296.7).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X713+10

LOCATION: CL

LATITUDE: 36.23946 ^{0} LONGITUDE: 94.16212 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 24.1 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Brown & copper, sandy lean clay with gravel.			11.2					
5.0											
10.0											
15.0											
20.0											
			22.0'								
			Tan, clayey sand with gravel.			45.3					
			24.1'								
25.0			Auger Refusal & Boring Terminated @ 24.1' (Elev. 1276.4).								
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X717+00
LOCATION: CL
LATITUDE: 36.23903 ^{0} LONGITUDE: 94.16090 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 25.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1307.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'		18	21.0	30				
			Dark brown, sandy lean clay.								
5.0											
10.0											
15.0											
20.0			21.0'								
			Tan, sandy fat clay.		24	41.5	50				
25.0			25.8'								
			Auger Refusal & Boring Terminated @ 25.8' (Elev. 1281.4).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X722+00

LOCATION: CL

LATITUDE: 36.23838 ^{0} LONGITUDE: 94.15941 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 3.1 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1311.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.7'			19.6					
			Dark brown & dark beige, clayey sand. 3.1'								
			Auger Refusal & Boring Terminated @ 3.1' (Elev. 1307.9).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X725+00

LOCATION: CL

LATITUDE: 36.23798 ^{0} LONGITUDE: 94.15852 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 23 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1310.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'			17.5					
5.0			Dark beige, clayey sand.								
10.0											
15.0											
20.0			23.0'								
25.0			No Refusal & Boring Terminated @ 23.0' (Elev. 1287.3).								
30.0											
35.0											

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BORING NO.: 73

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X729+00
LOCATION: CL
LATITUDE: 36.23745 ^{0} LONGITUDE: 94.15733 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 12.4 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1323.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'		17	17.9	35				
5.0			Dark brown, clayey sand.								
10.0			12.4'								
			Auger Refusal & Boring Terminated @ 12.4' (Elev. 1323.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X733+00
LOCATION: CL
LATITUDE: 36.23692 ^{0} LONGITUDE: 94.15615 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 18.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1331.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Dark reddish brown, sandy fat clay.		21	18.6	51				
5.0			8.5'								
			Brown, clayey sand.			22.8					
10.0											
15.0			18.8'								
			Auger Refusal & Boring Terminated @ 18.8' (Elev. 1331.5).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X741+00

LOCATION: CL

LATITUDE: 36.23585 ^{0} LONGITUDE: 94.15378 ^{0}

DATE: 4/2/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 11.9 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1336.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'		18	21.4	20				
5.0			Dark brown, sandy silt.								
10.0			11.9'								
			Auger Refusal & Boring Terminated @ 11.9' (Elev. 1324.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 77

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X744+55
LOCATION: CL
LATITUDE: 36.23527 ^{0} LONGITUDE: 94.15250 ^{0}

DATE: 4/2/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 14.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1330.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Dark beige, sandy lean clay.			17.6					
5.0			9.0'								
			Beige & brown, sandy lean clay.			20.0					
10.0											
			14.6'								
15.0			Auger Refusal & Boring Terminated @ 14.6' (Elev. 1315.9).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X748+55
LOCATION: CL
LATITUDE: 36.23474 ^{0} LONGITUDE: 94.15131 ^{0}

DATE: 4/2/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 20.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1344.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Brown, sandy lean clay.		17	17.8	27				
5.0			8.0'								
			Brown, sandy lean clay.		15	13.4	28				
10.0			12.0'								
			Tan, sandy lean clay.			24.4					
15.0											
20.0			20.8'								
			Auger Refusal & Boring Terminated @ 20.8' (Elev. 1323.3).								
25.0											
30.0											
35.0											

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BORING NO.: 82

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: A669+86

LOCATION: 15' Rt.

LATITUDE: 36.23234 ^{0} LONGITUDE: 94.14598 ^{0}

DATE: 4/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Carver

COMPLETION DEPTH: 5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1343.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Copper, lean clay.			19.4					
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1338.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 83

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: A675+82
LOCATION: 61' Rt.
LATITUDE: 36.23154 ^{0} LONGITUDE: 94.14420 ^{0}

DATE: 4/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Carver

COMPLETION DEPTH: 5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1355.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'		23	33.4	47				
			Dark brown, lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1350.8).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 84

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 447+00
LOCATION: CL
LATITUDE: 36.22448 ^{0} LONGITUDE: 94.24748 ^{0}

DATE: 9/23/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 22.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 1.0'								
			Brown & reddish brown, sandy lean clay with gravel.		17	16.5	33				
5.0											
10.0											
15.0											
20.0			22.0'								
			No Refusal & Boring Terminated @ 22.0' (Elev. 1264.4).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 451+00

LOCATION: CL

LATITUDE: 36.22517 ^{0} LONGITUDE: 94.24642 ^{0}

DATE: 10/10/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1277.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & reddish brown, sandy lean clay with gravel.			14.2					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1272.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 455+00

LOCATION: CL

LATITUDE: 36.22577 ^{0} LONGITUDE: 94.24529 ^{0}

DATE: 10/9/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 14.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			17.1					
			Reddish brown & dark brown, sandy lean clay with gravel.								
5.0											
10.0			14.0'								
15.0			No Refusal & Boring Terminated @ 14.0' (Elev. 1261.2).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 461+00

LOCATION: CL

LATITUDE: 36.22649 ^{0} LONGITUDE: 94.24346 ^{0}

DATE: 10/17/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.2 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown, lean clay.			9.2					
5.0			4.2' Auger Refusal & Boring Terminated @ 4.2' (Elev. 1261.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 467+00

LOCATION: CL

LATITUDE: 36.22696 ^{0} LONGITUDE: 94.24151 ^{0}

DATE: 10/9/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, sandy lean clay with gravel.			16.4					
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1255.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 89

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 473+00
LOCATION: CL
LATITUDE: 36.22718 ^{0} LONGITUDE: 94.23950 ^{0}

DATE: 10/9/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1243.3								
			Topsoil 0.3'		23	24.2	51				
			Reddish brown, sandy lean clay with gravel.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1228.3).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 479+00

LOCATION: CL

LATITUDE: 36.22718 ^{0} LONGITUDE: 94.23746 ^{0}

DATE: 10/6/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 13.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			29.3					
			Reddish brown & tan, sandy lean clay with gravel.								
5.0											
10.0			13.0'								
			No Refusal & Boring Terminated @ 13.0' (Elev. 1249.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 485+00

LOCATION: CL

LATITUDE: 36.22715 ^{0} LONGITUDE: 94.23543 ^{0}

DATE: 8/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 29.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			9.2					
			Brown, sandy lean clay.								
5.0											
10.0											
15.0											
20.0											
25.0											
			29.0'								
30.0			No Refusal & Boring Terminated @ 29.0' (Elev. 1242.1).								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 491+00
LOCATION: CL
LATITUDE: 36.22712 ^{0} LONGITUDE: 94.23340 ^{0}

DATE: 10/5/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			23.4					
			Reddish brown & tan, sandy lean clay with gravel.								
5.0											
10.0											
15.0											
			19.0'								
20.0			No Refusal & Boring Terminated @ 19.0' (Elev. 1234.1).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 497+00

LOCATION: CL

LATITUDE: 36.22709 ^{0} LONGITUDE: 94.23136 ^{0}

DATE: 10/5/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1234.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		20	25.3	27				
			Brown & reddish brown, gravelly, silty clay with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1229.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 503+00

LOCATION: CL

LATITUDE: 36.22706 ^{0} LONGITUDE: 94.22933 ^{0}

DATE: 10/5/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 16.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1266.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			21.9					
			Reddish brown & brown, sandy fat clay.								
5.0											
10.0											
15.0			16.0'								
			No Refusal & Boring Terminated @ 16.0' (Elev. 1250.6).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 507+00

LOCATION: CL

LATITUDE: 36.22704 ^{0} LONGITUDE: 94.22797 ^{0}

DATE: 10/2/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 10.2 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1241.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, sandy fat clay.		24	35.2	56				
5.0											
10.0			10.2' Auger Refusal & Boring Terminated @ 10.2' (Elev. 1231.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 96

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 513+00
LOCATION: CL
LATITUDE: 36.22701 ^{0} LONGITUDE: 94.22594 ^{0}

DATE: 10/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown & brown, sandy fat clay.			28.8					
5.0			5.5' Auger Refusal & Boring Terminated @ 5.5' (Elev. 1247.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 519+00

LOCATION: CL

LATITUDE: 36.22698 ^{0} LONGITUDE: 94.22391 ^{0}

DATE: 10/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 25.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		21	26.0	52				
			Brown & reddish brown, fat clay with sand.								
5.0											
10.0											
15.0											
20.0											
25.0			25.0'								
			No Refusal & Boring Terminated @ 25.0' (Elev. 1212.9).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 525+00

LOCATION: CL

LATITUDE: 36.22695 ^{0} LONGITUDE: 94.22187 ^{0}

DATE: 9/23/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & reddish brown, lean clay with sand. 4.0'			11.1					
5.0			Auger Refusal & Boring Terminated @ 4.0' (Elev. 1267.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 99

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 529+00
LOCATION: CL
LATITUDE: 36.22693 ^{0} LONGITUDE: 94.22052 ^{0}

DATE: 9/25/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 6.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		18	17.4	36				
5.0			Brown & reddish brown, lean clay with sand. 6.4'								
			Auger Refusal & Boring Terminated @ 6.4' (Elev. 1269.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 100

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 533+00

LOCATION: CL

LATITUDE: 36.22691 ^{0} LONGITUDE: 94.21916 ^{0}

DATE: 9/25/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.1 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1277.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark brown & reddish brown, lean clay.			20.6					
5.0			5.1' Auger Refusal & Boring Terminated @ 5.1' (Elev. 1272.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 101

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 537+00

LOCATION: CL

LATITUDE: 36.22689 ^{0} LONGITUDE: 94.21780 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.3 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		17	16.3	37				
			Brown & dark brown, lean clay.								
5.0			5.3'								
			Auger Refusal & Boring Terminated @ 5.3' (Elev. 1275.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 102

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 541+00

LOCATION: CL

LATITUDE: 36.22687 ^{0} LONGITUDE: 94.21645 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.1 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1278.7								
			Topsoil 0.3'			12.6					
			Brown, sandy lean clay with gravel.								
			4.1'								
5.0			Auger Refusal & Boring Terminated @ 4.1' (Elev. 1274.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 103

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 545+00

LOCATION: CL

LATITUDE: 36.22685 ^{0} LONGITUDE: 94.21509 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1282.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, sandy lean clay with gravel.			11.3					
5.0			4.4' Auger Refusal & Boring Terminated @ 4.4' (Elev. 1277.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 104

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 548+99

LOCATION: 14' Rt.

LATITUDE: 36.22684 ^{0} LONGITUDE: 94.21374 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 13.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			19.7					
			Reddish brown & tan, sandy lean clay with gravel.								
5.0											
10.0			13.0'								
			No Refusal & Boring Terminated @ 13.0' (Elev. 1268.2).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 105

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 552+91

LOCATION: 69' Rt.

LATITUDE: 36.22682 ^{0} LONGITUDE: 94.21238 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 19.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		16	14.9	35				
			Reddish brown, brown & brownish red, sandy lean clay with gravel.								
5.0											
10.0											
			13.0'								
			Brownish red, fat clay with sand.		22	34.0	65				
15.0											
			19.0'								
20.0			No Auger Refusal & Boring Terminated @ 19.0' (Elev. 1266.1).								
25.0											
30.0											
35.0											

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BORING NO.: 106

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 556+69

LOCATION: 163' Rt.

LATITUDE: 36.22680 ^{0} LONGITUDE: 94.21103 ^{0}

DATE: 9/24/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 21.0 ft

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			15.9					
			Reddish brown, lean clay.								
5.0											
10.0			10.0'								
			Brownish red, sandy lean clay.			31.4					
15.0											
20.0			21.0'								
			No Refusal & Boring Terminated @ 21.0' (Elev. 1260.1).								
25.0											
30.0											
35.0											

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BORING NO.: 107

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 560+26

LOCATION: 294' Rt.

LATITUDE: 36.22678 ^{0} LONGITUDE: 94.20967 ^{0}

DATE: 8/14/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: A. Stroud

COMPLETION DEPTH: 5.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			13.0					
			Brown, sandy lean clay wih gravel.								
5.0			5.4'								
			Auger Refusal & Boring Terminated @ 5.4' (Elev. 1279.8).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 127

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+00
LOCATION: CL
LATITUDE: 36.17830 ^{0} LONGITUDE: 94.29559 ^{0}

DATE: 8/24/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 48.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Copper & dark brown, silty sand with gravel.								
5.0		X				20.1			3,4,7		
			8.3'								
			Reddish brown, light gray & tan, clayey sand with gravel.								
10.0		X				18.7			10,40,47		
15.0		X				16.2			13,50/0.5		
20.0		X				18.0			10,37,47		
			23.3'								
			Dark brown, brown & reddish brown, clayey gravel with sand.								
25.0		X				41.2			5,7,8		
30.0		X				44.7			10,10,8		
			33.3'								
			Light gray, light beige, white & light brown, well-graded sand with silt & gravel.								
35.0											

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BORING NO.: 127

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+00
LOCATION: CL
LATITUDE: 36.17830 ^{0} LONGITUDE: 94.29559 ^{0}

DATE: 8/24/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 48.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						24.5			10,40,15		
40.0					NP	32.8	NP		10,50/0.4		
45.0						24.6			50/0.5		
			48.0' No Refusal & Boring Terminated @ 48.0' (Elev. 1209.1).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 128

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+00
LOCATION: 168' Rt.
LATITUDE: 36.17787 ^{0} LONGITUDE: 94.29540 ^{0}

DATE: 9/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 45.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1258.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish brown, tan, white & black, clayey sand with gravel.								
5.0		X				22.7			3,6,9		
10.0		X				21.9			15,34,50/0.2		
15.0		X			21	25.3	36		8,36,50/0.3		
20.0		X				24.2			5,15,28		
25.0		X				25.2			5,15,34		
			28.3'								
			Light reddish tan, white, reddish brown & tan, clayey gravel with sand.								
30.0		X				33.5			5,20,10		
35.0											

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BORING NO.: 128

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 186+00
LOCATION: 168' Rt.
LATITUDE: 36.17787 ^{0} LONGITUDE: 94.29540 ^{0}

DATE: 9/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 45.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1258.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						22.4			6,23,20		
			38.3' Reddish brown, reddish tan, white & tan, well-graded sand with silt and gravel.								
40.0						22.2			14,15,50		
45.0			45.8' Auger Refusal & Boring Terminated @ 45.8' (Elev. 1212.6).			32.8			5,50/0.3		
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 129

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+00
LOCATION: CL
LATITUDE: 36.17885 ^{0} LONGITUDE: 94.29404 ^{0}

DATE: 8/29/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 18.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish, tan & dark tan, clayey sand with gravel.								
5.0						27.9			15,50/0.2		
10.0						32.0			8,20,35		
			13.3'								
			Dark brown, clayey gravel with sand.								
15.0						46.1			10,8,7		
			18.3'								
			Auger Refusal & Boring Terminated @ 18.3' (Elev. 1253.9).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 130

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+00
LOCATION: 183' Rt.
LATITUDE: 36.17841 ^{0} LONGITUDE: 94.29376 ^{0}

DATE: 9/8/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 55.5 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1261.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark reddish brown & reddish brown, silty sand with gravel.								
5.0		X			30	34.4	49		6,50/0.4		
10.0		X				21.9			15,33,43		
			13.3'								
			Reddish brown & dark reddish brown, clayey sand with gravel.								
15.0		X				24.8			40,21,45		
20.0		X				23.2			13,19,48		
25.0		X				35.2			6,8,32		
			28.3'								
			Reddish brown & dark reddish brown, clayey gravel with sand.								
30.0		X				19.1			5,12,16		
35.0											

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BORING NO.: 130

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 191+00
LOCATION: 183' Rt.
LATITUDE: 36.17841 ^{0} LONGITUDE: 94.29376 ^{0}

DATE: 9/8/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Crawford

COMPLETION DEPTH: 55.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1261.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
					20	23.0	43		8,16,32		
40.0						19.8			13,18,18		
45.0						23.1			3,15,22		
			48.3' Dark reddish brown, reddish brown & tan, well-graded sand with silt & gravel.								
50.0						34.6			0,1,1		
55.0			55.5' Auger Refusal & Boring Terminated @ 55.5' (Elev. 1205.6).			27.8			50/0.5		
60.0											
65.0											
70.0											

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BORING NO.: 131

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 196+00

LOCATION: CL

LATITUDE: 36.17957 ^{0} LONGITUDE: 94.29260 ^{0}

DATE: 6/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.8 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4' Overburden								
5.0			4.8' Auger Refusal & Boring Terminated @ 4.8' (Elev. 1267.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 196+00

LOCATION: 130' Rt.

LATITUDE: 36.17927 ^{0} LONGITUDE: 94.29235 ^{0}

DATE: 6/29/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1271.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red & brown, clayey sand with gravel.								
5.0			5.6'			20.1			10,50/0.1		
			Auger Refusal & Boring Terminated @ 5.8' (Elev. 1265.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 133

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 201+00
LOCATION: 176' Lt.
LATITUDE: 36.18078 ^{0} LONGITUDE: 94.29168 ^{0}

DATE: 6/29/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1256.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, silty sand with gravel.								
5.0		X				32.8			4,6,11		
			7.7'								
			Auger Refusal & Boring Terminated @ 7.7' (Elev. 1248.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 134

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 201+00

LOCATION: 194' Rt.

LATITUDE: 36.18003 ^{0} LONGITUDE: 94.29083 ^{0}

DATE: 6/29/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5								
			Red, clayey sand with gravel.								
5.0						13.1			13,39,50/0.4		
			6.7								
			Auger Refusal & Boring Terminated @ 6.7' (Elev. 1247.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 135

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 206+00

LOCATION: CL

LATITUDE: 36.18142 ^{0} LONGITUDE: 94.29011 ^{0}

DATE: 6/29/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.8 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1269.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red & white, silty sand with gravel.								
5.0		X				36.9			9,11,27		
			6.8'								
			Auger Refusal & Boring Terminated @ 6.8' (Elev. 1262.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 136

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 206+00

LOCATION: 136' Rt.

LATITUDE: 36.18118 ^{0} LONGITUDE: 94.28975 ^{0}

DATE: 6/29/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 4.7 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5 Overburden								
5.0			4.7 Auger Refusal & Boring Terminated @ 4.7' (Elev. 1260.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 137

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 223+00

LOCATION: 84' Lt.

LATITUDE: 36.01856 ^{0} LONGITUDE: 94.28773 ^{0}

DATE: 6/30/07

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 34.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red & gray, clayey sand with gravel.								
5.0		X				20.8			4,7,9		
			9.0'								
10.0			Auger Refusal @ 9.0' (Elev. 1264.9). Begin Coring in Chert.							67	0
			Chert: White, light gray & gray, bedded & fragmented, broken, vugs, traces fossiliferous, mod. to sev. weathered w/red, brown & orange clay in seams, fracture filled and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							88	0
15.0											
										100	0
20.0											
										70	0
25.0											
										70	12
30.0											
										34	0
			34.0'								
35.0			Boring Terminated @ 34.0' (Elev. 1239.9).								

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BORING NO.: 138

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 223+00
LOCATION: 84' Rt.
LATITUDE: 36.18545 ^{0} LONGITUDE: 94.28719 ^{0}

DATE: 7/1/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 33.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1272.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0		X	Red & gray, clayey sand with gravel. 7.8'			19.8			12,12,15		
10.0			Auger Refusal @ 7.8' (Elev. 1264.8). Begin Coring in Chert. Chert: White, light gray & gray, bedded & fragmented, broken, vugs, sli. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							41	13
										94	13
15.0										52	0
20.0										74	0
25.0										66	10
30.0										64	0
			33.0'								
35.0			Boring Terminated @ 33.0' (Elev. 1239.6).								

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BORING NO.: 139

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 228+00
LOCATION: 84' Lt.
LATITUDE: 36.18690 ^{0} LONGITUDE: 94.28720 ^{0}

DATE: 6/30/07
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 49.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1284.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5' Overburden 2.3'								
			Auger Refusal @ 2.3' (Elev. 1282.6). Begin Coring in Chert. Chert: White, light gray & gray, bedded & fragmented, broken, vugs, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings, void fillings and coatings, core loss interpreted as void, mud & clay seams, numerous fractures present.							38	0
5.0										24	0
10.0										14	0
15.0										26	0
20.0										26	0
25.0										26	0
30.0										10	0
			31.7' Clay filled void. 34.7'								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 228+00
LOCATION: 84' Lt.
LATITUDE: 36.18690 ^{0} LONGITUDE: 94.28720 ^{0}

DATE: 6/30/07
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 49.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1284.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Chert: White, light gray & gray, fragmented, vugs, clay filled voids.							18	0
										18	0
40.0			40.5'								
			Limestone: Gray & white, cryptocrystalline, microcrystalline & fine grained, cherty, sli. to sev. weathered, stylolites, brecciated in parts, clay seams.							84	26
45.0											
										98	44
50.0			49.7'								
			Boring Terminated @ 49.7' (Elev. 1235.2).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 140

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 228+00
LOCATION: 84' Rt.
LATITUDE: 36.18676 ^{0} LONGITUDE: 94.28666 ^{0}

DATE: 7/2/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1283.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Yellowish brown, clayey sand with gravel.								
5.0		X				37.4			7,33,40		
			7.0'								
			Auger Refusal @ 7.0' (Elev. 1276.1). Begin Coring in Chert.							41	0
10.0			Chert: White, light gray & gray, bedded & fragmented, broken, trace vugs, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings, and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							84	0
15.0										38	0
			19.2'								
20.0			Yellowish brown & white, silty sand with gravel.								
25.0		X				21.0			26,27,33		
			26.5'								
			Chert: White, light gray & gray, bedded & fragmented, broken, vugs, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							82	0
30.0										49	0
										24	0
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 228+00
LOCATION: 84' Rt.
LATITUDE: 36.18676 ^{0} LONGITUDE: 94.28666 ^{0}

DATE: 7/2/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1283.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										24	0
										38	8
40.0											
			41.7'								
			Predominately voids w/scattered chert fragments and mud.							12	0
45.0											
										0	0
50.0			51.7'								
			Boring Terminated @ 51.7' (Elev. 1231.4).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 141

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 239+00
LOCATION: 123' Rt.
LATITUDE: 36.18912 ^{0} LONGITUDE: 94.28476 ^{0}

DATE: 10/19/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1210.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0						30.8			9,50/0.3		
			7.9'								
			White, silty sand with gravel.								
10.0					26	23.1	33		38,50/0.5		
15.0						25.4			49,50/0.1		
			15.8'								
			Auger Refusal & Boring Terminated @ 15.8' (Elev. 1194.5).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 142

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 244+00
LOCATION: 247' Lt.
LATITUDE: 36.19072 ^{0} LONGITUDE: 94.28391 ^{0}

DATE: 10/19/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.5 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1164.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0					21	20.8	31		9,14,50/0.2		
10.0						18.8			25,50/0.4		
			13.0'								
			Brown, silty sand with gravel.								
15.0						13.3			50/0.3		
			18.5'								
20.0			Auger Refusal & Boring Terminated @ 18.5' (Elev. 1146.2).								
25.0											
30.0											
35.0											

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BORING NO.: 143

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 244+00
LOCATION: CL
LATITUDE: 36.19009 ^{0} LONGITUDE: 94.28359 ^{0}

DATE: 7/13/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 16.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1206.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & white, clayey sand with gravel.								
5.0						47.4			20,15,27		
			8.3'								
			White & brown, silty sand with gravel.								
10.0						15.2			20,7,50/0.3		
15.0						21.2			5,50/0.1		
			16.0'								
			Auger Refusal & Boring Terminated @ 16.0' (Elev. 1190.4).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 144

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 247+00
LOCATION: 84' Rt.
LATITUDE: 36.19011 ^{0} LONGITUDE: 94.28256 ^{0}

DATE: 7/13/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 41.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, white & brown, silty, clayey sand with gravel.								
5.0		X				24.9			9,31,50/0.5		
10.0		X				25.9			11,20,21		
			13.3'								
			Dark brown & white, clayey sand with gravel.								
15.0		X				35.5			12,10,13		
20.0		X				23.6			5,14,44		
25.0		X				53.5			3,3,3		
			28.3'								
			Dark brown & white, silty sand with gravel.								
30.0		X				23.1			50/0.2		
35.0											

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BORING NO.: 144

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 247+00
LOCATION: 84' Rt.
LATITUDE: 36.19011 ^{0} LONGITUDE: 94.28256 ^{0}

DATE: 7/13/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 41.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			35.7'			30.2			5/50/0.2		
			Auger Refusal @ 35.7' (Elev. 1201.5). Begin Coring in Chert.							100	0
			Chert: White, stained red/brown in parts, sev. weathered, vugs, fossil molds, broken in intervals.							100	0
40.0			41.0'								
			Boring Terminated @ 41.0' (Elev. 1196.2).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 145

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 255+00
LOCATION: 274' Lt.
LATITUDE: 36.19129 ^{0} LONGITUDE: 94.27999 ^{0}

DATE: 8/10/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 14.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1132.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, silty, clayey sand with gravel.								
5.0						18.2			6,7,5		
10.0						18.7			10,8,12		
			14.4'								
15.0			Auger Refusal & Boring Terminated @ 14.4' (Elev. 1118.2).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 146

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 255+00
LOCATION: 135' Lt.
LATITUDE: 36.19091 ^{0} LONGITUDE: 94.27996 ^{0}

DATE: 8/10/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 13.7 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1137.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3								
			Brown, silty, clayey sand with gravel.								
5.0						20.0			6,12,20		
10.0						19.7			14,20,13		
			13.7								
15.0			Auger Refusal & Boring Terminated @ 13.7' (Elev. 1123.3).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 147

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 255+00
LOCATION: CL
LATITUDE: 36.19054 ⁰ LONGITUDE: 94.27993 ⁰

DATE: 8/10/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 12.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1151.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown, silty, clayey sand with gravel.								
5.0		X			19	17.1	25		6,7,6		
10.0		X				19.5			5,5,6		
			12.3' Auger Refusal & Boring Terminated @ 12.3' (Elev. 1139.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 148

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 261+00
LOCATION: 84' Lt.
LATITUDE: 36.19088 ^{0} LONGITUDE: 94.27792 ^{0}

DATE: 8/12/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 57.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1232.8								
			Topsoil 0.3'								
			Brown, silty, clayey sand with gravel.								
5.0						18.7			50/0.4		
10.0						17.9			17,50/0.3		
			12.9'								
			Brown, clayey sand with gravel.								
15.0						24.9			7,35,35		
20.0						25.1			30,17,17		
25.0						39.1			3,5,10		
30.0						33.5			8,11,9		
35.0											

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BORING NO.: 148

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 261+00
LOCATION: 84' Lt.
LATITUDE: 36.19088 ^{0} LONGITUDE: 94.27792 ^{0}

DATE: 8/12/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 57.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						28.1			17,16,13		
40.0						38.1			7,9,9		
45.0					NP	22.7	NP		6,50/0.3		
			48.0' Beige, white & brown, silty sand with gravel.								
50.0						32.0			10,50/0.3		
55.0						20.8			12,50/0.2		
			57.0' No Refusal & Boring Terminated @ 57.0' (Elev. 1175.8).								
60.0											
65.0											
70.0											

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BORING NO.: 149

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 261+00
LOCATION: 84' Rt.
LATITUDE: 36.19042 ^{0} LONGITUDE: 94.27788 ^{0}

DATE: 8/12/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 54.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1229.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Red, beige & white, silty, clayey sand with gravel.								
5.0		X				29.7			16,17,40		
10.0		X				23.4			10,30,38		
			13.3'								
			Brown, red, white & beige, clayey sand with gravel.								
15.0		X				25.3			9,20,20		
20.0		X				13.9			10,45,20		
25.0		X				13.9			8,30,35		
30.0		X				32.7			10,12,8		
35.0											

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BORING NO.: 149

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 261+00
LOCATION: 84' Rt.
LATITUDE: 36.19042 ^{0} LONGITUDE: 94.27788 ^{0}

DATE: 8/12/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 54.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1229.7								
						18.8			8,14,10		
40.0						39.4			9,10,12		
45.0						20.4			12,50/0.2		
			47.9' White, silty sand with gravel.								
50.0						29.9			30,50/0.5		
			54.0' No Refusal & Boring Terminated @ 54.0' (Elev. 1175.7).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 150

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 266+00
LOCATION: 84' Lt.
LATITUDE: 36.19098 ^{0} LONGITUDE: 94.27623 ^{0}

DATE: 8/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 37.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1204.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, silty, clayey sand with gravel.								
5.0		X				37.0			6,7,14		
			8.3'								
			Brown, clayey sand with gravel.								
10.0		X				23.6			30,30,40		
15.0		X			19	16.9	41		34,50/0.4		
20.0		X				40.4			7,8,50/0.4		
			23.3'								
			White, dark red & brown, silty sand with gravel.								
25.0		X				27.5			22,5,25		
30.0		X				20.4			13,3,3		
35.0											

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BORING NO.: 150

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 266+00
LOCATION: 84' Lt.
LATITUDE: 36.19098 ^{0} LONGITUDE: 94.27623 ^{0}

DATE: 8/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 37.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1204.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						20.3			50/0.3		
			37.0'								
			No Refusal & Boring Terminated @ 37.0' (Elev. 1167.1).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 151

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 269+00

LOCATION: 168' Lt.

LATITUDE: 36.19126 ^{0} LONGITUDE: 94.27523 ^{0}

DATE: 8/13/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: A. Stroud

COMPLETION DEPTH: 9.9 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1144.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0						30.3			3,5,5		
10.0			9.9'								
			Auger Refusal & Boring Terminated @ 9.9' (Elev. 1134.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 152

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 271+00
LOCATION: 84' Rt.
LATITUDE: 36.19061 ^{0} LONGITUDE: 94.27450 ^{0}

DATE: 8/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 45.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1203.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0		X				27.9			10,50/0.4		
10.0		X				29.8			7,50/0.5		
15.0		X			20	18.3	38		12,23,29		
20.0		X				23.2			7,14,20		
25.0		X				13.1			25,50/0.4		
30.0		X				32.0			6,12,10		
			33.3'								
			Brown, silty gravel with sand.								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 271+00
LOCATION: 84' Rt.
LATITUDE: 36.19061 ^{0} LONGITUDE: 94.27450 ^{0}

DATE: 8/11/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 45.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1203.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						35.9			3,5,50/0.5		
40.0						27.7			50/0.0		
45.0			45.0'								
			No Refusal & Boring Terminated @ 45.0' (Elev. 1158.9).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 153

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 279+00
LOCATION: 228' Lt.
LATITUDE: 36.19162 ^{0} LONGITUDE: 94.27187 ^{0}

DATE: 8/13/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 14.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0						26.2			5,7,7		
10.0						20.4			5,8,8		
			14.2'								
15.0			Auger Refusal & Boring Terminated @ 14.2' (Elev. 1124.8).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 154

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 279+00
LOCATION: 178' Rt.
LATITUDE: 36.19051 ^{0} LONGITUDE: 94.27177 ^{0}

DATE: 8/13/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 12.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1127.6								
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0		X			18	22.1	41		6,9,8		
10.0		X				22.7			6,10,18		
			12.8'								
			Auger Refusal & Boring Terminated @ 12.8' (Elev. 1114.8).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 155

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 285+00
LOCATION: 84' Lt.
LATITUDE: 36.19134 ^{0} LONGITUDE: 94.26980 ^{0}

DATE: 7/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 54.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1212.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, brown & dark brown, clayey gravel with sand.								
5.0		X				32.2			13,50/0.3		
10.0		X				15.3			39,80/0.3		
15.0		X				36.0			8,16,18		
20.0		X				33.7			11,30,50/0.3		
25.0		X				46.8			5,6,7		
30.0		X				47.6			6,12,18		
			33.3'								
			Red & white, silty gravel with sand.								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 285+00
LOCATION: 84' Lt.
LATITUDE: 36.19134 ^{0} LONGITUDE: 94.26980 ^{0}

DATE: 7/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 54.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1212.6								
						18.1			50/0.3		
40.0					NP	22.8	NP		50/0.4		
45.0						37.9			50/0.3		
50.0						21.7			50/0.3		
			54.0'								
55.0			No Refusal & Boring Terminated @ 54.0' (Elev. 1158.6).								
60.0											
65.0											
70.0											

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BORING NO.: 156

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 285+00
LOCATION: 84' Rt.
LATITUDE: 36.19088 ^{0} LONGITUDE: 94.26976 ^{0}

DATE: 7/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 48.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1212.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Light brown, clayey gravel with sand.								
5.0						13.0			50/0.3		
			7.7'								
			Red, clayey gravel with sand.								
10.0						32.4			17,50/0.4		
15.0						30.2			12,50/0.5		
20.0						10.5			28,23,45		
			23.3'								
			Light brown & red, silty gravel with sand.								
25.0						21.0			23,28,10		
30.0						26.7			7,10,16		
35.0											

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BORING NO.: 156

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 285+00
LOCATION: 84' Rt.
LATITUDE: 36.19088 ^{0} LONGITUDE: 94.26976 ^{0}

DATE: 7/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 48.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1212.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						19.2			50/0.3		
40.0						18.2			50/0.2		
45.0						15.7			50/0.3		
			48.0'								
			No Refusal & Boring Terminated @ 48.0' (Elev. 1164.5).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 157

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 296+00

LOCATION: 193' Lt.

LATITUDE: 36.19184 ^{0} LONGITUDE: 94.26611 ^{0}

DATE: 10/19/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 11.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1150.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Yellowish brown & white, clayey gravel with sand.								
5.0						23.5			3,5,3		
10.0						31.8			3,7,50/0.4		
			11.7								
			Auger Refusal & Boring Terminated @ 11.7' (Elev. 1139.2).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 158

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 296+00
LOCATION: CL
LATITUDE: 36.19132 ^{0} LONGITUDE: 94.26607 ^{0}

DATE: 10/20/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 8.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1161.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3								
			Brown, clayey gravel with sand.								
5.0		X				15.2			5,7,6		
			8.7								
			Auger Refusal & Boring Terminated @ 8.7' (Elev. 1153.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 159

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 296+00
LOCATION: 166' Rt.
LATITUDE: 36.19086 ^{0} LONGITUDE: 94.26603 ^{0}

DATE: 10/20/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 10.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1159.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0						9.7			9,14,16		
			8.3'								
			Brown, clayey gravel with sand.								
10.0			10.4'			18.1			50/0.2		
			Auger Refusal & Boring Terminated @ 10.4' (Elev. 1149.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 160

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 312+00
LOCATION: 222' Lt.
LATITUDE: 36.19243 ^{0} LONGITUDE: 94.26090 ^{0}

DATE: 8/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 17.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1159.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown, clayey gravel with sand.								
5.0						26.3			6,6,12		
10.0					20	23.0	32		10,12,20		
15.0						24.8			6,15,16		
			17.0'								
			Auger Refusal & Boring Terminated @ 17.0' (Elev. 1142.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 161

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 312+00

LOCATION: CL

LATITUDE: 36.19185 ^{0} LONGITUDE: 94.26070 ^{0}

DATE: 8/23/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: A. Stroud

COMPLETION DEPTH: 15.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1161.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown, copper & brown, clayey gravel with sand.								
5.0						21.1			5,6,8		
10.0						22.7			8,16,12		
15.0			15.4'			20.1			50/0.4		
			Auger Refusal & Boring Terminated @ 15.4' (Elev. 1146.3).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 162

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 312+00
LOCATION: 202' Rt.
LATITUDE: 36.19132 ^{0} LONGITUDE: 94.26051 ^{0}

DATE: 10/20/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 20.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1170.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey gravel with sand.								
5.0						22.0			2,1,3		
			8.3'								
			Brown, clayey gravel with sand.								
10.0						18.7			6,11,10		
15.0					19	18.7	32		2,11,9		
20.0						35.2			23,50/0.1		
			20.9'								
			Auger Refusal & Boring Terminated @ 20.9' (Elev. 1149.1).								
25.0											
30.0											
35.0											

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BORING NO.: 163

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 317+00
LOCATION: CL
LATITUDE: 36.19231 ^{0} LONGITUDE: 94.25910 ^{0}

DATE: 8/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 15.8 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1176.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown, clayey gravel with sand.								
5.0						16.7			5,4,6		
			8.3'								
			Brown, red, light gray & dark brown, clayey gravel with sand.								
10.0						11.5			16,27,37		
15.0						22.4			40,50/0.3		
			15.8'								
			Auger Refusal & Boring Terminated @ 15.8' (Elev. 1160.4).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 164

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 317+00
LOCATION: 217' Rt.
LATITUDE: 36.19177 [0] LONGITUDE: 94.25881 [0]

DATE: 8/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 14.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1170.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3								
			Copper, dark tan, dark brown, tan & red, clayey gravel with sand.								
5.0						16.6			6,7,9		
10.0						21.6			10,12,19		
			14.6								
15.0			Auger Refusal & Boring Terminated @ 14.6' (Elev. 1156.2).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 165

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 337+00
LOCATION: 191' Lt.
LATITUDE: 36.19601 ^{0} LONGITUDE: 94.25438 ^{0}

DATE: 8/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 26.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1191.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, dark brown, copper, dark beige & tan, clayey gravel with sand.								
5.0						21.8			15,20,23		
10.0					17	25.8	42		7,9,12		
15.0						22.1			15,20,36		
20.0						29.8			5,50/0.2		
			23.1'								
			Beige, clayey gravel with sand.								
25.0						30.8			37,50/0.3		
			26.0'								
			Auger Refusal & Boring Terminated @ 26.0' (Elev. 1165.5).								
30.0											
35.0											

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BORING NO.: 166

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 337+00
LOCATION: 177' Rt.
LATITUDE: 36.19540 ^{0} LONGITUDE: 94.25338 ^{0}

DATE: 8/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 31.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1199.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Beige, dark brown, dark tan, copper & tan, clayey gravel with sand.								
5.0		X				20.5			8,10,10		
10.0		X				25.0			6,12,18		
			13.3'								
			Dark reddish brown, white, beige, dark brown, black & brown, clayey gravel with sand.								
15.0		X				31.4			10,13,16		
20.0		X			21	37.4	50		3,9,15		
25.0		X				34.0			3,3,50/0.1		
			28.1'								
			Light gray & brown, clayey gravel with sand.								
30.0		X				26.2			42,50/0.2		
			31.8'								
			Auger Refusal & Boring Terminated @ 31.8' (Elev. 1168.1).								
35.0											

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BORING NO.: 167

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 347+00
LOCATION: 84' Lt.
LATITUDE: 36.19817 ^{0} LONGITUDE: 94.25249 ^{0}

DATE: 7/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, clayey gravel with sand.								
5.0		X				31.7			5,12,26		
			8.3'								
			Red & white, clayey gravel with sand.								
10.0		X				26.0			10,50/0.4		
			11.1'								
			Auger Refusal @ 11.1' (Elev. 1244.6). Begin Coring in Chert.								
			Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, fossil molds, very porous in parts, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							35	0
15.0											
										16	0
20.0											
										32	0
25.0											
										26	0
30.0											
										46	0
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 347+00
LOCATION: 84' Lt.
LATITUDE: 36.19817 ^{0} LONGITUDE: 94.25249 ^{0}

DATE: 7/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										46	0
			38.3' Limestone: Gray & light gray, microcrystalline to megacrystalline, fresh to mod. weathered at discontinuities, nodules white to light gray chert, stylolites, dissolution enhanced discontinuities.							80	52
40.0											
										100	82
45.0											
										98	80
50.0			49.5' Interbedded Limestone & Chert: White, light gray & gray, amorphous to microcrystalline, sli. to mod. weathered, fossiliferous, healed fractures. 51.2'								
			Boring Terminated @ 51.2' (Elev. 1204.5).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 168

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 347+00
LOCATION: 84' Rt.
LATITUDE: 36.19801 ^{0} LONGITUDE: 94.25196 ^{0}

DATE: 7/16/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & white, clayey gravel with sand.								
5.0			9.3'			38.5			12,15,50/0.4		
10.0			Auger Refusal @ 9.3' (Elev. 1244.8). Begin Coring in Chert.							100	0
			Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, fossil molds, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							52	0
15.0			16.0'								
			No recovery - interpreted as clay filled void.							0	0
20.0			21.0'								
			Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, fossil molds, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, numerous fractures present.							34	8
25.0											
										60	0
30.0											
										30	0
35.0											

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BORING NO.: 168

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 347+00
LOCATION: 84' Rt.
LATITUDE: 36.19801 ^{0} LONGITUDE: 94.25196 ^{0}

DATE: 7/16/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										30	0
										22	0
40.0											
										48	0
45.0			46.0'								
			Boring Terminated @ 46.0' (Elev. 1208.1).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 169

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 364+00
LOCATION: 84' Lt.
LATITUDE: 36.20266 ⁰ LONGITUDE: 94.25162 ⁰

DATE: 7/20/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1215.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red & light brown, clayey gravel with sand.								
5.0						33.8			7,35,21		
10.0						26.7			18,25,21		
15.0						36.6			10,13,16		
			18.3'								
			Red, clayey gravel with sand.								
20.0						38.0			10,14,50/0.3		
			22.0'								
			Auger Refusal @ 22.0' (Elev. 1193.5). Begin Coring in Chert.								
			Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, fossil molds, porous in parts, mod. to sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, fractures present.							41	0
25.0										14	0
30.0										6	0
35.0											

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BORING NO.: 169

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 364+00
LOCATION: 84' Lt.
LATITUDE: 36.20266 ^{0} LONGITUDE: 94.25162 ^{0}

DATE: 7/20/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
	△ △		SURFACE ELEVATION: 1215.5							23	0
			36.0'							23	0
			Boring Terminated @ 36.0' (Elev. 1179.5).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 170

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 364+00
LOCATION: 84' Rt.
LATITUDE: 36.20267 ^{0} LONGITUDE: 94.25105 ^{0}

DATE: 7/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 46.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1222.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, clayey gravel with sand.								
5.0						31.0			16,50,50/0.4		
			8.2'								
			Red, clayey gravel with sand.								
10.0						33.3			38,26,19		
15.0						23.1			7,26,19		
20.0						31.8			8,12,17		
			23.3'								
			Red & light brown, clayey gravel with sand.								
25.0						30.4			15,17,16		
30.0						35.0			11,11,9		
35.0											

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BORING NO.: 170

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 364+00
LOCATION: 84' Rt.
LATITUDE: 36.20267 ^{0} LONGITUDE: 94.25105 ^{0}

DATE: 7/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 46.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1222.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
					24	20.5	39		10,12,11		
40.0						29.3			9,12,18		
45.0						27.7			10,13,15		
			46.5' No Refusal & Boring Terminated @ 46.5' (Elev. 1176.0).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 171

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 381+00
LOCATION: 181' Lt.
LATITUDE: 36.20732 ^{0} LONGITUDE: 94.25208 ^{0}

DATE: 7/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.5 ft.
GROUNDWATER @ 4.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1136.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Brown, sandy lean clay with gravel.								
5.0		X				24.6			1,6,10		
			7.5'								
			Auger Refusal & Boring Terminated @ 7.5' (Elev. 1129.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 172

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 381+00
LOCATION: CL
LATITUDE: 36.20734 ^{0} LONGITUDE: 94.25147 ^{0}

DATE: 7/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 7.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1139.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Light brown, sandy lean clay with gravel.								
5.0						13.8			3,4,9		
			7.8'								
			Auger Refusal & Boring Terminated @ 7.8' (Elev. 1131.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 173

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 381+00

LOCATION: 164' Rt.

LATITUDE: 36.20735 ^{0} LONGITUDE: 94.25092 ^{0}

DATE: 7/22/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 8.8 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1142.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Brown, sandy lean clay with gravel.								
5.0						21.8			7,6,9		
			8.8'								
10.0			Auger Refusal & Boring Terminated @ 8.8' (Elev. 1133.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 174

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 386+00
LOCATION: 182' Lt.
LATITUDE: 36.20870 ^{0} LONGITUDE: 94.25213 ^{0}

DATE: 10/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1142.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown, sandy lean clay with gravel.								
5.0					16	22.2	33		3,2,2		
10.0						22.2			1,6,8		
15.0			15.0'								
			Auger Refusal & Boring Terminated @ 15.0' (Elev. 1127.4).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 175

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 386+00
LOCATION: CL
LATITUDE: 36.20871 ^{0} LONGITUDE: 94.25151 ^{0}

DATE: 10/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 14.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1141.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown & gray, sandy lean clay with gravel.								
5.0						21.7			6,10,10		
10.0						23.0			8,10,10		
			14.0'								
15.0			Auger Refusal & Boring Terminated @ 14.0' (Elev. 1127.7).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 176

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 386+00
LOCATION: 188' Rt.
LATITUDE: 36.20872 ⁰ LONGITUDE: 94.25087 ⁰

DATE: 10/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 12.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1140.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, sandy lean clay with gravel.								
5.0						22.5			2,4,4		
10.0						19.6			1,7,6		
			12.0'								
			Auger Refusal & Boring Terminated @ 12.0' (Elev. 1128.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 177

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 400+00
LOCATION: 84' Lt.
LATITUDE: 36.21255 ^{0} LONGITUDE: 94.25190 ^{0}

DATE: 7/19/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Dark brown, sandy lean clay with gravel.								
5.0						15.9			50/0.4		
			7.7'								
			Pink, silty gravel with sand.								
10.0						7.7			41,34,43		
15.0						14.7			7,35,50/0.5		
			18.3'								
			Pink & red, clayey sand with gravel.								
20.0						15.1			10,18,20		
25.0					22	16.6	39		8,18,23		
30.0						18.0			3,3,4		
35.0											

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BORING NO.: 177

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 400+00
LOCATION: 84' Lt.
LATITUDE: 36.21255 ^{0} LONGITUDE: 94.25190 ^{0}

DATE: 7/19/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.5'			29.1			11,20,21		
			No Refusal & Boring Terminated @ 36.5' (Elev. 1197.4).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 178

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 405+00
LOCATION: 84' Lt.
LATITUDE: 36.21392 ^{0} LONGITUDE: 94.25194 ^{0}

DATE: 7/17/07
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Overburden								
			3.5'								
5.0			Auger Refusal @ 3.5' (Elev. 1252.0). Begin Coring in Chert. Chert: Predominately white w/light gray & gray, fragmented, traces vugs, very porous in parts, sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams.		31		38			22	0
										30	0
10.0											
										12	0
15.0			15.8'								
			Boring Terminated @ 15.8' (Elev. 1239.7).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 178A

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 405+03
LOCATION: 84' Lt.
LATITUDE: 36.21391 ^{0} LONGITUDE: 94.25193 ^{0}

DATE: 7/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Red & white, sandy lean clay with gravel.								
5.0						25.7			29,50/0.5		
			8.0'								
			Red & white, silty gravel with sand.								
10.0						19.7			10,33,50/0.4		
15.0						35.3			10,28,40		
20.0						31.5			10,10,50/0.5		
25.0						42.4			6,9,12		
			28.3'								
			Red & white, clayey sand with gravel.								
30.0						40.3			14,11,10		
35.0											

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BORING NO.: 178A

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 405+03
LOCATION: 84' Lt.
LATITUDE: 36.21391 ^{0} LONGITUDE: 94.25193 ^{0}

DATE: 7/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						44.8			15,8,10		
40.0						32.1			14,11,10		
45.0						31.7			14,9,8		
			46.5' No Refusal & Boring Terminated @ 46.5' (Elev. 1209.1).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 179

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 405+00
LOCATION: 84' Rt.
LATITUDE: 36.21393 ^{0} LONGITUDE: 94.25137 ^{0}

DATE: 7/17/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 43.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			White, sandy lean clay with gravel.								
5.0			5.4'			8.9			50/0.4	33	0
			Auger Refusal @ 5.4' (Elev. 1247.8). Begin Coring in Chert.								
			Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, very porous in parts, mod. to predominately sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, fractures present.							8	0
10.0											
										24	0
15.0											
										48	0
20.0			21.0'								
			Clay w/Chert: Red, brown & orange clay in seams, fracture fillings and coatings w/gray to stained white, fragmented chert, very porous in parts, sev. weathered w/core loss interpreted as mud & clay seams.							33	0
25.0											
										64	0
30.0											
										34	0
35.0											

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BORING NO.: 179

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 405+00
LOCATION: 84' Rt.
LATITUDE: 36.21393 ^{0} LONGITUDE: 94.25137 ^{0}

DATE: 7/17/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 43.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
										34	0
										28	0
40.0											
										75	0
			43.0'								
			Boring Terminated @ 43.0' (Elev. 1210.2).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 180

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 421+00
LOCATION: CL
LATITUDE: 36.21831 ^{0} LONGITUDE: 94.25158 ^{0}

DATE: 8/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 32.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark tan, tan & reddish brown, clayey sand with gravel.								
5.0		X				41.4			5,13,8		
10.0		X			24	37.9	47		8,12,18		
15.0		X				30.4			10,23,20		
			18.3'								
			Tan, brown, dark brown & light beige, silty sand with gravel.								
20.0		X				49.1			6,11,33		
25.0		X				53.6			5,7,6		
30.0		X				47.3			10,9,12		
			32.0'								
			Auger Refusal & Boring Terminated @ 32.0' (Elev. 1210.1).								
35.0											

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BORING NO.: 181

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 421+00
LOCATION: 156' Rt.
LATITUDE: 36.21825 ^{0} LONGITUDE: 94.25106 ^{0}

DATE: 8/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 33.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, tan, white & light beige, clayey sand with gravel.								
5.0		X				33.7			5,9,20		
10.0		X				28.6			20,35,23		
15.0		X				26.4			7,17,27		
			18.3'								
			Tan, reddish brown, brown & copper, silty sand with gravel.								
20.0		X			27	60.1	38		5,5,24		
25.0		X				39.4			5,8,12		
			28.3'								
			Dark brown, clayey gravel with sand.								
30.0		X				38.7			4,9,14		
			33.9'								
35.0			Auger Refusal & Boring Terminated @ 33.9' (Elev.								

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BORING NO.: 181

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 421+00
LOCATION: 156' Rt.
LATITUDE: 36.21825 ^{0} LONGITUDE: 94.25106 ^{0}

DATE: 8/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 33.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			1199.5).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 182

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 427+00
LOCATION: CL
LATITUDE: 36.21992 ^{0} LONGITUDE: 94.25111 ^{0}

DATE: 8/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 38.2 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1244.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan & brown, clayey sand with gravel.								
5.0		X				22.5			10,20,30		
10.0		X				26.7			7,27,50/0.5		
15.0		X				41.1			8,6,4		
			18.3'								
			Tan, dark brown, black, copper & brown, clayey gravel with sand.								
20.0		X				21.6			3,18,34		
25.0		X				21.1			14,50/0.2		
30.0		X				22.6			27,50/0.3		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 427+00
LOCATION: CL
LATITUDE: 36.21992 ^{0} LONGITUDE: 94.25111 ^{0}

DATE: 8/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 38.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1244.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			38.2'			16.5			50/0.3		
40.0			Auger Refusal & Boring Terminated @ 38.2' (Elev. 1206.3).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 183

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 427+00
LOCATION: 178' Rt.
LATITUDE: 36.21977 ^{0} LONGITUDE: 94.25054 ^{0}

DATE: 8/21/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 33.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1238.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Copper & dark tan, clayey sand with gravel.								
5.0						18.3			8,16,26		
			8.3'								
			Reddish, tan & dark brown, silty sand with gravel.								
10.0						45.1			6,9,8		
15.0						24.3			7,11,16		
			18.3'								
			Dark brown, tan, copper, white & brown, clayey gravel with sand.								
20.0						23.8			8,11,17		
25.0					19	40.6	40		5,7,8		
30.0						17.9			27,13,50/0.1		
			33.0'								
			Auger Refusal & Boring Terminated @ 33.0' (Elev. 1205.6).								
35.0											

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BORING NO.: 184

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 431+00
LOCATION: 147' Lt.
LATITUDE: 36.22110 ⁰ LONGITUDE: 94.25108 ⁰

DATE: 8/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 38.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan, clayey sand with gravel.								
5.0		X				25.4			10,47,50/0.3		
			8.2'								
			Tan & brown, silty sand with gravel.								
10.0		X				38.9			10,12,12		
15.0		X				39.6			5,6,8		
			18.3'								
			Dark brown, tan, copper, brown, white & light beige, clayey gravel with sand.								
20.0		X				22.1			6,34,47		
25.0		X				60.4			4,50/0.2		
30.0		X				22.4			10,50/0.3		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 431+00
LOCATION: 147' Lt.
LATITUDE: 36.22110 ^{0} LONGITUDE: 94.25108 ^{0}

DATE: 8/22/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 38.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						56.5			10,50/0.2		
			38.0'								
			No Refusal & Boring Terminated @ 38.0' (Elev. 1219.0).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 185

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 452+00

LOCATION: 161' Lt.

LATITUDE: 36.22569 ^{0} LONGITUDE: 94.24646 ^{0}

DATE: 10/10/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.2 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Overburden								
			4.2' Auger Refusal & Boring Terminated @ 4.2' (Elev. 1255.9).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 186

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 458+00
LOCATION: 176' Lt.
LATITUDE: 36.22659 ^{0} LONGITUDE: 94.24465 ^{0}

DATE: 10/16/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 28.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, silty sand with gravel.								
5.0						35.5			20,10,21		
10.0						19.2			17,20,22		
			13.3'								
			Brown & white, silty gravel with sand.								
15.0						45.4			9,8,7		
20.0						31.2			3,9,6		
25.0						33.8			3,3,6		
			28.0'								
			Auger Refusal & Boring Terminated @ 28.0' (Elev. 1219.0).								
30.0											
35.0											

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BORING NO.: 187

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 458+00
LOCATION: CL
LATITUDE: 36.22616 ^{0} LONGITUDE: 94.24439 ^{0}

DATE: 10/16/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.5 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1256.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red & white, silty sand with gravel.								
5.0		X				19.1			20,44,31		
10.0		X				34.0			28,22,24		
15.0		X				28.9			7,9,13		
20.0		X				20.8			5,10,13		
			23.3'								
			Red, white & brown, silty gravel with sand.								
25.0		X				28.8			3,4,3		
30.0		X			37	24.3	37		5,9,3		
35.0											

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BORING NO.: 187

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 458+00
LOCATION: CL
LATITUDE: 36.22616 ^{0} LONGITUDE: 94.24439 ^{0}

DATE: 10/16/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 51.5 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1256.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						36.6			3,6,10		
			38.5'								
			Brown & white, clayey gravel with sand.								
40.0						37.5			2,2,3		
45.0						27.4			4,4,3		
50.0						43.9			4,5,6		
			51.5'								
			No Refusal & Boring Terminated @ 51.5' (Elev. 1205.1).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 188

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+00
LOCATION: 197' Lt.
LATITUDE: 36.22727 ^{0} LONGITUDE: 94.24269 ^{0}

DATE: 10/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 36.1 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1228.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, silty sand with gravel.								
5.0						14.5			10,21,50/0.4		
10.0						25.7			10,27,22		
			13.3'								
			Brown, silty gravel with sand.								
15.0						16.2			3,9,9		
			18.3'								
			Brown & white, clayey gravel with sand.								
20.0						13.2			7,9,8		
25.0					18	28.5	34		3,11,13		
30.0						22.2			3,7,3		
35.0											

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BORING NO.: 188

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+00
LOCATION: 197' Lt.
LATITUDE: 36.22727 ^{0} LONGITUDE: 94.24269 ^{0}

DATE: 10/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 36.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1228.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.1'			18.9			7,9,50/0.1		
			Auger Refusal & Boring Terminated @ 36.1' (Elev. 1192.0).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 189

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+00
LOCATION: CL
LATITUDE: 36.22675 ^{0} LONGITUDE: 94.24250 ^{0}

DATE: 10/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1234.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, silty sand with gravel.								
5.0		X				23.9			10,9,14		
10.0		X				17.1			10,9,10		
			13.3'								
			White, silty gravel with sand.								
15.0		X				32.1			6,18,20		
			17.5'								
			Auger Refusal & Boring Terminated @ 17.5' (Elev. 1216.9).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 190

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+00
LOCATION: 160' Rt.
LATITUDE: 36.22633 ^{0} LONGITUDE: 94.24234 ^{0}

DATE: 10/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 38.9 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1236.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, silty sand with gravel.								
5.0						17.7			7,20,32		
10.0						22.2			5,50/0.5		
			13.0'								
			Brown & white, silty gravel with sand.								
15.0						17.3			7,8,8		
20.0						24.3			2,3,2		
25.0						26.1			1,2,2		
			28.3'								
			Brown & white, clayey gravel with sand.								
30.0						37.3			3,3,3		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 464+00
LOCATION: 160' Rt.
LATITUDE: 36.22633 ^{0} LONGITUDE: 94.24234 ^{0}

DATE: 10/17/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 38.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1236.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						23.7			6,10,14		
			38.9'								
40.0			Auger Refusal & Boring Terminated @ 38.9' (Elev. 1197.8).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 191

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 474+00
LOCATION: 180' Lt.
LATITUDE: 36.22768 ⁰ LONGITUDE: 94.23918 ⁰

DATE: 10/9/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1228.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan, reddish tan, white, reddish brown, brown & white, silty sand with gravel.								
5.0		X				28.2			2,14,14		
10.0		X			34	44.3	41		5,12,17		
15.0		X				35.5			3,7,17		
20.0		X				47.4			2,7,8		
			23.3'								
			Brown, reddish tan, white, tan & beige, silty gravel with sand.								
25.0		X				23.7			10,20,16		
30.0		X				28.1			20,42,41		
35.0											

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BORING NO.: 191

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 474+00
LOCATION: 180' Lt.
LATITUDE: 36.22768 ^{0} LONGITUDE: 94.23918 ^{0}

DATE: 10/9/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1228.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						22.0			20,50/0.2		
40.0			40.9'			34.2			7,50/0.2		
			Auger Refusal & Boring Terminated @ 40.9' (Elev. 1187.8).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 192

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 474+00
LOCATION: 5' Rt.
LATITUDE: 36.22717 ^{0} LONGITUDE: 94.23916 ^{0}

DATE: 10/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1235.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Brown, silty sand with gravel.								
5.0						16.0			21,38,32		
10.0						23.7			9,28,14		
15.0						25.7			3,6,8		
			18.3'								
			Brown & white, clayey gravel with sand.								
20.0						41.3			3,12,8		
25.0						22.5			27,22,29		
30.0			30.4'						50/0.2		
			Auger Refusal & Boring Terminated @ 30.4' (Elev. 1205.5).								
35.0											

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BORING NO.: 193

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 474+00
LOCATION: 128' Rt.
LATITUDE: 36.22684 ⁰ LONGITUDE: 94.23915 ⁰

DATE: 10/18/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 34.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown & white, silty sand with gravel.								
5.0		X				24.6			7,14,16		
10.0		X				23.7			5,12,20		
15.0		X				31.2			6,10,10		
20.0		X				43.0			3,6,6		
			23.3'								
			Brown & white, silty gravel with sand.								
25.0		X				44.6			5,9,50		
30.0		X				28.7			5,10,10		
			34.7'								
35.0											

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BORING NO.: 193

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 474+00

LOCATION: 128' Rt.

LATITUDE: 36.22684 ^{0} LONGITUDE: 94.23915 ^{0}

DATE: 10/18/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 34.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Auger Refusal & Boring Terminated @ 34.7' (Elev. 1207.8).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 194

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00
LOCATION: 84' Lt.
LATITUDE: 36.22737 ^{0} LONGITUDE: 94.23475 ^{0}

DATE: 7/24/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, clayey sand with gravel.								
5.0		X				25.5			4,6,18		
10.0		X			19	26.0	32		4,17,16		
15.0		X				30.6			9,10,9		
			18.3'								
			Red, clayey gravel with sand.								
20.0		X				28.9			8,9,10		
25.0		X				21.6			5,9,9		
30.0		X				18.2			6,7,8		
			33.3'								
			Red, silty gravel with sand.								
35.0											

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BORING NO.: 194

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00
LOCATION: 84' Lt.
LATITUDE: 36.22737 ^{0} LONGITUDE: 94.23475 ^{0}

DATE: 7/24/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.5'			22.1			2,3,4		
			No Refusal & Boring Terminated @ 36.5' (Elev. 1233.7).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 195

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00
LOCATION: 84' Rt.
LATITUDE: 36.22691 ^{0} LONGITUDE: 94.23476 ^{0}

DATE: 7/31/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 39.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1275.2								
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0		X				23.8			7,50/0.5		
10.0		X				38.3			16,50/0.4		
15.0		X				34.3			11,10,10		
			18.3'								
			Brown, clayey gravel with sand.								
20.0		X				23.1			15,15,19		
25.0		X			23	24.5	35		3,7,5		
30.0		X				26.3			18,15,13		
			33.3'								
			Brown, silty gravel with sand.								
35.0											

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BORING NO.: 195

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00
LOCATION: 84' Rt.
LATITUDE: 36.22691 ^{0} LONGITUDE: 94.23476 ^{0}

DATE: 7/31/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 39.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1275.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						20.3			20,15,13		
			39.0'								
40.0			No Refusal & Boring Terminated @ 39.0' (Elev. 1236.2).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 196

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 502+00

LOCATION: 84' Lt.

LATITUDE: 36.22729 ^{0} LONGITUDE: 94.22966 ^{0}

DATE: 7/23/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 31.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, clayey sand with gravel.								
5.0						38.6			21,19,16		
10.0						33.7			17,10,16		
15.0						35.9			5,12,8		
20.0						31.9			6,11,17		
			23.3'								
			Red, clayey gravel with sand.								
25.0						25.3			9,21,10		
30.0						21.4			50/0.4		
			31.0'								
			No Refusal & Boring Terminated @ 31.0' (Elev. 1233.2).								
35.0											

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BORING NO.: 197

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 502+00
LOCATION: 84' Rt.
LATITUDE: 36.22683 ^{0} LONGITUDE: 94.22967 ^{0}

DATE: 7/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1269.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red, clayey sand with gravel.								
5.0		X				32.4			3,7,11		
10.0		X				34.4			8,21,12		
15.0		X				43.0			8,8,21		
20.0		X				28.7			13,13,13		
25.0		X				33.7			4,4,18		
			28.3'								
			Red, silty gravel with sand.								
30.0		X				26.6			11,50/0.4		
35.0											

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BORING NO.: 197

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 502+00
LOCATION: 84' Rt.
LATITUDE: 36.22683 ^{0} LONGITUDE: 94.22967 ^{0}

DATE: 7/23/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1269.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.5'			24.4			25,21,38		
			No Refusal & Boring Terminated @ 36.5' (Elev. 1232.5).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 198

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 509+00
LOCATION: 204' Lt.
LATITUDE: 36.22759 ^{0} LONGITUDE: 94.22728 ^{0}

DATE: 9/26/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 13.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1212.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Light reddish tan & white, clayey sand with gravel.								
5.0		X				21.7			13,36,34		
10.0		X				23.7			27,34,50		
			13.0'								
			Auger Refusal & Boring Terminated @ 13.0' (Elev. 1199.8).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 199

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 509+00
LOCATION: CL
LATITUDE: 36.22703 ⁰ LONGITUDE: 94.22730 ⁰

DATE: 10/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1217.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, tan, beige, gray & reddish brown, clayey sand with gravel.								
5.0						16.5			5,50/0.2		
10.0						28.5			15,50/0.3		
15.0						22.5			7,25,50/0.4		
20.0						16.3			10,38,20		
			23.3'								
			Brown, tan, gray, reddish tan & reddish brown, silty gravel with sand.								
25.0						28.4			8,17,26		
30.0						29.8			3,13,26		
35.0											

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BORING NO.: 199

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 509+00
LOCATION: CL
LATITUDE: 36.22703 ^{0} LONGITUDE: 94.22730 ^{0}

DATE: 10/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 46.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1217.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						23.3			5,28,30		
40.0						30.6			31,47,20		
45.0						27.5			8,50/0.3		
			46.0' Auger Refusal & Boring Terminated @ 46.0' (Elev. 1171.8).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 200

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 509+00
LOCATION: 166' Rt.
LATITUDE: 36.22657 ^{0} LONGITUDE: 94.22731 ^{0}

DATE: 10/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 54.8 ft.
GROUNDWATER @ 2.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1225.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, tan, white, reddish brown, gray & beige, clayey sand with gravel.								
5.0		X				24.2			9,13,34		
10.0		X				24.0			14,40,50/0.4		
15.0		X				29.0			6,13,18		
20.0		X				22.1			36,24,24		
25.0		X				26.6			9,14,50		
			28.3'								
			Reddish brown, tan, gray, beige, dark tan & brown, silty gravel with sand.								
30.0		X				22.0			8,13,15		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 509+00
LOCATION: 166' Rt.
LATITUDE: 36.22657 ^{0} LONGITUDE: 94.22731 ^{0}

DATE: 10/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 54.8 ft.
GROUNDWATER @ 2.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1225.4								
					29	31.1	32		24,19,42		
40.0						27.6			12,7,8		
45.0						21.8			14,11,16		
50.0						29.1			5,5,7		
55.0			54.8' Auger Refusal & Boring Terminated @ 54.8' (Elev. 1170.6).								
60.0											
65.0											
70.0											

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BORING NO.: 201

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 559+67
LOCATION: 178' Rt.
LATITUDE: 36.22702 ^{0} LONGITUDE: 94.21000 ^{0}

DATE: 7/31/07
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Overburden 4.2'								
5.0			Auger Refusal @ 4.2' (Elev. 1277.7). Begin Coring In Chert. Chert: White, light gray & gray, bedded & fragmented, broken, scattered vugs, very porous in parts, fossil molds, mod. to predominately sev. weathered w/red, brown & orange clay in seams, fracture fillings and coatings, core loss interpreted as mud & clay seams, fractures present.							90	19
10.0										50	0
15.0										16	0
20.0										10	0
25.0										20	0
30.0										34	0
35.0										30	0

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 559+67
LOCATION: 178' Rt.
LATITUDE: 36.22702 ^{0} LONGITUDE: 94.21000 ^{0}

DATE: 7/31/07
TYPE OF DRILLING: HSA/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
	△ △ △									30	0
	△ △ △									19	0
40.0	△ △ △		40.0'								
			Boring Terminated @ 40.0' (Elev. 1241.9).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 217

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y672+38
LOCATION: 28' Lt.
LATITUDE: 36.23902 ⁰ LONGITUDE: 94.17545 ⁰

DATE: 8/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 32.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1293.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red & brown, sandy fat clay with gravel.								
5.0						12.6			17,50/0.3		
			7.9'								
			Red, brown & light brown, gravelly fat clay.								
10.0						43.2			10,9,6		
15.0					24	41.9	67		7,6,6		
20.0						36.2			11,9,50/0.5		
25.0						41.9			5,4,9		
			28.3'								
			Red & brown, silty sand with gravel.								
30.0						36.2			6,8,10		
			32.0'								
			No Refusal & Boring Terminated @ 32.0' (Elev. 1261.6).								
35.0											

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BORING NO.: 218

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y672+49
LOCATION: 140' Rt.
LATITUDE: 36.23859 ^{0} LONGITUDE: 94.17525 ^{0}

DATE: 8/4/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 32.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1293.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Brown & red, sandy fat clay with gravel.								
5.0						8.1			13,50/0.3		
10.0						41.9			7,6,10		
			13.3'								
			Red, gravelly fat clay.								
15.0						38.5			9,11,11		
20.0						37.5			14,19,20		
			23.3'								
			Red & brown, silty sand with gravel.								
25.0						32.7			6,21,16		
30.0						31.2			9,11,10		
			32.0'								
			No Refusal & Boring Terminated @ 32.0' (Elev. 1261.2).								
35.0											

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BORING NO.: 219

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X683+00
LOCATION: 89' Lt.
LATITUDE: 36.23998 ^{0} LONGITUDE: 94.17225 ^{0}

DATE: 8/5/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 34.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1292.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'								
			Red & light red, sandy fat clay with gravel.								
5.0						16.0			17,17,17		
10.0						17.5			45,37,50/0.4		
			13.2'								
			Light brown & red, gravelly fat clay.								
15.0						50.4			6,9,13		
			18.3'								
			Red, silty sand with gravel.								
20.0						35.0			6,6,7		
25.0					26	30.5	38		4,6,7		
30.0						32.5			5,6,10		
			34.0'								
35.0			No Refusal & Boring Terminated @ 34.0' (Elev. 1258.0).								

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BORING NO.: 220

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X683+00
LOCATION: 88' Rt.
LATITUDE: 36.23951 ^{0} LONGITUDE: 94.17207 ^{0}

DATE: 8/5/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 35.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1294.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.4'								
			Red, sandy fat clay with gravel.								
5.0					27	36.1	60		10,10,20		
10.0						40.7			6,6,8		
			13.3'								
			Red, silty sand with gravel.								
15.0						32.6			4,7,4		
20.0						17.4			9,11,12		
			22.7'								
			Auger Refusal @ 22.7' (Elev. 1271.5). Begin Coring in Limestone.							100	68
25.0			Limestone: Light gray, gray, w/white banding, microcrystalline to megacrystalline w/fine grained fragments, fresh w/moderate weathering on dissolution surfaces, chert nodules, bands & cherty inclusions, stylolites.							100	62
30.0										100	74
35.0			35.0'								

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BORING NO.: 220

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X683+00

LOCATION: 88' Rt.

LATITUDE: 36.23951 ^{0} LONGITUDE: 94.17207 ^{0}

DATE: 8/5/07

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1294.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Boring Terminated @ 35.0' (Elev. 1259.2).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 221

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X691+00

LOCATION: 154' Lt.

LATITUDE: 36.24061 ^{0} LONGITUDE: 94.16957 ^{0}

DATE: 10/31/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 7.2 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1241.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown & beige, clayey sand with gravel.								
5.0						18.6			3,5,8		
			7.2'								
			Auger Refusal & Boring Terminated @ 7.2' (Elev. 1234.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 223

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X691+00

LOCATION: 142' Rt.

LATITUDE: 36.23981 ^{0} LONGITUDE: 94.16945 ^{0}

DATE: 10/30/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 15.6 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & gray, clayey sand with gravel.								
5.0		X				22.8			3,5,7		
10.0		X				19.0			3,18,24		
			13.3'								
			Brown & beige, silty sand with gravel.								
15.0		X	15.6'			21.5			5,50/0.1		
			Auger Refusal & Boring Terminated @ 15.6' (Elev. 1227.0).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 224

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X701+00
LOCATION: 215' Lt.
LATITUDE: 36.24081 ^{0} LONGITUDE: 94.16605 ^{0}

DATE: 10/30/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 13.1 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1218.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0		X				17.0			2,3,14		
			8.3'								
			Light brown & gray, silty sand with gravel.								
10.0		X				19.6			7,14,15		
			13.1'								
			Auger Refusal & Boring Terminated @ 13.1' (Elev. 1205.3).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 225

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X701+00
LOCATION: CL
LATITUDE: 36.24022 ^{0} LONGITUDE: 94.16613 ^{0}

DATE: 10/30/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1223.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, beige & gray, clayey sand with gravel.								
5.0		X				14.3			5,11,8		
10.0		X				14.8			15,15,10		
			13.3'								
			Brown & beige, silty sand with gravel.								
15.0		X				34.1			1,3,3		
			19.0'								
20.0			Auger Refusal & Boring Terminated @ 19.0' (Elev. 1204.8).								
25.0											
30.0											
35.0											

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BORING NO.: 226

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X701+00
LOCATION: 176' Rt.
LATITUDE: 36.23974 ^{0} LONGITUDE: 94.16618 ^{0}

DATE: 10/30/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 17.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1227.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, tan, beige & gray, clayey sand with gravel.								
5.0		X				12.8			7,20,37		
10.0		X				14.1			7,11,12		
			13.3'								
			Brown & beige, silty sand with gravel.								
15.0		X				37.6			3,4,7		
			17.4'								
			Auger Refusal & Boring Terminated @ 17.4' (Elev. 1210.5).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 227

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X713+00
LOCATION: 89' Lt.
LATITUDE: 36.23971 ^{0} LONGITUDE: 94.16207 ^{0}

DATE: 8/15/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1300.8								
			Topsoil 0.3'								
			Brown, white & red, clayey sand with gravel.								
5.0		X				14.3			33,50/0.5		
10.0		X				33.3			10,20,50/0.2		
			13.1'								
			Brown, beige & white, silty sand with gravel.								
15.0		X				45.8			4,7,7		
20.0		X			34	43.4	37		5,5,6		
25.0		X				28.6			3,5,4		
30.0		X				26.8			50/0.3	100	67
			30.3'								
			Auger Refusal @ 30.3' (Elev. 1270.5). Begin Coring in Limestone.								
			Limestone: White, light gray & gray, cryptocrystalline w/fine grained fragments, cherty & chert nodules, fresh w/mod. to sev. weathering on dissolution surfaces, scattered fossiliferous, scattered stylolites, intervals porous.							100	95
35.0			35.0'								

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BORING NO.: 227

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X713+00

LOCATION: 89' Lt.

LATITUDE: 36.23971 ^{0} LONGITUDE: 94.16207 ^{0}

DATE: 8/15/07

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: A. Stroud

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Boring Terminated @ 35.0' (Elev. 1265.8).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 228

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X713+00
LOCATION: 88' Rt.
LATITUDE: 36.23925 ^{0} LONGITUDE: 94.16228 ^{0}

DATE: 8/14/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 36.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1297.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0						38.4			20,16,50/0.4		
10.0					22	18.0	45		7,11,18		
15.0						45.1			4,4,10		
			18.3'								
			Brown, silty sand with gravel.								
20.0						27.4			7,15,9		
25.0						28.3			7,14,50/0.2		
			26.2'								
			Auger Refusal @ 26.2' (Elev. 1271.0). Begin Coring in Limestone.								
			Limestone: White, light gray & gray, cryptocrystalline to fine grained fragments, cherty & chert nodules and layers, fresh w/mod. weathering on dissolution surfaces, stylolites, scattered fossiliferous.							100	73
30.0										88	26
35.0											

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BORING NO.: 228

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X713+00
LOCATION: 88' Rt.
LATITUDE: 36.23925 ^{0} LONGITUDE: 94.16228 ^{0}

DATE: 8/14/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: A. Stroud

COMPLETION DEPTH: 36.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1297.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.0'							88	26
			Boring Terminated @ 36.0' (Elev. 1261.2).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 229

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X723+00

LOCATION: 84' Lt.

LATITUDE: 36.23847 ^{0} LONGITUDE: 94.15900 ^{0}

DATE: 7/11/07

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 33.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1309.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & white, clayey sand with gravel.								
5.0						14.3			50/0.5		
10.0						12.9			15/20/27		
			13.3'								
			Dark brown, white, yellowish brown & light brown, silty sand with gravel.								
15.0						66.4			3/3/3		
20.0						89.5			5/6/1		
25.0			25.3'			45.8			50/0.3		
			Auger Refusal @ 25.3' (Elev. 1284.5). Begin Coring in Limestone.							100	100
			Limestone: White w/gray banding, cryptocrystalline to fine grained, fresh w/mod. weathering on dissolution surfaces, stylolites, scattered fossiliferous.							100	68
30.0										100	60
			33.0'								
			Boring Terminated @ 33.0' (Elev. 1276.8).								
35.0											

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BORING NO.: 230

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: X723+00
LOCATION: 84' Rt.
LATITUDE: 36.23807 ^{0} LONGITUDE: 94.15927 ^{0}

DATE: 7/12/07
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1312.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Yellowish brown, white & dark red, clayey sand with gravel.								
5.0		X				25.4			10,15,29		
10.0		X				14.1			46,42,31		
			13.3'								
			Yellowish brown, white, beige & red, silty sand with gravel.								
15.0		X				34.3			16,15,14		
20.0		X				29.6			5,11,15		
25.0			25.2'			21.2			50/0.3	100	75
			Auger Refusal @ 25.2' (Elev. 1286.8). Begin Coring in Limestone.								
			Limestone: White w/gray banding, microcrystalline to fine grained, fresh w/mod. weathering on dissolution surfaces, stylolites, traces fossiliferous.							100	80
30.0											
										100	78
35.0			35.0'								

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BORING NO.: 230

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: X723+00

LOCATION: 84' Rt.

LATITUDE: 36.23807 ^{0} LONGITUDE: 94.15927 ^{0}

DATE: 7/12/07

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1312.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Boring Terminated @ 35.0' (Elev. 1277.0).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 235

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 10+98 Hwy. 412B
LOCATION: 60' Lt.
LATITUDE: 36.17770 ^{0} LONGITUDE: 94.29228 ^{0}

DATE: 11/5/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 11.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		16	18.9	32				
5.0			Reddish brown, gravelly lean clay with sand.								
10.0			11.0'								
			No Refusal & Boring Terminated @ 11.0' (Elev. 1252.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 236

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 15+00 Hwy. 412B
LOCATION: 72' Lt.
LATITUDE: 36.17771 ^{0} LONGITUDE: 94.29092 ^{0}

DATE: 11/5/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 11.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			25.2					
			Reddish brown, gravelly lean clay with sand.								
5.0											
10.0			11.0'								
			No Refusal & Boring Terminated @ 11.0' (Elev. 1249.0).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 237

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 19+00 Hwy. 412B

LOCATION: 60' Rt.

LATITUDE: 36.17733 ^{0} LONGITUDE: 94.28957 ^{0}

DATE: 11/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 2.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1249.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			11.7					
			Brown, gravelly lean clay with sand. 2.0'								
			Auger Refusal & Boring Terminated @ 2.0' (Elev. 1247.4).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 175+00 U.S. 412 Ramp 1

LOCATION: 66' Rt.

LATITUDE: 36.17735 ^{0} LONGITUDE: 94.29923 ^{0}

DATE: 11/5/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 3.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			32.6					
			Red & brown, clayey sand with gravel. 3.0'								
			Auger Refusal & Boring Terminated @ 3.0' (Elev. 1251.5).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 178+00 U.S. 412 Ramp 1
LOCATION: 41' Rt.
LATITUDE: 36.17741 ^{0} LONGITUDE: 94.29822 ^{0}

DATE: 11/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1254.7								
			Topsoil 0.3'			19.4					
			Reddish brown, lean clay with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1249.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 184+00 U.S. 412 Ramp 1

LOCATION: 42' Lt.

LATITUDE: 36.17761 ^{0} LONGITUDE: 94.29618 ^{0}

DATE: 11/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			17.8					
			Reddish brown, gravelly lean clay with sand.								
5.0			5.0'								
			Auger Refusal & Boring Terminated @ 5.0' (Elev. 1259.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 241

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 188+00 U.S. 412 Ramp 1
LOCATION: 42' Lt.
LATITUDE: 36.17761 ^{0} LONGITUDE: 94.29483 ^{0}

DATE: 11/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 9.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	24.8	43				
5.0			Reddish brown, clayey sand with gravel. 9.0'								
10.0			Auger Refusal & Boring Terminated @ 9.0' (Elev. 1256.0).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 192+00 U.S. 412 Ramp 1

LOCATION: 45' Lt.

LATITUDE: 36.17763 ^{0} LONGITUDE: 94.29347 ^{0}

DATE: 11/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 9.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			20.8					
5.0			Reddish Brown, clayey sand with gravel. 9.0'								
10.0			No Refusal & Boring Terminated @ 9.0' (Elev. 1254.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 195+00 U.S. 412 Ramp 2
LOCATION: 38' Rt.
LATITUDE: 36.17880 ^{0} LONGITUDE: 94.29201 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 9.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		22	24.8	44				
5.0			Reddish brown, lean clay with sand.								
10.0			9.8'								
			Auger Refusal & Boring Terminated @ 9.8' (Elev. 1260.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 198+00 U.S 412 Ramp 2
LOCATION: CL
LATITUDE: 36.17947 ^{0} LONGITUDE: 94.29140 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Red & brown, gravelly lean clay with sand.			33.6					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1259.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 245

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 202+00 U.S. 412 Ramp 2
LOCATION: 104' Lt.
LATITUDE: 36.18054 ^{0} LONGITUDE: 94.29098 ^{0}

DATE: 10/31/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 27.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan & reddish tan, clayey sand.								
5.0		X				25.8			8,14,26		
10.0		X				34.6			8,16,20		
			13.3'								
			Light tan, tan & white, poorly graded gravel with clay and sand.								
15.0		X				31.3			5,15,48		
20.0		X			16	29.8	33		10,17,17		
25.0		X				26.1			11,10,10		
			26.5'								
			Auger Refusal & Boring Terminated @ 26.5' (Elev. 1226.5).								
30.0											
35.0											

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BORING NO.: 246

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 202+00 U.S. 412 Ramp 2

LOCATION: CL

LATITUDE: 36.18037 ^{0} LONGITUDE: 94.29068 ^{0}

DATE: 11/1/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 6.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3								
			Tan, clayey sand.								
5.0		X				29.6			12,24,17		
			6.7								
			Auger Refusal & Boring Terminated @ 6.7' (Elev. 1245.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 247

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 202+00 U.S. 412 Ramp 2
LOCATION: 120' Rt.
LATITUDE: 36.18023 ^{0} LONGITUDE: 94.29033 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 26.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1250.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Tan, brown & beige, clayey sand.								
5.0					26	40.2	49		6,10,17		
10.0						47.0			3,7,4		
			13.3'								
			Brown, gray, beige & white, poorly graded gravel with clay and sand.								
15.0						20.0			3,22,8		
20.0						28.2			7,11,6		
25.0						25.2			22,16,50/0.2		
			26.5'								
			Auger Refusal & Boring Terminated @ 26.5' (Elev. 1224.3).								
30.0											
35.0											

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BORING NO.: 248

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 204+00 U.S 412 Ramp 2
LOCATION: CL
LATITUDE: 36.18086 ^{0} LONGITUDE: 94.29031 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1266.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, clayey sand with gravel.			35.0					
5.0			5.0' Auger Refusal & Boring Terminated @ 5.0' (Elev. 1261.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 249

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 198+00 U.S. 412 Ramp 3
LOCATION: CL
LATITUDE: 36.18041 ^{0} LONGITUDE: 94.29261 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & reddish tan, gravelly lean clay with sand.		20	20.7	31				
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1262.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 202+00 U.S. 412 Ramp 3

LOCATION: 84' Lt.

LATITUDE: 36.18107 ^{0} LONGITUDE: 94.29153 ^{0}

DATE: 11/1/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1260.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3 Overburden								
5.0			4.8 Auger Refusal & Boring Terminated @ 4.8' (Elev. 1256.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 204+00 U.S. 412 Ramp 3
LOCATION: CL
LATITUDE: 36.18118 ^{0} LONGITUDE: 94.29083 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 4.2 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1266.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Brown & beige, gravelly lean clay with sand.			22.1					
5.0			Auger Refusal & Boring Terminated @ 4.2' (Elev. 1261.8). 4.2'								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 208+00 U.S. 412 Ramp 3
LOCATION: CL
LATITUDE: 36.18193 ^{0} LONGITUDE: 94.28984 ^{0}

DATE: 11/1/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		20	25.7	33				
			Brown & red, lean clay with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1263.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 253

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 173+00 U.S. 12 Ramp 4
LOCATION: 60' Lt.
LATITUDE: 36.17809 ^{0} LONGITUDE: 94.29994 ^{0}

DATE: 11/15/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1214.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	13.0	45				
5.0			Brown, clayey sand with gravel.								
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1199.4).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 254

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 176+00 U.S. 412 Ramp 4
LOCATION: 43' Rt.
LATITUDE: 36.17801 ^{0} LONGITUDE: 94.29888 ^{0}

DATE: 11/5/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			18.4					
			Reddish brown, sandy lean clay.								
5.0											
10.0											
15.0			19.0'								
20.0			No Refusal & Boring Terminated @ 19.0' (Elev. 1238.1).								
25.0											
30.0											
35.0											

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BORING NO.: 255

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 179+00 U.S. 412 Ramp 4
LOCATION: 110' Rt.
LATITUDE: 36.17810 ^{0} LONGITUDE: 94.29784 ^{0}

DATE: 11/5/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 33.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Dark reddish brown, clayey sand.								
5.0						31.3			10,44,35		
			8.3'								
			Reddish tan, silty sand with gravel.								
10.0						29.2			4,11,14		
15.0						30.7			7,14,13		
			18.3'								
			Reddish brown & beige, clayey gravel with sand.								
20.0						10.4			14,26,14		
25.0					20	23.1	38		4,30,21		
30.0						19.4			23,50/0.4		
			33.0'								
			No Refusal & Boring Terminated @ 33.0' (Elev. 1237.9).								
35.0											

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BORING NO.: 256

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 179+00 U.S 412 Ramp 4

LOCATION: 88' Lt.

LATITUDE: 36.17861 ^{0} LONGITUDE: 94.29806 ^{0}

DATE: 11/6/07

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 23.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan, clayey sand.								
5.0		X			24	33.2	46		15,47,50/0.4		
			8.3'								
			Light reddish tan, silty sand with gravel.								
10.0		X				20.4			35,50/0.4		
15.0		X			30	30.3	46		25,30,21		
20.0		X				39.3			15,18,40		
			23.0'								
			No Refusal & Boring Terminated @ 23.0' (Elev. 1240.9).								
25.0											
30.0											
35.0											

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BORING NO.: 257

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 10+68 Hwy 68
LOCATION: 39' Rt.
LATITUDE: 36.18060 ^{0} LONGITUDE: 94.29553 ^{0}

DATE: 11/5/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 10.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		21	27.5	38				
5.0			Reddish brown, sandy lean clay.								
10.0			10.0'								
			No Refusal & Boring Terminated @ 10.0' (Elev. 1279.9).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 258

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 14+68 Hwy 68

LOCATION: 37' Lt.

LATITUDE: 36.17993 ^{0} LONGITUDE: 94.29442 ^{0}

DATE: 11/5/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 9.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			13.0					
5.0			Reddish brown, gravelly lean clay with sand. 9.0'								
10.0			No Refusal & Boring Terminated @ 9.0' (Elev. 1271.0).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 259

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 22+67 Hwy 68
LOCATION: 46' Lt.
LATITUDE: 36.17834 ^{0} LONGITUDE: 94.29255 ^{0}

DATE: 11/2/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.5 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		19	12.9	33				
5.0			Brown, gravelly lean clay with sand. 5.5'								
			Auger Refusal & Boring Terminated @ 5.5' (Elev. 1258.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 18+00 Javello Rd.

LOCATION: 24' Rt.

LATITUDE: 36.19176 ^{0} LONGITUDE: 94.26664 ^{0}

DATE: 11/14/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 8.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1156.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		22	15.1	27				
5.0			Brown, silty gravel with sand. 8.0'								
			Auger Refusal & Boring Terminated @ 8.0' (Elev. 1148.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 261

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 24+00 Javello Rd.
LOCATION: CL
LATITUDE: 36.19033 ^{0} LONGITUDE: 94.26564 ^{0}

DATE: 11/14/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1162.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			13.2					
			Brown, silty gravel with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1157.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 262

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 25+00 Javello Rd.
LOCATION: 120' Lt.
LATITUDE: 36.19023 ^{0} LONGITUDE: 94.26512 ^{0}

DATE: 11/15/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 42.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1202.4								
			Topsoil 0.6'								
			Brown, clayey sand with gravel.								
5.0		X				43.1			5,9,18		
10.0		X				34.6			11,18,22		
			13.3'								
			Brown, silty sand with gravel.								
15.0		X				16.4			25,50/0.3		
20.0		X				20.4			12,26,26		
			23.3'								
			Brown, silty gravel with sand.								
25.0		X				34.0			12,25,13		
30.0		X				44.0			5,15,12		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 25+00 Javello Rd.
LOCATION: 120' Lt.
LATITUDE: 36.19023 ^{0} LONGITUDE: 94.26512 ^{0}

DATE: 11/15/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 42.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1202.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						32.9			12,9,5		
40.0						18.9			12,50/0.3		
			42.0'								
			No Refusal & Boring Terminated @ 42.0' (Elev. 1160.4).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 263

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 25+00 Javello Rd.
LOCATION: 20' Lt.
LATITUDE: 36.19008 ^{0} LONGITUDE: 94.26549 ^{0}

DATE: 11/15/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 16.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1189.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		21	12.1	37				
			Brown, clayey sand with gravel.								
5.0											
10.0											
15.0			16.0'								
			No Refusal & Boring Terminated @ 16.0' (Elev. 1173.1).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 30+00 Javello Rd.
LOCATION: 92' Rt.
LATITUDE: 36.18874 ^{0} LONGITUDE: 94.26498 ^{0}

DATE: 11/14/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 32.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1213.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Brown, clayey sand with gravel.								
5.0		X				36.3			5,18,30		
10.0		X				42.1			7,11,21		
			13.3'								
			Brown, silty sand with gravel.								
15.0		X				13.9			21,50/0.3		
			17.9'								
			Brown, silty gravel with sand.								
20.0		X				41.7			2,7,7		
25.0		X			27	27.0	43		9,18,11		
30.0		X				41.5			5,7,38		
			32.0'								
			No Refusal & Boring Terminated @ 32.0' (Elev. 1181.6).								
35.0											

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BORING NO.: 265

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 35+00 Javello Rd.
LOCATION: 76' Lt.
LATITUDE: 36.18838 ^{0} LONGITUDE: 94.26324 ^{0}

DATE: 11/15/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 14.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1201.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Brown, clayey sand with gravel.								
5.0					21	38.5	43		6,18,16		
10.0						23.9			6,18,36		
15.0			14.7								
			Auger Refusal & Boring Terminated @ 14.7' (Elev. 1186.3).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 266

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 34+85 Javello Rd.
LOCATION: CL
LATITUDE: 36.18819 ^{0} LONGITUDE: 94.26336 ^{0}

DATE: 11/14/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.9 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1195.6								
			Topsoil 0.6'								
			Brown, silty sand with gravel.								
5.0		X				19.0			18,36,46		
10.0		X			23	19.7	30		8,26,45		
15.0		X				17.4			28,50/0.1		
			15.9'								
			Auger Refusal & Boring Terminated @ 15.9' (Elev. 1179.7).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 267

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 35+00 Javello Rd.
LOCATION: 75' Rt.
LATITUDE: 36.18798 ^{0} LONGITUDE: 94.26337 ^{0}

DATE: 11/14/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 13.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1197.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6								
			Reddish, silty sand with gravel.								
5.0		X				16.5			9,45,39		
10.0		X				44.5			2,6,7		
			13.7								
15.0			Auger Refusal & Boring Terminated @ 13.7' (Elev. 1183.7).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 36+00 Javello Rd.

LOCATION: CL

LATITUDE: 36.18811 ^{0} LONGITUDE: 94.26298 ^{0}

DATE: 11/15/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1216.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			9.8					
			Gray, silty gravel with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1211.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 18+70 Liberty Ave.
LOCATION: 18' Lt.
LATITUDE: 36.18466 ^{0} LONGITUDE: 94.28828 ^{0}

DATE: 11/6/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1274.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Dark brown, lean clay.		20	24.7	34				
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1269.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 270

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 23+00 Liberty Ave.

LOCATION: CL

LATITUDE: 36.18457 ^{0} LONGITUDE: 94.28683 ^{0}

DATE: 10/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1276.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'			9.1					
			Tannish brown, clayey gravel with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1271.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 270A

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 25+00 Liberty Ave.

LOCATION: 18' Rt.

LATITUDE: 36.18451 ^{0} LONGITUDE: 94.28615 ^{0}

DATE: 11/6/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1277.3								
			Topsoil 0.3'								
			Reddish brown, sandy lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1272.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 271

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 17+00 Musteen Rd.

LOCATION: CL

LATITUDE: 36.17643 ^{0} LONGITUDE: 94.29903 ^{0}

DATE: 11/4/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 FT.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, sandy lean clay.			14.9					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1248.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 272

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+00 Musteen Rd.
LOCATION: CL
LATITUDE: 36.17711 ⁰ LONGITUDE: 94.29802 ⁰

DATE: 11/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 18.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1268.2								
			Topsoil 0.3'		20	21.7	37				
			Reddish brown, sandy lean clay.								
5.0											
10.0											
15.0			18.0'								
			No Refusal & Boring Terminated @ 18.0' (Elev. 1250.2).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 273

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 25+00 Musteen Rd.
LOCATION: CL
LATITUDE: 36.17714 ^{0} LONGITUDE: 94.29667 ^{0}

DATE: 11/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 10.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			22.8					
5.0			Reddish brown, sandy lean clay.								
10.0			10.0'								
			No Refusal & Boring Terminated @ 10.0' (Elev. 1255.2).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 274

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 28+00
LOCATION: CL
LATITUDE: 36.17713 ^{0} LONGITUDE: 94.29566 ^{0}

DATE: 11/4/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1243.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		21	16.8	39				
5.0			Reddish brown, clayey gravel with sand.								
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1228.3).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 275

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 33+00 Musteen Rd.
LOCATION: 60' Lt.
LATITUDE: 36.17708 ^{0} LONGITUDE: 94.29393 ^{0}

DATE: 11/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1241.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan & white, clayey gravel with sand.								
5.0						32.8			13,33,49		
10.0						35.3			15,18,50		
			13.3'								
			Reddish tan, gray & reddish brown, clayey gravel with sand.								
15.0						17.0			15,44,44		
20.0						22.1			16,25,29		
25.0						20.8			3,8,33		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1211.3).								
35.0											

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BORING NO.: 276

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 33+00 Musteen Rd.
LOCATION: CL
LATITUDE: 36.17693 ^{0} LONGITUDE: 94.29400 ^{0}

DATE: 11/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1236.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown & white, clayey gravel with sand.								
5.0						18.8			50/0.4		
			8.3'								
			Reddish brown, gray & white, clayey gravel with sand.								
10.0						25.1			9,25,20		
15.0					24	28.4	46		9,11,28		
20.0						40.5			3,11,8		
25.0						25.2			4,50/0.4		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1206.0).								
35.0											

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BORING NO.: 277

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 33+00 Musteen Rd.
LOCATION: 85' Rt.
LATITUDE: 36.17671 ^{0} LONGITUDE: 94.29410 ^{0}

DATE: 11/3/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Reddish tan, white, reddish brown & gray, clayey gravel with sand.								
5.0		X				33.4			19,11,12		
10.0		X			24	32.2	41		9,15,16		
15.0		X				23.0			5,18,33		
			18.3'								
			Reddish brown, tan & white, clayey gravel with sand.								
20.0		X				25.5			9,31,50/0.4		
25.0		X				29.1			9,15,22		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1202.1).								
35.0											

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BORING NO.: 278

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 35+00 Musteen Rd.
LOCATION: CL
LATITUDE: 36.17673 ^{0} LONGITUDE: 94.29337 ^{0}

DATE: 11/2/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1250.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Red & brown, sandy lean clay.		22	28.4	41				
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1245.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 279

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 23+00 Puppy Creek Rd.

LOCATION: CL

LATITUDE: 36.24041 ^{0} LONGITUDE: 94.17207 ^{0}

DATE: 11/12/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6' Overburden								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1281.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 280

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 26+01 Puppy Cr. Rd.
LOCATION: 31' Rt.
LATITUDE: 36.24029 ^{0} LONGITUDE: 94.17104 ^{0}

DATE: 10/31/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 14.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1281.7								
			Topsoil 0.3'		21	17.3	47				
			Brown & white, gravelly lean clay.								
5.0											
10.0											
			14.0'								
15.0			No Refusal & Boring Terminated @ 14.0' (Elev. 1267.7).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 281

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 31+01 Puppy Cr. Rd.
LOCATION: 80' Lt.
LATITUDE: 36.24089 ^{0} LONGITUDE: 94.16947 ^{0}

DATE: 10/30/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 23.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1247.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Dark brown & black, silty gravel with sand.								
5.0		X				15.7			2,3,5		
10.0		X				6.3			3,7,8		
			13.3'								
			Reddish brown, white & beige, silty sand with gravel.								
15.0		X			28	33.7	47		2,4,7		
20.0		X				43.9			4,7,5		
			23.0'								
			Auger Refusal & Boring Terminated @ 23.0' (Elev. 1224.3).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 30+99 Puppy Cr. Rd.

LOCATION: 92' Rt.

LATITUDE: 36.24044 ^{0} LONGITUDE: 94.16932 ^{0}

DATE: 10/31/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 4.3 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1235.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Overburden								
5.0			4.3' Auger Refusal & Boring Terminated @ 4.3' (Elev. 1231.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 283

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 33+00 Puppy Creek Rd.
LOCATION: 7' Lt.
LATITUDE: 36.24085 ^{0} LONGITUDE: 94.16876 ^{0}

DATE: 11/13/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1259.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			9.9					
			Reddish, clayey gravel with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1254.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 284

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+11 Spring Creek St.
LOCATION: CL
LATITUDE: 36.23976 ^{0} LONGITUDE: 94.17309 ^{0}

DATE: 11/13/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1291.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish, clayey gravel with sand.			17.8					
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1286.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+11 Spring Cr. St.
LOCATION: 59' Lt.
LATITUDE: 36.23921 ^{0} LONGITUDE: 94.17289 ^{0}

DATE: 11/6/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'								
			Light tan, brown & light brown, clayey gravel with sand.								
5.0		X				13.8			10,21,27		
10.0		X				13.4			20,19,21		
15.0		X			21	11.1	35		19,19,17		
20.0		X				12.8			4,5,13		
25.0		X				12.7			3,3,4		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1249.2).								
35.0											

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BORING NO.: 286

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+25 Spring Creek St.
LOCATION: CL
LATITUDE: 36.23917 ^{0} LONGITUDE: 94.17310 ^{0}

DATE: 11/13/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish, clayey gravel with sand.								
5.0						21.1			3,6,5		
10.0						19.3			35,45,17		
			13.5'								
			Brown, clayey gravel with sand.								
15.0						27.2			3,5,13		
20.0					20	16.1	38		3,7,5		
25.0						22.6			3,4,2		
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1240.2).								
35.0											

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BORING NO.: 287

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+11 Spring Creek St.
LOCATION: 58' Rt.
LATITUDE: 36.23921 ^{0} LONGITUDE: 94.17329 ^{0}

DATE: 11/13/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 21.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1279.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Fill								
5.0			5.0'								
			Brown, clayey gravel with sand.			22.6			5,18,14		
			8.3'								
			Reddish, gray & brown, clayey gravel with sand.								
10.0						43.5			5,7,9		
15.0						18.0			17,22,18		
20.0						10.4			11,39,50/0.3		
			21.5'								
			Auger Refusal & Boring Terminated @ 21.5' (Elev. 1257.9).								
25.0											
30.0											
35.0											

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BORING NO.: 288

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 25+11 Spring Cr. St.
LOCATION: 27' Lt.
LATITUDE: 36.23811 ^{0} LONGITUDE: 94.17302 ^{0}

DATE: 11/6/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 12.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1267.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3'		20	8.1	31				
			Tan, clayey gravel with sand.								
5.0											
10.0			12.0'								
			No Refusal & Boring Terminated @ 12.0' (Elev. 1255.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 289

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 15+00 Grimsley/West Miller Rd.
LOCATION: 27' Lt.
LATITUDE: 36.22827 ^{0} LONGITUDE: 94.21813 ^{0}

DATE: 11/6/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 7.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	18.3	37				
5.0			Red & brown, lean clay with sand. 7.0'								
			Auger Refusal & Boring Terminated @ 7.0' (Elev. 1274.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 290

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 22+00 Grimsley/West Miller Rd.
LOCATION: 14' Rt.
LATITUDE: 36.22635 ^{0} LONGITUDE: 94.21831 ^{0}

DATE: 11/6/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 7.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1281.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3' Reddish brown, lean clay with sand.		21	21.2	40				
5.0			7.0'								
			Auger Refusal & Boring Terminated @ 7.0' (Elev. 1274.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 291

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 623+14
LOCATION: 154' Lt.
LATITUDE: 36.23554 ^{0} LONGITUDE: 94.19129 ^{0}

DATE: 11/20/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 27.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, clayey gravel with sand.								
5.0						37.0			2,5,7		
			8.3'								
			Brown, silty gravel with sand.								
10.0						26.1			9,10,22		
15.0					31	30.8	34		10,20,19		
20.0						29.0			5,20,14		
25.0									2,5,2		
			27.0'								
			Auger Refusal & Boring Terminated @ 27.0' (Elev. 1206.9).								
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y630+00
LOCATION: CL
LATITUDE: 36.23561 ^{0} LONGITUDE: 94.18918 ^{0}

DATE: 11/19/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			21.3					
			Brown, lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1252.0).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y636+00

LOCATION: CL

LATITUDE: 36.23608 ^{0} LONGITUDE: 94.18723 ^{0}

DATE: 11/20/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1274.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	36.3	59				
5.0			Brown, sandy fat clay.								
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1259.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 294

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y640+00
LOCATION: CL
LATITUDE: 36.23640 ^{0} LONGITUDE: 94.18594 ^{0}

DATE: 11/19/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1284.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			16.4					
5.0			Brown, clayey gravel with sand. 5.8'								
			Auger Refusal & Boring Terminated @ 5.8' (Elev. 1278.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y643+00

LOCATION: CL

LATITUDE: 36.23663 ^{0} LONGITUDE: 94.18496 ^{0}

DATE: 11/19/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 17.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			17.6					
			Brown, lean clay.								
5.0											
10.0											
15.0			17.0'								
			No Refusal & Boring Terminated @ 17.0' (Elev. 1272.1).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 296

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y647+00
LOCATION: CL
LATITUDE: 36.23695 ^{0} LONGITUDE: 94.18366 ^{0}

DATE: 11/18/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 6.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1288.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		18	19.4	36				
5.0			Brown, clayey sand. 6.6'								
			Auger Refusal & Boring Terminated @ 6.6' (Elev. 1281.8).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 297

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y651+00
LOCATION: CL
LATITUDE: 36.23726 ^{0} LONGITUDE: 94.18236 ^{0}

DATE: 11/17/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 6.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			11.2					
5.0			Brown, clayey sand. 6.5'								
			Auger Refusal & Boring Terminated @ 6.5' (Elev. 1283.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 298

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y655+00
LOCATION: CL
LATITUDE: 36.23758 ^{0} LONGITUDE: 94.18106 ^{0}

DATE: 11/17/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 10.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1289.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			16.0					
5.0			Brown, clayey sand.								
10.0			10.6'								
			Auger Refusal & Boring Terminated @ 10.6' (Elev. 1278.6).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 299

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y659+00
LOCATION: CL
LATITUDE: 36.23790 ^{0} LONGITUDE: 94.17976 ^{0}

DATE: 11/18/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 9.2 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1290.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6		22	23.1	43				
5.0			Reddish, sandy lean clay.								
			9.2								
10.0			Auger Refusal & Boring Terminated @ 9.2' (Elev. 1280.9).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y663+00

LOCATION: CL

LATITUDE: 36.23821 ^{0} LONGITUDE: 94.17847 ^{0}

DATE: 11/18/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 18.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			13.5					
			Reddish, sandy lean clay.								
5.0											
10.0											
15.0			18.0'								
			No Refusal & Boring Terminated @ 18.0' (Elev. 1268.1).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 301

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: Y666+00

LOCATION: CL

LATITUDE: 36.23844 ^{0} LONGITUDE: 94.17749 ^{0}

DATE: 11/18/07

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			15.3					
			Copper, lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1258.9).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 302

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y666+00
LOCATION: 118' Lt.
LATITUDE: 36.23876 ^{0} LONGITUDE: 94.17761 ^{0}

DATE: 11/19/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 9.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Brown, silty gravel with sand.			27.8			5,4,5		
			9.3'								
10.0			Auger Refusal & Boring Terminated @ 9.3' (Elev. 1256.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 303

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: Y624+00
LOCATION: CL
LATITUDE: 36.23513 ^{0} LONGITUDE: 94.19113 ^{0}

DATE: 11/19/07
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1249.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	16.1	50				
5.0			Brown, sandy fat clay. 5.5'								
			Auger Refusal & Boring Terminated @ 5.5' (Elev. 1244.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 18+00 Hwy. 112

LOCATION: CL

LATITUDE: 36.22762 ^{0} LONGITUDE: 94.23075 ^{0}

DATE: 1/4/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1250.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	33.7	32				
			Red & brown, gravelly lean clay with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1245.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 19+00 Hwy. 112

LOCATION: 90' Rt.

LATITUDE: 36.22731 ^{0} LONGITUDE: 94.23100 ^{0}

DATE: 1/4/08

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 9.1 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Gray & tan, poorly graded gravel with sand.			8.1			50/0.5		
			9.1'								
10.0			Auger Refusal & Boring Terminated @ 9.1' (Elev. 1233.8).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 306

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 21+00 Hwy. 112

LOCATION: CL

LATITUDE: 36.22681 ^{0} LONGITUDE: 94.23060 ^{0}

DATE: 1/4/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1257.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			0.6' Reddish brown & white, sandy silt with gravel.			18.3					
5.0			5.0' No Refusal & Boring Terminated @ 5.0' (Elev. 1252.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 307

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 21+00 Hwy. 112
LOCATION: 82' Rt.
LATITUDE: 36.22677 ^{0} LONGITUDE: 94.23088 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 27.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1250.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan & white, sandy silt with gravel.								
5.0					32	18.2	35		20,27,40		
			8.3'								
			Light tan, reddish tan, white, reddish brown & beige, silty gravel with sand.								
10.0						10.2			23,29,30		
15.0					26	18.7	29		20,21,40		
20.0						10.5			50/0.4		
25.0						31.2			4,8,18		
			27.0'								
			No Refusal & Boring Terminated @ 27.0' (Elev. 1223.7).								
30.0											
35.0											

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BORING NO.: 308

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 24+00

LOCATION: CL

LATITUDE: 36.22599 ^{0} LONGITUDE: 94.23045 ^{0}

DATE: 1/5/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1265.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	30.0	44				
			Reddish brown, lean clay with sand.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1260.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 309

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 484+00 Hwy. 112 Ramp 1

LOCATION: 38' Lt.

LATITUDE: 36.22701 ^{0} LONGITUDE: 94.23577 ^{0}

DATE: 1/6/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 20.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1264.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	27.2	42				
			Reddish brown, sandy lean clay.								
5.0											
10.0											
15.0											
20.0			20.0'								
			No Refusal & Boring Terminated @ 20.0' (Elev. 1244.0).								
25.0											
30.0											
35.0											

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BORING NO.: 310

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00 Hwy. 112 Ramp 1
LOCATION: 44' Rt.
LATITUDE: 36.22668 ^{0} LONGITUDE: 94.23480 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1277.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6			30.0					
			Reddish brown, sandy lean clay.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00 Hwy. 112 Ramp 1
LOCATION: 44' Rt.
LATITUDE: 36.22668 ^{0} LONGITUDE: 94.23480 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1277.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
40.0			40.0'								
			No Refusal & Boring Terminated @ 40.0' (Elev. 1237.1).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 311

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00 Hwy. 112 Ramp 1
LOCATION: 168' Rt.
LATITUDE: 36.22635 ^{0} LONGITUDE: 94.23489 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 49.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1278.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray & reddish brown, clayey gravel with sand.								
5.0		X				12.0			7,31,17		
10.0		X			18	29.2	36		8,11,12		
15.0		X				14.3			6,8,11		
			18.3'								
			Reddish brown, silty sand with gravel.								
20.0		X			28	37.0	46		3,4,8		
			23.3'								
			Beige & reddish brown, silty gravel with sand.								
25.0		X				26.7			4,4,3		
			28.3'								
			Reddish brown & gray, silty gravel with sand.								
30.0		X				23.9			2,4,6		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 487+00 Hwy. 112 Ramp 1
LOCATION: 168' Rt.
LATITUDE: 36.22635 ^{0} LONGITUDE: 94.23489 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 49.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1278.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						31.5			6,8,4		
			38.3'								
			Dark brown & beige, clayey sand.								
40.0					30	77.3	61		1,1,0		
45.0						68.5			2,1,0		
			49.3'								
50.0			Auger Refusal & Boring Terminated @ 49.3' (Elev. 1229.5).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 312

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 490+00 Hwy. 112 Ramp 1

LOCATION: 46' Rt.

LATITUDE: 36.22641 ^{0} LONGITUDE: 94.23389 ^{0}

DATE: 1/5/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 35.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			18.9					
			Reddish brown, sandy lean clay with gravel.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0			35.0'								

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BORING NO.: 312

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 490+00 Hwy. 112 Ramp 1
LOCATION: 46' Rt.
LATITUDE: 36.22641 ^{0} LONGITUDE: 94.23389 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 35.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			No Refusal & Boring Terminated @ 35.0' (Elev. 1235.1).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 313

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 493+00 Hwy. 112 Ramp 1
LOCATION: 75' Rt.
LATITUDE: 36.22591 ^{0} LONGITUDE: 94.23310 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 20.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		15	30.0	37				
			Reddish brown, sandy lean clay with gravel.								
5.0											
10.0											
15.0											
20.0			20.0'								
			No Refusal & Boring Terminated @ 20.0' (Elev. 1233.9).								
25.0											
30.0											
35.0											

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BORING NO.: 314

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 495+00 Hwy. 112 Ramp 1
LOCATION: 105' Lt.
LATITUDE: 36.22601 ^{0} LONGITUDE: 94.23220 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 45.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown & tan, clayey gravel with sand.								
5.0						31.2			7,11,39		
			8.3'								
			Brown, silty gravel with sand.								
10.0					21	20.3	25		19,22,50/0.4		
			13.2'								
			Red, white, tan & reddish tan, silty gravel with sand.								
15.0						22.0			3,12,13		
20.0					38	40.8	44		6,7,6		
25.0						41.0			3,6,8		
			28.3'								
			Reddish brown, tan, gray & beige, silty gravel with sand.								
30.0						41.1			7,8,5		
35.0											

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BORING NO.: 314

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 495+00 Hwy. 112 Ramp 1
LOCATION: 105' Lt.
LATITUDE: 36.22601 ^{0} LONGITUDE: 94.23220 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 45.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
					31	32.0	36		3,8,5		
40.0						16.7			3,30,50/0.2		
45.0			45.0'								
			Auger Refusal & Boring Terminated @ 45.0' (Elev. 1187.7).								
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 315

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 496+00 Hwy. 112 Ramp 1
LOCATION: CL
LATITUDE: 36.22562 ^{0} LONGITUDE: 94.23212 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1245.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	31.6	52				
			Red, sandy fat clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1230.0).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 316

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 502+00 Hwy. 112 Ramp 2

LOCATION: CL

LATITUDE: 36.22545 ^{0} LONGITUDE: 94.22939 ^{0}

DATE: 1/3/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1268.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	27.5	47				
			Red & white, clayey sand with gravel.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1263.8).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 317

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 508+00 Hwy. 112 Ramp 2
LOCATION: CL
LATITUDE: 36.22602 ^{0} LONGITUDE: 94.22748 ^{0}

DATE: 1/4/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 1.0'								
			Tan, silty sand with gravel.			22.7					
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1222.7).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 318

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 508+00 Hwy. 112 Ramp 2
LOCATION: 100' Rt.
LATITUDE: 36.22576 ^{0} LONGITUDE: 94.22736 ^{0}

DATE: 1/4/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.8'								
			Tan, white & brown, silty sand with gravel.								
5.0					21	21.6	23		12,24,24		
10.0						32.2			5,9,20		
			13.3'								
			Tan & white, clayey gravel with sand.								
15.0						30.5			5,18,50/0.4		
20.0					23	36.6	40		9,27,11		
25.0						39.6			5,13,20		
30.0						36.7			22,42,50		
			33.3'								
			Tan & red, silty gravel with sand.								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 508+00 Hwy. 112 Ramp 2
LOCATION: 100' Rt.
LATITUDE: 36.22576 ^{0} LONGITUDE: 94.22736 ^{0}

DATE: 1/4/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1233.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						42.5			6,18,22		
40.0			40.0' No Refusal & Boring Terminated @ 40.0' (Elev. 1193.9).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 319

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 513+00 Hwy. 112 Ramp 2

LOCATION: 40' Rt.

LATITUDE: 36.22639 ^{0} LONGITUDE: 94.22584 ^{0}

DATE: 1/4/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			12.5					
			Dark reddish brown, clayey sand with gravel.								
5.0			5.0'								
			Auger Refusal & Boring Terminated @ 5.0' (Elev. 1258.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 320

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 498+00 Hwy. 112 Ramp 3
LOCATION: 38' Rt.
LATITUDE: 36.22887 ^{0} LONGITUDE: 94.23047 ^{0}

DATE: 1/3/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 8.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1248.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 1.0'								
			Red, sandy fat clay.		24	30.7	55				
5.0			8.8'								
			Auger Refusal & Boring Terminated @ 8.8' (Elev. 1239.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 321

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 501+00 Hwy. 112 Ramp 3
LOCATION: 42' Rt.
LATITUDE: 36.22877 ^{0} LONGITUDE: 94.22951 ^{0}

DATE: 1/3/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 10.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1248.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil (1.0')								
			Red, sandy fat clay.			28.3					
5.0											
10.0			(10.3')								
			Auger Refusal & Boring Terminated @ 10.3' (Elev. 1238.6).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 322

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 501+00 Hwy. 112 Ramp 3

LOCATION: 95' Rt.

LATITUDE: 36.22863 ^{0} LONGITUDE: 94.22956 ^{0}

DATE: 1/3/08

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 9.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil (1.0')								
			Red & white, silty gravel with sand.								
5.0						31.7			5,11,14		
			(9.0')								
10.0			Auger Refusal & Boring Terminated @ 9.0' (Elev. 1242.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 323

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 504+00 Hwy. 112 Ramp 3

LOCATION: 38' Rt.

LATITUDE: 36.22839 ^{0} LONGITUDE: 94.22866 ^{0}

DATE: 1/3/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 8.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1242.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			34.2					
5.0			Red, clayey sand with gravel. 8.4'								
10.0			No Refusal & Boring Terminated @ 8.4' (Elev. 1234.1).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 324

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 509+00 Hwy. 112 Ramp 3

LOCATION: CL

LATITUDE: 36.22769 ^{0} LONGITUDE: 94.22719 ^{0}

DATE: 1/3/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1217.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		18	15.8	41				
5.0			Reddish brown & white, clayey gravel with sand.								
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1202.1).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 325

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 509+00 Hwy. 112 Ramp 3

LOCATION: 118' Rt.

LATITUDE: 36.22741 ^{0} LONGITUDE: 94.22739 ^{0}

DATE: 1/3/08

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 24.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1216.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan, white & reddish brown, silty gravel with sand.								
5.0		X			28	25.0	39		13,9,9		
10.0		X				28.4			19,17,12		
			13.3'								
			Tan, beige & brown, silty gravel with sand.								
15.0		X			35	32.1	37		7,8,26		
20.0		X				40.8			7,6,6		
			21.5'								
			Auger Refusal & Boring Terminated @ 24.4' (Elev. 1191.9).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 485+00 Hwy 112 Ramp 4

LOCATION: 40' Lt.

LATITUDE: 36.22745 ^{0} LONGITUDE: 94.23544 ^{0}

DATE: 1/4/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 30.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	24.5	45				
			Red, clayey sand with gravel.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1240.9).								
35.0											

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BORING NO.: 327

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 485+00 Hwy. 112 Ramp 4
LOCATION: 115' Lt.
LATITUDE: 36.22765 ⁰ LONGITUDE: 94.23547 ⁰

DATE: 1/4/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan, white, reddish brown & light reddish tan, silty gravel with sand.								
5.0		X				27.9			12,50/0.5		
10.0		X			30	33.0	41		5,19,20		
15.0		X				28.8			5,4,3		
			18.3'								
			Reddish brown, reddish tan & white, silty sand with gravel.								
20.0		X			32	33.7	37		7,8,9		
25.0		X				27.4			10,8,8		
			28.3'								
			Reddish tan, white & reddish brown, clayey gravel with sand.								
30.0		X			22	17.7	46		7,8,9		
35.0											

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BORING NO.: 327

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 485+00 Hwy. 112 Ramp 4
LOCATION: 115' Lt.
LATITUDE: 36.22765 ^{0} LONGITUDE: 94.23547 ^{0}

DATE: 1/4/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 36.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1270.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			36.5'			30.3			6,7,7		
			No Refusal & Boring Terminated @ 36.5' (Elev. 1233.7).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 488+00 Hwy. 112 Ramp 4

LOCATION: 40' Lt.

LATITUDE: 36.22762 ^{0} LONGITUDE: 94.23447 ^{0}

DATE: 1/5/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 21.5 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1263.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			27.0					
			Red, sandy lean clay.								
5.0											
10.0											
15.0											
20.0			21.5'								
			Auger Refusal & Boring Terminated @ 21.5' (Elev. 1242.3).								
25.0											
30.0											
35.0											

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BORING NO.: 329

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 488+00 Hwy. 112 Ramp 4
LOCATION: 115' Lt.
LATITUDE: 36.22781 ⁰ LONGITUDE: 94.23455 ⁰

DATE: 1/5/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 20.6 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1266.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Tan, reddish tan, reddish brown & white, silty gravel with sand.								
5.0						42.6			4,19,8		
10.0						20.8			10,20,21		
			13.3'								
			Reddish brown & white, clayey gravel with sand.								
15.0						26.6			12,20,24		
			18.3'								
			Reddish brown, brown & white, clayey gravel with sand.								
20.0			20.6'			24.0			50/0.3		
			Auger Refusal & Boring Terminated @ 20.6' (Elev. 1245.8).								
25.0											
30.0											
35.0											

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BORING NO.: 330

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 494+00 Hwy. 112 Ramp 4
LOCATION: CL
LATITUDE: 36.22824 ^{0} LONGITUDE: 94.23262 ^{0}

DATE: 1/5/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1226.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	27.0	41				
			Reddish brown, sandy lean clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1221.6).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 497+00 Hwy. 112 Ramp 4

LOCATION: CL

LATITUDE: 36.22865 ^{0} LONGITUDE: 94.23174 ^{0}

DATE: 1/5/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1208.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			21.5					
			Brown, sandy lean clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1193.5).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 332

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 497+00 Hwy. 112 Ramp 4
LOCATION: 122' Lt.
LATITUDE: 36.22894 ⁰ LONGITUDE: 94.23194 ⁰

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1205.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & white, silty gravel with sand.								
5.0						15.2			6,9,11		
			8.3'								
			Gray, brown, reddish brown & tan, clayey gravel with sand.								
10.0						16.4			17,18,17		
15.0					21	13.8	32		20,16,12		
20.0						11.1			17,8,8		
			22.7'								
			Brown, silty sand with gravel.								
25.0						19.6			3,5,6		
			28.3'								
			Brown, gray & beige, poorly graded gravel with clay & sand.								
30.0					21	23.8	28		17,16,8		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 497+00 Hwy. 112 Ramp 4
LOCATION: 122' Lt.
LATITUDE: 36.22894 ^{0} LONGITUDE: 94.23194 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 40.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1205.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						19.4			12,26,29		
40.0			40.0' Auger Refusal & Boring Terminated @ 40.0' (Elev. 1165.2).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 333

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 694+00 Ramp EN

LOCATION: CL

LATITUDE: 36.24004 ^{0} LONGITUDE: 94.16846 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 11.6 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		17	20.0	34				
5.0			Brown, sandy lean clay with gravel.								
10.0			11.6'								
			Auger Refusal & Boring Terminated @ 11.6' (Elev. 1226.2).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 334

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 694+00 Ramp EN

LOCATION: 115' Rt.

LATITUDE: 36.23972 ^{0} LONGITUDE: 94.16848 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 10.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown, clayey sand with gravel.								
5.0						38.3			3,10,13		
			8.3'								
			Gray & brown, silty gravel with sand.								
10.0			10.4'			8.1			50/0.3		
			Auger Refusal & Boring Terminated @ 10.4' (Elev. 1222.0).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 700+00 Ramp EN

LOCATION: CL

LATITUDE: 36.23975 ^{0} LONGITUDE: 94.16646 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 10.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1218.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 1.0'								
			Brown, lean clay with gravel.			18.3					
5.0											
10.0			10.0'								
			Auger Refusal & Boring Terminated @ 10.0' (Elev. 1208.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 700+00 Ramp EN
LOCATION: 150' Rt.
LATITUDE: 36.23935 ⁰ LONGITUDE: 94.16662 ⁰

DATE: 1/7/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 19.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1222.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown & beige, silty gravel with sand.								
5.0		X				19.3			2,4,3		
10.0		X				22.2			11,18,15		
			13.3'								
			Brown, clayey gravel with sand.								
15.0		X				19.1			2,7,7		
			19.0'								
20.0			Auger Refusal & Boring Terminated @ 19.0' (Elev. 1203.5).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 704+00 Ramp EN

LOCATION: 38' Rt.

LATITUDE: 36.23923 ^{0} LONGITUDE: 94.16527 ^{0}

DATE: 1/8/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 20.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1283.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		25	19.7	55				
			Reddish brown, sandy fat clay.								
5.0											
10.0											
15.0											
20.0			20.0'								
			No Refusal & Boring Terminated @ 20.0' (Elev. 1263.4).								
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 704+00 Ramp EN
LOCATION: 95' Rt.
LATITUDE: 36.23909 ⁰ LONGITUDE: 94.16535 ⁰

DATE: 1/7/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1286.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red & reddish tan, clayey sand with gravel.								
5.0		X				35.2			8,8,15		
10.0		X			25	34.9	39		6,8,30		
15.0		X				32.0			8,23,16		
			18.3'								
			Reddish tan & gray, silty gravel with sand.								
20.0		X				16.9			8,24,8		
			22.7'								
			Reddish brown & gray, clayey gravel with sand.								
25.0		X			19	34.8	58		2,11,13		
			26.5'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1256.0).								
30.0											
35.0											

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BORING NO.: 339

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 709+00 Ramp EN
LOCATION: CL
LATITUDE: 36.23875 ^{0} LONGITUDE: 94.16368 ^{0}

DATE: 1/8/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 7.3 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1262.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			21.4					
5.0			Brown, sandy fat clay. 7.3'								
			Auger Refusal & Boring Terminated @ 7.3' (Elev. 1255.3).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 340

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 709+00 Ramp EN
LOCATION: 122' Lt.
LATITUDE: 36.23906 ^{0} LONGITUDE: 94.16352 ^{0}

DATE: 1/15/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 5.9 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1258.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil w/rock fragments. 1.0'								
			Dark brown & beige, sandy lean clay.								
5.0			5.9'			22.7			5,50/0.3		
			Auger Refusal & Boring Terminated @ 5.9' (Elev. 1252.5).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 715+00 Ramp EN

LOCATION: CL

LATITUDE: 36.23838 ^{0} LONGITUDE: 94.16170 ^{0}

DATE: 1/15/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1296.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			27.1					
			Reddish brown & white, sandy fat clay.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1291.4).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 719+00 Ramp EN
LOCATION: 85' Rt.
LATITUDE: 36.23814 ⁰ LONGITUDE: 94.16034 ⁰

DATE: 1/8/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 30.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1306.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan, gray, brown & white, silty gravel with sand.								
5.0						18.5			37,50/0.3		
10.0					25	14.6	36		41,50/0.2		
15.0						47.9			1,2,15		
20.0						63.4			2,2,3		
			23.4'								
25.0			Auger Refusal & Boring Terminated @ 23.4' (Elev. 1282.6).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 727+00 Ramp EN

LOCATION: CL

LATITUDE: 36.23837 ^{0} LONGITUDE: 94.15763 ^{0}

DATE: 1/16/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1312.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		17	14.7	31				
			Red, sandy lean clay with gravel.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1297.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 344

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 729+00 Ramp EN
LOCATION: 110' Lt.
LATITUDE: 36.23868 ^{0} LONGITUDE: 94.15695 ^{0}

DATE: 1/16/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 19.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1314.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown & gray, clayey sand with gravel.								
5.0						35.8			5,7,9		
			8.3'								
			Reddish brown & gray, silty gravel with sand.								
10.0						22.2			7,34,10		
15.0						27.2			3,5,5		
			19.7'								
20.0			Auger Refusal & Boring Terminated @ 19.7' (Elev. 1294.4).								
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 739+00 Ramp EN
LOCATION: 145' Lt.
LATITUDE: 36.24007 [0] LONGITUDE: 94.15484 [0]

DATE: 4/29/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 4.1 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			14.9					
			Brown, sandy lean clay with gravel. 4.1'								
5.0			Auger Refusal & Boring Terminated @ 4.1' (Elev. 1281.2).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 348

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 745+20 Ramp EN
LOCATION: 50' Rt.
LATITUDE: 36.24132 ^{0} LONGITUDE: 94.15339 ^{0}

DATE: 1/17/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 12.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1311.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			20.1					
			Dark brown, sandy fat clay.								
5.0											
10.0			12.0'								
			No Refusal & Boring Terminated @ 12.0' (Elev. 1299.4).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 349

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 749+00 Ramp EN
LOCATION: 48' Rt.
LATITUDE: 36.24226 ^{0} LONGITUDE: 94.15270 ^{0}

DATE: 1/17/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1304.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		16	18.4	34				
			Dark brown, sandy fat clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1289.3).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 703+31 Ramp ES
LOCATION: 48' Rt.
LATITUDE: 36.23913 ^{0} LONGITUDE: 94.16540 ^{0}

DATE: 1/8/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 28.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1284.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		28	35.9	67				
			Red, sandy fat clay.								
5.0											
10.0											
15.0											
20.0											
25.0			28.0'								
			No Refusal & Boring Terminated @ 28.0' (Elev. 1256.6).								
30.0											
35.0											

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BORING NO.: 351

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 703+31 Ramp ES
LOCATION: 115' Rt.
LATITUDE: 36.23900 ^{0} LONGITUDE: 94.16556 ^{0}

DATE: 1/8/07
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 29.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown & beige, elastic silt with sand.								
5.0					33	41.8	55		2,6,13		
			8.3'								
			Tan & white, silty gravel with sand.								
10.0						20.1			19,12,16		
			13.3'								
			Dark reddish tan, red & dark reddish brown, clayey gravel.								
15.0						29.3			12,15,13		
20.0					20	30.4	45		3,4,3		
25.0						31.1			6,6,12		
			29.4'								
30.0			Auger Refusal & Boring Terminated @ 29.4' (Elev. 1255.9).								
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 707+30 Ramp ES

LOCATION: 47' Rt.

LATITUDE: 36.23825 ^{0} LONGITUDE: 94.16478 ^{0}

DATE: 1/8/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 30.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			35.6					
			Red & brown, sandy fat clay.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0			30.0'								
			No Refusal & Boring Terminated @ 30.0' (Elev. 1270.0).								
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 710+30 Ramp ES

LOCATION: 37' Rt.

LATITUDE: 36.23748 ^{0} LONGITUDE: 94.16471 ^{0}

DATE: 1/8/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 20.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1296.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			37.6					
			Red, sandy silt.								
5.0											
10.0											
15.0											
20.0			20.0'								
			No Refusal & Boring Terminated @ 20.0' (Elev. 1276.3).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 714+30 Ramp ES

LOCATION: 41' Rt.

LATITUDE: 36.23657 ^{0} LONGITUDE: 94.16528 ^{0}

DATE: 1/8/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 25.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1304.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		28	34.8	48				
			Red, sandy silt.								
5.0											
10.0											
15.0											
20.0											
25.0			25.0'								
			No Refusal & Boring Terminated @ 25.0' (Elev. 1279.6).								
30.0											
35.0											

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BORING NO.: 355

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 704+00 Ramp NW
LOCATION: CL
LATITUDE: 36.24039 ^{0} LONGITUDE: 94.16510 ^{0}

DATE: 1/7/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 6.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1236.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			23.7					
5.0			Brown, silty gravel with sand. 6.6'								
			Auger Refusal & Boring Terminated @ 6.6' (Elev. 1230.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 356

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 704+00 Ramp NW
LOCATION: 155' Lt.
LATITUDE: 36.24081 ^{0} LONGITUDE: 94.16508 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 8.8 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1232.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish brown & beige, silty gravel with sand.								
5.0						28.5			3,4,15		
			8.8'								
10.0			Auger Refusal & Boring Terminated @ 8.8' (Elev. 1223.5).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 710+00 Ramp NW

LOCATION: CL

LATITUDE: 36.24033 ^{0} LONGITUDE: 94.16307 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 10.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1283.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		27	39.4	45				
5.0			Dark reddish tan, sandy silt.								
10.0			10.3'								
			Auger Refusal & Boring Terminated @ 10.3' (Elev. 1272.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 358

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 716+00 Ramp NW
LOCATION: CL
LATITUDE: 36.23962 ^{0} LONGITUDE: 94.16129 ^{0}

DATE: 1/15/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1302.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	23.3	43				
			Red, sandy lean clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1287.3).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 722+00 Ramp NW
LOCATION: CL
LATITUDE: 36.23812 ⁰ LONGITUDE: 94.16055 ⁰

DATE: 1/8/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1306.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	20.3	39				
			Red, sandy lean clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1291.1).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 723+00 Ramp NW

LOCATION: 260' Rt.

LATITUDE: 36.23792 ^{0} LONGITUDE: 94.16145 ^{0}

DATE: 1/15/08

TYPE OF DRILLING: HSA/SPT

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 10.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1282.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Brown, beige & gray, silty gravel with sand.								
5.0						23.2			2,9,6		
10.0						9.5			50/0.3		
15.0			15.0'								
			Auger Refusal & Boring Terminated @ 10.4' (Elev. 1272.5).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 728+00 Ramp NW

LOCATION: CL

LATITUDE: 36.23661 ^{0} LONGITUDE: 94.16125 ^{0}

DATE: 1/16/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1314.2	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		19	19.4	38				
			Red, clayey sand with gravel.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1299.2).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 362

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 728+00 Ramp NW
LOCATION: 168' Rt.
LATITUDE: 36.23691 ^{0} LONGITUDE: 94.16167 ^{0}

DATE: 1/17/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 25.6 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1311.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, beige, white, reddish brown & tan, silty sand with gravel.								
5.0						25.5			7,8,14		
10.0					39	40.0	41		14,13,7		
15.0						46.4			6,10,4		
			18.3'								
			Reddish brown, tan & beige, silty gravel with sand.								
20.0					33	31.4	33		5,4,5		
25.0			25.6'			20.0			50/0.2		
			Auger Refusal & Boring Terminated @ 25.6' (Elev. 1285.4).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 734+00 Ramp NW

LOCATION: CL

LATITUDE: 36.23582 ^{0} LONGITUDE: 94.16300 ^{0}

DATE: 1/16/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1316.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			20.9					
			Dark reddish brown, silty sand with gravel.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1301.7).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 740+00 Ramp NW

LOCATION: CL

LATITUDE: 36.23533 ^{0} LONGITUDE: 94.16494 ^{0}

DATE: 1/16/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		20	22.7	26				
			Brown, sandy silty clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1270.9).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 744+00 Ramp NW

LOCATION: CL

LATITUDE: 36.23500 ^{0} LONGITUDE: 94.16623 ^{0}

DATE: 1/16/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 5.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1287.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			27.9					
			Reddish brown, clayey sand with gravel.								
5.0			5.0'								
			No Refusal & Boring Terminated @ 5.0' (Elev. 1282.4).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 713+00 Ramp SW

LOCATION: 5' Lt.

LATITUDE: 36.24034 ^{0} LONGITUDE: 94.16205 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 6.7 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1299.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6		18	9.5	31				
5.0			Tan, clayey sand with gravel. 6.7								
			Auger Refusal & Boring Terminated @ 6.7' (Elev. 1292.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 719+99 Ramp SW

LOCATION: 39' Lt.

LATITUDE: 36.24028 ^{0} LONGITUDE: 94.15968 ^{0}

DATE: 1/15/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1299.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		18	15.9	33				
			Reddish brown, clayey sand.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1284.5).								
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 723+18 Ramp SW
LOCATION: 287' Lt.
LATITUDE: 36.24091 ^{0} LONGITUDE: 94.15865 ^{0}

DATE: 1/7/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 22.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Light brown & beige, silty gravel with sand.			7.9			8,12,15		
			8.3'								
10.0			Tan, brown & white, silty sand with gravel.			30.7			8,8,12		
15.0						30.9			8,12,20		
20.0						25.9			12,50/0.3		
			22.3'								
25.0			Auger Refusal & Boring Terminated @ 22.3' (Elev. 1258.6).								
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 725+11 Ramp SW

LOCATION: 36' Lt.

LATITUDE: 36.24029 ^{0} LONGITUDE: 94.15798 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 8.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1300.1	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		22	13.0	45				
5.0			Brown, clayey sand with gravel. 8.4'								
10.0			Auger Refusal & Boring Terminated @ 8.4' (Elev. 1291.7).								
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 728+37 Ramp SW
LOCATION: 202' Lt.
LATITUDE: 36.24098 ^{0} LONGITUDE: 94.15721 ^{0}

DATE: 1/7/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 19.4 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1298.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Gray & tan, silty gravel with sand.								
5.0						7.4			35,50/0.3		
			7.9'								
			Red, tan & reddish brown, silty sand with gravel.								
10.0					37	42.0	48		12,50/0.4		
15.0						53.4			2,2,2		
			19.4'								
20.0			Auger Refusal & Boring Terminated @ 19.4' (Elev. 1279.5).								
25.0											
30.0											
35.0											

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JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 11+00 South Zion Rd.

LOCATION: 26' Rt.

LATITUDE: 36.23706 ^{0} LONGITUDE: 94.18629 ^{0}

DATE: 4/29/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Davis

COMPLETION DEPTH: 2.2 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1285.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			17.9					
			Red, sandy lean clay. 2.2'								
			Auger Refusal & Boring Terminated @ 2.2' (Elev. 1282.8).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 372

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 18+00 South Zion Rd.

LOCATION: CL

LATITUDE: 36.23629 ^{0} LONGITUDE: 94.18831 ^{0}

DATE: 1/7/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			22.6					
			Brown, sandy lean clay.								
5.0											
10.0											
15.0			15.0'								
			Auger Refusal & Boring Terminated @ 15.0' (Elev. 1239.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 373

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+00 South Zion Rd.
LOCATION: 124' Rt.
LATITUDE: 36.23613 ^{0} LONGITUDE: 94.18883 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 42.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Reddish tan, beige, red & white, clayey gravel with sand.								
5.0		X				16.1			17,50/0.4		
10.0		X				36.3			7,9,8		
15.0		X				25.6			17,18,21		
			18.3'								
			Red, white, brown, tan & beige, silty gravel with sand.								
20.0		X				21.0			21,22,24		
25.0		X				38.2			12,8,7		
30.0		X				15.6			10,10,12		
			33.3'								
			Brown, silty gravel with sand.								
35.0											

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BORING NO.: 373

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 19+00 South Zion Rd.
LOCATION: 124' Rt.
LATITUDE: 36.23613 ^{0} LONGITUDE: 94.18883 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 42.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						38.7			6,10,17		
40.0						33.4			1,2,2		
			42.3' Auger Refusal & Boring Terminated @ 42.3' (Elev. 1212.4).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 374

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 23+00 South Zion Rd.

LOCATION: CL

LATITUDE: 36.23498 ^{0} LONGITUDE: 94.18884 ^{0}

DATE: 1/6/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: D. Kofron

COMPLETION DEPTH: 15.0 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1259.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	31.8	43				
			Red, sandy lean clay.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1244.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 375

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 23+00 South Zion Rd.
LOCATION: 118' Rt.
LATITUDE: 36.23506 ^{0} LONGITUDE: 94.18923 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 40.1 ft.
GROUNDWATER @ 35.5 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Tan, white, brown & copper, clayey gravel with sand.								
5.0						13.5			22,48,27		
10.0					20	32.3	35		11,12,14		
15.0						19.7			7,7,12		
			18.3'								
			Tan, brown, white & beige, silty gravel with sand.								
20.0						29.7			10,12,50/0.4		
25.0					23	28.3	29		7,7,6		
30.0						20.5			16,27,12		
			33.3'								
			Brown & beige, silty gravel with sand.								
35.0											

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BORING NO.: 375

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 23+00 South Zion Rd.
LOCATION: 118' Rt.
LATITUDE: 36.23506 ^{0} LONGITUDE: 94.18923 ^{0}

DATE: 1/6/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: D. Kofron

COMPLETION DEPTH: 40.1 ft.
GROUNDWATER @ 35.5 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1251.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
					NP	46.1	NP		6,7,6		
40.0			40.1'								
			Auger Refusal & Boring Terminated @ 40.1' (Elev. 1211.6).			39.0			50/0.1		
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 376

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 560+00

LOCATION: CL

LATITUDE: 36.22751 ^{0} LONGITUDE: 94.21010 ^{0}

DATE: 4/29/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: J. Davis

COMPLETION DEPTH: 2.8 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1273.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			26.5					
			Brown, silty gravel with sand. 2.8'								
			Auger Refusal & Boring Terminated @ 2.8' (Elev. 1270.5).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 377

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 563+00
LOCATION: 226' Rt.
LATITUDE: 36.22726 ^{0} LONGITUDE: 94.20884 ^{0}

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 50.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1282.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, clayey gravel with sand.								
5.0						12.4			50/0.4		
			8.3'								
			Red, silty gravel with sand.								
10.0					NP	7.9	NP		15,50/0.3		
15.0						29.8			10,20,40		
			18.3'								
			Red, silty gravel with sand.								
20.0					30	24.9	37		9,29,34		
25.0						19.6			20,34,26		
			28.3'								
			Red, silty gravel with sand.								
30.0						61.7			20,22,21		
			34.6'								
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 563+00
LOCATION: 226' Rt.
LATITUDE: 36.22726 ^{0} LONGITUDE: 94.20884 ^{0}

DATE: 4/23/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 50.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1282.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Auger Refusal @ 34.6' (Elev. 1247.8). Begin Coring. Core loss, no recovery, interpreted as mud and clay seams.							0	0
										0	0
40.0			39.6' Limestone: Light gray, gray, w/white banding, fine to medium grained, fresh w/moderate weathering and stains on fracture surfaces, styolites, core loss interpreted as mud and clay seams.							16	12
45.0			44.6' Chert: White, lt. gray, gray, residual fragments, broken, pits and vugs, porous, fossil molds, sev.weathered w/staining, clay in fractures, core loss interpreted as clay.							58	10
50.0			48.6' Limestone: Light gray, gray, w/white banding, microcrystalline to macrocrystalline w/fine grained fragments, moderate weathering on dissolution surfaces, styolites. 50.0'							75	0
			Boring Terminated @ 50.0' (Elev. 1232.4).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 378

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 564+00
LOCATION: CL
LATITUDE: 36.22794 ^{0} LONGITUDE: 94.20886 ^{0}

DATE: 4/24/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 50.0 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		23	34.9	60				
			Red, silty gravel with sand.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 564+00
LOCATION: CL
LATITUDE: 36.22794 ^{0} LONGITUDE: 94.20886 ^{0}

DATE: 4/24/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 50.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1280.9	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
40.0											
45.0											
50.0			50.0'								
			Auger Refusal & Boring Terminated @ 50.0' (Elev. 1230.9).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 379

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 568+00
LOCATION: CL
LATITUDE: 36.22848 ^{0} LONGITUDE: 94.20768 ^{0}

DATE: 4/24/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 42.3 ft.

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			30.2					
			Red, silty gravel with sand.								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 568+00
LOCATION: CL
LATITUDE: 36.22848 ^{0} LONGITUDE: 94.20768 ^{0}

DATE: 4/24/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 42.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
40.0			42.3' No Refusal & Boring Terminated @ 42.3' (Elev. 1212.1).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 380

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 570+00
LOCATION: 212' Lt.
LATITUDE: 36.22926 ^{0} LONGITUDE: 94.20753 ^{0}

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 51.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1254.4								
			Topsoil 0.6'								
			Red, silty gravel with sand.								
5.0		X			NP	37.2	NP		23,30,20		
10.0		X				23.0			13,14,18		
			13.3'								
			Red, silty gravel with sand.								
15.0		X			NP	26.0	NP		14,50/0.3		
20.0		X				28.5			4,15,19		
			23.3'								
			Red, silty gravel with sand.								
25.0		X				24.7			9,13,18		
30.0		X				20.0			13,15,13		
35.0											

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JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 570+00
LOCATION: 212' Lt.
LATITUDE: 36.22926 ^{0} LONGITUDE: 94.20753 ^{0}

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 51.5 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1254.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
						12.2			11,18,21		
			38.5'								
			Red, silty gravel with sand.								
40.0						23.7			13,18,20		
45.0					NP	21.6	NP		12,19,22		
50.0						26.9			15,21,30		
			51.5'								
			No Refusal & Boring Terminated @ 51.5' (Elev. 1202.9).								
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 381

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 572+00
LOCATION: CL
LATITUDE: 36.22912 ^{0} LONGITUDE: 94.20658 ^{0}

DATE: 4/25/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1194.8	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		21	32.4	37				
			Red, silty gravel with sand.								
5.0											
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1179.8).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 382

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 578+00
LOCATION: CL
LATITUDE: 36.23015 ^{0} LONGITUDE: 94.20498 ^{0}

DATE: 4/25/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 15.0 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1155.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'		18	33.1	51				
5.0			Light brown & red, silty gravel with sand.								
10.0											
15.0			15.0'								
			No Refusal & Boring Terminated @ 15.0' (Elev. 1140.6).								
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 383

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 581+00
LOCATION: 243' Rt.
LATITUDE: 36.23014 ^{0} LONGITUDE: 94.20368 ^{0}

DATE: 4/25/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 6.5 ft.
GROUNDWATER @ 4.0 ft.

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			SURFACE ELEVATION: 1144.3								
			Topsoil 0.3'								
			Brown, silty gravel with sand.								
5.0		X				23.3			13,14,20		
			9.3'								
10.0			Auger Refusal & Boring Terminated @ 9.3' (Elev. 1135.0).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 384

PAGE: 1 of 1

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 584+00

LOCATION: CL

LATITUDE: 36.23117 ^{0} LONGITUDE: 94.20339 ^{0}

DATE: 4/24/08

TYPE OF DRILLING: HSA

EQUIPMENT: CME 45C

LOGGED BY: K. Murray

COMPLETION DEPTH: 8.8 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1142.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			25.3					
5.0			Dark brown, silty gravel with sand.								
			8.8'								
10.0			Auger Refusal & Boring Terminated @ 8.8' (Elev. 1133.2).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 385

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 588+00
LOCATION: 228' Lt.
LATITUDE: 36.23232 ^{0} LONGITUDE: 94.20269 ^{0}

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: Dry

GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1159.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Red, clayey gravel with sand. 7.6'		15	13.7	28		14,30,29		
			Auger Refusal & Boring Terminated @ 7.6' (Elev. 1152.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 386

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 590+00
LOCATION: CL
LATITUDE: 36.23208 ^{0} LONGITUDE: 94.20170 ^{0}

DATE: 4/26/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 12.1 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1159.7	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			32.2					
5.0			Light brown & red, silty gravel with sand.								
10.0			12.1'								
			Auger Refusal & Boring Terminated @ 12.1' (Elev. 1147.6).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 387

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 596+00
LOCATION: CL
LATITUDE: 36.23285 ^{0} LONGITUDE: 94.19990 ^{0}

DATE: 4/27/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 10.6 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1222.5	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.3		18	24.3	57				
5.0			Red, silty gravel with sand.								
10.0			10.6								
			Auger Refusal & Boring Terminated @ 10.6' (Elev. 1211.9).								
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 388

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 597+00
LOCATION: 166' Lt.
LATITUDE: 36.23338 ^{0} LONGITUDE: 94.19981 ^{0}

DATE: 4/26/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 35.4 ft.
GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1225.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
			Red, silty gravel with sand.								
5.0		X				38.5			16,10,11		
			9.7'								
10.0			Auger Refusal @ 9.7' (Elev. 1215.3). Begin Coring in Chert.							71	0
			Chert: White, lt. gray, gray, weathered, fragments up to 0.3', sub-angular to sub-rounded, fossiliferous, clay coating on fragments, red, brown, plastic.							42	0
15.0											
										14	0
20.0											
										4	0
25.0											
										14	0
30.0											
										14	0
35.0											

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BORING NO.: 388

JOB NO.: 001966

JOB NAME: U.S. Hwy. 412, Springdale By-Pass

STATION: 597+00

LOCATION: 166' Lt.

LATITUDE: 36.23338 ^{0} LONGITUDE: 94.19981 ^{0}

DATE: 4/26/08

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 45C

LOGGED BY: J. Davis

COMPLETION DEPTH: 35.4 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1225.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			35.4'							14	0
			Boring Terminated @ 35.4' (Elev. 1189.6).								
40.0											
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 389

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 600+00
LOCATION: CL
LATITUDE: 36.23327 ^{0} LONGITUDE: 94.19865 ^{0}

DATE: 4/27/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 3.3 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1219.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			16.7					
			Light brown & red, silty gravel with sand. 3.3'								
			Auger Refusal & Boring Terminated @ 3.3' (Elev. 1216.0).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 390

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 604+00
LOCATION: CL
LATITUDE: 36.23362 ^{0} LONGITUDE: 94.19736 ^{0}

DATE: 4/27/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 5.7 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1237.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			26.4					
5.0			Red, silty gravel with sand. 5.7'								
			Auger Refusal & Boring Terminated @ 5.7' (Elev. 1231.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 391

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 607+00
LOCATION: 174' Rt.
LATITUDE: 36.23340 ^{0} LONGITUDE: 94.19622 ^{0}

DATE: 4/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 40 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'								
5.0			Red & brown, clayey gravel with sand. 7.0'			19.2			20,31,45		
10.0			Auger Refusal @ 7.0' (Elev. 1248.3). Begin Coring in Chert. Chert: White, lt. gray, gray, tan to lt. brown, bedded and fragmented, broken, scattered vugs and pits, trace high angle joints (70 to 80 degrees) fossil molds, predominantly sev. weathered w/red, brown, orange clay in seams, fracture and joint fillings and coatings, core loss interpreted as highly fractured and clay.							18	0
15.0										67	12
20.0										40	8
25.0										43	7
30.0										24	0
35.0										24	6

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BORING NO.: 391

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 607+00
LOCATION: 174' Rt.
LATITUDE: 36.23340 ^{0} LONGITUDE: 94.19622 ^{0}

DATE: 4/28/08
TYPE OF DRILLING: HSA/SPT/CORE
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 40 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1255.3	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
	△ △ △									24	6
	△ △ △									23	0
40.0			40.0'								
			Boring Terminated @ 40.0' (Elev. 1215.3).								
45.0											
50.0											
55.0											
60.0											
65.0											
70.0											

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BORING NO.: 392

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 608+00
LOCATION: CL
LATITUDE: 36.23394 ^{0} LONGITUDE: 94.19606 ^{0}

DATE: 4/28/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 2.4 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1252.4	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'			23.0					
			Red, clayey gravel with sand. 2.4'								
			Auger Refusal & Boring Terminated @ 2.4' (Elev. 1250.0).								
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 393

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 613+00
LOCATION: CL
LATITUDE: 36.23433 ^{0} LONGITUDE: 94.19444 ^{0}

DATE: 4/28/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: J. Davis

COMPLETION DEPTH: 6.9 ft.
GROUNDWATER @ Dry

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1253.6	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.5'		18	30.0	44				
5.0			Red, silty gravel with sand. 6.9'								
			Auger Refusal & Boring Terminated @ 6.9' (Elev. 1246.7).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

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BORING NO.: 394

PAGE: 1 of 1

JOB NO.: 001966
JOB NAME: U.S. Hwy. 412, Springdale By-Pass
STATION: 617+00
LOCATION: CL
LATITUDE: 36.23465 ^{0} LONGITUDE: 94.19314 ^{0}

DATE: 4/28/08
TYPE OF DRILLING: HSA
EQUIPMENT: CME 45C
LOGGED BY: K. Murray

COMPLETION DEPTH: 6.9 ft.

GROUNDWATER @

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS SURFACE ELEVATION: 1234.0	SOIL GROUP	PLASTIC LIMIT	% MOISTURE	LIQUID LIMIT	DRY WEIGHT (lbs. per cu. ft.)	NO. OF BLOWS PER 0.5 ft.	% SCR	% RQD
			Topsoil 0.6'			18.7					
5.0			Red, clayey gravel with sand. 6.9'								
			Auger Refusal & Boring Terminated @ 6.9' (Elev. 1227.1).								
10.0											
15.0											
20.0											
25.0											
30.0											
35.0											

APPENDIX II – LABORATORY DATA

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Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
	Mainline							
1	1	165+00 @ CL	MC-1	0.3	5.0	Brown Sandy Lean Clay		27.4
1	2	171+00 @ CL	MC-1	0.3	5.0	Reddish Brown Sandy Lean Clay		24.8
1	3	177+00 @ CL	MC-1	0.3	4.5	Reddish Brown Sandy Lean Clay		23.6
2	4	183+00 @ CL	MC-1	0.3	5.0	Dark Tan & Beige Sandy Lean Clay		24.8
2	5	189+00 @ CL	MC-1	0.4	13.5	Dark Tan & Beige Sandy Lean Clay		25.6
3	6	195+00 @ CL	MC-1	0.4	6.6	Tan Sandy Lean Clay		23.3
3	7	201+00 @ CL	MC-1	0.3	10.0	Tan Sandy Lean Clay		21.4
3	8	207+00 @ CL	MC-1	0.6	3.0	Beige & Tan Sandy Lean Clay		14.3
4	9	213+00 @ CL	MC-1	0.5	6.0	Brown Clayey Gravel with Sand		7.6
4	10	217+00 @ CL	MC-1	0.4	2.0	Dark Beige Clayey Gravel with Sand		12.7
5	11	221+00 @ CL	MC-1	0.2	7.2	Dark Gray & Tan Lean Clay		19.9
4	12	225+00 @ CL	MC-1	0.2	2.0	Dark Brown & Tan Clayey Gravel with Sand		14.1
6	13	229+00 @ CL	MC-1	0.3	3.7	Tan Gravelly Lean Clay with Sand		21.0
4	14	233+00 @ CL	MC-1	0.3	5.0	Brown & Tan Clayey Gravel with Sand		11.9
6	15	239+00 @ CL	MC-1	0.2	4.4	Dark Tan & Dark Gray Gravelly Lean Clay with Sand		27.1
7	16	245+00 @ CL	MC-1	0.3	8.0	Dark Tan & Beige Sandy Lean Clay		19.8
7	17	249+00 @ CL	MC-1	0.3	6.2	Dark Tan & Beige Sandy Lean Clay		23.7
7	18	253+00 @ CL	MC-1	0.3	4.3	Tan Sandy Lean Clay		21.1
8	19	259+00 @ CL	MC-1	0.4	9.5	Dark Tan Sandy Lean Clay with Gravel		27.9
8	20	263+00 @ CL	MC-1	0.3	6.4	Tan Sandy Lean Clay with Gravel		24.9
8	21	267+00 @ CL	MC-1	0.4	4.5	Tan Sandy Lean Clay with Gravel		25.9
8	22	273+00 @ CL	MC-1	0.3	9.5	Dark Yellowish Orange Sandy Lean Clay with Gravel		20.4
9	23	279+00 @ CL	MC-1	0.4	7.0	Copper Sandy Lean Clay with Gravel		25.7
9			MC-2	7.0	14.4	Dark Beige Sandy Lean Clay with Gravel		44.6
37	24	285+00 @ CL	MC-1	0.5	16.0	Red Sandy Lean Clay		23.3
37	25	289+00 @ CL	MC-1	0.5	28.0	Red Sandy Lean Clay		26.4
29	26	293+00 @ CL	MC-1	0.3	12.0	Brown Sandy Lean Clay		14.2
37	27	299+00 @ CL	MC-1	0.3	13.0	Red Sandy Lean Clay		31.0
9	28	305+00 @ CL	MC-1	0.4	3.3	Copper Sandy Lean Clay with Gravel		17.8
11	29	309+00 @ CL	MC-1	0.5	4.6	Brown Clayey Sand with Gravel		12.0
11	30	315+00 @ CL	MC-1	0.5	12.0	Dark Brown Clayey Sand with Gravel		15.9
11			MC-2	12.0	15.2	Brown Clayey Sand with Gravel		27.3
11	31	321+00 @ CL	MC-1	0.4	4.0	Brown Clayey Sand with Gravel		7.9

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
10	32	327+00 @ CL	MC-1	0.4	5.0	Brown & Beige Sandy Lean Clay with Gravel		9.9
12	33	333+00 @ CL	MC-1	0.4	7.4	Reddish Brown Clayey Sand with Gravel		20.2
12	34	337+00 @ CL	MC-1	0.4	6.1	Brown Clayey Sand with Gravel		16.6
12	35	343+00 @ CL	MC-1	0.5	15.0	Tan Clayey Sand with Gravel		16.8
13	36	347+00 @ CL	MC-1	0.5	5.5	Dark Tan Sandy Lean Clay		16.6
13	37	351+00 @ CL	MC-1	0.4	4.8	Dark Reddish Brown Sandy Lean Clay		9.1
13	38	355+00 @ CL	MC-1	0.5	4.0	Tan Sandy Lean Clay		17.7
14	39	361+00 @ CL	MC-1	0.7	14.3	Dark Tan Sandy Lean Clay		24.8
14	40	365+00 @ CL	MC-1	0.4	8.3	Dark Tan Sandy Lean Clay		24.2
14	41	369+00 @ CL	MC-1	0.4	18.0	Dark Tan & Black Sandy Lean Clay		23.8
15	42	373+00 @ CL	MC-1	0.3	17.5	Dark Brown Sandy Lean Clay		22.3
15	43	379+00 @ CL	MC-1	0.4	7.1	Dark Beige Sandy Lean Clay		16.3
16	44	385+00 @ CL	MC-1	0.5	10.0	Olive Gray Clayey Gravel with Sand		33.3
17	45	391+00 @ CL	MC-1	0.7	5.0	Dark Brown Clayey Sand with Gravel		19.0
18	46	395+00 @ CL	MC-1	0.8	33.0	Dark Tan Sandy Lean Clay		29.7
17	47	399+00 @ CL	MC-1	0.7	22.0	Tan Clayey Sand with Gravel		16.5
18			MC-2	22.0	34.0	Brown Sandy Lean Clay		20.5
17	48	403+00 @ CL	MC-1	0.8	16.0	Brown & Dark Tan Clayey Sand with Gravel		19.3
18			MC-2	16.0	33.0	Tan Sandy Lean Clay		30.4
19	49	407+00 @ CL	MC-1	0.7	5.5	Brown Sandy Lean Clay		20.2
20			MC-2	5.5	10.7	Tan Sandy Lean Clay		28.1
19	50	411+00 @ CL	MC-1	0.6	17.0	Dark Brown Sandy Lean Clay		33.7
20			MC-2	17.0	28.0	Brown Sandy Lean Clay		34.3
19	51	415+00 @ CL	MC-1	0.7	10.5	Tan Sandy Lean Clay		24.5
20			MC-2	10.5	17.0	Dark Tan Sandy Lean Clay		33.6
19	52	419+00 @ CL	MC-1	0.6	5.0	Tan Sandy Lean Clay		26.0
21	53	425+00 @ CL	MC-1	0.7	7.0	Brown Lean Clay with Sand		30.3
22			MC-2	7.0	19.0	Dark Tan Sandy Lean Clay		31.5
21	54	431+00 @ CL	MC-1	0.6	6.5	Tan Lean Clay with Sand		20.9
22			MC-2	6.5	19.0	Tan Sandy Lean Clay		28.6
23	55	437+00 @ CL	MC-1	0.7	11.0	Brown Sandy Lean Clay with Gravel		13.3
23	56	441+00 @ CL	MC-1	0.7	5.0	Brown Sandy Lean Clay with Gravel		20.2
24	57	655+00 @ CL	MC-1	0.4	5.0	Dark Reddish Brown & Beige Lean Clay with Sand		22.1
24	58	661+00 @ CL	MC-1	0.4	4.7	Dark Tan Lean Clay with Sand		25.8
24	59	665+00 @ CL	MC-1	0.3	7.3	Dark Brown Lean Clay with Sand		21.8
25	60	671+00 @ CL	MC-1	0.4	16.0	Dark Tan Clayey Gravel with Sand		36.3

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
25	61	675+00 @ CL	MC-1	0.3	14.0	Copper & Dark Beige Clayey Gravel with Sand		18.7
25	62	679+00 @ CL	MC-1	0.4	3.3	Beige Clayey Gravel with Sand		12.2
25	63	683+00 @ CL	MC-1	0.4	3.7	Dark Tan Clayey Gravel with Sand		17.0
26	64	687+00 @ CL	MC-1	0.4	11.0	Tan Sandy Lean Clay		23.8
27			MC-2	11.0	18.0	Brown Sandy Lean Clay with Gravel		12.1
29	65	691+00 @ CL	MC-1	0.6	10.2	Dark Brown Sandy Lean Clay		18.4
28	66	697+00 @ CL	MC-1	0.5	13.3	Copper Clayey Sand with Gravel		13.7
28	67	703+00 @ CL	MC-1	0.3	9.0	Dark Tan & Black Clayey Sand with Gravel		17.3
29	68	709+00 @ CL	MC-1	0.7	8.0	Tan & Reddish Brown Sandy Lean Clay		27.2
29	69	713+00 @ CL	MC-1	0.4	3.3	Copper & Dark Brown Sandy Lean Clay		19.4
29	69A	713+10 @ CL	MC-1	0.8	24.0	Brown & Copper Sandy Lean Clay		11.2
30			MC-2	22.0	24.1	Tan Sandy Fat Clay		45.3
29	70	717+00 @ CL	MC-1	0.7	21.0	Dark Brown Sandy Lean Clay		21.0
30			MC-2	21.0	25.8	Tan Sandy Fat Clay		41.5
31	71	721+00 @ CL	MC-1	0.7	3.1	Dark Brown & Dark Beige Clayey Sand		19.6
31	72	725+00 @ CL	MC-1	0.8	23.0	Dark Beige Clayey Sand		17.5
31	73	729+00 @ CL	MC-1	0.8	12.4	Dark Brown Clayey Sand		17.9
32	74	733+00 @ CL	MC-1	0.8	8.5	Dark Reddish Brown Sandy Fat Clay		18.6
31			MC-2	8.5	18.8	Brown Clayey Sand		22.8
33	76	741+00 @ CL	MC-1	0.8	11.9	Dark Brown Sandy Silt		21.4
34	77	A647+00 @ CL	MC-1	0.8	9.0	Dark Beige Sandy Lean Clay		17.6
35			MC-2	9.0	14.6	Beige & Brown Sandy Lean Clay		20.0
34	78	A651+00 @ CL	MC-1	0.8	8.0	Brown Sandy Lean Clay		17.8
35			MC-2	8.0	12.0	Brown Sandy Lean Clay		13.4
34			MC-3	12.0	20.8	Tan Sandy Lean Clay		24.4
36	82	A669+00 @ CL	MC-1	0.8	5.0	Copper Lean Clay		19.4
36	83	A675+00 @ CL	MC-1	0.8	5.0	Dark Brown Lean Clay		33.4
41	84	447+00 @ CL	MC-1	1.0	22.0	Brown & Reddish Brown Sandy Lean Clay with Gravel		16.5
41	85	451+00 @ CL	MC-1	0.3	5.0	Brown & Reddish Brown Sandy Lean Clay with Gravel		14.2
41	86	455+00 @ CL	MC-1	0.3	14.0	Reddish Brown & Dark Brown Sandy Lean Clay with Gravel		17.1
36	87	461+00 @ CL	MC-1	0.3	4.2	Brown Lean Clay		9.2
41	88	467+00 @ CL	MC-1	0.3	5.0	Reddish Brown Sandy Lean Clay with Gravel		16.4
41	89	473+00 @ CL	MC-1	0.3	15.0	Reddish Brown Sandy Lean Clay with Gravel		24.2
41	90	479+00 @ CL	MC-1	0.3	13.0	Reddish Brown & Tan Sandy Lean Clay with Gravel		29.3
37	91	485+00 @ CL	MC-1	0.3	29.0	Brown Sandy Lean Clay		9.2
41	92	491+00 @ CL	MC-1	0.3	19.0	Reddish Brown & Tan Sandy Lean Clay with Gravel		23.4

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CONSULTING ENGINEERS

Moisture Data

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
47	93	497+00 @ CL	MC-1	0.3	5.0	Brown & Reddish Brown Gravelly Silty Clay with Sand		25.3
49	94	503+00 @ CL	MC-1	0.3	16.0	Reddish Brown & Brown Sandy Fat Clay		21.9
49	95	507+00 @ CL	MC-1	0.3	10.2	Reddish Brown Sandy Fat Clay		35.2
49	96	513+00 @ CL	MC-1	0.3	5.5	Reddish Brown & Brown Sandy Fat Clay		28.8
46	97	519+00 @ CL	MC-1	0.3	25.0	Brown & Reddish Brown Fat Clay with Sand		26.0
45	98	525+00 @ CL	MC-1	0.3	4.0	Brown & Reddish Brown Lean Clay with Sand		11.1
45	99	529+00 @ CL	MC-1	0.3	6.4	Brown & Reddish Brown Lean Clay with Sand		17.4
44	100	533+00 @ CL	MC-1	0.3	5.1	Dark Brown & Reddish Brown Lean Clay		20.6
44	101	537+00 @ CL	MC-1	0.3	5.3	Brown & Dark Brown Lean Clay		16.3
42	102	541+00 @ CL	MC-1	0.3	4.1	Brown Sandy Lean Clay with Gravel		12.6
42	103	545+00 @ CL	MC-1	0.3	4.4	Reddish Brown Sandy Lean Clay with Gravel		11.3
42	104	549+00 @ CL	MC-1	0.3	13.0	Reddish Brown & Tan Sandy Lean Clay with Gravel		19.7
42	105	553+00 @ CL	MC-1	0.3	13.0	Reddish Brown & Brown Sandy Lean Clay with Gravel		14.9
43			MC-2	13.0	19.0	Brownish Red Fat Clay with Sand		34.0
36	106	557+00 @ CL	MC-1	0.3	10.0	Reddish Brown Lean Clay		15.9
37			MC-2	10.0	21.0	Brownish Red Sandy Lean Clay		31.4
42	107	561+00 @ CL	MC-1	0.3	5.4	Brown Sandy Lean Clay with Gravel		13.0
40	108	565+00 @ CL	MC-1	0.3	16.0	Red Sandy Silty Clay		18.3
36	109	571+00 @ CL	MC-1	0.3	15.0	Red Lean Clay		25.7
36	110	575+00 @ CL	MC-1	0.3	11.0	Red Lean Clay		29.6
101	127	186+00 @ CL	SS-1	5.0	6.5	Copper & Dark Brown Silty Sand with Gravel		20.1
102			SS-2	10.0	11.5	Reddish Brown & Light Gray Clayey Sand with Gravel		18.7
102			SS-3	15.0	16.0	Reddish Brown Clayey Sand with Gravel		16.2
102			SS-4	20.0	21.5	Reddish Brown & Tan Clayey Sand with Gravel		18.0
103			SS-5	25.0	26.5	Dark Brown & Brown Clayey Gravel with Sand		41.2
103			SS-6	30.0	31.5	Reddish Brown Clayey Gravel with Sand		44.7
104			SS-7	35.0	36.5	Light Gray & Light Beige Well-Graded Sand with Silt and Gravel		24.5
104			SS-8	40.0	40.9	White & Light Brown Well-Graded Sand with Silt and Gravel		32.8
104			SS-9	45.0	45.5	White & Light Beige Well-Graded Sand with Silt and Gravel		24.6
102	128	186+00 @ 168' Rt.	SS-1	5.0	6.5	Reddish Brown & Tan Clayey Sand with Gravel		22.7
102			SS-2	10.0	11.2	Reddish Brown & Tan Clayey Sand with Gravel		21.9
102			SS-3	15.0	16.3	Reddish Brown, Tan, White & Black Clayey Sand with Gravel		25.3
102			SS-4	20.0	21.5	Reddish Brown, Tan & White Clayey Sand with Gravel		24.2
102			SS-5	25.0	26.5	Reddish Brown, Tan & White Clayey Sand with Gravel		25.2
103			SS-6	30.0	31.5	Light Reddish Tan & White Clayey Gravel with Sand		33.5
103			SS-7	35.0	36.5	Reddish Brown, Tan & White Clayey Gravel with Sand		22.4
104			SS-8	40.0	41.5	Reddish Brown, Reddish Tan & White Well-Graded Sand with Silt and Gravel		22.2
104			SS-9	45.0	45.3	White, Tan & Reddish Brown Well-Graded Sand with Silt and Gravel		32.8
102	129	191+00 @ CL	SS1	5.0	5.7	Reddish & Tan Clayey Sand with Gravel		27.9
102			SS2	10.0	11.5	Dark Tan Clayey Sand with Gravel		32.0
103			SS3	15.0	16.5	Dark Brown Clayey Gravel with Sand		46.1
101	130	191+00 @ 183' Rt.	SS-1	5.0	5.9	Dark Reddish Brown Silty Sand with Gravel		34.4
101			SS-2	10.0	11.5	Reddish Brown Silty Sand with Gravel		21.9
102			SS-3	15.0	16.5	Reddish Brown Clayey Sand with Gravel		24.8

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Moisture Data

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
102			SS-4	20.0	21.5	Dark Reddish Brown Clayey Sand with Gravel		23.2
102			SS-5	25.0	26.5	Reddish Brown Clayey Sand with Gravel		35.2
103			SS-6	30.0	31.5	Reddish Brown Clayey Gravel with Sand		19.1
103			SS-7	35.0	36.5	Reddish Brown Clayey Gravel with Sand		23.0
103			SS-8	40.0	41.5	Reddish Brown Clayey Gravel with Sand		19.8
103			SS-9	45.0	46.5	Dark Reddish Brown Clayey Gravel with Sand		23.1
104			SS-10	50.0	51.5	Dark Reddish Brown Well-Graded Sand with Silt and Gravel		34.6
104			SS-11	55.0	55.5	Reddish Brown & Tan Well-Graded Sand with Silt and Gravel		27.8
102	132	196+00 @ 130' Rt.	SS-1	5.0	5.6	Red & Brown Clayey Sand with Gravel		20.1
101	133	201+00 @ 176' Lt.	SS-1	5.0	6.5	Red Silty Sand with Gravel		32.8
102	134	201+00 @ 194' Rt.	SS-1	5.0	6.4	Red Clayey Sand with Gravel		13.1
101	135	206+00 @ CL	SS-1	5.0	6.5	Red & White Silty Sand with Gravel		36.9
132	137	223+00 @ 84' Lt.	SS-1	5.0	6.5	Red & Gray Clayey Sand with Gravel		20.8
132	138	223+00 @ 84' Rt.	SS-1	5.0	6.5	Red & Gray Clayey Sand with Gravel		19.8
132	140	228+00 @ 84' Rt.	SS-1	5.0	6.5	Yellowish Brown Clayey Sand with Gravel		37.4
133			SS-2	25.0	26.5	Yellowish Brown & White Silty Sand with Gravel		21.0
132	141	239+00 @ 123' Rt.	SS-1	5.0	5.8	Brown Clayey Sand with Gravel		30.8
133			SS-2	10.0	11.0	White Silty Sand with Gravel		23.1
133			SS-3	15.0	15.6	White Silty Sand with Gravel		25.4
132	142	244+00 @ 247' Lt.	SS-1	5.0	6.2	Brown Clayey Sand with Gravel		20.8
132			SS-2	10.0	10.9	Brown Clayey Sand with Gravel		18.8
133			SS-3	15.0	15.3	Brown Silty Sand with Gravel		13.3
132	143	244+00 @ CL	SS-1	5.0	6.5	Brown & White Clayey Sand with Gravel		47.4
133			SS-2	10.0	11.3	White & Brown Silty Sand with Gravel		15.2
133			SS-3	15.0	15.6	Brown & White Silty Sand with Gravel		21.2
105	144	247+00 @ 84' Rt.	SS-1	5.0	6.5	Red & White Silty, Clayey Sand with Gravel		24.9
105			SS-2	10.0	11.5	Brown & Red Silty, Clayey Sand with Gravel		25.9
106			SS-3	15.0	16.5	Dark Brown & White Clayey Sand with Gravel		35.5
106			SS-4	20.0	21.5	Dark Brown & White Clayey Sand with Gravel		23.6
106			SS-5	25.0	26.5	Dark Brown & White Clayey Sand with Gravel		53.5
107			SS-6	30.0	30.2	Dark Brown & White Silty Sand with Gravel		23.1
107			SS-7	35.0	35.7	White Silty Sand with Gravel		30.2
105	145	255+00 @ 274' Lt.	SS-1	5.0	6.5	Brown Silty, Clayey Sand with Gravel		18.2
105			SS-2	10.0	11.5	Brown Silty, Clayey Sand with Gravel		18.7
105	146	255+00 @ CL	SS-1	5.0	6.5	Brown Silty, Clayey Sand with Gravel		20.0
105			SS-2	10.0	11.5	Brown Silty, Clayey Sand with Gravel		19.7
105	147	255+00 @ 135' Lt.	SS-1	4.4	5.9	Brown Silty, Clayey Sand with Gravel		17.1
105			SS-2	9.4	10.9	Brown Silty, Clayey Sand with Gravel		19.5
105	148	261+00 @ 84' Lt.	SS-1	5.0	5.4	Brown Silty, Clayey Sand with Gravel		18.7
105			SS-2	10.0	10.8	Brown Silty, Clayey Sand with Gravel		17.9
106			SS-3	15.0	16.5	Brown Clayey Sand with Gravel		24.9
106			SS-4	20.0	21.5	Brown Clayey Sand with Gravel		25.1
106			SS-5	25.0	26.5	Brown Clayey Sand with Gravel		39.1
106			SS-6	30.0	31.5	Brown Clayey Sand with Gravel		33.5
106			SS-7	35.0	36.5	Brown Clayey Sand with Gravel		28.1
107			SS-8	40.0	41.5	Brown Silty Sand with Gravel		38.1
107			SS-9	45.0	46.0	Brown Silty Sand with Gravel		22.7
107			SS-10	50.0	50.8	Beige & White Silty Sand with Gravel		32.0
107			SS-11	55.0	55.7	Brown & White Silty Sand with Gravel		20.8

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Moisture Data

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
105	149	261+00 @ 84' Rt.	SS-1	5.0	6.5	Red Silty, Clayey Sand with Gravel		29.7
105			SS-2	10.0	11.5	Beige & White Silty, Clayey Sand with Gravel		23.4
106			SS-3	15.0	16.5	Brown Clayey Sand with Gravel		25.3
106			SS-4	20.0	21.5	Red & White Clayey Sand with Gravel		13.9
106			SS-5	25.0	26.5	Beige & White Clayey Sand with Gravel		13.9
106			SS-6	30.0	31.5	Brown Clayey Sand with Gravel		32.7
106			SS-7	35.0	36.5	Brown Clayey Sand with Gravel		18.8
106			SS-8	40.0	41.5	Brown Clayey Sand with Gravel		39.4
106			SS-9	45.0	45.8	Brown Clayey Sand with Gravel		20.4
107			SS-10	50.0	50.7	White Silty Sand with Gravel		29.9
105	150	266+00 @ 84' Lt.	SS-1	5.0	6.5	Brown Silty, Clayey Sand with Gravel		37.0
106			SS-2	10.0	11.5	Brown Clayey Sand with Gravel		23.6
106			SS-3	15.0	16.5	Brown Clayey Sand with Gravel		16.9
106			SS-4	20.0	21.5	Brown Clayey Sand with Gravel		40.4
107			SS-5	25.0	26.5	White Silty Sand with Gravel		27.5
107			SS-6	30.0	31.5	White & Dark Red Silty Sand with Gravel		20.4
107			SS-7	35.0	35.3	Brown Silty Sand with Gravel		20.3
108	151	269+00 @ 168' Lt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		30.3
109	152	271+00 @ 84' Rt.	SS-1	5.0	5.9	Brown Clayey Gravel with Sand		27.9
109			SS-2	10.0	10.8	Brown Clayey Gravel with Sand		29.8
109			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		18.3
109			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		23.2
109			SS-5	25.0	25.9	Brown Clayey Gravel with Sand		13.1
109			SS-6	30.0	31.5	Brown Clayey Gravel with Sand		32.0
110			SS-7	35.0	36.5	Brown Silty Gravel with Sand		35.9
110			SS-8	40.0	40.0	Brown Silty Gravel with Sand		27.7
108	153	279+00 @ 228' Lt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		26.2
108			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		20.4
108	154	279+00 @ 178' Rt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		22.1
108			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		22.7
109	155	285+00 @ 84' Lt.	SS-1	5.0	5.8	Red Clayey Gravel with Sand		32.2
109			SS-2	10.0	10.8	Red Clayey Gravel with Sand		15.3
109			SS-3	15.0	16.5	Red & Brown Clayey Gravel with Sand		36.0
109			SS-4	20.0	21.3	Red & Brown Clayey Gravel with Sand		33.7
109			SS-5	25.0	26.5	Dark Brown Clayey Gravel with Sand		46.8
109			SS-6	30.0	31.5	Brown Clayey Gravel with Sand		47.6
110			SS-7	35.0	35.3	Red Silty Gravel with Sand		18.1
110			SS-8	40.0	40.4	Red Silty Gravel with Sand		22.8
110			SS-9	45.0	45.3	White Silty Gravel with Sand		37.9
110			SS-10	50.0	50.3	White Silty Gravel with Sand		21.7
108	156	285+00 @ 84' Rt.	SS-1	5.0	5.3	Light Brown Clayey Gravel with Sand		13.0
109			SS-2	10.0	10.9	Red Clayey Gravel with Sand		32.4
109			SS-3	15.0	16.0	Red Clayey Gravel with Sand		30.2
109			SS-4	20.0	21.5	Red Clayey Gravel with Sand		10.5
110			SS-5	25.0	26.5	Light Brown Silty Gravel with Sand		21.0
110			SS-6	30.0	31.5	Light Brown Silty Gravel with Sand		26.7
110			SS-7	35.0	35.3	Red Silty Gravel with Sand		19.2
110			SS-8	40.0	40.2	Red Silty Gravel with Sand		18.2
110			SS-9	45.0	45.3	Red Silty Gravel with Sand		15.7
127	157	296+00 @ 193' Lt.	SS-1	5.0	6.5	Yellowish Brown & White Clayey Gravel with Sand		23.5
127			SS-2	10.0	11.4	Yellowish Brown & White Clayey Gravel with Sand		31.8
127	158	296+00 @ CL	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		15.2
127	159	296+00 @ 166' Rt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		9.7
128			SS-2	10.0	10.2	Brown Clayey Gravel with Sand		18.1

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Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
127	160	312+00 @ 222' Lt.	SS-1	5.0	6.5	Dark Brown Clayey Gravel with Sand		26.3
127			SS-2	10.0	11.5	Dark Brown Clayey Gravel with Sand		23.0
127			SS-3	15.0	16.5	Dark Brown Clayey Gravel with Sand		24.8
127	161	312+00 @ CL	SS-1	5.0	6.5	Dark Brown & Copper Clayey Gravel with Sand		21.1
127			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		22.7
127			SS-3	15.0	15.4	Brown Clayey Gravel with Sand		20.1
127	162	312+00 @ 202' Rt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		22.0
128			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		18.7
128			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		18.7
128			SS-4	20.0	20.6	Brown Clayey Gravel with Sand		35.2
127	163	317+00 @ CL	SS-1	5.0	6.5	Dark Brown Clayey Gravel with Sand		16.7
128			SS-2	10.0	11.5	Brown & Red Clayey Gravel with Sand		11.5
128			SS-3	15.0	15.8	Light Gray & Dark Brown Clayey Gravel with Sand		22.4
127	164	317+00 @ 217' Rt.	SS-1	5.0	6.5	Copper & Dark Tan Clayey Gravel with Sand		16.6
127			SS-2	10.0	11.5	Dark Brown, Tan & Red Clayey Gravel with Sand		21.6
111	165	337+00 @ 191' Lt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		21.8
111			SS-2	10.0	11.5	Dark Brown & Copper Clayey Gravel with Sand		25.8
111			SS-3	15.0	16.5	Dark Brown Clayey Gravel with Sand		22.1
111			SS-4	20.0	21.2	Dark Beige & Tan Clayey Gravel with Sand		29.8
113			SS-5	25.0	25.8	Beige Clayey Gravel with Sand		30.8
111	166	337+00 @ 177' Rt.	SS-1	5.0	6.5	Beige, Dark Brown & Dark Tan Clayey Gravel with Sand		20.5
111			SS-2	10.0	11.5	Dark Brown, Copper & Tan Clayey Gravel with Sand		25.0
112			SS-3	15.0	16.5	Dark Reddish Brown & White Clayey Gravel with Sand		31.4
112			SS-4	20.0	21.5	Beige, Dark Brown & Black Clayey Gravel with Sand		37.4
112			SS-5	25.0	26.1	Brown Clayey Gravel with Sand		34.0
113			SS-6	30.0	31.2	Light Gray & Brown Clayey Gravel with Sand		26.2
111	167	347+00 @ 84' Lt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		31.7
112			SS-2	10.0	10.9	Red & White Clayey Gravel with Sand		26.0
111	168	347+00 @ 84' Rt.	SS-1	5.0	6.4	Brown & White Clayey Gravel with Sand		38.5
111	169	364+00 @ 84' Lt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		33.8
111			SS-2	10.0	11.5	Red Clayey Gravel with Sand		26.7
111			SS-3	15.0	16.5	Light Brown Clayey Gravel with Sand		36.6
112			SS-4	20.0	21.3	Red Clayey Gravel with Sand		38.0
111	170	364+00 @ 84' Rt.	SS-1	5.0	6.4	Red Clayey Gravel with Sand		31.0
112			SS-2	10.0	11.5	Red Clayey Gravel with Sand		33.3
112			SS-3	15.0	16.5	Red Clayey Gravel with Sand		23.1
112			SS-4	20.0	21.5	Red Clayey Gravel with Sand		31.8
113			SS-5	25.0	26.5	Red Clayey Gravel with Sand		30.4
113			SS-6	30.0	31.5	Light Brown Clayey Gravel with Sand		35.0
113			SS-7	35.0	36.5	Light Brown Clayey Gravel with Sand		20.5
113			SS-8	40.0	41.5	Red Clayey Gravel with Sand		29.3
113			SS-9	45.0	46.5	Red Clayey Gravel with Sand		27.7
129	171	381+00 @ 181' Lt.	SS-1	5.0	6.5	Brown Sandy Lean Clay with Gravel		24.6
129	172	381+00 @ CL	SS-1	4.3	5.8	Light Brown Sandy Lean Clay with Gravel		13.8
129	173	381+00 @ 164' Rt.	SS-1	5.0	6.5	Brown Sandy Lean Clay with Gravel		21.8
129	174	386+00 @ 182' Lt.	SS-1	5.0	6.5	Dark Brown Sandy Lean Clay with Gravel		22.2
129			SS-2	10.0	11.5	Dark Brown Sandy Lean Clay with Gravel		22.2
129	175	386+00 @ CL	SS-1	5.0	6.5	Dark Brown Sandy Lean Clay with Gravel		21.7
129			SS-2	10.0	11.5	Gray Sandy Lean Clay with Gravel		23.0

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
129	176	386+00 @ 188' Rt.	SS-1	5.0	6.5	Brown Sandy Lean Clay with Gravel		22.5
129			SS-2	10.0	11.5	Brown Sandy Lean Clay with Gravel		19.6
129	177	400+00 @ 84' Lt.	SS-1	5.0	5.4	Dark Brown Sandy Lean Clay with Gravel		15.9
130			SS-2	10.0	11.5	Pink Silty Gravel with Sand		7.7
130			SS-3	15.0	16.5	Pink Silty Gravel with Sand		14.7
131			SS-4	20.0	21.5	Pink & Red Clayey Sand with Gravel		15.1
131			SS-5	25.0	26.5	Red Clayey Sand with Gravel		16.6
131			SS-6	30.0	31.5	Red Clayey Sand with Gravel		18.0
131			SS-7	35.0	36.5	Red Clayey Sand with Gravel		29.1
129	178	405+00 @ 84' Lt.	SS-1	5.0	6.0	Red & White Sandy Lean Clay with Gravel		25.7
130			SS-2	10.0	11.4	Red & White Silty Gravel with Sand		19.7
130			SS-3	15.0	16.5	Red & White Silty Gravel with Sand		35.3
130			SS-4	20.0	21.5	Red & White Silty Gravel with Sand		31.5
130			SS-5	25.0	26.5	Red & White Silty Gravel with Sand		42.4
131			SS-6	30.0	31.5	Red & White Clayey Sand with Gravel		40.3
131			SS-7	35.0	36.5	Red & White Clayey Sand with Gravel		44.8
131			SS-8	40.0	41.5	White & Red Clayey Sand with Gravel		32.1
131			SS-9	45.0	46.5	White & Red Clayey Sand with Gravel		31.7
129	179	405+00 @ 84' Rt.	SS-1	5.0	5.4	White Sandy Lean Clay with Gravel		8.9
114	180	421+00 @ CL	SS-1	5.0	6.5	Dark Tan & Tan Clayey Sand with Gravel		41.4
114			SS-2	10.0	11.5	Tan & Reddish Brown Clayey Sand with Gravel		37.9
114			SS-3	15.0	16.5	Tan Clayey Sand with Gravel		30.4
115			SS-4	20.0	21.5	Tan Silty Sand with Gravel		49.1
115			SS-5	25.0	26.5	Brown & Dark Brown Silty Sand with Gravel		53.6
115			SS-6	30.0	31.5	Tan & Light Beige Silty Sand with Gravel		47.3
114	181	421+00 @ 156' Rt.	SS-1	5.0	6.5	Brown & Tan Clayey Sand with Gravel		33.7
114			SS-2	10.0	11.5	Tan, White & Light Beige Clayey Sand with Gravel		28.6
114			SS-3	15.0	16.5	Tan & Brown Clayey Sand with Gravel		26.4
115			SS-4	20.0	21.5	Tan & Reddish Brown Silty Sand with Gravel		60.1
115			SS-5	25.0	26.5	Tan, Brown & Copper Silty Sand with Gravel		39.4
116			SS-6	30.0	31.5	Dark Brown Clayey Gravel with Sand		38.7
114	182	427+00 @ CL	SS-1	5.0	6.5	Tan & Brown Clayey Sand with Gravel		22.5
114			SS-2	10.0	11.5	Tan Clayey Sand with Gravel		26.7
114			SS-3	15.0	16.5	Tan Clayey Sand with Gravel		41.1
116			SS-4	20.0	21.5	Tan, Dark Brown & Black Clayey Gravel with Sand		21.6
116			SS-5	25.0	26.2	Tan & Dark Brown Clayey Gravel with Sand		21.1
116			SS-6	30.0	31.3	Dark Brown & Copper Clayey Gravel with Sand		22.6
116			SS-7	35.0	35.3	Brown Clayey Gravel with Sand		16.5
114	183	427+00 @ 178' Rt.	SS-1	5.0	6.5	Copper & Dark Tan Clayey Sand with Gravel		18.3
115			SS-2	10.0	11.5	Reddish & Tan Silty Sand with Gravel		45.1
115			SS-3	15.0	16.5	Dark Brown Silty Sand with Gravel		24.3
116			SS-4	20.0	21.5	Dark Brown Clayey Gravel with Sand		23.8
116			SS-5	25.0	26.5	Tan & Copper Clayey Gravel with Sand		40.6
116			SS-6	30.0	31.1	White & Brown Clayey Gravel with Sand		17.9
114	184	431+00 @ 147' Lt.	SS-1	50.0	6.3	Tan Clayey Sand with Gravel		25.4
115			SS-2	10.0	11.5	Tan Silty Sand with Gravel		38.9
115			SS-3	15.0	16.5	Tan & Brown Silty Sand with Gravel		39.6
116			SS-4	20.0	21.5	Dark Brown & Tan Clayey Gravel with Sand		22.1
116			SS-5	25.0	26.2	Dark Brown & Copper Clayey Gravel with Sand		60.4
116			SS-6	30.0	31.3	Brown & Copper Clayey Gravel with Sand		22.4
116			SS-7	35.0	36.2	White & Light Beige Clayey Gravel with Sand		56.5
134	186	458+00 @ 176' Lt.	SS-1	5.0	6.5	Brown Silty Sand with Gravel		35.5
134			SS-2	10.0	11.5	Brown Silty Sand with Gravel		19.2
135			SS-3	15.0	16.5	Brown Silty Gravel with Sand		45.4
135			SS-4	20.0	21.5	Brown & White Silty Gravel with Sand		31.2
135			SS-5	25.0	26.5	Brown & White Silty Gravel with Sand		33.8

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
134	187	458+00 @ CL	SS-1	5.0	6.5	Red Silty Sand with Gravel		19.1
134			SS-2	10.0	11.5	Red Silty Sand with Gravel		34.0
134			SS-3	15.0	16.5	Red Silty Sand with Gravel		28.9
134			SS-4	20.0	21.5	Red & White Silty Sand with Gravel		20.8
135			SS-5	25.0	26.5	Red & White Silty Gravel with Sand		28.8
135			SS-6	30.0	31.5	Brown Silty Gravel with Sand		24.3
135			SS-7	35.0	36.5	Brown Silty Gravel with Sand		36.6
136			SS-8	40.0	41.5	Brown & White Clayey Gravel with Sand		37.5
136			SS-9	45.0	46.5	Brown & White Clayey Gravel with Sand		27.4
136			SS-10	50.0	51.5			43.9
134	188	464+00 @ 197' Lt.	SS-1	5.0	6.4	Brown Silty Sand with Gravel		14.5
134			SS-2	10.0	11.5	Brown Silty Sand with Gravel		25.7
135			SS-3	15.0	16.5	Brown Silty Gravel with Sand		16.2
136			SS-4	20.0	21.5	Brown & White Clayey Gravel with Sand		13.2
136			SS-5	25.0	26.5	Brown & White Clayey Gravel with Sand		28.5
136			SS-6	30.0	31.5	Brown & White Clayey Gravel with Sand		22.2
136			SS-7	35.0	36.1	Brown & White Clayey Gravel with Sand		18.9
134	189	464+00 @ CL	SS-1	5.0	6.5	Brown Silty Sand with Gravel		23.9
134			SS-2	10.0	11.5	Brown Silty Sand with Gravel		17.1
135			SS-3	15.0	16.5	White Silty Gravel with Sand		32.1
134	190	464+00 @ 160' Rt.	SS-1	5.0	6.5	Brown Silty Sand with Gravel		17.7
134			SS-2	10.0	11.0	Brown Silty Sand with Gravel		22.2
135			SS-3	15.0	16.5	Brown & White Silty Gravel with Sand		17.3
135			SS-4	20.0	21.5	Brown Silty Gravel with Sand		24.3
135			SS-5	25.0	26.5	Brown & White Silty Gravel with Sand		26.1
136			SS-6	30.0	31.5	Brown & White Clayey Gravel with Sand		37.3
136			SS-7	35.0	36.5	Brown & White Clayey Gravel with Sand		23.7
134	191	474+00 @ 180' Lt.	SS-1	5.0	6.5	Tan, Reddish Tan & White Silty Sand with Gravel		28.2
134			SS-2	10.0	11.5	Reddish Brown & Tan Silty Sand with Gravel		44.3
134			SS-3	15.0	16.5	Brown, Reddish Tan & White Silty Sand with Gravel		35.5
134			SS-4	20.0	21.5	Brown, Reddish Tan & White Silty Sand with Gravel		47.4
135			SS-5	25.0	26.5	Brown, Reddish Tan & White Silty Gravel with Sand		23.7
135			SS-6	30.0	31.5	Tan, White & Beige Silty Gravel with Sand		28.1
135			SS-7	35.0	35.7	Tan, White & Beige Silty Gravel with Sand		22.0
135			SS-8	40.0	40.7	Brown & White Silty Gravel with Sand		34.2
134	192	474+00 @ CL	SS-1	5.0	6.5	Brown Silty Sand with Gravel		16.0
134			SS-2	10.0	11.5	Brown Silty Sand with Gravel		23.7
134			SS-3	15.0	16.5	Brown Silty Sand with Gravel		25.7
136			SS-4	20.0	21.5	Brown & White Clayey Gravel with Sand		41.3
136			SS-5	25.0	26.5	Brown & White Clayey Gravel with Sand		22.5
134	193	474+00 @ 128' Rt.	SS-1	5.0	6.5	Brown & White Silty Sand with Gravel		24.6
134			SS-2	10.0	11.5	Brown & White Silty Sand with Gravel		23.7
134			SS-3	15.0	16.5	Brown & White Silty Sand with Gravel		31.2
134			SS-4	20.0	21.5	Brown & White Silty Sand with Gravel		43.0
135			SS-5	25.0	26.5	Brown & White Silty Gravel with Sand		44.6
135			SS-6	30.0	31.5	Brown & White Silty Gravel with Sand		28.7
124	194	487+00 @ 84' Lt.	SS-1	5.0	6.5	Red Clayey Sand with Gravel		25.5
124			SS-2	10.0	11.5	Red Clayey Sand with Gravel		26.0
124			SS-3	15.0	16.5	Red Clayey Sand with Gravel		30.6
125			SS-4	20.0	21.5	Red Clayey Gravel with Sand		28.9
125			SS-5	25.0	26.5	Red Clayey Gravel with Sand		21.6
125			SS-6	30.0	31.5	Red Clayey Gravel with Sand		18.2
126			SS-7	35.0	36.5	Red Silty Gravel with Sand		22.1
124	195	487+00 @ 84' Rt.	SS-1	5.0	6.0	Brown Clayey Sand with Gravel		23.8
124			SS-2	10.0	10.9	Brown Clayey Sand with Gravel		38.3
124			SS-3	15.0	16.5	Brown Clayey Sand with Gravel		34.3

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CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
125			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		23.1
125			SS-5	25.0	26.5	Brown Clayey Gravel with Sand		24.5
125			SS-6	30.0	31.5	Brown Clayey Gravel with Sand		26.3
126			SS-7	35.0	36.5	Brown Silty Gravel with Sand		20.3
124	196	502+00 @ 84' Lt.	SS-1	5.0	6.5	Red Clayey Sand with Gravel		38.6
124			SS-2	10.0	11.5	Red Clayey Sand with Gravel		33.7
124			SS-3	15.0	16.5	Red Clayey Sand with Gravel		35.9
124			SS-4	20.0	21.5	Red Clayey Sand with Gravel		31.9
125			SS-5	25.0	26.5	Red Clayey Gravel with Sand		25.3
125			SS-6	30.0	30.4	Red Clayey Gravel with Sand		21.4
124	197	502+00 @ 84' Rt.	SS-1	5.0	6.5	Red Clayey Sand with Gravel		32.4
124			SS-2	10.0	11.5	Red Clayey Sand with Gravel		34.4
124			SS-3	15.0	16.5	Red Clayey Sand with Gravel		43.0
124			SS-4	20.0	21.5	Red Clayey Sand with Gravel		28.7
124			SS-5	25.0	26.5	Red Clayey Sand with Gravel		33.7
126			SS-6	30.0	30.9	Red Silty Gravel with Sand		26.6
126			SS-7	35.0	36.5	Red Silty Gravel with Sand		24.4
124	198	509+00 @ 204' Lt.	SS-1	5.0	6.5	Light Reddish Tan & White Clayey Sand with Gravel		21.7
124			SS-2	10.0	11.5	Light Reddish Tan & White Clayey Sand with Gravel		23.7
124	199	509+00 @ CL	SS-1	5.0	5.7	Brown, Tan & Beige Clayey Sand with Gravel		16.5
124			SS-2	10.0	10.8	Brown, Tan, Beige & Gray Clayey Sand with Gravel		28.5
124			SS-3	15.0	16.4	Brown, Tan, Reddish Brown & Gray Clayey Sand with Gravel		22.5
124			SS-4	20.0	21.5	Brown, Tan, Reddish Brown & Gray Clayey Sand with Gravel		16.3
126			SS-5	25.0	26.5	Brown, Tan & Gray Silty Gravel with Sand		28.4
126			SS-6	30.0	31.5	Reddish Tan & Gray Silty Gravel with Sand		29.8
126			SS-7	35.0	36.5	Reddish Brown & Gray Silty Gravel with Sand		23.3
126			SS-8	40.0	41.5	Brown & Reddish Tan Silty Gravel with Sand		30.6
126			SS-9	45.0	45.8	Brown Silty Gravel with Sand		27.5
124	200	509+00 @ 166' Rt.	SS-1	5.0	6.5	Brown, Tan & White Clayey Sand with Gravel		24.2
124			SS-2	10.0	11.4	Brown, Tan & White Clayey Sand with Gravel		24.0
124			SS-3	15.0	16.5	Brown, Tan & White Clayey Sand with Gravel		29.0
124			SS-4	20.0	21.5	Reddish Brown, Tan & Gray Clayey Sand with Gravel		22.1
124			SS-5	25.0	26.5	Tan, Beige & Gray Clayey Sand with Gravel		26.6
126			SS-6	30.0	31.5	Reddish Brown, Tan & Gray Silty Gravel with Sand		22.0
126			SS-7	35.0	36.5	Beige & Tan Silty Gravel with Sand		31.1
126			SS-8	40.0	41.5	Dark Tan Silty Gravel with Sand		27.6
126			SS-9	45.0	46.5	Brown, Beige & Gray Silty Gravel with Sand		21.8
126			SS-10	50.0	51.5	Dark Tan Silty Gravel with Sand		29.1
121	217	X672+38 @ 28' Lt.	SS-1	5.0	5.8	Red & Brown Sandy Fat Clay with Gravel		12.6
122			SS-2	10.0	11.5	Red & Brown Gravelly Fat Clay		43.2
122			SS-3	15.0	16.5	Light Brown & Red Gravelly Fat Clay		41.9
122			SS-4	20.0	21.5	Red & Brown Gravelly Fat Clay		36.2
122			SS-5	25.0	26.5	Red & Brown Gravelly Fat Clay		41.9
123			SS-6	30.0	31.5	Red & Brown Silty Sand with Gravel		36.2
121	218	X672+49 @ 140' Rt.	SS-1	5.0	5.8	Brown Sandy Fat Clay with Gravel		8.1
121			SS-2	10.0	11.5	Red Sandy Fat Clay with Gravel		41.9
122			SS-3	15.0	16.5	Red Gravelly Fat Clay		38.5
122			SS-4	20.0	21.5	Red Gravelly Fat Clay		37.5
123			SS-5	25.0	26.5	Red & Brown Silty Sand with Gravel		32.7
123			SS-6	30.0	31.5	Red & Brown Silty Sand with Gravel		31.2
121	219	X683+00 @ 89' Lt.	SS-1	5.0	6.5	Red Sandy Fat Clay with Gravel		16.0
121			SS-2	10.0	11.4	Light Red Sandy Fat Clay with Gravel		17.5
122			SS-3	15.0	16.5	Light Brown & Red Gravelly Fat Clay		50.4
123			SS-4	20.0	21.5	Red Silty Sand with Gravel		35.0
123			SS-5	25.0	26.5	Red Silty Sand with Gravel		30.5
123			SS-6	30.0	31.5	Red Silty Sand with Gravel		32.5

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Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
121	220	X683+00 @ 88' Rt.	SS-1	5.0	6.5	Red Sandy Fat Clay with Gravel		36.1
121			SS-2	10.0	11.5	Red Sandy Fat Clay with Gravel		40.7
123			SS-3	15.0	16.5	Red Silty Sand with Gravel		32.6
123			SS-4	20.0	21.5	Red Silty Sand with Gravel		17.4
139	221	X691+00 @ 154' Lt.	SS-1	5.0	6.5	Brown & Beige Clayey Sand with Gravel		18.6
139	223	X691+00 @ 142' Rt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		22.8
139			SS-2	10.0	11.5	Gray & Brown Clayey Sand with Gravel		19.0
140			SS-3	15.0	15.6	Brown & Beige Silty Sand with Gravel		21.5
139	224	X701+00 @ 215' Lt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		17.0
140			SS-2	10.0	11.5	Light Brown & Gray Silty Sand with Gravel		19.6
139	225	X701+00 @ CL	SS-1	5.0	6.5	Brown & Beige Clayey Sand with Gravel		14.3
139			SS-2	10.0	11.5	Gray & Brown Clayey Sand with Gravel		14.8
140			SS-3	15.0	16.5	Brown & Beige Silty Sand with Gravel		34.1
139	226	X701+00 @ 176' Rt.	SS-1	5.0	6.5	Brown, Tan & Beige Clayey Sand with Gravel		12.8
139			SS-2	10.0	11.5	Brown, Beige & Gray Clayey Sand with Gravel		14.1
140			SS-3	15.0	16.5	Brown & Beige Silty Sand with Gravel		37.6
139	227	X713+00 @ 89' Lt.	SS-1	5.0	6.0	Brown & White Clayey Sand with Gravel		14.3
139			SS-2	10.0	11.2	Red Clayey Sand with Gravel		33.3
140			SS-3	15.0	16.5	Brown Silty Sand with Gravel		45.8
140			SS-4	20.0	21.5	Beige & White Silty Sand with Gravel		43.4
140			SS-5	25.0	26.5	Brown Silty Sand with Gravel		28.6
140			SS-6	30.0	30.3	Brown Silty Sand with Gravel		26.8
139	228	X713+00 @ 88' Rt.	SS-1	5.0	6.4	Brown Clayey Sand with Gravel		38.4
139			SS-2	10.0	11.5	Brown Clayey Sand with Gravel		18.0
139			SS-3	15.0	16.5	Brown Clayey Sand with Gravel		45.1
140			SS-4	20.0	21.5	Brown Silty Sand with Gravel		27.4
140			SS-5	25.0	26.2	Brown Silty Sand with Gravel		28.3
139	229	X723+00 @ 84' Lt.	SS-1	5.0	5.5	Brown & White Clayey Sand with Gravel		14.3
139			SS-2	10.0	11.5	Brown & White Clayey Sand with Gravel		12.9
140			SS-3	15.0	16.5	Dark Brown & White Silty Sand with Gravel		66.4
140			SS-4	20.0	21.5	Yellowish Brown & White Silty Sand with Gravel		89.5
140			SS-5	25.0	25.3	Light Brown Silty Sand with Gravel		45.8
139	230	X723+00 @ 84' Rt.	SS-1	5.0	6.5	Yellowish Brown & White Clayey Sand with Gravel		25.4
139			SS-2	10.0	11.5	White & Dark Red Clayey Sand with Gravel		14.1
140			SS-3	15.0	16.5	Yellowish Brown & White Silty Sand with Gravel		34.3
140			SS-4	20.0	21.5	Beige & White Silty Sand with Gravel		29.6
140			SS-5	25.0	25.2	Red Silty Sand with Gravel		21.2
		Highway 412						
60	235	11+00 @ 60' Lt.	MC-1	0.0	11.0	Reddish Brown Gravelly Lean Clay with Sand		18.9
60	236	15+00 @ 72' Lt.	MC-1	0.0	11.0	Reddish Brown Gravelly Lean Clay with Sand		25.2
55	237	19+00 @ 60' Rt.	MC-1	0.0	2.0	Brown Gravelly Lean Clay with Sand		11.7
		Highway 412 Ramp 1						
58	238	175+00 @ 66' Rt.	MC-1	0.6	3.0	Red & Brown Clayey Sand with Gravel		32.6
53	239	178+00 @ 41' Rt.	MC-1	0.3	5.0	Reddish Brown Lean Clay with Sand		19.4
52	240	184+00 @ 42' Lt.	MC-1	0.6	5.0	Reddish Brown Gravelly Lean Clay with Sand		17.8
58	241	188+00 @ 38' Lt.	MC-1	0.6	9.0	Reddish Brown Clayey Sand with Gravel		24.8
58	242	192+00 @ 45' Lt.	MC-1	0.6	9.0	Reddish Brown Clayey Sand with Gravel		20.8

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
		Highway 412 Ramp 2						
53	243	195+00 @ CL	MC-1	0.3	9.8	Reddish Brown Lean Clay with Sand		24.8
60	244	198+00 @ CL	MC-1	0.3	5.0	Red & Brown Gravelly Lean Clay with Sand		33.6
141	245	202+00 @ 104' Lt.	SS-1	5.0	6.5	Tan Clayey Sand		25.8
141			SS-2	10.0	11.5	Reddish Tan Clayey Sand		34.6
142			SS-3	15.0	16.5	Light Tan Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		31.3
142			SS-4	20.0	21.5	Light Tan Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		29.8
142			SS-5	25.0	26.5	Tan & White Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		26.1
141	246	202+00 @ CL	SS-1	5.0	6.5	Tan Clayey Sand		29.6
141	247	202+00 @ 120' Rt.	SS-1	5.0	6.5	Tan Clayey Sand		40.2
141			SS-2	10.0	11.5	Brown, Tan & Beige Clayey Sand		47.0
142			SS-3	15.0	16.5	Brown & Gray Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		20.0
142			SS-4	20.0	21.5	Brown & Beige Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		28.2
142			SS-5	25.0	26.2	Brown & White Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		25.2
58	248	204+00 @ CL	MC-1	0.3	5.0	Reddish Brown Clayey Sand with Gravel		35.0
		Highway 412 Ramp 3						
52	249	198+00 @ CL	MC-1	0.3	5.0	Brown & Reddish Tan Gravelly Lean Clay with Sand		20.7
52	251	204+00 @ CL	MC-1	0.3	4.2	Brown & Beige Gravelly Lean Clay with Sand		22.1
54	252	208+00 @ CL	MC-1	0.3	5.0	Brown & Red Lean Clay with Sand		25.7
		Highway 412 Ramp 4						
67	253	173+00 @ 60' Lt.	MC-1	0.6	15.0	Brown Clayey Sand with Gravel		13.0
59	254	176+00 @ 43' Rt.	MC-1	0.6	19.0	Reddish Brown Sandy Lean Clay		18.4
143	255	179+00 @ 110' Rt	SS-1	5.0	6.5	Dark Reddish Brown Clayey Sand		31.3
144			SS-2	10.0	11.5	Reddish Tan Silty Sand with Gravel		29.2
144			SS-3	15.0	16.5	Reddish Tan Silty Sand with Gravel		30.7
145			SS-4	20.0	21.5	Reddish Brown & Gray Clayey Gravel with Sand		10.4
145			SS-5	25.0	26.5	Reddish Brown & Gray Clayey Gravel with Sand		23.1
145			SS-6	30.0	30.9	Reddish Bworn & Beige Clayey Gravel with Sand		19.4
143	256	179+00 @ 88' Lt.	SS-1	5.0	6.5	Reddish Tan Clayey Sand		33.2
144			SS-2	10.0	11.5	Reddish Tan & Gray Silty Sand with Gravel		20.4
144			SS-3	15.0	16.5	Reddish Tan Silty Sand with Gravel		30.3
144			SS-4	20.0	21.5	Light Reddish Tan Silty Sand with Gravel		39.3
		Highway 68						
59	257	42+00 @ 38' Rt.	MC-1	0.6	10.0	Reddish Brown Sandy Lean Clay		27.5
55	258	46+00 @ 38' Lt.	MC-1	0.6	9.0	Reddish Brown Gravelly Lean Clay with Sand		13.0
55	259	54+00 @ 44' Lt.	MC-1	0.3	5.5	Brown Gravelly Lean Clay with Sand		12.9
65	260	18+00 @ 24' Rt.	MC-1	0.6	8.0	Brown Silty Gravel with Sand		15.1
65	261	24+00 @ CL	MC-1	0.6	5.0	Brown Silty Gravel with Sand		13.2
146	262	25+00 @ 120' Lt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		43.1
146			SS-2	10.0	11.5	Brown Clayey Sand with Gravel		34.6
147			SS-3	15.0	15.8	Brown Silty Sand with Gravel		16.4
147			SS-4	20.0	21.5	Brown Silty Sand with Gravel		20.4
148			SS-5	25.0	26.5	Brown Silty Gravel with Sand		34.0
148			SS-6	30.0	31.5	Brown Silty Gravel with Sand		44.0
148			SS-7	35.0	36.5	Brown Silty Gravel with Sand		32.9
148			SS-8	40.0	40.8	Brown Silty Gravel with Sand		18.9

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Moisture Data

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Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
66	263	25+00 @ CL	MC-1	0.6	16.0	Brown Clayey Sand with Gravel		12.1
146	264	30+00 @ 92' Rt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		36.3
146			SS-2	10.0	11.5	Brown Clayey Sand with Gravel		42.1
147			SS-3	15.0	15.8	Brown Silty Sand with Gravel		13.9
148			SS-4	20.0	21.5	Brown Silty Gravel with Sand		41.7
148			SS-5	25.0	26.5	Brown Silty Gravel with Sand		27.0
148			SS-6	30.0	31.5	Brown Silty Gravel with Sand		41.5
146	265	35+00 @ 76' Lt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		38.5
146			SS-2	10.0	11.5	Brown Clayey Sand with Gravel		23.9
147	266	35+00 @ CL	SS-1	5.0	6.5	Brown Silty Sand with Gravel		19.0
147			SS-2	10.0	11.5	Brown Silty Sand with Gravel		19.7
147			SS-3	15.0	15.6	Brown Silty Sand with Gravel		17.4
147	267	35+00 @ 75' Rt.	SS-1	5.0	6.5	Reddish Silty Sand with Gravel		16.5
147			SS-2	10.0	11.5	Reddish Silty Sand with Gravel		44.5
65	268	36+00 @ CL	MC-1	0.6	5.0	Brown Silty Gravel with Sand		9.8
		Liberty Avenue						
61	269	19+00 @ 18' Lt.	MC-1	0.3	5.0	Dark Brown Lean Clay		24.7
63	270	25+00 @ 18' Rt.	MC-1	0.3	5.0	Tannish Brown Clayey Gravel with Sand		9.1
57	270A	25+00 @ 18' Rt.	MC-1	0.3	5.0	Reddish Brown Sandy Lean Clay		17.1
		Musteen Road						
57	271	17+00 @ CL	MC-1	0.3	5.0	Reddish Brown Sandy Lean Clay		14.9
57	272	21+00 @ CL	MC-1	0.3	18.0	Reddish Brown Sandy Lean Clay		21.7
57	273	25+00 @ CL	MC-1	0.6	10.0	Reddish Brown Sandy Lean Clay		22.8
64	274	28+00 @ CL	MC-1	0.6	15.0	Reddish Brown Clayey Gravel with Sand		16.8
149	275	33+00 @ 60' Lt.	SS-1	5.0	6.5	Reddish Tan & White Clayey Gravel with Sand		32.8
149			SS-2	10.0	11.5	Reddish Tan & White Clayey Gravel with Sand		35.3
150			SS-3	15.0	16.5	Reddish Tan & Gray Clayey Gravel with Sand		17.0
150			SS-4	20.0	21.5	Reddish Brown & Gray Clayey Gravel with Sand		22.1
150			SS-5	25.0	26.5	Reddish Brown & Gray Clayey Gravel with Sand		20.8
149	276	33+00 @ CL	SS-1	5.0	6.5	Reddish Brown & White Clayey Gravel with Sand		18.8
150			SS-2	10.0	11.5	Reddish Brown & Gray Clayey Gravel with Sand		25.1
150			SS-3	15.0	16.5	Reddish Brown & White Clayey Gravel with Sand		28.4
150			SS-4	20.0	21.5	Reddish Brown & White Clayey Gravel with Sand		40.5
150			SS-5	25.0	26.5	Reddish Brown & White Clayey Gravel with Sand		25.2
149	277	33+00 @ 85' Rt.	SS-1	5.0	6.5	Reddish Tan & White Clayey Gravel with Sand		33.4
149			SS-2	10.0	11.5	Reddish Brown & Gray Clayey Gravel with Sand		32.2
149			SS-3	15.0	16.5	Reddish Brown Clayey Gravel with Sand		23.0
154			SS-4	20.0	21.4	Reddish Brown, Tan & White Clayey Gravel with Sand		25.5
154			SS-5	25.0	26.5	Reddish Brown Clayey Gravel with Sand		29.1
56	278	35+00 @ CL	MC-1	0.3	5.0	Red & Brown Sandy Lean Clay		28.4
		Puppy Creek Road						
51	280	26+00 @ 29' Rt.	MC-1	0.3	14.0	Brown & White Gravelly Lean Clay		17.3
151	281	31+00 @ 70' Lt.	SS-1	0.5	6.5	Dark Brown Silty Gravel with Sand		15.7
151			SS-2	10.0	11.5	Black & Dark Brown Silty Gravel with Sand		6.3
152			SS-3	15.0	16.5	Reddish Brown & White Silty Sand with Gravel		33.7
152			SS-4	20.0	21.5	Brown & Beige Silty Sand with Gravel		43.9

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63	283	33+00 @ CL	MC-1	0.6	5.0	Reddish Clayey Gravel with Sand		9.9
		Spring Creek Street						
63	284	19+00 @ CL	MC-1	0.6	5.0	Reddish Clayey Gravel with Sand		17.8
153	285	21+00 @ 59' Lt.	SS-1	0.5	6.5	Light Tan Clayey Gravel with Sand		13.8
153			SS-2	10.0	11.5	Brown Clayey Gravel with Sand		13.4
153			SS-3	15.0	16.5	Light Tan Clayey Gravel with Sand		11.1
153			SS-4	20.0	21.5	Light Brown Clayey Gravel with Sand		12.8
153			SS-5	25.0	26.5	Light Brown Clayey Gravel with Sand		12.7
153	286	21+00 @ CL	SS-1	5.0	6.5	Reddish Clayey Gravel with Sand		21.1
153			SS-2	10.0	11.5	Reddish Clayey Gravel with Sand		19.3
154			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		27.2
154			SS-4	20.0	21.5	Brown Clayey Gravel with Sand		16.1
154			SS-5	25.0	26.5	Brown Clayey Gravel with Sand		22.6
153	287	21+00 @ 58' Rt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		22.6
154			SS-2	10.0	11.5	Reddish Clayey Gravel with Sand		43.5
154			SS-3	15.0	16.5	Reddish Clayey Gravel with Sand		18.0
154			SS-4	20.0	21.3	Gray & Brown Clayey Gravel with Sand		10.4
63	288	25+00 @ 27' Lt.	MC-1	0.3	12.0	Tan Clayey Gravel with Sand		8.1
		Grimsley/West Miller Road						
62	289	15+00 @ 27' Lt.	MC-1	0.6	7.0	Red & Brown Lean Clay with Sand		18.3
62	290	22+00 @ CL	MC-1	0.3	7.0	Reddish Brown Lean Clay with Sand		21.2
		Mainline Alignment Change						
155	291	623+14 @ 154' Lt.	SS-1	5.0	6.5	Brown Clayey Gravel with Sand		37.0
156			SS-2	10.0	11.5	Brown Silty Gravel with Sand		26.1
156			SS-3	15.0	16.5	Brown Silty Gravel with Sand		30.8
156			SS-4	20.0	21.5	Brown Silty Gravel with Sand		29.0
156			SS-5	25.0	26.5	Brown Silty Gravel with Sand		NA
61	292	Y630+00 @ CL	MC-1	0.6	5.0	Brown Lean Clay		21.3
70	293	Y636+00 @ CL	MC-1	0.6	15.0	Brown Sandy Fat Clay		36.3
63	294	Y640+00 @ CL	MC-1	0.6	5.8	Brown Clayey Gravel with Sand		16.4
61	295	Y643+00 @ CL	MC-1	0.6	17.0	Brown Lean Clay		17.6
69	296	Y647+00 @ CL	MC-1	0.6	6.6	Brown Clayey Sand		19.4
69	297	Y651+00 @ CL	MC-1	0.6	6.5	Brown Clayey Sand		11.2
69	298	Y655+00 @ CL	MC-1	0.6	10.6	Brown Clayey Sand		16.0
68	299	Y659+00 @ CL	MC-1	0.6	9.2	Reddish Sandy Lean Clay		23.1
68	300	Y663+00 @ CL	MC-1	0.6	18.0	Reddish Sandy Lean Clay		13.5
61	301	Y666+00 @ CL	MC-1	0.6	5.0	Copper Lean Clay		15.3
156	302	Y666+00 @ 118' Lt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		27.8
71	303	Y624+00 @ CL	MC-1	0.6	5.5	Brown Sandy Fat Clay		16.1
		Highway 112						
72	304	18+00 @ CL	MC-1	0.6	5.0	Red & Brown Gravelly Lean Clay with Sand		33.7
159	305	19+00 @ 90' Rt.	SS-1	5.0	5.5	Gray & Tan Poorly Graded Gravel with Sand		8.1

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157	306	21+00 @ CL	MC-1	0.6	5.0	Reddish Brown & White Sandy Silt with Gravel		18.3
157	307	21+00 @ 82' Rt.	SS-1	5.0	6.5	Reddish Tan & White Sandy Silt with Gravel		18.2
158			SS-2	10.0	11.5	Light Tan Silty Gravel with Sand		10.2
158			SS-3	15.0	16.5	Reddish Tan & White Silty Gravel with Sand		18.7
158			SS-4	20.0	20.4	Reddish Brown & White Silty Gravel with Sand		10.5
158			SS-5	25.0	26.5	Beige & White Silty Gravel with Sand		31.2
79	308	24+00 @ CL	MC-1	0.6	5.0	Reddish Brown Lean Clay with Sand		30.0
		Highway 112, Ramp 1						
80	309	484+00 @ 38' Lt.	MC-1	0.6	20.0	Reddish Brown Sandy Lean Clay		27.2
80	310	487+00 @ 44' Rt.	MC-1	0.6	40.0	Reddish Brown Sandy Lean Clay		30.0
160	311	487+00 @ 168' Rt.	SS-1	5.0	6.5	Gray & Reddish Brown Clayey Gravel with Sand		12.0
160			SS-2	10.0	11.5	Reddish Brown Clayey Gravel with Sand		29.2
160			SS-3	15.0	16.5	Reddish Brown Clayey Gravel with Sand		14.3
162			SS-4	20.0	21.5	Reddish Brown Silty Sand with Gravel		37.0
163			SS-5	25.0	26.5	Beige & Reddish Brown Silty Gravel with Sand		26.7
164			SS-6	30.0	31.5	Reddish Brown Silty Gravel with Sand		23.9
164			SS-7	35.0	36.5	Gray & Reddish Brown Silty Gravel with Sand		31.5
165			SS-8	40.0	41.5	Dark Brown Clayey Sand		77.3
165			SS-9	45.0	46.5	Dark Brown & Beige Clayey Sand		68.5
77	312	490+00 @ 46' Rt.	MC-1	0.6	35.0	Reddish Brown Sandy Lean Clay with Gravel		18.9
77	313	493+00 @ 75' Rt.	MC-1	0.6	20.0	Reddish Brown Sandy Lean Clay with Gravel		30.0
160	314	495+00 @ 105' Lt.	SS-1	5.0	6.5	Reddish Brown & Tan Clayey Gravel with Sand		31.2
161			SS-2	10.0	11.4	Brown Silty Gravel with Sand		20.3
163			SS-3	15.0	16.5	Red & White Silty Gravel with Sand		22.0
163			SS-4	20.0	21.5	Tan Silty Gravel with Sand		40.8
163			SS-5	25.0	26.5	Reddish Tan & White Silty Gravel with Sand		41.0
164			SS-6	30.0	31.5	Reddish Brown Silty Gravel with Sand		41.1
164			SS-7	35.0	36.5	Reddish Brown & Tan Silty Gravel with Sand		32.0
164			SS-8	40.0	41.2	Gray & Beige Silty Gravel with Sand		16.7
78	315	496+00 @ CL	MC-1	0.6	15.0	Red Sandy Fat Clay		31.6
		Highway 112, Ramp 2						
73	316	502+00 @ CL	MC-1	0.6	5.0	Red & White Clayey Sand with Gravel		27.5
166	317	508+00 @ CL	MC-1	1.0	15.0	Tan Silty Sand with Gravel		22.7
166	318	508+00 @ 100' Rt.	SS-1	5.0	6.5	Tan & White Silty Sand with Gravel		21.6
166			SS-2	10.0	11.5	Tan & Brown Silty Sand with Gravel		32.2
167			SS-3	15.0	16.5	Tan Clayey Gravel with Sand		30.5
167			SS-4	20.0	21.5	Tan & White Clayey Gravel with Sand		36.6
167			SS-5	25.0	26.5	White & Tan Clayey Gravel with Sand		39.6
167			SS-6	30.0	31.5	Tan Clayey Gravel with Sand		36.7
168			SS-7	35.0	36.5	Tan & Red Silty Gravel with Sand		42.5
74	319	513+00 @ 40' Rt.	MC-1	0.6	5.0	Dark Reddish Brown Clayey Sand with Gravel		12.5
		Highway 112, Ramp 3						
75	320	498+00 @ 38' Rt.	MC-1	1.0	8.8	Red Sandy Fat Clay		30.7
75	321	501+00 @ 42' Rt.	MC-1	1.0	10.3	Red Sandy Fat Clay		28.3
169	322	501+00 @ 95' Rt.	SS-1	5.0	6.5	Red & White Silty Gravel with Sand		31.7
73	323	504+00 @ 38' Rt.	MC-1	0.6	8.4	Red Clayey Sand with Gravel		34.2

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76	324	509+00 @ CL	MC-1	0.6	15.0	Reddish Brown & White Clayey Gravel with Sand		15.8
169	325	509+00 @ 118' Rt.	SS-1	5.0	6.5	Reddish Tan & White Silty Gravel with Sand		25.0
169			SS-2	10.0	11.5	Reddish Brown & White Silty Gravel with Sand		28.4
170			SS-3	15.0	16.5	Tan, Beige & Brown Silty Gravel with Sand		32.1
170			SS-4	20.0	21.5	Tan Silty Gravel with Sand		40.8
		Highway 112, Ramp 4						
84	326	485+00 @ 40' Lt.	MC-1	0.6	30.0	Red Clayey Sand with Gravel		24.5
171	327	485+00 @ 115' Lt.	SS-1	5.0	6.0	Reddish Tan & White Silty Gravel with Sand		27.9
171			SS-2	10.0	11.5	Reddish Brown & Light Reddish Tan Silty Gravel with Sand		33.0
171			SS-3	15.0	16.5	Reddish Tan Silty Gravel with Sand		28.8
173			SS-4	20.0	21.5	Reddish Brown Silty Sand with Gravel		33.7
173			SS-5	25.0	26.5	Reddish Tan & White Silty Sand with Gravel		27.4
174			SS-6	30.0	31.5	Reddish Tan & White Clayey Gravel with Sand		17.7
174			SS-7	35.0	36.5	Reddish Brown & White Clayey Gravel with Sand		30.3
85	328	488+00 @ 40' Lt.	MC-1	0.6	21.5	Red Sandy Lean Clay		27.0
171	329	488+00 @ 115' Lt.	SS-1	5.0	6.5	Tan & Reddish Tan Silty Gravel with Sand		42.6
171			SS-2	10.0	11.5	Reddish Brown & White Silty Gravel with Sand		20.8
172			SS-3	15.0	16.5	Reddish Brown & White Clayey Gravel with Sand		26.6
174			SS-4	20.0	20.3	Reddish Brown, Brown & White Clayey Gravel with Sand		24.0
85	330	494+00 @ CL	MC-1	0.6	5.0	Reddish Brown Sandy Lean Clay		27.0
85	331	497+00 @ CL	MC-1	0.6	15.0	Brown Sandy Lean Clay		21.5
171	332	497+00 @ 122' Lt.	SS-1	5.0	6.5	Brown & White Silty Gravel with Sand		15.2
172			SS-2	10.0	11.5	Gray & Brown Clayey Gravel with Sand		16.4
172			SS-3	15.0	16.5	Gray, Reddish Brown & Tan Clayey Gravel with Sand		13.8
172			SS-4	20.0	20.3	Gray & Brown Clayey Gravel with Sand		11.1
173			SS-5	25.0	26.5	Brown Silty Sand with Gravel		19.6
175			SS-6	30.0	31.5	Brown & Gray Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		23.8
175			SS-7	35.0	36.5	Beige & Gray Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		19.4
		Ramp EN						
81	333	694+00 @ CL	MC-1	0.6	11.6	Brown Sandy Lean Clay with Gravel		20.0
183	334	694+00 @ 115' Rt.	SS-1	5.0	6.5	Reddish Brown Clayey Sand with Gravel		38.3
184			SS-2	10.0	10.3	Gray & Brown Silty Gravel with Sand		8.1
81	335	700+00 @ CL	MC-1	1.0	10.0	Brown Sandy Lean Clay with Gravel		18.3
183	336	700+00 @ 150' Rt.	SS-1	5.0	6.5	Brown Clayey Sand with Gravel		19.3
183			SS-2	10.0	11.5	Brown & Beige Clayey Sand with Gravel		22.2
185			SS-3	15.0	16.5	Brown Clayey Gravel with Sand		19.1
83	337	704+00 @ 38' Rt.	MC-1	0.6	20.0	Reddish Brown Sandy Fat Clay		19.7
183	338	704+00 @ 95' Rt.	SS-1	5.0	6.5	Red Clayey Sand with Gravel		35.2
183			SS-2	10.0	11.5	Red Clayey Sand with Gravel		34.9
183			SS-3	15.0	16.5	Reddish Tan Clayey Sand with Gravel		32.0
184			SS-4	20.0	20.3	Reddish Tan & Gray Silty Gravel with Sand		16.9
185			SS-5	25.0	26.5	Reddish Brown & Gray Clayey Gravel with Sand		34.8
83	339	709+00 @ CL	MC-1	0.6	7.3	Brown Sandy Fat Clay		21.4
18	340	709+00 @ 122' Lt.	SS-1	5.0	5.8	Dark Brown & Beige Sandy Lean Clay		22.7
83	341	715+00 @ CL	MC-1	0.6	5.0	Reddish Brown & White Sandy Fat Clay		27.1
184	342	719+00 @ 85' Rt.	SS-1	5.0	5.8	Reddish Tan & Gray Silty Gravel with Sand		18.5
184			SS-2	10.0	10.7	Brown & White Silty Gravel with Sand		14.6

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
184			SS-3	15.0	16.5	Brown Silty Gravel with Sand		47.9
184			SS-4	20.0	21.5	Brown & White Silty Gravel with Sand		63.4
81	343	727+00 @ CL	MC-1	0.6	15.0	Red Sandy Lean Clay with Gravel		14.7
183	344	729+00 @ 110' Lt.	SS-1	5.0	6..5	Reddish Brown & Gray Clayey Sand with Gravel		35.8
184			SS-2	10.0	11.5	Reddish Brown & Gray Silty Gravel with Sand		22.2
184			SS-3	15.0	16.5	Reddish Brown & Gray Silty Gravel with Sand		27.2
81	347	739+00 @ 145' Lt	MC-1	0.5	4.1	Brown Sandy Lean Clay with Gravel		14.9
83	348	745+00 @ 50' Rt.	MC-1	0.6	12.0	Dark Brown Sandy Fat Clay		20.1
83	349	749+00 @ 48' Rt.	MC-1	0.6	15.0	Dark Brown Sandy Fat Clay		18.4
		Ramp ES						
82	350	704+00 @ 48' Rt.	MC-1	0.6	28.0	Red Sandy Fat Clay		35.9
176	351	704+00 @ 115' Rt.	SS-1	5.0	6.5	Reddish Brown & Beige Elastic Silt with Sand		41.8
177			SS-2	10.0	11.5	Tan & White Silty Gravel with Sand		20.1
178			SS-3	15.0	16.5	Dark Reddish Tan Clayey Gravel		29.3
178			SS-4	20.0	21.5	Red Clayey Gravel		30.4
178			SS-5	25.0	26.5	Dark Reddish Brown Clayey Gravel		31.1
82	352	708+00 @ 48' Rt.	MC-1	0.6	30.0	Red & Brown Sandy Fat Clay		35.6
92	353	711+00 @ 38' Rt.	MC-1	0.6	20.0	Red Sandy Silt		37.6
92	354	715+00 @ 42' Rt	MC-1	0.6	25.0	Red Sandy Silt		34.8
		Ramp NW						
180	355	704+00 @ CL	MC-1	0.6	6.6	Brown Silty Gravel with Sand		23.7
180	356	704+00 @ 155' Lt.	SS-1	5.0	6.5	Reddish Brown & Beige Silty Gravel with Sand		28.5
91	357	710+00 @ CL	MC-1	0.6	10.3	Dark Reddish Tan Sandy Silt		39.4
95	358	716+00 @ CL	MC-1	0.6	15.0	Red Sandy Lean Clay		23.3
93	359	722+00 @ CL	MC-1	0.6	15.0	Reddish Brown Sandy Lean Clay		20.3
180	360	723+00 @ 260' Rt	SS-1	5.0	6.5	Brown & Beige Silty Gravel with Sand		23.2
180			SS-2	10.0	10.3	Brown & Gray Silty Gravel with Sand		9.5
101	361	728+00 @ CL	MC-1	0.6	15.0	Red Silty Sand with Gravel		19.4
179	362	728+00 @ 168' Rt.	SS-1	5.0	6.5	Red, Beige & White Silty Sand with Gravel		25.5
179			SS-2	10.0	11.5	Reddish Brown, Tan & White Silty Sand with Gravel		40.0
179			SS-3	15.0	16.5	Reddish Brown, Tan & White Silty Sand with Gravel		46.4
180			SS-4	20.0	21.5	Reddish Brown, Tan & Beige Silty Gravel with Sand		31.4
180			SS-5	25.0	25.2	Reddish Brown & Tan Silty Gravel with Sand		20.0
101	363	734+00 @ CL	MC-1	0.6	15.0	Dark Reddish Brown Silty Sand with Gravel		20.9
102	364	740+00 @ CL	MC-1	0.6	15.0	Brown Clayey Sand with Gravel		22.7
102	365	744+00 @ CL	MC-1	0.6	5.0	Reddish Brown Clayey Sand with Gravel		27.9
		Ramp SW						
90	366	713+00 @ CL	MC-1	0.6	6.7	Tan Clayey Sand with Gravel		9.5
100	367	720+00 @ CL	MC-1	0.6	15.0	Reddish Brown Lean Clay with Sand		15.9
181	368	723+00 @ 240' Lt.	SS-1	5.0	6.5	Light Brown & Beige Silty Gravel with Sand		7.9
182			SS-2	10.0	11.5	Tan Silty Sand with Gravel		30.7

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
182			SS-3	15.0	16.5	Tan & Brown Silty Sand with Gravel		30.9
182			SS-4	20.0	21.3	White & Brown Silty Sand with Gravel		25.9
86	369	725+00 @ CL	MC-1	0.6	8.4	Brown Clayey Sand with Gravel		13.0
181	370	728+00 @ 192' Lt.	SS-1	5.0	5.8	Gray & Tan Silty Gravel with Sand		7.4
182			SS-2	10.0	10.9	Red & Tan Silty Sand with Gravel		42.0
182			SS-3	15.0	16.5	Reddish Brown & Tan Silty Sand with Gravel		53.4
		South Zion Road						
87	371	11+00 @ 26' Rt.	MC-1	0.5	2.2	Red Sandy Lean Clay		17.9
87	372	18+00 @ CL	MC-1	0.6	15.0	Brown Sandy Lean Clay		22.6
186	373	19+00 @ 124' Rt.	SS-1	5.0	6.5	Reddish Tan & Beige Clayey Gravel with Sand		16.1
186			SS-2	10.0	11.5	Red Clayey Gravel with Sand		36.3
186			SS-3	15.0	16.5	Red & White Clayey Gravel with Sand		25.6
187			SS-4	20.0	21.5	Red & White Silty Gravel with Sand		21.0
187			SS-5	25.0	26.5	Brown & Tan Silty Gravel with Sand		38.2
187			SS-6	30.0	31.5	Brown, Beige & Tan Silty Gravel with Sand		15.6
188			SS-7	35.0	36.5	Brown Silty Gravel with Sand		38.7
188			SS-8	40.0	40.3	Brown Silty Gravel with Sand		33.4
87	374	23+00 @ CL	MC-1	0.6	15.0	Red Sandy Lean Clay		31.8
186	375	23+00 @ 118' Rt.	SS-1	5.0	6.5	Tan & White Clayey Gravel with Sand		13.5
186			SS-2	10.0	11.5	Tan & White Clayey Gravel with Sand		32.3
186			SS-3	15.0	16.5	Brown & Copper Clayey Gravel with Sand		19.7
187			SS-4	20.0	21.4	Tan Silty Gravel with Sand		29.7
187			SS-5	25.0	26.5	Brown & White Silty Gravel with Sand		28.3
187			SS-6	30.0	31.5	Beige & White Silty Gravel with Sand		20.5
188			SS-7	35.0	36.5	Brown & Beige Silty Gravel with Sand		46.1
188			SS-8	40.0	40.1	Brown Silty Gravel with Sand		39.0
		Second Mainline Alignment Change						
190	376	560+00 @ CL	MC-1	0.5	2.8	Brown Silty Gravel with Sand		26.5
189	377	563+00 @ 226' Rt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		12.4
191			SS-2	10.0	11.5	Red Silty Gravel with Sand		7.9
191			SS-3	15.0	16.5	Red Silty Gravel with Sand		29.8
193			SS-4	20.0	21.5	Red Silty Gravel with Sand		24.9
193			SS-5	25.0	26.5	Red Silty Gravel with Sand		19.6
194			SS-6	30.0	31.5	Red Silty Gravel with Sand		61.7
192	378	564+00 @ CL	MC-1	0.6	50.0	Red Silty Gravel with Sand		34.9
192	379	568+00 @ CL	MC-1	0.6	42.3	Red Silty Gravel with Sand		30.2
190	380	570+00 @ 212' Lt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		37.2
190			SS-2	10.0	11.5	Red Silty Gravel with Sand		23.0
192			SS-3	15.0	16.5	Red Silty Gravel with Sand		26.0
192			SS-4	20.0	21.5	Red Silty Gravel with Sand		28.5
193			SS-5	25.0	26.5	Red Silty Gravel with Sand		24.7
193			SS-6	30.0	31.5	Red Silty Gravel with Sand		20.0
193			SS-7	35.0	36.5	Red Silty Gravel with Sand		12.2
194			SS-8	40.0	41.5	Red Silty Gravel with Sand		23.7
194			SS-9	45.0	46.5	Red Silty Gravel with Sand		21.6
194			SS-10	50.0	51.5	Red Silty Gravel with Sand		26.9
192	381	572+00 @ CL	MC-1	0.6	15.0	Red Silty Gravel with Sand		32.4
192	382	578+00 @ CL	MC-1	0.6	15.0	Light Brown & Red Silty Gravel with Sand		33.1
190	383	581+00 @ 243' Rt.	SS-1	5.0	6.5	Brown Silty Gravel with Sand		23.3

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

Moisture Data

Project Name : Springdale By-Pass
Location : Washington / Benton County, Arkansas
Job Number : 06127

Soil No.	Boring No.	Station & Offset	Sample No.	Depth		Description of Soil	pH	Natural Moisture Content (%)
190	384	584+00 @ CL	MC-1	0.6	8.8	Dark Brown Silty Gravel with Sand		25.3
189	385	588+00 @ 228' Lt.	SS-1	5.0	6.5	Red Clayey Gravel with Sand		13.7
192	386	590+00 @ CL	MC-1	0.6	12.1	Light Brown & Red Silty Gravel with Sand		32.2
190	387	596+00 @ CL	MC-1	0.3	10.6	Red Silty Gravel with Sand		24.3
192	388	597+00 @ 166' Lt.	SS-1	5.0	6.5	Red Silty Gravel with Sand		38.5
190	389	600+00 @ CL	MC-1	0.6	3.3	Light Brown & Red Silty Gravel with Sand		16.7
190	390	604+00 @ CL	MC-1	0.6	5.7	Red Silty Gravel with Sand		26.4
189	391	607+00 @ 174' Rt.	SS-1	5.0	6.5	Red & Brown Clayey Gravel with Sand		19.2
189	392	608+00 @ CL	MC-1	0.5	2.4	Red Clayey Gravel with Sand		23.0
192	393	613+00 @ CL	MC-1	0.5	6.9	Red Silty Gravel with Sand		30.0
189	394	617+00 @ CL	MC-1	0.6	6.9	Red Clayey Gravel with Sand		18.7

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 1
Project County	: Washington / Benton	Sample Loc.	: Boring No. 1
Project State	: Arkansas	Sample Depth	: 0.3' to 5.0'
Laboratory No.	: 06127	Date Tested	: 04-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.7
No.4		4.75	mm	91.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	72.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	61.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0219mm

California Bearing Ratio	: NA
Maximum Dry Density	: NA
Optimum Moisture	: NA

Natural Moisture (%)	: 27.4
Liquid Limit	: 49
Plastic Limit	: 22
Plasticity Index	: 27
Liquidity Index	: 0.20
Activity	: NA
Specific Gravity	: NA
AASHTO Classification	: A-7-6 (14)
ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 17.1
Coarse Sand (-No.10 + No.40)	: 10.3
Fine Sand (-No.40 + No.200)	: 11.2
Silt + Clay (-No.200)	: 61.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 8.6
Coarse Sand (-No.4 + No.10)	: 8.5
Medium Sand (-No.10 + No.40)	: 10.3
Fine Sand (-No.40 + No.200)	: 11.2
Silt + Clay (-No.200)	: 61.4

Approved By : DLC

Soil No. 1

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 2
Project County	: Washington / Benton	Sample Loc.	: Boring No. 4
Project State	: Arkansas	Sample Depth	: 0.3' to 5.5'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan & Beige Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.6
No.4		4.75	mm	89.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	72.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	64.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0175mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.8
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: 0.31
Gravel (3in. + No.10)	: 18.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.5	AASHTO Classification	: A-6 (10)
Silt + Clay (-No.200)	: 64.1	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 10.6
Coarse Sand (-No.4 + No.10)	: 7.8
Medium Sand (-No.10 + No.40)	: 9.0
Fine Sand (-No.40 + No.200)	: 8.5
Silt + Clay (-No.200)	: 64.1

Approved By : DLC

Soil No. 2

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 3
Project County	: Washington / Benton	Sample Loc.	: Boring No. 6
Project State	: Arkansas	Sample Depth	: 0.4' to 6.6'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	99.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.7
No.4		4.75	mm	94.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	86.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	68.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0130mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 23.3
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.24
Gravel (3in. + No.10)	: 13.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.9	AASHTO Classification	: A-6 (10)
Silt + Clay (-No.200)	: 68.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.9
Fine Gravel (-3/4in. + No.4)	: 5.1
Coarse Sand (-No.4 + No.10)	: 7.1
Medium Sand (-No.10 + No.40)	: 10.0
Fine Sand (-No.40 + No.200)	: 8.9
Silt + Clay (-No.200)	: 68.0

Approved By : hjc

Soil No. 3

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 4
Project County	: Washington / Benton	Sample Loc.	: Boring No. 9
Project State	: Arkansas	Sample Depth	: 0.5' to 6.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.0
No.4		4.75	mm	66.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	58.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	49.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	43.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.4489mm

California Bearing Ratio	: 20.6	Natural Moisture (%)	: 7.6
Maximum Dry Density	: 117 pcf	Liquid Limit	: 30
Optimum Moisture	: 13 %	Plastic Limit	: 18
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: -0.87
Gravel (3in. + No.10)	: 41.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.1	AASHTO Classification	: A-6 (2)
Silt + Clay (-No.200)	: 43.6	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.8
Fine Gravel (-3/4in. + No.4)	: 28.4
Coarse Sand (-No.4 + No.10)	: 8.6
Medium Sand (-No.10 + No.40)	: 8.5
Fine Sand (-No.40 + No.200)	: 6.1
Silt + Clay (-No.200)	: 43.6

Approved By : DLC

Soil No. 4

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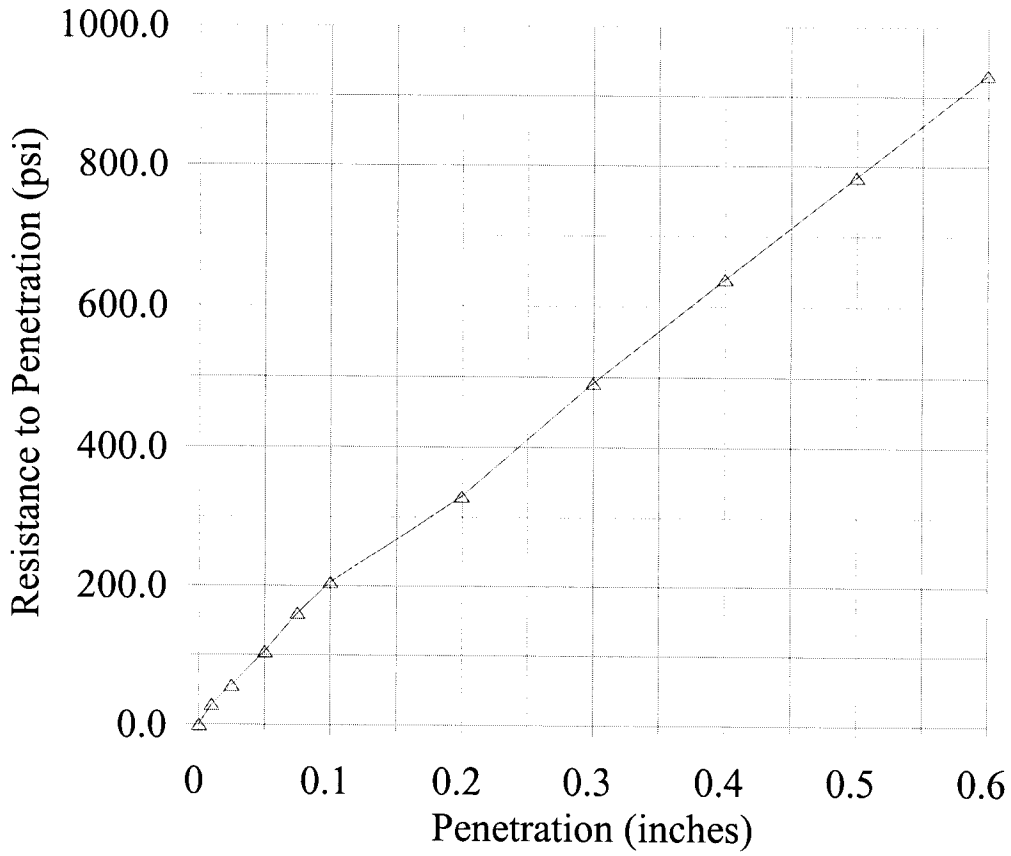
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 4
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 9
Project State	:	Arkansas	Sample Depth :	0.5' to 6.0'
Laboratory No.	:	06127	Date Tested :	04-12-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Brown Clayey Gravel with Sand		



Compaction Effort = 2000 psi
NA
Percent Swell = -0.08 %

C.B.R. @ 0.1 In. = 20.6*
C.B.R. @ 0.2 In. = 22.0
C.B.R. @ 0.3 In. = 25.9
C.B.R. @ 0.4 In. = 27.8
C.B.R. @ 0.5 In. = 30.2

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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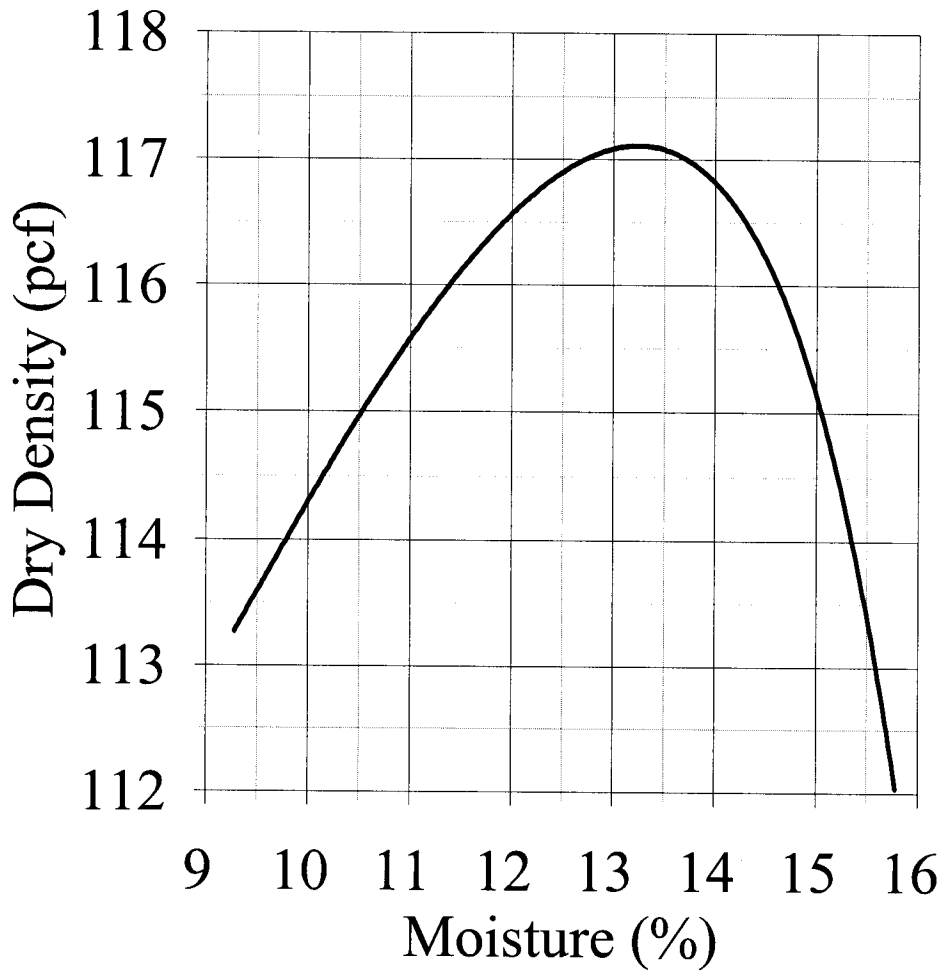
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 4
Project County	: Washington / Benton	Sample Loc. :	Boring No. 9
Project State	: Arkansas	Sample Depth :	0.5' to 6.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Clayey Gravel with Sand		



MAXIMUM DENSITY: 117 pcf

OPTIMUM MOISTURE: 13 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 5
Project County	: Washington / Benton	Sample Loc.	: Boring No. 11
Project State	: Arkansas	Sample Depth	: 0.2' to 7.2'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Gray & Tan Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	99.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	97.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	95.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0033mm

California Bearing Ratio	: 2.9	Natural Moisture (%)	: 19.9
Maximum Dry Density	: 104 pcf	Liquid Limit	: 32
Optimum Moisture	: 20 %	Plastic Limit	: 18
		Plasticity Index	: 14
AASHTO Composition of Total Sample		Liquidity Index	: 0.14
Gravel (3in. + No.10)	: 1.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 2.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 2.0	AASHTO Classification	: A-6 (13)
Silt + Clay (-No.200)	: 95.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.2
Coarse Sand (-No.4 + No.10)	: 0.8
Medium Sand (-No.10 + No.40)	: 2.0
Fine Sand (-No.40 + No.200)	: 2.0
Silt + Clay (-No.200)	: 95.0

Approved By : DLC

Soil No. 5

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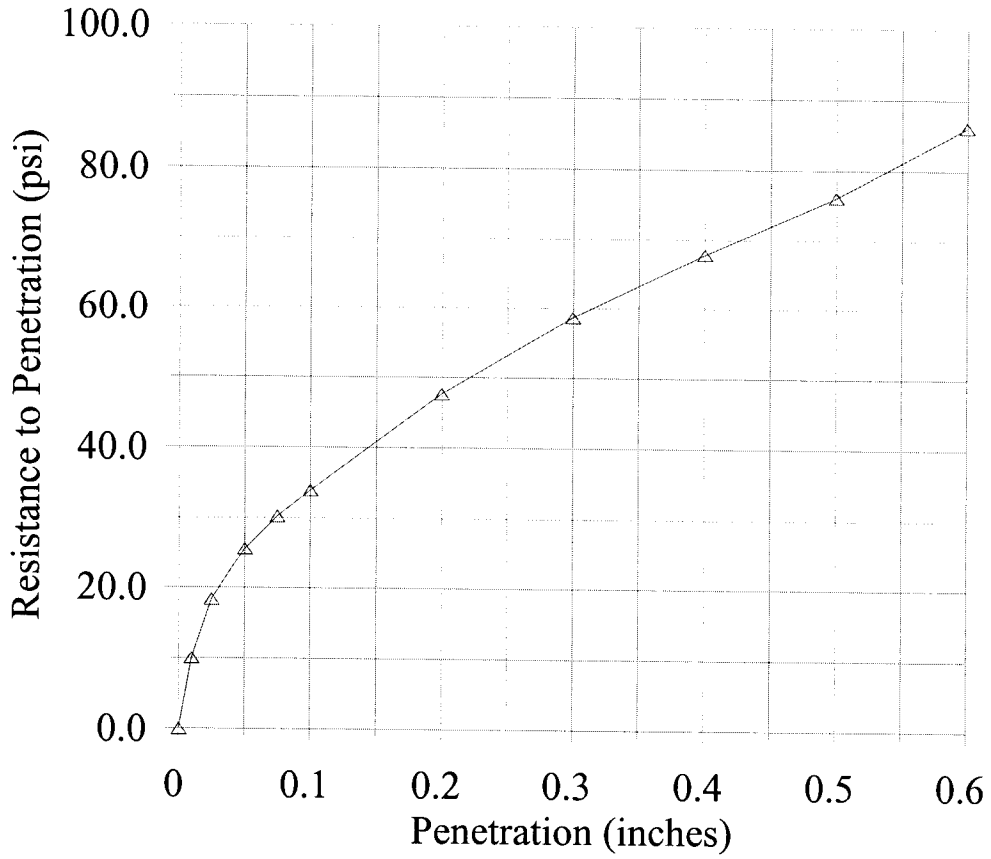
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 5
Project County	: Washington / Benton	Sample Loc. :	Boring No. 11
Project State	: Arkansas	Sample Depth :	0.2' to 7.2'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Gray & Tan Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 97.9 %
Percent Swell = 1.46 %

C.B.R. @ 0.1 In. = 3.4
C.B.R. @ 0.2 In. = 3.2
C.B.R. @ 0.3 In. = 3.1
C.B.R. @ 0.4 In. = 3.0
C.B.R. @ 0.5 In. = 2.9*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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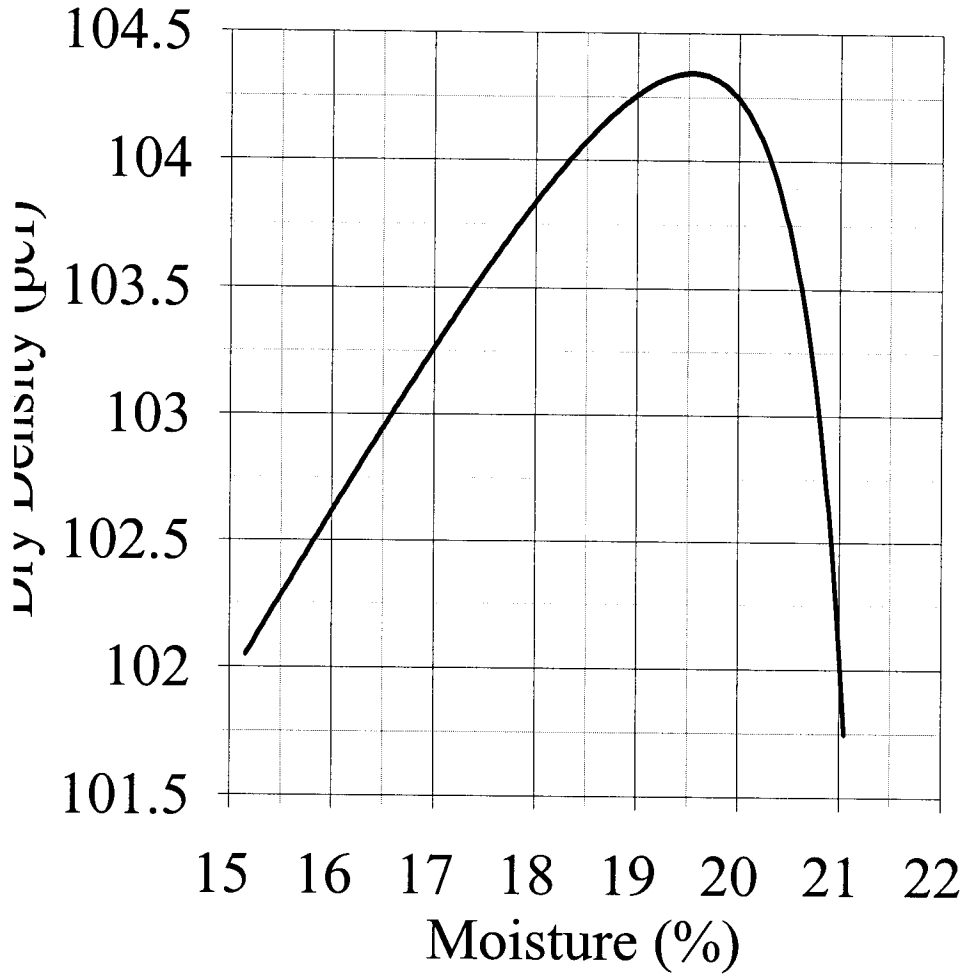
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 5
Project County	: Washington / Benton	Sample Loc. :	Boring No. 11
Project State	: Arkansas	Sample Depth :	0.2' to 7.2'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Gray & Tan Lean Clay		



MAXIMUM DENSITY: 104 pcf

OPTIMUM MOISTURE: 20 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 6
Project County	: Washington / Benton	Sample Loc.	: Boring No. 13
Project State	: Arkansas	Sample Depth	: 0.3' to 3.7'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Gravelly Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	100.0
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	87.2
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.9
3/4	in.	19	mm	84.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.7
No.4		4.75	mm	75.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	69.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	60.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	53.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0504mm

California Bearing Ratio	: 9.2	Natural Moisture (%)	: 21.0
Maximum Dry Density	: 106 pcf	Liquid Limit	: 35
Optimum Moisture	: 18 %	Plastic Limit	: 19
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.13
Gravel (3in. + No.10)	: 30.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.8	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 53.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 15.1
Fine Gravel (-3/4in. + No.4)	: 9.3
Coarse Sand (-No.4 + No.10)	: 6.4
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 6.8
Silt + Clay (-No.200)	: 53.2

Approved By : bcc

Soil No. 6

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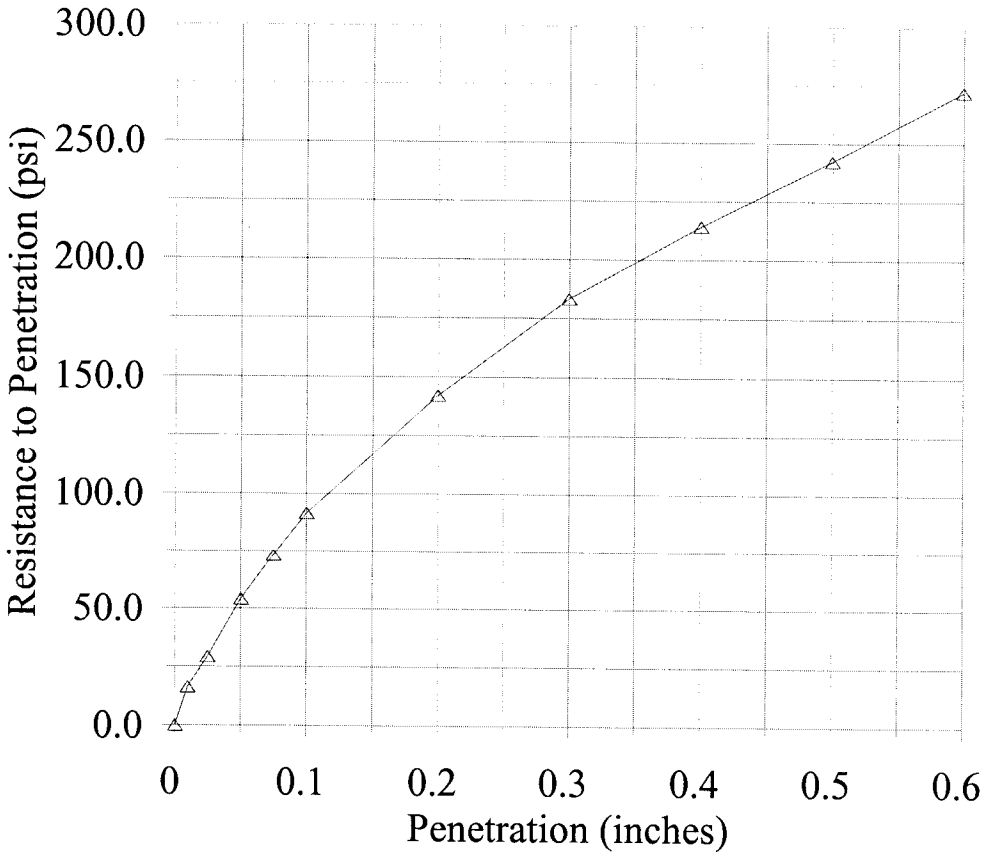
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 6
Project County	: Washington / Benton	Sample Loc.	: Boring No. 13
Project State	: Arkansas	Sample Depth	: 0.3' to 3.7'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Gravelly Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 100.3 %
Percent Swell = 0.16 %

C.B.R. @ 0.1 In. = 9.2*
C.B.R. @ 0.2 In. = 9.5
C.B.R. @ 0.3 In. = 9.7
C.B.R. @ 0.4 In. = 9.3
C.B.R. @ 0.5 In. = 9.3

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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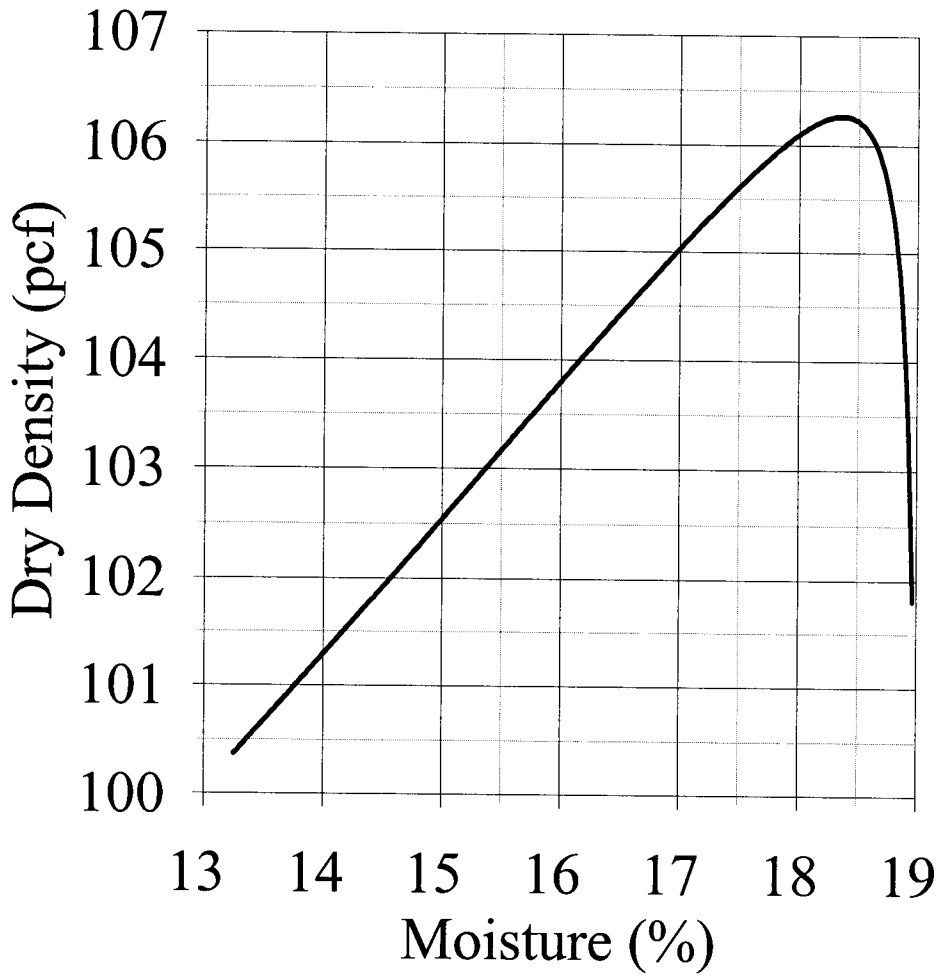
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 6
Project County	: Washington / Benton	Sample Loc. :	Boring No. 13
Project State	: Arkansas	Sample Depth :	0.3' to 3.7'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Tan Gravelly Lean Clay with Sand		



MAXIMUM DENSITY: 106 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: bcc

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 7
Project County	: Washington / Benton	Sample Loc.	: Boring No. 16
Project State	: Arkansas	Sample Depth	: 0.3' to 8.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan & Beige Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.2
No.4		4.75	mm	94.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	62.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0201mm

California Bearing Ratio	: 8.9
Maximum Dry Density	: 107 pcf
Optimum Moisture	: 19 %

Natural Moisture (%)	: 19.8
Liquid Limit	: 40
Plastic Limit	: 20
Plasticity Index	: 20
Liquidity Index	: -0.01
Activity	: NA
Specific Gravity	: NA
AASHTO Classification	: A-6 (10)
ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 14.2
Coarse Sand (-No.10 + No.40)	: 12.5
Fine Sand (-No.40 + No.200)	: 10.9
Silt + Clay (-No.200)	: 62.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.5
Coarse Sand (-No.4 + No.10)	: 8.7
Medium Sand (-No.10 + No.40)	: 12.5
Fine Sand (-No.40 + No.200)	: 10.9
Silt + Clay (-No.200)	: 62.4

Approved By : DC

Soil No. 7

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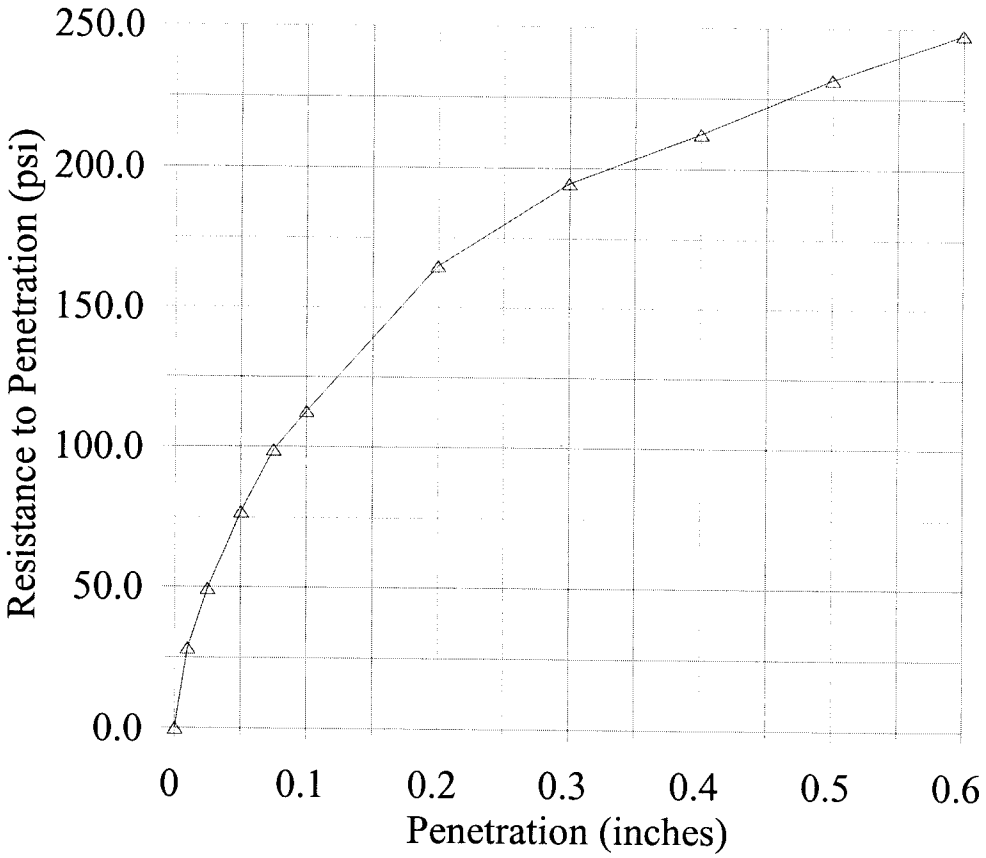
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 7
Project County	: Washington / Benton	Sample Loc. :	Boring No. 16
Project State	: Arkansas	Sample Depth :	0.3' to 8.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan & Beige Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.2 %
Percent Swell = 0.02 %

C.B.R. @ 0.1 In. = 11.3
C.B.R. @ 0.2 In. = 11.0
C.B.R. @ 0.3 In. = 10.2
C.B.R. @ 0.4 In. = 9.2
C.B.R. @ 0.5 In. = 8.9*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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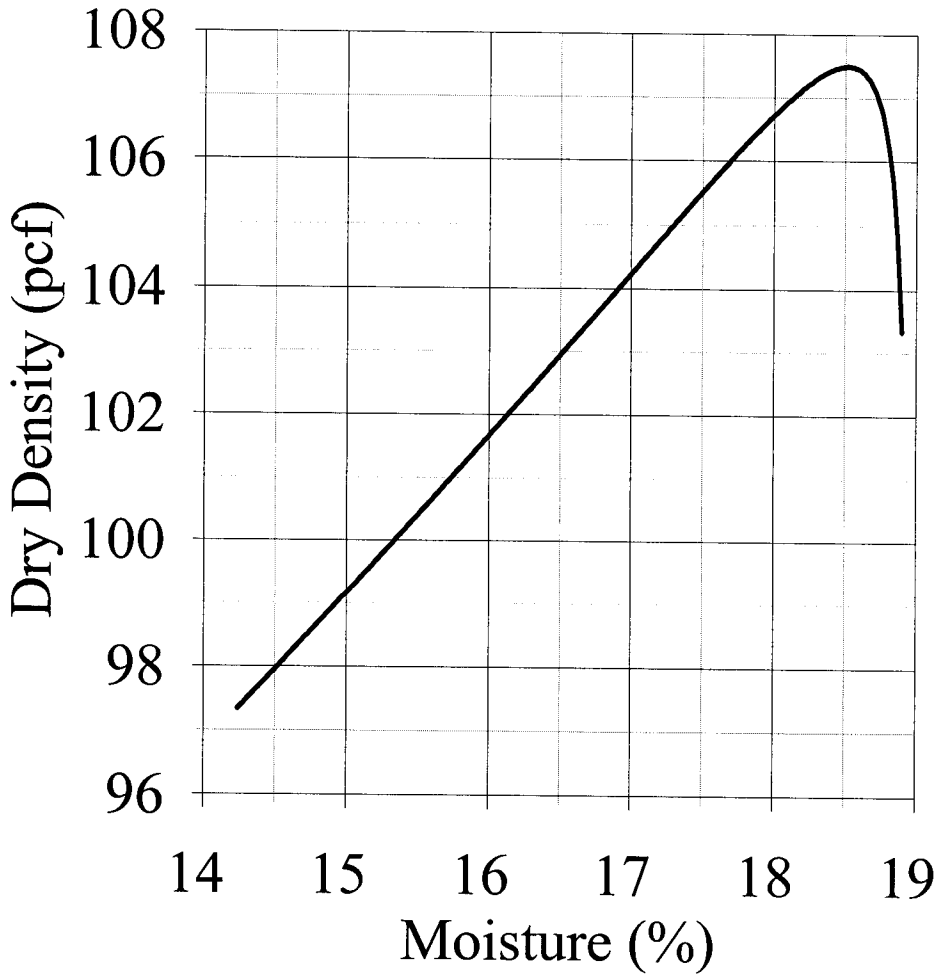
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 7
Project County	: Washington / Benton	Sample Loc. :	Boring No. 16
Project State	: Arkansas	Sample Depth :	0.3' to 8.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan & Beige Sandy Lean Clay		



MAXIMUM DENSITY: 107 pcf

OPTIMUM MOISTURE: 19 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 8
Project County	: Washington / Benton	Sample Loc.	: Boring No. 19
Project State	: Arkansas	Sample Depth	: 0.4' to 9.5'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.2
No.4		4.75	mm	78.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0712mm

California Bearing Ratio	: 8.0	Natural Moisture (%)	: 27.9
Maximum Dry Density	: 106 pcf	Liquid Limit	: 34
Optimum Moisture	: 19 %	Plastic Limit	: 18
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.62
Gravel (3in. + No.10)	: 29.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.2	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 50.4	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.9
Fine Gravel (-3/4in. + No.4)	: 19.5
Coarse Sand (-No.4 + No.10)	: 7.6
Medium Sand (-No.10 + No.40)	: 11.4
Fine Sand (-No.40 + No.200)	: 9.2
Silt + Clay (-No.200)	: 50.4

Approved By : DLC

Soil No. 8

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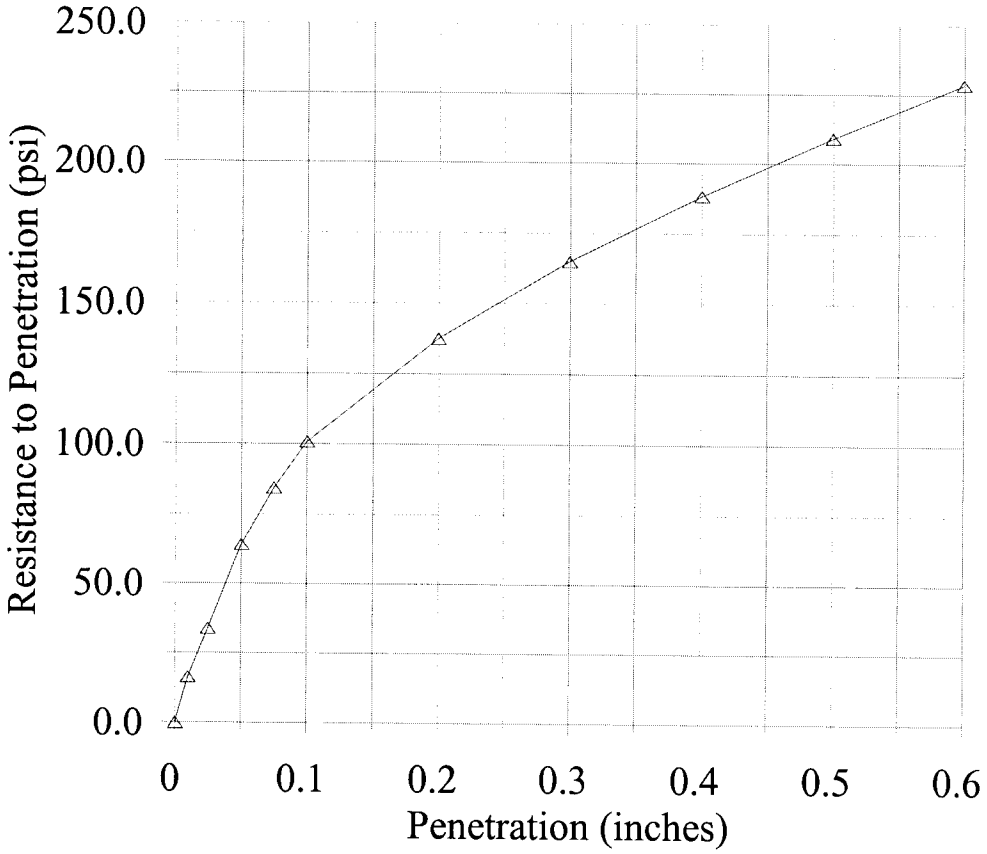
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 8
Project County	: Washington / Benton	Sample Loc.	: Boring No. 19
Project State	: Arkansas	Sample Depth	: 0.4' to 9.5'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Sandy Lean Clay with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.6 %
Percent Swell = 0.18 %

C.B.R. @ 0.1 In. = 10.1
C.B.R. @ 0.2 In. = 9.2
C.B.R. @ 0.3 In. = 8.7
C.B.R. @ 0.4 In. = 8.2
C.B.R. @ 0.5 In. = 8.0*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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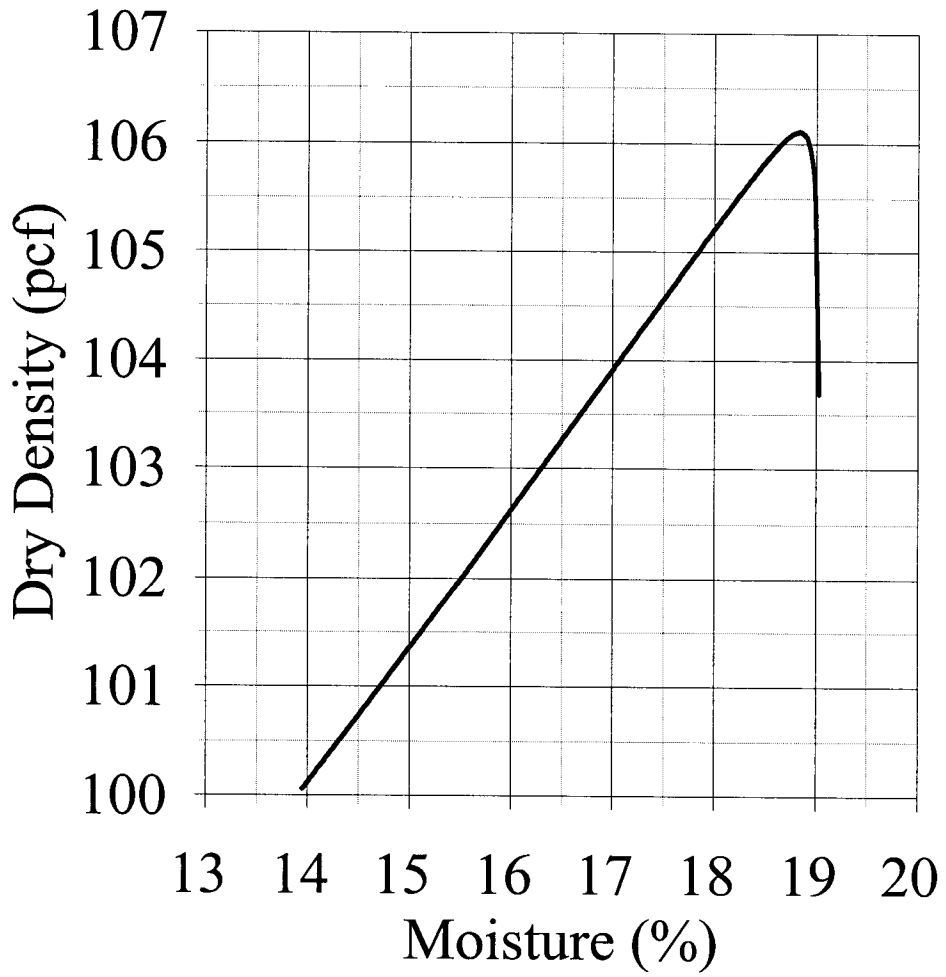
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 8
Project County	: Washington / Benton	Sample Loc. :	Boring No. 19
Project State	: Arkansas	Sample Depth :	0.4' to 9.5'
Laboratory No.	: 06127	Date Tested :	04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 106 pcf

OPTIMUM MOISTURE: 19 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: BLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 9
Project County	: Washington / Benton	Sample Loc.	: Boring No. 23
Project State	: Arkansas	Sample Depth	: 0.4' to 14.4'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Copper & Dark Beige Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.0
3/4	in.	19	mm	92.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.3
No.4		4.75	mm	84.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	76.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	66.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0340mm

California Bearing Ratio	: NA
Maximum Dry Density	: NA
Optimum Moisture	: NA

Natural Moisture (%)	: 35.2
Liquid Limit	: 39
Plastic Limit	: 18
Plasticity Index	: 21
Liquidity Index	: 0.82
Activity	: NA
Specific Gravity	: NA
AASHTO Classification	: A-6 (9)
ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 23.5
Coarse Sand (-No.10 + No.40)	: 10.2
Fine Sand (-No.40 + No.200)	: 9.5
Silt + Clay (-No.200)	: 56.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.0
Fine Gravel (-3/4in. + No.4)	: 7.6
Coarse Sand (-No.4 + No.10)	: 7.9
Medium Sand (-No.10 + No.40)	: 10.2
Fine Sand (-No.40 + No.200)	: 9.5
Silt + Clay (-No.200)	: 56.8

Approved By : DLC

Soil No. 9

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SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 11
Project County	: Washington / Benton	Sample Loc.	: Boring No. 30
Project State	: Arkansas	Sample Depth	: 0.5' to 12.0'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.3
3/4	in.	19	mm	94.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	84.9
No.4		4.75	mm	75.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.1818mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 15.9
Maximum Dry Density	: NA	Liquid Limit	: 31
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: -0.26
Gravel (3in. + No.10)	: 34.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.6	AASHTO Classification	: A-6 (2)
Silt + Clay (-No.200)	: 45.1	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.7
Fine Gravel (-3/4in. + No.4)	: 19.3
Coarse Sand (-No.4 + No.10)	: 9.3
Medium Sand (-No.10 + No.40)	: 11.0
Fine Sand (-No.40 + No.200)	: 9.6
Silt + Clay (-No.200)	: 45.1

Approved By : DLC

Soil No. 11

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SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 10
Project County	: Washington / Benton	Sample Loc.	: Boring No. 33
Project State	: Arkansas	Sample Depth	: 0.4' to 7.4'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Reddish Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.3
No.4		4.75	mm	71.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	58.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	46.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	38.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.6722mm

California Bearing Ratio	: 8.4	Natural Moisture (%)	: 20.2
Maximum Dry Density	: 111 pcf	Liquid Limit	: 31
Optimum Moisture	: 15 %	Plastic Limit	: 18
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.17
Gravel (3in. + No.10)	: 41.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.3	AASHTO Classification	: A-6 (1)
Silt + Clay (-No.200)	: 38.0	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.0
Fine Gravel (-3/4in. + No.4)	: 26.7
Coarse Sand (-No.4 + No.10)	: 12.5
Medium Sand (-No.10 + No.40)	: 12.5
Fine Sand (-No.40 + No.200)	: 8.3
Silt + Clay (-No.200)	: 38.0

Approved By : DLC

Soil No. 12

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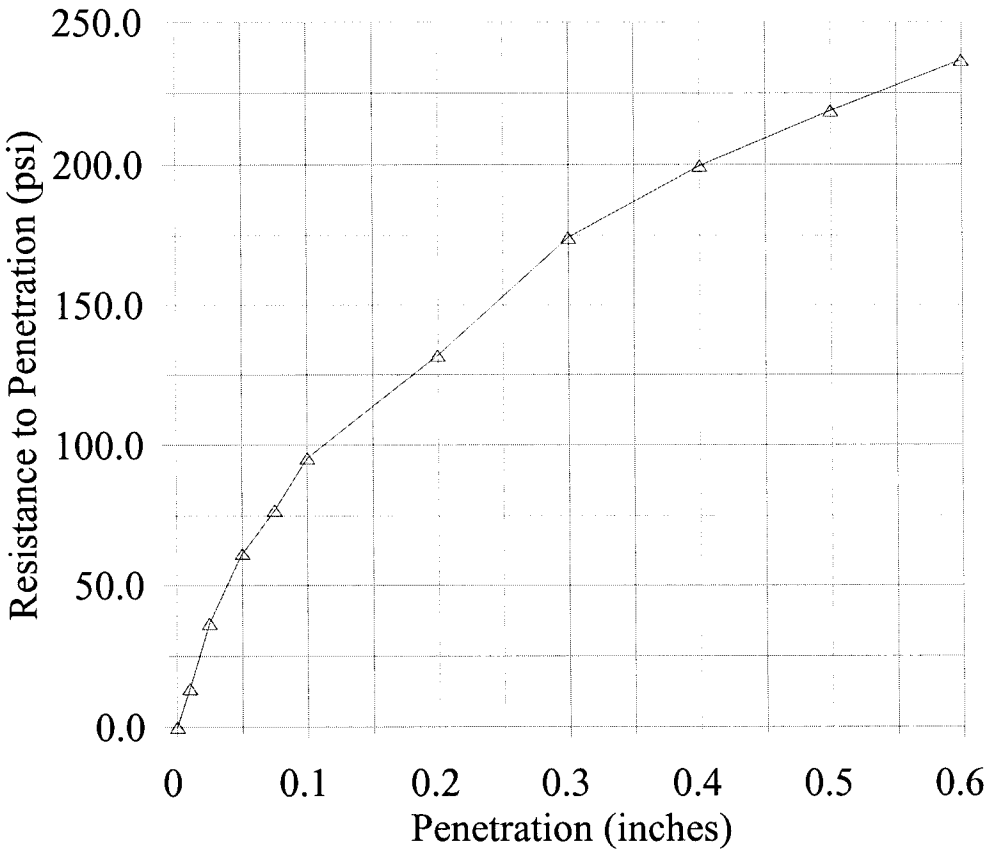
CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 10
Project County	: Washington / Benton	Sample Loc. :	Boring No. 33
Project State	: Arkansas	Sample Depth :	0.4' to 7.4'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Reddish Brown Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 97.7 %
Percent Swell = 0.16 %

C.B.R. @ 0.1 In. = 9.5
C.B.R. @ 0.2 In. = 8.8
C.B.R. @ 0.3 In. = 9.2
C.B.R. @ 0.4 In. = 8.7
C.B.R. @ 0.5 In. = 8.4*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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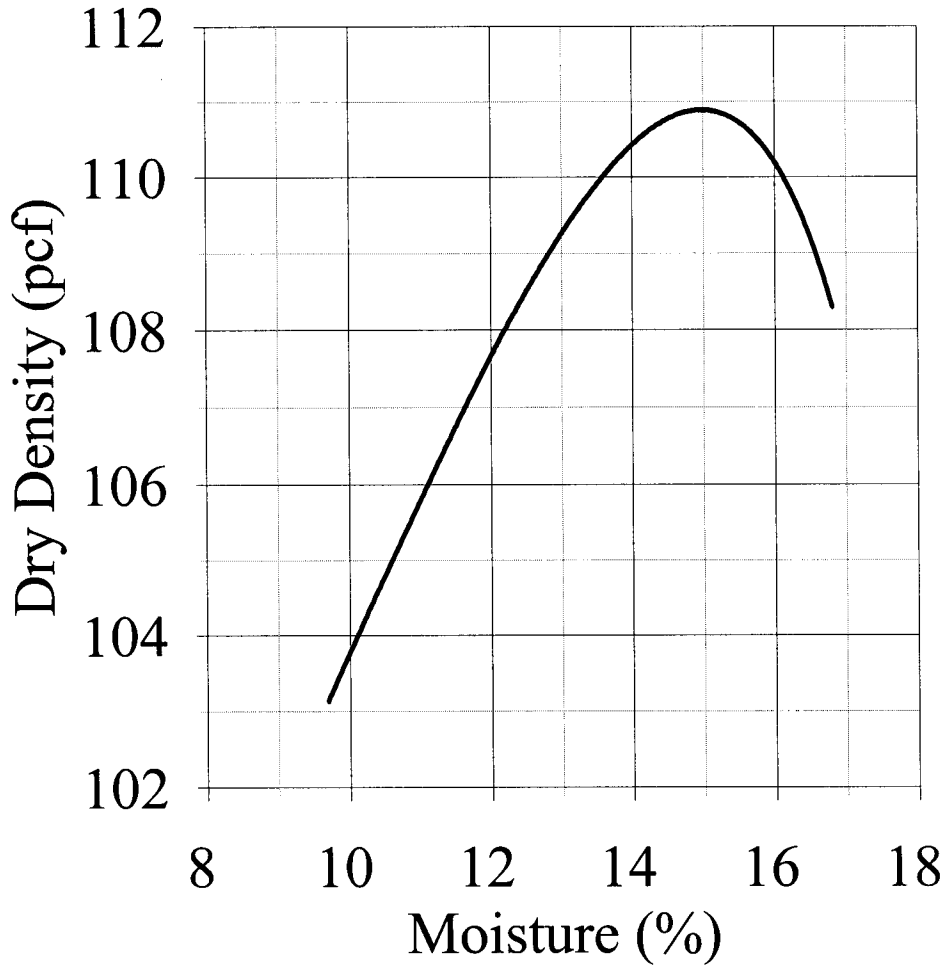
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 10
Project County	: Washington / Benton	Sample Loc. :	Boring No. 33
Project State	: Arkansas	Sample Depth :	0.4' to 7.4'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Reddish Brown Clayey Sand with Gravel		



MAXIMUM DENSITY: 111 pcf

OPTIMUM MOISTURE: 15 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 12
Project County	: Washington / Benton	Sample Loc.	: Boring No. 36
Project State	: Arkansas	Sample Depth	: 0.5' to 5.5'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.4
No.4		4.75	mm	89.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	80.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0273mm

California Bearing Ratio	: 8.4	Natural Moisture (%)	: 16.6
Maximum Dry Density	: 112 pcf	Liquid Limit	: 37
Optimum Moisture	: 16 %	Plastic Limit	: 19
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: -0.13
Gravel (3in. + No.10)	: 19.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.9	AASHTO Classification	: A-6 (8)
Silt + Clay (-No.200)	: 59.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 10.1
Coarse Sand (-No.4 + No.10)	: 9.7
Medium Sand (-No.10 + No.40)	: 12.3
Fine Sand (-No.40 + No.200)	: 8.9
Silt + Clay (-No.200)	: 59.0

Approved By : DLC

Soil No. 13

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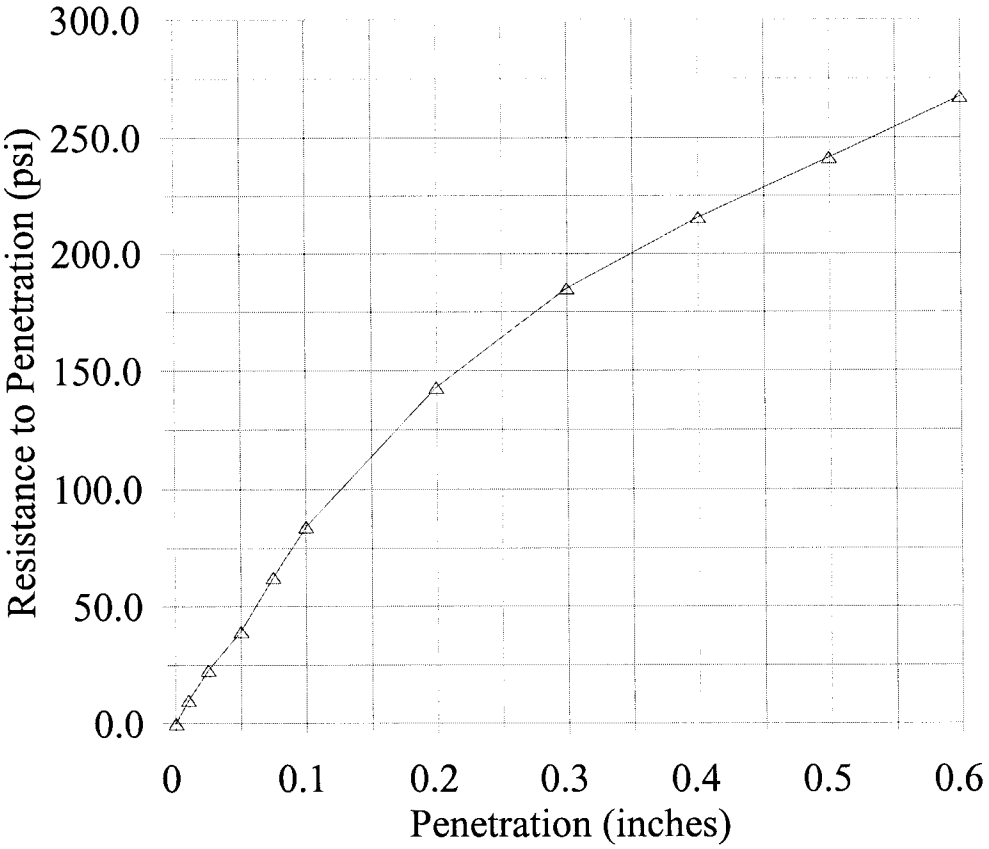
CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 12
Project County	: Washington / Benton	Sample Loc. :	Boring No. 36
Project State	: Arkansas	Sample Depth :	0.5' to 5.5'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 101.3 %
Percent Swell = 0.02 %

C.B.R. @ 0.1 In. = 8.4*
C.B.R. @ 0.2 In. = 9.5
C.B.R. @ 0.3 In. = 9.7
C.B.R. @ 0.4 In. = 9.4
C.B.R. @ 0.5 In. = 9.3

COMMENTS: KM 64-501-02

APPROVED BY: BLC

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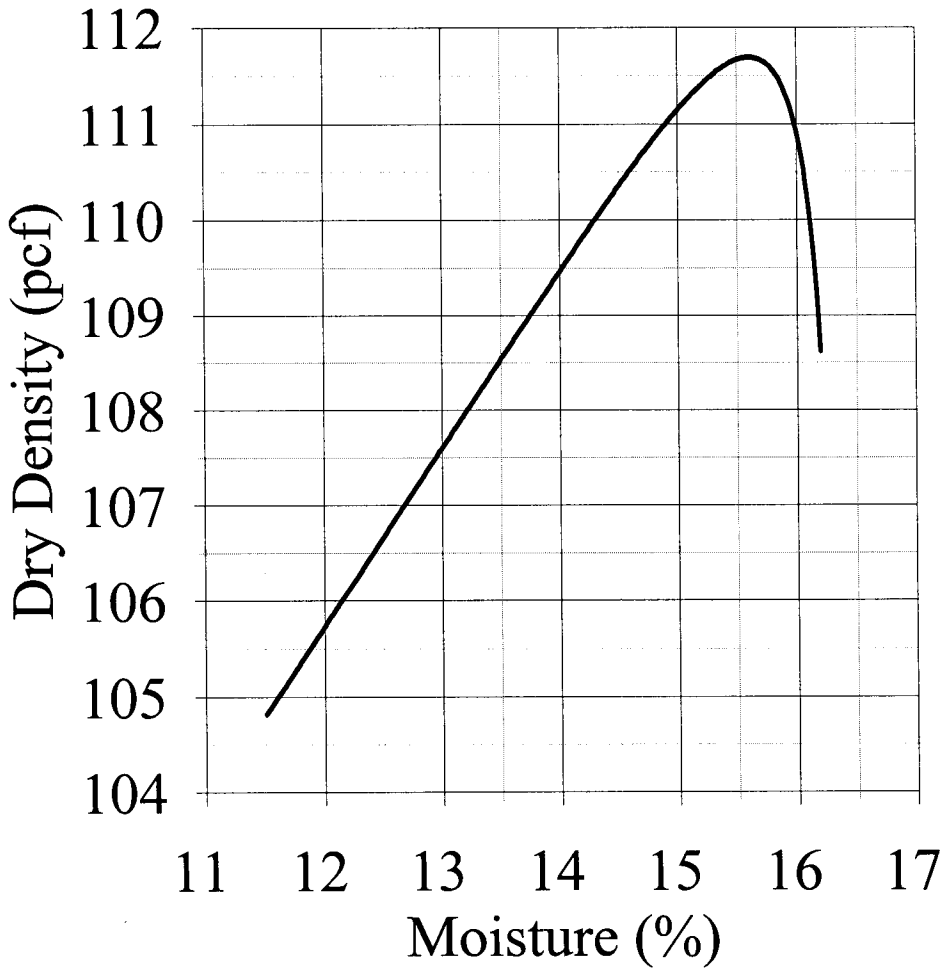
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 12
Project County	: Washington / Benton	Sample Loc. :	Boring No. 36
Project State	: Arkansas	Sample Depth :	0.5' to 5.5'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		



MAXIMUM DENSITY: 112 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 13
Project County	: Washington / Benton	Sample Loc.	: Boring No. 39
Project State	: Arkansas	Sample Depth	: 0.4' to 14.3'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.2
No.4		4.75	mm	90.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	70.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	60.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0236mm

California Bearing Ratio	: 10.1	Natural Moisture (%)	: 24.8
Maximum Dry Density	: 104 pcf	Liquid Limit	: 37
Optimum Moisture	: 18 %	Plastic Limit	: 19
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.32
Gravel (3in. + No.10)	: 17.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.4	AASHTO Classification	: A-6 (8)
Silt + Clay (-No.200)	: 60.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.1
Coarse Sand (-No.4 + No.10)	: 8.5
Medium Sand (-No.10 + No.40)	: 12.4
Fine Sand (-No.40 + No.200)	: 9.4
Silt + Clay (-No.200)	: 60.6

Approved By : DLC

Soil No. 14

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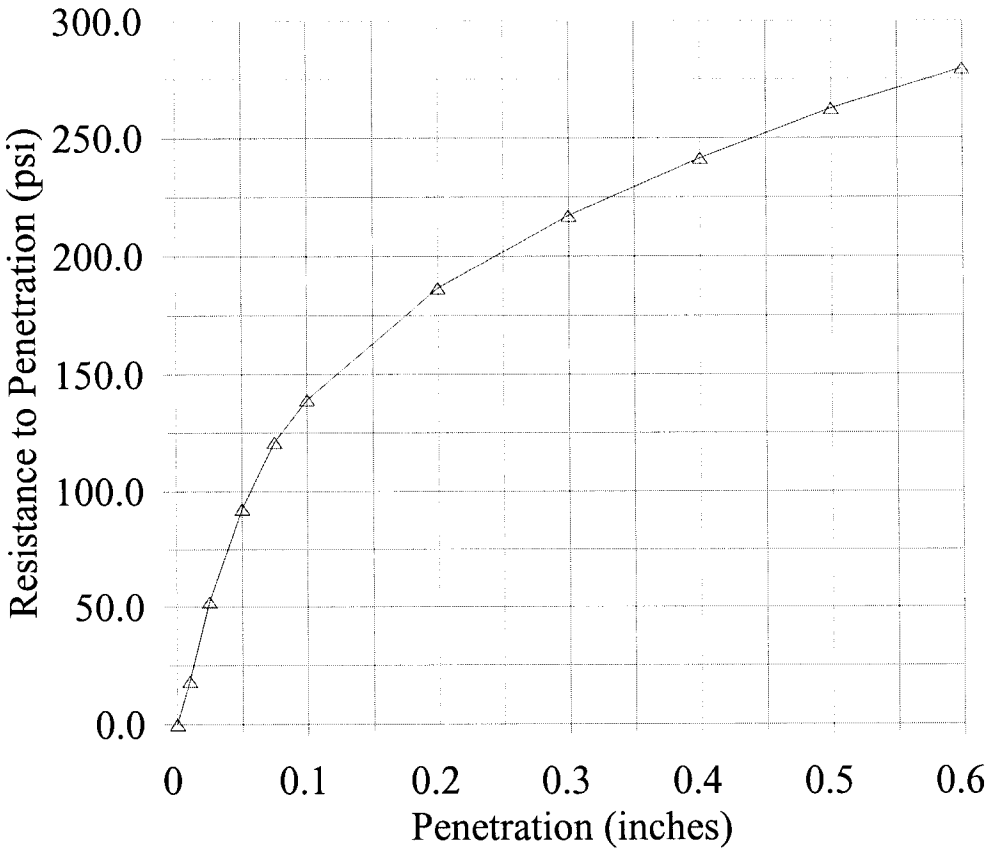
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 13
Project County	: Washington / Benton	Sample Loc. :	Boring No. 39
Project State	: Arkansas	Sample Depth :	0.4' to 14.3'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 101.2 %
Percent Swell = 0.04 %

C.B.R. @ 0.1 In. = 13.9
C.B.R. @ 0.2 In. = 12.4
C.B.R. @ 0.3 In. = 11.4
C.B.R. @ 0.4 In. = 10.5
C.B.R. @ 0.5 In. = 10.1*

COMMENTS: KM 64-501-02

APPROVED BY: bjc

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Florence & Hutcheson, Inc.
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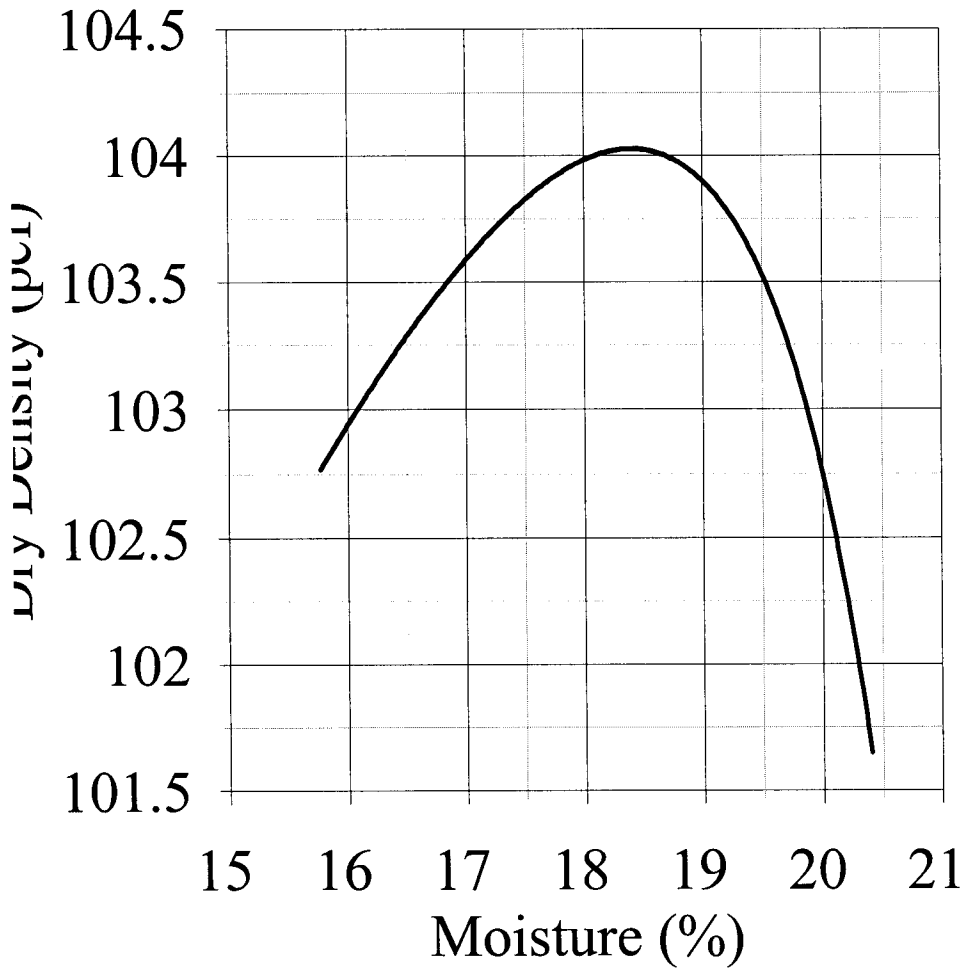
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 13
Project County	: Washington / Benton	Sample Loc. :	Boring No. 39
Project State	: Arkansas	Sample Depth :	0.4' to 14.3'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		



MAXIMUM DENSITY: 104 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 14
Project County	: Washington / Benton	Sample Loc.	: Boring No. 42
Project State	: Arkansas	Sample Depth	: 0.3' to 17.5'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.4
No.4		4.75	mm	87.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	77.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	58.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0292mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 22.3
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.18
Gravel (3in. + No.10)	: 22.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.8	AASHTO Classification	: A-6 (8)
Silt + Clay (-No.200)	: 58.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 12.8
Coarse Sand (-No.4 + No.10)	: 9.5
Medium Sand (-No.10 + No.40)	: 10.6
Fine Sand (-No.40 + No.200)	: 8.8
Silt + Clay (-No.200)	: 58.3

Approved By : DHC

Soil No. 15

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 35
Project County	: Washington / Benton	Sample Loc.	: Boring No. 44
Project State	: Arkansas	Sample Depth	: 0.5' to 10.0'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Olive Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	100.0
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	88.8
1 1/4	in.	31.5	mm	
1	in.	25	mm	82.3
3/4	in.	19	mm	77.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	49.7
No.4		4.75	mm	37.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	28.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	18.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 9.5713mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.3
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: 0.70
Gravel (3in. + No.10)	: 71.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 2.9	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 18.5	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 22.5
Fine Gravel (-3/4in. + No.4)	: 39.6
Coarse Sand (-No.4 + No.10)	: 9.4
Medium Sand (-No.10 + No.40)	: 7.1
Fine Sand (-No.40 + No.200)	: 2.9
Silt + Clay (-No.200)	: 18.5

Approved By : blc

Soil No. 16

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 25
Project County	: Washington / Benton	Sample Loc.	: Boring No. 47
Project State	: Arkansas	Sample Depth	: 0.7' to 22.0'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	91.7
No.4		4.75	mm	80.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	56.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0833mm

California Bearing Ratio	: 12.4	Natural Moisture (%)	: 16.5
Maximum Dry Density	: 108 pcf	Liquid Limit	: 28
Optimum Moisture	: 15 %	Plastic Limit	: 20
		Plasticity Index	: 8
AASHTO Composition of Total Sample		Liquidity Index	: -0.44
Gravel (3in. + No.10)	: 32.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.6	AASHTO Classification	: A-4 (1)
Silt + Clay (-No.200)	: 49.6	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.1
Fine Gravel (-3/4in. + No.4)	: 18.7
Coarse Sand (-No.4 + No.10)	: 12.4
Medium Sand (-No.10 + No.40)	: 11.6
Fine Sand (-No.40 + No.200)	: 6.6
Silt + Clay (-No.200)	: 49.6

Approved By : DLC

Soil No. 17

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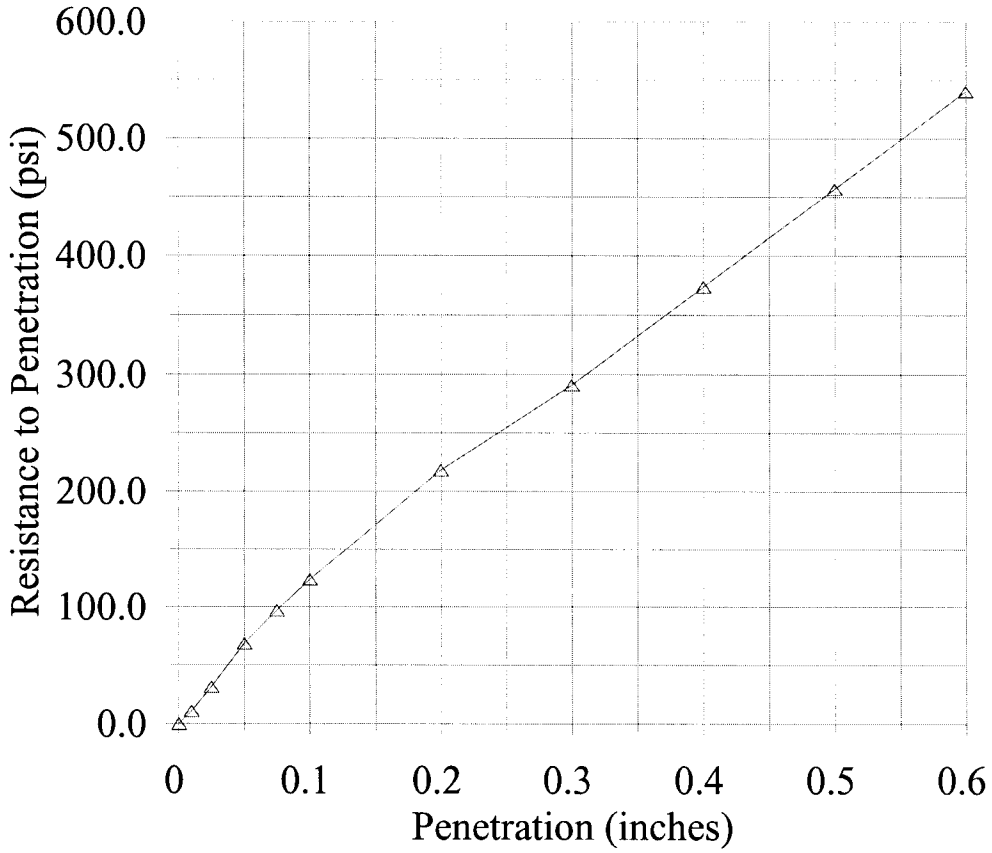
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 25
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 47
Project State	:	Arkansas	Sample Depth :	0.7' to 22.0'
Laboratory No.	:	06127	Date Tested :	04-17-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Tan Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.0 %
Percent Swell = 0.24 %

C.B.R. @ 0.1 In. = 12.4*
C.B.R. @ 0.2 In. = 14.5
C.B.R. @ 0.3 In. = 15.3
C.B.R. @ 0.4 In. = 16.3
C.B.R. @ 0.5 In. = 17.6

COMMENTS: KM 64-501-02

APPROVED BY: BLC

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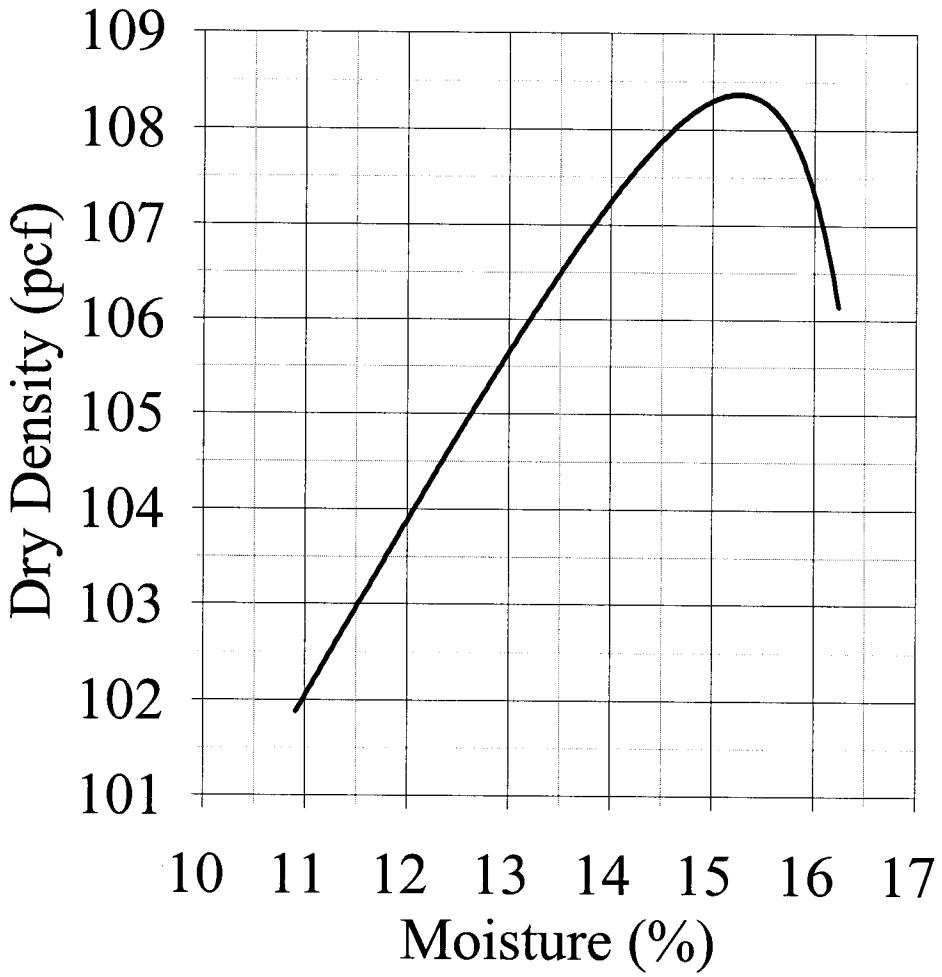
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 25
Project County	: Washington / Benton	Sample Loc. :	Boring No. 47
Project State	: Arkansas	Sample Depth :	0.7' to 22.0'
Laboratory No.	: 06127	Date Tested :	04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Tan Clayey Sand with Gravel		



MAXIMUM DENSITY: 108 pcf

OPTIMUM MOISTURE: 15 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 26
Project County	: Washington / Benton	Sample Loc.	: Boring No. 47
Project State	: Arkansas	Sample Depth	: 22.0' to 34.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.8
No.4		4.75	mm	97.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	91.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	66.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0147mm

California Bearing Ratio	: 9.7	Natural Moisture (%)	: 20.5
Maximum Dry Density	: 105 pcf	Liquid Limit	: 37
Optimum Moisture	: 17 %	Plastic Limit	: 19
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.08
Gravel (3in. + No.10)	: 8.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 12.0	AASHTO Classification	: A-6 (10)
Silt + Clay (-No.200)	: 66.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 2.4
Coarse Sand (-No.4 + No.10)	: 5.8
Medium Sand (-No.10 + No.40)	: 13.5
Fine Sand (-No.40 + No.200)	: 12.0
Silt + Clay (-No.200)	: 66.3

Approved By : DLC

Soil No. 18

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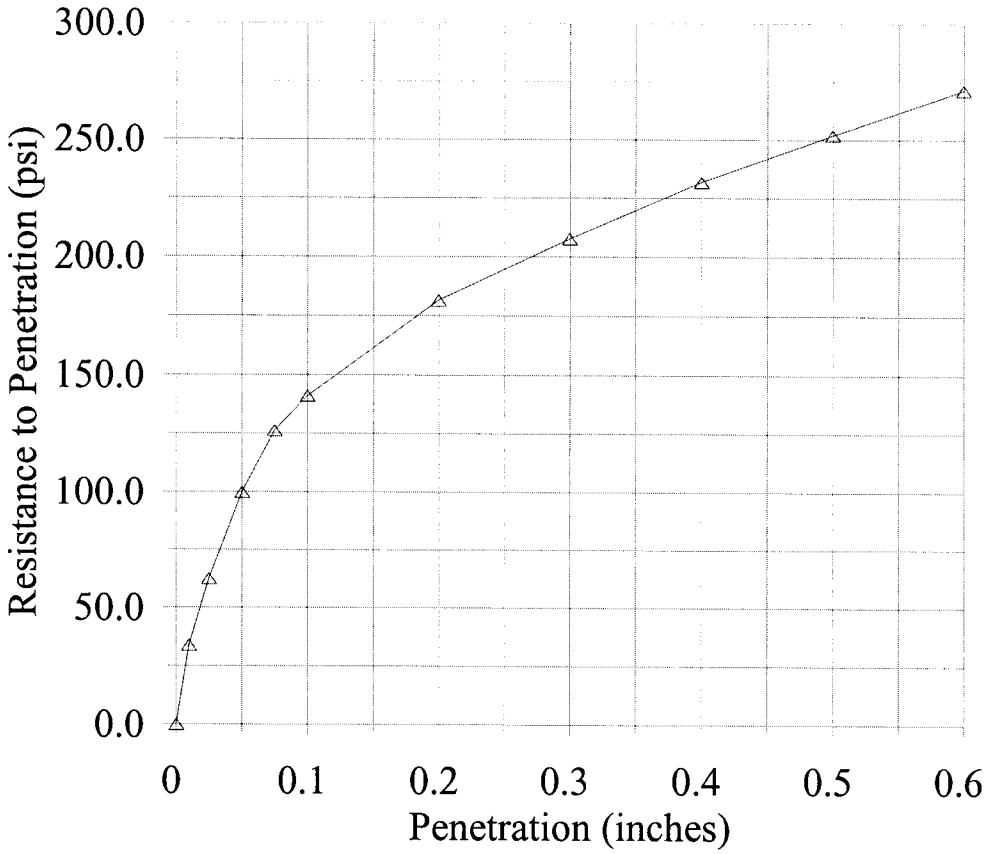
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 26
Project County	: Washington / Benton	Sample Loc.	: Boring No. 47
Project State	: Arkansas	Sample Depth	: 22.0' to 34.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.8 %
Percent Swell = 0.22 %

C.B.R. @ 0.1 In. = 14.1
C.B.R. @ 0.2 In. = 12.1
C.B.R. @ 0.3 In. = 10.9
C.B.R. @ 0.4 In. = 10.1
C.B.R. @ 0.5 In. = 9.7*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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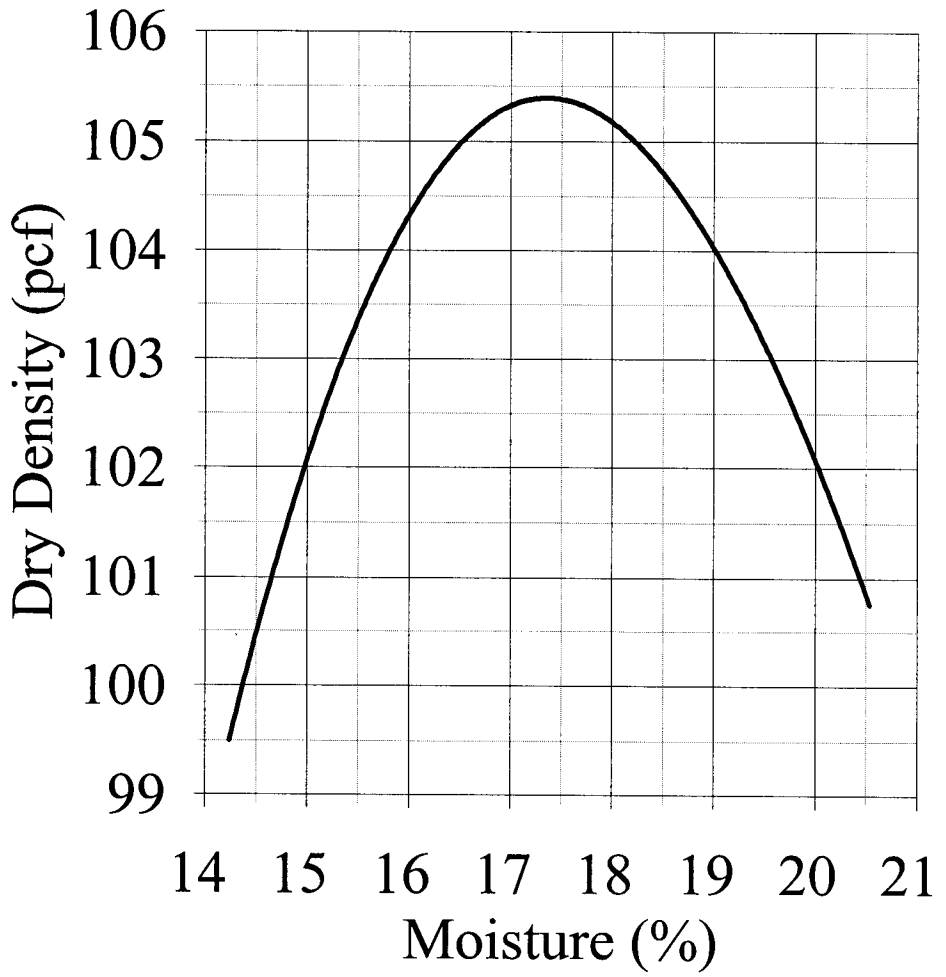
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 26
Project County	: Washington / Benton	Sample Loc. :	Boring No. 47
Project State	: Arkansas	Sample Depth :	22.0' to 34.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 23
Project County	: Washington / Benton	Sample Loc.	: Boring No. 50
Project State	: Arkansas	Sample Depth	: 0.6' to 17.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.2
No.4		4.75	mm	94.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	89.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	69.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0121mm

California Bearing Ratio	: 6.8	Natural Moisture (%)	: 33.7
Maximum Dry Density	: 99 pcf	Liquid Limit	: 44
Optimum Moisture	: 23 %	Plastic Limit	: 23
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.51
Gravel (3in. + No.10)	: 10.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.7	AASHTO Classification	: A-7-6 (13)
Silt + Clay (-No.200)	: 69.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.2
Coarse Sand (-No.4 + No.10)	: 5.5
Medium Sand (-No.10 + No.40)	: 12.6
Fine Sand (-No.40 + No.200)	: 7.7
Silt + Clay (-No.200)	: 69.0

Approved By : DLC

Soil No. 19

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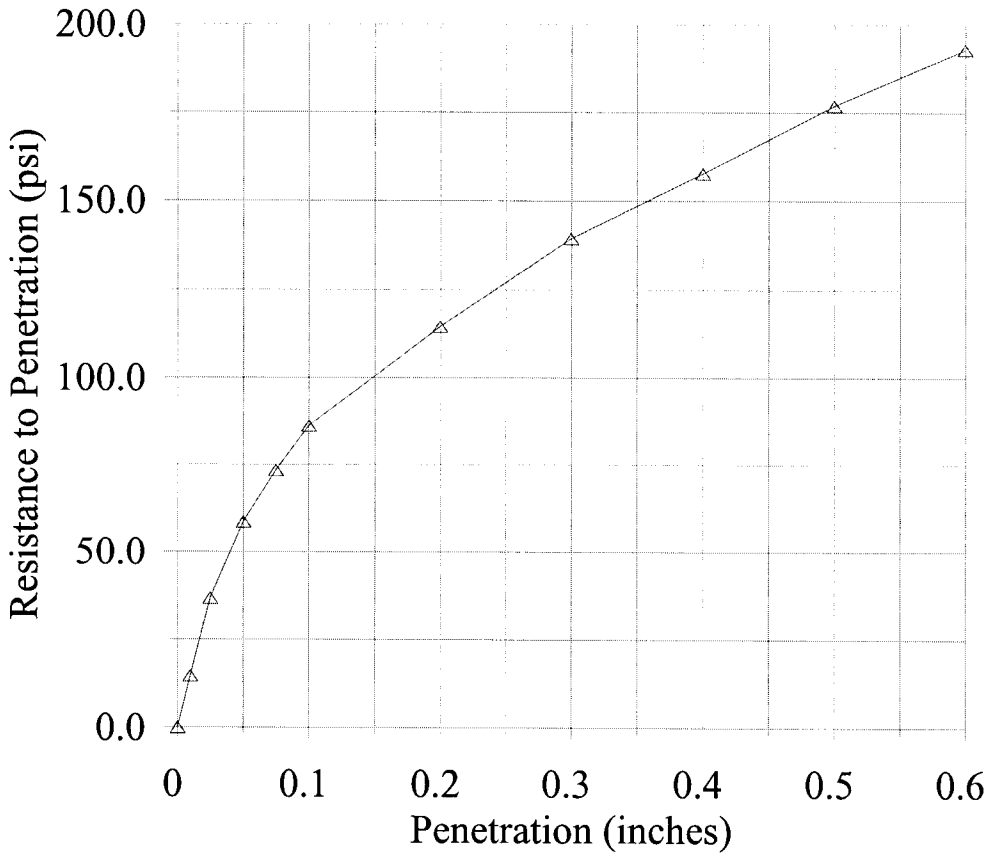
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 23
Project County	: Washington / Benton	Sample Loc. :	Boring No. 50
Project State	: Arkansas	Sample Depth :	0.6' to 17.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 98.9 %
Percent Swell = 0.16 %

C.B.R. @ 0.1 In. = 8.6
C.B.R. @ 0.2 In. = 7.6
C.B.R. @ 0.3 In. = 7.3
C.B.R. @ 0.4 In. = 6.9
C.B.R. @ 0.5 In. = 6.8*

COMMENTS: KM 64-501-02

APPROVED BY: _____

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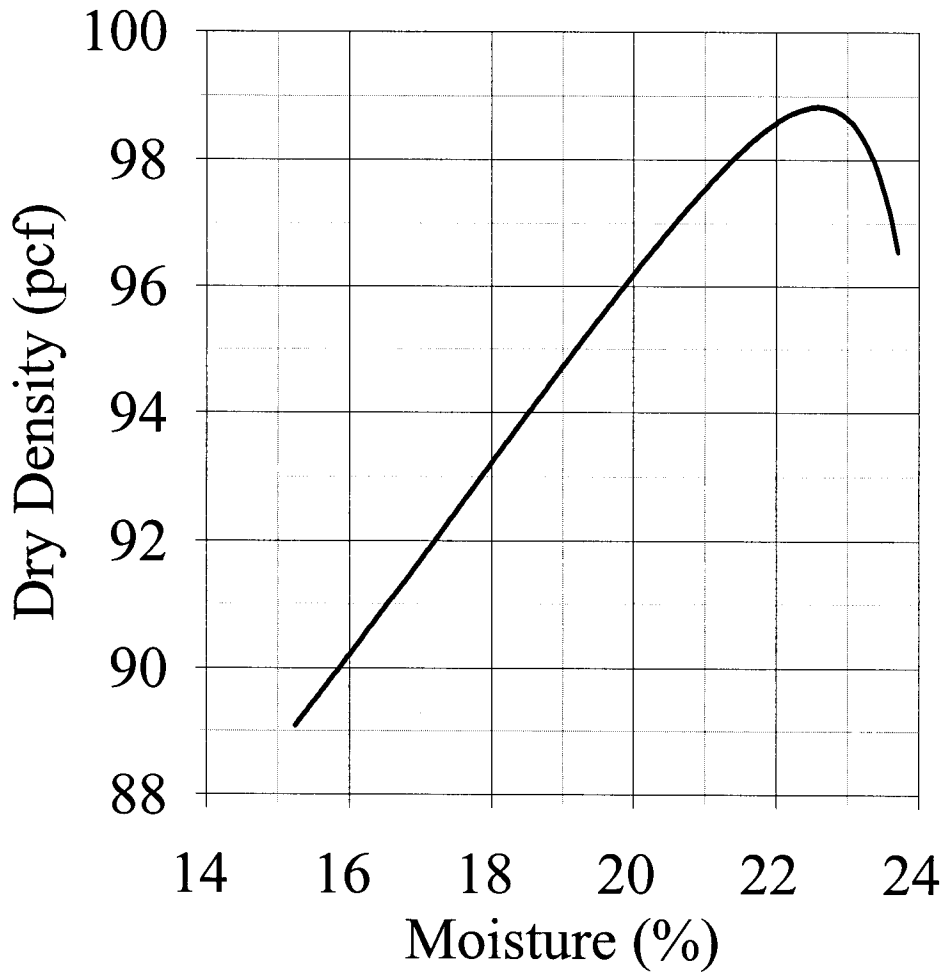
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 23
Project County	: Washington / Benton	Sample Loc. :	Boring No. 50
Project State	: Arkansas	Sample Depth :	0.6' to 17.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Brown Sandy Lean Clay		



MAXIMUM DENSITY: 99 pcf

OPTIMUM MOISTURE: 23 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 24
Project County	: Washington / Benton	Sample Loc.	: Boring No. 50
Project State	: Arkansas	Sample Depth	: 17.0' to 28.0'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.7
No.4		4.75	mm	94.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	89.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	70.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0385mm

California Bearing Ratio	: 8.2	Natural Moisture (%)	: 34.3
Maximum Dry Density	: 93 pcf	Liquid Limit	: 48
Optimum Moisture	: 26 %	Plastic Limit	: 27
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.35
Gravel (3in. + No.10)	: 11.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 18.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 15.1	AASHTO Classification	: A-7-6 (9)
Silt + Clay (-No.200)	: 55.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.6
Coarse Sand (-No.4 + No.10)	: 5.4
Medium Sand (-No.10 + No.40)	: 18.3
Fine Sand (-No.40 + No.200)	: 15.1
Silt + Clay (-No.200)	: 55.6

Approved By : DLC

Soil No. 20

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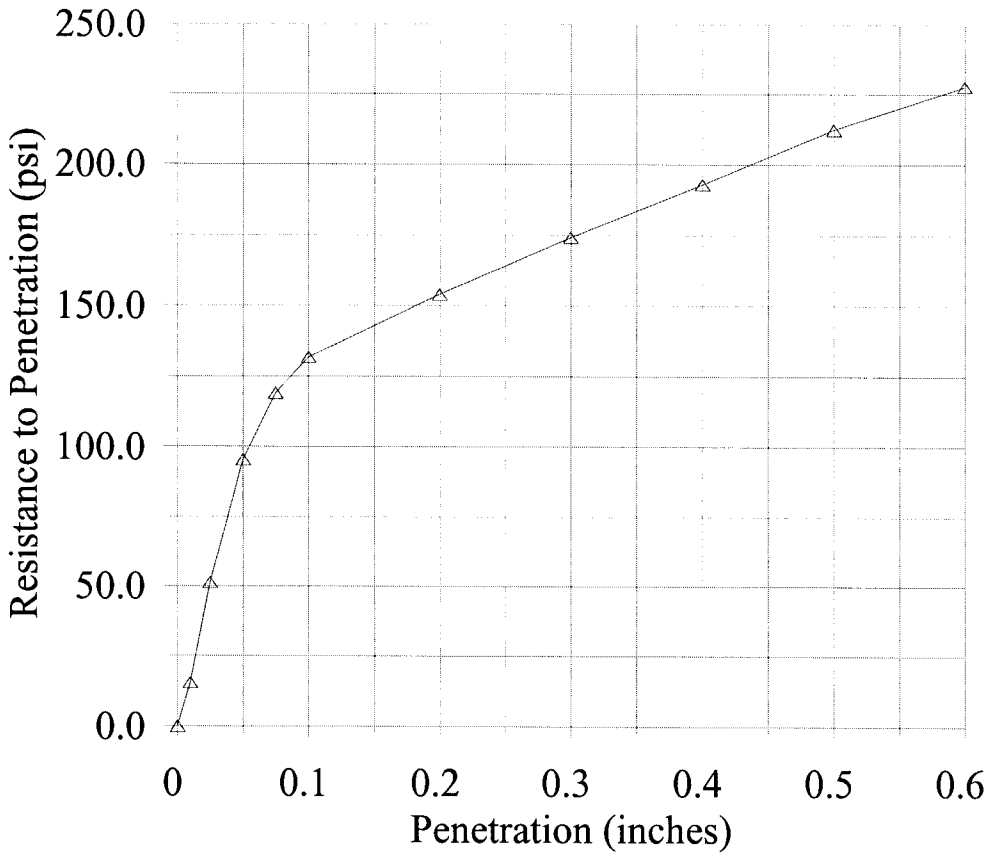
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 24
Project County	: Washington / Benton	Sample Loc. :	Boring No. 50
Project State	: Arkansas	Sample Depth :	17.0' to 28.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.3 %
Percent Swell = 0.34 %

C.B.R. @ 0.1 In. = 13.2
C.B.R. @ 0.2 In. = 10.3
C.B.R. @ 0.3 In. = 9.2
C.B.R. @ 0.4 In. = 8.4
C.B.R. @ 0.5 In. = 8.2*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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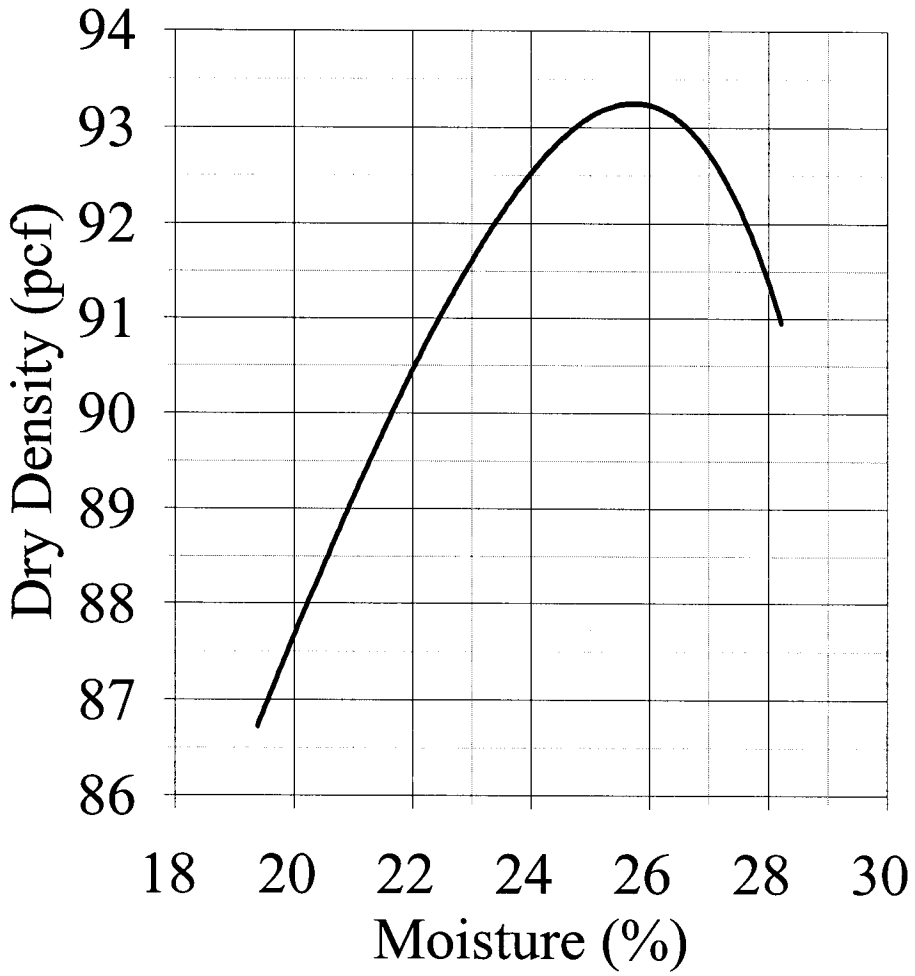
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 24
Project County	: Washington / Benton	Sample Loc. :	Boring No. 50
Project State	: Arkansas	Sample Depth :	17.0' to 28.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay		



MAXIMUM DENSITY: 93 pcf

OPTIMUM MOISTURE: 26 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 21
Project County	: Washington / Benton	Sample Loc.	: Boring No. 53
Project State	: Arkansas	Sample Depth	: 0.7' to 7.0'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.6
No.4		4.75	mm	92.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	86.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0096mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 30.3
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 26
AASHTO Composition of Total Sample		Liquidity Index	: 0.36
Gravel (3in. + No.10)	: 13.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.3	AASHTO Classification	: A-7-6 (18)
Silt + Clay (-No.200)	: 72.5	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 7.2
Coarse Sand (-No.4 + No.10)	: 6.7
Medium Sand (-No.10 + No.40)	: 7.3
Fine Sand (-No.40 + No.200)	: 6.3
Silt + Clay (-No.200)	: 72.5

Approved By : PLC

Soil No. 21

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 22
Project County	: Washington / Benton	Sample Loc.	: Boring No. 53
Project State	: Arkansas	Sample Depth	: 7.0' to 19.0'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.8
No.4		4.75	mm	88.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	72.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	65.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0163mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.5
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.33
Gravel (3in. + No.10)	: 18.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.1	AASHTO Classification	: A-7-6 (14)
Silt + Clay (-No.200)	: 65.0	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 11.6
Coarse Sand (-No.4 + No.10)	: 7.1
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 7.1
Silt + Clay (-No.200)	: 65.0

Approved By : DLC

Soil No. 22

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 20
Project County	: Washington / Benton	Sample Loc.	: Boring No. 55
Project State	: Arkansas	Sample Depth	: 0.7' to 11.0'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.6
No.4		4.75	mm	81.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	69.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0618mm

California Bearing Ratio	: 12.2	Natural Moisture (%)	: 13.3
Maximum Dry Density	: 105 pcf	Liquid Limit	: 41
Optimum Moisture	: 18 %	Plastic Limit	: 20
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: -0.32
Gravel (3in. + No.10)	: 30.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.3	AASHTO Classification	: A-7-6 (7)
Silt + Clay (-No.200)	: 51.5	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 18.6
Coarse Sand (-No.4 + No.10)	: 11.5
Medium Sand (-No.10 + No.40)	: 10.1
Fine Sand (-No.40 + No.200)	: 8.3
Silt + Clay (-No.200)	: 51.5

Approved By : DLC

Soil No. 23

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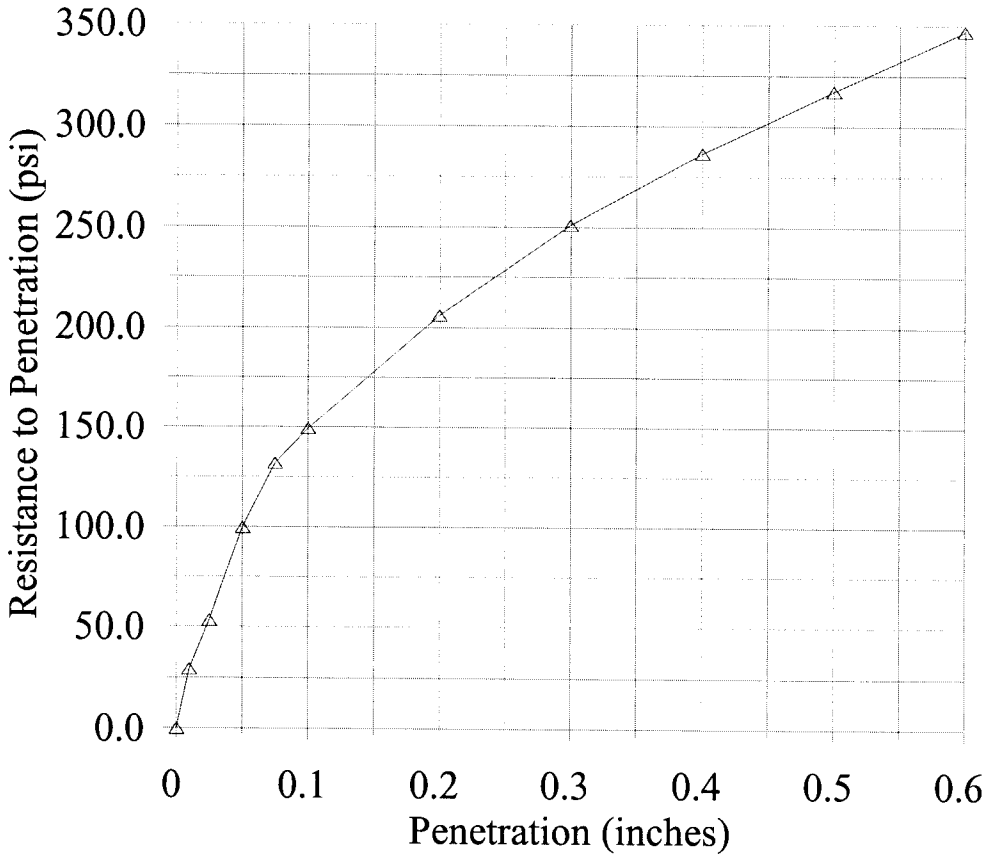
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 20
Project County	: Washington / Benton	Sample Loc. :	Boring No. 55
Project State	: Arkansas	Sample Depth :	0.7' to 11.0'
Laboratory No.	: 06127	Date Tested :	04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.6 %
Percent Swell = 0.30 %

C.B.R. @ 0.1 In. = 14.9
C.B.R. @ 0.2 In. = 13.7
C.B.R. @ 0.3 In. = 13.2
C.B.R. @ 0.4 In. = 12.5
C.B.R. @ 0.5 In. = 12.2*

COMMENTS: KM 64-501-02

APPROVED BY: blC

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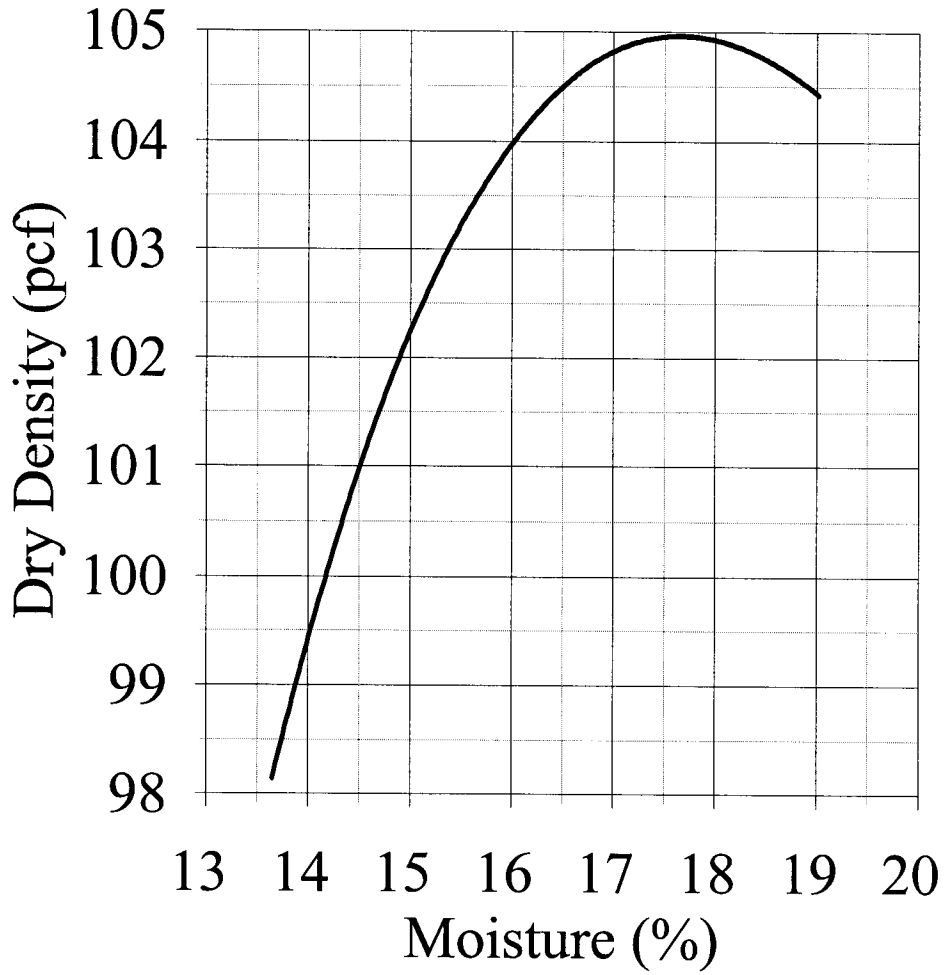
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 20
Project County	: Washington / Benton	Sample Loc. :	Boring No. 55
Project State	: Arkansas	Sample Depth :	0.7' to 11.0'
Laboratory No.	: 06127	Date Tested :	04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 15
Project County	: Washington / Benton	Sample Loc.	: Boring No. 58
Project State	: Arkansas	Sample Depth	: 0.4' to 4.7'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.4
No.4		4.75	mm	94.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0097mm

California Bearing Ratio	: 5.3	Natural Moisture (%)	: 25.8
Maximum Dry Density	: 100 pcf	Liquid Limit	: 43
Optimum Moisture	: 21 %	Plastic Limit	: 20
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.25
Gravel (3in. + No.10)	: 13.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.8	AASHTO Classification	: A-7-6 (15)
Silt + Clay (-No.200)	: 72.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.7
Coarse Sand (-No.4 + No.10)	: 7.3
Medium Sand (-No.10 + No.40)	: 7.9
Fine Sand (-No.40 + No.200)	: 6.8
Silt + Clay (-No.200)	: 72.3

Approved By : BLC

Soil No. 24

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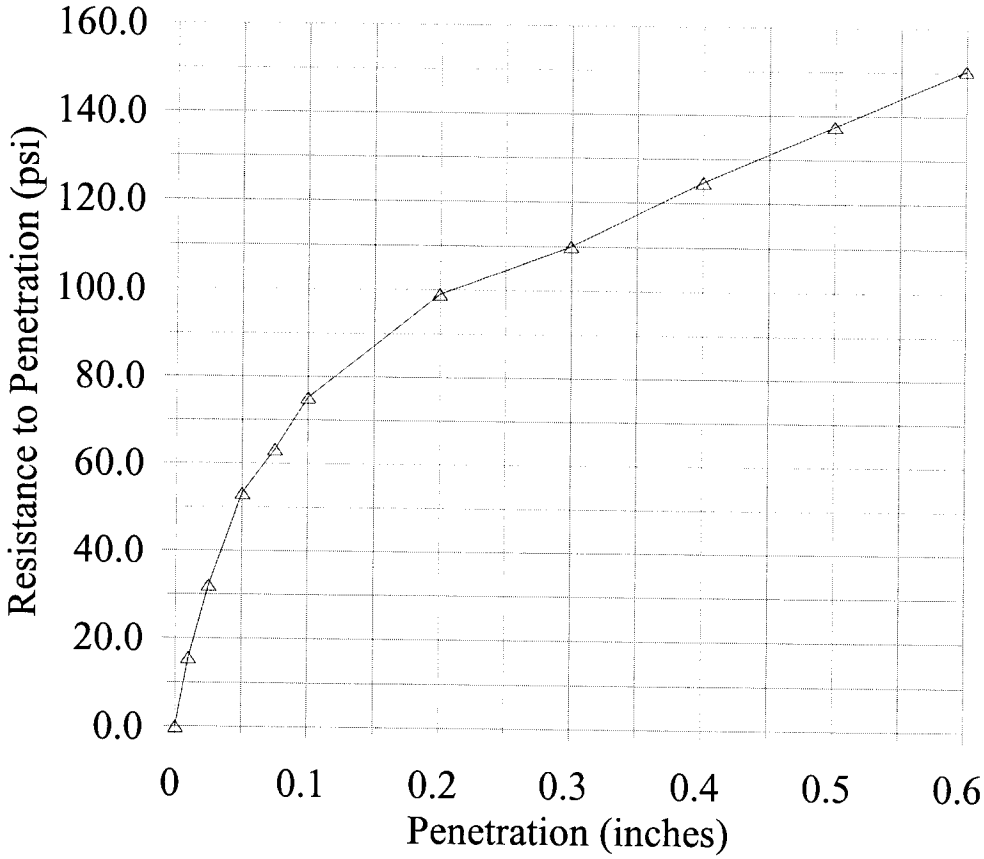
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 15
Project County	: Washington / Benton	Sample Loc.	: Boring No. 58
Project State	: Arkansas	Sample Depth	: 0.4' to 4.7'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 101.1 %
Percent Swell = 0.78 %

C.B.R. @ 0.1 In. = 7.5
C.B.R. @ 0.2 In. = 6.6
C.B.R. @ 0.3 In. = 5.8
C.B.R. @ 0.4 In. = 5.4
C.B.R. @ 0.5 In. = 5.3*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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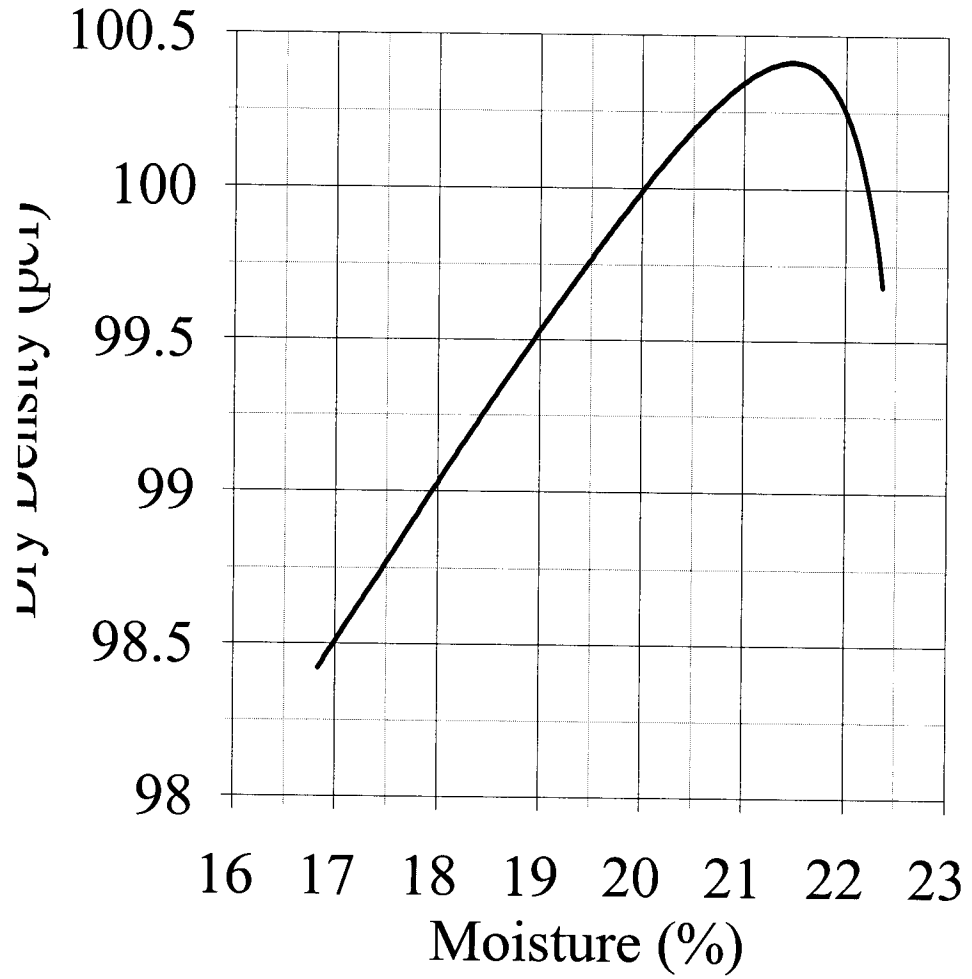
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 15
Project County	: Washington / Benton	Sample Loc.	: Boring No. 58
Project State	: Arkansas	Sample Depth	: 0.4' to 4.7'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Tan Lean Clay with Sand		



MAXIMUM DENSITY: 100 pcf

OPTIMUM MOISTURE: 21 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 16
Project County	: Washington / Benton	Sample Loc.	: Boring No. 61
Project State	: Arkansas	Sample Depth	: 0.3' to 14.0'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Copper & Dark Beige Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	84.0
No.4		4.75	mm	69.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	62.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	51.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.3204mm

California Bearing Ratio : 6.8
Maximum Dry Density : 107 pcf
Optimum Moisture : 16 %

Natural Moisture (%) : 18.7
Liquid Limit : 34
Plastic Limit : 19
Plasticity Index : 15
Liquidity Index : -0.02
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (3)
ASTM Classification : GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 37.3
Coarse Sand (-No.10 + No.40) : 11.3
Fine Sand (-No.40 + No.200) : 8.6
Silt + Clay (-No.200) : 42.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 6.9
Fine Gravel (-3/4in. + No.4) : 23.3
Coarse Sand (-No.4 + No.10) : 7.1
Medium Sand (-No.10 + No.40) : 11.3
Fine Sand (-No.40 + No.200) : 8.6
Silt + Clay (-No.200) : 42.8

Approved By : DLC

Soil No. 25

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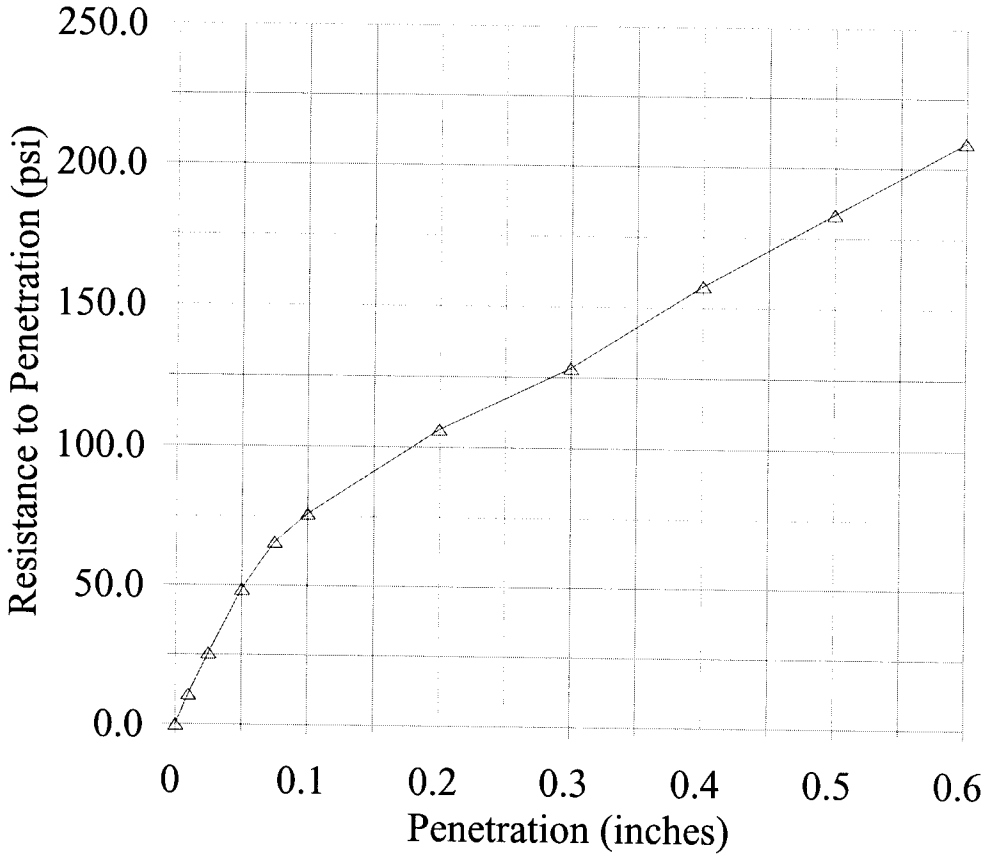
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 16
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 61
Project State	:	Arkansas	Sample Depth :	0.3' to 14.0'
Laboratory No.	:	06127	Date Tested :	04-17-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Copper & Dark Beige Clayey Gravel with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 97.6 %
Percent Swell = 0.47 %

C.B.R. @ 0.1 In. = 7.6
C.B.R. @ 0.2 In. = 7.1
C.B.R. @ 0.3 In. = 6.8*
C.B.R. @ 0.4 In. = 6.9
C.B.R. @ 0.5 In. = 7.1

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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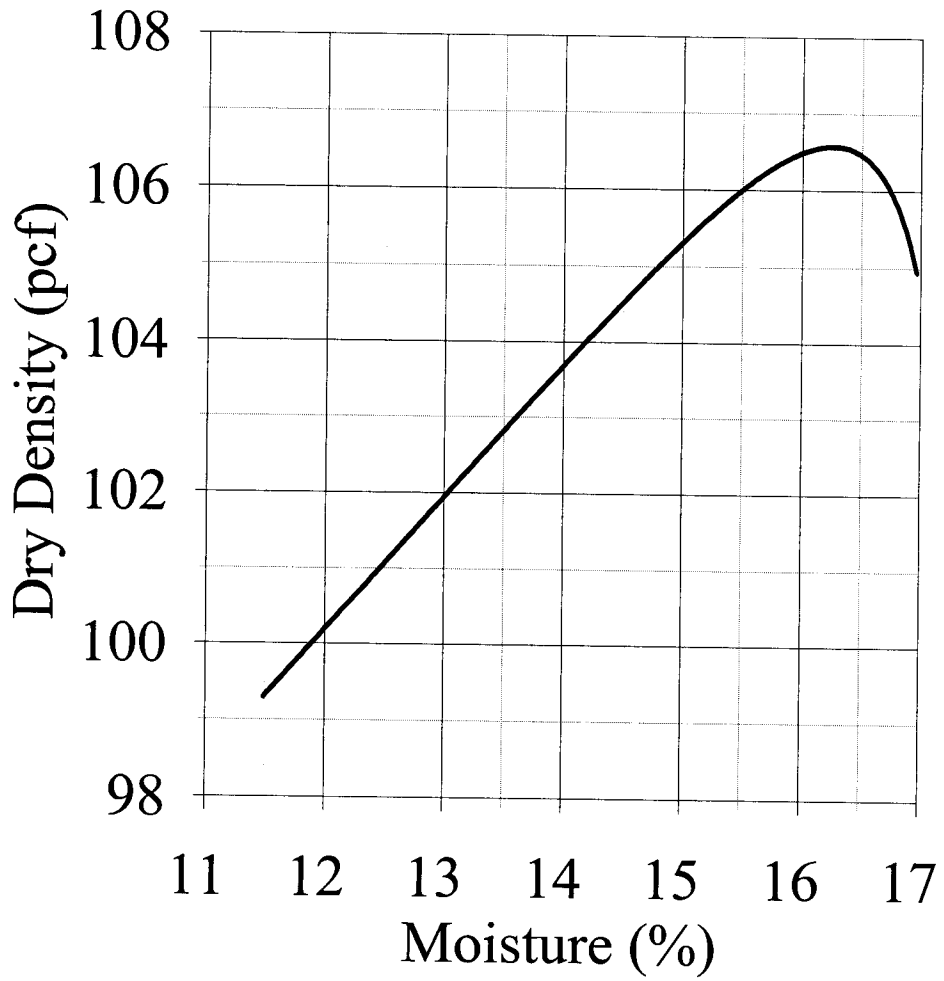
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 16
Project County	: Washington / Benton	Sample Loc. :	Boring No. 61
Project State	: Arkansas	Sample Depth :	0.3' to 14.0'
Laboratory No.	: 06127	Date Tested :	04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Copper & Dark Beige Clayey Gravel with Sand		



MAXIMUM DENSITY: 107 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127		
Project County	: Washington / Benton	Sample No.	: Bag No. 17
Project State	: Arkansas	Sample Loc.	: Boring No. 64
Laboratory No.	: 06127	Sample Depth	: 0.4' to 11.0'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 04-09-07
Soil Type	: Tan Sandy Lean Clay	Date Reported	: 08-08-07

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.5
No.4		4.75	mm	90.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	84.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	75.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	67.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0139mm

California Bearing Ratio : 3.3
Maximum Dry Density : 101 pcf
Optimum Moisture : 17 %

Natural Moisture (%) : 23.8
Liquid Limit : 37
Plastic Limit : 20
Plasticity Index : 17
Liquidity Index : 0.22
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (10)
ASTM Classification : CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 15.8
Coarse Sand (-No.10 + No.40) : 9.1
Fine Sand (-No.40 + No.200) : 8.0
Silt + Clay (-No.200) : 67.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 3.0
Fine Gravel (-3/4in. + No.4) : 6.5
Coarse Sand (-No.4 + No.10) : 6.3
Medium Sand (-No.10 + No.40) : 9.1
Fine Sand (-No.40 + No.200) : 8.0
Silt + Clay (-No.200) : 67.1

Approved By : DLC

Soil No. 26

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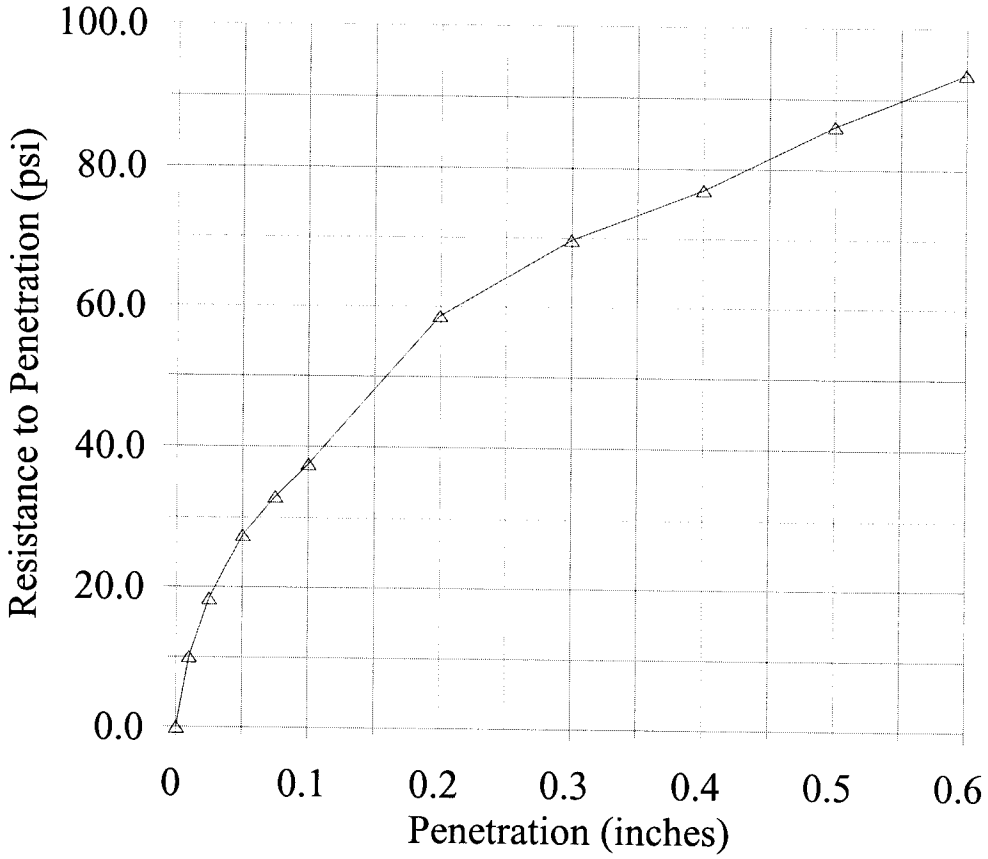
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 17
Project County	: Washington / Benton	Sample Loc.	: Boring No. 64
Project State	: Arkansas	Sample Depth	: 0.4' to 11.0'
Laboratory No.	: 06127	Date Tested	: 04-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 98.1 %
Percent Swell = 0.33 %

C.B.R. @ 0.1 In. = 3.8
C.B.R. @ 0.2 In. = 3.9
C.B.R. @ 0.3 In. = 3.7
C.B.R. @ 0.4 In. = 3.3
C.B.R. @ 0.5 In. = 3.3*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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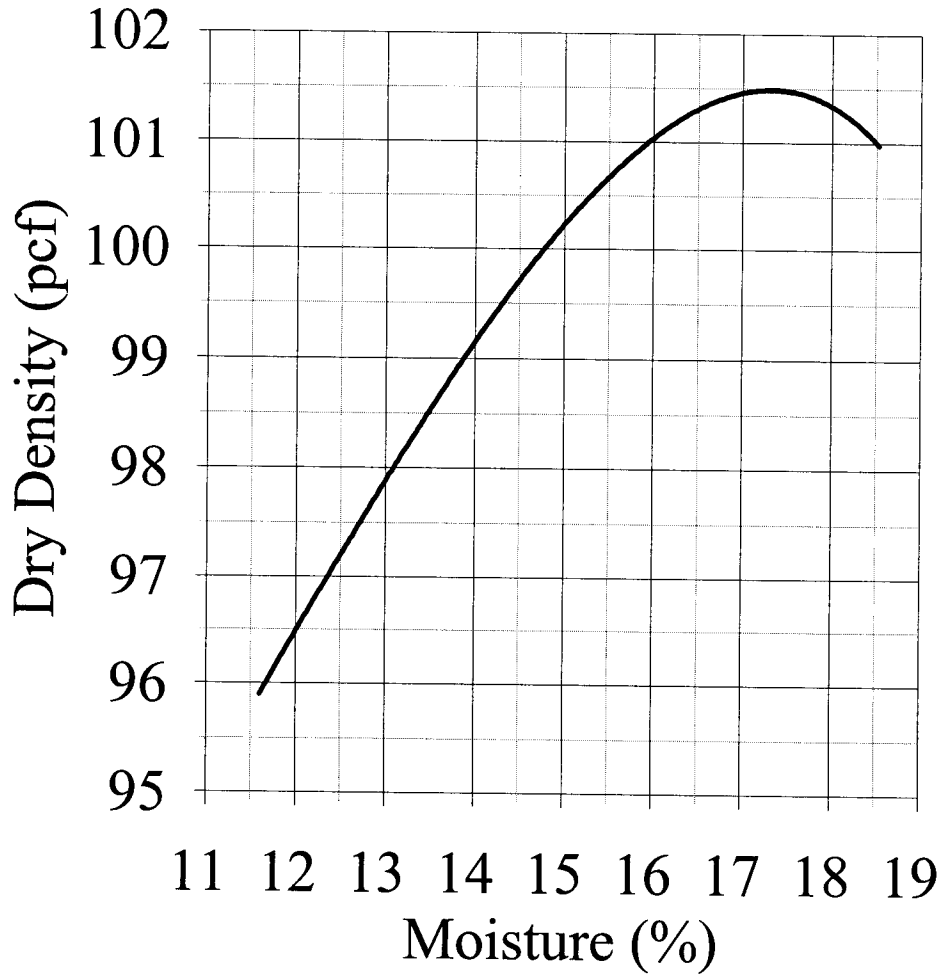
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 17
Project County	: Washington / Benton	Sample Loc. :	Boring No. 64
Project State	: Arkansas	Sample Depth :	0.4' to 11.0'
Laboratory No.	: 06127	Date Tested :	04-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Tan Sandy Lean Clay		



MAXIMUM DENSITY: 101 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: pLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 18
Project County	: Washington / Benton	Sample Loc.	: Boring No. 64
Project State	: Arkansas	Sample Depth	: 11.0' to 18.0'
Laboratory No.	: 06127	Date Tested	: 04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	97.6
3/4	in.	19	mm	95.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.4
No.4		4.75	mm	79.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0702mm

California Bearing Ratio : 15.1
Maximum Dry Density : 103 pcf
Optimum Moisture : 18 %

Natural Moisture (%) : 12.1
Liquid Limit : 37
Plastic Limit : 20
Plasticity Index : 17
Liquidity Index : -0.46
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (5)
ASTM Classification : CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 32.6
Coarse Sand (-No.10 + No.40) : 9.1
Fine Sand (-No.40 + No.200) : 7.8
Silt + Clay (-No.200) : 50.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 4.1
Fine Gravel (-3/4in. + No.4) : 16.9
Coarse Sand (-No.4 + No.10) : 11.6
Medium Sand (-No.10 + No.40) : 9.1
Fine Sand (-No.40 + No.200) : 7.8
Silt + Clay (-No.200) : 50.5

Approved By : DLC

Soil No. 27

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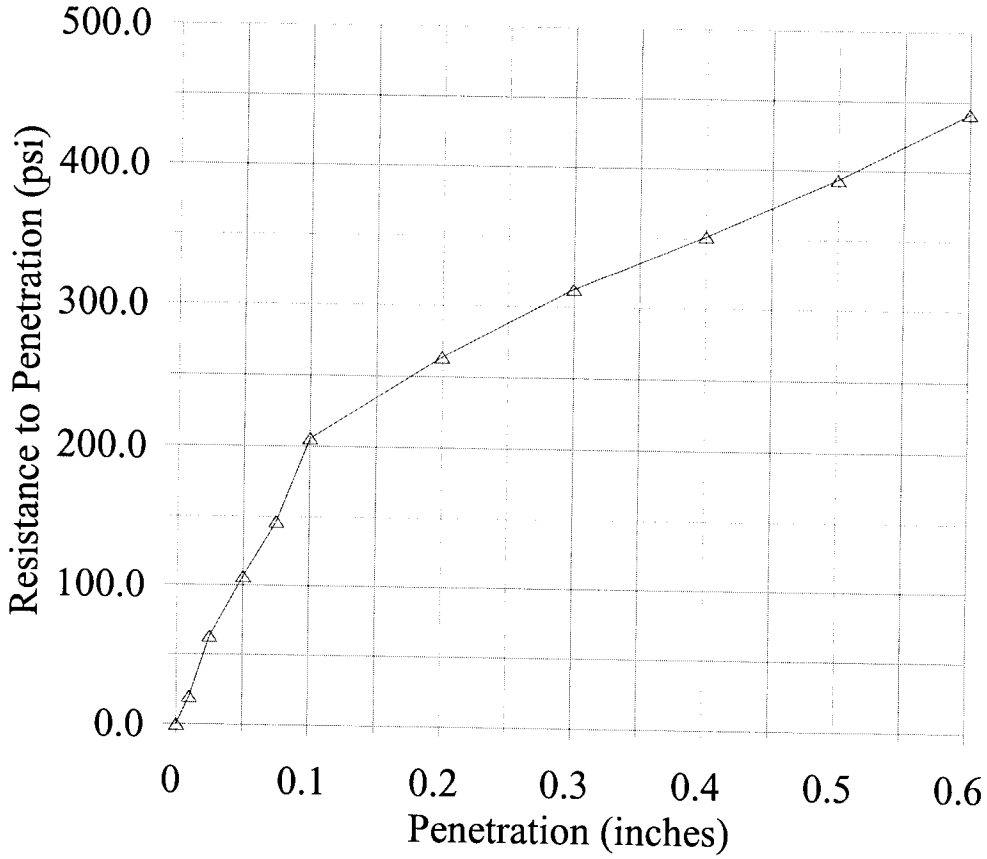
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 18
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 64
Project State	:	Arkansas	Sample Depth :	11.0' to 18.0'
Laboratory No.	:	06127	Date Tested :	04-17-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Brown Sandy Lean Clay with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.4 %
Percent Swell = 0.04 %

C.B.R. @ 0.1 In. = 20.6
C.B.R. @ 0.2 In. = 17.6
C.B.R. @ 0.3 In. = 16.4
C.B.R. @ 0.4 In. = 15.3
C.B.R. @ 0.5 In. = 15.1*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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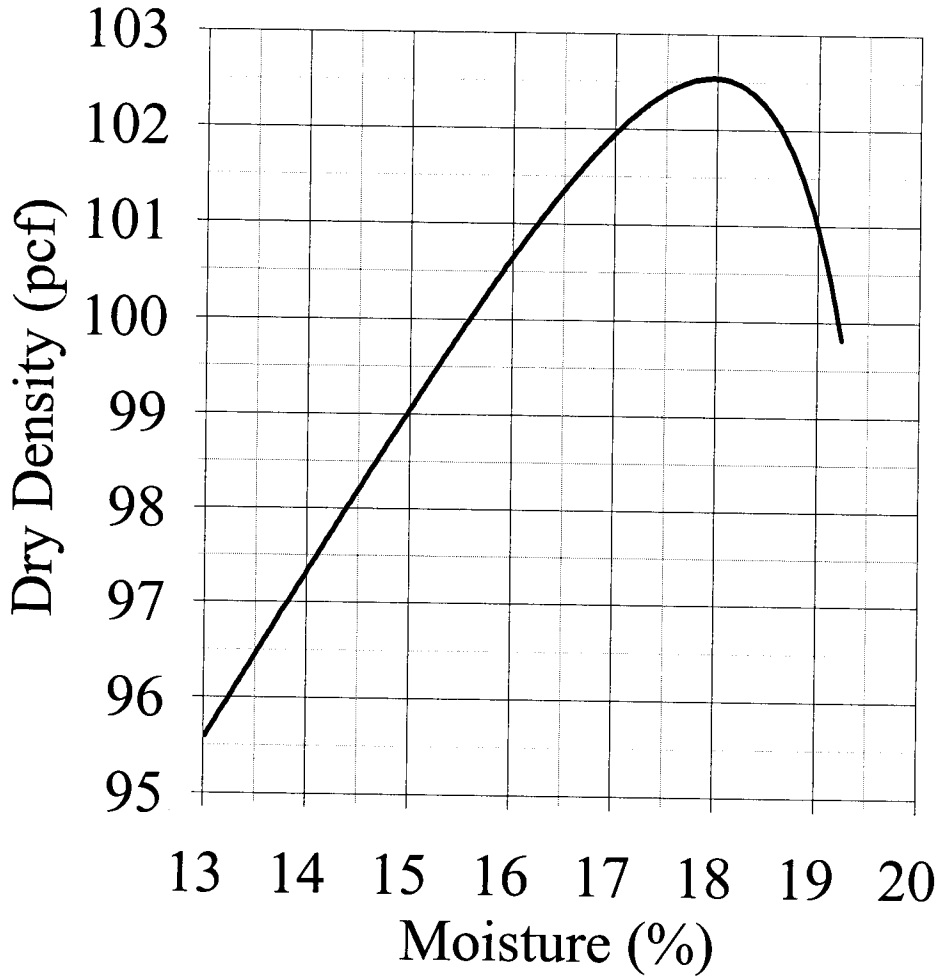
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 18
Project County	: Washington / Benton	Sample Loc. :	Boring No. 64
Project State	: Arkansas	Sample Depth :	11.0' to 18.0'
Laboratory No.	: 06127	Date Tested :	04-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 103 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 19
Project County	: Washington / Benton	Sample Loc.	: Boring No. 66
Project State	: Arkansas	Sample Depth	: 0.5' to 13.3'
Laboratory No.	: 06127	Date Tested	: 04-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Copper Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.6
No.4		4.75	mm	78.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	70.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	61.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	46.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.1126mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 13.7
Liquid Limit : 31
Plastic Limit : 18
Plasticity Index : 13
Liquidity Index : -0.33
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (3)
ASTM Classification : SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 29.3
Coarse Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 14.5
Silt + Clay (-No.200) : 46.6

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 2.4
Fine Gravel (-3/4in. + No.4) : 19.6
Coarse Sand (-No.4 + No.10) : 7.3
Medium Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 14.5
Silt + Clay (-No.200) : 46.6

Approved By : DLC

Soil No. 28

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127		
Project County	: Washington / Benton	Sample No.	: Bag No. 27
Project State	: Arkansas	Sample Loc.	: Boring No. 70
Laboratory No.	: 06127	Sample Depth	: 0.7' to 21.0'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 04-12-07
Soil Type	: Dark Brown Sandy Lean Clay	Date Reported	: 08-08-07

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.6
No.4		4.75	mm	87.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	76.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	65.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0365mm

California Bearing Ratio	: 12.9	Natural Moisture (%)	: 21.0
Maximum Dry Density	: 112 pcf	Liquid Limit	: 30
Optimum Moisture	: 14 %	Plastic Limit	: 18
		Plasticity Index	: 12
		Liquidity Index	: 0.25
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-6 (4)
		ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 23.2
Coarse Sand (-No.10 + No.40)	: 11.6
Fine Sand (-No.40 + No.200)	: 9.1
Silt + Clay (-No.200)	: 56.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 12.9
Coarse Sand (-No.4 + No.10)	: 10.3
Medium Sand (-No.10 + No.40)	: 11.6
Fine Sand (-No.40 + No.200)	: 9.1
Silt + Clay (-No.200)	: 56.1

Approved By : DLC

Soil No. 29

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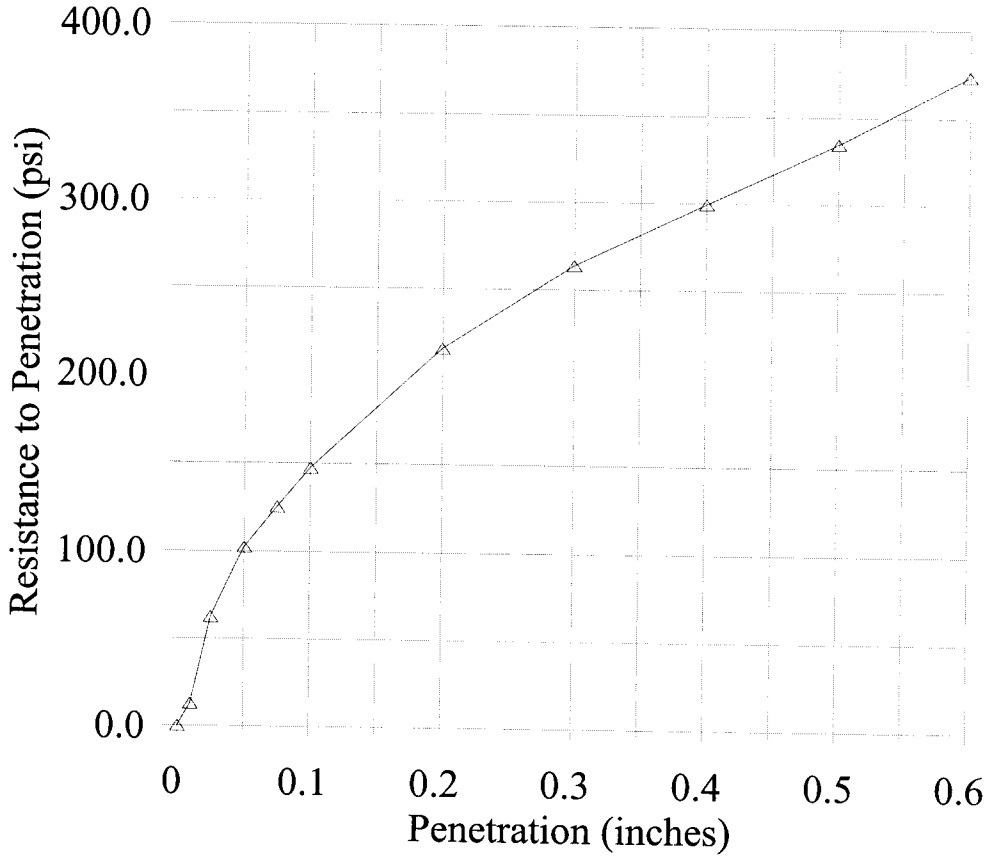
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 27
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 70
Project State	:	Arkansas	Sample Depth :	0.7' to 21.0'
Laboratory No.	:	06127	Date Tested :	04-12-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Dark Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.2 %
Percent Swell = 0.18 %

C.B.R. @ 0.1 In. = 14.8
C.B.R. @ 0.2 In. = 14.4
C.B.R. @ 0.3 In. = 13.9
C.B.R. @ 0.4 In. = 13.0
C.B.R. @ 0.5 In. = 12.9*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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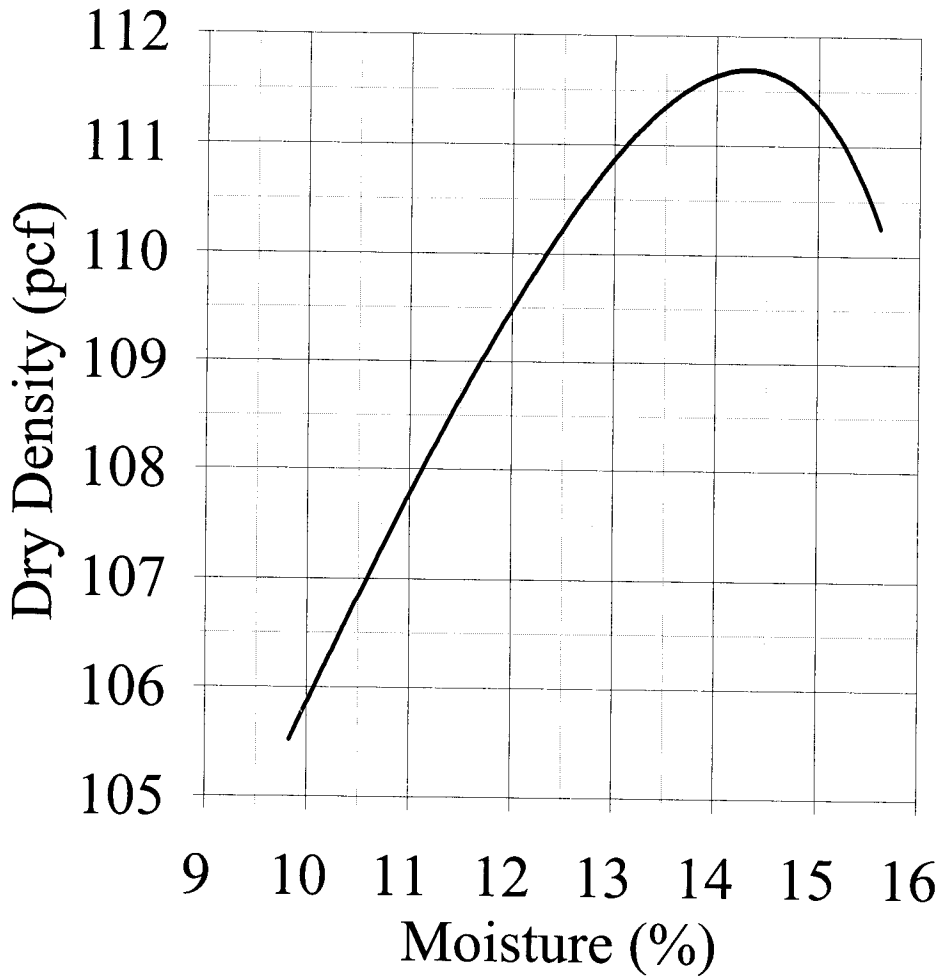
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 27
Project County	: Washington / Benton	Sample Loc. :	Boring No. 70
Project State	: Arkansas	Sample Depth :	0.7' to 21.0'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Brown Sandy Lean Clay		



MAXIMUM DENSITY: 112 pcf

OPTIMUM MOISTURE: 14 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bcc

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SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 28
Project County	: Washington / Benton	Sample Loc.	: Boring No. 70
Project State	: Arkansas	Sample Depth	: 21.0' to 25.8'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Tan Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.1
No.4		4.75	mm	94.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	89.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	68.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0130mm

California Bearing Ratio	: 9.2	Natural Moisture (%)	: 41.5
Maximum Dry Density	: 97 pcf	Liquid Limit	: 50
Optimum Moisture	: 23 %	Plastic Limit	: 24
		Plasticity Index	: 26
AASHTO Composition of Total Sample		Liquidity Index	: 0.67
Gravel (3in. + No.10)	: 10.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 11.4	AASHTO Classification	: A-7-6 (17)
Silt + Clay (-No.200)	: 68.0	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.1
Coarse Sand (-No.4 + No.10)	: 5.7
Medium Sand (-No.10 + No.40)	: 9.8
Fine Sand (-No.40 + No.200)	: 11.4
Silt + Clay (-No.200)	: 68.0

Approved By : DLC

Soil No. 30

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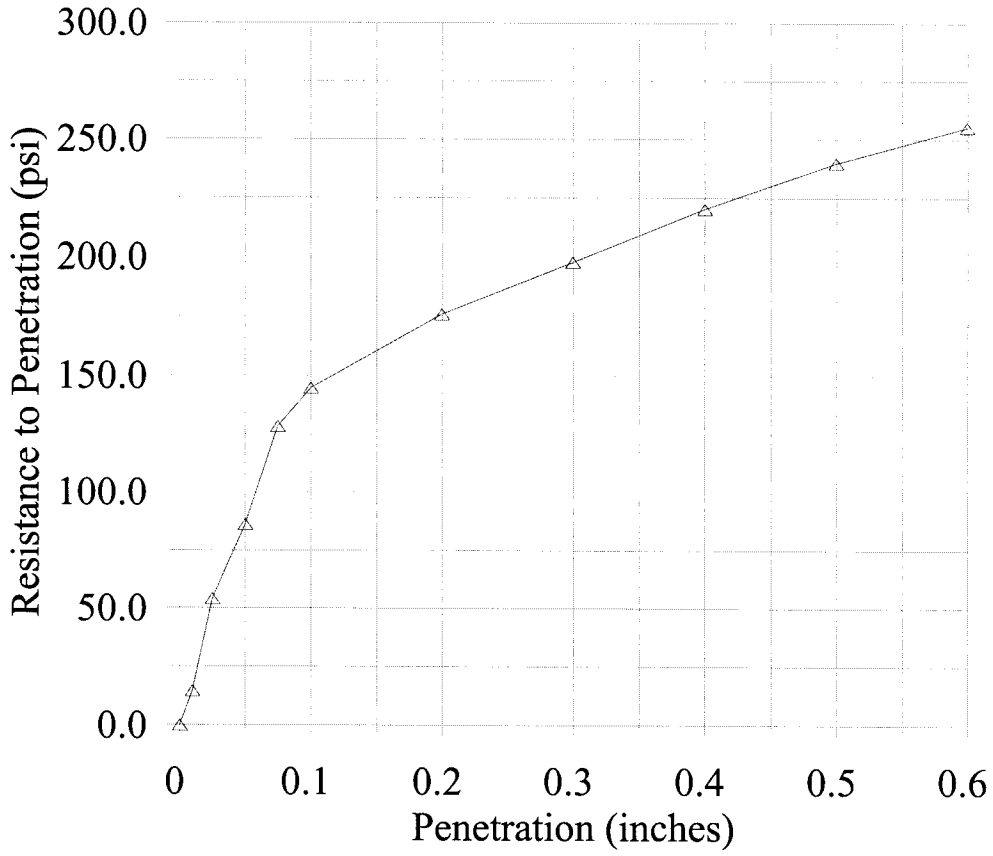
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 28
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 70
Project State	:	Arkansas	Sample Depth :	21.0' to 25.8'
Laboratory No.	:	06127	Date Tested :	04-10-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Tan Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 102.0 %
Percent Swell = 0.35 %

C.B.R. @ 0.1 In. = 14.5
C.B.R. @ 0.2 In. = 11.7
C.B.R. @ 0.3 In. = 10.4
C.B.R. @ 0.4 In. = 9.6
C.B.R. @ 0.5 In. = 9.2*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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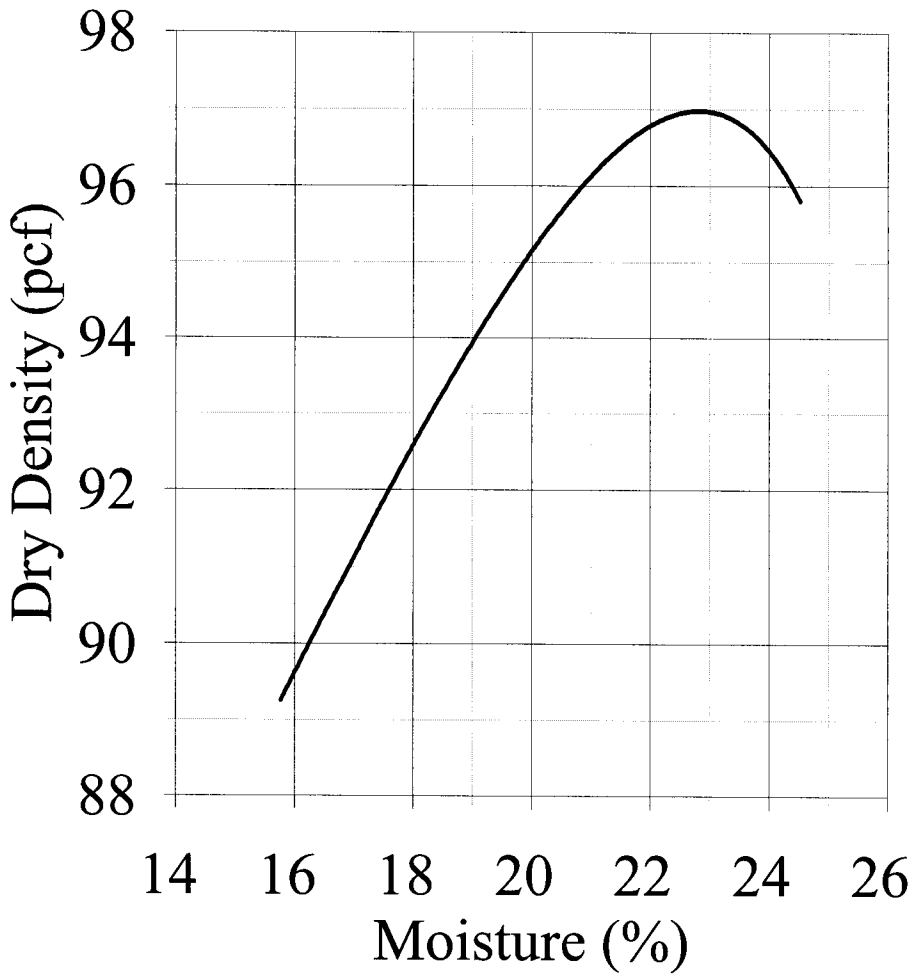
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 28
Project County	: Washington / Benton	Sample Loc. :	Boring No. 70
Project State	: Arkansas	Sample Depth :	21.0' to 25.8'
Laboratory No.	: 06127	Date Tested :	04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Tan Sandy Fat Clay		



MAXIMUM DENSITY: 97 pcf

OPTIMUM MOISTURE: 23 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 30
Project County	: Washington / Benton	Sample Loc.	: Boring No. 73
Project State	: Arkansas	Sample Depth	: 0.8' to 12.4'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Brown Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.0
No.4		4.75	mm	89.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	77.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	46.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.1059mm

California Bearing Ratio	: 6.0	Natural Moisture (%)	: 17.9
Maximum Dry Density	: 114 pcf	Liquid Limit	: 35
Optimum Moisture	: 15 %	Plastic Limit	: 17
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.05
Gravel (3in. + No.10)	: 22.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 15.6	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 46.9	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 10.5
Coarse Sand (-No.4 + No.10)	: 11.8
Medium Sand (-No.10 + No.40)	: 15.2
Fine Sand (-No.40 + No.200)	: 15.6
Silt + Clay (-No.200)	: 46.9

Approved By : DLC

Soil No. 31

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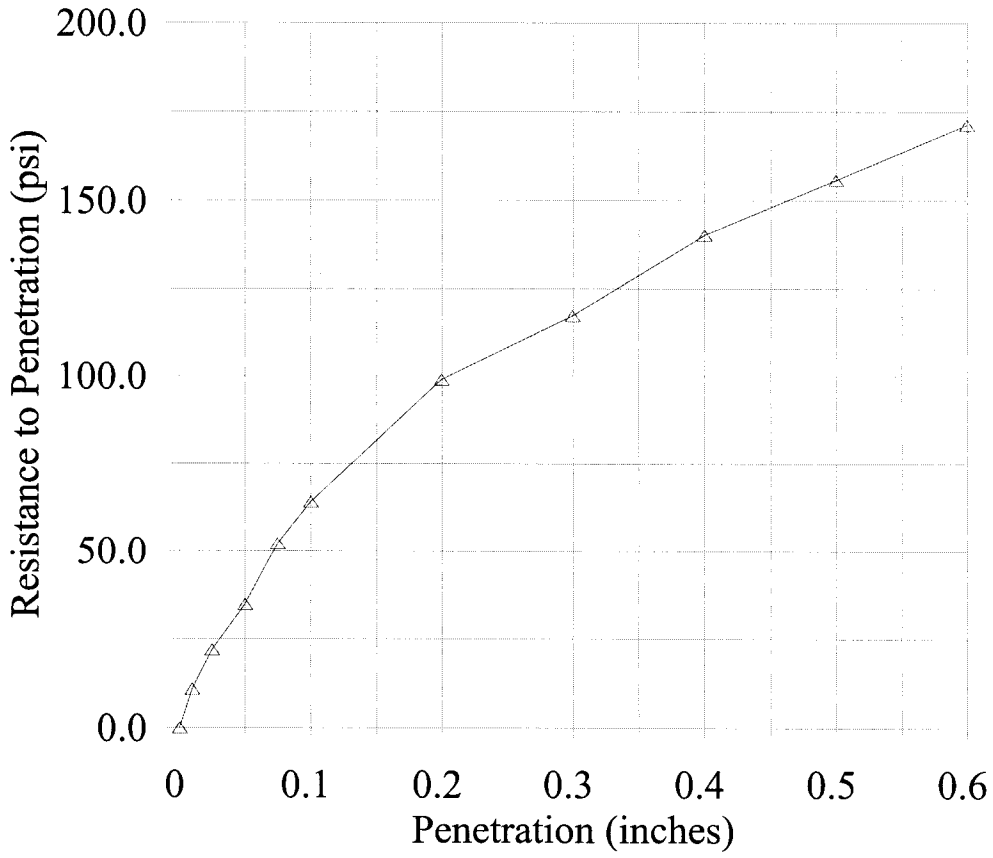
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 30
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 73
Project State	:	Arkansas	Sample Depth :	0.8' to 12.4'
Laboratory No.	:	06127	Date Tested :	04-12-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Dark Brown Clayey Sand		



Compaction Effort = 2000 psi
Percent Compacted = 94.7 %
Percent Swell = 0.06 %

C.B.R. @ 0.1 In. = 6.4
C.B.R. @ 0.2 In. = 6.6
C.B.R. @ 0.3 In. = 6.2
C.B.R. @ 0.4 In. = 6.1
C.B.R. @ 0.5 In. = 6.0*

COMMENTS: KM 64-501-02

APPROVED BY: QC

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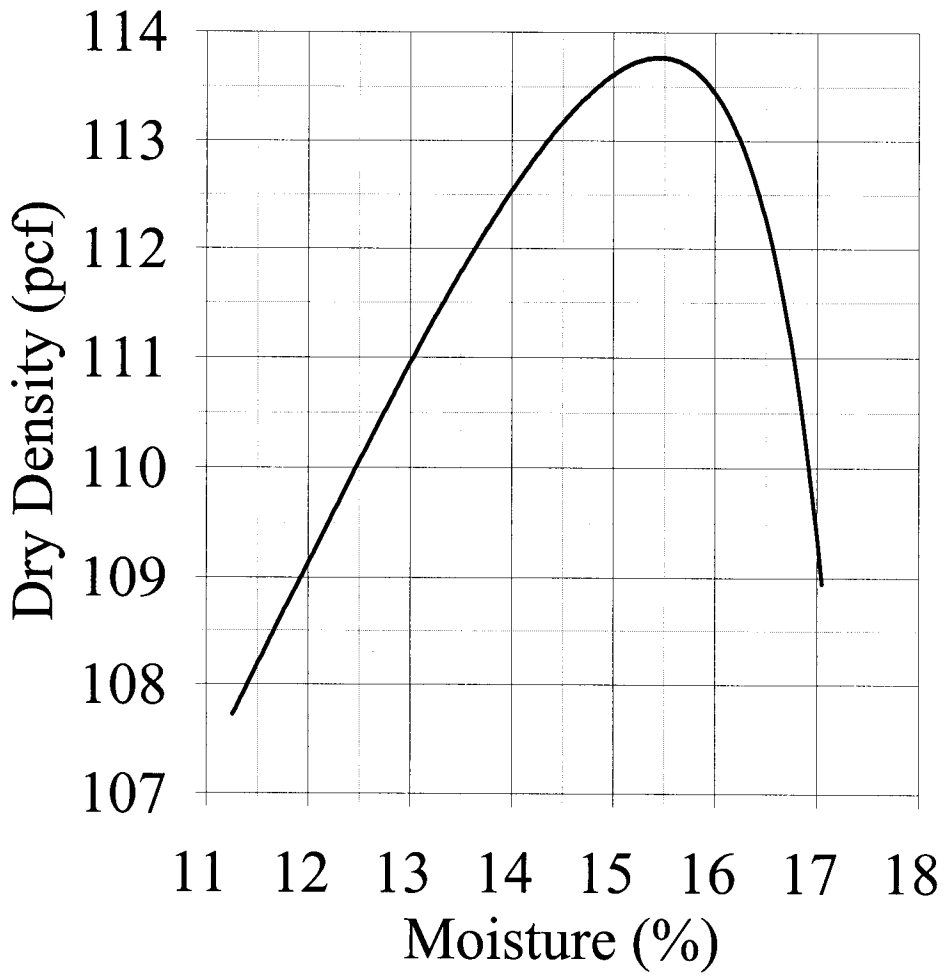
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 30
Project County	: Washington / Benton	Sample Loc. :	Boring No. 73
Project State	: Arkansas	Sample Depth :	0.8' to 12.4'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Brown Clayey Sand		



MAXIMUM DENSITY: 114 pcf

OPTIMUM MOISTURE: 15 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 31
Project County	: Washington / Benton	Sample Loc.	: Boring No. 74
Project State	: Arkansas	Sample Depth	: 0.8' to 8.5'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Reddish Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	98.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	90.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0107mm

California Bearing Ratio	: 1.9	Natural Moisture (%)	: 18.6
Maximum Dry Density	: 98 pcf	Liquid Limit	: 51
Optimum Moisture	: 22 %	Plastic Limit	: 21
		Plasticity Index	: 30
AASHTO Composition of Total Sample		Liquidity Index	: -0.08
Gravel (3in. + No.10)	: 1.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 20.1	AASHTO Classification	: A-7-6 (20)
Silt + Clay (-No.200)	: 70.8	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.3
Coarse Sand (-No.4 + No.10)	: 1.6
Medium Sand (-No.10 + No.40)	: 7.2
Fine Sand (-No.40 + No.200)	: 20.1
Silt + Clay (-No.200)	: 70.8

Approved By : DLC

Soil No. 32

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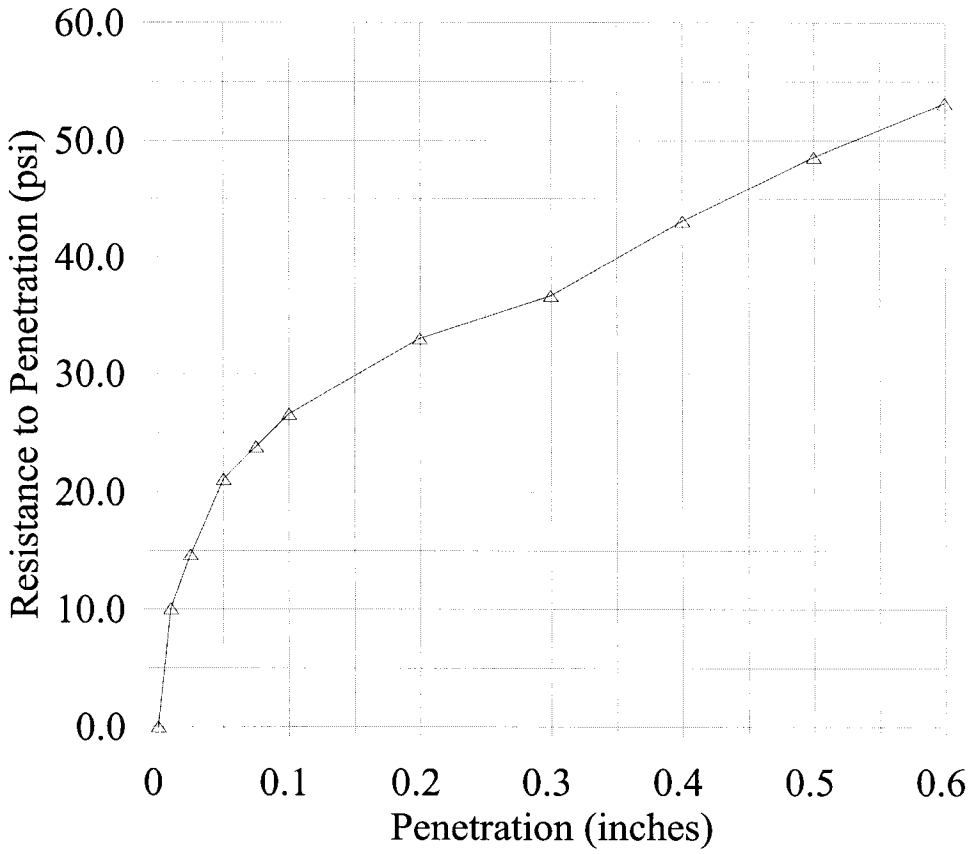
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 31
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 74
Project State	:	Arkansas	Sample Depth :	0.8' to 8.5'
Laboratory No.	:	06127	Date Tested :	04-12-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Dark Reddish Brown Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100.8 %
Percent Swell = 4.98 %

C.B.R. @ 0.1 In. = 2.7
C.B.R. @ 0.2 In. = 2.2
C.B.R. @ 0.3 In. = 1.9
C.B.R. @ 0.4 In. = 1.9
C.B.R. @ 0.5 In. = 1.9*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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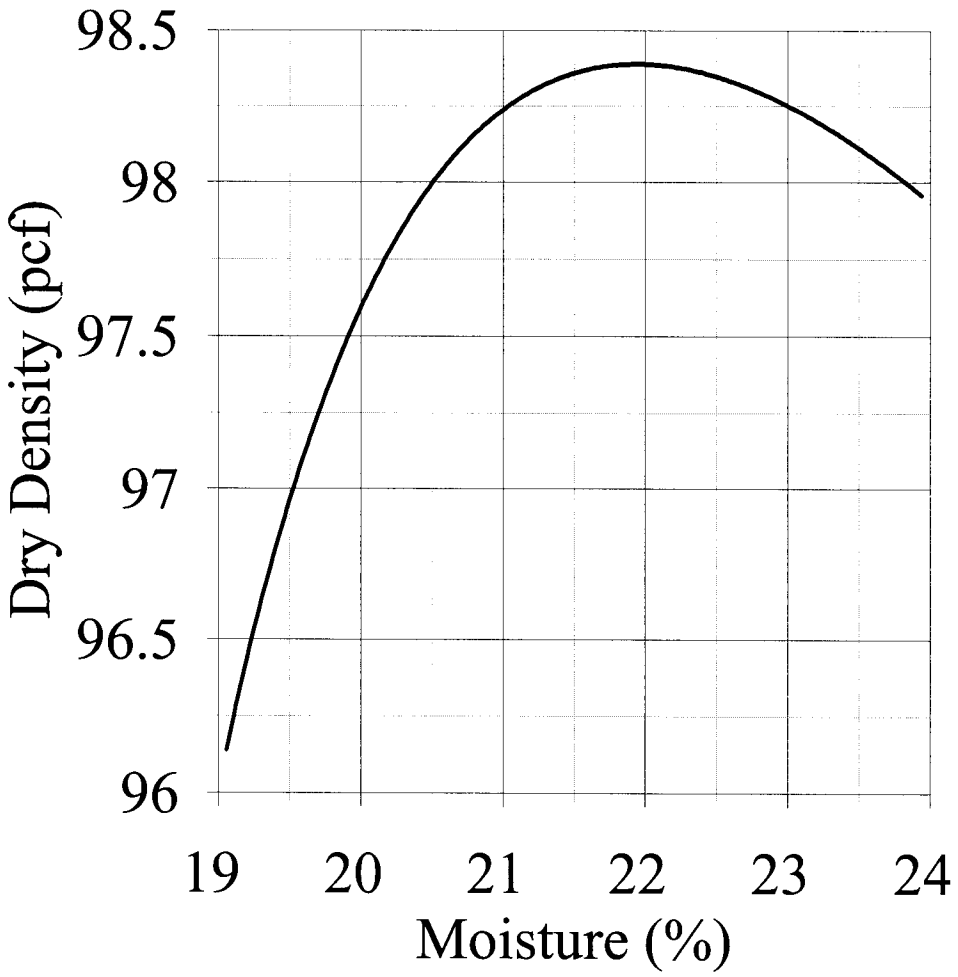
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 31
Project County	: Washington / Benton	Sample Loc. :	Boring No. 74
Project State	: Arkansas	Sample Depth :	0.8' to 8.5'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Reddish Brown Sandy Fat Clay		



MAXIMUM DENSITY: 98 pcf

OPTIMUM MOISTURE: 22 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 34
Project County	: Washington / Benton	Sample Loc.	: Boring No. 76
Project State	: Arkansas	Sample Depth	: 0.8' to 11.9'
Laboratory No.	: 06127	Date Tested	: 04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Dark Brown Sandy Silt		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.6
No.4		4.75	mm	92.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	53.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0475mm

California Bearing Ratio	: 6.5	Natural Moisture (%)	: 21.4
Maximum Dry Density	: 119 pcf	Liquid Limit	: 20
Optimum Moisture	: 15 %	Plastic Limit	: 18
		Plasticity Index	: 2
AASHTO Composition of Total Sample		Liquidity Index	: 1.70
Gravel (3in. + No.10)	: 17.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 23.4	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 53.7	ASTM Classification	: ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.6
Fine Gravel (-3/4in. + No.4)	: 5.4
Coarse Sand (-No.4 + No.10)	: 9.1
Medium Sand (-No.10 + No.40)	: 5.8
Fine Sand (-No.40 + No.200)	: 23.4
Silt + Clay (-No.200)	: 53.7

Approved By : DLC

Soil No. 33

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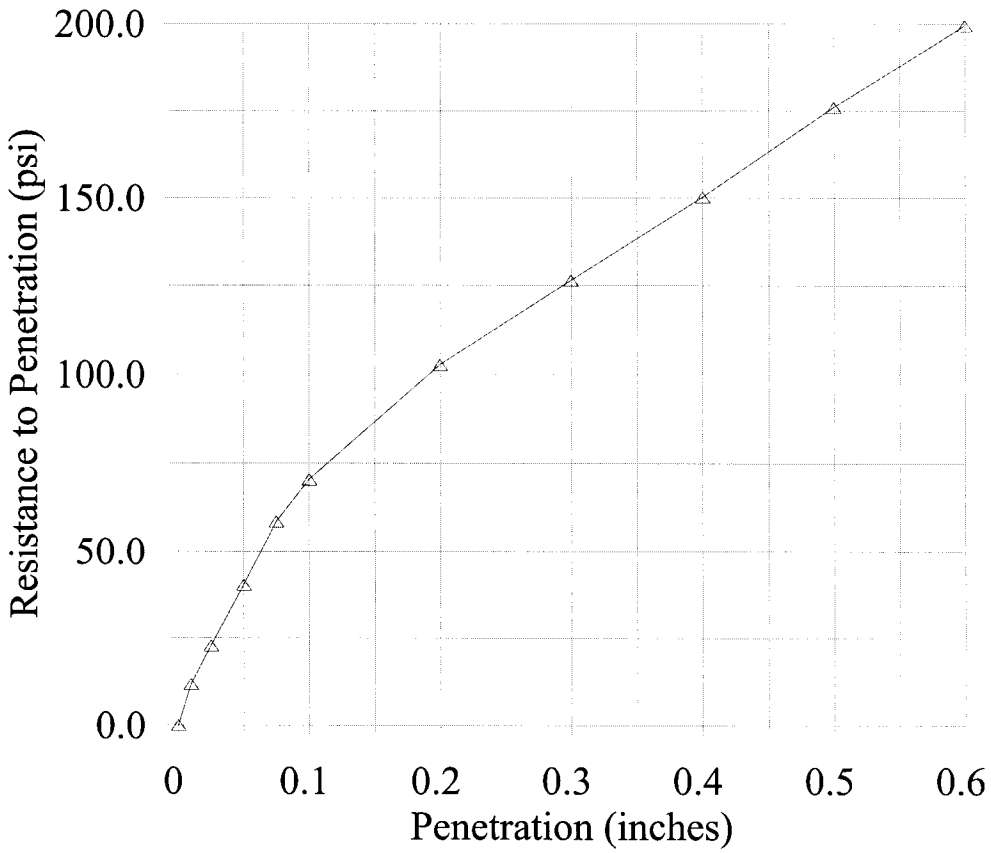
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 34
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 76
Project State	:	Arkansas	Sample Depth :	0.8' to 11.9'
Laboratory No.	:	06127	Date Tested :	04-12-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Dark Brown Sandy Silt		



Compaction Effort = 2000 psi
Percent Compacted = 99.6 %
Percent Swell = 0.99 %

C.B.R. @ 0.1 In. = 7.1
C.B.R. @ 0.2 In. = 6.8
C.B.R. @ 0.3 In. = 6.7
C.B.R. @ 0.4 In. = 6.5*
C.B.R. @ 0.5 In. = 6.8

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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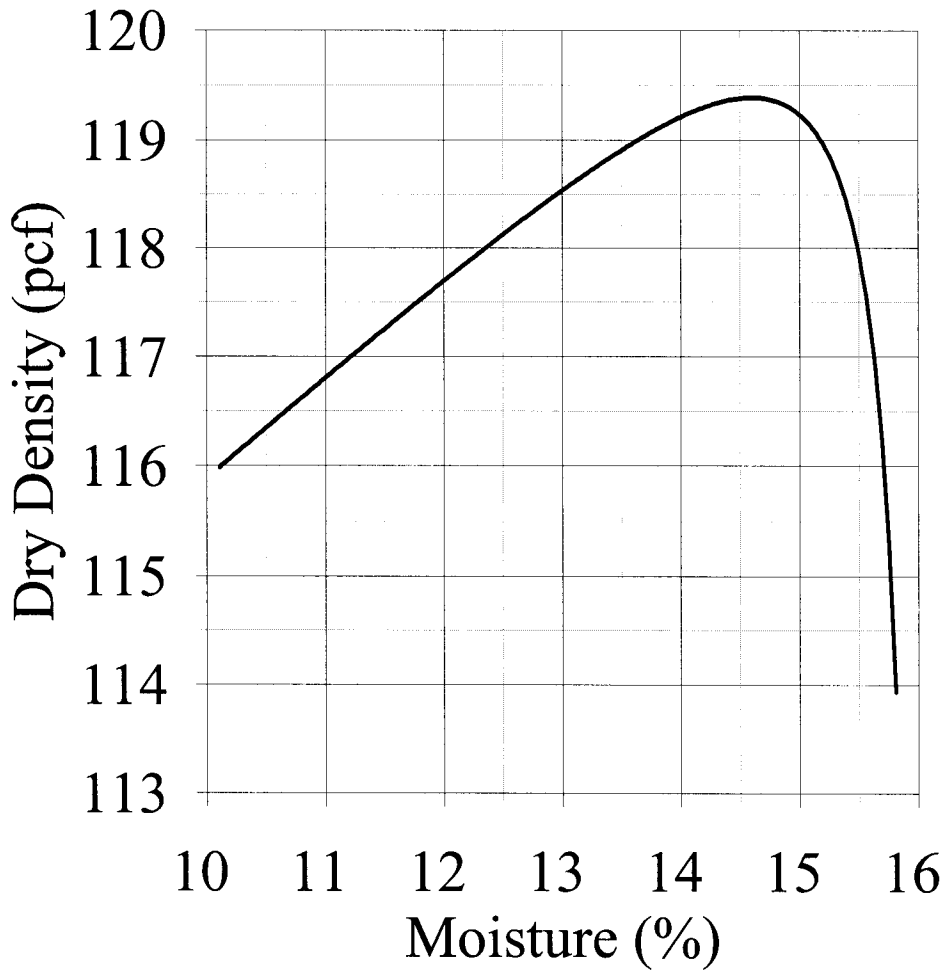
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 34
Project County	: Washington / Benton	Sample Loc. :	Boring No. 76
Project State	: Arkansas	Sample Depth :	0.8' to 11.9'
Laboratory No.	: 06127	Date Tested :	04-12-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Dark Brown Sandy Silt		



MAXIMUM DENSITY: 119 pcf

OPTIMUM MOISTURE: 15 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 32
Project County	: Washington / Benton	Sample Loc.	: Boring No. 78
Project State	: Arkansas	Sample Depth	: 0.8' to 8.0'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-08-07
Soil Type	: Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	99.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	97.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0109mm

California Bearing Ratio	: 9.4	Natural Moisture (%)	: 27.4
Maximum Dry Density	: 116 pcf	Liquid Limit	: 27
Optimum Moisture	: 12 %	Plastic Limit	: 17
		Plasticity Index	: 10
AASHTO Composition of Total Sample		Liquidity Index	: 1.04
Gravel (3in. + No.10)	: 0.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 1.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 27.2	AASHTO Classification	: A-4 (5)
Silt + Clay (-No.200)	: 70.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.1
Coarse Sand (-No.4 + No.10)	: 0.7
Medium Sand (-No.10 + No.40)	: 1.4
Fine Sand (-No.40 + No.200)	: 27.2
Silt + Clay (-No.200)	: 70.6

Approved By : NC

Soil No. 34

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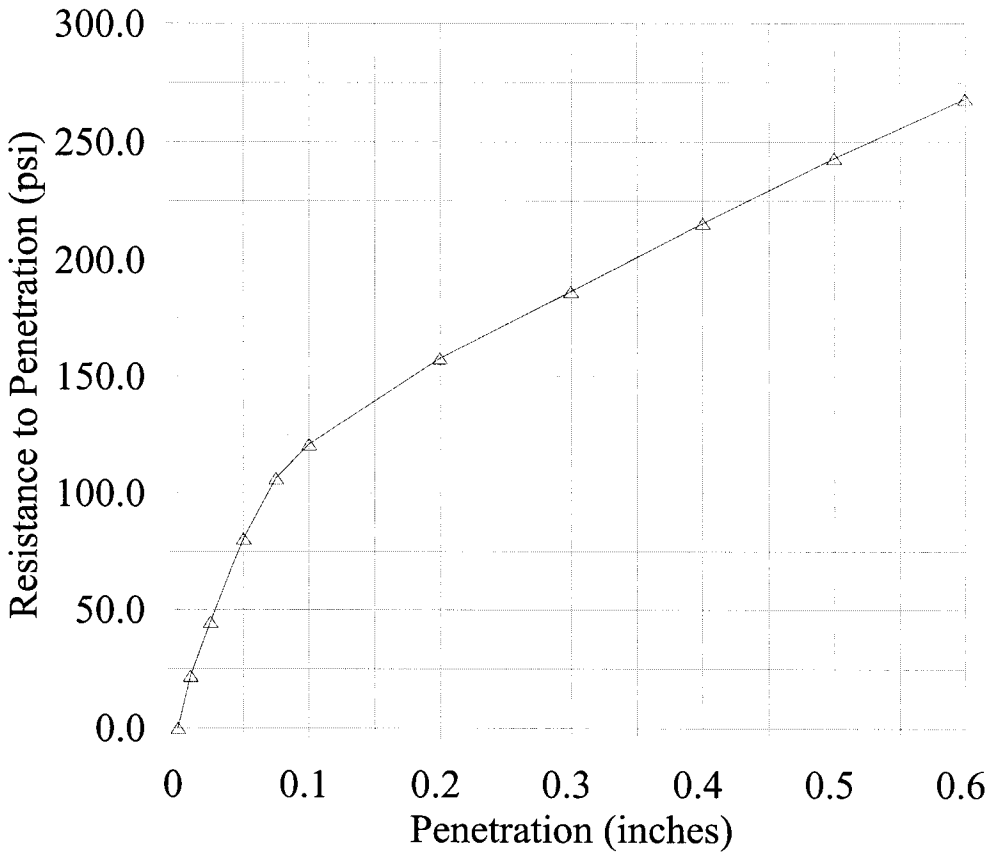
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 32
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 78
Project State	:	Arkansas	Sample Depth :	0.8' to 8.0'
Laboratory No.	:	06127	Date Tested :	04-10-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	:	Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100.1 %
Percent Swell = 0.40 %

C.B.R. @ 0.1 In. = 12.1
C.B.R. @ 0.2 In. = 10.5
C.B.R. @ 0.3 In. = 9.8
C.B.R. @ 0.4 In. = 9.4
C.B.R. @ 0.5 In. = 9.4*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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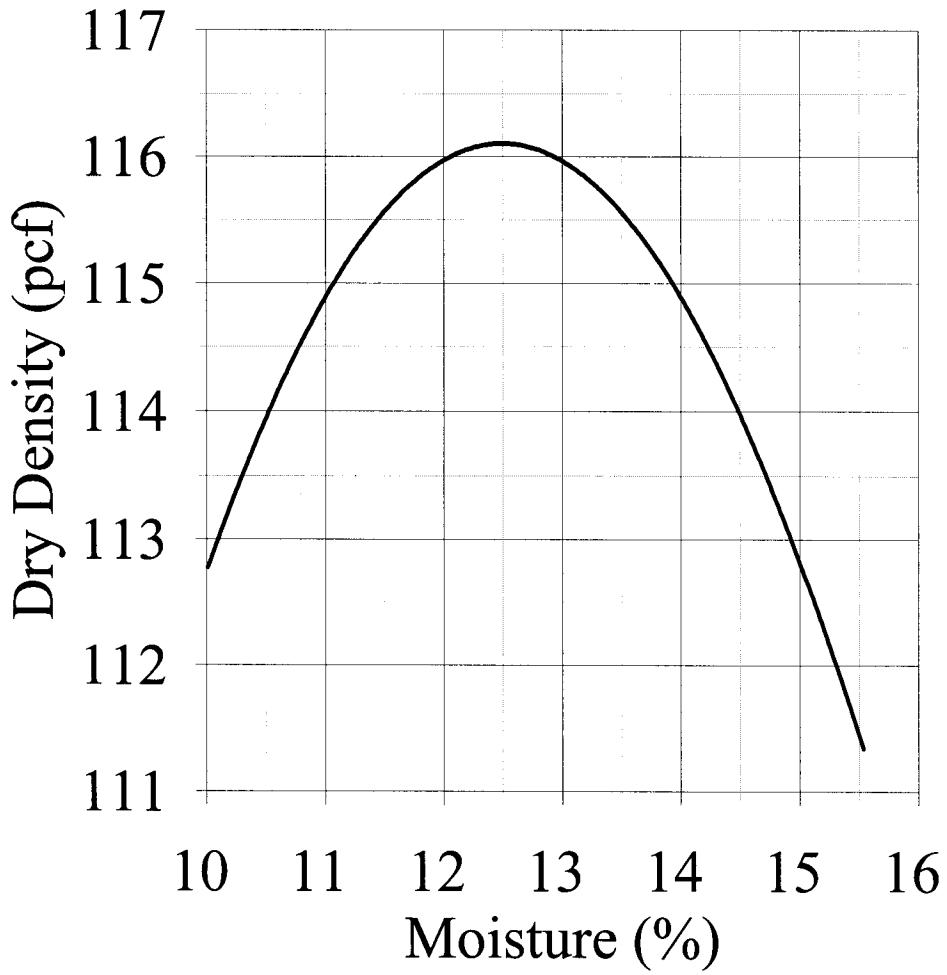
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 32
Project County	: Washington / Benton	Sample Loc. :	Boring No. 78
Project State	: Arkansas	Sample Depth :	0.8' to 8.0'
Laboratory No.	: 06127	Date Tested :	04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-08-07
Soil Type	: Brown Sandy Lean Clay		



MAXIMUM DENSITY: 116 pcf

OPTIMUM MOISTURE: 12 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 33
Project County	: Washington / Benton	Sample Loc.	: Boring No. 78
Project State	: Arkansas	Sample Depth	: 8.0' to 12.0'
Laboratory No.	: 06127	Date Tested	: 04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-09-07
Soil Type	: Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.5
No.4		4.75	mm	95.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	88.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	84.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0429mm

California Bearing Ratio	: 8.2	Natural Moisture (%)	: 13.4
Maximum Dry Density	: 120 pcf	Liquid Limit	: 28
Optimum Moisture	: 13 %	Plastic Limit	: 15
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: -0.12
Gravel (3in. + No.10)	: 11.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 4.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 29.9	AASHTO Classification	: A-6 (4)
Silt + Clay (-No.200)	: 54.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 4.9
Coarse Sand (-No.4 + No.10)	: 6.2
Medium Sand (-No.10 + No.40)	: 4.4
Fine Sand (-No.40 + No.200)	: 29.9
Silt + Clay (-No.200)	: 54.6

Approved By : DLC

Soil No. 35

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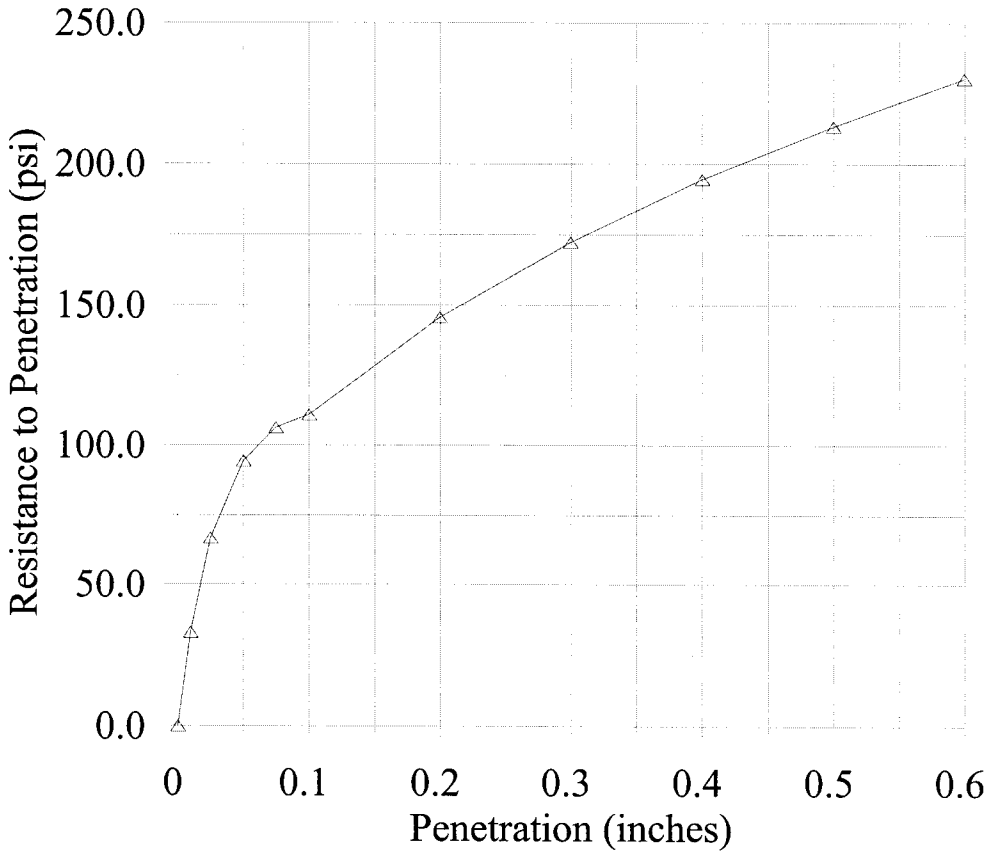
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass			
Project No.	:	06127	Sample No.	:	Bag No. 33
Project County	:	Washington / Benton	Sample Loc.	:	Boring No. 78
Project State	:	Arkansas	Sample Depth	:	8.0' to 12.0'
Laboratory No.	:	06127	Date Tested	:	04-10-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	:	08-09-07
Soil Type	:	Brown Sandy Lean Clay			



Compaction Effort = 2000 psi
Percent Compacted = 99.7 %
Percent Swell = 0.24 %

C.B.R. @ 0.1 In. = 11.1
C.B.R. @ 0.2 In. = 9.7
C.B.R. @ 0.3 In. = 9.1
C.B.R. @ 0.4 In. = 8.5
C.B.R. @ 0.5 In. = 8.2*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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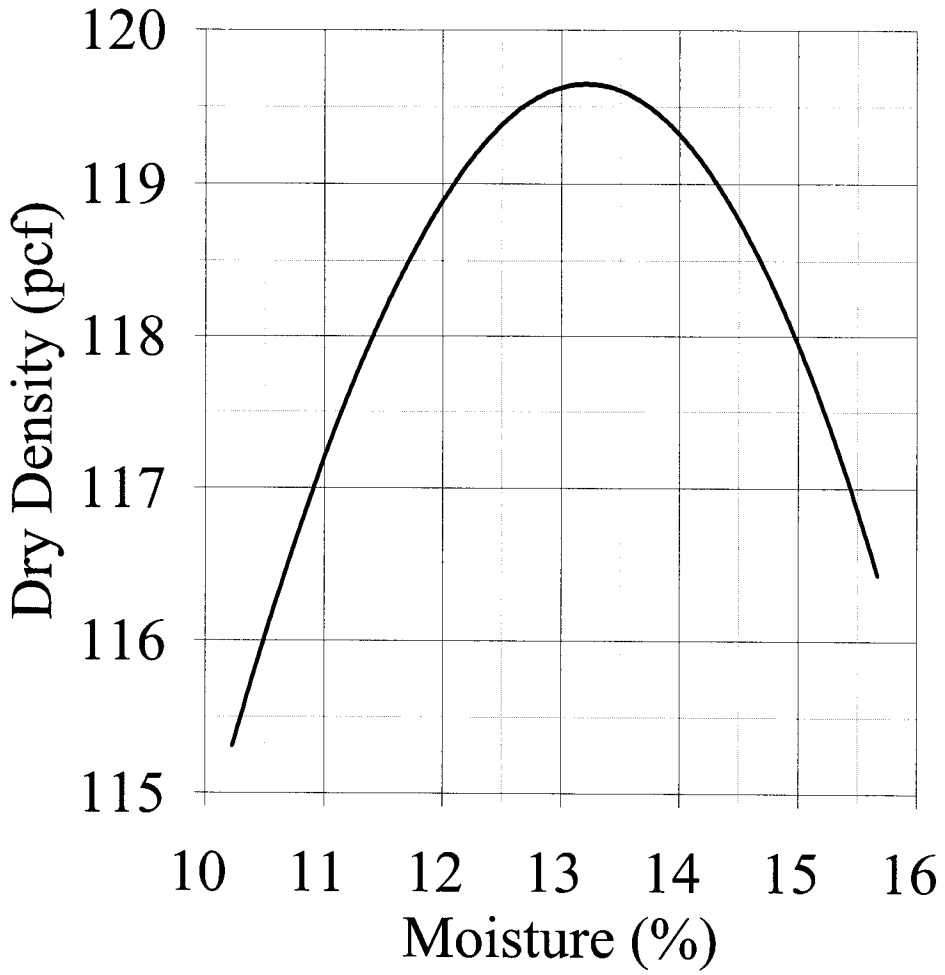
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 33
Project County	: Washington / Benton	Sample Loc. :	Boring No. 78
Project State	: Arkansas	Sample Depth :	8.0' to 12.0'
Laboratory No.	: 06127	Date Tested :	04-10-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	08-09-07
Soil Type	: Brown Sandy Lean Clay		



MAXIMUM DENSITY: 120 pcf

OPTIMUM MOISTURE: 13 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bcc

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 29
Project County	: Washington / Benton	Sample Loc.	: Boring No. 83
Project State	: Arkansas	Sample Depth	: 0.8' to 5.0'
Laboratory No.	: 06127	Date Tested	: 04-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 08-09-07
Soil Type	: Dark Brown Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	98.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	95.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	92.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0036mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.4
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 24
AASHTO Composition of Total Sample		Liquidity Index	: 0.43
Gravel (3in. + No.10)	: 1.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 2.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.6	AASHTO Classification	: A-7-6 (24)
Silt + Clay (-No.200)	: 92.1	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.3
Coarse Sand (-No.4 + No.10)	: 1.3
Medium Sand (-No.10 + No.40)	: 2.7
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 92.1

Approved By : DLC

Soil No. 36

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 37
Project County	: Washington / Benton	Sample Loc.	: Boring No. 24
Project State	: Arkansas	Sample Depth	: 0.5' to 16.0'
Laboratory No.	: 06127	Date Tested	: 09-18-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-03-07
Soil Type	: Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	92.2
No.4		4.75	mm	85.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	77.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0336mm

California Bearing Ratio	: 9.5	Natural Moisture (%)	: 23.3
Maximum Dry Density	: 100 pcf	Liquid Limit	: 43
Optimum Moisture	: 20 %	Plastic Limit	: 22
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.06
Gravel (3in. + No.10)	: 22.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.1	AASHTO Classification	: A-7-6 (9)
Silt + Clay (-No.200)	: 56.9	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 14.6
Coarse Sand (-No.4 + No.10)	: 7.9
Medium Sand (-No.10 + No.40)	: 10.5
Fine Sand (-No.40 + No.200)	: 10.1
Silt + Clay (-No.200)	: 56.9

Approved By : DLC

Soil No. 37

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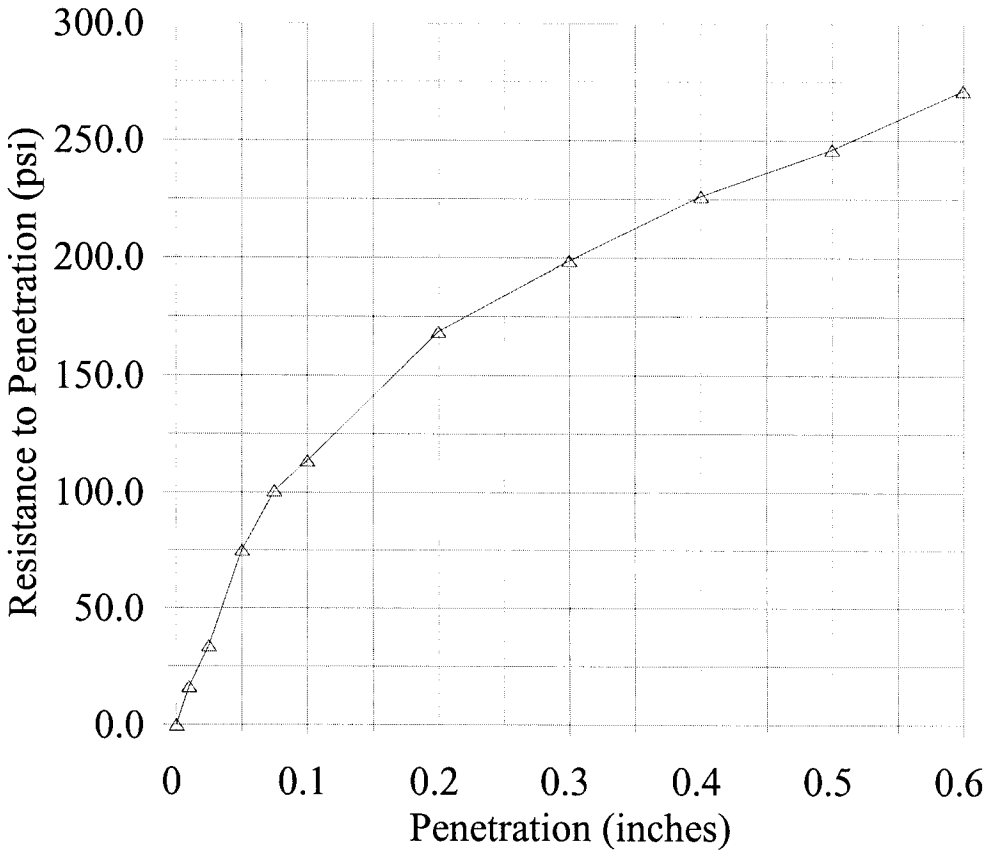
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass			
Project No.	:	06127	Sample No.	:	Bag No. 37
Project County	:	Washington / Benton	Sample Loc.	:	Boring No. 24
Project State	:	Arkansas	Sample Depth	:	0.5' to 16.0'
Laboratory No.	:	06127	Date Tested	:	09-18-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	:	10-03-07
Soil Type	:	Red Sandy Lean Clay			



Compaction Effort = 2000 psi
Percent Compacted = 101.2 %
Percent Swell = 0.04 %

C.B.R. @ 0.1 In. = 11.4
C.B.R. @ 0.2 In. = 11.2
C.B.R. @ 0.3 In. = 10.5
C.B.R. @ 0.4 In. = 9.8
C.B.R. @ 0.5 In. = 9.5*

COMMENTS: KM 64-501-02

APPROVED BY: bcc

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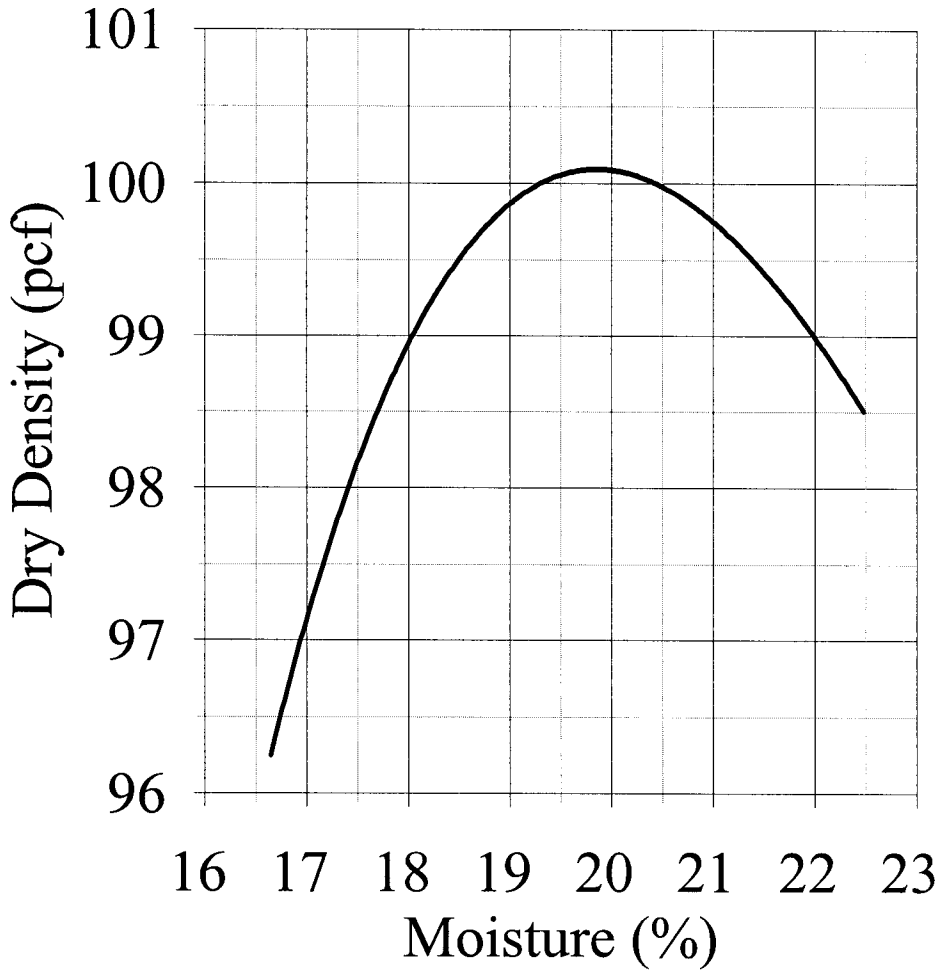
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 37
Project County	: Washington / Benton	Sample Loc. :	Boring No. 24
Project State	: Arkansas	Sample Depth :	0.5' to 16.0'
Laboratory No.	: 06127	Date Tested :	09-18-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	10-03-07
Soil Type	: Red Sandy Lean Clay		



MAXIMUM DENSITY: 100 pcf

OPTIMUM MOISTURE: 20 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: blc

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 41
Project County	: Washington / Benton	Sample Loc.	: Boring No. 84
Project State	: Arkansas	Sample Depth	: 1.0' to 22.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brown & Reddish Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.7
No.4		4.75	mm	81.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	73.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	65.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	58.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0289mm

California Bearing Ratio	: 12.8	Natural Moisture (%)	: 17.1
Maximum Dry Density	: 111 pcf	Liquid Limit	: 33
Optimum Moisture	: 14 %	Plastic Limit	: 17
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.01
Gravel (3in. + No.10)	: 26.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.9	AASHTO Classification	: A-6 (6)
Silt + Clay (-No.200)	: 58.4	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 3.0
Fine Gravel (-3/4in. + No.4)	: 16.0
Coarse Sand (-No.4 + No.10)	: 7.6
Medium Sand (-No.10 + No.40)	: 8.1
Fine Sand (-No.40 + No.200)	: 6.9
Silt + Clay (-No.200)	: 58.4

Approved By : bcc

Soil No. 41

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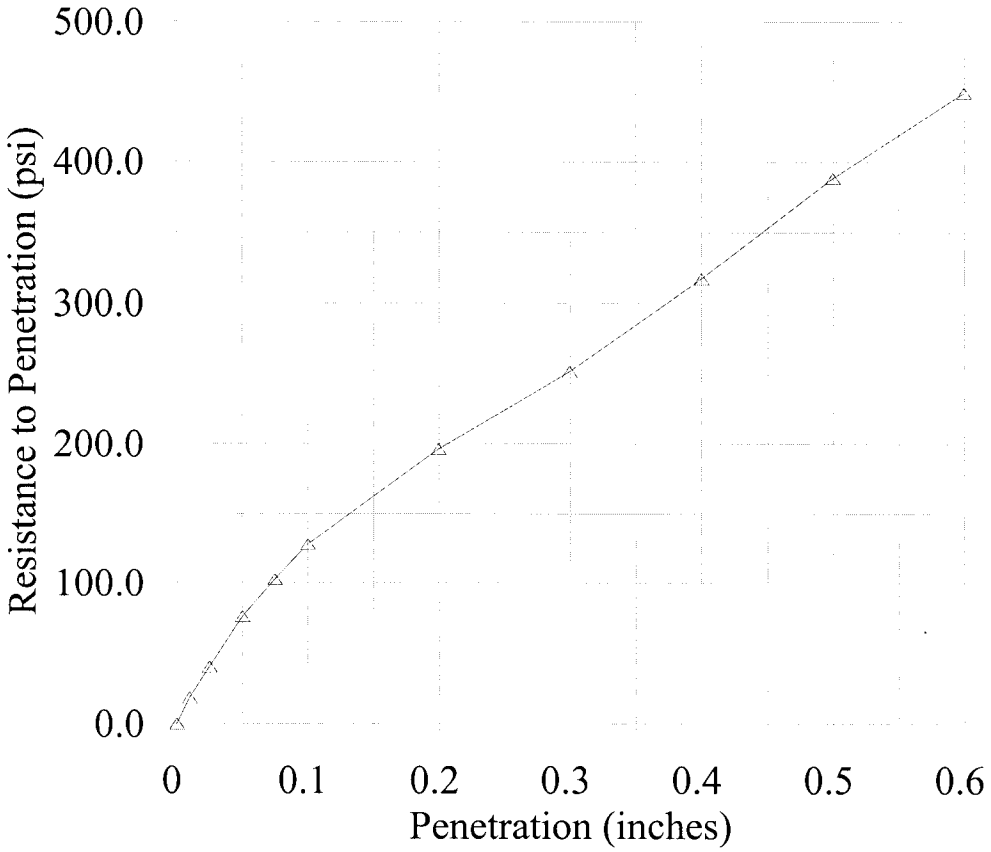
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass			
Project No.	:	06127	Sample No.	:	Bag No. 41
Project County	:	Washington / Benton	Sample Loc.	:	Boring No. 84
Project State	:	Arkansas	Sample Depth	:	1.0' to 22.0'
Laboratory No.	:	06127	Date Tested	:	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	:	11-12-07
Soil Type	:	Brown & Reddish Brown Sandy Lean Clay with Gravel			



Compaction Effort = 2000 psi
Percent Compacted = 99.5 %
Percent Swell = 0.14 %

C.B.R. @ 0.1 In. = 12.8*
C.B.R. @ 0.2 In. = 13.1
C.B.R. @ 0.3 In. = 13.3
C.B.R. @ 0.4 In. = 13.8
C.B.R. @ 0.5 In. = 14.9

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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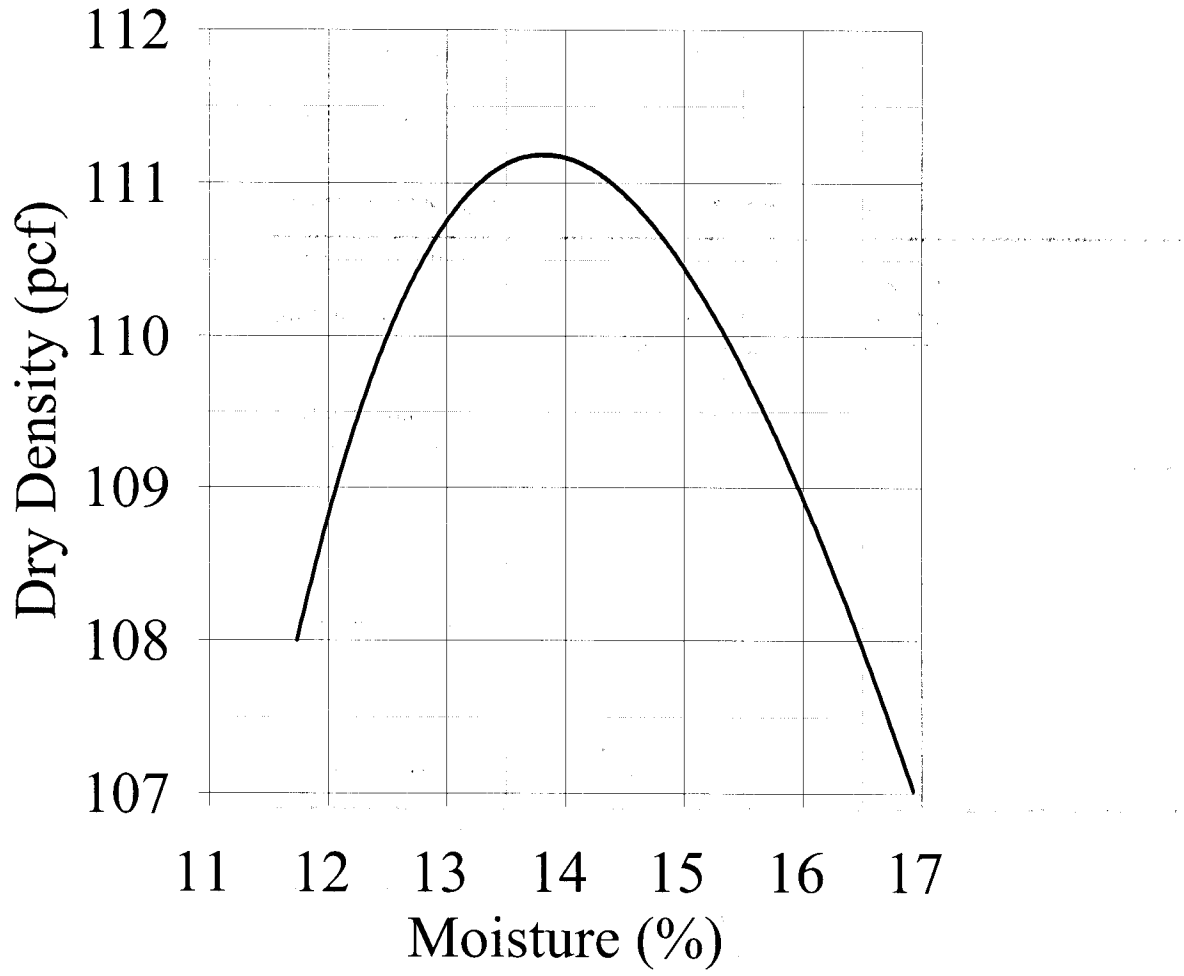
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 41
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 84
Project State	:	Arkansas	Sample Depth :	1.0' to 22.0'
Laboratory No.	:	06127	Date Tested :	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	:	Brown & Reddish Brown Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 111 pcf

OPTIMUM MOISTURE: 14 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 42
Project County	: Washington / Benton	Sample Loc.	: Boring No. 105
Project State	: Arkansas	Sample Depth	: 0.3' to 13.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Reddish Brown & Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.3
No.4		4.75	mm	84.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	63.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0402mm

California Bearing Ratio	: 11.7	Natural Moisture (%)	: 14.9
Maximum Dry Density	: 116 pcf	Liquid Limit	: 35
Optimum Moisture	: 13 %	Plastic Limit	: 16
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: -0.06
Gravel (3in. + No.10)	: 27.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.0	AASHTO Classification	: A-6 (7)
Silt + Clay (-No.200)	: 55.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 15.2
Coarse Sand (-No.4 + No.10)	: 12.7
Medium Sand (-No.10 + No.40)	: 8.9
Fine Sand (-No.40 + No.200)	: 8.0
Silt + Clay (-No.200)	: 55.2

Approved By : DLC

Soil No. 42

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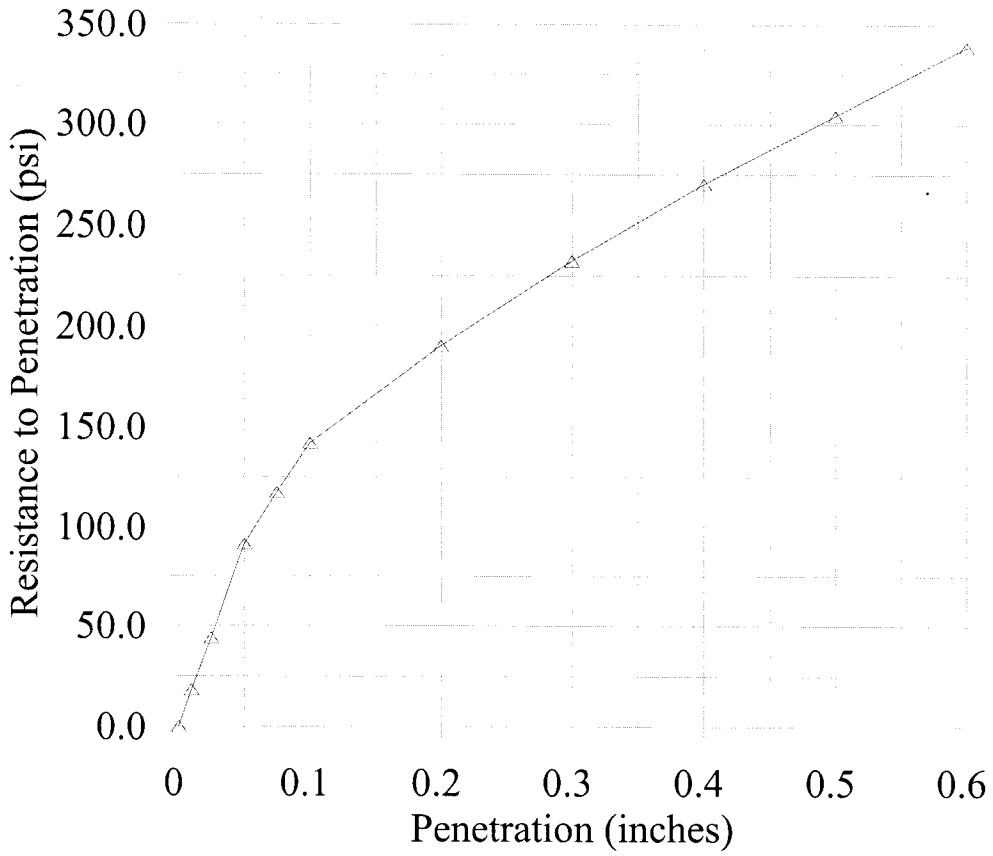
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 42
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 105
Project State	:	Arkansas	Sample Depth :	0.3' to 13.0'
Laboratory No.	:	06127	Date Tested :	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	:	Reddish Brown & Brown Sandy Lean Clay with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 101.5 %
Percent Swell = 0.04 %

C.B.R. @ 0.1 In. = 14.2
C.B.R. @ 0.2 In. = 12.7
C.B.R. @ 0.3 In. = 12.2
C.B.R. @ 0.4 In. = 11.8
C.B.R. @ 0.5 In. = 11.7*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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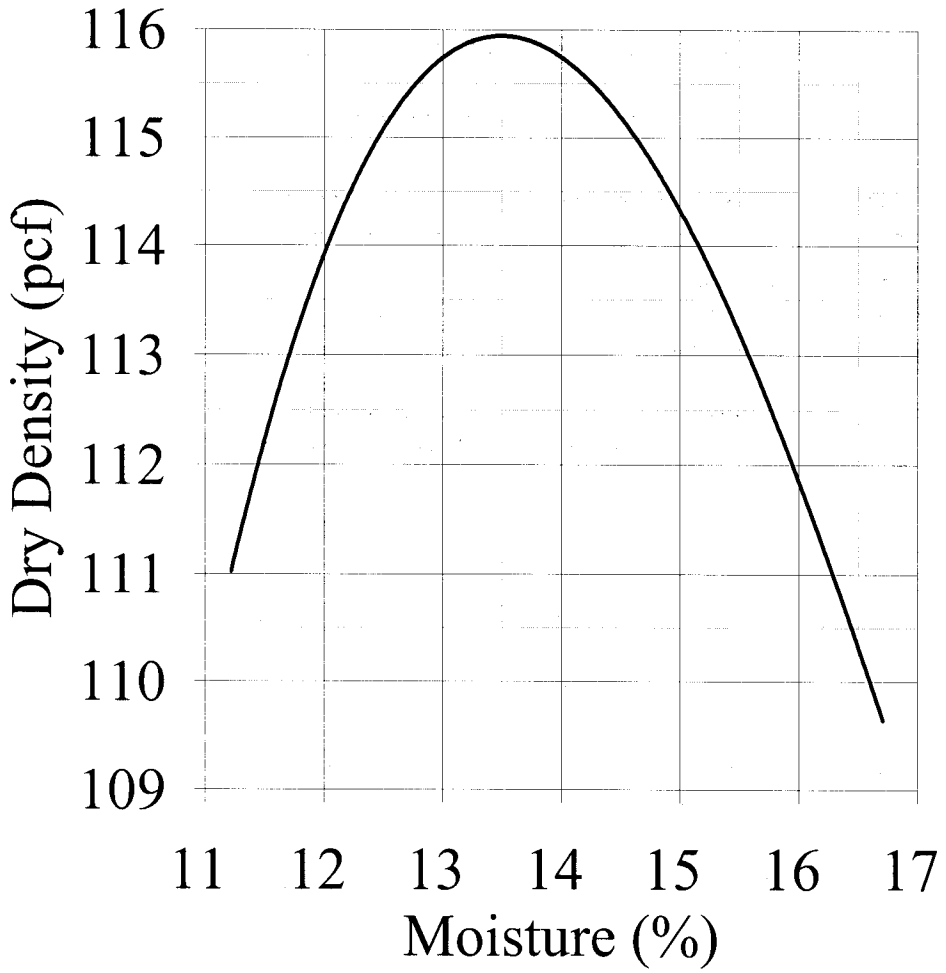
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 42
Project County	: Washington / Benton	Sample Loc. :	Boring No. 105
Project State	: Arkansas	Sample Depth :	0.3' to 13.0'
Laboratory No.	: 06127	Date Tested :	11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	: Reddish Brown & Brown Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 116 pcf

OPTIMUM MOISTURE: 13 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 43
Project County	: Washington / Benton	Sample Loc.	: Boring No. 105
Project State	: Arkansas	Sample Depth	: 13.0' to 19.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brownish Red Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.6
No.4		4.75	mm	94.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	89.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0104mm

California Bearing Ratio	: 4.5	Natural Moisture (%)	: 34.0
Maximum Dry Density	: 94 pcf	Liquid Limit	: 65
Optimum Moisture	: 25 %	Plastic Limit	: 22
		Plasticity Index	: 43
AASHTO Composition of Total Sample		Liquidity Index	: 0.28
Gravel (3in. + No.10)	: 10.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.9	AASHTO Classification	: A-7-6 (30)
Silt + Clay (-No.200)	: 71.2	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 5.8
Coarse Sand (-No.4 + No.10)	: 5.0
Medium Sand (-No.10 + No.40)	: 9.1
Fine Sand (-No.40 + No.200)	: 8.9
Silt + Clay (-No.200)	: 71.2

Approved By : DLC

Soil No. 43

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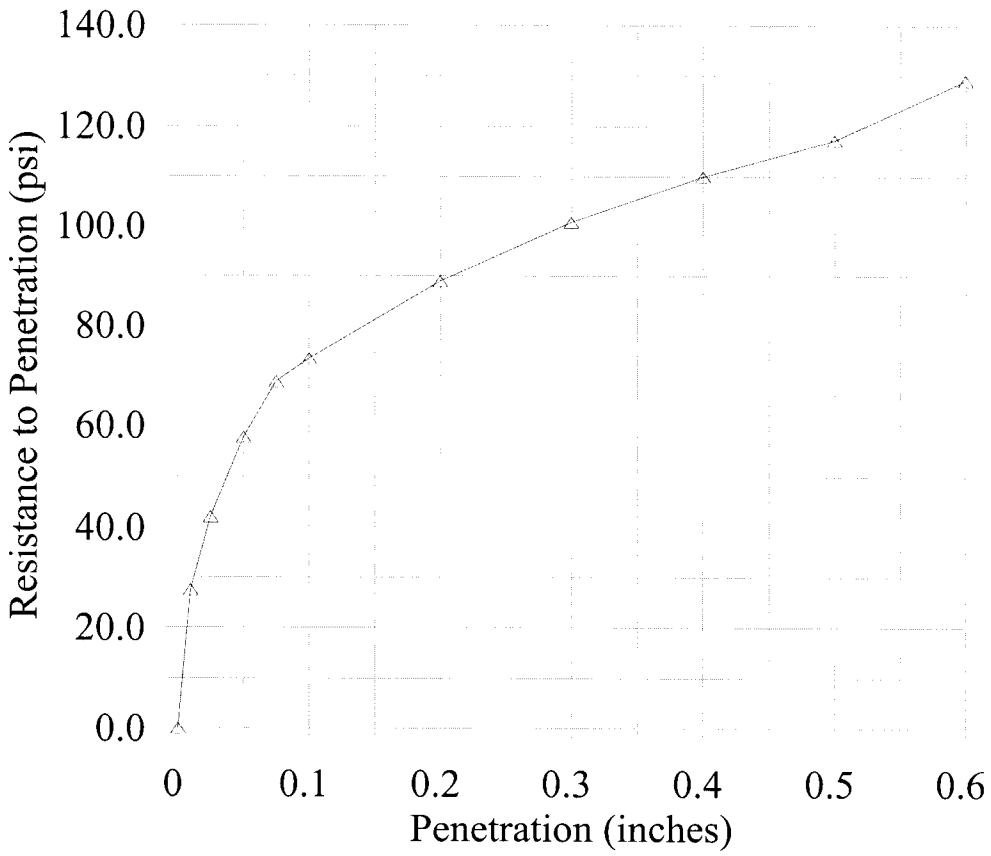
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 43
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 105
Project State	:	Arkansas	Sample Depth :	13.0' to 19.0'
Laboratory No.	:	06127	Date Tested :	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	:	Brownish Red Fat Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 100.7 %
Percent Swell = 0.32 %

C.B.R. @ 0.1 In. = 7.3
C.B.R. @ 0.2 In. = 5.9
C.B.R. @ 0.3 In. = 5.3
C.B.R. @ 0.4 In. = 4.8
C.B.R. @ 0.5 In. = 4.5*

COMMENTS: KM 64-501-02

APPROVED BY: D.C

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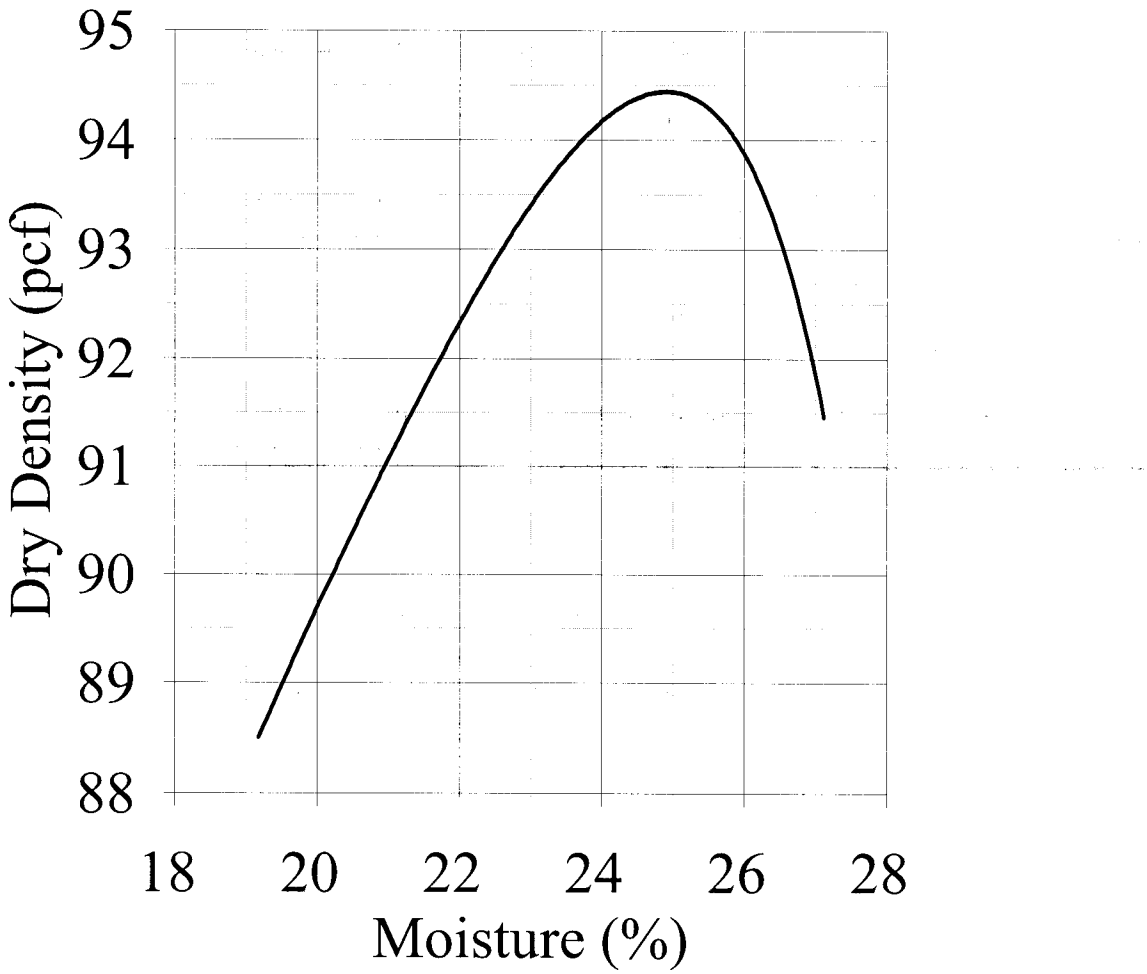
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 43
Project County	: Washington / Benton	Sample Loc. :	Boring No. 105
Project State	: Arkansas	Sample Depth :	13.0' to 19.0'
Laboratory No.	: 06127	Date Tested :	11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	: Brownish Red Fat Clay with Sand		



MAXIMUM DENSITY: 94 pcf

OPTIMUM MOISTURE: 25 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 43
Project County	: Washington / Benton	Sample Loc.	: Boring No. 101
Project State	: Arkansas	Sample Depth	: 0.3' to 5.3'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brown & Dark Brown Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.6
No.4		4.75	mm	96.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	93.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	90.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	85.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0047mm

California Bearing Ratio	: 5.6	Natural Moisture (%)	: 16.3
Maximum Dry Density	: 112 pcf	Liquid Limit	: 37
Optimum Moisture	: 15 %	Plastic Limit	: 17
		Plasticity Index	: 20
AASHTO Composition of Total Sample		Liquidity Index	: -0.03
Gravel (3in. + No.10)	: 7.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 2.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.2	AASHTO Classification	: A-6 (17)
Silt + Clay (-No.200)	: 85.9	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 3.9
Coarse Sand (-No.4 + No.10)	: 3.1
Medium Sand (-No.10 + No.40)	: 2.9
Fine Sand (-No.40 + No.200)	: 4.2
Silt + Clay (-No.200)	: 85.9

Approved By : DLC

Soil No. 44

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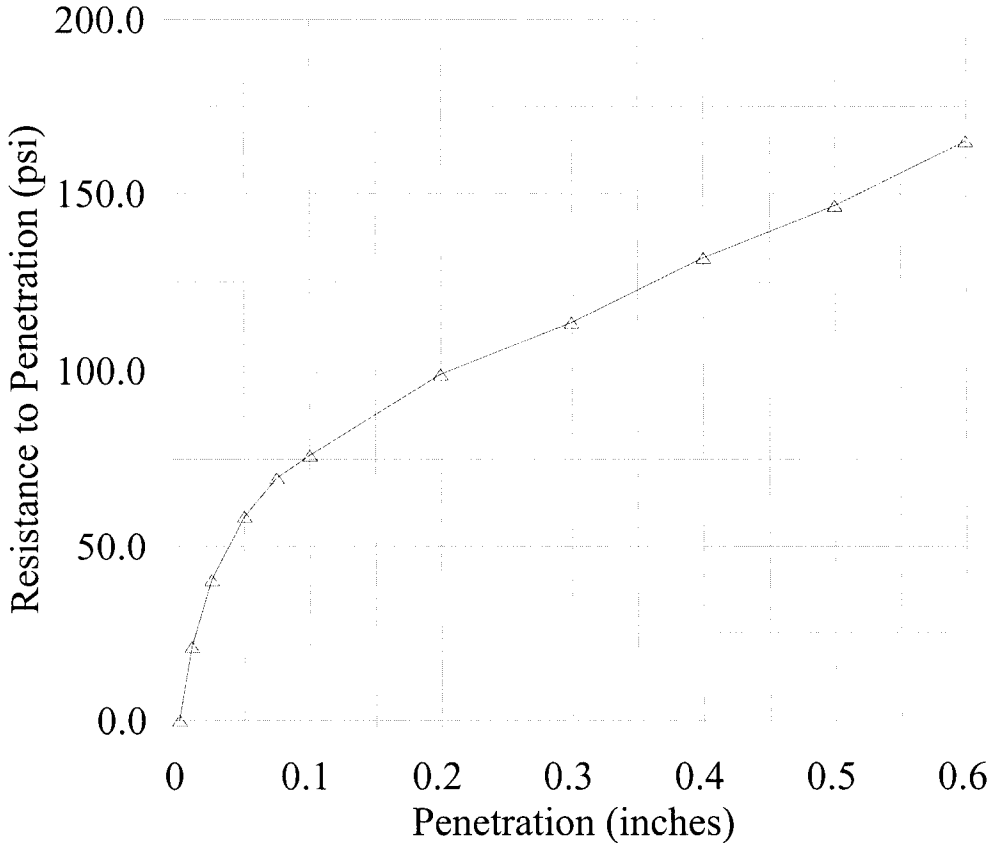
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass			
Project No.	:	06127	Sample No.	:	Bag No. 43
Project County	:	Washington / Benton	Sample Loc.	:	Boring No. 101
Project State	:	Arkansas	Sample Depth	:	0.3' to 5.3'
Laboratory No.	:	06127	Date Tested	:	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	:	11-12-07
Soil Type	:	Brown & Dark Brown Lean Clay			



Compaction Effort = 2000 psi
Percent Compacted = 98.5 %
Percent Swell = 0.64 %

C.B.R. @ 0.1 In. = 7.6
C.B.R. @ 0.2 In. = 6.6
C.B.R. @ 0.3 In. = 6.0
C.B.R. @ 0.4 In. = 5.7
C.B.R. @ 0.5 In. = 5.6*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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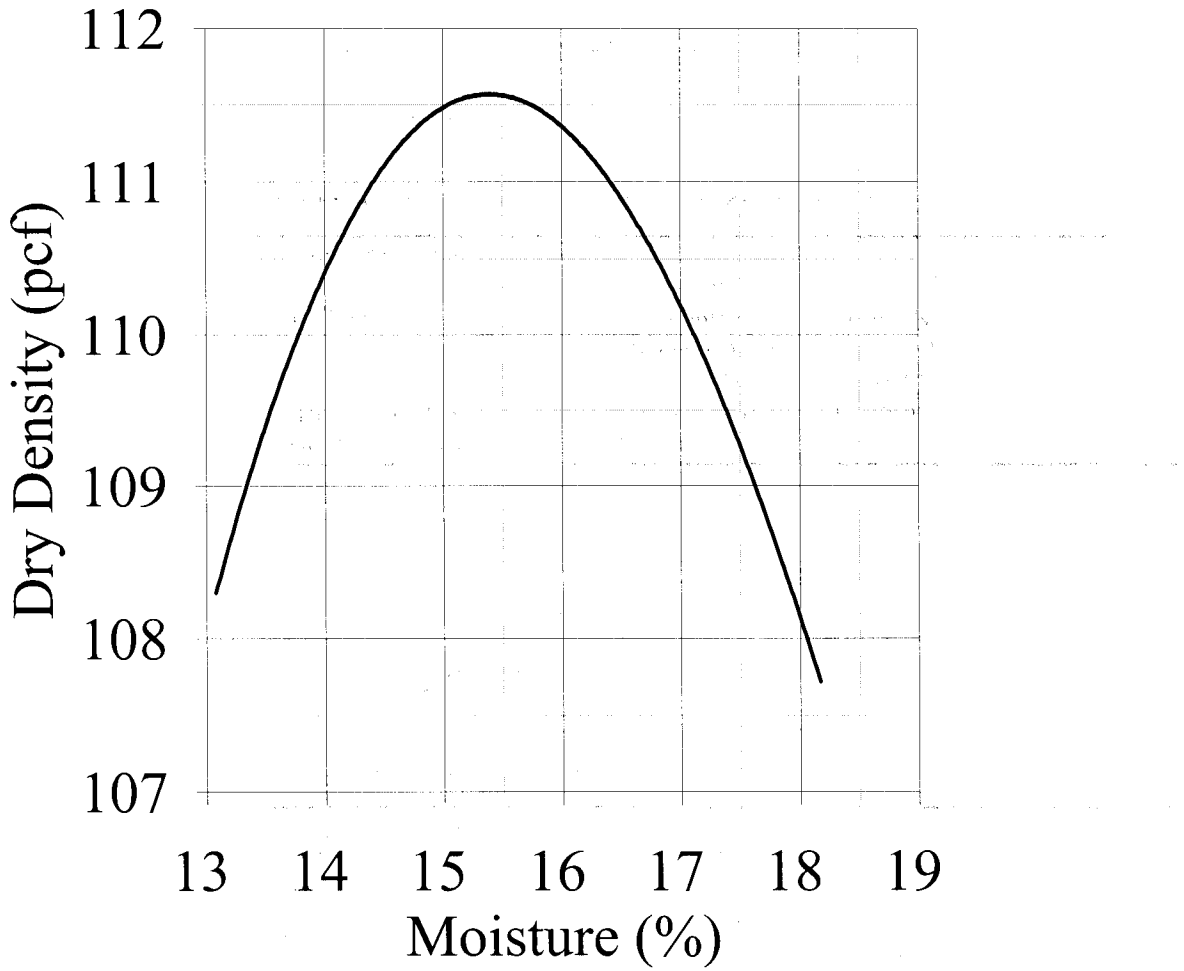
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 43
Project County	: Washington / Benton	Sample Loc. :	Boring No. 101
Project State	: Arkansas	Sample Depth :	0.3' to 5.3'
Laboratory No.	: 06127	Date Tested :	11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	: Brown & Dark Brown Lean Clay		



MAXIMUM DENSITY: 112 pcf

OPTIMUM MOISTURE: 15 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 45
Project County	: Washington / Benton	Sample Loc.	: Boring No. 99
Project State	: Arkansas	Sample Depth	: 0.3' to 6.4'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brown & Reddish Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.8
No.4		4.75	mm	88.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	74.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0086mm

California Bearing Ratio	: 5.1	Natural Moisture (%)	: 17.4
Maximum Dry Density	: 110 pcf	Liquid Limit	: 36
Optimum Moisture	: 16 %	Plastic Limit	: 18
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: -0.03
Gravel (3in. + No.10)	: 17.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 3.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.8	AASHTO Classification	: A-6 (12)
Silt + Clay (-No.200)	: 74.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 11.8
Coarse Sand (-No.4 + No.10)	: 5.3
Medium Sand (-No.10 + No.40)	: 3.8
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 74.3

Approved By : DLC

Soil No. 45

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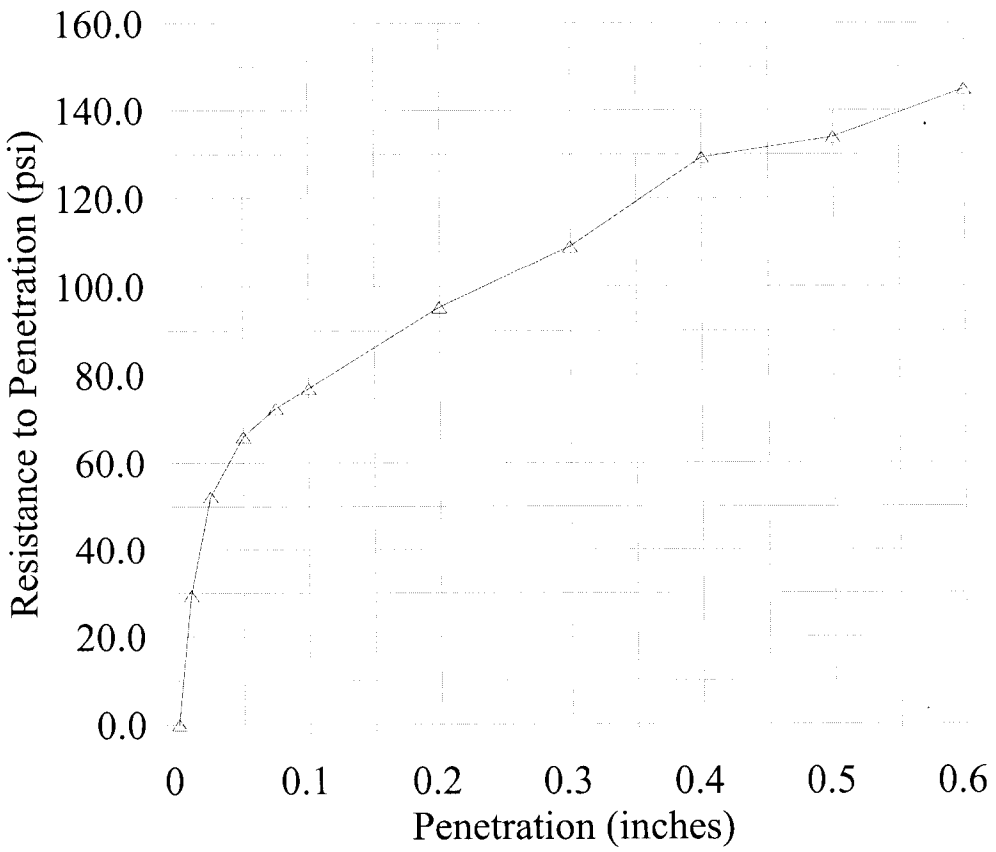
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Northern Bypass		
Project No.	:	06127	Sample No. :	Bag No. 45
Project County	:	Washington / Benton	Sample Loc. :	Boring No. 99
Project State	:	Arkansas	Sample Depth :	0.3' to 6.4'
Laboratory No.	:	06127	Date Tested :	11-05-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	:	Brown & Reddish Brown Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 100.1 %
Percent Swell = 0.62 %

C.B.R. @ 0.1 In. = 7.7
C.B.R. @ 0.2 In. = 6.4
C.B.R. @ 0.3 In. = 5.7
C.B.R. @ 0.4 In. = 5.6
C.B.R. @ 0.5 In. = 5.1*

COMMENTS: KM 64-501-02

APPROVED BY: OLC

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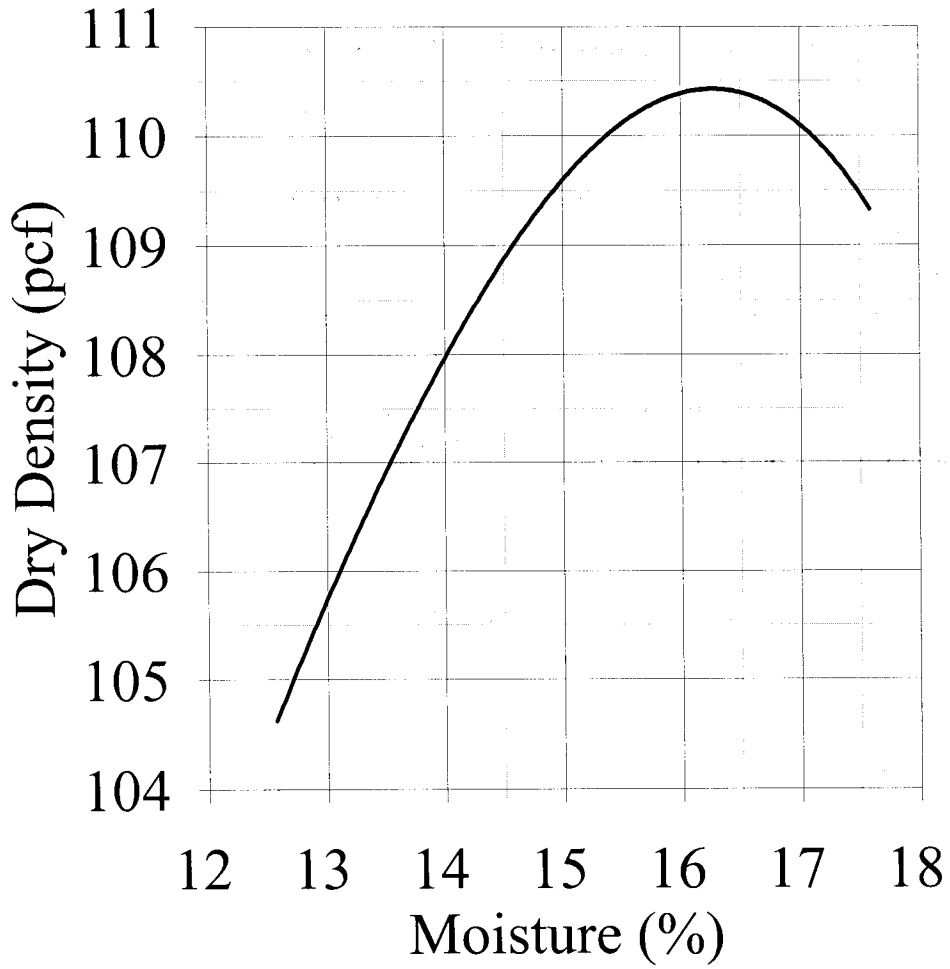
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No. :	Bag No. 45
Project County	: Washington / Benton	Sample Loc. :	Boring No. 99
Project State	: Arkansas	Sample Depth :	0.3' to 6.4'
Laboratory No.	: 06127	Date Tested :	11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	11-12-07
Soil Type	: Brown & Reddish Brown Lean Clay with Sand		



MAXIMUM DENSITY: 110 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 46
Project County	: Washington / Benton	Sample Loc.	: Boring No. 97
Project State	: Arkansas	Sample Depth	: 0.3' to 25.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brown & Reddish Brown Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.9
No.4		4.75	mm	90.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	86.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0096mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.0
Maximum Dry Density	: NA	Liquid Limit	: 52
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 31
AASHTO Composition of Total Sample		Liquidity Index	: 0.16
Gravel (3in. + No.10)	: 13.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.3	AASHTO Classification	: A-7-6 (22)
Silt + Clay (-No.200)	: 72.5	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.1
Coarse Sand (-No.4 + No.10)	: 4.4
Medium Sand (-No.10 + No.40)	: 6.7
Fine Sand (-No.40 + No.200)	: 7.3
Silt + Clay (-No.200)	: 72.5

Approved By : DLC

Soil No. 46

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 47
Project County	: Washington / Benton	Sample Loc.	: Boring No. 93
Project State	: Arkansas	Sample Depth	: 0.3' to 5.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Brown & Reddish Brown Gravelly Silty Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.2
3/4	in.	19	mm	94.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.1
No.4		4.75	mm	79.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	62.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0196mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 25.3
Maximum Dry Density	: NA	Liquid Limit	: 27
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 7
AASHTO Composition of Total Sample		Liquidity Index	: 0.76
Gravel (3in. + No.10)	: 27.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-4 (2)
Silt + Clay (-No.200)	: 62.7	ASTM Classification	: CL-ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.8
Fine Gravel (-3/4in. + No.4)	: 15.0
Coarse Sand (-No.4 + No.10)	: 6.6
Medium Sand (-No.10 + No.40)	: 5.5
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 62.7

Approved By : DLC

Soil No. 47

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 48
Project County	: Washington / Benton	Sample Loc.	: Boring No. 89
Project State	: Arkansas	Sample Depth	: 0.3' to 15.0'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Reddish Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	93.6
No.4		4.75	mm	88.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	65.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0154mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.2
Maximum Dry Density	: NA	Liquid Limit	: 51
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 28
AASHTO Composition of Total Sample		Liquidity Index	: 0.04
Gravel (3in. + No.10)	: 19.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.5	AASHTO Classification	: A-7-6 (17)
Silt + Clay (-No.200)	: 65.7	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.3
Fine Gravel (-3/4in. + No.4)	: 8.9
Coarse Sand (-No.4 + No.10)	: 7.8
Medium Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 7.5
Silt + Clay (-No.200)	: 65.7

Approved By : DLC

Soil No. 48

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Northern Bypass		
Project No.	: 06127	Sample No.	: Bag No. 49
Project County	: Washington / Benton	Sample Loc.	: Boring No. 95
Project State	: Arkansas	Sample Depth	: 0.3' to 10.2'
Laboratory No.	: 06127	Date Tested	: 11-05-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 11-12-07
Soil Type	: Reddish Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.1
No.4		4.75	mm	89.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	66.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0141mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 35.2
Maximum Dry Density	: NA	Liquid Limit	: 56
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 32
AASHTO Composition of Total Sample		Liquidity Index	: 0.35
Gravel (3in. + No.10)	: 17.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.5	AASHTO Classification	: A-7-6 (20)
Silt + Clay (-No.200)	: 66.9	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.0
Fine Gravel (-3/4in. + No.4)	: 7.0
Coarse Sand (-No.4 + No.10)	: 6.8
Medium Sand (-No.10 + No.40)	: 8.8
Fine Sand (-No.40 + No.200)	: 6.5
Silt + Clay (-No.200)	: 66.9

Approved By : DLC

Soil No. 49

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 51
Project County	: Washington/Benton	Sample Loc.	: Boring No. 280
Project State	: Arkansas	Sample Depth	: 0.3' to 14.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown & White Gravelly Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.1
No.4		4.75	mm	84.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	78.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	74.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0112mm

California Bearing Ratio	: 3.6	Natural Moisture (%)	: 17.3
Maximum Dry Density	: 95 pcf	Liquid Limit	: 47
Optimum Moisture	: 24 %	Plastic Limit	: 21
		Plasticity Index	: 26
AASHTO Composition of Total Sample		Liquidity Index	: -0.14
Gravel (3in. + No.10)	: 21.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 4.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.6	AASHTO Classification	: A-7-6 (17)
Silt + Clay (-No.200)	: 70.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 15.6
Coarse Sand (-No.4 + No.10)	: 5.6
Medium Sand (-No.10 + No.40)	: 4.0
Fine Sand (-No.40 + No.200)	: 4.6
Silt + Clay (-No.200)	: 70.2

Approved By : DLC

Soil No. 51

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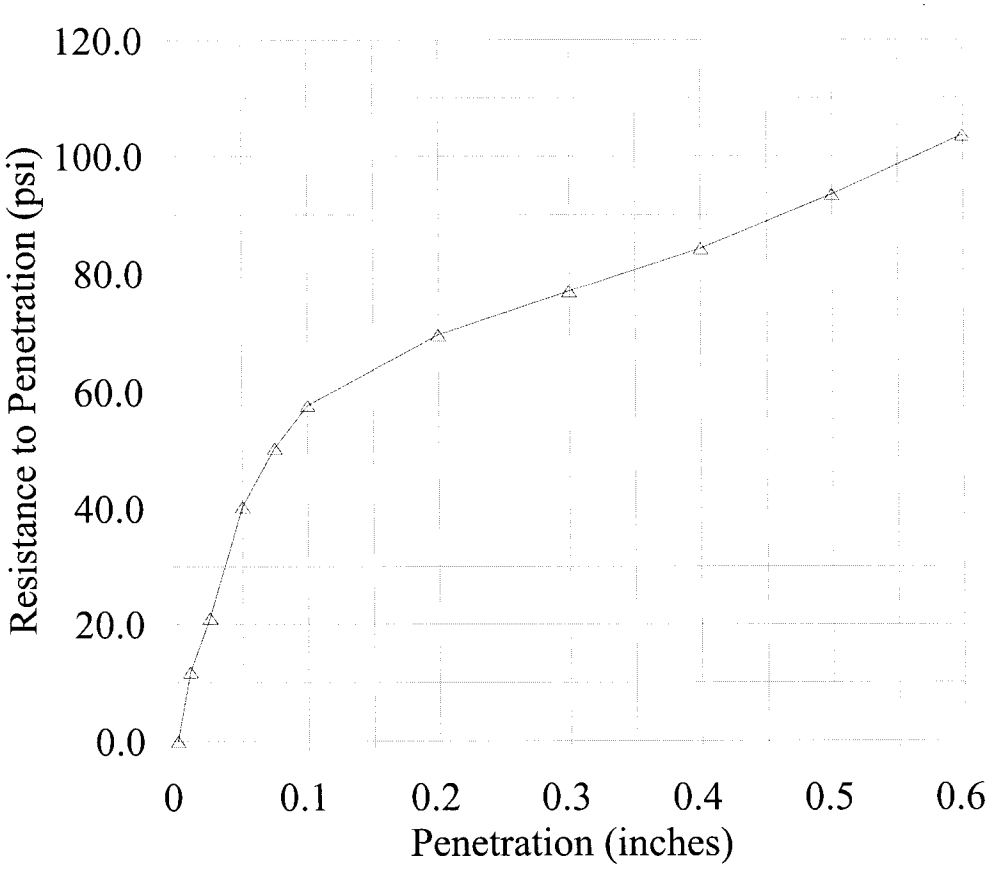
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 51
Project County	: Washington/Benton	Sample Loc. :	Boring No. 280
Project State	: Arkansas	Sample Depth :	0.3' to 14.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Brown & White Gravelly Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.1 %
Percent Swell = 1.36 %

C.B.R. @ 0.1 In. = 5.8
C.B.R. @ 0.2 In. = 4.6
C.B.R. @ 0.3 In. = 4.1
C.B.R. @ 0.4 In. = 3.7
C.B.R. @ 0.5 In. = 3.6*

COMMENTS: KM 64-501-02

APPROVED BY: QC

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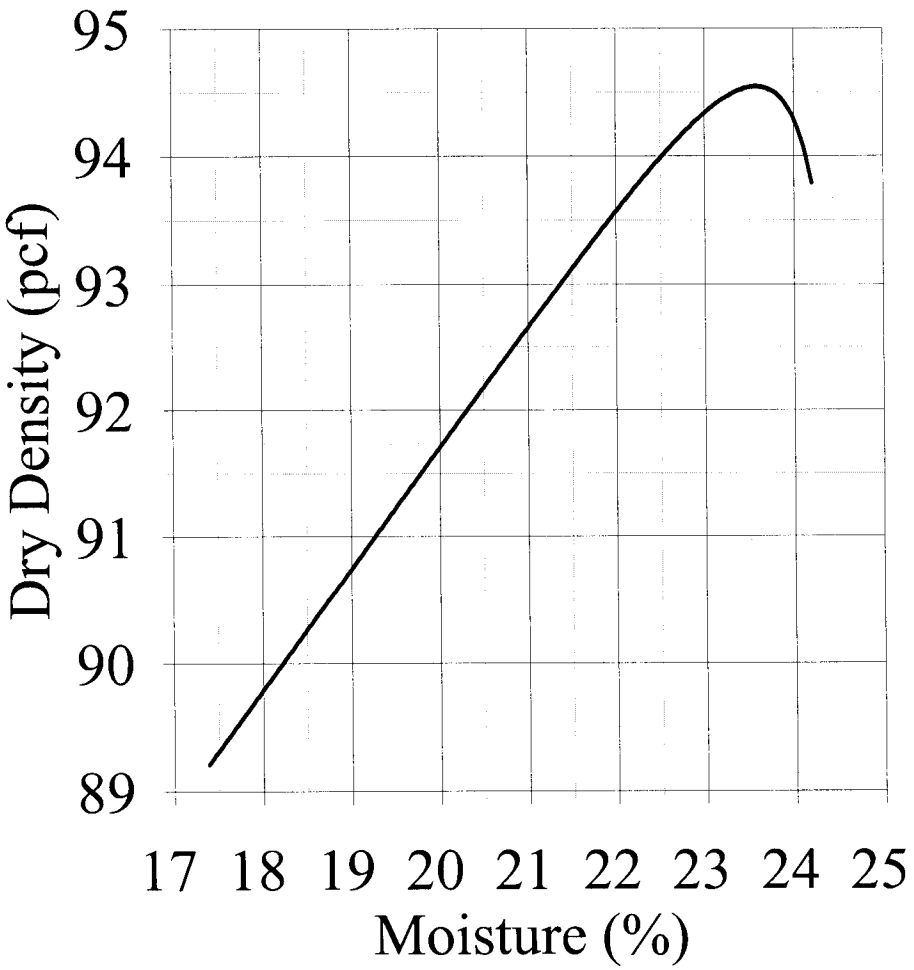
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 51
Project County	: Washington/Benton	Sample Loc. :	Boring No. 280
Project State	: Arkansas	Sample Depth :	0.3' to 14.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Brown & White Gravelly Lean Clay		



MAXIMUM DENSITY: 95 pcf

OPTIMUM MOISTURE: 24 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 52
Project County	: Washington/Benton	Sample Loc.	: Boring No. 249
Project State	: Arkansas	Sample Depth	: 0.3' to 5.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown & Reddish Tan Gravelly Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.0
3/4	in.	19	mm	94.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.5
No.4		4.75	mm	78.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	64.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0271mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 20.7
Maximum Dry Density	: NA	Liquid Limit	: 31
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 11
AASHTO Composition of Total Sample		Liquidity Index	: 0.06
Gravel (3in. + No.10)	: 29.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.1	AASHTO Classification	: A-6 (4)
Silt + Clay (-No.200)	: 59.1	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.0
Fine Gravel (-3/4in. + No.4)	: 15.4
Coarse Sand (-No.4 + No.10)	: 7.6
Medium Sand (-No.10 + No.40)	: 6.8
Fine Sand (-No.40 + No.200)	: 5.1
Silt + Clay (-No.200)	: 59.1

Approved By : DLC

Soil No. 52

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 53
Project County	: Washington/Benton	Sample Loc.	: Boring No. 243
Project State	: Arkansas	Sample Depth	: 0.3' to 9.8'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Reddish Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.3
No.4		4.75	mm	95.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	74.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0085mm

California Bearing Ratio	: 5.7	Natural Moisture (%)	: 24.8
Maximum Dry Density	: 99 pcf	Liquid Limit	: 44
Optimum Moisture	: 20 %	Plastic Limit	: 22
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.13
Gravel (3in. + No.10)	: 12.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.4	AASHTO Classification	: A-7-6 (16)
Silt + Clay (-No.200)	: 74.5	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 4.7
Coarse Sand (-No.4 + No.10)	: 7.8
Medium Sand (-No.10 + No.40)	: 7.6
Fine Sand (-No.40 + No.200)	: 5.4
Silt + Clay (-No.200)	: 74.5

Approved By : DCC

Soil No. 53

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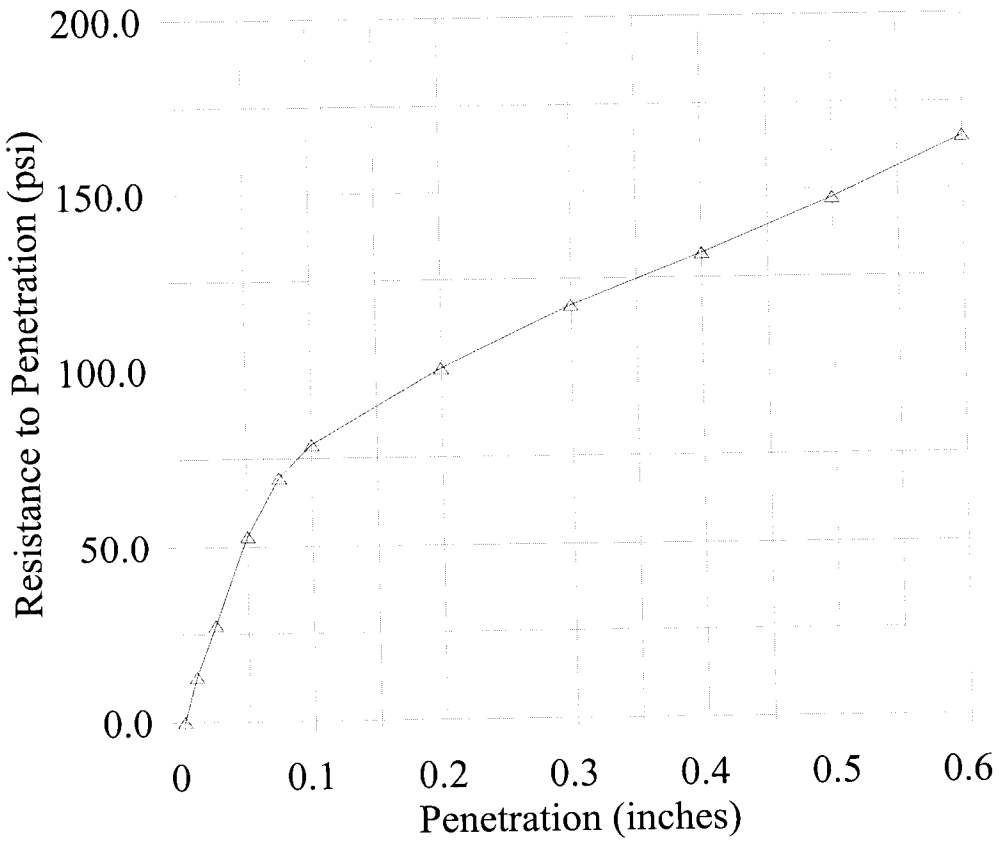
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 53
Project County	: Washington/Benton	Sample Loc. :	Boring No. 243
Project State	: Arkansas	Sample Depth :	0.3' to 9.8'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Reddish Brown Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 101.0 %
Percent Swell = 1.13 %

C.B.R. @ 0.1 In. = 7.9
C.B.R. @ 0.2 In. = 6.7
C.B.R. @ 0.3 In. = 6.2
C.B.R. @ 0.4 In. = 5.7
C.B.R. @ 0.5 In. = 5.7*

COMMENTS: KM 64-501-02

APPROVED BY: DC

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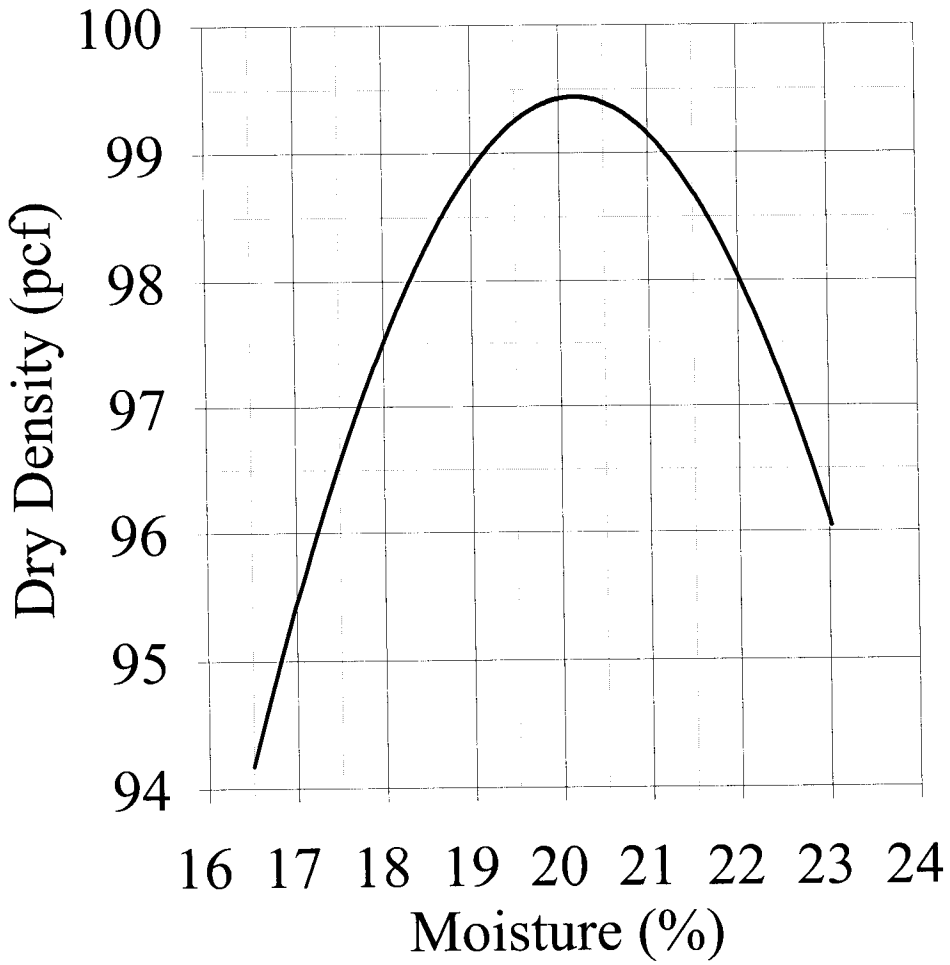
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 53
Project County	: Washington/Benton	Sample Loc. :	Boring No. 243
Project State	: Arkansas	Sample Depth :	0.3' to 9.8'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Reddish Brown Lean Clay with Sand		



MAXIMUM DENSITY: 99 pcf

OPTIMUM MOISTURE: 20 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 54
Project County	: Washington/Benton	Sample Loc.	: Boring No. 252
Project State	: Arkansas	Sample Depth	: 0.3' to 8.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown & Red Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.5
No.4		4.75	mm	92.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	73.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0088mm

California Bearing Ratio	: NA
Maximum Dry Density	: NA
Optimum Moisture	: NA

Natural Moisture (%)	: 25.7
Liquid Limit	: 33
Plastic Limit	: 20
Plasticity Index	: 13
Liquidity Index	: 0.44
Activity	: NA
Specific Gravity	: NA
AASHTO Classification	: A-6 (8)
ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 12.2
Coarse Sand (-No.10 + No.40)	: 7.6
Fine Sand (-No.40 + No.200)	: 6.3
Silt + Clay (-No.200)	: 73.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 7.4
Coarse Sand (-No.4 + No.10)	: 4.8
Medium Sand (-No.10 + No.40)	: 7.6
Fine Sand (-No.40 + No.200)	: 6.3
Silt + Clay (-No.200)	: 73.9

Approved By : blc

Soil No. 54

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 55
Project County	: Washington/Benton	Sample Loc.	: Boring No. 259
Project State	: Arkansas	Sample Depth	: 0.3' to 5.5'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Brown Gravelly Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.2
No.4		4.75	mm	77.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	67.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	60.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0373mm

California Bearing Ratio	: 7.5	Natural Moisture (%)	: 12.9
Maximum Dry Density	: 105 pcf	Liquid Limit	: 33
Optimum Moisture	: 16 %	Plastic Limit	: 19
		Plasticity Index	: 14
AASHTO Composition of Total Sample		Liquidity Index	: -0.44
Gravel (3in. + No.10)	: 32.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.0	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 55.9	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.2
Fine Gravel (-3/4in. + No.4)	: 18.5
Coarse Sand (-No.4 + No.10)	: 9.7
Medium Sand (-No.10 + No.40)	: 6.7
Fine Sand (-No.40 + No.200)	: 5.0
Silt + Clay (-No.200)	: 55.9

Approved By : DLC

Soil No. 55

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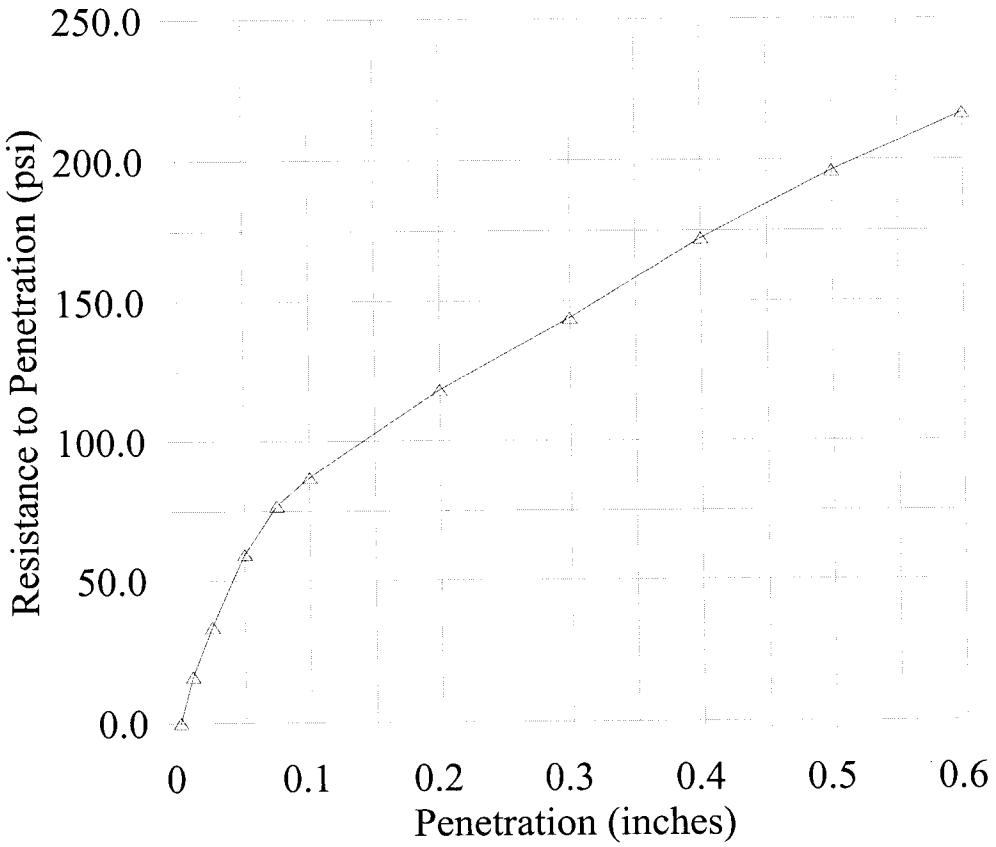
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 55
Project County	: Washington/Benton	Sample Loc. :	Boring No. 259
Project State	: Arkansas	Sample Depth :	0.3' to 5.5'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Brown Gravelly Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 98.9 %
Percent Swell = 0.78 %

C.B.R. @ 0.1 In. = 8.7
C.B.R. @ 0.2 In. = 7.9
C.B.R. @ 0.3 In. = 7.6
C.B.R. @ 0.4 In. = 7.5*
C.B.R. @ 0.5 In. = 7.5

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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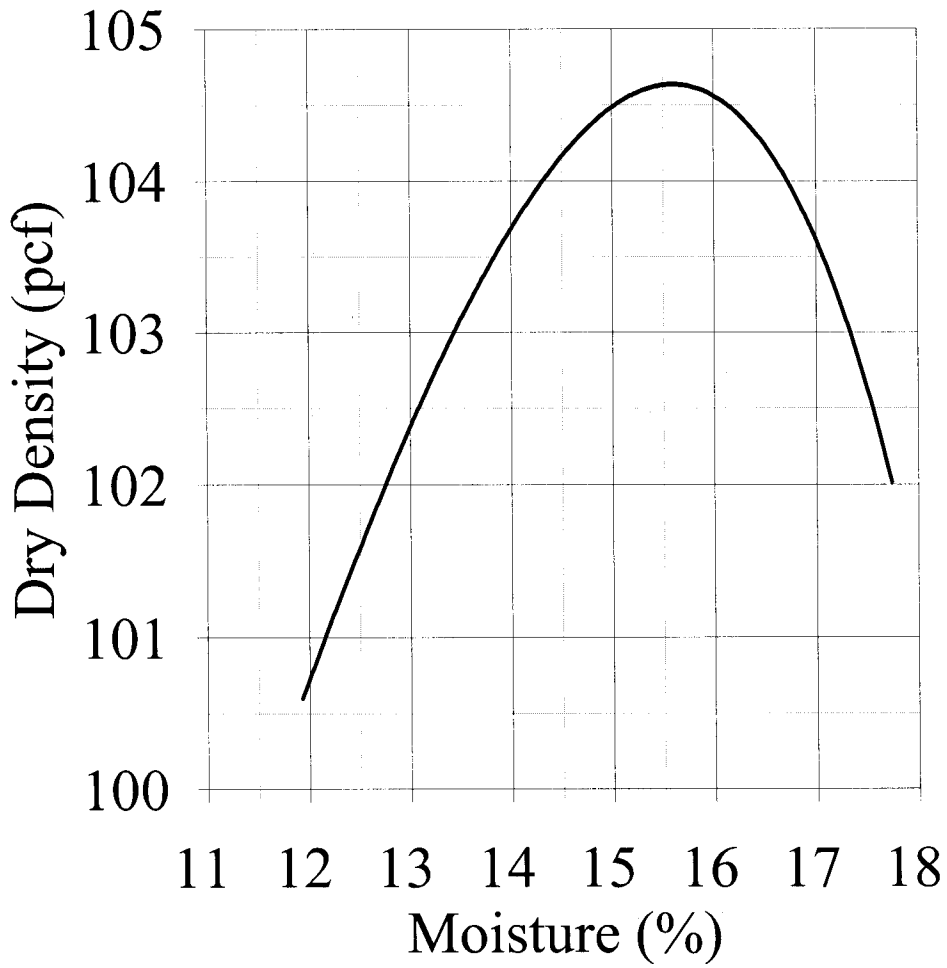
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 55
Project County	: Washington/Benton	Sample Loc. :	Boring No. 259
Project State	: Arkansas	Sample Depth :	0.3' to 5.5'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Brown Gravelly Lean Clay with Sand		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 56
Project County	: Washington/Benton	Sample Loc.	: Boring No. 278
Project State	: Arkansas	Sample Depth	: 0.3' to 5.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Red & Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.0
No.4		4.75	mm	90.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	84.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	74.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	65.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0155mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.4
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: 0.34
Gravel (3in. + No.10)	: 15.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.3	AASHTO Classification	: A-7-6 (11)
Silt + Clay (-No.200)	: 65.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.1
Coarse Sand (-No.4 + No.10)	: 6.7
Medium Sand (-No.10 + No.40)	: 9.3
Fine Sand (-No.40 + No.200)	: 9.3
Silt + Clay (-No.200)	: 65.6

Approved By : bcc

Soil No. 56

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 57
Project County	: Washington/Benton	Sample Loc.	: Boring No. 272
Project State	: Arkansas	Sample Depth	: 0.3' to 18.0'
Laboratory No.	: 06127	Date Tested	: 11-18-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Reddish Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.6
No.4		4.75	mm	90.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	83.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	63.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0179mm

California Bearing Ratio	: 9.2	Natural Moisture (%)	: 21.7
Maximum Dry Density	: 108 pcf	Liquid Limit	: 37
Optimum Moisture	: 17 %	Plastic Limit	: 20
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: 0.10
Gravel (3in. + No.10)	: 16.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.6	AASHTO Classification	: A-6 (9)
Silt + Clay (-No.200)	: 63.8	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.8
Coarse Sand (-No.4 + No.10)	: 6.8
Medium Sand (-No.10 + No.40)	: 10.0
Fine Sand (-No.40 + No.200)	: 9.6
Silt + Clay (-No.200)	: 63.8

Approved By : DLC

Soil No. 57

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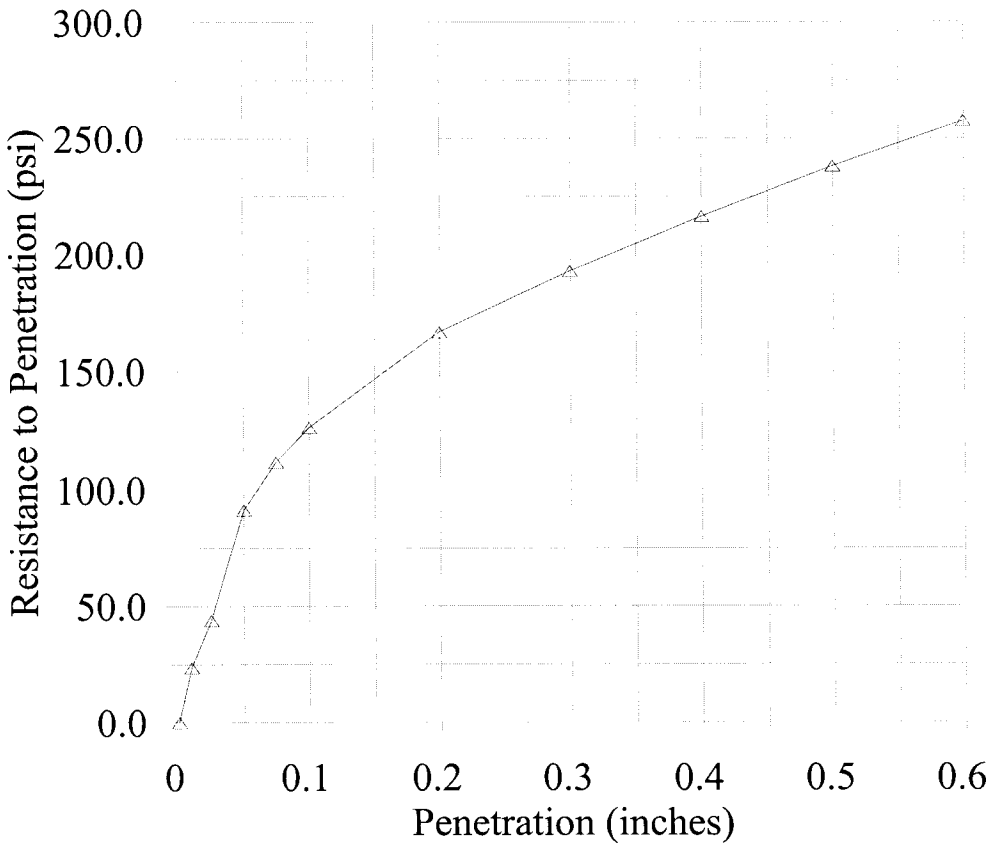
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass			
Project No.	:	06127	Sample No.	:	Bag No. 57
Project County	:	Washington/Benton	Sample Loc.	:	Boring No. 272
Project State	:	Arkansas	Sample Depth	:	0.3' to 18.0'
Laboratory No.	:	06127	Date Tested	:	11-18-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	:	12-13-07
Soil Type	:	Reddish Brown Sandy Lean Clay			



Compaction Effort = 2000 psi
Percent Compacted = 98.6 %
Percent Swell = 0.20 %

C.B.R. @ 0.1 In. = 12.7
C.B.R. @ 0.2 In. = 11.1
C.B.R. @ 0.3 In. = 10.2
C.B.R. @ 0.4 In. = 9.4
C.B.R. @ 0.5 In. = 9.2*

COMMENTS: KM 64-501-02

APPROVED BY: DCC

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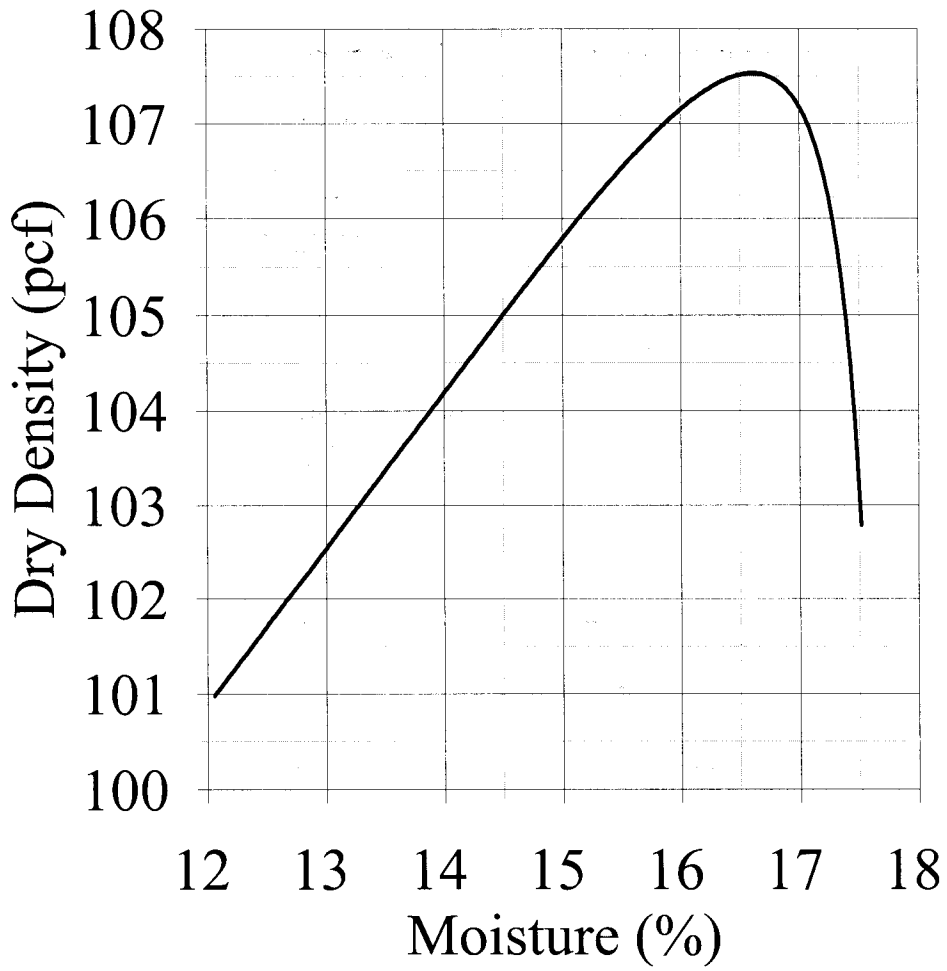
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 57
Project County	: Washington/Benton	Sample Loc. :	Boring No. 272
Project State	: Arkansas	Sample Depth :	0.3' to 18.0'
Laboratory No.	: 06127	Date Tested :	11-18-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Reddish Brown Sandy Lean Clay		



MAXIMUM DENSITY: 108 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 58
Project County	: Washington/Benton	Sample Loc.	: Boring No. 241
Project State	: Arkansas	Sample Depth	: 0.6' to 9.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.5
3/4	in.	19	mm	94.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.5
No.4		4.75	mm	75.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	57.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0912mm

California Bearing Ratio	: 5.6	Natural Moisture (%)	: 24.8
Maximum Dry Density	: 104 pcf	Liquid Limit	: 43
Optimum Moisture	: 16 %	Plastic Limit	: 20
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.21
Gravel (3in. + No.10)	: 33.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.0	AASHTO Classification	: A-7-6 (7)
Silt + Clay (-No.200)	: 49.1	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.5
Fine Gravel (-3/4in. + No.4)	: 18.7
Coarse Sand (-No.4 + No.10)	: 9.5
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 8.0
Silt + Clay (-No.200)	: 49.1

Approved By : DLC

Soil No. 58

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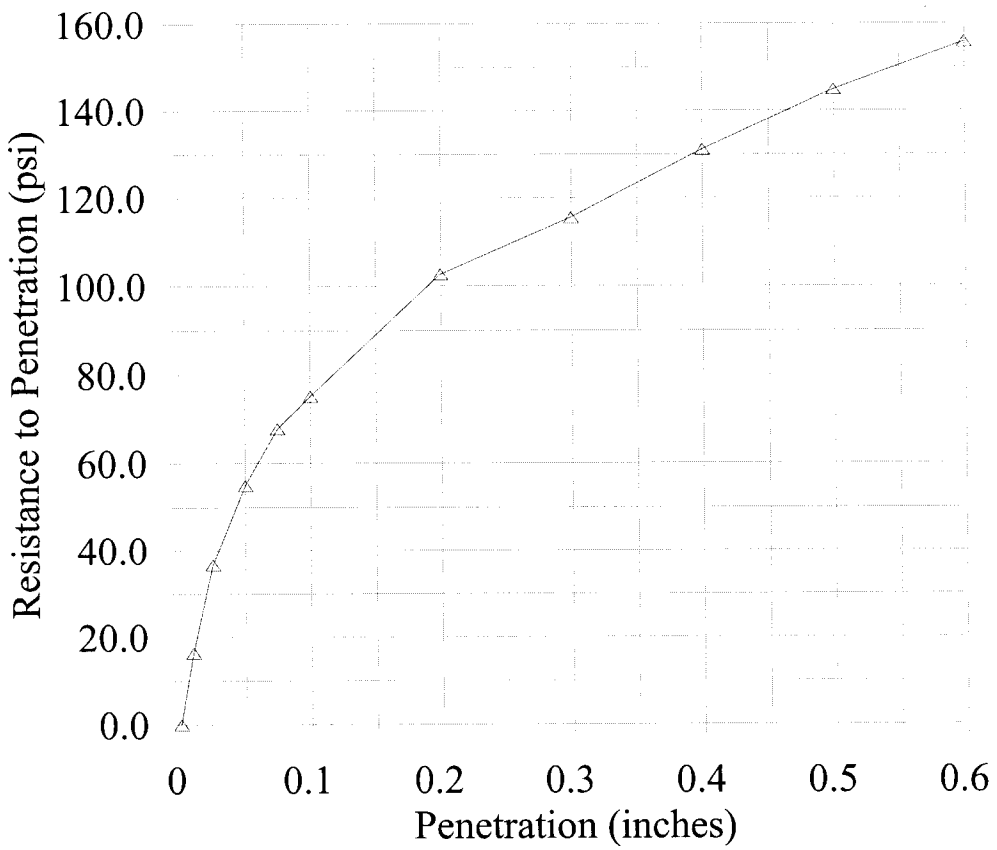
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 58
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 241
Project State	:	Arkansas	Sample Depth :	0.6' to 9.0'
Laboratory No.	:	06127	Date Tested :	11-13-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	:	Reddish Brown Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 98.4 %
Percent Swell = 0.61 %

C.B.R. @ 0.1 In. = 7.5
C.B.R. @ 0.2 In. = 6.8
C.B.R. @ 0.3 In. = 6.1
C.B.R. @ 0.4 In. = 5.7
C.B.R. @ 0.5 In. = 5.6*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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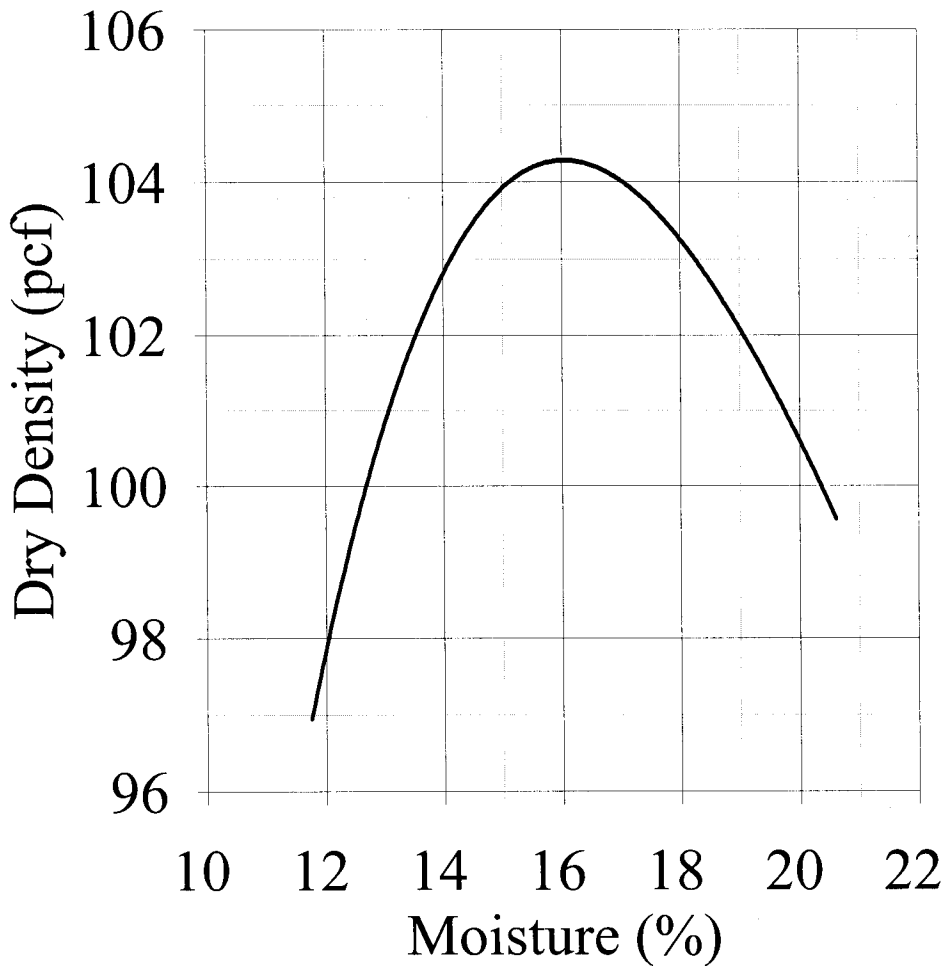
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 58
Project County	: Washington/Benton	Sample Loc. :	Boring No. 241
Project State	: Arkansas	Sample Depth :	0.6' to 9.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Reddish Brown Clayey Sand with Gravel		



MAXIMUM DENSITY: 104 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: bLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 59
Project County	: Washington/Benton	Sample Loc.	: Boring No. 257
Project State	: Arkansas	Sample Depth	: 0.6' to 10.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.0
No.4		4.75	mm	91.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	65.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0152mm

California Bearing Ratio	: 9.0	Natural Moisture (%)	: 27.5
Maximum Dry Density	: 101 pcf	Liquid Limit	: 38
Optimum Moisture	: 18 %	Plastic Limit	: 21
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: 0.38
Gravel (3in. + No.10)	: 17.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.4	AASHTO Classification	: A-6 (9)
Silt + Clay (-No.200)	: 65.9	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 8.6
Coarse Sand (-No.4 + No.10)	: 9.0
Medium Sand (-No.10 + No.40)	: 9.1
Fine Sand (-No.40 + No.200)	: 7.4
Silt + Clay (-No.200)	: 65.9

Approved By : DLC

Soil No. 59

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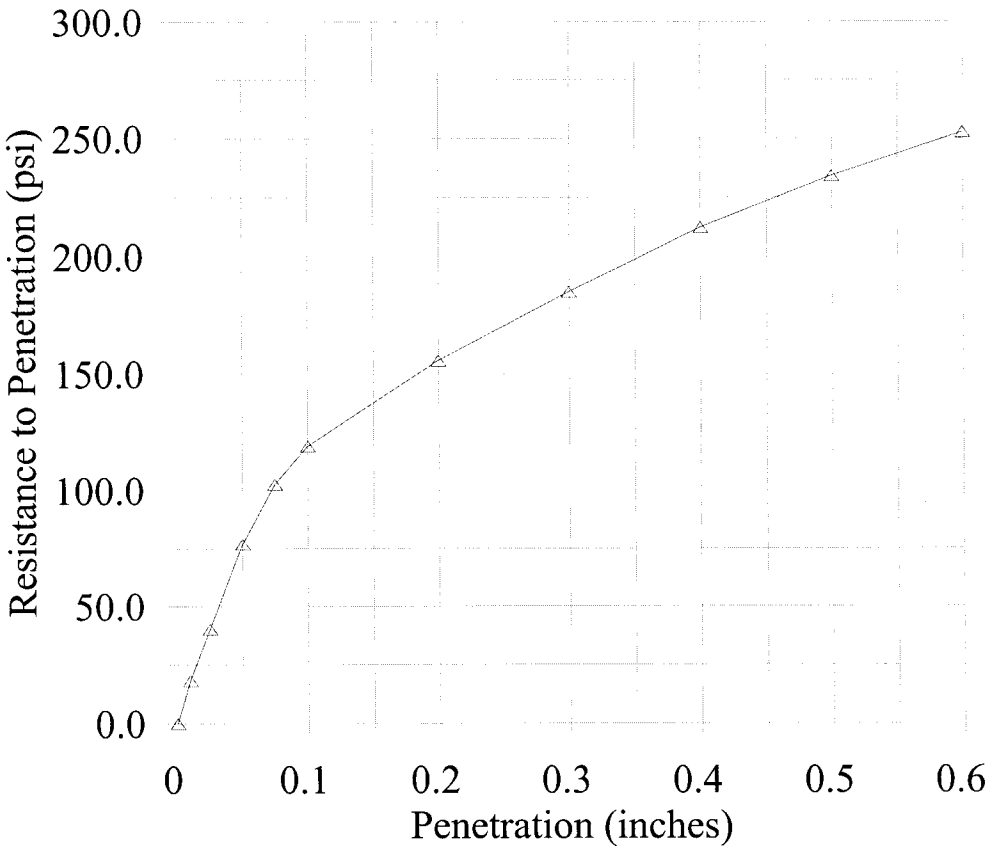
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 59
Project County	: Washington/Benton	Sample Loc.	: Boring No. 257
Project State	: Arkansas	Sample Depth	: 0.6' to 10.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100.8 %
Percent Swell = 0.54 %

C.B.R. @ 0.1 In. = 11.9
C.B.R. @ 0.2 In. = 10.4
C.B.R. @ 0.3 In. = 9.7
C.B.R. @ 0.4 In. = 9.2
C.B.R. @ 0.5 In. = 9.0*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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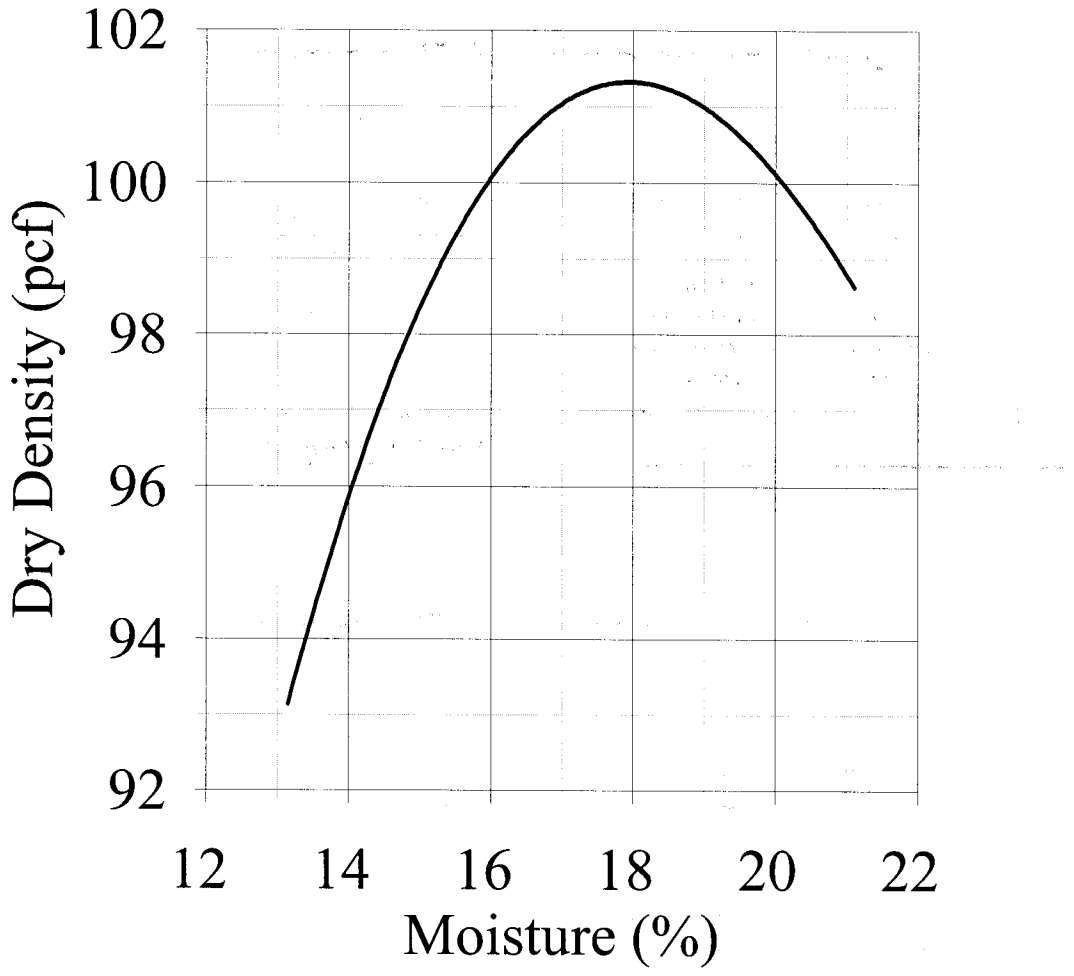
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 59
Project County	: Washington/Benton	Sample Loc. :	Boring No. 257
Project State	: Arkansas	Sample Depth :	0.6' to 10.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Reddish Brown Sandy Lean Clay		



MAXIMUM DENSITY: 101 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 60
Project County	: Washington/Benton	Sample Loc.	: Boring No. 235
Project State	: Arkansas	Sample Depth	: 0.6' to 11.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Gravelly Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.9
No.4		4.75	mm	78.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	70.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	64.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	60.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0244mm

California Bearing Ratio	: 7.9	Natural Moisture (%)	: 18.9
Maximum Dry Density	: 114 pcf	Liquid Limit	: 32
Optimum Moisture	: 13 %	Plastic Limit	: 16
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.18
Gravel (3in. + No.10)	: 29.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 5.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-6 (7)
Silt + Clay (-No.200)	: 60.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.5
Fine Gravel (-3/4in. + No.4)	: 19.7
Coarse Sand (-No.4 + No.10)	: 8.3
Medium Sand (-No.10 + No.40)	: 5.9
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 60.2

Approved By : DLC

Soil No. 60

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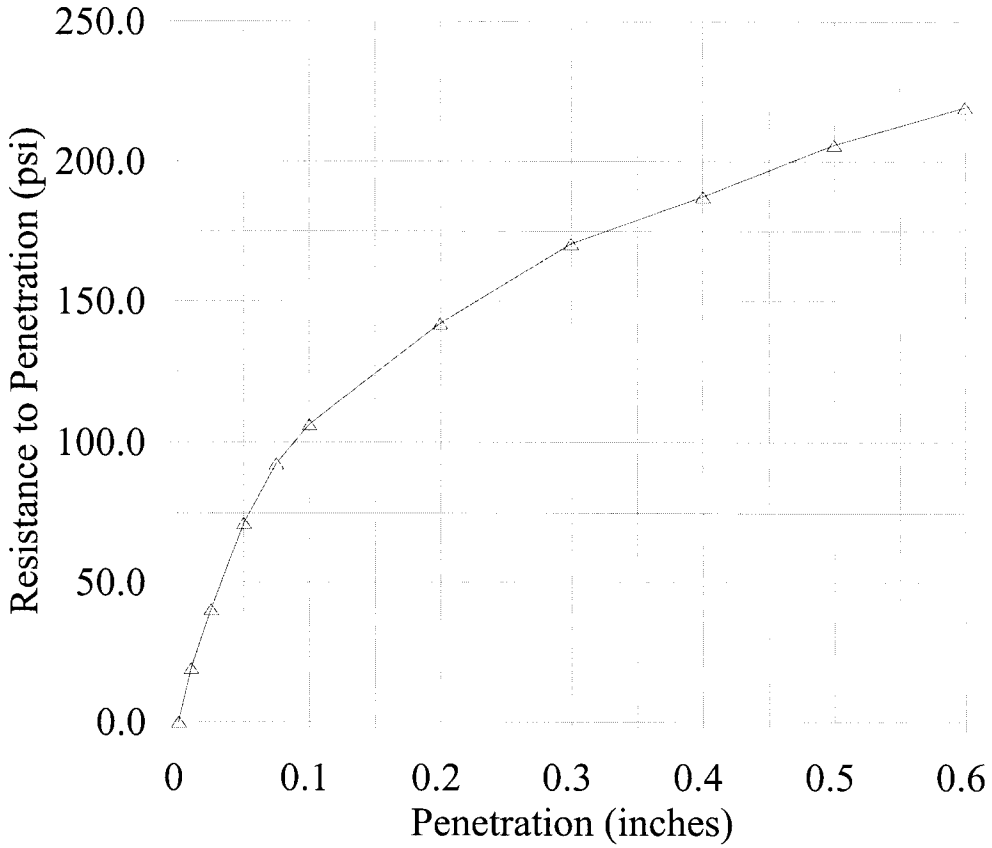
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 60
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 235
Project State	:	Arkansas	Sample Depth :	0.6' to 11.0'
Laboratory No.	:	06127	Date Tested :	11-13-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	:	Reddish Brown Gravelly Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 97.4 %
Percent Swell = 0.76 %

C.B.R. @ 0.1 In. = 10.6
C.B.R. @ 0.2 In. = 9.5
C.B.R. @ 0.3 In. = 9.0
C.B.R. @ 0.4 In. = 8.1
C.B.R. @ 0.5 In. = 7.9*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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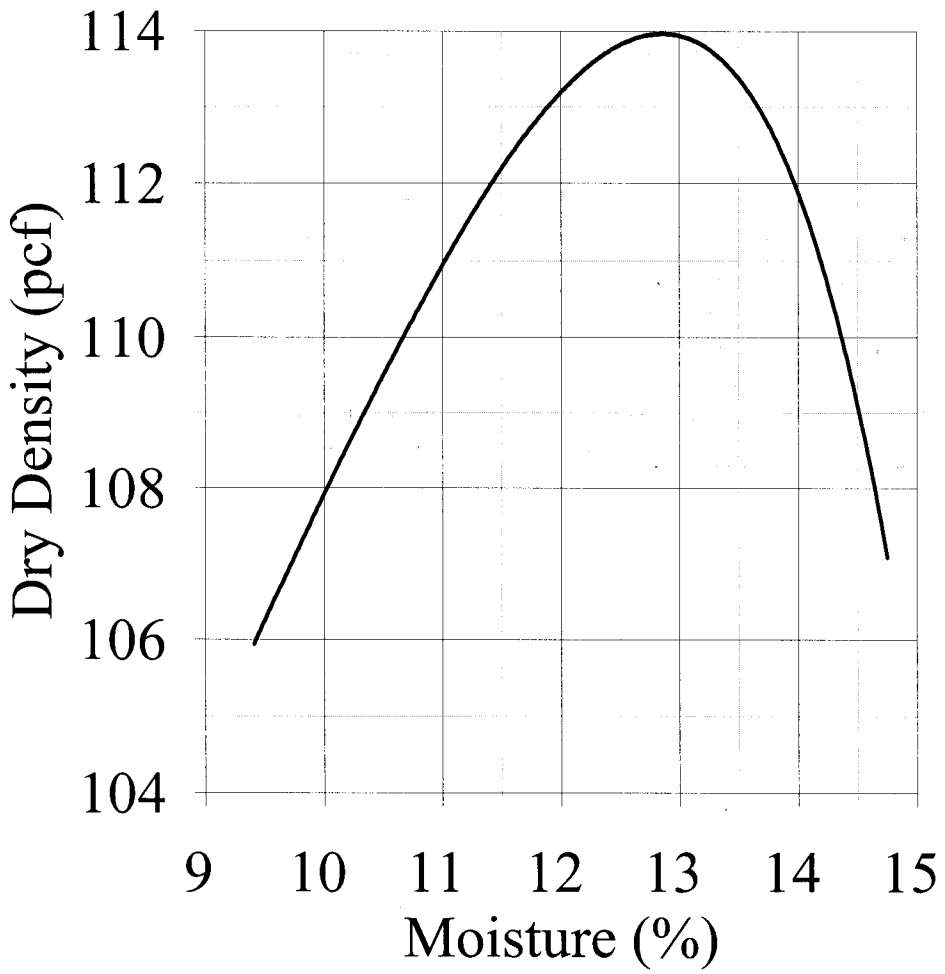
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 60
Project County	: Washington/Benton	Sample Loc. :	Boring No. 235
Project State	: Arkansas	Sample Depth :	0.6' to 11.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Reddish Brown Gravelly Lean Clay with Sand		



MAXIMUM DENSITY: 114 pcf

OPTIMUM MOISTURE: 13 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 61
Project County	: Washington/Benton	Sample Loc.	: Boring No. 269
Project State	: Arkansas	Sample Depth	: 0.3' to 5.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Dark Brown Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.5
No.4		4.75	mm	98.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	97.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	96.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	94.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0033mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.7
Maximum Dry Density	: NA	Liquid Limit	: 34
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 14
AASHTO Composition of Total Sample		Liquidity Index	: 0.34
Gravel (3in. + No.10)	: 2.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 1.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 1.8	AASHTO Classification	: A-6 (13)
Silt + Clay (-No.200)	: 94.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 1.3
Coarse Sand (-No.4 + No.10)	: 0.9
Medium Sand (-No.10 + No.40)	: 1.4
Fine Sand (-No.40 + No.200)	: 1.8
Silt + Clay (-No.200)	: 94.6

Approved By : DLC

Soil No. 61

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 62
Project County	: Washington/Benton	Sample Loc.	: Boring No. 289
Project State	: Arkansas	Sample Depth	: 0.6' to 7.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Red & Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.5
No.4		4.75	mm	95.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	86.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	72.2
No.270		0.053	mm	.
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0098mm

California Bearing Ratio	: 6.6	Natural Moisture (%)	: 18.3
Maximum Dry Density	: 110 pcf	Liquid Limit	: 37
Optimum Moisture	: 17 %	Plastic Limit	: 20
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: -0.10
Gravel (3in. + No.10)	: 14.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.7	AASHTO Classification	: A-6 (11)
Silt + Clay (-No.200)	: 72.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 4.7
Coarse Sand (-No.4 + No.10)	: 9.3
Medium Sand (-No.10 + No.40)	: 7.1
Fine Sand (-No.40 + No.200)	: 6.7
Silt + Clay (-No.200)	: 72.2

Approved By : DLC

Soil No. 62

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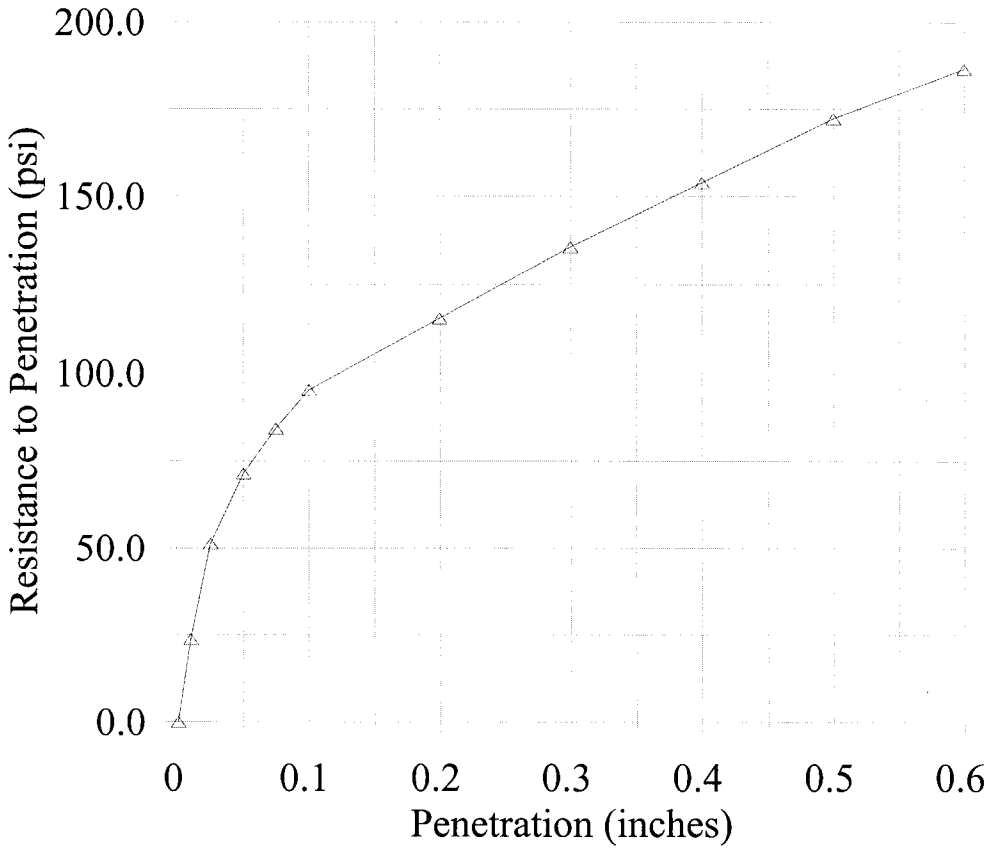
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 62
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 289
Project State	:	Arkansas	Sample Depth :	0.6' to 7.0'
Laboratory No.	:	06127	Date Tested :	11-13-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	:	Red & Brown Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 98.5 %
Percent Swell = 0.65 %

C.B.R. @ 0.1 In. = 9.5
C.B.R. @ 0.2 In. = 7.7
C.B.R. @ 0.3 In. = 7.1
C.B.R. @ 0.4 In. = 6.7
C.B.R. @ 0.5 In. = 6.6*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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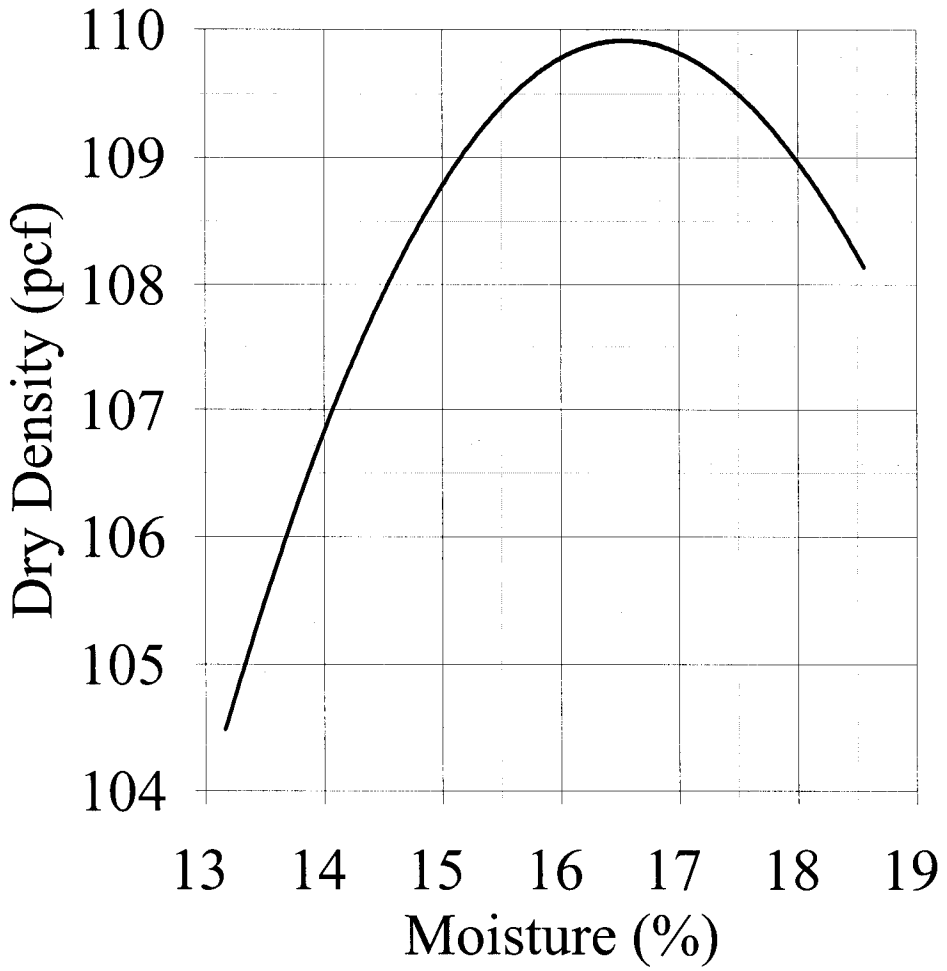
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 62
Project County	: Washington/Benton	Sample Loc. :	Boring No. 289
Project State	: Arkansas	Sample Depth :	0.6' to 7.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Red & Brown Lean Clay with Sand		



MAXIMUM DENSITY: 110 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bcc

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 63
Project County	: Washington/Benton	Sample Loc.	: Boring No. 288
Project State	: Arkansas	Sample Depth	: 0.3' to 12.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Tan Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.7
No.4		4.75	mm	66.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	56.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.5725mm

California Bearing Ratio	: 5.5	Natural Moisture (%)	: 8.1
Maximum Dry Density	: 98 pcf	Liquid Limit	: 31
Optimum Moisture	: 20 %	Plastic Limit	: 20
		Plasticity Index	: 11
AASHTO Composition of Total Sample		Liquidity Index	: -1.08
Gravel (3in. + No.10)	: 43.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.2	AASHTO Classification	: A-6 (1)
Silt + Clay (-No.200)	: 42.3	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 33.8
Coarse Sand (-No.4 + No.10)	: 9.9
Medium Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 6.2
Silt + Clay (-No.200)	: 42.3

Approved By : DLC

Soil No. 63

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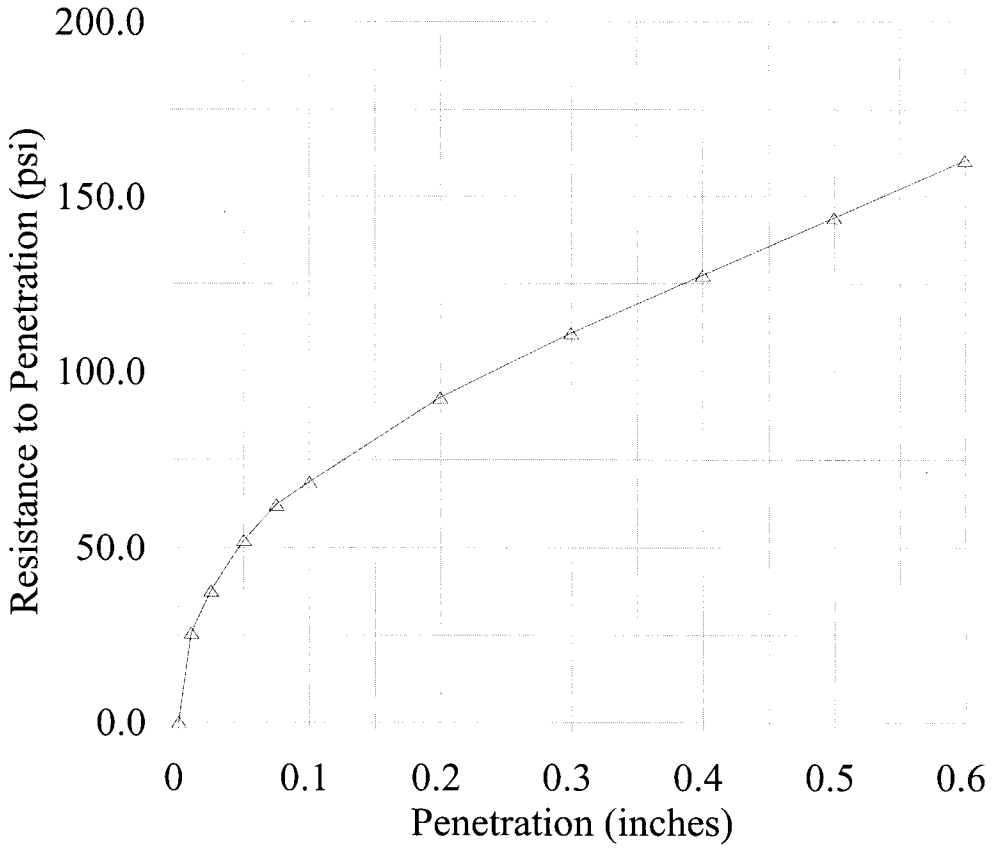
CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 63
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 288
Project State	:	Arkansas	Sample Depth :	0.3' to 12.0'
Laboratory No.	:	06127	Date Tested :	11-13-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	:	Tan Clayey Gravel with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 99.0 %
Percent Swell = 0.12 %

C.B.R. @ 0.1 In. = 6.9
C.B.R. @ 0.2 In. = 6.2
C.B.R. @ 0.3 In. = 5.8
C.B.R. @ 0.4 In. = 5.5
C.B.R. @ 0.5 In. = 5.5*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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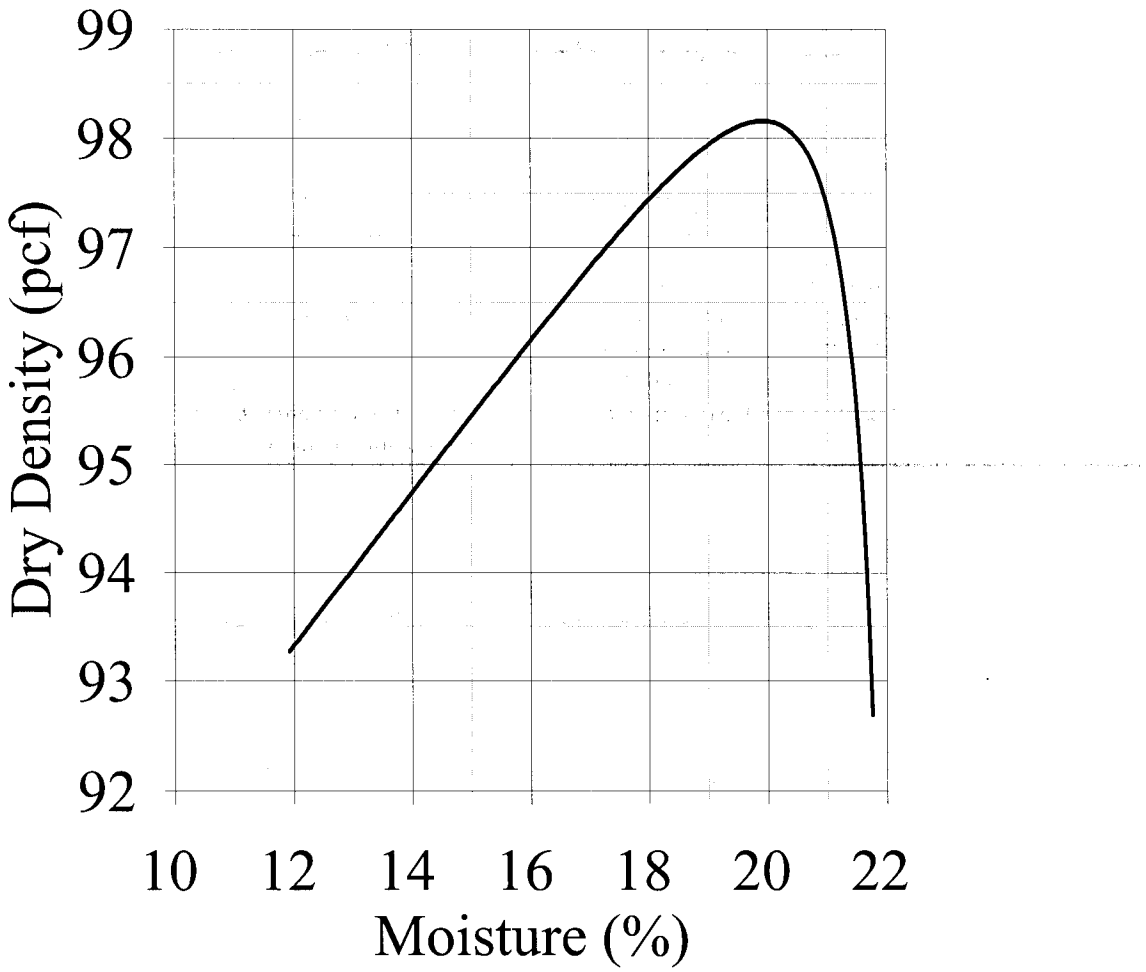
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 63
Project County	: Washington/Benton	Sample Loc. :	Boring No. 288
Project State	: Arkansas	Sample Depth :	0.3' to 12.0'
Laboratory No.	: 06127	Date Tested :	11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-11-07
Soil Type	: Tan Clayey Gravel with Sand		



MAXIMUM DENSITY: 98 pcf

OPTIMUM MOISTURE: 20 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: bLC

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 64
Project County	: Washington/Benton	Sample Loc.	: Boring No. 274
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	82.7
No.4		4.75	mm	63.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.1475mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 16.8
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: -0.23
Gravel (3in. + No.10)	: 46.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.4	AASHTO Classification	: A-6 (2)
Silt + Clay (-No.200)	: 35.7	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 36.6
Coarse Sand (-No.4 + No.10)	: 10.1
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 8.4
Silt + Clay (-No.200)	: 35.7

Approved By : DLC

Soil No. 64

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 65
Project County	: Washington/Benton	Sample Loc.	: Boring No. 260
Project State	: Arkansas	Sample Depth	: 0.6' to 8.0'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	74.2
No.4		4.75	mm	56.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.0213mm

California Bearing Ratio	: 13.6	Natural Moisture (%)	: 15.1
Maximum Dry Density	: 105 pcf	Liquid Limit	: 27
Optimum Moisture	: 18 %	Plastic Limit	: 22
		Plasticity Index	: 5
AASHTO Composition of Total Sample		Liquidity Index	: -1.38
Gravel (3in. + No.10)	: 56.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.0	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 30.1	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.9
Fine Gravel (-3/4in. + No.4)	: 41.3
Coarse Sand (-No.4 + No.10)	: 13.0
Medium Sand (-No.10 + No.40)	: 8.7
Fine Sand (-No.40 + No.200)	: 5.0
Silt + Clay (-No.200)	: 30.1

Approved By : DLC

Soil No. 65

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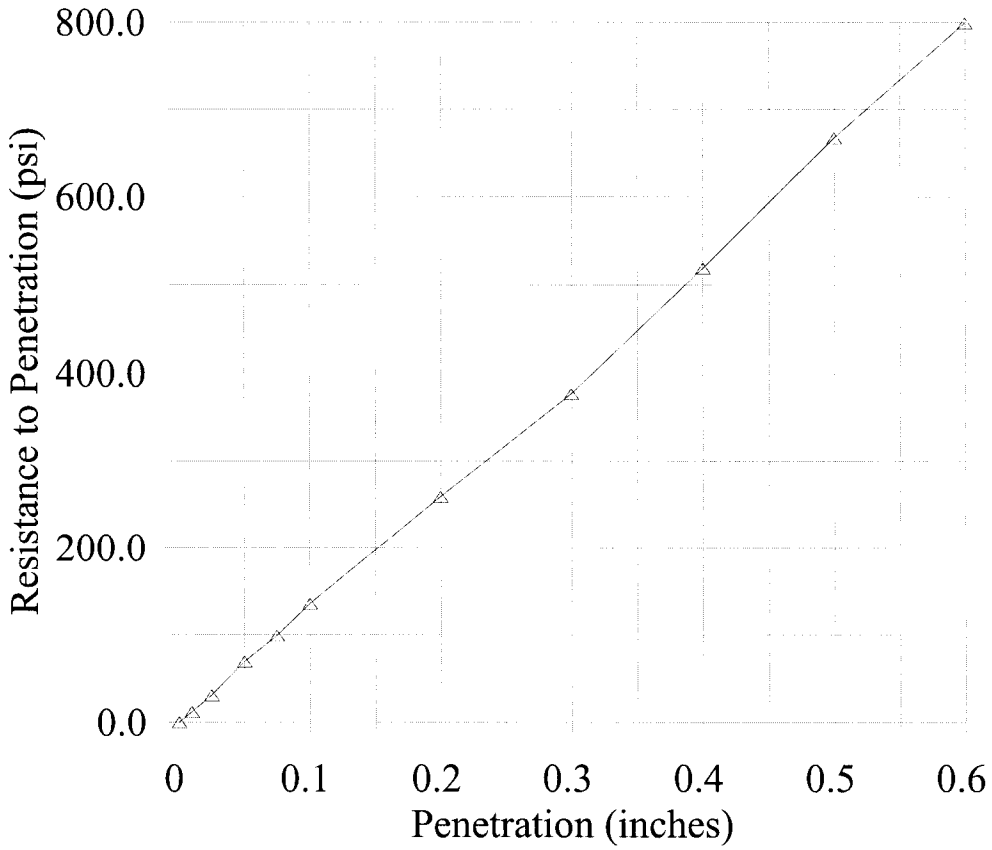
CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 65
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 260
Project State	:	Arkansas	Sample Depth :	0.6' to 8.0'
Laboratory No.	:	06127	Date Tested :	11-30-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	:	Brown Silty Gravel with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 96.8 %
Percent Swell = 0.02 %

C.B.R. @ 0.1 In. = 13.6*
C.B.R. @ 0.2 In. = 17.3
C.B.R. @ 0.3 In. = 19.9
C.B.R. @ 0.4 In. = 22.6
C.B.R. @ 0.5 In. = 25.7

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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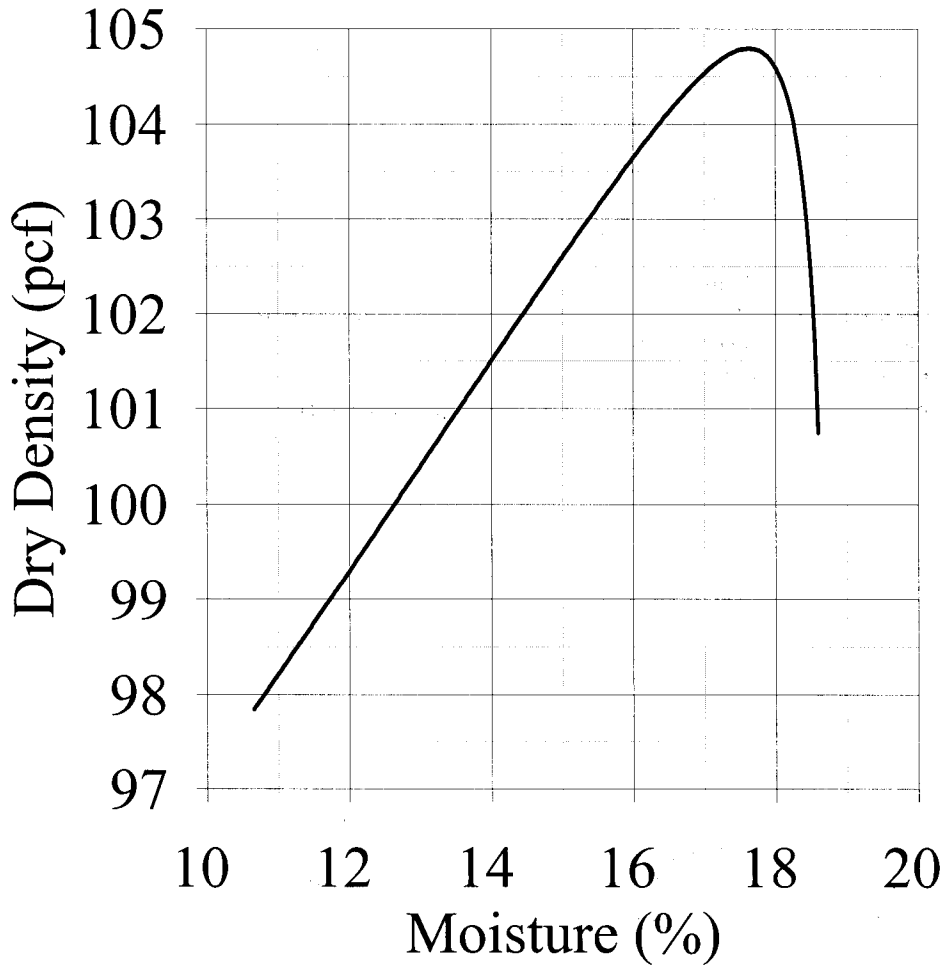
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 65
Project County	: Washington/Benton	Sample Loc. :	Boring No. 260
Project State	: Arkansas	Sample Depth :	0.6' to 8.0'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Brown Silty Gravel with Sand		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 66
Project County	: Washington/Benton	Sample Loc.	: Boring No. 263
Project State	: Arkansas	Sample Depth	: 0.6' to 16.0'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	93.2
No.4		4.75	mm	82.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	69.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0814mm

California Bearing Ratio	: 20.6	Natural Moisture (%)	: 12.1
Maximum Dry Density	: 100 pcf	Liquid Limit	: 37
Optimum Moisture	: 17 %	Plastic Limit	: 21
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: -0.56
Gravel (3in. + No.10)	: 30.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.5	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 49.6	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 17.9
Coarse Sand (-No.4 + No.10)	: 12.3
Medium Sand (-No.10 + No.40)	: 11.7
Fine Sand (-No.40 + No.200)	: 8.5
Silt + Clay (-No.200)	: 49.6

Approved By : DLC

Soil No. 66

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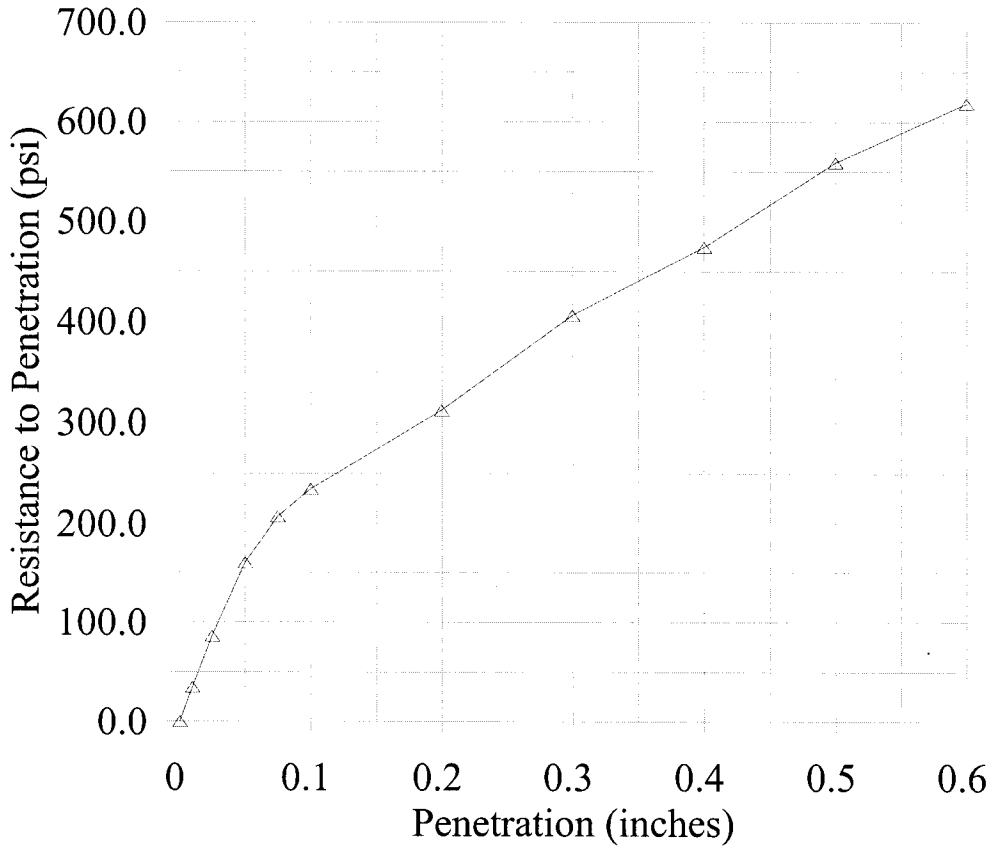
CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 66
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 263
Project State	:	Arkansas	Sample Depth :	0.6' to 16.0'
Laboratory No.	:	06127	Date Tested :	11-30-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	:	Brown Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.0 %
Percent Swell = 0.20 %

C.B.R. @ 0.1 In. = 23.5
C.B.R. @ 0.2 In. = 20.8
C.B.R. @ 0.3 In. = 21.4
C.B.R. @ 0.4 In. = 20.6*
C.B.R. @ 0.5 In. = 21.5

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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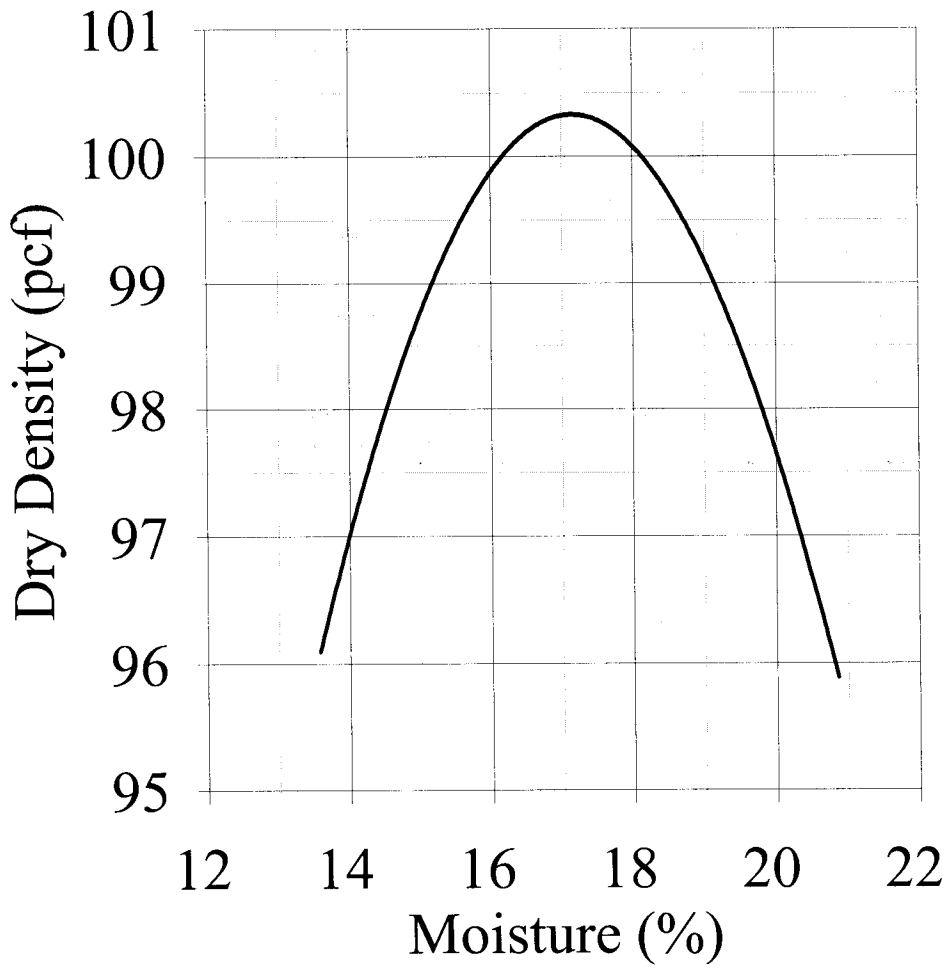
MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 66
Project County	: Washington/Benton	Sample Loc. :	Boring No. 263
Project State	: Arkansas	Sample Depth :	0.6' to 16.0'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Brown Clayey Sand with Gravel		



MAXIMUM DENSITY: 100 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 67
Project County	: Washington/Benton	Sample Loc.	: Boring No. 253
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	91.4
No.4		4.75	mm	78.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.2452mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 13.0
Maximum Dry Density	: NA	Liquid Limit	: 45
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 25
AASHTO Composition of Total Sample		Liquidity Index	: -0.28
Gravel (3in. + No.10)	: 34.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.2	AASHTO Classification	: A-7-6 (7)
Silt + Clay (-No.200)	: 44.4	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 21.2
Coarse Sand (-No.4 + No.10)	: 13.1
Medium Sand (-No.10 + No.40)	: 13.1
Fine Sand (-No.40 + No.200)	: 8.2
Silt + Clay (-No.200)	: 44.4

Approved By : DLC

Soil No. 67

P O Box 7267 • Paducah, KY 42002 • 2550 Irvin Cobb Dr • Paducah, KY 42003 • 270/444-9691 • fax 270/443-3943
mail@flohut.com

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 68
Project County	: Washington/Benton	Sample Loc.	: Boring No. 299
Project State	: Arkansas	Sample Depth	: 0.6' to 9.2'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Reddish Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.6
No.4		4.75	mm	90.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	82.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	74.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	68.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0126mm

California Bearing Ratio	: 3.3	Natural Moisture (%)	: 23.1
Maximum Dry Density	: 100 pcf	Liquid Limit	: 43
Optimum Moisture	: 21 %	Plastic Limit	: 22
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.05
Gravel (3in. + No.10)	: 17.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.3	AASHTO Classification	: A-7-6 (13)
Silt + Clay (-No.200)	: 68.4	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.3
Coarse Sand (-No.4 + No.10)	: 8.0
Medium Sand (-No.10 + No.40)	: 8.0
Fine Sand (-No.40 + No.200)	: 6.3
Silt + Clay (-No.200)	: 68.4

Approved By : DLC

Soil No. 68

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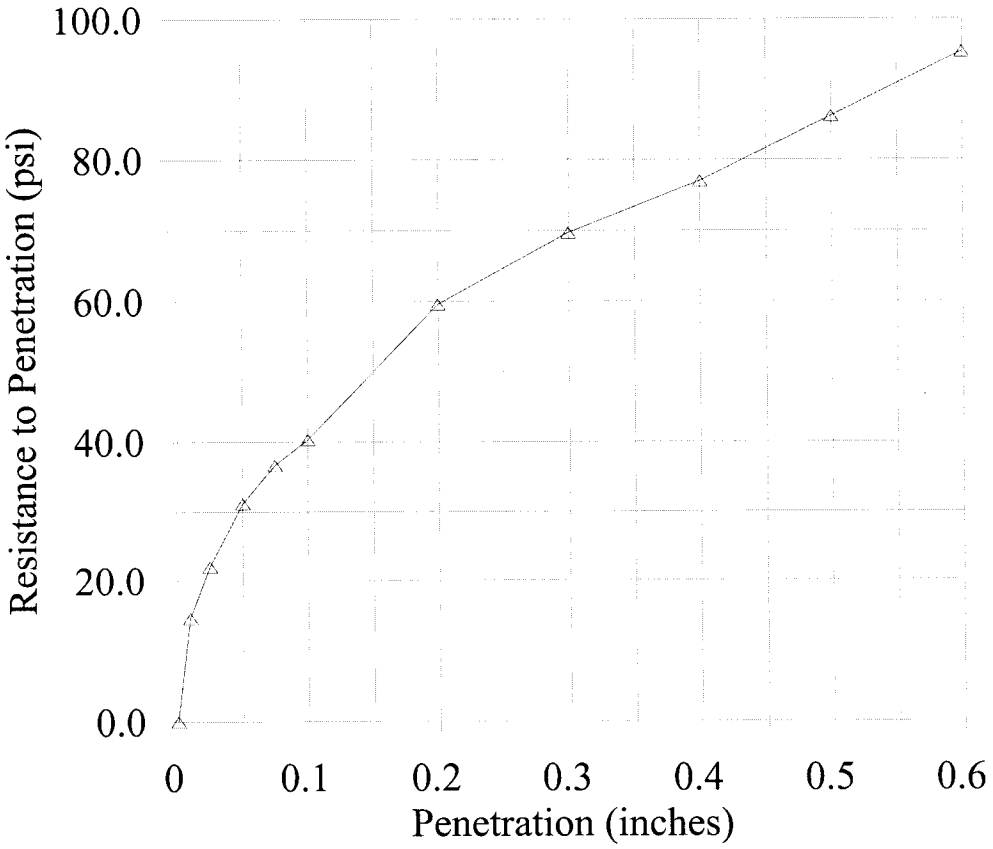
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 68
Project County	: Washington/Benton	Sample Loc. :	Boring No. 299
Project State	: Arkansas	Sample Depth :	0.6' to 9.2'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Reddish Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100.9 %
Percent Swell = 0.93 %

C.B.R. @ 0.1 In. = 4.0
C.B.R. @ 0.2 In. = 4.0
C.B.R. @ 0.3 In. = 3.7
C.B.R. @ 0.4 In. = 3.3
C.B.R. @ 0.5 In. = 3.3*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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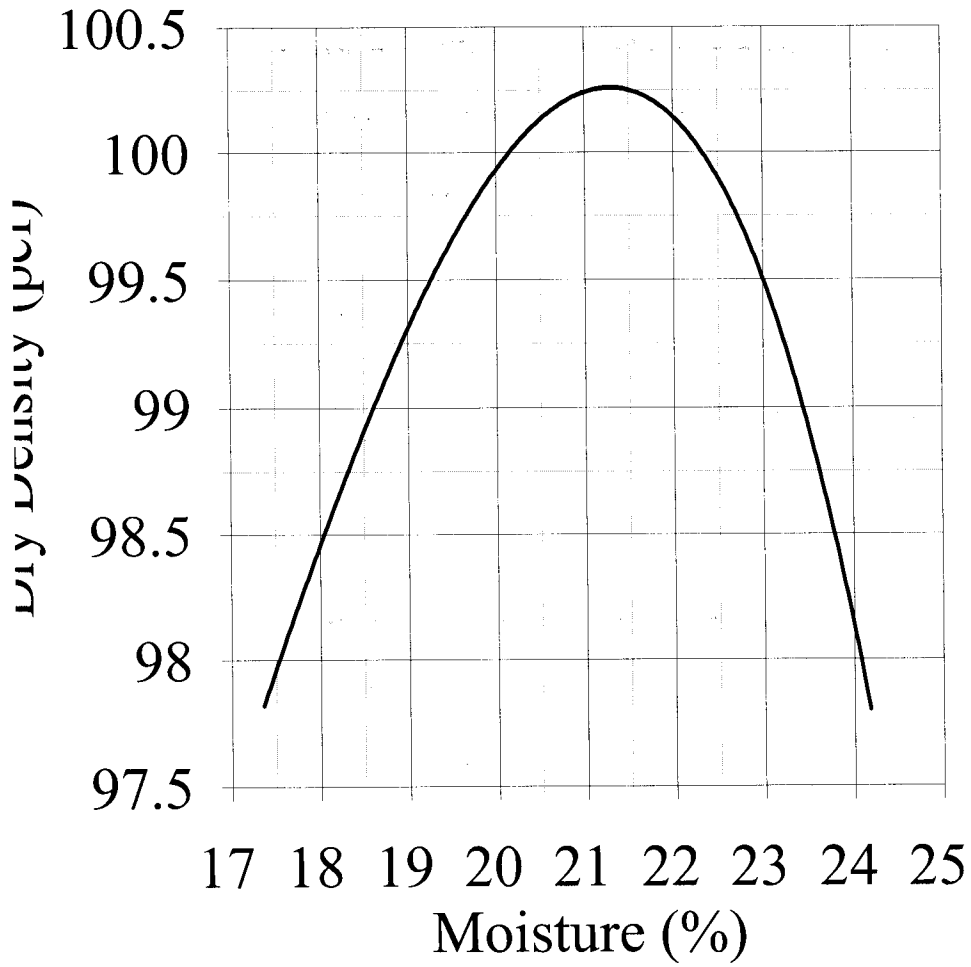
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 68
Project County	: Washington/Benton	Sample Loc. :	Boring No. 299
Project State	: Arkansas	Sample Depth :	0.6' to 9.2'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Reddish Sandy Lean Clay		



MAXIMUM DENSITY: 100 pcf

OPTIMUM MOISTURE: 21 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 69
Project County	: Washington/Benton	Sample Loc.	: Boring No. 296
Project State	: Arkansas	Sample Depth	: 0.6' to 6.6'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-30-07
Soil Type	: Brown Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.8
No.4		4.75	mm	87.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	73.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0764mm

California Bearing Ratio	: 8.6	Natural Moisture (%)	: 19.4
Maximum Dry Density	: 106 pcf	Liquid Limit	: 36
Optimum Moisture	: 17 %	Plastic Limit	: 18
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.08
Gravel (3in. + No.10)	: 26.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 14.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.4	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 49.9	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 13.0
Coarse Sand (-No.4 + No.10)	: 13.3
Medium Sand (-No.10 + No.40)	: 14.4
Fine Sand (-No.40 + No.200)	: 9.4
Silt + Clay (-No.200)	: 49.9

Approved By : DLC

Soil No. 69

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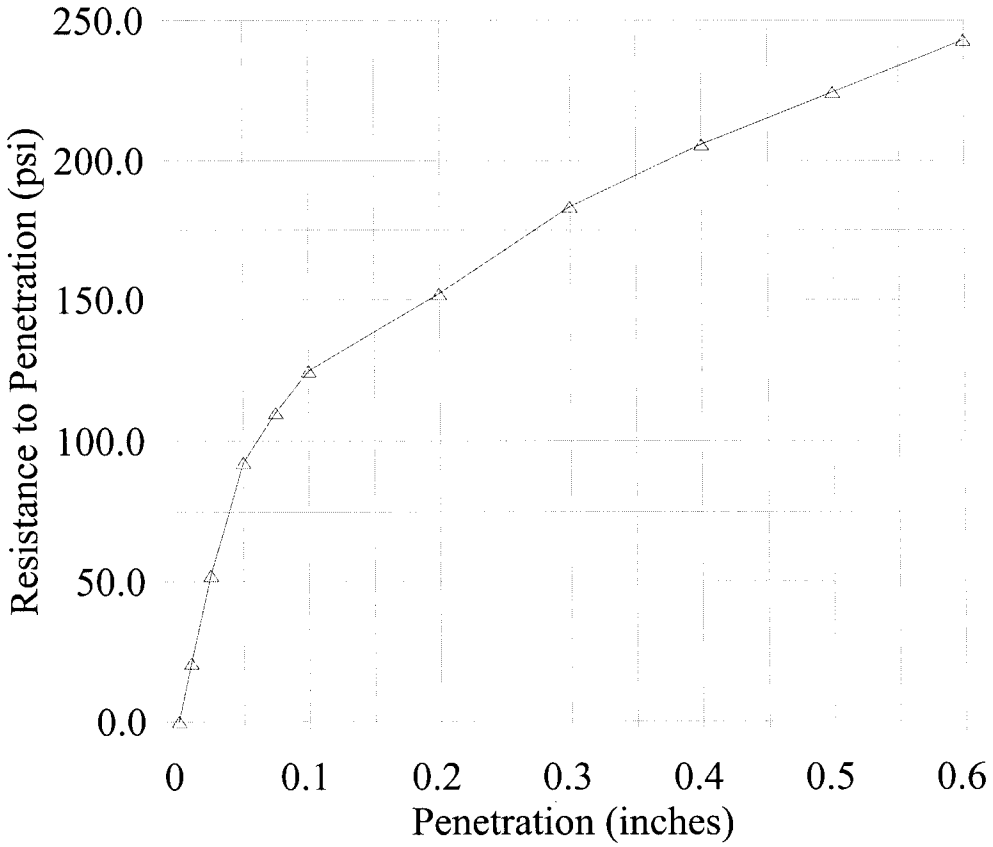
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 69
Project County	: Washington/Benton	Sample Loc. :	Boring No. 296
Project State	: Arkansas	Sample Depth :	0.6' to 6.6'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-30-07
Soil Type	: Brown Clayey Sand		



Compaction Effort = 2000 psi
Percent Compacted = 99.0 %
Percent Swell = 0.22 %

C.B.R. @ 0.1 In. = 12.5
C.B.R. @ 0.2 In. = 10.1
C.B.R. @ 0.3 In. = 9.7
C.B.R. @ 0.4 In. = 9.0
C.B.R. @ 0.5 In. = 8.6*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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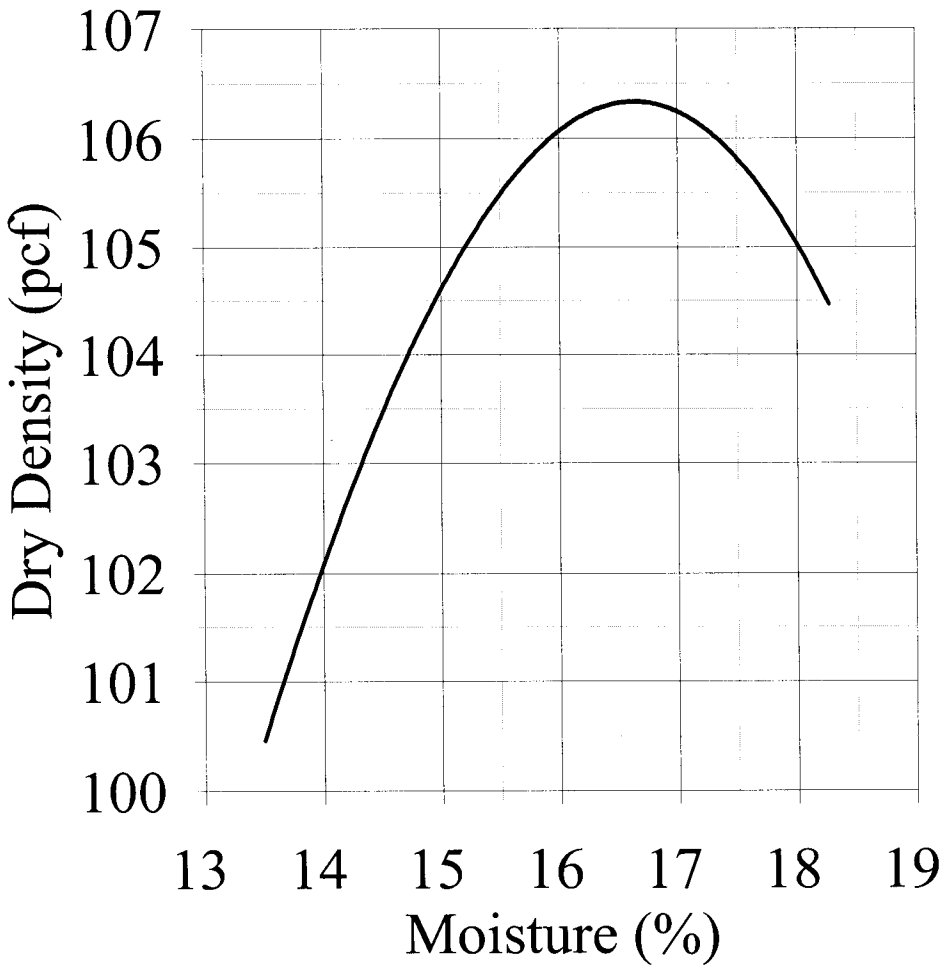
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 69
Project County	: Washington/Benton	Sample Loc. :	Boring No. 296
Project State	: Arkansas	Sample Depth :	0.6' to 6.6'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-30-07
Soil Type	: Brown Clayey Sand		



MAXIMUM DENSITY: 106 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 70
Project County	: Washington/Benton	Sample Loc.	: Boring No. 293
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-13-07
Soil Type	: Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.5
No.4		4.75	mm	90.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	84.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	69.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0119mm

California Bearing Ratio	: 4.5	Natural Moisture (%)	: 36.3
Maximum Dry Density	: 94 pcf	Liquid Limit	: 59
Optimum Moisture	: 25 %	Plastic Limit	: 23
		Plasticity Index	: 36
AASHTO Composition of Total Sample		Liquidity Index	: 0.37
Gravel (3in. + No.10)	: 15.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.4	AASHTO Classification	: A-7-6 (24)
Silt + Clay (-No.200)	: 69.3	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.7
Fine Gravel (-3/4in. + No.4)	: 6.8
Coarse Sand (-No.4 + No.10)	: 5.9
Medium Sand (-No.10 + No.40)	: 7.9
Fine Sand (-No.40 + No.200)	: 7.4
Silt + Clay (-No.200)	: 69.3

Approved By : NLC

Soil No. 70

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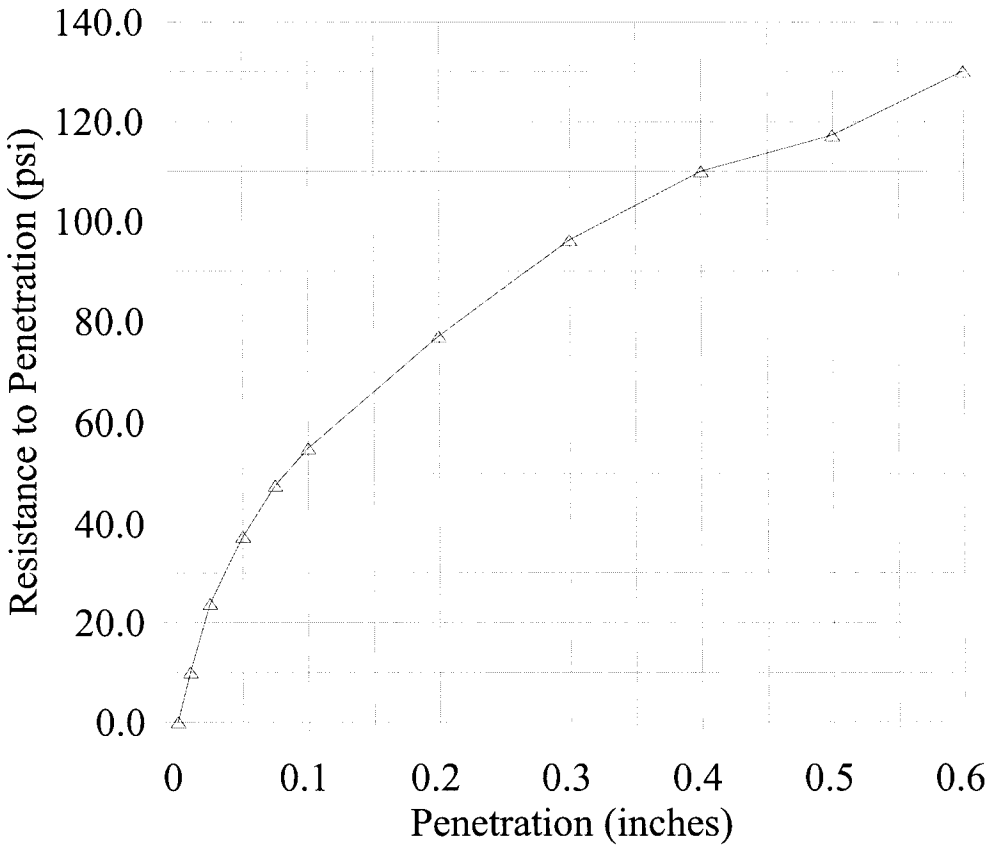
Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No. :	Bag No. 70
Project County	:	Washington/Benton	Sample Loc. :	Boring No. 293
Project State	:	Arkansas	Sample Depth :	0.6' to 15.0'
Laboratory No.	:	06127	Date Tested :	11-30-07
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	:	Brown Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 97.8 %
Percent Swell = 0.55 %

C.B.R. @ 0.1 In. = 5.5
C.B.R. @ 0.2 In. = 5.1
C.B.R. @ 0.3 In. = 5.1
C.B.R. @ 0.4 In. = 4.8
C.B.R. @ 0.5 In. = 4.5*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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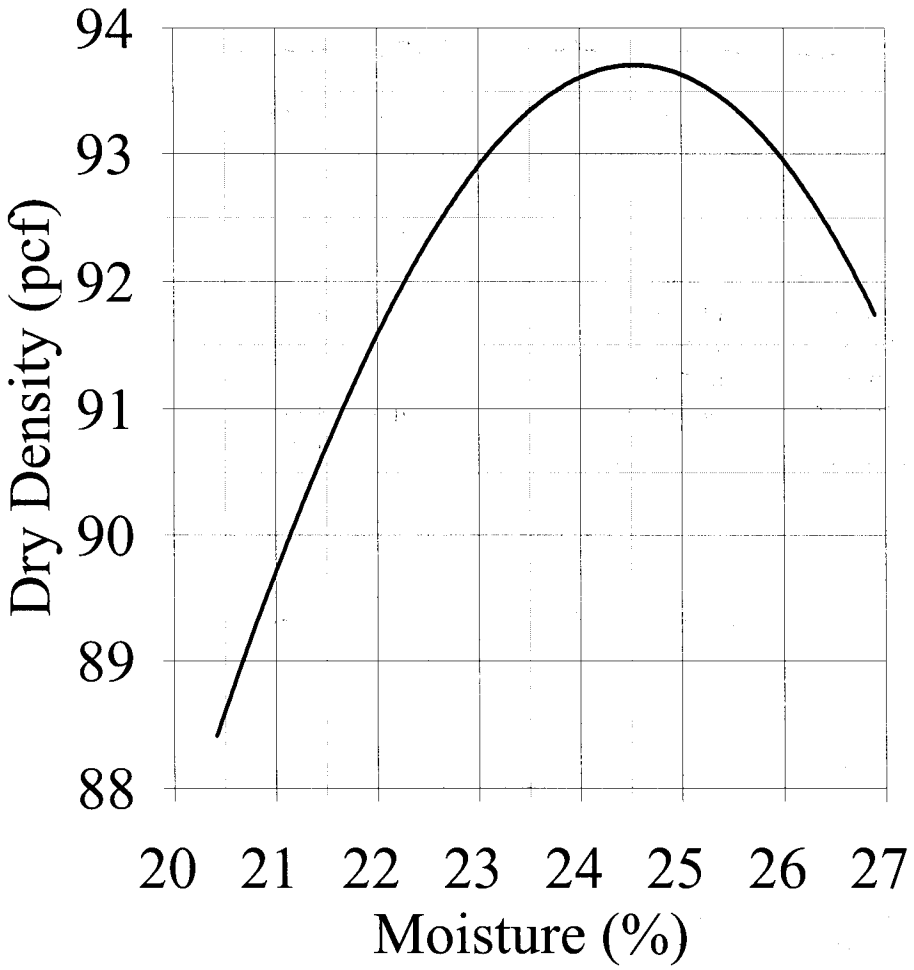
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No. :	Bag No. 70
Project County	: Washington/Benton	Sample Loc. :	Boring No. 293
Project State	: Arkansas	Sample Depth :	0.6' to 15.0'
Laboratory No.	: 06127	Date Tested :	11-30-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported :	12-13-07
Soil Type	: Brown Sandy Fat Clay		



MAXIMUM DENSITY: 94 pcf

OPTIMUM MOISTURE: 25 %

COMMENTS: KM 64-511-03; Method (C); Plus ¾ in. materials removed.

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: Bag No. 71
Project County	: Washington/Benton	Sample Loc.	: Boring No. 303
Project State	: Arkansas	Sample Depth	: 0.6' to 5.5'
Laboratory No.	: 06127	Date Tested	: 11-13-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.4
No.4		4.75	mm	93.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	67.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0140mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 16.1
Maximum Dry Density	: NA	Liquid Limit	: 50
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 27
AASHTO Composition of Total Sample		Liquidity Index	: -0.26
Gravel (3in. + No.10)	: 13.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.2	AASHTO Classification	: A-7-6 (17)
Silt + Clay (-No.200)	: 67.0	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 6.7
Coarse Sand (-No.4 + No.10)	: 6.3
Medium Sand (-No.10 + No.40)	: 9.8
Fine Sand (-No.40 + No.200)	: 10.2
Silt + Clay (-No.200)	: 67.0

Approved By : bjc

Soil No. 71

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112)		
Project No.	: 06127	Sample No.	: Bag No. 72
Project County	: Washington/Benton	Sample Loc.	: Boring No. 304
Project State	: Arkansas	Sample Depth	: 0.6' to 5.0'
Laboratory No.	: 06127	Date Tested	: 01-31-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red & Brown Gravelly Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.3
3/4	in.	19	mm	91.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.3
No.4		4.75	mm	78.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	66.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	61.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0828 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.7
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: 1.14
Gravel (3in. + No.10)	: 27.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	: 61.8	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.5
Fine Gravel (-3/4in. + No.4)	: 12.7
Coarse Sand (-No.4 + No.10)	: 6.6
Medium Sand (-No.10 + No.40)	: 6.0
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 61.8

Approved By : DLC

Soil No. 72

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 2)		
Project No.	: 06127	Sample No.	: Bag No. 73
Project County	: Washington/Benton	Sample Loc.	: Boring No. 316
Project State	: Arkansas	Sample Depth	: 0.6' to 5.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red & White Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	91.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.7
No.4		4.75	mm	76.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	53.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.132 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 27.5
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 28
AASHTO Composition of Total Sample		Liquidity Index	: 0.30
Gravel (3in. + No.10)	: 33.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.4	AASHTO Classification	: A-7-6 (8)
Silt + Clay (-No.200)	: 45.3	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.7
Fine Gravel (-3/4in. + No.4)	: 15.0
Coarse Sand (-No.4 + No.10)	: 9.9
Medium Sand (-No.10 + No.40)	: 12.7
Fine Sand (-No.40 + No.200)	: 8.4
Silt + Clay (-No.200)	: 45.3

Approved By : OLC

Soil No. 73

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 3)		
Project No.	: 06127	Sample No.	: Bag No. 75
Project County	: Washington/Benton	Sample Loc.	: Boring No. 320
Project State	: Arkansas	Sample Depth	: 1.0' to 8.8'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.5
No.4		4.75	mm	90.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	83.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	68.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0404 mm

California Bearing Ratio : 4
Maximum Dry Density : 94 pcf
Optimum Moisture : 25 %

Natural Moisture (%) : 30.7
Liquid Limit : 55
Plastic Limit : 24
Plasticity Index : 31
Liquidity Index : 0.22
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (20)
ASTM Classification : CH

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 16.3
Coarse Sand (-No.10 + No.40) : 7.2
Fine Sand (-No.40 + No.200) : 8.4
Silt + Clay (-No.200) : 68.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 2.2
Fine Gravel (-3/4in. + No.4) : 7.3
Coarse Sand (-No.4 + No.10) : 6.8
Medium Sand (-No.10 + No.40) : 7.2
Fine Sand (-No.40 + No.200) : 8.4
Silt + Clay (-No.200) : 68.1

Approved By : DLC

Soil No. 75

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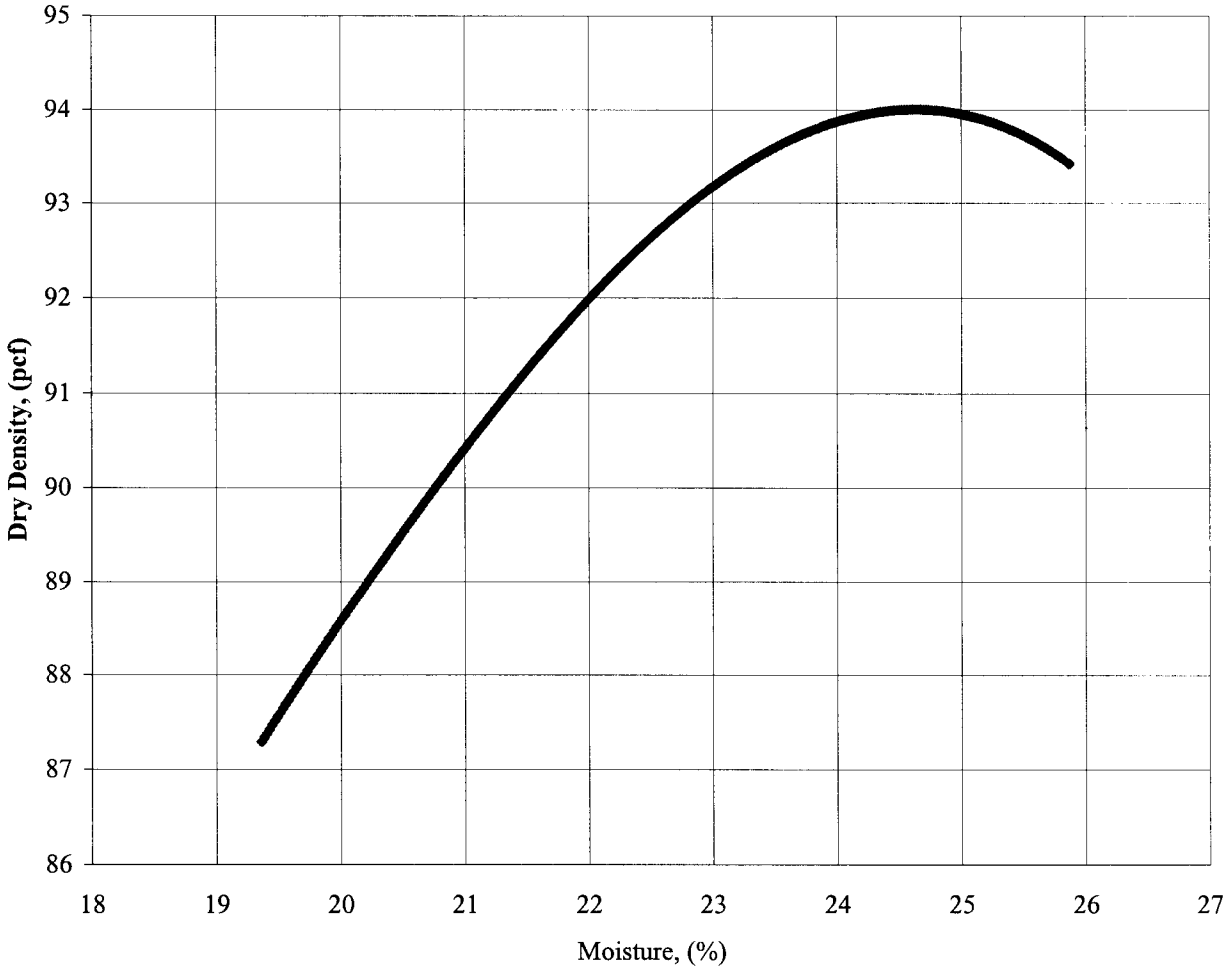
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Highway 112, Ramp 3)		
Project No.	: 06127	Sample No.	: Bag No. 75
Project County	: Washington/Benton	Sample Loc.	: Boring No. 320
Project State	: Arkansas	Sample Depth	: 1.0' to 8.8'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		



MAXIMUM DENSITY: 94 pcf

OPTIMUM MOISTURE: 25 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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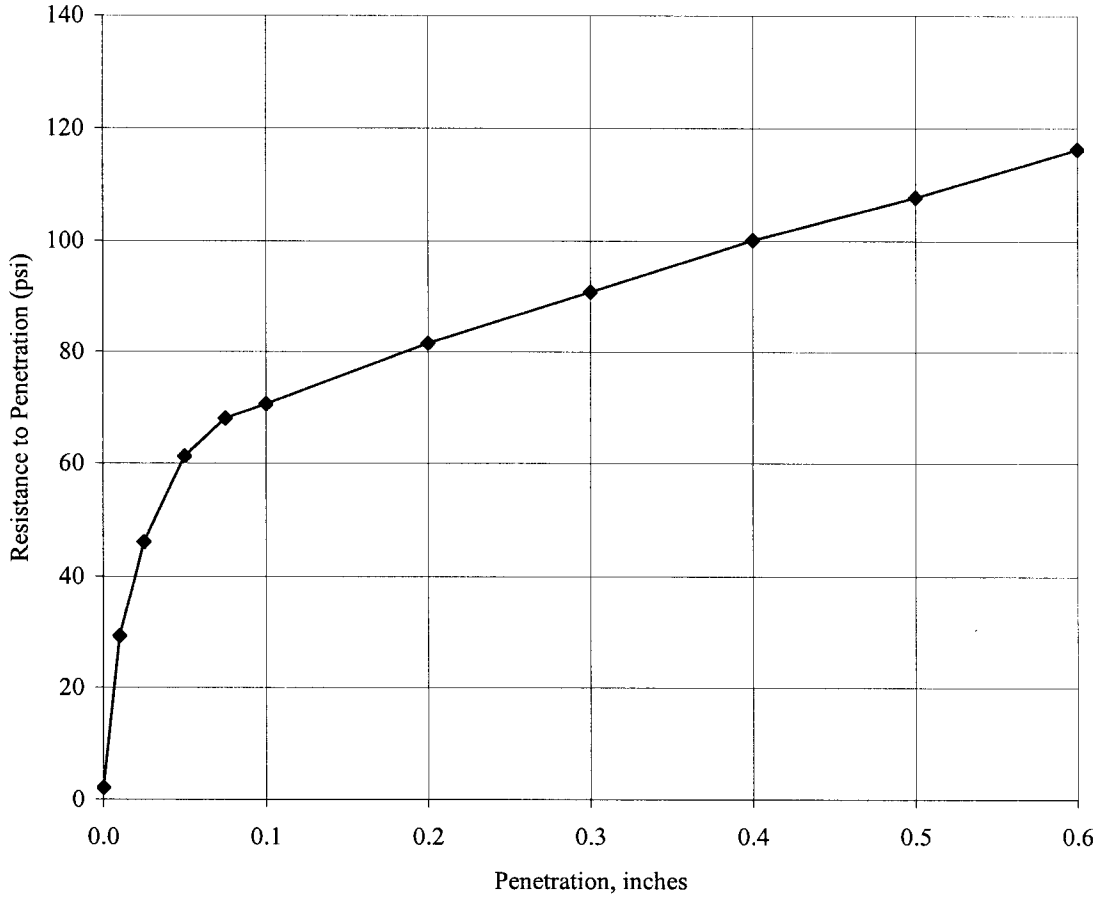
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Highway 112, Ramp 3)		
Project No.	: 06127	Sample No.	: Bag No. 75
Project County	: Washington/Benton	Sample Loc.	: Boring No. 320
Project State	: Arkansas	Sample Depth	: 1.0' to 8.8'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 97.9 %
Percent Swell = 0.36 %

C.B.R. @ 0.1 In. = 7.1
C.B.R. @ 0.2 In. = 5.4
C.B.R. @ 0.3 In. = 4.8
C.B.R. @ 0.4 In. = 4.4
C.B.R. @ 0.5 In. = 4.1*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 3)		
Project No.	: 06127	Sample No.	: Bag No. 76
Project County	: Washington/Benton	Sample Loc.	: Boring No. 324
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.6
No.4		4.75	mm	57.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0404 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 15.8
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 18
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: -0.09
Gravel (3in. + No.10)	: 55.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 4.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.2	AASHTO Classification	: A-7-6 (3)
Silt + Clay (-No.200)	: 35.3	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 3.8
Fine Gravel (-3/4in. + No.4)	: 38.9
Coarse Sand (-No.4 + No.10)	: 12.9
Medium Sand (-No.10 + No.40)	: 4.9
Fine Sand (-No.40 + No.200)	: 4.2
Silt + Clay (-No.200)	: 35.3

Approved By : DLC

Soil No. 76

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 77
Project County	: Washington/Benton	Sample Loc.	: Boring No. 313
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	99.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	92.1
No.4		4.75	mm	82.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	61.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0504 mm

California Bearing Ratio	: 9	Natural Moisture (%)	: 30
Maximum Dry Density	: 105 pcf	Liquid Limit	: 37
Optimum Moisture	: 18 %	Plastic Limit	: 15
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.68
Gravel (3in. + No.10)	: 28.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.9	AASHTO Classification	: A-6 (8)
Silt + Clay (-No.200)	: 52.7	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.0
Fine Gravel (-3/4in. + No.4)	: 16.9
Coarse Sand (-No.4 + No.10)	: 10.4
Medium Sand (-No.10 + No.40)	: 10.1
Fine Sand (-No.40 + No.200)	: 8.9
Silt + Clay (-No.200)	: 52.7

Approved By : DLC

Soil No. 77

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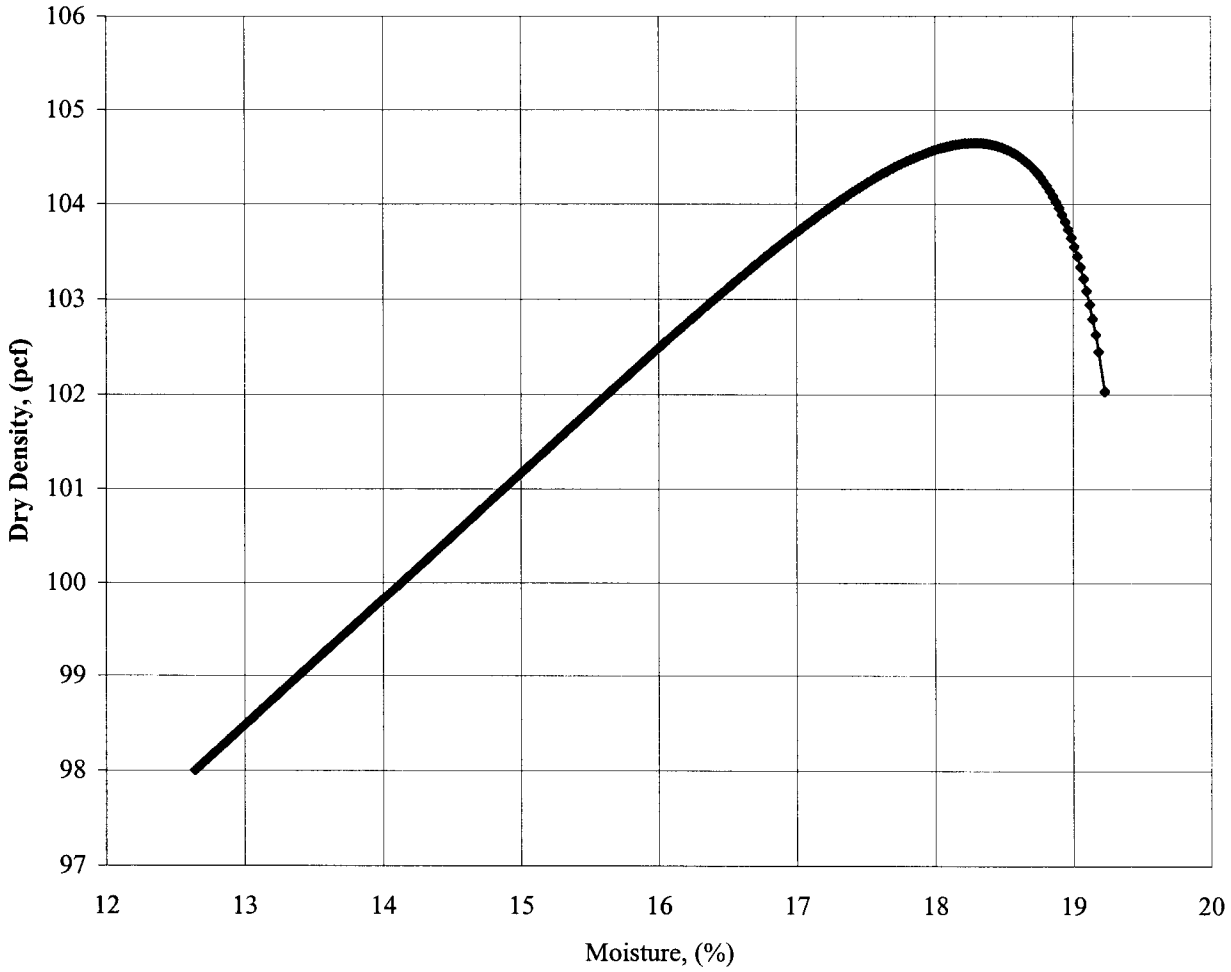
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 77
Project County	: Washington/Benton	Sample Loc.	: Boring No. 313
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay with Gravel		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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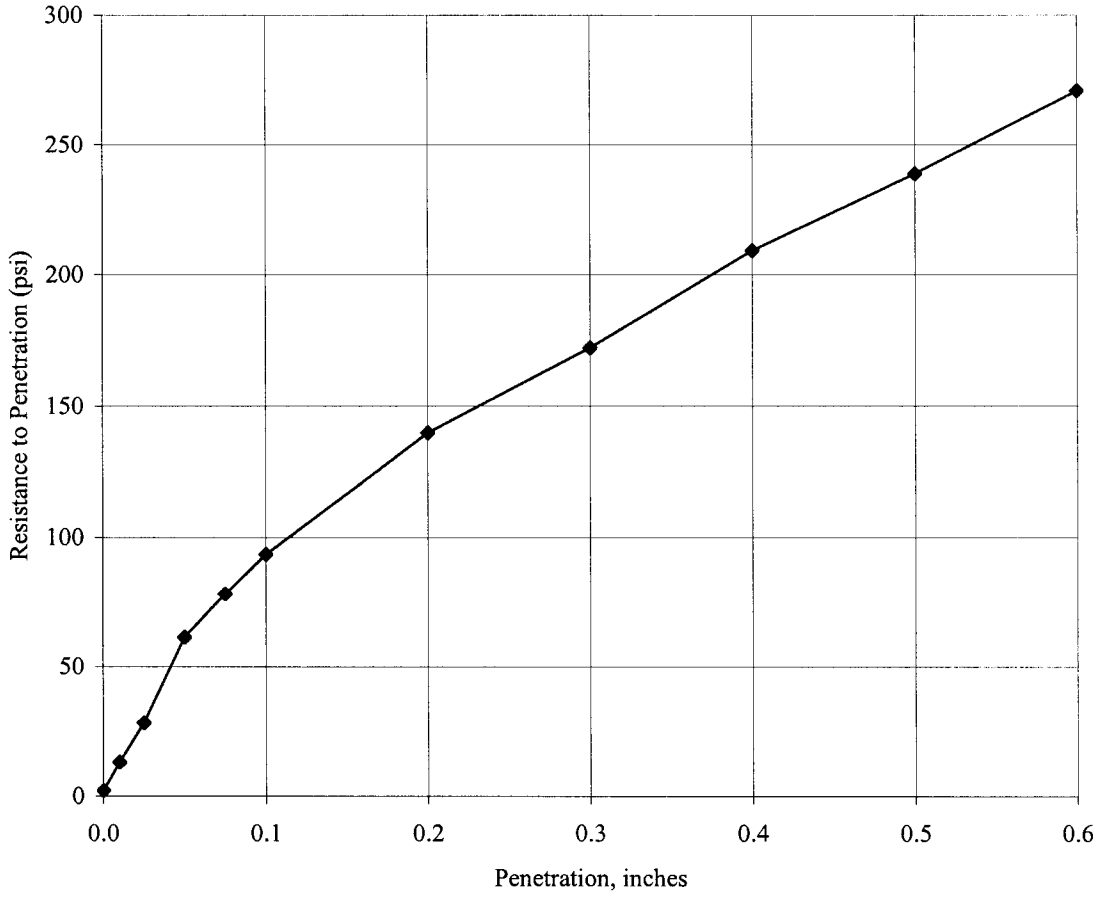
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 77
Project County	: Washington/Benton	Sample Loc.	: Boring No. 313
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 100.9 %
Percent Swell = 0.04 %

C.B.R. @ 0.1 In. = 9.3
C.B.R. @ 0.2 In. = 9.3
C.B.R. @ 0.3 In. = 9.1*
C.B.R. @ 0.4 In. = 9.1
C.B.R. @ 0.5 In. = 9.2

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 78
Project County	: Washington/Benton	Sample Loc.	: Boring No. 315
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.3
No.4		4.75	mm	91.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	83.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	62.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.034 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.6
Maximum Dry Density	: NA	Liquid Limit	: 52
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 29
AASHTO Composition of Total Sample		Liquidity Index	: 0.29
Gravel (3in. + No.10)	: 16.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.3	AASHTO Classification	: A-7-6 (16)
Silt + Clay (-No.200)	: 62.1	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 8.3
Coarse Sand (-No.4 + No.10)	: 8.4
Medium Sand (-No.10 + No.40)	: 11.9
Fine Sand (-No.40 + No.200)	: 9.3
Silt + Clay (-No.200)	: 62.1

Approved By : DLC

Soil No. 78

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112)		
Project No.	: 06127	Sample No.	: Bag No. 79
Project County	: Washington/Benton	Sample Loc.	: Boring No. 308
Project State	: Arkansas	Sample Depth	: 0.6' to 5.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.8
No.4		4.75	mm	96.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	89.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	77.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0312 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 30
Maximum Dry Density	: NA	Liquid Limit	: 44
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 24
		Liquidity Index	: 0.42
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-6 (18)
		ASTM Classification	: CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 10.5
Coarse Sand (-No.10 + No.40)	: 5.8
Fine Sand (-No.40 + No.200)	: 6.0
Silt + Clay (-No.200)	: 77.7

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 3.3
Coarse Sand (-No.4 + No.10)	: 7.2
Medium Sand (-No.10 + No.40)	: 5.8
Fine Sand (-No.40 + No.200)	: 6.0
Silt + Clay (-No.200)	: 77.7

Approved By : DLC

Soil No. 79

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SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 80
Project County	: Washington/Benton	Sample Loc.	: Boring No. 309
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	97.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	93.7
No.4		4.75	mm	88.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	80.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0453 mm

California Bearing Ratio	: 8	Natural Moisture (%)	: 27.2
Maximum Dry Density	: 103 pcf	Liquid Limit	: 42
Optimum Moisture	: 19 %	Plastic Limit	: 19
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.35
Gravel (3in. + No.10)	: 19.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.6	AASHTO Classification	: A-7-6 (11)
Silt + Clay (-No.200)	: 59.8	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 2.8
Fine Gravel (-3/4in. + No.4)	: 8.9
Coarse Sand (-No.4 + No.10)	: 8.1
Medium Sand (-No.10 + No.40)	: 11.8
Fine Sand (-No.40 + No.200)	: 8.6
Silt + Clay (-No.200)	: 59.8

Approved By : DLC

Soil No. 80

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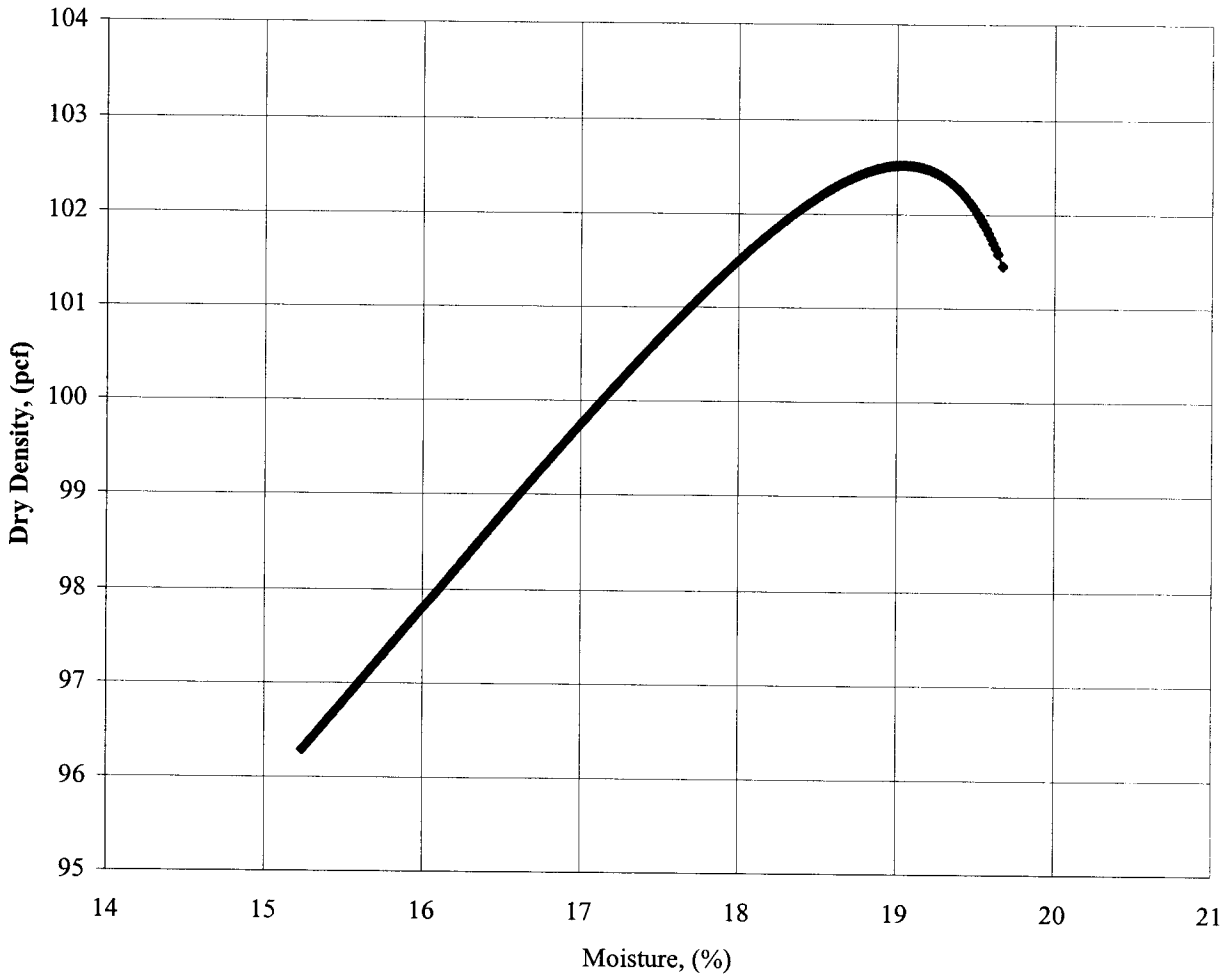
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 80
Project County	: Washington/Benton	Sample Loc.	: Boring No. 309
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay		



MAXIMUM DENSITY: 103 pcf

OPTIMUM MOISTURE: 19 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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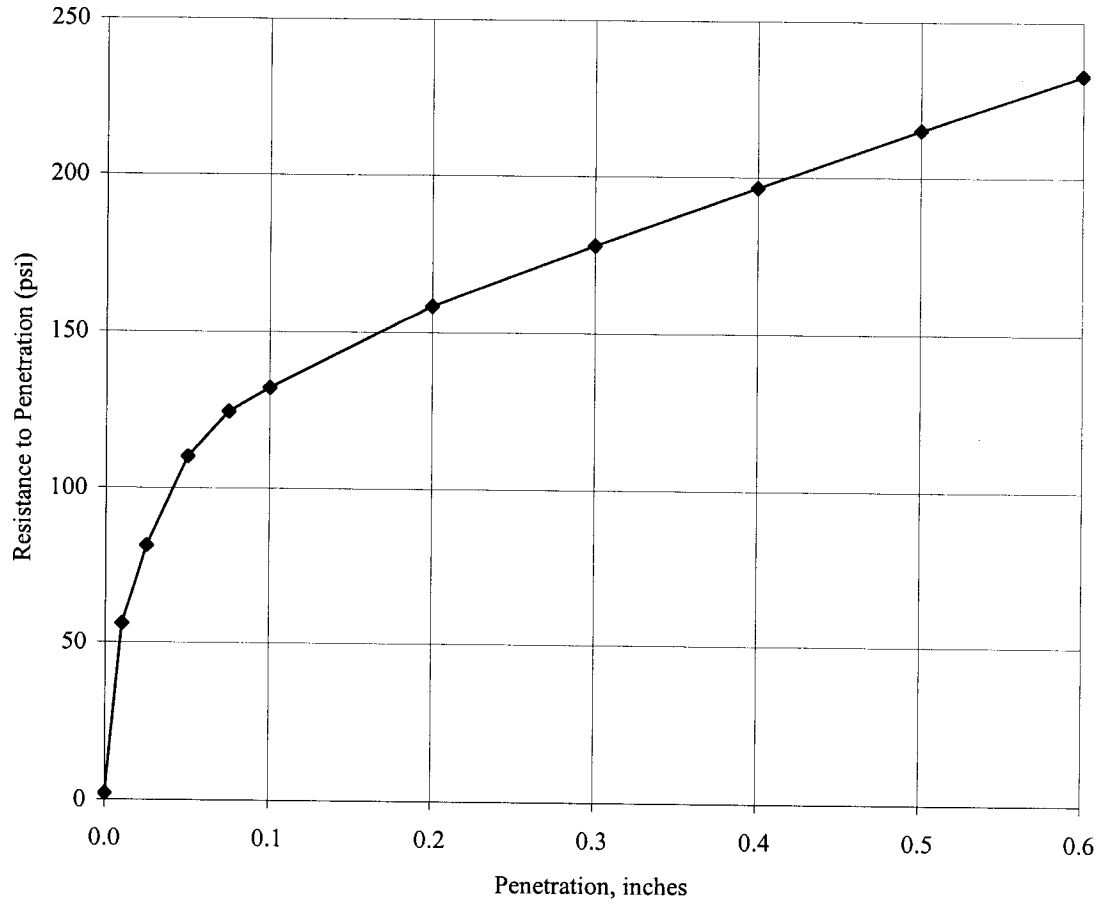
CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Highway 112, Ramp 1)		
Project No.	: 06127	Sample No.	: Bag No. 80
Project County	: Washington/Benton	Sample Loc.	: Boring No. 309
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.4 %
Percent Swell = 0.3 %

C.B.R. @ 0.1 In. = 13.2
C.B.R. @ 0.2 In. = 10.6
C.B.R. @ 0.3 In. = 9.4
C.B.R. @ 0.4 In. = 8.5
C.B.R. @ 0.5 In. = 8.3*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp EN)		
Project No.	:	06127	Sample No.	: Bag No. 81
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 333
Project State	:	Arkansas	Sample Depth	: 0.6' to 11.6'
Laboratory No.	:	06127	Date Tested	: 01-23-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	:	Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	94.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.6
No.4		4.75	mm	79.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	69.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	50.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0748 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 20
Maximum Dry Density	:	NA	Liquid Limit	: 34
Optimum Moisture	:	NA	Plastic Limit	: 17
			Plasticity Index	: 17
AASHTO Composition of Total Sample			Liquidity Index	: 0.18
Gravel (3in. + No.10)	:	30.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.4	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	:	50.1	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	5.6
Fine Gravel (-3/4in. + No.4)	:	14.6
Coarse Sand (-No.4 + No.10)	:	10.1
Medium Sand (-No.10 + No.40)	:	10.2
Fine Sand (-No.40 + No.200)	:	9.4
Silt + Clay (-No.200)	:	50.1

Approved By : DLC

Soil No. 81

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp ES)		
Project No.	:	06127	Sample No.	: Bag No. 82
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 350
Project State	:	Arkansas	Sample Depth	: 0.6' to 28.0'
Laboratory No.	:	06127	Date Tested	: 01-22-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	:	Red Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.9
No.4		4.75	mm	96.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	90.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0329 mm

California Bearing Ratio	:	5	Natural Moisture (%)	: 35.9
Maximum Dry Density	:	92 pcf	Liquid Limit	: 67
Optimum Moisture	:	27 %	Plastic Limit	: 28
			Plasticity Index	: 39
AASHTO Composition of Total Sample			Liquidity Index	: 0.20
Gravel (3in. + No.10)	:	9.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	19.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	11.8	AASHTO Classification	: A-7-6 (21)
Silt + Clay (-No.200)	:	59.5	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	3.2
Coarse Sand (-No.4 + No.10)	:	6.1
Medium Sand (-No.10 + No.40)	:	19.4
Fine Sand (-No.40 + No.200)	:	11.8
Silt + Clay (-No.200)	:	59.5

Approved By : DLC

Soil No. 82

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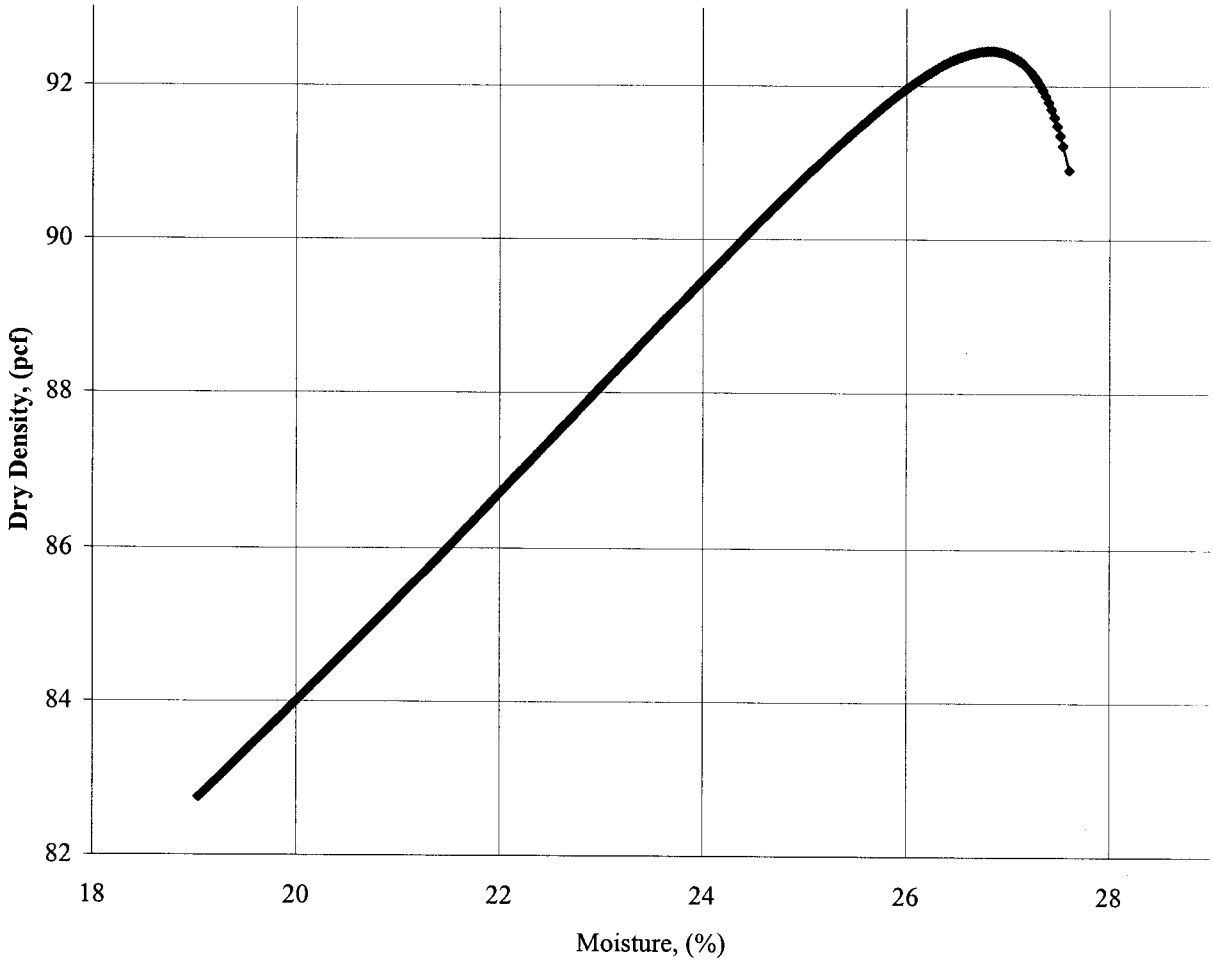
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Ramp ES)		
Project No.	: 06127	Sample No.	: Bag No. 82
Project County	: Washington/Benton	Sample Loc.	: Boring No. 350
Project State	: Arkansas	Sample Depth	: 0.6' to 28.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		



MAXIMUM DENSITY: 92 pcf

OPTIMUM MOISTURE: 27 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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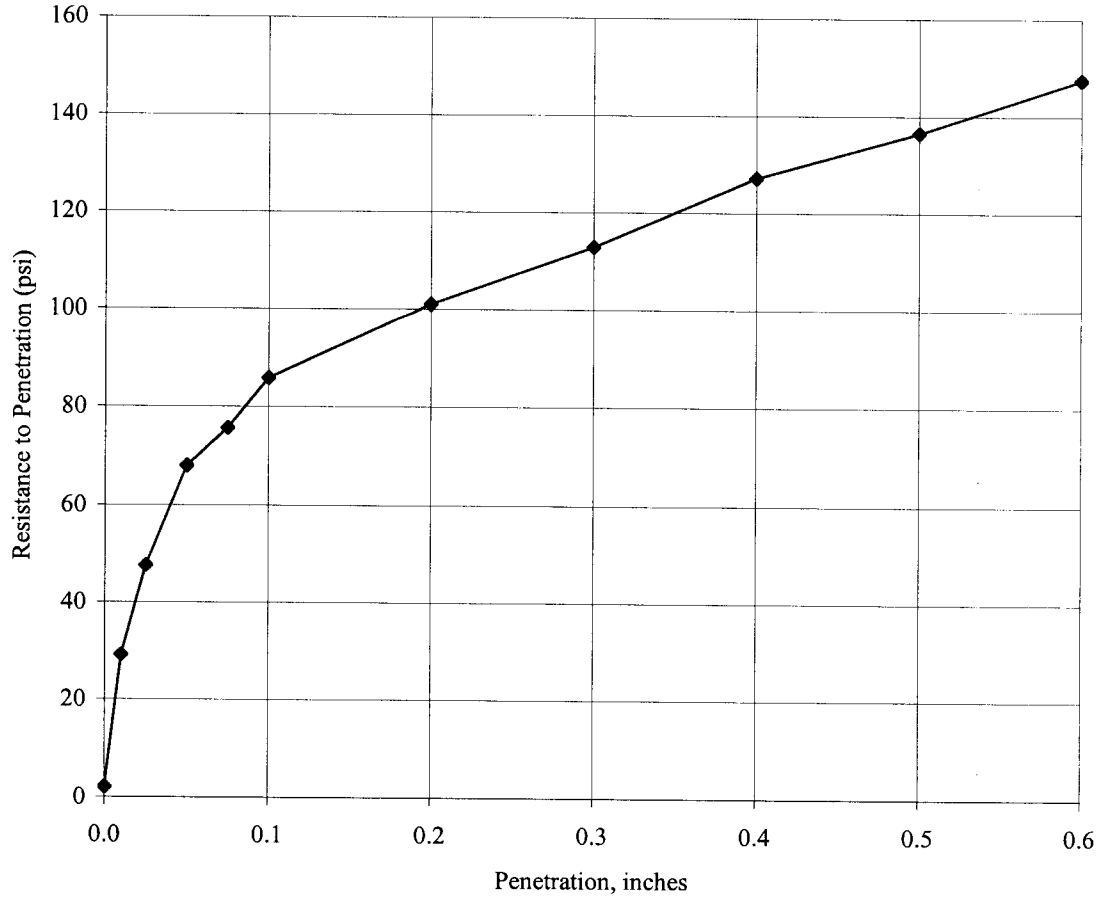
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Ramp ES)		
Project No.	: 06127	Sample No.	: Bag No. 82
Project County	: Washington/Benton	Sample Loc.	: Boring No. 350
Project State	: Arkansas	Sample Depth	: 0.6' to 28.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Red Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.9 %
Percent Swell = 0.56 %

C.B.R. @ 0.1 In. = 8.6
C.B.R. @ 0.2 In. = 6.7
C.B.R. @ 0.3 In. = 5.9
C.B.R. @ 0.4 In. = 5.5
C.B.R. @ 0.5 In. = 5.2*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp EN)		
Project No.	:	06127	Sample No.	: Bag No. 83
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 337
Project State	:	Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	:	06127	Date Tested	: 01-23-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	:	Reddish Brown Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.0
No.4		4.75	mm	91.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	84.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	65.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0368 mm

California Bearing Ratio : 5
Maximum Dry Density : 95 pcf
Optimum Moisture : 24 %

Natural Moisture (%) : 19.7
Liquid Limit : 55
Plastic Limit : 25
Plasticity Index : 30
Liquidity Index : -0.17
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (13)
ASTM Classification : CH

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 15.7
Coarse Sand (-No.10 + No.40) : 18.9
Fine Sand (-No.40 + No.200) : 11.4
Silt + Clay (-No.200) : 54.0

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 1.6
Fine Gravel (-3/4in. + No.4) : 7.3
Coarse Sand (-No.4 + No.10) : 6.8
Medium Sand (-No.10 + No.40) : 18.9
Fine Sand (-No.40 + No.200) : 11.4
Silt + Clay (-No.200) : 54.0

Approved By : DLC

Soil No. 83

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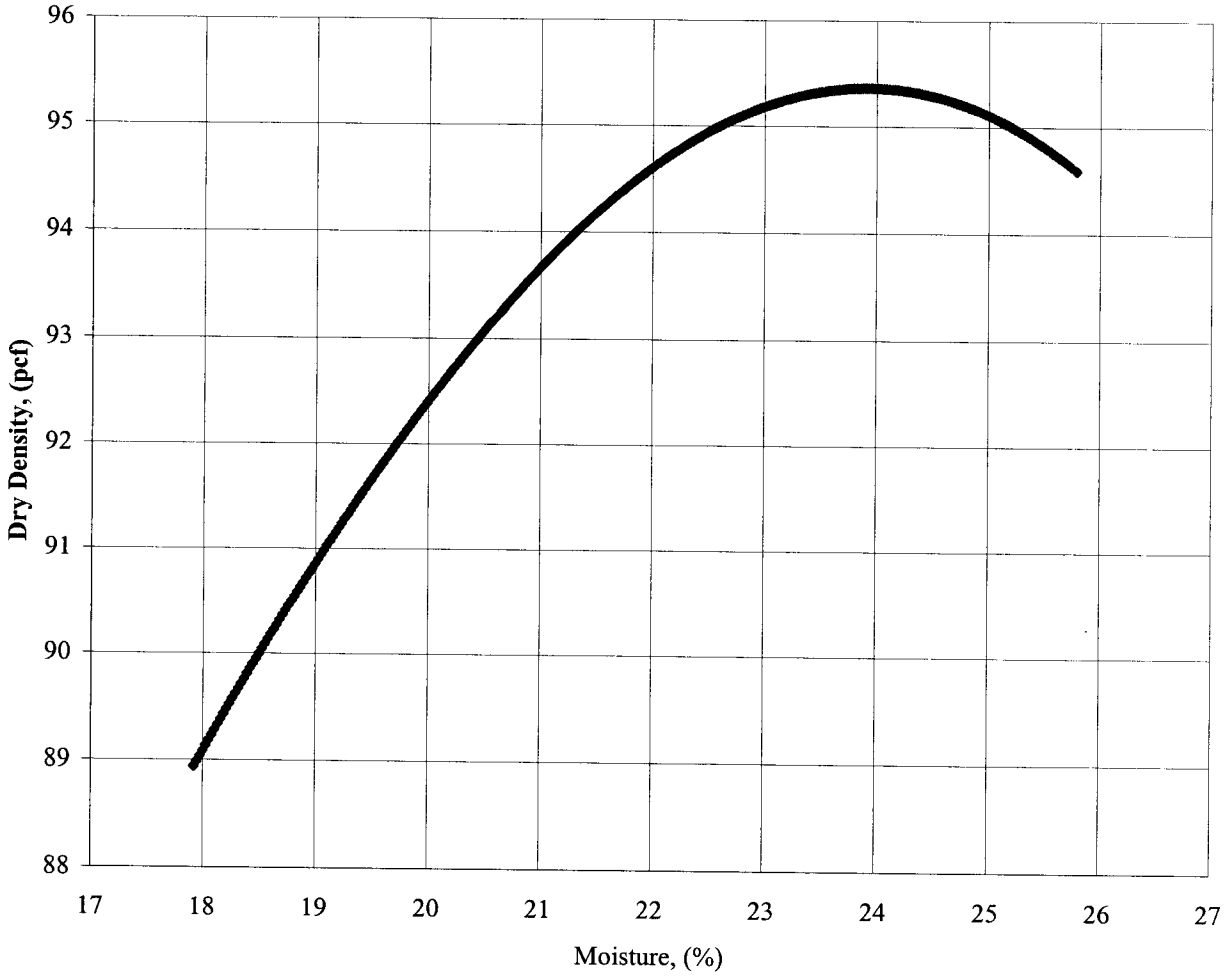
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Ramp EN)		
Project No.	: 06127	Sample No.	: Bag No. 83
Project County	: Washington/Benton	Sample Loc.	: Boring No. 337
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Fat Clay		



MAXIMUM DENSITY: 95 pcf

OPTIMUM MOISTURE: 24 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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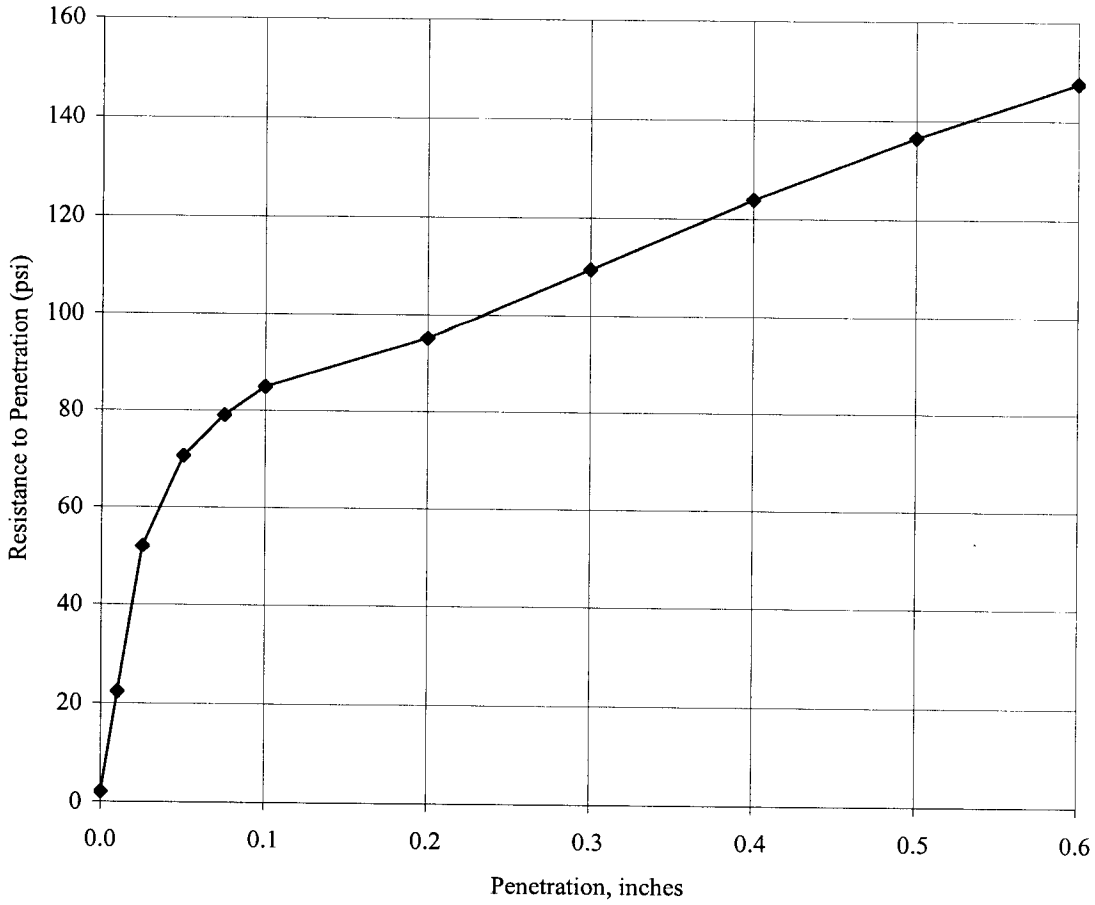
CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Ramp EN)		
Project No.	: 06127	Sample No.	: Bag No. 83
Project County	: Washington/Benton	Sample Loc.	: Boring No. 337
Project State	: Arkansas	Sample Depth	: 0.6' to 20.0'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-19-08
Soil Type	: Reddish Brown Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100 %
Percent Swell = 0.64 %

C.B.R. @ 0.1 In. = 8.5
C.B.R. @ 0.2 In. = 6.3
C.B.R. @ 0.3 In. = 5.8
C.B.R. @ 0.4 In. = 5.4
C.B.R. @ 0.5 In. = 5.2*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No.326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.0
3/4	in.	19	mm	92.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.8
No.4		4.75	mm	82.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.079 mm

California Bearing Ratio	: 6	Natural Moisture (%)	: 24.5
Maximum Dry Density	: 105 pcf	Liquid Limit	: 45
Optimum Moisture	: 18 %	Plastic Limit	: 19
		Plasticity Index	: 26
AASHTO Composition of Total Sample		Liquidity Index	: 0.23
Gravel (3in. + No.10)	: 28.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.4	AASHTO Classification	: A-7-6 (9)
Silt + Clay (-No.200)	: 49.6	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.5
Fine Gravel (-3/4in. + No.4)	: 10.2
Coarse Sand (-No.4 + No.10)	: 10.9
Medium Sand (-No.10 + No.40)	: 12.4
Fine Sand (-No.40 + No.200)	: 9.4
Silt + Clay (-No.200)	: 49.6

Approved By : DLC

Soil No. 84

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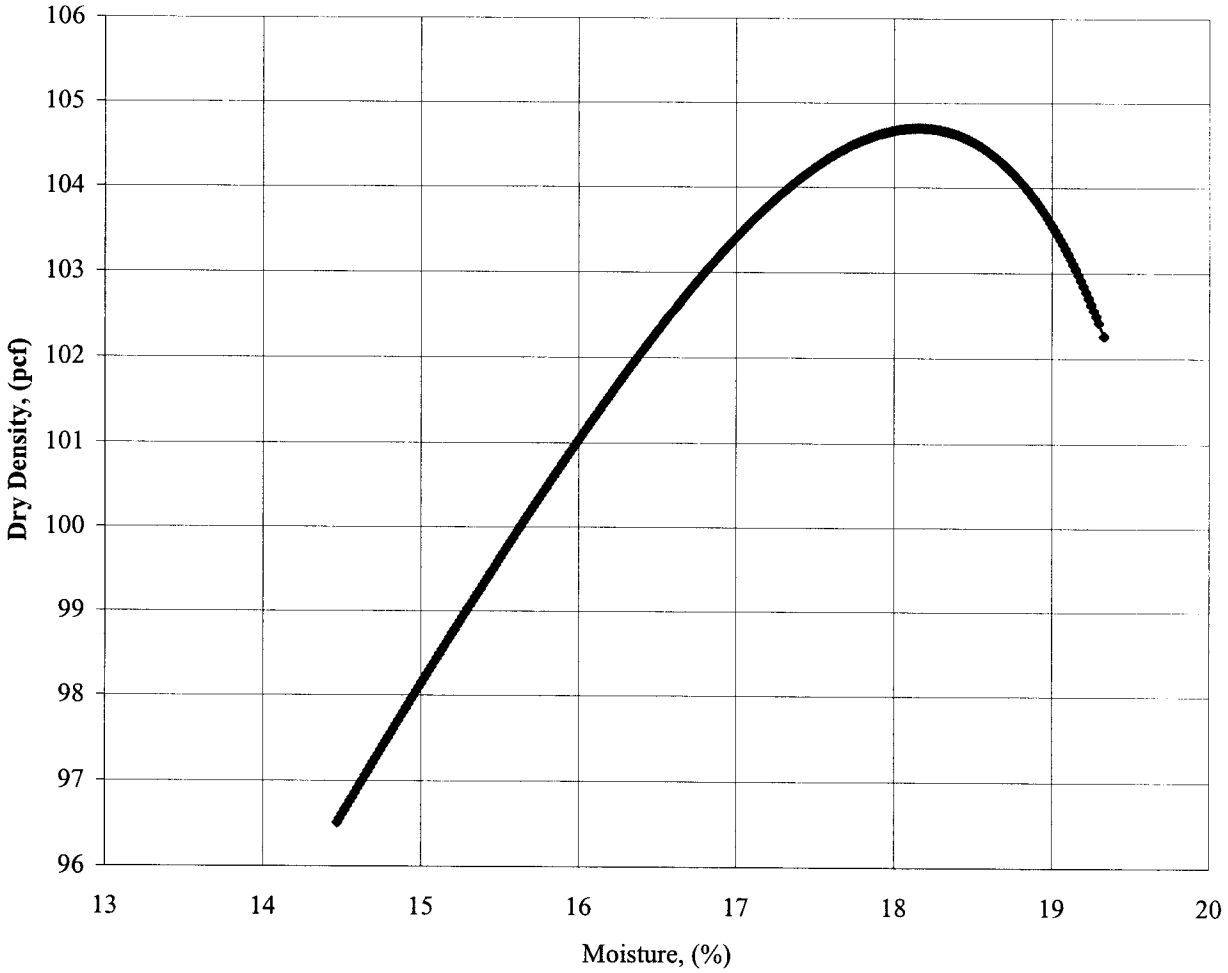
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No.326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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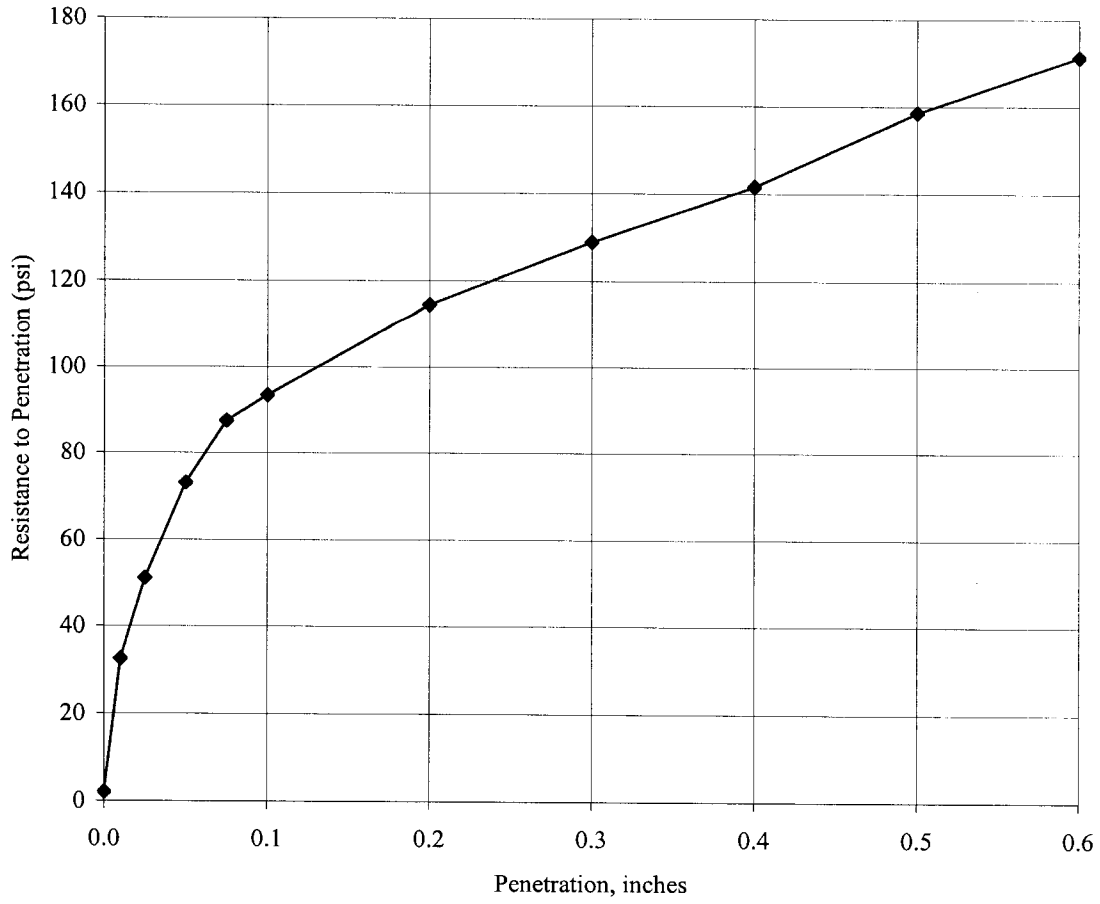
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No.326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.6 %
Percent Swell = 0.42 %

C.B.R. @ 0.1 In. = 9.3
C.B.R. @ 0.2 In. = 7.6
C.B.R. @ 0.3 In. = 6.8
C.B.R. @ 0.4 In. = 6.2
C.B.R. @ 0.5 In. = 6.1*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Highway 112, Ramp 4)		
Project No.	:	06127	Sample No.	: Bag No. 85
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 330
Project State	:	Arkansas	Sample Depth	: 0.6' to 5.0'
Laboratory No.	:	06127	Date Tested	: 01-23-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Reddish Brown Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.5
No.4		4.75	mm	89.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	80.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	65.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.043 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 27
Liquid Limit : 41
Plastic Limit : 19
Plasticity Index : 22
Liquidity Index : 0.37
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (12)
ASTM Classification : CL

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 19.7
Coarse Sand (-No.10 + No.40) : 8.7
Fine Sand (-No.40 + No.200) : 6.1
Silt + Clay (-No.200) : 65.5

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 11.0
Coarse Sand (-No.4 + No.10) : 8.7
Medium Sand (-No.10 + No.40) : 8.7
Fine Sand (-No.40 + No.200) : 6.1
Silt + Clay (-No.200) : 65.5

Approved By : DLC

Soil No. 85

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp SW)		
Project No.	:	06127	Sample No.	: Bag No. 86
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 369
Project State	:	Arkansas	Sample Depth	: 0.6' to 8.4'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.0
No.4		4.75	mm	80.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	68.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	39.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1975 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 13
Liquid Limit : 45
Plastic Limit : 22
Plasticity Index : 23
Liquidity Index : -0.38
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (4)
ASTM Classification : SC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 31.2
Coarse Sand (-No.10 + No.40) : 14.5
Fine Sand (-No.40 + No.200) : 14.9
Silt + Clay (-No.200) : 39.4

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 19.3
Coarse Sand (-No.4 + No.10) : 11.9
Medium Sand (-No.10 + No.40) : 14.5
Fine Sand (-No.40 + No.200) : 14.9
Silt + Clay (-No.200) : 39.4

Approved By : bil

Soil No. 86

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (South Zion Road)		
Project No.	: 06127	Sample No.	: Bag No. 87
Project County	: Washington/Benton	Sample Loc.	: Boring No. 374
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-31-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.8
No.4		4.75	mm	92.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	86.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	78.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0373 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.8
Maximum Dry Density	: NA	Liquid Limit	: 43
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 20
AASHTO Composition of Total Sample		Liquidity Index	: 0.43
Gravel (3in. + No.10)	: 13.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.8	AASHTO Classification	: A-7-6 (13)
Silt + Clay (-No.200)	: 70.1	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 7.5
Coarse Sand (-No.4 + No.10)	: 6.0
Medium Sand (-No.10 + No.40)	: 7.6
Fine Sand (-No.40 + No.200)	: 8.8
Silt + Clay (-No.200)	: 70.1

Approved By : bjc

Soil No. 87

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp SW)		
Project No.	:	06127	Sample No.	: Bag No. 90
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 366
Project State	:	Arkansas	Sample Depth	: 0.6' to 6.7'
Laboratory No.	:	06127	Date Tested	: 01-23-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Tan Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	99.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.7
No.4		4.75	mm	68.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	40.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	34.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.8334 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 9.5
Maximum Dry Density	:	NA	Liquid Limit	: 31
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 13
AASHTO Composition of Total Sample			Liquidity Index	: -0.64
Gravel (3in. + No.10)	:	46.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	13.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.1	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	:	34.0	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	1.0
Fine Gravel (-3/4in. + No.4)	:	30.4
Coarse Sand (-No.4 + No.10)	:	14.9
Medium Sand (-No.10 + No.40)	:	13.6
Fine Sand (-No.40 + No.200)	:	6.1
Silt + Clay (-No.200)	:	34.0

Approved By : bc

Soil No. 90

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Ramp NW)		
Project No.	: 06127	Sample No.	: Bag No. 91
Project County	: Washington/Benton	Sample Loc.	: Boring No. 357
Project State	: Arkansas	Sample Depth	: 0.6' to 10.3'
Laboratory No.	: 06127	Date Tested	: 01-23-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Dark Reddish Tan Sandy Silt		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.6
No.4		4.75	mm	93.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	73.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	63.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0355 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 39.4
Maximum Dry Density	: NA	Liquid Limit	: 45
Optimum Moisture	: NA	Plastic Limit	: 27
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.72
Gravel (3in. + No.10)	: 14.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.7	AASHTO Classification	: A-7-6 (10)
Silt + Clay (-No.200)	: 63.5	ASTM Classification	: ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 6.8
Coarse Sand (-No.4 + No.10)	: 7.8
Medium Sand (-No.10 + No.40)	: 12.2
Fine Sand (-No.40 + No.200)	: 9.7
Silt + Clay (-No.200)	: 63.5

Approved By : DLC

Soil No. 91

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp ES)		
Project No.	:	06127	Sample No.	: Bag No. 92
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 354
Project State	:	Arkansas	Sample Depth	: 0.6' to 25.0'
Laboratory No.	:	06127	Date Tested	: 01-30-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Red Sandy Silt		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.5
No.4		4.75	mm	91.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0404 mm

California Bearing Ratio	:	6	Natural Moisture (%)	: 34.8
Maximum Dry Density	:	96 pcf	Liquid Limit	: 48
Optimum Moisture	:	23 %	Plastic Limit	: 28
			Plasticity Index	: 20
AASHTO Composition of Total Sample			Liquidity Index	: 0.33
Gravel (3in. + No.10)	:	14.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	7.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.9	AASHTO Classification	: A-7-6 (14)
Silt + Clay (-No.200)	:	70.8	ASTM Classification	: ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	3.2
Fine Gravel (-3/4in. + No.4)	:	5.6
Coarse Sand (-No.4 + No.10)	:	5.7
Medium Sand (-No.10 + No.40)	:	7.8
Fine Sand (-No.40 + No.200)	:	6.9
Silt + Clay (-No.200)	:	70.8

Approved By : bLC

Soil No. 92

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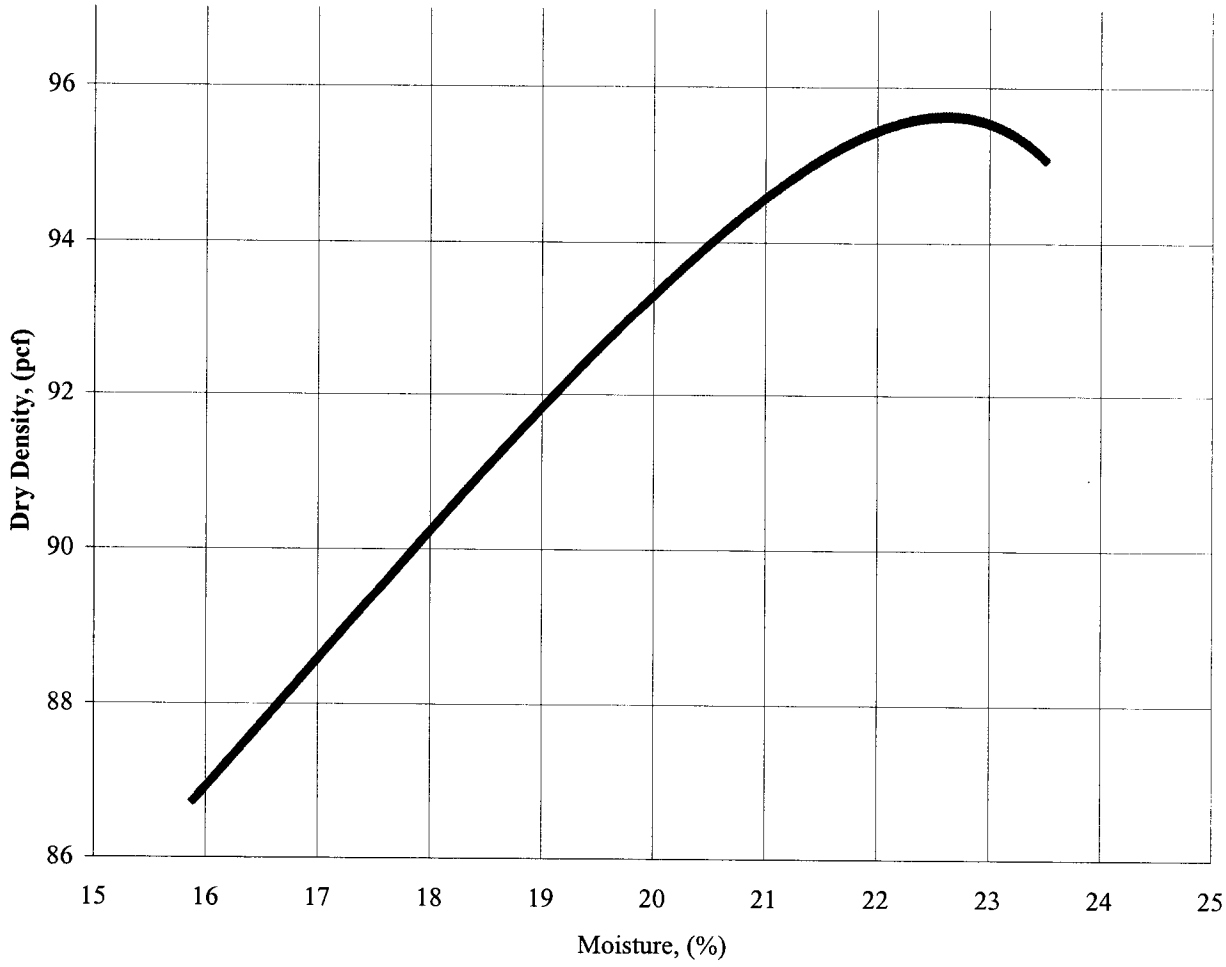
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Ramp ES)		
Project No.	: 06127	Sample No.	: Bag No. 92
Project County	: Washington/Benton	Sample Loc.	: Boring No. 354
Project State	: Arkansas	Sample Depth	: 0.6' to 25.0'
Laboratory No.	: 06127	Date Tested	: 01-30-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Sandy Silt		



MAXIMUM DENSITY: 96 pcf

OPTIMUM MOISTURE: 23 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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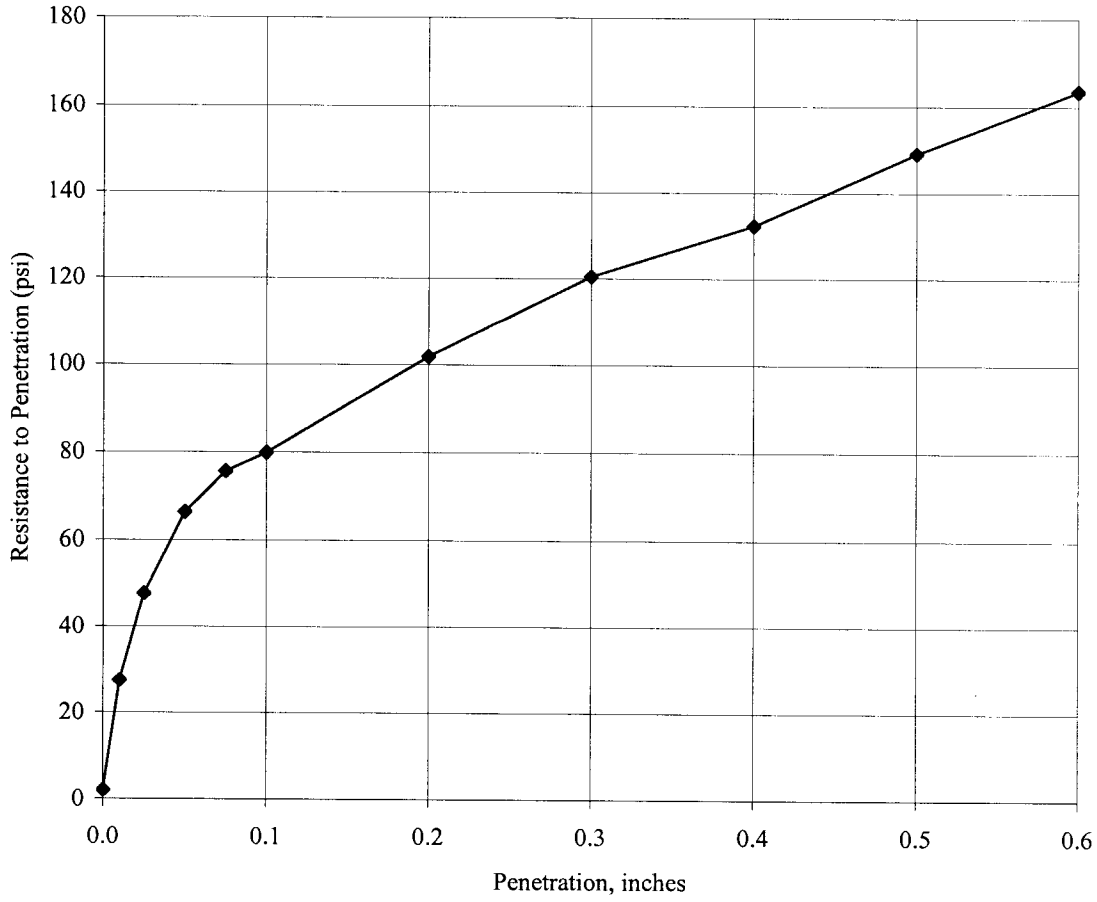
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Ramp ES)		
Project No.	: 06127	Sample No.	: Bag No. 92
Project County	: Washington/Benton	Sample Loc.	: Boring No. 354
Project State	: Arkansas	Sample Depth	: 0.6' to 25.0'
Laboratory No.	: 06127	Date Tested	: 01-30-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Sandy Silt		



Compaction Effort = 2000 psi
Percent Compacted = 99.3 %
Percent Swell = 0.47 %

C.B.R. @ 0.1 In. = 8
C.B.R. @ 0.2 In. = 6.8
C.B.R. @ 0.3 In. = 6.3
C.B.R. @ 0.4 In. = 5.7
C.B.R. @ 0.5 In. = 5.7*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No. 326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.0
3/4	in.	19	mm	92.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.8
No.4		4.75	mm	82.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.079 mm

California Bearing Ratio : 3
Maximum Dry Density : 105 pcf
Optimum Moisture : 18 %

Natural Moisture (%) : 24.5
Liquid Limit : 45
Plastic Limit : 19
Plasticity Index : 26
Liquidity Index : 0.23
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (9)
ASTM Classification : SC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 28.6
Coarse Sand (-No.10 + No.40) : 12.4
Fine Sand (-No.40 + No.200) : 9.4
Silt + Clay (-No.200) : 49.6

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 7.5
Fine Gravel (-3/4in. + No.4) : 10.2
Coarse Sand (-No.4 + No.10) : 10.9
Medium Sand (-No.10 + No.40) : 12.4
Fine Sand (-No.40 + No.200) : 9.4
Silt + Clay (-No.200) : 49.6

Approved By : blc

Soil No. 84

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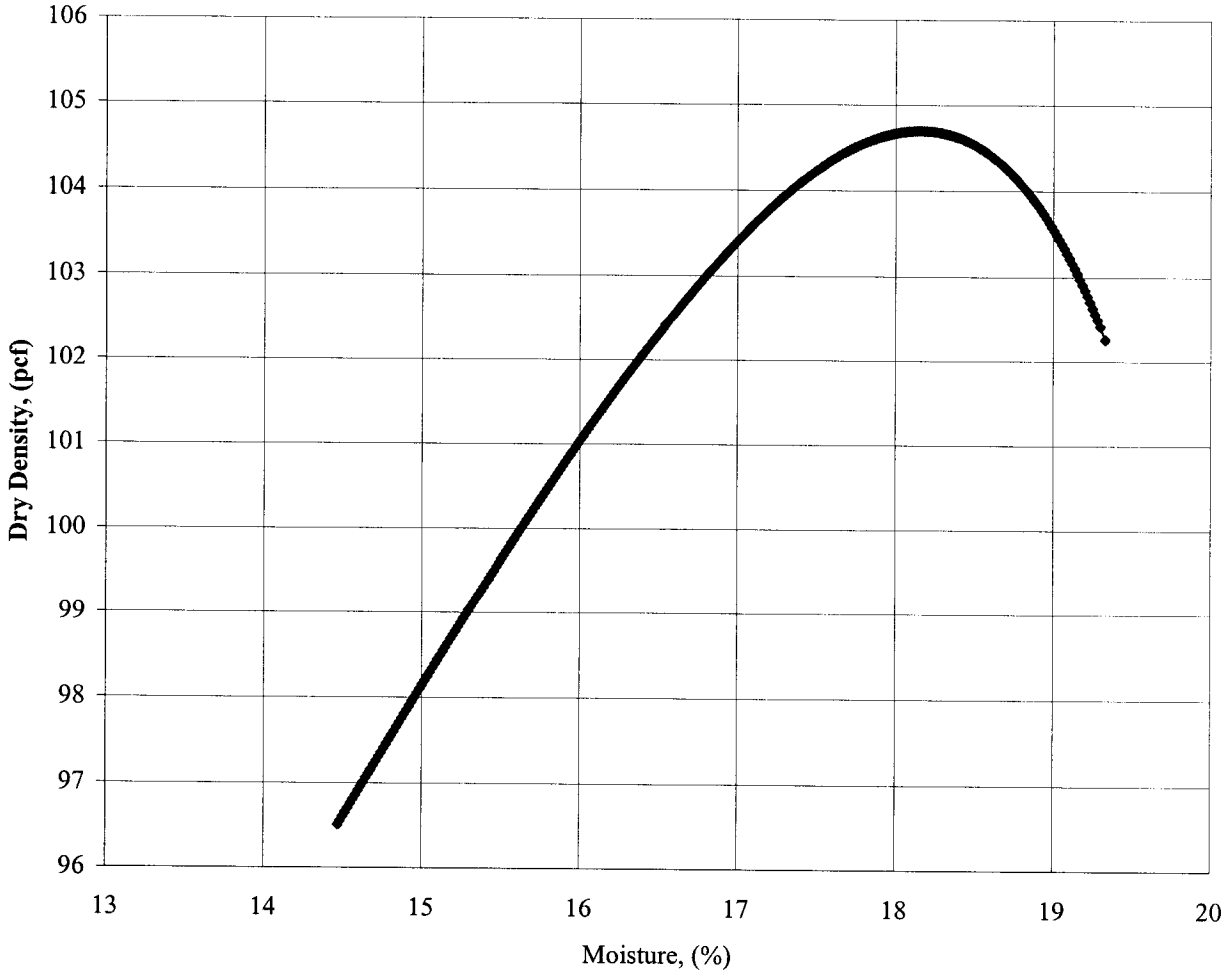
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No. 326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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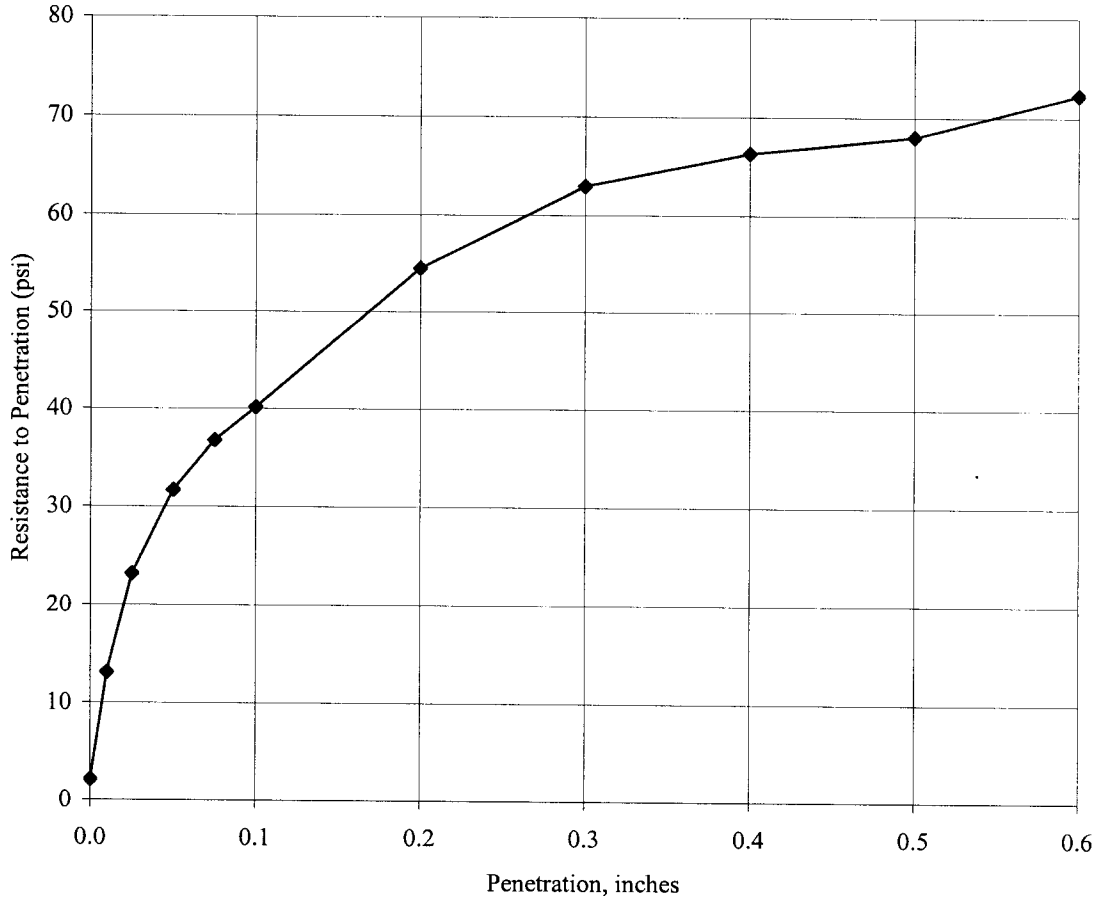
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Highway 112, Ramp 4)		
Project No.	: 06127	Sample No.	: Bag No. 84
Project County	: Washington/Benton	Sample Loc.	: Boring No. 326
Project State	: Arkansas	Sample Depth	: 0.6' to 30.0'
Laboratory No.	: 06127	Date Tested	: 01-22-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Red Clayey Sand with Gravel		



Compaction Effort = 2000 psi
Percent Compacted = 99.6 %
Percent Swell = 0.42 %

C.B.R. @ 0.1 In. = 4
C.B.R. @ 0.2 In. = 3.6
C.B.R. @ 0.3 In. = 3.3
C.B.R. @ 0.4 In. = 2.9
C.B.R. @ 0.5 In. = 2.6*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp NW)		
Project No.	:	06127	Sample No.	: Bag No. 93
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 359
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.6
No.4		4.75	mm	91.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	78.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	65.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	55.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0315 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 20.3
Liquid Limit : 39
Plastic Limit : 19
Plasticity Index : 20
Liquidity Index : 0.07
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (8)
ASTM Classification : CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 21.1
Coarse Sand (-No.10 + No.40) : 13.5
Fine Sand (-No.40 + No.200) : 10.1
Silt + Clay (-No.200) : 55.3

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 8.8
Coarse Sand (-No.4 + No.10) : 12.3
Medium Sand (-No.10 + No.40) : 13.5
Fine Sand (-No.40 + No.200) : 10.1
Silt + Clay (-No.200) : 55.3

Approved By : DLC

Soil No. 93

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp NW)		
Project No.	:	06127	Sample No.	: Bag No. 95
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 358
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.0
No.4		4.75	mm	93.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	75.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	63.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0327 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 23.3
Maximum Dry Density	:	NA	Liquid Limit	: 43
Optimum Moisture	:	NA	Plastic Limit	: 20
			Plasticity Index	: 23
AASHTO Composition of Total Sample			Liquidity Index	: 0.13
Gravel (3in. + No.10)	:	14.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	10.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	11.9	AASHTO Classification	: A-7-6 (12)
Silt + Clay (-No.200)	:	63.2	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	6.5
Coarse Sand (-No.4 + No.10)	:	8.2
Medium Sand (-No.10 + No.40)	:	10.2
Fine Sand (-No.40 + No.200)	:	11.9
Silt + Clay (-No.200)	:	63.2

Approved By : DLC

Soil No. 95

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp SW)		
Project No.	:	06127	Sample No.	: Bag No. 96
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 367
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Reddish Brown Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.1
No.4		4.75	mm	86.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	76.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1006 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 15.9
Liquid Limit : 33
Plastic Limit : 18
Plasticity Index : 15
Liquidity Index : -0.14
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (4)
ASTM Classification : SC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 23.5
Coarse Sand (-No.10 + No.40) : 14.5
Fine Sand (-No.40 + No.200) : 14.8
Silt + Clay (-No.200) : 47.2

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 13.2
Coarse Sand (-No.4 + No.10) : 10.3
Medium Sand (-No.10 + No.40) : 14.5
Fine Sand (-No.40 + No.200) : 14.8
Silt + Clay (-No.200) : 47.2

Approved By : bLC

Soil No. 96

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp NW)		
Project No.	:	06127	Sample No.	: Bag No. 97
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 361
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Red Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.6
No.4		4.75	mm	82.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	68.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.3092 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 19.4
Liquid Limit : 38
Plastic Limit : 19
Plasticity Index : 19
Liquidity Index : 0.03
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (2)
ASTM Classification : SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 31.2
Coarse Sand (-No.10 + No.40) : 18.1
Fine Sand (-No.40 + No.200) : 17.9
Silt + Clay (-No.200) : 32.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 18.0
Coarse Sand (-No.4 + No.10) : 13.2
Medium Sand (-No.10 + No.40) : 18.1
Fine Sand (-No.40 + No.200) : 17.9
Silt + Clay (-No.200) : 32.8

Approved By : blc

Soil No. 97

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass (Ramp NW)		
Project No.	: 06127	Sample No.	: Bag No. 98
Project County	: Washington/Benton	Sample Loc.	: Boring No. 364
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-31-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Brown Sandy Silty Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.8
No.4		4.75	mm	88.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	79.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	58.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0351 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 22.7
Maximum Dry Density	: NA	Liquid Limit	: 26
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 6
AASHTO Composition of Total Sample		Liquidity Index	: 0.50
Gravel (3in. + No.10)	: 20.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.9	AASHTO Classification	: A-4 (1)
Silt + Clay (-No.200)	: 58.3	ASTM Classification	: CL-ML

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 11.9
Coarse Sand (-No.4 + No.10)	: 8.3
Medium Sand (-No.10 + No.40)	: 11.6
Fine Sand (-No.40 + No.200)	: 9.9
Silt + Clay (-No.200)	: 58.3

Approved By : DLC

Soil No. 98

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp EN)		
Project No.	:	06127	Sample No.	: Bag No. 99
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 343
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-31-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.3
No.4		4.75	mm	91.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	57.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.034 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 14.7
Maximum Dry Density	:	NA	Liquid Limit	: 31
Optimum Moisture	:	NA	Plastic Limit	: 17
			Plasticity Index	: 14
AASHTO Composition of Total Sample			Liquidity Index	: -0.14
Gravel (3in. + No.10)	:	19.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	14.4	AASHTO Classification	: A-6 (5)
Silt + Clay (-No.200)	:	57.3	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	8.4
Coarse Sand (-No.4 + No.10)	:	10.6
Medium Sand (-No.10 + No.40)	:	9.3
Fine Sand (-No.40 + No.200)	:	14.4
Silt + Clay (-No.200)	:	57.3

Approved By : DLC

Soil No. 99

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass (Ramp EN)		
Project No.	:	06127	Sample No.	: Bag No. 100
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 349
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 01-30-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Dark Brown Lean Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	97.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	92.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	88.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	78.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0308 mm

California Bearing Ratio	:	4	Natural Moisture (%)	: 18.4
Maximum Dry Density	:	112 pcf	Liquid Limit	: 34
Optimum Moisture	:	16 %	Plastic Limit	: 16
			Plasticity Index	: 18
AASHTO Composition of Total Sample			Liquidity Index	: 0.12
Gravel (3in. + No.10)	:	7.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	4.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.7	AASHTO Classification	: A-6 (12)
Silt + Clay (-No.200)	:	78.4	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	2.1
Coarse Sand (-No.4 + No.10)	:	5.3
Medium Sand (-No.10 + No.40)	:	4.5
Fine Sand (-No.40 + No.200)	:	9.7
Silt + Clay (-No.200)	:	78.4

Approved By : DLC

Soil No. 100

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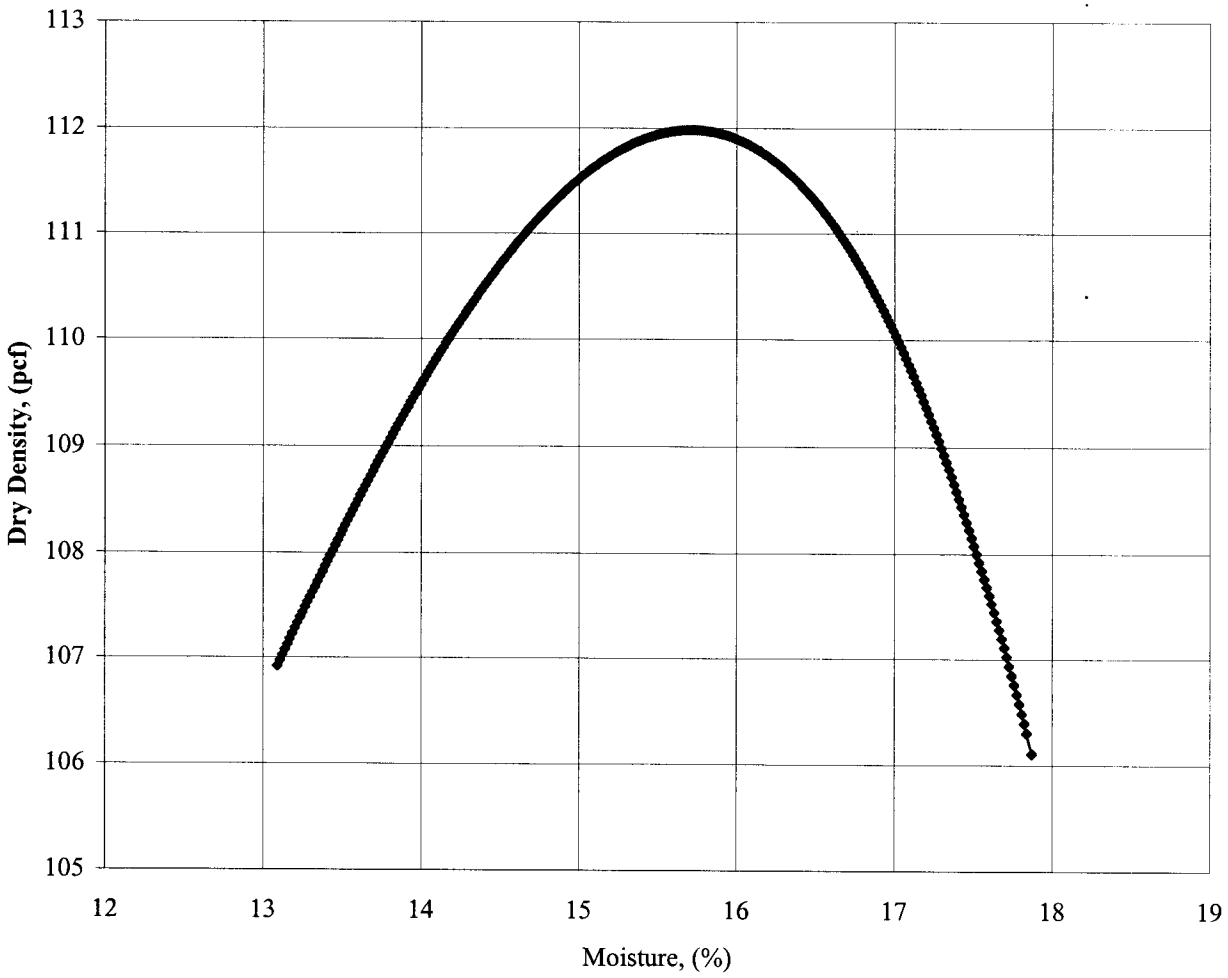
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale Bypass (Ramp EN)		
Project No.	: 06127	Sample No.	: Bag No. 100
Project County	: Washington/Benton	Sample Loc.	: Boring No. 349
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-30-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Dark Brown Lean Clay with Sand		



MAXIMUM DENSITY: 112 pcf

OPTIMUM MOISTURE: 16 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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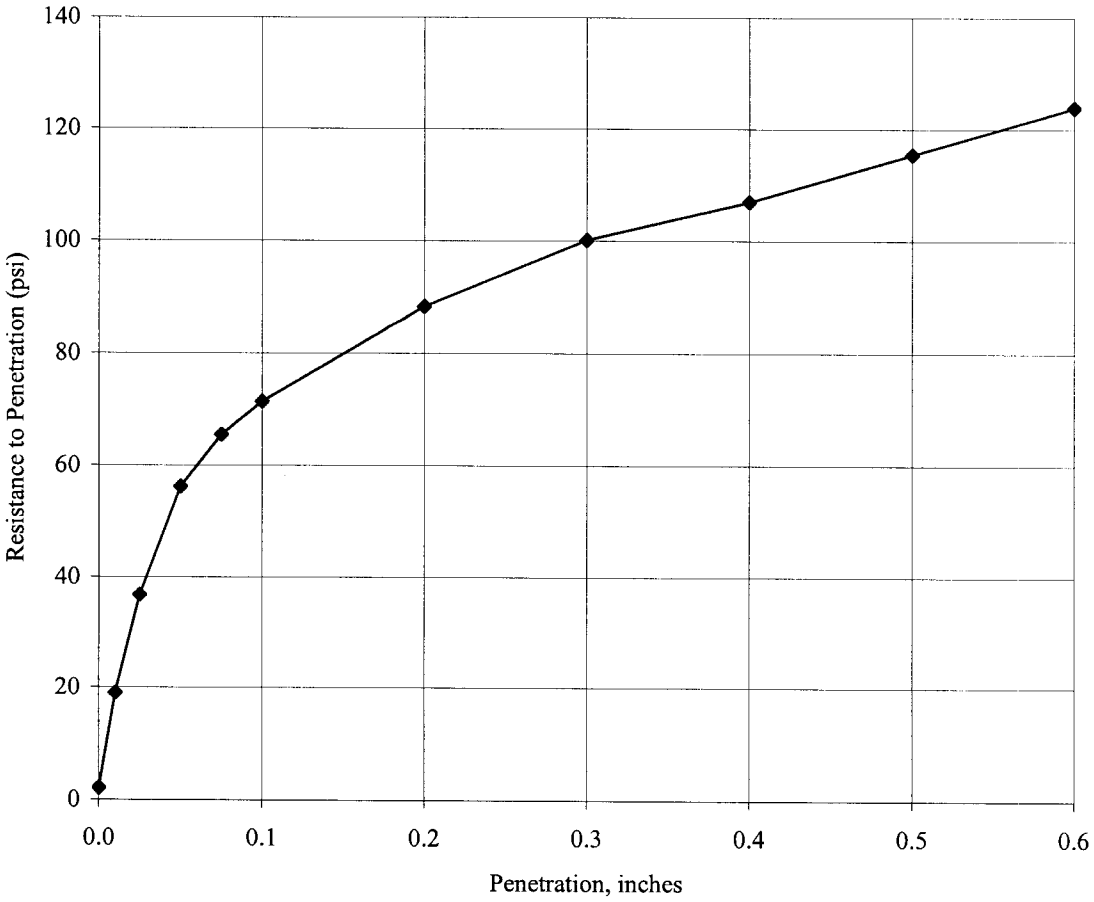
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale Bypass (Ramp EN)		
Project No.	: 06127	Sample No.	: Bag No. 100
Project County	: Washington/Benton	Sample Loc.	: Boring No. 349
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 01-30-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	: Dark Brown Lean Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 100.1 %
Percent Swell = 0.48 %

C.B.R. @ 0.1 In. = 7.1
C.B.R. @ 0.2 In. = 5.9
C.B.R. @ 0.3 In. = 5.3
C.B.R. @ 0.4 In. = 4.6
C.B.R. @ 0.5 In. = 4.4*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 101
Project County	: Washington/Benton	Sample Loc.	: Boring No. 378
Project State	: Arkansas	Sample Depth	: 0.6' to 50.0'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Fat Clay with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.4
No.4		4.75	mm	94.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	88.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.01 mm

California Bearing Ratio	: 6	Natural Moisture (%)	: 34.9
Maximum Dry Density	: 94 pcf	Liquid Limit	: 60
Optimum Moisture	: 24 %	Plastic Limit	: 23
		Plasticity Index	: 37
		Liquidity Index	: 0.31
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-6 (26)
		ASTM Classification	: CH

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 11.5
Coarse Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 8.8
Silt + Clay (-No.200)	: 71.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.4
Fine Gravel (-3/4in. + No.4)	: 4.1
Coarse Sand (-No.4 + No.10)	: 6.0
Medium Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 8.8
Silt + Clay (-No.200)	: 71.9

Approved By : DLC

Soil No. 101s

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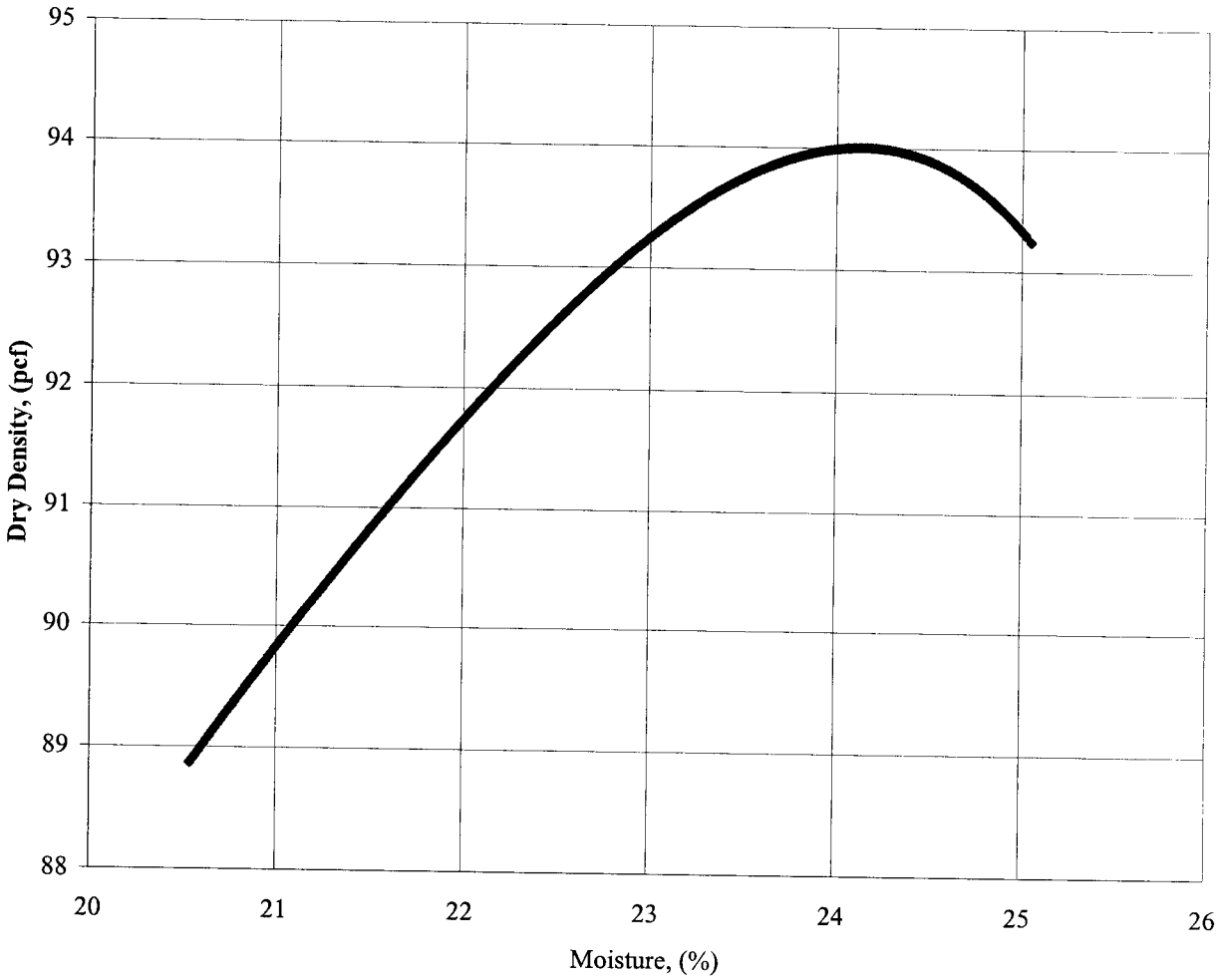
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale By-Pass	Sample No.	: Bag No. 101
Project No.	: 06127	Sample Loc.	: Boring No. 378
Project County	: Washington/Benton	Sample Depth	: 0.6' to 50.0'
Project State	: Arkansas	Date Tested	: 05/06/08
Laboratory No.	: 06127	Date Reported	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.		
Soil Type	: Red Fat Clay with Sand		



MAXIMUM DENSITY: 94 pcf

OPTIMUM MOISTURE: 24 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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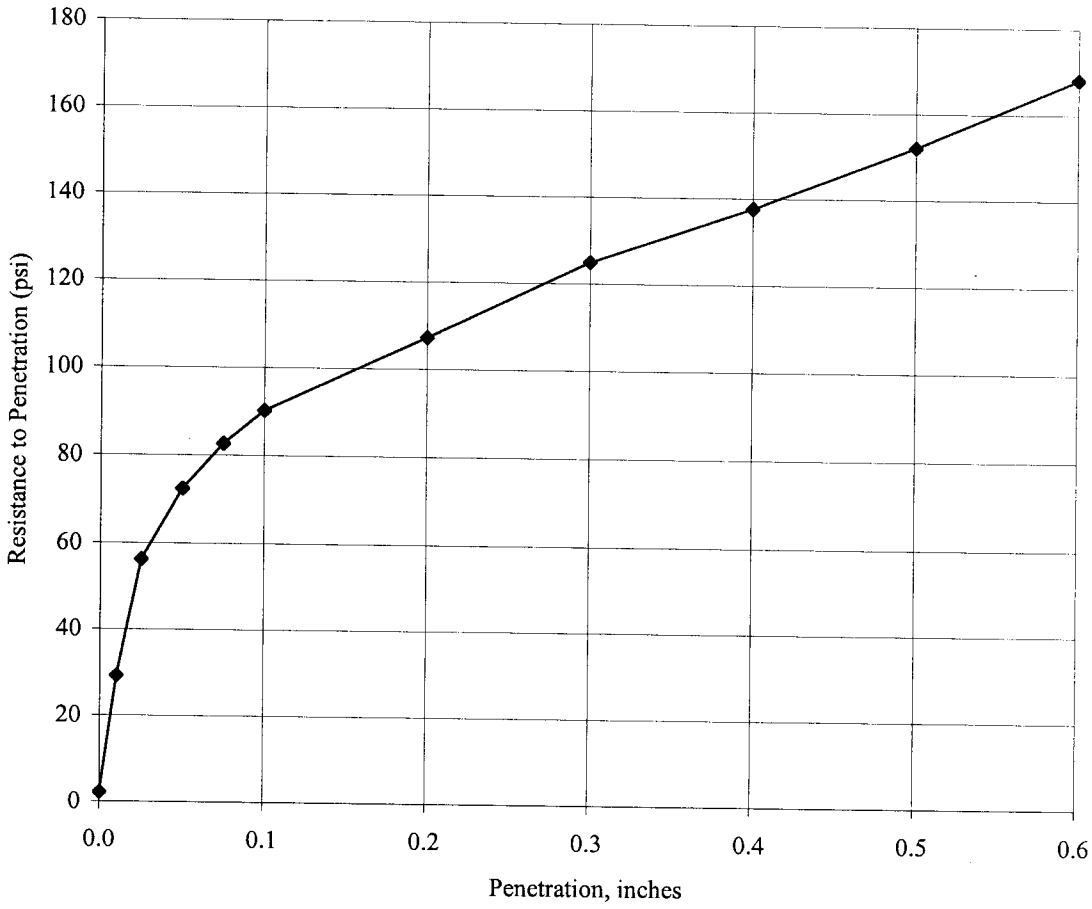
CALIFORNIA BEARING RATIO

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 101
Project County	: Washington/Benton	Sample Loc.	: Boring No. 378
Project State	: Arkansas	Sample Depth	: 0.6' to 50.0'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Fat Clay with Sand		



Compaction Effort = 2000 psi
Percent Compacted = 100.4 %
Percent Swell = 0.4 %

C.B.R. @ 0.1 In. = 9
C.B.R. @ 0.2 In. = 7.1
C.B.R. @ 0.3 In. = 6.6
C.B.R. @ 0.4 In. = 6
C.B.R. @ 0.5 In. = 5.8*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127	Sample No.	: Bag No. 102
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 381
Project State	:	Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	:	06127	Date Tested	: 05/06/08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	:	Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	95.9
No.4		4.75	mm	87.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	78.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	69.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	60.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0231 mm

California Bearing Ratio : 2
Maximum Dry Density : 100 pcf
Optimum Moisture : 19 %

Natural Moisture (%) : 32.4
Liquid Limit : 37
Plastic Limit : 21
Plasticity Index : 16
Liquidity Index : 0.70
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (7)
ASTM Classification : CL

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 21.4
Coarse Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 8.2
Silt + Clay (-No.200) : 60.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 12.7
Coarse Sand (-No.4 + No.10) : 8.7
Medium Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 8.2
Silt + Clay (-No.200) : 60.8

Approved By : DLC

Soil No. 102s

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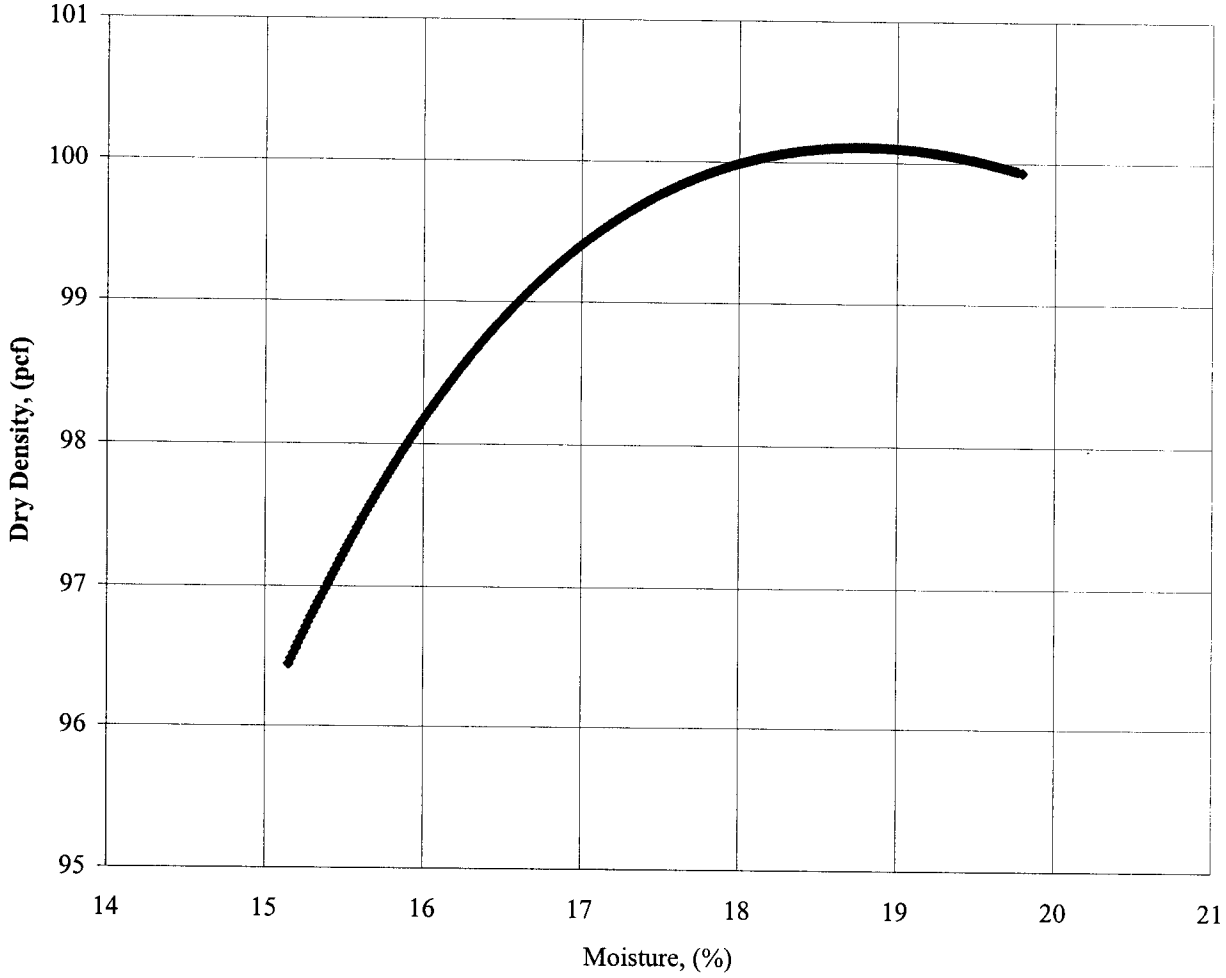
CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale By-Pass	Sample No.	: Bag No. 102
Project No.	: 06127	Sample Loc.	: Boring No. 381
Project County	: Washington/Benton	Sample Depth	: 0.6' to 15.0'
Project State	: Arkansas	Date Tested	: 05/06/08
Laboratory No.	: 06127	Date Reported	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.		
Soil Type	: Red Sandy Lean Clay		



MAXIMUM DENSITY: 100 pcf

OPTIMUM MOISTURE: 19 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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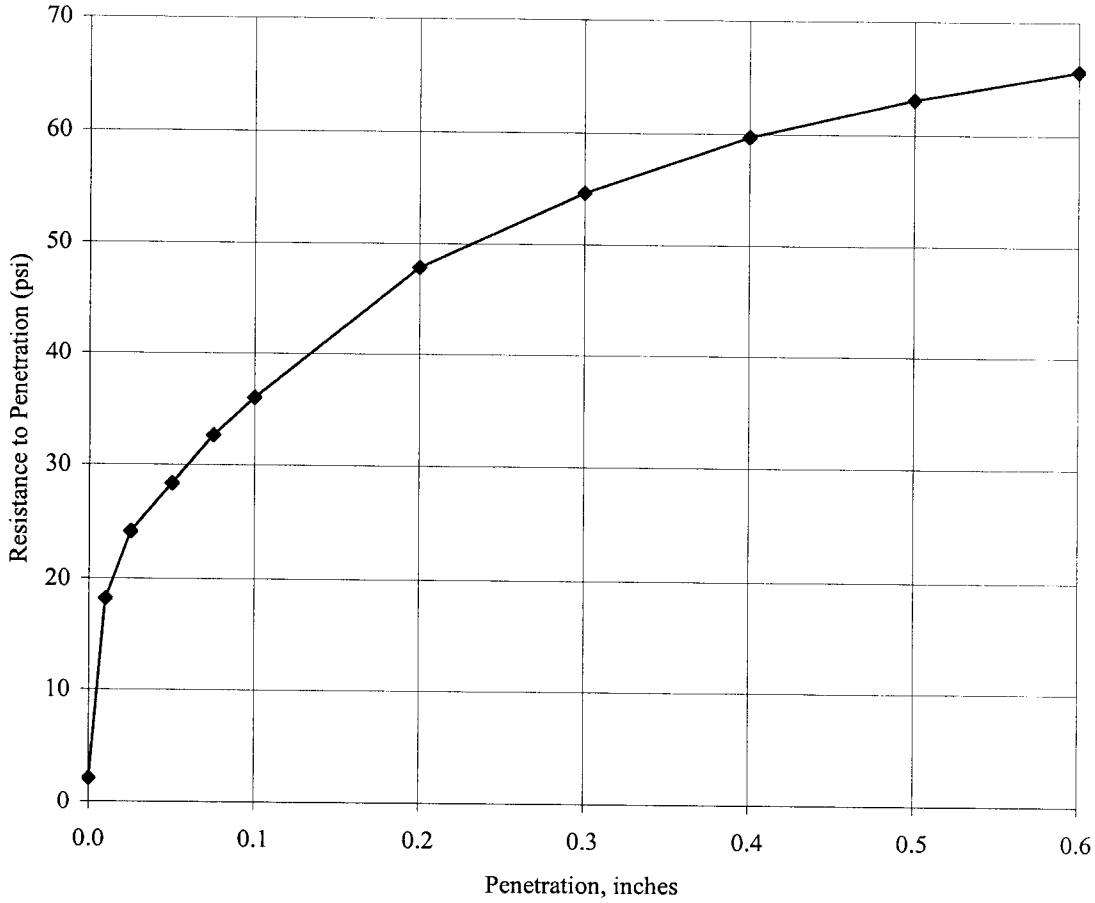
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 102
Project County	: Washington/Benton	Sample Loc.	: Boring No. 381
Project State	: Arkansas	Sample Depth	: 0.6' to 15.0'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 100.7 %
Percent Swell = 0.22 %

C.B.R. @ 0.1 In. = 3.6
C.B.R. @ 0.2 In. = 3.2
C.B.R. @ 0.3 In. = 2.9
C.B.R. @ 0.4 In. = 2.6
C.B.R. @ 0.5 In. = 2.4*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 103
Project County	: Washington/Benton	Sample Loc.	: Boring No. 382
Project State	: Arkansas	Sample Depth	: 0.5' to 15.0'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Light Brown & Red Fat Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.5
3/4	in.	19	mm	96.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	93.2
No.4		4.75	mm	89.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	85.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	82.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	79.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0066 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 33.1
Liquid Limit : 51
Plastic Limit : 18
Plasticity Index : 33
Liquidity Index : 0.46
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (26)
ASTM Classification : CH

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 14.8
Coarse Sand (-No.10 + No.40) : 2.9
Fine Sand (-No.40 + No.200) : 3.2
Silt + Clay (-No.200) : 79.1

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 3.5
Fine Gravel (-3/4in. + No.4) : 7.1
Coarse Sand (-No.4 + No.10) : 4.2
Medium Sand (-No.10 + No.40) : 2.9
Fine Sand (-No.40 + No.200) : 3.2
Silt + Clay (-No.200) : 79.1

Approved By : DLC

Soil No. 103s

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 104
Project County	: Washington/Benton	Sample Loc.	: Boring No. 387
Project State	: Arkansas	Sample Depth	: 0.3' to 10.6'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.8
No.4		4.75	mm	87.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	79.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	67.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	58.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0295 mm

California Bearing Ratio	: 5	Natural Moisture (%)	: 24.3
Maximum Dry Density	: 103 pcf	Liquid Limit	: 57
Optimum Moisture	: 19 %	Plastic Limit	: 18
		Plasticity Index	: 39
		Liquidity Index	: 0.16
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-6 (19)
		ASTM Classification	: CH

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 21.0
Coarse Sand (-No.10 + No.40)	: 11.4
Fine Sand (-No.40 + No.200)	: 9.4
Silt + Clay (-No.200)	: 58.2

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 1.4
Fine Gravel (-3/4in. + No.4)	: 11.1
Coarse Sand (-No.4 + No.10)	: 8.5
Medium Sand (-No.10 + No.40)	: 11.4
Fine Sand (-No.40 + No.200)	: 9.4
Silt + Clay (-No.200)	: 58.2

Approved By : blc

Soil No. 104s

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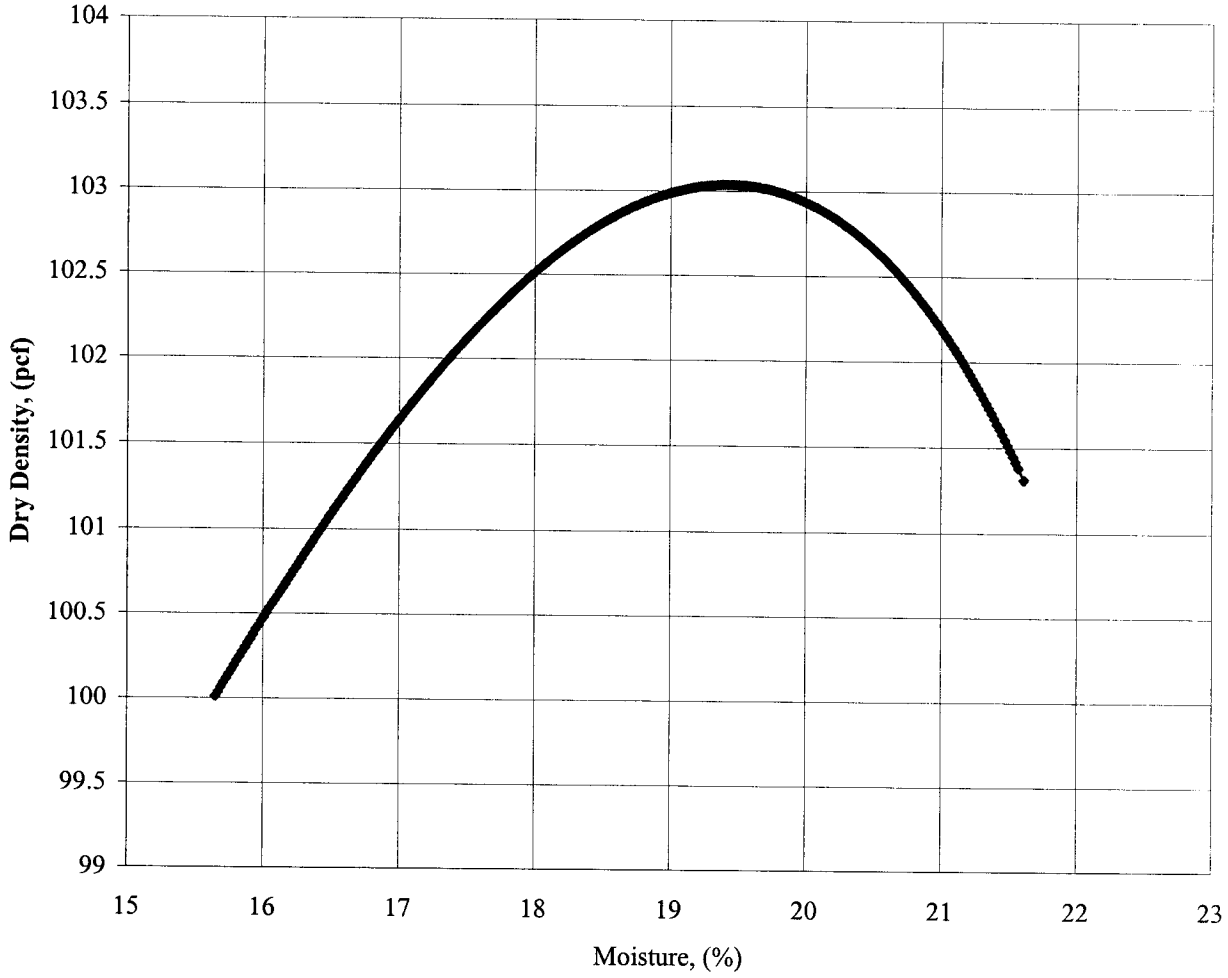
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 104
Project County	: Washington/Benton	Sample Loc.	: Boring No. 387
Project State	: Arkansas	Sample Depth	: 0.3' to 10.6'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Fat Clay		



MAXIMUM DENSITY: 103 pcf

OPTIMUM MOISTURE: 19 %

COMMENTS: KM 64-511-03; Method (C)

APPROVED BY: DLC

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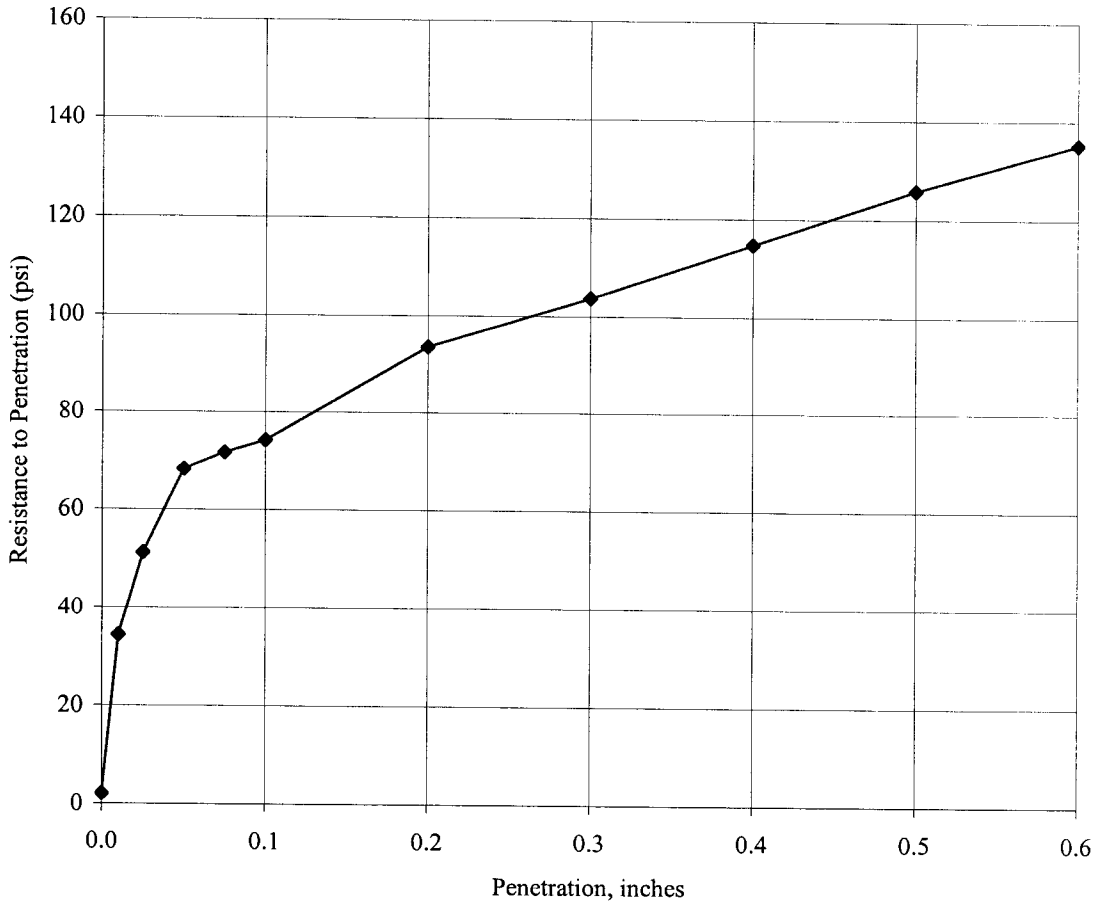
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 104
Project County	: Washington/Benton	Sample Loc.	: Boring No. 387
Project State	: Arkansas	Sample Depth	: 0.3' to 10.6'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Fat Clay		



Compaction Effort = 2000 psi
Percent Compacted = 98.5 %
Percent Swell = 0.38 %

C.B.R. @ 0.1 In. = 7.4
C.B.R. @ 0.2 In. = 6.2
C.B.R. @ 0.3 In. = 5.5
C.B.R. @ 0.4 In. = 5
C.B.R. @ 0.5 In. = 4.8*

COMMENTS: KM 64-501-02

APPROVED BY: DLC

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 105
Project County	: Washington/Benton	Sample Loc.	: Boring No. 393
Project State	: Arkansas	Sample Depth	: 0.5' to 6.9'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Lean Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	96.8
No.4		4.75	mm	90.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	80.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	69.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0258 mm

California Bearing Ratio	: 5	Natural Moisture (%)	: 30
Maximum Dry Density	: 105 pcf	Liquid Limit	: 44
Optimum Moisture	: 18 %	Plastic Limit	: 18
		Plasticity Index	: 26
AASHTO Composition of Total Sample		Liquidity Index	: 0.46
Gravel (3in. + No.10)	: 19.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.7	AASHTO Classification	: A-7-6 (13)
Silt + Clay (-No.200)	: 59.6	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 9.7
Coarse Sand (-No.4 + No.10)	: 10.1
Medium Sand (-No.10 + No.40)	: 10.9
Fine Sand (-No.40 + No.200)	: 9.7
Silt + Clay (-No.200)	: 59.6

Approved By : DLC

Soil No. 105s

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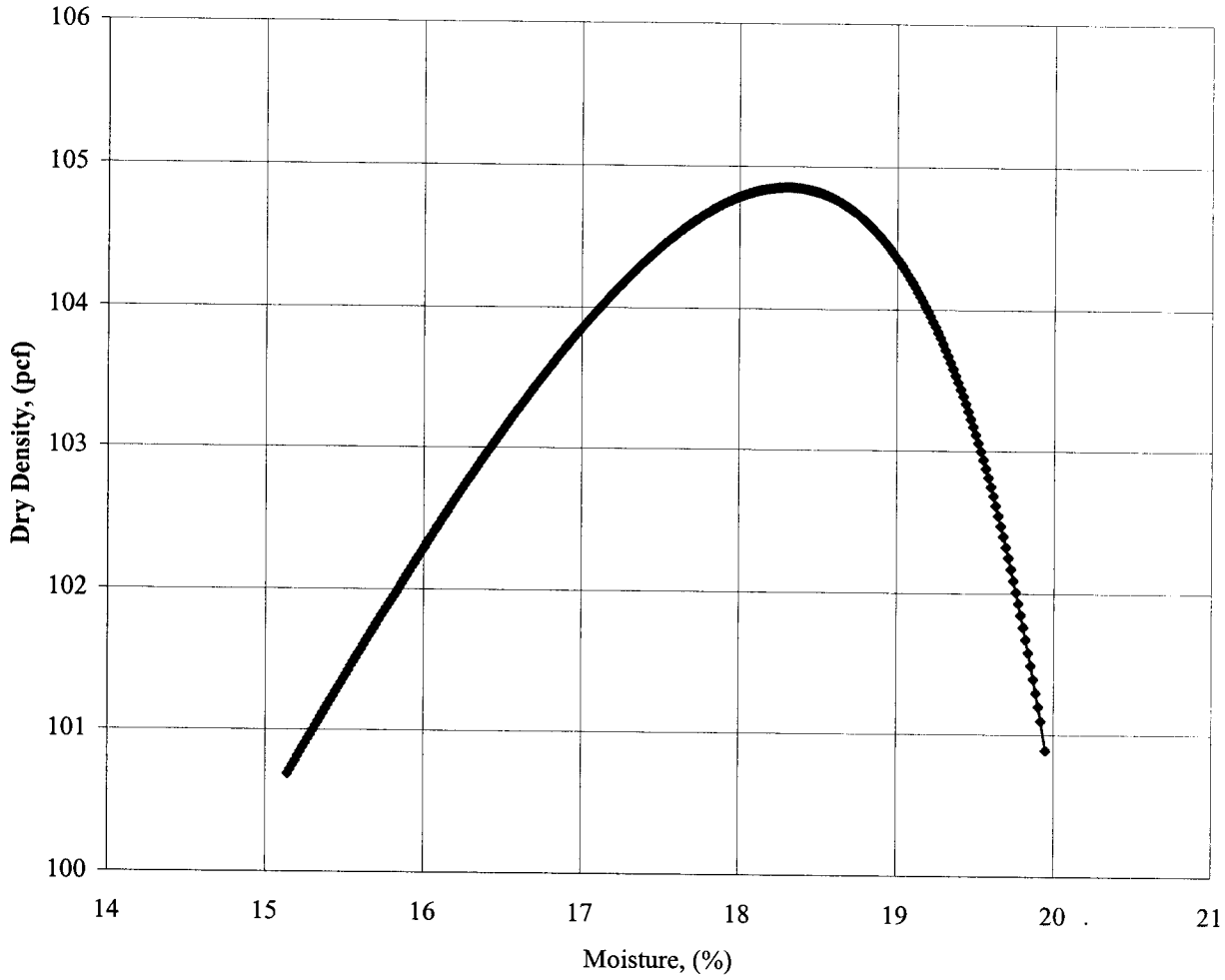
Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

MOISTURE-DENSITY RELATIONSHIP

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 105
Project County	: Washington/Benton	Sample Loc.	: Boring No. 393
Project State	: Arkansas	Sample Depth	: 0.5' to 6.9'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Lean Clay		



MAXIMUM DENSITY: 105 pcf

OPTIMUM MOISTURE: 18 %

COMMENTS: KM 64-511-03; Method (C)

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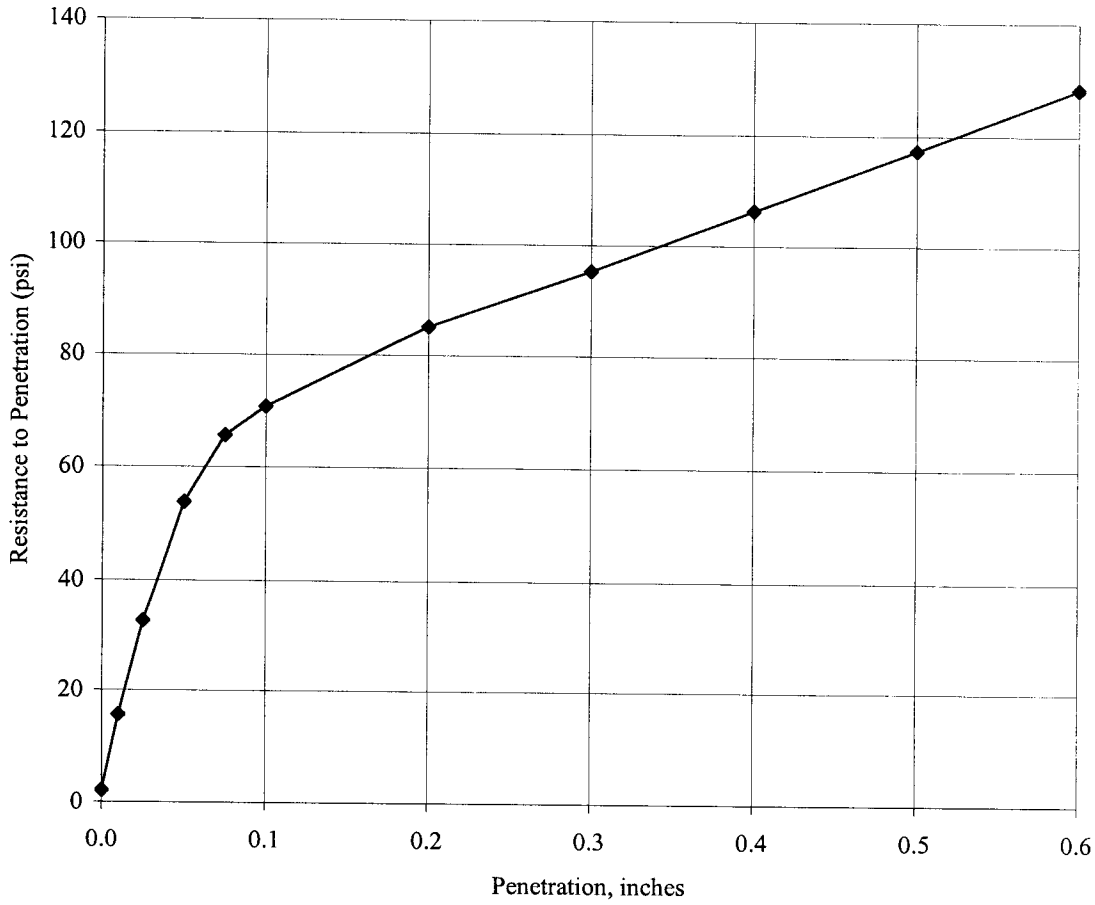
CONSULTING ENGINEERS

CALIFORNIA BEARING RATIO

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: Bag No. 105
Project County	: Washington/Benton	Sample Loc.	: Boring No. 393
Project State	: Arkansas	Sample Depth	: 0.5' to 6.9'
Laboratory No.	: 06127	Date Tested	: 05/06/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 05/13/08
Soil Type	: Red Sandy Lean Clay		



Compaction Effort = 2000 psi
Percent Compacted = 99.8 %
Percent Swell = 0.26 %

C.B.R. @ 0.1 In. = 7.1
C.B.R. @ 0.2 In. = 5.7
C.B.R. @ 0.3 In. = 5
C.B.R. @ 0.4 In. = 4.6
C.B.R. @ 0.5 In. = 4.5*

COMMENTS: KM 64-501-02

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 130
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.4
No.4		4.75	mm	73.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	60.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	47.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	39.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.5682mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.2
Maximum Dry Density	: NA	Liquid Limit	: 49
Optimum Moisture	: NA	Plastic Limit	: 30
		Plasticity Index	: 19
		Liquidity Index	: -0.09
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-7-5 (3)
		ASTM Classification	: SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 39.6
Coarse Sand (-No.10 + No.40)	: 12.8
Fine Sand (-No.40 + No.200)	: 8.1
Silt + Clay (-No.200)	: 39.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 26.7
Coarse Sand (-No.4 + No.10)	: 12.9
Medium Sand (-No.10 + No.40)	: 12.8
Fine Sand (-No.40 + No.200)	: 8.1
Silt + Clay (-No.200)	: 39.5

Approved By : DLC

Soil No. 101

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 128
Project State	: Arkansas	Sample Depth	: 5.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown, Tan & White Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	97.5
3/4	in.	19	mm	89.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.2
No.4		4.75	mm	64.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.2743mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 23.9
Maximum Dry Density	: NA	Liquid Limit	: 36
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 15
		Liquidity Index	: 0.19
AASHTO Composition of Total Sample		Activity	: NA
Gravel (3in. + No.10)	: 52.6	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	: 16.1	AASHTO Classification	: A-2-6 (1)
Fine Sand (-No.40 + No.200)	: 4.8	ASTM Classification	: SC
Silt + Clay (-No.200)	: 26.5		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 10.3
Fine Gravel (-3/4in. + No.4)	: 24.8
Coarse Sand (-No.4 + No.10)	: 17.5
Medium Sand (-No.10 + No.40)	: 16.1
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 26.5

Approved By : DLC

Soil No. 102

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 6 thru 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 130
Project State	: Arkansas	Sample Depth	: 30.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.5
3/4	in.	19	mm	91.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.8
No.4		4.75	mm	54.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.5831mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 21.3
Maximum Dry Density	: NA	Liquid Limit	: 43
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 23
		Liquidity Index	: 0.06
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-7 (3)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 59.1
Coarse Sand (-No.10 + No.40)	: 11.5
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 24.6

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.9
Fine Gravel (-3/4in. + No.4)	: 36.7
Coarse Sand (-No.4 + No.10)	: 13.5
Medium Sand (-No.10 + No.40)	: 11.5
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 24.6

Approved By : DLC

Soil No. 103

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 7, 8 & 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 127
Project State	: Arkansas	Sample Depth	: 35.0' to 45.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Light Beige & White Well-Graded Sand with Silt and Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	88.4
3/4	in.	19	mm	82.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.4
No.4		4.75	mm	57.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	16.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	7.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.3699mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 27.3
Liquid Limit : NP
Plastic Limit : NP
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-1-a (0)
ASTM Classification : SW-SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 61.4
Coarse Sand (-No.10 + No.40) : 21.8
Fine Sand (-No.40 + No.200) : 9.7
Silt + Clay (-No.200) : 7.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 17.3
Fine Gravel (-3/4in. + No.4) : 25.2
Coarse Sand (-No.4 + No.10) : 18.9
Medium Sand (-No.10 + No.40) : 21.8
Fine Sand (-No.40 + No.200) : 9.7
Silt + Clay (-No.200) : 7.1

Approved By : DLC

Soil No. 104

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 147
Project State	: Arkansas	Sample Depth	: 4.4' to 10.9'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Silty, Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.7
3/4	in.	19	mm	95.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.2
No.4		4.75	mm	70.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.4870mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 18.3
Liquid Limit : 25
Plastic Limit : 19
Plasticity Index : 6
Liquidity Index : -0.12
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : SC-SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 46.9
Coarse Sand (-No.10 + No.40) : 16.2
Fine Sand (-No.40 + No.200) : 4.5
Silt + Clay (-No.200) : 32.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 4.3
Fine Gravel (-3/4in. + No.4) : 25.7
Coarse Sand (-No.4 + No.10) : 16.9
Medium Sand (-No.10 + No.40) : 16.2
Fine Sand (-No.40 + No.200) : 4.5
Silt + Clay (-No.200) : 32.4

Approved By : DLC

Soil No. 105

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127		
Project County	: Washington/Benton	Sample No.	: SS - 2, 3 & 4
Project State	: Arkansas	Sample Loc.	: Boring No. 150
Laboratory No.	: 06127	Sample Depth	: 10.0' to 21.5'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 10-16-07
Soil Type	: Brown Clayey Sand with Gravel	Date Reported	: 10-24-07

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	82.5
No.4		4.75	mm	66.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.0306mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 27.0
Liquid Limit : 41
Plastic Limit : 19
Plasticity Index : 22
Liquidity Index : 0.36
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-7 (2)
ASTM Classification : SC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 50.3
Coarse Sand (-No.10 + No.40) : 13.3
Fine Sand (-No.40 + No.200) : 3.7
Silt + Clay (-No.200) : 32.7

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 33.2
Coarse Sand (-No.4 + No.10) : 17.1
Medium Sand (-No.10 + No.40) : 13.3
Fine Sand (-No.40 + No.200) : 3.7
Silt + Clay (-No.200) : 32.7

Approved By : DLC

Soil No. 106

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127		
Project County	: Washington/Benton	Sample No.	: SS - 8 thru 11
Project State	: Arkansas	Sample Loc.	: Boring No. 148
Laboratory No.	: 06127	Sample Depth	: 40.0' to 55.7'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 10-16-07
Soil Type	: Brown Silty Sand with Gravel	Date Reported	: 10-24-07

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.0
3/4	in.	19	mm	94.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	84.0
No.4		4.75	mm	72.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	60.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	47.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.5779mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.4
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
		Liquidity Index	: NA
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-4 (0)
		ASTM Classification	: SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 39.9
Coarse Sand (-No.10 + No.40)	: 12.6
Fine Sand (-No.40 + No.200)	: 4.6
Silt + Clay (-No.200)	: 42.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.0
Fine Gravel (-3/4in. + No.4)	: 21.3
Coarse Sand (-No.4 + No.10)	: 12.6
Medium Sand (-No.10 + No.40)	: 12.6
Fine Sand (-No.40 + No.200)	: 4.6
Silt + Clay (-No.200)	: 42.9

Approved By : DLC

Soil No. 107

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 154
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	91.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.4
No.4		4.75	mm	51.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	35.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	23.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 4.4276mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 22.4
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 18
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.19
Gravel (3in. + No.10)	: 64.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.2	AASHTO Classification	: A-2-7 (3)
Silt + Clay (-No.200)	: 20.5	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.8
Fine Gravel (-3/4in. + No.4)	: 39.9
Coarse Sand (-No.4 + No.10)	: 16.0
Medium Sand (-No.10 + No.40)	: 11.6
Fine Sand (-No.40 + No.200)	: 3.2
Silt + Clay (-No.200)	: 20.5

Approved By : DLC

Soil No. 108

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 thru 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 152
Project State	: Arkansas	Sample Depth	: 5.0' to 31.5'
Laboratory No.	: 06127	Date Tested	: 10-16-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	88.1
3/4	in.	19	mm	86.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.8
No.4		4.75	mm	53.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	32.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.6119mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.1
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.23
Gravel (3in. + No.10)	: 58.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.4	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 26.6	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 13.3
Fine Gravel (-3/4in. + No.4)	: 32.9
Coarse Sand (-No.4 + No.10)	: 12.0
Medium Sand (-No.10 + No.40)	: 9.8
Fine Sand (-No.40 + No.200)	: 5.4
Silt + Clay (-No.200)	: 26.6

Approved By : DLC

Soil No. 109

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 7 thru 10
Project County	: Washington/Benton	Sample Loc.	: Boring No. 155
Project State	: Arkansas	Sample Depth	: 35.0' to 50.3'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.6
3/4	in.	19	mm	79.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.2
No.4		4.75	mm	51.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 4.0795mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 25.1
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
AASHTO Composition of Total Sample		Liquidity Index	: NA
Gravel (3in. + No.10)	: 58.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.4	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 22.9	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 20.2
Fine Gravel (-3/4in. + No.4)	: 27.9
Coarse Sand (-No.4 + No.10)	: 10.8
Medium Sand (-No.10 + No.40)	: 12.8
Fine Sand (-No.40 + No.200)	: 5.4
Silt + Clay (-No.200)	: 22.9

Approved By : DLC

Soil No. 110

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 thru 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 165
Project State	: Arkansas	Sample Depth	: 5.0' to 21.2'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	90.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.6
No.4		4.75	mm	61.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.1341mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 24.9
Liquid Limit : 42
Plastic Limit : 17
Plasticity Index : 25
Liquidity Index : 0.32
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-7 (3)
ASTM Classification : GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 50.9
Coarse Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 5.7
Silt + Clay (-No.200) : 33.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 9.2
Fine Gravel (-3/4in. + No.4) : 29.7
Coarse Sand (-No.4 + No.10) : 12.0
Medium Sand (-No.10 + No.40) : 9.6
Fine Sand (-No.40 + No.200) : 5.7
Silt + Clay (-No.200) : 33.8

Approved By : DLC

Soil No. 111

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3, 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 166
Project State	: Arkansas	Sample Depth	: 15.0' to 26.1'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.0
No.4		4.75	mm	62.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.1334mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 34.3
Liquid Limit : 50
Plastic Limit : 21
Plasticity Index : 29
Liquidity Index : 0.46
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-7 (4)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 51.0
Coarse Sand (-No.10 + No.40) : 13.0
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 31.4

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 7.4
Fine Gravel (-3/4in. + No.4) : 30.2
Coarse Sand (-No.4 + No.10) : 13.4
Medium Sand (-No.10 + No.40) : 13.0
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 31.4

Approved By : DLC

Soil No. 112

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 5 thru 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 170
Project State	: Arkansas	Sample Depth	: 25.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red & Light Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	96.8
3/4	in.	19	mm	92.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.2
No.4		4.75	mm	56.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	42.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.2153mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 28.6
Liquid Limit : 39
Plastic Limit : 24
Plasticity Index : 15
Liquidity Index : 0.31
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (1)
ASTM Classification : GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 57.3
Coarse Sand (-No.10 + No.40) : 11.6
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 26.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 7.6
Fine Gravel (-3/4in. + No.4) : 36.4
Coarse Sand (-No.4 + No.10) : 13.3
Medium Sand (-No.10 + No.40) : 11.6
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 26.5

Approved By : DLC

Soil No. 113

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 180
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Tan Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.7
No.4		4.75	mm	77.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	63.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	47.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.5257mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 36.6
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.55
Gravel (3in. + No.10)	: 36.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.3	AASHTO Classification	: A-7-6 (5)
Silt + Clay (-No.200)	: 42.6	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.9
Fine Gravel (-3/4in. + No.4)	: 17.4
Coarse Sand (-No.4 + No.10)	: 14.5
Medium Sand (-No.10 + No.40)	: 15.3
Fine Sand (-No.40 + No.200)	: 5.3
Silt + Clay (-No.200)	: 42.6

Approved By : DLC

Soil No. 114

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 181
Project State	: Arkansas	Sample Depth	: 20.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Tan & Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	92.4
No.4		4.75	mm	84.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	63.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	47.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.5348mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 49.8
Liquid Limit : 38
Plastic Limit : 27
Plasticity Index : 11
Liquidity Index : 2.07
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (2)
ASTM Classification : SM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 36.8
Coarse Sand (-No.10 + No.40) : 15.5
Fine Sand (-No.40 + No.200) : 5.6
Silt + Clay (-No.200) : 42.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 3.9
Fine Gravel (-3/4in. + No.4) : 12.0
Coarse Sand (-No.4 + No.10) : 20.9
Medium Sand (-No.10 + No.40) : 15.5
Fine Sand (-No.40 + No.200) : 5.6
Silt + Clay (-No.200) : 42.1

Approved By : DLC

Soil No. 115

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 183
Project State	: Arkansas	Sample Depth	: 20.0' to 31.1'
Laboratory No.	: 06127	Date Tested	: 10-17-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown & Tan Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.1
3/4	in.	19	mm	83.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	58.6
No.4		4.75	mm	46.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	36.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 5.9191mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 27.4
Maximum Dry Density	: NA	Liquid Limit	: 40
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 21
AASHTO Composition of Total Sample		Liquidity Index	: 0.40
Gravel (3in. + No.10)	: 63.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.2	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 23.1	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 16.8
Fine Gravel (-3/4in. + No.4)	: 37.2
Coarse Sand (-No.4 + No.10)	: 9.3
Medium Sand (-No.10 + No.40)	: 8.4
Fine Sand (-No.40 + No.200)	: 5.2
Silt + Clay (-No.200)	: 23.1

Approved By : DLC

Soil No. 116

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 220
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 10-19-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red Sandy Fat Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.4
No.4		4.75	mm	84.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	78.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	64.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0175mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 38.4
Maximum Dry Density	: NA	Liquid Limit	: 60
Optimum Moisture	: NA	Plastic Limit	: 27
		Plasticity Index	: 33
AASHTO Composition of Total Sample		Liquidity Index	: 0.35
Gravel (3in. + No.10)	: 21.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-7-6 (20)
Silt + Clay (-No.200)	: 64.1	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 15.5
Coarse Sand (-No.4 + No.10)	: 6.2
Medium Sand (-No.10 + No.40)	: 9.8
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 64.1

Approved By : DLC

Soil No. 121

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 217
Project State	: Arkansas	Sample Depth	: 10.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 10-19-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red & Brown Gravelly Fat Clay		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.7
No.4		4.75	mm	83.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	77.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	72.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0109mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 40.8
Maximum Dry Density	: NA	Liquid Limit	: 67
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 43
AASHTO Composition of Total Sample		Liquidity Index	: 0.39
Gravel (3in. + No.10)	: 22.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 4.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 2.4	AASHTO Classification	: A-7-6 (30)
Silt + Clay (-No.200)	: 70.5	ASTM Classification	: CH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.5
Fine Gravel (-3/4in. + No.4)	: 8.7
Coarse Sand (-No.4 + No.10)	: 6.0
Medium Sand (-No.10 + No.40)	: 4.9
Fine Sand (-No.40 + No.200)	: 2.4
Silt + Clay (-No.200)	: 70.5

Approved By : DLC

Soil No. 122

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 219
Project State	: Arkansas	Sample Depth	: 20.0' to 31.5'
Laboratory No.	: 06127	Date Tested	: 10-19-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.2
3/4	in.	19	mm	91.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	81.6
No.4		4.75	mm	71.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	60.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	46.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	38.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.6155mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 32.7
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 26
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: 0.56
Gravel (3in. + No.10)	: 39.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.8	AASHTO Classification	: A-6 (1)
Silt + Clay (-No.200)	: 38.9	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.5
Fine Gravel (-3/4in. + No.4)	: 20.0
Coarse Sand (-No.4 + No.10)	: 11.0
Medium Sand (-No.10 + No.40)	: 13.8
Fine Sand (-No.40 + No.200)	: 7.8
Silt + Clay (-No.200)	: 38.9

Approved By : DLC

Soil No. 123

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 194
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 10-22-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Red Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	94.3
3/4	in.	19	mm	94.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
No.4		4.75	mm	73.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	61.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	45.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.3517mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 27.4
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.65
Gravel (3in. + No.10)	: 38.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.5	AASHTO Classification	: A-6 (3)
Silt + Clay (-No.200)	: 45.1	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 5.7
Fine Gravel (-3/4in. + No.4)	: 21.1
Coarse Sand (-No.4 + No.10)	: 11.7
Medium Sand (-No.10 + No.40)	: 10.9
Fine Sand (-No.40 + No.200)	: 5.5
Silt + Clay (-No.200)	: 45.1

Approved By : DLC

Soil No. 124

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 195
Project State	: Arkansas	Sample Depth	: 20.0' to 31.5'
Laboratory No.	: 06127	Date Tested	: 10-22-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.6
3/4	in.	19	mm	85.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.8
No.4		4.75	mm	55.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	46.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.8056mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.6
Maximum Dry Density	: NA	Liquid Limit	: 35
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: 0.13
Gravel (3in. + No.10)	: 53.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.6	AASHTO Classification	: A-2-6 (0)
Silt + Clay (-No.200)	: 31.5	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 14.1
Fine Gravel (-3/4in. + No.4)	: 30.3
Coarse Sand (-No.4 + No.10)	: 9.2
Medium Sand (-No.10 + No.40)	: 8.3
Fine Sand (-No.40 + No.200)	: 6.6
Silt + Clay (-No.200)	: 31.5

Approved By : DLC

Soil No. 125

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 6 thru 10
Project County	: Washington/Benton	Sample Loc.	: Boring No. 200
Project State	: Arkansas	Sample Depth	: 30.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 10-22-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 10-24-07
Soil Type	: Dark Tan Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.4
3/4	in.	19	mm	86.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.0
No.4		4.75	mm	52.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.9443mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.3
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 29
		Plasticity Index	: 3
AASHTO Composition of Total Sample		Liquidity Index	: -0.90
Gravel (3in. + No.10)	: 59.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.0	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 22.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 13.6
Fine Gravel (-3/4in. + No.4)	: 33.8
Coarse Sand (-No.4 + No.10)	: 12.1
Medium Sand (-No.10 + No.40)	: 11.8
Fine Sand (-No.40 + No.200)	: 6.0
Silt + Clay (-No.200)	: 22.7

Approved By : DLC

Soil No. 126

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 160
Project State	: Arkansas	Sample Depth	: 5.0' to 15.4'
Laboratory No.	: 06127	Date Tested	: 11-08-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Dark Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	90.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.2
No.4		4.75	mm	57.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	39.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	23.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.3351mm & D90 = 19.0000mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.7
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 12
AASHTO Composition of Total Sample		Liquidity Index	: 0.39
Gravel (3in. + No.10)	: 60.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.6	AASHTO Classification	: A-2-6 (0)
Silt + Clay (-No.200)	: 20.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 10.0
Fine Gravel (-3/4in. + No.4)	: 32.6
Coarse Sand (-No.4 + No.10)	: 18.1
Medium Sand (-No.10 + No.40)	: 15.5
Fine Sand (-No.40 + No.200)	: 3.6
Silt + Clay (-No.200)	: 20.2

Approved By : DLC

Soil No. 127

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2, 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 162
Project State	: Arkansas	Sample Depth	: 10.0' to 20.6'
Laboratory No.	: 06127	Date Tested	: 11-08-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.4
No.4		4.75	mm	60.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.7064mm & D90 = 16.7551mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.2
Maximum Dry Density	: NA	Liquid Limit	: 32
Optimum Moisture	: NA	Plastic Limit	: 19
		Plasticity Index	: 13
AASHTO Composition of Total Sample		Liquidity Index	: 0.40
Gravel (3in. + No.10)	: 55.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.7	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 24.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.1
Fine Gravel (-3/4in. + No.4)	: 33.3
Coarse Sand (-No.4 + No.10)	: 16.3
Medium Sand (-No.10 + No.40)	: 15.7
Fine Sand (-No.40 + No.200)	: 3.7
Silt + Clay (-No.200)	: 24.9

Approved By : DLC

Soil No. 128

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 174
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 11-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Dark Brown Sandy Lean Clay with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	89.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.2
No.4		4.75	mm	79.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	72.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	62.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	56.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0343mm & D90 = 19.2975mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 22.2
Maximum Dry Density	: NA	Liquid Limit	: 33
Optimum Moisture	: NA	Plastic Limit	: 16
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: 0.36
Gravel (3in. + No.10)	: 27.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.7	AASHTO Classification	: A-6 (6)
Silt + Clay (-No.200)	: 56.7	ASTM Classification	: CL

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 10.6
Fine Gravel (-3/4in. + No.4)	: 10.2
Coarse Sand (-No.4 + No.10)	: 6.3
Medium Sand (-No.10 + No.40)	: 10.5
Fine Sand (-No.40 + No.200)	: 5.7
Silt + Clay (-No.200)	: 56.7

Approved By : DLC

Soil No. 129

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 178
Project State	: Arkansas	Sample Depth	: 10.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 11-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Red & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	74.3
No.4		4.75	mm	64.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	52.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.5746mm & D90 = 17.3896mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 32.2
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 31
		Plasticity Index	: 7
AASHTO Composition of Total Sample		Liquidity Index	: 0.17
Gravel (3in. + No.10)	: 47.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.0	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 30.5	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.7
Fine Gravel (-3/4in. + No.4)	: 28.3
Coarse Sand (-No.4 + No.10)	: 11.9
Medium Sand (-No.10 + No.40)	: 13.6
Fine Sand (-No.40 + No.200)	: 8.0
Silt + Clay (-No.200)	: 30.5

Approved By : DLC

Soil No. 130

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 thru 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 177
Project State	: Arkansas	Sample Depth	: 20.0' to 36.5'
Laboratory No.	: 06127	Date Tested	: 11-09-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Red Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	90.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
No.4		4.75	mm	67.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	48.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	28.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.1135mm & D90 = 17.7782mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 19.7
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: -0.14
Gravel (3in. + No.10)	: 51.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 20.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.4	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 23.7	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.3
Fine Gravel (-3/4in. + No.4)	: 23.1
Coarse Sand (-No.4 + No.10)	: 18.8
Medium Sand (-No.10 + No.40)	: 20.7
Fine Sand (-No.40 + No.200)	: 4.4
Silt + Clay (-No.200)	: 23.7

Approved By : DLC

Soil No. 131

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 142
Project State	: Arkansas	Sample Depth	: 5.0' to 10.9'
Laboratory No.	: 06127	Date Tested	: 11-14-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.4
No.4		4.75	mm	77.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	63.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.4784mm & D90 = 9.2948mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 19.8
Maximum Dry Density	: NA	Liquid Limit	: 31
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 10
AASHTO Composition of Total Sample		Liquidity Index	: -0.12
Gravel (3in. + No.10)	: 36.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 14.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.5	AASHTO Classification	: A-4 (1)
Silt + Clay (-No.200)	: 41.4	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 22.3
Coarse Sand (-No.4 + No.10)	: 14.4
Medium Sand (-No.10 + No.40)	: 14.4
Fine Sand (-No.40 + No.200)	: 7.5
Silt + Clay (-No.200)	: 41.4

Approved By : DLC

Soil No. 132

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 141
Project State	: Arkansas	Sample Depth	: 10.0' to 15.6'
Laboratory No.	: 06127	Date Tested	: 11-14-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: White Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.6
No.4		4.75	mm	77.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	61.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.6892mm & D90 = 10.3441mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 24.3
Maximum Dry Density	: NA	Liquid Limit	: 33
Optimum Moisture	: NA	Plastic Limit	: 26
		Plasticity Index	: 7
AASHTO Composition of Total Sample		Liquidity Index	: -0.24
Gravel (3in. + No.10)	: 38.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 17.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.5	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 35.1	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 22.8
Coarse Sand (-No.4 + No.10)	: 15.3
Medium Sand (-No.10 + No.40)	: 17.3
Fine Sand (-No.40 + No.200)	: 9.5
Silt + Clay (-No.200)	: 35.1

Approved By : DLC

Soil No. 133

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1thru 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 191
Project State	: Arkansas	Sample Depth	: 5.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 11-14-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown, Reddish Tan & White Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	82.2
No.4		4.75	mm	74.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	51.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.3550mm & D90 = 14.0167mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 38.9
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 34
		Plasticity Index	: 7
AASHTO Composition of Total Sample		Liquidity Index	: 0.70
Gravel (3in. + No.10)	: 34.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 14.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.6	AASHTO Classification	: A-5 (0)
Silt + Clay (-No.200)	: 40.5	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 3.9
Fine Gravel (-3/4in. + No.4)	: 22.1
Coarse Sand (-No.4 + No.10)	: 8.0
Medium Sand (-No.10 + No.40)	: 14.9
Fine Sand (-No.40 + No.200)	: 10.6
Silt + Clay (-No.200)	: 40.5

Approved By : DLC

Soil No. 134

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 thru 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 187
Project State	: Arkansas	Sample Depth	: 25.0' to 36.5'
Laboratory No.	: 06127	Date Tested	: 11-14-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	90.6
3/4	in.	19	mm	83.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	73.7
No.4		4.75	mm	61.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	45.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	32.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.5105mm & D90 = 24.4499mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 29.9
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 37
		Plasticity Index	: NP
AASHTO Composition of Total Sample		Liquidity Index	: NA
Gravel (3in. + No.10)	: 54.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.2	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 25.9	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 16.8
Fine Gravel (-3/4in. + No.4)	: 21.7
Coarse Sand (-No.4 + No.10)	: 15.6
Medium Sand (-No.10 + No.40)	: 13.8
Fine Sand (-No.40 + No.200)	: 6.2
Silt + Clay (-No.200)	: 25.9

Approved By : DLC

Soil No. 135

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4 thru 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 188
Project State	: Arkansas	Sample Depth	: 20.0' to 36.1'
Laboratory No.	: 06127	Date Tested	: 11-14-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	82.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.2
No.4		4.75	mm	42.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	31.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	22.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	19.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 6.4001mm & D90 = 21.4465mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 20.7
Maximum Dry Density	: NA	Liquid Limit	: 34
Optimum Moisture	: NA	Plastic Limit	: 18
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.17
Gravel (3in. + No.10)	: 68.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 3.0	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 19.0	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 17.9
Fine Gravel (-3/4in. + No.4)	: 39.8
Coarse Sand (-No.4 + No.10)	: 10.9
Medium Sand (-No.10 + No.40)	: 9.4
Fine Sand (-No.40 + No.200)	: 3.0
Silt + Clay (-No.200)	: 19.0

Approved By : DLC

Soil No. 136

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 228
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 11-15-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	95.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.3
No.4		4.75	mm	74.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	60.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	45.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	38.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.6730mm & D90 = 13.1162mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.8
Maximum Dry Density	: NA	Liquid Limit	: 45
Optimum Moisture	: NA	Plastic Limit	: 22
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.51
Gravel (3in. + No.10)	: 39.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.7	AASHTO Classification	: A-7-6 (4)
Silt + Clay (-No.200)	: 38.7	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.6
Fine Gravel (-3/4in. + No.4)	: 21.1
Coarse Sand (-No.4 + No.10)	: 13.4
Medium Sand (-No.10 + No.40)	: 15.5
Fine Sand (-No.40 + No.200)	: 6.7
Silt + Clay (-No.200)	: 38.7

Approved By : DLC

Soil No. 139

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3 thru 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 227
Project State	: Arkansas	Sample Depth	: 15.0' to 30.3'
Laboratory No.	: 06127	Date Tested	: 11-15-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-06-07
Soil Type	: Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.8
3/4	in.	19	mm	92.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.4
No.4		4.75	mm	76.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	65.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.4098mm & D90 = 15.4556mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 36.2
Maximum Dry Density	: NA	Liquid Limit	: 37
Optimum Moisture	: NA	Plastic Limit	: 34
		Plasticity Index	: 3
AASHTO Composition of Total Sample		Liquidity Index	: 0.73
Gravel (3in. + No.10)	: 34.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 15.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.5	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 40.7	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.2
Fine Gravel (-3/4in. + No.4)	: 16.0
Coarse Sand (-No.4 + No.10)	: 11.6
Medium Sand (-No.10 + No.40)	: 15.0
Fine Sand (-No.40 + No.200)	: 9.5
Silt + Clay (-No.200)	: 40.7

Approved By : DLC

Soil No. 140

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 247
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown, Tan & Beige Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	92.7
No.4		4.75	mm	87.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	76.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	59.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0777mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 43.6
Maximum Dry Density	: NA	Liquid Limit	: 49
Optimum Moisture	: NA	Plastic Limit	: 26
		Plasticity Index	: 23
AASHTO Composition of Total Sample		Liquidity Index	: 0.77
Gravel (3in. + No.10)	: 23.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 17.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.7	AASHTO Classification	: A-7-6 (8)
Silt + Clay (-No.200)	: 49.8	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 12.3
Coarse Sand (-No.4 + No.10)	: 11.1
Medium Sand (-No.10 + No.40)	: 17.1
Fine Sand (-No.40 + No.200)	: 9.7
Silt + Clay (-No.200)	: 49.8

Approved By : DLC

Soil No. 141

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3, 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 245
Project State	: Arkansas	Sample Depth	: 15.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Light Tan Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.8
3/4	in.	19	mm	79.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	55.1
No.4		4.75	mm	38.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	23.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	16.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	12.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 7.7258mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 29.1
Maximum Dry Density	: NA	Liquid Limit	: 33
Optimum Moisture	: NA	Plastic Limit	: 16
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: 0.77
Gravel (3in. + No.10)	: 77.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.1	AASHTO Classification	: A-2-6 (1)
Silt + Clay (-No.200)	: 12.0	ASTM Classification	: GP-GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 20.1
Fine Gravel (-3/4in. + No.4)	: 41.9
Coarse Sand (-No.4 + No.10)	: 15.0
Medium Sand (-No.10 + No.40)	: 6.9
Fine Sand (-No.40 + No.200)	: 4.1
Silt + Clay (-No.200)	: 12.0

Approved By : DLC

Soil No. 142

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 256
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Tan Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.7
No.4		4.75	mm	86.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	81.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	61.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	34.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.2026mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 33.2
Maximum Dry Density	: NA	Liquid Limit	: 46
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.42
Gravel (3in. + No.10)	: 18.6	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 20.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 26.7	AASHTO Classification	: A-2-7 (2)
Silt + Clay (-No.200)	: 34.7	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 13.8
Coarse Sand (-No.4 + No.10)	: 4.8
Medium Sand (-No.10 + No.40)	: 20.0
Fine Sand (-No.40 + No.200)	: 26.7
Silt + Clay (-No.200)	: 34.7

Approved By : DLC

Soil No. 143

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2, 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 256
Project State	: Arkansas	Sample Depth	: 10.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Tan Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	81.0
No.4		4.75	mm	69.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	58.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	45.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.7371mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 30.0
Maximum Dry Density	: NA	Liquid Limit	: 46
Optimum Moisture	: NA	Plastic Limit	: 30
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.00
Gravel (3in. + No.10)	: 41.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.1	AASHTO Classification	: A-7-5 (2)
Silt + Clay (-No.200)	: 36.1	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 6.5
Fine Gravel (-3/4in. + No.4)	: 24.2
Coarse Sand (-No.4 + No.10)	: 10.6
Medium Sand (-No.10 + No.40)	: 13.5
Fine Sand (-No.40 + No.200)	: 9.1
Silt + Clay (-No.200)	: 36.1

Approved By : DLC

Soil No. 144

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 255
Project State	: Arkansas	Sample Depth	: 20.0' to 30.9'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown & Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.1
3/4	in.	19	mm	81.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.6
No.4		4.75	mm	44.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	32.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	16.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 5.8867mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 17.6
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: -0.13
Gravel (3in. + No.10)	: 67.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.4	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.8	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 16.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 18.4
Fine Gravel (-3/4in. + No.4)	: 36.8
Coarse Sand (-No.4 + No.10)	: 12.7
Medium Sand (-No.10 + No.40)	: 10.4
Fine Sand (-No.40 + No.200)	: 4.8
Silt + Clay (-No.200)	: 16.9

Approved By : DLC

Soil No. 145

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 265
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Clayey Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	96.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.3
No.4		4.75	mm	72.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	58.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	41.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.9393mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 31.2
Maximum Dry Density	: NA	Liquid Limit	: 43
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.46
Gravel (3in. + No.10)	: 41.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 16.6	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 9.8	AASHTO Classification	: A-2-7 (2)
Silt + Clay (-No.200)	: 31.7	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 4.0
Fine Gravel (-3/4in. + No.4)	: 24.0
Coarse Sand (-No.4 + No.10)	: 13.9
Medium Sand (-No.10 + No.40)	: 16.6
Fine Sand (-No.40 + No.200)	: 9.8
Silt + Clay (-No.200)	: 31.7

Approved By : DLC

Soil No. 146

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 266
Project State	: Arkansas	Sample Depth	: 5.0' to 15.6'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.0
3/4	in.	19	mm	85.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.0
No.4		4.75	mm	66.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	53.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.3243mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 18.7
Maximum Dry Density	: NA	Liquid Limit	: 30
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 7
AASHTO Composition of Total Sample		Liquidity Index	: -0.61
Gravel (3in. + No.10)	: 46.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.9	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.2	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 32.6	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 14.9
Fine Gravel (-3/4in. + No.4)	: 18.2
Coarse Sand (-No.4 + No.10)	: 13.2
Medium Sand (-No.10 + No.40)	: 13.9
Fine Sand (-No.40 + No.200)	: 7.2
Silt + Clay (-No.200)	: 32.6

Approved By : DLC

Soil No. 147

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 264
Project State	: Arkansas	Sample Depth	: 20.0' to 31.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.4
3/4	in.	19	mm	84.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.7
No.4		4.75	mm	68.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	61.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	51.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.2882mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 36.7
Maximum Dry Density	: NA	Liquid Limit	: 43
Optimum Moisture	: NA	Plastic Limit	: 27
		Plasticity Index	: 16
AASHTO Composition of Total Sample		Liquidity Index	: 0.61
Gravel (3in. + No.10)	: 39.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.7	AASHTO Classification	: A-7-6 (4)
Silt + Clay (-No.200)	: 44.8	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 15.6
Fine Gravel (-3/4in. + No.4)	: 16.0
Coarse Sand (-No.4 + No.10)	: 7.4
Medium Sand (-No.10 + No.40)	: 9.5
Fine Sand (-No.40 + No.200)	: 6.7
Silt + Clay (-No.200)	: 44.8

Approved By : DLC

Soil No. 148

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 277
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.8
3/4	in.	19	mm	85.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.9
No.4		4.75	mm	65.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	55.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	46.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.8274mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 29.5
Maximum Dry Density	: NA	Liquid Limit	: 41
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 17
AASHTO Composition of Total Sample		Liquidity Index	: 0.32
Gravel (3in. + No.10)	: 44.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.9	AASHTO Classification	: A-7-6 (3)
Silt + Clay (-No.200)	: 40.1	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 14.4
Fine Gravel (-3/4in. + No.4)	: 19.7
Coarse Sand (-No.4 + No.10)	: 10.6
Medium Sand (-No.10 + No.40)	: 9.3
Fine Sand (-No.40 + No.200)	: 5.9
Silt + Clay (-No.200)	: 40.1

Approved By : DLC

Soil No. 149

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 276
Project State	: Arkansas	Sample Depth	: 10.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Reddish Brown & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	93.2
3/4	in.	19	mm	90.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.8
No.4		4.75	mm	59.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	50.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	40.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	34.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.7669mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 29.8
Maximum Dry Density	: NA	Liquid Limit	: 46
Optimum Moisture	: NA	Plastic Limit	: 24
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.26
Gravel (3in. + No.10)	: 49.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.9	AASHTO Classification	: A-2-7 (2)
Silt + Clay (-No.200)	: 34.9	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.4
Fine Gravel (-3/4in. + No.4)	: 31.0
Coarse Sand (-No.4 + No.10)	: 8.8
Medium Sand (-No.10 + No.40)	: 10.0
Fine Sand (-No.40 + No.200)	: 5.9
Silt + Clay (-No.200)	: 34.9

Approved By : DLC

Soil No. 150

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1& 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 281
Project State	: Arkansas	Sample Depth	: 0.5' to 11.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Dark Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	78.1
3/4	in.	19	mm	78.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.9
No.4		4.75	mm	54.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	34.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 3.3317mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 11.0
Maximum Dry Density	: NA	Liquid Limit	: NA
Optimum Moisture	: NA	Plastic Limit	: NA
		Plasticity Index	: NA
AASHTO Composition of Total Sample		Liquidity Index	: NA
Gravel (3in. + No.10)	: 55.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.7	AASHTO Classification	: A-2-4 (0) *
Silt + Clay (-No.200)	: 27.2	ASTM Classification	: GM *
		* Visual Classification	

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 21.9
Fine Gravel (-3/4in. + No.4)	: 24.0
Coarse Sand (-No.4 + No.10)	: 10.0
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 7.7
Silt + Clay (-No.200)	: 27.2

Approved By : DLC

Soil No. 151

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3 & 4
Project County	: Washington/Benton	Sample Loc.	: Boring No. 281
Project State	: Arkansas	Sample Depth	: 15.0' to 21.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	86.5
No.4		4.75	mm	75.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	62.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	50.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.3908mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 38.8
Maximum Dry Density	: NA	Liquid Limit	: 47
Optimum Moisture	: NA	Plastic Limit	: 28
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: 0.57
Gravel (3in. + No.10)	: 37.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 12.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.2	AASHTO Classification	: A-7-6 (5)
Silt + Clay (-No.200)	: 44.1	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 7.3
Fine Gravel (-3/4in. + No.4)	: 17.0
Coarse Sand (-No.4 + No.10)	: 13.4
Medium Sand (-No.10 + No.40)	: 12.0
Fine Sand (-No.40 + No.200)	: 6.2
Silt + Clay (-No.200)	: 44.1

Approved By : DLC

Soil No. 152

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 285
Project State	: Arkansas	Sample Depth	: 0.5' to 26.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Light Tan & Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.9
3/4	in.	19	mm	87.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.2
No.4		4.75	mm	73.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	56.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	48.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 0.0973mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 12.8
Maximum Dry Density	: NA	Liquid Limit	: 35
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 14
AASHTO Composition of Total Sample		Liquidity Index	: -0.59
Gravel (3in. + No.10)	: 33.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 8.0	AASHTO Classification	: A-6 (4)
Silt + Clay (-No.200)	: 48.8	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 12.6
Fine Gravel (-3/4in. + No.4)	: 13.8
Coarse Sand (-No.4 + No.10)	: 7.5
Medium Sand (-No.10 + No.40)	: 9.3
Fine Sand (-No.40 + No.200)	: 8.0
Silt + Clay (-No.200)	: 48.8

Approved By : DLC

Soil No. 153

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3, 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 286
Project State	: Arkansas	Sample Depth	: 15.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	88.8
3/4	in.	19	mm	71.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.4
No.4		4.75	mm	55.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 2.7239mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 22.0
Maximum Dry Density	: NA	Liquid Limit	: 38
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 18
AASHTO Composition of Total Sample		Liquidity Index	: 0.11
Gravel (3in. + No.10)	: 53.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 7.8	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 6.0	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	: 33.2	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 28.7
Fine Gravel (-3/4in. + No.4)	: 15.9
Coarse Sand (-No.4 + No.10)	: 8.4
Medium Sand (-No.10 + No.40)	: 7.8
Fine Sand (-No.40 + No.200)	: 6.0
Silt + Clay (-No.200)	: 33.2

Approved By : DLC

Soil No. 154

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 290
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.0
3/4	in.	19	mm	84.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	73.6
No.4		4.75	mm	64.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	54.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	43.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	37.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 1.0526mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 18.8
Maximum Dry Density	: NA	Liquid Limit	: 40
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 19
AASHTO Composition of Total Sample		Liquidity Index	: -0.12
Gravel (3in. + No.10)	: 45.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 11.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.9	AASHTO Classification	: A-6 (3)
Silt + Clay (-No.200)	: 37.6	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 16.0
Fine Gravel (-3/4in. + No.4)	: 19.9
Coarse Sand (-No.4 + No.10)	: 9.5
Medium Sand (-No.10 + No.40)	: 11.1
Fine Sand (-No.40 + No.200)	: 5.9
Silt + Clay (-No.200)	: 37.6

Approved By : DLC

Soil No. 155

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2 thru 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 291
Project State	: Arkansas	Sample Depth	: 10.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 12-04-07
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 12-11-07
Soil Type	: Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	78.6
3/4	in.	19	mm	72.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	59.7
No.4		4.75	mm	48.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	39.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D50 = 5.2673mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 28.6
Maximum Dry Density	: NA	Liquid Limit	: 34
Optimum Moisture	: NA	Plastic Limit	: 31
		Plasticity Index	: 3
AASHTO Composition of Total Sample		Liquidity Index	: -0.80
Gravel (3in. + No.10)	: 60.5	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 9.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.3	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	: 22.5	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 27.9
Fine Gravel (-3/4in. + No.4)	: 23.8
Coarse Sand (-No.4 + No.10)	: 8.8
Medium Sand (-No.10 + No.40)	: 9.7
Fine Sand (-No.40 + No.200)	: 7.3
Silt + Clay (-No.200)	: 22.5

Approved By : DLC

Soil No. 156

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 307
Project State	:	Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	:	06127	Date Tested	: 03-05-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Reddish Tan & White Sandy Silt with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.9
No.4		4.75	mm	77.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	70.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	60.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0678 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 18.2
Liquid Limit : 35
Plastic Limit : 32
Plasticity Index : 3
Liquidity Index : -4.49
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-4 (0)
ASTM Classification : ML

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 29.9
Coarse Sand (-No.10 + No.40) : 9.5
Fine Sand (-No.40 + No.200) : 8.6
Silt + Clay (-No.200) : 52.0

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 22.4
Coarse Sand (-No.4 + No.10) : 7.5
Medium Sand (-No.10 + No.40) : 9.5
Fine Sand (-No.40 + No.200) : 8.6
Silt + Clay (-No.200) : 52.0

Approved By : DLC

Soil No. 157

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 2 thru 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 307
Project State	:	Arkansas	Sample Depth	: 10.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 03-05-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-20-08
Soil Type	:	Reddish Tan & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.0
3/4	in.	19	mm	83.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.4
No.4		4.75	mm	58.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	47.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.3013 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 38.1
Liquid Limit : 29
Plastic Limit : 26
Plasticity Index : 3
Liquidity Index : 3.89
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : GM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 52.5
Coarse Sand (-No.10 + No.40) : 10.8
Fine Sand (-No.40 + No.200) : 6.0
Silt + Clay (-No.200) : 30.7

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 16.1
Fine Gravel (-3/4in. + No.4) : 25.7
Coarse Sand (-No.4 + No.10) : 10.7
Medium Sand (-No.10 + No.40) : 10.8
Fine Sand (-No.40 + No.200) : 6.0
Silt + Clay (-No.200) : 30.7

Approved By : DLC

Soil No. 158

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 305
Project State	:	Arkansas	Sample Depth	: 5.0' to 5.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Gray & Tan Poorly Graded Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	62.0
3/4	in.	19	mm	62.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	37.0
No.4		4.75	mm	23.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	14.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	7.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	3.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 13.6226 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 8.1
Liquid Limit : NA
Plastic Limit : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-1-a (0) *
ASTM Classification : GP *
* Visual Classification

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 85.6
Coarse Sand (-No.10 + No.40) : 7.1
Fine Sand (-No.40 + No.200) : 3.7
Silt + Clay (-No.200) : 3.6

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 38.0
Fine Gravel (-3/4in. + No.4) : 38.1
Coarse Sand (-No.4 + No.10) : 9.5
Medium Sand (-No.10 + No.40) : 7.1
Fine Sand (-No.40 + No.200) : 3.7
Silt + Clay (-No.200) : 3.6

Approved By : DLC

Soil No. 159

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 311
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	87.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.7
No.4		4.75	mm	57.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	48.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	33.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.4188 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 18.5
Maximum Dry Density	:	NA	Liquid Limit	: 36
Optimum Moisture	:	NA	Plastic Limit	: 18
			Plasticity Index	: 18
AASHTO Composition of Total Sample			Liquidity Index	: 0.02
Gravel (3in. + No.10)	:	52.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.4	AASHTO Classification	: A-2-6 (2)
Silt + Clay (-No.200)	:	33.6	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	12.9
Fine Gravel (-3/4in. + No.4)	:	30.0
Coarse Sand (-No.4 + No.10)	:	9.1
Medium Sand (-No.10 + No.40)	:	9.0
Fine Sand (-No.40 + No.200)	:	5.4
Silt + Clay (-No.200)	:	33.6

Approved By : bLC

Soil No. 160

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 2
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 314
Project State	:	Arkansas	Sample Depth	: 10.0' to 11.4'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	80.3
3/4	in.	19	mm	80.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	74.6
No.4		4.75	mm	69.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	60.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	49.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.4557 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 20.3
Maximum Dry Density	:	NA	Liquid Limit	: 25
Optimum Moisture	:	NA	Plastic Limit	: 21
			Plasticity Index	: 4
AASHTO Composition of Total Sample			Liquidity Index	: -0.17
Gravel (3in. + No.10)	:	39.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	11.1	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.5	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	:	40.0	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	19.7
Fine Gravel (-3/4in. + No.4)	:	11.0
Coarse Sand (-No.4 + No.10)	:	8.7
Medium Sand (-No.10 + No.40)	:	11.1
Fine Sand (-No.40 + No.200)	:	9.5
Silt + Clay (-No.200)	:	40.0

Approved By : DLC

Soil No. 161

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 311
Project State	:	Arkansas	Sample Depth	: 20.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Brown Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	91.2
No.4		4.75	mm	81.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	69.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	54.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.201 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 37
Maximum Dry Density	:	NA	Liquid Limit	: 46
Optimum Moisture	:	NA	Plastic Limit	: 28
			Plasticity Index	: 18
AASHTO Composition of Total Sample			Liquidity Index	: 0.53
Gravel (3in. + No.10)	:	30.9	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	15.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	9.5	AASHTO Classification	: A-7-6 (5)
Silt + Clay (-No.200)	:	44.6	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	18.2
Coarse Sand (-No.4 + No.10)	:	12.7
Medium Sand (-No.10 + No.40)	:	15.0
Fine Sand (-No.40 + No.200)	:	9.5
Silt + Clay (-No.200)	:	44.6

Approved By : DLC

Soil No. 162

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 3, 4 & 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 314
Project State	: Arkansas	Sample Depth	: 15.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Red, Tan & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.4
3/4	in.	19	mm	87.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.1
No.4		4.75	mm	62.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	54.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	37.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.951 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 34.6
Maximum Dry Density	: NA	Liquid Limit	: 44
Optimum Moisture	: NA	Plastic Limit	: 38
		Plasticity Index	: 6
AASHTO Composition of Total Sample		Liquidity Index	: -0.57
Gravel (3in. + No.10)	: 45.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 10.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 7.3	AASHTO Classification	: A-5 (0)
Silt + Clay (-No.200)	: 37.5	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 12.6
Fine Gravel (-3/4in. + No.4)	: 24.6
Coarse Sand (-No.4 + No.10)	: 8.0
Medium Sand (-No.10 + No.40)	: 10.0
Fine Sand (-No.40 + No.200)	: 7.3
Silt + Clay (-No.200)	: 37.5

Approved By : BLC

Soil No. 163

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 6, 7 & 8
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 314
Project State	:	Arkansas	Sample Depth	: 30.0' to 41.2'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.2
3/4	in.	19	mm	87.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.2
No.4		4.75	mm	53.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	42.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	33.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.6738 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 29.9
Maximum Dry Density	:	NA	Liquid Limit	: 36
Optimum Moisture	:	NA	Plastic Limit	: 31
			Plasticity Index	: 5
AASHTO Composition of Total Sample			Liquidity Index	: -0.18
Gravel (3in. + No.10)	:	57.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	6.7	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	26.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	12.8
Fine Gravel (-3/4in. + No.4)	:	34.2
Coarse Sand (-No.4 + No.10)	:	10.1
Medium Sand (-No.10 + No.40)	:	9.5
Fine Sand (-No.40 + No.200)	:	6.7
Silt + Clay (-No.200)	:	26.7

Approved By : DLC

Soil No. 164

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 8 & 9
Project County	: Washington/Benton	Sample Loc.	: Boring No. 311
Project State	: Arkansas	Sample Depth	: 40.0' to 46.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Dark Brown Clayey Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
No.4		4.75	mm	99.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	98.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	81.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1631 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 72.9
Maximum Dry Density	: NA	Liquid Limit	: 61
Optimum Moisture	: NA	Plastic Limit	: 30
		Plasticity Index	: 31
AASHTO Composition of Total Sample		Liquidity Index	: 1.38
Gravel (3in. + No.10)	: 1.2	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 17.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 57.6	AASHTO Classification	: A-2-7 (4)
Silt + Clay (-No.200)	: 24.2	ASTM Classification	: SC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 0.1
Coarse Sand (-No.4 + No.10)	: 1.1
Medium Sand (-No.10 + No.40)	: 17.0
Fine Sand (-No.40 + No.200)	: 57.6
Silt + Clay (-No.200)	: 24.2

Approved By : DLC

Soil No. 165

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 318
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Tan Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	94.2
No.4		4.75	mm	83.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	71.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	58.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	47.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1153 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.9
Maximum Dry Density	: NA	Liquid Limit	: 23
Optimum Moisture	: NA	Plastic Limit	: 21
		Plasticity Index	: 2
AASHTO Composition of Total Sample		Liquidity Index	: 3.19
Gravel (3in. + No.10)	: 28.8	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 13.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 10.9	AASHTO Classification	: A-4 (0)
Silt + Clay (-No.200)	: 47.3	ASTM Classification	: SM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 16.6
Coarse Sand (-No.4 + No.10)	: 12.2
Medium Sand (-No.10 + No.40)	: 13.0
Fine Sand (-No.40 + No.200)	: 10.9
Silt + Clay (-No.200)	: 47.3

Approved By : DLC

Soil No. 166

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 3 thru 6
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 318
Project State	:	Arkansas	Sample Depth	: 5.0' to 31.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Tan Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.9
3/4	in.	19	mm	93.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.5
No.4		4.75	mm	54.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	34.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	29.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.3712 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 35.9
Liquid Limit : 40
Plastic Limit : 23
Plasticity Index : 17
Liquidity Index : 0.76
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-6 (1)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 56.7
Coarse Sand (-No.10 + No.40) : 8.6
Fine Sand (-No.40 + No.200) : 5.0
Silt + Clay (-No.200) : 29.7

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 7.0
Fine Gravel (-3/4in. + No.4) : 38.6
Coarse Sand (-No.4 + No.10) : 11.1
Medium Sand (-No.10 + No.40) : 8.6
Fine Sand (-No.40 + No.200) : 5.0
Silt + Clay (-No.200) : 29.7

Approved By : DLC

Soil No. 167

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 7
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 318
Project State	:	Arkansas	Sample Depth	: 35.0' to 36.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Tan & Red Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	67.3
3/4	in.	19	mm	62.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	50.1
No.4		4.75	mm	39.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	29.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	21.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 9.4403 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 42.5
Maximum Dry Density	:	NA	Liquid Limit	: NA
Optimum Moisture	:	NA	Plastic Limit	: NA
			Plasticity Index	: NA
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-1-b (0) *
			ASTM Classification	: GM *

* Visual Classification

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	70.1
Coarse Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	5.3
Silt + Clay (-No.200)	:	15.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	37.5
Fine Gravel (-3/4in. + No.4)	:	23.4
Coarse Sand (-No.4 + No.10)	:	9.2
Medium Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	5.3
Silt + Clay (-No.200)	:	15.8

Approved By : DLC

Soil No. 168

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1 & 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 325
Project State	: Arkansas	Sample Depth	: 5.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Reddish & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	91.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.1
No.4		4.75	mm	51.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	42.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.3004 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.7
Maximum Dry Density	: NA	Liquid Limit	: 39
Optimum Moisture	: NA	Plastic Limit	: 28
		Plasticity Index	: 11
AASHTO Composition of Total Sample		Liquidity Index	: -0.12
Gravel (3in. + No.10)	: 57.7	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 6.7	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 4.9	AASHTO Classification	: A-2-6 (0)
Silt + Clay (-No.200)	: 30.7	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 9.0
Fine Gravel (-3/4in. + No.4)	: 40.0
Coarse Sand (-No.4 + No.10)	: 8.7
Medium Sand (-No.10 + No.40)	: 6.7
Fine Sand (-No.40 + No.200)	: 4.9
Silt + Clay (-No.200)	: 30.7

Approved By : DLC

Soil No. 169

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 3 & 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 325
Project State	:	Arkansas	Sample Depth	: 15.0' to 21.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Tan Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	93.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.1
No.4		4.75	mm	52.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	31.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.9128 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 36.5
Maximum Dry Density	:	NA	Liquid Limit	: 37
Optimum Moisture	:	NA	Plastic Limit	: 35
			Plasticity Index	: 2
AASHTO Composition of Total Sample			Liquidity Index	: 0.84
Gravel (3in. + No.10)	:	59.0	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	9.3	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	5.8	AASHTO Classification	: A-2-4 (0)
Silt + Clay (-No.200)	:	25.9	ASTM Classification	: GM

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	6.6
Fine Gravel (-3/4in. + No.4)	:	40.8
Coarse Sand (-No.4 + No.10)	:	11.6
Medium Sand (-No.10 + No.40)	:	9.3
Fine Sand (-No.40 + No.200)	:	5.8
Silt + Clay (-No.200)	:	25.9

Approved By : DLC

Soil No. 170

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 1, 2 & 3
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 327
Project State	:	Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Tan Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	92.4
3/4	in.	19	mm	92.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	71.9
No.4		4.75	mm	55.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	44.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.1061 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 29.9
Liquid Limit : 41
Plastic Limit : 30
Plasticity Index : 11
Liquidity Index : -0.03
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-7 (0)
ASTM Classification : GM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 55.7
Coarse Sand (-No.10 + No.40) : 8.9
Fine Sand (-No.40 + No.200) : 6.8
Silt + Clay (-No.200) : 28.6

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 7.6
Fine Gravel (-3/4in. + No.4) : 36.9
Coarse Sand (-No.4 + No.10) : 11.2
Medium Sand (-No.10 + No.40) : 8.9
Fine Sand (-No.40 + No.200) : 6.8
Silt + Clay (-No.200) : 28.6

Approved By : DLC

Soil No. 171

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 2, 3 & 4
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 332
Project State	:	Arkansas	Sample Depth	: 10.0' to 20.3'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Gray & Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	91.7
3/4	in.	19	mm	75.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	50.4
No.4		4.75	mm	34.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	25.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	20.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	18.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 9.3368 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 15.1
Maximum Dry Density	:	NA	Liquid Limit	: 32
Optimum Moisture	:	NA	Plastic Limit	: 21
			Plasticity Index	: 11
AASHTO Composition of Total Sample			Liquidity Index	: -0.56
Gravel (3in. + No.10)	:	74.1	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	5.2	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	2.4	AASHTO Classification	: A-2-6 (0)
Silt + Clay (-No.200)	:	18.3	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	24.3
Fine Gravel (-3/4in. + No.4)	:	41.3
Coarse Sand (-No.4 + No.10)	:	8.5
Medium Sand (-No.10 + No.40)	:	5.2
Fine Sand (-No.40 + No.200)	:	2.4
Silt + Clay (-No.200)	:	18.3

Approved By : DLC

Soil No. 172

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 327
Project State	:	Arkansas	Sample Depth	: 20.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Brown & Tan Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	81.7
No.4		4.75	mm	65.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	49.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.0677 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 30.6
Liquid Limit : 37
Plastic Limit : 32
Plasticity Index : 5
Liquidity Index : -0.27
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : SM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 50.6
Coarse Sand (-No.10 + No.40) : 12.5
Fine Sand (-No.40 + No.200) : 6.9
Silt + Clay (-No.200) : 30.0

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 35.0
Coarse Sand (-No.4 + No.10) : 15.6
Medium Sand (-No.10 + No.40) : 12.5
Fine Sand (-No.40 + No.200) : 6.9
Silt + Clay (-No.200) : 30.0

Approved By : DLC

Soil No. 173

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 6 & 7
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 327
Project State	:	Arkansas	Sample Depth	: 30.0' to 36.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Tan & Brown Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	77.1
3/4	in.	19	mm	70.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	58.0
No.4		4.75	mm	49.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	38.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	26.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.8705 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24
Maximum Dry Density	:	NA	Liquid Limit	: 46
Optimum Moisture	:	NA	Plastic Limit	: 22
			Plasticity Index	: 24
AASHTO Composition of Total Sample			Liquidity Index	: 0.08
Gravel (3in. + No.10)	:	61.3	Activity	: NA
Coarse Sand (-No.10 + No.40)	:	8.5	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	:	3.9	AASHTO Classification	: A-2-7 (3)
Silt + Clay (-No.200)	:	26.3	ASTM Classification	: GC

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	29.4
Fine Gravel (-3/4in. + No.4)	:	20.9
Coarse Sand (-No.4 + No.10)	:	11.0
Medium Sand (-No.10 + No.40)	:	8.5
Fine Sand (-No.40 + No.200)	:	3.9
Silt + Clay (-No.200)	:	26.3

Approved By : DLC

Soil No. 174

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 6 & 7
Project County	: Washington/Benton	Sample Loc.	: Boring No. 332
Project State	: Arkansas	Sample Depth	: 30.0' to 36.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Brown, Gray & Beige Poorly Graded Gravel with Clay and Sand (and/or Silty Clay and Sand)		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	78.4
3/4	in.	19	mm	68.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	46.6
No.4		4.75	mm	30.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	20.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	14.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	11.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 10.564 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 21.6
Liquid Limit : 28
Plastic Limit : 21
Plasticity Index : 7
Liquidity Index : 0.10
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : GP-GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 79.7
Coarse Sand (-No.10 + No.40) : 5.8
Fine Sand (-No.40 + No.200) : 2.8
Silt + Clay (-No.200) : 11.7

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 31.2
Fine Gravel (-3/4in. + No.4) : 38.4
Coarse Sand (-No.4 + No.10) : 10.1
Medium Sand (-No.10 + No.40) : 5.8
Fine Sand (-No.40 + No.200) : 2.8
Silt + Clay (-No.200) : 11.7

Approved By : DLC

Soil No. 175

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CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 351
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Reddish Brown & Beige Elastic Silt with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.9
No.4		4.75	mm	95.2
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	87.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	79.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	74.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.0086 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 41.8
Maximum Dry Density	: NA	Liquid Limit	: 55
Optimum Moisture	: NA	Plastic Limit	: 33
		Plasticity Index	: 22
AASHTO Composition of Total Sample		Liquidity Index	: 0.39
Gravel (3in. + No.10)	: 12.4	Activity	: NA
Coarse Sand (-No.10 + No.40)	: 8.0	Specific Gravity	: NA
Fine Sand (-No.40 + No.200)	: 5.3	AASHTO Classification	: A-7-5 (18)
Silt + Clay (-No.200)	: 74.3	ASTM Classification	: MH

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 0.0
Fine Gravel (-3/4in. + No.4)	: 4.8
Coarse Sand (-No.4 + No.10)	: 7.6
Medium Sand (-No.10 + No.40)	: 8.0
Fine Sand (-No.40 + No.200)	: 5.3
Silt + Clay (-No.200)	: 74.3

Approved By : DLC

Soil No. 176

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 2
Project County	: Washington/Benton	Sample Loc.	: Boring No. 351
Project State	: Arkansas	Sample Depth	: 10.0' to 11.5'
Laboratory No.	: 06127	Date Tested	: 03-07-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Tan & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	86.5
3/4	in.	19	mm	84.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.5
No.4		4.75	mm	57.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	46.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 2.6006 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 20.1
Liquid Limit : NA
Plastic Limit : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0) *
ASTM Classification : GM *
* Visual Classification

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 53.4
Coarse Sand (-No.10 + No.40) : 10.4
Fine Sand (-No.40 + No.200) : 8.0
Silt + Clay (-No.200) : 28.2

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 15.4
Fine Gravel (-3/4in. + No.4) : 26.8
Coarse Sand (-No.4 + No.10) : 11.2
Medium Sand (-No.10 + No.40) : 10.4
Fine Sand (-No.40 + No.200) : 8.0
Silt + Clay (-No.200) : 28.2

Approved By : DLC

Soil No. 177

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 3, 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 351
Project State	:	Arkansas	Sample Depth	: 15.0' to 26.5'
Laboratory No.	:	06127	Date Tested	: 03-07-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Dark Reddish Tan & Brown Clayey Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.8
3/4	in.	19	mm	84.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	67.2
No.4		4.75	mm	60.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	56.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	48.0
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.1681 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 30.3
Liquid Limit : 45
Plastic Limit : 20
Plasticity Index : 25
Liquidity Index : 0.43
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-6 (8)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 43.9
Coarse Sand (-No.10 + No.40) : 3.8
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 48.0

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 15.2
Fine Gravel (-3/4in. + No.4) : 24.0
Coarse Sand (-No.4 + No.10) : 4.7
Medium Sand (-No.10 + No.40) : 3.8
Fine Sand (-No.40 + No.200) : 4.3
Silt + Clay (-No.200) : 48.0

Approved By : DLC

Soil No. 178

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 362
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 03-11-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Reddish Brown, Tan & White Silty Sand with Gravel		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	98.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.1
No.4		4.75	mm	74.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	63.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	49.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	42.6
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.4643 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 37.3
Liquid Limit : 41
Plastic Limit : 39
Plasticity Index : 2
Liquidity Index : -0.96
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-5 (0)
ASTM Classification : SM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 36.8
Coarse Sand (-No.10 + No.40) : 14.0
Fine Sand (-No.40 + No.200) : 6.6
Silt + Clay (-No.200) : 42.6

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 1.9
Fine Gravel (-3/4in. + No.4) : 23.2
Coarse Sand (-No.4 + No.10) : 11.7
Medium Sand (-No.10 + No.40) : 14.0
Fine Sand (-No.40 + No.200) : 6.6
Silt + Clay (-No.200) : 42.6

Approved By : DLC

Soil No. 179

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale Bypass		
Project No.	:	06127	Sample No.	: SS - 4 & 5
Project County	:	Washington/Benton	Sample Loc.	: Boring No. 362
Project State	:	Arkansas	Sample Depth	: 20.0' to 25.2'
Laboratory No.	:	06127	Date Tested	: 03-11-08
Submitted By	:	Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	:	Reddish Brown & Tan Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	74.5
3/4	in.	19	mm	74.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	62.3
No.4		4.75	mm	50.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	40.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.4736 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 25.7
Liquid Limit : 33
Plastic Limit : 33
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-1-b (0)
ASTM Classification : GM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 59.4
Coarse Sand (-No.10 + No.40) : 9.7
Fine Sand (-No.40 + No.200) : 7.0
Silt + Clay (-No.200) : 23.9

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 25.5
Fine Gravel (-3/4in. + No.4) : 23.8
Coarse Sand (-No.4 + No.10) : 10.1
Medium Sand (-No.10 + No.40) : 9.7
Fine Sand (-No.40 + No.200) : 7.0
Silt + Clay (-No.200) : 23.9

Approved By : blc

Soil No. 180

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 368
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 03-11-08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 03-24-08
Soil Type	: Light Brown & Beige Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	74.0
3/4	in.	19	mm	68.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	52.6
No.4		4.75	mm	42.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	33.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	22.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 8.0147 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 7.9
Liquid Limit : NA
Plastic Limit : NA
Plasticity Index : NA
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-1-b (0) *
ASTM Classification : GM *
* Visual Classification

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 66.5
Coarse Sand (-No.10 + No.40) : 10.6
Fine Sand (-No.40 + No.200) : 7.2
Silt + Clay (-No.200) : 15.7

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 31.5
Fine Gravel (-3/4in. + No.4) : 26.5
Coarse Sand (-No.4 + No.10) : 8.5
Medium Sand (-No.10 + No.40) : 10.6
Fine Sand (-No.40 + No.200) : 7.2
Silt + Clay (-No.200) : 15.7

Approved By : bcc

Soil No. 181

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale Bypass		
Project No.	: 06127		
Project County	: Washington/Benton	Sample No.	: SS - 2 & 3
Project State	: Arkansas	Sample Loc.	: Boring No. 370
Laboratory No.	: 06127	Sample Depth	: 10.0' to 16.5'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 03-11-08
Soil Type	: Tan & Brown Silty Sand with Gravel	Date Reported	: 03-24-08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	95.4
3/4	in.	19	mm	91.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.6
No.4		4.75	mm	72.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	61.1

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.4999 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 29.2
Liquid Limit : 48
Plastic Limit : 37
Plasticity Index : 11
Liquidity Index : -0.68
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-7-5 (2)
ASTM Classification : SM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 38.9
Coarse Sand (-No.10 + No.40) : 12.4
Fine Sand (-No.40 + No.200) : 6.9
Silt + Clay (-No.200) : 41.8

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 8.9
Fine Gravel (-3/4in. + No.4) : 19.0
Coarse Sand (-No.4 + No.10) : 11.0
Medium Sand (-No.10 + No.40) : 12.4
Fine Sand (-No.40 + No.200) : 6.9
Silt + Clay (-No.200) : 41.8

Approved By : DLC

Soil No. 182

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127		
Project County	:	Washington/Benton	Sample No.	: SS - 1, 2 & 3
Project State	:	Arkansas	Sample Loc.	: Boring No. 338
Laboratory No.	:	06127	Sample Depth	: 5.0' to 16.5'
Submitted By	:	Florence & Hutcheson, Inc.	Date Tested	: 05/13/08
Soil Type	:	Red Clayey Sand with Gravel	Date Reported	: 06/05/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	88.8
No.4		4.75	mm	77.8
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	66.5

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.3
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.2468 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 34
Maximum Dry Density	:	NA	Liquid Limit	: 39
Optimum Moisture	:	NA	Plastic Limit	: 25
			Plasticity Index	: 14
			Liquidity Index	: 0.63
AASHTO Composition of Total Sample			Activity	: NA
Gravel (3in. + No.10)	:	33.5	Specific Gravity	: NA
Coarse Sand (-No.10 + No.40)	:	13.9	AASHTO Classification	: A-6 (3)
Fine Sand (-No.40 + No.200)	:	8.3	ASTM Classification	: SC
Silt + Clay (-No.200)	:	44.3		

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	0.0
Fine Gravel (-3/4in. + No.4)	:	22.2
Coarse Sand (-No.4 + No.10)	:	11.3
Medium Sand (-No.10 + No.40)	:	13.9
Fine Sand (-No.40 + No.200)	:	8.3
Silt + Clay (-No.200)	:	44.3

Approved By : DLS

Soil No. 183

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127		
Project County	:	Washington/Benton	Sample No.	: SS - 1 thru 4
Project State	:	Arkansas	Sample Loc.	: Boring No. 342
Laboratory No.	:	06127	Sample Depth	: 5.0' to 21.5'
Submitted By	:	Florence & Hutcheson, Inc.	Date Tested	: 05/13/08
Soil Type	:	Brown & White Silty Gravel with Sand	Date Reported	: 06/05/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	86.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	74.6
No.4		4.75	mm	65.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	55.8

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	44.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	36.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.9158 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 36.1
Liquid Limit : 36
Plastic Limit : 25
Plasticity Index : 11
Liquidity Index : 0.98
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-6 (0)
ASTM Classification : GM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 44.2
Coarse Sand (-No.10 + No.40) : 11.5
Fine Sand (-No.40 + No.200) : 7.9
Silt + Clay (-No.200) : 36.4

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 13.2
Fine Gravel (-3/4in. + No.4) : 21.2
Coarse Sand (-No.4 + No.10) : 9.8
Medium Sand (-No.10 + No.40) : 11.5
Fine Sand (-No.40 + No.200) : 7.9
Silt + Clay (-No.200) : 36.4

Approved By : DLC

Soil No. 184

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 5
Project County	: Washington/Benton	Sample Loc.	: Boring No. 338
Project State	: Arkansas	Sample Depth	: 25.0' to 26.5'
Laboratory No.	: 06127	Date Tested	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/05/08
Soil Type	: Reddish Brown & Gray Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	87.4
3/4	in.	19	mm	75.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.3
No.4		4.75	mm	47.5
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	37.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	32.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.2
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 5.4386 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 34.8
Liquid Limit : 58
Plastic Limit : 19
Plasticity Index : 39
Liquidity Index : 0.40
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-7 (6)
ASTM Classification : GC

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 62.3
Coarse Sand (-No.10 + No.40) : 4.9
Fine Sand (-No.40 + No.200) : 2.6
Silt + Clay (-No.200) : 30.2

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 24.6
Fine Gravel (-3/4in. + No.4) : 27.9
Coarse Sand (-No.4 + No.10) : 9.8
Medium Sand (-No.10 + No.40) : 4.9
Fine Sand (-No.40 + No.200) : 2.6
Silt + Clay (-No.200) : 30.2

Approved By : DLC

Soil No. 185

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 1, 2 & 3
Project County	: Washington/Benton	Sample Loc.	: Boring No. 375
Project State	: Arkansas	Sample Depth	: 5.0' to 16.5'
Laboratory No.	: 06127	Date Tested	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/05/08
Soil Type	: Tan & White Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.7
3/4	in.	19	mm	84.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	55.4
No.4		4.75	mm	41.0
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	29.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	22.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	19.1
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 7.3255 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 21.8
Maximum Dry Density	: NA	Liquid Limit	: 35
Optimum Moisture	: NA	Plastic Limit	: 20
		Plasticity Index	: 15
		Liquidity Index	: 0.12
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-6 (1)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 70.3
Coarse Sand (-No.10 + No.40)	: 7.4
Fine Sand (-No.40 + No.200)	: 3.2
Silt + Clay (-No.200)	: 19.1

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 15.3
Fine Gravel (-3/4in. + No.4)	: 43.7
Coarse Sand (-No.4 + No.10)	: 11.3
Medium Sand (-No.10 + No.40)	: 7.4
Fine Sand (-No.40 + No.200)	: 3.2
Silt + Clay (-No.200)	: 19.1

Approved By : DLC

Soil No. 186

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 4, 5 & 6
Project County	: Washington/Benton	Sample Loc.	: Boring No. 375
Project State	: Arkansas	Sample Depth	: 20.0' to 31.5'
Laboratory No.	: 06127	Date Tested	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/05/08
Soil Type	: Tan & White Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	75.0
3/4	in.	19	mm	72.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	52.4
No.4		4.75	mm	39.4
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	28.4

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	20.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	16.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 8.3589 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 26.2
Maximum Dry Density	: NA	Liquid Limit	: 29
Optimum Moisture	: NA	Plastic Limit	: 23
		Plasticity Index	: 6
		Liquidity Index	: 0.49
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-1-b (0)
		ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 71.6
Coarse Sand (-No.10 + No.40)	: 8.2
Fine Sand (-No.40 + No.200)	: 3.8
Silt + Clay (-No.200)	: 16.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 27.5
Fine Gravel (-3/4in. + No.4)	: 33.1
Coarse Sand (-No.4 + No.10)	: 11.0
Medium Sand (-No.10 + No.40)	: 8.2
Fine Sand (-No.40 + No.200)	: 3.8
Silt + Clay (-No.200)	: 16.4

Approved By : DLC

Soil No. 187

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 7 & 8
Project County	: Washington/Benton	Sample Loc.	: Boring No. 375
Project State	: Arkansas	Sample Depth	: 35.0' to 40.1'
Laboratory No.	: 06127	Date Tested	: 05/13/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/05/08
Soil Type	: Brown Silty Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	74.8
3/4	in.	19	mm	74.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.9
No.4		4.75	mm	51.9
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	41.9

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	33.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	25.7
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.0301 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 42.6
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
		Liquidity Index	: NA
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-4 (0)
		ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 58.1
Coarse Sand (-No.10 + No.40)	: 8.4
Fine Sand (-No.40 + No.200)	: 7.8
Silt + Clay (-No.200)	: 25.7

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 25.2
Fine Gravel (-3/4in. + No.4)	: 22.9
Coarse Sand (-No.4 + No.10)	: 10.0
Medium Sand (-No.10 + No.40)	: 8.4
Fine Sand (-No.40 + No.200)	: 7.8
Silt + Clay (-No.200)	: 25.7

Approved By : DLC

Soil No. 188

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127	Sample No.	: SS - 1
Project County	: Washington/Benton	Sample Loc.	: Boring No. 385
Project State	: Arkansas	Sample Depth	: 5.0' to 6.5'
Laboratory No.	: 06127	Date Tested	: 05/07/08
Submitted By	: Florence & Hutcheson, Inc.	Date Reported	: 06/06/08
Soil Type	: Red Clayey Gravel with Sand		

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	91.4
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.1
No.4		4.75	mm	51.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	35.7

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.4654 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 13.7
Maximum Dry Density	: NA	Liquid Limit	: 28
Optimum Moisture	: NA	Plastic Limit	: 15
		Plasticity Index	: 13
		Liquidity Index	: -0.08
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-6 (1)
		ASTM Classification	: GC

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 64.3
Coarse Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 3.7
Silt + Clay (-No.200)	: 22.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 8.6
Fine Gravel (-3/4in. + No.4)	: 40.3
Coarse Sand (-No.4 + No.10)	: 15.4
Medium Sand (-No.10 + No.40)	: 9.2
Fine Sand (-No.40 + No.200)	: 3.7
Silt + Clay (-No.200)	: 22.8

Approved By : DLC

Soil No. 189

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127		
Project County	:	Washington/Benton		
Project State	:	Arkansas		
Laboratory No.	:	06127		
Submitted By	:	Florence & Hutcheson, Inc.		
Soil Type	:	Red Silty Gravel with Sand		
			Sample No.	: SS - 1 & 2
			Sample Loc.	: Boring No. 380
			Sample Depth	: 5.0' to 11.5'
			Date Tested	: 05/07/08
			Date Reported	: 06/06/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	84.2
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.6
No.4		4.75	mm	67.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	58.2

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	49.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	40.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 0.4723 mm

California Bearing Ratio	:	NA
Maximum Dry Density	:	NA
Optimum Moisture	:	NA

Natural Moisture (%)	:	30.1
Liquid Limit	:	NP
Plastic Limit	:	NP
Plasticity Index	:	NP
Liquidity Index	:	NA
Activity	:	NA
Specific Gravity	:	NA
AASHTO Classification	:	A-4 (1)
ASTM Classification	:	GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	41.8
Coarse Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	8.6
Silt + Clay (-No.200)	:	40.8

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	15.8
Fine Gravel (-3/4in. + No.4)	:	17.1
Coarse Sand (-No.4 + No.10)	:	8.9
Medium Sand (-No.10 + No.40)	:	8.8
Fine Sand (-No.40 + No.200)	:	8.6
Silt + Clay (-No.200)	:	40.8

Approved By : DCC

Soil No. 190

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127		
Project County	: Washington/Benton	Sample No.	: SS - 2 & 3
Project State	: Arkansas	Sample Loc.	: Boring No. 377
Laboratory No.	: 06127	Sample Depth	: 10.0' to 16.5'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 05/07/08
Soil Type	: Red Silty Gravel with Sand	Date Reported	: 06/06/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	81.8
3/4	in.	19	mm	71.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	55.2
No.4		4.75	mm	46.6
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	34.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	25.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	19.8
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 6.2475 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 10.2
Liquid Limit : NP
Plastic Limit : NP
Plasticity Index : NP
Liquidity Index : NA
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-1-b (0)
ASTM Classification : GM

AASHTO Composition of Total Sample
Gravel (3in. + No.10) : 65.4
Coarse Sand (-No.10 + No.40) : 8.9
Fine Sand (-No.40 + No.200) : 5.9
Silt + Clay (-No.200) : 19.8

ASTM Composition of Total Sample
Coarse Gravel (3in. + 3/4in.) : 28.7
Fine Gravel (-3/4in. + No.4) : 24.7
Coarse Sand (-No.4 + No.10) : 12.0
Medium Sand (-No.10 + No.40) : 8.9
Fine Sand (-No.40 + No.200) : 5.9
Silt + Clay (-No.200) : 19.8

Approved By : DLC

Soil No. 191

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Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	: Springdale By-Pass		
Project No.	: 06127		
Project County	: Washington/Benton	Sample No.	: SS - 3 & 4
Project State	: Arkansas	Sample Loc.	: Boring No. 380
Laboratory No.	: 06127	Sample Depth	: 15.0' to 21.5'
Submitted By	: Florence & Hutcheson, Inc.	Date Tested	: 05/08/08
Soil Type	: Red Silty Gravel with Sand	Date Reported	: 06/10/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	87.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	77.3
No.4		4.75	mm	65.1
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	51.6

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	38.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.4
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 1.66 mm

California Bearing Ratio	: NA	Natural Moisture (%)	: 27.3
Maximum Dry Density	: NA	Liquid Limit	: NP
Optimum Moisture	: NA	Plastic Limit	: NP
		Plasticity Index	: NP
		Liquidity Index	: NA
		Activity	: NA
		Specific Gravity	: NA
		AASHTO Classification	: A-2-4 (0)
		ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	: 48.4
Coarse Sand (-No.10 + No.40)	: 13.3
Fine Sand (-No.40 + No.200)	: 6.9
Silt + Clay (-No.200)	: 31.4

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	: 13.0
Fine Gravel (-3/4in. + No.4)	: 21.9
Coarse Sand (-No.4 + No.10)	: 13.5
Medium Sand (-No.10 + No.40)	: 13.3
Fine Sand (-No.40 + No.200)	: 6.9
Silt + Clay (-No.200)	: 31.4

Approved By : DLC

Soil No. 192

P O Box 7267 • Paducah, KY 42002 • 2550 Irvin Cobb Dr • Paducah, KY 42003 • 270/444-9691 • fax 270/443-3943 • mail@flohut.com

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass	
Project No.	:	06127	
Project County	:	Washington/Benton	
Project State	:	Arkansas	
Laboratory No.	:	06127	
Submitted By	:	Florence & Hutcheson, Inc.	
Soil Type	:	Red Silty Gravel with Sand	
Sample No.	:	SS - 4 & 5	
Sample Loc.	:	Boring No. 377	
Sample Depth	:	20.0' to 26.5'	
Date Tested	:	05/08/08	
Date Reported	:	06/10/08	

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	85.3
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.9
No.4		4.75	mm	55.7
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	43.0

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.5
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 3.2217 mm

California Bearing Ratio : NA
Maximum Dry Density : NA
Optimum Moisture : NA

Natural Moisture (%) : 22.3
Liquid Limit : 37
Plastic Limit : 30
Plasticity Index : 7
Liquidity Index : -1.10
Activity : NA
Specific Gravity : NA
AASHTO Classification : A-2-4 (0)
ASTM Classification : GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10) : 57.0
Coarse Sand (-No.10 + No.40) : 12.2
Fine Sand (-No.40 + No.200) : 7.3
Silt + Clay (-No.200) : 23.5

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.) : 14.7
Fine Gravel (-3/4in. + No.4) : 29.6
Coarse Sand (-No.4 + No.10) : 12.7
Medium Sand (-No.10 + No.40) : 12.2
Fine Sand (-No.40 + No.200) : 7.3
Silt + Clay (-No.200) : 23.5

Approved By : DLC

Soil No. 193

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Florence & Hutcheson, Inc.
CONSULTING ENGINEERS

SOIL CLASSIFICATION

Project Name	:	Springdale By-Pass		
Project No.	:	06127		
Project County	:	Washington/Benton	Sample No.	: SS - 8, 9 & 10
Project State	:	Arkansas	Sample Loc.	: Boring No. 380
Laboratory No.	:	06127	Sample Depth	: 40.0' to 51.5'
Submitted By	:	Florence & Hutcheson, Inc.	Date Tested	: 05/08/08
Soil Type	:	Red Silty Gravel with Sand	Date Reported	: 06/10/08

				% Passing
4	in.	100	mm	
3 1/2	in.	90	mm	
3	in.	75	mm	
2 1/2	in.	63	mm	
2	in.	50	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	66.7
No.4		4.75	mm	52.3
No.6		3.35	mm	
No.8		2.36	mm	
No.10		2	mm	37.3

				% Passing
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	23.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	16.9
No.270		0.053	mm	
Hyd. Rd.	# 1		mm	
Hyd. Rd.	# 2		mm	
Hyd. Rd.	# 3		mm	
Hyd. Rd.	# 4		mm	
Hyd. Rd.	# 5		mm	
Hyd. Rd.	# 6		mm	
Hyd. Rd.	# 7		mm	

D_{50} = 4.16 mm

California Bearing Ratio	:	NA	Natural Moisture (%)	: 24.1
Maximum Dry Density	:	NA	Liquid Limit	: NP
Optimum Moisture	:	NA	Plastic Limit	: NP
			Plasticity Index	: NP
			Liquidity Index	: NA
			Activity	: NA
			Specific Gravity	: NA
			AASHTO Classification	: A-1-b (0)
			ASTM Classification	: GM

AASHTO Composition of Total Sample

Gravel (3in. + No.10)	:	62.7
Coarse Sand (-No.10 + No.40)	:	13.9
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	16.9

ASTM Composition of Total Sample

Coarse Gravel (3in. + 3/4in.)	:	7.5
Fine Gravel (-3/4in. + No.4)	:	40.2
Coarse Sand (-No.4 + No.10)	:	15.0
Medium Sand (-No.10 + No.40)	:	13.9
Fine Sand (-No.40 + No.200)	:	6.5
Silt + Clay (-No.200)	:	16.9

Approved By : DLC

Soil No. 194

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APPENDIX III – DESIGN CROSS SECTIONS

RAMP SE OVER GOAD SPRINGS ROAD

RAMP EN OVER HWY. 412

HWY. 412 OVER PUPPY CREEK

RAMP EN OVER PUPPY CREEK

SPRING CREEK STREET OVER HWY. 412

ZION ROAD OVER HWY. 412

RAMP EN OVER SILENT GROVE ROAD

HWY. 412 OVER WAGON WHEEL ROAD

RAMP NW OVER HWY. 412

HWY. 412 OVER SPRING CREEK

GRIMSLEY/MILLER ROAD OVER HWY. 412

HWY. 412 OVER ROBBINS ROAD

HWY. 412 OVER MARCHANT ROAD

HWY. 112 OVER HWY. 412

HWY. 412 OVER BRUSH CREEK AND BRUSH CREEK ROAD

HWY 412 OVER JAVELLO ROAD

LIBERTY ROAD OVER HWY. 412

HWY. 412 OVER OLD HWY. 68

HWY 412 OVER RAMP 4

GRAPHIC SCALE

0 500 1,000 2,000

Feet

Florence & Hutcheson, Inc.

CONSULTING ENGINEERS

PROJECT LOCATION MAP

SPRINGDALE NORTHERN BYPASS
(US 412 RELOCATED)
JOB NO. 001966

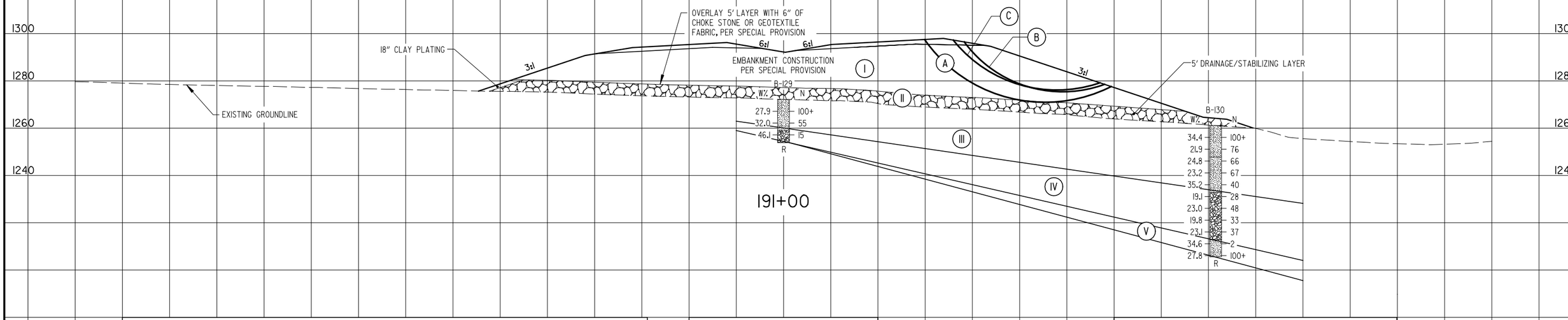
7.5 MINUTE SERIES TOPOGRAPHIC QUADRANGLE
ARKANSAS - BENTON & WASHINGTON COUNTIES

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 34° γ= 110 PCF	c= 0 PSF ϕ= 33° γ= 110 PCF	c= 0 PSF ϕ= 36° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 33° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF

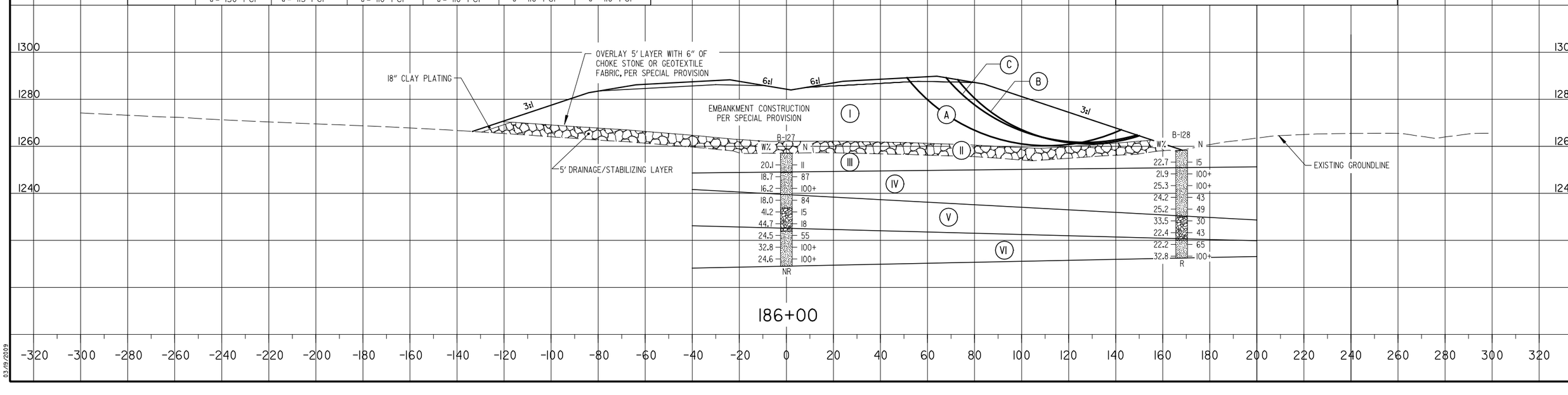
FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.5
Seismic	C	1.9



ASSUMED SOIL STRENGTH PARAMETERS						
Soil	I	II	III	IV	V	VI
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 28° γ= 110 PCF	c= 0 PSF ϕ= 36° γ= 110 PCF	c= 0 PSF ϕ= 32° γ= 110 PCF	c= 0 PSF ϕ=36° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.1
Seismic	C	1.7

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



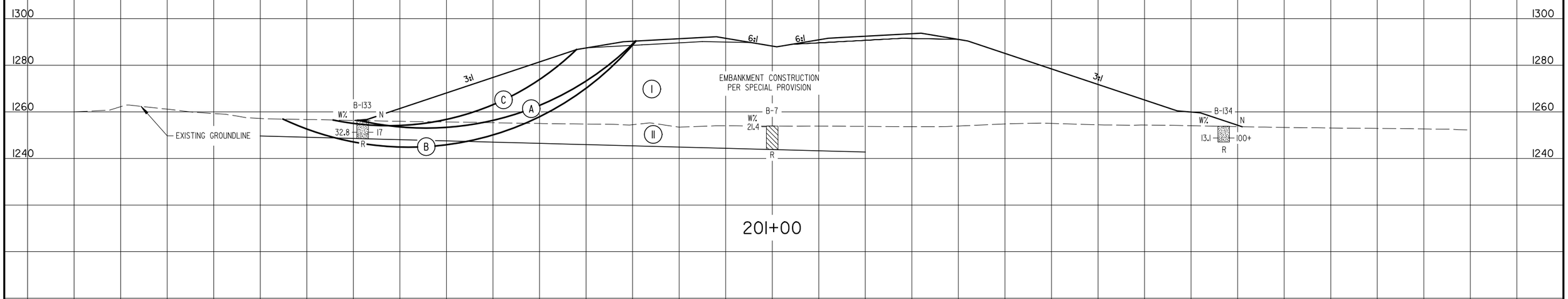
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

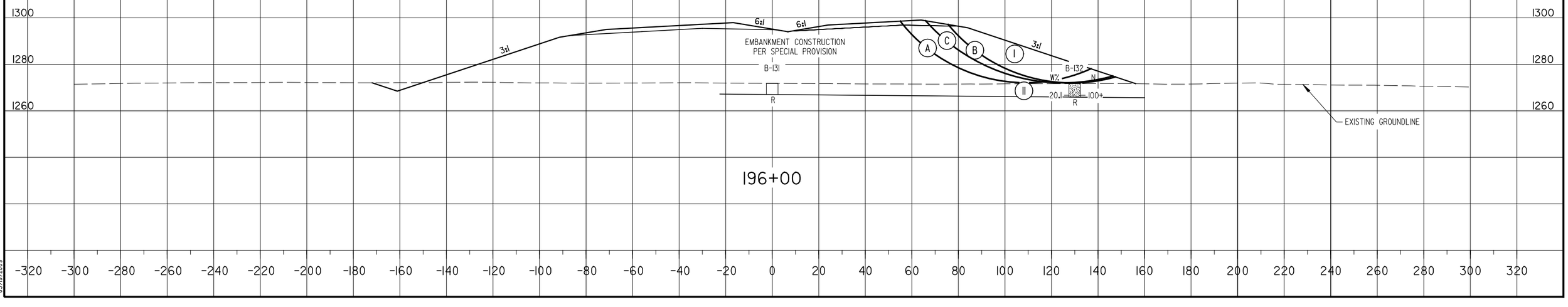
ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.8
Long Term	B	1.9
Seismic	C	1.5



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.2
Seismic	C	1.7



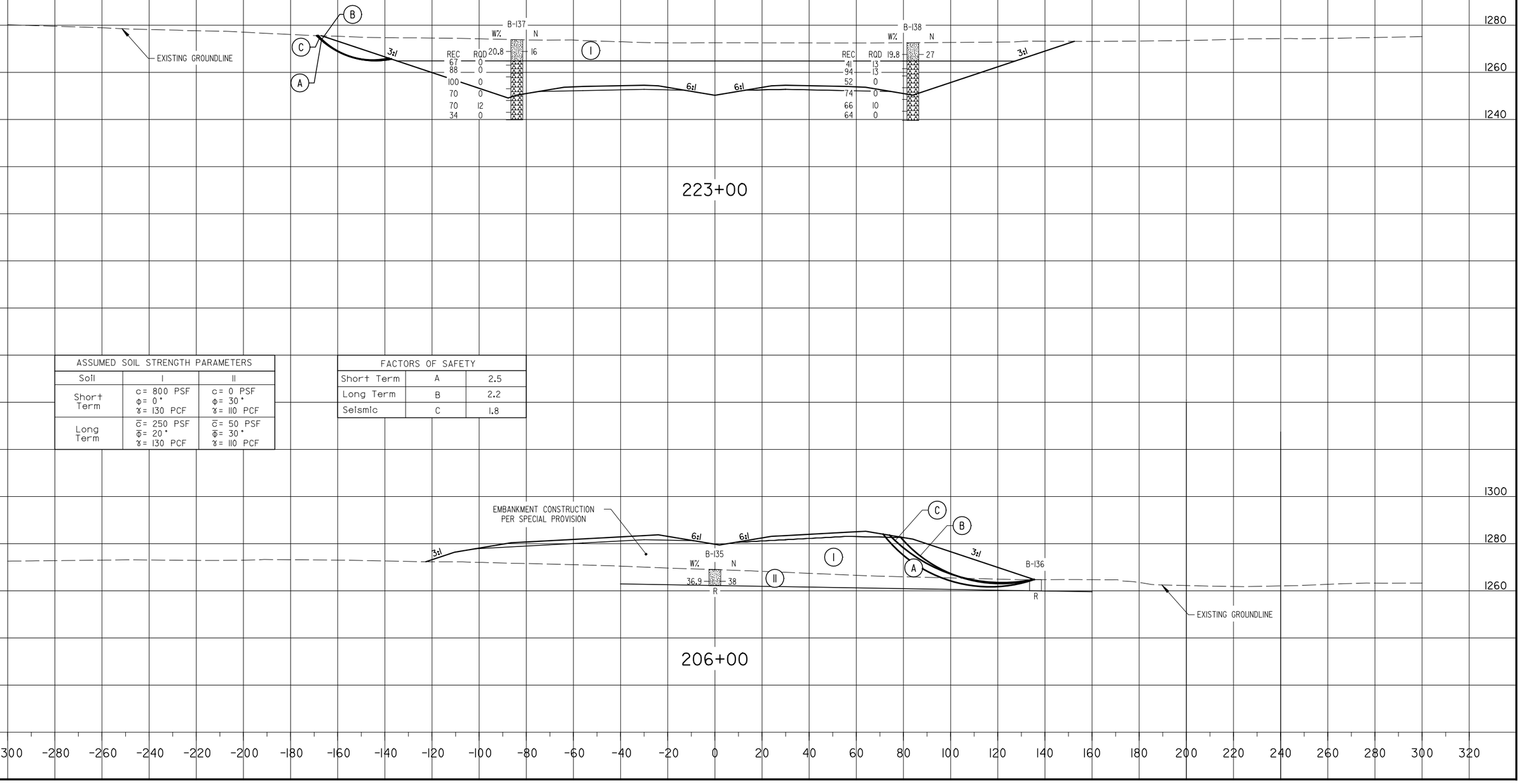
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 0 PSF $\bar{\Phi}$ = 30° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.0
Seismic	C	1.5



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\Phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 30° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.5
Long Term	B	2.2
Seismic	C	1.8

03/19/2009

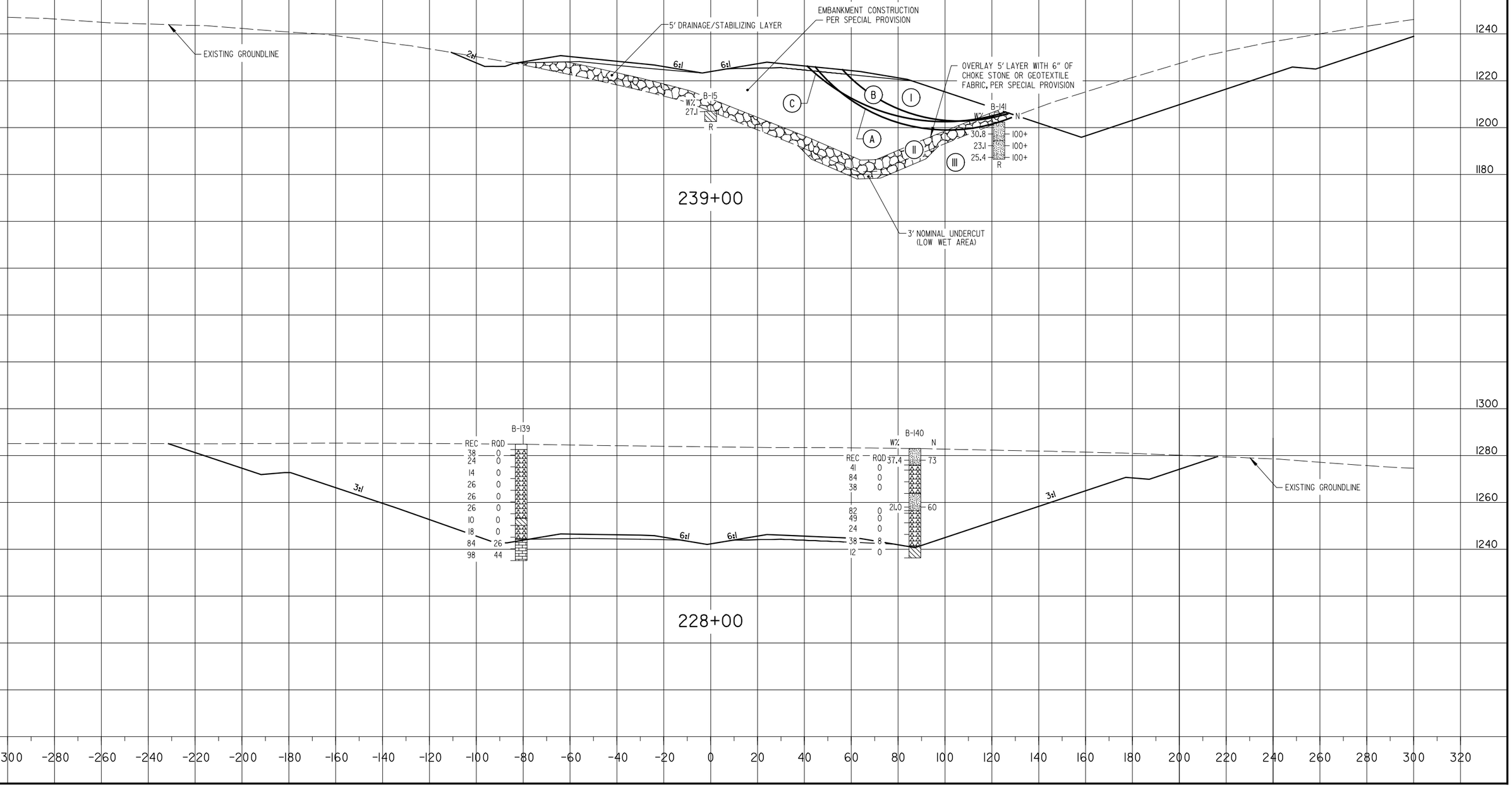
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ=130 PCF	c= 0 PSF ϕ=36° γ=115 PCF	c= 0 PSF ϕ=34° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\phi}$=20° γ=130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$=36° γ=115 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$=34° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.6
Seismic	C	2.0

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



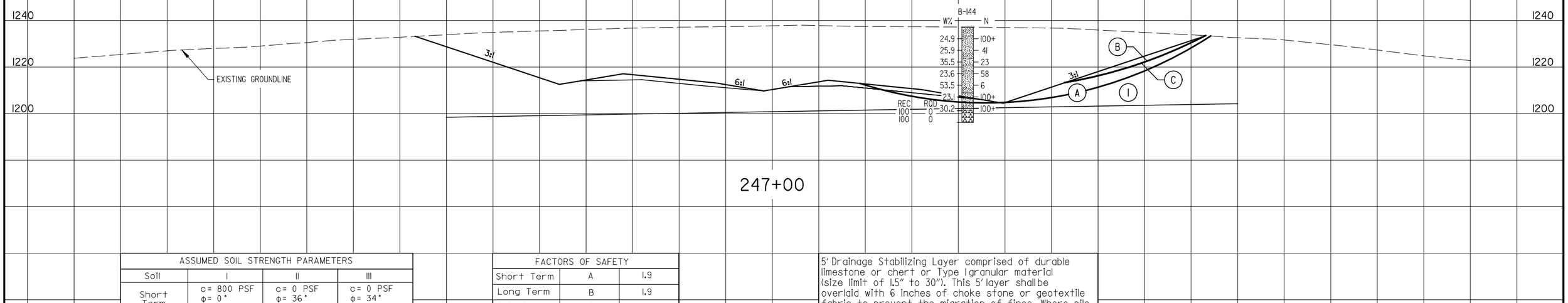
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.9
Long Term	B	2.5
Seismic	C	1.9

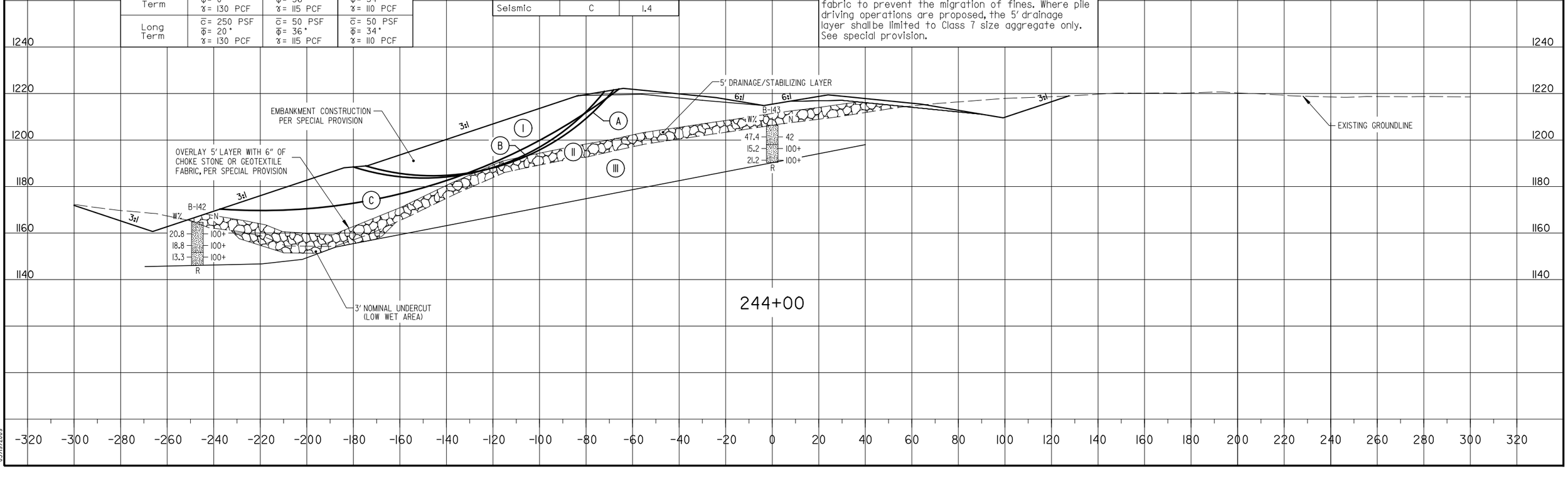


247+00

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.9
Long Term	B	1.9
Seismic	C	1.4

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



244+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

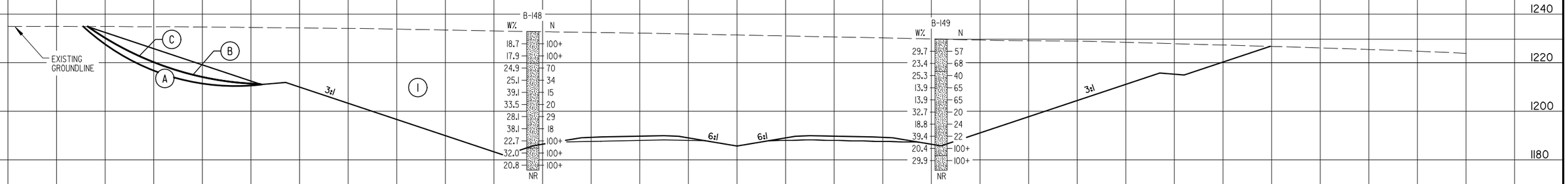
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 34° γ = 110 PCF
Long Term	$\bar{c}$ = 0 PSF $\bar{\Phi}$ = 34° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.5
Long Term	B	2.1
Seismic	C	1.7

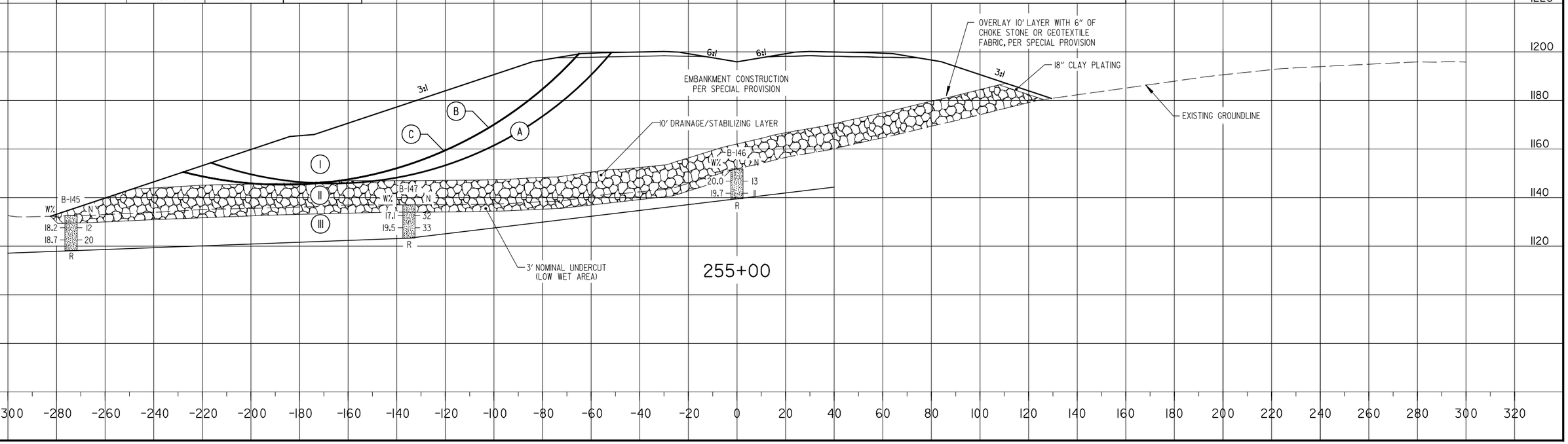


261+00

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 36° γ = 115 PCF	c = 0 PSF Φ = 32° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\Phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 36° γ = 115 PCF	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 32° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.3
Long Term	B	1.8
Seismic	C	1.4

10' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 10' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 10' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



255+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

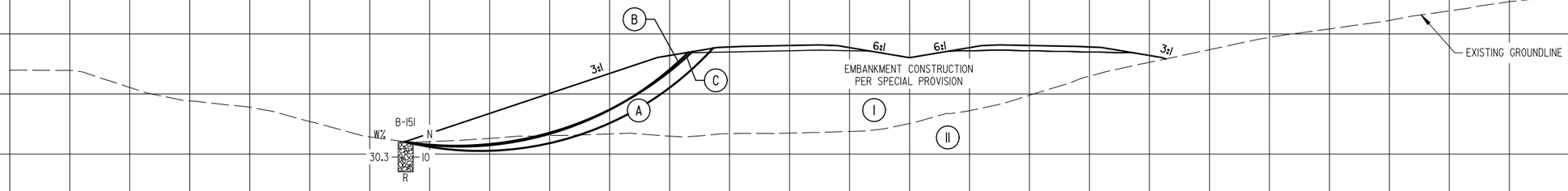
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 28° γ= 110 PCF

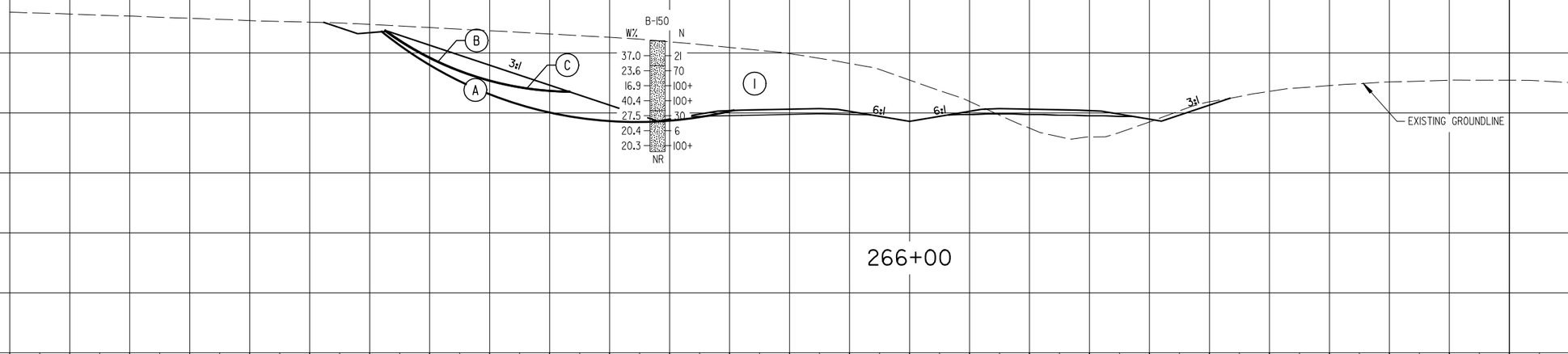
FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	2.0
Seismic	C	1.6



269+00

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.1
Seismic	C	1.7



266+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

03/19/2009

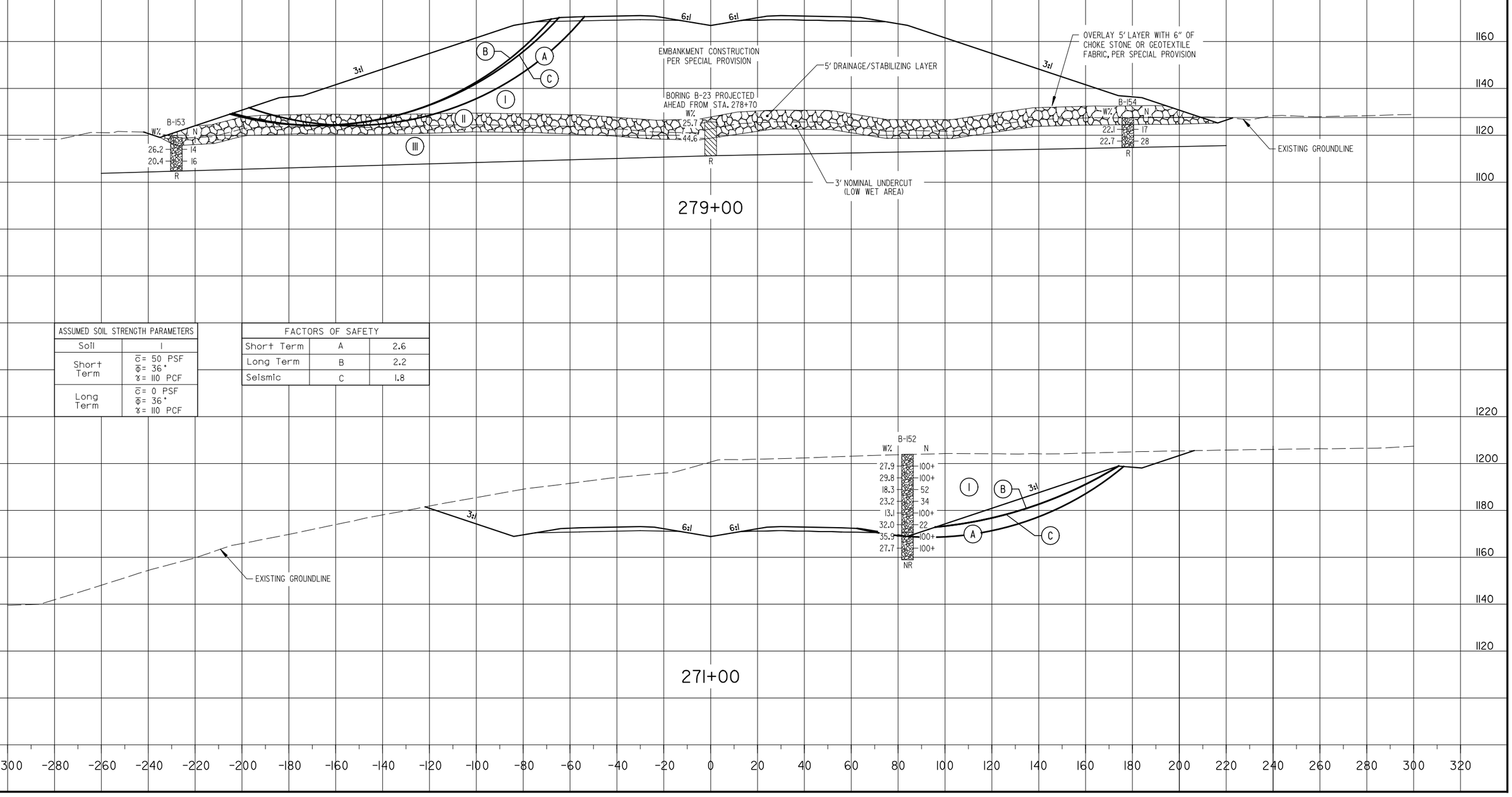
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.9
Seismic	C	1.5

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\phi}$= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.6
Long Term	B	2.2
Seismic	C	1.8

03/19/2009

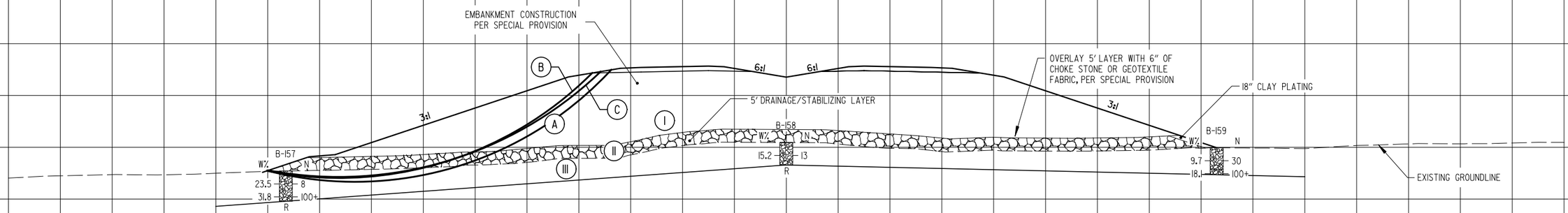
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF φ= 0° γ= 130 PCF	c= 0 PSF φ= 36° γ= 115 PCF	c= 0 PSF φ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 0 PSF $\bar{\phi}$= 36° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\phi}$= 28° γ= 110 PCF

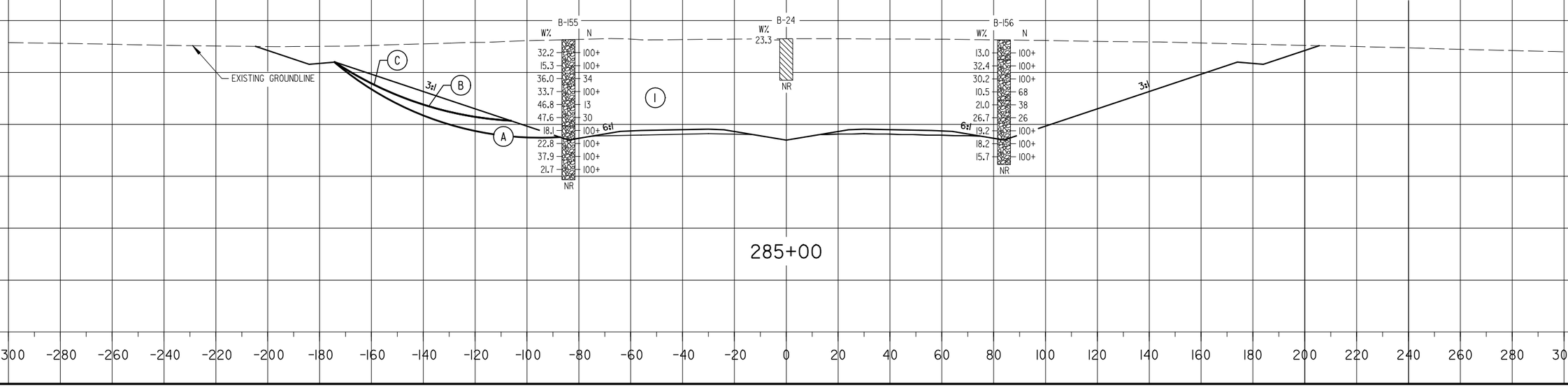
FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.2
Seismic	C	1.7

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\phi}$= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.6
Long Term	B	2.2
Seismic	C	1.8



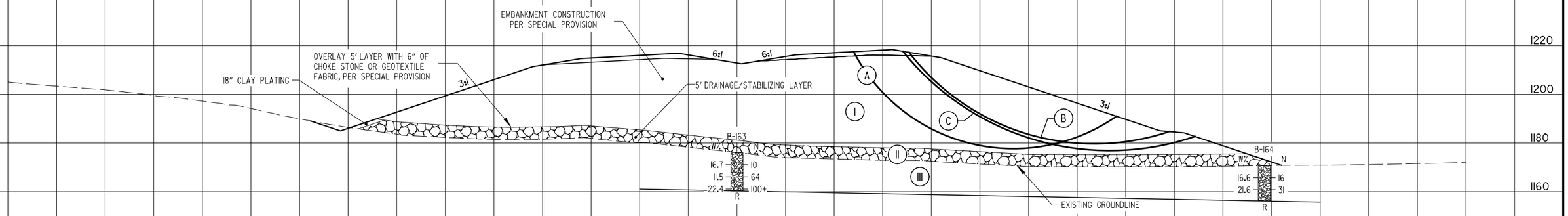
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 115 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.8
Long Term	B	1.9
Seismic	C	1.5

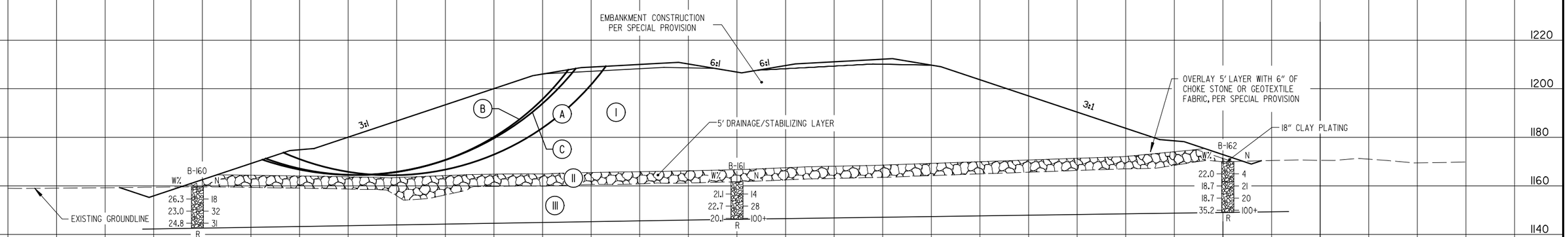


317+00

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 110 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.6
Long Term	B	1.9
Seismic	C	1.5



312+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

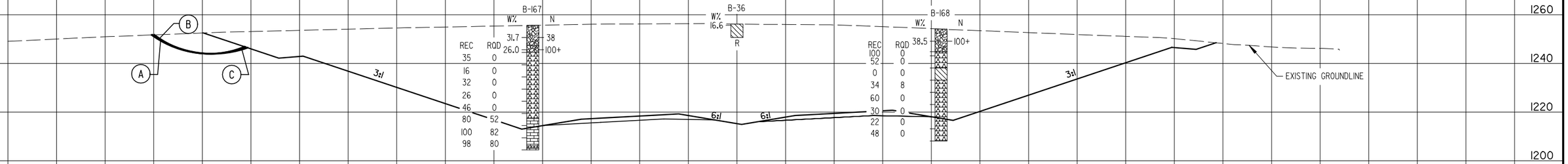
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$=36° γ=110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$=36° γ=110 PCF

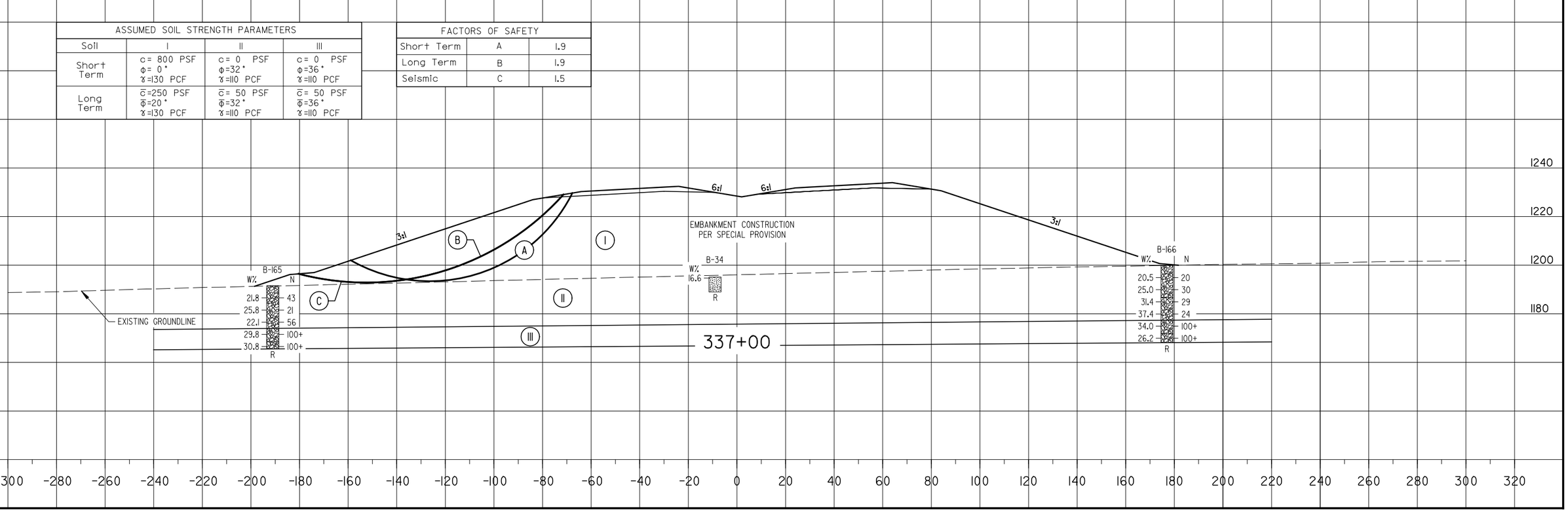
FACTORS OF SAFETY		
Short Term	A	4.9
Long Term	B	4.1
Seismic	C	2.8



347+00

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ=130 PCF	c= 0 PSF Φ=32° γ=110 PCF	c= 0 PSF Φ=36° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$=32° γ=110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$=36° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	1.9
Long Term	B	1.9
Seismic	C	1.5



337+00

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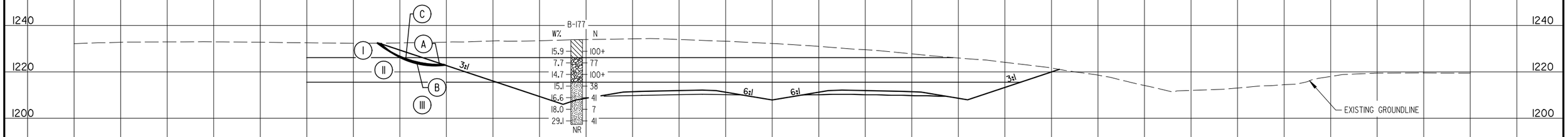
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$= 150 PSF $\bar{\phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 32° γ= 110 PCF
Long Term	$\bar{c}$= 30 PSF $\bar{\phi}$= 28° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\phi}$= 34° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\phi}$= 32° γ= 110 PCF

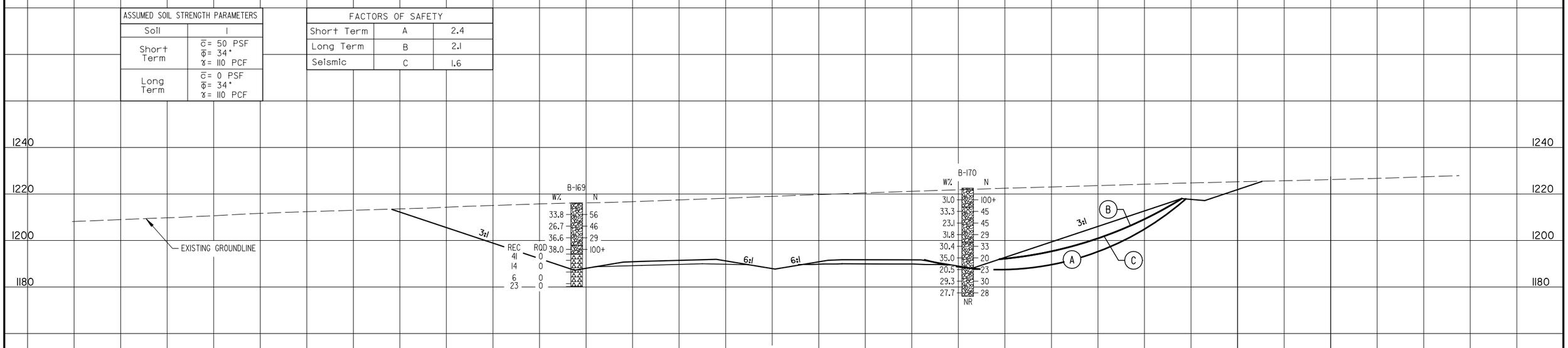
FACTORS OF SAFETY		
Short Term	A	1.9
Long Term	B	1.4
Seismic	C	1.1



400+00

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.1
Seismic	C	1.6



364+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

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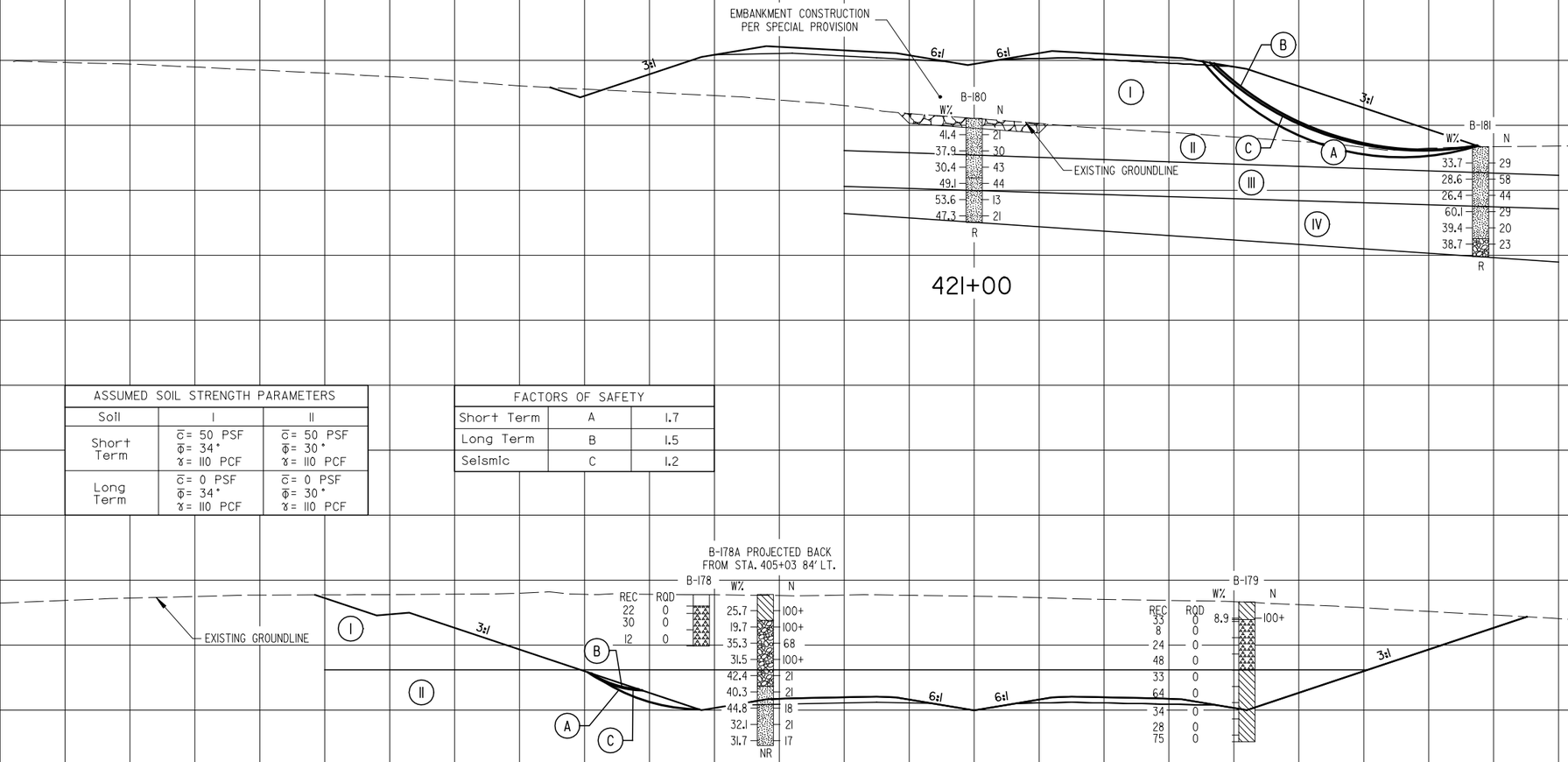
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

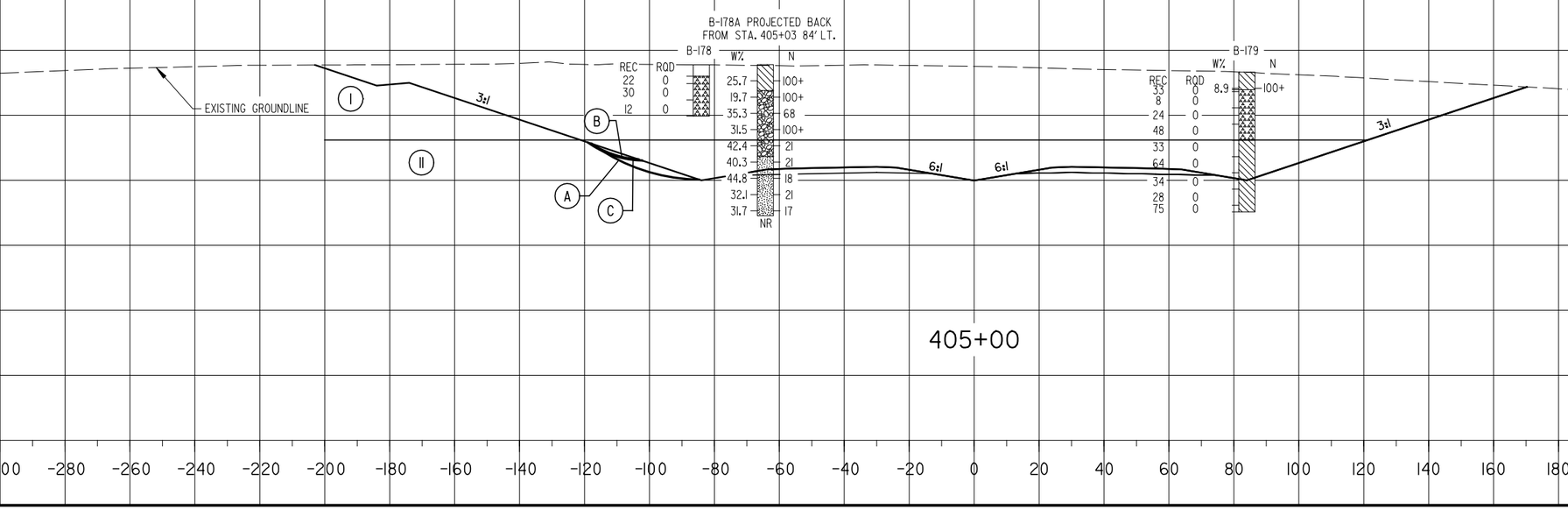
ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.2
Seismic	C	1.8



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c̄= 50 PSF Φ̄= 34° γ= 110 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF
Long Term	c̄= 0 PSF Φ̄= 34° γ= 110 PCF	c̄= 0 PSF Φ̄= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	1.5
Seismic	C	1.2



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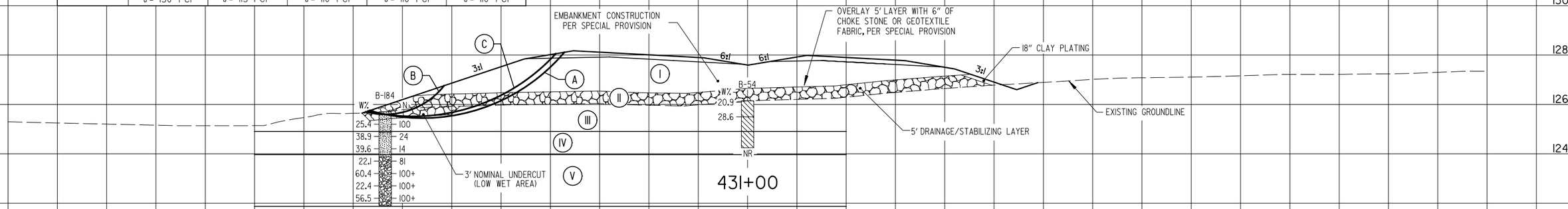
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 36° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 110 PCF

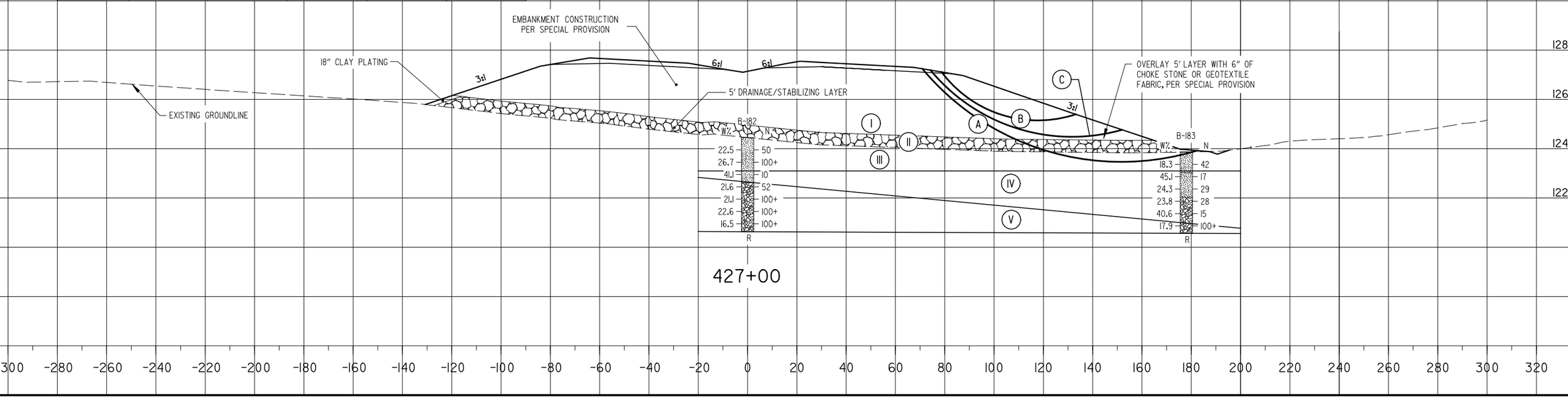
FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.3
Seismic	C	2.0



5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shallbe limited to Class 7 size aggregate only. See special provision.

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 36° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	2.5
Seismic	C	1.7



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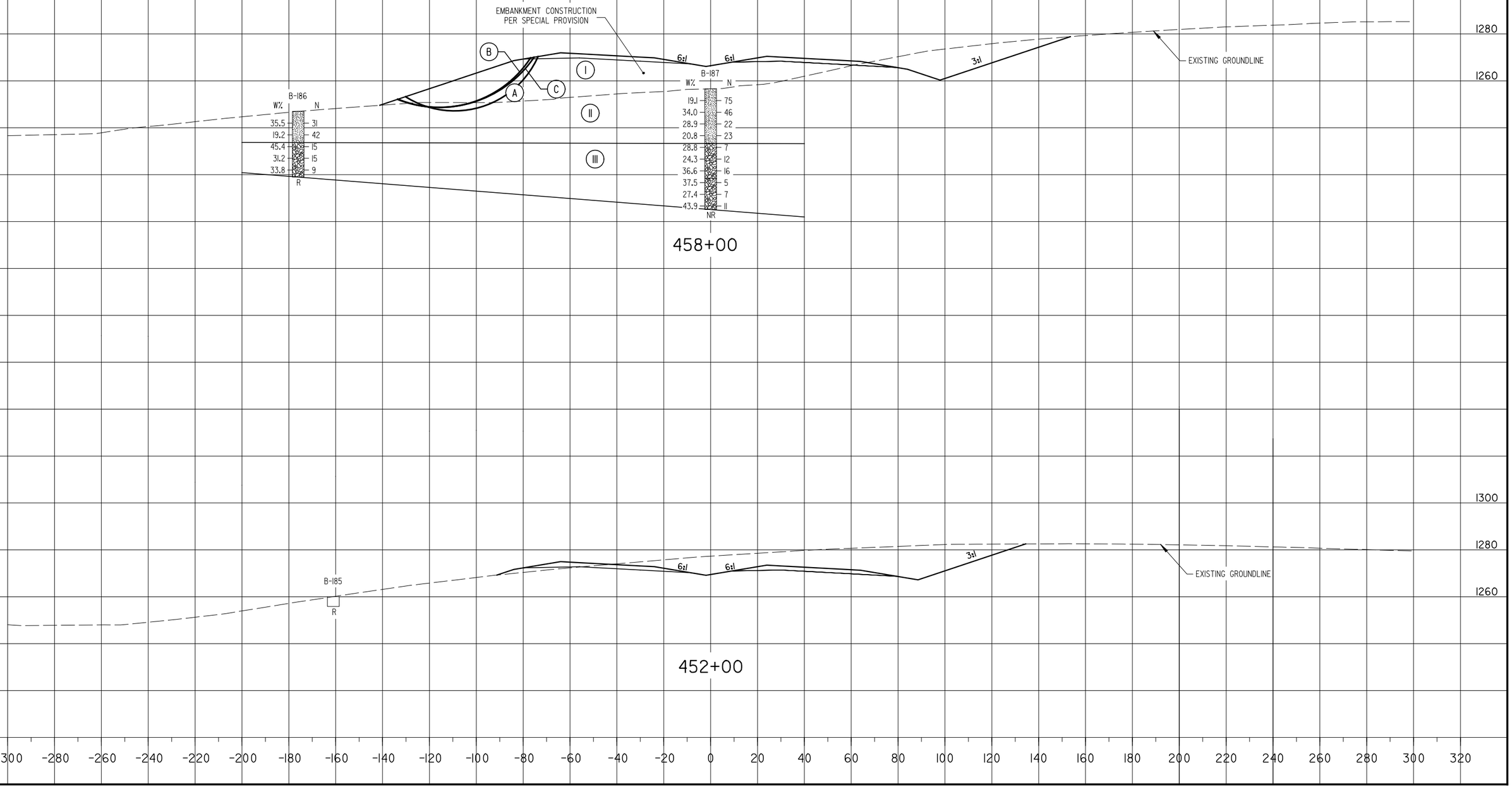
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	1.7
Seismic	C	1.5



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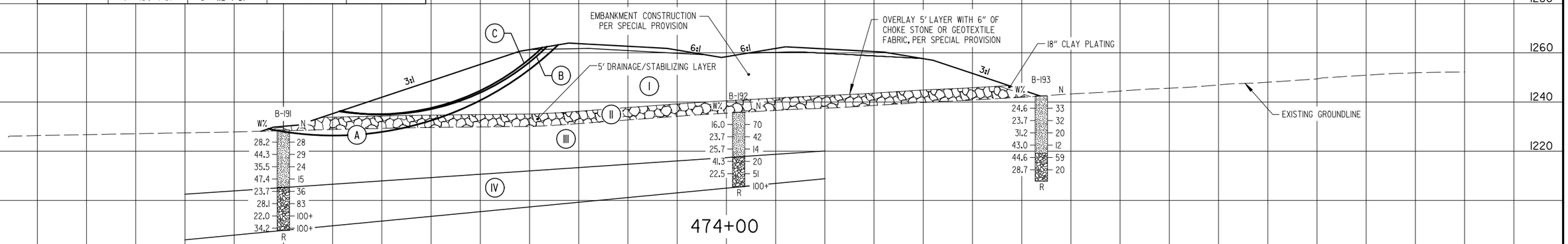
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 115 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 34° γ= 110 PCF

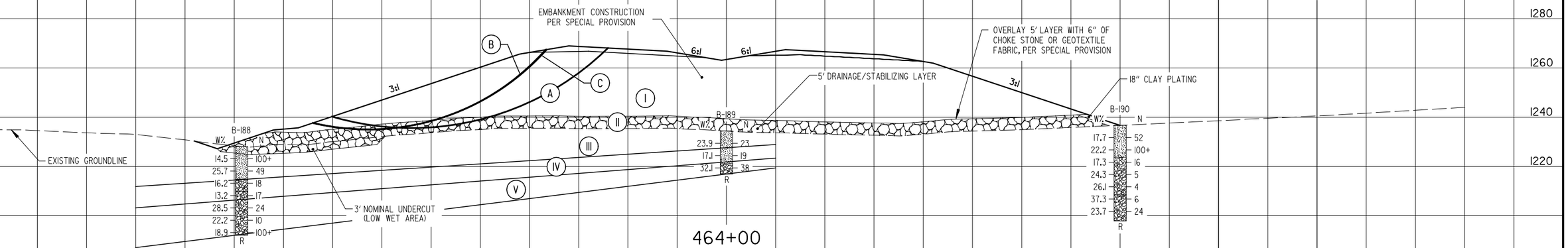
FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	2.1
Seismic	C	1.7



5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.

ASSUMED SOIL STRENGTH PARAMETERS					
Soil	I	II	III	IV	V
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 115 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.1
Seismic	C	1.6



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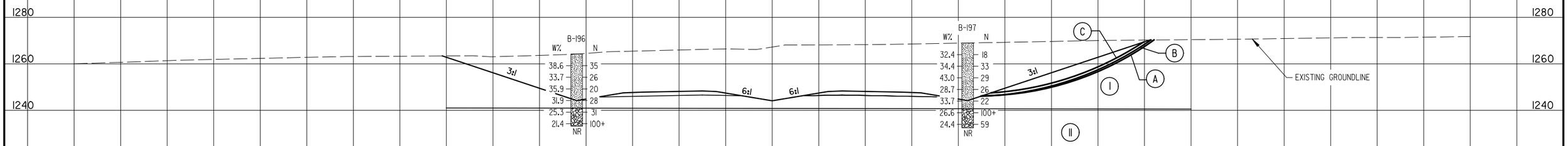
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 36° γ= 110 PCF

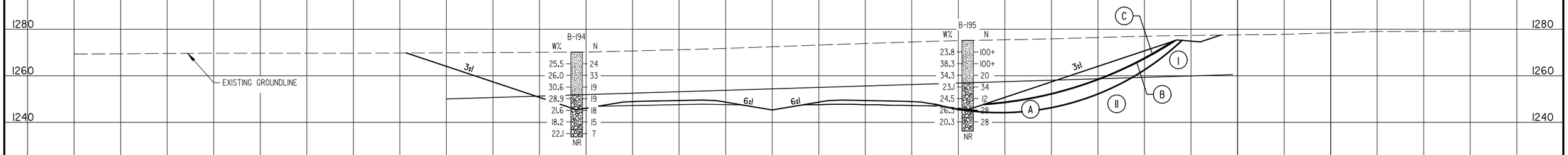
FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.0
Seismic	C	1.6



502+00

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	1.8
Seismic	C	1.4



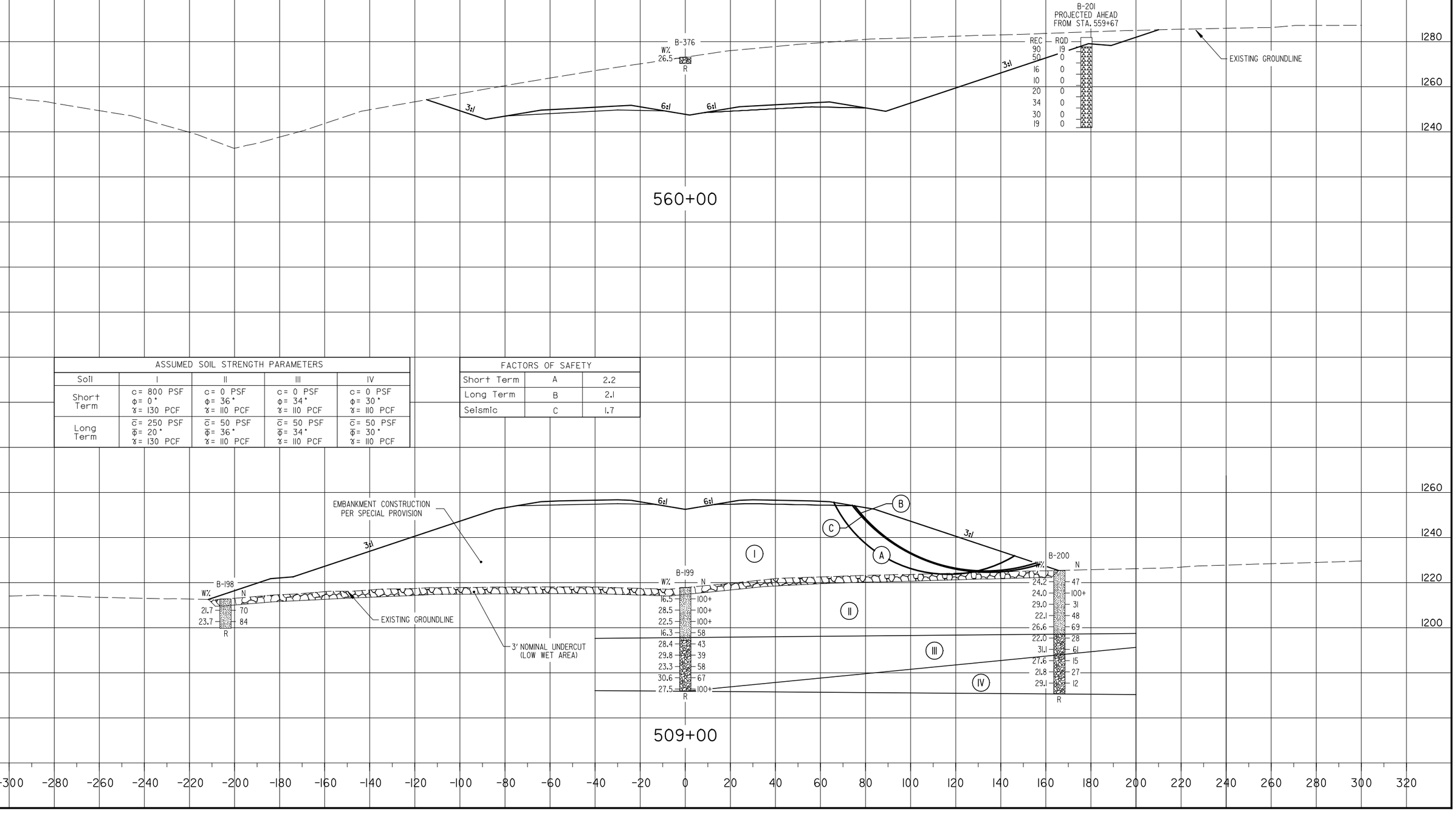
487+00

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +



ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 36° γ= 110 PCF	c= 0 PSF ϕ= 34° γ= 110 PCF	c= 0 PSF ϕ= 30° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 36° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.2
Long Term	B	2.1
Seismic	C	1.7

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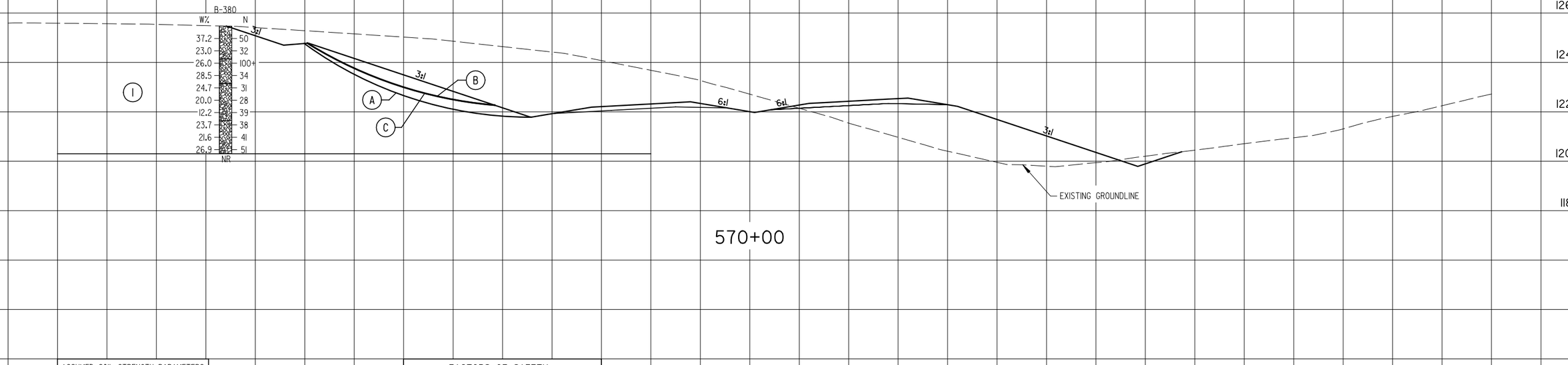
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

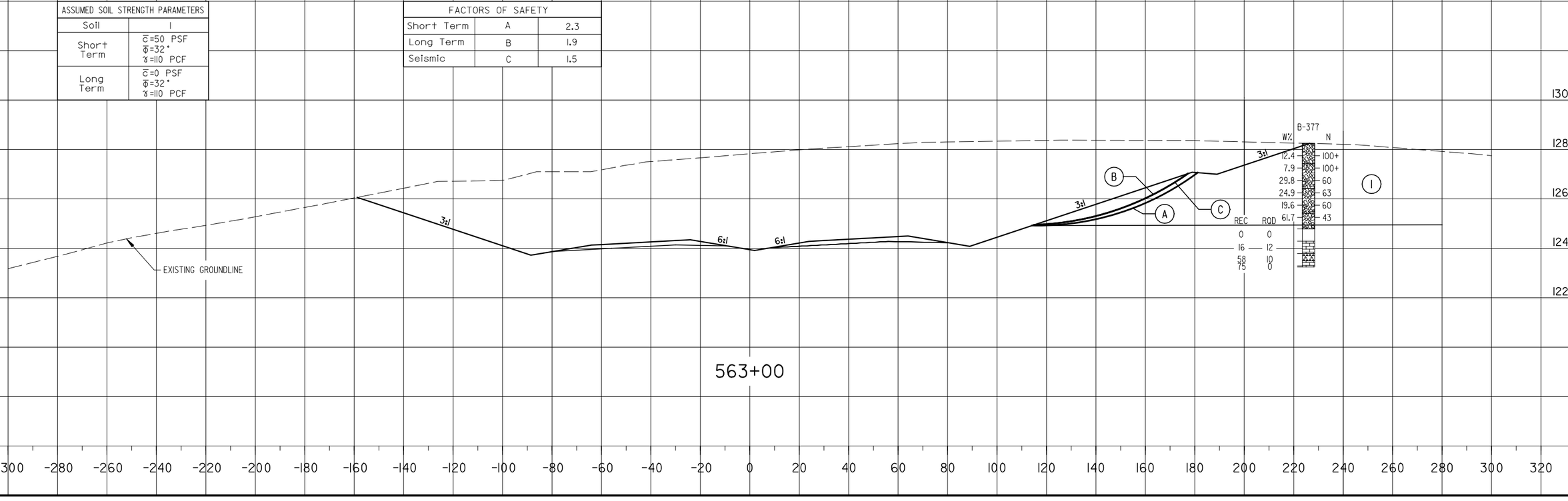
ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$=50 PSF $\bar{\Phi}$=32° γ=110 PCF
Long Term	$\bar{c}$=0 PSF $\bar{\Phi}$=32° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.2
Long Term	B	1.9
Seismic	C	1.5



ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$=50 PSF $\bar{\Phi}$=32° γ=110 PCF
Long Term	$\bar{c}$=0 PSF $\bar{\Phi}$=32° γ=110 PCF

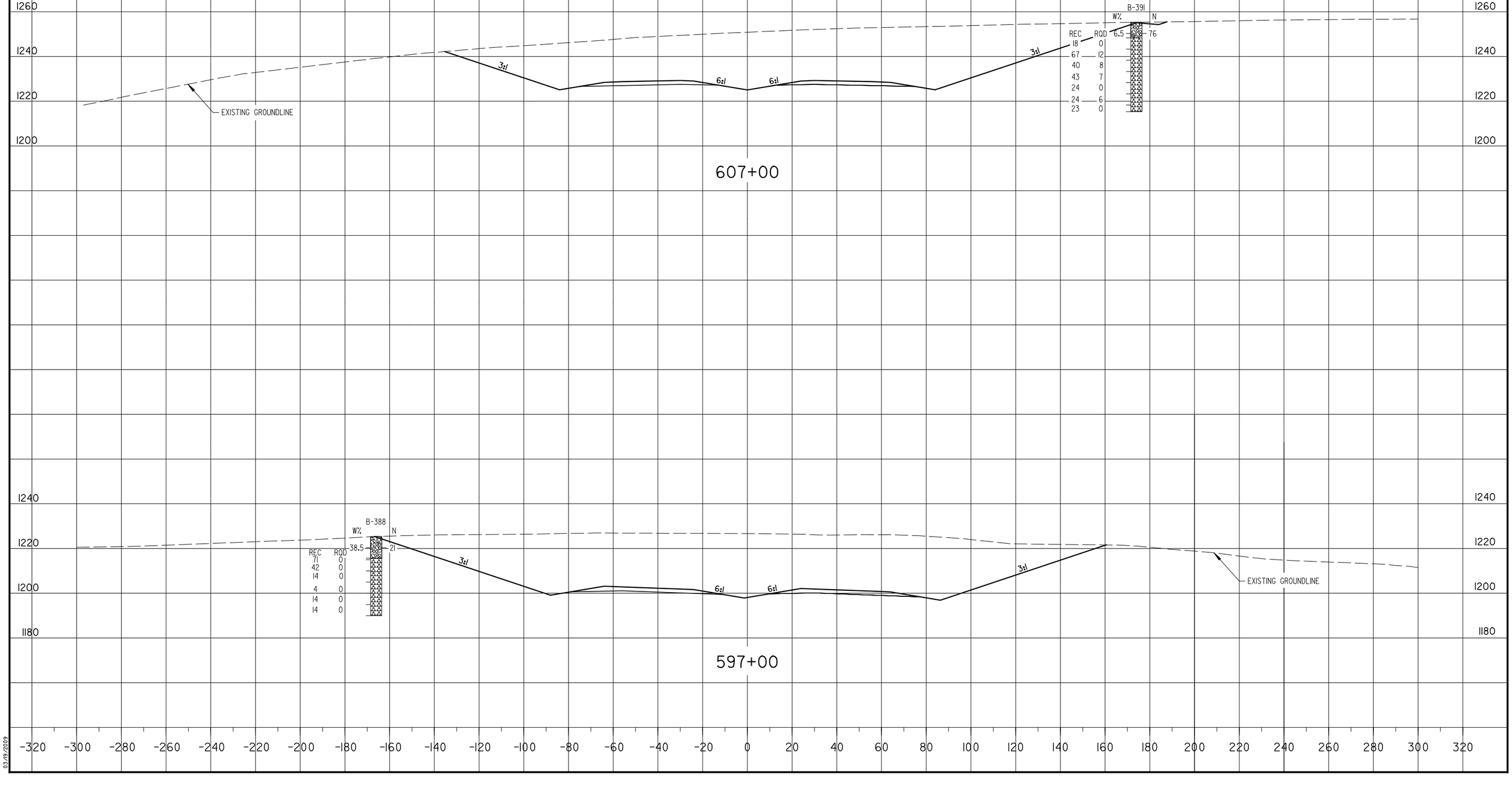
FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	1.9
Seismic	C	1.5



03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +



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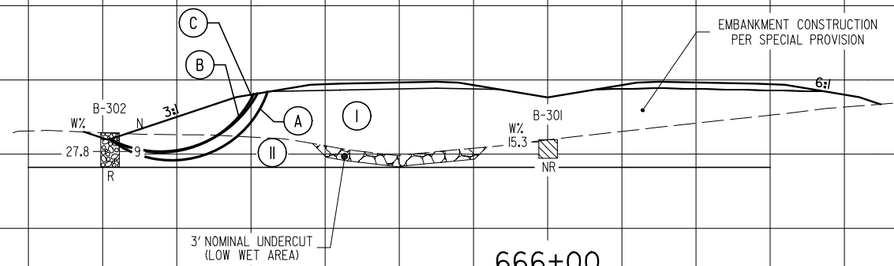
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

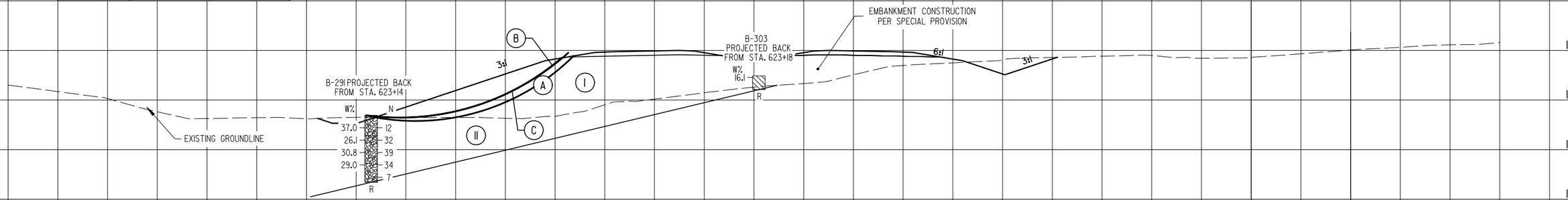
ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	3.9
Long Term	B	3.0
Seismic	C	2.3



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF ϕ= 0° γ= 130 PCF	c= 0 PSF ϕ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.2
Seismic	C	1.8



1300 1280 1260 1240 1220 1200

-320 -300 -280 -260 -240 -220 -200 -180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

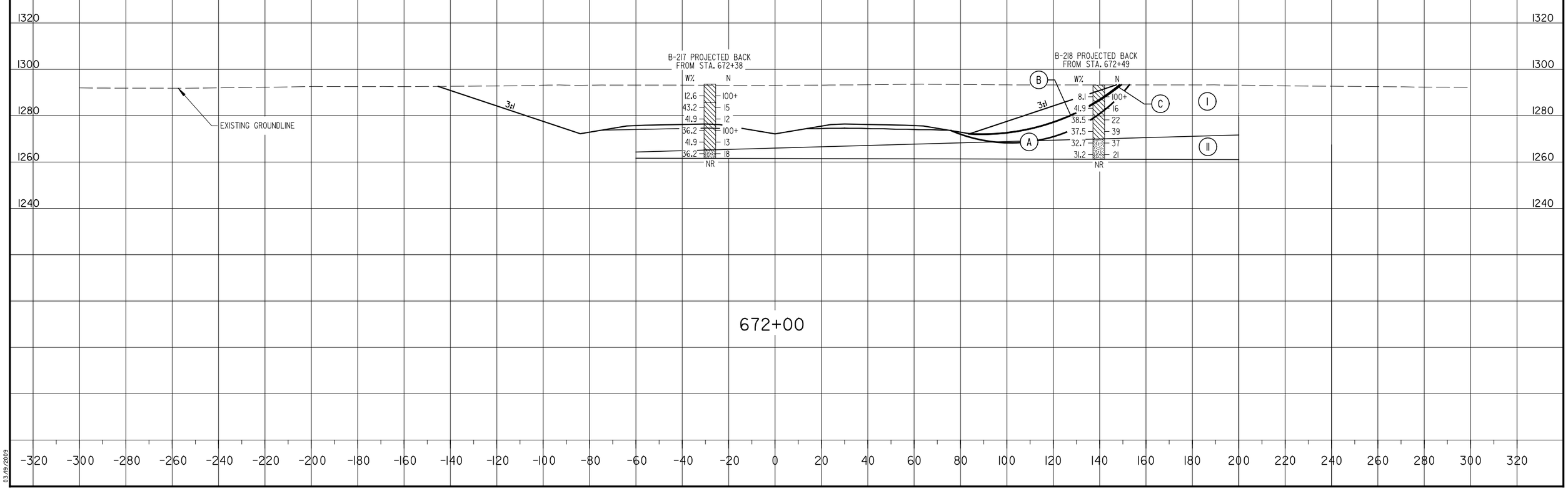
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 150 PSF $\bar{\Phi}$= 28° γ= 120 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF
Long Term	$\bar{c}$= 30 PSF $\bar{\Phi}$= 28° γ= 120 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 30° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.5
Long Term	B	1.9
Seismic	C	1.5



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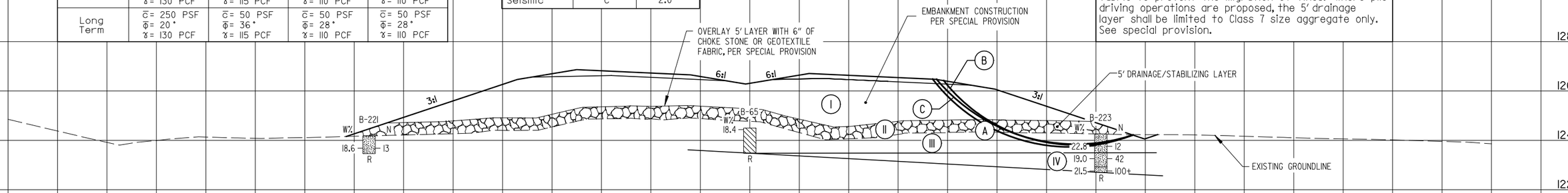
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 115 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.8
Long Term	B	2.6
Seismic	C	2.0

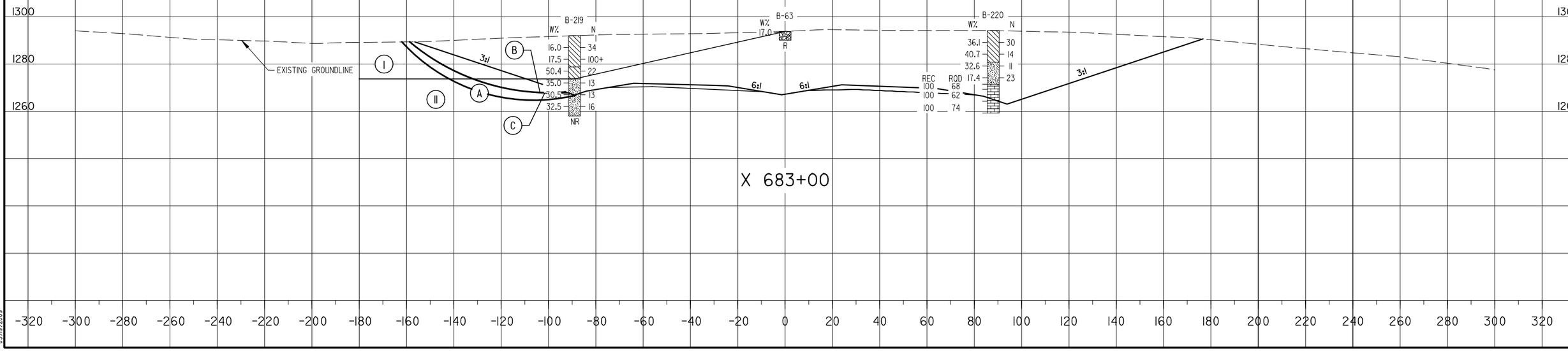
5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



X 691+00

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c̄= 175 PSF Φ̄= 28° γ= 120 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF
Long Term	c̄= 35 PSF Φ̄= 28° γ= 120 PCF	c̄= 0 PSF Φ̄= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.2
Long Term	B	1.8
Seismic	C	1.4



X 683+00

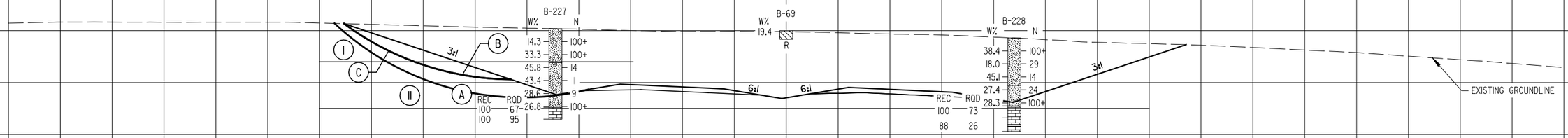
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.6
Seismic	C	1.3

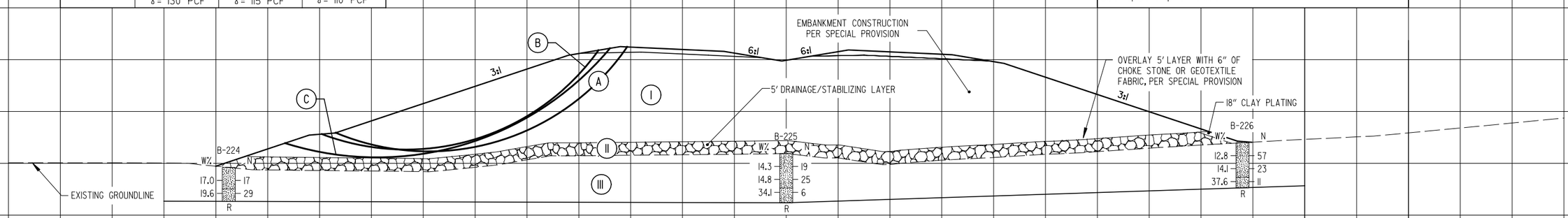


X 713+00

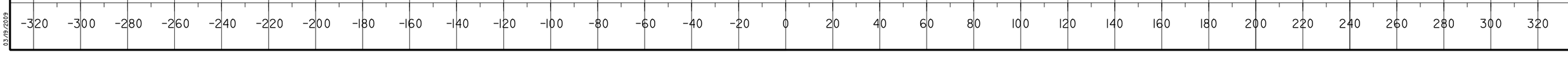
ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 36° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	1.9
Seismic	C	1.5

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



X 701+00



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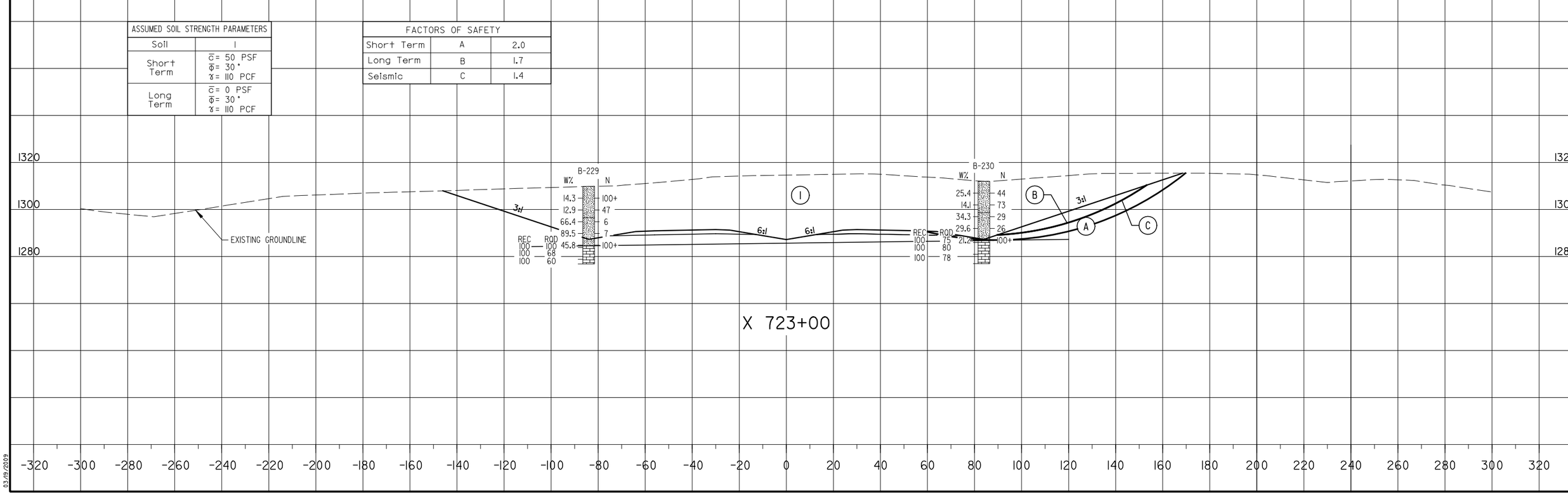
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 0 PSF $\bar{\Phi}$ = 30° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.7
Seismic	C	1.4



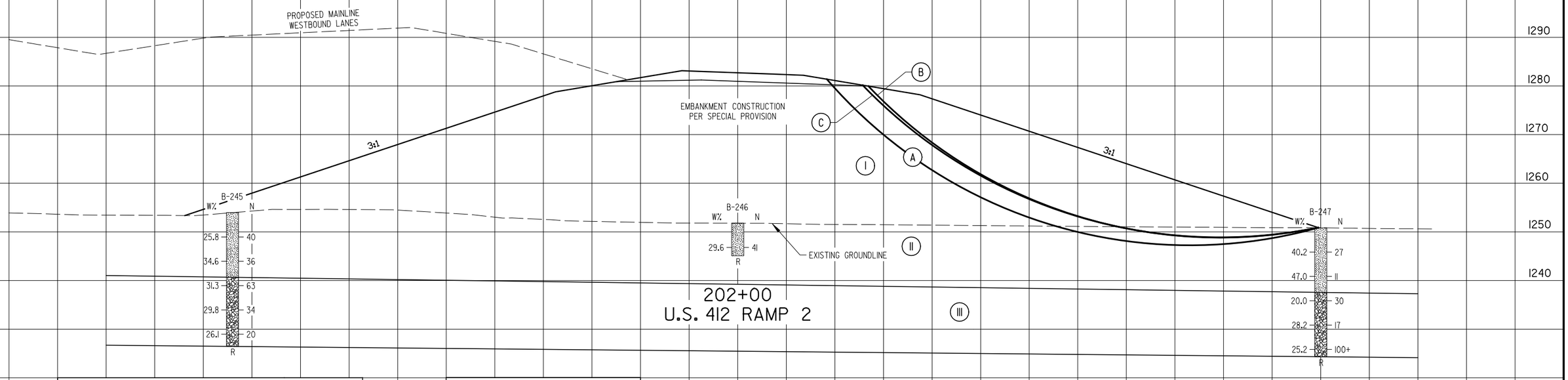
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF	c̄= 50 PSF Φ̄= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.0
Seismic	C	1.6

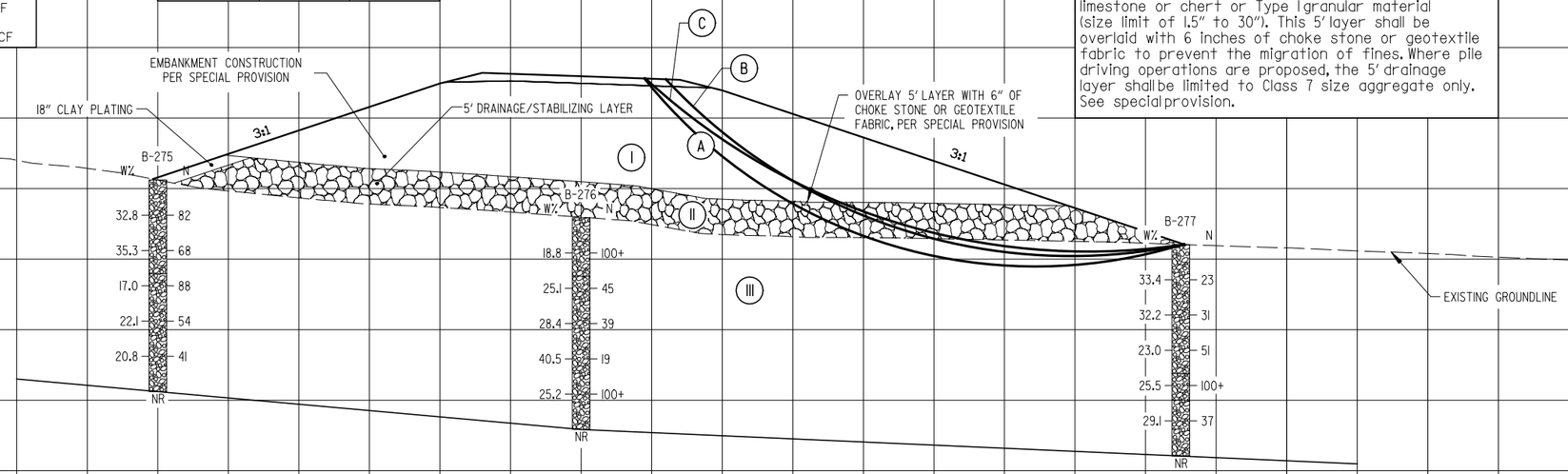


202+00
U.S. 412 RAMP 2

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 115 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 0 PSF Φ̄= 36° γ= 115 PCF	c̄= 0 PSF Φ̄= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.5
Seismic	C	2.0

5' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 5' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 5' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



33+00
MUSTEEN RD.

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

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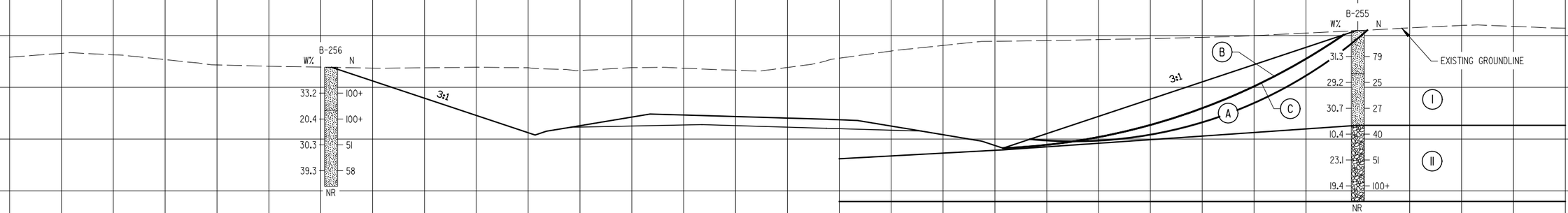
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$=32° γ=110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$=34° γ=110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$=32° γ=110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$=34° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	1.9
Seismic	C	1.5



179+00
U.S. 412 RAMP 4

1290 1280 1270 1260 1250 1240

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

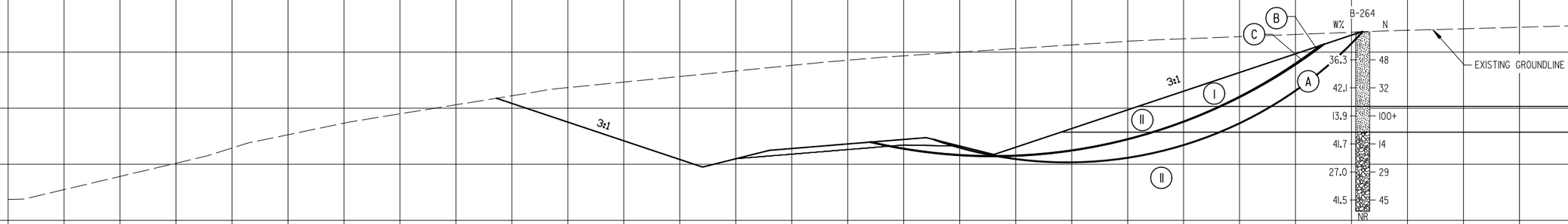
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF

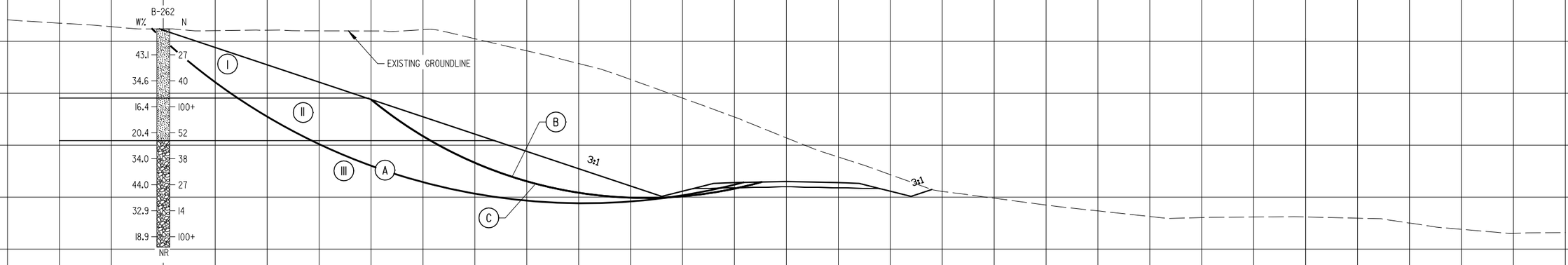
FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	1.8
Seismic	C	1.4



30+00
JAVELLO RD.

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.8
Seismic	C	1.4



25+00
JAVELLO RD.

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

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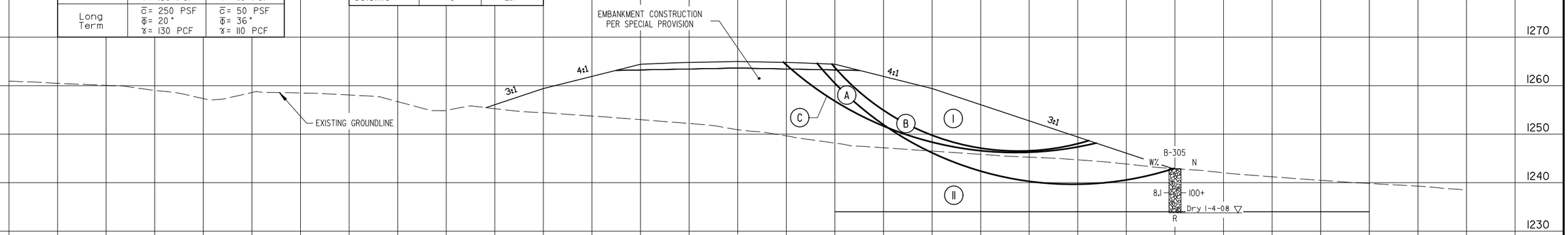
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 36° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 36° γ= 110 PCF

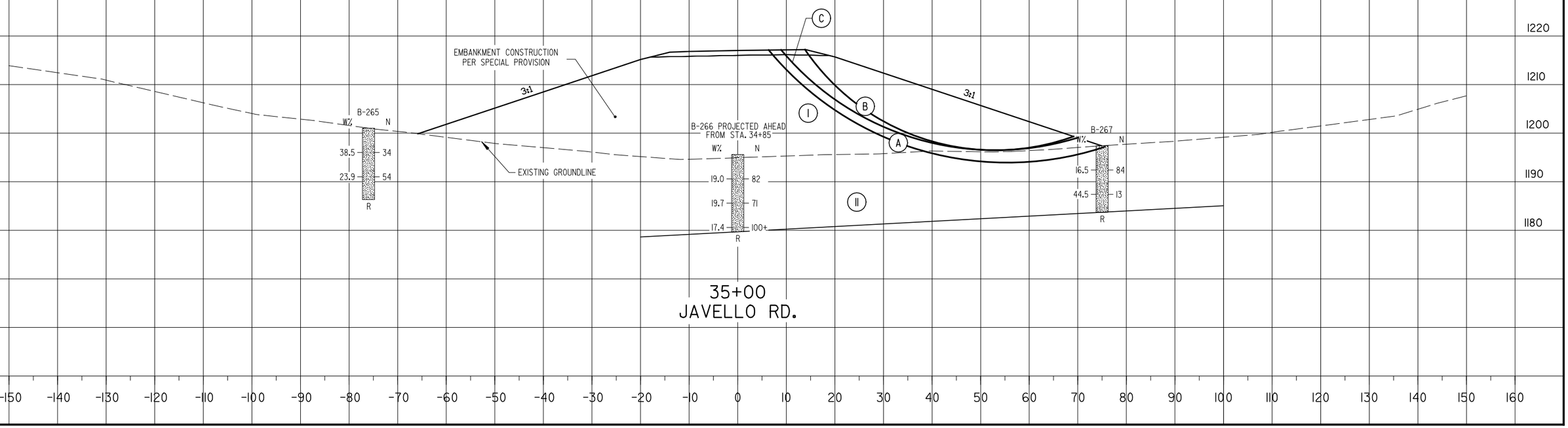
FACTORS OF SAFETY		
Short Term	A	3.0
Long Term	B	2.8
Seismic	C	2.1



19+00
HIGHWAY 112

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.6
Long Term	B	2.4
Seismic	C	1.9



35+00
JAVELLO RD.

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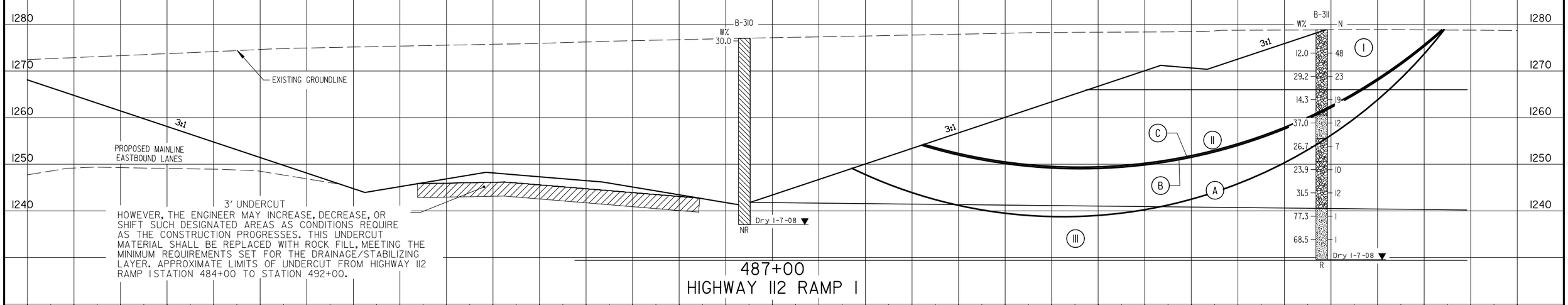
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

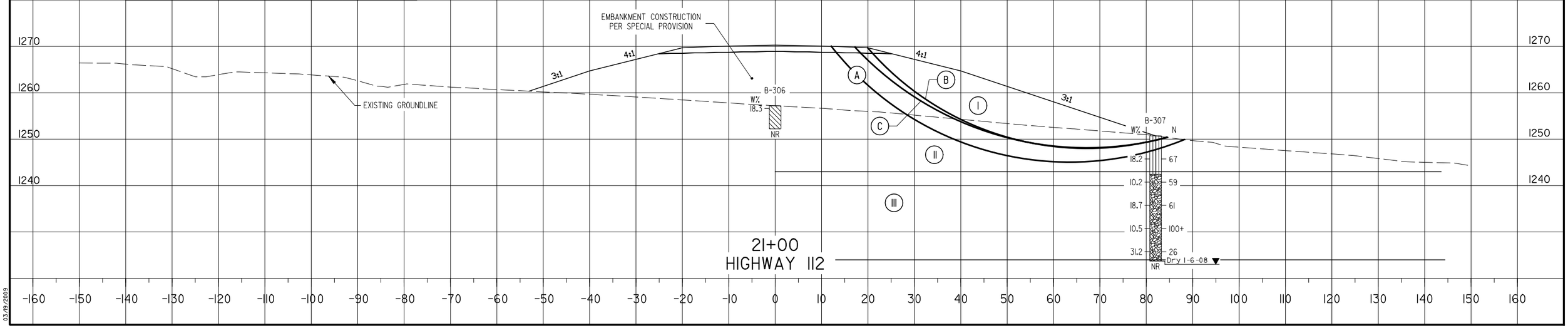
ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$ 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 26° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 26° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.7
Seismic	C	1.3



ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 26° γ= 115 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 26° γ= 115 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	2.1
Seismic	C	1.7



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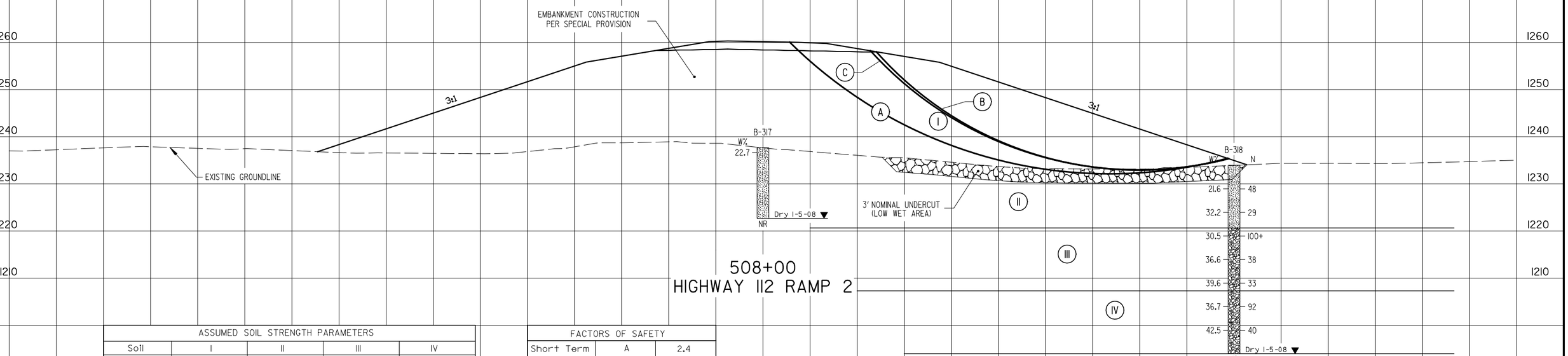
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF

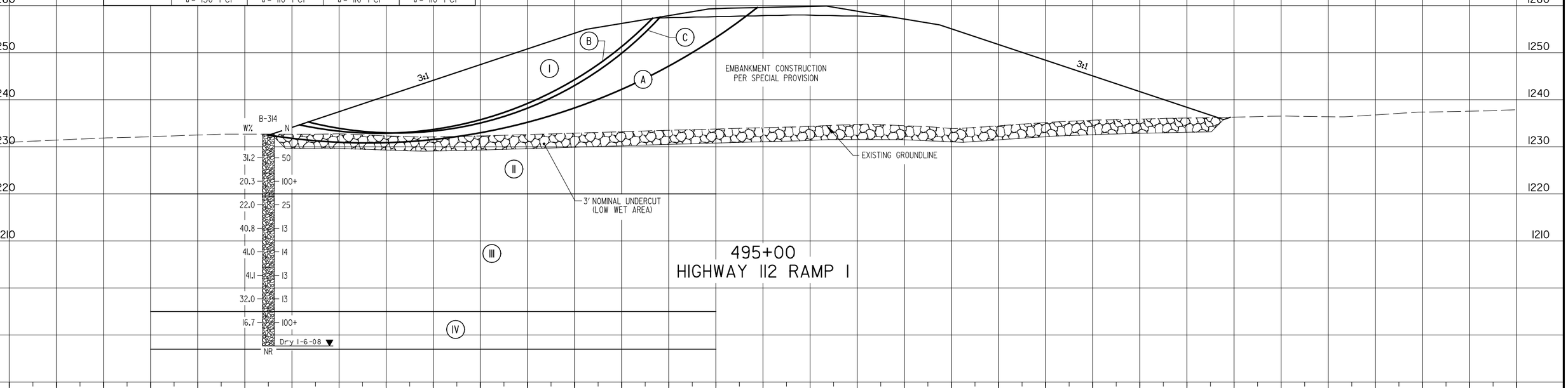
FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.9
Seismic	C	1.5



508+00
HIGHWAY 112 RAMP 2

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 34° γ= 110 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 34° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 30° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.4
Long Term	B	2.2
Seismic	C	1.8



495+00
HIGHWAY 112 RAMP 1

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

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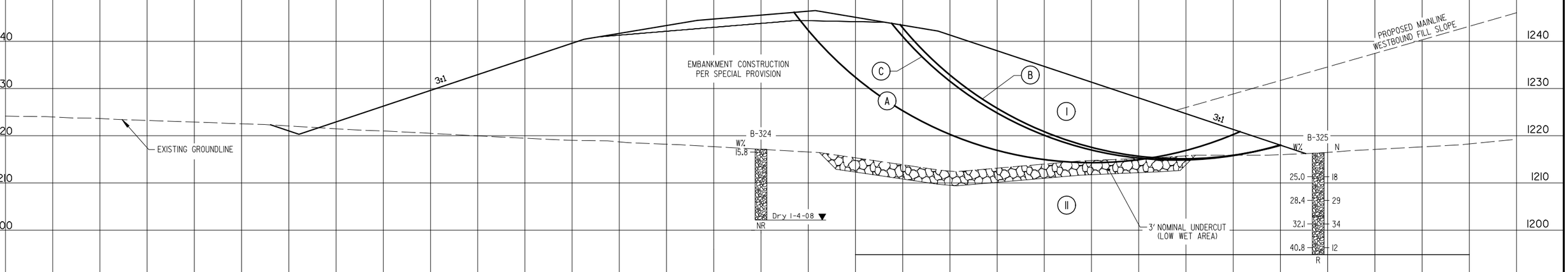
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF

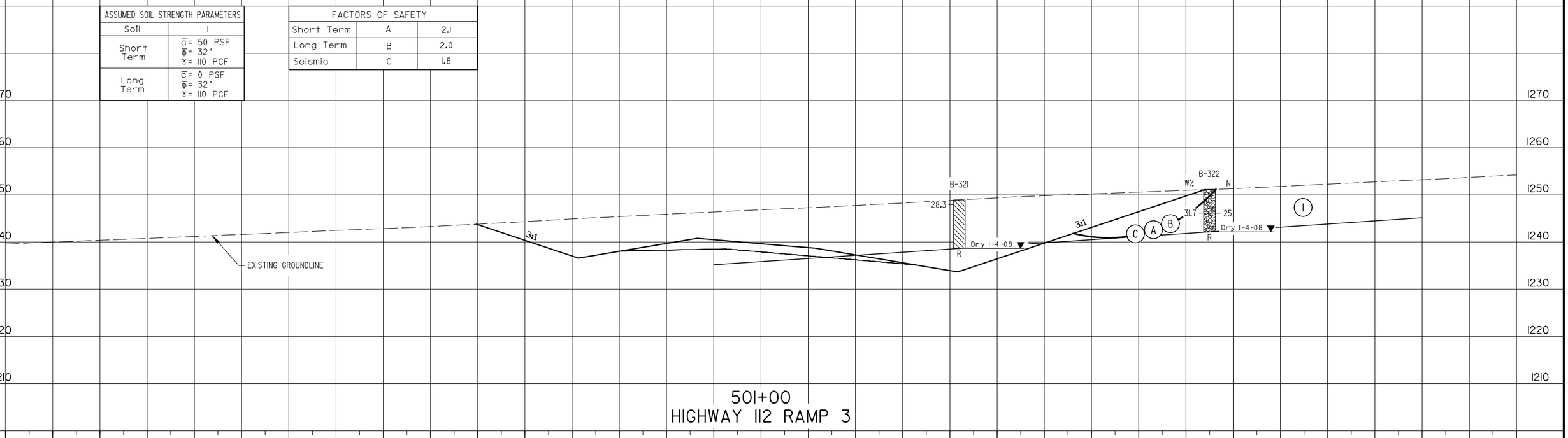
FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.0
Seismic	C	1.6



509+00
HIGHWAY 112 RAMP 3

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.0
Seismic	C	1.8



501+00
HIGHWAY 112 RAMP 3

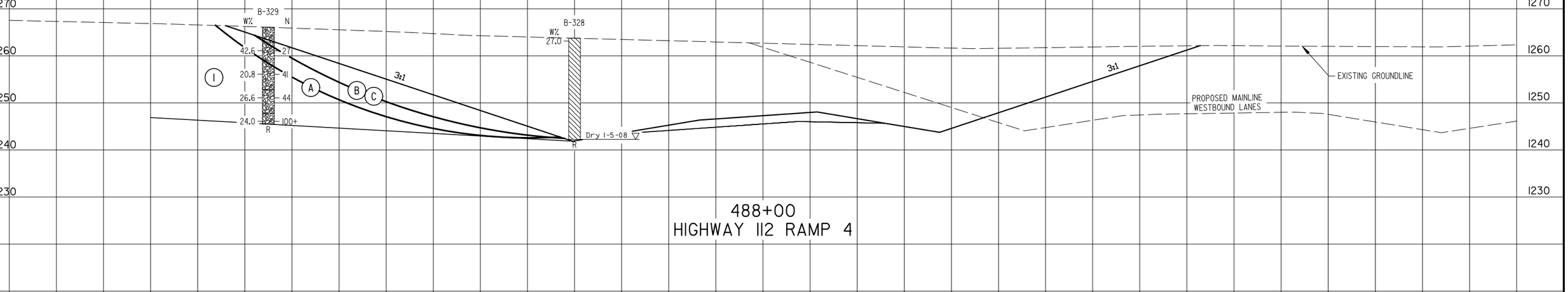
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	I
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 32° γ= 110 PCF

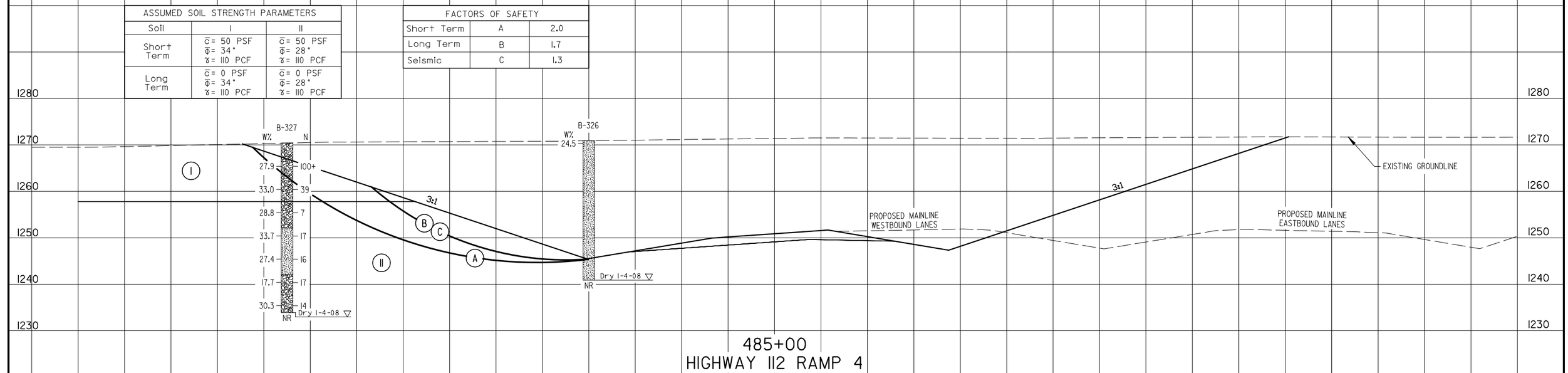
FACTORS OF SAFETY		
Short Term	A	2.3
Long Term	B	1.9
Seismic	C	1.5



488+00
HIGHWAY 112 RAMP 4

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$= 50 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF
Long Term	$\bar{c}$= 0 PSF $\bar{\Phi}$= 34° γ= 110 PCF	$\bar{c}$= 0 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	1.7
Seismic	C	1.3



485+00
HIGHWAY 112 RAMP 4

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

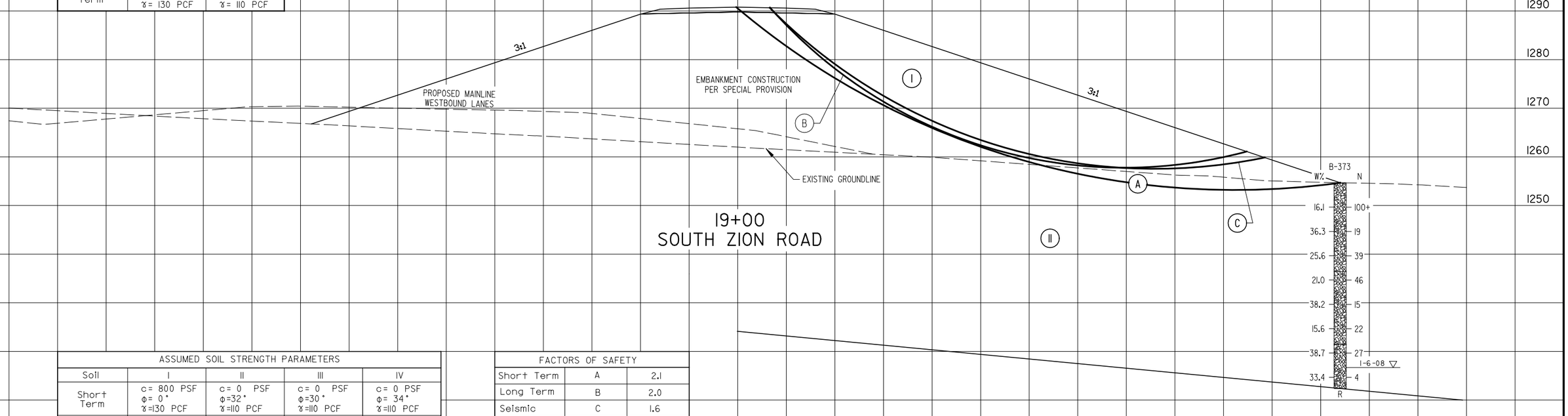
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	2.0
Seismic	C	1.5

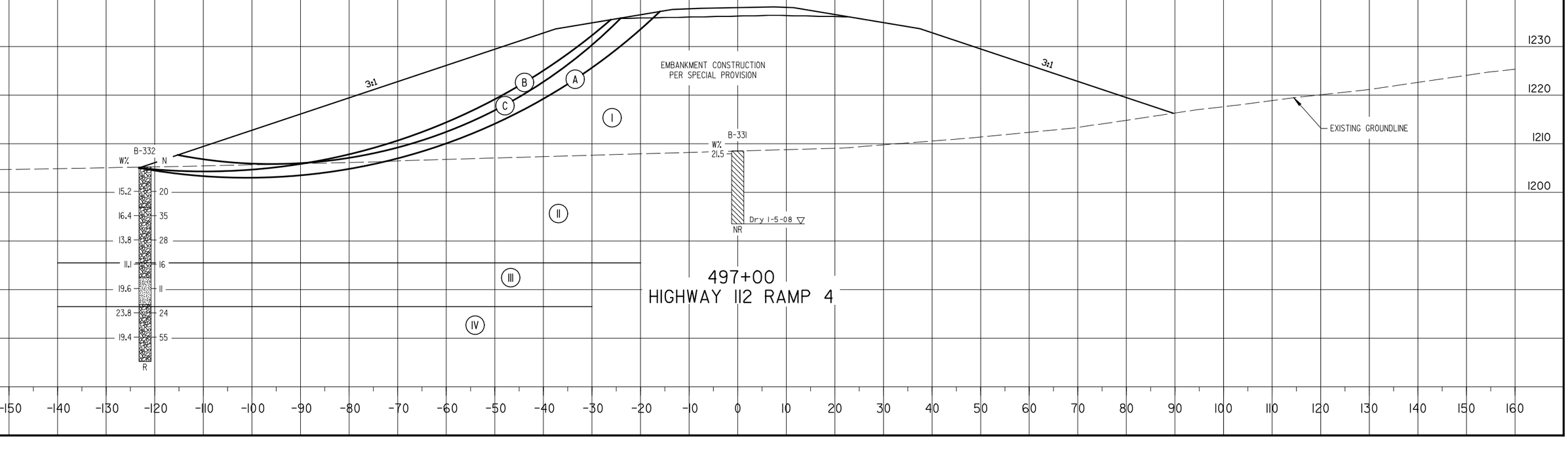
(2) X-SEC STA + TO STA +



19+00
SOUTH ZION ROAD

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ=130 PCF	c= 0 PSF Φ=32° γ=110 PCF	c= 0 PSF Φ=30° γ=110 PCF	c= 0 PSF Φ= 34° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$=32° γ=110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$=30° γ=110 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=34° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	2.0
Seismic	C	1.6



497+00
HIGHWAY 112 RAMP 4

03/19/2009

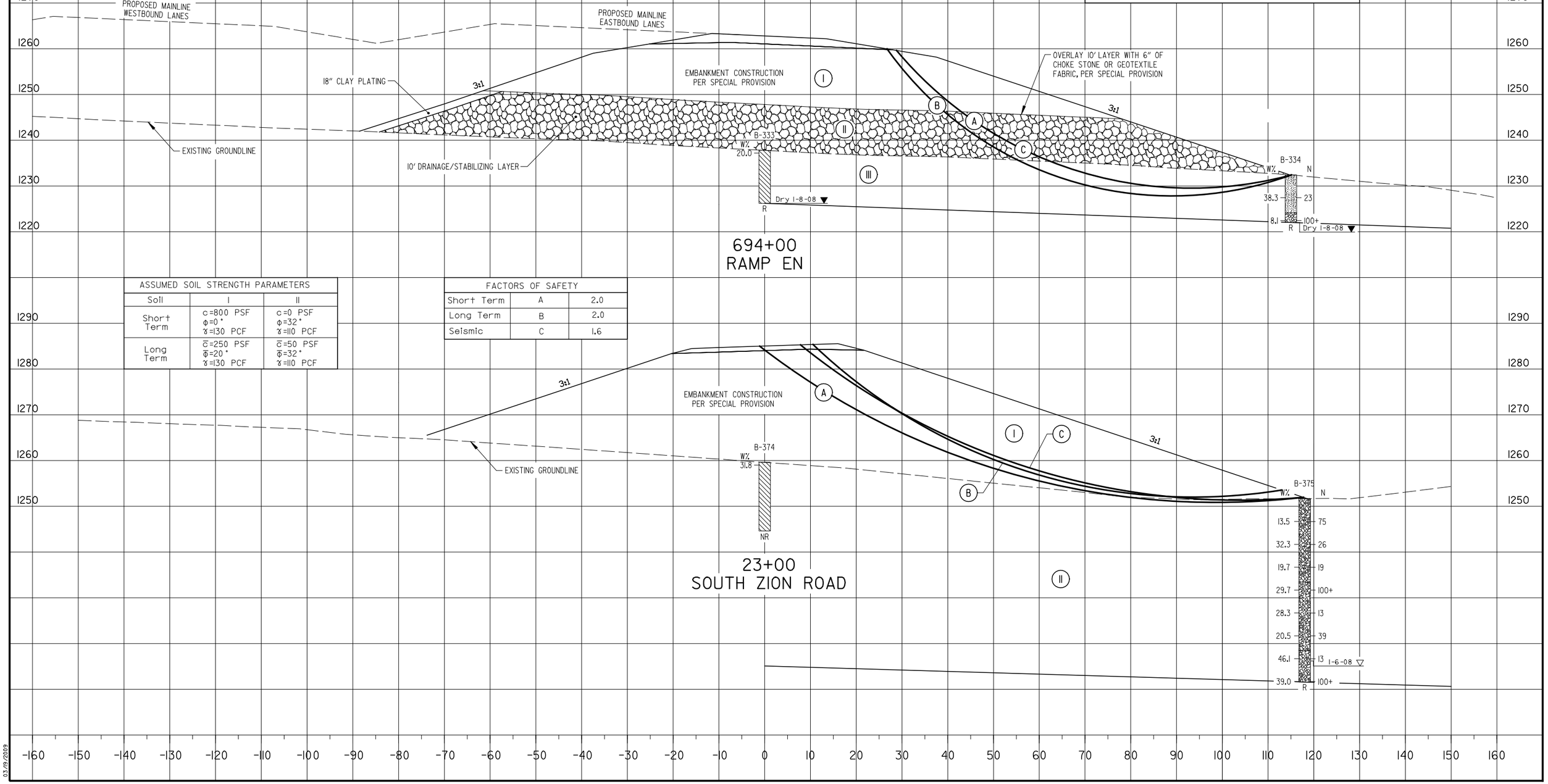
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=0 PSF Φ=36° γ=115 PCF	c=0 PSF Φ=28° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=36° γ=115 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=28° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.2
Long Term	B	2.3
Seismic	C	1.8

10' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 10' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 10' drainage layer shall be limited to Class 7 size aggregate only. See special provision.



694+00
RAMP EN

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=0 PSF Φ=32° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=32° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.0
Long Term	B	2.0
Seismic	C	1.6

23+00
SOUTH ZION ROAD

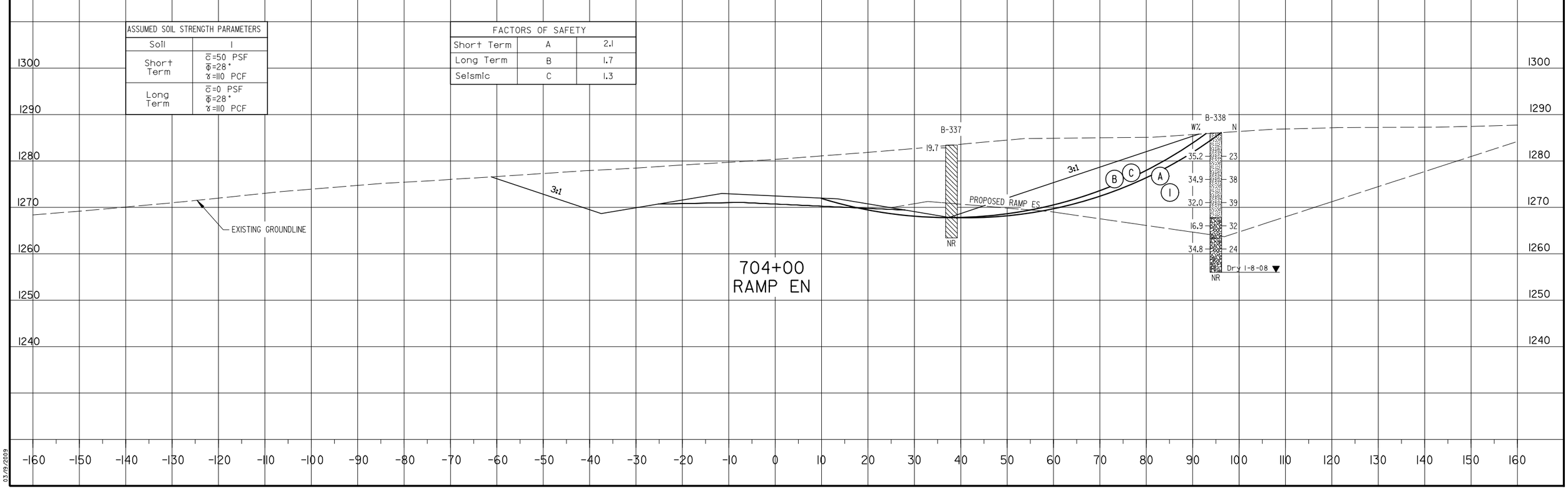
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS	
Soil	1
Short Term	$\bar{c}$=50 PSF $\bar{\Phi}$=28° γ=110 PCF
Long Term	$\bar{c}$=0 PSF $\bar{\Phi}$=28° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	1.7
Seismic	C	1.3



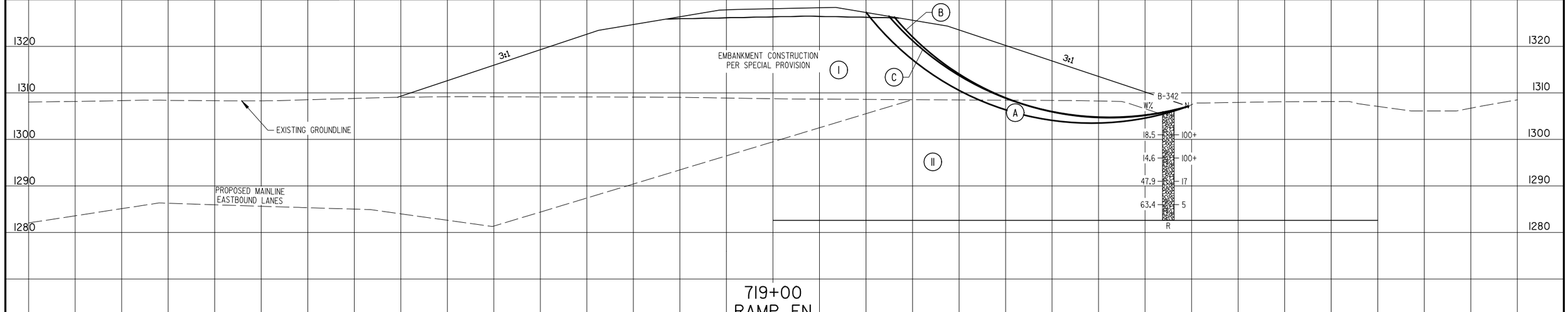
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=0 PSF Φ=28° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=28° γ=110 PCF

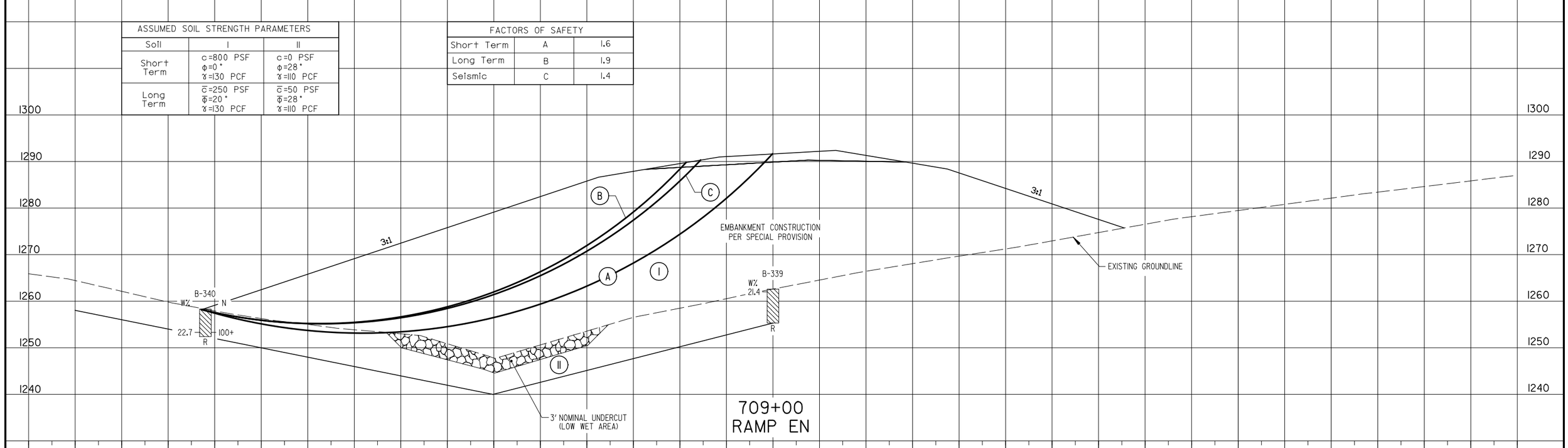
FACTORS OF SAFETY		
Short Term	A	2.5
Long Term	B	2.2
Seismic	C	1.8



719+00
RAMP EN

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=0 PSF Φ=28° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=28° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	1.6
Long Term	B	1.9
Seismic	C	1.4



709+00
RAMP EN

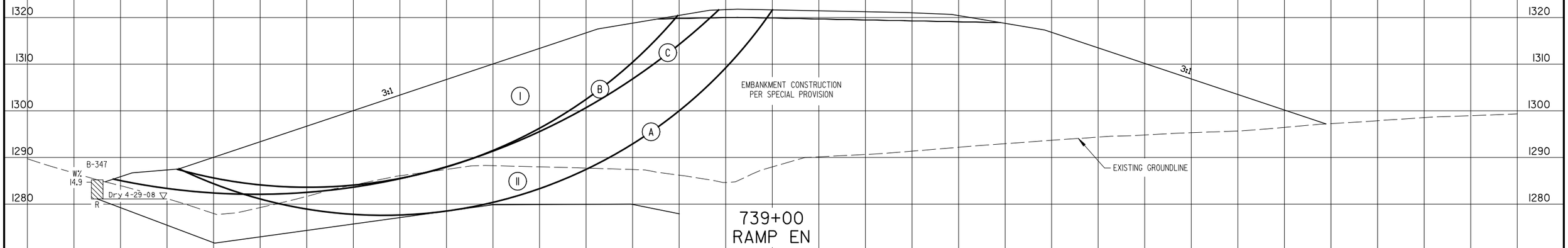
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

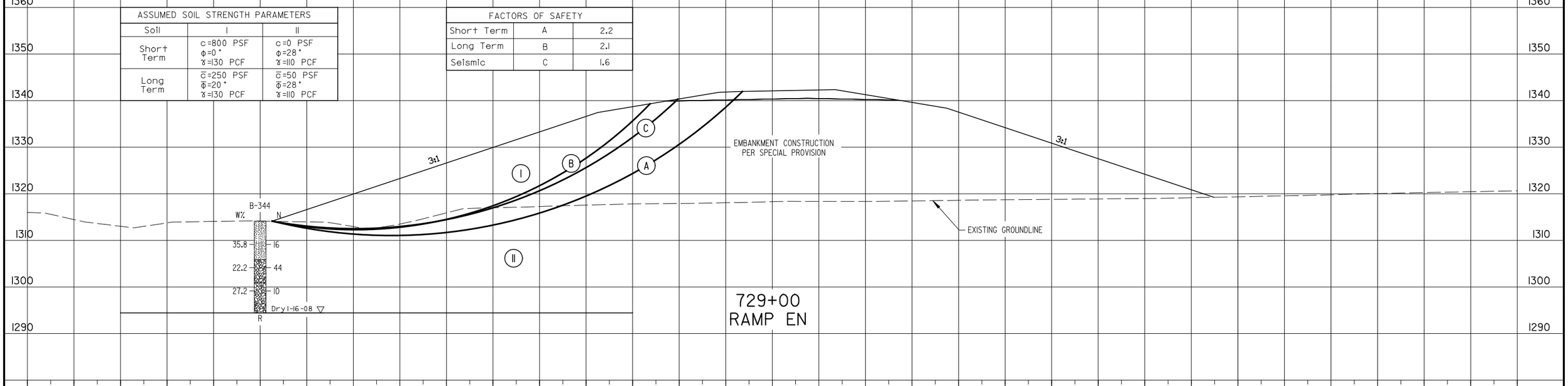
ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=750 PSF Φ=0° γ=120 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=150 PSF $\bar{\Phi}$=30° γ=120 PCF

FACTORS OF SAFETY		
Short Term	A	1.4
Long Term	B	1.9
Seismic	C	1.5



ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c=800 PSF Φ=0° γ=130 PCF	c=0 PSF Φ=28° γ=110 PCF
Long Term	$\bar{c}$=250 PSF $\bar{\Phi}$=20° γ=130 PCF	$\bar{c}$=50 PSF $\bar{\Phi}$=28° γ=110 PCF

FACTORS OF SAFETY		
Short Term	A	2.2
Long Term	B	2.1
Seismic	C	1.6



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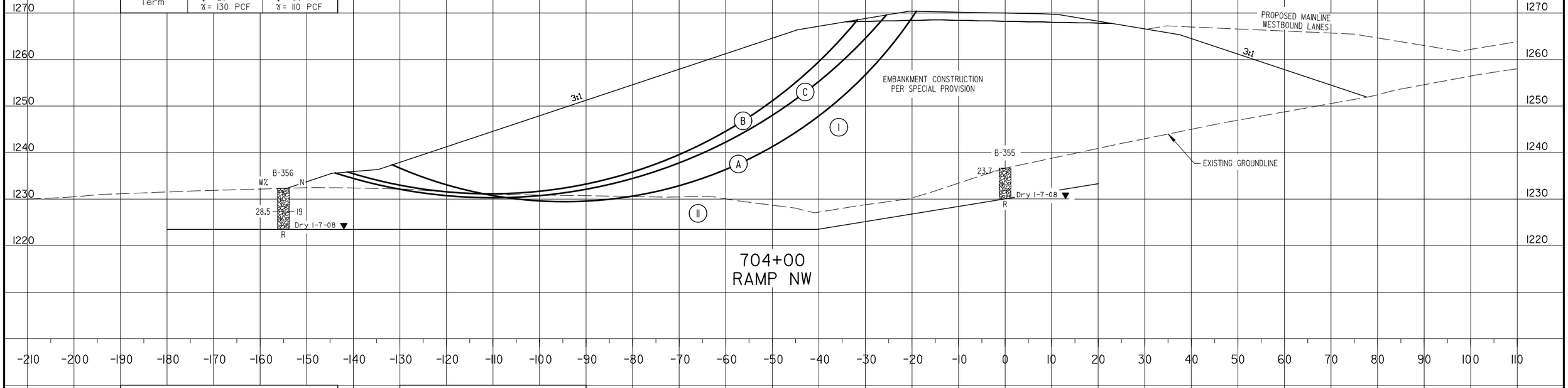
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$ = 800 PSF Φ = 0° γ = 130 PCF	$\bar{c}$ = 0 PSF Φ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 250 PSF $\bar{\Phi}$ = 20° γ = 130 PCF	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 30° γ = 110 PCF

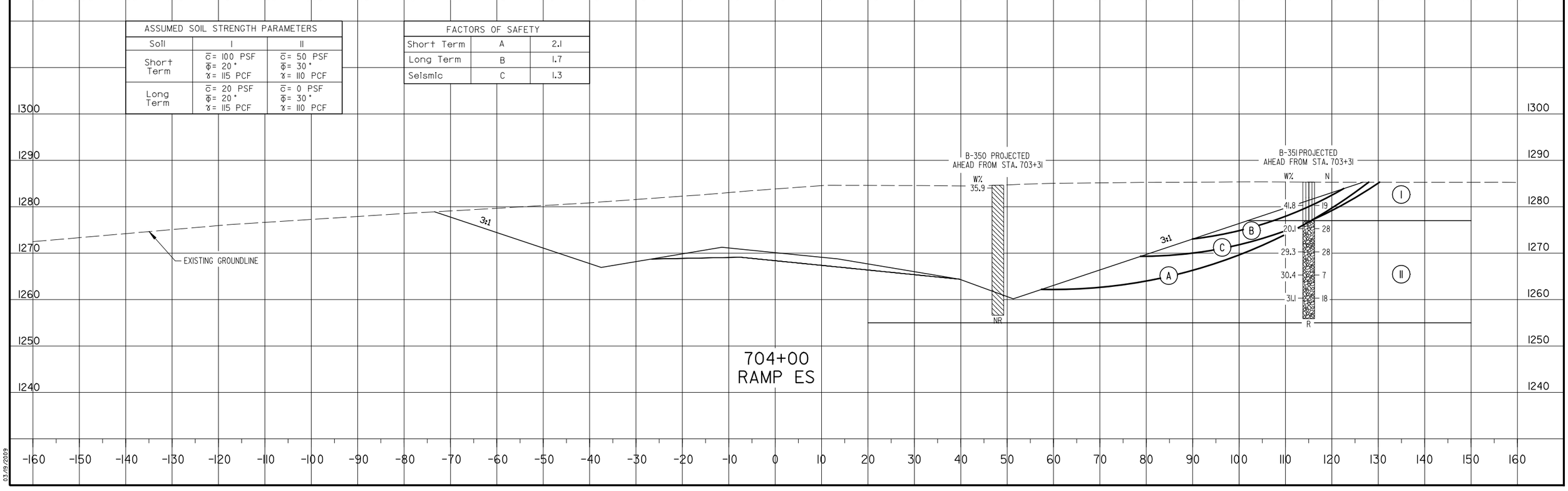
FACTORS OF SAFETY		
Short Term	A	1.7
Long Term	B	1.9
Seismic	C	1.5



704+00
RAMP NW

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	$\bar{c}$ = 100 PSF Φ = 20° γ = 115 PCF	$\bar{c}$ = 50 PSF $\bar{\Phi}$ = 30° γ = 110 PCF
Long Term	$\bar{c}$ = 20 PSF $\bar{\Phi}$ = 20° γ = 115 PCF	$\bar{c}$ = 0 PSF $\bar{\Phi}$ = 30° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.1
Long Term	B	1.7
Seismic	C	1.3



704+00
RAMP ES

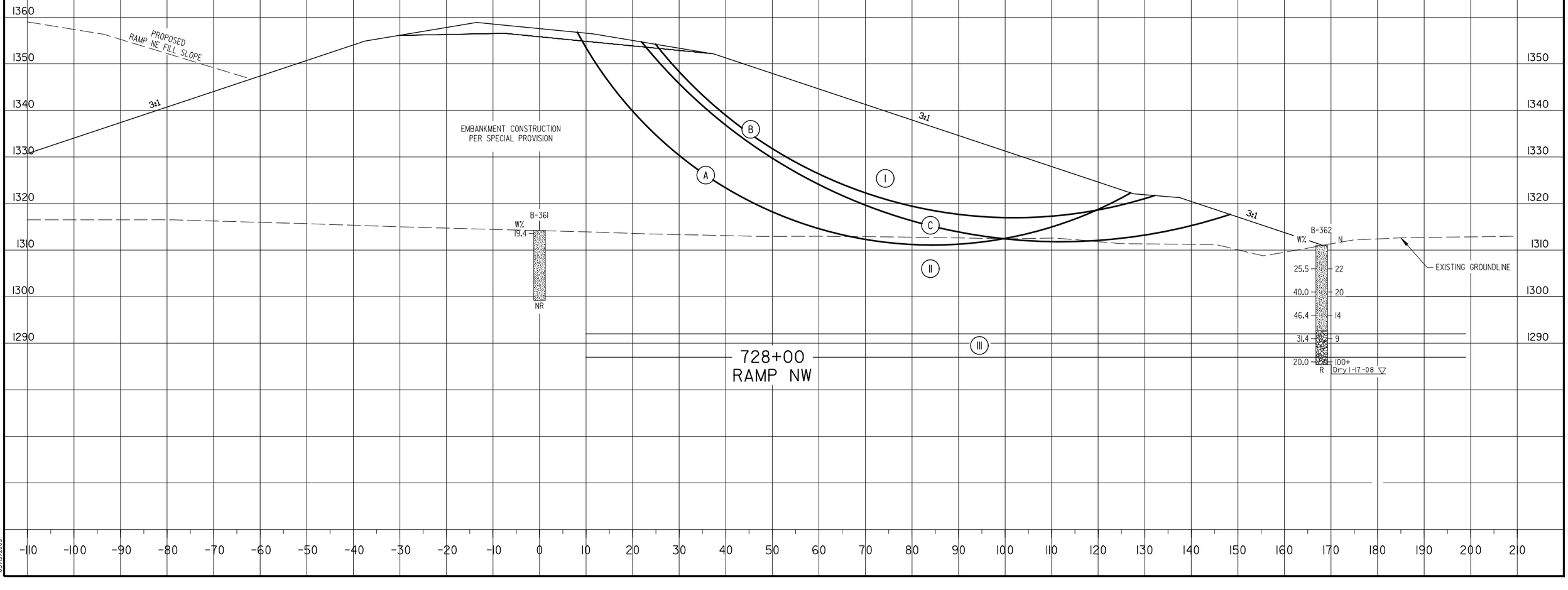
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	$\bar{c}$= 250 PSF $\bar{\Phi}$= 20° γ= 130 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF	$\bar{c}$= 50 PSF $\bar{\Phi}$= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.9
Seismic	C	1.5



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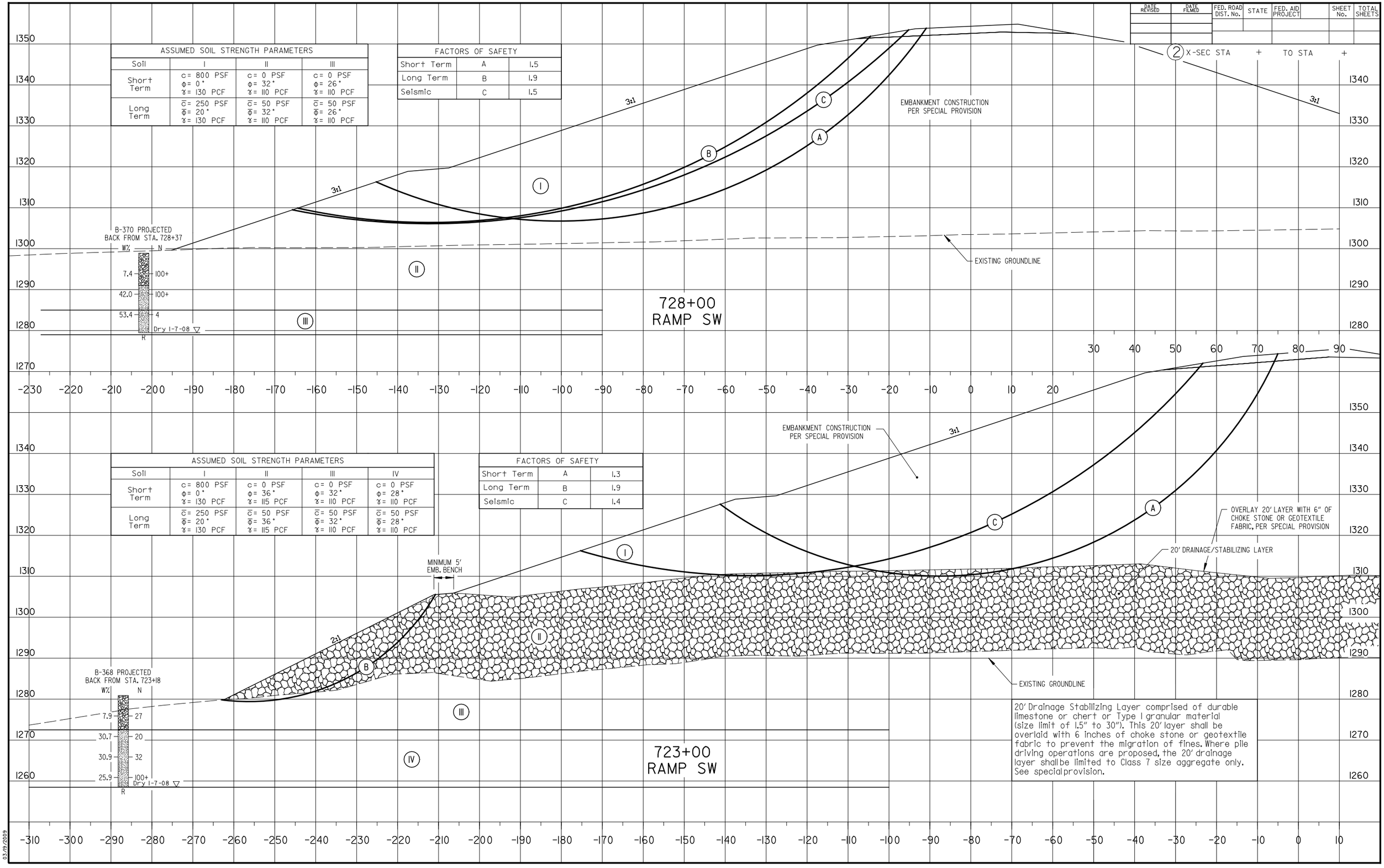
DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT		SHEET No.	TOTAL SHEETS

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 32° γ = 110 PCF	c = 0 PSF Φ = 26° γ = 110 PCF
Long Term	c̄ = 250 PSF Φ̄ = 20° γ = 130 PCF	c̄ = 50 PSF Φ̄ = 32° γ = 110 PCF	c̄ = 50 PSF Φ̄ = 26° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.5
Long Term	B	1.9
Seismic	C	1.5



ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c = 800 PSF Φ = 0° γ = 130 PCF	c = 0 PSF Φ = 36° γ = 115 PCF	c = 0 PSF Φ = 32° γ = 110 PCF	c = 0 PSF Φ = 28° γ = 110 PCF
Long Term	c̄ = 250 PSF Φ̄ = 20° γ = 130 PCF	c̄ = 50 PSF Φ̄ = 36° γ = 115 PCF	c̄ = 50 PSF Φ̄ = 32° γ = 110 PCF	c̄ = 50 PSF Φ̄ = 28° γ = 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.3
Long Term	B	1.9
Seismic	C	1.4

20' Drainage Stabilizing Layer comprised of durable limestone or chert or Type I granular material (size limit of 1.5" to 30"). This 20' layer shall be overlaid with 6 inches of choke stone or geotextile fabric to prevent the migration of fines. Where pile driving operations are proposed, the 20' drainage layer shall be limited to Class 7 size aggregate only. See special provision.

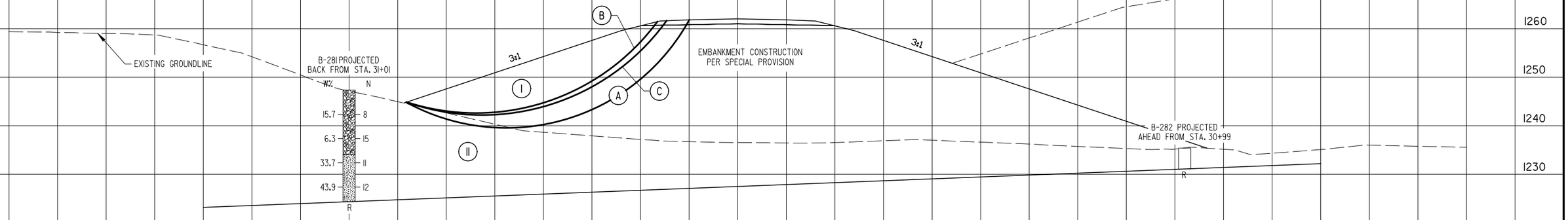
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS		
Soil	I	II
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF

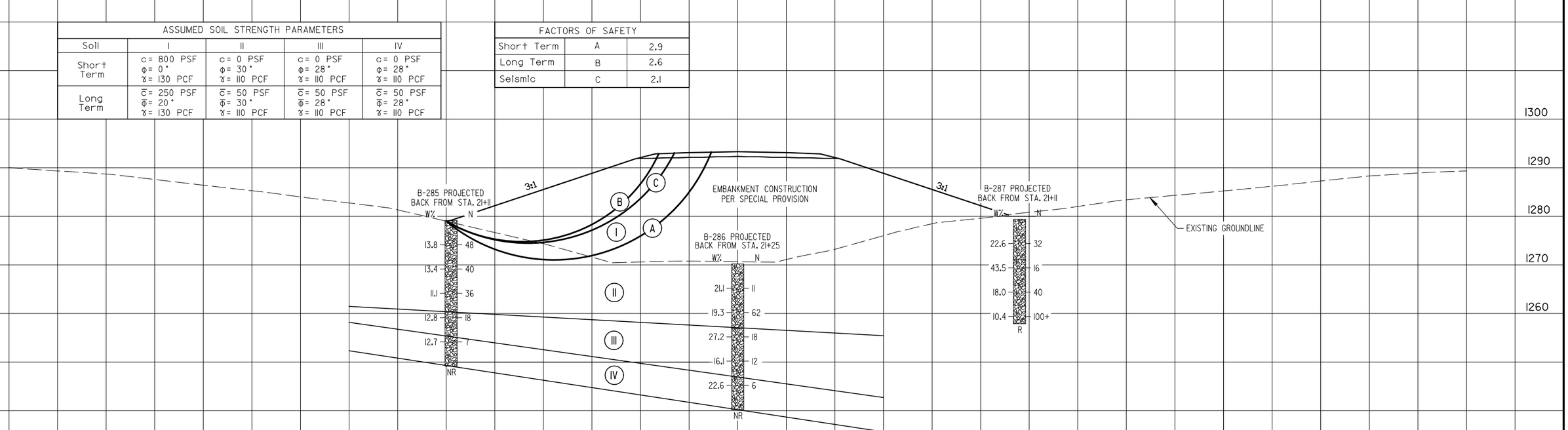
FACTORS OF SAFETY		
Short Term	A	2.7
Long Term	B	2.4
Seismic	C	1.9



31+00
PUPPY CREEK RD.

ASSUMED SOIL STRENGTH PARAMETERS				
Soil	I	II	III	IV
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 30° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF	c= 0 PSF Φ= 28° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 30° γ= 110 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF	c̄= 50 PSF Φ̄= 28° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	2.9
Long Term	B	2.6
Seismic	C	2.1



21+00
SPRING CREEK ST.

-160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

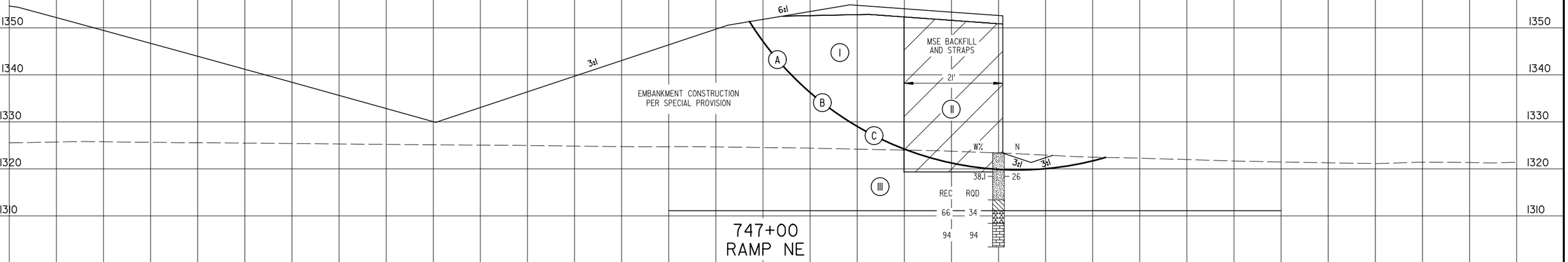
03/19/2009

DATE REVISED	DATE FILMED	FED. ROAD DIST. No.	STATE	FED. AID PROJECT	SHEET No.	TOTAL SHEETS

(2) X-SEC STA + TO STA +

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF

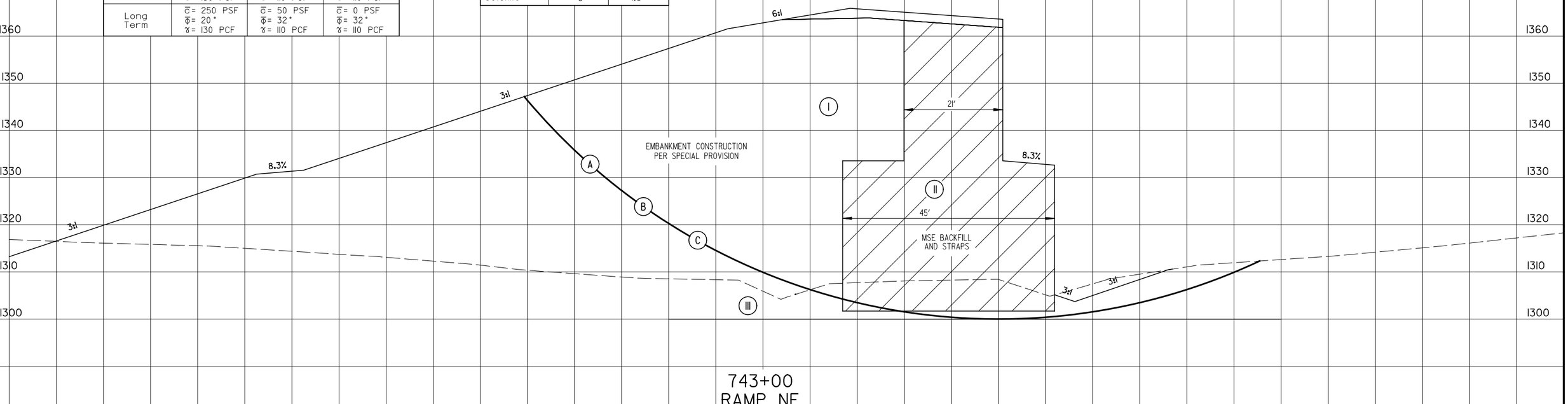
FACTORS OF SAFETY		
Short Term	A	1.4
Long Term	B	1.6
Seismic	C	1.4



747+00
RAMP NE

ASSUMED SOIL STRENGTH PARAMETERS			
Soil	I	II	III
Short Term	c= 800 PSF Φ= 0° γ= 130 PCF	c= 0 PSF Φ= 32° γ= 110 PCF	c= 0 PSF Φ= 32° γ= 110 PCF
Long Term	c̄= 250 PSF Φ̄= 20° γ= 130 PCF	c̄= 50 PSF Φ̄= 32° γ= 110 PCF	c̄= 0 PSF Φ̄= 32° γ= 110 PCF

FACTORS OF SAFETY		
Short Term	A	1.4
Long Term	B	1.8
Seismic	C	1.5



743+00
RAMP NE

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03/19/2009