

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT



SUBSURFACE INVESTIGATION

STATE JOB NO. BB0413

FEDERAL AID PROJECT NO. NHPP-540-1(76)73

ELM SPRINGS RD. INTCHNG. IMPVTS. (F)

STATE HIGHWAY 49 SECTION 28

IN WASHINGTON COUNTY

LETTING OF MARCH 23, 2016

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



SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)



Gravel



Sand



Silt



Clay

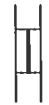
Predominant type shown heavy

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 (1) 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



BORING LOG TERMS - ROCK

ROCK TYPES
(SHOWN IN SYMBOLS COLUMN)



Sandstone



Limestone



Siltstone



Coal



Shale

<p>Joint Characteristics -</p> <p>Bedding Characteristics -</p> <p>Lithologic Characteristics -</p> <p>Parting -</p> <p>Seam -</p> <p>Layer -</p> <p>Stratum -</p> <p>Hardness-</p> <p>Texture -</p> <p>Structure -</p>	<p><u>Spacing</u></p> <p>Very Close Close Moderately Close Wide Very Wide</p> <p>Very Thin Thin Medium Thick Massive</p> <p>Clayey Shaly Calcareous (limy) Siliceous Sandy (Arenaceous) Silty Plastic Seams</p> <p>Less than 1/16 inch 1/16 to 1/2 inch 1/2 to 12 inches Greater than 12 inches</p> <p>Soft (S) - Reserved for plastic material alone.</p> <p>Friable (F) - Easily crumbled by hand, pulverized or reduced to powder and is too soft to be cut with a pocket knife.</p> <p>Low Hardness (LH) - Can be gouged deeply or carved with a pocket knife.</p> <p>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.</p> <p>Hard (H) - Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.</p> <p>Very hard (VH) - Cannot be scratched with a pocket knife. Knife steel marks left on surface.</p> <p>Fine - Barely seen with naked eye Medium - Barely seen up to 1/8 in. Coarse - 1/8 in. to 1/4 in.</p> <p><u>Bedding</u> Flat - 0° - 5° Gently Dipping - 5° - 35° Moderately Dipping - 55° - 85° Steeply Dipping - 55° - 85°</p> <p>Fractures, scattered Open Cemented or Tight</p> <p>Fractures, closely spaced Open Cemented or Tight</p> <p>Brecciated (Sheared and Fragmented) Open Cemented or Tight</p> <p>Joints Faulted Slickensides</p>	<p><u>Degree of Weathering -</u></p> <p>Fresh - No visible signs of decomposition or discoloration. Rings under hammer impact.</p> <p>Slightly Weathered - Slight discoloration inwards from open fractures, otherwise similar to fresh.</p> <p>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.</p> <p>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</p> <p>Completely Weathered - Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.</p> <p>Residual Soil - Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.</p> <p><u>Solution and Void Conditions -</u></p> <p>Solid, contains no voids Yuggy (pitted) Vesicular (igneous) Porous Cavities Cavernous</p> <p><u>Swelling Properties -</u></p> <p>Nonswelling Swelling</p> <p><u>Slaking Properties -</u></p> <p>Nonslaking Slakes slowly on exposure Slakes readily on exposure</p> <p><u>Rock Quality Designation (RQD) -</u></p> <table border="0"> <tr> <td><u>RQD (Percent)</u></td> <td><u>Diagnostic Description</u></td> </tr> <tr> <td>Greater than 90</td> <td>Excellent</td> </tr> <tr> <td>75 - 90</td> <td>Good</td> </tr> <tr> <td>50 - 75</td> <td>Fair</td> </tr> <tr> <td>25 - 50</td> <td>Poor</td> </tr> <tr> <td>Less than 25</td> <td>Very Poor</td> </tr> </table>	<u>RQD (Percent)</u>	<u>Diagnostic Description</u>	Greater than 90	Excellent	75 - 90	Good	50 - 75	Fair	25 - 50	Poor	Less than 25	Very Poor
<u>RQD (Percent)</u>	<u>Diagnostic Description</u>													
Greater than 90	Excellent													
75 - 90	Good													
50 - 75	Fair													
25 - 50	Poor													
Less than 25	Very Poor													



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

LOG OF BORING NO. 1
BB0413 Elm Springs Road Interchange
Springdale, Arkansas

TYPE: Auger to 33 ft /Core

LOCATION: See Plate 2 - Bent 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT			
			SURF. EL: 1332±								
			Stiff light brown silty clay w/chert fragments (fill)	21						88	
5			Stiff grayish tan and reddish brown silty clay w/fine sandy clay seams	23						79	
10			Dense to very dense light gray and white clayey fine to coarse chert gravel w/reddish brown silty clay seams and layers	50/5"							
15			Stiff reddish brown silty clay w/light gray and white fine to coarse chert fragments	16						82	
20			- firm, grayish tan at 18 to 23 ft	8							
25			- very stiff, more cherty at 23 to 28 ft	25							
30			- stiff below 28 ft	19							
35			Hard to very hard light gray limestone w/chert inclusions, seams and layers and close stylolites	50/5"							
			- cherty limestone at 33.9 - 34.4 ft								
			- cherty limestone at 35.4 - 36.2 ft								
			- cherty limestone at 37.6 - 38.1 ft								
			- cherty limestone at 38.6 - 39 ft								
										97	56
										98	67
COMPLETION DEPTH: 41.2 ft				DEPTH TO WATER				DATE: 2/15/2013			
DATE: 2-15-13				IN BORING: Dry to 33 ft							

RECRQDN200 13-019.GPJ 5-1-13



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

LOG OF BORING NO. 2
BB0413 Elm Springs Road Interchange
Springdale, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Bent 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
SURF. EL: 1332±						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
5			Stiff brown and gray silty clay w/fine sand and chert fragments (fill)	13									91
				22									
10			Dense to very dense light gray and white clayey fine to coarse chert gravel w/reddish brown silty clay seams	50/5"									
				50/5"									
15			Medium dense light gray clayey fine to coarse chert gravel w/reddish brown silty clay seams and layers	25									22
20			Medium dense light gray and white clayey fine to coarse chert gravel w/grayish tan silty clay seams	19									
25				14									
30			- dense at 28 to 33 ft	46									
35			- medium dense below 33 ft	23									
40				16									
45			Hard to very hard light gray limestone w/chert inclusions, seams and layers - auger refusal at 43.5 ft on limestone	50/1"									

LGBNEW 13-019.GPJ 4-30-13

COMPLETION DEPTH: 43.5 ft
DATE: 2-12-13

DEPTH TO WATER
IN BORING: Dry

DATE: 2/12/2013



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

LOG OF BORING NO. 3
BB0413 Elm Springs Road Interchange
Springdale, Arkansas

TYPE: Auger to 29.5 ft /Core

LOCATION: See Plate 2 - Bent 3

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	% Recovery	% RQD
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT			
			SURF. EL: 1326±								
			Stiff reddish brown silty clay w/fine to coarse light gray chert fragments	14							
5			Dense light gray and white clayey fine to coarse chert gravel w/reddish brown silty clay seams and layers	50/5"					11		
			- medium dense below 4.5 ft	22							
			Stiff reddish brown silty clay	14				95	99		
10			Medium dense light gray and white clayey fine to coarse cherty gravel w/grayish tan silty clay seams and layers	19					66		
15				12							
20			- more cherty below 18 ft	24							
25				14							
30			Hard to very hard gray limestone w/chert inclusions, seams and layers and close stylolites	50/2"							
			- cherty limestone at 29.7 - 30 ft						96	83	
			- cherty limestone at 31.4 - 32.2 ft								
			- cherty limestone at 33.9 - 34.2 ft						98	67	
			- cherty limestone at 35 - 35.7 ft								
40											

RECRQDN200 13-019.GPJ 4-30-13

COMPLETION DEPTH: 37.5 ft
DATE: 2-14-13

DEPTH TO WATER
IN BORING: Dry to 29.5 ft

DATE: 2/14/2013



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

LOG OF BORING NO. 4
BB0413 Elm Springs Road Interchange
Springdale, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Bent 4

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %				
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
			SURF. EL: 1326±			0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						10	20	30	40	50	60	70	
5	▲		Dense light gray and white clayey fine to coarse chert gravel w/reddish brown silty clay seams	66									
				35									34
				50/5"									
				50/3"									
10	▲		Stiff grayish tan clayey silt w/light gray fine chert fragments	12									62
15	▲		Medium dense light gray and white clayey fine to coarse chert gravel w/grayish tan silty clay seams and layers	23									
20	▲			17									
25	▲			11									
30	▲		- with more chert below 28 ft	19									
35	▲		Hard to very hard gray limestone w/chert inclusions, seams and layers - auger refusal at 33.1 ft on very hard limestone	50/1"									

LGBNEW 13-019.GPJ 4-30-13

COMPLETION DEPTH: 33.1 ft
DATE: 2-13-13

DEPTH TO WATER
IN BORING: Dry

DATE: 2/13/2013



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

LOG OF BORING NO. 5
BB0413 Elm Springs Road Interchange
Springdale, Arkansas

TYPE: Auger to 41 ft /Core

LOCATION: See Plate 2 - Bent 5

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 % % Recovery	% RQD
						PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
			SURF. EL: 1330±							
5			Stiff reddish brown silty clay w/occasional light gray fine chert fragments (fill)	12					90	
			Stiff grayish tan and reddish brown silty clay w/fine sandy clay seams	12						
			Dense to very dense light gray and white clayey fine to coarse chert gravel w/reddish brown silty clay seams and layers	70/10"						
10				50/4"						
				50/5"						
15				50/2"						
20			Medium dense light gray clayey fine to coarse chert gravel w/reddish brown clayey silt seams and layers	23					32	
25			Medium dense light gray and white clayey fine to coarse chert gravel w/grayish tan silty clay seams and layers	14						
30				50						
35				17						
40				28						
45			Hard to very hard gray limestone w/chert inclusions, seams and layers and close stylolites	50/1"					83	82
			- cherty limestone at 42.5 - 42.9 ft						80	63
			- cherty limestone at 43.3 - 44.1 ft						96	96
50			- cherty limestone at 45.3 - 45.8 ft							
			- cherty limestone at 46.2 - 46.7 ft							

q_u = 6120 psi, TUW = 145 pcf

REGRQDN200 13-019.GPJ 4-30-13

COMPLETION DEPTH: 48.8 ft
DATE: 2-13-13

DEPTH TO WATER
IN BORING: Dry to 41 ft

DATE: 2/13/2013