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GEOTECHNICAL ENGINEERING EXPLORATION

Proposed 50 Acres Subdivision along Hilltop Road Bryant, Arkansas

PREPARED FOR:

Jonathan Hope
Hope Consulting
117 South Market Street
Benton, AR 72015

PREPARED BY:

MTA ENGINEERS
8001 National Drive
Little Rock, AR 72209

June 27th, 2023

MTA ENGINEERS

Jonathan Hope
Hope Consulting
117 South Market Street
Benton, AR 72015

June 27th, 2023

Subject: Report of Geotechnical Engineering Exploration
Proposed 50 Acres Subdivision along Hilltop Road
Bryant, Arkansas

Mr. Hope:

MTA Engineers has completed the authorized Geotechnical Engineering Exploration for the above referred project. This work was conducted in accordance with the agreement between MTA Engineers and Hope Consulting, detailed in MTA Engineers Proposal dated June 25th, 2023.

The purpose of our work was to review general surface and subsurface conditions within the project site area, and to gather and present data relative to the design and construction of the proposed 50 Acres Subdivision located in Bryant, Arkansas. This report outlines the exploration procedures used, exhibits the data obtained, and presents our recommendations.

MTA Engineers appreciates this opportunity to provide these services and looks forward to working with you on future projects. Please contact us if you have any questions or require additional information.

Sincerely,

MTA ENGINEERS

Kelton Price, P.E.
Project Engineer
Office +1 501-753-2626
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STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 10650
KELTON W. PRICE

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EXECUTIVE SUMMARY

The geotechnical exploration was conducted near Hilltop Road located in Bryant, Arkansas. The general topography of the site was varying elevations. In general, the soil will consist of clayey sand with gravel and lean clay. Subsurface conditions were consistent throughout the entirety of the proposed development. The potential to find buried stumps or other organic material is low.

Major soil types encountered at each boring may be summarized as follow:

Table 1. Soil Types Encountered

SOIL TYPE	DESCRIPTION
SC	Clayey Sand w/ Surface Organics
CL	Lean Clay

See Table 2 General Strata Classification of Soil Logs or the individual soil logs found in Appendix B for a more detailed overview of the soils encountered on site.

Based on the nature of the existing strata encountered at the time of exploration, it is assumed that proposed improvements will be at/or above existing grades. The surface soil contains organic and loose clayey sand. In grass covered areas, the soil of Stratum I is loose and will contain 6-in of topsoil. The stability of these soils will depend on soil moisture conditions at the time of construction, area of improvements may require over-excavation of 2-ft to remove loose isolated surface soils (deeper during wetter seasons). Additional over-excavation may be required in the footing trenches, depending upon weather conditions.

Based on the anticipated bearing load, it is recommended that the store's structures be supported on traditional shallow footings founded a minimum of 24-in below final grade, within Structural fill. Footings founded as recommended may be designed using a net allowable bearing capacity of 2,000-psf for continuous and 2,500-psf for individual spread footings.

The net allowable end bearing pressures are based on a factor of safety in excess of 3.0 with respect to the anticipated shear strength of the structural fill. Total and differential settlement is anticipated in the order of ½ -in.

SUMMARY

- **Rock/Hard Dig:**
  - No rock was encountered.
  - Medium to heavy duty equipment will be required for deep utilities.

- **Soils:**
  - Soils generally consist of medium dense clayey sand and lean clay.
  - Structural fill should be placed according to the "Structural Fill" section of this report.
  - Stripping in the order of 6-in to remove organics.
  - Subgrade soil must meet requirements of City of Bryant.

- **Foundations/Slabs:**
  - Shallow footings founded a minimum of 24-in beneath final grade may be sized using a bearing pressure of 2,000-psf for continuous and 2,500-psf for individual spread footings.

- **Un-compacted Fill:**
  - No un-compacted fill was encountered on the property during the exploration.

- **Stump/Organic Findings:**
  - The potential to find stumps or other organic material beneath the surface is low.

- **Pavement:**
  - Recommended pavement sections are presented within this report.
  - Pavement must meet the requirement of City of Bryant

- **Miscellaneous:**
  - The building is anticipated to be at/or above existing grade.

INTRODUCTION

This exploration was requested in order to evaluate existing subsurface conditions and provide geotechnical design recommendations. The results of this exploration and the geotechnical design recommendations for site construction are presented in this report.

Exploration was accomplished by:

1. Boring 5 locations up to 10-ft or refusal explore subsurface soil, and groundwater conditions.
2. Obtaining samples from each stratum, within the accessible areas, using standard geotechnical sampling technique or standard penetration test.
3. Performing laboratory tests on various samples to determine pertinent engineering properties of the subsurface strata.
4. Analyzing field and laboratory test data to develop design recommendations.

The scope of this geotechnical exploration did not include an environmental assessment to determine the presence of wetlands and/ or hazardous or toxic materials in the soil or groundwater on or near this site. If there is concern of wetlands or a hazardous/ toxic material presence, a qualified environmental assessment consultant should be contacted to perform a site investigation before construction begins.

FIELD EXPLORATION

Subsurface conditions at the site were explored by using dry auger methods and a split spoon sampler to a depth of up to 10-ft at 5 boring locations. The approximate boring locations are shown on the Plan of Borings, Appendix A. Boring logs presenting descriptions of the soil strata encountered are included in Appendix B. Laboratory testing results of the different soil types are located in Appendix D.

Samples were obtained throughout the entirety of most locations in general accordance with Standard Penetration Sampling (SPT). The recorded N-Values (Blows per foot) are indicated on the Boring Logs in the Blows per foot column. All soil samples encountered were removed from the field in moisture

tight containers and transported to our laboratory for further examination. At the lab, a visual classification was performed for each sample.

All various soil types were then analyzed for specific engineering properties. The dry auger drilling procedures facilitated observation of shallow groundwater conditions.

GENERAL SITE AND SUBSURFACE CONDITIONS

The exploration for the proposed Subdivision located along Hilltop Road in Bryant, Arkansas. It is anticipated that proposed roads will be constructed near the existing grade. Soil as explored consisted of lean clays, and clayey sands. Borings were advanced to a depth of 10-ft or refusal within the building and pavement areas using dry auger procedures.

For a more detailed description of soils encountered while testing see the boring log sheets found in the attached report.

Table2. General Strata Classification of Boring Logs

STRATA	DEPTH (ft)	SOIL CLASSIFICATION	SOIL DESCRIPTION	SIGNIFICANT PROPERTIES
STRATUM I	0 to Completion	SC *Except B-3*	Clayey Sand Surface Organics	Loose to Medium Dense Low Shrink Swell Potential Moderate bearing capacity
STRATUM II	0 to completion	CL *Only in B-3 & 5*	Lean Clay	Firm to Stiff Moderate Bearing

The significant properties and characteristics of the subsurface strata pertinent to design and constructions are as follows:

A. The topography of the site and planned building location.
B. The anticipated bearing loads.
C. The anticipated pavement Loading.
D. The anticipated pavement loading.

LABORATORY TESTING

Description of the soils encountered in the borings was prepared in general accordance with applicable ASTM standards. The soil stratification shown on the boring logs represents soil conditions at the specific boring locations. There may be some variations that occur between or beyond the boring locations. The stratification lines on the boring logs represent the approximate boundaries between soil types, but the actual transitions between soil layers in the subsurface of the proposed site may be gradual.

Laboratory soil testing was performed to verify/evaluate classification, volumetric stability, and to determine water content. The laboratory testing for soil properties was limited in this report. The results of the gradations, plasticity and moisture testing is attached as Appendix D. The results are also presented on the Boring Logs in Appendix B.

ANALYSIS AND RECOMMENDATIONS

SITE PREPARATION

Prior to the addition of any fill or the construction of any improvements, areas of the proposed building and parking should be grubbed approximately 6-in to remove organics. Existing soils do not meet the requirements for subgrade within the top 24-in, per City of Bryant. A minimum of 24-in of suitable fill shall be placed. To maintain grades over-excavation may be required. If grades allow fill can be placed above the in-situ soils. All fill/ backfill shall meet City of Bryant requirements for material as well as compaction. Once fill is placed, the area should be proof rolled using a loaded dump truck, or 62,000-lbs equivalent load, to locate any areas of instability. Isolated area of unstable soils should be evaluated at that time**.** Due to the nature of the in-situ soils, instability will increase significantly with increased soil moisture. Fill should be placed as described in the Structural Fill section of this report. Soils near surface are loose (Stratum I), Stability of these soils is dependent on moisture condition at the time of construction. As stated previously unstable areas will require over-excavation and backfill.

Excavation should be performed under dry conditions, using equipment adequate to perform the work. Depending upon the weather conditions, isolated undercuts of saturated soft clay may be necessary. Structural fill, where needed, should be placed as recommended in the “Structural Fill” section of the

report. Positive drainage should be maintained throughout this process. The addition of excessive moisture could cause a significant loss of soil stability.

STRUCTURAL FILL

Structural Fill within roadways must conform to City of Bryant requirements. Fill should consist of approved materials, which are free of organic matter and debris. For approval, samples of the proposed fill material should be submitted to MTA Engineers for classification testing. Select fill consisting of low plasticity soil such as lean clay or clayey gravel classifying as SC, CL, or GC according to the Unified Soils Classification System are generally considered suitable. High plasticity clay soils (soils with a Liquid Limit above 50) should not be used as fill.

Placement of approved fill should be achieved in multiple thin lifts. Each lift should not exceed 8-in in loose thickness. Compaction of these lifts should be performed with suitable equipment to achieve the compaction requirements noted in Table 3. Care should be taken that all compaction recommendations are performed.

If cohesive soils are to be used, compaction should be performed using a kneading-type vibratory compactor, such as a vibratory sheepsfoot. The material should be broken down sufficiently to provide a dense matrix of particles. All fill within the roadway must comply with City of Bryant Specifications.

Table 3: Compaction Requirements

Material Type and Location	Minimum Compaction (percent of ASTM D1557)	Allowable variance in moisture from optimum
Structural Fill Beneath Pavement Sections	95%	Optimum to +3 (Clay Shale) -3 to +3 (Other Approved Select Fill)
Structural Fill Beneath Buildings	95%	Optimum to +3 (Clay Shale) -3 to +3 (Other Approved Select Fill)
Utility Backfill in Building Area and Pavement	95%	-3 to +3
Miscellaneous and Green Areas	90%	-3 to +3
Aggregate Base Course	95%	-3 to +3 at time of compaction

BUILDING FOUNDATIONS

All foundations must satisfy two basic and independent design criteria. First, foundations must have an acceptable factor of safety against bearing failure under maximum design loads. Secondly, movement of the foundation due to consolidation, shrinkage, and/or swelling of the supporting strata should not exceed tolerable limits for the structure.

Construction factors such as installation of foundations units, excavation procedures, and surface and groundwater conditions should also be considered. These factors and the aforementioned subsurface conditions were influential in the development of the following statement.

In view of the anticipated foundation loading and subsurface conditions encountered, it is suggested that the proposed structures be supported on a foundation system designed in accordance with the following recommendations.

FOUNDATIONS/ SLABS

Shallow Foundations

Based on the nature of existing soils encountered at the time of exploration and the anticipated loading, it is recommended that all structures be supported on traditional shallow footings founded a minimum of 24-in beneath final exterior grade, within Structural fill. In addition, to minimize the potential for localized shear failure within the soils, a minimum footing width of 24-in is recommended. Shallow foundations founded as accounted may be designed using a net allowable bearing pressure of 2,000-psf for continuous and 2,500-psf for individual spread footings. The net allowable end bearing pressures will be based on a factor or safety in excess of 3.0. Total and differential settlement is anticipated to be less than ½-in.

Slab-on-grade type construction is considered appropriate for the floor slab. We recommend that the slab be supported on 4-in of clean crushed stone or gravel (ASTM C-33 #57 or equivalent) on prepared subgrade. A Class A impervious moisture barrier with a minimum thickness of 10-mils, specified according to ASTM E-1745, should be provided between slab and the granular fill due to the potential for perched water to develop during the wetter seasons.

PAVEMENT DESIGN

Paved parking and drives will be constructed as part of the project. Design traffic volumes and loadings have not been determined. However, we anticipate that the drives will be subject to light vehicles and weekly service trucks. We anticipate that the drives will be placed at/or above the existing elevation. The following design criteria were used to develop the recommended pavement sections in conjunction with the AASHTO Design Guide 1996:

Table 3. Pavement Design Assumption Values

PAVEMENT DESIGN ASSUMPTION VALUES	
CBR	5
R-VALUE	15
SOIL SUPPORT VALUE (S)	5

Based on information obtained during this study, subgrade soils in the paved areas should generally consist of proof-rolled properly compacted Structural fill. Structural fill should be placed as recommended in the Structural fill section of the report. It is recommended that positive site drainage should be provided during construction and be incorporated during the final design.

All pavement sections must comply with the City of Bryant minimum requirements. It should be recognized that some periodic maintenance of pavement will be required. As a minimum, this should include periodic sealing of all joints and cracks to prevent surface water infiltration.

UN-COMPACTED FILL

No uncompacted fill was encountered on the property during our exploration.

STUMP/ ORGANIC FINDINGS

potential to find stumps or other organic material below the surface is low.

SEISMIC CONSIDERATION

Based on IBC-2015, a site soil **Class D** may be used for design purposes. Liquefaction potential of the soils in Stratum I & II is negligible. Additional design information on Seismic Consideration is attached as Appendix E.

CONSTRUCTION PROCEDURES

The potential exists for increased perched water to develop during wetter seasons. Therefore, foundation excavation and any other site grading should be performed during drier periods to reduce the possibility of changes in conditions.

Subsurface conditions significantly at variance with those encountered within the borings should be brought to the attention of the engineer, and work delayed pending evaluation and/or preparation of additional recommendations, if warranted.

♦ ♦ ♦ ♦

The following illustrations are attached and complete this report:

Appendix A: Excavation Location Plan
Appendix B: Test Pit Logs
Appendix C: Key to terms and Symbols
Appendix D: Laboratory Test Summary
Appendix E: Seismic Design Criteria

♦ ♦ ♦ ♦

Appendix A :
Boring Location Plan


50 Acres
Subdivision
Little Rock, AR
Legend
length of each boundary
Miller Rd & Hilltop Rd
od Dog Behavior Academy Inc
Furry Feet Retreat And Training Center
1725 ft
465 ft
568 ft
435 ft
660 ft
Not To Scale
734 ft
623 ft
Miller Rd & Hilltop Rd
Google Earth
800 ft
N

Appendix B: Boring Logs

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Boring Log Report

BORING NO. B-1
PAGE 1 OF 1

JOB NO. GEO23-097
JOB NAME: 50 ACRES SUBDIVISION
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: BRYANT, AR

DATE: 6-13-2023
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROB 7822
LOGGED BY: CORY. S
DRILLED BY: P. KING

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			LOOSE, RED-BROWN, CLAYEY SAND W/ SANDSTONE FRAGMENTS & SURFACE ORGANICS		22	9.7	38	16	36.6	5 4-4	8
										4 5-7	12
5			MEDIUM DENSE, RED-TAN, SANDY CLAY W/ SANDSTONE FRAGMENTS	SC						5 4-4	8
										4 5-4	9
10			LOOSE, TANNISH RED TO GRAY, SANDY CLAY							4 5-6	11
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: 10 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

P.O. Box 23715 • Little Rock, AR 72221
Ph. 501.753.2526 • Fax 501.753.5747

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Ph. 479.756.0061 • Fax 479.756.9254

101 S. Church St. • Jonesboro, AR 72401
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Boring Log Report

BORING NO. B-2
PAGE 1 OF 1

JOB NO. GEO23-097
JOB NAME: 50 ACRES SUBDIVISION
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: BRYANT, AR

DATE: 6-13-2023
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROB 7822
LOGGED BY: CORY. S
DRILLED BY: P. KING

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
5			LOOSE TO MEDIUM DENSE, TANNISH GRAY TO RED, SANDY CLAY W/ SANDSTONE FRAGMENTS & SURFACE ORGANICS	SC	22	18.2	38	16	38.0	5 6-5 3 2-5 5 5-6	11 7 11
10			MEDIUM DENSE, TANNISH RED TO GRAY, CLAYEY SAND							5 5-8 5 7-8	13 15
15			Boring Terminated								
20											
25											
30											

COMPLETION DEPTH: 10 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Boring Log Report

BORING NO. B-3
PAGE 1 OF 1

JOB NO. GEO23-097
JOB NAME: 50 ACRES SUBDIVISION
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: BRYANT, AR

DATE: 6-13-2023
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROB 7822
LOGGED BY: CORY. S
DRILLED BY: P. KING

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			STIFF, TAN-RED, SANDY CLAY W/ SURFACE ORGANICS							5 7-6	13
										7 9-10	19
5				CL						6 7-5	12
			FIRM TO STIFF, TAN-RED, SANDY CLAY							6 7-15	22
10										8 9-11	20
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: 10 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Boring Log Report

BORING NO. B-4
PAGE 1 OF 1

JOB NO.	GEO23-097	DATE:	6-13-2023
JOB NAME:	50 ACRES SUBDIVISION	TYPE OF DRILLING:	DRY AUGER
COORDINATES: NORTH:		EAST:	EQUIPMENT: GEOPROB 7822
STATION:		LOGGED BY:	CORY. S
LOCATION:	BRYANT, AR	DRILLED BY:	P. KING

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			LOOSE, TAN-RED, CLAYEY SAND W/ SURFACE ORGANICS & SANDSTONE FRAGMENTS		14	10.7	24	10	39.2	4 5-4 6 5-5	9 10
5			MEDIUM DENSE, TAN-RED, CLAYEY SAND	SC						7 7-10 4 5-8	17 13
10										4 6-8	14
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: 10 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Boring Log Report

BORING NO. B-5
PAGE 1 OF 1

JOB NO. GEO23-097
JOB NAME: 50 ACRES SUBDIVISION
COORDINATES: NORTH: _____ EAST: _____
STATION: _____
LOCATION: BRYANT, AR

DATE: 6-13-2023
TYPE OF DRILLING: DRY AUGER
EQUIPMENT: GEOPROB 7822
LOGGED BY: CORY. S
DRILLED BY: P. KING

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: EXISTING GRADE	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			LOOSE, TAN-RED, CLAYEY SAND W/ SURFACE ORGANICS	SC	14	14.6	27	13	37.6	4 3-3	6
										3 2-3	5
5			FIRM TO STIFF, TANNISH RED TO GRAY, SANDY CLAY	CL	18	36.1	35	17	87.2	2 2-4	6
										3 6-8	14
10										5 6-8	14
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: 10 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Appendix C: Key to Terms

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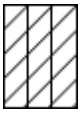
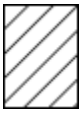
P.O. Box 688 • Springdale, AR 72765 Ph. 479.756.0061
101 S. Church Street, Box 4 • Jonesboro, AR 72401 Ph. 870.530.8380

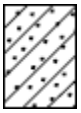
TERMS AND SYMBOLS USED ON BORING LOGS

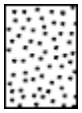
SOIL TYPES

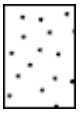

CLAY (CH)

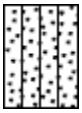

SILTY CLAY (CL)


CLAY (CL)

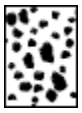

SANDY CLAY (CL)

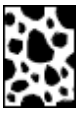

WELL-GRADED SAND (SW)

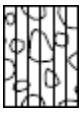

POORLY-GRADED SAND (SP)


SILTY SAND (SM)


CLAYEY SAND (SC)

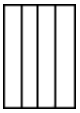

WELL-GRADED GRAVEL (GW)


POORLY-GRADED GRAVEL (GP)


SILTY GRAVEL (GM)


SANDY SILT (ML)


CLAYEY GRAVEL (GC)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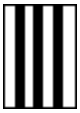
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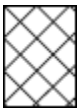
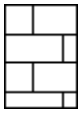
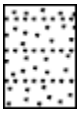
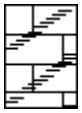

FILL MATERIAL

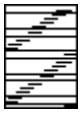
ROCK TYPES

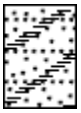

LIMESTONE


SHALE


SANDSTONE

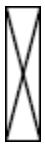

WEATHERED LIMESTONE


WEATHERED SHALE


WEATHERED SANDSTONE

SAMPLER TYPE


SHELBY TUBE SAMPLE


SPLIT SPOON SAMPLE


AUGER SAMPLE


NO RECOVERY

MTA ENGINEERS a division of Materials Testing of Arkansas, Inc.

P.O. Box 23715 • Little Rock, AR 72221 Ph. 501.753.2526
P.O. Box 688 • Springdale, AR 72765 Ph. 479.756.0061
101 S. Church Street, Box 4 • Jonesboro, AR 72401 Ph. 870.530.8380

SOIL GRAIN SIZE

U.S. STANDARD SIEVE								
12"	3"	3/4"	4	10	40	200		
BOULDERS	**COBBLES**	**GRAVEL**		**SAND**			**SILT**	**CLAY**
		COARSE	**FINE**	**COARSE**	**MEDIUM**	**FINE**		
304	76.2	19.1	4.75	2	0.42	0.074	0.002	
SOIL GRAIN SIZE IN MILIMETERS								

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No 200 sieve): Includes (1) clean gravels and sands, and (2) silty clayey gravels and sands condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERMS	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): include (1) inorganic and organic silt and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer reading or by unconfined compression tests.

DESCRIPTIVE TERMS	N VALUE	UNCONFINED COMPRESSIVE STRENGTH TON / SQ. FT.
VERY SOFT	0-3	less than 0.25
SOFT	3-6	0.25 - 0.50
FIRM	6-12	0.50 - 1.00
STIFF	13-20	1.00 - 2.00
VERY STIFF	20-50	2.00- 4.00
HARD	50 and above	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 rating of such soils are based on penetrometer readings

TERMS CHARACTERIZING MOISTURE CONTENT

DRY: No water evident in sample; fines less than plastic limit.
MOIST: Sample feels damp; fines near the plastic limit.
VERY MOIST: Water visible on sample; fines greater than plastic limit and less than liquid limit.
WET: Sample bears free water; fines greater than liquid limit.

TERMS CHARACTERIZING SOIL STRUCTURE

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

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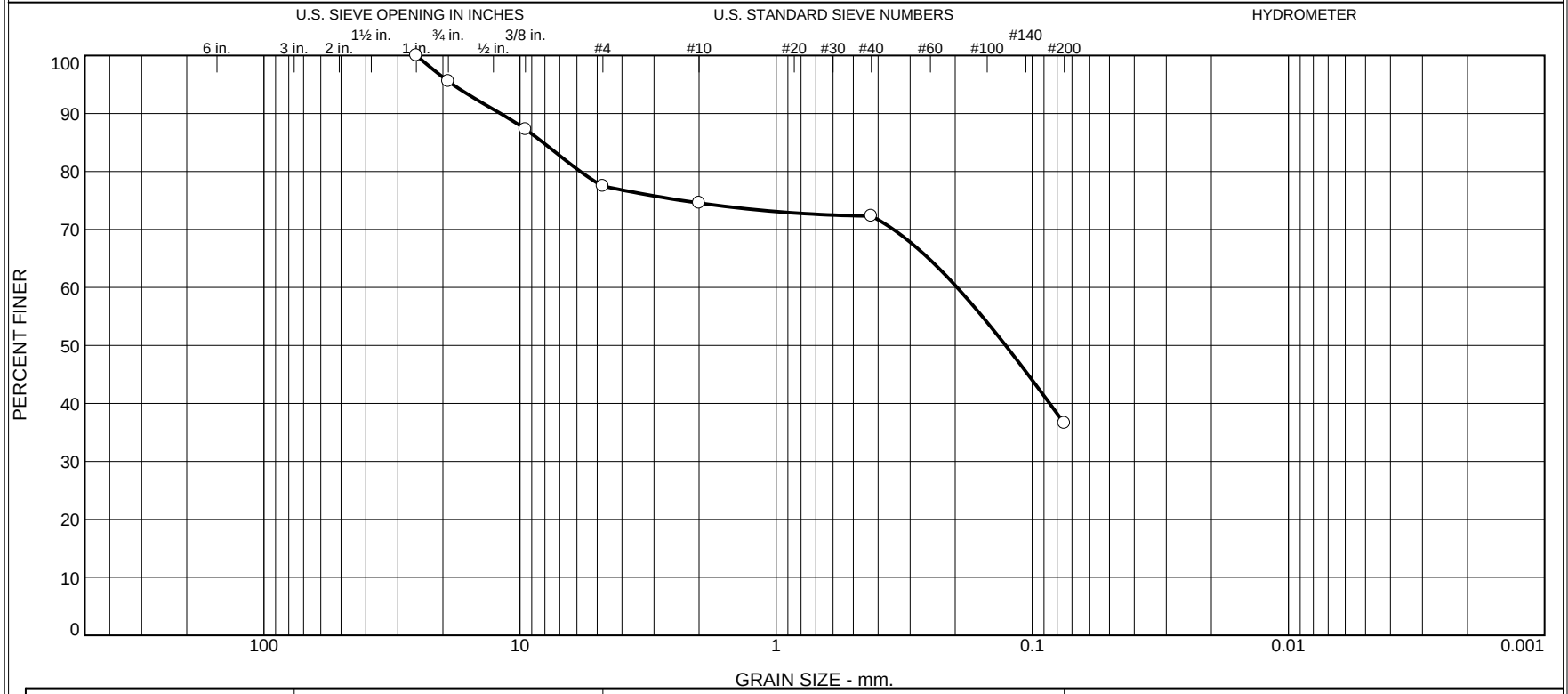
Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with UNIFIED SOIL CLASSIFICATION SYSTEM as described in technical Memorandum No 3-357, Waterways Experiment Station, March 1953

Appendix D: Laboratory Test Summary

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.4	18.1	2.9	2.3	35.7	36.6	

Source	Sample #	Depth/Elev.	Date Sampled	AASHTO	Material Description	NM %	LL	PL
B-1	S-1	0	6-15-2023	A-6(2)	RED-BROWN, CLAYEY SAND W/ GRAVEL	9.7	38	22

Client HOPE CONSULTING

Project 50 ACRES SUBDIVISION

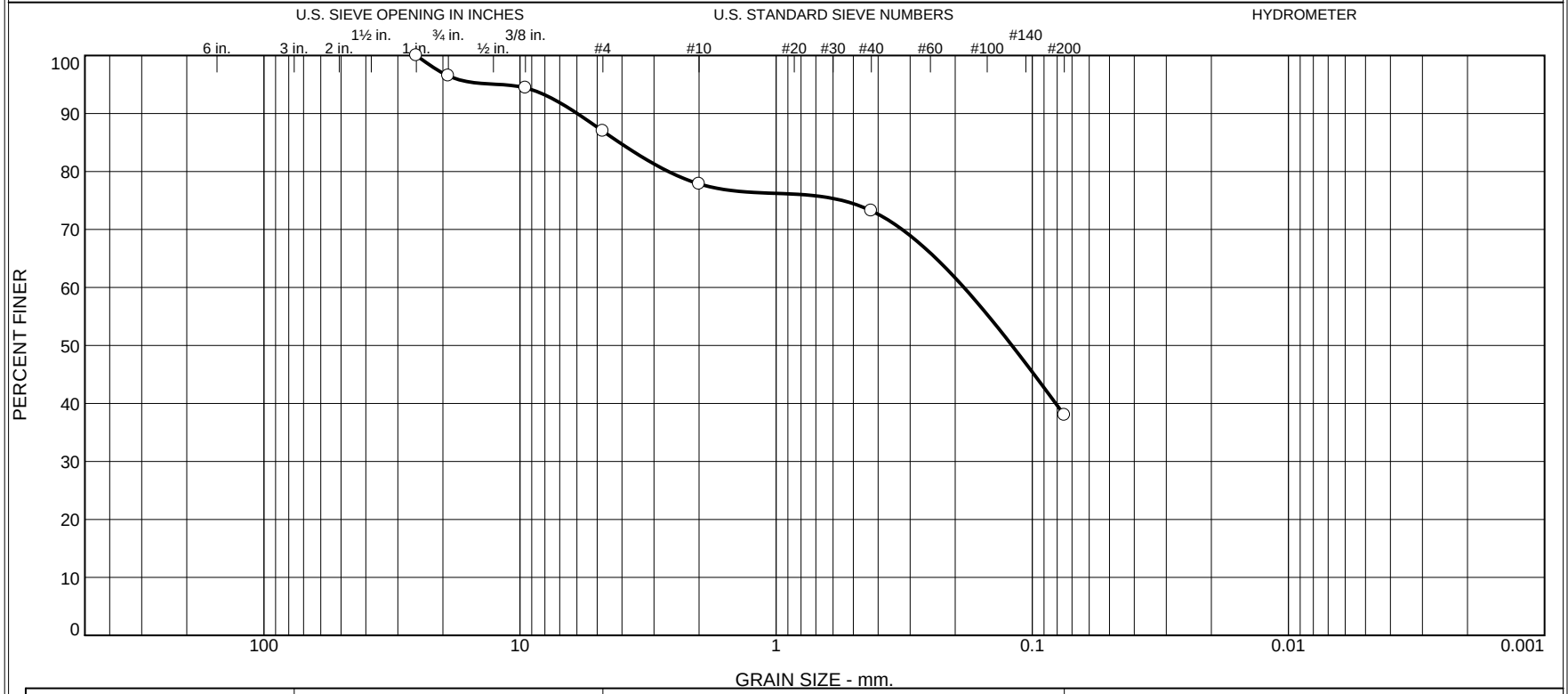
Project No. GEO23-097 Figure

Materials Testing of Arkansas

Little Rock, AR

Tested By: S. PENNINGTON **Checked By:** F. MONDUN

Particle Size Distribution Repor



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.5	9.5	9.1	4.7	35.2	38.0	

Source	Sample #	Depth/Elev.	Date Sampled	AASHTO	Material Description	NM %	LL	PL
B-2	S-2	2	6-15-2023	A-6(2)	TANNISH GRAY TO RED, CLAYEY SAND	18.2	38	22

Client HOPE CONSULTING

Project 50 ACRES SUBDIVISION

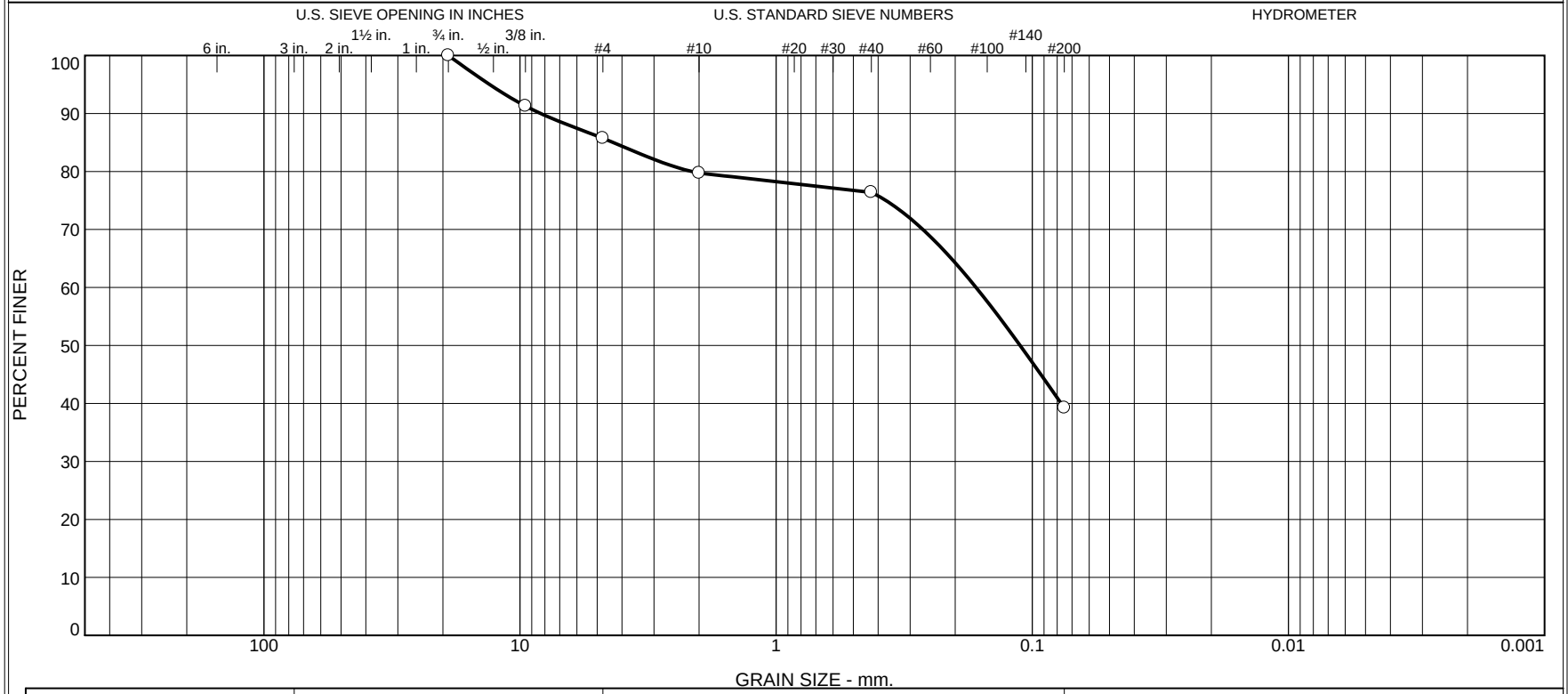
Project No. GEO23-097 Figure

Materials Testing of Arkansas

Little Rock, AR

Tested By: S. PENNINGTON **Checked By:** F. MONDUN

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.3	6.0	3.3	37.2	39.2	

Source	Sample #	Depth/Elev.	Date Sampled	AASHTO	Material Description	NM %	LL	PL
B-4	S-1	0	6-15-2023	A-4(0)	TAN-RED, CLAYEY SAND	10.7	24	14

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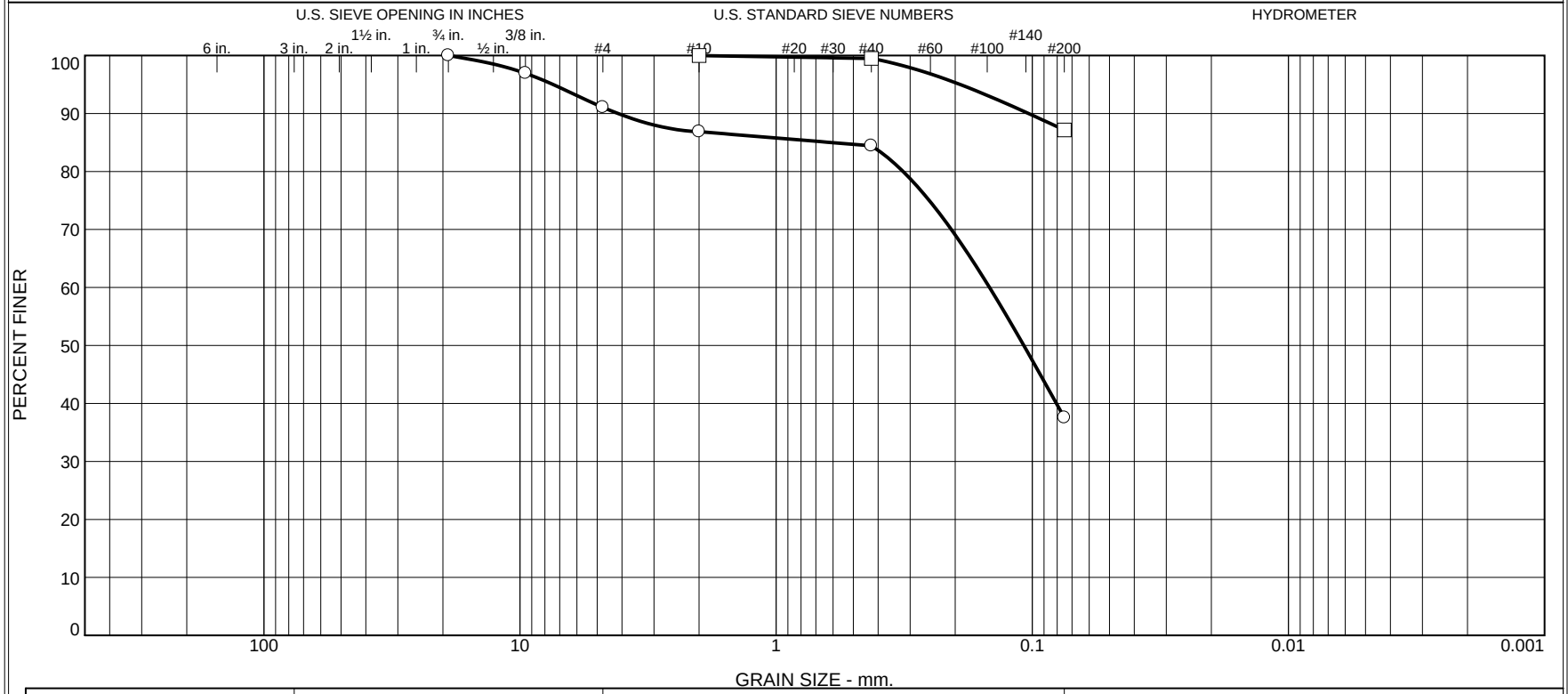
Project No. GEO23-097 Figure

Materials Testing of Arkansas

Little Rock, AR

Tested By: S. PENNINGTON **Checked By:** F. MONDUN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	8.9	4.2	2.5	46.8	37.6	
□	0.0	0.0	0.0	0.0	0.5	12.3	87.2	

	Source	Sample #	Depth/Elev.	Date Sampled	AASHTO	Material Description	NM %	LL	PL
○	B-5	S-1	0	6-15-2023	A-6(1)	TAN-RED, CLAYEY SAND	14.6	27	14
□	B-5	S-3	4	6-15-2023	A-6(14)	TANNISH RED TO GRAY, SANDY CLAY	36.1	35	18

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Project 50 ACRES SUBDIVISION

Project No. GEO23-097 Figure

Materials Testing of Arkansas

Little Rock, AR

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Appendix E:
Seismic Design Criteria

Hazards by Location

Search Information

Coordinates: 34.643606998951, -92.50461665805817

Elevation: 542 ft

Timestamp: 2023-06-27T19:08:20.123Z

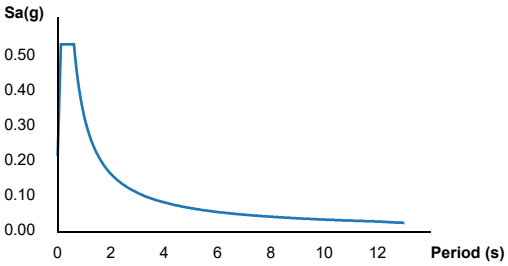
Hazard Type: Seismic

Reference Document: IBC-2015

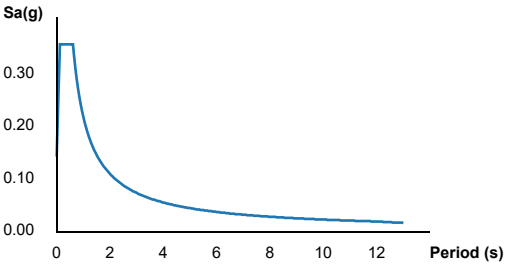
Risk Category: II

Site Class: D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.352	MCE_R ground motion (period=0.2s)
S_1	0.148	MCE_R ground motion (period=1.0s)
S_{MS}	0.534	Site-modified spectral acceleration value
S_{M1}	0.326	Site-modified spectral acceleration value
S_{DS}	0.356	Numeric seismic design value at 0.2s SA
S_{D1}	0.218	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.519	Site amplification factor at 0.2s
F_v	2.209	Site amplification factor at 1.0s
CR_S	0.839	Coefficient of risk (0.2s)
CR_1	0.817	Coefficient of risk (1.0s)
PGA	0.18	MCE_G peak ground acceleration
F_{PGA}	1.439	Site amplification factor at PGA
PGA_M	0.26	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	0.352	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.419	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.148	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.181	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)

PGAd	0.6	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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