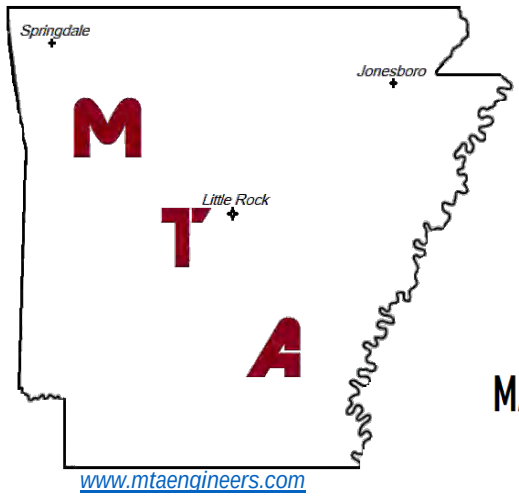

MTA ENGINEERS

a division of Materials Testing of Arkansas, Inc.

GEOTECHNICAL ENGINEERING
MATERIALS TESTING - SPECIAL INSPECTIONS

GEOTECHNICAL ENGINEERING EXPLORATION

Proposed "Hamlet Apartments"

Conway, Arkansas

PREPARED FOR:

McCarty Architects
533 West Main Street
Tupelo, Mississippi 38804

PREPARED BY:

MTA ENGINEERS
a Division of Materials Testing of Arkansas, Inc.
8001 National Drive
Little Rock, AR 72202

December 11th, 2019

MTA Engineers: *a Division of Materials Testing of Arkansas, Inc.*
♦Little Rock, AR ♦Springdale, AR ♦Jonesboro, AR
P.O.Box 2375 Little Rock, AR 72221
501-753-2526 or mtaengineers.com

December 11th, 2019

Jay Bryan
McCarty Architects
533 West Main Street
Tupelo, Mississippi 38804
Sent via email: jbryan@mccartycompany.com

Subject: Report of Geotechnical Engineering Exploration
Proposed "Hamlet Apartments"
Conway, Arkansas

Mr. Bryan:

MTA Engineers has completed the authorized Preliminary Geotechnical Engineering Exploration for the subject project. This work was conducted in accordance with the agreement between MTA ENGINEERS and McCarty Architects, which is detailed in MTA Engineers Proposal, dated November 1sh, 2019.

The purpose of our work was to explore general surface and subsurface conditions within the subject project site, and to gather and present data relative to the design and construction of the proposed facility located in Hot Springs, 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

STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER ★ ★ ★ No. 8019 STEVEN RAY GARRETT

Steve Garett, PE
Arkansas Registration No.8019
President, Senior Geotechnical Engineer
Office +1 501-753-2526
steve@mtaengineers.com

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SECTION

APPENDICES

TABLES

EXECUTIVE SUMMARY

The geotechnical exploration was conducted at the proposed site for the Hamlet Apartments project in Conway, Arkansas. At the time of exploration, the site consisted of wooded acreage sloping south from elevation 350 to 285. The soil strata were generally consistent with layers of silty clay with sand seams. Soft sandstone and shale layers were encountered within 7 feet of existing grade. The consistency of the subsurface conditions varied from soft saturated to stiff sandy clay with some sandstone and shale.

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

Table1. Soil Types Encountered

SOIL TYPE	DESCRIPTION
CL	Silty Clay with Organics OR Sandy Clay
GC	Sandstone/ Shale Fragments-Sand-Clay Mixtures

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

Based on the nature of the existing soil encountered at the time of exploration and the anticipated loading, it is recommended that the apartments be supported on continuous and individual spread footings founded within the clay layer of Stratum II or select compacted fill. Continuous and individual footings may be sized using an allowable bearing pressure of 2500-psf & 3000-psf, respectfully. All footings must be founded a minimum of 2-ft beneath final exterior ground elevation.

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 bearing stratum.

SUMMARY:

- **Rock/Hard Dig:**
  - No hard rock was encountered.

- **Soils:**
  - In general, the soils will consist of soft, saturated sandy clay beneath elevation 310
  - **Undercutting up to 3.5 feet will be required**
  - Stability of these soils will be dependent on soil-moisture conditions at the time of construction.
  - Groundwater may be present within the above the sandstone or shale seams during wet periods.

- **Foundations/Slabs:**
  - Shallow foundations founded within the sandy clay soils or properly compacted fill may be sized using a net allowable end bearing pressure of 2500 psf and 3000 psf for continuous and individual spread footings.

- **Un-compacted Fill:**
  - No un-compacted fill was encountered on the property during the exploration.
- **Pavement Section:**
  - Pavement section will generally consist of light duty parking and heavy-duty drives. Recommended sections are provided in the "Pavement Section" of this report.

- **Stump/Organic Findings:**
  - The potential for finding stumps or other organic material beneath the surface is low.
  - There are no indications of buried debris.

- **Deep Utilities:**
  - Excavation for deep utilities can be performed with medium duty equipment

INTRODUCTION

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

Exploration was accomplished by:

1. Borings or test pits performed at 7 locations within the plan building and pavement area to a maximum depth of 10 ft to explore subsurface soil, rock, and groundwater conditions.
2. Obtaining samples from each stratum 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 a phase 1 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 10 or test pits at 7 locations. The approximate locations are shown below.

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 or excavating procedures facilitated observation of shallow groundwater conditions. No free groundwater was encountered within the depths explored.

GENERAL SITE AND SUBSURFACE CONDITIONS

The exploration of the 10 Acres in Conway, Arkansas was performed on December 5-6, 2019. The general stratigraphy of the property consisted of soft, saturated sandy clay to stiff sandy clay above elevation 310. New roadways and drives will be constructed as part of the project. It is assumed the improvements will be constructed at\or beneath the existing grade to achieve proper drainage. The stratigraphy encountered in the boring locations is summarized in Table2.

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

Table2. General Strata Classification of Boring Logs

STRATA	DEPTH	SOIL CLASSIFICATION	SOIL DESCRIPTION	SIGNIFICANT PROPERTIES
STRATUM I	0 to 2 -4 ft	CL	Silty Clay with Organics	Very Soft, Saturated Moisture Sensitive
STRATUM II (a)	2 - 4 ft to Completion	CL	Sandy Clay	Firm to Stiff Low Shrink Swell Potential
STRATUM II (b)	2 – 6 ft to Completion	GC	Sandy Clay with Sandstone Fragments	Medium Dense

Some perched groundwater was encountered at the site above the sandstone and shale.

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

A. The topography of the site and planned locations.
B. The soft saturated soils to a depth of 3 to 4 feet at elevations lower that 10-ft.

C. The anticipated loading.
D. The inherent loss in shear strength of the clay soils upon saturation.

LABORATORY TESTING

Descriptions of the soils encountered in the sample locations were prepared in general accordance with applicable ASTM standards. The soil stratification shown on the Boring Log Reports represent soil conditions at the specific sample locations. Possible variations occur between or beyond the sample location. The stratification lines on the Boring Log represent the approximative boundaries between soil types, but actual transitions between soil layers in the stratification of the proposed site may be gradual.
Laboratory testing was performed to verify/evaluate the response of the cohesive soil to stress, classification and to determine water content. The results of the laboratory testing are presented on the attached boring logs in addition to the lab test results presented in the attached appendices.

ANALYSIS AND RECOMMENDATIONS

SITE PREPARATION

The site is currently wooded and will require clearing and stripping of the organic containing soil.
Stripping on the order of 12 inches on average is anticipated due to the level of saturation. The soils are moisture sensitive and will lose soil shear strength upon saturation.

Excavation should be performed during drier periods of the year. The in-situ clay stratum has variable shrink swell potential depending on the sand content. **Undercutting up to 3.5 feet will be required at elevations below 310.** There are some cuts up to 5 feet anticipated to establish grade. These areas are anticipated to be stable.

Construction traffic accessibility will be limited during wetter periods. Positive drainage should be maintained throughout this process. The addition of excessive moisture could cause a significant loss of soil stability. Depending upon time of construction additional isolated undercutting may be needed for areas of high moisture content where loss of soil shear strength has occurred due to inundation, however this is not anticipated. If areas of instability due to high moisture are encountered during construction, the areas should be processed by scarifying, drying, and re-compacting.

STRUCTURAL FILL

The improvements will require additional select fill to establish final grade. Select fill, consisting of low plasticity (PI of 12% minimum) 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. Higher plasticity clay soils (soils with a Liquid Limit above 40) should not be used as fill without consideration of placement location, drainage, and procedures. Rock fragments that are greater than 4-in should not be included in engineered fill.

Placement of approved fill should be achieved in multiple thin lifts. Each lift should not exceed eight (8") inches in loose thickness. Compaction of these lifts should be performed with suitable equipment to achieve 95% of the material's modified proctor (ASTM D-1557) at optimum to 3% above optimum moisture content. Care should be taken that all compaction recommendations are performed.

In undercut areas of soft saturated soil, a "bridge lift" of select fill may be required. If required, the initial bridge may be placed in a single lift thickness of 12 to 18 in- and compacted to a minimum of 90% of Specified Proctor Value. If a bridge lift is required, vibration of the bridge lift should be avoided. Additional lifts should be compacted as stated above.

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. On-site soils are considered suitable for structural fill with precautions for loss in shear strength upon saturation and installation of proper drainage. The on-site soils should be evaluated during construction by a representative of MTA Engineers for proper use and compaction.

BUILDING FOUNDATIONS

All foundations must satisfy two basic and independent design criteria. First, foundations must have 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. The factors and the aforementioned subsurface conditions were influential in development of the following recommendation.

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

FOUNDATIONS/ SLABS

Shallow Foundations

If final grades are at or above existing elevation, we recommend that the proposed building structures be supported on a continuous and individual spread footings , founded a minimum of 24 in. beneath the final exterior grade within Stratum II or compacted select fill.

For design, continuous and individual spread footings may be sized using a net allowable end bearing pressure of 2500 psf and 3000 psf from continuous and individual spread footings, respectfully. This net allowable end bearing pressure will be based on a factor of safety in excess of 3.0. Total and differential settlement is anticipated to be less than 0.5 inches.

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.

RETAINING WALLS PARAMETERS

The construction of retaining walls is required for this project so we are providing wall parameters for design. Therefore, it is assumed that the bearing soils will be compacted aggregate base course. The fill material within the reinforced zone is recommended to be a select granular fill. Generally, an AHTD Class 7 crushed stone base course or equivalent is acceptable as granular fill. In addition, the design may need to incorporate a concrete leveling foundation to be placed beneath the wall.

Wall design must include consideration of hydrostatic pressures due to infiltration of groundwater or perched water above the low permeability clay infiltrating into the wall backfill. Unless design incorporates other measures, lateral earth pressures can be reduced, and proper drainage maintained by backfilling the zone behind the wall extending at least 1-ft laterally with clean, free draining granular soils.

Typically, a granular material complying with the gradation of ASTM C-33 Grade #57 is suitable for use as drainage media or free draining backfill. A geotextile fabric should be used to separate free draining granular soil and compact backfill. If crushed stone base is placed beneath and within the reinforcing zone, a drainage media may be omitted.

Footing drains should also be incorporated into design if not placed on aggregate base. To allow drainage of groundwater and seepage water from wall backfill, a perimeter drain at footing depth consisting of a continuous, perforated PVC pipe wrapped in geotextile fabric should be provided within the granular drainage course. Water should be discharged from backfill by a positive discharge system.

As stated previously, lateral earth pressures will be influenced by wall construction (i.e., active or at-rest pressures), backfill type and drainage of infiltrated water. Design parameters of equivalent fluid weights, in pcf for alternative backfill and loading conditions are summarized below. These equations are based on positive drainage. If positive drainage cannot be maintained, then design must consider the added hydrostatic pressures.

Backfill	Equivalent Fluid Weight, lbs./cu-ft	
AHTD Class 7	Active 35	At-Rest 55
Shale Fill	Active 45	At-Rest 65

Wall pressures must also consider surcharge loads, if any.

PAVEMENT DESIGN

Paved roadways will be constructed as part of the project. Any city street alterations, widening or addition, the subgrade upon preparation will require inspection by the City of Conway. Design traffic volumes and loadings have not been determined at this time. However, we anticipate that the drives will be subject to light vehicles and daily truck traffic. We also anticipate that pavement construction will involve only minor cut and fill. 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 the soils in Stratum II or select compacted fill. Structural fill, where required, should be placed as recommended in the site grading section of the report. It is recommended that positive site drainage should be provided during construction and be incorporated during the final design.

Table 4. Pavement Design Recommendations

PAVEMENT DESIGN RECOMMENDATIONS	
Light Duty Residential	2-in ACHM Surface Course
	6-in Crushed Stone Base Course
	8-in Compacted Subgrade
Heavy Duty Asphalt Paving	4-in Asphalt Surface Course
	6-in Crushed Stone Base Course
	8-in Compacted Subgrade
Light Duty Concrete Paving	5-in Concrete Pavement
	6-in Crushed Stone Base Course
	8-in Compacted Subgrade
Heavy Duty Concrete and Dumpster Pad	7-in Concrete Pavement
	6-in Crushed Stone Base Course
	8-in Compacted Subgrade

Note: Pavement design for any city street should be verified and comply with current city requirements for minimal pavement thickness for city streets.

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 un-compacted fill was encountered on the property during our exploration.

SEISMIC CONSIDERATION

Based on IBC-2015, a site soil **Class B** may be used for design purpose. 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 groundwater 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. The silty clay will have inherent loss of shear strength upon saturation.

Drainage should be established at the start of the project and maintained throughout construction. Consideration should be given to placing 2 to 3 inches of crushed stone aggregate base course upon final grading for construction traffic during wetter periods. Surface rutting will occur upon saturation under traffic.

♦ ♦ ♦ ♦

The following illustrations are attached and complete this report:

Appendix A: Plan of Borings
Appendix B: Borings Logs
Appendix C: Key to terms and Symbols
Appendix D: Seismic Design Criteria

♦ ♦ ♦ ♦

Appendix A:
Boring Location Plan


Sherwood Ln
McNatt Rd
Dena Ln
Old Military Rd
B-1
B-2
B-3
B-4
B-5
B-6
B-7

Appendix B:
Boring Logs

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Boring Log Report

BORING NO. TP-1
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			BROWN, SILTY SANDY CLAY W/ SANDSTONE FRAGMENTS & SURFACE ORGANIC, FIRM TO STIFF	CL	19	10.5	27	8	23.8		
			RED, SANDY CLAY W/ SANDSTONE FRAGMENTS, STIFF								
5			ORANGE & RED, SANDY CLAY W/ SANDSTONE-SHALE	GC							
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Boring Log Report

BORING NO. TP-2
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			TAN & RED, SILTY SANDY CLAY W/ SANDSTONE-SHALE, FIRM TO STIFF	CL							
5			ORANGISH RED, SANDSTONE-SHALE W/ SOME FAT CLAY, STIFF	GC	28	13.7	53	25	39.1		
			TAN & RED, SANDY CLAY W/ SANDSTONE-SHALE.								
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

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Boring Log Report

BORING NO. TP-3
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			BROWN, SILTS W/ SOME FINE SAND & SURFACE ORGANIC, FIRM TO STIFF	ML	NP	47.0	NV		75.8		
			RED, SANDY CLAY W/ SANDSTONE FRAGMENTS, STIFF	GC							
5			ORANGE & RED, SANDY CLAY W/ SANDSTONE-SHALE								
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

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Boring Log Report

BORING NO. TP-4
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			BROWN, SILTY SANDY CLAY, V.SOFT & SATURATED	CL	20	24.2	30	10	72.2		
5			ORANGE & GRAY, SANDY CLAY								
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

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Boring Log Report

BORING NO. TP-5
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			BROWN, SILTY SANDY CLAY, SOFT & SATURATED	CL							
5			RED & TAN, SANDY CLAY		17	17.3	29	12	79.9		
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

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Boring Log Report

BORING NO. TP-6
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			BROWN, SILTY SANDY CLAY, SOFT & SATURATED	CL	20	30.7	36	16	85.7		
			TANNISH GRAY, SANDY CLAY								
5			GRAY & TAN, SANDY CLAY W/ SANDSTONE	GC							
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 7 WATER DEPTH> INITIAL: AFTER 24 HOURS:

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Boring Log Report

BORING NO. TP-7
PAGE 1 OF 1

JOB NO.
JOB NAME: HAMLET APARTMENTS
COORDINATES: NORTH: EAST:
STATION:
LOCATION: CONWAY, AR

DATE: 12/10/2019
TYPE OF DRILLING: MINI EXCAVATOR
EQUIPMENT: BOBCAT E35
LOGGED BY: S.MANZI
DRILLED BY: Q.MOORE

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
			GRAY,SILTY SANDY CLAY, SOFT & SATURATED	CL	21	23.0	42	21	81.5		
			GRAY & RED, SANDY CLAY								
5			TANNISH BROWN, SANDY CLAY								
			ORANGE & GRAY, SANDY CLAY W/ SANDSTONE	GC							
			Boring Terminated								
10											
15											
20											
25											
30											

COMPLETION DEPTH: 8 WATER DEPTH> INITIAL: AFTER 24 HOURS:

REMARKS:

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Appendix C:
Key to Terms

MTA ENGINEERS a division of
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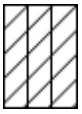
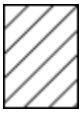
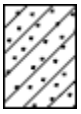
TERMS AND SYMBOLS USED ON BORING LOGS

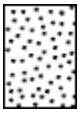
SOIL TYPES

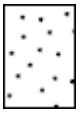

CLAY (CH)

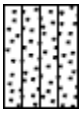

SILTY CLAY (CL)


CLAY (CL)

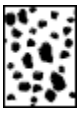

SANDY CLAY (CL)

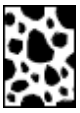

WELL-GRADED SAND (SW)

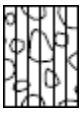

POORLY-GRADED SAND (SP)


SILTY SAND (SM)


CLAYEY SAND (SC)

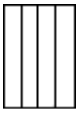

WELL-GRADED GRAVEL (GW)

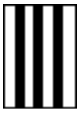

POORLY-GRADED GRAVEL (GP)

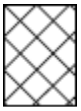

SILTY GRAVEL (GM)


SANDY SILT (ML)

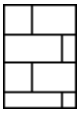

CLAYEY GRAVEL (GC)


SILT (ML)

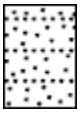

SILT (MH)

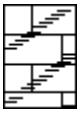

FILL MATERIAL

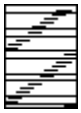
ROCK TYPES

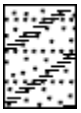

LIMESTONE


SHALE


SANDSTONE

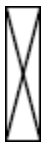

WEATHERED LIMESTONE


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

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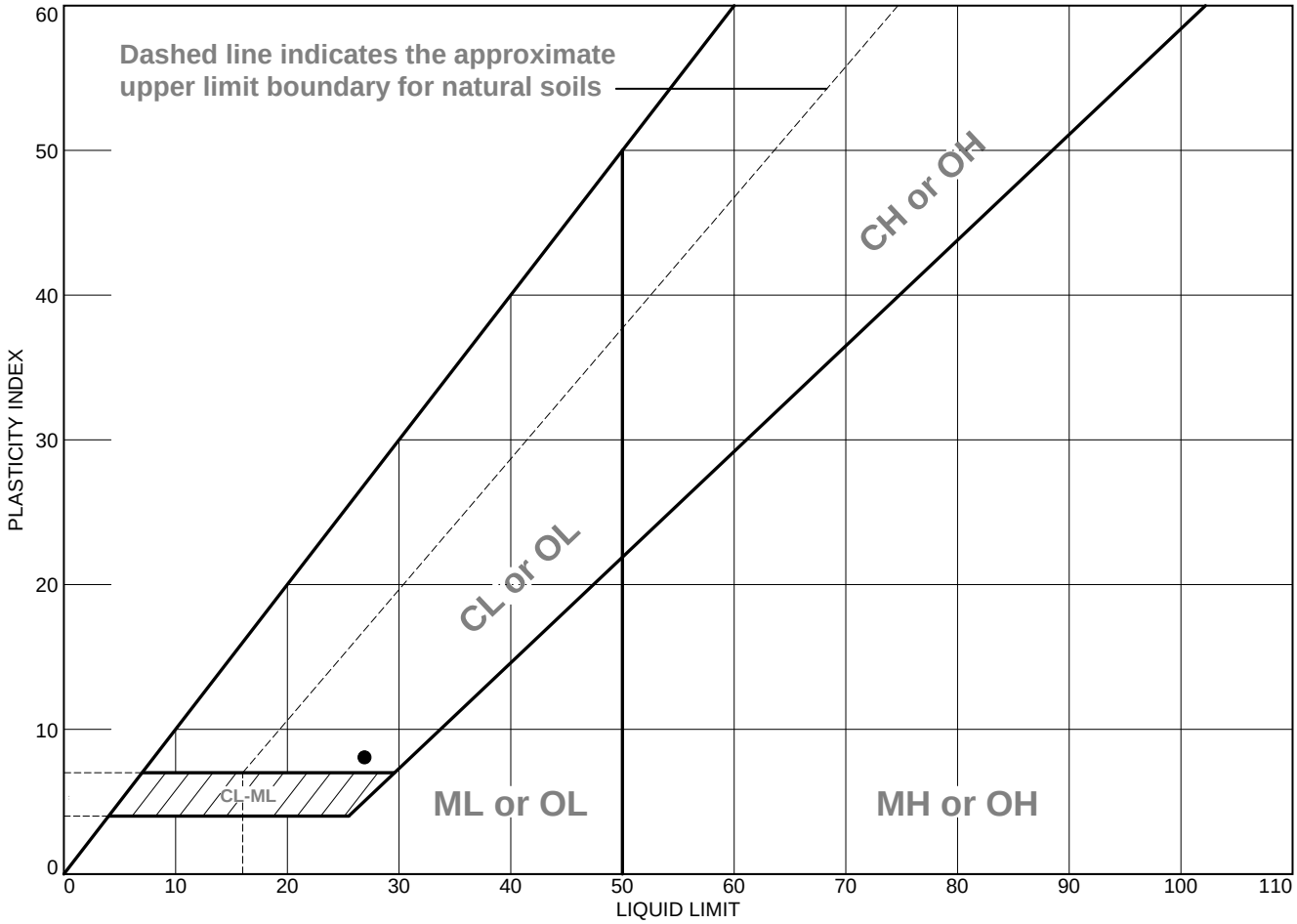
Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with UNIFIED SOIL CLASSIFICATION SYSTEM as described in technical Memorandum No 3-357, Waterways Experiment Station, March 1953

Appendix D:
Laboratory Test Results

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	RED, SILTY SANDY CLAY W/ SANDSTONE FRAGMENTS, STIFF	27	19	8	30.6	23.8	GC

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-1 **Depth:** 2

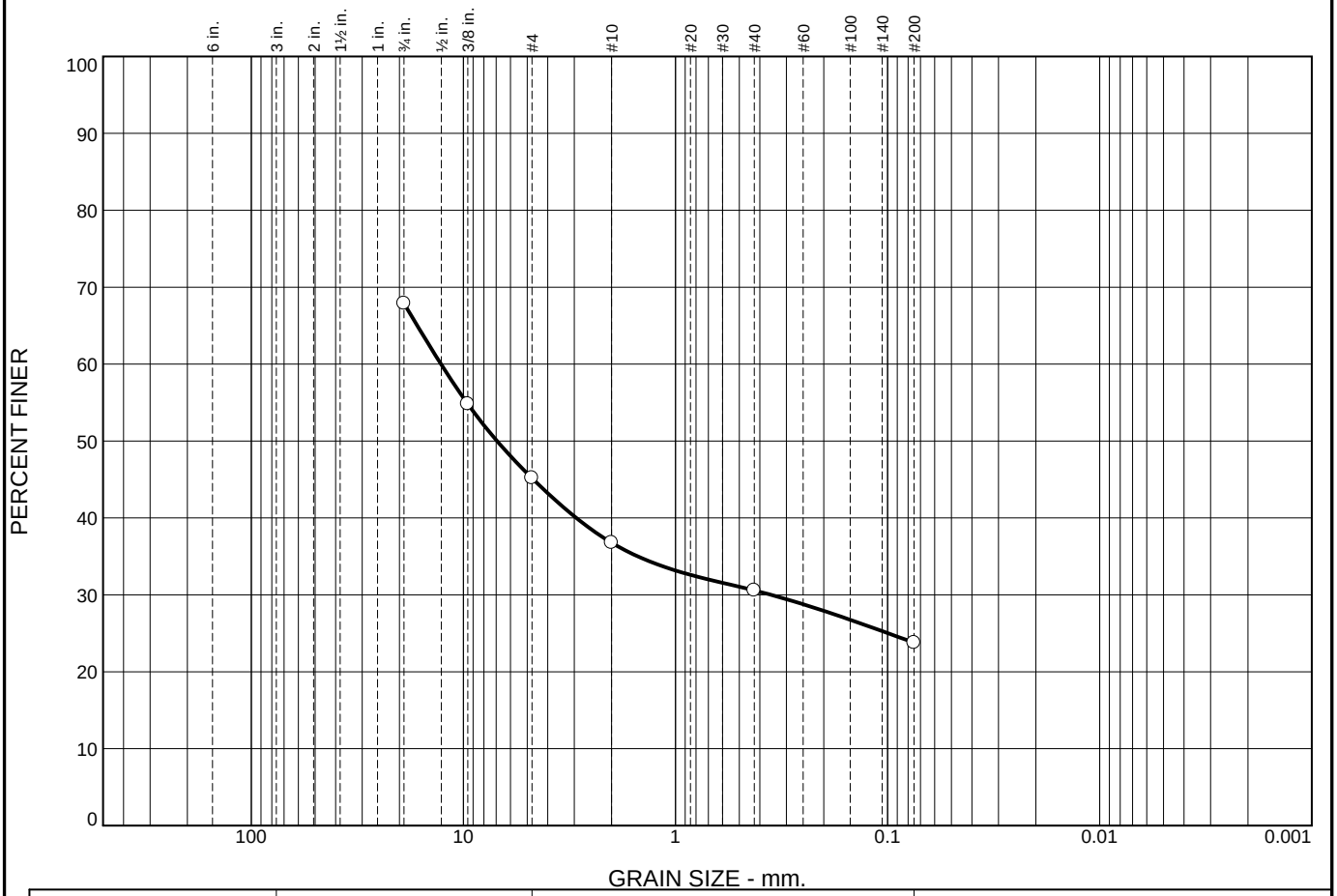
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○			22.7	8.4	6.2	6.8	23.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	27	19		12.7454	6.9352	0.3542				

Material Description	USCS	AASHTO
○ RED, SILTY SANDY CLAY W/ SANDSTONE FRAGMENTS, STIFF	GC	A-2-4(0)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-1 **Depth:** 2

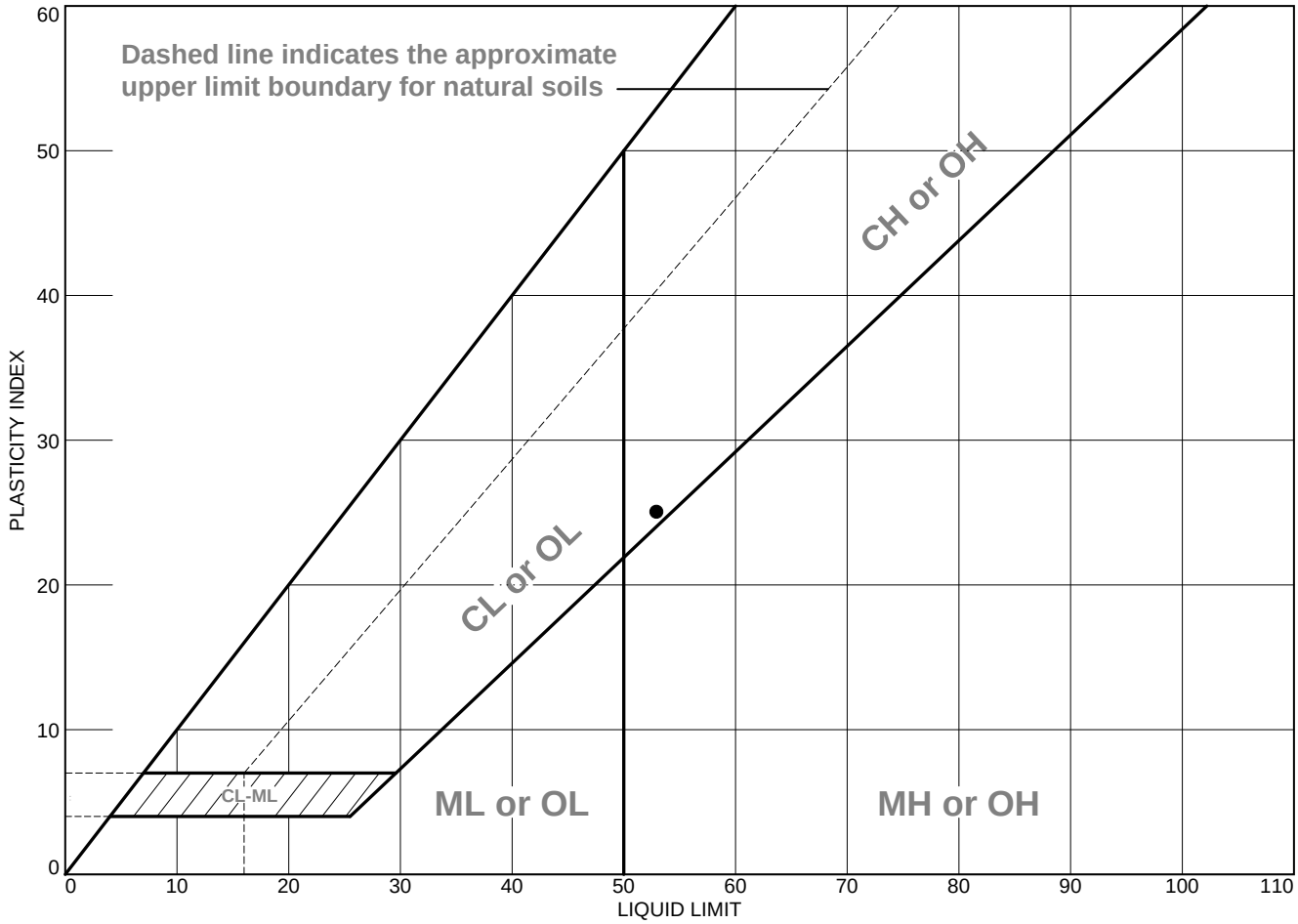
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	ORANGISH RED, SANDSTONE-SHALE W/ SOME FAT CLAY, STIFF	53	28	25	39.8	39.1	GC

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-2 **Depth:** 4

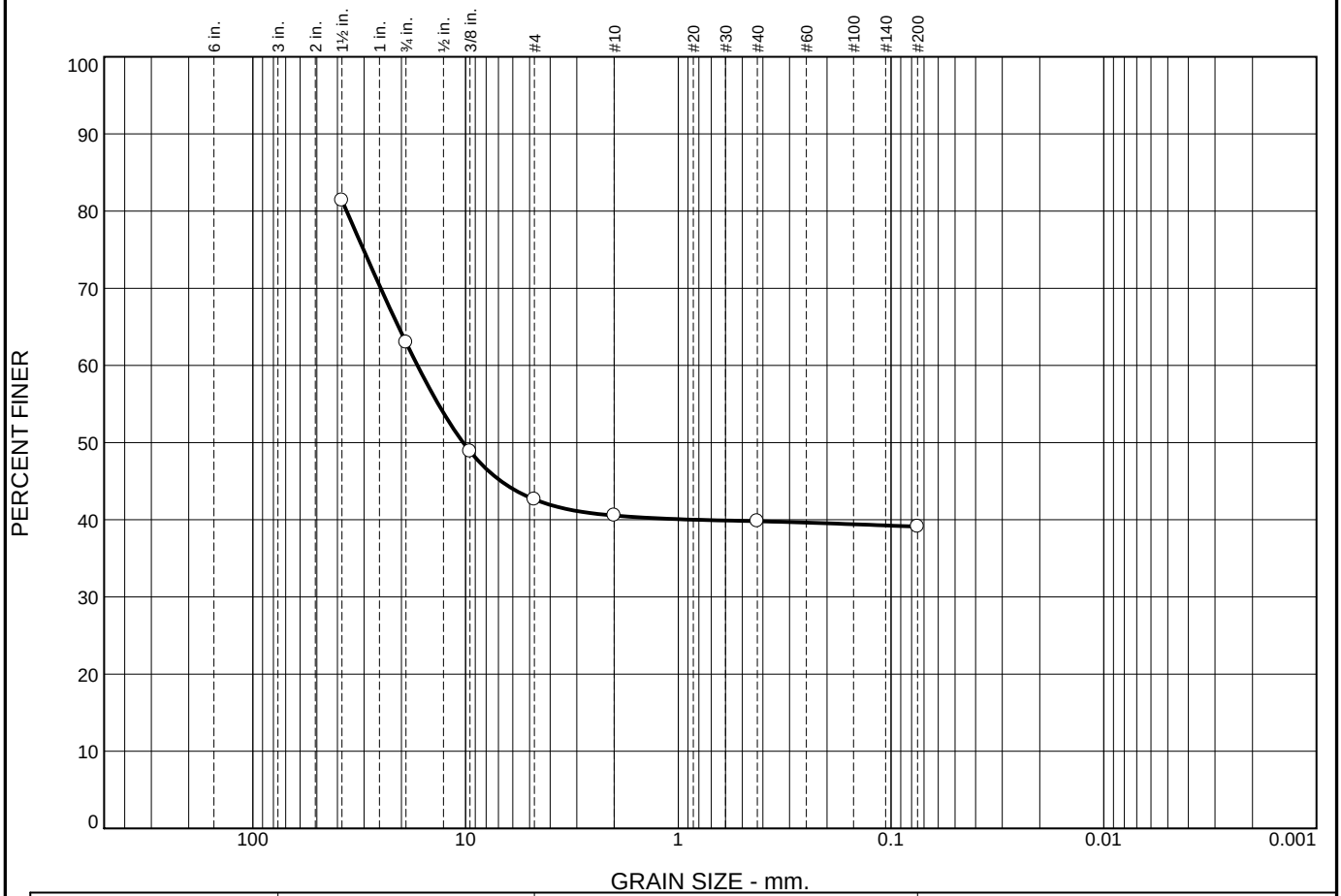
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○			20.4	2.1	0.7	0.7	39.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	53	28		16.8275	10.2546					

Material Description	USCS	AASHTO
○ ORANGISH RED, SANDSTONE-SHALE W/ SOME FAT CLAY, STIFF	GC	A-7-6(5)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-2 **Depth:** 4

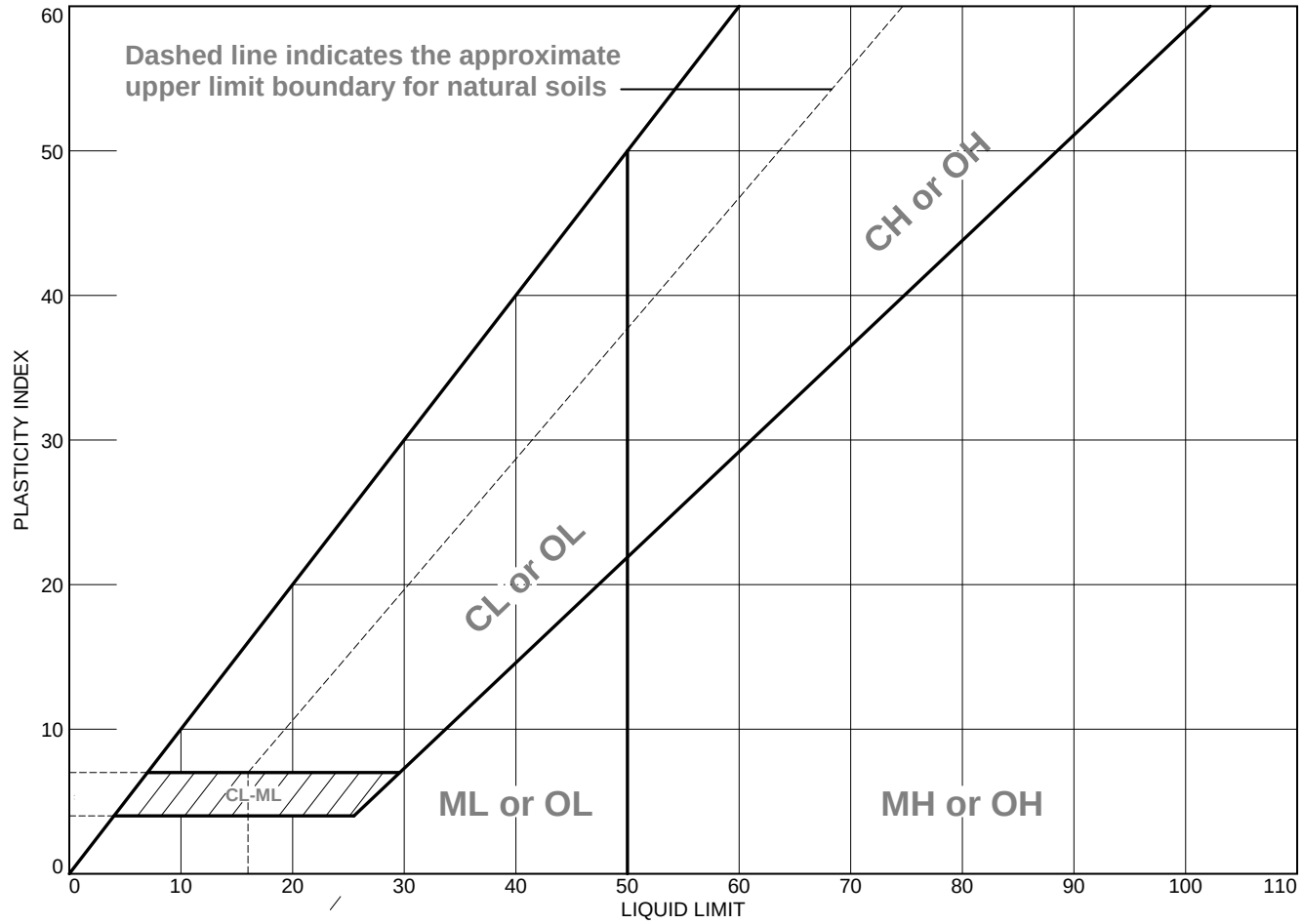
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	BROWN, SILTS W/ SOME SAND & SURFACE ORGANIC, FIRM TO STIFF	NV	NP	NP	93.4	75.8	ML

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-3 **Depth:** 0

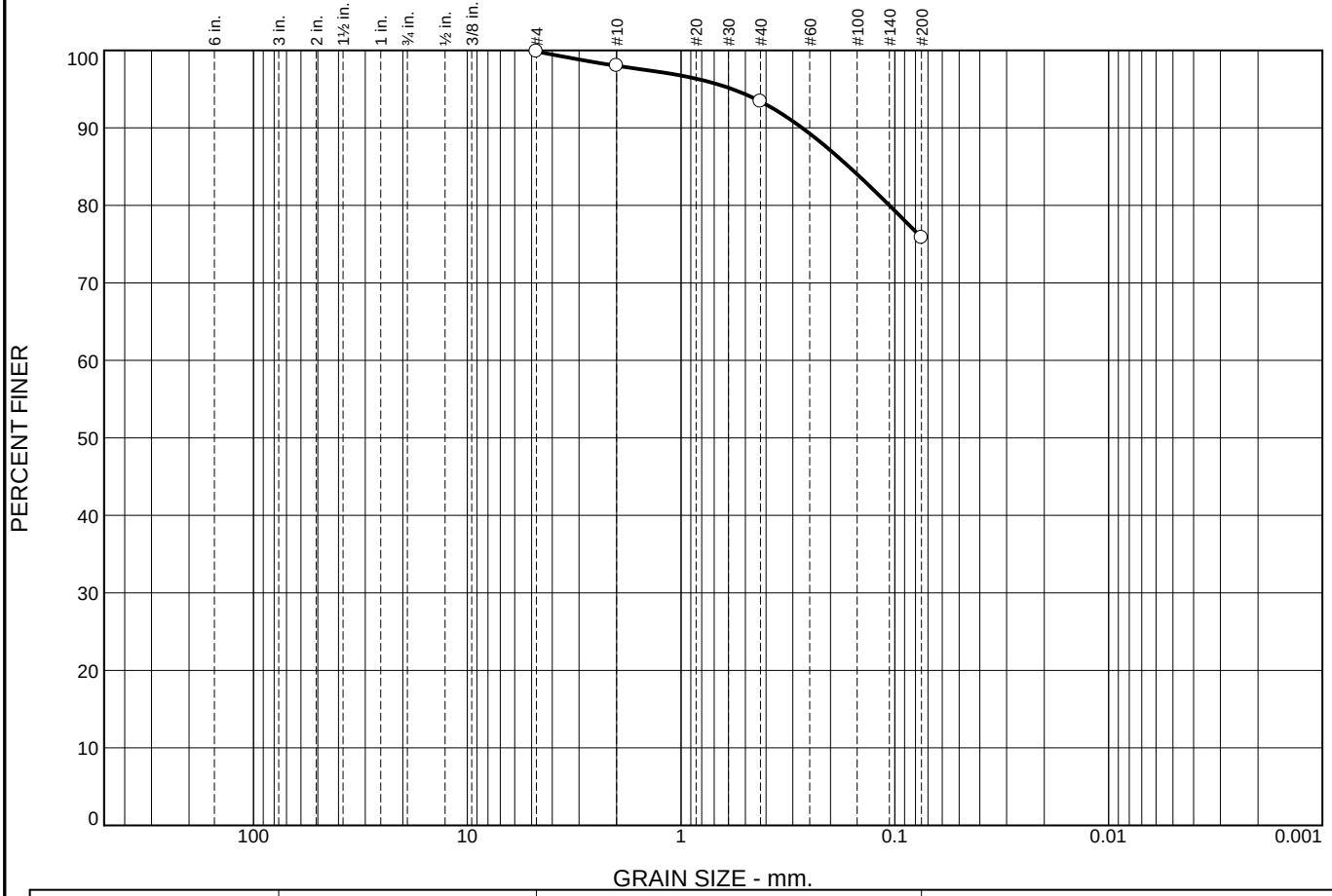
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				1.9	4.6	17.6	75.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.1641							

Material Description	USCS	AASHTO
○ BROWN, SILTS W/ SOME SAND & SURFACE ORGANIC, FIRM TO STIFF	ML	A-4(0)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-3 **Depth:** 0

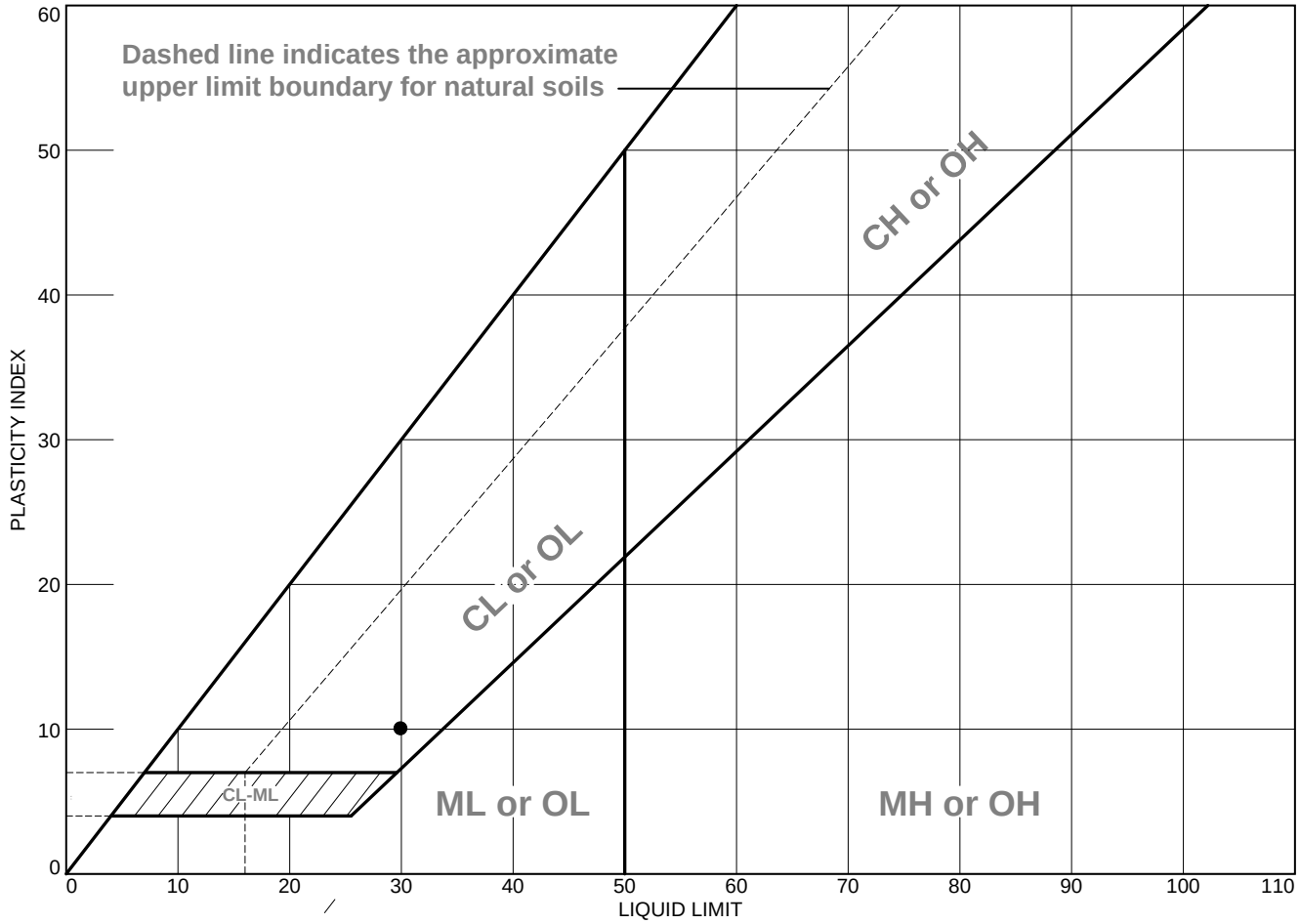
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	ORANGE & GRAY, SILTY SANDY CLAY	30	20	10	84.3	72.2	CL

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-4 **Depth:** 2

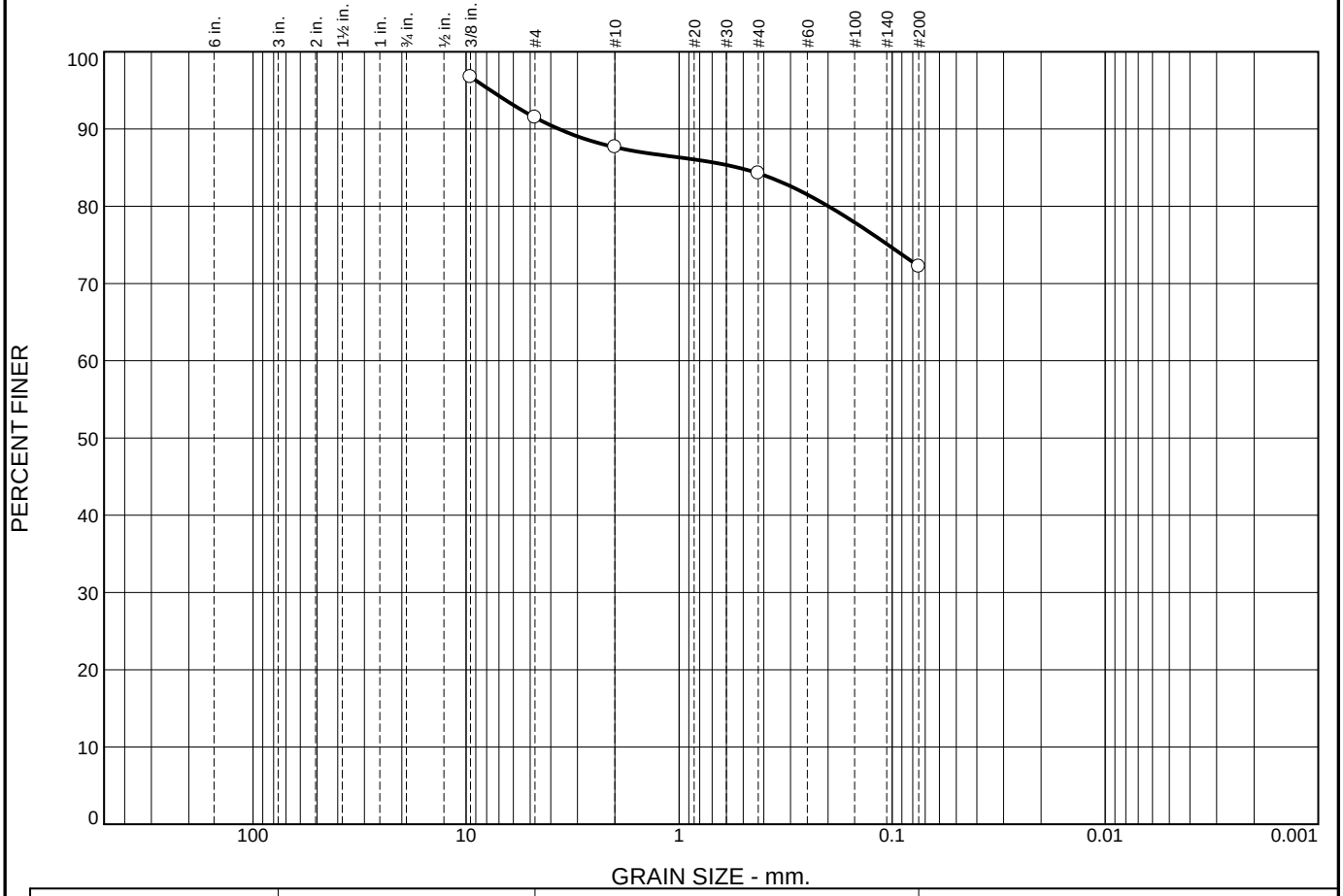
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				3.9	3.3	12.1	72.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	30	20	0.5267							

Material Description	USCS	AASHTO
○ ORANGE & GRAY, SILTY SANDY CLAY	CL	A-4(6)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-4 **Depth:** 2

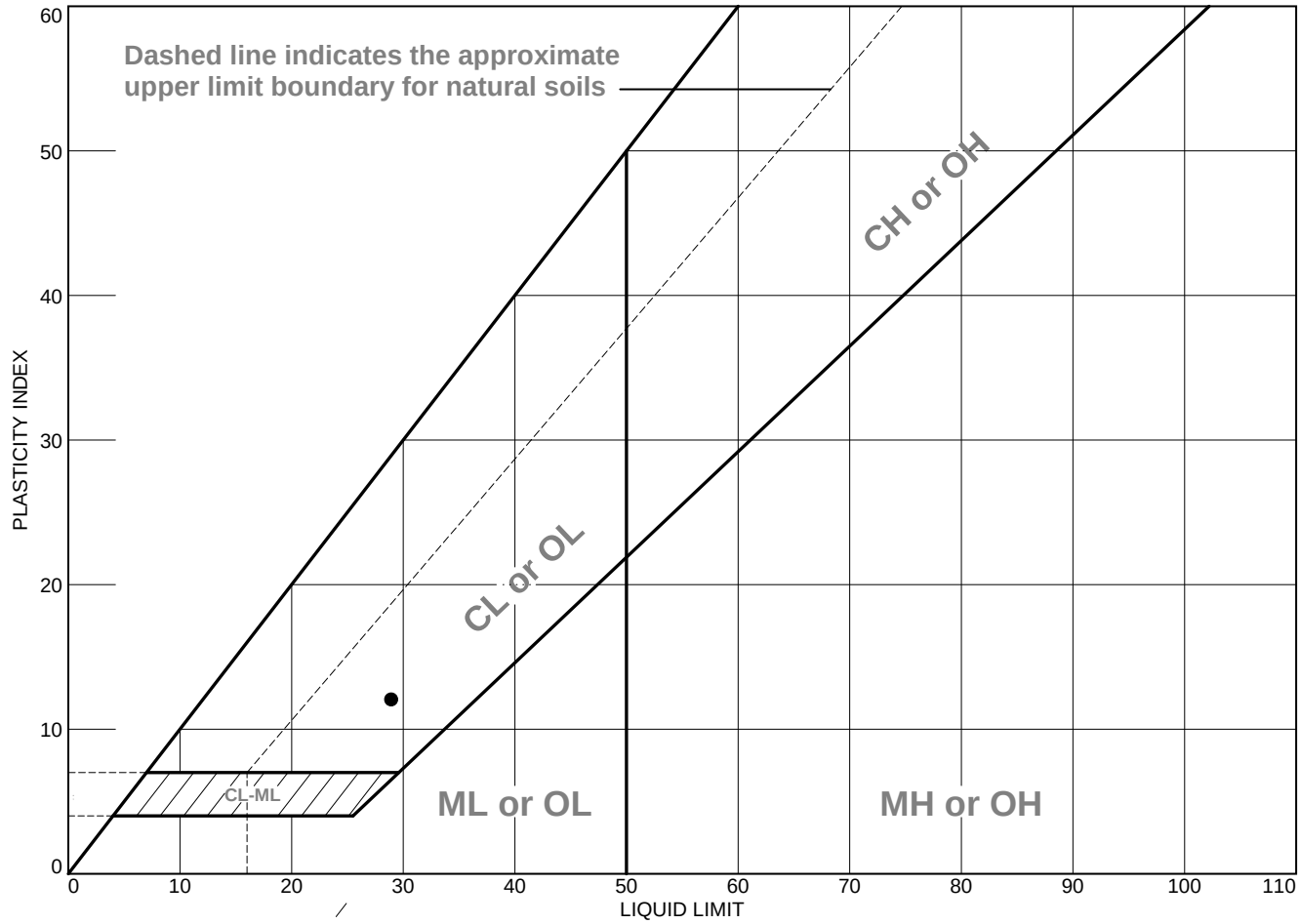
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	RED & TAN, SANDY CLAY	29	17	12	90.9	79.9	CL

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-5 **Depth:** 5

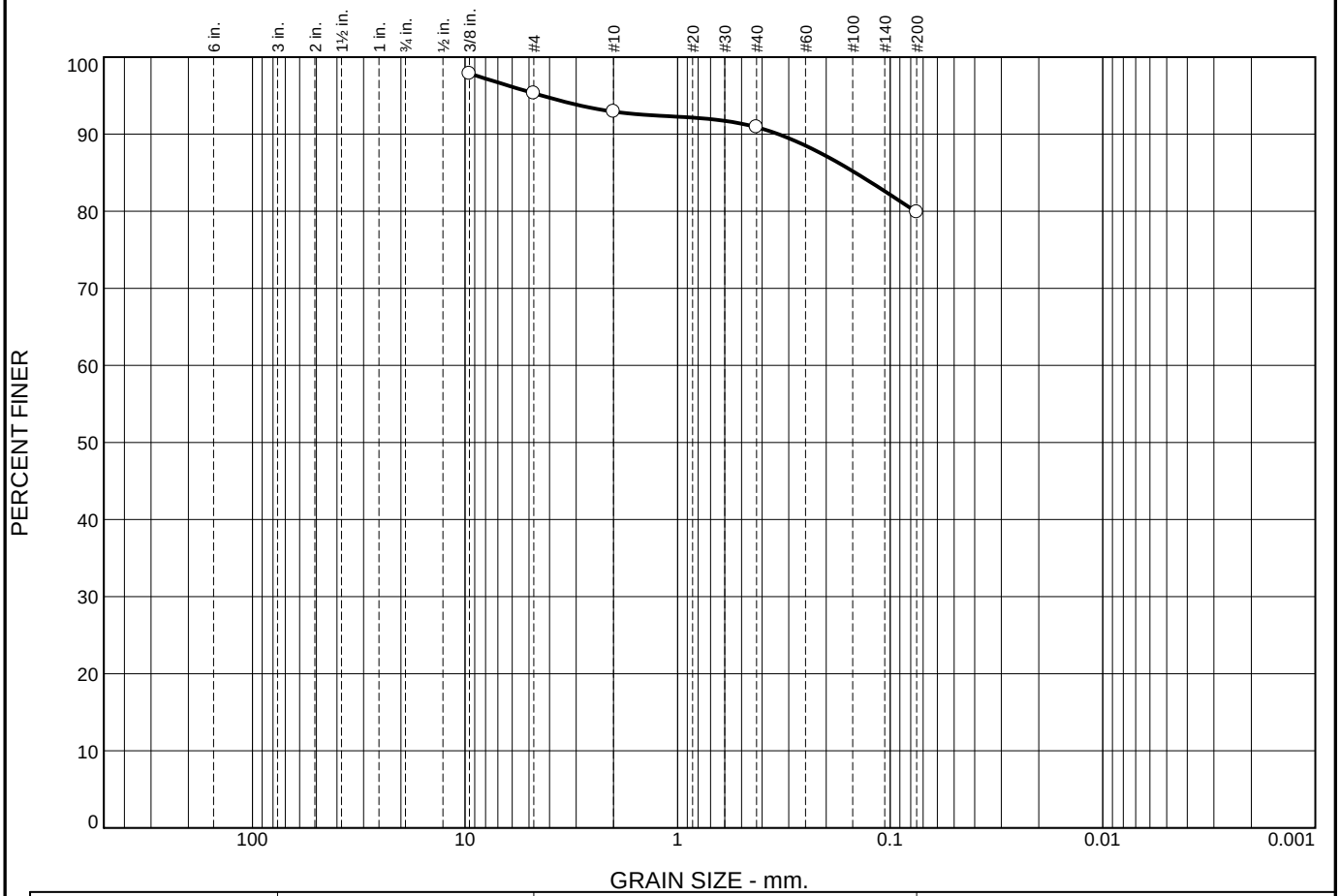
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				2.4	2.0	11.0	79.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	29	17	0.1459							

Material Description	USCS	AASHTO
○ RED & TAN, SANDY CLAY	CL	A-6(8)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-5 **Depth:** 5

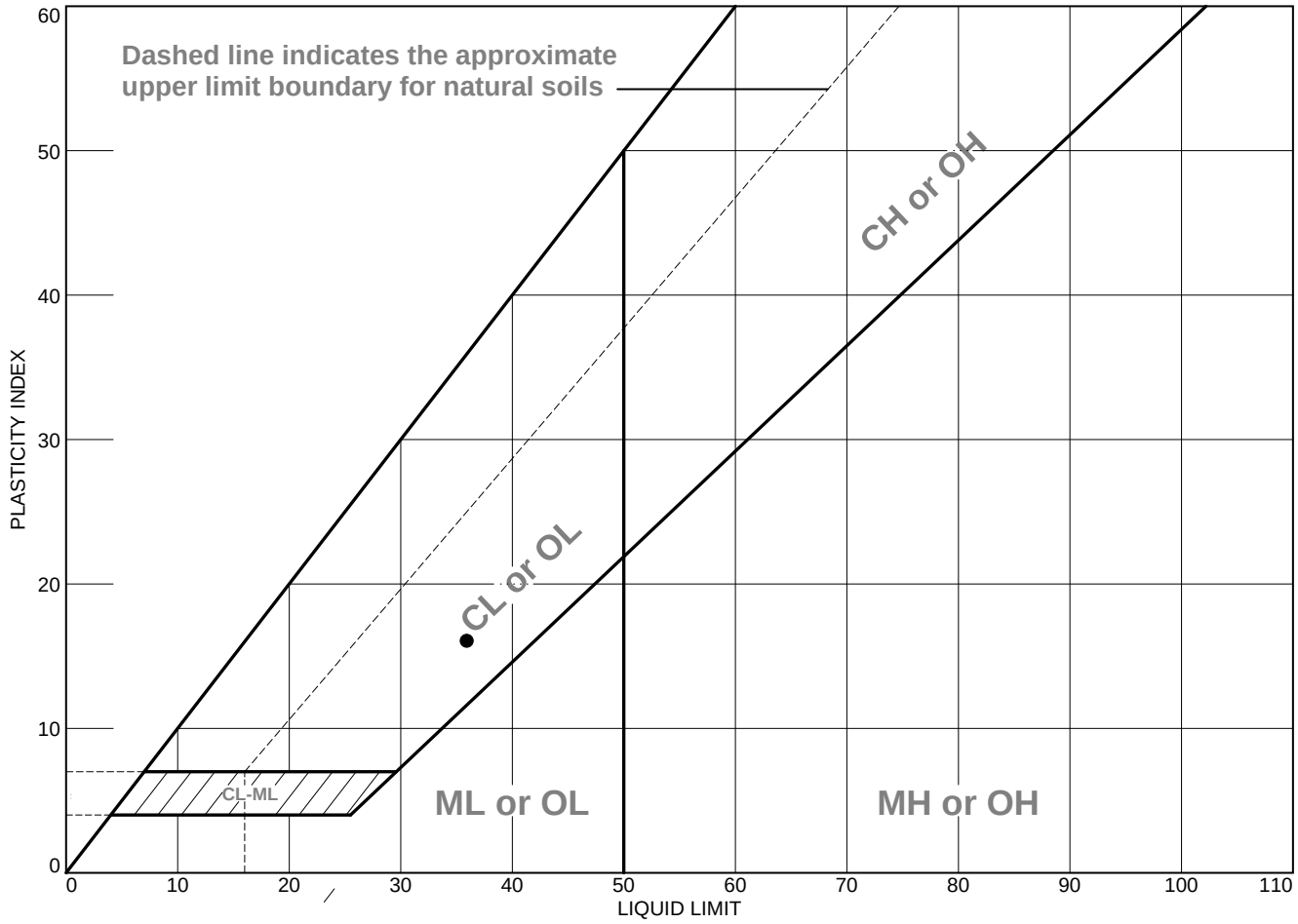
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	TANNISH GRAY, SILTY SANDY CLAY	36	20	16	93.8	85.7	CL

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-6 **Depth:** 2

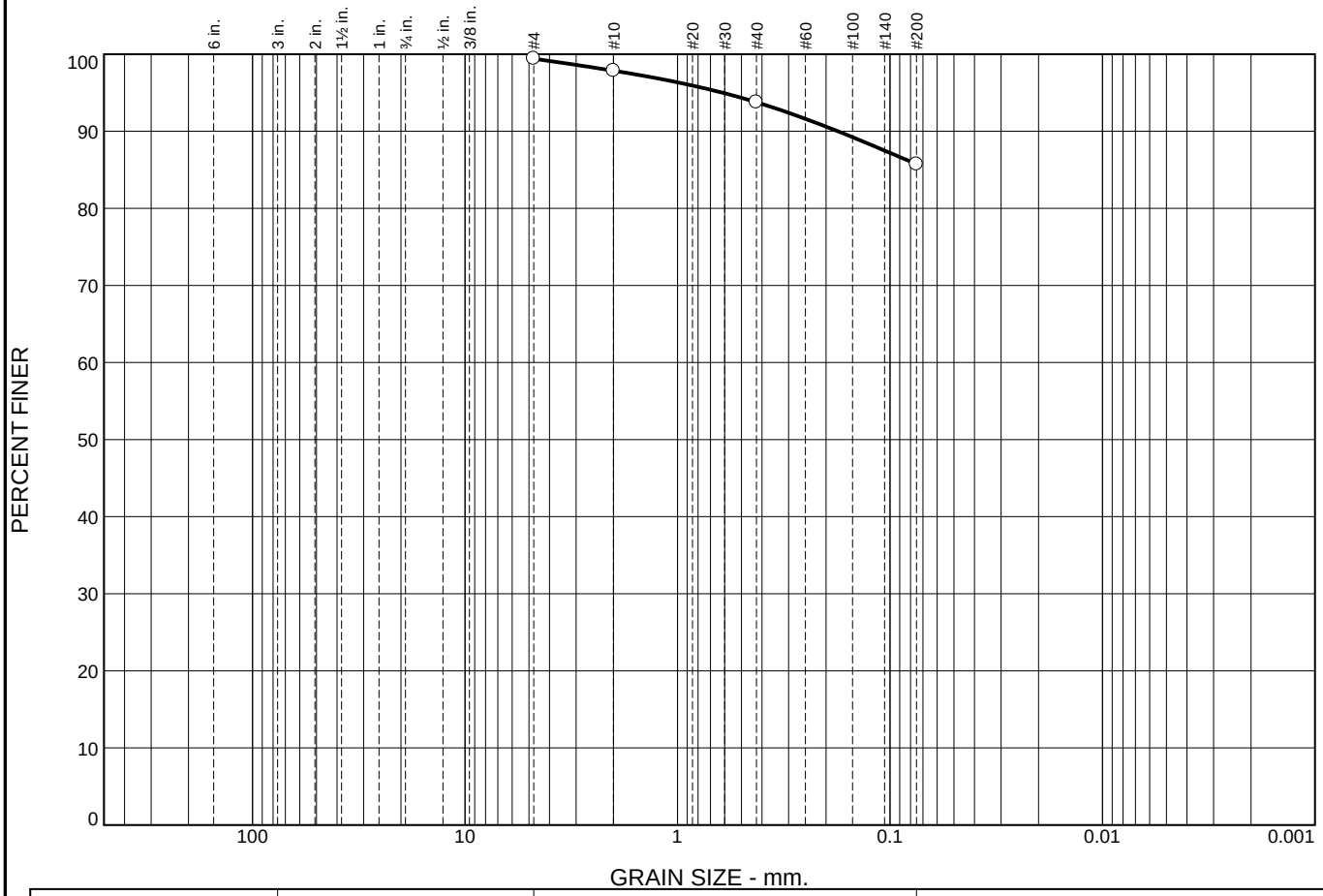
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				1.5	4.1	8.1	85.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	36	20								

Material Description	USCS	AASHTO
○ TANNISH GRAY, SILTY SANDY CLAY	CL	A-6(13)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-6 **Depth:** 2

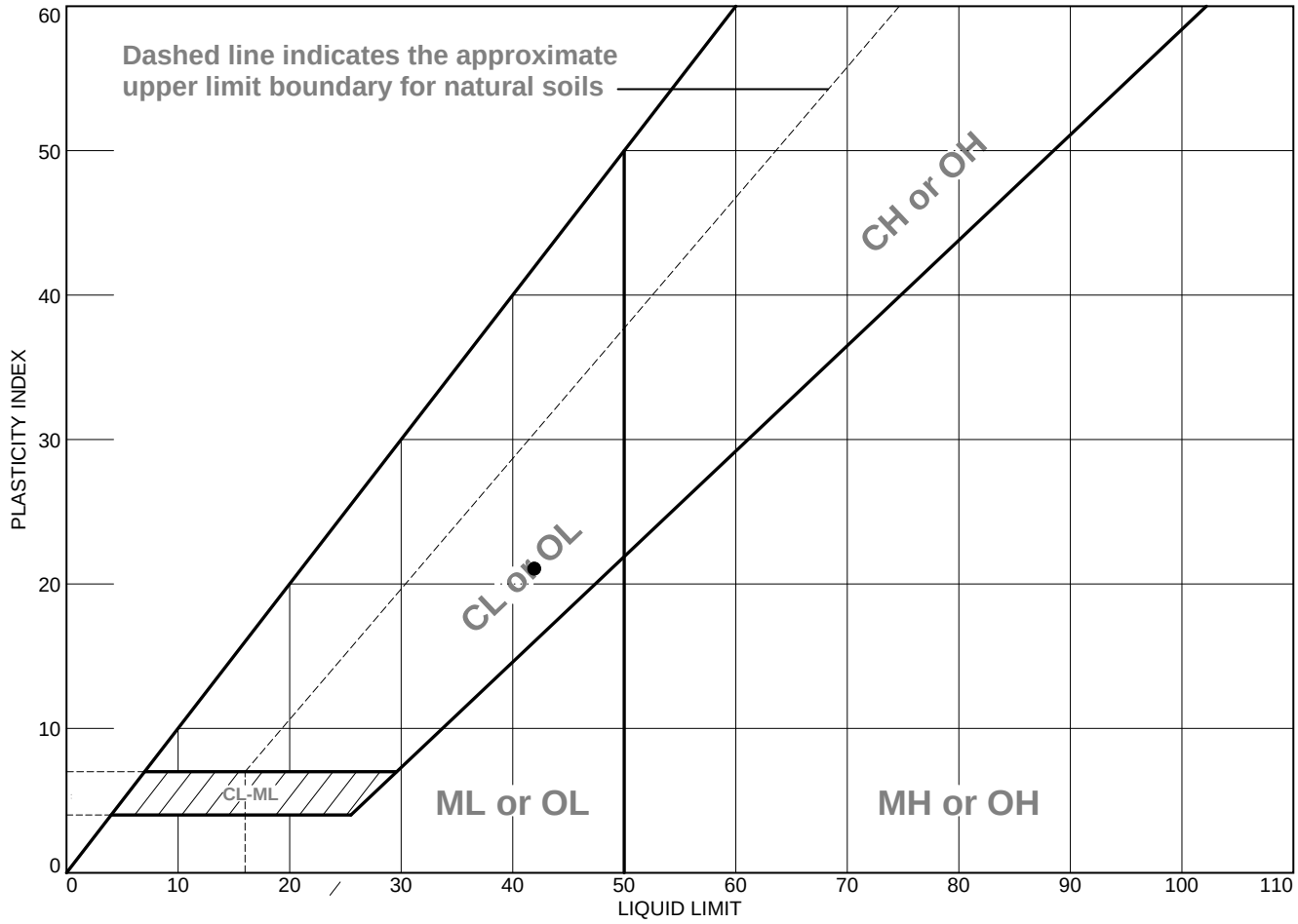
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	TANNISH BROWN, SILTY SANDY CLAY	42	21	21	87.9	81.5	CL

Project No. **Client:**

Project: CONWAY APARTMENT

●**Source of Sample:** TP-7 **Depth:** 4

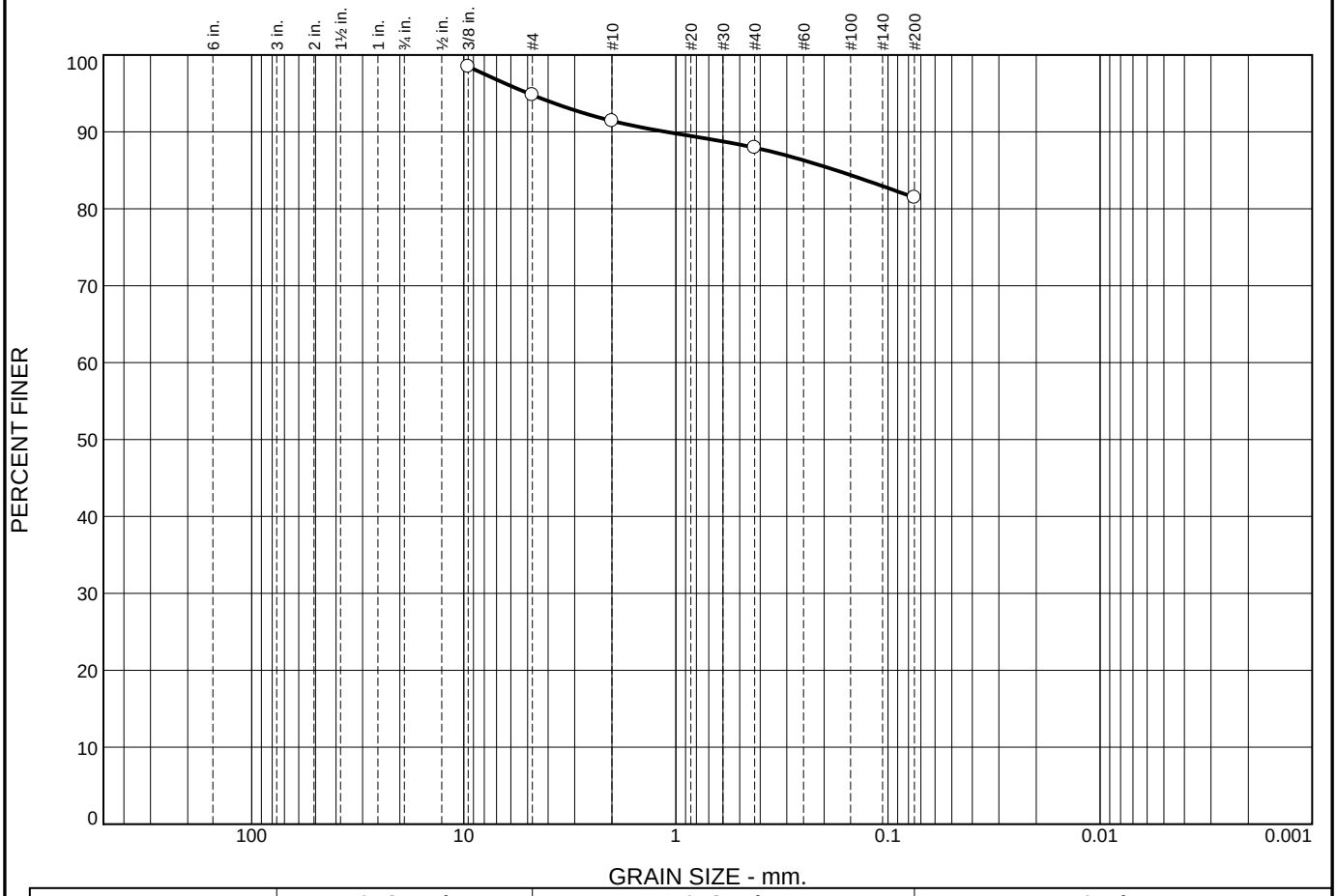
Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○				3.4	3.5	6.4	81.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	42	21	0.1755							

Material Description	USCS	AASHTO
○ TANNISH BROWN, SILTY SANDY CLAY	CL	A-7-6(17)

Project No. **Client:**

Project: CONWAY APARTMENT

○ **Source of Sample:** TP-7 **Depth:** 4

Remarks:

Materials Testing of Arkansas

Little Rock, AR

Figure

Appendix E:
Seismic Design Criteria

Hazards by Location

Search Information

Address: Conway, AR, USA

Coordinates: 35.0886963, -92.4421011

Elevation: ft

Timestamp: 2019-12-11T20:45:45.229Z

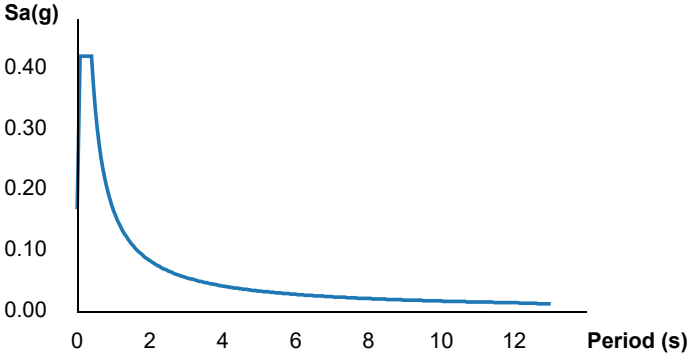
Hazard Type: Seismic

Reference Document: IBC-2015

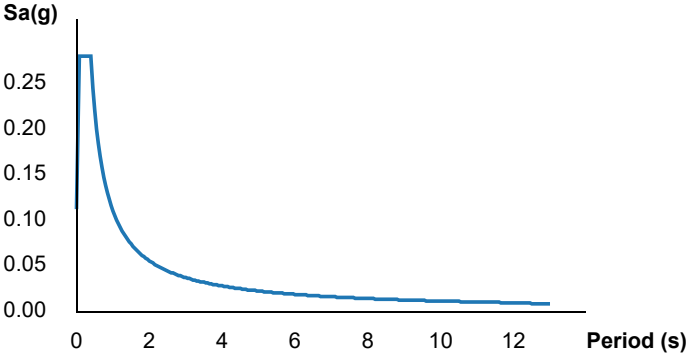
Risk Category: III

Site Class: B

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.42	MCE_R ground motion (period=0.2s)
S_1	0.165	MCE_R ground motion (period=1.0s)
S_{MS}	0.42	Site-modified spectral acceleration value
S_{M1}	0.165	Site-modified spectral acceleration value
S_{DS}	0.28	Numeric seismic design value at 0.2s SA
S_{D1}	0.11	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	B	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1	Site amplification factor at 1.0s
CR_S	0.832	Coefficient of risk (0.2s)
CR_1	0.816	Coefficient of risk (1.0s)

PGA	0.222	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.222	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	0.42	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.505	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.165	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.203	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.

Disclaimer

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

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