SECTION 00 31 00

AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:

B. Geotechnical Report: Entitled RESULTS of GEOTECHNICAL INVESTIGATION - PROPOSED BUILDING A14 ADDITION – AEROJET ROCKETDYNE, dated OCT 11, 2024.
   1. Prepared by Grubbs, Hoskyn, Barton & Wyatt, Inc. dba UES, Little Rock, Arkansas.
   2. For Contractor's convenience a copy is included following end of this section.
   3. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of the Architect Engineer.
   4. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
   5. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Sum accruing to Owner by a Change Order.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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October 11, 2024
Job No. A24184.00321

Cromwell Architects Engineers
1300 East 6th Street
Little Rock, Arkansas 72202

Attn: Mr. Michael Callahan, P.E.
Principal, Structural

RESULTS OF GEOTECHNICAL INVESTIGATION
PROPOSED BUILDING A14 ADDITION – AEROJET ROCKETDYNE
EAST CAMDEN, ARKANSAS

INTRODUCTION

Presented herein are the results of the geotechnical investigation performed for the proposed Building A14 addition planned on the Aerojet Rocketdyne campus in East Camden, Arkansas. These services were authorized on behalf of Aerojet Rocketdyne on July 24, 2024. This geotechnical investigation has been performed in general accordance with our proposal of July 23, 2024.

We understand the project will be an addition to the existing Building A14. The addition will have plan dimensions of approximately 26 ft by 31 feet. The building addition will include a new breakroom and some office spaces. Foundation loads are expected to be very light to light. Site grading information has not been provided. However, site grading is expected to be minor with grades matching the existing building.

The purposes of this study were to explore subsurface conditions at the building addition site and to develop recommendations to guide design and construction of foundations. The results of the field and laboratory studies are discussed in the following report sections. Conclusions and recommendations are discussed in subsequent report sections.

SUBSURFACE EXPLORATION

Subsurface conditions at the Building A14 project site were explored by drilling two (2) sample borings in the addition area to depths of 20 ft each. The site vicinity is shown on Plate 1. The approximate boring locations are shown on the Plan of Borings, Plate 2. Boring logs, presenting

descriptions of the subsurface strata encountered and results of field and laboratory tests, are included as Plates 3 and 4. A key to the terms and symbols used on the logs is presented as Plate 5.

The borings were drilled with a truck-mounted SIMCO 2800 rotary-drilling rig using dry-auger drilling procedures. Samples were typically obtained using a 2-inch-diameter split-barrel sampler driven into the strata by blows of a 140-lb automatic hammer dropped 30 inches, in accordance with Standard Penetration Test (SPT) procedures. The number of blows required to drive the standard split-barrel sampler the final 12 inches of an 18-inch total drive, or portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the boring logs in the "Blows Per Ft" column.

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

The borings were advanced using dry-auger drilling procedures to facilitate groundwater observations. Observations regarding groundwater are noted in the lower-right portion of each log and are discussed in subsequent sections of this report.

LABORATORY TESTING

To confirm visual classification and to evaluate relevant soil properties, laboratory tests consisting of classification and natural water content determinations were performed. A total of 11 natural water content determinations were performed to develop data on *in-situ* soil water content for each boring. Water content results are plotted on the log forms in accordance with the scale and symbols shown in the legend located in the upper-right corner of the log.

To evaluate soil plasticity, three (3) liquid and plastic (Atterberg) limit determinations and five (5) sieve analyses were performed. The Atterberg limits are plotted on the boring logs as pluses connected with a dashed line using the water content scale. The percent of soil passing the No. 200 sieve is noted in the "Minus No. 200" column on the log forms. Classification test results, along with soil classification by the Unified Soil Classification System and AASHTO Classification System, are summarized in Appendix A.

GENERAL SITE and SUBSURFACE CONDITIONS

Site Conditions

The addition will be located on the south side of the existing Building A14 west of Byrnes Avenue at the Aerojet facility in East Camden, Arkansas. The addition site is currently being utilized

as an asphalt concrete paved parking lot. Open land with a sparse, short grass cover surrounds the present parking lot. Underground utilities are present on the site. The site terrain is nearly flat. Surface drainage is considered poor.

Seismic Conditions

The Arkansas Building Authority (2005) indicates that the Calhoun County site is located in Seismic Zone 1, i.e., the zone of least seismic potential. Based on the subsurface conditions encountered in the borings and the local geology, a Seismic Site Class D (stiff soil profile) is considered appropriate for this location with respect to the criteria of the International Building Code (IBC 2021).

Subsurface Conditions

The Building A14 addition site is located in the Gulf Coastal Plain physiographic province. As indicted by the Geologic Map of Arkansas[1], the site vicinity is within the mapped exposure of Quaternary Terrace Deposits. The Terrace deposits are flood-plain deposits comprising terraces of gravel, sand, silt and clay and mixtures of any or all of these clastic materials. The overall thickness of the terrace deposits varies and individual horizontal and vertical distributions of soil units are highly variable. Bedrock (Paleozoic rocks) in the Camden vicinity is reported to be in excess of 4000 ft deep.

A thin layer of asphalt concrete covers the majority of the ground surface of the addition site. Approximately 1 to 1.5 inches of asphalt concrete were encountered in the borings. The asphalt concrete has been placed on clayey fine sand or fine sandy silt on-site fill.

The surficial soils consist of on-site fill extending to 6- to 8-ft depth. The fill is comprised of loose to medium dense tan, red, brown, reddish brown, and gray fine sandy silt, silty fine sand, and clayey fine sand. The fill also includes stiff fine sandy clay. The fill contains variable amounts of fine to coarse gravel and ferrous nodules and concretions. The fine sandy silt and silty fine sand are fine-grained and moderately to highly moisture sensitive. Consequently, these low-plasticity soils will exhibit reduced stability when saturated and/or disturbed. The variable on-site fill has poor to fair compaction and high to low compressibility. The depth, content, and compaction of the on-site fill is likely to vary across the site.

Below the surficial fill is natural soft to firm reddish tan and gray fine sandy clay extending to 13-ft depth. The sandy clay contains small amounts of decayed organics and occasional fine to

[1] Geologic Map of Arkansas, Arkansas Geological Commission and U.S. Geological Survey; 1993

coarse gravel. The fine sandy clay exhibits low plasticity, very low shear strength, and high compressibility.

A localized stratum of very loose gray silty fine sand is present above the sandy clay in the vicinity of the southeast portion of the building addition footprint (see Boring 2). The silty fine sand extends to about 8-ft depth. This unit is highly compressible with very low bearing capacity.

The basal stratum encountered in the borings is medium dense to very dense brown, gray, and tan silty and clayey fine sand with frequent fine to coarse gravel. The gravel content typically increases with depth. The basal silty, clayey fine sand has low plasticity, moderate to high relative density, and low compressibility.

Groundwater Conditions

Groundwater was encountered at 16 ft in the silty fine sand stratum in August 2024. Groundwater levels will vary with seasonal precipitation and surface runoff and infiltration.

ANALYSES and RECOMMENDATIONS

Foundations

Foundations for the Building A14 addition must satisfy two (2) basic and independent design criteria. First, the maximum bearing pressure must not exceed the allowable bearing pressure based on an adequate factor of safety with respect to soil shear strength. Secondly, foundation movements resulting from consolidation, shrinking, or swelling of the supporting soils must be within tolerable limits for the structure. Construction factors such as foundation construction, excavation procedures, and surface and groundwater conditions must also be considered.

In light of the results of the borings, the expected minor site grading, and the anticipated very light to light foundation loads, a footing foundation system is recommended. Recommendations for foundations and floor slabs are provided in the following sections of this report.

Footings

Based on the results of the borings and the anticipated very light to light foundation loads, shallow footings are recommended for support of the structural loads of the addition. Continuous or individual footings should be founded in the compact medium dense red, reddish brown, gray, and tan clayey fine sand or stiff fine sandy clay fill or compacted select fill at a minimum depth of 1.5 ft below lowest adjacent grade. Footings must not be founded in noncompact zones of the on-site fill.

Footings founded in the medium dense clayey fine sand or stiff fine sandy clay fill or compacted select fill may be sized with respect to maximum net allowable soil bearing pressures of 1250 and 1500 lbs per sq ft, for continuous and individual footings, respectively. The recommended

bearing values include a minimum factor of safety of 2.5 with respect to measured relative density/shear strength of the medium dense clayey fine sand and stiff fine sandy clay fill and anticipated shear strength of properly-compacted select fill.

The borings indicate that the depth to the medium dense clayey fine sand and stiff fine sandy clay fill that is suitable for bearing is about 2 ft below existing grades. The as-built footing depth will vary with specific subsurface conditions and grading plans. Footing excavations or undercuts must extend through the non-compact and/or unstable zones of the on-site fill to bear in suitable medium dense clayey fine sand or stiff fine sandy clay. The required footing or undercut depth is expected to be about 2 ft below existing grades. Footing excavations may be undercut to the suitable bearing stratum and backfilled with select fill, flowable fill (minimum compressive strength 300 psi), or lean concrete. Footings supported on undercut backfill as recommended may be sized for the previously recommended bearing pressures.

Footing undercuts backfilled with select fill should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom. Undercuts backfilled with flowable fill or lean concrete may be excavated neat to plan footing dimensions. Where site conditions warrant mass undercut, footings may be founded in the compacted undercut backfill. Mass undercuts should extend at least 5 ft outside the building limits to the extent possible.

Uplift resistance of footings will be provided by the weight of the structure and foundation units. Resistance to lateral forces will be developed by the passive resistance of the foundation soils and sliding resistance at the footing bottom. The passive resistance of the soil within the upper 1.5 ft should be neglected. Below 1.5-ft depth, an ultimate passive resistance value of 100 lbs per sq ft per ft depth increasing at 150 lbs per sq ft per ft depth to a maximum depth equal to two (2) footing widths or 6 ft, whichever is less, may be utilized for the compact, stable on-site fill and compacted select fill. Resistance to sliding may also be evaluated using an ultimate friction value (tan δ) of 0.33 for concrete on the clayey sand and sandy clay fill and compacted select fill. An appropriate factor of safety must be included in analysis of sliding.

Continuous footings should have a minimum width of 18 in. and individual footings a minimum dimension of 24 inches. A minimum footing depth of 1.5 ft below lowest adjacent grade is recommended. All footing excavations and any foundation undercuts should be observed by the Geotechnical Engineer to verify suitable bearing and adequate foundation undercut.

Floor Slab

Slab-on-ground or slab-on-fill construction is recommended for the building floor slab. Subgrade preparation in floor slab area must include thorough proof-rolling to verify subgrade stability. Depending on seasonal site conditions and final grading plans, localized undercuts on the order of 2 ft below existing grades, more or less, could be warranted.

We recommend that the at-grade floor slab be supported on a 4- to 6-in.-thick clean crushed stone layer placed on a properly prepared subgrade. The granular layer should be densified with vibrating equipment prior to floor slab construction. Impervious sheeting should be placed between the slab and granular course to act as a vapor retarder.

Subgrade Preparation and Site Grading

The surficial soils at the project site are presently stable and compact. However, the fine sandy silt is moisture sensitive and will exhibit reduced stability when saturated. Though site conditions will vary significantly with seasonal precipitation and surface runoff, site grading operations will be significantly easier to perform during dry seasons of the year.

Site preparation in the building addition project area should begin by demolishing the existing pavements and stripping the zone of organic-containing soils. A stripping depth of 3 to 6 in. is anticipated. All abandoned underground utilities should be fully excavated and excavations backfilled with select fill unless specifically accepted by the Engineer.

After pavement demolition, stripping, and performing any cut, and prior to placing any fill, all subgrade should be evaluated by the Geotechnical Engineer. This evaluation should include thorough proof-rolling. The results of the borings indicate that the localized weak and unstable soil zone extends to about 2 ft depth. It is feasible that the on-site fill can be scarified, moisture conditioned, and recompacted to develop a stable subgrade. However, localized undercuts of approximately 2 ft below existing grade, more or less, could be warranted for subgrade preparation. Mass undercuts should extend at least 5 ft outside the building limits to the extent possible

The on-site clayey sand and sandy clay fill, free of organics and debris, is suitable for use as fill or backfill in building addition areas. The fine sandy silt may be used in landscape areas away from buildings, pavements, and areas of future development. Imported borrow for fill or backfill in building areas should consist of low-plasticity clayey sand (SC), sandy clay (CL), clayey gravel (GC or GC-GM), or sandy gravel (GP, GW, GP-GM) with a liquid limit less than 40 and a maximum plasticity index (PI) of 18, or an approved alternate. The locally-available clayey sand or clayey gravel borrow should be evaluated by the Geotechnical Engineer but is typically suitable for use as

select fill. All fill and backfill should have a maximum plasticity index (PI) of 18 and should be approved by the Geotechnical Engineer.

All fill and backfill should be free of organic materials and durable rock fragments in excess of about 3-in. dimension, and other debris. Maximum particle size should be limited to about 1.5 in. in the top 18 in. of fills.

All fill, backfill, and recompacted soils should be compacted to a minimum of 95 percent of the Modified Proctor (ASTM D1557) maximum dry density within a water content range of 2 percent below to 3 percent above the optimum value. Fill and backfill should be placed in horizontal, nominal 6- to 8-in.-thick loose lifts. Each lift of fill and backfill should be properly compacted, tested and approved prior to placing subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Positive surface and subsurface drainage should be established at the start of construction, maintained during the work, and incorporated into final design to prevent surface water ponding and subsequent saturation of subgrade soils. Density and water content of all earthwork should be maintained until the foundations and floor slabs are completed. Subgrade soils that become saturated by ponding water or runoff should be excavated to suitable material.

Groundwater was encountered at in the borings at 16 ft in August 2024. Shallow perched groundwater could also be encountered during the work, particularly during wet seasons. If encountered, limited seepage into shallow excavations can probably be controlled by ditching or via sump-and-pump methods. If seepage infiltration cannot be controlled, construction of French drains and/or the use of stone backfill (i.e., #57 stone or “B” stone) will be warranted. Granular backfill should be fully encapsulated in a geotextile filter fabric such as Mirafi 140N or approved alternate and vented to positive discharge into storm lines or to daylight.

All footing excavations and any foundation undercuts should be observed by the Geotechnical Engineer to verify suitable bearing and adequate undercut. Where footings are excavated in sandy soils, the bearing stratum should be tamped prior to placed steel and concrete. Concrete should be placed in footing excavations expeditiously following final clean up and approval to limit changes in foundation conditions. Footing excavations should be clean and dry at the time of concrete placement. Where footing excavations will be left open for extended periods, the bearing stratum should be protected with a thin layer of seal concrete.

CLOSURE

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

The following plates are attached and complete this report.

Plate 1	Site Vicinity
Plate 2	Plan of Borings
Plates 3 and 4	Boring Logs
Plate 5	Key to Terms and Symbols
Appendix A	Classification Test Results

* * * * *

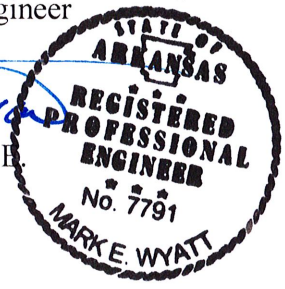
We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, or if we may be of additional assistance during final design or construction, please call on us.

Sincerely,

GRUBBS, HOSKYN,
BARTON & WYATT, LLC

Velleta M. Scott

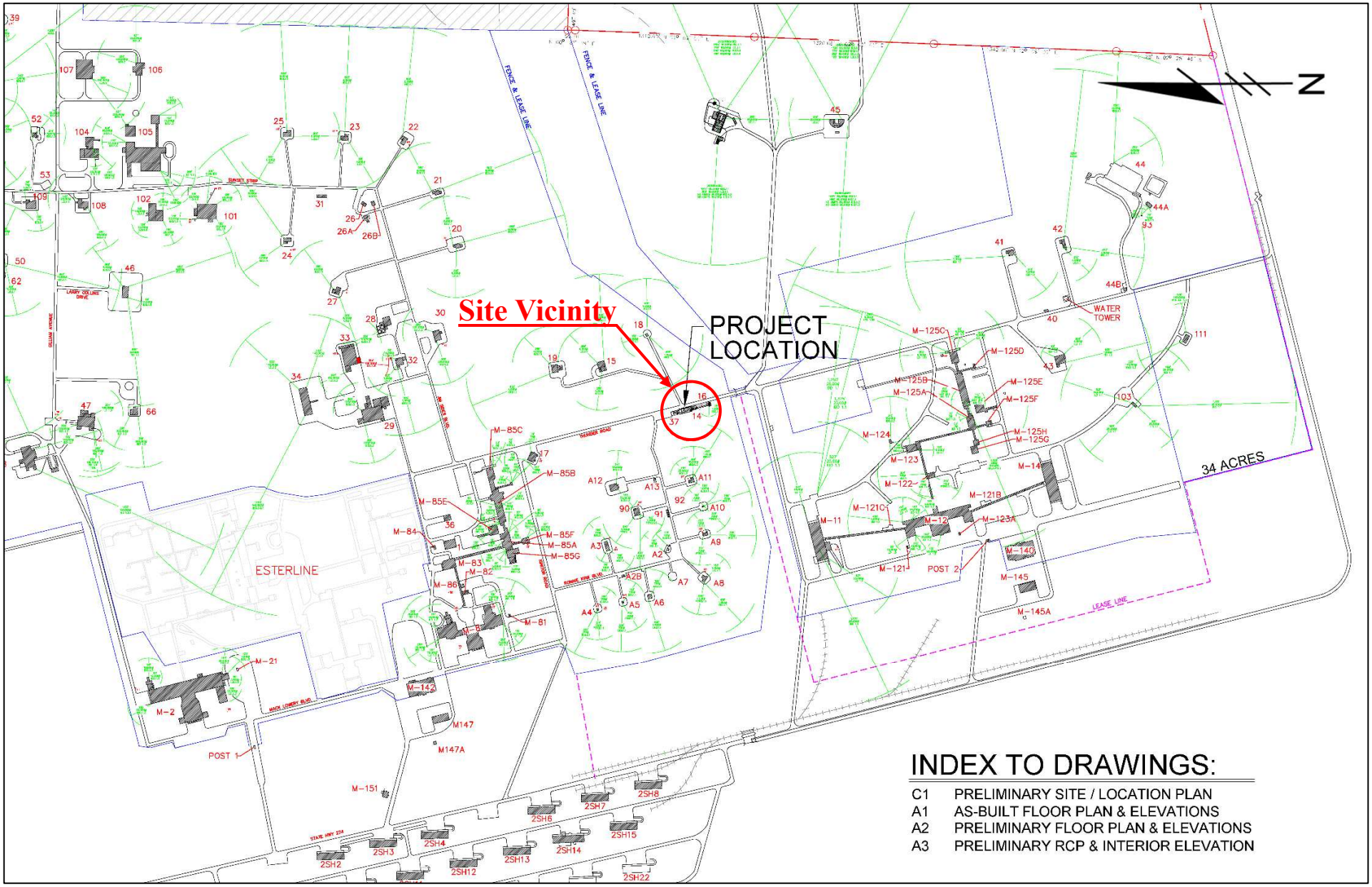
Velleta M. Scott, P.E.
Senior Project Engineer



Mark E. Wyatt, P.E.
President

VMS/MEW:jw

Copies submitted: Cromwell Architects Engineers
Attn: Mr. Michael Callahan, P.E. (1-email)
Attn: Ms. Brittani Mitchell, E.I. (1-email)



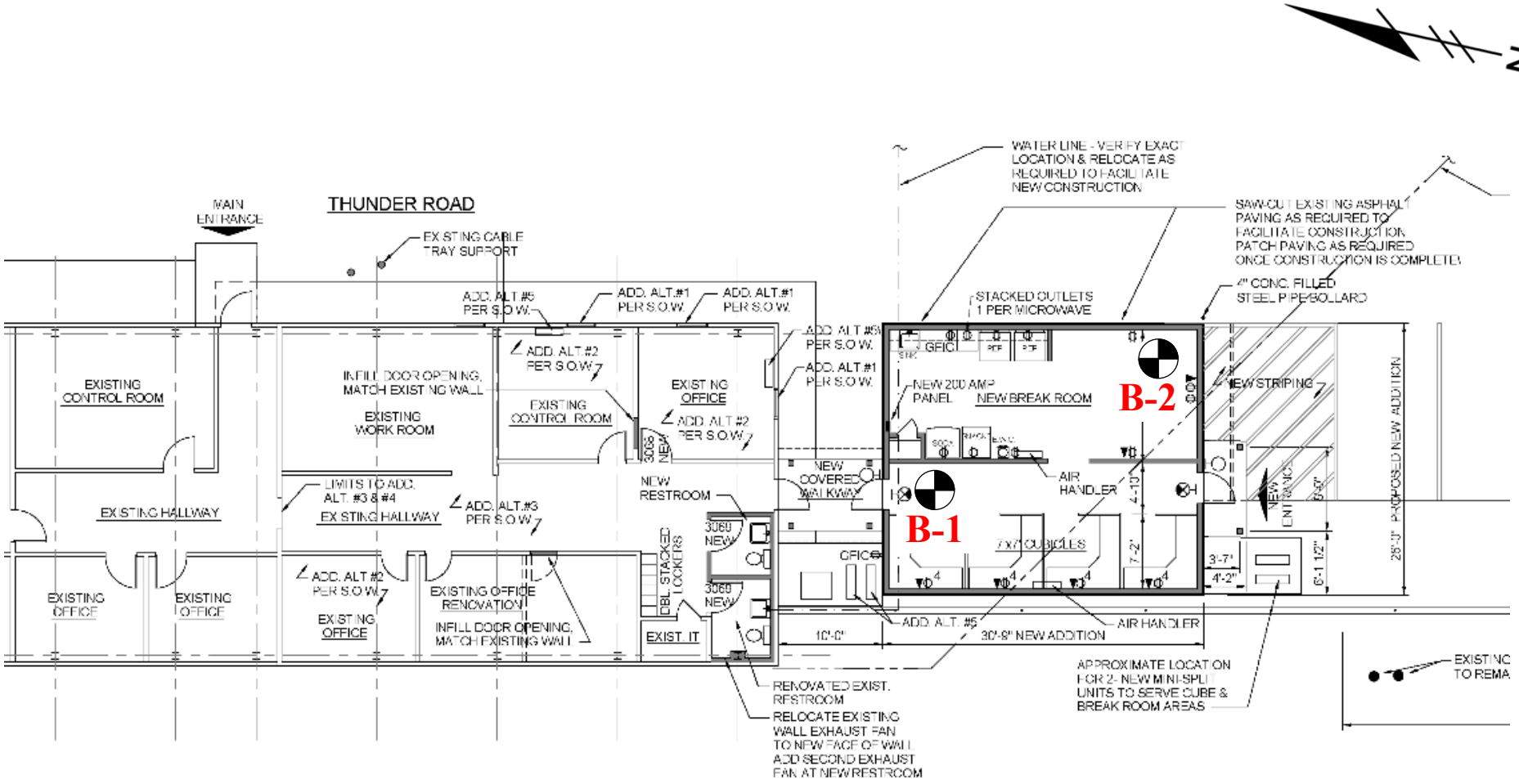
Grubbs, Hoskyn, Barton & Wyatt, LLC
CONSULTING ENGINEERS
A UES Company

SITE VICINITY MAP

Aerojet Building A14 Addition
East Camden, Arkansas

Job No. A24184.00321

Plate 1



Grubbs, Hoskyn, Barton & Wyatt, LLC
CONSULTING ENGINEERS
A UES Company

PLAN of BORINGS
Aerojet Building A14 Addition
East Camden, Arkansas

Scale: As Shown

Job No. A24184.00321

Plate 2

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

LOG OF BORING NO. 1

Aerojet Building A14 Addition
East Camden, Arkansas

TYPE: Auger

LOCATION: See Plate 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL:				
			1.5 in. Asphalt Cement Concrete				
			Loose brown clayey fine sand w/ferrous nodules and stains and fine to coarse gravel (fill)	5			
			- medium dense, reddish brown below 2 ft	12			
5				18			25
			Loose reddish brown clayey fine sand w/trace fine gravel (fill)	7			30
			Soft gray and reddish tan fine sandy clay w/ferrous stains and a little fine gravel	6			
10							
			Dense to very dense brown and gray silty fine sand w/fine to coarse gravel	66			14
15							
			Medium dense gray and tan sandy fine to coarse gravel, silty	13			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 8-22-24

DEPTH TO WATER IN BORING: 16 ft

DATE: 8/22/2024

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

LOG OF BORING NO. 2

Aerojet Building A14 Addition
East Camden, Arkansas

TYPE: Auger

LOCATION: See Plate 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70)	- No. 200 %
			SURF. EL:				
			1 in. Asphalt Cement Concrete				
			Medium dense tan and gray fine sandy silt w/ferrous nodules and concretions (fill)	29			
			Stiff red, tan, and gray fine sandy clay w/fine sand pockets and a little fine to coarse gravel (fill)	16			43
5			Medium dense reddish brown silty fine sand, slightly clayey w/a little fine to coarse gravel (fill)	14			
			Very loose gray silty fine sand w/numerous decayed organics	3			44
10			Firm gray fine sandy clay w/decayed organics and a little fine to coarse gravel, moist	7			
15			Dense brown and gray silty fine sand w/fine to coarse gravel	43			
			Medium dense gray clayey fine sand w/fine to coarse gravel	16			
20							
25							

COMPLETION DEPTH: 20.0 ft
DATE: 8-22-24

DEPTH TO WATER IN BORING: 16 ft

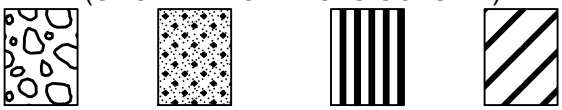
DATE: 8/22/2024

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

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOLS COLUMN)



Gravel Sand Silt Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)

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

TERMS DESCRIBING CONSISTENCY OR CONDITION

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

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

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

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

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

TERMS CHARACTERIZING SOIL STRUCTURE

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

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

KEY 5-25-12

APPENDIX A

SUMMARY of CLASSIFICATION TEST RESULTS

PROJECT: Aerojet Building A14 Addition
LOCATION: East Camden, Arkansas
GHBW JOB NUMBER: A24184.00321

BORING No.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			PERCENT RETAINED #4	PERCENT PASSING #200	USCS CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
1	4.5-5.5	7	24	16	8	47	25	GC	A-2-4
1	6.5-7.5	12	25	17	8	9	30	SC	A-2-4
1	14-15	6	---	---	---	41	14	SM	A-2-4
2	2.5-3.5	14	30	19	11	32	43	GC	A-6
2	6.5-7.5	40	---	---	---	8	44	SM	A-4

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