ADDENDUM No. 1
PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
520 RHODELIA ROAD
PAYNEVILLE, KY 40157
BG #18-283
SCB PROJECT NO. 1569

TO: All Plan Holders

FROM: Sherman-Carter-Barnhart Architects
9300 Shelbyville Road, Suite 502
Louisville, Kentucky 40222

DATE: August 2, 2019

The purpose of this Addendum is to clarify further the requirements of the plans and specifications. The bidders are governed by the information in this Addendum as if included in the plans and specifications. This Addendum does hereby become a part of the Contract Documents. Each bidder shall acknowledge receipt of this Addendum in the space provided in the Bid Form.

This Addendum consists of 119 pages total. (115) 8 ½ x 11 pages and (4) 30 x 42 pages.

General Items

1. Refer to attached Architectural Pre-Bid Meeting Notes dated July 31, 2019. These Notes do hereby become part of the contract documents.

2. All references to Bid Opening Dated “Thursday August 15, 2019 (11:00am EST)” shall be deleted and replaced with “Monday August 19, 2019 (11:00am EST).

3. A Supplementary Pre-Bid Meeting is scheduled for August 8, 2019 (3:45pm EST) at Payneville Elementary School Cafeteria located at 520 Rhodelia Road, Payneville, Kentucky 40157.

4. For clarification, construction phasing plans shall be discussed further at the Supplementary Pre-Bid Meeting listed above.

Site Items

None.

Structural Items

None.

Architectural Items

Specifications

1. Refer to Volume 1 Specification Section 002113 – INSTRUCTIONS TO BIDDERS – A701-1997 (KDE Version), Modify Article 4 BIDDING PROCEDURES, Paragraph 4.2 Bid Security, Subparagraph 4.2.1 as follows:

"4.2.1 Each Bid greater than $100,000 shall be accompanied by bid security in the form of a Bond provided by a Surety company authorized to do business in the Commonwealth of Kentucky, or in the form of a certified check, and in an amount equal to at least five percent (5%) of the Base Bid amount, pledging that the Bidder will enter into a contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payments of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty."

2. Refer to Volume 1 Specification Section 003132 – GEOTECHNICAL DATA. Add in its entirety the Geotechnical Investigation Report for Project, prepared by AEI dated March 2019 (attached as part of this addendum) and Add in its entirety the Supplemental Geotechnical Letter for Project, prepared by AEI dated May 14, 2019 (attached as part of this addendum).

3. Refer to Volume 1 Specification Section 004114 – FORM OF PROPOSAL (KDE 702 KAR 4:160). Replace Page 9 of 9 Form of Proposal with attached revised Page 9 of 9 Form of Proposal (attached as part of this addendum) changing sum of $25,000 to $100,000.

4. Refer to Volume 1 Specification Section 006000 – FORMS (AIA Documents) AIA Document A201 (General Conditions of the Contract for Construction) – KDE Version. Modify Article 11 INSURANCE AND BONDS, Paragraph 11.4 Performance and Payment Bond, Subparagraph 11.4.1 as follows:

   "11.4.1 Unless otherwise provided, when the Contract Sum exceeds one hundred thousand ($100,000) the Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. A surety company authorized to do business in Kentucky shall execute bonds, and the cost thereof shall be included in the Contract Sum. Unless otherwise provided, the amount of each bond shall be equal to 100% of the Contract Sum plus Purchase Orders, or 100% of the Lump Sum Base Bid plus or minus accepted Alternates, whichever is greater."

5. Refer to Volume 2 Specification Section 087100 – DOOR HARDWARE. Replace section in its entirety with attached "Specification Section 087100 – DOOR HARDWARE ADD#1."

6. Refer to Volume 2 Specification Section 102600 – WALL AND DOOR PROTECTION. To further clarify provide wall corner guards at all outside corners of newly installed gypsum board walls. The top of corner guard shall be at 7'-4" above finish floor and terminate above wall base.

MEP Items

Refer to attached CMTA Addendum #1 dated August 1st, 2019.

End of Addendum.

July 31, 2019

PRE-BID MEETING MINUTES

RE: Payneville Elementary School Addition and Renovation
SCB Project No. 1569

DATE OF MEETING: July 25, 2019 at 3:30 p.m. EST

LOCATION: Payneville Elementary School

ATTENDEES: See Sign-In Sheet

The following is a summary of items to be discussed during the meeting:

1. Introductions and Responsibilities

a. Dr. John Millay- Superintendent for the Meade County Board of Education (Not present).

b. Marie Barr – Payneville Elementary School Principal.

c. Donna Farmer – Architect/Project Manager, Sherman Carter Barnhart Architects.

d. Brian Baumgartle and JR Epps – MEP Engineers/Project Managers – CMTA (Not present).

e. Bill Grigsby – Structural Engineer, Sherman Carter Barnhart Architects (Not present).

f. Ben Sorrell – Site Project Manager, Sherman Carter Barnhart Architects (Not present).

2. Circulation of Sign-In Sheet – All parties are requested to sign the sign-in sheet. Refer to attached Sign-In Sheet.

3. All meeting minutes generated from this meeting will be issued as part of Addendum No. 1.

4. General

a. Project Scope: Project consists of an 11,393 square foot addition which includes a new gymnasium, two new kindergarten classrooms and group airport style restrooms. This is a load bearing masonry construction building with spray foam roofing system on metal deck and steel joists. Improvements to the existing building include renovating the existing gymnasium into a

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859 224 8446 Fax
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new media center, renovating and expanding the administration area, providing a security vestibule, new ceilings and LED lighting throughout the existing building and window / door replacement and replace existing roofing system with new spray foam roofing system.

b. Review project bidding as related to general construction delivery method.

1. Review the various bid forms and submittal requirements. Contractors are to closely review all submittal forms and sequence of bidding and bidding requirements as outlined in Division 0 and Division 1 of the Contract Documents.

c. There are no prevailing wage scale requirements.

d. The project sales tax exempt for all Owner direct purchased items. Refer to specifications.

5. Critical Dates

a. Bid Date is Mon**day, August 19, 2019 at 11:00 a.m.** local time at the Meade County Board of Education, 1155 Old Ekron Road, Brandenburg, Kentucky.

b. Due to short notice of the pre-bid meeting today a S**ubsequent Pre-bid Meeting date is scheduled for Thursday August 8, 2019 at 3:45 p.m**. local time at Payneville Elementary School Cafeteria, 520 Rhodelia Road, Payneville, Kentucky.

b. The Owner anticipates issuing the Notice to Proceed pending KDE approval on or about September 3, 2019.

c. The dates of completion shall be as follows:

1. Substantial Completion date will be as follows: July 31, 2020.

2. Completion date will be as follows: August 31, 2020.

6. Bidding Requirements

a. All bids shall be sealed in an envelope with the following information addressed on the outside of the envelope.

Bid Documents: **Payneville Elementary School Addition and Renovation**
Meade County Board of Education
Brandenburg, Kentucky
11:00 a.m. local time EST
Monday, August 19, 2019

b. One copy of the signed and completed Form of Proposal will be required from each bidder. The successful, apparent low bidder(s) shall provide a second signed copy within **one hour** of notification of apparent low bidder.

c. At time of bid submittal, bidders are required to submit the following portions of the Form of Proposal:

1. KDE Department of Education Form of Proposal – 2013, Pages 1, 2, 3, and 9 shall be submitted at time of bid.

2. KDE Department of Education Form of Proposal – 2013, Pages 4, 5 and 6 shall be submitted within 1 hour of bid.

3. KDE Department of Education Form of Proposal – 2013, Pages 7 and 8 shall be submitted within four days of bid.

d. Form of Proposals not completed or incorrectly filled out will not be considered.

e. Bid security in the amount of 5% for each proposal submitted must accompany each proposal. A certified check or bid bond is acceptable.

f. The General Contractor shall not list himself as a subcontractor unless he intends to complete the work.

g. The successful bidder shall be required to provide 100% Performance and Payment Bond.

h. Owner reserves the right to waive any or all bidding irregularities.

7. Interpretation and Correction to Bidding Documents

a. The Architect and Engineers may take questions until **5:00 p.m. on Monday, August 12, 2019.**

b. Bidders and sub-bidders requiring clarifications or interpretations of bidding documents shall make a written request but shall reach the Architect prior to the above referenced date.

c. Any interpretations and corrections that change the bidding documents will be made by addenda only. Interpretations, corrections and/or changes of the bidding documents made in any other manner will not be binding. Bidders shall not rely upon them.

d. After the above referenced date, the contractor must bid the plans and specifications as they see or in the event of a conflict they must bid the most costly item.

8. Obtaining Bidding Documents

a. Contract Documents are available from Lynn Imaging Company, 328 Old Vine Street, Lexington, Kentucky 40507, telephone number is (859) 255-1021. A deposit in the amount for each printed set is $360.00 or electronic PDF sets are available for free. All checks shall be made payable to Lynn Imaging Company. Web site address is www.lynnimaging.com.

9. Product Substitution

a. All requests for proposed substitutions shall be submitted in writing and accompanied with a complete description including drawings, performance and test data and all other information necessary for evaluation. The contractor is required to submit a completed and signed **Certificate of Product Compliance** in Specification Section 012500.

The Architect's decision of approval or disapproval of a proposed substitution shall be final. However, the contractor is still required to meet specifications. Any approved substitutions shall be set forth in an addendum.

10. Review of Scheduled Alternates

A. Alternate No. 1: Remove existing windows in the 1998 and 1999 portions of building and replace with new aluminum windows as indicated on drawings and specifications.

B. Alternate No. 2: Owner preferred Door Hardware manufacturer:

1. Best-Door Hardware

C. Alternate No. 3: All work associated with the right-of-way on Rhodelia Road, KY Route 144.

D. Alternate No. 4: Remove existing VCT in existing corridors and provide new VCT floor pattern in new and existing corridors. Refer to Sheet A8.2.

E. Alternate No. 5: Remove VCT in existing cafeteria and replace with new VCT floor pattern. Refer to Sheet A8.2.

F. Alternate No. 6: Paint all walls in existing corridor. Price to include accent colors for 1/3 corridor wall square footage.

G. Alternate No. 7: Owner preferred Lighting Manufacturer:

1. Lithonia Lighting

H. Alternate No. 8: Owner preferred Electrical Manufacturer:

1. B Square D (Electrical)

J. Alternate No. 9: Owner preferred Plumbing (Faucets only) Manufacturer:

1. Delta (Plumbing, Faucets only)

K. Alternate No. 10: Owner preferred Mechanical Equipment & Controls Manufacturer:

1. Trane (Mechanical Equipment & Controls)

11. Contractor's Comments / Questions

a. Will there be a bond sale for this project? Yes there will be a bond sale.
b. Will some form of identification be required while working? TBD
c. Contractor's requested that a copy of the school calendar be included in these meeting minutes. (see attached school calendar).
d. Contractor requested times of normal school operations. (Principal stated that hours of normal operation are between 7:20am to 3:30pm local time).

12. Owner's Comments

a. None.

13. Engineer's Comments

a. None.

14. Architect's Comments

a. Addendum No. 1 will be issued Friday August 2, 2019 and will include Pre-Bid Meeting Minutes.

b. Phasing will be required on this project in order for the school to operate normally during the 2019-2020 school year. The addition will need to be completed first in order to utilize the new kindergarten classrooms so students can move out of two existing classrooms to allow for administration suite work. The winning general contractor will be responsible for coordinating phasing with the owner after award of contract. Additional information on phasing will be discussed at the subsequent Pre-bid meeting scheduled above.

15. Meeting Adjournment

End of meeting agenda.

X:\Projects\2015\1569\Minutes & Reports\1569PreBidMtgAgenda.docx

Sign-in Sheet

Payneville Elementary School Addition and Renovation Project Pre-Bid Meeting July 25, 2019 3:30 pm.

Name	Company	Email
Tommy Gumm	Alliance Corporation	tgumm@allianceincorporation.com
Charles Orr	Blue Sky	corr@blueskyelec.com
Mac Burton	Calhoun Construction	MacBurton@calhounconstructs.com
Ethan Yount	Dirt Works Unlimited	woodcreek38@gmail.com
Greg Snyder	Prodigy Construction	gsnyder@prodigy-construction.com
~~Scotty Brown~~	Prodigy Construction	
Curt Barley	Lusk Mechanical	Cbarley@theluskgroup.com
Richard Jackson	Morel Construction	Rjackson@morelconstruction.com
Margaret Gibson	GBMC Inc	gbmcinc82@aol.com
David Murphy	Landmark Sprinkler	david.murphy@landmarksprink.com
Chad Ford	Schardein Mechanical	Chad.Ford@Schardein.com
Corey Hall	EH Construction	chall@ehconst.com
Mark Byas	Martin Construction	MarkB@martinconc.com
Chuck Croley	Scotty's Contracting	CharlesC@ScottysContracting.com
Cory Redmon	Phillips Bros Construction	cory@phillipsdirt.com
Kurt Harper	Phillips Brothers	estimating@phillipsdirt.com
Justin Tillery	Siemens Building Technologies	Justin.Tillery@Siemens.com
Joe Kuerzi	Certified Protection Services LLC	jKuerzijrey@hoo.com
Barry Clements	Redlee	barry.clements@redleeconstruction.com
Marie Barr	PES	marie.barr@meade.kyschools.us

Meade County 2019-2020 School Calendar

JULY 2019						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

AUGUST 2019						
S	M	T	W	T	F	S
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER 2019						
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29	30					

OCTOBER 2019						
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NOVEMBER 2019						
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DECEMBER 2019						
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22	23	24	25	26	27	28
29	30	31				

August 5 ..... Opening Day for Teachers
August 6 ..... Professional Development/Professional Work Day
August 7 ..... First Day for Students
September 2 .....School Dismissed (Labor Day)
September 27 .....School Dismissed (Professional Development)
October 7-11 .....School Dismissed (Fall Break)
November 5 .....School Dismissed (Professional Development)
November 27-29 ..... School Dismissed (Thanksgiving)
December 20 -Jan 3 ..... School Dismissed (Winter Break)
January 6.....School Dismissed (Professional Development)
January 7..... School Resumes
January 20..... School Dismissed (Martin Luther King Day)
February 17 .. School Dismissed (Presidents' Day/Professional Dev)*
March 30 – April 3 ..... School Dismissed (Spring Break)
May 1 ..... School Dismissed
May 15 .....Last Day for Students
May 18 ..... Closing Day for Teachers
May 20 – June 12 .....Make-up Days

* February 17th may be used as a make-up day ***IF*** needed.

School Dismissed

JANUARY 2020						
S	M	T	W	T	F	S
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FEBRUARY 2020						
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MARCH 2020						
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29	30	31				

APRIL 2020						
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MAY 2020						
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JUNE 2020						
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21	22	23	24	25	26	27
28	29	30				

Approved 12/11/2018

REPORT OF GEOTECHNICAL EXPLORATION

AMERICAN ENGINEERS, INC.

MARCH 2019

PAYNEVILLE ELEMENTARY SCHOOL ADDITION

MEADE COUNTY, KY

AEI
AMERICAN
ENGINEERS, INC.

March 28, 2019

Dr. John Millay, Superintendent
Meade County Board of Education
1155 Old Ekron Road
Brandenburg, KY 40108

Re: Report of Geotechnical Exploration
Payneville Elementary School Addition
Meade County, Kentucky
AEI Project No. 218-487

Dear Dr. Millay:

American Engineers, Inc. is pleased to submit this geotechnical report that details the results of our geotechnical exploration performed at the above referenced site.

The attached report describes the site and subsurface conditions and also details our recommendations for the proposed project. The Appendices to the report contains a drawing with a boring layout, typed boring logs and the results of laboratory testing.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

Respectfully,
AMERICAN ENGINEERS, INC.

Brad High, PG, PMP
Project Geologist

Dusty Barrett, PE, PMP
Director of Geotechnical Services

REPORT OF GEOTECHNICAL EXPLORATION
PAYNEVILLE ELEMENTARY SCHOOL ADDITION
PAYNEVILLE, KENTUCKY

Table of Contents

APPENDICES

REPORT OF GEOTECHNICAL EXPLORATION
PAYNEVILLE ELEMENTARY SCHOOL ADDITION
PAYNEVILLE, KENTUCKY

1 GENERAL SITE DESCRIPTION

The site of the proposed building addition for the Payneville Elementary School is located at 520 Rhodelia Road in Payneville, Kentucky. Topography of the site is relatively level to gently rolling with descending relief to the southwest and northwest of the site. Topographic relief on the site is on the order of about ten feet. The majority of the site was covered with paved parking areas and mixed grass at the time of the exploration.

It is our understanding that the project consists of constructing an addition which is scheduled to include a gymnasium with classrooms to the existing Payneville Elementary School. The building addition is scheduled to have a total area of about 10,000 square feet (sf). Construction of the addition will consist of reinforced concrete masonry bearing walls with a concrete slab on metal deck and open-web steel bar joists and bar joists and metal deck roof structure. Maximum wall loads are not anticipated to exceed 6.5 kips per linear foot within the building while column loads for the structure are not expected to exceed 25 kips. The finished floor elevation for the addition was unknown at the time of the investigation however it is assumed that the finished floor elevation will lie close to that of the existing school.

2 GENERAL SITE GEOLOGY

Available geologic mapping (*Geologic Map of the Irvington Quadrangle, Meade and Breckinridge Counties, Kentucky, USGS 1976 and the Kentucky Geological Survey Geologic Map Information Service* online) shows the site to be underlain by Mississippian-aged deposits of the Big Clifty Sandstone Member and the Beech Creek Limestone Member of the Golconda Formation. The Big Clifty Sandstone Member consists of sandstone and minor shale. Sandstone of the Big Clifty Sandstone Member of Golconda Formation is described as interbedded with shale in part, light gray to light brown in color, weathers brown to yellowish brown, fine to medium grained, medium to thick bedded, commonly massive, some locally thin bedded and crossbedding and ripple marks are common. The shale was described as light to dark gray in color and locally silty. The Beech Creek Limestone Member is primarily comprised of limestone with lesser instances of shale. Limestone of the member is described as medium to brownish gray in color, medium to fine crystalline and medium to thick bedded. Shale of the member is typically brownish gray, calcareous and occurs as partings and thin interbeds in the upper and lower parts of the member.

Karst potential mapping was reviewed for the site and ranged from non-karst to high potential for development of karst features at the site. **Caves and other karst features are often encountered near the contact of sandstone and limestone bedrock.** No other geologic hazards were readily apparent during the investigation; however it is impossible to fully identify the presence of or risk for development of all geologic hazards during the course of a typical geotechnical investigation.

3 SCOPE OF WORK PERFORMED

The geotechnical exploration consisted of nine soil test borings and seven rockline soundings. Each soil test boring was drilled to auger refusal. Rock coring was performed in one of the soil test borings to a depth of about ten feet beyond the auger refusal depth into the underlying bedrock. Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

The borings were drilled by an AEI drill crew using a track-mounted drill rig equipped with continuous flight hollow-stem augers and NQ2 coring equipment. An Engineer-In-Training was on site throughout the investigation to log the recovered soils encountered during drilling operations. During logging, particular attention was given to the soil color, texture, consistency and apparent moisture content. Standard Penetration Tests (SPT's) were performed on two and one-half foot centers throughout the soil test borings. Soil samples were collected from the split-barrel samplers and stored in sealed plastic bags at the site. In addition, four undisturbed Shelby Tubes samples (ST's) were obtained from selected depth intervals throughout the soil test borings. All recovered samples were transported to our laboratory for further classification and testing. The individual soil samples were visually classified by experienced laboratory technicians and verified by a Professional Geologist based on texture, strength and plasticity. A copy of the boring logs is included in Appendix B.

The natural moisture content of the soil samples was determined in the laboratory. The natural moisture content is denoted as (W%) and shown as a percentage of the dry weight of the soil on the boring logs. Atterberg limits, grain size analyses, and soil unconfined for compressive strength tests were performed on samples representative of the predominant soil horizons. The results of the laboratory tests are summarized in Appendix C. The soils were classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The Unified symbol for each stratum is shown on the legend for the typed boring logs. The testing was performed in accordance with the generally accepted standards for such tests.

4 RESULTS OF THE EXPLORATION

4.1 GENERAL

Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

4.2 SUBSURFACE SOIL CONDITIONS

The generalized subsurface conditions encountered at the boring locations, including descriptions of the various strata and their depths and thicknesses are presented on the Typed Boring Logs in Appendix B.

Topsoil was encountered at the surface in seven of the soil test borings with thicknesses ranging from about six to seven inches. Asphalt was encountered at the surface in the two remaining soil test borings with thicknesses of two and five inches. Beneath the asphalt pavement, dense graded aggregate was encountered with thicknesses of two and eight inches, respectively. Below the surface materials, lean clay was typically encountered to the reported auger refusal depths. The lean clay was typically described as containing variable amounts of sand and sandstone gravel, brown to red in color, moist to wet of anticipated optimum moisture content for compaction and typically soft to stiff in soil strength consistency.

Atterberg limits testing was performed on representative samples and the results indicate that the near-surface clay soils classify as CL (Clay of Low plasticity), lean clay and as CL-ML (silty lean clay) in accordance with the USCS. Liquid limit test results ranged from 20 to 26 percent with corresponding plasticity indices ranging from six to nine percent. Natural moisture content testing resulted in values ranging from 13 to 36 percent, with most values ranging from 16 to 26 percent. Results of the natural moisture content and Atterberg limits testing indicate that the on-site soils are typically at a moisture content near to ten percent wet or more of the plastic limit.

Unconfined compressive strength testing was performed on selected recovered samples representative of the predominant soil horizons. Unconfined compressive strength, or Q_u, results ranged from 1,858 to 4,787 pounds per square foot (psf) with corresponding dry unit weights ranging from 110 to 120 pounds per cubic foot (pcf).

SPT-N values in the cohesive soils ranged from four to 33 blows per foot (bpf), excluding blow counts that exceed 50 bpf; with most values ranging from seven to 14 bpf. Corresponding Q_p values ranged from 0.5 to 4.5 tons per square foot (tsf) with most values between 1.5 to 2.5 tsf. Together, the SPT-N, unconfined compressive strength and Q_p values are indicative of medium stiff to stiff soil strength consistencies with isolated soft and very stiff zones.

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change but rather the general area of change from one soil type to another; in-situ, the transition is gradual.

4.3 BEDROCK CONDITIONS

Refusal, as would be indicated by the Engineer on the field boring logs, indicates a depth where either essentially no downward progress can be made by the auger or where the N-value indicates essentially no penetration of the split-spoon sampler. It is normally indicative of a very hard or very dense material such as large boulders or the upper bedrock surface. Auger refusal was encountered in each of the soil test borings and rockline soundings. Auger refusal was encountered at depths ranging from about four to nine feet beneath the existing ground surface. Sandstone was recovered during rock coring in Boring B-1. The sandstone was typically described as weathered, fine to coarse grained, thin to thick bedded and soft to moderately hard. Rock core recovery ranged from 50 to 100 percent and rock quality designation (RQD) ranged from zero to 30 percent, indicative of very poor to poor rock quality. **It should be noted that bedrock is often weathered to such a degree near the soil/ bedrock interface that the augers are able to be advanced to some amount into the underlying bedrock, however during construction the upper bedrock surface may not be rippable with conventional excavation methods. It is recommended that the contractor verify depths to rock in the field prior to and during construction and not infer rockline data solely from the boring logs.**

4.4 GROUNDWATER CONDITIONS

Groundwater was not encountered in any of the borings during the investigation. To accurately determine the long-term groundwater level, as well as the seasonal and precipitation induced fluctuations of the groundwater level, it is necessary to install piezometers in the borings and monitor them for an extended length of time. Frequently, groundwater conditions affecting construction in this region are caused by trapped or perched groundwater, which occurs within the soil materials or at the soil/rock interface in irregular, discontinuous locations. If these water bodies are encountered during excavation, they can produce seepage durations and rates that will vary depending on the recent rainfall activity and the hydraulic conductivity of the material.

4.5 SEISMIC CONDITIONS

According to the Kentucky Building Code, 2018 Edition, and the subsurface conditions encountered in the borings, Site Class B can be utilized for any seismic structural design.

Soil liquefaction analysis was outside the scope of this investigation. Prior studies in this region on similar soil types indicate that the potential for liquefaction is low to moderate and is primarily dependent on the variability of site soils and earthquake severity.

Consideration for seismic loading and liquefaction potential beyond this level of investigation is left to the discretion of the structural framing and foundation design engineer.

5 ANALYSES AND RECOMMENDATIONS

The recommendations that follow are based on our conceptual understanding of the project. As the site design is advanced, please notify us of any significant design changes so that our recommendations can be reviewed and modified as necessary.

5.1 GENERAL SITE WORK

5.1.1 On-Site Soils

The near-surface soils on this site are residual clays which classify as low plasticity lean clay, CL, and silty lean clay, CL-ML, in accordance with the USCS. These soils exhibit low potential to swell or shrink when exposed to long-term increases or decreases in moisture content. These soils are suitable for use as fill material provided they are wetted or dried to a moisture content suitable for compaction.

5.1.2 General Fill Requirements

Any material, whether borrowed on-site or imported to the site, placed as engineered fill on the project site beneath the proposed building or other proposed on-grade structures such as pavement, parking lots, sidewalks, etc., should be an approved material, free of environmental contamination, vegetation, topsoil, organic material, wet soil, construction debris, and rock fragments greater than six inches in diameter. We recommend that any borrow material, if needed, consist of granular or lean clay materials or mixtures thereof with Unified Classifications of CL, SC, or GC. We further recommend high plasticity clays, known as fat clays (CH soils) not be *imported* to the site due to their potential for volume changes with fluctuations in moisture content.

The preferred borrow material should have a Plasticity Index (PI) less than 30 and a standard Proctor maximum dry density of at least 95 pcf. Engineering classification and standard Proctor tests should be performed on all potential borrow soils and the test results evaluated by an AEI Geotechnical Engineer to evaluate the suitability of the soil for use as engineered fill.

5.1.3 Topsoil Stripping/ Pavement Removal

Prior to earthwork operations, topsoil and surface plant material root mat should be stripped from both cut and fill areas and stockpiled for landscaping purposes.

Pavement (and crushed aggregate) may remain in place but should be rubblized prior to any fill placement. Rubblized pavement should be less than six inches in its greatest dimension. Any pavement removed should also be stockpiled and may be utilized as stabilization material or structural fill.

5.1.4 Subgrade Evaluation/Conditioning

Once the surface materials are removed, areas to receive fill should be "proof-rolled" under the observation of an AEI Geotechnical Engineer or Technician to evaluate the subgrade for suitability for fill placement. The proof-rolling should be performed using heavy construction equipment such as a fully loaded single or tandem axle dump truck (approximately 20-25 tons), passing repeatedly over the subgrade at a slow rate of speed.

Subgrade soils that are considered unstable after proof-rolling should be stabilized by additional compaction or by one or more of the following methods; in-place stabilization using chemical methods (lime/soil cement), removal and replacement with engineered fill, partial depth removal and replacement with a crushed (angular) aggregate layer, or partial depth removal and replacement with a geogrid and a crushed aggregate layer. The specific method of treatment will be based on the conditions present at the time the proof-rolling is performed and local availability of materials and economic factors. The selection of the appropriate method to mitigate degrading subgrade soils is dependent on the time of year site work is anticipated, cost, anticipated effectiveness, and scheduling impacts. AEI can assist in selecting this method considering all factors.

Once the subgrade is judged to be relatively uniform and suitable for support of engineered fill, fill areas should be brought to design elevations with onsite soil and/or suitable off-site borrow material placed and compacted as specified in Section 5.1.5 Fill Placement.

5.1.5 Fill Placement

Lean clay, CL, soil placed under building areas should be placed in maximum eight inch (loose thickness) horizontal lifts, with each lift being compacted to a minimum of 98 percent of the standard Proctor maximum dry density, at a moisture content from plus/ minus two percent of optimum. Due to the silty and sandy nature of the existing soils on site, closer tolerances than two percent deviation from optimum moisture may be required to achieve adequate compaction. The compaction requirement may be reduced to 95 percent in proposed paved areas and to 92 percent in proposed landscape areas. **Based on the results of moisture content tests performed in the borings, drying of the**

on-site soils will be necessary to achieve moisture contents suitable for compaction. Representative and adequate field density testing should be performed by AEI to verify that compaction requirements have been met.

Sandstone bedrock may be encountered in moderately deep excavations at the site and will likely be encountered in any significant cut areas. **The sandstone recovered during rock coring is judged to be nondurable.** If any sandstone excavated at the site is to be utilized as fill at the site, it should be broken down with heavy tracked equipment or a sizable sheep's foot roller adequately prior to placement of subsequent lifts.

5.1.6 Soil Movement

Site grading should be maintained during construction so that positive drainage is promoted at all times. Final site grading should be accomplished in such a manner as to divert surface runoff and roof drains away from the foundation elements and paved areas. Precipitation runoff should be collected in storm sewers as quickly as possible. Maintenance should be performed regularly on paved areas to seal pavement cracks and reduce surface water infiltration into the pavement subgrade.

5.1.7 Site Soil Practices

Working with the on-site soils will demand sensible construction practices and techniques. Some of these include:

- Prevent stripping too far in advance of actual earthwork needs. Problems arise when broad areas of clay/silt mixtures are exposed and allowed to become wet and soft from rainfall. Once saturated, deep rutting can occur by movement of construction equipment.

- Strip areas to receive fill in small, sequential areas as needed. These areas should be limited to the contractor's abilities to reasonably place and compact fill material.

- Schedule earthwork construction to take full advantage of a summer season. Generally, the on-site clays need to be placed at two percent wet of optimum moisture content to achieve compaction and reduce the potential for subgrade volume change. This moisture range is difficult to achieve in the winter and early spring when rainfall activity is more prevalent and soil drying is not always possible.

- Maintain good surface drainage during earthwork construction. Grade construction areas on a daily basis if necessary to promote sheet drainage of precipitation and seal all engineered fill placed with a smooth drum steel roller at the end of each day.

- Perform frequent density tests during fill placement to confirm achievement of proper compaction.

5.2 STRUCTURE FOUNDATIONS

5.2.1 Recommended Bearing Capacity Values

Due to the relatively shallow depths to bedrock at the site, it is recommended that a rock-bearing foundation system be incorporated into the design. An allowable bearing capacity of five ksf may be utilized for design of foundations bearing directly on relatively unweathered sandstone bedrock which underlies the site or on properly placed lean concrete in contact with the bedrock surface. The recovered rock core encountered in Boring B-1 indicates weathered, friable sandstone in the upper bedrock surface. Some undercutting of friable sandstone may be required to provide a uniform, level bearing surface.

These recommendations are provided in consideration of the field-testing, laboratory testing, local codes, and our experience with materials of similar description.

5.2.2 Recommended Minimum Footing Dimensions

The *minimum* recommended width of continuous wall footings is 18 inches. The minimum recommended plan dimension for isolated spread footings is 24 inches. Actual foundation sizes should be determined by the foundation engineer based on design structure loads and the net allowable bearing values presented in 4.2.1.

5.2.3 Footing Trenches

We recommend that the bottom of exterior continuous strip spread footings extend a minimum of 24 inches below finished exterior grade to provide protection against frost penetration related problems in normal winters. Interior foundations not exposed to severe drying, freezing temperatures, and/or severe moisture fluctuations can be constructed at relatively shallow depths as appropriate for construction. Foundation construction should follow these recommendations:

- Foundation concrete should be placed in the excavations the same day the trenches are cut.

- Exposed bearing surfaces should be protected from severe drying, freezing, and water accumulation. A concrete “mud-mat” may be constructed over the bearing materials if the excavation must remain exposed to the elements for an extended period of time.

- Any loose soil, debris, or excess water should be removed from the bearing surface by hand cleaning prior to concrete placement.

- The foundation-bearing surface should be level or appropriately benched.
- Foundation materials that have deteriorated as a result of the elements should be removed prior to concrete placement.
- Foundation trenches should be "clean-cut" where possible and constructed without the use of forms.
- Reinforcing steel should be placed in all footings to provide strength to distribute loads on the foundation that may be overlying weak or more compressible foundation materials to stronger adjacent materials.

5.2.4 Excavations and Rock Removal

Temporary excavations should be properly sloped in accordance with the Kentucky Occupational Safety and Health Standards for the Construction Industry 29 CFR Part 1926, Subpart)- Excavations. The soil overburden at the site consists of Type B soils. Type B soils at the site should be laid back on temporary slopes not exceeding 1 Horizontal: 1 Vertical (1H:1V) in excavations not exceeding 20 feet in depth. Sloping or benching for excavations greater than 20 feet deep should be designed by a registered professional engineer.

In the event of encountering weathered-friable sandstone at depths exceeding three feet from the soil/bedrock interface, excavations in these areas should be treated as Type B soils and should be laid back on temporary slopes not exceeding 1 Horizontal: 1 Vertical (1H: 1V) until competent bedrock is encountered. **Rock removal in these areas as described above should be performed by hoe-ramming or other mechanical efforts.**

5.2.5 Below Grade Walls

Lateral earth pressures are influenced by structural design, wall restraint conditions, construction equipment and methods and backfill material properties. Wall restraint conditions are presented below in the form of "at-rest" and "active" lateral earth pressure conditions. The "at-rest" (Ko) condition is applicable when lateral movement is prevented by an unyielding element and assumes no wall movement. The "active" (Ka) condition is used for design of free-standing cantilever walls and assumes wall movement as indicated below. Below grade walls should be designed for earth pressures at a minimum of those indicated in Table 2 below.

Table 1: Earth Pressure Coefficients

Earth Pressure Coefficient		Equivalent Fluid Pressure Above Water Table (pcf)	Equivalent Fluid Pressure Below Water Table (pcf)
Active Coefficient (Ka)	0.36	43	83
Passive Coefficient (Kp)	2.77	166	142
At-Rest Coefficient (Ko)	0.53	64	93

Note: Equivalent fluid pressures below water table ACCOUNT for groundwater hydrostatic pressures.

- For active earth pressure, wall must rotate about base, with top lateral movements of about 0.0002 H to 0.004 H, where H is wall height.
- Uniform surcharge behind the wall is not accounted for in the values presented above.
- Loading from heavy construction equipment is not included.
- Dynamic loading is not included.
- No safety factors included in soil parameters.
- Hydrostatic pressure should be accounted for unless positive backfill drainage conditions can be achieved.
- A friction coefficient between the subgrade soils and foundation concrete has been estimated to be 0.3 based on results of soil classification testing.
- Presented values are based on level backfill. If backfill is sloped above the wall, these stated values will require increasing to account for the additional loads.

5.2.6 Grade Supported Floor Slab Recommendations

We recommend on-grade supported floor slabs be isolated from the building foundations and allowed to float free and settle differentially with the building. We have estimated an Effective Modulus of Soil Subgrade Reaction (k) of 125 pci. The final floor slab design, including the amount of and type of steel reinforcement (welded wire mesh or bar reinforcing) will be dependent on the structural engineer's evaluation of the final grade slab thickness, concrete compressive strength, and actual slab loadings. Additional design and construction recommendations are provided as follows:

- Proof-rolling of the cut subgrade and existing subgrade should be performed to identify soft or unstable soil prior to engineered fill placement. Soft soils should be removed to the extent determined in the field by the AEI Geotechnical Engineer or Technician. Proof-rolling of the final floor slab subgrade should also be performed prior to floor slab construction and any defects appropriately repaired as recommended in the field by AEI.

- The floor slab should be supported on a minimum 4-inch compacted layer of free draining granular base material to distribute concentrated loads, improve

drainage, and reduce the risk of deterioration of the prepared subgrade during construction. The stone should be kept moist not wet, immediately before placement of concrete to limit differential curing conditions at the top and bottom of the slab.

- A vapor barrier of appropriate thickness should be placed on the granular subbase to reduce migration of moisture through the slab. However, proper concrete mix designs, placement and curing methods must be used to reduce the potential for concrete shrinkage problems that are sometimes associated with the use of a vapor barrier. Reference to ACI 302.1 R 96, "Guide for Concrete Floor and Slab Construction", should be utilized. Joints between slab sections should contain keys or dowels to permit slab rotation but to reduce extreme vertical differential displacements.

5.3 PAVEMENT CONSIDERATIONS

Flexible and rigid pavement designs were performed for light and heavy-duty pavements. ESAL's (equivalent 18-kip single axle loads) of 15,000 were utilized for light-duty pavement and 120,000 for heavy duty. ESAL's were estimated for heavy-duty pavement based on 45 passenger cars and 7 buses per day and one delivery trucks and one garbage truck per week. Light-duty ESALs were determined using only the passenger cars for staff parking and occasional bus or delivery parking. A CBR value of 3.0 was utilized for design based on projects with similar soils such as those present at the site.

Our analysis was made using the *AASHTO Guide for Design of Pavement Structures (1993 Edition)* and the following parameters:

- Subgrade Resilient Modulus (M_r)= 4,500 psi
- CBR value = 3.0
- Initial Serviceability = 4.5
- Terminal Serviceability = 2.25
- Reliability = 95%
- Standard Deviation = 0.45
- ESAL's = 15,000 (Light Duty); 120,000 (Heavy Duty)
- Design Life = 20 Years
- Drainage Coefficient = 1.0
- Layer Coefficient = 0.44 for asphaltic surface, 0.40 for asphaltic base, 0.14 for crushed aggregate base.

Pavement performance is highly dependent on the support provided by the subgrade that can be greatly impacted by changes in the moisture condition of the subgrade. Measures that reduce the risk of the subgrade becoming saturated should be incorporated into the site design. Pavement slopes should have a minimum gradient of two percent where

possible. Pavement edges should be "daylighted", or provided a means where water trapped in the aggregate base can escape by extending the aggregate base course through the sides of drainage channels.

5.3.1 Flexible Pavement

Using the design parameters previously outlined, a recommended light-duty pavement should at a minimum consist of 6-inches of dense graded aggregate (DGA) or crushed stone base (CSB) aggregate base course, a 2 ½-inch bituminous base course, and a 1 ¼-inch bituminous surface course. This design would be appropriate for car parking and travel areas only with sporadic parcel delivery vehicles. A recommended minimum heavy-duty pavement should at a minimum consist of 10-inches dense graded aggregate (DGA) or crushed stone base (CSB) aggregate base course, a 3-inch bituminous base course, and a 1 ¼-inch bituminous surface course. This design would be appropriate for school buses as well as sporadic fully loaded delivery and garbage trucks and daily car traffic.

5.3.2 Aggregate Base Paving

We recommend the Bituminous Pavement aggregate base consist of dense graded aggregate (DGA) or crushed stone base (CSB) meeting the requirements of Section 805 of the KDOH Standard Specifications, 2012 Edition. The aggregate base should be placed in maximum 4-inch thick horizontal lifts, with each lift being compacted in accordance with the control strip guidelines set forth in Section 302.03.04A of the KDOH Standard Specifications, 2012 Edition.

5.3.3 Rigid Pavement

We have estimated an Effective Modulus of Subgrade Reaction (k) of 125 pci and various other parameters for rigid pavement design. A minimal recommended light-duty rigid pavement design would consist of 4-inches of CSB underlying 5-inches of Portland Cement Concrete Pavement with a 28-day compressive strength of 4,000 psi. A minimal recommended heavy-duty rigid pavement design would consist of 4-inches of CSB underlying 6-inches of Portland Cement Concrete Pavement with a 28-day compressive strength of 4,000 psi. The concrete used to construct the pavement should have four to six percent entrained air to improve the concrete's resistance to spalling from saturated freeze-thaw cycles.

Control joints, filled with a fuel resistant seal to deter liquid intrusion into the subgrade, should be incorporated at minimum of 25-foot spacings.

5.4 GENERAL CONSIDERATIONS

5.4.1 Construction Monitoring/Testing

Field density and moisture content determinations should be made on each lift of fill with a minimum of one test per 3,000 to 5,000 square feet in building pad areas, one test per lift per 5,000 to 10,000 square feet in other fill areas, and one test per lift per 100 to 200 linear feet of utility trench backfill. All construction operations involving earthwork and paving should be performed in the presence of an experienced representative of AEI. The representative would operate under the direct supervision of an AEI Geotechnical Engineer. Some adjustments in the test frequencies may be required based upon the general fill types, changes in the fill material and soil conditions at the time of placement.

Site problems can be avoided or reduced if proper field observation and testing services are provided. We recommend all foundation excavations, proof-rolling, site and subgrade preparation, sinkhole remediation, subgrade stabilization (if used), and pavement construction be monitored by AEI. Density tests should be performed to verify compaction and moisture content for all earthwork operations. Field observations should be performed prior to and during concrete placement operations.

5.4.2 Construction Considerations

The surface soils at the site are susceptible to loss of bearing capacity (pumping) by the action of water and construction equipment. Once the subgrade has been stripped, cut to grade and performed adequately during proof-rolling, it should be sealed at the end of each filling day with a smooth drum roller and sloped to sheet drain rainwater. Any material disturbed by rainwater and construction operations should be undercut prior to placing the next lift of fill.

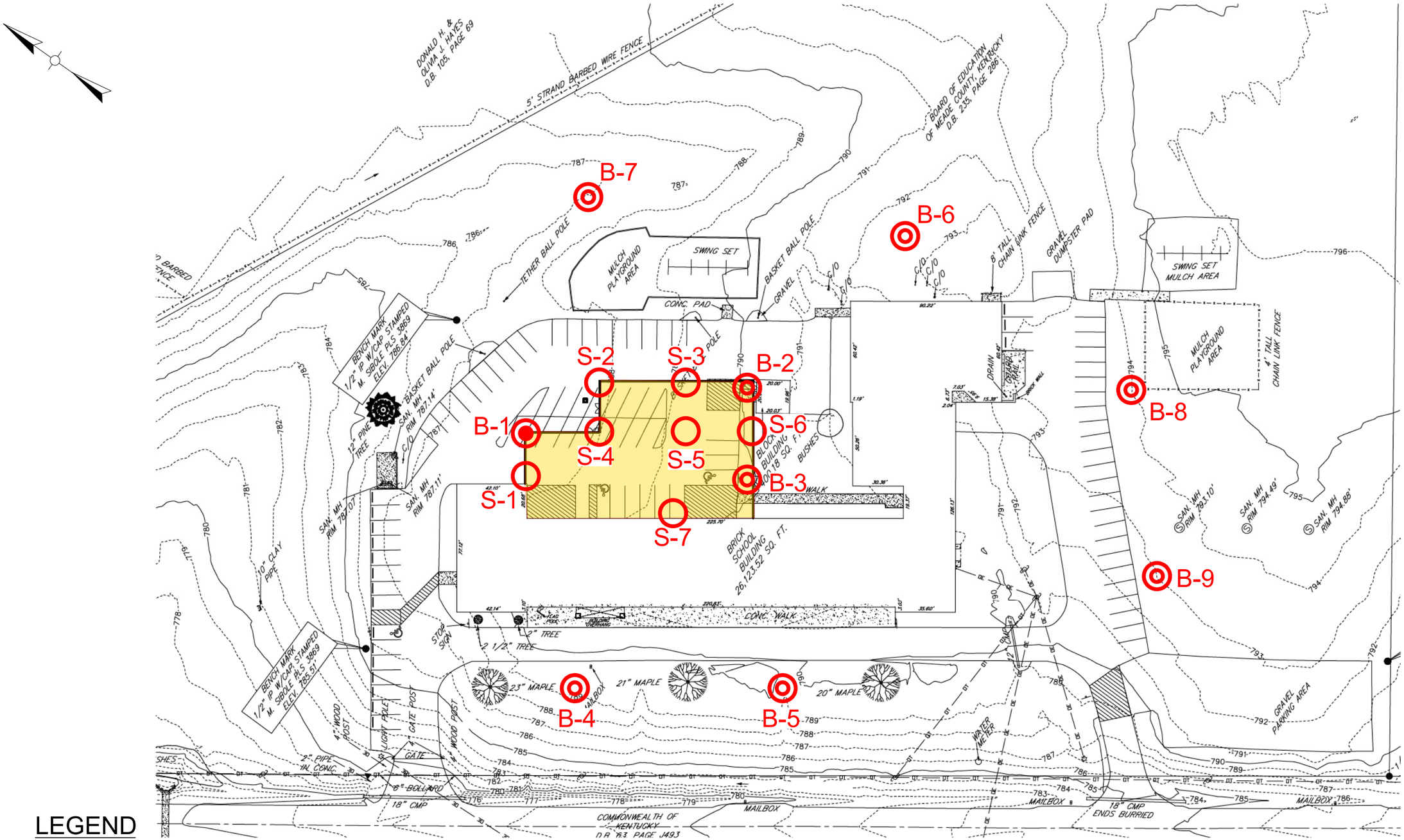
If the project is to begin in the fall and continue through the winter, care must be taken not to place frozen soil, as proper compaction will be impossible. Moisture contents must also be carefully monitored during the winter, as wet soil will be difficult to dry.

5.4.3 Limitations

The conclusions and recommendations presented herein are based on information gathered from the borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between the borings.

APPENDIX A

Boring Layout



LEGEND

- SOIL TEST BORING WITH STANDARD PENETRATION TESTS AND UNDISTURBED SHELBY TUBES
- SOIL TEST BORING WITH STANDARD PENETRATION TESTS AND UNDISTURBED SHELBY TUBES AND ROCK CORE
- ROCKLINE SOUNDING

DRAWING NOT TO SCALE

NOTE: ALL BORING LOCATIONS APPROXIMATE

NO.	DATE	DESCRIPTION

BORING LAYOUT

CLIENT: Meade County Board of Education

PROJECT: Payneville Elementary Additions

AEI
AMERICAN ENGINEERS, INC.
DESIGNING YOUR FUTURE
65 Aberdeen Drive, Glasgow KY
270.651.7220

SCALE: NTS

DATE: 02/08/2019

DRAWN BY: J. CHILDRESS

CHECKED BY: D. MITCHELL

FILE:

SHEET: B1

APPENDIX B

Boring Logs

FIELD TESTING PROCEDURES

The general field procedures employed by the Field Services Center are summarized in the following outline. The procedures utilized by the AEI Field Service Center are recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Soil Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the surface conditions. Borings are advanced into the ground using continuous flight augers. At prescribed intervals throughout the boring depths, soil samples are obtained with a split-spoon or thin-walled sampler and sealed in airtight glass jars and labeled. The sampler is first seated 6 inches to penetrate loose cuttings and then driven an additional foot, where possible, with blows from a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler each six-inch increment is recorded. The penetration resistance, or "N-value" is designated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. The split spoon sampling procedures used during the exploration are in general accordance with ASTM D 1586. Split spoon samples are considered to provide *disturbed* samples, yet are appropriate for most engineering applications. Thin-walled (Shelby tube) samples are considered to provide *undisturbed* samples and obtained when warranted in general accordance with ASTM D 1587.

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Core Drilling Procedures for use on refusal materials. Prior to coring, casing is set in the boring through the overburden soils. Refusal materials are then cored according to ASTM D-2113 using a diamond bit attached to the end of a hollow double tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Samples of the material penetrated are protected and retained in the inner tube, which is retrieved at the end of each drill run. Upon retrieval of the inner tube the core is recovered, measured and placed in boxes for storage.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soil in general accordance with the procedures outlined in ASTM D 2487 and D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

Representative portions of soil samples are placed in sealed containers and transported to the laboratory. In the laboratory, the samples are examined to verify the driller's field classifications. Test Boring Records are attached which show the soil descriptions and penetration resistances.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designate the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using as electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Sampling Terminology

Undisturbed Sampling: Thin-walled or Shelby tube samples used for visual examination, classification tests and quantitative laboratory testing. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airtight and transported to the laboratory. Locations and depths of undisturbed samples are shown on the "Boring Logs."

Bag Sampling: Bulk samples of soil are obtained at selected locations. These samples consist of soil brought to the surface by the drilling augers, or obtained from test pits or the ground surface using hand tools. Samples are placed in bags, with sealed jar samples of the material, and taken to our laboratory for testing where more mass material is required (i.e. Proctors and CBR's). The locations of these samples are indicated on the appropriate logs, or on the Boring Location Plan.

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

COHESIVE SOILS
(Clay, Silt, and Mixtures)

CONSISTENCY	SPT N-VALUE	Qu/Qp (tsf)
Very Soft	2 blows/ft or less	0 – 0.25
Soft	2 to 4 blows/ft	0.25 – 0.49
Medium Stiff	4 to 8 blows/ft	0.50 – 0.99
Stiff	8 to 15 blows/ft	1.00 – 2.00
Very Stiff	15 to 30 blows/ft	2.00 – 4.00
Hard	30 blows/ft or more	> 4.00

PLASTICITY

Degree of Plasticity	Plasticity Index (PI)
Low	0 – 7
Medium	8 – 22
High	over 22

NON-COHESIVE SOILS
(Silt, Sand, Gravel, and Mixtures)

DENSITY	SPT N-VALUE
Very Loose	4 blows/ft or less
Loose	4 to 10 blows/ft
Medium Dense	10 to 30 blows/ft
Dense	30 to 50 blows/ft
Very Dense	50 blows/ft or more

PARTICLE SIZE IDENTIFICATION

Boulders	12 inch diameter or more
Cobbles	3 to 12 inch diameter
Gravel	Coarse – 1 to 3 inch
	Medium – ½ to 1 inch
	Fine – ¼ to ½ inch
Sand	Coarse – 0.6mm to ¼ inch
	Medium – 0.2mm to 0.6mm
	Fine – 0.05mm to 0.2mm
Silt	0.05mm to 0.005mm
Clay	0.005mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 – 10
Trace to Some	11 – 20
Some	21 – 35
And	36 – 50

NOTES

Classification – The Unified Soil Classification System is used to identify soil unless otherwise noted.

Standard "N" Penetration Test (SPT) (ASTM D1586) – Driving a 2-inch O.D., 1 3/8-inch I.D. sampler a distance of 1 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6-inches to seat the sampler into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the field drill long (e.g., 10/8/7). On the report log, the Standard Penetration Test result (i.e., the N value) is normally presented and consists of the sum of the 2nd and 3rd penetration counts (i.e., N = 8 + 7 = 15 blows/ft.)

Soil Property Symbols

Qu:	Unconfined Compressive Strength	N:	Standard Penetration Value (see above)
Qp:	Unconfined Comp. Strength (pocket pent.)	omc:	Optimum Moisture content
LL:	Liquid Limit, % (Atterberg Limit)	PL:	Plastic Limit, % (Atterberg Limit)
PI:	Plasticity Index	mdd:	Maximum Dry Density

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65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/23/19 **COMPLETED** 1/23/19
GROUND ELEVATION 787.5 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD HSA/ Diamond impregnated coring bit
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		ASPHALT (5 inches)									
		CRUSHED AGGREGATE (2 inches)									
		(CL) lean CLAY, brown, moist, stiff	SPT 1	13	11-7-4/0"	1.75	8				
			ST 1	100			14	24	15	9	
5			SPT 2	100	10-50/0"	3.0	22				
		weathered SANDSTONE, fine to coarse grained, brown to reddish brown, thin to thick bedded, arenaceous, friable, soft	RC 1	100 (0)							
			RC 2	50 (0)							
10		SANDSTONE, coarse grained, brown to grayish brown, thin to thick bedded, moderately hard	RC 3	100 (30)							
15											

Refusal at 4.8 feet.
Bottom of borehole at 15.4 feet.

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 790 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		ASPHALT (2 inches)									
		DENSE GRADE AGGREGATE (8 inches)									
		(CL-ML) silty lean CLAY, brown, moist to wet, medium stiff	SPT 1	93	1-2-5/0"	1.25	21				
			ST 1	90			16	20	14	6	

Refusal at 4.8 feet.
Bottom of borehole at 4.8 feet.

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PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 790 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)									
		(CL-ML) silty lean CLAY, brown, moist to wet, medium stiff	SPT 1	100	0-2-5/0"	1.75	28				
			ST 1	100			18	26	19	7	
			ST 2	100			17				
5			SPT 2	100	28-20-13/0"	3.0	14				

Refusal at 5.8 feet.
Bottom of borehole at 5.8 feet.

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65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 789 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)									
		(CL) lean CLAY, trace to some sand, brown, moist to wet, soft to stiff	SPT 1	93	1-2-2/0"		28				
			SPT 2	100	3-4-5/0"	1.5	26				
5			SPT 3	100	13-50/0"	2.75	15				

Refusal at 5.1 feet.
Bottom of borehole at 5.1 feet.

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PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 789.5 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)									
		(CL) lean CLAY, brown, moist to wet, soft to stiff	SPT 1	87	1-1-3/0"	1.75	36				
			SPT 2	100	3-6-7/0"	2.25	25				
			SPT 3	100	7-50/0"	1.5	22				
		Refusal at 4.8 feet. Bottom of borehole at 4.8 feet.									

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PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/23/19 **COMPLETED** 1/23/19
GROUND ELEVATION 792.5 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (7 inches)									
		(CL) lean CLAY, brown, moist to wet, medium stiff to very stiff	SPT 1	80	1-2-3/0"	0.25	25				
			SPT 2	100	4-4-5/0"	1.5	28				
5			SPT 3	100	9-10-11/0"	3.0	16				
		Refusal at 6.2 feet.									
		Bottom of borehole at 6.2 feet.									

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DATE STARTED 1/23/19 **COMPLETED** 1/23/19
GROUND ELEVATION 787 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (7 inches)									
		(CL) lean CLAY, with sandstone gravel, brown, moist to wet, medium stiff	SPT 1	87	1-2-3/0"	2.25	25				
			SPT 2	67	3-3-4/0"	1.0	29				
5			SPT 3	100	12-50/0"	4.5	13				

Refusal at 5.2 feet.
Bottom of borehole at 5.2 feet.

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/23/19 **COMPLETED** 1/23/19
GROUND ELEVATION 794 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (7 inches)									
		(CL) lean CLAY, trace gravel, brown to red, moist, stiff to very stiff	SPT 1	80	1-4-6/0"	2.0	24				
			SPT 2	87	4-6-8/0"	4.0	22				
5			SPT 3	80	6-7-11/0"	2.25	21				
			SPT 4	100	7-11-12/0"	0.5	20				

Refusal at 8.8 feet.
Bottom of borehole at 8.8 feet.

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GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (6 inches)	SPT 1	100	2-4-4/0"		21				
		(CL) lean CLAY, trace to some sand, brown, moist, medium stiff to very stiff	SPT 2	80	4-4-6/0"	1.25	25				
5			SPT 3	100	6-7-10/0"	2.5	16				
			SPT 4	100	7-25-50/0"	1.75	27				

Refusal at 8.9 feet.
Bottom of borehole at 8.9 feet.

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CLIENT Meade County Board of Education
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GROUND ELEVATION 787.5 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											

Refusal at 5.1 feet.
Bottom of borehole at 5.1 feet.

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PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 788 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									

Refusal at 4.5 feet.
Bottom of borehole at 4.5 feet.

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PROJECT NUMBER 218-487
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DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 789 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									

Refusal at 4.1 feet.
Bottom of borehole at 4.1 feet.

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5		Refusal at 5.0 feet. Bottom of borehole at 5.0 feet.									

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											

Refusal at 5.1 feet.
Bottom of borehole at 5.1 feet.

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 790 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									

Refusal at 4.9 feet.
Bottom of borehole at 4.9 feet.

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 1/24/19 **COMPLETED** 1/24/19
GROUND ELEVATION 789.4 ft
DRILLING CONTRACTOR James Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Jacob Cowan **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5		Refusal at 5.8 feet. Bottom of borehole at 5.8 feet.									

KEY TO SYMBOLS

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary School Addition
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- ASPHALT: Asphalt
- CL: USCS Low Plasticity Clay
- CL-ML: USCS Low Plasticity Silty Clay
- CRUSHED AGGREGATE
- SANDSTONE: Sandstone
- TOPSOIL: Topsoil

SAMPLER SYMBOLS

- Rock Core
- Standard Penetration Test
- Shelby Tube

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

APPENDIX C

Laboratory Testing Results

ATTERBERG LIMITS' RESULTS

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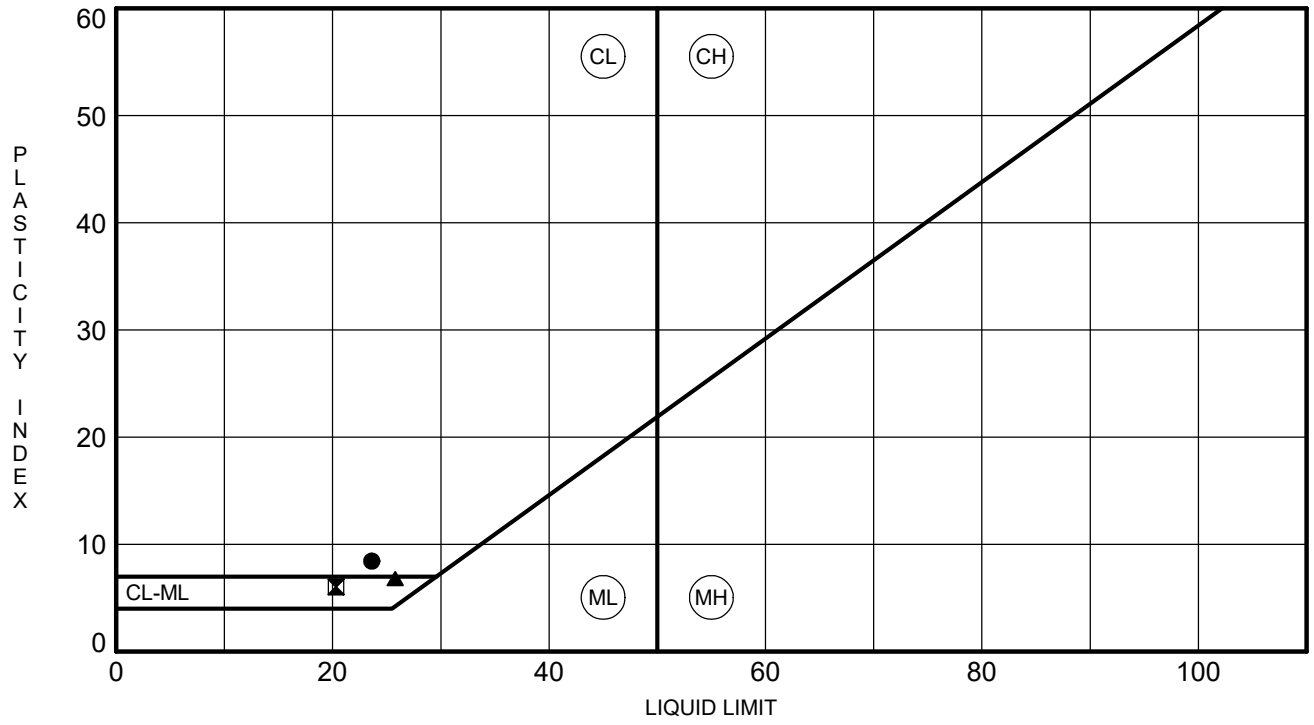
(270) 651-7220

CLIENT Meade County Board of Education **PROJECT NAME** Payneville Elementary School Addition

PROJECT NUMBER 218-487 **PROJECT LOCATION** Payneville, KY



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**2.0**	**24**	**15**	**9**	**60**	**brown lean CLAY**
⊠	**B-2**	**3.0**	**20**	**14**	**6**	**73**	**brown silty lean CLAY**
▲	**B-3**	**1.5**	**26**	**19**	**7**	**81**	**brown silty lean CLAY**

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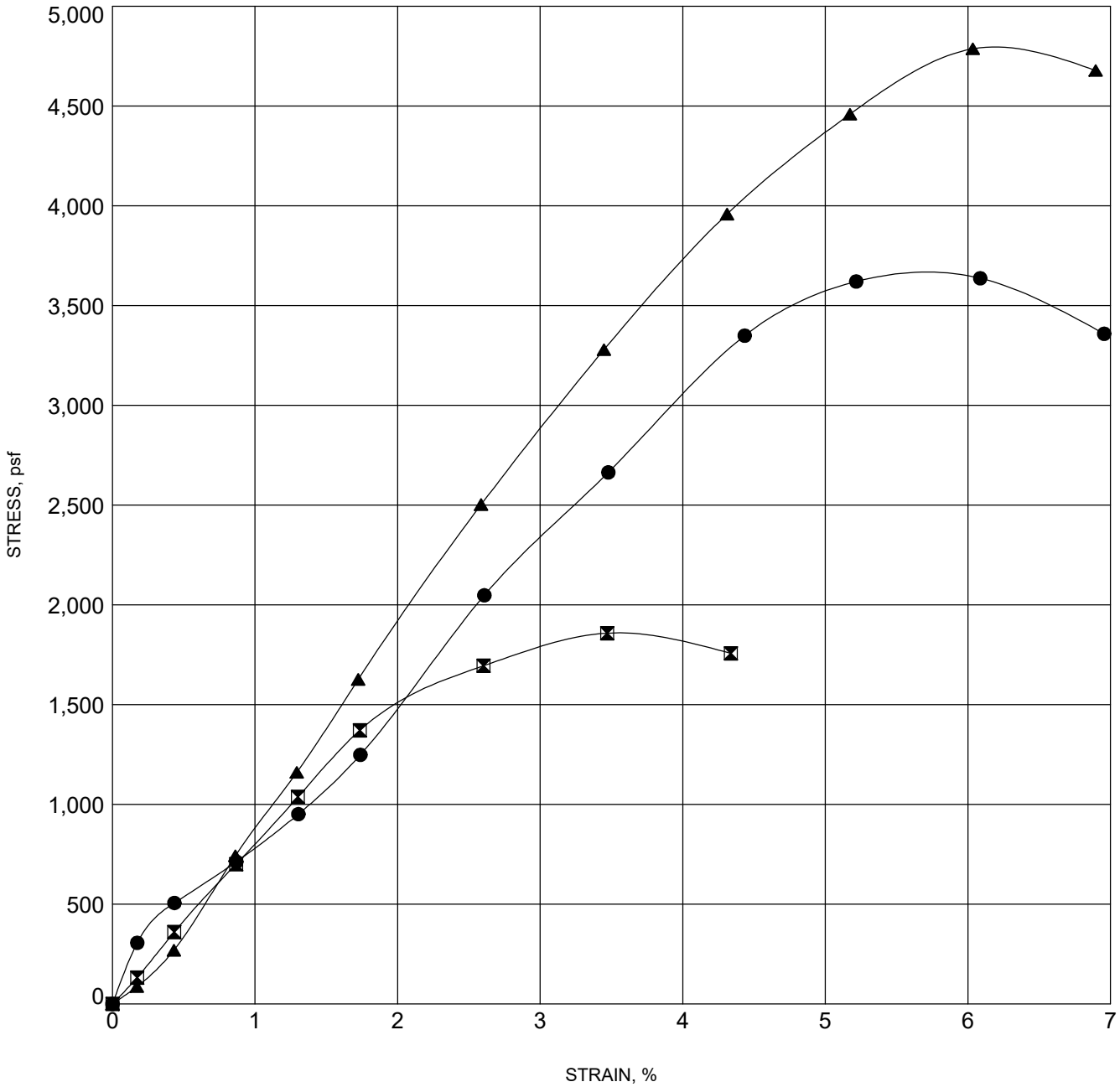
UNCONFINED COMPRESSION TEST

CLIENT Meade County Board of Education **PROJECT NAME** Payneville Elementary School Addition

PROJECT NUMBER 218-487 **PROJECT LOCATION** Payneville, KY



	BOREHOLE	DEPTH	Classification	γ_d	Qu
●	**B-1**	**2.0**	**brown lean CLAY**	**120**	**3637**
⊠	**B-2**	**3.0**	**brown silty lean CLAY**	**117**	**1858**
▲	**B-3**	**1.5**	**brown silty lean CLAY**	**110**	**4787**

AEI
AMERICAN
ENGINEERS, INC.

May 14, 2019

Dr. John Millay
Superintendent
Meade County Board of Education
115 Old Ekron Road
Brandenburg, KY 40108

RE: Geotechnical Investigation
Payneville Elementary Borrow Site and Lagoon/Drip Irrigation System
Meade County, Kentucky
AEI Project No. 218-487

Dear Dr. Millay:

American Engineers, Inc. (AEI) is pleased to submit this letter report that summarizes the results of the geotechnical exploration performed at the above referenced site.

1. General Site Description

The site of the proposed borrow site and lagoon irrigation system are located at the existing Payneville Elementary School in Payneville, Kentucky. Currently, the area consists of mixed grasses. The topography of the site is best described as gently rolling with descending relief to the southwest and northwest of the site. Topographic relief of the borrow area and preferred area is on the order of about 12 and eight feet, respectively. The majority of the site is covered with mixed grass at the time of the exploration.

It is our understanding that the project will consist of constructing either a lagoon or drip irrigation system. The purpose of this investigation is to evaluate the suitability of the on-site soils at the borrow location and to determine the suitability of installing either a lagoon (which is most preferred) or a drip irrigation system.

2. Scope of Work Performed

The geotechnical exploration consisted of drilling four soil test borings in total, two soil test borings within the proposed borrow site and two soil test borings within the proposed lagoon irrigation system. In addition, four rockline soundings were performed at the site, two soundings within the proposed borrow site and two soundings within the proposed lagoon irrigation system footprint. During the investigation, all borings were drilled to auger refusal. The borings were field located relative to existing site features and elevated from existing topographic mapping.

The borings were drilled by an AEI drill crew using a track-mounted drill rig equipped with continuous flight hollow-stem augers. A Graduate Geologist was on site throughout the fieldwork to log recovered samples during the drilling operation. During logging, particular attention was given to the soil color, texture, consistency and apparent moisture content. Standard Penetration Tests (SPT's) were typically performed on two and one-half foot centers.

The natural moisture content of the soil samples was determined in the laboratory. The natural moisture content is denoted as (W%) and shown as a percentage of the dry weight of the soil on the boring logs. Atterberg limits, grain-size analyses and standard Proctor testing was performed on samples representative of the predominant soil horizons. The results of the laboratory tests are summarized in Appendix C. The soils were classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The Unified symbol for each stratum is shown on the legend for the typed boring logs. The testing was performed in accordance with the generally accepted standards for such tests.

3. Results of the Exploration

Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

Topsoil was encountered at the existing surface with thicknesses of two to four inches. Beneath the topsoil, sandy lean clay was encountered to depths of about 4 ½ to seven feet beneath the surface. The clay encountered was described as sandy lean clay, containing various amounts of gravel, brown to gray in color, very moist to saturated and very soft to stiff in soil strength consistency. Gravelly lean clay was typically encountered beneath the lean clay to the boring termination depths. The gravelly lean clay was typically described as containing various amounts of sand, orange to gray in color, moist to very moist and hard in soil strength consistency.

SPT-N values in the near surface cohesive soils ranged from two to 18 blows per foot, with most values between four and 15 blows per foot. Corresponding Qp values ranged from 0.5 to greater than 4.5 tons per square foot (tsf), with most values between 1.0 and greater than 4.5 tons per square foot. Together, the SPT-N and Qp values in the cohesive soils are generally indicative of very soft to very stiff soil strength consistencies.

SPT-N values in the gravelly cohesive soils at depth ranged from 33 to exceeding 50 blows per foot. These values are likely inflated due to the various amounts of gravel throughout the majority of the recovered samples. The SPT-N values indicate that **the gravelly soils are of hard soil strength consistency and are representative of the fragipan soil horizon** as defined in Chapter 3 of the *NRCS Soil Survey Manual.*

Atterberg limits tests yielded liquid limits results ranging from 26 to 34 percent with corresponding plasticity indices ranging from ten to 19 percent. The results of soil classification testing indicate that the residual soils at the site classify as CL (Clay of Low plasticity), lean clay, in accordance with the USCS. Natural moisture content testing resulted in a range of 16 to 36 percent, with most values between 21 and 31 percent. Results of natural moisture content and Atterberg limits testing indicate that **the on-site soils are typically at a moisture content ten to 13 percent wet of the plastic limit.**

Grain-size analyses were performed on Borings B-102 and B-104 and the results yielded gravel contents of 5.4 and 5.7 percent, sand contents of 26 and 44 percent, silt contents of about 49 and 26 percent and clay contents of about 20 percent and 24 percent, all respectively.

Standard Proctor testing was performed on bulk samples from Borings B-102 and B-104 for the proposed borrow site, which resulted in a maximum dry densities of 115.7 and 112.1 pounds per cubic foot (pcf), respectively, with corresponding optimum moisture contents of 11.7 and 15.5 percent, respectively. At the time of the investigation, **the on-site soils are about ten to 15 percent wet of the optimum moisture content.**

Groundwater was encountered in Borings B-104, S-103 and S-107 at depths of near the surface to about six feet beneath the surface. Groundwater encountered in Sounding S-107 is likely caused from an isolated, perched groundwater body since groundwater was not encountered in the adjacent borings. The table below summarizes the groundwater table depths and elevations at the time of drilling:

Borehole	Groundwater Table Depth (feet)	Groundwater Table Elevation (feet)
B-104	0.8	780.7
S-103	5.7	774.3
S-107	0.0	792.0

Auger refusal was encountered in all borings at depths of 3.2 to 9.4 feet beneath the surface. Stiff auger resistance was encountered in Borings B-108, S-103, S-106 and S-107 prior to auger refusal. The table below summarizes the auger refusal and the estimated depth of restrictive horizon for the installation of a lagoon irrigation system:

Boring	Auger Refusal Depth (feet)	Stiff Auger Resistance Depth (feet)	Restrictive Horizon Depth (feet)	Remarks
B-102	8.8	-	7.0	Hard, gravelly lean clay encountered at 7.0'
B-104	5.4	-	4.4	Hard, gravelly lean clay encountered at 4.4'
B-105	5.2	-	4.5	Hard, gravelly lean clay encountered at 4.5'
B-108	7.2	6.1	6.1	Stiff auger resistance encountered at 6.1'
S-101	3.2	-	3.2	Auger refusal encountered at 3.2'
S-103	6.3	5.0	5.0	Stiff auger resistance encountered at 5.0'
S-106	9.4	8.0	8.0	Stiff auger resistance encountered at 8.0'
S-107	4.5	3.9	3.9	Stiff auger resistance encountered at 3.9'

4. Borrow Site Recommendations

Any material, whether borrowed on-site or imported to the site, placed as engineered fill on the project site beneath the proposed building or other proposed on-grade structures such as pavement, parking lots, sidewalks, etc., should be an approved material, free of environmental contamination, vegetation, topsoil, organic material, wet soil, construction debris and rock fragments greater than six inches in diameter. We further recommend high plasticity clays, known as fat clays (CH soils) not be imported to the site due to their potential for volume changes with fluctuations in moisture content.

Visual and laboratory classification testing of the on-site soils within the proposed borrow area consists of lean clay, CL, with various amounts of sand and gravel. The on-site soils within the proposed borrow area are **suitable for the use of fill for structural purposes.** However, **the contractor should anticipate significant moisture conditioning of the fill to achieve the optimum moisture for compaction.** Moisture conditioning can be performed utilizing mechanical efforts including aeration of the near surface soils during the fill placement.

5. Lagoon Irrigation System Site Evaluation

Site Evaluations were performed for both the preferred area and the proposed borrow site to evaluate the suitability of installing a lagoon irrigation system for wastewater disposal in accordance with *902 KAR 10:085 Kentucky on-site sewage disposal systems.*

The following evaluation factors and results presented below are in accordance with *Section 3. Site Evaluation Standards of 902 KAR 10:085:*

Section 3. (2) Topography

Available topographic mapping provided by SCB indicates that the slope gradient of the preferred area does not exceed seven percent and is considered **suitable** (S) with respect to topography. The slope gradient of the borrow site is on the order of about ten to 20 percent and is considered **provisionally suitable** (PS). Due to the topography characteristics of the borrow site, the slopes within this area may require the installation of curtain drains, vertical drains, or other approved drainage methods upslope from the lateral field. In addition, Usable areas larger than normally required may be needed in this slope range.

Section 3. (3) Landscape Position

Both the preferred and borrow areas are described as a convex hill or ridge top with shoulder slopes and side slopes and are considered **suitable** (S) with respect to landscape position. If the surface water run-off cannot be diverted around the lateral field and if groundwater flow is not intercepted and diverted through curtain or vertical drains (if required), then the borrow site is then classified as **unsuitable** (U).

Section 3. (4) Soil Characteristics or Morphology

Soil classification testing results indicate that the site soils are classified as **Soil Group III** – fine loamy texture soils containing less than 40 percent clay-sized particles in a soil mass. Moreover, this soil group

includes sandy clay loam, silt, silt loam, clay loam and silty clay loam textural classes and are generally to be considered **provisionally suitable** (PS) with respect to texture.

Section 3. (5) Internal Soil Drainage

The groundwater depths encountered at the time of the investigation indicate that the site soils are considered to be **provisionally suitable** (PS) with respect to internal drainage. However, curtain drains, vertical drains, or other approved methods may be required within the borrow site to maintain a groundwater depth of at least 24 inches. Refer to the groundwater table above.

Section 3. (6) Soil Depth

The presence of large boulders was not encountered during the investigation. Auger refusal depths for the borings within the preferred area were greater than 42 inches and is considered to be **suitable** (s) with respect to soil depth. Auger refusal depths for the borings within the borrow are indicative of **provisionally suitable** (PS) conditions due to encountering auger refusal at 3.2 feet (less than 42 inches but greater than 24 inches) in Sounding S-101. Refer to the auger refusal summary table above.

Section 3. (7) Restrictive Horizons

Restrictive horizons were encountered in the borings at depths of 3.9 to seven feet beneath the surface and is considered to be **suitable** (S). The restrictive horizons encountered are described as gravelly lean clay of hard soil strength consistency and are delineated in the attached boring logs. Refer to the auger refusal summary table above.

Section 3. (8) Available Space

The available surface area of the preferred site is on the order of about 1,500 square feet and is considered **provisionally suitable** (PS) as to available space. The available surface area of the borrow site is on the order of about 1,500 square feet and is considered **provisionally suitable** (PS) as to available space.

Section 3. (9) Determination of Overall Site Suitability

The lowest classification of the factors described above governs the overall site classification and is considered to be **provisionally suitable** (PS) for the preferred area and borrow site. However, the preferred area is the recommended location to install the lagoon irrigation system due to the favorable conditions that include the uphill land scape position and the soil depth. The evaluation factors as described above are summarized in the table below:

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Evaluation Factor	Preferred Area	Borrow Site
(2) Topography	Suitable (S)	Provisionally Suitable (PS)
(3) Landscape Position	Suitable (S)	Suitable (S)
(4) Soil Characteristics or Morphology	Provisionally Suitable (PS)	Provisionally Suitable (PS)
(5) Internal Soil Drainage	Provisionally Suitable (PS)	Provisionally Suitable (PS)
(6) Soil Depth	Suitable (S)	Provisionally Suitable (PS)
(7) Restrictive Horizons	Suitable (S)	Suitable (S)
(8) Available Space	Provisionally Suitable (PS)	Provisionally Suitable (PS)
(9) Determination of Overall Site Suitability	Provisionally Suitable (PS)	Provisionally Suitable (PS)

The USDA Soil Survey mapping indicates that the preferred area consists of Sadler silt loam, SaB2 and the borrow site consists of Zanesville silt loam, ZaC2. In addition, USDA Soil survey mapping also indicates that both the preferred area and borrow site locations are very limited with respect to slow water movement and depth to saturated zone. For that reason, **we recommend installing curtain drains, vertical drains, or other approved methods within the preferred area and the borrow site.**

A boring layout and boring logs are included in the Appendices of this report.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

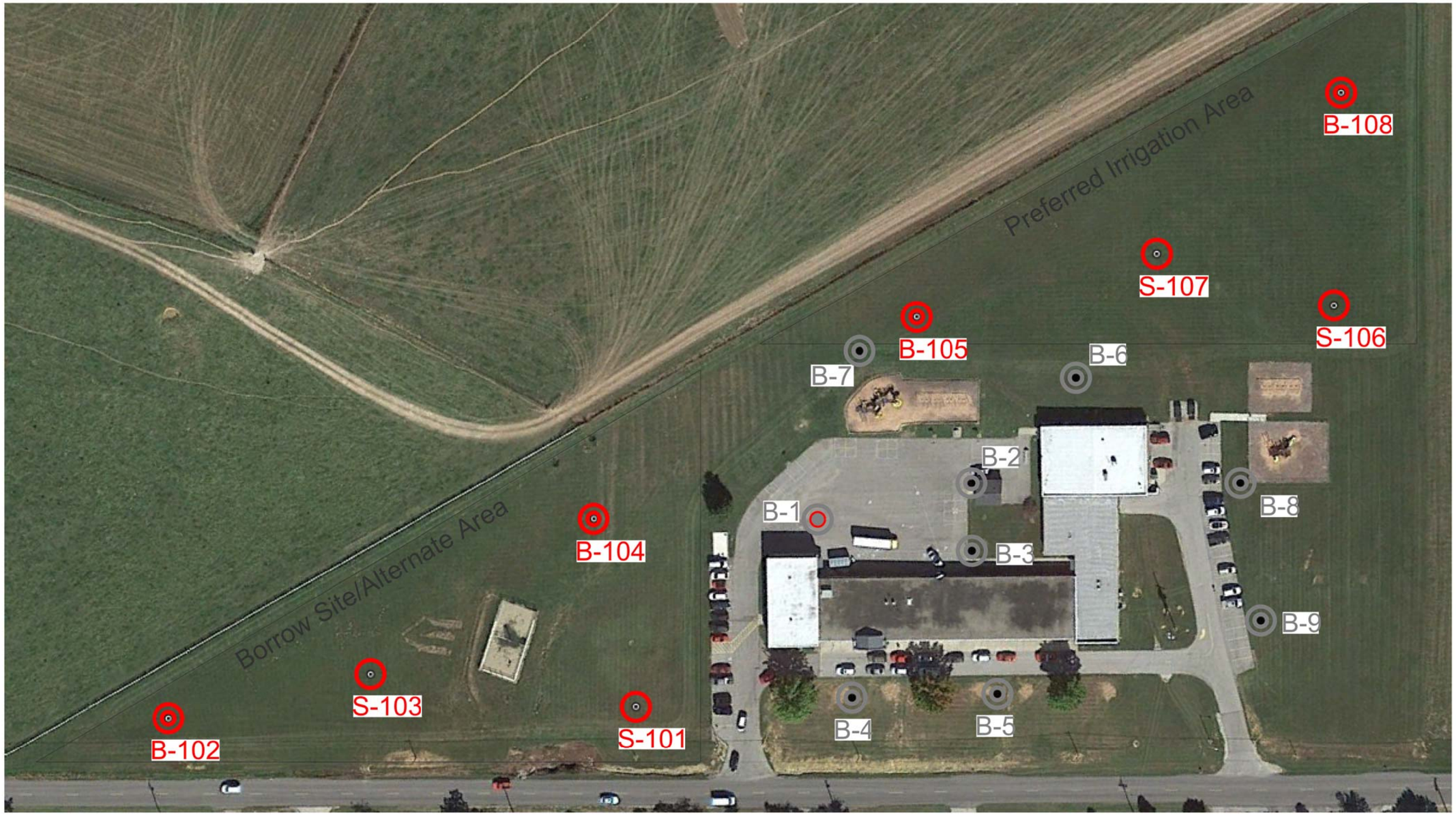
Respectfully,
AMERICAN ENGINEERS, INC.

Jacob Cowan, EIT
Geotechnical Engineer

Dennis Mitchell, PE, PMP
Director of Geotechnical Services

APPENDIX A

Boring Layout



LEGEND

- SOIL TEST BORING WITH STANDARD PENETRATION TESTS
- SOIL TEST BORING WITH STANDARD PENETRATION TESTS FROM PREVIOUS INVESTIGATION
- ROCKLINE SOUNDING

DRAWING NOT TO SCALE

NOTE: ALL BORING LOCATIONS APPROXIMATE

NO.	REVISIONS DATE	DESCRIPTION

BORING LAYOUT

CLIENT: Meade County Board of Education

PROJECT: Payneville Elementary School Addition

AEI
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DESIGNING YOUR FUTURE
45 Aberdeen Drive Glasgow KY
270.651.7220

SCALE: NTS

DATE: 05/06/2019

DRAWN BY: J. COWAN

CHECKED BY: D. BARRETT

FILE: T:\PROJECTS 218-487 Payneville Elementary Additions\Geotech\Lagoon Drip

SHEET: B1

APPENDIX B

Boring Logs

FIELD TESTING PROCEDURES

The general field procedures employed by the Field Services Center are summarized in the following outline. The procedures utilized by the AEI Field Service Center are recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Soil Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the surface conditions. Borings are advanced into the ground using continuous flight augers. At prescribed intervals throughout the boring depths, soil samples are obtained with a split-spoon or thin-walled sampler and sealed in airtight glass jars and labeled. The sampler is first seated 6 inches to penetrate loose cuttings and then driven an additional foot, where possible, with blows from a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler each six-inch increment is recorded. The penetration resistance, or "N-value" is designated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. The split spoon sampling procedures used during the exploration are in general accordance with ASTM D 1586. Split spoon samples are considered to provide *disturbed* samples, yet are appropriate for most engineering applications. Thin-walled (Shelby tube) samples are considered to provide *undisturbed* samples and obtained when warranted in general accordance with ASTM D 1587.

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Core Drilling Procedures for use on refusal materials. Prior to coring, casing is set in the boring through the overburden soils. Refusal materials are then cored according to ASTM D-2113 using a diamond bit attached to the end of a hollow double tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Samples of the material penetrated are protected and retained in the inner tube, which is retrieved at the end of each drill run. Upon retrieval of the inner tube the core is recovered, measured and placed in boxes for storage.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soil in general accordance with the procedures outlined in ASTM D 2487 and D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

Representative portions of soil samples are placed in sealed containers and transported to the laboratory. In the laboratory, the samples are examined to verify the driller's field classifications. Test Boring Records are attached which show the soil descriptions and penetration resistances.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designate the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using as electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Sampling Terminology

Undisturbed Sampling: Thin-walled or Shelby tube samples used for visual examination, classification tests and quantitative laboratory testing. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airtight and transported to the laboratory. Locations and depths of undisturbed samples are shown on the "Boring Logs."

Bag Sampling: Bulk samples of soil are obtained at selected locations. These samples consist of soil brought to the surface by the drilling augers, or obtained from test pits or the ground surface using hand tools. Samples are placed in bags, with sealed jar samples of the material, and taken to our laboratory for testing where more mass material is required (i.e. Proctors and CBR's). The locations of these samples are indicated on the appropriate logs, or on the Boring Location Plan.

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

COHESIVE SOILS
(Clay, Silt, and Mixtures)

CONSISTENCY	SPT N-VALUE	Qu/Qp (tsf)
Very Soft	2 blows/ft or less	0 – 0.25
Soft	2 to 4 blows/ft	0.25 – 0.49
Medium Stiff	4 to 8 blows/ft	0.50 – 0.99
Stiff	8 to 15 blows/ft	1.00 – 2.00
Very Stiff	15 to 30 blows/ft	2.00 – 4.00
Hard	30 blows/ft or more	> 4.00

PLASTICITY

Degree of Plasticity	Plasticity Index (PI)
Low	0 – 7
Medium	8 – 22
High	over 22

NON-COHESIVE SOILS
(Silt, Sand, Gravel, and Mixtures)

DENSITY	SPT N-VALUE
Very Loose	4 blows/ft or less
Loose	4 to 10 blows/ft
Medium Dense	10 to 30 blows/ft
Dense	30 to 50 blows/ft
Very Dense	50 blows/ft or more

PARTICLE SIZE IDENTIFICATION

Boulders	12 inch diameter or more
Cobbles	3 to 12 inch diameter
Gravel	Coarse – 1 to 3 inch
	Medium – ½ to 1 inch
	Fine – ¼ to ½ inch
Sand	Coarse – 0.6mm to ¼ inch
	Medium – 0.2mm to 0.6mm
	Fine – 0.05mm to 0.2mm
Silt	0.05mm to 0.005mm
Clay	0.005mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 – 10
Trace to Some	11 – 20
Some	21 – 35
And	36 – 50

NOTES

Classification – The Unified Soil Classification System is used to identify soil unless otherwise noted.

Standard "N" Penetration Test (SPT) (ASTM D1586) – Driving a 2-inch O.D., 1 3/8-inch I.D. sampler a distance of 1 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6-inches to seat the sampler into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the field drill long (e.g., 10/8/7). On the report log, the Standard Penetration Test result (i.e., the N value) is normally presented and consists of the sum of the 2nd and 3rd penetration counts (i.e., N = 8 + 7 = 15 blows/ft.)

Soil Property Symbols

Qu:	Unconfined Compressive Strength	N:	Standard Penetration Value (see above)
Qp:	Unconfined Comp. Strength (pocket pent.)	omc:	Optimum Moisture content
LL:	Liquid Limit, % (Atterberg Limit)	PL:	Plastic Limit, % (Atterberg Limit)
PI:	Plasticity Index	mdd:	Maximum Dry Density

AEI AMERICAN ENGINEERS, INC.
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65 Aberdeen Drive
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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 779 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
AT TIME OF DRILLING ---
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (4 inches)									
		(CL) sandy lean CLAY, trace gravel, brown to gray, wet, soft to very stiff	SPT 1	73	1-1-3 (4)	1.0	27				
			SPT 2	100	3-6-9 (15)	3.5	29				
								26	16	10	Bulk sample obtained at 3.0' to 5.0'
5			SPT 3	100	6-8-10 (18)	4.5	28				
		(CL) gravelly lean CLAY, light to dark gray, moist, hard	SPT 4	100	5-8-25 (33)	4.5+	21				

Refusal at 8.8 feet.
Bottom of borehole at 8.8 feet.

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B-104

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 781.5 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
▽ **AT TIME OF DRILLING** 0.80 ft / Elev 780.70 ft
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		▽ TOPSOIL (3 inches)									
		(CL) sandy lean CLAY, brown, wet, very soft to medium stiff	SPT 1	100	1-1-1 (2)	0.5	31				
			SPT 2	100	0-2-3 (5)	1.0	28				
								34	15	19	Bulk sample obtained at 3.0' to 5.0'
5		(CL) gravelly lean CLAY, some fine to coarse sand, brown, moist, hard	SPT 3	100	5-25-50 (75)	4.5+	24				

Refusal at 5.4 feet.
Bottom of borehole at 5.4 feet.

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B-105

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 788 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
AT TIME OF DRILLING ---
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (3 inches)									
		(CL) sandy lean CLAY, trace gravel, brown to gray, very moist to wet, soft to stiff	SPT 1	100	1-2-1 (3)	1.0	26				
			SPT 2	100	2-3-7 (10)	3.5	21				
5		(CL) lean CLAY with gravel, orange to gray, moist to very moist, hard	SPT 3	100	9-13-50 (63)	4.5	21				

Refusal at 5.2 feet.
Bottom of borehole at 5.2 feet.

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B-108

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 796 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
AT TIME OF DRILLING ---
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2 inches)	SPT 1	93	1-2-1 (3)	2.5	36				
		(CL) sandy lean CLAY, brown to gray, very moist to wet, soft to stiff	SPT 2	100	3-6-9 (15)	4.0	23				
5		(CL) sandy lean CLAY with gravel, orange to brown, moist to very moist	SPT 3	100	4-5-8 (13)	3.0	16				Stiff auger resistance at 6.1'

Refusal at 7.2 feet.
Bottom of borehole at 7.2 feet.

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PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 779 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
AT TIME OF DRILLING ---
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									

Refusal at 3.2 feet.
Bottom of borehole at 3.2 feet.

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PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 780 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
▽ **AT TIME OF DRILLING** 5.70 ft / Elev 774.30 ft
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5		▽									Stiff auger resistance at 5.0'

Refusal at 6.3 feet.
Bottom of borehole at 6.3 feet.

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PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 796 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
AT TIME OF DRILLING ---
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											Stiff auger resistance at 8.0'
		Refusal at 9.4 feet. Bottom of borehole at 9.4 feet.									

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CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY
DATE STARTED 4/24/19 **COMPLETED** 4/24/19
GROUND ELEVATION 792 ft
DRILLING CONTRACTOR James Felts
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Augers
▽ **AT TIME OF DRILLING** 0.00 ft / Elev 792.00 ft
LOGGED BY Nathaniel Blackburn **CHECKED BY** Brad High
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		▽ OVERBURDEN									
		Refusal at 4.5 feet. Bottom of borehole at 4.5 feet.									Stiff auger resistance at 3.9'

APPENDIX C

Laboratory Testing Results

ATTERBERG LIMITS' RESULTS

AEI AMERICAN ENGINEERS, INC.
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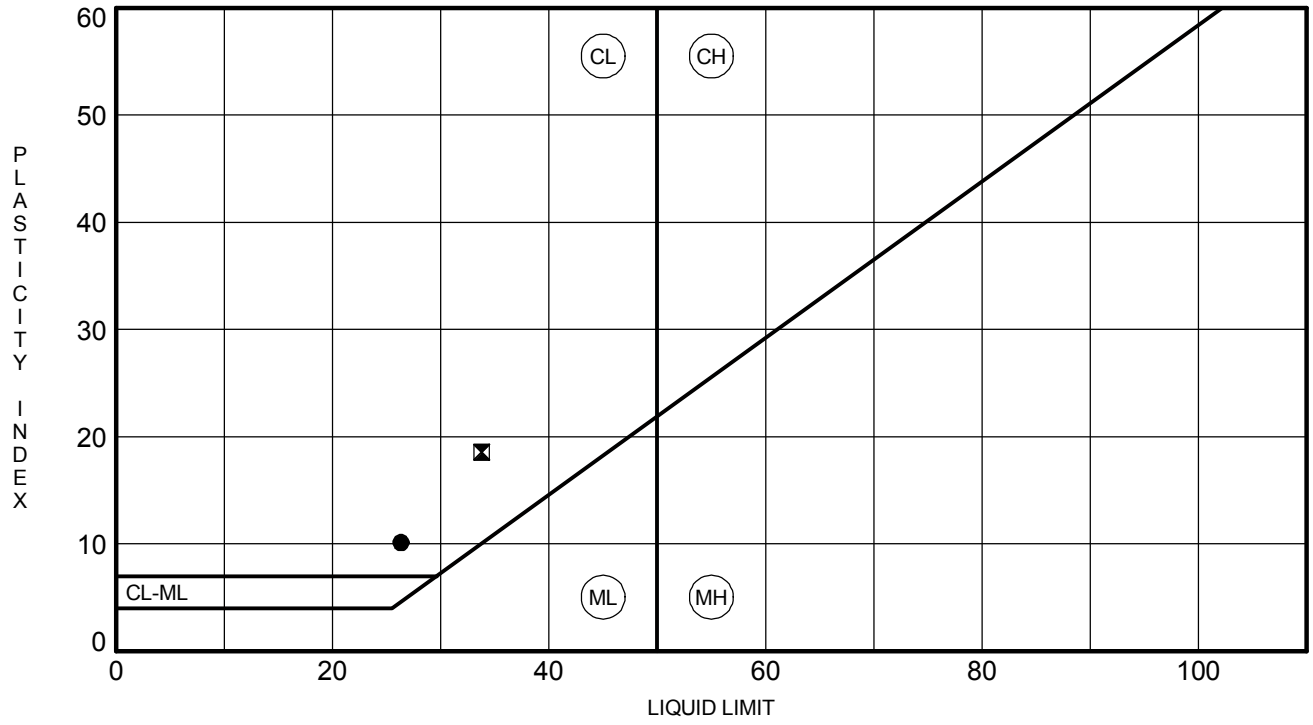
65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

CLIENT Meade County Board of Education **PROJECT NAME** Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System

PROJECT NUMBER 218-487 **PROJECT LOCATION** Payneville, KY



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-102**	**3.0**	**26**	**16**	**10**	**69**	**lean CLAY with sand, brown to gray**
⧓	**B-104**	**3.0**	**34**	**15**	**19**	**50**	**lean CLAY, brown**

GRAIN SIZE DISTRIBUTION

AMERICAN ENGINEERS, INC.
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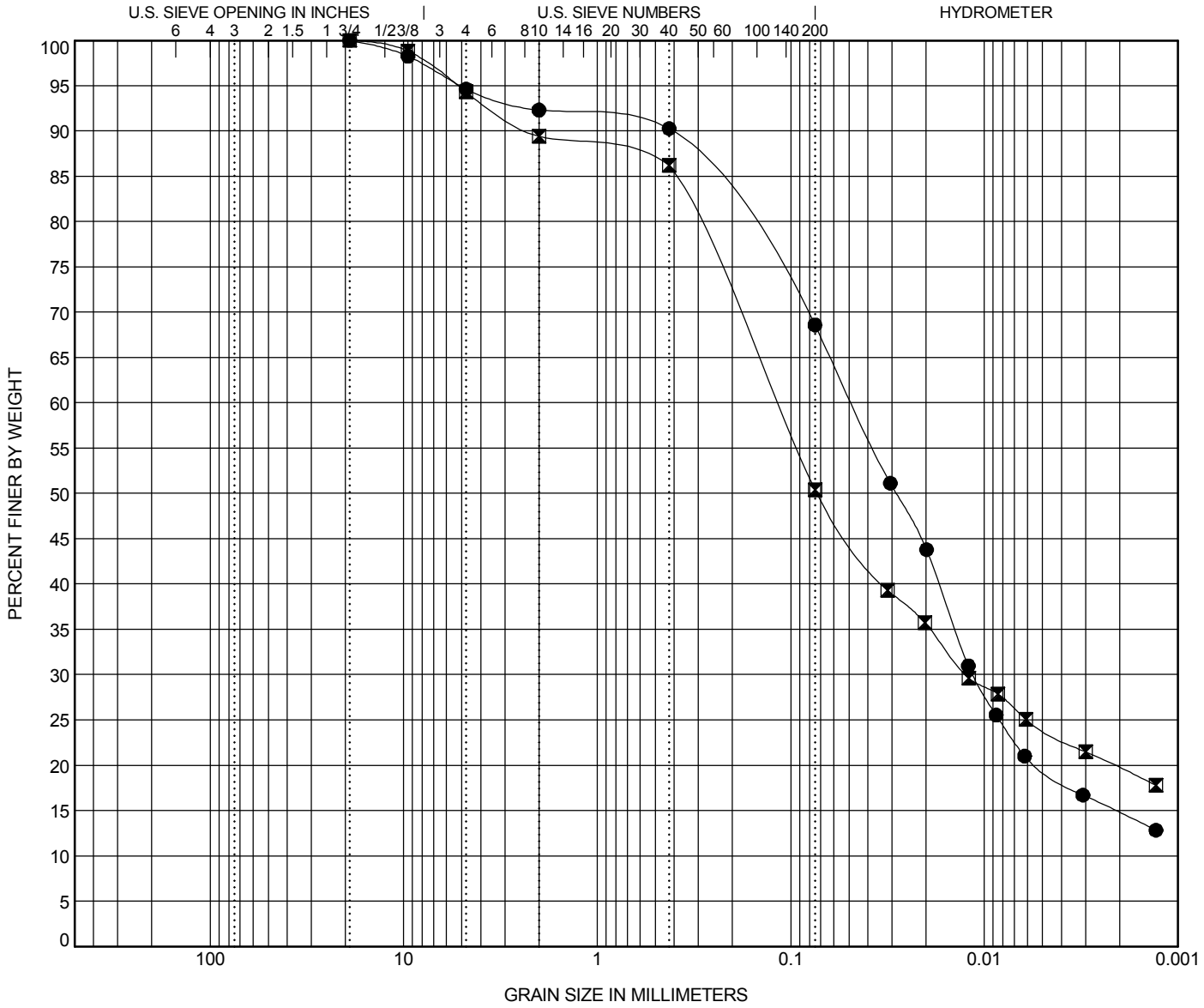
65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

CLIENT Meade County Board of Education **PROJECT NAME** Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System

PROJECT NUMBER 218-487 **PROJECT LOCATION** Payneville, KY



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

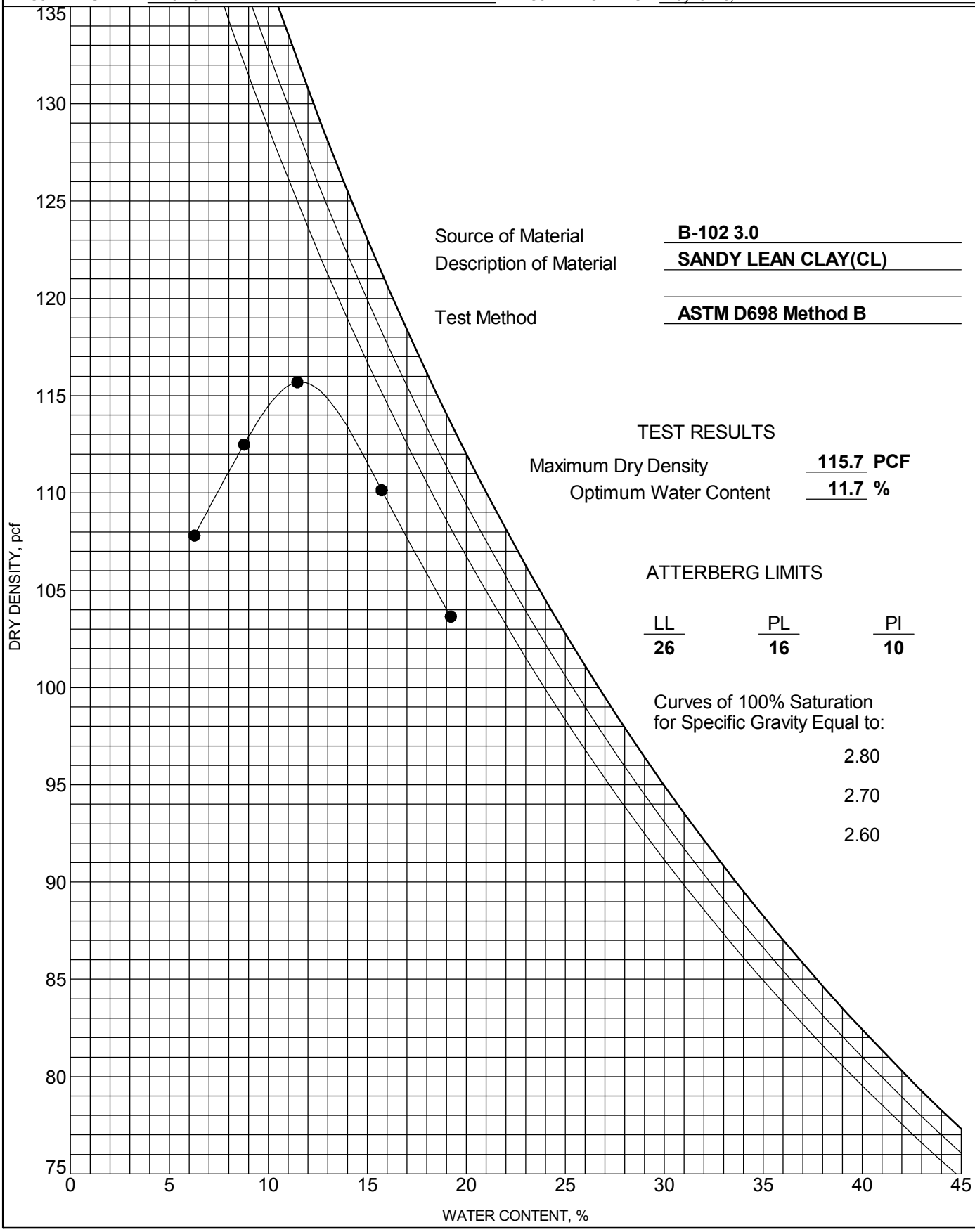
	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-102**	**3.0**	**SANDY LEAN CLAY(CL)**	**26**	**16**	**10**		
⊠	**B-104**	**3.0**	**SANDY LEAN CLAY(CL)**	**34**	**15**	**19**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-102**	**3.0**	**19**	**0.048**	**0.011**		**5.4**	**26.0**	**48.9**	**19.7**
⊠	**B-104**	**3.0**	**19**	**0.119**	**0.012**		**5.7**	**43.9**	**26.4**	**24.0**

AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING
65 Aberdeen Drive
Glasgow, KY 42141
(270) 651-7220

MOISTURE-DENSITY RELATIONSHIP

CLIENT Meade County Board of Education
PROJECT NAME Payneville Elementary Borrow Site & Lagoon/Drip Irrigation System
PROJECT NUMBER 218-487
PROJECT LOCATION Payneville, KY



Source of Material **B-102 3.0**
Description of Material **SANDY LEAN CLAY(CL)**

Test Method **ASTM D698 Method B**

TEST RESULTS

Maximum Dry Density **115.7** **PCF**
Optimum Water Content **11.7** **%**

ATTERBERG LIMITS

LL	PL	PI
26	**16**	**10**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

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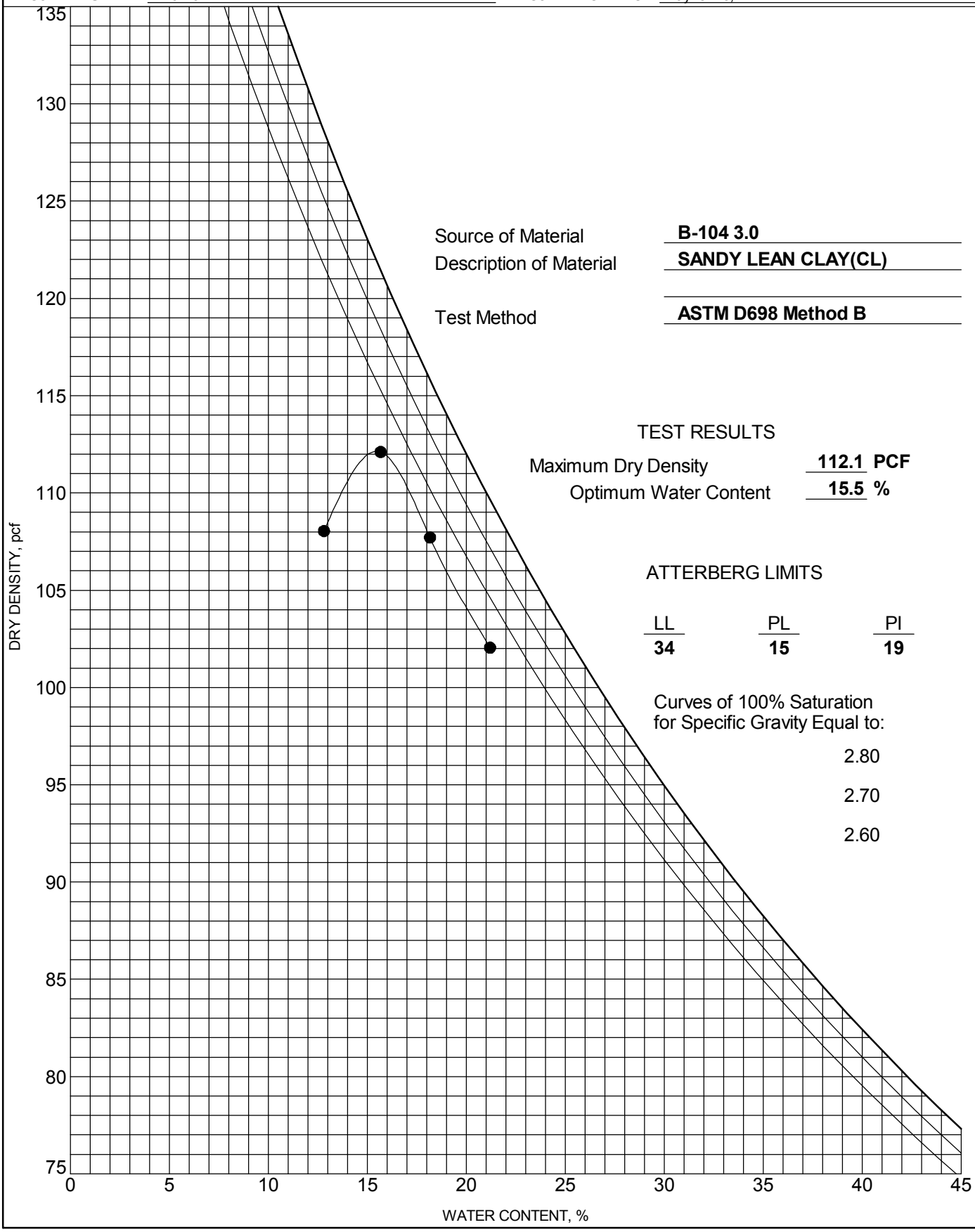

Source of Material **B-104 3.0**
Description of Material **SANDY LEAN CLAY(CL)**

Test Method **ASTM D698 Method B**

TEST RESULTS

Maximum Dry Density **112.1** **PCF**
Optimum Water Content **15.5** **%**

ATTERBERG LIMITS

LL	PL	PI
34	**15**	**19**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

Your Geotechnical Engineering Report

To help manage your risks, this information is being provided because subsurface issues are a major cause of construction delays, cost overruns, disputes, and claims.

Geotechnical Services are Performed for Specific Projects, Purposes, and People

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering exploration conducted for an engineer may not fulfill the needs of a contractor or even another engineer. Each geotechnical engineering exploration and report is unique and is prepared solely for the client. No one except the client should rely on the geotechnical engineering report without first consulting with the geotechnical engineer who prepared it. The report should not be applied for any project or purpose except the one originally intended.

Read the Entire Report

To avoid serious problems, the full geotechnical engineering report should be read in its entirety. Do not only read selected sections or the executive summary.

A Unique Set of Project-Specific Factors is the Basis for a Geotechnical Engineering Report

Geotechnical engineers consider a numerous unique, project-specific factors when determining the scope of a study. Typical factors include: the client's goals, objectives, project costs, risk management preferences, proposed structures, structures on site, topography, and other proposed or existing site improvements, such as access roads, parking lots, and utilities. Unless indicated otherwise by the geotechnical engineer who conducted the original exploration, a geotechnical engineering report should not be relied upon if it was:

- not prepared for you or your project,
- not prepared for the specific site explored, or
- completed before important changes to the project were implemented.

Typical changes that can lessen the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a multi-story hotel to a parking lot
- finished floor elevation, location, orientation, or weight of the proposed structure, anticipated loads or
- project ownership

Geotechnical engineers cannot be held liable or responsible for issues that occur because their report did not take into account development items of which they were not informed. The geotechnical engineer should always be notified of any project changes. Upon notification, it should be requested of the geotechnical engineer to give an assessment of the impact of the project changes.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that exist at the time of the exploration. A geotechnical engineering report should not be relied upon if its reliability could be in question due to factors such as man-made events as construction on or adjacent to the site, natural events such as floods, earthquakes, or groundwater fluctuation, or time. To determine if a geotechnical report is still reliable, contact the geotechnical engineer. Major problems could be avoided by performing a minimal amount of additional analysis and/or testing.

Most Geotechnical Findings are Professional Opinions

Geotechnical site explorations identify subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field logs and laboratory data and apply their professional judgment to make conclusions about the subsurface conditions throughout the site. Actual subsurface conditions may differ from those indicated in the report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risk associated with unanticipated conditions.

The Recommendations within a Report Are Not Final

Do not put too much faith on the construction recommendations included in the report. The recommendations are not final due to geotechnical engineers developing them principally from judgment and opinion. Only by observing actual subsurface conditions revealed during construction can geotechnical engineers finalize their recommendations. Responsibility and liability cannot be assumed for the recommendations

within the report by the geotechnical engineer who developed the report if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject To Misinterpretation

Misinterpretation of geotechnical engineering reports has resulted in costly problems. The risk of misinterpretation can be lowered after the submittal of the final report by having the geotechnical engineer consult with appropriate members of the design team. The geotechnical engineer could also be retained to review crucial parts of the plans and specifications put together by the design team. The geotechnical engineering report can also be misinterpreted by contractors which can result in many problems. By participating in pre-bid and preconstruction meetings and providing construction observations by the geotechnical engineer, many risks can be reduced.

Final Boring Logs Should not be Re-drawn

Geotechnical engineers prepare final boring logs and testing results based on field logs and laboratory data. The logs included in a final geotechnical engineering report should never be redrawn to be included in architectural or design drawings due to errors that could be made. Electronic reproduction is acceptable, along with photographic reproduction, but it should be understood that separating logs from the report can elevate risk.

Contractors Need a Complete Report and Guidance

By limiting what is provided for bid preparation, contractors are not liable for unforeseen subsurface conditions although some owners and design professionals believe the opposite to be true. The complete geotechnical engineering report, accompanied with a cover letter or transmittal, should be provided to contractors to help prevent costly problems. The letter states that the report was not prepared for purposes of bid development and the report's accuracy is limited. Although a fee may be required, encourage the contractors to consult with the geotechnical engineer who prepared the report and/or to conduct additional studies to obtain the specific types of information they need or prefer. A prebid conference involving the owner, geotechnical engineer, and contractors can prove to be very valuable. If needed, allow contractors sufficient time to perform additional studies. Upon doing this you might be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Closely Read Responsibility Provisions

Geotechnical engineering is not as exact as other engineering disciplines. This lack of understanding by clients, design professionals, and contractors has created unrealistic expectations that have led to disappointments, claims, and disputes. To minimize such risks, a variety of explanatory provisions may be included in the report by the geotechnical engineer. To help others recognize their own responsibilities and risks, many of these provisions indicate where the geotechnical engineer's responsibilities begin and end. These provisions should be read carefully, questions asked if needed, and the geotechnical engineer should provide satisfactory responses.

Environmental Issues/Concerns are not Covered

Unforeseen environmental issues can lead to project delays or even failures. Geotechnical engineering reports do not usually include environmental findings, conclusions, or recommendations. As with a geotechnical engineering report, do not rely on an environmental report that was prepared for someone else.

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65 Aberdeen Drive
Glasgow, KY 42141
270-651-7220

TIME LIMIT FOR EXECUTION OF CONTRACT DOCUMENTS:

In the event that a bidder's proposal is accepted by the Owner and such bidder should fail to execute the contract within ten (10) consecutive days from the date of notification of the awarding of the contract, the Owner, at his option, may determine that the awardee has abandoned the contract. The bidder's proposal shall then become null and void, and the bid bond or certified check which accompanied it shall be forfeited to and become the property of the Owner as liquidated damages for failure to execute the contract.

The bidder hereby agrees that failure to submit herein above all required information and/or prices can cause disqualification of this proposal.

Submitted by:

NAME OF CONTRACTOR / BIDDER: _____

AUTHORIZED REPRESENTATIVE'S NAME:_____
Signature

AUTHORIZED REPRESENTATIVE'S NAME(printed): _____

AUTHORIZED REPRESENTATIVE'S TITLE: _____

NOTICE: Bid security must accompany this proposal if the Base Bid price is greater than ~~of $25,000.~~ $100,000. (change effective June 3, 2019.)

This form shall not be modified.

SCHOOL RENOVATION AND ADDITION
PAYNEVILLE, KENTUCKY

SECTION 087100 – DOOR HARDWARE ADD#1

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes furnishing items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

1. Butt Hinges
2. Continuous Hinges
3. Cylinders
4. Flushbolts and Strikes
5. Locks and Latches
6. Closers
7. Push and Pull Plates
8. Protection Plates
9. Door Stops
10. Thresholds,Weatherstripping,Gasketing,Auto.Door Bottoms.
11. Magnetic Holders
12. Silencers

B. Related Sections: The following Sections contain requirements that relate to this Section:

1.	Division 1	ORGANIZATIONS & SERVICES
	a. Section 01300	Administrative Requirements
	b. Section 01400:	Quality Requirements
	c. Section 01500	Temporary Facilities and Controls
2.	Division 3	CONCRETE
	a. Section 03400	Precast Concrete, installation of door frames.
3.	Division 4	MASONRY
	a. Section 04400	Concrete Masonry Units, installation of door frames.
4.	Division 6	WOOD & PLASTICS
	a. Section 06100	Rough Carpentry, blocking for finish hardware.
	b. Section 06400	Architectural Woodwork, installation of doors and finish hardware.
5.	Division 7	THERMAL & MOISTURE PROTECTION
	a. Section 07900	Caulks and Sealants.
6.	Division 8	DOORS and WINDOWS

a. Section 08110 Standard Hollow Metal Doors and Frames
b. Section 08210 Flush Wood Doors.

7. Division 9 FINISHES
   a. Section 09900 Paintings and Coatings

1.03 REFERENCES

A. Applicable publications: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American National Standards Institute (ANSI)
   1. ANSI A117.1-1998, Providing Accessibility and Usability for Physically Handicapped People
   2. ANSI/BHMA A156.1-1997, Butts and Hinges
   3. ANSI/BHMA A156.4-1992, Door Controls-Closers
   4. ANSI/BHMA A156.6-2001, Architectural Door Trim
   5. ANSI/BHMA A156.7-1997, Template Hinge Dimensions
   6. ANSI/BHMA A156.13-1994, Locks & Latches, Mortise
   7. ANSI/BHMA A156.18-1993, Materials and Finishes
   8. ANSI/BHMA A156.21-1996, Thresholds
   9. ANSI/BHMA A156.22-1996, Door Gasketing Systems

C. American Society for Testing and Materials (ASTM)

   1. ASTM E 283-84 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors
   2. ASTM-E2074-2001 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies

D. Americans with Disabilities Act Accessibility Guidelines(ADAAG)
   1. ICC/ANSI A117.1, JULY 1998

E. Door and Hardware Institute (DHI)
   1. Keying Systems and Nomenclature, 1989 edition.
   2. Hardware for Labeled Fire Doors, January 1996 edition.
   3. Sequence and Format for the Hardware Schedule, January 1996 edition.
   4. Abbreviations and Symbols, September 1983 edition.

F. National Fire Protection Association (NFPA)
   1. NFPA 80 Standard for Fire Doors and Windows, 1999 edition.
   2. NFPA 101 Life Safety Code, 2003 edition.
   3. NFPA 105 Recommended Practice for the Installation of Smoke-Control Door Assemblies, 1999 edition.

4. NFPA 252 Standard Methods of Fire Tests of Door Assemblies, 1995 edition.

G. Steel Door Institute (SDI)
   1. SDI 100 Recommended Specifications for Standard Steel Doors and Frames, 1998 edition.

H. Underwriter's Laboratories, Inc. (UL) - UL Standards for Safety:
   1. UL 10C-Positive Pressure Fire Tests of Door Assemblies
   2. UL 228 Door Closer-Holders, With or Without Integral Smoke Detectors
   3. UL 1784-90 Air Leakage Tests of Door Assemblies

1.04 SUBMITTALS

A. General: Each requirement listed under headings below shall be submitted in relation to all items specified in this section. The submittal for each heading shall be compiled by the Contractor and submitted complete and in its entirety.

B. Shop Drawings: Submit binder with label on the front cover and spine indicating job name, date, Contractor's name and the title "DOOR HARDWARE". Binder shall contain all of the door hardware shop drawings with largest sheets 11" x 17" (279 x 432 mm). Punch and fold largest sheets to fit in binder. Separate items in binder with tabbed reinforced index sheets indicating contents in each section. Use door references same as contract documents. Highlight items on shop drawings in question with yellow marker for Architect's review and response. Submit complete hardware schedule, catalog cut sheets, templates, and specifications for all hardware set items.

   1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule in vertical format "hardware sets" indicating complete designations of every item required for each door or opening. Hardware schedule to be in the DHI vertical format as per DHI publication Sequence and Format for the Hardware Schedule. Use specification Heading numbers with any variations suffixed a, b, etc. Include the following information:
      a) Type, style, function, size, hand, and finish of each hardware item.
      b) Name and manufacturer of each item.
      c) Fastenings and other pertinent information.
      d) Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
      e) Index and explanation of all abbreviations, symbols, and codes contained in schedule.
      f) Mounting locations for hardware.
      g) Door and frame sizes and materials.
      h) Keying information.
      i) Cross-reference numbers used within schedule deviating from those specified.
         1) Column 1: State specified item and manufacturer.
         2) Column 2: State prior approved substituted item and its manufacturer.

2. Production and Delivery Schedule: Submit a production and delivery schedule as well as all templates to be forwarded to other trades involved in hardware preparation work.

3. Templates: Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

4. Operations and Maintenance Data: The manufacturer shall furnish the owner a OPERATIONS AND MAINTENANCE MANUAL. Information shall be bound in a 3-ring loose-leaf binder with project name and address on the front cover and spine. Submit in accordance with Section 01770 Closeout Procedures. In this manual are to be one copy of each of the following:
   a. Name, address, phone and fax for the Finish Hardware supplier.
   b. Name, address, phone and fax number for the local manufacturers representative for each manufacturers who's products have been used on this project.
   c. Specification Section 08710 Finish Hardware.
   d. "AS BUILT" Door and Frame Schedule.
   e. "AS BUILT" Finish Hardware schedule.
   f. "AS BUILT" Keying Schedule.
   g. Hardware manufacturers maintenance instructions, if any.
   h. Fully executed Warranty(s) for finish hardware.
   i. Specifications for related sections.

5. Abbreviations: Use abbreviations per DHI publication Abbreviations and Symbols.

6. Keying Schedule: Keying schedule is to be formatted as per DHI publication Keying Systems and Nomenclature. Supplier shall submit a keying schedule after meeting with Owner and Architect as specified.

1.05 QUALITY ASSURANCE

A. Manufacturers Requirements: Repair or replace damaged or defective materials prior to shipment. If product is repaired it is to meet all QA requirements for said product.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with office and warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC), or a person with equilvalent experience, who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation. Supplier to be a regular authorized distributor of the products he or she intends to furnish. Supplier to meet with Owner to

finalize keying requirements and to obtain final instructions in writing. Supplier to meet with installer prior to beginning of installation of door hardware to answer any questions concerning installation.

C. Regulatory Requirements: Comply with requirements of NFPA 80, NFPA101 and NFPA 252 in providing hardware for fire rated openings.

D. Product Standards:

1. Hinges, Mortise Locks and Latches, Closers, Thresholds, Trim, Finishes and other miscellaneous hardware: Complying with requirements of ANSI A156 standards for quality, construction, performance and operation applicable for specified hardware.

E. Substitutions: Submit requests for substitution no less than ten days prior to bid date and accordance with the requirements set fourth in Division 1.

F. Pre-Installation Conference: Require attendance for the GC project manager & superintendant, material supplier, installer, and manufacturer's representative. Notify all participants of the meeting at least one week before the meeting. No hardware is to be installed prior to this meeting. Installer shall not proceed with installation, until installer has performed the correct and satisfactory installation of an exit device, closer, and mortise lockset. All parties shall agree before proceeding.

G. Keying Meeting: The supplier will be responsible for scheduling, coordinating and documenting a keying meeting to establish requirements for the project.

1.06 DELIVERY AND STORAGE

A. Tag each item or package according to the approved finish hardware schedule, and include manufacturers installation instructions with each item or package.

B. Deliver hardware in manufacturers original packaging.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items to the jobsite according to the progress of construction. No drop shipments will be accepted.

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

F. Store Finish Hardware per manufacturers recommendations.

1.07 WARRANTY

A. Warranty to comply with requirements set fourth in Division 1. Warranty to commence at date of acceptance. Furnish manufacturers' limited warranty covering defects in materials and workmanship for the minimum periods indicated below:

Continuous Hinges: Lifetime
Door Closers: Minimum Ten years
Locksets: Minimun Ten years
Exit Devices: Minimum Ten years
All other hardware: Minimum One year

1.08 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware. These tools are limited to tools that are manufactured by the hardware manufacturers for the products used on this project .ie spanner wrenches, closer adjustment tools.

B. Extra Materials: The following is a list of parts and materials that shall be furnished:
1. Furnish 2 screw packages, or fasteners, for each hardware item.
2. Furnish 20 keys cut at the owner's requests.
3. Furnish 1 storeroom function mortise locks.
4. Furnish 1 dead stop closers with cover, arm, and fasteners.
5. Furnish 1 rim exit device with lockable lever trim.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers listed have products specified in this section. Only the manufacturers' products specifically listed are acceptable, subject to meeting or exceeding the requirements specified.

B. Acceptable manufacturers listed as follows are referred to in this section hereinafter by their first or common trade names:
1. Best
2. Dorma
3. Hager
4. LCN
5. McKinney
6. National Guard Products, Inc.

7. Norton
8. PBB
9. Pemko Mfg. Co.
10. Precision
11. Reese Enterprises, Inc.
12. Rockwood Mfg. Co.
13. Sargent Mfg. Corp.
14. Schlage
15. Stanley
16. Trimco
17. Von Duprin

2.02 HINGES

A. Full Mortise Butt Hinges:
Provide templated hinges. Furnish flathead screws with each hinge. Finish screw heads to match surface of hinges. Provide steel threaded, to the head, wood screws. Provide out-swing exterior doors with non-removable pins. Out -Swing Corridor Doors with locks with non-removable pins, and interior door with non-rising pins. All hinges to have flat button and matching plug. Size hinges in accordance with specified manufacturer's published recommendations. Furnish one pair of hinges for all doors up to 5'0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof. Furnish heavy weight hinges for doors over 3'-4", or doors that are frequently used such as: locker rooms, rest rooms, vestibule, and the main office door. Furnish non-ferrous hinges on exterior doors, doors in wet areas, and in areas where doors that are exposed to heavy corrosion. Furnish stainless steel spring hinges on toilet compartment doors, in conjunction, with a three knuckle stainless steel standard weight hinge where specified.

1. Acceptable manufacturers and products:
   a. Steel Five Knuckle Full Mortise Butt Hinges:

MFG.	STD.WT.	HEAVY WT.	SPRING HNG.
MCKINNEY	TA2714	T4A3786	1552
Hager	BB1279	BB1168	1250
Stanley	FBB179	FBB168	2060R
PBB	BB81	4B81	SP81

2.03 CONTINUOUS HINGES

A. Geared Aluminum Continuous Hinges:

1. Full Mortise: Provide heavy duty geared aluminum continuous hinges. Continuous hinges to be manufactured from 6063-T6. Hinges will comply with ANSI/BHMA Standard A156.26-2000. Hinges will be certified Grade 1-300, and cycle for a minimum of 1.5 million cycles without failure. Anodizing to be applied after gearing the hinge. Hinges will be non-handed. Hinges to carry a lifetime warranty.

2. Acceptable products and manufacturers:

Manufacturer	Product
ABH	A110HD, A111HD
McKinney	MCK-12HD, MCK-14HD
Pemko	FM83SLFHD,FM83SLIHD
PBB	CG31

2.04 KEY CYLINDERS AND KEYING

A. Key Cylinders: Provide six-pin removable core cylinders meeting ANSI Grade 1 Security. Furnish the cylinders with a patent keyway. Supply manufacturer's standard size cylinder as required to accommodate specified hardware. Include security cylinder rings, extensions and collars as required to accommodate installation. Provide factory original keys of nickel silver. Provide only one outside cylinder at banks of doors.

B. Acceptable manufacturers and products:
BEST-CORMAX, no substiutuition.

C. Keying:

1. Key Systems: Furnish a grand master key system for this project to tie into the owners existing system.
2. Key Quantities: Provide number of keys indicated. Quantities indicated shall be used as the basis for adjustments, if required, after keying is established with Owner.
    a. Provide 3 each Change Keys per lock.
    b. Provide 4 each Master Keys
    c. Provide 4 each Grand Master Keys

3. Key Control: Hardware manufacturer shall produce pinning chart. All keys shall be accounted for at all times and delivered to the designated personnel as directed by Owner. Index, tag and deliver keys in sealed containers; shipped direct to Owner by prepaid registered mail or other secure method acceptable to Owner. All keys assigned to Contractor shall be surrendered to Owner upon completion of the project. The Owner will provide a receipt for all keys received. If at any time a key cannot be accounted for, the lock cylinder shall be re-keyed, or the entire lock replaced if re-keying is not possible, at no additional cost to the Owner.
4. Key Identification: Each key shall be stamped or engraved with the key set per the approved key schedule in addition to the manufacturer’s standard markings.

2.05 MORTISE LOCK AND LATCH SETS:

A. Mortise Locks and Latches: Provide mortise sets that conform to ANSI/BHMA A156.13-1994, Locks & Latches, Mortise. Mortise locksets to be Operational Grade 1 Series 1000. Lockset

functions to be manufactured in a single sized case formed from 12 gauge steel. The case shall be closed on all sides. The lockset shall have a backset of 2-3/4" and a one piece ¾" throw anti-friction stainless steel latchbolt. Where deadbolts are specified within the mortise lock; the deadbolts shall have a full 1" throw made of stainless steel and have two hardened steel roller inserts. Furnish knurled outside levers for all mechanical and electrical rooms. Furnish a Grade 1 extra-heavy duty cylindrical privacy on toilet compartment doors as specified. Furnish a keyless,battery powered, stand alone, pushbutton lockset on the Records Room.

B. Acceptable manufacturers and product series:

Manufacturer	Lock Series	Cylindrical	Pushbutton Lock
Schlage	L9000-03A	D Series	Cobra
Sargent	8200-LNJ	CL800 Series	KP8277
Best	45H-3H	93K Series	

2.06 EXIT DEVICES/TRIM/AND MULLIONS

A. Provide exit devices with "UL" listing for life safety and with "UL" labels for "Fire Exit Hardware" unless noted otherwise. At any non-rated applications indicated, provide key cylinder control of latch dogging. All exit devices mounted on labeled wood doors shall be mounted on the door per the door manufacturer's requirements. All trim shall be thru-bolted to the lock stile case. Provide glass bead conversion kits to shim exit devices on doors with raised glass beads as required. All exit devices shall be one manufacturer. No deviation will be considered. Lever trim shall be solid case material with a free wheeling feature to limit damage to the unit from vandalism. Hardware to comply with ANSI A156.3, Grade 1 requirements. Mount all exit devices at 40" centerline. Furnish key removable mullions with stabilizer kits on pairs of doors where specified. Furnish steel mullions on fire-rated openings where specified.

B. Acceptable manufacturers and products:

MFG.	LEVER TRIM	MULLIONS
Sargent 80 Series	ETJ	L980/L980A
Precision 2100 Series	49C	KR822
Dorma 9000 Series	LT	F1300KR
Von Duprin	03	KR4954

2.07 DOOR CLOSERS

A. Door closers shall have fully hydraulic, full rack and pinion action. Closers shall be one piece cast aluminum. Furnish a universal closer body where all arms are interchangeable with the same body. All closers shall utilize a stable all weather fluid without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C, as required. Closers shall be multi sized 1 thru 6, and non-handed. Provide full closer cover. Stake or captivate all closer

adjustment valves. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms. Provide closer variants conforming to ADA ANSI-A117.1. Furnish the necessary brackets and spacers for the correct operation of the closer rather specified or not. Furnish heavy duty thumb turn hold open arms at vestibule locations.

B. Acceptable manufacturers and products:

Manufacturer	Heavy Duty
Norton	UNI7500 Series
Dorma	8900 Series
LCN	4040 Series
Sargent	351 Series

2.08 DOOR BOLTS/DUST PROOF STRIKES/COORDINATORS

A. Furnish 12”manual top and bottom flushbolts for non-rated doors. Furnish automatic flushbolts for fire-rated doors.

B. Furnish a dust proof strike for the bottom flushbolt where specified in the hardware sets.

C. Furnish a door coordinator with automatic flushbolts; allowing the inactive leaf door to close before the active leaf. Furnish the correct size according to the width of the opening. Use filler plates where needed. Furnish special mounting brackets for stop mounted hardware.

Acceptable manufacturers and products:

Manufacturer	Manual Flushbolts	Dust Proof Strike	Automatic Flushbolts	Coordin.
Rockwood	555	570	1942	1672
Trimco	3917	3910	3815	3094B2

2.09 PUSH PLATES, PULLS AND PULL PLATES

A. Pulls: Material to be 1” solid stainless steel. Pulls to be 10” Center to Center. Provide spanner type thru-bolt back to back fasteners at common ends and button tip spanner thru-bolts at free ends.

B. Furnish 6 X 16 push plates wherever possible, except when the stile on the door will not allow you to do so. In these cases, furnish 4 X 16 push plates.

C. Furnish 4 X 16 pull plates where specified in the hardware sets.

D. Plates to be furnished with .050 thick. Furnish back to back mounting wherever possible, and metal scews for metal doors and wood screws for wood doors. Plates shall be CuVerro anti-microbial base metal. Coatings are unacceptable.

E. Acceptable manufacturers and products:

Manufacturer	Push Plates	Pulls
Trimco	1001-9	1018-3B

2.10 PROTECTIVE PLATES

Protective plates to be .050” thick (U.S. 18 gage) stainless steel. Counter sink for mechanical fasteners. Fasten with pan head oval stainless steel sheet metal screws provided by protective plate manufacturer. Bevel all four sides.

A. Kick Plates: Kick plates are to be mounted on push side of door and to be 8” in height and 2” LDW, unless otherwise specified. Where the bottom rail will not allow for the full 8” in height, furnish the maxium height that will protect the bottom rail.

B. Acceptable manufacturers and products:

Manufacturer	Kick Plate
Rockwood	K1050
Trimco	K0050

2.11 WALL STOPS

A. Wall Stops: Provide convex wall stops with concealed combo pack fasteners. Use toggle fasteners in drywall and machine screws and rawl plugs in masonry and concrete walls.

B. Acceptable manufacturers and products:

Manufacturer	Wall	Wall/Holder
Trimco	1278CX	1283-6S

2.12 DOOR SEALS/GASKETING/THRESHOLDS/AUTO.DOOR BOTTOMS

Aluminum extrusions to be T-6063 or T-6463 with a minimum hardness of T-5. Provide mechanical fasteners. Use only manufacturer supplied fasteners.

A. Door Seals and Gasketing:
Fasteners shall be stainless steel sheet metal screws. Furnish UL listed gasketing for all fire-rated doors.

1. Perimeter Seals:
Provide bulb seal at head and jambs. Seal to be polyurethane. Fasten with manufacturer's recommended and supplied fasteners.

2. Thresholds & Automatic Door Bottoms:
Furnish thresholds 4" longer than the door width. Provide only manufacturer supplied fasteners. Secure thresholds with stainless steel wood screws and plastic anchors. Secure automatic door bottoms with stainless steel sheet metal screws.
   a. Thresholds: Provide .125" thick material for ¼" rise saddle thresholds and .200" material for ½" rise saddle thresholds.
   b. Furnish thresholds with anti-slip surface similar to "PemKote"
   c. Acceptable manufacturers and products:

Manufacturer	Weatherstrip	½" Rise x ADA Panic	½" Rise Saddle	Gasket	Auto.Door Bottoms
NGP	162S	896S	425SIA	5050	335N
Pemko	297AS	2005AT	171AK	S88D	411ARL
Reese	762A	S483AU	S425A	797B	370A

2.13 SILENCERS

A. Provide punch in silencers. Manufactured of rubber, neoprene or silicone types of pneumatic design for mounting to metal door frames. Silencers to meet the requirements of ANSI A156.16.

B. Acceptable manufacturers and products:

Manufacturer	Open Section Frame	Closed Section Frame
Rockwood	608	608
Trimco	1229A	1229A

C. Provide three for each single doors; two for pairs of doors.

2.14 KEY CABINET

A. Key cabinet to have hinged panel and be a wall mount type unit. Key cabinet to have a two tag type system with a key loan register for the tracking of signed out keys. Furnish a mortise cylinder for the key cabinet.
Acceptable manufacturers and products:

Manufacturer	Product
MMF	201846003
Tel-Kee	AWC-450-S

2.15 MATERIALS AND FABRICATION

A. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
4. Do not use thru-bolts or sex bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of adequately fastening the hardware, or otherwise found in Headings. Coordinate with wood doors and metal doors and frames where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.16 HARDWARE FINISHES

A. Match items to the manufacturer’s standard color and texture finish for the latch and lock sets (or push-pull units if no latch of lock sets). Match existing finishes**.**

B. Provide finishes that match those established by ANSI or, if none established, match the Architect’s sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide compatible finishes for the aluminum storefront doors and frames. Use 626 for clear anodized and 695 for dark bronze doors and frames.

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

1.	Continuous Hinges (Exterior)	Aluminum/match the door and frame.
2.	Hinges (Interior)	652
3.	Locks	626
4.	Exit Devices	630
5.	Door Closers	689
6.	Protective Plates	630
7.	Door Stops	626/630 as specified
8.	Thresholds/Weatherstripping	Mill Finish Aluminum

PART 3 EXECUTION

3.01 INSTALLATION

A. USE ONLY MANUFACTURER SUPPLIED FASTENERS. USE OF ANY OTHER FASTENERS WILL VOID LABEL AND WARRANTY.

B. Install hardware per manufacturers instructions and in compliance with:
1. NFPA-80
2. NFPA-101
3. NFPA-105
4. NFPA-252
5. ANSI A117.1
6. Local building code requirements
7. Approved Shop Drawings
8. Approved Finish Hardware Schedule

C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and

reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

D. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section “Joint Sealers”.

G. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 FIELD QUALITY CONTROL

Furnish a hardware inspection prior to final acceptance in order to ensure that hardware has been properly installed. A written report describing discrepancies, code violations, defective hardware, and clearance issues shall be provided to the material supplier, Architect, General Contractor and Installer. All discrepancies are to be corrected prior to final acceptance unless otherwise directed by the Owner.

3.03 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjusting: Hardware installer to adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Cleaning: General Contractor to:

1. Clean adjacent surfaces soiled by hardware installation.

2. Clean finish hardware per manufacturers instructions after installer makes final adjustments and prior to final acceptance. Remove all mortar, dry wall mud, paint over spray and foreign

materials from hardware. Replace at no cost to owner items that can not be cleaned to manufacturers level of finish quality.

C. Demonstrating: Prior to final acceptance, the Door Hardware Supplier and Hardware Installer shall:

1. Conduct a training class for the building maintenance personnel in the adjustment, operation and maintenance of mechanical and electrified finish hardware. At the start of this class the installer is to turn over all special tools for finish hardware, that were provided with hardware, by the hardware manufacturer, to the building maintenance supervisor.

3.04 HARDWARE SCHEDULE

Hardware Set #1 E100,

1ea. Cont.Hinges	A110HD TW8 R
1ea. Cont.Hinges	A110HD
1ea. Exit Device	CD9300B L
1ea. Exit Device	CD9300B L MLR 9PBO
1ea. Rem.Mullion	1340KR
1ea. Mullion Seal	628
1ea. Power Supply	PS610RF
1ea. Card Reader	By Others
1ea. Remote Push Button	3909
4ea. Cylinders	1E74 X 1E72
2ea. Closer	8916 SDS
2ea. Pulls	1191-4 710CU
2ea. Blade Stop Spacers	BSHD
1ea. Threshold	S424A SRS

Note: Weatherstripping and door bottoms by door supplier.

OPERATION DESCRIPTION: DOORS ARE LOCKED AT ALL TIMES. INGRESS VIA AUTHORIZED CREDENTIAL, OR MECHANICAL KEY, OR REMOTE PUSH BUTTON. EGRESS AT ALL TIMES.

Hardware Set #2 E146,

1ea. Cont.Hinges	A110HD TW8 R
1ea. Cont.Hinges	A110HD
1ea. Exit Device	CD9300B L
1ea. Exit Device	CD9300B L MLR 9PBO
1ea. Rem.Mullion	1340KR
1ea. Mullion Seal	628
1ea. Power Supply	PS610RF

1ea.	Card Reader	By Others
4ea.	Cylinders	1E74 X 1E72
2ea.	Closer	8916 SDS
2ea.	Pulls	1191-4 710CU
2ea.	Blade Stop Spacers	BSHD
1ea.	Threshold	S424A SRS

Note: Weatherstripping and door bottoms by door supplier.

OPERATION DESCRIPTION: DOORS ARE LOCKED AT ALL TIMES. INGRESS VIA AUTHORIZED CREDENTIAL, OR MECHANICAL KEY. EGRESS AT ALL TIMES.

Hardware Set #3 E127B,E131,

2ea.	Cont.Hinges	A110HD
2ea.	Exit Device	LD9300B
1ea.	Rem.Mullion	1340KR
1ea.	Mullion Seal	628
1ea.	Cylinders	1E74
2ea.	Closer	8916 SDS
2ea.	Blade Stop Spacers	BSHD
1ea.	Threshold	S424A SRS
1ea.	Rain Drip	R201A

Note: Weatherstripping and door bottoms by door supplier.

Hardware Set #4 E144,E145,

2ea.	Cont.Hinges	A111HD
2ea.	Exit Device	LD9300B
1ea.	Rem.Mullion	1340KR
1ea.	Mullion Seal	628
1ea.	Cylinders	1E74
2ea.	Closer	8916 SDS
1ea.	Threshold	S483U SRS
1ea.	Weatherstripping	769A
2ea.	Door Bottom	772A
1ea.	Rain Drip	R201A

Hardware Set #5 E108,

1ea. Cont.Hinges	FMSLF83HD
1ea. Exit Device	CD9300B 9PBO
2ea. Cylinders	1E74 X 1E72
1ea. Closer	8916 SDS
1ea. Blade Stop Spacers	BSHD
2ea. Pulls	1191-4 710CU
1ea. Threshold	S424A SRS

Note: Weatherstripping and door bottoms by door supplier.

Hardware Set #6 E117,

1ea. Cont.Hinges	A111HD
1ea. Lockset	45H7D3H
1ea. Closer	8916 SDST
1ea. Kickplate	KO050
1ea. Latch Guard	5001
1ea. Threshold	S483U SRS
1ea. Weatherstripping	769A
1ea. Door Bottom	772A
1ea. Rain Drip	R201A

Hardware Set #7 E125,

1ea. Cont.Hinges	A111HD
1ea. Exit Device	CD9300B L V103
2ea. Cylinders	1E74 X 1E72
1ea. Closer	8916 SDST
1ea. Kickplate	KO050 12” X 2”LDW
1ea. Door Bell	By Others
1ea. Threshold	S425A SRS
1ea. Weatherstripping	769A
1ea. Door Bottom	772A

OPERATION DESCRIPTION: DOOR IS LOCKED AT ALL TIMES. INGRESS VIA DOOR BELL, OR MECHANICAL KEY. EGRESS AT ALL TIMES.

Hardware Set #8	E127A
1ea. Cont.Hinges	A111HD TW8 R
1ea. Exit Device	CD9300B L MLR V103
2ea. Cylinders	1E74 X 1E72
1ea. Power Supply	PS610RF
1ea. Card Reader	By Others
1ea. Closer	8916 SDST
1ea. Threshold	S425A SRS
1ea. Weatherstripping	769A
1ea. Door Bottom	772A

OPERATION DESCRIPTION: DOORS ARE LOCKED AT ALL TIMES. INGRESS VIA AUTHORIZED CREDENTIAL, OR MECHANICAL KEY. EGRESS AT ALL TIMES.

Hardware Set #9	E155,
1ea. Cont.Hinges	A111HD
1ea. Exit Device	LD9300B
1ea. Closer	8916 SDS
1ea. Threshold	S483U SRS
1ea. Weatherstripping	769A
1ea. Door Bottom	772A
1ea. Rain Drip	R201A

Hardware Set #10	100,
1ea. Cont.Hinges	A110HD TW8 R
1ea. Cont.Hinges	A110HD
1ea. Exit Device	CD9300B L
1ea. Exit Device	CD9300B L MLR 9PBO
1ea. Rem.Mullion	1340KR
1ea. Mullion Seal	628
1ea. Power Supply	PS610RF
1ea. Card Reader	By Others

1ea.	Remote Push Button	3909
4ea.	Cylinders	1E74 X 1E72
2ea.	Closer	8916 SDS
2ea.	Pulls	1191-4 710CU
2ea.	Blade Stop Spacers	BSHD

OPERATION DESCRIPTION: DOORS ARE LOCKED AT ALL TIMES. INGRESS VIA AUTHORIZED CREDENTIAL, OR MECHANICAL KEY, OR REMOTE PUSH BUTTON. EGRESS AT ALL TIMES.

Hardware Set #11 146,

1ea.	Cont.Hinges	A110HD TW8 R
1ea.	Cont.Hinges	A110HD
1ea.	Exit Device	CD9300B L
1ea.	Exit Device	CD9300B L 9PBO
1ea.	Rem.Mullion	1340KR
1ea.	Mullion Seal	628
4ea.	Cylinders	1E74 X 1E72
2ea.	Closer	8916 SDS
2ea.	Pulls	1191-4 710CU
2ea.	Blade Stop Spacers	BSHD

OPERATION DESCRIPTION: DOORS ARE LOCKED AT ALL TIMES. INGRESS VIA MECHANICAL KEY. DOORS CAN BE UNLOCKED BY DOGGING DOWN EXIT DEVICES. FRAME PREPPED FOR FUTURE ACCESS CONTROL.EGRESS AT ALL TIMES.

Hardware Set #12 101A,

1ea.	Cont.Hinges	A110HD
1ea.	Lockset	45H7D3H
1ea.	Electric Strike	ES86 FSV U
1ea.	Power Supply	PS610RF
1ea.	Card Reader	By Others
1ea.	Remote Push Button	3909
1ea.	Closer	8916 AF

OPERATION DESCRIPTION: DOOR IS LOCKED AT ALL TIMES. INGRESS VIA AUTHORIZED CREDENTIAL, OR MECHANICAL KEY, OR REMOTE PUSH BUTTON. EGRESS AT ALL TIMES.

Hardware Set #13 101B,

1ea. Hinges	A110HD
1ea. Lockset	Yale 8894-2 or equal.
1ea. Power Supply	PS610
1ea. Remote Push Button	3909MA
1ea. Closer	8916 SPA
1ea. Blade Stop Spacers	BSHD

OPERATION DESCRIPTION: **DURING SCHOOL HOURS**, DOOR IS UNLOCKED FROM
BOTH SIDES. FREE INGRESS AND EGRESS AT ALL TIMES, EXCEPT IN THE EVENT OF AN EMERGENCY WHEREAS THE LOCK CAN BE LOCKED BY REMOTE PUSH BUTTON. MECHANICAL KEY OVERIDE.

AFTER HOURS, DOOR IS LOCKED FROM BOTH SIDES BY REMOTE PUSH BUTTON.
INGRESS AND EGRESS BY MECHANICAL KEY OVERIDE. LOCK WILL UNLOCK UPON ACTIVATION OF FIRE ALARM. KEY SIDE IS LOBBY SIDE OF DOOR.

Hardware Set #14	102A,102B,107,108,111,143,158B,
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7TA3H
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A
Hardware Set #15	103A,103B,142,
3ea. Hinges	FBB191 4.5 X 4.5
1ea. Privacy	45HOL3H
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A
Hardware Set #16	104,106A,106B,
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7TA3H
1ea. Wall Stop	1278CXCP
1ea. Sound Seals	797B
1ea. Auto.Door Bottom	370A
3ea. Silencers	1229A
Hardware Set #17	109,117,159,
3ea. Hinges	FBB179 4.5 X 4.5

1ea. Lockset	45H7D3H
1ea. Closer	8916 AF
1ea. Kickplate	KO050
1ea. Wall Stop	1278CXCP
1ea. Gasketing	797B

Hardware Set #18 110,141A

3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 SPA
1ea. Kickplate	KO050
1ea. Wall Stop/Holder	1283-6S
3ea. Silencers	1229A

Hardware Set #19 112A,139B,

3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 AF
1ea. Kickplate	KO050
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A

Hardware Set #20
113,114,115,116,120,121,128,129A,132,133,134,135A,147,149,
152A,156,158A,160,161

3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A

Hardware Set #21 118,119,138A,139A,

3ea. Hinges	FBB191 4.5 X 4.5
1ea. Deadbolt	48H7R
1ea. Push Plate	1001-9 710
1ea. Pull Plate	1018-3B 710
1ea. Closer	8916 AF
1ea. Kickplate	KO050
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A

Hardware Set #22	125,126,152B
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 ISH
1ea. Kickplate	KO050
3ea. Silencers	1229A
Hardware Set #23	122,123,124A,125A,
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Wall Stop	1278CXCP
1ea. Kickplate	KO050
1ea. Mop Plate	KO050 4” X 1”LDW
3ea. Silencers	1229A
Hardware Set #24	127B,127C,
3ea. Hinges	FBB191 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 SPA
1ea. Kickplate	KO050
1ea. Mop Plate	KO050 4” X 1”LDW
1ea. Wall Stop/Holder	1283-6S
3ea. Silencers	1229A
Hardware Set #25	127,
6ea. Hinges	FBB179 4.5 X 4.5
1ea. Exit Device	CD9400B LBR L YT08
1ea. Exit Device	CD9400B LBR L YT02
3ea. Cylinders	1E74
2ea. Closer	8916 SPA
2ea. Kickplate	KO050
2ea. Wall Stop/Holders	1283-6S
2ea. Silencers	1229A
Hardware Set #26	129B,
3ea. Hinges	FBB191 4.5 X 4.5
1ea. Passage	45HON3H
1ea. Wall Stop	1278CXCP

3ea. Silencers	1229A

Hardware Set #27	131,140,
6ea. Hinges	FBB179 4.5 X 4.5
2ea. Exit Device	9400B LBR
2ea. Closer	8916 SPA
2ea. Kickplate	KO050
2ea. Wall Stop/Holders	1283-6S
2ea. Silencers	1229A

Hardware Set #28	135B,144,148
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 DS
1ea. Kickplate	KO050
1ea. Gasketing	797B

Hardware Set #29	137,141B
6ea. Hinges	BB5000 450
1ea. Lockset	45H7D3H
2ea. Flushbolts	3917
1ea. Closer	8916 DST
1ea. O.H.Stops	902H
2ea. Kickplate	KO050
1ea. Gasketing	797B
2ea. Astragals	804A

Hardware Set #30	138B,
3ea. Hinges	FBB191 4.5 X 4.5
1ea. Lockset	45H7D3H
1ea. Closer	8916 DST
1ea. Kickplate	KO050 12” X 2”LDW
3ea. Silencers	1229A

Hardware Set #31	145A,145B,155B,
6ea. Hinges	FBB168 4.5 X 4.5
1ea. Exit Device	CD9300B L YT08
1ea. Exit Device	CD9300B L YT02
1ea. Keyed Rem. Mullion	1340KR
4ea. Cylinders	1E74
2ea. Closer	8916 SPA
2ea. Kickplate	KO050
2ea. Wall Stop/Holders	1283-6S
1ea. Sound Seals	797B
1ea. Mullion Seal	628
2ea. Silencers	1229A

Hardware Set #32	151,
3ea. Hinges	FBB191 4.5 X 4.5
1ea. Privacy	45H7HJ3H VB
1ea. Closer	8916 AF
1ea. Kickplate	KO050
1ea. Wall Stop	1278CXCP
3ea. Silencers	1229A

Hardware Set #33	155A,
3ea. Hinges	FBB179 4.5 X 4.5
1ea. Exit Device	F9300B L YT08
1ea. Cylinders	1E74
1ea. Closer	8916 SPA
1ea. Kickplate	KO050
1ea. Wall Stop/Holder	1283-6S
1ea. Sound Seal	797B

Hardware Set #34	T1
1ea. Hinge	CB1900R 4-1/2 X 4-1/2
2ea. Hinges	2060R 4-1/2 X 4-1/2
1ea. Privacy	93K0L15D
1ea. Coat Hook/Stop	7010
1ea. Wall Stop	1278CXCP

1ea.	Fingerguard	KE39 50”
3ea.	Silencers	1229A

Hardware Set #35 T2

2ea.	Hinges	2060R 4-1/2 X 4-1/2
1ea.	Privacy	93K0L15D
1ea.	Coat Hook/Stop	7010
1ea.	Fingerguard	KE39 50”
3ea.	Silencers	1229A

END OF SECTION 087100

Payneville Elementary School Renovation and Addition

For

Meade County Public Schools

Brandenburg, Kentucky

ADDENDUM #1
August 1st, 2019

CMTA, INC.
Consulting Engineers
10411 Meeting Street
Prospect, Kentucky 40059
Telephone: (502) 326-3085
Fax: (502) 326-2691

Meade County Public Schools
Payneville Elementary School Renovation and Addition
CMTA Engineers
Addendum #1
August 1st, 2019

The following information supersedes or is in addition to information released in the Contract Documents dated July 10th, 2019.

Mechanical Specification Items:

1. Reference specification section 230200 HVAC Equipment. Revise specification as below.
    a. Revise Part 2.2 "Provide factory built and factory tested air handling units as indicated, as manufactured by Daikin, Trane or ~~JCI~~ AAON of sizes and capacities as scheduled, and as specified herein.
    b. Add Part 8 as below:

PART 8 – WATER COOLED VARIABLE REFRIGERANT FLOW SYSTEM:

8.1 SYSTEM DESCRIPTION:

8.1.1 Acceptable manufacturers, assuming compliance with these equipment specifications, are Mitsubishi, Daikin, and LG. Contractor bidding an alternate manufacturer does so with full knowledge that that manufactures product may not be acceptable or approved and that contractor is responsible for all specified items and intents of this document without further compensation.

8.1.2 Simultaneous heating/cooling (heat recovery) systems shall consist of a water-cooled outdoor unit, BC (Branch Circuit) Controller (or comparable branch devices), multiple indoor units, and an integral DDC (Direct Digital Controls) system. Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. To ensure owner comfort, each indoor unit or group of indoor units shall be independently controlled and capable of changing mode automatically when zone temperature strays 1.8 degrees F from set point for ten minutes.

8.1.3 No additional branch circuit controllers (or comparable branch devices) than shown on the drawings/schedule may be connected to any one outdoor unit. Contractor bidding alternate manufacturer(s) requiring additional branch devices assumes responsibility for additional all costs & placement.

8.2 QUALITY ASSURANCE: System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.

8.3 DELIVERY, STORAGE AND HANDLING: Unit shall be stored and handled according to the manufacturer's recommendation.

8.4 WARRANTY:

8.4.1 The units shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

8.4.2 Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.

8.4.3 All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required.

8.5 VARIABLE REFRIGERANT HEAT PUMP CONDENSER:

8.5.1 GENERAL:

8.5.1.1 The outdoor unit modules shall be water-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section and Part 5 (Controls). The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

8.5.1.2 Outdoor unit systems may be comprised of multiple modules with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install alternate units shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, piping costs, etc.

8.5.1.3 Outdoor unit shall have a sound rating no higher than 58 dB(A) individually or 60 dB(A) twinned. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

8.5.1.4 Refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller or comparable branch devices shall be insulated in accordance with the installation manual.

8.5.1.5 The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

8.5.1.6 The water source unit must be installed with strainer in water line near water inlet to protect heat exchanger from debris in water lines. Units with plate heat exchangers require field-installed 60 mesh strainer and units with tube-in-tube heat exchangers require field-installed 25 mesh strainer.

8.5.1.7 The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.

8.5.1.8 The water-source unit shall have 0-10V output signal or two position valve closure interlock available for conformance with IECC requirements.

8.5.1.9 The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence

based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.

8.5.2 UNIT CABINET:

8.5.2.1 The cabinet(s) shall be fabricated of hot-dip galvanized steel sheet for corrosion resistance.

8.5.2.2 The water-source systems can be mounted side-by-side or stacked (with proper structural supports) depending on selected connection locations.

8.5.3 INVERTER COOLER:

8.5.3.1 The water-source unit shall have an internal direct expansion type inverter cooler. The inverter cooler shall provide cooling for all internal cabinet components eliminating the need for cabinet ventilation along with associated clearance requirements and additional space cooling load.

8.5.3.2 Alternate systems without integral cooling for internal cabinet components shall require additional indoor unit(s) sized for total heat rejection of water-source unit and additional outdoor unit capacity must be added to account for load. Submitted efficiency data must be corrected to reflect system capacity reduction due to cooling capacity applied to heat rejected by HVAC equipment.

8.5.4 REFRIGERANT AND REFRIGERANT PIPING:

8.5.4.1 R410A refrigerant shall be required for systems.

8.5.4.2 Refrigerant line sizing shall be in accordance with manufacturer specifications. Future changes to indoor unit styles or sizes must be possible without resizing/replacing refrigerant piping to any other branch devices or indoor units.

8.5.5 WATER-REFRIGERANT HEAT EXCHANGER COIL AND CONNECTIONS:

8.5.5.1 The water-source heat exchanger shall be a cross-flow, stainless steel brazed plate heat exchanger. The channel plate shall be constructed from AISI 316 SS. The Frame/Pressure plate shall be constructed from AISI 304 SS. The brazing material shall be pure copper.

8.5.5.2 The water-source unit shall be approved for use in a closed water loop system.

8.5.6 COMPRESSOR:

8.5.6.1 Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.

8.5.6.2 Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 24%.

8.5.6.3 The compressor shall be equipped with an internal thermal overload.

8.5.6.4 Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

8.5.7 CONTROLS:

8.5.7.1 Condensing unit shall include Variable Evaporator Temperature or comparable method of varying system evaporator (refrigerant) temperature in order to reduce compression ratio and power consumption during light load or mild ambient temperatures. Multiple evaporator refrigerant temperature settings shall be required in order to optimize efficiency within required system-specific performance and installation constraints. System shall reduce compression ratio only when/if all indoor units are within 1.8F of setpoint; reducing compression ratio based solely on ambient temperature risks discomfort and is not allowed. Variable Evaporator Temperature or comparable method shall incorporate override or disable capability based on external signal to allow for space humidity control or load demand.

8.5.7.2 Water-source modules shall contain a terminal block with dry contacts for proof of flow status via a field provided flow switch, as well as a dry contact to energize the control circuit for an auxiliary dedicated pump or motorized isolation valve.

8.5.7.3 Two-stage condenser water flow shall be utilized during periods when all indoor units on a water source system are OFF by installing motorized two position valves (provided by contractor) on each of the water source modules tied to the appropriate terminal block. Systems comprised of twinned modules will not de-energize the field provided two position valves on any of the modules, until all the modules become thermally inactive AND all connected indoor units are OFF. Contractor to coordinate with respective manufacturer for piping/wiring requirements.

8.5.7.4 Modulating Water Flow Control

8.5.7.4.1 Each Water Cooled Module shall be supplied with a pressure independent characterized control valve capable of modulating water flow through each water cooled module independently of the rest of the condenser water system.

8.5.7.4.2 Valve shall maximize energy efficiency of each Water Cooled Module by accurately matching the water cooled units demand output to flow requirements through custom manufacturer supplied actuator programming.

8.5.7.4.3 Each valve shall include an Ultrasonic flow meter that will constantly monitor flow to each water cooled module ensuring any variation in system pressure doesn't affect the flow through each Water Cooled Module.

8.5.7.4.4 Each valve shall utilize Ultrasonic flow meter for proof of flow and protect each water cooled unit's brazed plate heat exchanger in event of any water system failure.

8.5.7.4.5 Each actuator shall have its own built in web browser for setup utilizing pre-programmed drop down list for each water cooled unit/module size for easy startup and commissioning of system.

8.5.7.4.6 Each valve shall be self-balancing due to its pressure independent nature, use of Auto-flow valve or circuit setter for condenser water balancing is not allowed.

8.5.7.4.7 Systems utilizing pressure dependent condenser water control valves shall not be allowed.

8.5.7.4.8 Utilization of paddle or differential flow switches shall not be allowed. Only ultrasonic or thermal flow switches shall be allowed as they can provide accuracy to protect each heat exchanger without potential fouling of switch due to contaminants in the condenser water loop.

8.5.7.4.9 Valve packages that do not give direct feedback of flow to each water cooled module shall not be allowed as they can allow the water cooled units to run at less-efficient flow rates with no correction.

8.5.7.4.10 Valve package shall be provided by VRF manufacturer, field provided valve packages shall not be allowed.

8.5.7.5 Valve shall include BACnet IP or MS/TP connection to allow monitoring of flow through each module as well as valve open percentage.

8.5.7.6 The water source outdoor unit shall be an integral part of the system & control network described in Part 5 (Controls) and react to heating/cooling demand as communicated from connected indoor units over the control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.

8.5.7.7 The unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.

8.5.7.8 The unit shall have the capability of interlocking operation of the water circuit and error detection.

8.5.8 ELECTRICAL:

8.5.8.1 The outdoor unit shall be controlled by integral microprocessors.

8.5.8.2 The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

8.6 <u>BRANCH CIRCUIT CONTROLLERS:</u>

8.6.1 GENERAL:

8.6.1.1 BC (Branch Circuit) Controllers (or comparable branch devices) shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling. Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices which do not include controlled refrigerant subcooling risk bubbles in liquid supplied to indoor unit LEVs and are not allowed.

8.6.1.2 BC Controllers (or comparable branch devices) shall be equipped with a circuit board that interfaces to the controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish and be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. BC Controllers (or comparable branch devices) shall be suitable for use in plenums in accordance with UL1995 ed 4.

8.6.2 BC UNIT CABINET:

8.6.2.1 The casing shall be fabricated of galvanized steel.

8.6.2.2 Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.

8.6.2.3 The unit shall house two tube-in-tube heat exchangers.

8.6.3 REFRIGERANT PIPING (SPECIFICATIONS IN ADDITION TO THOSE FOR OUTDOOR UNIT): Future changes to indoor unit quantities or sizes served by BC Controller or comparable branch device must be possible with no piping changes except between the branch device and indoor unit(s) changing. Systems which might require future piping changes between branch device and outdoor unit—if changes to indoor unit quantities or sizes are made—are not considered equal and are not allowed.

8.6.4 REFRIGERANT VALVES: Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.

8.6.5 FUTURE USE BRANCH: Each VRF system shall include at least one (1) unused branch or branch device for future use. Future-use branches or branch devices shall be fully installed & wired in central location with capped service shutoff valve & service port.

8.6.6 CONDENSATE MANAGEMENT: BC Controller (or comparable branch device) must have integral resin drain pan or insulate refrigeration components with removable insulation that allows easy access for future service needs. Cabinets filled with solid foam insulation do not allow for future service and are not allowed.

8.6.7 ELECTRICAL:

8.6.7.1 The BC Controller shall be controlled by integral microprocessors.

8.6.7.2 The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total.

Mechanical Items:

1. Sheet M4.1
    a. Reference “Enlarged Mechanical Room 137”. In outside air duct from ERV on roof, provide 18”x18” pressure relief door in side of ductwork rise.
2. Sheet M5.0

a. See attached sheet M5.0 for revisions, clouded.

3. Sheet M6.1
   a. See attached sheet M6.1 for added detail, clouded.
4. Sheet M7.0
   a. See attached sheet M7.0 for revisions, clouded.
5. Sheet M7.1
   a. See attached sheet M7.1 for revisions, clouded.

Electrical Items:

1. Sheets E2.1 & E2.2
   a. For clarification, Tagged Note # D10 is a typical note and applies to all mechanical equipment being demolished.
   b. All existing ceiling mounted smoke detectors shall be removed complete.
   c. Remove all unused cabling above ceilings being replaced. Provide new supports from structure and support all existing cabling to remain.

2. Sheet E3.1
   a. Provide six (6) additional Type X1 exit signs installed complete and connected to corridor lighting circuit. Exact location to be confirmed with architect and engineer prior to installation.

3. Sheet E3.2
   a. Provide a Type AE light fixture in Toilet Room 130 in lieu of a Type V1 fixture.

4. Sheet E4.1
   a. Provide a fire alarm audio/visual device in Rooms 147 and 149 in lieu of a visual only device.
   b. Remove smoke detectors in Rooms 137, 156 and 159.
   c. Provide a smoke detector in Room 136 to serve the new fire alarm control panel.
   d. Provide a 30A/600V/3P disconnect switch fused at equipment nameplate to serve Unit VHP-90 located in Room 156. Coordinate exact location with mechanical contractor achieving required clearances.
   e. Provide a 50A/2P circuit from Panel LD-1 to serve Water Heater DWH-1. In addition, provide a 60A/250V/2P disconnect switch fused at equipment nameplate.
   f. Provide a 30A/250V/2P disconnect switch to serve each new AC unit. Coordinate disconnect switch locations with mechanical contractor achieving proper clearances prior to installation.

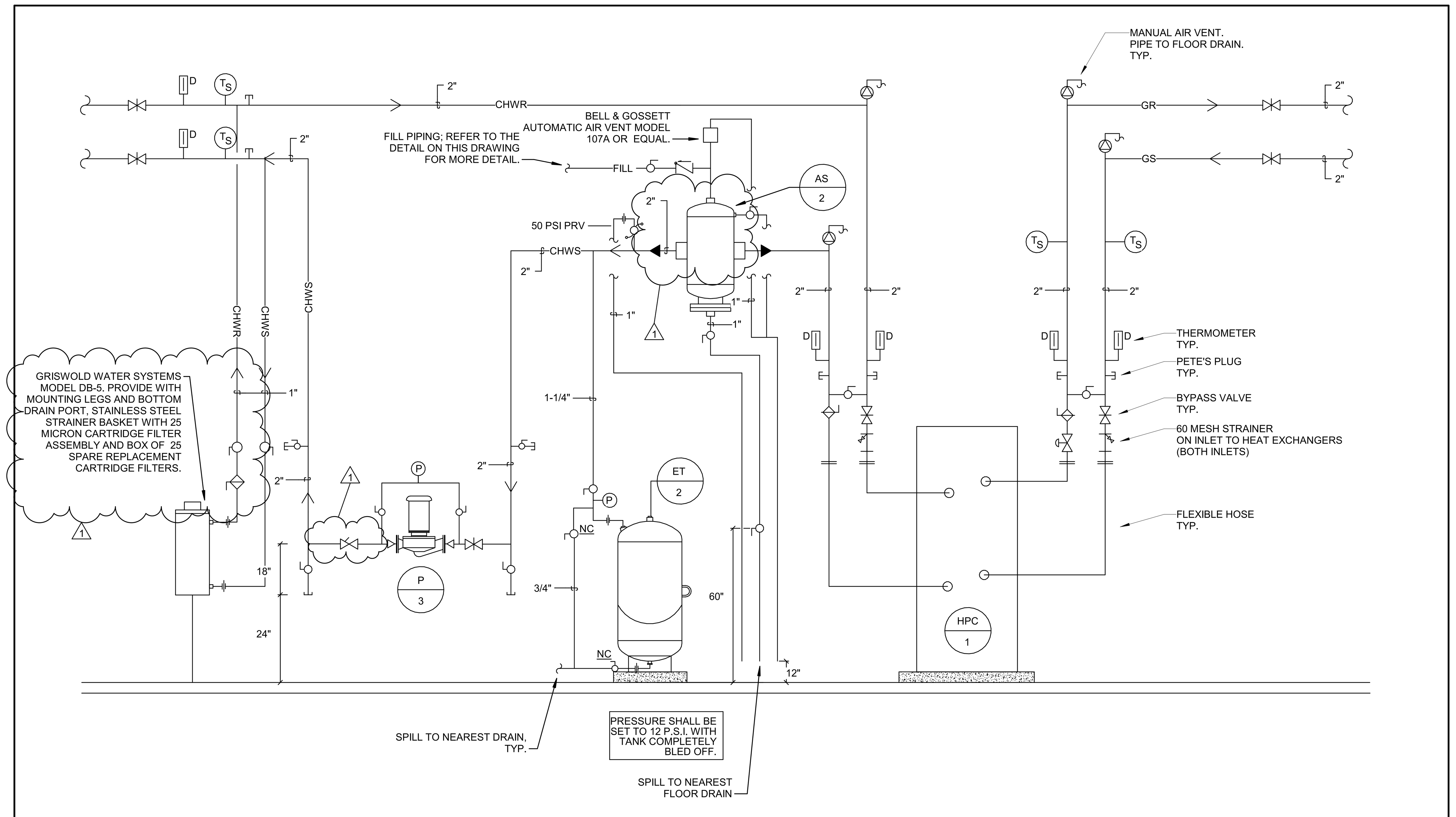
5. Sheets E4.1 and E4.2

a. Provide J-hook cable path in all corridors as required for support of new low voltage systems cabling. Refer to detail on Drawing E6.3.

6. Sheet 5.0
   a. Coordinate exact location of Pump House electrical panels and equipment with mechanical, plumbing and fire protection contractors achieving proper clearances prior to installation.
   b. Provide a 30A/600V/3P disconnect switch fused at equipment nameplate to serve each Unit VHP-120 located in Room 144. Coordinate exact locations with mechanical contractor achieving required clearances.
   c. Coordinate exact location of all panels and disconnect switches with mechanical contractor in Room 144 achieving required clearances.

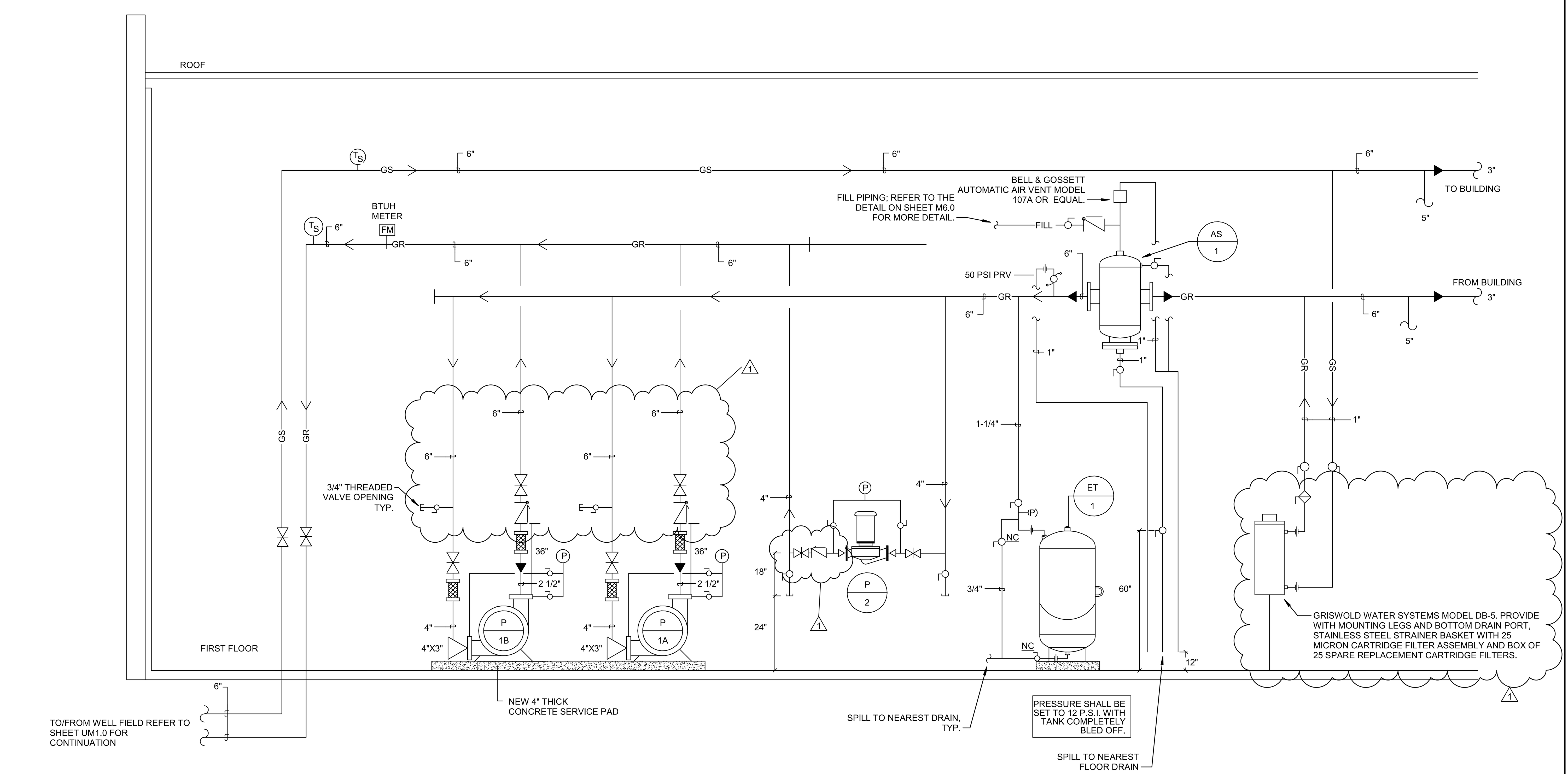
7. Sheet E7.0
   a. Panel LD1 shall be a 60-pole panel in lieu of a 42-pole panel.
   b. Circuit HD1-56 shall be a 35A/3P circuit consisting of #8 conductors and a #10 ground.

RECEIPT OF THIS ADDENDUM MUST BE ACKNOWLEDGED ON THE BID.



2-PIPE HYDRONIC HEAT PUMP CHILLER PIPING SCHEMATIC - MECHANICAL ROOM 137

NOT TO SCALE



GEOTHERMAL PIPING SCHEMATIC - MECHANICAL ROOM 144

NOT TO SCALE

SHERMAN CARTER BARNHART ARCHITECTS

FINAL DOCUMENTS

STATE OF KENTUCKY WILLIAM EPPS, JR. PE-19127 PROFESSIONAL ENGINEER

CMTA

PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
PAYNEVILLE, KY

MECHANICAL PIPING SCHEMATICS

JOB NO.	1569
DATE	07/10/2019
DRAWN	CAH
CHECKED	JRE

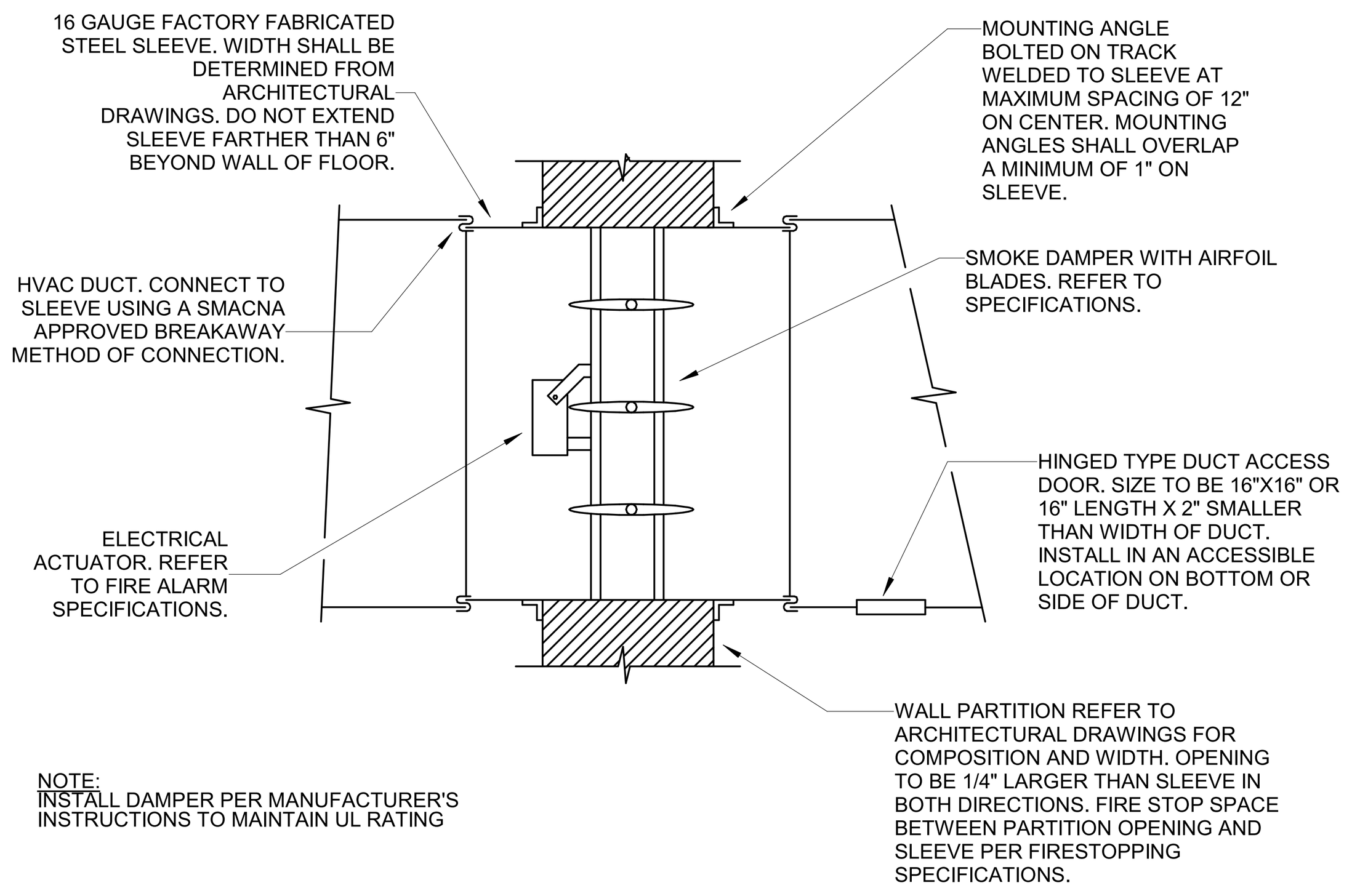
REVISIONS

No.	Description	Date
1	Addendum 1	08.01.19

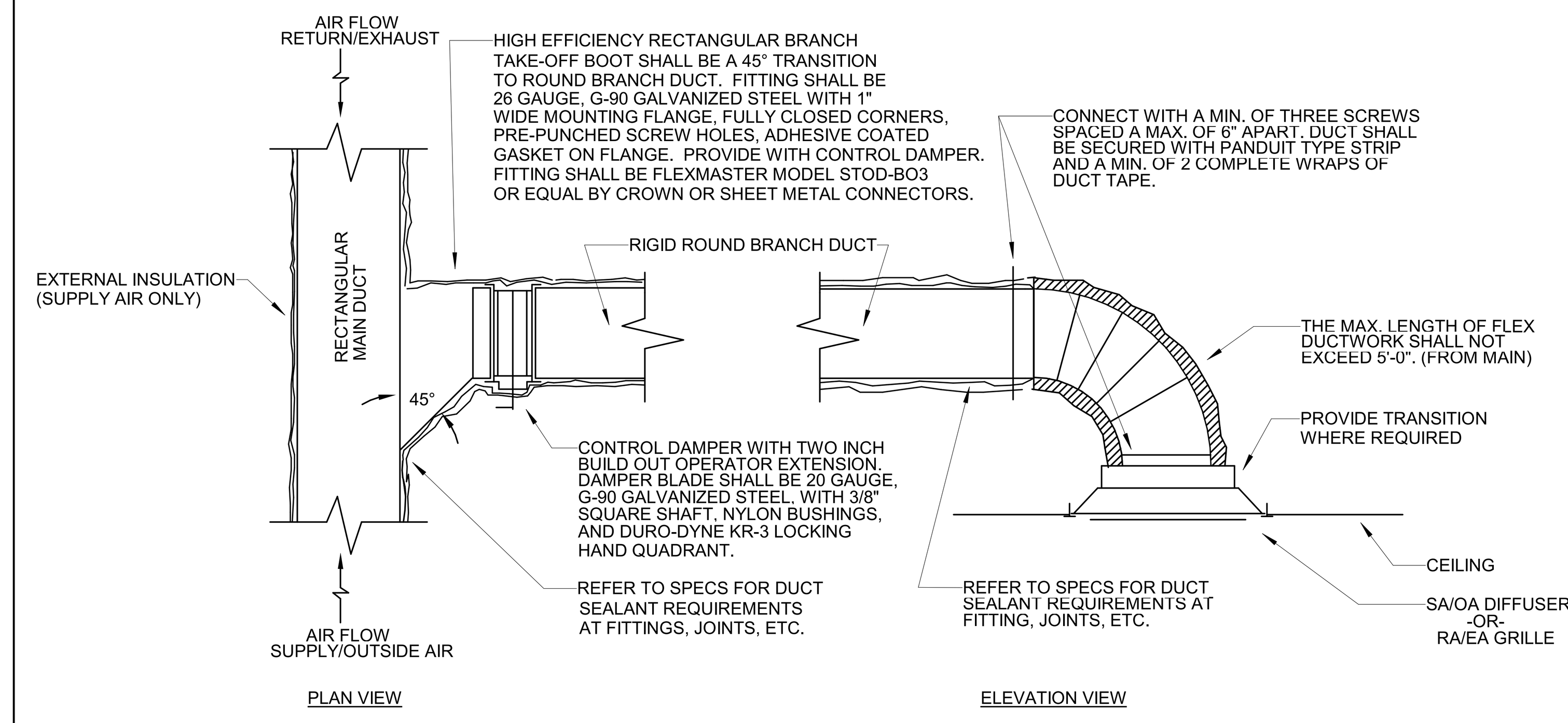
SHEET

M5.0

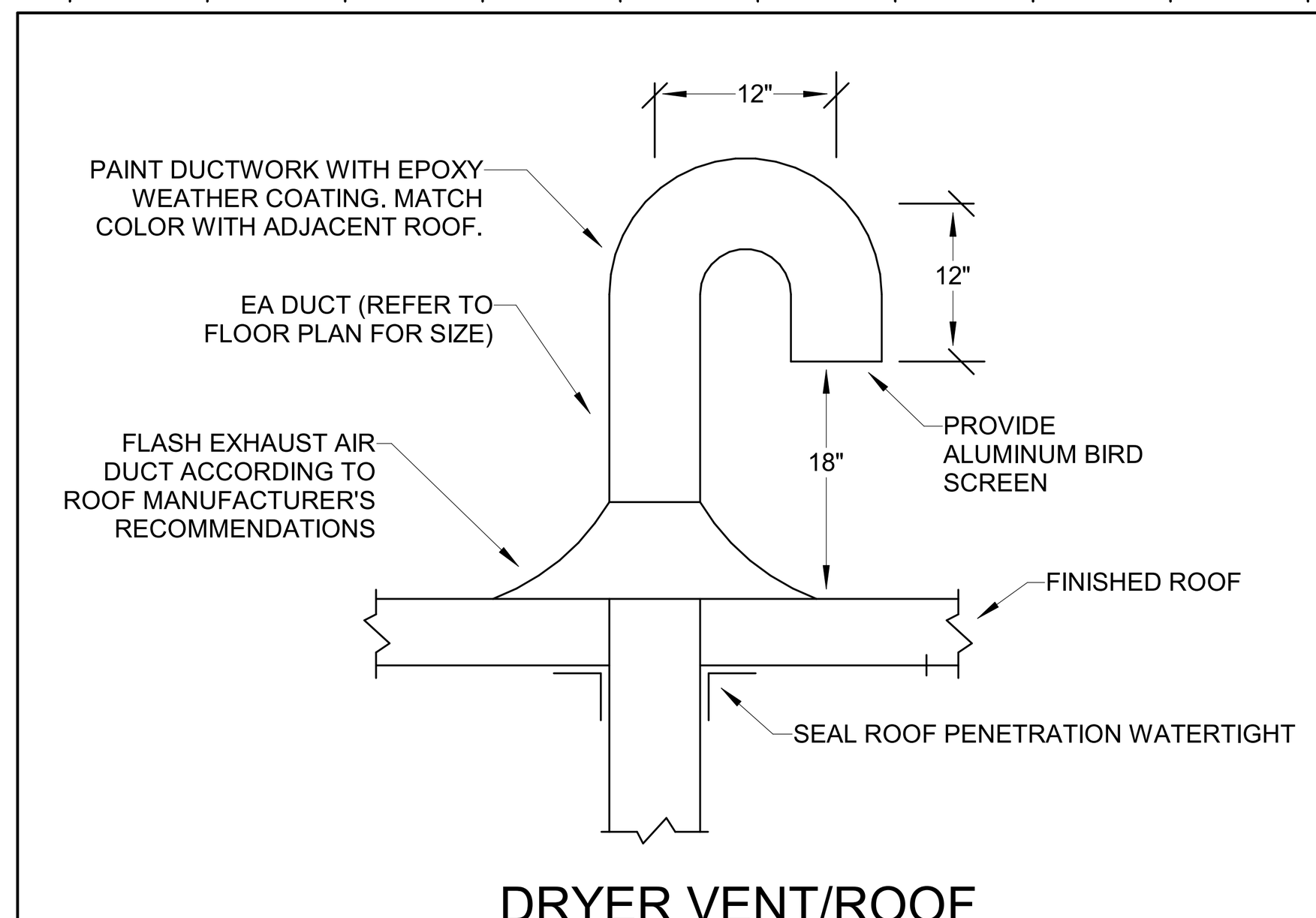
1569 PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
M5.0 MECHANICAL PIPING SCHEMATICS
8/1/2019 2:54:59 PM



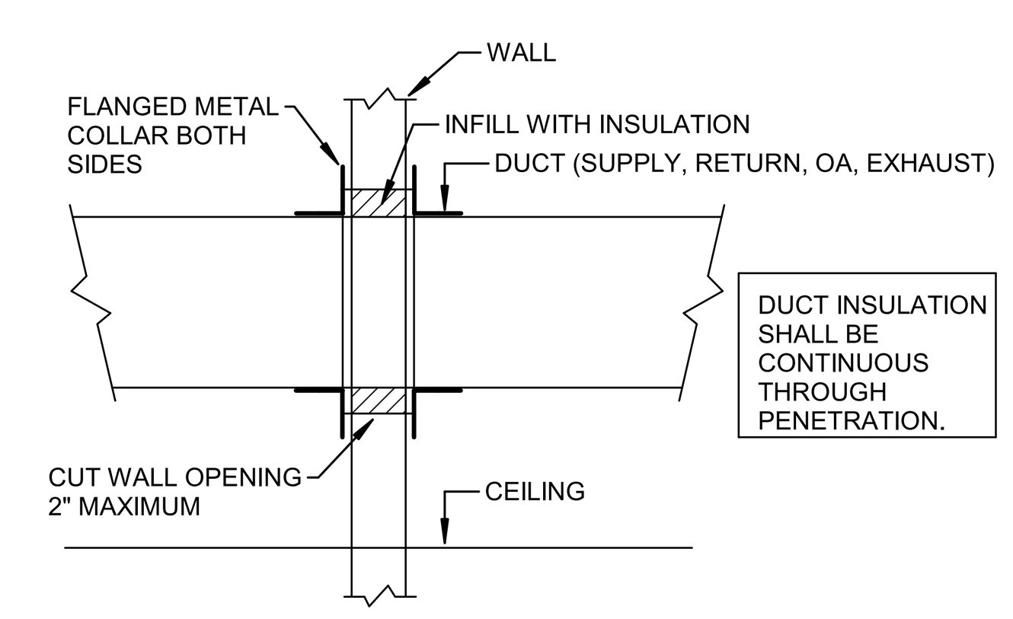
FIRE DAMPER DETAIL
NOT TO SCALE



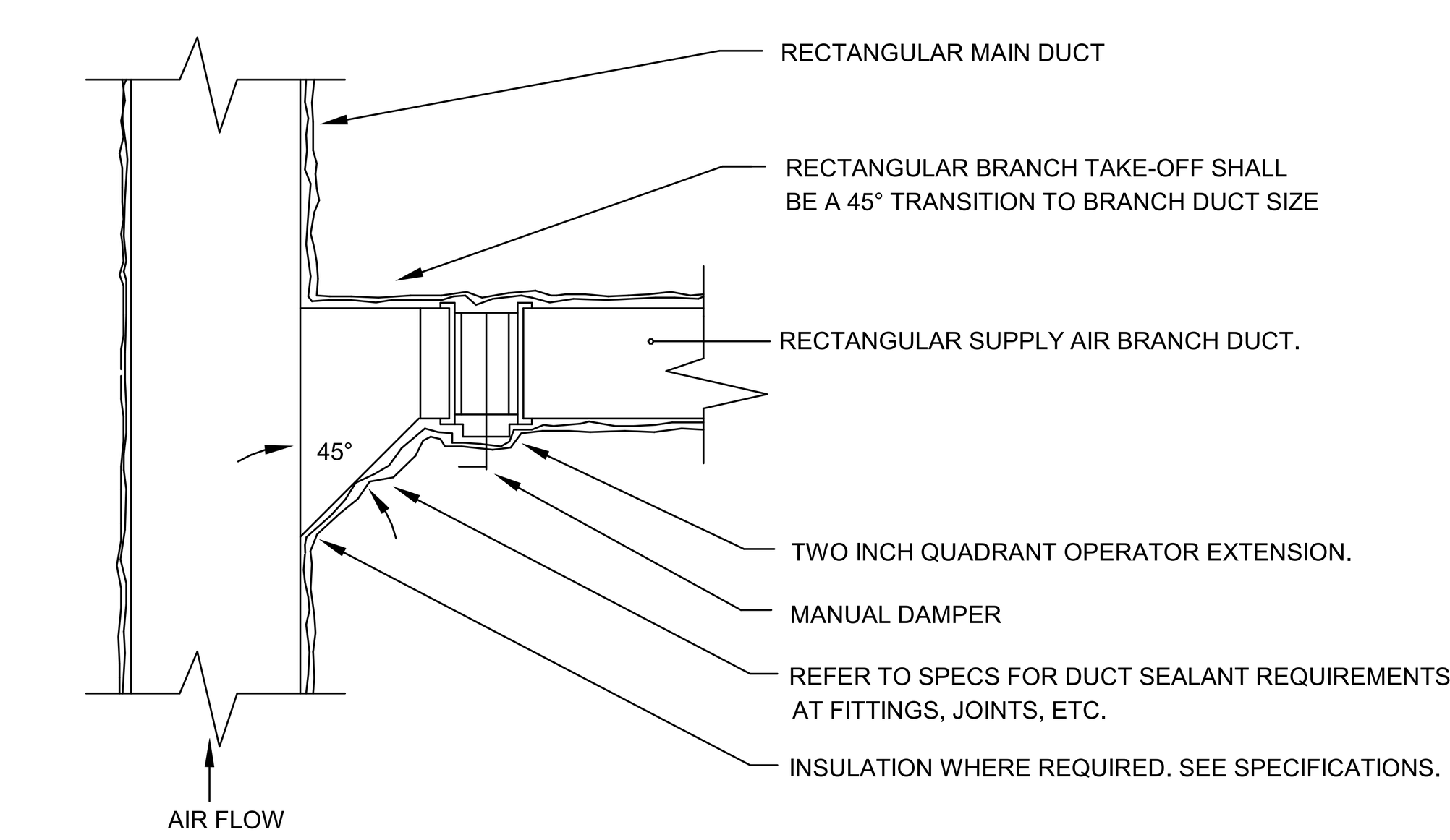
TYPICAL RECTANGULAR-TO-ROUND BRANCH DUCT DETAIL
NTS



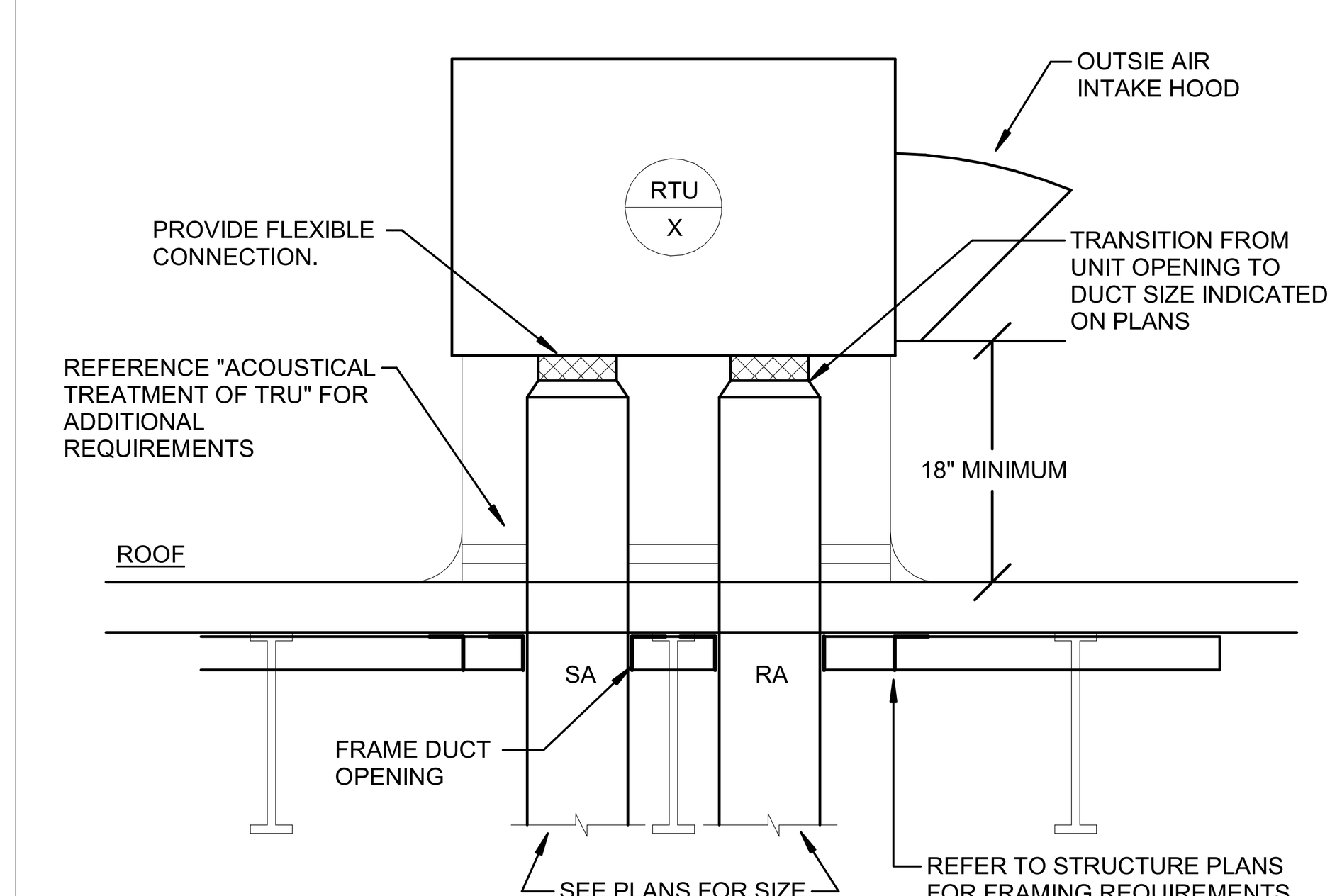
DRYER VENT/ROOF PENETRATION DETAIL
NOT TO SCALE



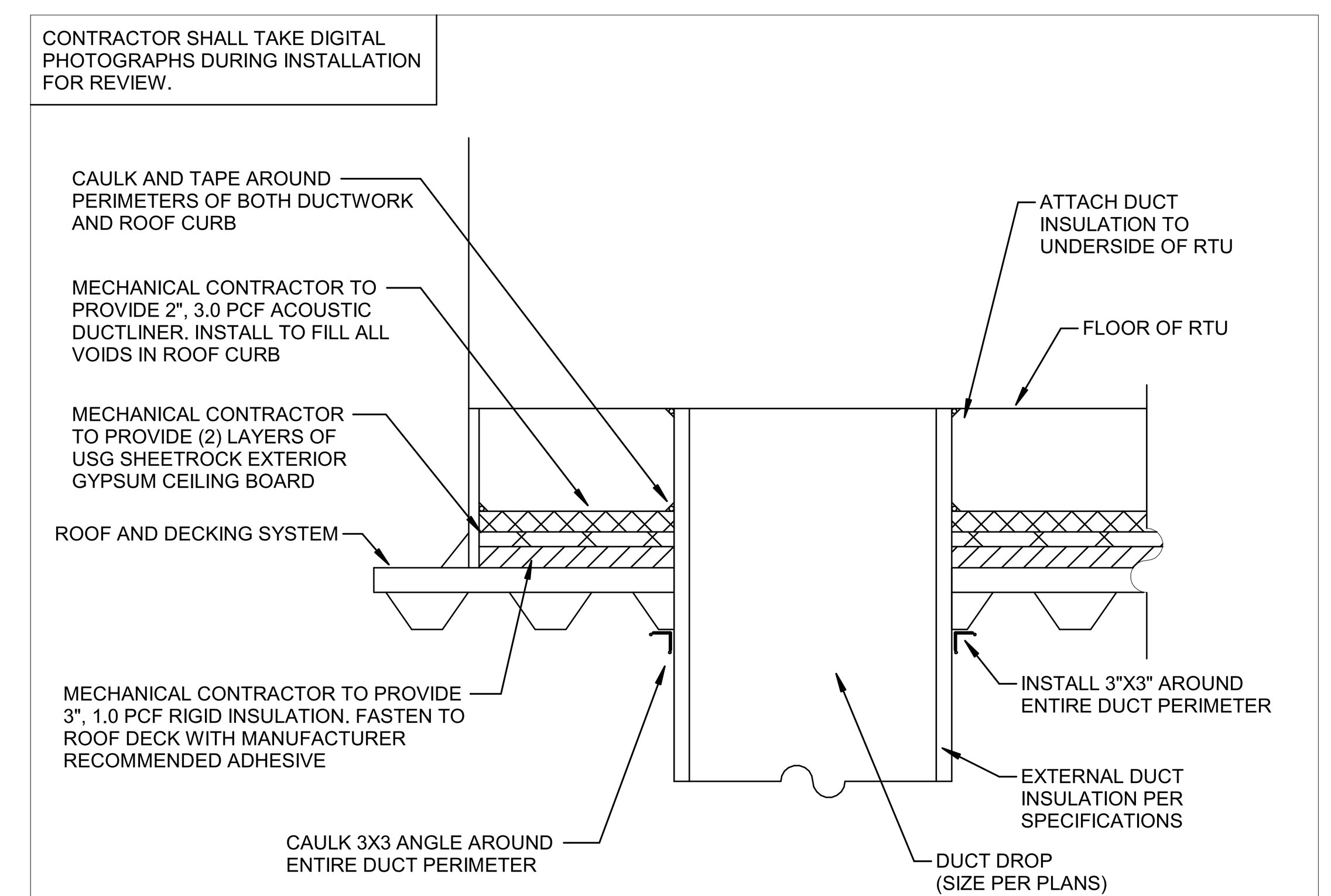
DUCT PENETRATION THROUGH NON-RATED WALL DETAIL
NTS



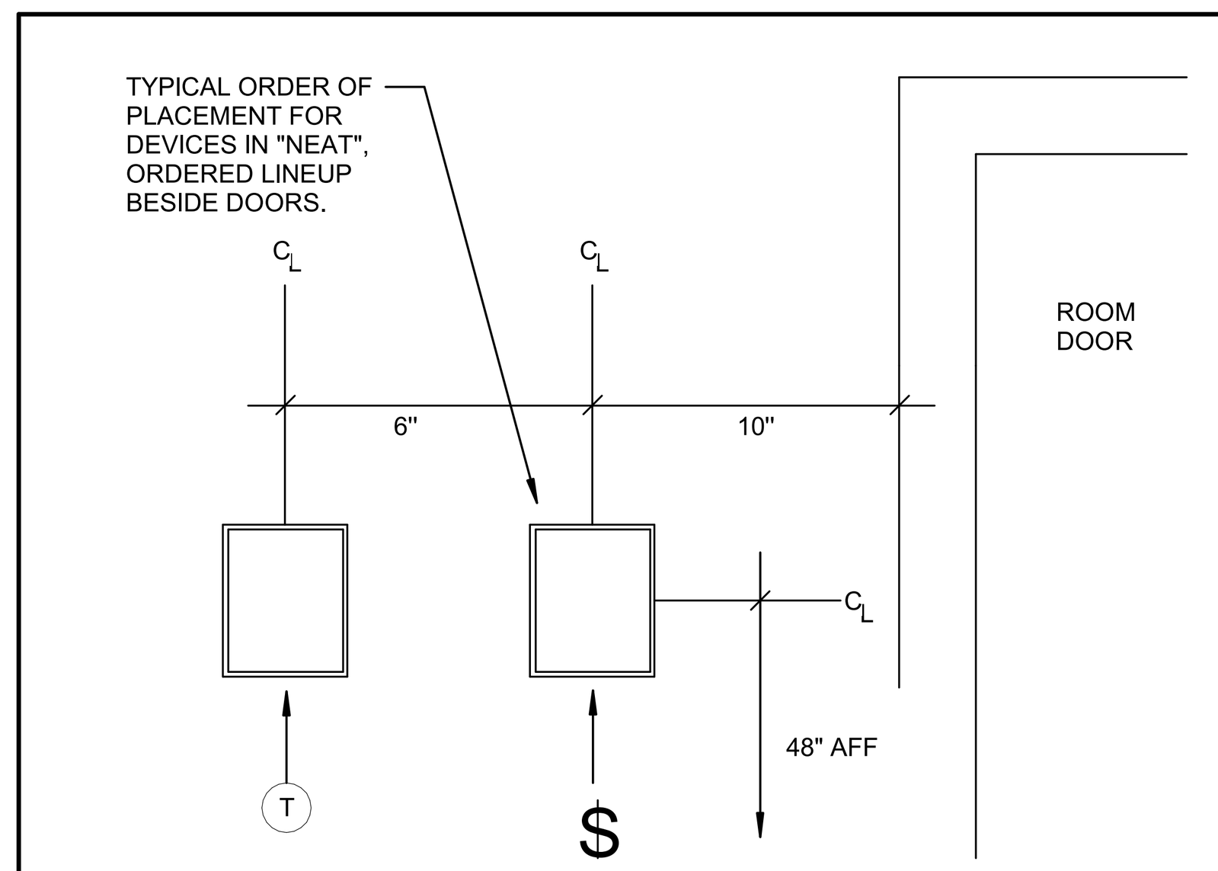
TYPICAL RECTANGULAR SUPPLY, RETURN, & EXHAUST BRANCH DUCT TAKE OFF
NTS



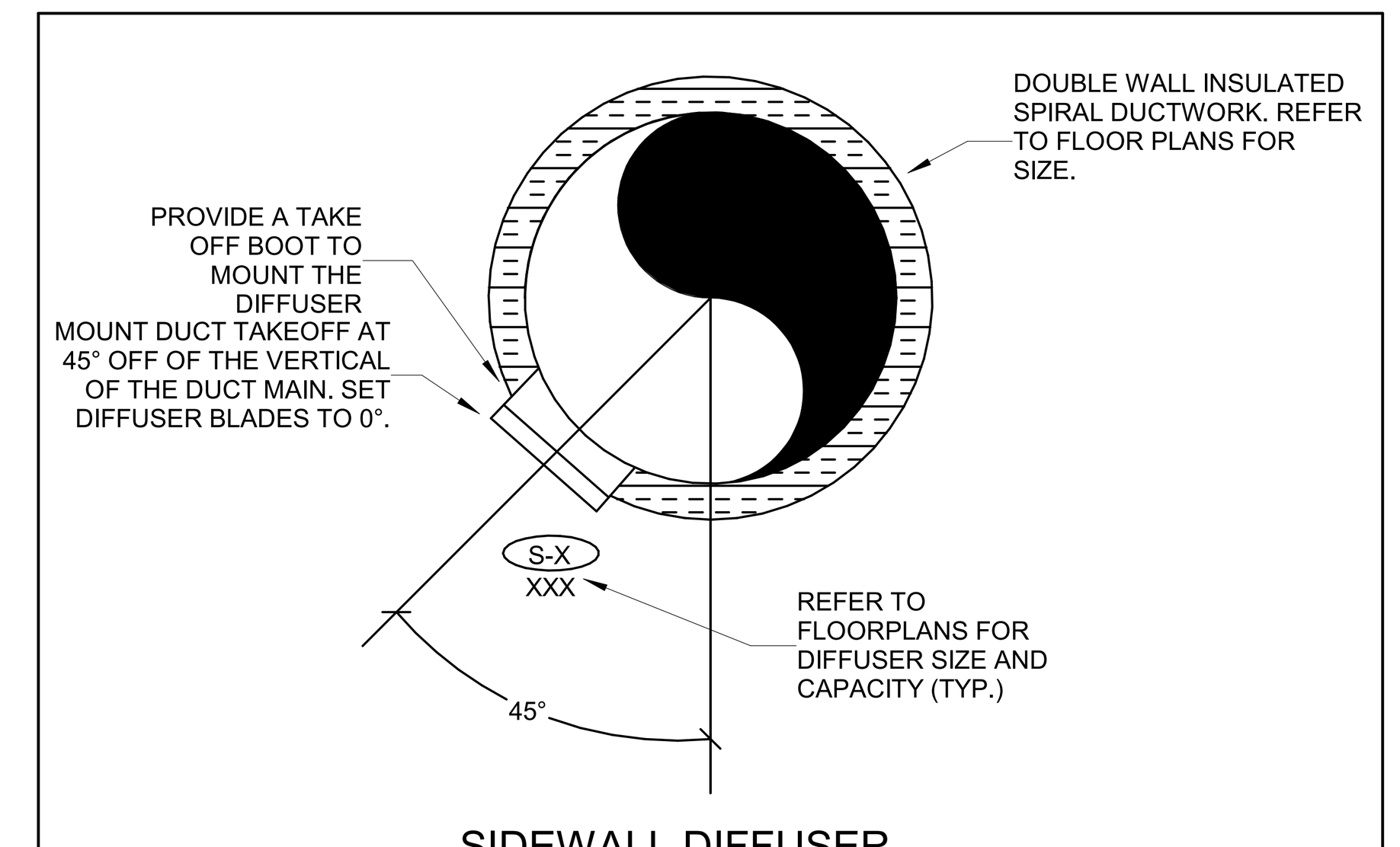
ROOF TOP UNIT INSTALLATION DETAIL
NTS



ACOUSTICAL TREATMENT OF RTU
NTS



THERMOSTAT SENSOR COORDINATION DETAIL
NOT TO SCALE



SIDEWALL DIFFUSER DUCT TAKEOFF DETAIL
NTS

FINAL DOCUMENTS

SHERMAN CARTER BARNHART ARCHITECTS

STATE OF KENTUCKY WILLIAM EPPS, JR. PE-19127 LICENSED PROFESSIONAL ENGINEER

CMTA

PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
PAYNEVILLE, KY

MECHANICAL DETAILS

JOB NO.	1569
DATE	07/10/2019
DRAWN	CAH
CHECKED	JRE

REVISIONS

No.	Description	Date
1	Addendum 1	08.01.19

SHEET
M6.1

1569 PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
M6.1 MECHANICAL DETAILS
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OUTSIDE AIR UNIT SCHEDULE

SYMBOL	OAU-1
MANF & MODEL	TRANE CSAA008
TYPE OF SYSTEM	100% DEDICATED OA SYSTEM
CONFIGURATION	SEE DRAWINGS
DESIGN DIMENSIONS	132"L x 51"W x 42"H
DESIGN WEIGHT	1,655 lbs
REMARKS (SEE NOTES BELOW)	ALL
FAN SECTION	
MAXIMUM CFM	3,500
TYPE / OPERATING RPM	PLENUM / 2,523
TOTAL SP / ESP	2.5" / 1" WG
HP / V / ∅ / Hz	3 / 460 / 3 / 60
DRIVE	DIRECT
FACE DAMPER MAX AIRFLOW / APD	2,100 / 0.044"
BYPASS DAMPER MAX AIRFLOW / APD	1,400 / 0.109"
WATER COIL PERFORMANCE (COOLING)	
TOTAL COOLING CAP. (MBH)	100.4
SENSIBLE COOLING CAP. (MBH)	64.4
MAX. FACE VELOCITY (FT/MIN)	431
TOTAL CFM	2,100
MAX. AIR PRESSURE DROP	0.59" WG
EAT - SUMMER (DB/WB)	82.7°F / 69.6°F
COIL LAT - SUMMER (DB/WB)	55.0°F / 54.7°F
UNIT LAT - SUMMER (DB/WB)	66.1°F / 61.3°F
WATER COIL PERFORMANCE (HEATING)	
TOTAL HEATING CAP. (MBH)	124.4
TOTAL CFM	2,100
MAX. AIR PRESSURE DROP	0.42" WG
ENTERING AIR TEMP	48.2°F / 40.7°F
COIL LEAVING AIR TEMP	102.8°F / 63.6°F
UNIT LEAVING AIR TEMP	81.0°F / 55.7°F
FILTERS	
MANUFACTURER	AAF
MODEL/TYPE	30-30/DISPOSABLE
EFFICIENCY	MERV 8
VELOCITY	315
SIZE (W" x H" x D") / QTY	20x20x2 / 4
RESISTANCE (CL./MEAN.)	0.16"WG/.58"WG
APPROVED MANUFACTURERS	FARR, AFF, AND FLANDERS
UNIT ELECTRIC (SINGLE POINT POWER CONNECTION)	
VOLTS/PH/HZ	460/3/60
FLA/MCA/MOP	5.45 / 6.65 / 15

REMARKS:

1. ENTIRE UNIT SHALL BE DOUBLE WALL CONSTRUCTION.
2. SUPPLY STAINLESS STEEL IAQ CONDENSATE DRAIN PAN. ENTIRE PAN SHALL BE PITCHED TO OUTLET.
3. PROVIDE STAINLESS STEEL DX WATER COIL CASING.
4. PROVIDE ROOF CURB.
5. FUSED DISCONNECT SHALL BE PROVIDED FOR SINGLE POINT POWER CONNECTION.
6. PROVIDE BACNET CARD FOR INTERFACE WITH BAS.
7. ACCEPTABLE MANUFACTURERS: DAIKIN, JCI, MCQUAY, TRANE, CARRIER, INNOVENT, AAON.

HEAT PUMP CHILLER SCHEDULE

GENERAL	
SYMBOL	HPC-1
MANUFACTURER & MODEL	MULTISTACK MR010
SERVICE	OAU-1
DESCRIPTION	WATER SOURCE HEAT PUMP
REFRIGERANT	R-410A
COMPRESSOR	INVERTER SCROLL (2)
COOLING PERFORMANCE	
COOLING CAPACITY (MBH)	135.2
HEAT REJECTION (MBH)	164.3
EER	15.9
SOURCE GPM / WPD (FT)	37.8 / 12.0
SOURCE EWT / LWT (°F)	85 / 93.7
LOAD EWT / LWT (°F)	55 / 45.3
HEATING PERFORMANCE	
HEATING CAPACITY (MBH)	161.0
HEAT ABSORPTION (MBH)	120.1
COP	3.9
SOURCE GPM / WPD (FT)	37.8 / 12.0
SOURCE EWT / LWT (°F)	55 / 49.1
LOAD EWT / LWT (°F)	100 / 111
ELECTRIC	
V / PH / HZ	460 / 3 / 60
MCA / MOP PER MODULE	24 / 35
DISCONNECT WITH SINGLE POINT POWER	YES

REMARKS:

1. ACCEPTABLE MANUFACTURERS: MULTISTACK, ARCTICHILL, CLIMACOOL

EXHAUST FAN SCHEDULE

GENERAL	
SYMBOL	EF-1
MANUFACTURER	GREENHECK
MODEL	SE1-16-436-VG
SERVICE	FIRE PUMP HOUSE
TYPE	WALL MOUNTED
CFM / ESP	800 / .32
FAN BHP / HP	0.14 / 3/4
DRIVE / FAN RPM	DIRECT / 910
VOLTS / PHASE / Hz	115V / 1PH / 60
SONES	13.2
REMARKS	ALL

REMARKS:

1. PROVIDE WITH FACTORY BACKDRAFT DAMPER.
2. PROVIDE WITH FACTORY INSTALLED DISCONNECT SWITCH.
3. PROVIDE WITH OPTIONAL WALL HOUSING.
4. PROVIDE WITH MOTOR COVER.

GEOTHERMAL HEAT PUMP SCHEDULE

GENERAL					
SYMBOL	CHP-18	VHP-24	VHP-36	VHP-90	VHP-120
MANF. & MODEL	TRANE MODEL GECE018	TRANE MODEL DXVF024	TRANE MODEL DXVF036	TRANE MODEL GEVE090	TRANE MODEL GEVE120
BOX TYPE	CONSOLE UNIT	VERTICAL UNIT	VERTICAL UNIT	VERTICAL UNIT	VERTICAL UNIT
NOMINAL CFM/ESP	530 / 0.0"	700 - 950 / 0.7"	1,000 - 1,300 / 0.7"	1,800 - 2,600 / 0.6"	2,600 - 4,000 / 1.0"
# COMPR. / # STAGES	1 / SINGLE STAGE	1 / TWO STAGE	1 / TWO STAGE	2 / TWO STAGE	2 / TWO STAGE
ECM MOTOR	NO	YES	YES	NO	YES
REFRIGERANT	410A	410A	410A	410A	410A
VOLTS/PHASE/HZ	277/1/60	460/3/60	460/3/60	460/3/60	460/3/60
MCA/MOP	10.5 / 15	6.6 / 15	10.6 / 15	17.8 / 20	24.1 / 30
REVERSE CYCLE HEATING CAPACITY -- 70°F EAT - 60°F EWT					
GPM/WPD (FT)	4.5 / 10.6	6.0 / 7.2	9.0 / 6.9	22.5 / 14.5	30 / 15.1
TOTAL HEAT (MBH)	20.5	33.2	50.9	103.2	140.3
HEAT OF ABSORPTION (MBH)	16.2	26.9	40.7	81.9	110.3
COP @ ARI	4.8	5.3	5.1	4.5	4.5
COOLING CAPACITY -- 80°F/67°F EAT - 90°F EWT					
SENSIBLE (MBH)	13.2	20.2	29.6	67.4	92.3
TOTAL (MBH)	16.5	26.2	37.9	89.7	120.0
HEAT OF REJECTION (MBH)	20.5	31.8	46.7	111.3	150.0
EER @ ARI	13.4	17.7	16.6	15.1	14.5

REMARKS:

1. PROVIDE WITH FACTORY START-UP UTILIZING MANUFACTURER'S STANDARD FORMS AND THE FORMS INCLUDED IN SPECIFICATIONS.
2. UNIT SHALL BE ARI STANDARD 330 LISTED.
3. PROVIDE WITH R-410A REFRIGERANT.
4. PROVIDE FACTORY/FIELD CONTROLS, REFER TO SPECIFICATION OF CONTROLS SCOPE OF WORK.
5. HEAT PUMPS CHP-18, VHP-24, AND VHP-36 TO BE PROVIDED WITH INTEGRAL DISCONNECT. IF MANUFACTURER CANNOT ACCOMMODATE, A DISCONNECT SHALL BE PROVIDED AS REQUIRED. OTHER HEAT PUMPS TO HAVE DISCONNECT PROVIDED BY ELECTRICAL CONTRACTOR.
6. PROVIDE HEAT PUMP WITH CONDENSATE OVERFLOW SWITCH.
7. INSTALL DUCT SMOKE DETECTOR, PROVIDED BY ELECTRICAL CONTRACTOR, IN RETURN DUCT OF VHP-080 - VHP-120. COORDINATE LOCATION WITH ELECTRICAL CONTRACTOR.
8. EQUIPMENT VENDOR IS RESPONSIBLE FOR PURCHASE AND INSTALLATION OF BI-POLAR IONIZATION DEVICE ON ALL UNITS. THIS DEVICE SHALL BE PLASMA AIR MODEL BAR-PB FOR VERTICAL UNITS 10 TONS AND LARGER AND MODEL PA-600 FOR ALL OTHERS (OR EQUAL).
9. ACCEPTABLE MANUFACTURERS: TRANE, JCI, DAIKIN, CLIMATEMASTER, FLORIDA HEAT PUMP, WATERFURNACE.

ELECTRIC UNIT HEATER SCHEDULE

GENERAL	
SYMBOL	UH-1
MANUFACTURER	MARKEL
MODEL	3320 SERIES
TYPE	FAN FORCED WALL HEATER
SIZE (WATTS)	3000
VOLTS / PHASE / Hz	277V / 1PH / 60
MCA	10.8
FINISH	--

REMARKS:

1. APPROVED MANUFACTURERS: MARKEL, REZNOR, QMARK
2. WALL HEATER WITH BUILT-IN THERMOSTAT, DISCONNECT SWITCH, THERMAL OVERHEAT PROTECTION, AND RECESSED MOUNTING FRAME.

ENERGY RECOVERY UNITS

SYMBOL	ERV-1	ERV-2
MANF. & MODEL	MICROMETL EVH	LOSSNAY LGH-F300
CONFIGURATION	SEE DRAWINGS	SEE DRAWINGS
V/PHASE/Hz	460/3/60	208/1/60
SINGLE POINT MCA/MOP	9.0A / 15A	1.8A / 15A
FRESH AIR CFM / ESP	3,500 CFM @ 1.0"	300 CFM @ 0.75"
EXHAUST AIR CFM / ESP	3,200 CFM @ 0.75"	250 CFM @ 0.75"
HEATING EFFICIENCY	76% TOTAL	63% TOTAL
COOLING EFFICIENCY	72.8% TOTAL	50% TOTAL
REMARKS	1, 2, 5, 6, 7, 8, 9, 10	1, 2, 3, 4, 5

REMARKS:

1. ACCEPTABLE MANUFACTURERS: MICROMETL, LOSSNAY, RENEWAIRE, FANTECH, GREENHECK
2. PROVIDE WITH SINGLE POINT POWER CONNECTION.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE DISCONNECT SWITCH. REFER TO ELECTRICAL DRAWINGS.
4. PROVIDE ISOLATION DAMPERS IN THE AIR STREAMS.
5. REFER TO DRAWINGS FOR UNIT DUCT CONNECTION ORIENTATIONS.
6. TEMPERED SIDE OF UNIT CASING SHALL BE DOUBLE WALL WITH 1" INSULATION.
7. PROVIDE WITH INSULATED ROOF CURB.
8. PROVIDE WITH OPTIONAL TWO POSITION OA/EA DAMPERS.
9. PROVIDE WITH OPTIONAL DOWN DISCHARGE HOODS.
10. PROVIDE WITH FROST PROTECTION.

INTAKE/RELIEF HOOD SCHEDULE

SYMBOL	IH-1	RH-1	IH-2	RH-2
MANUFACTURER / TYPE	GREENHECK / PENTHOUSE INTAKE	GREENHECK / PENTHOUSE RELIEF	GREENHECK / PENTHOUSE INTAKE	GREENHECK / PENTHOUSE INTAKE
MODEL	WIH-WITH ROOF CURB AND SCREEN	WRH-WITH ROOF CURB AND SCREEN	WIH-WITH ROOF CURB AND SCREEN	WRH-WITH ROOF CURB AND SCREEN
PHYSICAL SIZE	24"X24" NECK 32"X32" HOOD CURB	24"X24" NECK 32"X32" HOOD CURB	32"X32" NECK 40"X40" HOOD CURB	42"X42" NECK 56"X56" HOOD CURB
CFM	2,400 CFM	2,400 CFM	4,000 CFM	8,000 CFM
MAX THROAT VEL / PRESSURE DROP	700 FPM / 0.065"	700 FPM / 0.055"	700 FPM / 0.065"	700 FPM / 0.088"
SERVICE	INTAKE	RELIEF	INTAKE	RELIEF
MOUNTING HEIGHT	PROVIDE ROOF CURB FOR 24" CLEAR	PROVIDE ROOF CURB FOR 24" CLEAR	PROVIDE ROOF CURB FOR 24" CLEAR	PROVIDE ROOF CURB FOR 24" CLEAR

REMARKS:

1. 1/2" MESH SCREEN OVER INLET/RELIEF
2. ALL ALUMINUM CONSTRUCTION
3. ACCEPTABLE MANUFACTURERS: K-TECH, GREENHECK, CAPTIVE-AIRE OR HALTON

REGISTERS, GRILLES, AND DIFFUSERS

SYMBOL	MANUFACTUER & MODEL	MATERIAL & TYPE	CFM RANGE	INLET DUCT SIZE	FACE SIZE	NECK SIZE	REMARKS
S-1	TITUS OMNI AA	EXTRUDED ALUMINUM SQUARE PLAQUE FACE	0-100	6"ø	24X24	6"ø	1, 3, 4
S-2	TITUS OMNI AA	EXTRUDED ALUMINUM SQUARE PLAQUE FACE	101-225	8"ø	24X24	8"ø	1, 3, 4
S-3	TITUS OMNI AA	EXTRUDED ALUMINUM SQUARE PLAQUE FACE	226-375	10"ø	24X24	10"ø	1, 3, 4
S-4	TITUS OMNI AA	EXTRUDED ALUMINUM SQUARE PLAQUE FACE	376-600	12"ø	24X24	12"ø	1, 3, 4
S-5	TITUS 300FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING DOUBLE DEFLECTION	0-200	8X8	10X10	8X8	1, 3
S-6	TITUS 300FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING DOUBLE DEFLECTION	201-600	12X12	14X14	12X12	1, 3
S-7	TITUS OMNI AA	EXTRUDED ALUMINUM SQUARE PLAQUE FACE	0-100	6"ø	12X12	6"ø	1, 3, 4
S-8	TITUS 300RS	STEEL 3/4" BLADE SPACING DOUBLE DEFLECTION GYMNASIUM GRILLE	400-800	18X14	20X16	18X14	1, 3
S-9	TITUS 300RS	STEEL 3/4" BLADE SPACING DOUBLE DEFLECTION GYMNASIUM GRILLE	801-1100	24X12	26X14	24X12	1, 3
R-1	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	0-100	6"ø	24X24	8X8	1, 2, 3
R-2	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	101-225	8"ø	24X24	10X10	1, 2, 3
R-3	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	226-375	10"ø	24X24	12X12	1, 2, 3
R-4 / T-2	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	376-600	12"ø	24X24	14X14	1, 2, 3
R-5	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	601-1000	14"ø	24X24	16X16	1, 2, 3
R-6	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	1001-1500	16"ø	24X24	20X20	1, 2, 3
R-7	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE	1500-2000	22X22	24X24	22X22	1, 2, 3
R-8 / T-1	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	0-600	12X12	14X14	12X12	1, 2, 3
R-9	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	501-900	18X12	20X14	18X12	1, 2, 3
R-10	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	901-1350	18X18	20X20	18X18	1, 2, 3
R-11	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	1351-1750	24X18	26X20	24X18	1, 2, 3
R-12	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	1751-2400	30X24	32X26	30X24	1, 2, 3
R-13	TITUS 33RFL	STEEL 3/8" BLADE SPACING 35 DEGREE DEFLECTION GYMNASIUM GRILLE	2401-5000	36X24	38X26	36X24	1, 2, 3
R-14	TITUS 33RFL	STEEL 3/8" BLADE SPACING 35 DEGREE DEFLECTION GYMNASIUM GRILLE	5001-10000	80X40	82X42	80X40	1, 2, 3
E-1	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE 35 DEGREE DEFLECTION	0-100	6"ø	12X12	8X8	1, 2, 3
E-2	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE 35 DEGREE DEFLECTION	101-225	8"ø	24X24	10X10	1, 2, 3
E-3	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE 35 DEGREE DEFLECTION	226-375	10"ø	24X24	12X12	1, 2, 3
E-4	TITUS 50F	EXTRUDED ALUMINUM FRAME W/ 1/2" CUBE CORE 35 DEGREE DEFLECTION	376-600	12"ø	24X24	14X14	1, 2, 3
E-5	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	501-900	18X12	20X14	18X12	1, 2, 3
E-6	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	0-75	4X6	6X8	4X6	1, 2, 3
E-7	TITUS 350FS	EXTRUDED ALUMINUM 3/4" BLADE SPACING 35 DEGREE DEFLECTION	76-200	8X6	10X8	8X6	1, 2, 3

REMARKS:

1. REFER TO ARCHITECTURAL REFLECTIVE CEILING PLAN FOR AIR DEVICE MOUNTING TYPE. FOR LAY-IN CEILINGS PROVIDE T-BAR MOUNTED AND 24"x24" ALUMINUM FILLER PANELS. FOR DRYWALL, WALL OR DUCT MOUNTED AIR DEVICES PROVIDE APPROPRIATE SURFACE MOUNTING FRAME.
2. PROVIDE SQUARE TO ROUND TRANSITION BOX.
3. COORDINATE COLOR OF AIR DEVICES IN GYMNASIUM AND CAFETERIA WITH ARCHITECT. ALL OTHERS SHALL HAVE A WHITE FINISH.
4. PROVIDE WITH MOLDED INSULATION BLANKET.
5. PROVIDE WITH CUSTOM PLENUM BOX WITH ROUND DUCT INLET.

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M7.0 MECHANICAL SCHEDULES
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SHERMAN CARTER BARNHART ARCHITECTS

FINAL DOCUMENTS

WILLIAM EPPS, JR.
PE-19127

CMTA

PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
PAYNEVILLE, KY

MECHANICAL SCHEDULES

JOB NO.	1569
DATE	07/10/2019
DRAWN	CAH
CHECKED	JRE

REVISIONS

No.	Description	Date
1	Addendum 1	08.01.19

SHEET

M7.0

AIR SEPARATOR SCHEDULE

GENERAL		
SYMBOL	AS-1	AS-2
MANUF. & MODEL	BELL & GOSSETT RL-6F	BELL & GOSSETT RL-2N
SERVICE	PRIMARY GEO LOOP	CHILLED WATER LOOP
GPM	365	30
HEAD LOSS	0.91 FT	1.0 FT
MAX TEMPERATURE	350 F	350 F
MAX PRESSURE	125 PSI	125 PSI
ASME CERTIFIED	YES	YES

REMARKS:
1. ACCEPTABLE MANUFACTURER'S: TACO, BELL AND GOSSETT, ARMSTRONG

EXPANSION TANK SCHEDULE

GENERAL		
SYMBOL	ET-1	ET-2
MANUF. & MODEL	BELL & GOSSETT D-280V	BELL & GOSSETT D-40V
SERVICE	PRIMARY GEO LOOP	CHILLED WATER LOOP
TANK VOLUME	211 GAL	21.7 GAL
ACCEPTANCE VOLUME	84 GAL	11.3 GAL
ORIENTATION	VERTICAL	VERTICAL
TYPE	DIAPHRAGM	DIAPHRAGM
MAX TEMPERATURE	240 F	240 F
MAX PRESSURE	125 PSI	125 PSI
AIR PRESSURE CHARGE	15 PSI	15 PSI
ASME RATED	YES	YES

REMARKS:
1. ACCEPTABLE MANUFACTURER'S: TACO, BELL AND GOSSETT, ARMSTRONG

HYDRONIC PUMP SCHEDULE

GENERAL			
SYMBOL	P-1A/1B	P-2	P-3
MANUF. & MODEL	BELL & GOSSETT E-1510 3BD	BELL & GOSSETT E-80 2X2X9.5C SENSORLESS ITSC OPTION	BELL & GOSSETT E-90 1AAB
SERVICE	PRIMARY GEO LOOP	LOW-FLOW GEO LOOP	CHILLED WATER LOOP
GPM	365	100	30
HEAD (FT)	55	55	35
VFD	YES	YES	NO
HP	10	3	1
MIN. EFFICIENCY (%)	81	55	55
RPM	1622	1750	3450
IMPELLER	8.5	7.875	3.25
VOLTS / PHASE / HZ	460 / 3 / 60	208 / 3 / 60	208 / 3 / 60
REMARKS	1, 2, 3, 4	2, 3, 4	2, 3, 4

REMARKS:
1. PROVIDE PUMPS WITH MANUFACTURER'S PUMP STAND ON EXISTING CONCRETE PAD.
2. PUMP SHALL NOT USE MORE THAN 90% OF FULL IMPELLER.
3. LESS EFFICIENT EQUIPMENT WILL NOT BE ACCEPTED.
4. ACCEPTABLE MANUFACTURER'S: TACO, BELL AND GOSSETT, ARMSTRONG

VARIABLE FREQUENCY DRIVE SCHEDULE

GENERAL		
SYMBOL	VFD-1A	VFD-1B
MANUF. & MODEL	ABB ACH550	ABB ACH550
SERVICE	P-1A	P-1B
MOTOR HP	10	10
VOLTS / PH / HZ	460 V / 3 / 60	460 V / 3 / 60
FUSED DISCONNECT AND NEMA 12 ENCLOSURE	YES	YES
BYPASS STARTER	YES	YES

REMARKS:

1. THE VFD SHALL INCLUDE A COMMUNICATIONS PORT FOR BACNET COMPATIBLE PROTOCOL. COORDINATE WITH THE TCC. PROVIDE INPUT POINTS FOR TWO PRESET SPEEDS. PROVIDE TWO PROGRAMMABLE FORM C RELAYS RATED FOR 2 AMPS TO ACTIVATE AT SPEED.
2. PROVIDE VFD EQUIPPED MOTORS WITH SHAFT GROUNDING RINGS.
3. PROVIDE ALL VFDS WITH A LAMICOID PLATE INDICATING ID#, HP, AND EQUIPMENT SERVED. INCLUDE VFD SPEED FOR REQUIRED FLOW ONPUMP VFDS AND VFD SPEED FOR REQUIRED AIRFLOW ON AHU VFDS.
4. PROVIDE NEMA 12 ENCLOSURE AND BACNET MS/TP PROTOCOL.
5. ACCEPTABLE MANUFACTURERS: ABB, SQUARE D, DANFOSS, YASKAWA

VARIABLE REFRIGERANT HEAT PUMP UNIT SCHEDULE

GENERAL				
SYMBOL	AC-1	AC-2	AC-3	AC-4
MANUFACTURER & MODEL	TRANE PLFY-P05NFMU-E	TRANE PLFY-P08NFMU-E	TRANE PLFY-P12NFMU-E	TRANE PLFY-P15NFMU-E
SERVICE	ADMIN VRF	ADMIN VRF	ADMIN VRF	ADMIN VRF
DESCRIPTION	CEILING CASSETTE	CEILING CASSETTE	CEILING CASSETTE	CEILING CASSETTE
REFRIGERANT	R-410A	R-410A	R-410A	R-410A
PERFORMANCE				
COOLING CAPACITY (MBH)	5.0	8.0	12.0	15.0
HEATING CAPACITY (MBH)	5.6	9.0	13.5	17.0
AIRFLOW	230-265-280	230-280-315	245-280-335	265-315-390
ELECTRIC				
V / PH / HZ	208 / 1 / 60	208 / 1 / 60	208 / 1 / 60	208 / 1 / 60
MCA / FUSE	0.24 / 15	0.28 / 15	0.29 / 15	0.35 / 15

REMARKS:
1. ACCEPTABLE MANUFACTURERS: DAIKIN, LG OR TRANE

VARIABLE REFRIGERANT HEAT PUMP CONDENSER

GENERAL	
SYMBOL	VRC-1
MANUFACTURER & MODEL	TRANE PQRY-P72YLMU-A1
SERVICE	ADMINISTRATION VRF
DESCRIPTION	6 TON WATER-COOLED CONDENSING UNIT
REFRIGERANT	R-410A
COMPRESSOR	INVERTER SCROLL HERMETIC COMPRESSOR
COOLING PERFORMANCE	
COOLING CAPACITY (MBH)	72.0
EER	16.7
SOURCE GPM / WPD (FT)	25.4 / 8.0
SOURCE EWT / LWT (°F)	85 / 97.1
HEATING PERFORMANCE	
HEATING CAPACITY (MBH)	80.0
COP	5.51
SOURCE GPM / WPD (FT)	25.4 / 8.0
SOURCE EWT / LWT (°F)	45 / 35.9
ELECTRIC	
V / PH / HZ	460 / 3 / 60
MCA / MOP	6 / 15
DISCONNECT WITH SINGLE POINT POWER	YES

REMARKS:
1. ACCEPTABLE MANUFACTURERS: DAIKIN, LG OR TRANE

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SHERMAN CARTER BARNHART ARCHITECTS

FINAL DOCUMENTS

STATE OF KENTUCKY
WILLIAM EPPS, JR.
PE-19127
PROFESSIONAL ENGINEER

CMTA

PAYNEVILLE ELEMENTARY SCHOOL RENOVATION AND ADDITION
PAYNEVILLE, KY

MECHANICAL SCHEDULES

JOB NO.	1569
DATE	07/10/2019
DRAWN	CAH
CHECKED	JRE

REVISIONS

No.	Description	Date
1	Addendum 1	08.01.19

SHEET
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