MORE THAN ARCHITECTS

ADDENDUM

NO. 2

TO THE DRAWINGS AND THE PROJECT MANUAL

PROJECT NAME: Jarrell Middle School Addition and Renovations

CLIENT NAME: Jarrell Independent School District

LOCATION: Jarrell, Texas

PROJECT NUMBER: 01756-02-01

PROPOSAL DATE: 13, September 2018, 2:00 PM

ADDENDUM DATE: 4, September 2018

09/04/2018

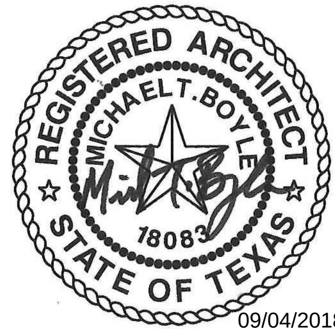
For additional information regarding this project, contact Mike Boyle at 512-387-3413

THIS ADDENDUM INCLUDES:

Architectural Items	33 Pages
Mechanical	1 Page
Electrical	2 Pages
Plumbing	2 Pages

AND ALL ATTACHED REVISED DRAWING REFERENCES IN THE ADDENDUM

Project Name: Jarrell Middle School Addition and Renovations
Client: Jarrell ISD
Jarrell, Texas
Project Number: 01756-02-01



09/04/2018

ARCHITECTURAL ITEMS FOR ADDENDUM NO. 2

NOTICE TO PROPOSERS:

A. This Addendum shall be considered part of the contract documents for the above-mentioned project as though it had been issued at the same time and incorporated integrally therewith. Where provisions of the following supplementary data differ from those of the original contract documents, this Addendum shall govern and take precedence.

B. Proposers are hereby notified that they shall make any necessary adjustments in their estimate on account of this Addendum. It will be construed that each Proposer's proposal is submitted with full knowledge of all modifications and supplemental data specified therein. Acknowledge receipt of this addendum in the space provided on the proposal form. Failure to do so may subject Proposer to disqualification.

REFERENCE IS MADE TO THE DRAWINGS AND THE PROJECT MANUAL AS NOTED:

PROJECT MANUAL:

AD No 1, Arch. Item 1: **00 2116 Instruction to Proposers**

1. Change bid date to September 13, 2018.

AD No 1, Arch. Item 2: **00 2216 Supplementary Instructions to Proposers**

1. Change bid date to September 13, 2018.

AD No 1, Arch. Item 3: **00 3132 Geotechnical Data**

1. Add this section in its entirety, including adding it to the Table of Contents.

BIDDER QUESTIONS (NOT OTHERWISE ANSWERED IN THE BODY OF THIS ADDENDUM):

AD No 1, Arch. Item 4: **Tiling**

Question: What type of cap do you want in the Hallways? Bullnose or a Schluter**?** RR's show bullnose. Also at outside corners what do they want Schluter or bullnose? Need some clarification on alternate finish notes on A4.1.

Answer: Refer to Specification Section 09 3000 Tiling, Paragraph 2.2. Contractor has the option of providing bullnose at open edges (including top cap) as indicated in subparagraph A or brushed stainless steel trim as indicated in subparagraph B. Outside corners shall comply with 2.2.B.1.a. Delete Alternate Finish Notes – they do not apply.

END OF ARCHITECTURAL ADDENDUM

SECTION 00 3132

GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Related Documents: General and Supplementary Conditions of the Contract, Division 01 General Requirements, and Drawings are applicable to this Section.

1.02 INVESTIGATION

A. An investigation of subsurface soil conditions at the building site was authorized bv Owner. and these investigations were made by Alpha Testing, Inc., report number A182085, dated September 4, 2018.

1.03 REPORT

A. The complete report of the testing laboratory follows this section and is provided for information only.

B. Report and log of borings are available for Contractor's information but is not a warranty of subsurface conditions, nor is it a part of the Contract Documents.

1.04 RESPONSIBILITY

A. Bidders are expected to examine the site and subsurface investigation reports and then decide for themselves the character of the materials to be encountered.

B. The Owner and Architect assume no responsibility for variations of subsoil quality or conditions.

C. The Owner and the Architect assume no responsibility for any conclusions or interpretations made on the basis of subsurface information contained in the contract documents.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

GEOTECHNICAL EXPLORATION

JARRELL MIDDLE SCHOOL ADDITIONS
101 East Avenue F
Jarrell, Texas
ALPHA Report No. A182085
September 4, 2018

Prepared for:

JARRELL INDEPENDENT SCHOOL DISTRICT
P.O. Box 9
Jarrell, Texas76537
Attention: Dr. Bill Chapman

Prepared By:

ALPHA TESTING
WHERE IT ALL BEGINS

ALPHA TESTING
WHERE IT ALL BEGINS

Geotechnical
Construction Materials
Environmental
TBPE Firm No. 813

4740 Perrin Creek, Suite 480
San Antonio, Texas78217

Tel: 210-249-2100
Fax: 210-249-2101
www.alphatesting.com

September 4, 2018

Jarrell Independent School District
P.O. Box 9
Jarrell, Texas 76537

Attention: Dr. Bill Chapman

Re: Geotechnical Exploration
Jarrell Middle School Additions
101 East Avenue F
Jarrell, Texas
ALPHA Report No. A182085

Attached is the report of the geotechnical exploration performed for the project referenced above. This study was authorized by Dr. Bill Chapman with Jarrell Independent School District on July 30, 2018 and performed in accordance with ALPHA Proposal No. 60638-R2 dated July 27, 2018.

This report contains results of field explorations and laboratory testing and an engineering interpretation of these with respect to available project characteristics. The results and analyses were used to develop recommendations to aid design and construction of foundations and pavements.

ALPHA TESTING, INC. appreciates the opportunity to be of service on this project. If we can be of further assistance, such as providing materials testing services during construction, please contact our office.

Sincerely,

ALPHA TESTING, INC.

STATE OF TEXAS
ADAM J. HEIMAN
106047
LICENSED
PROFESSIONAL ENGINEER
9/4/18

Adam J. Heiman, P.E.
Geotechnical Department Manager

Theodore A. (Tony) Janish, P.E.
Principal

CJD/AJH/TAJ
Copy: Jarrell ISD; Bill Chapman (bill.chapman@jarrellisd.org); via email
Jarrell ISD; Andy Pogue (andy.pogue@jarrellisd.org); via email
Huckabee; Mike Boyle, A.I.A. (mboyle@huckabee-inc.com); via email
Huckabee; Craig McKee, P.E. (cmckee@huckabee-inc.com); via email

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ALPHA REPORT NO. A182085

1.0 PURPOSE AND SCOPE

The purpose of this geotechnical exploration is for ALPHA TESTING, INC. (ALPHA) to evaluate for the JARRELL ISD (Client) some of the physical and engineering properties of subsurface materials at selected locations on the subject site with respect to formulation of appropriate geotechnical design parameters for the proposed construction. The field exploration was accomplished by securing subsurface samples from widely spaced test borings performed across the expanse of the site. Engineering analyses were performed from results of the field exploration and results of laboratory tests performed on representative samples.

Also included are general comments pertaining to reasonably anticipated construction problems and recommendations concerning earthwork and quality control testing during construction. This information can be used to evaluate subsurface conditions and to aid in ascertaining construction meets project specifications.

Recommendations provided in this report were developed from information obtained in test borings depicting subsurface conditions only at the specific boring locations and at the particular time designated on the logs. Subsurface conditions at other locations may differ from those observed at the boring locations, and subsurface conditions at boring locations may vary at different times of the year. The scope of work may not fully define the variability of subsurface materials and conditions that are present on the site.

The nature and extent of variations between borings may not become evident until construction. If significant variations then appear evident, our office should be contacted to re-evaluate our recommendations after performing on-site observations and possibly other tests.

2.0 PROJECT CHARACTERISTICS

It is proposed to construct new additions to the Jarrell Middle School campus located at 101 East Avenue F in Jarrell, Texas. A site plan illustrating the general outline of the property is provided as Figure 1, Boring Location Plan, in the Appendix of this report. According to the grading plan provided to us by the client, the area of the addition is generally sloping down toward the east with a maximum change in elevation of about 10 ft (Elevations 890 to 880). The Finished Floor Elevation (FFE) for the north part of the addition is FFE = 891.20 ft and for the south part of the addition is FFE = 889.60 ft. Based on this grading information, it appears that fills up to about 9 ft will be required to establish the FFE of the building addition.

The new addition will include a single-story building addition with maximum column loads of 300 kips, and a maximum upward load of 100 kips with a minimum assumed pier diameter of 18 inches and a maximum assumed pier diameter of 30 inches. We anticipate that both deep and shallow foundation systems will be considered to support the proposed structures at this site. No new pavements are planned at this time.

3.0 FIELD EXPLORATION

Subsurface conditions on the site were explored by drilling a total of three (3) borings in general accordance with ASTM D 420 using standard rotary drilling equipment. The corresponding location of each boring is provided in Table A.

TABLE A		
Locations	**Boring No.**	**Boring Depth, ft**
Building Addition Area	B-1 to B-3	40

The approximate location of each boring is shown on the Boring Location Plan, Figure 1, enclosed in the Appendix of this report. Details of drilling and sampling operations are briefly summarized in Methods of Field Exploration, Section A-1 of the Appendix.

Subsurface types encountered during the field exploration are presented on the boring logs included in the Appendix of this report. The boring logs contain our Field Technician's and Engineer's interpretation of conditions believed to exist between actual samples retrieved. Therefore, these boring logs contain both factual and interpretive information. Lines delineating subsurface strata on the boring logs are approximate and the actual transition between strata may be gradual.

4.0 LABORATORY TESTS

Selected samples of the subsurface materials were tested in the laboratory to evaluate their engineering properties as a basis in providing recommendations for foundation design and earthwork construction. A brief description of testing procedures used in the laboratory can be found in Methods of Laboratory Testing, Section B-1 of the Appendix. Individual test results are presented on Log of Boring sheets enclosed in the Appendix.

5.0 GENERAL SUBSURFACE CONDITIONS

The Geologic Map of Texas, published by the University of Texas at Austin, Bureau of Economic Geology, has mapped the Austin Chalk (Kau) formation in the general area of the project site. The Austin Chalk (Kau) formation generally consists of clay, chalk, marl, and limestone. Although not common, Karst features such as caves, sinkholes, solution zones and collapse breccia may be encountered in the Austin Chalk Formation. No Karst features were encountered in the borings drilled at this site.

Within the 40-ft maximum depth explored on the site, subsurface materials consist generally of moderate to very high plasticity FILL: FAT CLAY with SAND (CH), FILL: LEAN CLAY with SAND (CL), FAT CLAY with SAND (CH), and CLAYEY SAND (SC), overlying MARL (rock). Fill material was encountered up to 5 ft below the existing ground surface in Boring B-3. Marl was encountered at depths ranging from 5 to 9 ft at the boring locations. The letters in parenthesis represent the soils' classification according to the Unified Soil Classification System (ASTM D 2488). More detailed stratigraphic information is presented on the boring logs attached to this report.

Marl is defined in ASTM D 653-90 Standard Terminology Relating to Soil, Rock and Contained Fluids as "calcareous clay usually containing from 35 to 65 percent calcium carbonate." The calcium carbonate is an indication of a cemented matrix of sand, silt or clay. When submerged in water, marl will begin to slake. *Note*: *However, when being excavated or drilled this material typically behaves more like a rock than soil thereby requiring construction equipment and procedures typically used for rock.* ***The contractor selected should have experience with excavation and drilling in this marl/rock***.

The clayey materials and marl encountered are considered relatively impermeable and are anticipated to have a relatively slow response to water movement. The granular materials encountered are considered relatively permeable and are anticipated to have a relatively fast response to water movement. Therefore, several days of observation would be required to evaluate actual groundwater levels within the depths explored. Also, the groundwater level at the site is anticipated to fluctuate seasonally depending on the amount of rainfall, prevailing weather conditions and subsurface drainage characteristics.

Groundwater was not encountered during drilling at this site. However, it is common to detect seasonal groundwater from natural fractures within the clayey matrix, in the granular materials, and at the soil/rock (marl) interface, particularly during or after periods of precipitation. If more detailed groundwater information is required, monitoring wells or piezometers can be installed. Further details concerning subsurface materials and conditions encountered can be obtained from the boring logs provided in the Appendix.

6.0 DESIGN RECOMMENDATIONS

The following design recommendations were developed on the basis of the previously described Project Characteristics (Section 2.0) and General Subsurface Conditions (Section 5.0). If project criteria should change, our office should conduct a review to determine if modifications to the recommendations are required. Further, it is recommended our office be provided with a copy of the final plans and specifications for our review prior to construction.

6.1 General Considerations

The foundation system being considered to provide support for the proposed structures must satisfy two independent engineering criteria. One criterion is the foundation system must be designed with an appropriate factor of safety, or a performance limit state, to reduce the possibility of soil failure when subjected to axial and lateral load conditions. The other criterion is foundation movements, whether vertical, horizontal or rotational, must be within allowable operational limits of the structures. These criteria can be achieved for the planned structure foundations if they are designed and constructed in accordance with the recommendations contained in this report.

We understand an addition will be constructed to the existing building. Differential movements can occur between the existing foundations and the proposed addition, particularly if the new and existing structures are on differing foundation types. If possible, methods should be implemented to allow for possible differential movement between the foundation system of the existing foundation and the new addition. Further, preventative measures should be taken to avoid damaging or adversely affecting the integrity of the existing foundation system during construction activities. The risks associated with dissimilar performances between the addition and existing structure may be reduced by the following:

- Include flexible connections between the addition and existing foundation/slab to prevent differential vertical movements across the joint

- Construct an expansion joint between the new and existing structure to allow for differential horizontal movement between the addition and existing structure

Excavating adjacent to the existing foundation system should be performed with care. Excavations adjacent to the existing structure could cause the foundation to become undermined and the foundation could suffer damage. We recommend the contractor monitor the existing foundations carefully during construction and be prepared to brace the existing foundations if necessary. All excavation should conform to OSHA requirements.

Design criteria given in this report were developed assuming the floor slab of the building is constructed at the FFEs provided on the grading plan. Substantial cutting and filling on the site can alter the recommended foundation design parameters. Therefore, it is recommended ALPHA be contacted before performing other cutting and filling on site to verify the appropriate design parameters are utilized for final foundation design.

6.1.1 Existing Fill

As stated in Section 5.0, existing fill was encountered to a depth up to 5 ft below the existing ground surface at this site at one of the boring locations. Such fill may also exist away from the boring locations to greater or lesser depths. We anticipate the fill was placed during initial development of the site and was tested by others. Evaluation of the consistency and compaction of the existing fill are considered beyond the scope of this study. The following recommendations are predicated upon our understanding that the existing fill encountered on the site meets or exceeds the recommendations contained in Section 7.3 of this report. *Note: It is recommended the Client obtain written confirmation from a Professional Engineer that the existing fill was tested upon placement and has been adequately compacted. If the fill material was not placed under engineering supervision, ALPHA should be contacted to reevaluate our recommendations*

6.1.2 Vertical Movements

Expansive soils are present at this site. This report provides recommendations to reduce the effects of soil shrinkage and expansion. However, even if these recommendations are followed, some movement and cracking in the structures should be anticipated. The severity of cracking and other damage such as uneven floor slabs will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils.

Grade supported structures at this site (including foundations) could experience soil-related potential seasonal movement (i.e. PVR) up to 4 inches if supported at existing grade and up to 6 inches if the high PI on-site soil is used to raise grade in the building area. This potential seasonal movement was estimated in general accordance with methods outlined by the Texas Department of Transportation (TxDOT) Test Method Tex-124-E, engineering judgment, and experience. The estimated movement was calculated assuming the moisture content of the in-situ soil within the normal zone of seasonal moisture content change varies between a "dry" condition and a "wet" condition as defined by Tex-124-E. Also, it was assumed a 1 psi surcharge load from the floor slab acts on the subgrade soils.

Movements exceeding those predicted above could occur if positive drainage of surface water is not maintained or if soils are subject to an outside water source, such as leakage from a utility line or subsurface moisture migration from off-site locations. However, soil movements may be reduced by implementing the subgrade improvement recommendations presented below, in Section 6.2 of this report.

6.1.3 Foundation Considerations

We understand that a deep foundation system or a shallow foundation system will support the structural loads for the proposed building addition at this site. The deep foundation system should consist of drilled piers and a shallow foundation system should consist of spread and continuous footings. Recommendations for these types of foundation systems are provided in the following sections.

6.2 Subgrade Preparation for Floor Slabs On-Grade and Shallow Foundations

As discussed, floor slabs constructed at the FFEs provided on the grading plan could experience soil-related potential seasonal movement up to 6 inches. Potential seasonal movements can be reduced to about ½ inch by properly preparing the building pad as recommended below:

Over-excavate all of the existing surface dark brown expansive soils and fill material in the building area to expose native clayey sand or marl. *Note: Based on our boring logs, this over-excavation should range from about ½ to 5 ft deep from existing grade; however, the contractor should over-excavate all dark brown clay and fill material present above the underlying tan clayey sand or marl.* The building area is defined as the area directly beneath and at least 5 ft (horizontal) beyond the perimeter of the proposed buildings and appurtenances. Appurtenances are those items attached to the buildings, typically including, but not limited to, the building sidewalks, porches, ramps, stoops, etc. *Note: The dark brown clay and existing fill material can be used in landscape areas at this site, but should not be used as fill in the building area.*

After over-excavating all of the dark brown clays and fill material, the building pad can be completed by placing and compacting granular select fill and/or flexible base to the bottom of the floor slab in the building area. Criteria for granular select fill and flexible base are provided in Section 7.3 of this report.

Based on the grading plan, up to 9 ft of fill will be required to achieve the building's FFE from existing grade and up to about 14 ft of fill material will be required to achieve the building's FFE after the over-excavation of dark brown clay and fill material. All fill in the building area that is below a depth of 10 ft below final building pad grade should consist of flexible base material, placed and compacted as described in Section 7.3 below. The remaining fill in the building area used to establish finished grades should consist of granular select fill and/or flexible base and should be compacted to at least 98 percent of modified Proctor maximum dry density (ASTM D 1557). Some differential movements in the slab could occur between areas with deep fills and areas with less fill. This should be taken into consideration during design.

Subgrade improvements discussed above are not required if the floor slab is suspended above the existing expansive soils on drilled pier foundations.

6.3 Deep Foundations (Drilled Piers)

Straight shaft drilled piers bearing in marl are recommended to support the structural loads for the proposed building addition. Recommendations for straight-sided pier foundation systems are provided in the following sections.

6.3.1 Axial Loading

Our findings indicate the structural loads of the proposed building addition could be supported using a system of drilled straight-sided piers bearing at least 20 ft below existing grade and at least 5 ft into the marl stratum. The marl stratum was encountered at depths of about 5 to 9 ft below the ground surface at the boring locations. Based on the proposed grading, these depths correspond to about 11 to 14 ft below the final building pad grade. Straight-shaft drilled piers in marl can be designed based on the following parameters provided in Table B.

TABLE B
DRILLED STRAIGHT-SHAFTPIERS
ALLOWABLE END BEARING AND SKIN FRICTION VALUES

Embedment Depth in Marl, ft	Allowable End Bearing, psf	Allowable Skin Friction, psf for Compressive Load	Allowable Skin Friction, psf for Uplift Load
0 to 5	Neglect	1,000	1,000
5 to 15	25,000	3,500	3,000
Below 15	35,000	4,500	4,000

The above bearing capacities contain a factor of safety of at least three (3) considering a general bearing capacity failure; and the skin friction and uplift resistance values have a factor of safety of at least two (2). Normal elastic settlement of piers under loading is estimated at less than about 1 inch. The allowable end bearing and skin friction values are based on center-to-center spacing of the pier foundations no closer than a horizontal distance of three (3) pier diameters (using the largest pier diameter).

Although not encountered at the boring locations, the Austin Chalk geologic formation in this area is known to contain possible voids in the marl (karst features). Pilot holes are recommended for piers designed for end bearing (see Section 6.3.5 for more information). In addition, if a void is encountered, side shear should also be neglected for the section of pier shaft that extends from 1½ ft above to 1½ ft below the karst feature. ALPHA should be contacted to evaluate karst features encountered in the pier excavations.

Uplift Force – Each pier shaft should be reinforced with suitable tension steel over its entire length and should be embedded a sufficient distance into the marl bearing stratum to adequately resist potential uplift (tensile) forces due to potential soil swell (soil-to-pier adhesion) along the shaft, from post construction heave and other uplift forces applied by structural loadings. The magnitude of uplift adhesion due to soil swell along the pier shaft cannot be defined accurately and can vary according to the actual in-place moisture content of the soils during construction. It is estimated this uplift adhesion will not exceed about 1,500 psf. This soil adhesion is approximated to act uniformly over the upper 10 ft of the pier shaft. *Note: Uplift adhesion due to soil heave can be neglected over the portion of the pier shaft in contact with granular select fill and flexible base. Uplift adhesion can also be neglected for the portion of the shaft in the marl.*

This calculated uplift force may be used to compute the longitudinal reinforcing steel required in the pier to resist the uplift force induced by the swelling clays. However, the cross-sectional area of the reinforcing steel should not be less than ½ percent of the gross cross-sectional area of the drilled pier shaft.

The uplift resistance of each pier can be computed using the allowable uplift resistance values provided in Table B. The marl stratum above the bottom of temporary casing should be neglected in computing the uplift resistance of each pier.

Total settlements, based on the indicated bearing pressure, should be about ¾ inch or less for properly designed and constructed drilled piers. Settlement beneath individual piers will be primarily elastic with most of the settlement occurring during construction. Differential settlement may also occur between adjacent piers. For properly designed and constructed piers, differential settlement between adjacent piers is estimated to be about ¼ of an inch. Settlement response of drilled piers is impacted more by the quality of construction than by soil-structure interaction.

6.3.2 Lateral Loading

Lateral analysis for drilled piers can be performed using the following design parameters provided for the site soils in Table C. The lateral resistance of the top portion of the pier shafts (portion within 6 ft of final grade) should be neglected.

TABLE C DESIGN PARAMETERS FOR L-PILE			
Material	**Clayey Soils Deeper Than 6 ft Below Grade**	**Granular Soil Deeper than 6 ft Below Grade**	**Marl**
L-Pile p-y Model	Stiff Clay	Sand	Weak Rock
Effective Unit Weight (γ), pci	0.069	0.075	0.079
Undrained Cohesion (c), psi	20	0	----
Undrained Friction Angle (F), degrees	0	32	----
Rock Uniaxial Compressive Strength (q_u), psi	----	----	200
Rock Mass Modulus (E_r), psi	----	----	16,000
Rock Quality Designation (RQD)[2], %	----	----	50-70
Rock Strain Factor (k_{rm})	----	----	0.0001
1	Rock Quality Designation (RQD) is estimated from field data and sample examination, and our experience with similar materials. Rock coring was not performed for this study.		

6.3.3 Grade Beams

Grade beams (if used) connecting to piers should be formed and not cast in earthen trenches. Grade beams should be formed with a nominal 10-inch void at the bottom if subgrade improvement is **not** performed and the floor slab is structurally suspended. A void space is not required below grade beams provided the subgrade is improved as recommended in Section 6.2.

Commercially available cardboard box forms (cartons) are made for this purpose. The cardboard cartons should extend the full length and width of the grade beams. Prior to concrete placement, cartons should be inspected to verify they are firm, properly placed, and capable of supporting wet concrete. Some type of permanent soil retainer, such as pre-cast concrete panels, must be provided to prevent soils adjacent to grade beams from sloughing into the void space at the bottom of the grade beams. Additionally, backfill soils placed adjacent to grade beams must be compacted as outlined in Section 7.3 of this report.

6.3.4 Floor Slab Associated with Drilled Pier Foundations

Floor slabs associated with drilled piers may be grade supported or structurally suspended above grade. Recommendations for both types of floor slabs are provided below:

Grade Supported Floor Slab – If a grade supported floor slab is utilized with drilled piers, a floating (fully ground supported and not structurally connected to walls or foundations) floor slab may be used. The floating floor slab can be designed to uniformly bear on improved subgrade soils. Subgrade improvements to reduce floor slab movements to about 1/2 inch are provided in Section 6.2.

A floor slab doweled into perimeter grade beams can develop a plastic hinge (crack) parallel to and approximately 5 to 10 ft inside the building perimeter. The structural engineer should determine the need for connections between the slab and structural elements and determine if control joints to limit cracking are needed.

A soil modulus of subgrade reaction of at least 150pounds per square inch/inch (psi/in) is achieved for the floor slab situated on select fill placed as recommended in Section 6.2.

The use of a vapor retarder should be considered beneath concrete slabs in areas with moisture sensitive flooring. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 for procedures and cautions about the use and placement of a vapor retarder.

Suspended Floor Slab – A structural slab suspended completely above the existing highly expansive soils could be used for the building supported on piers. At least 12 inches of void space should be provided between the bottom of the floor slab (and lowest suspended fixture) and top surface of the underlying expansive clays. This 12-inch void space should also be maintained between the bottom of any structural element or utility line above the expansive soils. Cardboard carton forms or a deeper crawl space can be used to create the minimum void space. *Note: Subgrade improvements discussed in Section 6.2 will not be required if the floor slab is suspended above the existing expansive soils.*

If a crawl space is constructed, consideration should be given to constructing a mud mat below the crawl space. The benefits of a mud mat include (but are not limited to) resistance to moisture ingress through the suspended floor slab from the precipitation of moisture from the underlying soils and improved access below the structure for maintenance and repairs of utilities. In addition, proper ventilation should be provided to reduce the possibility that a high humidity environment could develop in the void space areas. We recommend that the crawl space subgrade be sloped (not exceeding 3 horizontal to 1 vertical) to appropriate drainage outlets to reduce the possibility of water accumulation in these areas. Flexible connections should be utilized in suspended piping, especially where it enters the ground.

6.3.5 Pilot Holes for Drilled Pier Foundations

Karst features such as voids, solution cavities, or sinkholes were not encountered during drilling in the marl stratum. However, due to our local experience and the geologic formation present, we recommend that pilot holes be drilled at all pier locations to a depth below the base of the pier equal to two (2) times the pier diameter or 10 ft, whichever is deeper. *Note: Deeper penetration into the marl will be required if air or clay filled voids are encountered during pilot hole drilling.*

THE PILOT HOLES SHOULD BE DRILLED PRIOR TO PIER DRILLING USING A PNEUMATIC DRILL. The minimum diameter of the pilot holes should be at least

3 inches. The purpose of the pilot holes is to validate the presence or non-presence of voids or soil-filled voids within the influence zone of the pier base. If karst features are encountered, they should be cleaned out and backfilled with a cementitious grout or concrete with a minimum compressive strength of 3,000 psi. The vertical and horizontal extent of the portion of the feature that will require backfilling would have to be determined on an individual basis. Options other than using a cementitious grout to fill voids can be considered and should be determined during construction on a case by case basis.

The recommended pilot holes are not required if the piers are designed strictly for side shear with no end bearing. That is, the piers should be designed as frictional units disregarding the end-bearing component.

6.4 Shallow Foundations

As an alternative to drilled piers, a shallow foundation system may be considered to support the structural loads at this site. Shallow foundations could be subjected to potential seasonal movements between 4 to 6 inches as described in Section 6.1.2 of this report. Subgrade improvement, as discussed in Section 6.2 to reduce soil movements to about ½ inch will be required if shallow foundations are utilized. The shallow foundation system should consist of a grade supported floor slab with grade beams and/or spread footings. Recommendations for these types of foundation systems are provided in the following sections:

6.4.1 Footings

Our findings indicate a shallow foundation system consisting of grade beams and/or spread footings could be utilized to support the structural loads of the proposed structure provided the subgrade is prepared as described above in Section 6.2. Foundations bearing on select fill or flexible base placed and compacted as described in Section 6.2 can be designed using an allowable net soil bearing pressure of 3,000 psf. This bearing pressure includes a factor of safety of at least 3.

We recommend that exterior footings and grade beams be at least 24 inches below final exterior grade and interior footings and grade beams be supported at a nominal depth below the bottom of the floor slab. Grade beams should have a minimum dimension of 10 inches in width and spread footings should have a minimum width of 24 inches for bearing capacity considerations.
Also, footings subjected to lateral forces or overturning should be proportioned such that the resultant reaction force on the base of the footing lies within the middle one-third of the footing width.

Post construction settlements for footing foundations as described above should be less than ¾ inch, with differential settlements in the order of 1/2 of an inch assuming proper construction. Careful monitoring during construction is necessary to locate any pockets or seams of unsuitable materials which might be encountered in excavations for footings. Unsuitable soils encountered at the foundation bearing level should be removed and replaced with either lean concrete (about 2,000 psi strength at 28 days), structural concrete, or compacted select fill as described in Section 7.3.

Resistance to sliding will be developed by friction along the base of the footings and passive earth pressure acting on the vertical face of the footing and/or a key installed in the base of the footings, if required. We recommend a coefficient of base friction of 0.35 along the bottom of the footing bearing on properly placed and compacted select fill or native granular soils. Passive resistance on the vertical face of the footing within 2 ft of the general excavation subgrade should be neglected. Passive resistance can be developed using a key constructed in the base of the footing and for any portion of the footing bearing at least 2 ft below the general excavation subgrade. For footings bearing against vertical, undisturbed cuts in properly placed and compacted select fill (see Section 7.3), an allowable uniform passive pressure of 300 psf per ft can be utilized.

6.4.2 Floor Slab Associated with Shallow Footings

The recommendations for a grade-supported floor slab provided in Section 6.3.4 above are applicable if shallow foundations are utilized.

6.5 Flatwork

Exterior flatwork supported on-grade could be subjected to potential seasonal movements between 4 to 6 inches as described in Section 6.1.2 of this report. Subgrade improvement, as discussed in Section 6.2, could be considered if it is desired to reduce these anticipated movements and to reduce the risk of potential for differential movements between the flatwork and adjoining structural elements. Subgrade improvement below flatwork is intended to maintain the potential for large differential movements between the flatwork and the structure. However, some differential movement should be expected. Therefore, allowances should be made for differential movements between the structure and the flatwork, including flexible connections and control joints. The use of sand as a leveling course below flatwork supported on expansive clays should be avoided. *Note: ALPHA should be contacted if supplemental recommendations are desired to reduce the potential seasonal movements in the flatwork area at this site.*

The flatwork should be installed to ensure drainage away from the structure. A positive slope away from the structure should be maintained. The slope should be sufficient to accommodate future potential movements. The flatwork should never be allowed to reach either a level plane or negative slope back toward the structure. In addition, a moisture seal should be provided at the joint between the flatwork and the foundation.

6.6 Lateral Earth Pressures

We anticipate that site retaining walls may be constructed at this site. The walls should be designed to resist the expected lateral earth pressures. The magnitude of lateral earth pressure against the walls is dependent on the method of backfill placement, type of backfill soil, drainage provisions, and type of wall (rigid or yielding) after placement of the backfill. Experience demonstrates when a wall is held rigidly against horizontal movement (restrained at the top), the lateral pressure (at-rest lateral earth pressure) against the wall is greater than the normally assumed active pressure. Yielding walls (rotation at the top of the wall on the order of 0.1 to 0.4 percent of the wall height) can be designed for active earth pressures (k_a) but rigid walls should be designed for higher at-rest lateral earth pressures (k_o).

Walls should be designed using the equivalent fluid pressures provided in Table D, considering a triangular stress distribution and assuming a horizontal ground surface extending back from the top of the wall. The equivalent fluid pressures provided do not include a factor of safety.

TABLE D LATERAL EARTH PRESSURE			
Material	**Condition**	**Equivalent Fluid Pressure, pcf**	
		Drained	**Undrained including Hydrostatic Pressure**
Free Draining Granular Soil Φ=32˚, Υ_T =125 pcf	At-Rest, k_o=0.47	59	92
	Active, k_a=0.31	39	82
On-Site Clay Soil, Φ=12˚, Υ_T =125 pcf	At-Rest, k_o=0.8	--	112
	Active, k_a=0.7	--	103

Φ – Internal friction and ϒm – Effective Total Unit Weight

***Notes**: Free Draining Granular Backfill*

Free Draining Granular backfill material should be a clean, non-plastic, relatively well-graded granular backfill consisting of a sand, gravel, or sand and gravel mixture, with less than 5 percent finer than the No. 200 sieve size. Material meeting the requirements of ASTM C 33 Size No. 57 or 67 are examples of commercially available materials that could be used for this purpose. To reduce surface water seepage into the free draining granular backfill, the top 1 ft of the backfill should consist of on-site clay soil with a plasticity index of 25 to 35 percent. The free draining granular backfill should extend outward at least 2 ft from the base of the wall and then extend upward on a 1 (horizontal) to 2 (vertical) slope to utilize the active earth pressure in the table above. The free draining granular backfill should be separated from the adjacent native soils using a non-woven filter fabric (Mirafi 140N, or equivalent) to prevent intrusion of native soils into the free draining granular backfill. Complete drainage of the free draining granular material should be provided to prevent the development of hydrostatic pressures behind the wall. A typical drainage system should consist of perforated plastic drain pipes placed in filter trenches excavated parallel to the base of the walls for their entire length. The drain pipes should be positioned at a depth lower than the bottom elevation of the wall and should also be wrapped with filter fabric (Mirafi 140N, or equivalent). A perimeter drain system is beneficial regardless of the type of backfill used behind the wall. As a minimum, a system of weep-holes should be provided for free standing site walls that are not structurally associated with the building, although weep holes by themselves will likely not be sufficient to prevent occasional build-up of hydrostatic pressure behind the wall. Subsurface drains are recommended behind retaining walls structurally associated with the building or in below-grade areas. Subsurface drains would not be required for typical at-grade slabs.

The effects of surcharge loading must also be considered. The surcharge load should be multiplied by the applicable coefficient of earth pressure from the table above, and the resulting pressure applied as a uniform lateral pressure over the full height of the wall. *A global slope stability analysis will be required for walls 4 ft or greater and/or with surcharge loading. While this is not in our current scope of services, ALPHA would be pleased to perform global slope stability analysis upon request.*

6.7 Seismic Considerations

TABLE E SEISMICPARAMETERS		
Description		**Values**
2015 International Building Code Site Classification (IBC) [1]		C [2]
Site Latitude (Degrees)		30.83036
Site Longitude (Degrees)		-97.60489
Mapped Spectral Acceleration for Short Periods (0.2-Second): (S_S) [3]		0.064 g
Mapped Spectral Acceleration for a 1-Second Period: (S_1) [3]		0.036 g
1	The site class definition was determined using SPT N-values in conjunction with section 1613.3.2 in the 2015 IBC and Table 20.3-1 in the 2010 ASCE-7.	
2	Section 20.1 in the 2010 ASCE-7 requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Borings extended to a maximum depth of 40 ft, and this seismic site class definition considers that hard soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be needed to confirm the conditions below the current depth of exploration.	
3	The Spectral Acceleration values were determined using publicly available information provided on the United States Geological Survey (USGS) website. The spectral acceleration values can be used to determine the site coefficients using Tables 1613.3.3 (1) and 1613.3.3 (2) in the 2015 IBC.	

6.8 Drainage and Other Considerations

Adequate drainage should be provided to reduce seasonal variations in the moisture content of foundation soils. All pavement and sidewalks within 5 ft of the building should be sloped away from the building to prevent ponding of water around the building. Final grades within 5 ft of the building should be adjusted to slope away from the building at a minimum slope of 2 percent. **Maintaining positive surface drainage throughout the life of the structure is essential.**

In areas with pavement or sidewalks adjacent to the new structures, a positive seal must be maintained between the structure and the pavement or sidewalk to minimize seepage of water into the underlying supporting soils. Post-construction movement of pavement and flatwork is common. Normal maintenance should include examination of all joints in paving and sidewalks, etc. as well as resealing where necessary.

Several factors relate to civil and architectural design and/or maintenance, which can significantly affect future movements of the foundation and floor slab system:

- Preferably, a complete system of gutters and downspouts should carry runoff water a minimum of 5 ft from the completed structures.

- Large trees and shrubs should not be allowed closer to the foundations than a horizontal distance equal to roughly their mature canopy due to their significant moisture demand upon maturing. *Note: A landscape expert may be consulted to evaluate the precise extents of potential root growth for specific tree and shrub species so that root growth beneath the structures and pavements can be avoided.*

- Moisture conditions should be maintained "constant" around the edge of the slabs. Ponding of water in planters, in unpaved areas, and around joints in paving and sidewalks can cause slab movements beyond those predicted in this report.

- Planter box structures placed adjacent to the building should be provided with a means to assure concentrations of water are not available to the subsoil stratigraphy.

- The root systems from any existing trees cleared/removed at this site will have dried and desiccated the surrounding clay soils, resulting in soil with near-maximum swell potential. Clay soils surrounding tree root mats within the building areas or flatwork areas should be removed to a depth of 3 ft or to the top of the marl, whichever occurs first, and compacted in-place with moisture and density control as described in Section 7.3 of this report, below.

Trench backfill for utilities should be properly placed and compacted as outlined in Section 7.3 of this report and in accordance with requirements of local City standards. Since granular bedding backfill is used for most utility lines, the backfilled trench should not become a conduit and allow access for surface or subsurface water to travel toward the new structures. Concrete cut-off collars or clay plugs should be provided where utility lines cross building lines to prevent water from traveling in the trench backfill and entering beneath the structures.

6.9 Corrosion

Results of resistivity, pH and soluble sulfate tests performed on a selected sample are tabulated below in Table F.

TABLE F
CORROSION TEST RESULTS

Sample		Type of Material	Resistivity ohm-cm	pH	Sulfates ppm
Boring No.	Depth, ft				
B–1	2.5 – 4	Dark Brown Clay	19,610 (Dry) / 778 (Wet)	8.45	654

Based on results of these tests, the corrosion potential of metal utility lines is anticipated to be moderate to high and metal utility lines would require corrosion protection. Based on the soluble sulfate test results, Type I or II cement may be used at this project.

7.0 GENERAL CONSTRUCTION PROCEDURES AND RECOMMENDATIONS

Variations in subsurface conditions could be encountered during construction. To permit correlation between the boring data and actual subsurface conditions encountered during construction, it is recommended a registered Professional Engineering firm be retained to observe construction procedures and materials.

Some construction problems, particularly degree or magnitude, cannot be anticipated until the course of construction. The recommendations offered in the following paragraphs are intended not to limit or preclude other conceivable solutions, but rather to provide our observations based on our experience and understanding of the project characteristics and subsurface conditions encountered in the borings.

7.1 Site Preparation and Grading

Marl (rock) was encountered at depths ranging from 5 to 9 ft below the existing ground surface, and rock could be encountered during general excavation and grading at this site. From our experience, this rock can be hard and difficult to excavate, and difficulty excavating this material can increase with depth. Rock excavation methods (including, but not limited to rock teeth, rippers, jack hammers, or sawcutting) will be required to remove this material. Crushing equipment will be required to process the rock if it is desired to utilize this material as on-site fill. **The contractor selected should have experience with excavation in this marl (rock).**

All areas supporting floor slabs, foundations, pavement, flatwork, or areas to receive new fill should be properly prepared.

- After completion of the necessary stripping, clearing, and excavating and prior to placing any required fill, the exposed soil subgrade should be carefully evaluated by probing and testing. Any undesirable material (organic material, wet, soft, or loose soil) still in place should be removed.

- The exposed soil subgrade should be further evaluated by proof-rolling with a heavy pneumatic tired roller, loaded dump truck or similar equipment weighing approximately 20 tons to check for pockets of soft or loose material hidden beneath a thin crust of possibly better soil.

- Proof-rolling procedures should be observed routinely by a Professional Engineer, or his designated representative.

- Any undesirable material (organic material, wet, soft, or loose soil) exposed during the proofroll should be removed and replaced with well-compacted material as outlined in Section 7.3.

- Prior to placement of any fill, the exposed soil subgrade should then be scarified to a minimum depth of 6 inches and recompacted as outlined in Section 7.3.

Slope stability analysis of embankments (natural or constructed) was not within the scope of this study. If fill is to be placed on existing slopes (natural or constructed) steeper than six (6) horizontal to one (1) vertical (6:1), the fill materials should be benched into the existing slopes in such a manner as to provide a minimum bench width of five (5) ft. This should provide a good contact between the existing soils and new fill materials, reduce potential sliding planes and allow relatively horizontal lift placements.

The contractor is responsible for designing any excavation slopes, temporary sheeting or shoring. Design of these structures should include any imposed surface surcharges. Construction site safety is the sole responsibility of the contractor, who shall also be solely responsible for the means, methods and sequencing of construction operations. The contractor should also be aware that slope height, slope inclination or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state and/or federal safety regulations, such as OSHA Health and Safety Standard for Excavations, 29 CFR Part 1926, or successor regulations. Stockpiles should be placed well away from the edge of the excavation and their heights should be controlled so they do not surcharge the sides of the excavation. Surface drainage should be carefully controlled to prevent flow of water over the slopes and/or into the excavations. Construction slopes should be closely observed for signs of mass movement, including tension cracks near the crest or bulging at the toe. If potential stability problems are observed, a geotechnical engineer should be contacted immediately. Shoring, bracing or underpinning required for the project (if any) should be designed by a professional engineer registered in the State of Texas.

Due to the nature of the clayey soils found near the surface at the borings, traffic of heavy equipment (including heavy compaction equipment) may create pumping and general deterioration of shallow soils. Therefore, some construction difficulties should be anticipated during periods when these soils are saturated.

7.2 Foundation Excavations

All foundation excavations should be monitored to verify foundations bear on suitable material. The bearing stratum exposed in the base of all foundation excavations should be protected against any detrimental change in conditions. Surface runoff water should be drained away from excavations and not allowed to collect. All concrete for foundations should be placed as soon as practical after the excavation is made. Prolonged exposure of the bearing surface to air or water will result in changes in strength and compressibility of the bearing stratum. Drilled piers should be completed the same day as excavated. All other excavations should not be let open for more than 48 hours.

Prolonged exposure of the bearing surface to air or water will result in changes in strength and compressibility of the bearing stratum. Therefore, if delays occur, excavations for drilled piers should be slightly widened and cleaned. Excavations for grade beams for slab foundations, and spread footing foundations should be slightly deepened and cleaned to provide a fresh bearing surface.

All pier shafts should be at least 1.5-ft in diameter to facilitate clean-out of the base and proper monitoring. Concrete placed in pier holes should be directed through a tremie, hopper, or equivalent. Placement of concrete should be vertical through the center of the shaft without hitting the sides of the pier or reinforcement to reduce the possibility of segregation of aggregates. Concrete placed in piers should have a minimum slump of 5 inches (but not greater than 7 inches) to avoid potential honey-combing.

Observations during pier drilling should include, but not necessarily be limited to, the following items:

- Verification of proper bearing strata and consistency of subsurface stratification with regard to boring logs,
- Confirmation the minimum required penetration into the bearing strata is achieved,
- Complete removal of cuttings from bottom of pier holes,
- Proper handling of any observed water seepage and sloughing of subsurface materials,

- No more than 2 inches of standing water should be permitted in the bottom of pier holes prior to placing concrete, and

- Verification of pier diameter and steel reinforcement.

Groundwater was not encountered during drilling at this site. However, from our experience, seasonal groundwater seepage could be encountered at the site during pier installation, and the risk of encountering seepage is increased during or after periods of precipitation. Temporary casing may be required to control sloughing of the subsurface granular soils and groundwater seepage encountered during the pier drilling. The casing should be properly seated into the marl below the depth of seepage and groundwater should be removed prior to beginning the design penetration. As casing is extracted, care should be taken to maintain a positive head of plastic concrete and minimize the potential for intrusion of sloughing of fill soils. It is recommended a separate bid item be provided for casing on the contractor's bid schedule. Pier drilling contractors experienced in similar soil and groundwater conditions should be utilized for this project. The sidewalls of the pier excavation need to be sufficiently rough or artificially roughened to mobilize skin friction. ALPHA should be contacted for further review and evaluation if groundwater seepage and/or pier shaft sidewall collapse occurs during pier installation.

When the pier excavation depth is achieved and the bearing area has been cleaned, steel and concrete should then be placed immediately in the excavation. The concrete should be placed completely to the bottom of the excavation with a closed-end tremie in the pier excavation if more than 2 inches of water is ponded on the bearing surface or the slurry drilling technique is used. A short tremie may be used if the excavation has less than 2 inches of ponded water or if the water is pumped out prior to concrete placement. The fluid concrete should not be allowed to strike the pier reinforcement, temporary casing (if required) or excavation sidewalls during concrete placement.

For drilled piers, rock drilling teeth, core barrels, or other means may be required to penetrate the rock at this site. **The contractor selected should have experience with excavation in this marl/rock.**

7.3 Fill Materials and Compaction

The following fill materials and compaction recommendations provided below are applicable for general site grading in the building area and other structural areas.

Granular Select Fill – Materials used as granular select fill material should consist of a "non-expansive" material with a liquid limit less than 35 percent, a PI not less than about 5 percent or greater than 15 percent and contain no more than 0.5 percent fibrous organic materials, by weight. The granular select fill should have no more than 30 percent by weight passing the No. 200 Sieve. All granular select fill material should contain no deleterious material and should be compacted to a dry density of at least 98 percent modified Proctor maximum dry density (ASTM D 1557) and within the range of 2 percentage point below to 2percentage points above the material's optimum moisture content. *Note: The plasticity index and liquid limit of material used as select fill material should be routinely verified during placement using laboratory tests.*

Visual observation and classification should not be relied upon to confirm the material to be used as select fill material satisfies the above Atterberg-limit criteria.

Flexible Base – Flexible base used in the building pad should consist of material meeting the requirements of TxDOT Standard Specifications Item 247, Type A, B, C or D, Grade 1-2. The flexible base should be compacted to at least 95 percent of modified Proctor maximum dry density (ASTM D 1557) and within the range of 2 percentage points below to 2 percentage points above the material's optimum moisture content.

The following fill compaction recommendations provided below are applicable for general site grading.

General Fill (Clay) – Clay soils should be compacted to a dry density between 95 and 100 percent of standard Proctor maximum dry density (ASTM D 698). The compacted moisture content of the clays during placement should be within the range of 0 to 4 percentage points above optimum. Clayey materials used as fill should be processed and the largest particle or clod should be less than 6 inches prior to compaction.

General Fill (Granular) – Granular materials should be compacted to a dry density between 95 and 100 percent of standard Proctor maximum dry density (ASTM D 698). The compacted moisture content of the granular soils during placement should be within the range of -2 to +2 percentage points of optimum.

Prior to placement of any fill or foundation, the subgrade should be scarified to a depth of 6 inches and recompacted to a dry density of at least 95 percent of standard Proctor maximum dry density (ASTM D 698) and within the range of -1 to +3 percentage points of the material's optimum moisture content.

In cases where either mass fills or utility lines are more than 10 ft deep, the fill/backfill below 10 ft should be compacted to at least 100 percent of standard Proctor maximum dry density (ASTM D-698) and within 2 percentage points of the material's optimum moisture content. The portion of the fill/backfill shallower than 10 ft should be compacted as outlined above.

Even if fill is properly compacted, fills in excess of about 10 ft are still subject to settlements over time of up to about 1 to 2 percent of the total fill thickness. This should be considered when designing utility lines under pavements and/or wall backfill.

Compaction should be accomplished by placing fill in about 8-inch thick loose lifts and compacting each lift to at least the specified minimum dry density. Field density and moisture content tests should be performed on each lift. A qualified geotechnical engineering firm should be retained to perform sufficient in-place density tests during the filling operations to evaluate that proper levels of compaction, including dry unit weight and moisture content, are being attained. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris or materials exceeding 4 inches in maximum dimension.

7.4 Groundwater

Groundwater was not encountered during drilling at this site. However, from our experience with similar soils, seasonal groundwater seepage could be encountered in excavations for grade beams, foundations, utility conduits and other general excavations. The risk of encountering seepage increases with depth of excavation and during or after periods of precipitation. Standard sump pits and pumping may be adequate to control minor seepage on a local basis in relatively shallow excavations.

Marl (rock) was encountered at depths ranging from 5 to 9 ft below the existing ground surface at this site. However, from our experience, seasonal seepage could occur where marl is at or near the final site grade. Subsurface drains may be required to intercept seasonal groundwater seepage in areas where marl is at or near final site grade. The need for subsurface drains or other de-watering devices across the site should be carefully addressed by the construction testing laboratory during construction. ALPHA can review any required drainage details once prepared.

In any areas where cuts are made to establish final grades at the site, attention should be given to possible seasonal water seepage that could occur through natural cracks and fissures in the newly exposed stratigraphy. Subsurface drains may be required to intercept seasonal groundwater seepage. The need for these or other de-watering devices should be carefully addressed during construction. Our office could be contacted to visually observe the final grades to evaluate the need for such drains.

8.0 LIMITATIONS

Professional services provided in this geotechnical exploration were performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. The scope of services provided herein does not include an environmental assessment of the site or investigation for the presence or absence of hazardous materials in the soil, surface water or groundwater. ALPHA, upon written request, can be retained to provide these services.

ALPHA is not responsible for conclusions, opinions or recommendations made by others based on this data. Information contained in this report is intended for the exclusive use of the Client (and their designated design representatives), and is related solely to design of the specific structures outlined in Section 2.0. No party other than the Client (and their designated design representatives) shall use or rely upon this report in any manner whatsoever unless such party shall have obtained ALPHA's written acceptance of such intended use. Any such third party using this report after obtaining ALPHA's written acceptance shall be bound by the limitations and limitations of liability contained herein, including ALPHA's liability being limited to the fee paid to it for this report. Recommendations presented in this report should not be used for design of any other structures except those specifically described in this report. In all areas of this report in which ALPHA may provide additional services if requested to do so in writing, it is presumed that such requests have not been made if not evidenced by a written document accepted by ALPHA. Further, subsurface conditions can change with passage of time. Recommendations contained herein are not considered applicable for an extended period of time after the completion date of this report. It is recommended our office be contacted for a review of the contents of this report for construction commencing more than one (1) year after completion of this report. Non-compliance with any of these requirements by the Client or anyone else shall release ALPHA from any liability resulting from the use of, or reliance upon, this report.

Recommendations provided in this report are based on our understanding of information provided by the Client about characteristics of the project. If the Client notes any deviation from the facts about project characteristics, our office should be contacted immediately since this may materially alter the recommendations. Further, ALPHA is not responsible for damages resulting from workmanship of designers or contractors. It is recommended the Owner retain qualified personnel, such as a Geotechnical Engineering firm, to verify construction is performed in accordance with plans and specifications.

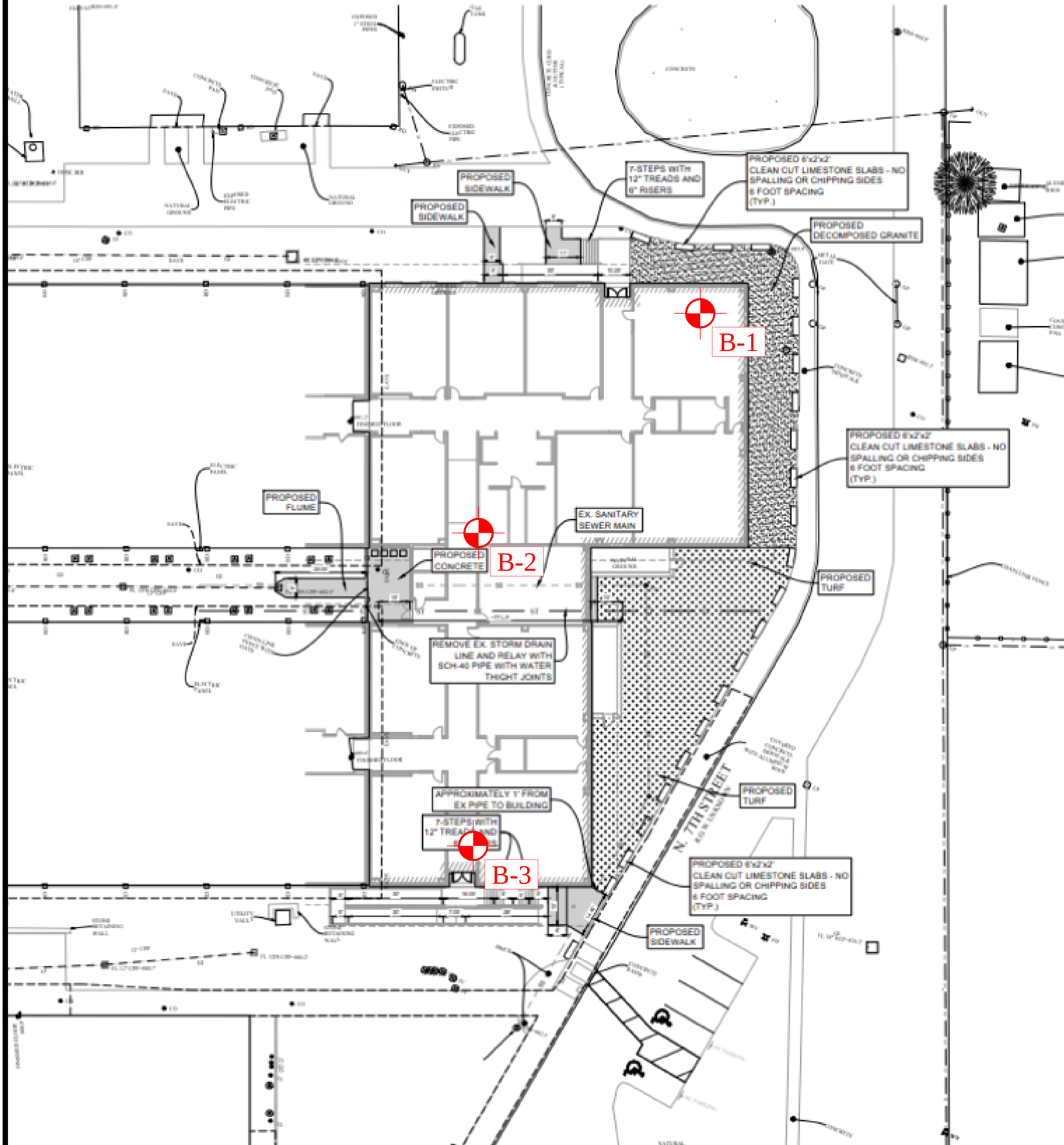
APPENDIX

A-1 METHODS OF FIELD EXPLORATION

A truck-mounted, rotary drill rig equipped with continuous flight augers was used to advance the boreholes. A total of three (3) borings were performed for this geotechnical exploration at the approximate locations shown on the Boring Location Plan, Figure 1. The boring locations were staked by either pacing or taping and estimating right angles from landmarks which could be identified in the field and as shown on the site plan provided during this study. The locations of the borings shown on the Boring Location Plan are considered accurate only to the degree implied by the methods used to define them. The approximate latitude and longitude coordinates at each boring location were obtained using a handheld GPS device.

Samples of granular and cohesive materials were obtained using split-spoon sampling procedures in general accordance with ASTM Standard D 1586. Disturbed samples were obtained at selected depths in the borings by driving a standard 2-inch O.D. split-spoon sampler 18 inches into the subsurface material using a 140-pound hammer falling 30 inches. The number of blows required to drive the split-spoon sampler the final 12 inches of penetration (N-value) is recorded in the appropriate column on the boring logs. However, if the sampler was not driven the initial 6-inch seating increment with 50 hammer blows, refusal (i.e. “ref”) is recorded along with the inches driven on the logs.

Our field representative prepared field logs as part of the field exploration. The field logs included visual descriptions of the materials encountered during drilling and their interpretation of the subsurface conditions between samples. The Log of Boring sheets included in this report represent the engineer’s interpretation of the field logs and include modifications based on visual observations using the Unified Soil Classification System (USCS) and testing of the samples in the laboratory. **Samples not consumed by testing will be retained in our laboratory for at least 30 days and then discarded unless the Client requests otherwise.**



GEOTECHNICAL EXPLORATION
JARRELL MIDDLE SCHOOL ADDITIONS
101 EAST AVENUE F
JARRELL, TEXAS
ALPHA PROJECT NO. A182085

N

APPROXIMATE BORING LOCATIONS

ALPHA TESTING

BORING LOCATION PLAN
FIGURE 1

B-1 METHODS OF LABORATORY TESTING

Representative samples were inspected and classified by a qualified member of the Geotechnical Division and the boring logs were edited as necessary. To aid in classifying the subsurface materials and to determine the general engineering characteristics, natural moisture content tests (ASTM D 2216), Atterberg-limit tests (ASTM D 4318), and percent passing No. 200 Sieve (ASTM D 1140) were performed on selected samples. Results of all laboratory tests described above are provided on the accompanying boring logs as noted.

ALPHA TESTING
WHERE IT ALL BEGINS

4740 Perrin Creek
Suite 480
San Antonio, Texas
Phone: 210-249-2100
Fax: 210-249-2101
www.alphatesting.com

BORING NO.: B-1
Sheet 1 of 1
PROJECT NO.: A182085

Client: Jarrell Independent School District
Project: Jarrell Middle School Additions
Start Date: 8/9/2018 **End Date:** 8/9/2018
Drilling Contractor:
Drilling Method: CONTINUOUS FLIGHT AUGER / AIR ROTARY

Location: Jarrell, Texas
Surface Elevation: 884
Longitude: -97.60489
Latitude: 30.83036
Hammer Drop (lbs / in): 140 / 30

GROUND WATER OBSERVATIONS
On Rods (ft): NONE
After Drilling (ft): DRY
After ___ Hours (ft):

Depth, feet	MATERIAL DESCRIPTION	Sample Type	Recovery % RQD	N Value (blows/ft)	Pocket Penetrometer (tsf)	Unconfined Comp. Strength (tsf)	% Passing No. 200 Sieve	Unit Dry Weight (pcf)	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
0–5.0	**FAT CLAY with SAND (CH)** dark brown	X		17			84		18	77	30	47
		X		21					21			
5.0		X		33					21	79	27	52
5.0–6.0	**CLAYEY SAND (SC)** tan											
6.0–40.0	**MARL** tan; weathered with clay seams and LIMESTONE fragments and layers	X		ref/2"					9			
		X		ref/1"					10			
		X		ref/1"					8			
		X		ref/0"					7			
	- becoming gray below 23 feet	X		ref/0"					8			
		X		ref/1"					8			
		X		ref/1"					9			
40.0		X		ref/0"					9			

BORING TERMINATED AT 40 FEET

ALPHA TESTING
WHERE IT ALL BEGINS

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www.alphatesting.com

BORING NO.: B-2

PROJECT NO.: A182085

Client: Jarrell Independent School District
Location: Jarrell, Texas
Project: Jarrell Middle School Additions
Surface Elevation: 886
Start Date: 8/9/2018 **End Date:** 8/9/2018
Longitude: -97.60503
Drilling Contractor:
Latitude: 30.83014
Drilling Method: CONTINUOUS FLIGHT AUGER / AIR ROTARY
Hammer Drop (lbs / in): 140 / 30

GROUND WATER OBSERVATIONS
On Rods (ft): NONE
After Drilling (ft): DRY
After ____ Hours (ft):

Depth, feet	MATERIAL DESCRIPTION	N Value (blows/ft)	Recovery % RQD	Pocket Penetrometer (tsf)	Unconfined Comp. Strength (tsf)	% Passing No. 200 Sieve	Unit Dry Weight (pcf)	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
0–0.5	**FAT CLAY with SAND (CH)** dark brown	38						4	46	20	26
0.5–9.0	**CLAYEY SAND (SC)** tan	56						8			
		30				30		2			
		9						9	34	13	21
9.0–40.0	**MARL** tan; weathered with clay seams and LIMESTONE fragments and layers	ref/4"						13			
		ref/1"						15			
		ref/0"						9			
	- becoming gray below 23 feet	ref/0"						8			
		ref/0"						8			
		ref/0"						8			
		ref/0"						8			

BORING TERMINATED AT 40 FEET

ALPHA TESTING
WHERE IT ALL BEGINS

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Suite 480
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Phone: 210-249-2100
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www.alphatesting.com

BORING NO.: B-3

PROJECT NO.: A182085

Client: Jarrell Independent School District
Project: Jarrell Middle School Additions
Start Date: 8/9/2018 **End Date:** 8/9/2018
Drilling Contractor:
Drilling Method: CONTINUOUS FLIGHT AUGER / AIR ROTARY

Location: Jarrell, Texas
Surface Elevation: 884
Longitude: -97.60492
Latitude: 30.82986
Hammer Drop (lbs / in): 140 / 30

GROUND WATER OBSERVATIONS
On Rods (ft): NONE
After Drilling (ft): DRY
After ____ Hours (ft): ____

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Sample Type	Recovery % RQD	N Value (blows/ft)	Pocket Penetrometer (tsf)	Unconfined Comp. Strength (tsf)	% Passing No. 200 Sieve	Unit Dry Weight (pcf)	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
0–2.0		**FILL: LEAN CLAY with SAND (CL)** brown and tan	X		62					5	45	20	25
2.0–5.0		**FILL: FAT CLAY with SAND (CH)** dark brown and tan	X		61					10			
			X		ref/5"					6	52	24	28
5.0–40.0		**MARL** tan; weathered with clay seams and LIMESTONE fragments and layers	X		ref/4"					11			
		- clay seam at 8 feet	X		50/4"					23			
			X		ref/3"					12			
		- clay seam at 18 feet	X		50/4"					55			
		- becoming gray below 23 feet	X		ref/1"					8			
			X		ref/0"					6			
			X		ref/0"					8			
40.0			X		ref/0"					8			
		BORING TERMINATED AT 40 FEET											

ALPHA TESTING
WHERE IT ALL BEGINS

KEY TO SOIL SYMBOLS AND CLASSIFICATIONS

SOIL & ROCK SYMBOLS

- (CH), High Plasticity CLAY
- (CL), Low Plasticity CLAY
- (SC), CLAYEY SAND
- (SP), Poorly Graded SAND
- (SW), Well Graded SAND
- (SM), SILTY SAND
- (ML), SILT
- (MH), Elastic SILT
- LIMESTONE
- SHALE / MARL
- SANDSTONE
- (GP), Poorly Graded GRAVEL
- (GW), Well Graded GRAVEL
- (GC), CLAYEY GRAVEL
- (GM), SILTY GRAVEL
- (OL), ORGANIC SILT
- (OH), ORGANIC CLAY
- FILL

SAMPLING SYMBOLS

- SHELBY TUBE (3" OD except where noted otherwise)
- SPLIT SPOON (2" OD except where noted otherwise)
- AUGER SAMPLE
- TEXAS CONE PENETRATION
- ROCK CORE (2" ID except where noted otherwise)

RELATIVE DENSITY OF COHESIONLESS SOILS (blows/ft)

VERY LOOSE	0 TO 4
LOOSE	5 TO 10
MEDIUM	11 TO 30
DENSE	31 TO 50
VERY DENSE	OVER 50

SHEAR STRENGTH OF COHESIVE SOILS (tsf)

VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
FIRM	0.50 TO 1.00
STIFF	1.00 TO 2.00
VERY STIFF	2.00 TO 4.00
HARD	OVER 4.00

RELATIVE DEGREE OF PLASTICITY (PI)

LOW	4 TO 15
MEDIUM	16 TO 25
HIGH	26 TO 35
VERY HIGH	OVER 35

RELATIVE PROPORTIONS (%)

TRACE	1 TO 10
LITTLE	11 TO 20
SOME	21 TO 35
AND	36 TO 50

PARTICLE SIZE IDENTIFICATION (DIAMETER)

BOULDERS	8.0" OR LARGER
COBBLES	3.0" TO 8.0"
COARSE GRAVEL	0.75" TO 3.0"
FINE GRAVEL	5.0 mm TO 3.0"
COURSE SAND	2.0 mm TO 5.0 mm
MEDIUM SAND	0.4 mm TO 5.0 mm
FINE SAND	0.07 mm TO 0.4 mm
SILT	0.002 mm TO 0.07 mm
CLAY	LESS THAN 0.002 mm

Project Name: Jarrell Middle School Addition and Renovations
Client: Jarrell ISD
Jarrell, Texas
Project Number: 01756-02-01

STATE OF TEXAS
JASON W. REED
105129
LICENSED
PROFESSIONAL ENGINEER
9-4-18

MECHANICAL ITEMS FOR ADDENDUM NO. 2

NOTICE TO PROPOSERS:

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REFERENCE IS MADE TO THE DRAWINGS AND THE PROJECT MANUAL AS NOTED:

PROJECT MANUAL:

AD No 2, Mech. Item 1: **To the Project Manual, Section 23 07 13, "DUCT AND GRILLE INSULATION,"**

1) To paragraph 2.4 INTERNAL DUCT LINER, delete the subsection 2.4 in its entirety. No Internal duct liner needed on project.

END OF MECHANICAL ADDENDUM

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ESTES, McCLURE & ASSOCIATES REGISTRATION NO. F-893

STATE OF TEXAS
JAMES M. TATE III
102427
LICENSED
PROFESSIONAL ENGINEER
9-4-18

ELECTRICAL ITEMS FOR ADDENDUM NO. 2

NOTICE TO PROPOSERS:

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REFERENCE IS MADE TO THE DRAWINGS AND THE PROJECT MANUAL AS NOTED:

DRAWINGS:

AD No 2, Elec. Item 1: **To the Drawings, Sheet EP1.1, "ELECTRICAL FLOOR PLAN - SECTION 1,"**

1) Added an overall floor plan with new addition and main electrical room highlighted.

END OF ELECTRICAL ADDENDUM

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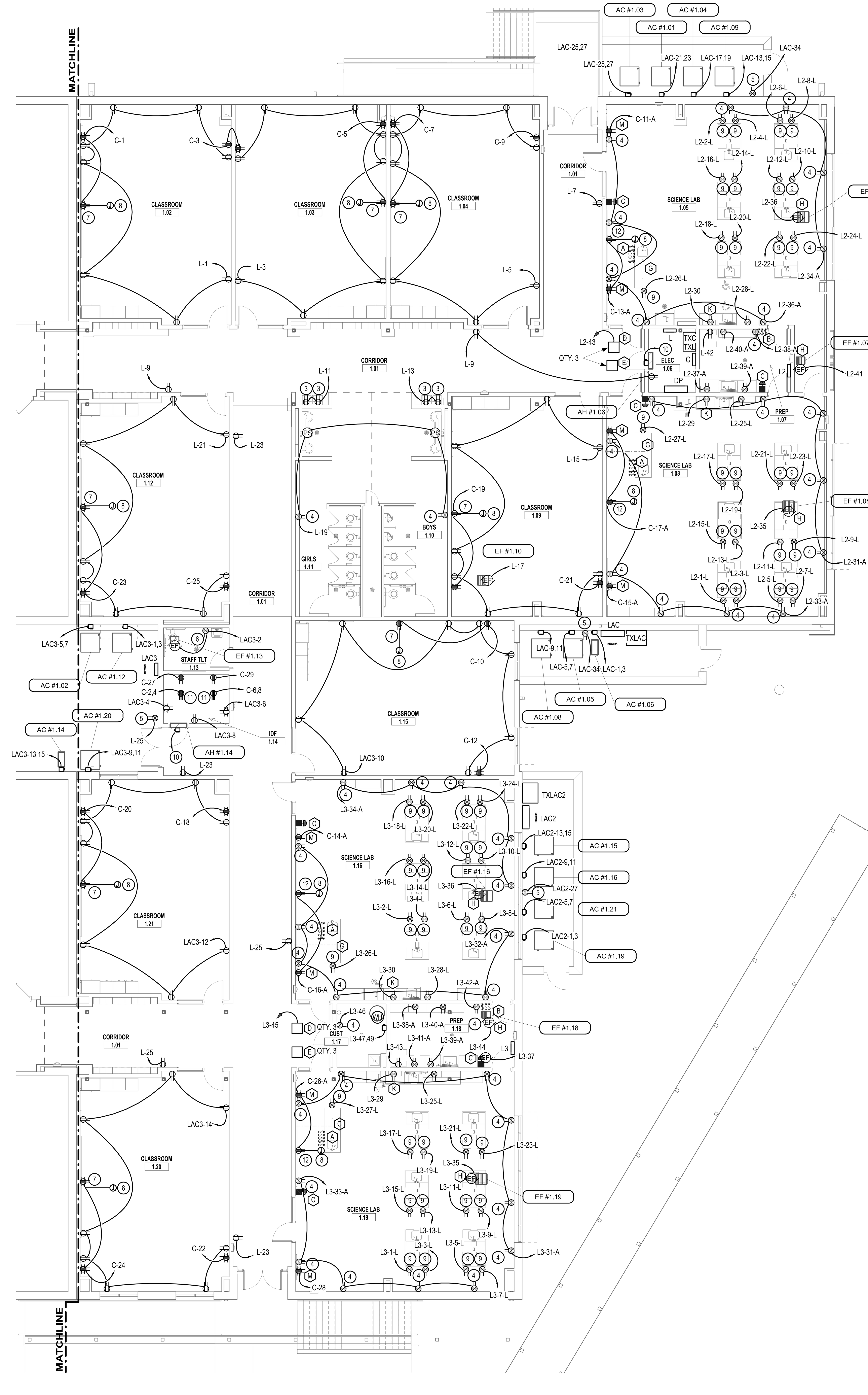
ESTES, McCLURE & ASSOCIATES REGISTRATION NO. F-893



1 ELECTRICAL FLOOR PLAN
1/8" = 1'-0"

SCIENCE LAB / PREP GENERAL NOTES:

1. REFER TO SECTION 26 09 19 - LABORATORY UTILITY SHUT-OFF SYSTEM AND TO THE LABORATORY CLASSROOM AND PREPARATION ROOM UTILITY SHUT-OFF SYSTEM DETAILS FOR MORE INFORMATION.

SCIENCE LAB / PREP PLAN NOTES:

-L CIRCUIT CALL OUTS WITH AN "-L" SUFFIX ARE LAB STATION DEDICATED RECEPTACLE GROUPS TO BE FED THROUGH NORMALLY OPEN ELECTRICALLY HELD CONTACTORS CONTROLLED BY THE LABORATORY SHUT-OFF SYSTEM.

-A CIRCUIT CALL OUTS WITH AN "-A" SUFFIX ARE ADDITIONAL AREA RECEPTACLE GROUPS TO BE FED THROUGH NORMALLY CLOSED ELECTRICALLY HELD CONTACTORS CONTROLLED BY THE LABORATORY SHUT-OFF SYSTEM.

A LABORATORY CLASSROOM CONTROL SWITCH PLATE. PROVIDE AND INSTALL AT THIS LOCATION IN THE LABORATORY CLASSROOM FOR CONTROL OF THE UTILITIES AND THE PURGE FAN IN THIS SPACE. SEE DETAIL IMAGE FOR CORRECT NUMBER OF REQUIRED SWITCHES.

B PREPARATION ROOM CONTROL SWITCH PLATE. PROVIDE AND INSTALL AT THIS LOCATION IN THE LABORATORY CLASSROOM FOR CONTROL OF THE UTILITIES AND THE PURGE FAN IN THIS SPACE.

C EMERGENCY SHUT-OFF BUTTON - PROVIDE AND INSTALL AT THIS LOCATION A SURFACE MOUNT MUSHROOM EMERGENCY SHUT-OFF SWITCH, USED TO SHUT- OFF UTILITY SYSTEMS AND ACTIVATE PURGE FAN IN THE ROOM. SHUT-OFF SHALL INCLUDE ALL CONTROLLED UTILITIES IN THE AREA, INCLUDING ALL DESIGNATED OUTLETS, BUT NOT INCLUDING THE LIGHTING.

D PROVIDE AND INSTALL AT THIS APPROXIMATE LOCATION, IN A SERVICE ACCESSIBLE LOCATION THAT IS CONCEALED ABOVE THE DROP CEILING, OR AS REQUIRED, SURFACE MOUNTED ENCLOSURES TO HOUSE:
- NORMALLY OPEN ELECTRICALLY HELD CONTACTORS TO FEED DEDICATED LAB STATION RECEPTACLE GROUPS FOR ALL CIRCUITS WITH CALLOUTS WITH AN "-L" SUFFIX.
- NORMALLY CLOSED ELECTRICALLY HELD CONTACTORS TO FEED ALL ADDITIONAL GENERAL PURPOSE RECEPTACLE GROUPS AND ALL THE COMPUTER ISOLATED GROUND RECEPTACLE GROUPS FOR ALL CIRCUITS WITH CALLOUTS INCLUDING AN "-A" SUFFIX.
- THESE CONTACTORS ARE TO BE CONTROLLED SEPARATELY BY THE UTILITY SHUT-OFF SYSTEM AS INDICATED.

E WATER ENCLOSURE - PROVIDE AND INSTALL, IN A SERVICE ACCESSIBLE LOCATION THAT IS CONCEALED ABOVE THE DROP CEILING, AT THIS APPROXIMATE LOCATION OR AS REQUIRED, SURFACE MOUNTED NEMA TYPE 1 ENCLOSURE TO HOUSE SHUT-OFF SOLENOIDS (FOR HOT WATER AND COLD WATER), TO BE CONTROLLED BY THE AREA UTILITY SHUT-OFF SYSTEM.

G PROVIDE A 1" CONDUIT FROM SERVICE ACCESSIBLE ATTIC SPACE, RUN CONDUIT DOWN NEAREST WALL (AND BELOW FLOOR IF REQUIRED) AND RUN CONCEALED IN MILLWORK TO GFCI OUTLETS. DO NOT MOUNT OUTLETS WITH FACEPLATE FACING UP IN MILLWORK.

H AREA EXHAUST PURGE FAN TO BE ACTIVATED THROUGH A RELAY CONTROLLED BY THE UTILITY SHUT-OFF SYSTEMS ONE-HOUR DURATION TIMER. REFER TO THE LABORATORY CLASSROOM AND PREPARATION ROOM UTILITY SHUT-OFF SYSTEM DETAILS FOR MORE INFORMATION.

J FUME HOOD ENCLOSURE - PROVIDE WALL MOUNTED JUNCTION BOX AND DIRECT CONNECT POWER FOR THE INTERNALLY WIRED AND SWITCHED: LIGHTS, GFCI OUTLET BUILT-IN TO THE ENCLOSURE, AND SEPARATE EXHAUST FAN. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

K GOGGLE CABINET POWER - PROVIDE AND INSTALL A GFCI OUTLET AT 18" A.F.F. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

M COMPUTER POWER - PROVIDE A COMPUTER ISOLATED GROUND RECEPTACLE, FED THROUGH A GFCI BREAKER, MOUNT AT 18" A.F.F. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

N COMPUTER POWER - PROVIDE A COMPUTER ISOLATED GROUND RECEPTACLE, FED THROUGH A GFCI BREAKER, MOUNT AT 6" ABOVE MILLWORK SPLASH. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

ELECTRICAL GENERAL NOTES
(SOME NOTES MAY NOT BE USED)

1. SEE SHEET EP0.1 FOR GENERAL NOTES APPLICABLE TO THE ENTIRE DRAWING SET.
2. CIRCUIT ALL FIRE ALARM SAFETY FUNCTION DEVICES IN THIS AREA TO L-2. SEE GENERAL NOTES ON NOTES SHEET FOR MORE INFORMATION ON THESE DEVICES.
3. PROVIDE POWER TO ENERGY MANAGEMENT CONTROL SYSTEM (EMCS) IN THIS AREA FROM CIRCUIT L-4.

ELECTRICAL PLAN NOTES
(SOME NOTES MAY NOT BE USED)

1 WEATHERPROOF GFCI MAINTENANCE OUTLET MOUNTED BELOW DISCONNECT.

2 OUTLET INSTALLED 6" ABOVE MILLWORK SPLASH. VERIFY EXACT LOCATION WITH ARCHITECTURAL DRAWINGS.

3 EWC OUTLET INSTALLED 20" A.F.F. - ON GFCI BREAKER.

4 GFCI OUTLET INSTALLED 18" A.F.F.

5 WEATHERPROOF GFCI MAINTENANCE OUTLET 18" A.F.F.

6 GFCI OUTLET INSTALLED 44" A.F.F.

7 PROVIDE CEILING INSTALLED OUTLET FOR PROJECTOR. REFER TO CEILING MOUNTED DEVICES DETAIL FOR INSTALLATION. COORDINATE EXACT MOUNTING HEIGHT AND LOCATION WITH TECHNOLOGY.

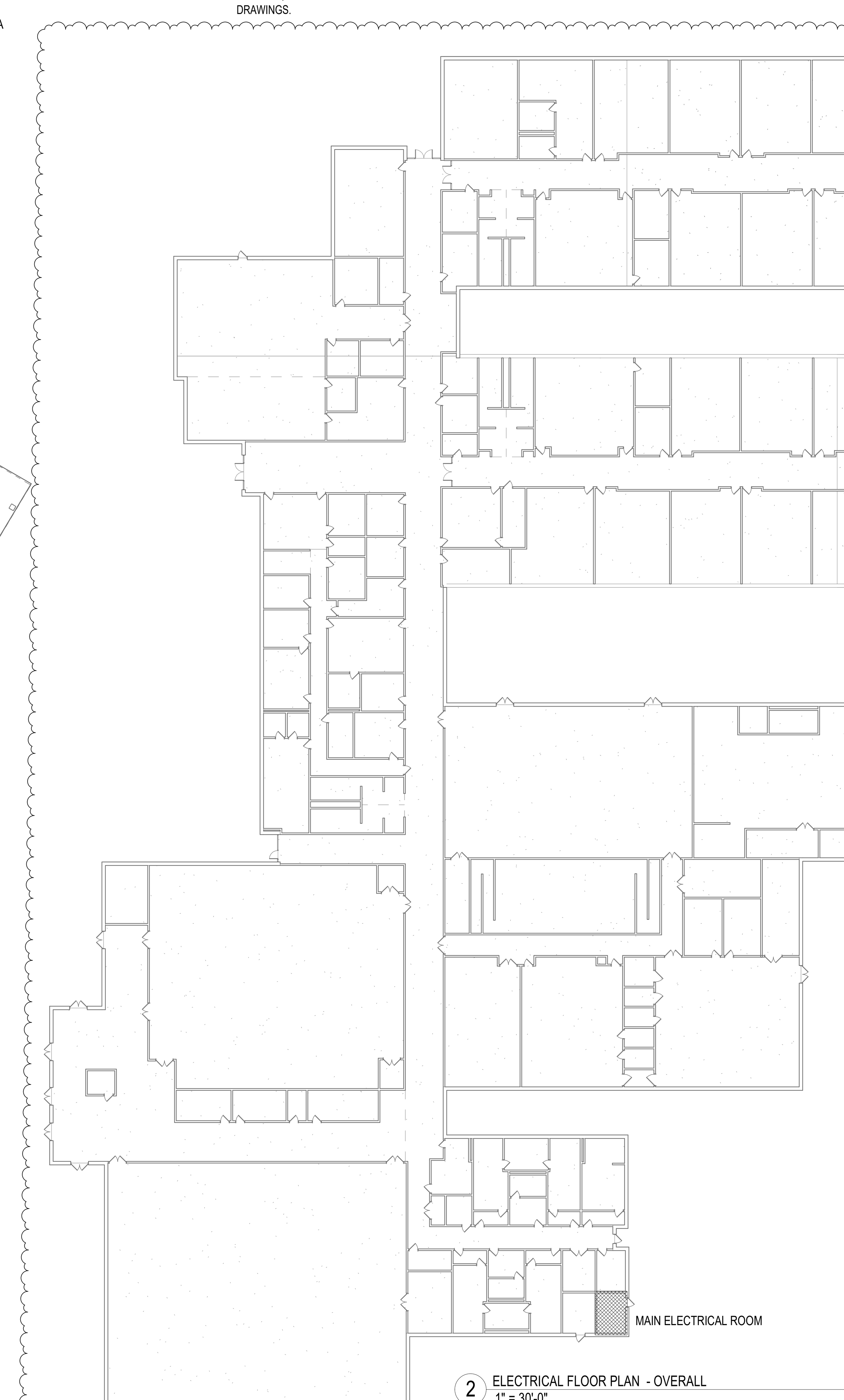
8 PROVIDE J-BOX ABOVE CEILNG FOR PRIJECTOR AND SOUND AMPLIFIER. COORDIANTE EXACT REQUIREMENTS WITH TECHNOLOGY.

9 OUTLETS TO BE MOUNTED IN MILLWORK OF TABLE. REFER TO ARCHITECTURAL CASEWORK DETAIL FOR EXACT MOUNTING HEIGHT LOCATION.

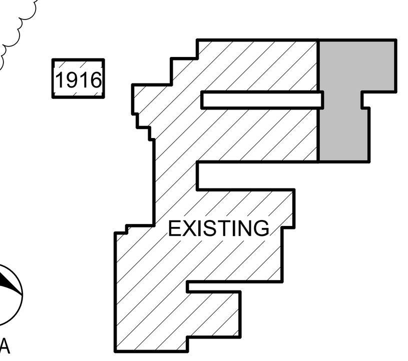
10 AIR HANDLER IS POWERED FROM AIC CONDENSER. REFER TO MECHANICAL SCHEDULE FOR MORE INFORMATION.

11 CEIILNG MOUNTED L6-30R OUTLET TO BE MOUNTED ABOVE EQUIPMENT RACK. FACEPLATE SHALL BE FLUSH WITH FINISHED CEIILNG AND ALIGN WITH VERICAL CABLE MANAGER. COORDINATE LOCATION WITH OWNER AND DATA PROVIDER BEFORE INSTALLATION TO ENSURE PROPER ALIGNMENT.

12 PROVIDE CEILING INSTALLED OUTLET FOR PROJECTOR - ON GFCI BREAKER. REFER TO CEILING MOUNTED DEVICES DETAIL FOR INSTALLATION. COORDINATE EXACT MOUNTING HEIGHT AND LOCATION WITH TECHNOLOGY.



2 ELECTRICAL FLOOR PLAN - OVERALL
1" = 30'-0"



PLAN N

KEY PLAN
N.T.S

JASON W. REED
TEXAS P.E. 105129

JAMES TATE III
TEXAS P.E. 102427

EMA Engineering and Consulting
Tyler ▪ Austin ▪ Houston
Phone: 1-800-933-0538
TBPE Firm Registration No. F-893
www.estesmcclure.com

SUBMISSION OF BID WILL BE CONSIDERED ACKNOWLEDGMENT THAT THE CONTRACTOR HAS VISITED THE SITE AND HAS VERIFIED ALL EXISTING JOB CONDITIONS AND INCLUDED ANY NECESSARY MODIFICATION TO EXISTING AND NEW WORK REQUIRED FOR INSTALLATION OF A COMPLETE AND WORKING SYSTEM.

Revision /	Date	
1	09/04/2018	ADDENDUM #2

Project: JARRELL MS ADDITIONS FOR JARRELL I.S.D. JARRELL, TEXAS

Huckabee
AUSTIN ▪ DALLAS ▪ FORT WORTH
HOUSTON ▪ SAN ANTONIO ▪ WACO
www.huckabee-inc.com
800.687.1229

ELECTRICAL FLOOR PLAN - SECTION 1

Job No.	1756-02-01
Drawn By:	NAN
Date:	08/20/2018
Sheet No.	EP1.1

Project Name: Jarrell Middle School Addition and Renovations
Client: Jarrell ISD
Jarrell, Texas
Project Number: 01756-02-01

STATE OF TEXAS
JASON W. REED
105129
LICENSED
PROFESSIONAL ENGINEER
9-4-18

PLUMBING ITEMS FOR ADDENDUM NO. 2

NOTICE TO PROPOSERS:

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REFERENCE IS MADE TO THE DRAWINGS AND THE PROJECT MANUAL AS NOTED:

PROJECT MANUAL:

AD No 2, Plumb. Item 1: **To the Project Manual, Section 22 05 33, "HEAT TRACING FOR PLUMBING SYSTEMS,"**

1) Delete section from project manual in its entirety. No Heat Trace on project.

DRAWINGS:

AD No 2, Plumb. Item 2: **To the Drawings, Sheet PL1.1, "PLUMBING FLOOR PLAN - SECTION 1,"**

1) Added subsoil drain, and associated piping & notes.
2) Removed "H3" in north section of CORRIDOR 1.01

END OF PLUMBING ADDENDUM

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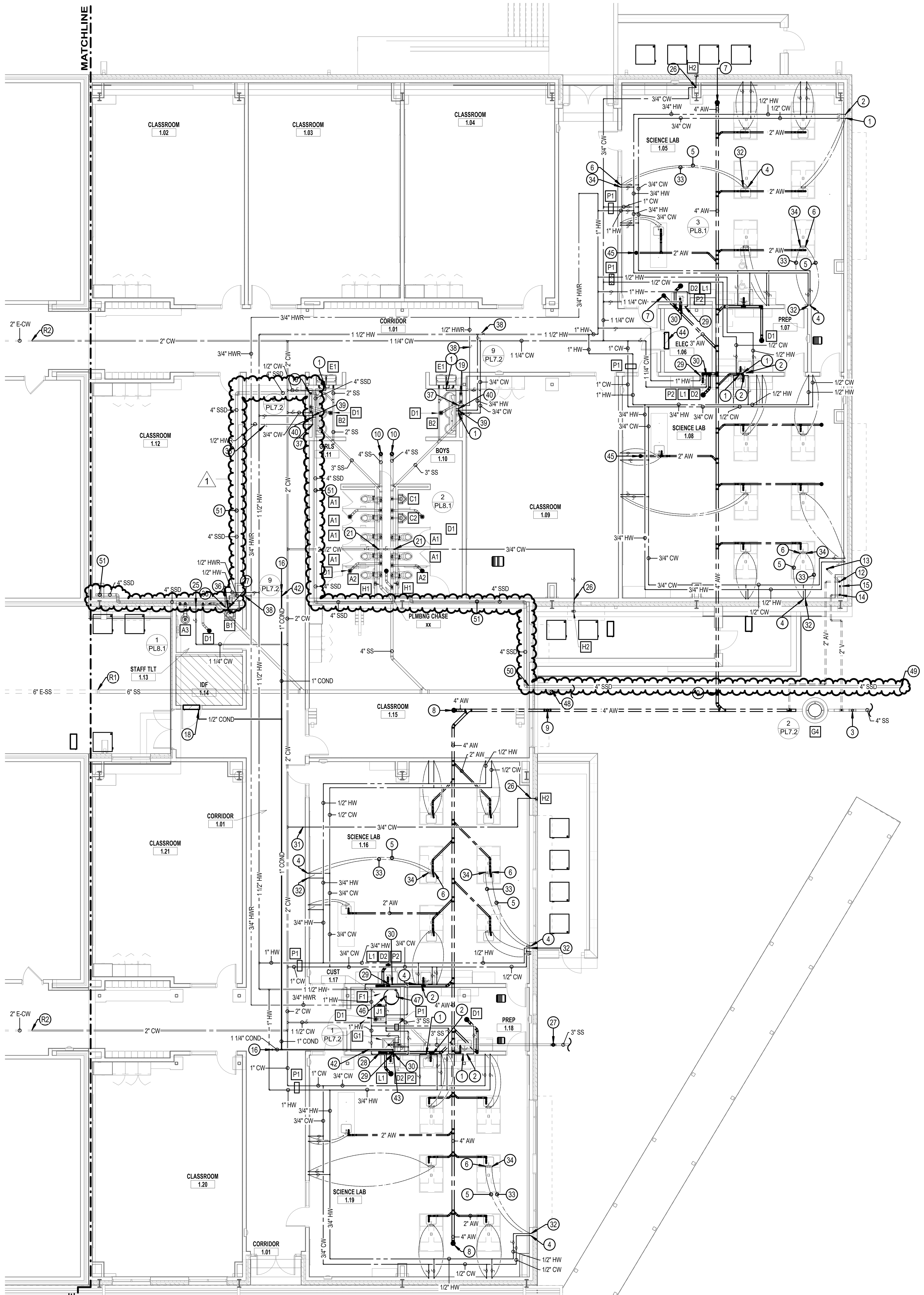
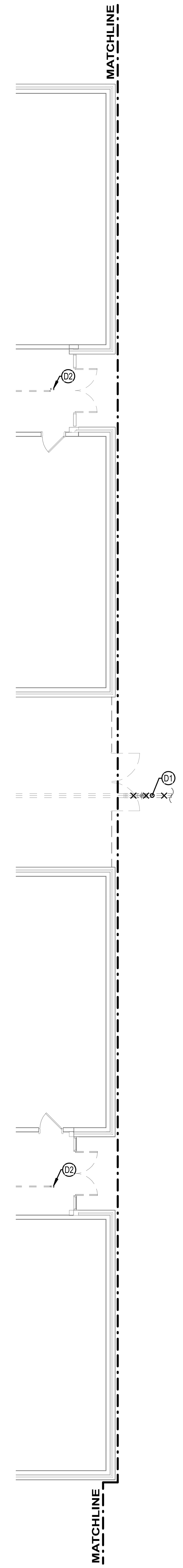
ESTES, McCLURE & ASSOCIATES REGISTRATION NO. F-893



PLUMBING CONTRACTOR SHALL PROVIDE APOLLO 34D SERIES MIXING VALVE AT EACH SINK IN SCIENCE LABS AND SCIENCE PREP ROOMS TO PRODUCE COLD AND TEMPERED WATER TO FAUCETS. ALL SINKS AND FAUCETS IN SCIENCE LABS ARE TO BE PROVIDED BY OTHERS. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL ACID P-TRAP, SUPPLIES WITH STOPS, AND ALL NECESSARY CONNECTIONS.

1 PLUMBING FLOOR PLAN
1/8" = 1'-0"



2 PLUMBING DEMOLITION FLOOR PLAN - SECTION 1
1/8" = 1'-0"

PLUMBING GENERAL NOTES:

1. PLUMBING CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS FOR A.D.A. PLUMBING FIXTURE AND STANDARD MOUNTING HEIGHTS.
2. PLUMBING CONTRACTOR TO COORDINATE ALL PIPE ROUTING ABOVE WITH MECHANICAL AND ELECTRICAL CONTRACTORS BEFORE INSTALLATION.
3. ALL VALVES SHALL BE INSTALLED NO HIGHER THAN 2'-0" ABOVE THE CEILING ACCESS DOORS TO BE INSTALLED AT ALL HARD CEILING LOCATIONS.
4. ALL PIPING PENETRATIONS SHALL BE SLEEVED. COMPLETELY GROUT AROUND THE OUTSIDE OF SLEEVE AND FILL VOIDS AROUND PIPE WITH FIBER FRAX FYRE-PUTTY.
5. AT ALL DISSIMILAR METAL CONNECTIONS, PROVIDE AND INSTALL DIELECTRIC UNIONS IMMEDIATELY TO MINIMIZE USE OF GALVANIZED PIPE MATERIAL.
6. PLUMBING CONTRACTOR SHALL COORDINATE WITH THE MECHANICAL CONTRACTOR MOUNTING HEIGHTS OF ALL AIR HANDLERS TO GUARANTEE POSITIVE DRAINAGE OF ALL CONDENSATE DRAINS (1/8" PER. FOOT SLOPE. MIN.).
7. MECHANICAL CONTRACTOR TO PROVIDE TO THE PLUMBING CONTRACTOR THE RECOMMENDED A.C. MANUFACTURES DATA FOR CONDENSATE TRAPS PER EACH TYPE OF UNIT.
8. PLUMBING CONTRACTOR TO PROVIDE TRAP PRIMERS TO ALL FLOOR DRAINS, SHOWER DRAINS, OPEN OPEN SITE DRAINS AND FLOOR SINKS.
9. DO NOT INSTALL PLUMBING VENTS WITHIN 10'-0" OF ANY ROOFTOP UNITS OR FRESH AIR UNITS/INTAKES. COORDINATE WITH MECHANICAL CONTRACTOR.
10. MOUNT A.D.A. FLUSH CONTROLS TO WIDE SIDE OF STALL.
11. PLUMBING CONTRACTOR TO PROVIDE AND INSTALL BACKFLOW PREVENTER TO KITCHEN.
12. PLUMBING CONTRACTOR TO PROVIDE AND INSTALL ALL BACKFLOW PREVENTER TO KITCHEN EQUIPMENT AS REQUIRED BY THE LOCAL AUTHORITY HAVING JURISDICTION.

PLUMBING PLAN NOTES

1 1/2" COLD WATER DOWN IN WALL/CHASE
2 1/2" HOT WATER DOWN IN WALL/CHASE
3 4" TWO-WAY SANITARY YARD CLEAN-OUT
4 1/2" COLD WATER DOWN IN WALL/CHASE TO BELOW SLAB (TYPICAL FOR ALL ISLAND SINKS)
5 1/2" COLD WATER BELOW SLAB (TYPICAL FOR ALL ISLAND SINKS)
6 1/2" COLD WATER STUBBED UP FROM BELOW SLAB TO SCIENCE LAB (TYPICAL FOR ALL ISLAND SINKS)
7 3" ONE-WAY ACID WASTE FLOOR CLEAN-OUT
8 4" ONE-WAY ACID WASTE FLOOR CLEAN-OUT
9 4" TWO-WAY ACID WASTE YARD CLEAN-OUT
10 4" ONE-WAY SANITARY SEWER FLOOR CLEAN-OUT
12 2" ACID VENT UP IN WALL/CHASE TO ABOVE CEILING
13 2" ACID VENT THROUGH ROOF
14 2" SANITARY VENT UP IN WALL/CHASE TO ABOVE CEILING
15 2" SANITARY VENT THROUGH ROOF
16 CONDENSATE CLEAN-OUT
18 3/4" CONDENSATE TIE-INTO AIR HANDLER WITH P-TRAP AND DOWN TO CONDENSATE SYSTEM
19 3" SANITARY WALL CLEAN-OUT
21 2" COLD WATER DOWN IN WALL/CHASE
22 1" CONDENSATE DOWN TO LOWER CEILING SPACE (REFER TO FLOOR PLAN FOR CONTINUATION)
23 1/2" PRESSURIZED CONDENSATE LINE UP IN WALL/CHASE TO MEZZANINE
24 1/2" PRESSURIZED CONDENSATE LINE MUST TIE INTO THE TOP OF GRAVITY FED CONDENSATE SYSTEM OR BE RUN SEPARATELY
25 1 1/4" COLD WATER DOWN IN WALL/CHASE
26 3/4" COLD WATER DOWN IN WALL/CHASE
27 3" TWO-WAY SANITARY YARD CLEAN-OUT

PLUMBING PLAN NOTES

28 3" ACID WASTE WALL CLEAN-OUT
29 1" HOT WATER DOWN IN WALL CHASE TO EMERGENCY MIXING VALVE
30 1 1/4" COLD WATER DOWN IN WALL/CHASE TO EMERGENCY MIXING VALVE
31 COLD WATER UP TO HIGHER CEILING SPACE
32 1/2" HOT WATER DOWN IN WALL/CHASE TO BELOW SLAB (TYPICAL FOR ALL ISLAND SINKS)
33 1/2" HOT WATER BELOW SLAB (TYPICAL FOR ALL ISLAND SINKS)
34 1/2" HOT WATER STUBBED UP FROM BELOW SLAB TO SCIENCE LAB (TYPICAL FOR ALL ISLAND SINKS)
35 1/2" HOT WATER LOOP DOWN IN WALL/CHASE TO 28" A.F.F.
36 1/2" HOT WATER DOWN FROM LOOP TO LAVATORY
37 1/2" HOT WATER RETURN LINE UP IN WALL/CHASE TO ABOVE CEILING
38 HOT WATER BALANCING VALVE
39 3/4" HOT WATER LOOP DOWN IN WALL/CHASE TO 28" A.F.F.
40 3/4" HOT WATER DOWN FROM LOOP TO LAVATORY
41 1/2" PRESSURIZED CONDENSATE LINE UP IN WALL/CHASE TO ABOVE CEILING
42 1" CONDENSATE DOWN FROM ABOVE
43 1 1/4" CONDENSATE DOWN TO MOP SINK
44 REFER TO PL1.2 FOR CONDENSATE
45 2" ONE-WAY ACID WASTE FLOOR CLEAN-OUT
46 1 1/2" COLD WATER DOWN TO WATER HEATER
47 1 1/2" HOT WATER UP FROM WATER HEATER
48 6" TWO-WAY SANITARY YARD CLEAN-OUT
49 DAY LIGHT SUB SOIL DRAIN THROUGH SLOPE IN GRADE
1
50 SUB SOIL DRAIN TO PENETRATE FOUNDATION FACE
51 REFER TO STRUCTURAL DETAILS FOR DEPTH OF SUB SOIL DRAIN AT FOOTING

PLUMBING DEMOLITION PLAN...

D1 REMOVE 4" SANITARY LINE AND CLEAN-OUT IN THE FOOT PRINT OF NEW ADDITIONS
D2 REMOVE CAP FROM 2" COLD WATER LINE PLACED FOR FUTURE ADDITION

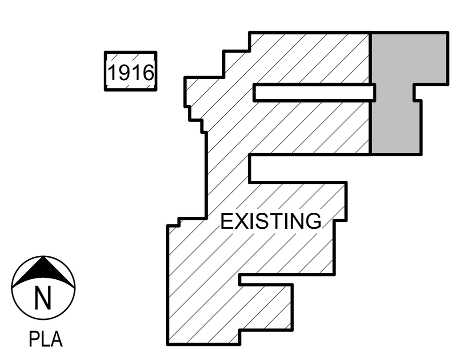
PLUMBING RENOVATION PLAN...

R1 NEW SANITARY TIE IN-TO EXISTING (CONTRACTOR TO FIELD VERIFY EXACT LOCATION)
R2 NEW COLD WATER TIE IN-TO EXISTING (CONTRACTOR TO FIELD VERIFY EXACT LOCATION)

ADDENDUM #2
Date 09/04/2018
Revision / 1

Project:
JARRELL MS ADDITIONS FOR JARRELL I.S.D. JARRELL, TEXAS

JASON W. REED LICENSED PROFESSIONAL ENGINEER 105129
8-20-18



PLAN N
KEY PLAN
N.T.S

JASON W. REED
TEXAS P.E. 105129
JAMES TATE III
TEXAS P.E. 102427

EMA Engineering and Consulting
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PLUMBING FLOOR PLAN - SECTION 1

Job No.	Sheet No.
1756-02-01	PL1.1
Drawn By: SJM	
Date: 08/20/2018	

9/4/2018 3:33:40 PM
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