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ADDENDUM NO. 2

PROJECT: 2024 Cy Lakes HS Renovation

BID DATE: **Thursday, December 19, 2024 (no Change)**

FROM: Carolina Weitzman, A.I.A.
Natex Corporation Architects
447 Heights Blvd, Houston, TX 77007

TO: **Prospective Bidders**

This Addendum forms a part of the Bidding Documents and will be incorporated into Contract Documents. Insofar as the Project Manual or Drawings or both are inconsistent, this Addendum governs. Acknowledge receipt of the Addendum by inserting its number into the Proposal Form. **FAILURE TO DO SO WILL SUBJECT BID TO DISQUALIFICATION**.

PART 1 CHANGES TO PROJECT MANUAL

1. SECTION 08 87 00 Door Hardware - Replace section in its entirety with one attached.

2. SECTION 13 34 13 Greenhouse - Revised Part 1.1.03: Modify size to " 30' x 72'" per drawing.

3. SECTION 23 09 33 Building Management and Control System, Part 3 Execution, Replace Article 3.31 Chilled Water System Control in its entirety with the following

4. SECTION 23 73 13 – Air Handling Units - Replace this section in its entirety as attached.

5. SECTION 23 35 16 – Welding Fume Exhaust System, Part 2 Products - Add Articles 2.7 and 2.8 as follows:

2.7 SLOTTED FUME HOODS

A. 18 gauge welded stainless steel construction.
B. Exhaust outlet size shall be full size of connected ductwork. Refer to drawings.
C. Provide manual balancing damper on outlet of hood.
D. Hood length as indicated on drawings.

2.8 INTERNAL SUPPORT SOURCE CAPTURE ARM

A. Internally supported source capture arm with a minimum of four pivot points and 180 to 360 degrees swivel.
B. Arm shall be provided with internal support structure,

6. SECTION 28 46 02 Expansion of Existing Fire Detection and Alarm System - Remove this section in its entirety.

7. SECTION 28 46 00 – Fire Detection and Alarm System - Add this section in its entirety.

PART 2 CHANGES TO DRAWINGS

1. SHEET C1.05 DEMOLITION PLAN (SHEET 3 OF 3)
   a. Revised location of existing irrigation water line offset to provide proposed domestic water line connection for proposed Greenhouse addition.

2. SHEET C3.03 UTILITY PLAN (SHEET 3 OF 3)
   a. Revised location of proposed domestic water line connection to existing domestic water line to move it out from under proposed pavement to serve proposed Greenhouse addition.
   b. Revised location of proposed MEP sanitary and water line stubs at proposed Greenhouse and revised flowline elevations accordingly.

3. SHEET A1.01 ENLARGED SITE PLAN
   a. Refer to revised sheet for revisions to Bollard detail, fencing reference and gate schedule.

4. SHEET A1.02 ATHLETIC STORAGE BLDG PLANS & DETAILS
   a. Detail 3 Enlg Ceiling Plan – Delete note " Open structure @roof". Provide metal liner panels per specification.

5. SHEET A1.04 ENLARGED CANOPY PLANS & DETAILS
   a. Refer to revised sheet for revisions to details 3, 4, 5 7, 9 & 10.

6. SHEET A1.05 GREENHOUSE PLAN & DETAILS
   a. Enlarged Greenhouse Plan – Revise note environmental control sys. under fire extinguisher to read "Environmental control sys. & Thermostat above or below fire extinguisher at greenhouse structural post.
   b. Detail 3 Wall Section – Greenhouse: Revise all notes regarding foundation to refer to structural drawings.

7. SHEET A2.30 OVERALL & ENLARGED ROOF PLANS
   a. Detail 2 Enlarged Roof plan: Add missing dimensions (5' x 25') for plan north aluminum awning.

8. SHEET A2.33 TYPICAL ROOF ACCESSORY DETAILS
   a. Refer to revised sheet for added roof expansion details 3, 4 & 5.

9. SHEET A3.01 RECEPTION PLANS & DETAILS
   a. Revise plam type PL-1 noted for front side of reception on section details to match elevations PL-2. PL-2 is correct.

10. SHEET A3.10 RESTROOM PLAN & ELEVATIONS
    a. Detail 14 Restroom tile corner – revise corner guard Schluter Rondec finish to brushed stainless steel.

11. SHEET A5.00 EXTERIOR OPENING TYPES
    a. Refer to revised sheet for revisions to details 2, 3, 4, 5, 6, 7, 8, 9 & 10.

12. SHEET A8.01 WALL SECTIONS & DETAILS
    a. Add Wall Section Notes from A8.02.

13. SHEET A8.02 WALL SECTIONS & DETAILS

a. Refer to revised sheet for added Wall Section Notes, and revisions to Wall Sections 1, 2 & 5.

14. SHEET A8.03 WALL SECTIONS & DETAILS
    a. Refer to revised sheet for added Wall Section Notes, and Wall Sections 3 & 4.

15. SHEET A8.04 WALL SECTIONS & DETAILS
    a. Refer to revised sheet for added Wall Section Notes, and Wall Section 4.

16. SHEET A11.01 1ST FLOOR REFLECTED CEILING PLAN
    a. Ceiling Plan – Area "F"
        1. Revise ceiling height in Corr 1768A to 9'-0"
        2. Add note for soffit outside of Corr 1768A – "New plaster soffit & downlight. Re: wall section 2A8.04 & Elec.
    b. Ceiling Plan Legend – Where existing exterior plaster is scheduled, revise to read "New exterior plaster soffit"

17. SHEET A12.00 FINISH LEGEND & ROOM SIGNAGE
    a. Finish Legend – revise the following:
        1. LVT-1: Tarkett ID Latitude Abstract; color: Greige 5103; Installation: Unidirectional.
        2. LVT-5: Mohawk Molven Stones; Color: 879 Perfect Greige; Installation: Half Lap.

18. SHEET M2.07 MECHANICAL FIRST FLOOR PLAN – AREA G
    a. Refer to revised sheet for details on fume extraction arms in Welding 4017.

19. SHEET M2.18 MECHANICAL ROOF PLAN
    a. Refer to revised sheet for revised equipment tags.

20. SHEET M7.05 MECHANICAL CONTROLS FIRST FLOOR PLAN – AREA P
    a. Refer to revised sheet for location of (E) FC-1.

21. SHEET M7.11 MECHANICALCONTROLS SCHEDULES
    a. Refer to revised sheet for additional existing equipment schedules.

22. SHEET M7.12 MECHANICALCONTROLS SCHEDULES
    a. Refer to revised sheet for additional control schedules.

23. SHEET E1.02, "ELECTRICAL SITE PLAN – ENLARGED VIEWS":
    a. Power provided at thermostat location.
    b. IDF Rack power relocated for coordination.
    c. Lighting general box note revised to include coordination of fixture locations prior to rough-in.

24. SHEET E6.02, "ELECTRICAL PARTIAL ONE-LINE DIAGRAM":
    a. Added keynotes and fire rated cable general note fore life safety feeders.

25. SHEET E8.01, "ELECTRICAL DETAILS, LEGENDS, AND SCHEDULES":
    a. Added detail 'ELECTRICAL EQUIPMENT MOUNTING RACK' to sheet.

26. SHEET T0.00, "TECHNOLOGY LEGENDS AND SCHEDULES":
    a. Revise Fire Alarm Legend. Reference new fire alarm specification for project scope.

27. SHEET T0.01, “TECHNOLOGY DEMOLITION FIRST FLOOR PLAN – AREA D”:
    a. Update FACP from existing to demo. Add demolition notes for FACP. Refer to revised sheet.

28. SHEET T1.01, “TECHNOLOGY SITE PLAN”:
    a. Revise intercom and data rack design. Refer to revised sheet.

29. SHEET T1.02, “TECHNOLOGY COMPOSITE FLOOR PLANS”:
    a. Remove Technology scope notes. Reference specifications for scope.

30. SHEET T2.04, “TECHNOLOGY FIRST FLOOR PLAN – AREA D”:
    a. Add new FACP in same location as existing. Refer to revised sheet.

31. SHEET T2.07, “TECHNOLOGY FIRST FLOOR PLAN – AREA G”:
    a. Remove note C from Fire Alarm note. Refer to revised sheet.

32. SHEET T2.08, “TECHNOLOGY FIRST FLOOR PLAN – AREA H”:
    a. Add note for addition of door buzzer in shop that will integrate with new 2N door station. Refer to revised sheet.

PART 3 CLARIFICATIONS

1. Question: In addition to upgrading the existing system to voice evac; is it the intent of the owner to add additional devices (i.e. smoke, heat, co detectors) in the existing building to meet the requirements of the Fire Marshall and contract specifications? This question only applies to existing building – not new addition.

   Answer: The fire alarm scope was changed from a system upgrade to a complete replacement in Addendum 02 so all new devices will be required.

PART 4 PRIOR APPROVALS

1. Specification Section 116133 Rigging Systems and Control – IWEISS is an approved manufacturer.

END OF ADDENDUM NO. 2

APPROVED FOR ISSUE: _____
By M. Carolina Weitzman, principal, NATEX Architects

END OF DOCUMENT

Total No. of Pages to Addendum No.2: 169 pages.

SECTION 087100 –
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Interior Aluminum Doors and Frames”.
4. Division 08 Section “Plastic Laminate Faced Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified installer of Windstorm assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained,

certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Lifetime for mortise locks and latches.
2. Five years for exit hardware.
3. Ten years for electric latch retraction exit motors

4. Twenty-five years for manual surface door closer bodies.
5. Two years for electromechanical door hardware.
6. Lifetime for SN200 readers.

1.8 MAINTENANCE SERVICE

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.

1.9 OWNER STOCK – See Attic Stock at the end of Hardware Schedule.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

    a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Acceptable Manufacturers:

    a. Hager Companies (HA).
    b. McKinney Products (MK).
    c. Stanley Hardware (ST).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Acceptable Manufacturers:

    a. McKinney Products (MK).
    b. Pemko Manufacturing (PE).
    c. Stanley Hardware (ST).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:

a. Pemko Manufacturing (PE) – EL-CEPT Series.
b. Securitron (SU) - EL-CEPT Series.
c. Stanley Hardware (ST) EPT-12C Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
   b. McKinney Products (MK) - Connector Hand Tool: QC-R003.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:

   a. Ives (IV).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

B. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

5. Acceptable Manufacturers:

a. Ives (IV).
b. Rockwood Manufacturing (RO).
c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Acceptable Manufacturers:

a. Stanley Best (BE).
b. Sargent Cylinder Housings
c. No Substitution.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Match Facility Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Key locks to Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Twenty construction cores
3. 50 Key Blanks – Best “A” Keyway

F. Construction Keying: Provide temporary keyed construction cores. Green Best Cores No Substitution . All Best temporary cores to be returned to the district at the end of the project.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project. Provide a new cabinet to all new construction projects. Use Lund 1205-B as a basis of design.

1. Acceptable Manufacturers:

a. Lund Equipment (LU).
b. MMF Industries (MM).
c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Acceptable Manufacturers

a. Sargent Manufacturing (SA) 8200 Series – No substitutions
b. Sargent Manufacturing (SA) 10X Series - No substitutions
1) Use at student restrooms or as directed by Cy Fair ISD

2.7 AUXILIARY LOCKS

A. Tubular Deadlocks: Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Acceptable Manufacturers:

a. Marks (MX) - 130 Series.
b. Sargent Manufacturing (SA) – 480 Series.

2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.
3. Dustproof Strikes: BHMA A156.16.

2.9 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Rail Sizing: Provide exit device rails factory sized for proper door width application.

7. Through Bolt Installation: For exit devices and trim as indicated (TB) in Door Hardware Sets.

8. Provide Less Dogging (LD) at all exit devices.

9. Add 31- Prefix to all exit devices being provided at two inch aluminum doors.

10. No self-tapping screws allowed.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.
b. No Substitution.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.

1. Provide keyed removable feature where specified in the Hardware Sets.

2. Provide stabilizers and mounting brackets as required.

3. Provide electrical quick connection wiring options as specified in the hardware sets.

4. Acceptable Manufacturers:

a. Stanley Precision (PR) - 822 Series.
b. No Substitution.

2.10 INTEGRATED WIEGAND OUTPUT ACCESS CONTROL EXIT DEVICES

A. Wiegand Output Integrated Card Reader Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.

1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
2. Reader supports either HID 125 kHz proximity (up to 39 bits, including Corporate 1000) or 13.56 MHz (2K-32K) iClass® credentials.
3. 12VDC external power supply required for reader, with optional 24VDC operation available with iClass® reader (125 kHz reader is always 12VDC). 24VDC required for solenoid operated exit trim (12VDC if applicable). Fail safe or fail secure options.
4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.

5. Acceptable Manufacturers:

a. Sargent Manufacturing (SA) - SN – 56-SN20080 Series Exits. x SPAR04867
b. Sargent Manufacturing (SA) - SN – SN2008200 Series Locks.
c. No Substitution.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.

8. Through Bolt Installation: All door closers are to be installed with (TB) through bolting as indicated in Door Hardware Sets.

9. No self-tapping screws allowed.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:

a. Sargent Manufacturing (SA) – TB 351 Series.

2.12 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Acceptable Manufacturers:

a. LCN Door Closers (LC) - SEM7800 Series.
b. Rixson (RF) - 980/990 Series.
c. Sargent Manufacturing (SA) - 1560 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

4. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

5. Acceptable Manufacturers:

a. Ives (IV).
b. Rockwood Manufacturing (RO).
c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated,

unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

    a. Ives (IV).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:

    a. Do not use overhead stops/holders

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. No Replaceable Seal Strips allowed: Provide only those units where they can be screw applied..

E. Acceptable Manufacturers:

1. National Guard Products (NG).
2. Pemko Manufacturing (PE).
3. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Acceptable Manufacturers:

a. Provided by Security

B. Switching Power Supplies: Provide UL listed or recognized filtered and regulated power supplies. Provide single, dual, or multi-voltage units as shown in the hardware sets. Units must be expandable up to eight Class 2 power limited outputs. Units must include the capability to incorporate a battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Acceptable Manufacturers:

a. Provided by Security

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. 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.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.

D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

G. No self-tapping screws allowed.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

B. Final Adjustment: Installer shall return and make final adjustment of all hardware once all air conditioning test and balance is complete. Final adjustment shall be made while air conditioner system is operating. Coordinate with General Contractor and Owner.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

A. Manufacturer's Abbreviations:

1. MK - McKinney
2. OT - OTHER
3. PE - Pemko
4. RO - Rockwood
5. PR - Precision
6. MX - Marks
7. SA - Sargent
8. AD - Adams Rite
9. BE - Best Access Systems
10. HS – HES
11. SU – Securitron
12. KD – Keedex
13. LO – Locinox

****At existing doors / frames, all conditions must be field verified prior to order.**
At aluminum frames, gasket is by frame manufacturer.
****Add 2891APK gasketing to all exterior hollow metal doors.**
****Confirm loop or EPT at all existing openings requiring access control.**

Hardware Sets based on plans dated 08-13-2024
10/14/2024 hardware revised per 75% review meeting.
11/11/2024 hardware revised per 95% review meeting.
12/8/2024 changes per review meeting.

Set: 1.0
Doors: 1070-2, 1500-1
Description: Add Reader

1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA
1	Balance of hardware	Existing to remain		OT

Set: 1.1
Doors: 1500A-2
Description: 2N Station - rail

1	68-1375 8500	Mounting Rail Insert		SA
1	Balance of hardware	Existing to remain		OT
1	2N Station	2N Station		OT

Set: 1.2
Doors: 4023-1, 4024-1, 4025-5
Description: New core only

1	Interchangeable Core	I/CK-7	626	BE

Set: 2.0
Doors: 1070-3, 1130-1
Description: Add Reader - 68-1375 Rail - Pivots

2	Pivots	New - by Storefront Supplier		OT
1	68-1375 8500	Mounting Rail Insert		SA
1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on exiting rail with 68-1375 mounting rail insert.

Set: 3.0
Doors: 1850-1
Description: Add Reader - 68-1375 Rail Insert - 2 - Threshold

2	68-1375 8500	Mounting Rail Insert		SA
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-1375 mounting rail insert

Set: 4.0
Doors: 1008-2, 1535-2, 1575-3
Description: Add Reader - Rail Insert

1	68-1375 8500	Mounting Rail Insert		SA
1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA

1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on exiting rail with 68-1375 mounting rail insert.
*Replace HID reader on wall with SN200 reader.

Set: 5.0
Doors: 1800-1
Description: Add Reader - 68-1375 Rail Insert - 2

2	68-1375 8500	Mounting Rail Insert		SA
1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-1375 mounting rail insert

Set: 6.0
Doors: 2515-3
Description: Add 68-0549 Rail Insert - 1

1	68-0549 8800	Rail Inserts		SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-0549 mounting rail insert

Set: 6.1
Doors: 1008-3
Description: Add 68-1375 Rail Insert - 1

1	68-1375 8500	Mounting Rail Insert		SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-1375 mounting rail insert

Set: 7.0
Doors: 1006-1, 1125-2, 1125-3
Description: Add 68-1375 Rail Insert - 8504

1	68-1375 8500	Mounting Rail Insert		SA
1	Rim Exit SPAR NC-E11 - Dogging	19 TB 43 70 8504 Less Pull	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-1375 mounting rail insert

Set: 8.0
Doors: 1100-1, 1125-1, 1174-1, 1225-1, 1225-2, 1225-3, 1225-4, 1373-2, 1575-1, 1575-2, 1575-4
Description: Add 68-1375 Rail Insert - SN200 8500 - EPT

1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit xSPAR04867/NC-E11/NC-E35 SN200-8504	US32D	19 LD TB 43 70 56-SA	
1	68-1375 8500	Mounting Rail Insert		SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	ElectroLynx Harness	QC-C1500P		MK
1	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on existing rail with 68-1375 mounting rail insert. Reuse existing trim.

Set: 8.1
Doors: 1000-1, 1000-2, 1006-2
Description: Add SN200 Narrow Exit - 862, Loop

1	Rim Exit xSPAR04867/NC-E11/NC-E35+-8504 862	US32D	19 TB 43 70 56-SN200-SA	
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	462	US2C	RO
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.

Set: 8.2
Doors: 1500A-1, 1502-1
Description: Add SN200 Narrow Exit - 862, EPT

1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit xSPAR04867/NC-E11/NC-E35 SN200-8504 Less Trim	US32D	19 LD TB 43 70 56-SA	
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	462	US2C	RO
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.
Verify use of EPT vs Door Loop.

Set: 9.0
Doors: 1008-1
Description: Add 2 ea - 68-1375 Rail Insert Only

2	68-1375 8500	Mounting Rail Insert		SA
2	Door Position Switch	By Security.		OT
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on rail with 68-1375 mounting rail insert.

Set: 10.0
Doors: 1125-4
Description: Add 1 ea - 68-1375 Rail Insert - SN200 Reader Only

1	68-1375 8500	Mounting Rail Insert		SA
2	Door Position Switch	By Security.		OT
1	SN200 Reader	52 6027 (Exit / Lock)	26D	SA
1	Balance of hardware	Existing to remain		OT

Notes: Remove cylinder dogging on exiting rail with 68-1375 mounting rail insert. Replace existing HID reader with SN200

Set: 11.0
Doors: 1104-2, 1104-3, 1109-1, 1109-2, 1113-1, 1119-1, 1119-2, 1607-1, 1608-1, 1609-1, 1610-1, 1611-1, 1612-1, 1613-1, 1663-1, 1665-1, 1667-1, 1713-2, 1803-1, 1809-1, 1810-1, 1830-1, 1836-1, 1845-1, 1873-3, 1874-2, 1881-3, 1909-1, 2122-1, 2135-1, 2137-1, 2515-1
Description: Add Exit Device-8816- HO Closers

1	Rim Exit Sec CR x SPAR#NC-E11	19 LD 43 49 70 8816 ETL	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors.

Set: 12.0
Doors: 1037-1, 1038-1, 1171-1, 1173-1, 1175-1, 1178-1, 2108-1, 2110-1, 2114-1, 2116-1, 2209-1, 2210-1, 2211-1, 2212-1, 2213-1, 2214-1, 2215-1, 2216-1, 2309-1, 2310-1, 2311-1, 2312-1, 2313-1, 2315-1, 2316-1, 2318-1, 2405-1, 2407-1, 2416-1, 2418-1, 2606-1, 2608-1, 2612-1, 2613-1, 2705-1, 2707-1, 2709-1, 2711-1, 2714-1, 2716-1, 2718-1, 2720-1, 2806-1, 2807-1, 2808-1, 2809-1, 2811-1, 2812-1, 2813-1, 2814-1, 2906-1, 2910-1, 2916-1, 2917-1
Description: Add Exit Device-8816- HO Closers - Thru bolts

1	Rim Exit Sec CR x SPAR#NC-E11	19 LD 43 49 70 8816 ETL	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Sex Nut & Bolt Kit	SNB134-38	689	NO
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors.
**TB Kit to be used to fill existing pull preps.

Set: 13.0
Doors: 1171-2, 1173-2, 1175-2, 1178-2
Description: Add Exit Device-8804- HO Closers - Thru bolts

1	Rim Exit NL SPAR#NC-E11	LD TB 19 43 70 8804 ETL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Sex Nut & Bolt Kit	SNB134-38	689	NO
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors.
**TB Kit to be used to fill existing pull preps.

Set: 14.0
Doors: 1047-1, 1047-2, 2500-1
Description: Add Exit Device-8816/8804- HO Closers - Thru bolts

1	Rim Exit Sec CR x SPAR#NC-E11	LD 19 LD 43 49 70 8816 ETL	US32D	SA
1	Rim Exit NL SPAR#NC-E11	LD TB 19 43 70 8804 ETL	US32D	SA
3	Interchangeable Core	I/CK-7	626	BE
3	Const. Core	7190224	Green	BE
2	Sex Nut & Bolt Kit	SNB134-38	689	NO
2	Surface Closer	TB 351 PSH	EN	SA
2	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors.
**TB Kit to be used to fill existing pull preps.

Set: 15.0
Doors: 1255-1, 1809-2, 1873-1, 1874-1, 1881-2, 1938-1, 2122-2, 2135-2, 2137-2
Description: Add Exit Device-8804- HO Closers

1	Rim Exit NL SPAR#NC-E11	LD TB 19 43 70 8804 ETL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE

1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors.

Set: 15.1
Doors: 1810-2, 1830-2
Description: New Exit Device-8804- STC - Confirm hinge

1	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
1	Rim Exit SPAR NC-E11 STC	LD TB 19 TB 31 43 70 8804 ETL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Parallel Hold Open Arm	25-PSH	EN	SA
1	Door Stop	462	US2C	RO
1	Gasketing, Threshold, Door Bottom	By the STC door manufacturer		OT
1	Balance of hardware	Existing to remain		OT

Notes: Confirm hinge type required to meet desired STC Rating. Existing frame - coordinate with new hardware. Hold open closers will not normally work with cam lift hinges - confirm hinge type prior to hardware purchase.

Set: 16.0
Doors: 1990-3
Description: Add Exit Device-8816- HO Closers - repair

1	Rim Exit Sec CR x SPAR#NC-E11	19 LD 43 49 70 8816 ETL	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Provide hold open closers at classrooms unless fire rated. No hold open on rated doors. Contractor to paint and bondo any existing holes.

Set: 17.0
Doors: 3101-1, 3101-2
Description: Add SN200 Narrow Exit 8504 x 8510, Loop

1	Rim Exit xSPAR04867/NC-E11/NC-E35 SN200-8504	19 LD TB 43 70 56-US32D	SA	
1	Rim Exit SPAR NC-E11	LD 19 TB 43 8510 EO	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK

1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.
Verify use of EPT vs Door Loop.

Set: 18.0
Doors: 1025-1
Description: Add SN200 Exit, Loop, Rail Insert - Threshold

1	Rim Exit x SPAR04867/NC-E11	19 LD TB 43 70 56-SN200-8804	US32D	SA
2	68-0549 8800	Rail Inserts		SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times. Reuse existing Trim

Verify use of EPT vs Door Loop.

Set: 19.0
Doors: 1140-1, 1140-2, 1165-2, 1724-2
Description: Add SN200 Exit, Loop, Rail Insert

1	Rim Exit x SPAR04867/NC-E11	19 LD TB 43 70 56-SN200-8804	US32D	SA
1	68-0549 8800	Rail Inserts		SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times. Reuse existing Trim. Remove cylinder dogging on exiting rail with 68-0549 mounting rail insert
Verify use of EPT vs Door Loop.

Set: 19.1

Doors: 1006-3
Description: Add 8804 Exit

1	Rim Exit NL SPAR#NC-E11	LD 19 TB 43 70 8804 Less Pull	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Position Switch	By Security.		OT
1	Balance of hardware	Existing to remain		OT

Set: 20.0
Doors: 1702-2, 1704-2, 1718-2, 1722-2, 1909-2, 1909-9, 1990-1
Description: Add SN200 Exit, Loop

1	Rim Exit x SPAR04867/NC-E11	19 LD TB 43 70 56-SN200-8804	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times. Reuse existing Trim. Remove cylinder dogging on exiting rail with 68-1375 mounting rail insert
Verify use of EPT vs Door Loop.

Set: 21.0
Doors: 1500B-1, 1800-2
Description: Add SN200 Lock, Loop

1	SN200 Mort Lock	70 SN200-82271 OL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times. Reuse existing Trim. Remove cylinder dogging on exiting rail with 68-1375 mounting rail insert
Verify use of EPT vs Door Loop.

Set: 22.0
Doors: 1933-1
Description: Add 2N Exit, Loop

1	Rim Exit - 2N SPAR#04867/NC-E11	LD 19 TB 43 56 70 8804 Less Pull	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	ElectroLynx Harness	QC-C1500P		MK
1	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Loop	DL-2		AK
1	Power Supply	Provided by security		SU
1	Balance of hardware	Existing to remain		OT

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times. Card reader by security. Reuse existing Trim.
Verify use of EPT vs Door Loop.

Set: 23.0
Doors: 1750-1, 1750-4
Description: Pair Add Rated Exit Devices-8816 x 8804

1	Rim Exit Rated Sec CR x SPAR#NC-E11	12 LD 19 43 49 70 8816 ETL	US32D	SA
1	Rim Exit SPAR NC-E11	12 LD 19 TB 43 70 8804 ETL	US32D	SA
3	Interchangeable Core	I/CK-7	626	BE
3	Const. Core	7190224	Green	BE
2	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Set: 24.0
Doors: 1102-1, 1102-2, 1102-3, 1102-4, 1102-5, 1102-6, 1102-7, 1120-1, 1120-2, 1147-1
Description: Pair Add Exit Devices-8804 x 8810 x HO Closer - SNB - 8804 with dogging

1	Rim Exit EO x SPAR#NC-E11	19 LD TB 43 8810	US32D	SA
1	Rim Exit NL SPAR#NC-E11 - Dog	19 TB 43 70 8804 Less Pull	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
2	Surface Closer	TB 351 PSH	EN	SA
2	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Notes: Reuse existing trim.

Set: 25.0
Doors: 1045-1, 1105-2, 1114-3, 1308-1, 1413-1, 3014-1
Description: Existing - Add 8204

1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Set: 26.0
Doors: 1156-1, 1159-1, 1162-1, 1163-1, 1164-1, 1166-1, 1168-1, 1169-1, 1170-1, 1206-1, 1212-3, 1214-1, 1260-1, 1264-3, 1305-1, 1306-1, 1309-1, 1311-1, 1369-1, 1371-1, 1705-1, 1717-2, 1867-1
Description: Existing - Add 8204 - HO Closer

1	Storeroom/Closet Lock	70 8204 LL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
1	Door Stop	481H	US26D	RO	
1	Balance of hardware	Existing to remain		OT	

Set: 27.0
Doors: 1030-1, 1034-1, 1048-1, 1049-1, 1103-1, 1156-2, 1159-2, 1162-2, 1163-2, 1164-2, 1166-2, 1168-2, 1169-2, 1170-2, 1206-2, 1212-2, 1214-2, 1255-2, 1260-3, 1264-2, 1301-1, 1305-2, 1306-2, 1309-2, 1311-2, 1369-2, 1371-2, 1374-1, 1375-1, 1534-1, 1556-1, 1558-1, 1560-1, 1562-1, 1602-1, 1604-1, 1605-1, 1657-1, 1658-1, 1659-1, 1662-1, 1664-1, 1666-1, 1704-1, 1705-2, 1711-1, 1717-1, 1718-1, 1854-1, 1860-1, 1867-2, 1900-1, 1902-1, 1924-1, 1932-1, 1938-2, 2006-1, 2008-1, 2010-1, 2012-1, 2014-1, 2016-1, 2018-1, 2109-1, 2111-1, 2113-1, 2307-1, 2402-1, 2410-1, 2411-1, 2417-1, 2519-1, 2520-1, 2702-1, 2904-1, 2911-1, 2915-1, 3004-1, 3006-1, 3008-1, 3010-1, 3012-1
Description: Existing - Add 8238 - HO Closer

1	Classroom Security Intruder Lock SA	V01 EMB 70 8238 VN1L 90-3/8" Collar		US26D	
2	Interchangeable Core	I/CK-7	626	BE	
2	Const. Core	7190224	Green	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
1	Door Stop	481H	US26D	RO	
1	Balance of hardware	Existing to remain		OT	

Set: 28.0
Doors: 1355-1, 1378-1, 2208-1, 2414-1
Description: Existing - Add 8238

1	Classroom Security Intruder Lock SA	V01 EMB 70 8238 VN1L 90-3/8" Collar		US26D	
2	Interchangeable Core	I/CK-7	626	BE	
2	Const. Core	7190224	Green	BE	
1	Door Stop	481H	US26D	RO	
1	Balance of hardware	Existing to remain		OT	

Set: 29.0
Doors: 1036-1, 1054-1, 1056-1, 1056-2, 1057-1, 1105-1, 1105-3, 1114-1, 1114-2, 1157-1, 1158-1, 1357-1, 1511-2, 1704-3, 1705-3, 1710-1, 1711-2, 1713-1, 1714-1, 1716-1, 1722-1, 1750-3, 1752-1, 1772-1, 1811-1, 1812-1, 1817-1, 1818-1, 1819-1, 1820-1, 1821-1, 1822-1, 1823-1, 1824-1, 1837-1, 1839-1, 1840-1, 1841-1, 1842-1, 1843-1, 1854-2, 1854-3, 1856-1, 1859-1, 1862-1, 1865-1, 1866-1, 1870-1, 1886-1, 1902-2, 1913-1, 1927-1, 1927-2, 1928-1, 1977-1, 1993-1, 2507-1, 2508-1, 2511-1, 2511-2, 2704-1, 2706-1, 2708-1, 2710-1, 2908-1, 2912-1, 3012-2, 3103-1

Description: Existing - No Work

1	All hardware	Existing to remain		OT

Set: 30.0
Doors: 1020-1, 1380-1, 1381-1, 1382-1, 1401-1, 1404-1, 1407-1, 1409-1, 1410-1, 1411-1, 1412-1, 1415-1, 1416-1, 1418-1, 1419-1, 1420-1, 1421-1, 1422-1, 1423-1, 1424-1, 1426-1, 1501-1, 1501-2, 1503-1, 1504-1, 1506-1, 1506-2, 1508-1, 1508-2, 1509-1, 1510-1, 1510-2, 1511-1, 1513-1, 1513-2, 1521-1, 1522-1, 1523-1, 1524-1, 1525-1, 1527-1, 1528-1, 1529-1, 1530-1, 1533-1, 1533-2, 1982-1
Description: Existing - Add 8205

1	Office/Entry Lock	70 8205 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Set: 31.0
Doors: 1512-1, 1514-1, 1514-2
Description: Existing - Add 8205/ Indicator

1	Office/Entry Lock	V01 EMB 70 8205 VN1L	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Set: 32.0
Doors: 1033-1, 1359-1, 1720-1, 1985-1, 1991-1
Description: Existing - No Work

1	All hardware	Existing to remain		OT

Set: 33.0
Doors: 1365-1, 1367-1, 1376-1
Description: Existing - No Work

1	All hardware	Existing to remain		OT

Set: 34.0
Doors: 1827-1
Description: Existing Pr- Add HO Closer

2	Surface Closer	TB 351 PSH	EN	SA
2	Door Stop	481H	US26D	RO
1	Balance of hardware	Existing to remain		OT

Set: 35.0
Doors: 4000B-1, 4010-2

Description: **Sgl Ext - ASF - Exit -SN200 - Closer w/Stop Arm- Access Control

1	Continuous Hinge	CFM SLF-HD1 PT x Dr. Ht.		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit xSPAR04867/NC-E11/NC-E35+-8504 862	19 TB 43 70 56-SN200-US32D	SA	
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Kit	581-1/ 581-2 as required	EN	SA
1	Surface Closer	TB 351 PS	EN	SA
1	Sweep IDF/MDF/Alum	18061CNB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	Perimeter Seal	By door mfgr		OT
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU

Notes: Operation: Doors normally closed and locked. Valid card at the card reader retracts the latch on the active leaf for entry. Free egress at all times. Door status monitored. Confirm specified hardware is compatible with aluminum door manufacturer.

Set: 36.0
Doors: 1768A-1
Description: **Pr Ext - ASF - Exit Device- SN200/DT - KR Mullion - Closer w/Stop Arm -Access Control

1	Continuous Hinge	CFM SLF-HD1 x Dr. Ht.		PE
1	Continuous Hinge	CFM SLF-HD1 PT x Dr. Ht.		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Mullion	KR822 (FLK as req)	600	PR
2	Stabilizer	ST989	Dull Black	PR
1	Spacer	MCS822	689	PR
1	Rim Exit xSPAR04867/NC-E11/NC-E35+-8504 862	19 TB 43 70 56-SN200-US32D	SA	
1	Rim Exit SPAR NC-E11	LD 19 TB 43 8510 862	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
1	Rim Cylinder	70 34 X #90 - 1/2	US32D	SA
1	Const. Core	7190224	Green	BE
2	Kit	581-1/ 581-2 as required	EN	SA
2	Surface Closer	TB 351 PS	EN	SA
2	Sweep IDF/MDF/Alum	18061CNB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	Perimeter Seal	By door mfgr		OT
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
2	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU

Notes: Operation: Doors normally closed and locked. Valid card at the card reader retracts the latch on the active leaf for entry. Free egress at all times. Door status monitored. Confirm specified hardware is compatible with aluminum door manufacturer.

Set: 36.1
Doors: 4000D-1
Description: **Pr Ext - ASF - Exit Device- 2N/DT - KR Mullion - Closer w/Stop Arm -Access Control

1	Continuous Hinge	CFM SLF-HD1 x Dr. Ht.		PE	
1	Continuous Hinge	CFM SLF-HD1 PT x Dr. Ht.		PE	
1	Electric Power Transfer	EL-CEPT	630	SU	
1	Mullion	KR822 (FLK as req)	600	PR	
2	Stabilizer	ST989	Dull Black		PR
1	Spacer	MCS822	689	PR	
1	Rim Exit SPAR NC-E11	LD 19 TB 43 8510 862	US32D	SA	
1	Rim Exit 2N xSPAR04867/NC-E11	LD 19 TB 43 56 70 8504 862	US32D	SA	
2	Interchangeable Core	I/CK-7	626	BE	
1	Rim Cylinder	70 34 X #90 - 1/2	US32D	SA	
1	Const. Core	7190224	Green	BE	
2	Kit	581-1/ 581-2 as required	EN	SA	
2	Surface Closer	TB 351 PS	EN	SA	
2	Sweep IDF/MDF/Alum	18061CNB x Dr. Width		PE	
1	Threshold	2005AT MSES25SS X Opening Width		PE	
1	Perimeter Seal	By door mfgr		OT	
1	ElectroLynx Harness	QC-C1500P		MK	
1	ElectroLynx Harness	QC-C***P (length as req'd)		MK	
2	Door Position Switch	By Security.		OT	
1	Power Supply	Provided by security		SU	

Notes: Operation: Doors normally closed and locked. Valid card at the card reader retracts the latch on the active leaf for entry. Free egress at all times. Door status monitored. Confirm specified hardware is compatible with aluminum door manufacturer.

Set: 37.0
Doors: 1047C-1, 1047D-1, 1904-1, 4025-2
Description: **Sgl - ExT -HM - Exit- SN200 - Closer /Stop- Access Control

1	Continuous Hinge	CFM HD1 PT x Dr. Ht.		PE	
1	Electric Power Transfer	EL-CEPT	630	SU	
1	Rim Exit x SPAR04867/NC-E11	19 LD TB 43 70 56-SN200-8804	US32D	SA	
1	Vandal Resistant Trim	826	US32D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Surface Closer	TB 351 PS	EN	SA	
1	Gasketing	2891APK (head & jambs)		PE	
1	Rain Guard	346C x Frame Width		PE	

1	Sweep	345ANB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.

Set: 37.1
Doors: 4017-2
Description: **Sgl - ExT -HM - Exit- 2N - Closer /Stop- Access Control

1	Continuous Hinge	CFM HD1 PT x Dr. Ht.		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Rim Exit x SPAR04867/NC-E11	19 LD TB 43 70 56-SN200-8804	US32D	SA
1	Vandal Resistant Trim	826	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PS	EN	SA
1	Gasketing	2891APK (head & jambs)		PE
1	Rain Guard	346C x Frame Width		PE
1	Sweep	345ANB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	ElectroLynx Harness	QC-C1500P		MK
1	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU

Notes: Doors are normally closed and secure. Presentation of valid credential will allow entry by pull. Upon loss of power, doors will remain secure. Free egress at all times.

Set: 38.0
Doors: 1986-2
Description: **Pr Ext - EX FR - 2N Lock - Closer w/HO -DPS- Peep

1	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
1	Continuous Hinge	CFM HD1 PT x Dr. Ht.		PE
1	Surface Bolt	580-12 @ top only	US26D	RO
1	Fail Secure Lock	RX 70 8271 LL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
2	Kit	581-1/ 581-2 as required	EN	SA
2	Surface Closer	TB 351 PSH	EN	SA
2	Armor Plate	K1050 36" CSK BEV	US32D	RO
1	Astragal Set (2)	18061CNB x Dr. Ht		PE

1	Gasketing	2891APK (head & jambs)		PE	
1	Rain Guard	346C x Frame Width		PE	
2	Sweep	345ANB x Dr. Width		PE	
1	Threshold	2005AT MSES25SS X Opening Width		PE	
1	ElectroLynx Harness	QC-C1500P		MK	
1	ElectroLynx Harness	QC-C***P (length as req'd)		MK	
2	Door Position Switch	By Security.		OT	
1	Power Supply	Provided by security		SU	
2	Viewer	622 x door thickness	DCRM	RO	

Notes: Door is normally closed and secure. Presentation of valid credential allows entry by trim. Upon loss of power, door will remain secure. Free egress at all times. Card reader is by security.

Set: 38.1
Doors: 1986-1
Description: Pr 8204 - 580 FB -Armor - HO Closer

2	Continuous Hinge	CFM HD1 x Dr. Ht.		PE	
1	Surface Bolt	580-12 @ top only	US26D	RO	
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
2	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing)	As Req	EN	SA
2	Armor Plate	K1050 36" CSK BEV	US32D	RO	
2	Door Stop	481H	US26D	RO	

Set: 39.0
Doors: 4011-1, 4025-4, S1000-1
Description: **Sgl - Ext- Mech/Storage/Fire Riser - Closer w/Stop Arm

1	Continuous Hinge	CFM HD1 x Dr. Ht.		PE	
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Surface Closer	TB 351 PS	EN	SA	
1	Gasketing	2891APK (head & jambs)		PE	
1	Rain Guard	346C x Frame Width		PE	
1	Sweep	345ANB x Dr. Width		PE	
1	Threshold	2005AT MSES25SS X Opening Width		PE	
1	Door Position Switch	By Security.		OT	

Set: 39.1
Doors: 1500B-2
Description: **Sgl Int - ASF - Exit -SN200 - Closer w/Stop Arm- Access Control

1	Continuous Hinge	CFM SLF-HD1 PT x Dr. Ht.		PE	
1	Electric Power Transfer	EL-CEPT	630	SU	

1	Rim Exit xSPAR04867/NC-E11/NC-E35+-8504 862	19 TB 43 70 56-SN200-US32D	SA	
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Kit	581-1/ 581-2 as required	EN	SA
1	Surface Closer	TB 351 PS	EN	SA
1	Perimeter Seal	By door mfgr		OT
1	ElectroLynx Harness	QC-C1500P		MK
2	ElectroLynx Harness	QC-C***P (length as req'd)		MK
1	Door Position Switch	By Security.		OT
1	Power Supply	Provided by security		SU

Notes: Operation: Doors normally closed and locked. Valid card at the card reader retracts the latch on the active leaf for entry. Free egress at all times. Door status monitored. Confirm specified hardware is compatible with aluminum door manufacturer.

Set: 40.0
Doors: 4010-1
Description: **Sgl Typ - Security Classroom - Closer - HO

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Security Intruder Lock SA	V01 EMB 70 8238 VN1L 90-3/8" Collar		US26D
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req	EN	SA
1	Kit	581-1/ 581-2 as required	EN	SA
1	Door Stop	481	US26D	RO
3	Silencer	608		RO

Notes: Provide hold open closers at classrooms.

Set: 41.0
Doors: 4000D-2
Description: **Pr Int -Vest Exit Device- NL x NL - Mullion - Closer

2	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
2	Stabilizer	ST989	Dull Black	PR
1	Spacer	MCS822	689	PR
1	Mullion	822 (FL as req)	600	PR
2	Rim Exit SPAR NC-E11	LD 19 TB 43 70 8804 ETL	US32D	SA
3	Interchangeable Core	I/CK-7	626	BE
1	Rim Cylinder	70 34 X #90 - 1/2	US32D	SA
3	Const. Core	7190224	Green	BE
2	Surface Closer	TB 351 PS	EN	SA
2	Silencer	608		RO

Set: 42.0

Doors: 1762-1
Description: **Sgl Ext - Storeroom/Mech- Closer/Stop

1	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PS	EN	SA
1	Gasketing	2891APK (head & jambs)		PE
1	Rain Guard	346C x Frame Width		PE
1	Sweep	345ANB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE
1	Door Position Switch	By Security.		OT

Notes: Closer on active leaf.

Set: 43.0
Doors: 1950-1
Description: **Pr Ext - Storeroom/Mech-(Classroom Lock) Closer/HO - Armor

2	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
1	Surface Bolt	580-12 @ top only	US26D	RO
1	Classroom Lock	70 8237 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
2	Surface Closer	TB 351 PSH	EN	SA
2	Armor Plate	K1050 36" CSK BEV	US32D	RO
1	Astragal Set (2)	18061CNB x Dr. Ht		PE
1	Gasketing	2891APK (head & jambs)		PE
2	Sweep	345ANB x Dr. Width		PE
1	Threshold	2005AT MSES25SS X Opening Width		PE

Set: 44.0
Doors: 1894-1, 1895-1, 4006-1
Description: **Sgl - Exit Device-Security CL - Closer - STC

3	Hinges	By the STC door manufacturer		OT
1	Rim Exit STC Sec CR x SPAR#NC-E11		LD 19 31 43 49 70 8816 ETL	
		US32D	SA	
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Door Closer	TB 351 O/P9 (type as required)	EN	SA
1	Door Stop	462	US2C	RO
1	Gasket, threshold, door bottom	By the STC door manufacturer		OT

Notes: Door hardware is specified for design intent. Confirm hardware compatibility and design meets the door manufacturer's approved assembly testing for the STC level indicated.

Set: 45.0

Doors: 4013-1, 4017-1, 4025-1
Description: Sgl - Exit Device-Security CL - Closer / HO

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit Sec CR x SPAR#NC-E11	19 LD 43 49 70 8816 ETL	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Gasketing	2891APK (head & jambs)		PE

Set: 46.0
Doors: 4013-2
Description: Sgl - Exit Device-NL - Closer / HO - Classroom

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit NL SPAR#NC-E11	LD TB 19 43 70 8804 ETL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Surface Closer	TB 351 PSH	EN	SA
1	Door Stop	481H	US26D	RO
1	Gasketing	2891APK (head & jambs)		PE

Set: 47.0
Doors: 1965-2
Description: Sgl - Exit Device-NL - Closer

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Rim Exit NL SPAR#NC-E11	LD TB 19 43 70 8804 ETL	US32D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
	Surface Closer	TB 351 PS	EN	SA
1	Door Stop	481H	US26D	RO
1	Gasketing	2891APK (head & jambs)		PE

Set: 48.0
Doors: 1827B-1
Description: No Work

1	All hardware	Existing to remain		OT

Set: 49.0
Doors: 4001-1
Description: **Pr - Int Classroom Sec CL x NL -Closer - STC

6	Hinges	By the STC door manufacturer		OT
1	Mullion	KR822 (FLK as req)	600	PR
2	Stabilizer	ST989	Dull Black	PR
1	Spacer	MCS822	689	PR

1	Rim Exit SPAR NC-E11 STC	LD TB 19 TB 31 43 70 8804 ETL	US32D	SA
1	Rim Exit STC Sec CR x SPAR#NC-E11		LD 19 31 43 49 70 8816 ETL	US32D	SA
4	Interchangeable Core	I/CK-7	626	BE
1	Mullion Cylinder	70 34 x 1KB-3	US32D	SA
4	Const. Core	7190224	Green	BE
2	Door Closer	TB 351 O/P9 (type as required)	EN	SA
2	Door Stop	481H	US26D	RO
1	Gasket, threshold, door bottom	By the STC door manufacturer		OT

Notes:
Door hardware is specified for design intent. Confirm hardware compatibility and design meets the door manufacturer's approved assembly testing for the STC level indicated.

Set: 50.0
Doors: 1120-3
Description: **Pr - EX FR - Int Classroom 8804/8810 MSL -Closer

2	Continuous Hinge	CFM HD1 x Dr. Ht.		PE	
1	Mullion	KR822 (FLK as req)	600	PR	
2	Stabilizer	ST989	Dull Black		PR
1	Spacer	MCS822	689	PR	
1	Rim Exit-Dog SPAR NC-E11	19 TB 43 70 8804 MSL	US32D	SA	
1	Rim Exit SPAR NC-E11	LD 19 TB 43 8810 MAL	US32D	SA	
3	Interchangeable Core	I/CK-7	626	BE	
1	Mullion Cylinder	70 34 x 1KB-3	US32D	SA	
3	Const. Core	7190224	Green	BE	
2	Surface Closer	TB 351 PSH	EN	SA	
2	Door Stop	481H	US26D	RO	
2	Silencer	608		RO	

Notes: Keep dogging

Set: 51.0
Doors: 4002-1
Description: **Pr - Push/Pull - Closer HO - STC

6	Hinges	By the STC door manufacturer		OT	
2	Push Plate	70E	US32D	RO	
2	Pull Plate	111x70C	US32D	RO	
2	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
2	Door Stop	462	US2C	RO	
1	Gasketing, Threshold, Door Bottom	By the STC door manufacturer		OT	

Notes: Door hardware is specified for design intent. Confirm hardware compatibility and design meets the door manufacturer's approved assembly testing for the STC level indicated.

Set: 52.0
Doors: 1838-1, 1892-1, 4007-1, 4008-1, 4012-1, 4014-1
Description: **Sgl - Storeroom

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
3	Silencer	608		RO

Set: 52.1
Doors: 4004-1
Description: **Sgl - Storeroom - Seals

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
1	Gasketing	2891APK (head & jambs)		PE

Set: 53.0
Doors: 4000-1, 4015-1
Description: **Sgl - Storeroom - Closer - Gasket - Sweep MDF/IDF

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Closer	TB 351 O/P9 (type as required)	EN	SA
1	Door Stop	481H	US26D	RO
1	Gasketing	2891APK (head & jambs)		PE
1	Sweep	345ANB x Dr. Width		PE
3	Silencer	608		RO

Set: 54.0
Doors: 1128-1
Description: **Pr - Storeroom Lock - Closer

6	Hinge, Full Mortise	TA2714	US26D	MK
1	Surface Bolt	580-12 @ top only	US26D	RO
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Closer	TB 351 O/P9 (type as required)	EN	SA
2	Door Stop	481H	US26D	RO
2	Silencer	608		RO

Notes: Closer on active leaf.

Set: 55.0
Doors: 1768-1
Description: **Pr - Storeroom Lock - Rated

6	Hinge, Full Mortise	TA2714	US26D	MK
2	Flush Bolt	555 12" / 72" AFF	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Closer	TB 351 O/P9 (type as required)	EN	SA
2	Door Stop	481H	US26D	RO
1	Astragal Set (2)	18061CNB x Dr. Ht		PE
1	Gasketing	2891APK (head & jambs)		PE

Notes: Closer on active leaf.

Set: 56.0
Doors: 1848-1, 4016-1
Description: **Pr - Storeroom - Floor Stop - Mechanical - No Closer

6	Hinge, Full Mortise	TA2714	US26D	MK
1	Surface Bolt	580-12 @ top only	US26D	RO
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
2	Door Stop	481H	US26D	RO
2	Silencer	608		RO

Set: 57.0
Doors: 4018-1
Description: **Sgl - Office, Conf, Work, Sat Admin Offices, Lounge, Nurse - No Closer

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	70 8237 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE
1	Const. Core	7190224	Green	BE
1	Door Stop	481H	US26D	RO
1	Silencer	608		RO

Set: 57.1
Doors: 1500C-1
Description: **Sgl - ASF Office (Storeroom function)

1	Continuous Hinge	CFM HD1 x Dr. Ht.		PE
1	Storeroom/Closet Lock	70 8204 LL	US26D	SA
1	Interchangeable Core	I/CK-7	626	BE

1	Const. Core	7190224	Green	BE	
1	Kit	581-1/ 581-2 as required	EN	SA	
1	Surface Closer	TB 351 PS	EN	SA	
1	Door Stop	481H	US26D	RO	
1	Perimeter Seal	By door mfgr		OT	

Set: 58.0
Doors: 1927-3
Description: **Sgl - Classroom - 8238 - HO

3	Hinge, Full Mortise	TA2714	US26D	MK	
1	Classroom Security Intruder Lock SA	V01 EMB 70 8238 VN1L 90-3/8" Collar		US26D	
2	Interchangeable Core	I/CK-7	626	BE	
2	Const. Core	7190224	Green	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req	EN	SA	
1	Door Stop	481H	US26D	RO	
3	Silencer	608		RO	

Set: 58.1
Doors: 4019-1
Description: **Sgl - Classroom - 8237 - HO

3	Hinge, Full Mortise	TA2714	US26D	MK	
	Classroom Lock	70 8237 LL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req	EN	SA	
1	Door Stop	481H	US26D	RO	
3	Silencer	608		RO	

Set: 59.0
Doors: 1832-1, 1890-1, 1891-1, 1893-1, 4003-1, 4005-1
Description: **Sgl - 8237 - STC

3	Hinges	By the STC door manufacturer		OT	
1	Classroom Lock	31 70 8237 LNL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Door Stop	462	US2C	RO	
1	Gasket, threshold, door bottom	By the STC door manufacturer		OT	

Notes:
Door hardware is specified for design intent. Confirm hardware compatibility and design meets the door manufacturer's approved assembly testing for the STC level indicated.

Set: 60.0
Doors: 4002-2
Description: Sgl - Push Pull - Closer - HO

3	Hinge (heavy weight)	T4A3786	US26D	MK	
1	Push Plate	70E	US32D	RO	
1	Pull Plate	111x70C	US32D	RO	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
1	Door Stop	481H	US26D	RO	
3	Silencer	608		RO	

Set: 61.0
Doors: 1124A-1, 1127A-1, 1852-1, 1853-1, 4021-1, 4022-1, G1001-1, G1001-2
Description: **Sgl - Multi Occ RR - Classroom Cyl - Closer

4	Hinge, Full Mortise	TA2714	US26D	MK	
1	Classroom Lock	70 10XG37 LL	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
1	Door Stop	481H	US26D	RO	
3	Silencer	608		RO	

Notes: Confirm door height / hinge quantity required at G1001-1, G1001-2

Set: 62.0
Doors: 1018-1, 1361-1, 1377-1, 1878-1
Description: No Work

1	All hardware	Existing to remain		OT

Set: 62.1
Doors: 2203-1, 2303-1, 2502-1, 2503-1, 2517-1, 2518-1
Description: **Sgl - Typ / 8250 Privacy - Closer - HO

3	Hinge, Full Mortise	TA2714	US26D	MK	
1	Hotel Guest Lock Lock	V20 LC 8250 VN1L	US26D	SA	
1	Interchangeable Core	I/CK-7	626	BE	
1	Const. Core	7190224	Green	BE	
1	Mortise Cylinder for Hotel Lock	1E-7G4 C208 RP3	626	BE	
1	Door Closer w/ HO	TB 351 H (inswing)/ PSH (outswing) As Req		EN	SA
1	Door Stop	481H	US26D	RO	
1	Silencer	608		RO	

Set: 63.0
Doors: 1126-2, 1426-2, 1530-2, 1760-1, 1760-2, 1904-2, 1904-3, 1909-3, 1909-4, 1909-5, 1909-6, 1909-7, 1909-8, 1933-2, C101-1, C102-2, C108-2, C108-3
Description: **OH Coiling Doors - No Work

1	All hardware	Existing to remain		OT

Set: 63.1

Doors: S1000-2
Description: **OH Coiling Doors - By Others

	All hardware	By the door manufacturer	OT

Set: 64.0
Doors: 4017-3, 4025-3
Description: **OH Coiling Doors - Motorized

2	Mortise Cylinder	70 42	US32D	SA
2	Interchangeable Core	I/CK-7	626	BE
2	Const. Core	7190224	Green	BE
2	Keyswitch	MK x MKS		SU
1	Balance hardware	by the door manufacturer		OT

Notes: Provide keyswitch on both sides of door.

Set: 65.0
Doors: 1016-1, 1022-1, 1031-1, 1032-1, 1035-1, 1039-1, 1041-1, 1042-1, 1043-1, 1044-1, 1046-1, 1047A-1, 1047B-1, 1050-1, 1055-1, 1058-1, 1061-1, 1062-1, 1062-2, 1063-1, 1070-1, 1100-2, 1104-1, 1106-1, 1110-1, 1111-1, 1112-1, 1115-1, 1117-1, 1118A-1, 1118A-2, 1121-1, 1122-1, 1123-1, 1124-1, 1126-1, 1127-1, 1129-1, 1141-1, 1141B-1, 1142-1, 1145-1, 1146-1, 1148-1, 1152-1, 1153-1, 1154-1, 1155-1, 1165-1, 1166-3, 1167-1, 1167-2, 1170-3, 1171-3, 1172-1, 1173-3, 1175-3, 1176-1, 1176-2, 1179-1, 1204-1, 1206-3, 1207-1, 1208-1, 1208-2, 1208-3, 1210-1, 1212-1, 1214-3, 1252-1, 1253-1, 1254-1, 1255-3, 1256-1, 1257-1, 1258-1, 1260-2, 1264-1, 1303-1, 1304-1, 1305-3, 1306-3, 1307-1, 1309-3, 1310-1, 1311-3, 1353-1, 1363-1, 1369-3, 1371-3, 1372-1, 1373-1, 1378-2, 1379-1, 1383-1, 1384-1, 1402-1, 1403-1, 1405-1, 1406-1, 1408-1, 1427-1, 1500-2, 1515-1, 1516-1, 1517-1, 1518-1, 1519-1, 1520-1, 1532-1, 1535-1, 1536-1, 1554-1, 1603-1, 1606-1, 1614-1, 1654-1, 1656-1, 1660-1, 1661-1, 1668-1, 1670-1, 1702-1, 1703-1, 1706-1, 1707-1, 1708-1, 1712-1, 1715-1, 1724-1, 1726-1, 1750-2, 1754-1, 1756-1, 1763-1, 1765-1, 1766-1, 1767-1, 1769-1, 1770-1, 1773-1, 1773-2, 1774-1, 1776-1, 1805-1, 1813-1, 1814-1, 1815-1, 1816-1, 1826-1, 1831-1, 1833-1, 1834-1, 1835-1, 1844-1, 1846-1, 1851-1, 1858-1, 1861-1, 1864-1, 1868-1, 1871-1, 1876-1, 1880-1, 1882-1, 1883-1, 1884-1, 1901-1, 1903-1, 1905-1, 1907-1, 1908-1, 1910-1, 1910B-1, 1911-1, 1912-1, 1914-1, 1915-1, 1916-1, 1917-1, 1918-1, 1925-1, 1926-1, 1929-1, 1930-1, 1931-1, 1939-1, 1940-1, 1953-1, 1955-1, 1956-1, 1958-1, 1960-1, 1962-1, 1965-1, 1966-1, 1968-1, 1968-2, 1968-3, 1968-4, 1969-1, 1972-1, 1975-1, 1975-2, 1975-3, 1975-4, 1975-5, 1975-6, 1975-7, 1976-1, 1978-1, 1979-1, 1983-1, 1984-1, 1990-2, 1992-1, 1995-1, 1995-2, 2001A-1, 2002-1, 2004-1, 2020-1, 2022-1, 2024-1, 2029-1, 2030-1, 2101-1, 2103-1, 2105-1, 2106-1, 2107-1, 2112-1, 2112-2, 2112A-1, 2112B-1, 2117-1, 2118-1, 2121-1, 2121-2, 2121-3, 2136-1, 2136-2, 2136-3, 2204-1, 2206-1, 2207-1, 2305-1, 2308-1, 2314-1, 2314-2, 2314B-1, 2403-1, 2406-1, 2408-1, 2409-1, 2413-1, 2419-1, 2420-1, 2504-1, 2505-1, 2506-1, 2509-1, 2510-1, 2510-2, 2512-1, 2512-2, 2515-2, 2516-1, 2521-1, 2522-1, 2604-1, 2609-1, 2610-1, 2610-2, 2611-1, 2703-1, 2712-1, 2765-1, 2801-1, 2803-1, 2804-1, 2805-1, 2810-1, 2902-1, 2905-1, 2907-1, 2909-1, 2913-1, 2914-1, 2918-1, 2919-1, 3016-1, 3018-1, 3020-1, 3022-1, 3024-1, 3026-1, 3102-1, 3104-1, 3105-1, 3106-1, 3106-2, 3107-1, 3108-1, 3109-1, 3209-1, 3210-1, 3211-1, BB100-1, BB200-1, C101-2, C102-1, C103-1, C104-1, C105-1, C106-1, C107-1, C108-1, C108-4, C109-1, C111-1, FB100-1, FB200-1, SB100-1, SB200-1
Description: No Work

1	All hardware	Existing to remain	OT

Set: 66.0
Doors: Attic
Description: **Attic Stock - EVERY CAMPUS

1	Hydraulic Gate Closer & Hinge	MAMMOTH-180-HD	9005	OT
5	Quick Fix Bolts	MAMMOTH-P00006000		OT
5	Mullion Lock	98-2520		SA
5	Mullion Lock	98-2518		SA
5	Classroom Security Intruder Lock	8238 Lock Body	US26D	SA
5	130KB	Thumbturn Kit	26D	SA
50	Key Blanks	Best "A" Keyway		BE
12	Regular Hold Open Arm	25-H	EN	SA
12	Parallel Hold Open Arm	25-PSH	EN	SA
4	Electromagnetic Holder	994M 24VAC	689	RF
5	994M Magnetic Parts	Door Armature 994510M	689	RF
5	994M Magnetic Parts	Screw & Backplate 998300	689	RF
5	994M Magnetic Parts	Swivel Armature 900-3	689	RF
5	994M Magnetic Parts	Magnet Assembly 998369-3V	689	RF
5	994M Magnetic Parts	Wall Cover 998315M	689	RF
4	SN200 Reader	52 6027 (Exit / Lock)	26D	SA

Notes: All attic stock ships direct to
Director of Technical Services
Cy Fair ISD Lockshop
11430 Perry Road
Houston, Texas 77064
**DO NOT ship to jobsite. Distributor to ship directly to Cy Fair.

END OF SECTION 087100

SECTION 23 09 33
BUILDING MANAGEMENT AND CONTROL SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. **Cy-Lakes High School** - The existing Building Management and Control System shall be removed and replaced in its entirety including the implementation of all new sequences here within. Provide and install a complete Building Management and Control System (BMCS), including industrial instrumentation necessary to obtain functions and results specified. A complete system includes items such as sensors, valves, dampers, valve and damper operators, DDC panels, relays, terminal equipment controllers, mounting brackets and thermowell, etc. Integrate all components to provide a complete and functioning system.

B. **All existing Trane controls that are being removed from project shall be returned to owner. Components shall be stored in a clean and dry environment and delivered to Cyfair ISD Maintenance upon completion of demolition phase.**

C. Temperature Control System components:
   1. Electronic instruments as specified
   2. Electric instruments as specified
   3. Microcomputer instruments as specified

D. All control devices of the same type product shall be of a single manufacturer.

E. Control, power and interlock wiring necessary to accomplish sequences specified in this Section shall be provided and installed by the Control Subcontractor. Materials and methods of execution as specified in Division 26, Electrical.
   1. Coordinate current characteristics of all electrical instruments and equipment with Division 26 of the specifications and related electrical drawings.

F. The manufacturer of the building automation system shall provide documentation supporting compliance with ISO-9002 (Model for Quality Assurance in Production, Installation, and Servicing). The intent of this specification requirement is to ensure that the products from the manufacturer are delivered through a Quality System and Framework that will assure consistency in the products delivered for this project.

G. The entire Building Management and Control System (BMCS) shall be installed, Commissioned, and tested; all performed by the Automation System Manufacturer or Authorized Distributor if approved by engineer.
   1. All components and elements.
   2. Start-up and point verification.
   3. The testing and acceptance procedure.

H. The cost of the work specified in this section is included in an allowance.
   1. Selection of subcontractor will be determined at a future date.

1.2 RELATED WORK

A. Division 23, Mechanical

B. Division 26, Electrical

1.3 SUBMITTALS

A. Submit items of the Building Management and Control System (BMCS).
   1. Temperature control equipment & Field devices.
   2. Wiring & Flow diagrams.
   3. Sequence of operation.
   4. Complete, detailed, control and interlock-wiring diagram.
   5. Indicate mechanical and electrical equipment furnished and electrical interlocks,

indicating terminal designation of equipment. Respective equipment manufacturers shall furnish through the Mechanical Contractor, approved drawings of equipment to be incorporated in this diagram.

6. Submit Input / Output summary of all points.
7. Submit an outline of testing procedures from section Testing and Acceptance.
8. Mark up a copy of the specifications for the product. Indicate in the margin of each paragraph the following: "Comply, "Do Not Comply", or "Not Applicable". Explain all "Do Not Comply" statements.
9. Submit sample of space temperature sensor and guards for review prior to purchase or installation.

1.4 COOPERATION WITH OTHER TRADES

A. Furnish control valves, temperature sensing element wells, flow and pressure sensing devices, dampers and other similar devices to the Mechanical Contractor in a timely manner for installation under the Building Management and Control System (BMCS), Subcontractor's supervision.

1.5 METERING AND VERIFICATION REQUIREMENTS

A. This project is a CHPS applicant. Granular data, derived from the BAS and inherent to this specification, is to be handled in such a way as to support this certification. Granular data is defined as temperatures, set points, run times and utility monitoring. This data is to be monitored on a fifteen-minute interval basis and stored in the BAS database. The BAS must have the inherent capability to trend and display all information as described below.

B. Monitoring software must include outside environmental condition data which affect building performance. Heating degree days and cooling degree days must be logged and formatted in such a way that the data may be used for comparative analysis of multiple facilities, this facility and any CyFair ISD facility on a historical basis over time. This data must be imported from a reliable, certified, third party source. On site instrumentation is not acceptable.

C. Metering and Verification requirements must be inherent to the BAS. It cannot be a "bolt on" product. It shall be of no extra cost to the project. It shall be easily accessible from the graphical interface on the main screens. It shall also be accessible from the BAS navigation tree. Data must be retrieved and stored in the BAS module until it is archived on the BAS server. Data acquisition and storage must continue even if communication to the facility is lost. Data for utility consumption and environmental indexing must be stored on the server for a minimum of two years.

D. All data described in this section shall be easily extractable, without external software or programming.

1.6 WARRANTY

A. Provide with a manufacturer's parts and labor warranty for a period of two years from substantial completion. Warranty shall include unlimited telephone technical support during the warranty period.

B. Provide DDC controllers with a manufacturer's parts and labor warranty for a period of 5 years from substantial completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Automated Logic Branch Office – WebCTRL

B. Unify Energy Solutions – Reliable Controls

2.2 SYSTEM ARCHITECTURE

A. The Building Management and Control System (BMCS) shall consist of an information-sharing network of stand-alone Direct Digital Control Panels (DDCP) to monitor and control equipment as specified of the control sequence and input/output summary.

B. "Information sharing" shall be defined as: The function of each DDCP to exchange data on the network trunk with other DDCP's without the need for additional devices such as network managers, gateways or central computers.

C. "Stand-alone" shall be defined as: The function of each DDCP to independently monitor and control connected equipment through its own microcomputer.

2.3 COMMUNICATIONS PROCESSING

A. The BMCS shall operate as a true token-pass peer-to-peer communication network. Resident processors in each DDCP shall provide for full exchange of system data between other DDCP's on the network trunk. Systems that limit data exchange to a defined number of system points are not acceptable.

B. Systems that operate via polled response or other types of protocols that rely on a central processor or similar device to manage DDCP to DDCP communications may be considered only if a similar device is provided as a stand-by. Upon a failure of malfunction of the primary device, the stand-by shall automatically, without any operator intervention, assume all BMCS network management activities.

C. The failure of any DDCP on the network shall not affect the operation of other DDCP's. All DDCP failure shall be annunciated at the specified alarm printers and terminals.

D. Network shall support a minimum communications speed of 115.2 Kbps.

E. The network shall support a minimum of 100 DDC controllers and PC workstations.

F. Each PC workstation shall support a minimum of 4 peer-to-peer networks, either by hardwired connection or dial up.

G. The system shall support integration of third party systems (fire alarm, security, lighting, PCL, chiller, boiler) via panel mounted open protocol processor. This processor shall exchange data between the two systems for inter-process control. All exchange points shall have full system functionality as specified herein for hardwired points. Provide examples of 5 reference projects utilizing gateways required for this project.

2.4 DDCP HARDWARE

A. Each DDCP shall consist of a 32-bit microprocessor and controller, power supply, input / output boards and communication board. All program and point databases shall be stored in battery-backed RAM. Provide a minimum of 1.2 MEG RAM in each DDCP to allow for point expansion and trend data storage.

B. Each DDCP shall incorporate a real-time clock.

C. Each DDCP shall be provided with two RS232 communications port. Connecting an operator terminal, whether portable or stationery, shall allow the user to communicate with the entire network.

D. Each DDCP shall provide for input / output connections to field equipment. The following point types shall be supported:

1. Analog inputs - for measuring sensed variables. Inputs shall be capable of accepting voltage, resistance, current or pressure signals.
2. Analog outputs - for controlling end devices. Outputs shall be capable of producing voltage, resistance, current or pressure signals. Pneumatic outputs shall be provided with a manual override for adjusting outputs in the event of a power loss at the DDCP.
3. Digital inputs - for monitoring dry contacts such as relays, switches, pulses, etc.

4. Digital outputs - to control two position devices such as starters, actuators, relays, etc.

E. Each DDCP shall be listed under UL916 (Energy Management Systems), and shall be tested to comply with sub-part J of Part 15 FCC rules for Class A computing equipment.

F. Each DDC Controller shall have sufficient memory to support its own operating system and databases, including:
1. Control processes
2. Energy management applications
3. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
4. Historical/trend data for points specified
5. Maintenance support applications
6. Custom processes
7. Operator I/O
8. Dial-up communications
9. Manual override monitoring

G. Operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points.
1. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides.
2. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.
3. All BMCS control modules shall have Hand Off Auto (HOA) switches on all outputs for HVAC and electrical, including digital outputs.

H. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.

I. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.
1. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.
2. Should DDC Controller memory be lost for any reason, the user shall have the capability of reloading the DDC Controller via the local RS-232C port, via telephone line dial-in or from a network workstation PC.
3. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.

2.5 PROGRAMMING FUNCTIONS

A. Resident software in each DDCP shall provide custom programming of control strategies.
1. Point database
2. Operator interface
3. Network communications

4. Facilities and energy management functions

B. Programming of control and energy management strategies shall be accomplished via a high-level computer language such as BASIC, JC BASIC, C, or Powers Process Control Language. A standard math processor shall be part of the programming language. All analog loops shall be capable of proportional, integral and derivative control.

C. Each DDCP shall incorporate an operator interface program (OIP) that provides an English language user interface. The OIP shall allow the user to program, interrogate, command and edit the BMCS via a self-prompting method. Operator terminals, whether textual or graphical, shall be able to access the entire network from any DDCP. Access shall be accomplished in a transparent fashion; that is, the operator shall not be required to address specific DDCP's in order to display or command system points.

2.6 FACILITY MANAGEMENT SOFTWARE

A. The BMCS shall be provided with standard and custom report generation functions that include:
   1. Alarm summaries
   2. Motor status summaries
   3. Point displays by type, system, status, overrides, failures, location, equipment and enabled/disabled.
   4. Program listings

B. All reports shall be either displayed or printed by:
   1. Operator request.
   2. Time of day.
   3. Event conditions (such as in response to an alarm, interlock, etc.).

C. All reports shall be time and date stamped.

D. An alarm-processing program shall be provided to annunciate those points designated as alarmable. Alarm points shall, upon alarm occurrence, be displayed or printed at designated terminals.

E. Historical trend data shall be collected and stored at each DDCP for later retrieval. Retrieval shall be manual or automatic. Any point, physical or calculated, may be designated for trending. The system shall allow for two methods of trend collection: Either by a pre-defined time interval sample or upon a pre-defined change of value. Trend data shall be presented in a columnar format. Each sample shall be timed stamped. Trend reports may be a single point or may be a group of points, up to a maximum of (8) points in any single group. Any point, regardless of physical location in the system may become part of a multiple point group.

F. Each BMCS network shall provide a point-monitoring function that can display single or multiple points in a continuous updated fashion for dynamic displays of point values.

G. A database and configuration report program shall be provided that allows the user to interrogate BMCS status. As a minimum, the user shall be able to: Verify available RAM at each DDCP, verify DDCP status (on-line, off-line, and failed) and set the system clock.

H. Any invalid operator entry shall result in an error message.

I. DDCP's shall contain a password access routine that will assign an operator to one of three level of access. Level 1 shall permit display function only, level 2 shall additionally permit commanding of system points and level 3 shall additionally permit full program and database editing.

J. DDCP's shall provide for the accumulation of totalized values for the purposes of run-time or energy totalization. Totalized values may be displayed or printed automatically or by operator request.

2.7 ENERGY MANAGEMENT SOFTWARE

A. The BMCS shall be provided with an optimal start program such that the building may be divided into ten zones for optimum start. Warm-up and cool-down shall occur in sequence with succeeding zones starting only after the preceding zone has completed its warm-up or cool-down.
   1. The optimum start-up time of assigned equipment shall be determined based on a software calculation that takes into consideration outdoor air conditions, space conditions, and building thermal characteristics ("U" factor).
   2. The optimum start program shall control start-up of the cooling and heating equipment to achieve the target occupancy space temperature at the precise time of building occupancy.
   3. A built-In "learning" technique shall cause the BMCS to automatically adjust itself to the most affective time to start equipment based on historical data.

B. The BMCS shall be provided with an operator interactive time of day (TOD) program. TOD programming and modifying shall be accomplished in a calendar-like format that prompts the user in English language to specify month, year, day and time and associated point commands. It shall be possible to assign single points or groups of points to any on or off time. Appropriate time delays shall be provided to "stagger" on times.
   1. TOD shall incorporate a holiday and special day schedule capability, which will automatically bring up a pre-defined holiday or special day schedule of operation. Holidays or special days can be scheduled up to one year in advance.
   2. In addition to the time dependent two-state control, TOD also provides time dependent setpoint control. This control provides the capability to output assignable, proportional setpoint values in accordance with the time of day and day of week. This program shall be used to accomplish night setback, morning warm-up and normal daily operating setpoints of all control system loops controlled by the BMCS. As with the two-state control, time dependent setpoint control shall be subject to the holiday schedule. The setpoints desired shall be user definable at any operator terminal.
   3. The operator shall be capable of reading and/or altering all sorted data pertaining to time of day, day of week, on/off times, setpoint values, and holiday designation.
   4. The TOD program shall also provide an override function that allows the user to conveniently change a start or stop time for any point up to one week in advance. The override command shall be temporary. Once executed the TOD program shall revert to its original schedule.
   5. The TOD program shall interface with the optimal start program (OSP) such that stop times may be assigned by OSP.

C. Additional Program functions required are to be installed and programmed as requested by end user at no additional cost:
   1. Enthalpy optimization.
   2. Supply air reset.
   3. Hot water reset.
   4. Chilled water reset.
   5. Volumetric control.
   6. Dead band control. Install dual set points as requested by user.
   7. All specified energy management programs, whether or not applicable to this project shall be provided such that the owner may enable the program at a future date without the need to purchase additional software or modify existing software.
   8. Time lapse graphics
   9. Global point commands

2.8 WEB SERVER ACCESSIBILITY

A. Industry leading encryption technology to provide accessibility through a web browser.
B. Building Manager's ability to access, view and command critical building information in real time over the intranet or internet.
   1. Alarm Display
   2. Point Commanding
   3. Graphic Display
   4. Scheduling
   5. Running Reports
   6. Point Details

2.9 REMOTE NOTIFICATION

A. Remote notification sends Alarm and System Event information to various notification devices as indicated below but not limited to. Operators can receive their building automation system alarms without restricting them to dedicated workstations.
   1. Alphanumeric pagers
   2. Numeric pagers
   3. Email
   4. Phones via voice or short message service (SMS) Text Messaging

2.10 POINT EXPANSION MODULES

A. Capable of extending its input/output capabilities via special purpose modules.
   1. Modules may be mounted remote from the DDCP.
   2. Shall communicate with the DDCP over a pair of twisted cables.
   3. Operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points.
   4. All BMCS control modules shall have Hand Off Auto (HOA) switches on all outputs for HVAC and electrical, including digital outputs.

2.11 TERMINAL EQUIPMENT CONTROLLERS

A. Provide for control of each piece of equipment, including, but not limited to, the following:
   1. Variable Air Volume (VAV) boxes
   2. Constant Air Volume (CAV) boxes
   3. Dual Duct Terminal Boxes
   4. Unit Conditioners
   5. Variable Refrigerant Volume DX System
   6. 100% Outside Air Split System
   7. Room Pressurization
   8. Fan Coil Units
B. Include the following items:
   1. All input and outputs necessary to perform the specified control sequences.
      a. Analog outputs shall be industry standard signals such as 24V floating control.
   2. Sufficient memory to accommodate point database, operating programs, local alarming and local trending.
   3. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM, or minimum of 100-hour battery backup shall be provided.

4. Return to full normal operation without user intervention after a power outage of unlimited duration.
5. Operation programs shall be field selectable for specific applications.
6. Specific control strategy requirements, allowing for additional system flexibility.
7. Controllers that require factory changes of all applications are not acceptable.

2.12 ELECTRONIC DAMPER ACTUATORS

A. Two position damper operators:
   1. Spring return to full travel position.
   2. Built in auxiliary switches (motor end switches)
      a. Switch shall be fully adjustable so that cut-in/cut-out points may be preset at any point within angular travel of the motor.
   3. Minimum torque 60-in-lb
B. Modulating damper operators:
   1. Sized with sufficient reserve power to provide smooth modulating action and tight close off against the system pressure
   2. Select the operator with available torque to exceed the maximum required operating torque by not less than 50%
   3. Minimum torque 100 in-lb

2.13 ETHERNET CARD

A. Ethernet Card:
   1. Local area network connection interface card.

2.14 CONTROL CABINETS

A. Fully enclosed NEMA 1 for indoors, NEMA 4 for outdoors.
   1. Powder coat painted on all sides
   2. Cabinet with continuously piano type hinged door
   3. Locking latch
   4. All locks shall use a common key
   5. Devices on the panel face must be identified with engraved nameplates.
   6. Panels or termination panels must be identified with engraved nameplates.
   7. Provide enamel beige finish and extruded aluminum alloy frame UL 50 certified.

2.15 REFRIGERANT MONITOR

A. Infrared Halogen Gas monitoring system for low level continuous monitoring of numerous CFC, HFC and HCFC halogen gases used in most refrigeration and air conditioning systems.
B. Two years parts and labor warranty.
C. Analyzer:
   1. Microprocessor based
   2. Infrared (IR) sensor technology
   3. Sensing down to 1 (PPM)
   4. Monitor multiple compounds
   5. Automatic calibration
   6. Synchronous 2 wave length infrared filtometer
   7. Insensitive to vibration and temperature variations.
   8. Response Time: Min.5 sec / Max. 90 sec.
   9. Sampling Mode in Auto and Manual operation
D. Multi-Point Sampling System:
   1. Minimum of six sample points

2. Adjustable sampling time, with optional skip and hold features for each point.
3. Sample lines up to 500' in length
4. Three stage alarms for each point
5. Flow loss and malfunction indicators
6. Individual relay contacts for each set of channel alarms.
7. Infrared detection

E. Alarming and Display:
1. Digital display in PPM/PERCENTAGE
2. Provide a 0-10V and 4-20mAmp output for direct input into the Building Management System or Direct Digital Control System.
3. Adjustable three level alarm for each point shall and be supplied with common alarm output contacts.
4. Provide local digital indication of PPM level for each sample point.
5. Loss of any sample flow
6. Identify alarm point by flashing display and actual PPM.
7. Automatic zero mechanism and malfunction indicators.
8. Silence audible alarm switch with re-activation after adjustable time delay.

F. Power requirement:
1. 120 VAC

G. Audible sound pressure level of at least 15Dba above the operating ambient noise level within machine room and providing a distinctive strobe type visual alarm both inside and out side machine room at each entrance. Ceiling mounted rotating beacon in center of machine room. Strobes shall be provided immediately adjacent to and outside of each refrigeration machinery room exit. A clearly identified switch of the break-glass type shall be provided immediately adjacent to and outside of each refrigeration machinery room exit.

H. Acceptable manufacturers:
1. General Analysis Corporation
2. Yokogawa Corporation
3. MSA
4. Sherlock
5. Vulcain

2.16 AUTOMATIC CONTROL VALVES

A. Pressure ratings: Minimum 125 psig or 1.25 times maximum system operating pressure.

B. Construction:
1. 2" and smaller:
   a. Screwed.
   b. Bodies and internal parts: Bronze, stainless steel or other approved corrosion-resistant metal.
2. 2-1/2" and larger:
   a. Flanged.
   b. Bodies: Cast iron or cast steel.
   c. Seats and parts exposed to fluid: Bronze, stainless steel or other approved corrosion-resistant metal.
3. Characterized port ball valves are acceptable for VAV terminal units only.

C. Modulating straight through water valves: Equal percentage contoured throttling plugs.

D. Three Way Mixing Valves: Linear throttling plugs allowing total flow through valve to remain constant regardless of position.

E. Sizes: By Automatic Control System Manufacturer for fully modulating operation.
1. Minimum pressure drop: Equal to pressure drop of coil or exchanger.

2. Maximum pressure drop: 5.5 psi.
3. Relief and bypass valves: Sized according to pressure available.
4. 2-position valves: Line size.
5. Manual by-pass operator.

F. Electronic Actuator:
1. Direct coupled installation
2. Visual and electronic stroke indicator
3. Die-cast aluminum housing
4. Manual override
5. Self-lubricating bearing and gear train
6. Automatic calibration
7. Automatic duty cycle protection
8. Overload and stall protection
9. Non-spring return
10. Floating /0-10 VAC / 4-20mA operation
11. UL approved
12. Provide smooth modulating action and tight close off against the system pressure.
13. Torque to exceed the maximum required operating torque by not less than 50%.
14. Actuator input signal shall be compatible with output DDC controller.
15. Provide weatherproof enclosure (exterior use).
16. Damper actuators not acceptable for valves.

G. Cooling Tower By-Pass and Chiller / Cooling Tower Isolation Valves & Actuators:
1. Valve Bray (Series 3L or NYL)
   a. Line Size Valve
   b. Under-cut disk for smooth operation
   c. Full Lug Valve
   d. Cast Iron Body
   e. EPDM - Seat
   f. 416 Stainless Steel Stem
   g. Nylon Coated Ductile Iron Disc
   h. Disc-to-stem connection shall utilize a double "D" or key design requiring no screws or pins to connect stem to disc.
2. Electronic Actuator: Bray (Series 70)
   a. Fully configurable without need for software or handheld settings device
   b. Direct Mount
   c. Solid state speed control
   d. Visual and electronic stroke indicator.
   e. Anti-Condensation Heater (exterior actuators)
   f. Die-cast aluminum housing.
   g. Manual override by means of hand wheel
   h. Self-lubricating bearing and gear train.
   i. All steel self-locking output gearing to be provided
   j. Continuous Duty Rated Motor
   k. Overload and stall protection.
   l. Floating /0-10 VAC / 4-20mA operation.
   m. Mechanical Travel stops
   n. UL approved.
   o. Smooth modulating action.
   p. Tight close off against the system pressure.
   q. Sized to exceed 150% of the maximum required operating torque of the valve while under the maximum rated shut-off pressure

r. Actuator input signal shall be compatible with output DDC controller.
s. Provide weatherproof enclosure
t. Damper actuators not acceptable for valves.

H. Variable Primary Flow By-Pass Control Valve:
1. Modulating straight through control valve with equal percentage contoured throttling plug and electronic operator.
2. Maximum pressure drop: 10 psi
3. Sized for minimum flow of one chiller
4. Torque to exceed the maximum required operating torque by not less than 150%.

2.17 DIFFERENTIAL PRESSURE SWITCHES

A. Wet/wet differential pressure switch
1. Integral Mounting Frame
2. Watertight, dust-tight, and corrosion resistant enclosure.
3. Wetted materials of brass and flouroelastomer.
4. Externally adjustable set point

B. Approved manufacturer:
1. Square D #9012GGW4
2. Dwyer #DXW-11-153-1
3. Carrier #HK06ZC033

2.18 TEMPERATURE LOW LIMIT SWITCH

A. Responsive to the coldest 1' section of its length.
1. Double pole single throw switch
2. 20' capillary
3. Line voltage with bellows actuated switch
4. Auto reset for outdoor installation
5. Manual reset for indoor installation

2.19 TEMPERATURE AND HUMIDITY SENSORS

A. Space Temperature Sensors
1. Thermistor with resistance of 10,000 ohms at 77°F.
2. Accuracy shall be +/-1/2°F.
3. Range of 45° to 95° F operating range.
4. Provide manufacturers calibration certificate.
5. Flush Mounted
a. Stainless steel flush mount sensor, submit sample for review.
6. Location and height to be approved by Architect/Engineer prior to installation.

B. Space / Duct Humidity Sensor
1. Capacitance element in the space or duct as required and output a 4 to 20 MA signal proportional to 0 to 100% RH to the DDC.
2. Capacitance element shall be field replaceable and not require calibration.
3. Accuracy shall be +/-2% in the range from 20 to 95% RH.
4. Relative humidity sensors shall have the sensing element of inorganic resistance media.
5. Provide locking metal covers suitable for institutional use. Submit sample for review.
6. Provide manufacturers calibration certificate.
7. Provide metal guards in the following locations:
a. Corridors

b. Cafeteria
c. Kitchen.
d. Gymnasium.
e. Dressing Rooms.
f. Industrial Labs.

C. Duct Temperature Sensors
1. Range of 20° to 120°F.
2. Single point sensing of temperature.
3. Averaging elements of sufficient length to sense temperature across 2/3 duct width.
4. Averaging elements of sufficient length to provide accurate, representative indication and control.
5. Averaging elements of sufficient length to prevent variances in temperature or stratification.

D. Liquid Immersion Temperature Sensors
1. Platinum type resistance temperature detector (RTD).
2. Match sensor range to medium being monitored.
a. Hot water range 30° to 250°F.
b. Chilled Water 20° to 70°F.
3. Furnish stainless steel wells for installation by Mechanical Contractor.
4. Locate all sensors in field with Owner/Engineer present.
5. System accuracy for liquid temperature sensing shall be +/-1/2°.
6. Sensors must be removable from wells.

E. Outside Air Temperature and Humidity Sensor
1. Temperature
a. Range of –40° to 140°F.
b. Accuracy shall be +/-0.9°F
c. Encapsulated into Type 304 stainless steel tubes with low conductivity moisture proofing material and lag extension for thickness of insulation.
2. Humidity
a. Capacitance element in the space or duct as required and output a 4 to 20 MA signal proportional to 0 to 100% RH to the DDC.
b. Accuracy shall be +/-2%
c. Range from 20 to 95% RH.
d. Relative humidity sensors shall have the sensing element of inorganic resistance media.
3. Weatherproof sun shield consisting of multiple white plastic plates to reduce the thermal effects of the sum and increasing air flow between the plates.
4. Sensor shall be mounted a minimum of 6" from all building structures.
5. Minimum of 8' long leads.
6. Provide manufacturers calibration certificate.
7. Provide with a 5-year warranty
8. Manufactured by ACI Model # A/-RH2-AN-O-SUN---NIST

F. Freezer / Cooler Sensors
1. Thermistor with resistance of 10,000 ohms at 77°F.
2. Accuracy shall be +/-1/2°F.
3. Range of -40°F to 210°F.
4. Provide manufacturers calibration certificate.
2. Die cast aluminum construction
3. Liquid tight wire connector to isolate sensor chamber from exterior temperature

influence.
4. 1/2" NPT threaded hub
5. Mamac Systems Model #TE-205-F-12
6. Reuse existing wiring penetrations through cooler or freezer where possible. If existing penetrations through cooler or freezers cannot be reused, seal existing holes with silicon such that opening is airtight.
7. All new penetrations into the cooler or freezer body shall be sealed airtight using silicon. This shall include screw holes and wiring penetrations.

2.20 CURRENT SENSITIVE RELAYS

A. Ensure compatibility with VFD applications for variable speed motor status.
1. Provide with adjustable set point.
2. Relays must be mounted and not hung by power wires thru CT.
3. Provide split-core type current sensors.
4. Loop powered.
5. LED Status.
6. Acceptable Manufacturer: Veris Industries / Hawkeye
7. Relays shall close status contacts in response to current flow in power leads to the equipment being monitored.
8. To be used on towers, vertical turbine pumps, exhaust fans and direct drive equipment only.

2.21 DIFFERENTIAL PRESSURE TRANSDUCER

A. Transducers to convert differential pressures to 4-20 MA analog outputs.
1. Solid state pressure sensor with accuracy of +/- 1% of calibration range.
2. Factory calibrated and have zero and span trimmers for field calibration.
3. Range shall be selected to match the medium being monitored.
4. Pressure snubbers to protect from pressure pulses and a 3-way bypass / valve assembly to protect the transducer from overpressure damage during start-up.
5. LCD Display
6. Acceptable Manufacturer: Rosemount 1151 or 3051 Pressure Transmitter

2.22 FLOW DIFFERENTIAL PRESSURE SWITCH

A. The pressure sensing element shall be of the convoluted diaphragm type for sensitivity to system differential pressure.
1. Select the pressure range based on the sensed differential pressure.
2. The unit shall be protected against overpressure to the full static pressure rating.
3. Accuracy: +/- 2% of full scale.

B. Switch assembly.
1. Reed switch.
2. NEMA-4 enclosure.
3. Threaded boss conduit entrance.
4. SPST action.
5. Voltage and rating as required for the control circuit.

C. Wetted parts shall be made of type 303 stainless steel.

D. Install an isolation valve in each sensing pipe leg to permit servicing without shutting the system down.

2.23 ELECTRIC REMOTE BULB THERMOSTAT

A. Two position remote bulb thermostat:
1. Bimetal controlled.

2. Sealed mercury switches.
3. Provide specified control action.
4. Adjustment can be made by removing unit cover.
5. Element with capillary length as required for the location.

2.24 ELECTRIC SPACE THERMOSTAT

A. Two position space thermostat.
1. Single Pole switch actuated by bi-metal sensing element.
2. Range shall be 60°F to 90°F.
3. Removable external knob adjustment means.

2.25 HIGH STATIC PRESSURE SWITCH

A. With manual reset switch
1. Approved manufacturer: Cleveland AFS-460.

2.26 INSERTION FLOW SENSORS

A. Electromagnetic Flow Meter
1. Retractable hot tap flow sensor
2. Accuracy: +/- 1% of full scale
3. Electromagnetic
4. Custom thread-o-let 400 psi / 250 degree F rated.
5. Line size from 1-1/4 to 72 inch
6. Metering range from 0.3 to 15 f/sec.
7. Remote NEMA 4 wall mounted LCD display
8. Field Pro Software & Communicator
9. Warranty two years
10. Approved Manufacturer Onicon Flow Meter F3500 or FT3500

2.27 CONTROL DAMPERS

A. Opposed blade dampers:
1. Frames of 13-gauge galvanized sheet metal.
2. Provisions for duct mounting.
3. Damper blades not exceeding 8" in width.
4. Blades of two sheets of 16-gauge galvanized sheet metal.
5. Blades suitable for high velocity performance.
6. Bearings of nylon or oil-impregnated, sinthered bronze.
7. Shafts of 1/2" zinc plated steel
8. Leakage does not exceed 1/2% based on 2000 fpm and 4" static pressure.
9. Replaceable resilient seals along top, bottom and sides of frame and blade edge.
10. Submit leakage and flow characteristics data with shop drawings.
11. Linkage shall be concealed out of the air stream within damper frame.
12. Acceptable Model is Ruskin Model CD60.

2.28 PHOTO CELL CONTROL

A. Light Sensitive Resistor:
1. 4-20 output or switch
2. On = 3.0 / fc. Off 10.0 / fc
3. UL Approved

2.29 DRAIN PAN FLOAT SWITCH

A. Rated at 10 Amps:

1. Shuts off equipment if water level becomes too high.
2. DPDT Contacts.

2.30 BY-PASS AUTOMATIC SHUT-OFF TIMERS

A. Rated at 10 Amps, 125 VAC:
   1. Shuts off equipment with timed switch
   2. White decorated timer
   3. Without hold feature
   4. Time Cycle 60 minutes

2.31 TEMPERATURE/CO_2 SENSOR

A. Sensor combo in one housing, Temperature and CO2.
B. Provide combo temperature/CO2 sensor in the following locations:
   a. Each Classroom
   b. Library
   c. Cafeteria
   d. Gymnasium
C. 0-2,000 ppm CO2
D. CO2 sensor shall have a self-calibration feature.
E. Temperature accuracy shall be +/-1/2°F.
F. Temperature range shall be 32° to 120° F
G. Location and height to be approved by Architect/Engineer prior to installation.
H. Internal RJ11 Communication jack at sensor for communications.
I. Provide metal guards in the following locations:
   a. Corridors
   b. Cafeteria
   c. Kitchen.
   d. Gymnasium.
   e. Dressing Rooms.
   f. Industrial Labs.
J. Color to be approved by Architect / Owner, submit sample for review.

2.32 AIR FLOW SENSING SWITCH

A. The pressure sensing element shall be of the convoluted diaphragm type for sensitivity to system positive, negative, or differential pressure.
   1. Select the pressure range based on the sensed differential pressure.
   2. The unit shall be protected against overpressure to the full static pressure rating.
   3. Accuracy: +/- 2% of full scale
B. Switch assembly:
   1. Reed switch
   2. Field adjustable setpoint
   3. Threaded boss conduit entrance
   4. SPST Action
   5. Voltage and rating as required for the control circuit

2.33 HVAC SHUTDOWN STATION

A. Shutdown Switch:
   1. Yellow Mushroom Button within a clear plastic cover
   2. Latches when depressed
   3. Twist reset
   4. Sign "HVAC SHUTDOWN"

5. Manufactured by STI Model # SS2231HV-EN

2.34 CARBON MONOXIDE MONITORING SYSTEM

A. Provide and install a manual reset Carbon Monoxide Detector located within the boiler room. The Carbon Monoxide Detector and the boilers and gas water heaters shall be interlocked so that the burners will not operate when the level of CO in the room rises above 50ppm. The Carbon Monoxide detector shall disable the boiler's or gas water heater's burner upon loss of power to the detector.

B. Carbon Monoxide Sensor with two year warranty by U.S. Draft Co. Model CGM-605 with model XB expansion module or Greystone Model CMD5B series.
   1. Provided with pre-programmed dry contacts to shut down equipment during unsafe operation.
   2. NEMA 1 Enclosure
   3. Complies with Texas State Boiler Code 65.603-2015
   4. Additional features shall include 0-10 VDC control signal out, visual alarm and audible alarm.
   5. Provide expansion board for additional equipment interlocks.

PART 3 - EXECUTION

3.1 REPLACEMENT OF EXISTING BMCS SYSTEMS

A. Complete replacement of the existing Building Management and Control Systems at this campus shall include the following:
   1. Remove all existing control devices and replace with new.
   2. Remove all existing wiring and replace with new.
   3. Replace all of the existing control valves at each coil including but not limited to AHUs, FCUs, and zone terminal units.
   4. Replace all of the existing dampers and damper actuators on exhaust fans, terminal units, outside air intake and relief hoods or etc.
   5. Remove all existing BMCS control cabinets and provide new.
   6. Existing control conduits may be reused. All existing control conduit being abandoned shall be removed.
   7. New wiring shall not be routed in the same conduit or pathway as any high voltage wiring.
   8. The owner shall be given first right of refusal on all existing control devices.
   9. All exhaust fans, outside air intakes, and relief vents shall be equipped with motorized dampers upon completion of project. Provide new dampers and actuators.

B. The new BMCS system shall maintain control of all equipment and devices currently on the BMCS system. The existing building control system points list is available upon request and contains all point to be control upon completion of this project.

C. It is the responsibility of the contractor to ensure all equipment is under control of a BMCS system prior to the building system being started and building becoming occupied. This includes intermediate systems startups due to phased construction.

D. Verify operation of all existing equipment prior to adding existing equipment to new control system. Notify engineer/owner of inoperable equipment.

E. Contractor is to maintain safety interlocks during all phases of the BMCS installation. This includes providing temporary rough-ins of high static limits to VFD shut downs, freeze stat interlocks to starters/VFDs, etc. The wiring for these rough-ins may be run in a temporary fashion overhead, exposed and unsupported as long as the wiring is not in the path of the normal construction movement in the space. Wires laying on the floor and/or in the path of other workers in not acceptable at any time. These safeties are to be

maintained until the AHUs controls are downloaded, commissioned, and operating in automatic mode per sequence of operations.

F. **All existing Trane controls that are being removed from project shall be returned to owner. Components shall be stored in a clean and dry environment and delivered to Cyfair ISD Maintenance upon completion of demolition phase.**

3.2 INSTALLATION

A. The control system shall be installed and final adjustments made by full-time employees of the factory-approved BMCS Building Management Control Subcontractor.

B. The contractor shall collaborate through Architect / Engineer and Owner to determine the Owner's preference for naming conventions, etc. before entering the data in to the system.

C. Due to actual operational or space conditions, it may be necessary for the Contractor to make sequence of operation modifications and/or controller adjustments, change the location or type of sensor to obtain proper operation and coverage of the system in each room or space. These change, if requested by the Owner or Engineer, shall be performed at no additional cost to the Owner. Therefore, labor allowances should be made for such changes and adjustments if requested.

3.3 INTERLOCK AND SAFETY CIRCUITS

A. Close the outdoor air dampers when the related HVAC unit supply or exhaust fan is de-energized:
   1. The damper and actuators are specified in this section.
   2. Outdoor air damper shall be fully opened before related air handling unit fan is energized for 100% outside air use.
   3. Provide motorized outside air dampers for the following:
      a. Supply fans
      b. AHUs
      c. Exhaust fans (except kitchen exhaust)
      d. Outside air intakes
      e. Relief air hoods

B. Close the chilled and hot water valves to the coil when the related unit is de-energized.

C. Interlock each chiller to start its dedicated chilled and condenser water pumps. Interlock pressure differential switch and pump auxiliary contacts in series to chiller safety terminal strip.
   1. On shutdown provide a circuit to permit the chilled water pumps and condenser water pumps to run while the chillers pump down as required by the manufacturer.
   2. As per manufacturer's recommendations.

D. Primary chilled water control:
   1. Operating and safety controls are furnished as an integral part of the water-chilling unit and not specified in this section.
   2. Provide pressure differential switch located in the chilled water and condenser water piping to each water-cooled liquid chiller.
      a) Interlock to prevent operation in the absence of flow.
      b) This may not be the prime controller to start/stop the chiller.
      c) Interlock thru pump auxiliary contacts.
   3. Provide a high limit temperature sensor in each primary chilled water pump loop.

E. Exhaust/Supply Fans:
   1. Interlock the related exhaust and supply fans and the related outside air damper.
   2. Interlock the exhaust fans with the related air-handling unit through software. The new BMCS shall integrate all existing fan interlocks.

3. Interlock related exhaust fan for dishwasher with time delay off relay.
4. Interlock related exhaust fan for kiln with time delay off relay
5. Interlock kitchen hood related supply and exhaust fans.
6. Provide additional interlocks as indicated on fan schedule and on drawings.
7. Interlock electrical and mechanical room exhaust fans with thermostat.
8. Interlock refrigerant monitor with mechanical room purge system.
9. Interlock science room related supply and exhaust fans.
10. Interlock outside air supply fans for VAV air-handling unit with air-handling unit status point.

F. Cooling Tower Fan Safety Interlock: Provide interlock wiring for the vibration sensor and oil level switch on each cooling tower fan.

G. Freeze Protection:
1. Provide a freeze protection sequence to ensure proper operation of equipment during a freeze condition not limited to the following:
   a. Outside Air Handling Units & Supply Fans with heating and cooling coils: If unit is in occupied or unoccupied mode, upon the triggering of software point indicating a freeze condition or the low temperature sensor (freeze stat) indicates a freeze condition, the system will be disabled, close the outside air damper, open both heating and cooling valves to enable full flow condition. If heating coil discharge air sensor indicates a failure to control and is below setpoint then enable software point indicating a freeze condition, disable unit, close outside air damper, and open both heating and cooling valves to enable full flow condition. Ensure HW & CHW pumps are operational.
   b. Boilers - Enable during a freeze condition.
   c. Air Cooled Chillers – enable pumps, run cycle for 15 minutes per hour, open all chilled water valves.
   d. Protect heating water coils downstream of DX cooling coil with freeze protection. If unit is in occupied or unoccupied mode, upon the triggering of software point indicating a freeze condition or the low temperature sensor (freeze stat) indicates a freeze condition, the system will be disabled, close the outside air damper, disable the DX cooling coil. If heating coil discharge air sensor indicates a failure to control and is below setpoint then enable software point indicating a freeze condition.
2. Temperature low limit switch wired with double pole single throw switch with one switch leg hard-wired to de-energize fan and one switch leg to signal BMCS.

H. Drain Pan Float Protection:
1. Interlock to shut down unit and close valves.
2. Cooling Coils mounted above ceiling and in roof mounted units.
3. Provide for each cooling coil location.
4. Signal BMCS alarm point

I. HVAC Shutdown Station:
1. Provide an emergency mushroom style push / pull station shutdown switch in a Administration Area or as directed by Owner / Architect.
2. Signal the building automation system to de-energize the HVAC equipment.
3. This is to stop exhaust fans and outside air units immediately.
4. Other air handling units, chillers and equipment shall be shut down in an orderly manner so as to not damage the equipment.
5. Once stopped, the system may only be restarted by relatching the emergency push button switch.

J. Science Room Utility Controllers:
   1. Interlock the utility controllers with related air-handling unit through software.
K. Domestic Water System:
   1. Interlock in-line circulating pumps at water heaters with return water pipe mounted thermostat to cycle pump with return water temperature.
   2. Interlock high temperature entering water solenoid valve with thermostat on discharge side of tempered water mixing valves.
L. Condensing Hot Water Boilers:
   1. Interlock each boiler to start its dedicated pump.
   2. Install communication cable between each boiler and master controller specified by boiler manufacturer.

3.4 GRAPHICS

A. Furnish as-built drawings indicating finally corrected "as installed" diagram(s) of the complete Building Management Control System.
   1. Modification of existing control systems shall be included.
   2. These must be as-built and any changes during the warranty period drawings must be revised and updated.
   3. Provide final sequence of operation in written format.
B. Provide a set of the "as installed" diagram(s) of the complete control system laminated in plastic and hung in the main mechanical room or as directed by Owner.
C. Provide a color-coded floor plan of the building showing the location of each system, and the area served by each AHU or related zone. These must be of professional quality. Floor plan is to hang in main mechanical room near central control panel.
D. Provide computer graphics for each system.
E. Provide final graphic room numbers as selected by District. Any changes during the warranty period shall be included.
F. Provide a summary page for each type of equipment. Summary pages shall be provided for, but not limited to, DDB, EF, AHU, CH, CT, Pumps, and FCU. Summary pages shall include the ability to modify the global set points for each equipment type.
G. Provide an alarm management and reporting graphical page. This page shall allow user to create, acknowledge and adjust alarms. All alarms shall have the ability to be selectable for remote notifications and control which personnel is notified.
H. System shall include a graphical page that contains building and system related documents stored for ease of remote access.
I. System shall include a real time dynamic dashboard to provide real time analysis of conditions and equipment performance.
J. System shall include a real time dynamic Central Plant Energy / Status dashboard. Dashboard shall display the following at a minimum:
   1. Actual Plant operating Tons
   2. Total Plant Capacity Available
   3. Percent Usage of Available Capacity
   4. Current Plant operation KW/Ton
   5. Current Chiller KW/Ton
   6. Bar Chart indicating energy consumption by plant component (Chillers, CW Pumps, CHW Pumps and Exhaust Fans)
   7. Tables for Chillers, Chilled Water Pumps, Condenser Water Pumps, and Cooling Tower Fan. The chart shall indicate S/S, Status, KW Consumption, Alarm Status Running AMPS on Chillers.
   7. Trending Graph (Total Chiller KW/Ton and Total Plant KW/Ton)

3.5 IDENTIFICATION

A. Provide a laminated engraved nameplate on all control panels and devices shown on the "as installed" control diagrams. Coordinate engraving with nomenclature used on the diagrams.

B. A black-white-black laminated plastic engraved identifying nameplate shall be secured to each terminal cabinet, and control panels. Identifying nameplates shall have ½ inch high, engraved letters.

C. A red-white-red 2"x8" laminated plastic engraved identifying nameplate shall be secured to each audible/visual alarm and emergency shutdown device. Provide identification and location of each A/V device laminated in plastic and hung at refrigerant monitor with identification, location of devices and proper operation of system in a graphic floor plan with written sequence of operation. Identifying nameplates shall have ½ inch high, engraved letters. A red-white-red 12"x12" laminated plastic engraved identifying name plate shall be secured to outside of each door to machine room with "A REFRIGERANT LEAK HAS BEEN DETECTED IN THIS BUILDING WHEN AUDIBLE/VISUAL ALARM IS ENABLED. DO NOT ENTER. CONTACT MAINTENANCE DEPARTMENT."

3.6 WIRING FOR BUILDING MANAGEMENT AND CONTROL SYSTEMS

A. Furnish and install all wire, conduit, raceways and cable systems required for the complete operation of the Building Management and Control System. In addition, furnish, and install all wire, conduit, raceways and cable systems required with the VRF system in the Administration area.

B. All wiring for the Building Management and Control System is specified in this section and includes, but is not limited to:
   1. Wiring of interlock system.
   2. Wiring of control instruments.
   3. Wiring of control panels.
   4. Wiring of related power supplies, i.e. transformers.
   5. Wiring of 120 VAC power circuits for control panels and devices.

C. All materials and methods specified in this section shall comply with the requirements specified in Division 26 of this specification.

D. All power supply requirements shall be connected to the building electrical distribution system in an approved manner. Do not connect control equipment of circuits common with other building loads or devices.

E. Temperature control wiring shall be jacketed cables installed with or without conduit as specified below or single conductors installed in conduit. Control wiring shall have minimum 300V insulation for low voltage wiring and 600V insulation for line voltage wiring.

F. All line voltage control wiring, all low voltage control wiring which is exposed in the central plant, penthouse, and other exposed ceiling spaces; all low voltage control wiring which is routed through concealed inaccessible locations shall be installed in conduit.

G. All low voltage control wiring which is routed through concealed accessible locations may be run without conduit provided that the wiring run without conduit is properly supported from the building structure on maximum 5' centers and does not depend upon the ceiling grid or the ceiling support system for support. Wiring run in plenum spaces shall be plenum rated. Support all plenum wiring in accessible locations in bridle rings, J-hooks, D rings. Plenum wiring is not to be supported within building structure or attached to conduit raceways. All low voltage wiring must be installed through supports. Wires shall be supported on 5' centers and identified at each termination point and at 50' centers minimum. Install wire parallel or perpendicular to the structural features of the

building.

H. Line and low voltage control wiring shall not be installed in the same conduit with control wiring and shall not be installed in the same conduit with power wiring.

I. All wiring associated with building management and control system cover shall be as follows:
   1. Sensor jacket color, Green
   2. LAN communications, Yellow
   3. All THHN wiring shall comply with Division 26 insulation color identification

3.7 EXHAUST AND SUPPLY FANS

A. Provide interlocks as scheduled on the plans unless shown on the electrical drawings.

B. Provide BMCS override to disable operation of all exhaust and supply fans interlocked and/or specified throughout project.

C. Provide wall mounted timers for fans indicated in Fan Schedule.

D. Provide wall mounted local switches for fans indicated in Fan Schedule

E. Dampers and actuators shall be provided by this contractor and shall not be furnished with the exhaust fan.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
Fan Status	DI	Current Sensitive Relay (EF) Air Flow Sensing Switch (SF)
Outside Air Damper	DO	Electronic Operator

3.8 SCIENCE EMERGENCY PURGE EXHAUST (DEDICATED EXAHUST FAN)

A. The following requirements are in addition to Article 3.7 above.

B. Provide an emergency purge push button located in each science as indicated on drawings. When push button is enabled, the fan shall be enabled.

3.9 SCIENCE FUME HOOD EXHAUST (DEDICATED EXAHUST FAN)

A. The following requirements are in addition to Article 3.7 above.

B. Fan shall be enabled to run when fume hood switch or switches are toggled to the on position. A single hood may have two switches and either switch shall control fan.

3.10 DISHWASHER EXHAUST

A. Interlock exhaust fan to operate when dishwasher is operating. Provide 5 minute (adjustable) run time for fan after dishwasher stops.

3.11 BUILDING ELECTRICAL USAGE

A. Provide digital monitoring of the building KVA and KWH via all meters on main switch gear provided with electrical switchgear by Division 26

B. Electrical Quality monitoring:
   1. Monitor Watts, VA, VAR, Demand, Imbalance, and Power Factor.

C. Provide a separate graphics page for all Building Level meters. The link to the graphics page shall be categorized under Misc. Equipment.

3.12 CENTRAL PLANT CHILLED WATER SYSTEM ELECTRICAL USAGE

A. Provide digital monitoring of the building KVA and KWH via all meters on switch gear serving central plant equipment provided with electrical switchgear by Division 26. This shall include all chilled water pumps (primary and secondar), tower fans, condenser water pumps, chillers, etc. The BMCS shall perform all necessary calculations to remove or add meters as required to capture only the chilled water system related components. Provide a separate graphics page that indicates instantaneous chilled water plant power consumption and the trend data for the past 90 days minimum.

B. Electrical Quality monitoring:
   1. Monitor Watts, VA, VAR, Demand, Imbalance, and Power Factor.

C. Provide a separate graphics page for all Central Plant Chilled Water System electrical switchgear meters. The graphics page shall indicate a panel directory of what is connected to the panel. The link to the graphics page shall be categorized under Misc. Equipment.

3.13 MISCELLANEOUS

A. Freezer/Cooler Temperature Monitoring:
   1. Provide an analog temperature sensor located in the freezer compartment and cooler compartment. The BMCS shall monitor the freezer and alarm when temperature rises above 28°F (adjustable) or falls below -20°F (adjustable). The BMCS shall monitor the cooler and alarm when temperature rises above 50°F (adjustable) or falls below 33°F (adjustable). The BMCS shall have the ability to suppress alarms during scheduled hours (adjustable) during the weekdays. In addition the BMCS shall include the ability to manually override the alarm suppression during holidays.

POINT DESCRIPTION	TYPE	DEVICE
Freezer Alarm	AI	RTD
Cooler Alarm	AI	RTD

B. MDF/IDF Temperature Sensor: Provide a temperature sensor in each MDF and IDF rooms to monitor space conditions. BMCS shall alarm when temperature is out of setpoint range.

POINT DESCRIPTION	TYPE	DEVICE
MDF/IDF Temperature	AI	Space Sensor

C. Specialized Storage Rooms: Provide a temperature and humidity sensor in each specialized storage room to monitor space conditions. BMCS shall alarm when temperature and humidity is out of setpoint range.

POINT DESCRIPTION	TYPE	DEVICE
Storage Temperature	AI	Space Temp Sensor

Storage Humidity	AI	Space Humidity Sensor

D. Outside Air:
1. Provide a temperature sensor and humidity sensor to monitor outside air conditions.
2. The BMCS control system shall reference the nearest airport weather data to verify BMCS sensor accuracy by comparing the local sensor readings to the airport conditions. If the values vary my more than 10% (Adjustable) an alarm shall be sent through the BMCS that local sensors are out of range and need to be re-calibrated.

POINT DESCRIPTION	TYPE	DEVICE
Outside Temperature	AI	Thermistor
Outside Humidity	AI	Humidity Sensor

E. Humidity Sensor: Provide a sensor in Library to monitor space conditions.

POINT DESCRIPTION	TYPE	DEVICE
Library Humidity	AI	Temperature Sensor

F. Photocell: Provide a photo sensor mounted on the north side of the building. Location is to be approved by Owner / Architect / Engineer.

POINT DESCRIPTION	TYPE	DEVICE
Photocell	AI	Contact

G. Interior Lighting Control:

Building Management Control System Scope

The lighting control system, as indicated on the electrical drawings lighting control details, will be provided with lighting control system BMCS interface devices via DLM room controllers, refer to Electrical Drawings and Details. The BMCS system shall send a occupied and unoccupied signal to the lighting control system BMCS interface devices based on a BMCS schedule.

The BMCS provider shall provide an additional 8 hours of technician support to ensure the lighting control system is commissioned and operating as described.

Lighting Control System Scope

When the Lighting Control system BMCS interface devices in an area receives an occupied signal from BMCS, the lights in that area shall remain in their current state (typically off) but allow any local switch in that area to control the lighting in that space.

When the Lighting Control system receives an unoccupied signal from BMCS, the lighting control system shall flash the lights, and after a delay, the lights in that area shall

be swept off by the lighting control system. In this unoccupied mode, the lighting control system shall allow any local light switch in that area to allow the lights to be controlled locally for 2-hours upon being switched on by the local switch. After the 2-hours, the lighting control system enable signal shall expire, and the lights shall again flash a warning, and if the local switch is not again activated, the lights shall be turned off by the lighting control system.

POINT DESCRIPTION	TYPE	DEVICE
Interior Lighting Control		DLM Room Controller

H. Exterior Lighting Control
1. Provide individual time/photo-cell and time based control of each lighting contactor specified in Division 26.
   a. Provide separate control of each contactor.
2. The exterior lights shall be controlled by the BMCS using both a combination of photosensor, time schedules and astronomical sunrise/sunset. The exterior lights shall automatically come on when the sun sets based on the longitude and latitude coordinates of the facility (adjustable +/- 30 minutes). At 11 p.m. (adjustable) the time schedule shall turn off the exterior lights. At 4:00 a.m. (adjustable) the exterior lights shall automatically turn on based on time schedule. Upon sunrise, which shall be based on longitude / latitude of the facility the exterior lights shall turn off.
3. Between sunrise and sunset, photo-sensor shall only deactivate all exterior lighting when ambient light levels are above set point (adjustable).

POINT DESCRIPTION	TYPE	DEVICE
Lighting Contactor	DO	Control Relay
Momentary Control Switch	DI	Switch

I. Tennis Court Lighting Control: The controls for AUTO shall accept a signal from the Building Management Control System (BMCS) for control of the tennis court lighting. The BMCS signal used for the interior lighting Wattstopper controls building occupied/un-occupied state shall enable/disable a BMCS tennis court lighting scheduled. The tennis court lighting shall turn ON 20-miniutes prior to sunset and turn off at a scheduled time as directed by Owner. Either a building Wattstopper un-occupied state or a tennis court scheduled turn OFF shall turn the tennis court lights OFF.

J. Utility Usage Metering: Provide a separate graphics page for the following items to allow for quick referencing, all new meters shall be provided and installed by this contractor.
1. Building Water Service - Provide meters, digital monitoring and logging, through the BMCS, of the building domestic water usage meter. Provide separate water meters for each service. Water meters shall have 4-20 mA signal or pulse for conversion by BMCS into water flow rates. BMCS shall log data for use.
2. Kitchen Water Service - Provide meters, digital monitoring and logging, through the BMCS, of the kitchen cold water usage meter and kitchen hot water usage meter.

Provide separate water meters for each service. Water meters shall have 4-20 mA signal or pulse for conversion by BMCS into water flow rates. BMCS shall log data for use.

3. Building Gas Service: Provide meters, digital monitoring and logging, through the BMCS, of the of the building gas meter. Gas meters shall have 4-20 mA signal or pulse for conversion by BMCS into water flow rates. BMCS shall log data for use.
4. Kitchen Gas Service: Provide meters, digital monitoring and logging, through the BMCS, of the of the kitchen gas meter. Gas meters shall have 4-20 mA signal or pulse for conversion by BMCS into water flow rates. BMCS shall log data for use.
5. Kitchen Electrical Service: Provide CT meters, digital monitoring and logging, through the BMCS, of each Current Transformer Meter added to all kitchen electrical panels and equipment. This shall include the normal power and emergency electrical panels. BMCS shall log data for use.
6. Provide a separate graphics page for all building and kitchen meters. The link to the graphics page shall be categorized under Misc. Equipment. Equipment and trended on a 15-minute interval.

3.14 ELECTRICAL DEMAND RESPONSE

A. BMCS system shall be provided with Automated Electrical Demand Management as described below.

B. The user shall have 8 levels of adjustment to reduce the electrical demand of the facility. Each level shall be schedulable, respond to a command from the electrical provider, and have a button for instant activation.

C. The user shall have the following configuration within each configurable level:
   1. Setpoint Relaxation
   2. Outside Air Shutdown
   3. Equipment Shutdown
   4. Chiller Plant State Limit
   5. Chiller Shutdown

D. Setpoint Relaxation will allow the setpoints to shift away from their current setpoint based on the amount specified in the active demand response level. Outside Air Shutdown will deactivate the outside air equipment. Equipment Shutdown will shut down the HVAC equipment. Chiller Plant State Limit will limit the number of available states the chiller plant can use. A plant state of 0 will shut down the chiller plant. Chiller Shutdown will shut down the chillers but allow the pumps to run maintaining differential pressure setpoint.

E. All equipment shall be configurable to ignore any or all demand response commands. The user shall have the ability to run a report to adjust each of these parameters.

F. The Demand Response dashboard shall display all levels and their configuration, the electrical demand of the facility, the current level of reduction scheduled, the button to enable each level, and the average reduction each level is able to achieve.

G. Support automated notifications of a demand response event scheduled, threshold met, strategies executed and strategies released to normal.

3.15 TERMINAL UNIT COORDINATION

A. Equipment furnished and installed in this section.
   1. Automatic temperature control card (DDC).
   2. Damper Actuator
   3. Flow Measurement tubing, taps and grommets.

3.16 VARIABLE VOLUME DUAL DUCT AIR HANDLING UNITS (AHU-B1, C1, C3, C4, D2,

D4, D5, E1, E2, E4, E5, G2, G3, G4, H1, H5, J6)

A. Units consist of a chilled water coil, a hot water coil, a fan, and a variable speed drive. The outside air to these units is only preheated in winter. Controls shall be as follows:
   1. An electronic averaging duct sensor in the cold duct shall, acting through the DDC System, modulate the chilled water valve to maintain desired setpoint. The cold deck discharge air temperature setpoint shall be reset between 53°F and 60°F (adjustable) based on the units return air temperature of 78°F to 70°F respectively (adjustable)
   2. An electronic averaging duct sensor in the hot deck duct shall, acting through the DDC System, modulate the hot water valve to maintain desired setpoint. The hot deck setpoint will be reset inversely such that when the outdoor air temperature is 20°F (adjustable) or below, the hot deck setpoint will be 95°F (adjustable): and when the outdoor air temperature is 75°F or above the hot deck will at its minimum of 75°F (adjustable)
   3. The unit shall be started and stopped from the BMCS system.
   4. An electronic duct static pressure sensor shall be located in the cold duct at a position approximately 2/3 the distance from the fan in the longest duct run. Location is to be approved by Engineer and coordinated with Section 23 05 93. The sensor shall transmit a signal to the supply fan motor speed controller, and modulate the fan speed to maintain a supply duct static pressure. A high limit static pressure sensor with manual reset, located at the fan discharge, shall de-energize the supply fan when sensing pressure above duct construction capabilities. Fan start-up shall be initiated at minimum air speed.
   5. A Pre Heat temperature sensor shall monitor unit's pre heat air temperature and modulate the pre heat control valve to maintain the pre heat air temperature setpoint of 55°F (adjustable)
      a. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.
   6. An air flow measuring station shall monitor the OA delivered to the unit and modulate the OA damper to maintain OA volume.

POINT DESCRIPTION	TYPE	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Discharge Air Temperature (2)	AI	Duct Temperature Sensor, One Each Deck
PHW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
HW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
CHW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor

POINT DESCRIPTION	TYPE	DEVICE
Return Air Temp.	AI	Averaging Duct Thermistor
PHW Valve	AO	Electronic Operator
HW Valve	AO	Electronic Operator
CHW Valve	AO	Electronic Operator
Air Flow Volume	AI	Air Flow Monitor
Duct Static Pressure (2)	AI	Static Pressure Sensor, One Each Deck
Outside Air Damper	AO	Electronic Operator
Fan Speed	AO	Variable Frequency Drive
Freeze Status	DI	Temperature Low Limit Switch

3.17 VARIABLE VOLUME DUAL DUCT AIR HANDLING UNITS (AHU-D1, D3)

A. Units consist of a chilled water coil, a hot water coil, a fan, and a variable speed drive. The outside air to these units is not treated. Controls shall be as follows:
   1. An electronic averaging duct sensor in the cold duct shall, acting through the DDC System, modulate the chilled water valve to maintain desired setpoint. The cold deck discharge air temperature setpoint shall be reset between 53°F and 60°F (adjustable) based on the units return air temperature of 78°F to 70°F respectively (adjustable)
   2. An electronic averaging duct sensor in the hot deck duct shall, acting through the DDC System, modulate the hot water valve to maintain desired setpoint. The hot deck setpoint will be reset inversely such that when the outdoor air temperature is 20°F (adjustable) or below, the hot deck setpoint will be 95°F (adjustable): and when the outdoor air temperature is 75°F or above the hot deck will at its minimum of 75°F (adjustable)
   3. The unit shall be started and stopped from the BMCS system.
   4. An electronic duct static pressure sensor shall be located in the cold duct at a position approximately 2/3 the distance from the fan in the longest duct run. Location is to be approved by Engineer and coordinated with Section 23 05 93. The sensor shall transmit a signal to the supply fan motor speed controller, and modulate the fan speed to maintain a supply duct static pressure. A high limit static pressure sensor with manual reset, located at the fan discharge, shall de-energize the supply fan when sensing pressure above duct construction capabilities. Fan start-up shall be initiated at minimum air speed.
   5. A Pre Heat temperature sensor shall monitor unit's pre heat air temperature and modulate the pre heat control valve to maintain the pre heat air temperature setpoint of 55°F (adjustable)
      a. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water

pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.

6. An air flow measuring station shall monitor the OA delivered to the unit and modulate the OA damper to maintain OA volume.

POINT DESCRIPTION	TYPE	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Discharge Air Temperature (2)	AI	Duct Temperature Sensor, One Each Deck
HW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
CHW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
Return Air Temp.	AI	Averaging Duct Thermistor
HW Valve	AO	Electronic Operator
CHW Valve	AO	Electronic Operator
Air Flow Volume	AI	Air Flow Monitor
Duct Static Pressure (2)	AI	Static Pressure Sensor, One Each Deck
Outside Air Damper	AO	Electronic Operator
Fan Speed	AO	Variable Frequency Drive
Freeze Status	DI	Temperature Low Limit Switch

3.18 VARIABLE VOLUME DUAL DUCT AIR HANDLING UNITS (AHU-J3,G5,G6)

A. Units consist of a chilled water coil, a hot water coil, a fan, and a variable speed drive. The outside air to these units is pretreated (cooled and heated). Controls shall be as follows:

1. An electronic averaging duct sensor in the cold duct shall, acting through the DDC System, modulate the chilled water valve to maintain desired setpoint. An electronic averaging duct sensor in the hot deck shall, acting through the DDC system, modulate the hot water valve to maintain desired setpoint. A schedule shall be set up for the hot deck temperature based on outside air temperature. The temperature of the hot deck shall modulate between the following criteria. If the temperature outside is 50°F (adjustable) or below, the hot deck temperature shall be 95°F; if the outside temperature is 75°F or above, the hot deck coil shall be deactivated.
2. The unit shall be started and stopped from the BMCS system.
3. An electronic duct static pressure sensor shall be located in the cold duct at a position approximately 2/3 the distance from the fan in the longest duct run.

Location is to be approved by Engineer and coordinated with Section 23 05 93. The sensor shall transmit a signal to the supply fan motor speed controller, and modulate the fan speed to maintain a supply duct static pressure. A high limit static pressure sensor with manual reset, located at the fan discharge, shall de-energize the supply fan when sensing pressure above duct construction capabilities. Fan start-up shall be initiated at minimum air speed.

POINT DESCRIPTION	TYPE	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Discharge Air Temperature (2)	AI	Duct Temperature Sensor, One Each Deck
HW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
CHW Coil Leaving Air Temp.	AI	Averaging Duct Thermistor
Return Air Temp.	AI	Averaging Duct Thermistor
HW Valve	AO	Electronic Operator
CHW Valve	AO	Electronic Operator
Duct Static Pressure (2)	AI	Static Pressure Sensor, One Each Deck
Fan Speed	AO	Variable Frequency Drive

3.19 DOUBLE DUCT VARIABLE VOLUME TERMINAL UNITS

A. Each unit shall consist of two pressure independent variable volume dampers, one on each duct inlet connection. Controls shall be as follows:

1. A space temperature sensor shall, through the direct digital control system, modulate the variable volume damper on the cold deck from full open to 40% air flow rate to maintain room setpoint. When heating is required, the temperature sensor shall first modulate the variable volume damper on the hot duct and cold deck while maintaining 40% airflow. If more heating is required, the temperature sensor shall modulate the variable volume damper on the hot deck from 40% to full open to maintain room setpoint.
2. The BMCS Contractor shall furnish the terminal box manufacturer with a controller to be factory mounted. The controller shall display cfm, temperature, and damper position.
3. The BMCS Contractor shall furnish the terminal box manufacturer the control flow diagram for correct mounting of flow measurement devices, wiring of actuators, and terminal equipment controllers.

POINT DESCRIPTION	TYPE	DEVICE
Space Temperature	AI	Temperature

POINT DESCRIPTION	TYPE	DEVICE
Primary Air (2)	AO	Variable Volume Damper Operator
CFM Flow	AI	Control Panel

3.20 SINGLE ZONE AIR HANDLING UNIT (AHU-A1,C2,H3,H4,E3,H6,J7,H2,G1)

A. This unit is furnished with a chilled water cooling coil and a hot water preheat coil. The outside air to these units is not treated. Control shall be as follows:

1. A room thermistor sensing space temperature shall, acting through the Direct Digital Control Panel, modulate the valve on the cooling coil and the valve on the hot water coil, in sequence, to maintain the desired space temperature. The hot water valve shall be closed prior to modulating the chilled water valve and the the chilled water valve shall be closed prior to modulating the hot water valve. The air-handling unit shall be started and stopped from the BMCS System.

B. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Space Temperature	AI	Space Thermistor
Space Humidity	AI	Humidity Sensor
CHW Valve	AO	Electronic Operator
Preheat HW Valve	AO	Electronic Operator
Heating Coil Leaving Air Temp.	AI	Averaging Sensor
Outside Air Damper	DO	Electronic Operator
Discharge Air Temperature	AI	Duct Thermistor
Freeze Status	DI	Temperature Low Limit Switch

3.21 SINGLE ZONE AIR HANDLING UNIT (AHU-I1,I2,I4,I6,J4)

A. This unit is furnished with a chilled water cooling coil and a hot water preheat coil. The outside air to these pretreated (cooled and heated). Control shall be as follows:

1. A room thermistor sensing space temperature shall, acting through the Direct Digital Control Panel, modulate the valve on the cooling coil and the valve on the hot water coil, in sequence, to maintain the desired space temperature. The hot

water valve shall be closed prior to modulating the chilled water valve and the the chilled water valve shall be closed prior to modulating the hot water valve. The air-handling unit shall be started and stopped from the BMCS System.

B. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Space Temperature	AI	Space Thermistor
Space Humidity	AI	Humidity Sensor
CHW Valve	AO	Electronic Operator
Preheat HW Valve	AO	Electronic Operator
Heating Coil Leaving Air Temp.	AI	Averaging Sensor
Outside Air Damper	DO	Electronic Operator
Discharge Air Temperature	AI	Duct Thermistor
Freeze Status	DI	Temperature Low Limit Switch

3.22 SINGLE ZONE VARIABLE AIR VOLUME AIR HANDLING UNIT (AHU-A2, ,I3,J2,J1,G1-01)

A. This unit is furnished with a chilled water cooling coil, a hot water reheat coil, and a variable frequency drive. The outside air to these pretreated (cooled and heated). Control shall be as follows:

1. A room Thermistor sensing space temperature through the Direct Digital Control Panel shall vary the speed of the fan to maintain room setpoint. The air volume of the fan can range from 100% to 30% (adjustable) of the air quantity specified or to the outside air percentage whichever value is larger. A chilled water coil leaving air temperature sensor through the Direct Digital Control Panel shall modulate the cooling coil control valve to maintain the leaving air temperature as scheduled. When the fan is at minimum speed of its specified air quantity and the room temperature is below the room setpoint, the room Thermistor shall modulate the valve on the cooling coil and the hot water or electric coil in sequence to maintain the desired space temperature. A room humidity sensor shall override the operation of the cooling coil control valve to maintain the relative humidity setpoint in the space. The room temperature sensor shall modulate the hot water or electric reheat coil to maintain the space temperature.

The dehumidification sequence only applies after the fan has reached the minimum fan speed.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Variable Speed Motor	AO	Variable Frequency Drive
Space Temperature	AI	Space Thermistor
Space Humidity	AI	Humidity Sensor
CHW Valve	AO	Electronic Operator
Reheat HW Valve	AO	Electronic Operator
Cooling Coil Leaving Air Temp.	AI	Averaging Sensor
Discharge Air Temperature	AI	Duct Thermistor

3.23 SINGLE ZONE VARIABLE AIR VOLUME AIR HANDLING UNIT (AHU-F2,A-1-01,F1)

A. This unit is furnished with a chilled water cooling coil, a hot water reheat coil, and a variable frequency drive. The outside air to these units is not treated. Control shall be as follows:

1. A room Thermistor sensing space temperature through the Direct Digital Control Panel shall vary the speed of the fan to maintain room setpoint. The air volume of the fan can range from 100% to 30% (adjustable) of the air quantity specified or to the outside air percentage whichever value is larger. A chilled water coil leaving air temperature sensor through the Direct Digital Control Panel shall modulate the cooling coil control valve to maintain the leaving air temperature as scheduled. When the fan is at minimum speed of its specified air quantity and the room temperature is below the room setpoint, the room Thermistor shall modulate the valve on the cooling coil and the hot water or electric coil in sequence to maintain the desired space temperature. A room humidity sensor shall override the operation of the cooling coil control valve to maintain the relative humidity setpoint in the space. The room temperature sensor shall modulate the hot water or electric reheat coil to maintain the space temperature. The dehumidification sequence only applies after the fan has reached the minimum fan speed.

B. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Variable Speed Motor	AO	Variable Frequency Drive
Space Temperature	AI	Space Thermistor
Space Humidity	AI	Humidity Sensor
CHW Valve	AO	Electronic Operator
Reheat HW Valve	AO	Electronic Operator
Cooling Coil Leaving Air Temp.	AI	Averaging Sensor
Discharge Air Temperature	AI	Duct Thermistor
Freeze Status	DI	Temperature Low Limit Switch

3.24 FAN COIL UNITS (FCU-B1, C1 thru C16, F1, G1-02, H1, BB1-1 thru BB1-5, BB2-1 thru BB2-5)

A. Each fan coil unit is furnished with a chilled water coil and hot water coil. Control shall be as follows:
   1. A space temperature sensor shall, acting through a terminal equipment controller, modulate the valves on the chilled water cooling coil and hot water reheat coil in sequence to maintain the desired space temperatures.
   2. Start/stop of fan coil unit shall be by terminal equipment controller.
   3. The outside air units providing the outside air shall be activated when the fan coil units are operating during the occupied periods.

B. On units with Raw OA, provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit and supply fan, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
FCU Status	DI	Air Flow Sensing Switch
CHW Valve	AO	Electronic Operator
HW valve	AO	Electronic Operator

POINT DESCRIPTION	TYPES	DEVICE
Outside Air Damper	DO	Elec. Operator (F1,H1,G1-02 ONLY)
Space Temperature	AI	Space Thermistor
Discharge Air Temperature	AI	Duct Thermistor
Freeze Status	DI	Temperature Low Limit Switch(F1,H1,G1-02 ONLY)

3.25 OUTSIDE AIR HANDLING UNIT CONTROL (OAHU-C5,I3,I5,I7,J5 BB-1)

A. These units are furnished with a chilled water coil and a hot water heating coil in the PREHEAT position and a wrap around heat pipe system (non controllable). OAHU-I3 is not equipped with a heat pipe. Control shall be as follows:

1. A duct mounted sensor sensing supply air temperature shall, acting through the Direct Digital Control Panel, modulate the valve on the cooling coil and the valve on the hot water coil, in sequence, to maintain the desired discharge air temperature of 55°F. The air-handling unit shall be started and stopped from the BMCS System.
2. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.
3. Open OA damper before starting unit. Provide end switch to ensure damper is in the open position in either the manual (hand) or auto position of the motor starter.
4. An air flow monitor on AHU-J5 only shall monitor the air flow and modulate the Variable frequency drive as required to maintain the air volume for each associated AHU that are in occupied mode.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Current Sensitive Relay
Variable Speed Motor	AO	Variable Freq. Drive (AHU-J5)
Air Flow Volume	AI	Air Flow Monitor (AHU-J5)
Discharge Air Temperature	AI	Duct Thermistor
CHW Valve	AO	Electronic Operator
Outside Air Damper	DO	Electronic Operator
Freeze Status	DI	Temperature Low Limit Switch

POINT DESCRIPTION	TYPES	DEVICE
HW Pre Heat Valve	AO	Electronic Operator

3.26 VARIABLE AIR VOLUME OUTSIDE AIR HANDLING UNIT CONTROL (OAU-G7)

A. These units are furnished with a chilled water coil and a hot water heating coil in the PREHEAT position. Control shall be as follows:
   1. A duct mounted sensor sensing supply air temperature shall, acting through the Direct Digital Control Panel, modulate the valve on the cooling coil and the valve on the hot water coil, in sequence, to maintain the desired discharge air temperature. Reference drawing schedule for discharge temperature.
      The air-handling unit shall be started and stopped from the BMCS System.
   2. Provide a temperature low limit switch located on the discharge side of the hot water preheat coil or the entering side of the cooling coil to de-energize the air handling unit, close the outside air damper, open the hot water valve 100%, start the boiler and hot water pump, signal an alarm to the BMCS when the temperature drops below 32°F. Device shall be manual reset.
   3. Open OA damper before starting unit. Provide end switch to ensure damper is in the open position in either the manual (hand) or auto position of the motor starter.

B. Variable air volume control:
   1. Duct static pressure sensor shall be located in the duct at a position approximately 2/3 the distance from the fan in the longest duct run. Location is to be approved by Engineer and coordinated with Section 23 05 93.
   2. The static pressure sensors shall, through the DDC panel, accept the signal from the operating control sensor to:
      a. Transmit a signal to the supply fan motor speed controller.
      b. Modulate the fan speed to maintain the desired static pressure.
      c. Coordinate signal with the fan motor speed controller.
   3. Install a static pressure high limit safety device to de-energize the system.
      a. Manual reset.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
AHU Status	DI	Air Flow Sensing Switch
Discharge Air Temperature	AI	Duct Thermistor
HW Coil Leaving Air Temperature	AI	Averaging Duct Thermistor
CHW Coil Leaving Air Temperature	AI	Averaging Duct Thermistor
CHW Valve	AO	Electronic Operator
Outside Air Damper	DO	Electronic Operator
Freeze Status	DI	Temperature Low Limit Switch

POINT DESCRIPTION	TYPES	DEVICE
HW Pre Heat Valve	AO	Electronic Operator
Variable Speed Motor	AO	Motor Controller
Static Pressure	AI	Static Pressure Sensor
High Static Limit	DI	High Static Limit Switch

3.27 OUTSIDE AIR VARIABLE VOLUME TERMINAL UNITS

A. Each unit shall consist of a pressure independent variable volume damper. The terminal unit's damper shall be interlocked with the associated OAHU supply fan.
   1. The Controls Contractor shall furnish the terminal box manufacturer with a controller to be factory mounted. The controller shall display cfm, temperature, and damper position. This information shall be displayed on the terminal unit graphics page.
   2. Terminal units serving Dual Duct Air Handling shall modulate to maintain the scheduled OA CFM during all occupied times.

POINT DESCRIPTION	TYPES	DEVICE
Primary Air	AO	Variable Volume Damper Operator
Discharge Air Temperature	AI	Duct Thermistor

3.28 HYDRONIC HEATING SYSTEM

A. The system consists of two sellers heating water boilers with boiler isolation valves, one PK near condensing boiler with inline circulation pump, boiler system mixing valve and two headered pumps. Control of the hot water heating system is as follows:
   1. Upon a call for heat, the lead boiler, isolation valve and building hot water pump shall start and attempt to achieve the building hot water setpoint. The second boiler, isolation valve and building hot water pump shall start if conditions require and the hot water supply water setpoint has not been achieved after a 20 minute delay (adjustable).
   2. The hot water mixing valve shall modulate to maintain the building hot water supply setpoint.
   3. A temperature sensor sensing outdoor air temperature shall reset the hot water temperature inversely with the outdoor air temperature using the mixing valve at each boiler.
      a. Maintain 180°F when the outdoor temperature is 20°F.
      b. Maintain 140°F when the outdoor temperature s 60°F and above.
   4. When the building hot water supply temperature drops to a setpoint minus 20°F (adjustable) for a time delay of 15 minutes the controller will start the boiler that has the least operating time. When the building hot water supply temperature rises to a setpoint minus 15°F (adjustable) for a time delay of 15 minutes the controller will stop the boiler with the most operating time.
   5. The main boilers, B-1 and B-2, shall be provided with lead/lag sequencing to

alternate lead boiler on a daily basis.

6. Boiler B-3 shall only operate when the outside air temperature is above 60°F and boiler B-1 and B-2 are off. When there is heating demand (reheat load on any AHU) HWP-1 or HWP-2 will be energized and the respective boiler isolation valve shall open. Boilers B-1 and B-2 shall remain off. Boiler B-3 and HWP-3 will be enabled when the building hot water supply temperature is setpoint minus 10°F (adjustable) and disabled when the building hot water supply temperature reaches setpoint for a period of 15 minutes (adjustable). HWP-3 shall remain on for 30 minutes (adjustable) after B-3 is disabled. If boiler B-3 does not maintain building hot water supply temperature set point and the building hot water supply temperature falls to set point minus 20°F then boiler B-3 and HWP-3 shall be disabled and the lead boilers B-1 and B-2 shall be started.
7. Enable the boilers throughout the year with an override option to disable the boilers, as Owner requires.

POINT DESCRIPTION	TYPES	DEVICE
Boiler Enable/Disable (Each Boiler)	DO	Control Relay
Boiler Status (Each Boiler)	DI	Safety Relay (2 each)
Boiler Alarm (Each Boiler)	DI	Safety Relay (2 each)
Boiler Isolation Valve (Each Boiler)	AO	Electronic Operator
Pump Start/Stop (HWP-1 & HWP-2)	DO	Control Relay
Pump Status (HWP-1 & HWP-2)	DI	Differential Pressure Switch
Pump Start/Stop (HWP-3)	DO	Control Relay
Pump Status (HWP-3)	DI	Differential Pressure Switch
Building Supply Temperature	AI	Pipe RTD
Building Return Temperature	AI	Pipe RTD
Boiler discharge water Temperature	AI	Pipe RTD
Hot Water Mixing Valve	AO	Electronic Operator
Ambient Temperature	AI	Thermistor

3.29 HYDRONIC AND DOMESTIC BOILER CO MONITOR SYSTEM

A. This contractor shall provide and wire interlocks from equipment to the CO monitor system. Upon alarm through the sensor all the boiler equipment, i.e. boiler and pumps and domestic water heaters, shall be deactivated. CO monitor shall provide a visual and audible alarm. Provide a sign at each entrance to boiler room to indicate information about system.

B. Upon Alarm of CO monitor, notify users via text message.
C. CO Monitor control shall be provided at each room that contains gas fired hydronic boilers or domestic water heaters/boilers.

POINT DESCRIPTION	TYPES	DEVICE
CO Monitor	DI	Control Panel
System Start/Stop	DO	Control Relay

3.30 HYDRONIC BOILER ROOM CONTROL

A. This system consists of a (2) supply air fans and (2) gas unit heater. Control shall be as follows:
   1. Cooling - A space temperature sensor shall, acting through a terminal equipment controller, activate the boiler room supply fan to maintain the desired space cooling temperatures, 80°F (adjustable).
   2. Heating - A space temperature sensor shall, acting through a terminal equipment controller, activate the boiler room gas unit heater to maintain the desired space heating temperatures, 50°F (adjustable).
   3. Start/stop of supply fan and unit heater unit shall be by terminal equipment controller.

POINT DESCRIPTION	TYPES	DEVICE
Fan Start/Stop	DO	Control Relay
Fan Status	DI	Current Sensitive Relay (EF) Air Flow Sensing Switch (SF)
Outside Air Damper	DO	Electronic Operator
Unit Heater Start/Stop	DO	Control Relay
Space Temperature	AI	Space Thermistor

3.31 CHILLED WATER SYSTEM CONTROL

A. The system consists of the following: (3) 600 ton water cooled chillers (CH-1, CH-2, CH-3), (1) 150 ton air cooled chiller (ACCH-1), three variable speed chilled water pumps, (2) low load thermal storage tank. Chiller plant shall have three operational modes:
   1. Normal Mode (Building Cooling Mode)
   2. Chilled Water Storage Tank Charging Mode
   3. Low Load Operation Mode
B. Normal Mode
   1. Mode selection – the chillers shall operate in either "occupied" or unoccupied" mode as selected through the BMCS based on time of day schedule or and operator command.
   2. Occupied Mode – Each chillers associated chilled water isolation valve shall modulate open and its differential pressure switch shall prove flow before chiller starting. Each chiller shall modulate the chilled water capacity using internal controls to maintain leaving water setpoint of 42°F (adjustable). A differential pressure sensor shall measure chilled water flow through each chiller. A

differential pressure switch shall monitor chilled water pump status of each chilled water pump.

3. Chiller sequencing – All chillers shall be "normal" chillers and shall rotate lead/lag sequence daily (adjustable). Chillers shall be added based on a variable flow system with temperature, percent running load (%RLA) or flow based add logic. An add request from any of these criteria shall cause a chiller to be added. Subtract logic shall be based on %RLA.
4. Temperature Based Add Logic – The system supply water temperature must exceed water setpoint 42°F (adjustable) plus the add temperature deadband 2°F (adjustable) before the chiller plant control program starts the add timer at 10 minutes (adjustable). The supply water temperature must remain above this value continuously for the duration of the add delay time before another chiller is enabled. When the add signal is received the lag chilled water pump will be started and all operating pumps will be ramped up. The pump speed shall be controlled equally through the chiller differential pressure sensor of the operating chiller to maintain chiller chilled water flow setpoint. When the pumps have been stable for 15 minutes (adjustable) the chilled water temperature setpoint of the operating chiller(s) will be reset to a value equal to the original setpoint plus 40% of the design temperature difference (16°F) of the added chiller. For example: At 42°F setpoint and 16°F (x 40%), the new setpoint will be 48.4°F. The operating chiller(s) will unload to 60% of the design capacity for approximately 15 minutes (adjustable) before opening the lag chillers isolation valve and enabling the lag chiller. When the operating chillers are operating in parallel their chilled water setpoint shall be reset to the design setpoint. The remaining chillers shall be added in the same manner.
5. Percent Running Load Amp Add Logic – The %RLC of the operating chiller must exceed 93% (adjustable) before the chiller plant control program starts and the add timer at 10 minutes (adjustable). The %RLA must remain above this value continuously for the duration of the add delay time before another chiller is enabled.
6. Flow Based Add Logic – The chilled water flow through the operating chiller must exceed 90% (adjustable) of the maximum rated flow before the chiller plant control program starts the add timer set at 10 minutes (adjustable). The flow must remain above this value continuously for the duration of the add delay time before another chiller is enabled.
7. Chiller add procedure – When a chiller is enabled to be added the chilled water pump shall be started and the chiller's isolation valve shall be opened. After the chiller DP switch proves flow, the chiller shall be started and will maintain the system chilled water setpoint using its internal controls.
8. Percent Power Based Subtract Logic – The subtract logic shall be based on the sum of the %PWR of all chillers operating divided by the number of chillers operating minus one. If the resulting value is below the subtract threshold of 80% (adjustable) then the subtract timer set at 10 minutes (adjustable) will be started. This condition must remain valid for the duration of the subtract timer before a chiller will be subtracted. For example: If three chillers are running at 30% %PWR and the subtract threshold is 80%, the resulting value is 95% which is above the threshold of 80%. The subtract timer will not be started.
9. Chiller subtract Procedure – When a chiller is selected to be subtracted, the chiller will be disabled, its isolation valve shall close slowly, approximately 5 minute interval (adjustable), a chilled water pump shall be stopped.
10. Primary Chilled Water Pump Control – Measure the chilled water pressure drop

across each chiller evaporator to monitor chiller minimum flow.

a. Minimum flow as recommended by the chiller manufacturer.
b. As the sensed differential pressure falls below the pressure drop associated with the chiller recommended minimum flow rate (3 psi, adj), modulate the variable primary flow by-pass control valve to maintain minimum flow through each chiller.
c. Provide control valve and actuator capable of tight close-off against system differential pressure. Size the by-pass valve for the minimum flow of one chiller.

11. Building Chilled Water Pump Control – A system differential pressure sensor shall modulate the energized pump(s) speed controller together to maintain the required system pressure in the building.
    a. Location of the building differential pressure system sensors shall be approved by the engineer and contractor specified in Section 23 05 93.
    b. Coordinate with the pump motor speed controller specified in another section.
12. Unoccupied Mode – When there is no command for the central plant to be operating, the chiller system shall go to stand-by mode. All chillers shall be disabled and all pumps shall be turned off.

C. Chilled Water Storage Tank Charging Mode – The "Normal Mode" of operation will be applied to this mode for the operation of the chillers and pumps.
1. Manual initiation
    a. The operating chilled water pump shall ramp to full capacity.
    b. The storage tanks supply valve shall be opened.
    c. The storage tanks bypass valve shall be closed. Do not close the storage tanks bypass valve before opening storage tanks supply valve.
    d. The (5) CHW Branch Bypass valves shall be opened.
    e. The operating chilled water pump shall reset to maintain system differential pressure set point.
    f. The chilled water system shall operate in this mode until the chilled water return temperature reaches setpoint of 45°F.
2. Manual return to "Normal Mode"
    a. Open the storage tanks bypass valve.
    b. Close the storage tanks supply valve and the CHW branch Bypass valves.
3. Automatic Initiation – The "Charging Mode" shall be initiated automatically when the calculated system tons is below 20% of the capacity of one of the chillers.
    a. The operating chilled water pump will ramp up to full capacity.
    b. The storage tanks supply valve shall be opened.
    c. The (5) CHW Branch Bypass Valves shall be opened.
    d. The storage tanks bypass valve will be closed.
    e. The operational chiller will ramp as needed to achieve chilled water return setpoint of 45°F.

D. Low Load Operation Mode – When the chilled water return temperature reaches set point of 45°F (adjustable) the following events shall occur.
1. The operating chiller shall ramp down and be stopped.
2. The chilled water bypass valve shall open.
3. The operating chilled water isolation valve shall be closed.
4. The storage tanks supply valve shall be closed.
5. The storage tanks bypass valve shall remain closed.

6. The chilled water branch bypass valves shall be closed.
7. The AHU chilled water valves shall operate in "Normal Mode"
8. The operational chilled water pump shall maintain differential pressure setpoint.

POINT DESCRIPTION	TYPE	DEVICE
Chiller Start/Stop (Each chiller)	DO	Control Relay
Chiller LWT Temperature Reset	AO	Chiller Control Module
Chiller % RLA (Each chiller)	AI	Chiller Control Module
Chiller Alarm	AI	Chiller Control Module
Chiller Status	DI	Chiller Control Module
Chiller Isolation Valve (Each Chiller)	AO	Electronic Operator
Chilled Water Supply Temperature (Each chiller)	AI	Pipe RTD
Chilled Water Return Temperature (Each chiller)	AI	Pipe RTD
Chiller Differential Water Press. (Each chiller)	AI	Pressure Differential Sensor
Pump Start / Stop (Each Pump)	DO	Control Relay
Pump VFD (Each Pump)	AO	Motor Controller
Pump Status (Each Pump)	DI	Differential Pressure Switch
Minimum Flow By-Pass Valve	AO	Electronic Operator
By-Pass Water Temperature	AI	Pipe RTD
Building Common Supply Water Temperature	AI	Pipe RTD
Chiller Loop Supply Water Temperature	AI	Pipe RTD
Storage Tank Supply Valve	AO	Electronic Operator
Storage Tank By-Pass Valve	AO	Electronic Operator
Building Chilled Water Supply Valve	AO	Electronic Operator
#1 Building Flow Meter (8" Pipe)	AI	Flow Meter
#2 Building Flow Meter (6" Pipe)	AI	Flow Meter
Building Common Return Water		

POINT DESCRIPTION	TYPE	DEVICE
Temperature	AI	Pipe RTD
Building Pressure Differential	AI	Pressure Sensor

3.32 CONDENSER WATER CONTROL

A. The system consists of a three single cell cooling towers with variable speed fans, three condenser water pumps, condenser water isolation valves at pumps, chillers and cooling towers and a condenser water bypass valve. The cooling towers are installed on a common concrete basin and sump. The condenser water pumps are headered and each cooling tower and each chiller, pump and cooling tower shall be provided with condenser water isolation valves. Alternate the lead condenser water pump and tower on a daily basis.

B. When a chiller is enabled, the respective condenser water pump, chiller condenser water isolation valve, cooling tower isolation valve, and condenser water pump isolation valve are modulated open. The cooling tower fans and the tower bypass valve shall be enabled when any condenser water pump is in operation and will modulate to maintain setpoint of 85°F (adjustable) condenser water supply temperature. The chiller isolation valve will be modulated to maintain the differential pressure necessary for the condenser water design flow, verify with chiller manufacturer. The cooling tower fans shall modulate as necessary to maintain condenser water basin temperature (adjustable).

C. Based on the outdoor ambient air temperature and relative humidity the BMCS shall calculate the ambient wet bulb temperature. The condenser water set point temperature to be equal to the sum of the wet bulb temperature and the cooling tower approach temperature. The range of acceptable condenser water temperatures shall be set as recommended by the chiller manufacturer.

D. Provide full automatic control of the entering condenser water temperature on initial chiller start-up.

E. Close the two way cooling tower isolation valve, two way chiller condenser water and two way condenser water pump isolation valve when chiller, pumps or towers are disabled.

F. The variable frequency drives on the condenser water pumps shall be utilized for soft start and balancing only.

POINT DESCRIPTION	TYPE	DEVICE
Start/Stop Pump (Each Pump)	DO	Control Relay
Start/Stop (Each Tower)	DO	Control Relay
Status (Each Tower Fan)	DI	Current Switch
Vibration Alarm (Each Tower)	DI	Vibration Switch
Low Oil Level Alarm (Each Tower)	DI	Oil Level Switch
CT speed (Each Tower)	AO	Variable Frequency Drive

POINT DESCRIPTION	TYPE	DEVICE
Tower Bypass Valve	AO	Electronic Operator
Pump VFD (Each pump)	AO	Variable Frequency Drive
Status (Pumps)	DI	Differential Pressure Switch
Chiller Differential Water Press. (Each chiller)	AI	Pressure Differential Sensor
Cooling Tower Isolation Valve (Inlet Each Tower)	AO	Electronic Operator
Chiller Condenser Water Isolation Valve (Each Chiller)	AO	Electronic Operator
Condenser Water Pump Isolation Valve (Each Pump)	AO	Electronic Operator
Condenser Water Supply Temp.	AI	Pipe Thermistor
Condenser Water Return Temp.	AI	Pipe Thermistor
Condenser Water Basin Temp.	AI	Pipe Thermistor

3.33 REFRIGERANT MONITORING / VENTILATION CENTRAL PLANT APPLICATIONS

A. Install refrigerant monitor in the central plant and other locations as required by code. Monitor the concentration of refrigerant through an analog input signal through the BMCS. Install (2) sensors at each chiller at opposite ends. Alarm levels of refrigerant concentrations are provided in the Code. Refrigerant levels shall be available at the BMCS.

B. Install audible and visual alarms in the area served, at locations as required by code. Audible sound pressure level of at least 15Dba above the operating ambient noise level within machine room and provide a distinctive strobe type visual alarm both inside and outside machine room at each entrance. Ceiling mounted rotating beacon in center of machine room. Strobes shall be provided immediately adjacent to and outside of each refrigeration machinery room exit. Provide visual and audible device installed at locations as per local code.

C. Provide a clearly identified switches of the break-glass type immediately adjacent to inside and outside of each refrigeration machinery room exit for emergency and activation of the emergency exhaust system and equipment shutdown i.e. chillers and pumps thru safety circuits upon alarm. Mechanical equipment shall be shut down in an orderly manner so as not to damage the equipment. Label switches / buttons per Code.

D. Provide a separate emergency ventilation buttons located on the inside the building adjacent to each refrigeration machinery room exit for activation of the central plant emergency ventilation system. Upon alarm either through the refrigerant monitor, by manually pushing the central plant emergency exhaust button or pressing the glass break type switch, the emergency exhaust fan shall be modulated to full speed via the VFD. Label switches / buttons per Code.

E. Activation of emergency exhaust and equipment shutdown shall signal an alarm to the BMCS and signal the audible and visual alarms in the area served.

F. During normal plant operation the plant exhaust fan shall operate via the VFD at

minimum speed as scheduled to provide general plant exhaust.

POINT DESCRIPTION	TYPE	DEVICE
Refrigerant Monitor / Sensors	AI	Control Panel
Emergency Shut	DI	Break Glass Switch
Emergency Ventilation	DI	Emergency Ventilation Button
Fan Start/Stop	DO	Control Relay
Fan Status	DI	Current Switch
Variable Speed Motor	AO	Motor Controller
System Start/Stop	DO	Control Relay

3.34 HYDRONIC UNIT HEATERS

A. Heater is furnished with a fan and a hot water coil. Controls shall be as follows:
   1. A space temperature sensor with an adjustable setpoint on the sensor shall, acting through a terminal equipment controller, activate the unit and modulate the hot water valve to maintain the desired space temperatures.
   2. Start/stop of fan coil unit shall be by terminal equipment controller.

POINT DESCRIPTION	TYPES	DEVICE
Start/Stop	DO	Control Relay
Space Temperature	AI	Space Thermistor
HW valve	AO	Electronic Operator

3.35 ELECTRIC UNIT HEATERS

A. An electric thermostat shall activate the unit and stage the electric coil to maintain room setpoint.

3.36 CHEMICAL TREATMENT SYSTEM

A. Monitor water treatment power circuit and alarm contacts from water treatment controllers. Provide with cooling tower systems only.

3.37 CHEMICAL TREATMENT SYSTEM

3.38 DECTRON NATATORIUM DEHUMIDIFICATION UNIT (NAHU-01)

A. The Dehumidification unit shall have a factory furnished sequencing panel with BACnet interface. The BAS contractor shall provide and install wiring to the BACnet interface and provide programming to monitor the system via BACnet. The BAS shall monitor all

points listed in "Equipment Control Points" and any additional points required to accomplish sequences of operation. In addition, BAS subcontractor shall acquire points list from the Pool Unit manufacturer representative and provide points list to owner and allow owner to choose desired available points for implementation. The natatorium dehumidification unit shall be controlled by factory furnished controls with BACnet interface. Refer to equipment specifications for sequence of operation. The BAS shall have read/write capability and display all available points on the BAS system graphic (coordinate all available equipment control points with Dehumidification Equipment Representative prior to bid). BAS contractor shall furnish and install all communication wiring and associated conduit between indoor pool unit and remote outdoor fluid-cooler / condensing unit. Dehumidification unit shall be provided with internal web application used to monitor the equipment remotely by end user as well as pool Dehumidification manufacturer service team and shall be web-based, connected to the internet. Contractor shall furnish and install Ethernet cable and conduit for the control panels at each unit. Units below 90 Ton will require (1) Ethernet drop, Units 90 Tons and above have dual control panels which will require (2) Ethernet drops (One at each panel). A static IP address, provided by Cy-Fair ISD, will be required for each control panel. Coordinate internal pool unit control system application with Owner and provide full demonstration and training of software and equipment.

B. Equipment Control Points:

Space Temperature – AI
Space Temperature Setpoint – (1) AO (BACnet via BAS)
Space Humidity – AI
Space Humidity Setpoint – AO (BACnet via BAS)
Pool Temperature Setpoint – (2) AI (BACnet via BAS)
Pool Water in Temperature – (2) AI (BACnet via BAS)
Pool Water Out Temperature – (2) AI (BACnet via BAS)
Supply Air Temperature – AI (BACnet via BAS)
Evaporator Coil Temperature – (2) AI
Reheat Coil Temperature – (1) AI (BACnet via BAS)
Unit Status – (6) DI (Modes: Service, Purging, Dehumidification, AC, Heating, and Pool Heat)
Supply Fan Status – DI
Unit Start/Stop – DO (Hardwired to BAS)
Return Air Temperature – AI (BACnet via BAS)
Return Air Humidity – AI (BACnet via BAS)
Outdoor Air Temperature – AI (BACnet via BAS)
Modulated Heat (% Output or Capacity) – AI (BACnet via BAS)
Reheat Capacity (% Output) – AI (BACnet via BAS)
Exhaust Fans (% Output) – AI (BACnet via BAS)
Outdoor Air Damper 1 (% Open) – AI (BACnet via BAS) Only if Controlled Directly by Seresco Unit
Outdoor Air Damper 2 (% Open) – AI (BACnet via BAS) Only if Controlled Directly by Seresco Unit
Purge Mode Enable – DI (BACnet via BAS)
Compressor Pump – DI (BACnet via BAS)
Available Alarms (BACnet via BAS)
Supply Blower Overload – DI
Exhaust Fan Overload – DI
No Airflow – DI
Freezestat – (2) DI
Dirty Filter – DI
Voltage Fault – DI
Purge Alarm – DI

Pool Water Flow Fault – (2) DI
Compressor Faults – Total of (14) DI
Outdoor Air Condenser Overloads – (2) DI

3.39 HEATING WATER BOILER SYSTEM - (N-B-01)

A. The heating water system is a non-condensing boiler hot water system with primary circulating pump and constant flow secondary pump. The boiler system shall be controlled by a sequencing panel provided by the boiler manufacturer equipped with a BACnet interface card for each boiler. The BAS contractor shall provide and install a BACnet interface to each boiler to communicate with the sequencing panel to request the heating water system and monitor pertinent data from the boilers such as but not limited to leaving water temperature, status, alarm, etc. The BAS shall control the pumps. BACnet interface shall be able to have remote read/write capability by end user; acquire all available points from boiler manufacturer.

B. Equipment Control Points:

Building HW supply temperature – AI
Building HW return temperature – AI
Building HW Return Flow Meter - AI
Boiler supply temperature – AI (each Boiler)
Boiler status – DI (each Boiler)
Boiler alarm – DI (each Boiler)
HW Pump status (each pump) – DI
Boiler enable – DO (each Boiler)
HW pump start/stop (each pump) – DO
HW Pump speed control (each pump) – AO

C. Heating Water System Activation
The heating water pump shall be available 24/7 for heating from any equipment it supplies with heating water. A current switch shall prove status to the BAS and shall alarm at the central site if the contacts are not made within 20 seconds (adjustable). Once the heating water pump has proven positive flow, the BAS shall request the boiler system to run. If the hot water supply temperature is less than 100°F (adjustable) or the building hot water pump status is not indicating the building hot water pump is running, the BAS control module shall broadcast that hot water is not available. HW Pumps shall be rotated weekly to maintain equal runtime.

D. Heating Water Temperature Reset: The heating water shall have a ratio Reset based on outside air temperature and the following schedule:

Outside Air Temp	Less than 50°F	Hot Water Temp	140°F
Outside Air Temp	Greater than 70°F	Hot Water Temp	100°F

E. Freeze Protection
When the outdoor air temperature drops to 34°F (adjustable) or below, the BAS shall open the hot water valves for flow through the coils for freeze protection. The hot water system shall be activated to run and the building HW supply set point shall be set to 88°F (adjustable) while running the boiler only until the low ambient temperature ceases to exist or the building start-up time arrives.

3.40 POOL WATER HEATING SYSTEM – (N-B-02)

A. Equipment Control Points:

Pool HW Return Flow Switch– AI
Boiler return temperature - AI
Boiler supply temperature – AI
Boiler status – DI
Boiler alarm – DI
HW Pump status– DI
Boiler enable – DO
HW pump start/stop (each pump) – DO
HW Pump speed control (each pump) – AO
Boiler Temperature Reset - AO
Pool leaving water temperature - Al
Pool entering water temperature - Al
Circulating pump status- Dl
Boiler hot water mixing valve – (3) AO
Circulating Pump on/off – DO – Interlocked with Boiler

B. Heating Water System Activation
The heating water pump shall be available 24/7 for heating from any equipment it supplies with heating water. A current switch shall prove status to the BAS and shall alarm at the central site if the contacts are not made within 20 seconds (adjustable). Once the heating water pump has proven positive flow, the BAS shall request the boiler system to run. The Boiler is to be commanded on in order to maintain the temps as below in the HW Temperature reset table. The 3-way modulating control valve is to control based upon Boiler HWS Temp.

C. Pool HW Temperature Control
The filtered pool water shall be circulated through the boiler. The BAS shall monitor the boiler entering and leaving water temperatures. The filter system bypass valve shall normally remain in the bypass position. The BAS shall command the filter system bypass valve to force flow through the boiler and the boiler control loop shall be enabled. The 3-way hot water mixing valve shall be modulated to maintain the leaving water temperature setpoint of 84ºF (adjustable). When the system is calling for heat, the BAS shall enable the boilers. The boiler controls shall energize the boiler circulating pump. (Refer to Heating Water System sequence of operation).

D. Heating Water Temperature Reset: The heating water shall have a ratio
Reset based on outside air temperature and the following schedule:

Outside Air Temp	Less than 50°F	Hot Water Temp	180°F
Outside Air Temp	Greater than 70°F	Hot Water Temp	160°F

E. Freeze Protection
When the outdoor air temperature drops to 34°F (adjustable) or below, the BAS shall open the hot water valves for flow through the coils for freeze protection. The hot water system shall be activated to run and the building HW supply set point shall be set to 88°F (adjustable) while running the boiler only until the low ambient temperature ceases to exist or the building start-up time arrives.

3.41 PACKAGED ROOFTOP UNIT WITH GAS HEAT – N-RTU-01

A. All controls devices external to units shall be provided by the RTU manufacturer and installed by the control's contractor. The Rooftop units shall have a factory furnished

controller with BACnet card. The BAS contractor shall furnish and install remote sensors and shall provide and install a BACnet interface and wiring. The BAS contractor shall coordinate with the unit manufacturer to ensure device compatibility with factory controller and sequences of operation meet specifications and to also discover and incorporate all available control points. RTU manufacturer shall verify software provided with the factory controller matches sequences of operation. The RTU manufacturer and the BAS contractor shall both commission the unit and verify operation. RTU shall be able to have all equipment control points available via BAS and shall have read and write capability.

B. Equipment Control Points:

Supply Air Temperature – AI
Supply Air Temperature Cooling & Heating Setpoints – (2) AO
Supply Duct Static Pressure – AI
Supply Duct Static Pressure Setpoint – AO
Evaporator Coil Temperature – AI
Evaporator Coil Temperature Setpoint – AO
Fan Status – DI
Outside air damper – AO
DX Cooling Capacity – AI
Hot Gas Reheat Capacity – AI
Static pressure high limit - DI
Gas Heating Capacity – AI
Unit Start/Stop – DO (Hardwired to BAS)

C. Zone Occupancy
Each rooftop unit shall have an occupancy / vacancy schedule, occupied heating / cooling setpoints assigned to it by the BAS. Each rooftop unit shall be enabled by the BAS based on the programmed occupancy schedule. When the unit is enabled, the outside air damper shall fully open, and the supply fan shall be enabled.

D. Fan Control
A fan airflow proving switch shall prove status to the unit controller and shall alarm at the central site if the switch is not made within 60 seconds.

E. Air Volume Control
While the rooftop unit is active, the factory mounted controller shall maintain the duct static pressure setpoint sent from the BAS at 1.5" w.g. (adjustable, final setpoint to be determined by TAB contractor) by modulating the speed of the supply fan through a variable speed drive (VSD). A static pressure sensor mounted two-thirds down the longest duct run shall monitor the duct static pressure. A manual-reset static pressure high limit switch shall monitor the static pressure of the supply duct. If the duct static pressure rises above 3.0" w.g. (locally adjustable) the rooftop unit shall be de-energized via hard-wire interlock to the VFD safety circuit. The factory mounted controller shall monitor the high static limit switch and shall send an alarm to the BAS for display at the central site. The static pressure high limit switch must be manually reset. Supply Air Temperature and Dew Point Control. The outside air temperature and relative humidity sensors shall control the unit mode of operation. When the outside air temperature is above 55°F, the unit shall be placed in dehumidification priority mode. During dehumidification priority mode, the refrigeration capacity shall modulate to maintain the evaporator coil temperature setpoint of 50°F (adj.), and the hot gas reheat valve shall be modulated to maintain the supply air temperature cooling setpoint of 68°F (adj.). When the outside air temperature is below 55°F, the unit shall be placed in heating mode. During heating

mode, the natural gas heater shall modulate to maintain the supply air temperature heating setpoint of 72ºF (adj.).

F. Equipment off Conditions
When the unit is de-energized, the cooling and heating stages shall remain off and the outside air damper shall be fully closed.

3.42 NATATORIUM HEAT EXCHANGER SYSTEM

A. System consists of tube and shell heat exchangers with hydronic hot water on one side and pool water on the other side. There are two heat exchangers that require different temperatures to be maintained, one for main swimming pool and one for the warmup pool. The main swimming pool and the warmup pool each have a dedicated pool water pumps and a shared hydronic hot water pump. Control of the hydronic hot water heating system is as follows:
1. Energize the natatorium heat exchanger system and hot water heating system whenever there is a call for pool water heating from either of the Pool temperature sensors.
   a. Monitor pool water temperature for each the main swimming pool and warmup pool. Sensor shall be in pool water supply piping from pool filtration pump prior to taps for pool heating loops.
   b. The boiler controller shall control all functions and sequencing of the hot water heating boiler.
2. Upon a call for heating in the pool, the heat exchanger control valve on the hot water side shall modulate based on the leaving water temperature from the heat exchanger on the pool water side of the heat exchanger. In addition, the pool water pump shall be energized and the mixing valve shall be modulated to meet the pool water temperature setpoint.

POINT DESCRIPTION	TYPE	DEVICE
Pool Water Pump Start/Stop (Warm Up)	DO	Variable Frequency Drive
Pool Water Pump Status (Warm Up)	DI	Current Sensitive Relay
Pool Water Pump Start/Stop (Main)	DO	Variable Frequency Drive
Pool Water Pump Status (Main)	DI	Current Sensitive Relay
Hot Water Pump Start/Stop (Hydronic)	DO	Variable Frequency Drive
Pool Water Pump Status (Hydronic)	DI	Current Sensitive Relay
Warm Up Pool Temperature	AI	Pipe Thermistor
Main Pool Temperature	AI	Pipe Thermistor
Hot Water Control Valve	AO	Electronic Operator (Each HX)
HX Pool Water Entering Temp.	AI	Pipe Thermistor (Each HX)

POINT DESCRIPTION	TYPE	DEVICE
HX Pool Water Leaving Temp.	AI	Pipe Thermistor (Each HX)
Pool Water Control Valve	AO	Electronic Operator (Each HX)

3.43 – 3.50 RESERVED

3.51 START-UP AND POINT VERIFICATION

A. Final startup and point verification shall include the following information.
   1. Field panel checkout:
      a. Verify enclosure is not mounted on vibrating surface.
      b. Verify class I and class II wiring is separated within enclosure.
      c. Check for shorts/grounds/induced voltages/proper voltages.
      d. Verify proper point terminations in accordance with as-builts.
      e. Verify that all modules are in proper place and addressed.
      f. Verify proper power voltage.
      g. Load database and programming.
      h. Startup the panel.
      i. Point and device checkout.
   2. Analog input point checkout:
      a. Verify the correct wiring terminations per the design documentation package, at the field panel. Verify that all wiring and terminations are neat and dressed.
      b. Verify the point address by checking that the analog input instrument is wired to the correct piece of field equipment. Do this by altering the environment at the sensing element or by disconnecting one of the wires at the sensor, and verifying that the reading at the field panel has reacted to this change.
      c. Verify the point database to be correct, (i.e., alarmability, alarm limits, slope/intercept, engineering units, etc.). Verify that the correct change of value (COV) limit has been defined.
      d. Verify the sensor has the correct range and input signal. (i.e., 20-120°F, 4 - 20 ma). Verify that the device is mounted in the correct location and is wired and installed correctly per the design documentation package.
      e. Set-up and/or calibrate any associated equipment (i.e., panel LCD meters, loop isolators, etc.). Verify that these auxiliary devices are mounted in the correct location and are wired and installed correctly per the design documentation package.
      f. Verify the correct reading at the field panel using appropriate MMI devices. Verify that any associated LCD panel meters indicate the correct measured value.
   3. Digital input point checkout:
      a. Verify the device is correctly wired and terminated as shown in the design documentation package. Verify that all wiring and terminations are neat and properly secured.
      b. Verify the point address by verifying that the digital input is correctly terminated at the controlled piece of equipment.
      c. Verify the point database is correct (i.e., point name, address, alarmability, etc.).
      d. Set-up and/or calibrate the associated equipment, i.e. smoke detector,

high/low temp detector, high/low static switch, flow switch, end switch, current relay, pressure switch, etc. is mounted in the correct location, and is wired and installed correctly per the control system installation drawings.

e. With the controlled equipment running or energized as described in the digital output checkout procedures, verify the correct operation of the digital input point and associated equipment by putting the digital input monitored equipment into its two states. Verify that the proof or status point indicates the correct value at the operator's terminal and that the status led is giving the proper indication in each mode of operation (on/off).

4. Digital output point checkout:
   a. Verify that device is correctly wired and terminated as shown in the design documentation package.
   b. Verify that the correct voltage is utilized in the circuit.
   c. Verify the point database to be correct (i.e. point name, address, etc.).
   d. Check and verify that the end device responds appropriately to the digital output(s).
   e. After verifying the set-up and operation of any associated digital input/proof points, check and verify correct operation of the logical point and associated equipment by commanding the point to all possible states (i.e. off, on, fast, slow, auto, etc.). Verify that the defined proof delay is adequate for all modes of operation.
   f. If any interlocked equipment exists that has independent hand-off-auto or auxiliary control wiring, verify correct operation of same. Also check that any interlocked equipment such as EP switches for damper operation or exhaust and return fans are wired correctly and operate correctly.
   g. Verify that the controlled piece or pieces of equipment cannot be caused to change state via the digital output if an associated hand-off-auto switch is in the hand/on or hand/off mode of operation, unless specified as a fireman's override point etc.
5. Analog output point checkout:
   a. Verify the correct wiring or piping terminations per the design documentation package, at the field panel. Verify that all wiring and piping terminations are neat and dressed.
   b. Insure that the correct output device(s) are installed per the Control System Installation Drawings. (i.e., I/P or P/I transducers, transformers, power supply, etc.). Verify that these devices are installed, wired and piped correctly. Verify that any configuration jumpers are in the proper settings for the required application. Verify related transformers are fused in accordance with installation drawings.
   c. Verify the point database to be correct. Verify that the correct COV limit has been defined.
   d. Verify the point address by checking that the analog output is wired and/or piped to the correct output transducer and/or equipment.
   e. Verify that the controlled device is calibrated (i.e., 3-8PSI valve, 8-13 PSI damper motor, 4-20 ma variable frequency drive, etc.) and is in the correct location, and is wired or piped and installed correctly per the design documentation package. If the controlled device is not calibrated, then a three-point (high, low and mid-point) calibration procedure must take place. Verify proper operation of the end device. When calibration has been verified, ensure that installation drawings, point database, and PPCL have been updated.

f. Set-up and or calibrate any associated equipment, (i.e., panel LCD meters, loop isolators, pneumatic gauges, etc.). Also verify that these auxiliary devices are mounted in the correct location, and are wired or piped and installed correctly per the design documentation package.
g. After verifying the set-up and operation of any associated equipment check for the correct operation of the logical point and associated equipment by commanding the analog output to the top and bottom of its range. Verify that the control device(s) responded appropriately as indicated by the design documentation package. Check to insure that all network terminals, host console devices, etc. can also command these outputs.
h. Check that all pneumatic gauges, pilot positioners and LCD panel meters indicate the correct values.

6. Terminal equipment controller checkout:
   a. Load program database
   b. Enable programs
   c. Verify sequence of operations
7. Programming checkout:
   a. Provide checkout for each system and sequence of operation.
   b. The following are sample sequence of operations tests. The intent of these procedures is to provide a plan of action to verify system operations via block checks of the project specific sequence of operations. The procedures may be used in this format, or one procedure to a page should more detail be required. The procedures outlined below should be verified for accuracy, and may be modified to meet your specific requirements.
   c. Description of Test: AHU Alarm Checkout. Verify AHU-1 discharge air temperature alarming is operational and is received at the designated terminal.
   d. Input to Trigger Test: Change discharge temperature high alarm limit through software to a value below the current discharge temperature (discharge temperature - 10°F).
   e. Expected Outcome: A high temperature alarm will be received per the Alarm Definition Report at its designated terminal.
   f. Provide signoff sheet with indication for test Pass, Fail, Date of test and Initials for signoff.
8. Workstation checkout:
   a. Verify the operation of all trunk interface equipment.
   b. Verify all workstation software, including options, based upon the installation instructions for the PC.
   c. Perform software backup (site, options, etc.)
   d. Complete workstation configuration report for owner signoff.
   e. Provide verification that all graphics have been created, as required by project bid documents.

3.52 TESTING AND ACCEPTANCE

A. General:
   1. After completion of installation and start-up procedures, commence the specified 3-phase verification and testing sequence leading to final acceptance.
      a. Follow in the order specified.
      b. Each testing phase shall be satisfactorily completed before entering the next phase.
   2. Prior to entering each phase of the sequence, submit for approval, a written

agenda describing in detail the procedure to be followed to meet the requirements for each specified verification, test or demonstration.

3. Submit for approval, a sample of the form on which the test will be reported.
   a. Identify project.
   b. Provide a list of all points, arrange in numerical order of point addresses.
      1) Show point descriptor and location of each.
      2) Indicate DDC panel that processes each point.
      3) Use the list as a basis for the specified report form.
   c. Signatures of participants and observers.
   d. Results.
   e. Description of adjustment or corrections of points in error.
   f. Date.
4. Provide schedule of tests. Estimate dates of significant events.
5. Test, calibrate and adjust each point in the system as specified.
6. Provide documentation of all tests and verifications as specified.
7. Provide trend reports indicating proper control of all points for an extended period of time.

B. Phase 1 - Testing, Calibrating, and Adjusting:
1. Operate each analog point in the entire system.
   a. At a point in the upper quarter of its range.
   b. At a point in the lower quarter of its range.
   c. At its operating point.
2. Provide personnel and diagnostic instruments at both the central and remote locations.
3. Provide testing stimulants for alarms.
4. Use digital meters of double the accuracy of the instruments being calibrated.
5. Provide an approved test device for simulating high and low temperatures.
6. When the function is performed, read values at the central control and observe the actual function at the field instrument.
7. Exercise each binary point and observe indication at console and simultaneously observe operation in the field.
8. Submit an operation report for each point in the system, in approved format, and describe any corrective or adjusting action taken.
9. Test all power transducers with a Dranetz Power Analyzer.

C. Phase 2 - Equipment and Point Verification:
1. Verify calibration or function of each point.
   a. Verify analog points at operating value.
   b. Record on specified form.
   c. Make approved adjustments to out of tolerance points.
      1) Identify these points for ready reference.
2. After verification procedure in completed:
   a. Verify corrected points.
   b. Record on specified form.
   c. Points requiring correction.
      1) Replace sensor or actuator if electrical measurements indicated components are out of specified tolerance.

D. Phase 3 - Software Verification:
1. Submit agenda and report format for software demonstrations.
2. Demonstrate to the Owner and the Engineer that all software programs and automatic control sequences function as specified.
3. Demonstrate compliance with response time specifications.

a. Simulate normal heavy load conditions.
b. Initiate at least ten successive occurrences on normal heavy load conditions as specified, and measure response time of typical alarms and status changes.

4. Provide written documentation of demonstration, signed by representatives of the Contractor and Engineer.

E. Provide the following reports to Engineer at final completion of all Testing:
1. List of all points.
2. List of all points currently in alarm.
3. List of all disabled points.
4. List of all points in over-ride status.
5. List of all points currently locked out.
6. List of user accounts and access levels.
7. List all weekly schedules.
8. List of holiday programming schedules.
9. List of limits and deadbands.
10. System diagnostics reports including, list of DDC panels on line and communicating, status of all DDC terminal units device points.
11. List of programs.
12. Provide trend data reports to ensure proper operation and sequence control of BMCS.

F. Substantial Completion of the BMCS will not occur until completion and acceptance of all testing and acceptance procedures.

3.53 TRAINING

A. The contractor shall provide factory-trained instructor to give full instruction to designated personnel in the operation of the system installed. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. The contractor shall provide all students with a student binder containing product specific training modules for the system installed. All training shall be held during normal working hours of 8:00 am to 4:30 PM weekdays.

B. Provide 40 hours of training for Owner's designated operating personnel. Training shall include:
Explanation of drawings, operations and maintenance manuals
Walk-through of the job to locate control components
Operator workstation and peripherals
DDC controller and ASC operation/function
Operator control functions including graphic generation and field panel programming
Operation of portable operator's terminal
Explanation of adjustment, calibration and replacement procedures
Student binder with training modules

C. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available from the Contractor.

3.54 PROJECT MANAGEMENT

A. Provide a designated project manager who will be responsible for the following:
1. Construct and maintain project schedule.
2. Authorized to accept and execute orders or instructions from General Contractor, Owner / Architect & Engineer.
3. Attend project meetings as necessary to avoid conflict and delays.
4. Make necessary field decisions relating to this section.
5. Coordination / Single point contact.

6. Have Internet access for project management.

END OF SECTION

SECTION 23 73 13
AIR HANDLING UNITS

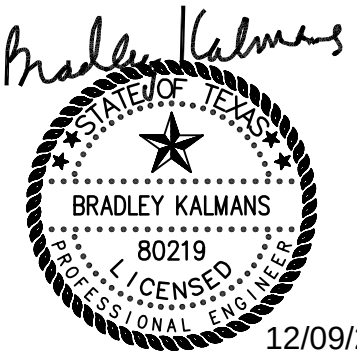
PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish and install air handling units with casing, fans, coils, filters and special items.

1.2 RELATED WORK

A. Division 23 Mechanical
   1. Air Balance
   2. Ductwork
   3. Controls
   4. Electrical Provisions of Mechanical Work
   5. Air Filtration
   6. Heating and Cooling Coils
   7. Other applicable sections



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1.3 PERFORMANCE

A. Unit capacities and characteristics as indicated.
   1. Units must be certified in accordance with ARI Standard 430-66.
   2. UL 1995 certification for safety including electric heat.
   3. ARI 430 listed and meet NFPA 90A requirements.

1.4 SHOP DRAWINGS

A. Indicate assembly, unit dimensions, weight loading required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

B. Submit fan performance curve for each unit:
   1. Plot fan volume against static pressure, horsepower and efficiency.
   2. Show point of rating based on static requirements of the system.
   3. Chart of specific sound power level at each octave band center frequency.
   4. For variable volume units, plot fan volume over entire range.

C. Submit for review a unit internal static pressure loss calculation.
   1. Provide an itemized list of static pressure loss at the scheduled CFM for each unit component including and not limited to:
      a. Coils
      b. Dirty filters
      c. Fan and unit system effect
      d. Cabinet and cabinet inlet and outlet
      e. Unit mounted dampers
   2. If a unit mounted outside air pretreatment section without supply fan, "piggyback" is specified:
      a. Provide an itemized static pressure loss as indicated above.
      b. Determine losses for unit configuration, i.e. parallel or series.
      c. Include losses in the primary unit internal static pressure required by configuration.
   3. The air handling unit schedule indicates static pressure external to the unit and does not include any losses associated with the air handling equipment.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units until ductwork is clean, filters are in place, bearings lubricated,

condensate properly tapped, piping connections verified and leak tested, belts aligned and tensioned, all shipping braces have been removed, and fan has been tested under observation.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inspect for transportation damage and store in a clean, dry location. Protect from weather and construction traffic.

B. Manufacturer shall provide quick shipment options to minimize product lead times.

1.7 WARRANTY

A. The Air Handling Unit manufacturer shall provide a full machine parts and labor warranty for a period of one (1) year from substantial completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Carrier
B. Daikin
C. JCI
D. Temtrol
E. Thermal
F. Trane

2.2 MISCELLANEOUS REQUIREMENTS

A. Provide factory assembled units. Large units may be shipped in sections, at contractor's option, to enable entrance to building, or for oversize shipping reasons only.

B. Furnish units with sealing and fastening hardware supplied by the manufacturer. Include written instructions needed to complete field assembly of the components.

C. Provide units designed and constructed so that coils, panels, fan housing and fans can be removed without affecting the structural integrity of the unit.

D. Unit casing panels shall be double wall construction with solid galvanized exterior and solid galvanized interior. Panels shall have a minimum thermal resistance of R-13. The casing shall not exceed 0.0042 inch deflection per inch of panel span at 1.5 times the design static pressure up to a maximum of +8 inches in all positive pressure sections and -8 inches in all negative pressure sections. Condensation on the exterior of the air handling units is not acceptable.

E. Provide full perimeter base rail channel under units constructed of heavy gauge galvanized steel (minimum 10 gauge) and intermediate cross members to assure unit integrity. Provide minimum size base rail to ensure proper trapping and slope of condensate drain (minimum 6 inch from bottom of drain opening).

F. Fan assembly shall be provided with 1" deflection internally mounted spring vibration isolation under the fan and motor base on units with coils less than 8 sq. ft. and 2" deflection internally mounted spring vibration isolation under the fan and motor base with coils greater than 8 sq. Ft. Units with coils over 35 sq. ft. shall have spring thrust restraints securing the fan housing to the discharge opening panel on units. Fan motor shall be internally mounted. Provide internal flex connection of fan discharge. Maximum acceptable RPM of fan shall not exceed 1000.

G. Provide factory installed removable hinged access doors in the following locations:
   1. Entering and leaving side of all coils to allow for cleaning of coils on both sides of unit.
   2. Each side of filter compartment to allow changing of filters from either side.
   3. Each side of motor compartment to allow motor and isolation access.

4. Each side of condensate drain pan to allow for cleaning and inspection.
5. Swing the doors against the casing static pressure.

H. Provide all coil modules, including heating coil modules, with stainless steel drain pans to facilitate cleaning and maintenance of the coils. Drain pan to extend 10" minimum downstream of cooling coil.

I. Provide coils with stainless steel casings, end plates, tube supports and top & bottom plates.

J. Units shall meet ASHRAE III Class 6 Low Leakage Standard. Casing shall have less than a 1% leakage rate at plus or minus 8 inches W.G.

2.3 DRAW THROUGH AIR HANDLING UNITS

A. Provided with:
1. Non-Overloading direct drive plenum fans. Provide minimum number of fans as indicated on drawings.
2. Insulated sheet metal cabinet with removable panels for access to the interior.
3. Hinged double wall doors with two-step safety handles.

B. Drive assembly:
1. Sized for 50% overload.

C. Motors and Control:
1. Totally enclosed, fan cooled, Variable speed, 1750 rpm.
2. Maximum operating point of 70 Hz.
3. Minimum 90% nominal efficiency at loads of 70%-100%.
4. Premium efficiency inverter duty
5. NEMA B design, with Class B insulation, capable to operate continuously at 104 deg F without tripping overloads.
6. +/- 10% voltage utilization range to protect against voltage variation.
5. Cast iron frame and end plate
6. Forged steel lifting eye
7. Oversized conduit box with ground lug
8. Provide with factory installed shaft grounding rings by Aegis
9. Motor selected so that the brake horsepower required to deliver the design air quantity at the system static pressure will not exceed the motor nameplate rating.

D. Supply Fans:
1. Single width, single inlet, backward curved welded aluminum plenum fan.
2. Statically and dynamically balanced to a BV-3 per AMCA 204 test standard.
3. Tested after being installed in the fan sections.
4. Selected for the design air quantities and pressure of the system.
5. Mounted on a common shaft if multiple wheels.
6. The fan shall be rated in accordance with AMCA 210 for performance and AMCA 260 for sound.
7. Minimum of Class II fan.

E. Fans selected with isolation shall be internally isolated with spring isolators. A flexible connection shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor to avoid transmission of noise and vibration through the ductwork and building structure.

F. Each direct drive fan in a multiple-fan array shall be provided with integral back flow prevention: a backdraft damper that prohibits recirculation of air in the event a fan or multiple fans become disabled. Dampers are tested and rated based on AMCA Standard

500. Dampers to be heavy duty type capable of a maximum back pressure that exceeds the design total static pressure with minimal leakage. The dampers should have a minimal total effect on airflow performance; both pressure drop when open and system effect on the fan. The damper blades and frame shall be extruded aluminum with blade edge seals locked into the blade edge. Adhesive type seals are unacceptable. AHU manufacturer responsible for providing proper spacing upstream of dampers to ensure full, uniform airflow through upstream components. For units where the damper(s) are supplied at the jobsite, the installing contractor shall contract a certified TAB contractor to verify uniform airflow thru upstream components.

G. Select fan to operate at or near its maximum efficiency point when handling the required air quantity and static pressure.

H. Stainless steel condensate pan with positive slope in all directions to outlet. Line the condensate drain pan with minimum 2" waterproof insulation.

I. Insulation, vapor barriers, facings and adhesives shall have:
   1. Flame spread not higher than 25.
   2. Smoke developed rating not higher than 50.

K. Filter section:
   1. Constructed with substantial hinges.
   2. Neoprene gasketing.
   3. Permanent quick release latching devices.
   4. Arranged to accommodate 2" thick filters as specified.
   5. Filter rack shall be factory manufactured to accommodate the filter sizes listed below. Filter racks shall not be altered in the field.
   6. Low velocity angled filter section unless otherwise specified.
   7. 16x20x2, 16x25x2, 20x20x2, 20x25x2 only.

L. Cooling coils as specified. Extend drain and vent piping through cabinets. Provide grommets at all pipe penetrations through cabinets.

M. Heating coils as specified. Extend drain and vent piping through cabinets. Provide grommets at all pipe penetrations through cabinets.

N. Provide each fan section with an additional 2" think perforated metal inner liner which utilizes fiberglass insulation. Liner shall be installed on all walls and top surface.

O. Factory dynamic fan balancing shall be conducted from 16Hz to 60Hz to identify and eliminate critical speeds to ensure stable operation through the entire operating range of the fan and drive assembly. Field fan balancing is not acceptable. Forward factory balancing test report to Engineer upon request.

2.4 BLOW THROUGH VARIABLE AIR VOLUME AIR HANDLING UNIT – DOUBLE DUCT

A. Provided with:
   1. Non-Overloading direct drive plenum fans. Provide minimum number of fans as indicated on drawings.
   2. Insulated sheet metal cabinet with removable panels for access to the interior.
   3. Hinged double wall doors with two-step safety handles.

B. Drive assembly:
   1. Sized for 50% overload.

C. Motors and Control:
   1. Totally enclosed, fan cooled, Variable speed, 1750 rpm.
   2. Maximum operating point of 70 Hz.
   3. Minimum 90% nominal efficiency at loads of 70%-100%.
   4. Premium efficiency inverter duty
   5. NEMA B design, with Class B insulation, capable to operate continuously at 104

deg F without tripping overloads.
6. +/- 10% voltage utilization range to protect against voltage variation.
5. Cast iron frame and end plate
6. Forged steel lifting eye
7. Oversized conduit box with ground lug
8. Provide with factory installed shaft grounding rings by Aegis
9. Motor selected so that the brake horsepower required to deliver the design air quantity at the system static pressure will not exceed the motor nameplate rating.

D. Supply Fans:
1. Single width, single inlet, backward curved welded aluminum plenum fan.
2. Statically and dynamically balanced to a BV-3 per AMCA 204 test standard.
3. Tested after being installed in the fan sections.
4. Selected for the design air quantities and pressure of the system.
5. Mounted on a common shaft if multiple wheels.
6. The fan shall be rated in accordance with AMCA 210 for performance and AMCA 260 for sound.
7. Minimum of Class II fan.

E. Fans selected with isolation shall be internally isolated with spring isolators. A flexible connection shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated, then the entire unit shall be externally isolated from the building, including supply and return duct work, piping, and electrical connections. External isolation shall be furnished by the installing contractor to avoid transmission of noise and vibration through the ductwork and building structure.

F. Each direct drive fan in a multiple-fan array shall be provided with integral back flow prevention: a backdraft damper that prohibits recirculation of air in the event a fan or multiple fans become disabled. Dampers are tested and rated based on AMCA Standard 500. Dampers to be heavy duty type capable of a maximum back pressure that exceeds the design total static pressure with minimal leakage. The dampers should have a minimal total effect on airflow performance; both pressure drop when open and system effect on the fan. The damper blades and frame shall be extruded aluminum with blade edge seals locked into the blade edge. Adhesive type seals are unacceptable. AHU manufacturer responsible for providing proper spacing upstream of dampers to ensure full, uniform airflow through upstream components. For units where the damper(s) are supplied at the jobsite, the installing contractor shall contract a certified TAB contractor to verify uniform airflow thru upstream components.

G. Select fan to operate at or near its maximum efficiency point when handling the required air quantity and static pressure.

H. Stainless steel condensate pan with positive slope in all directions to outlet. Insulate the condensate drain pan with a minimum of 1-1/2" waterproof insulation.

I. Insulation, vapor barriers, facings and adhesives shall have:
1. Flame spread not higher than 25.
2. Smoke developed rating not higher than 50.

J. Filter section:
1. Constructed with substantial hinges.
2. Neoprene gasketing.
3. Permanent quick release latching devices.
4. Arranged to accommodate 2" thick filters as specified.
5. Filter rack shall be factory manufactured to accommodate the filter sizes listed below. Filter racks shall not be altered in the field.
6. Low velocity angled filter section unless otherwise specified.

7. 16x20x2, 16x25x2, 20x20x2, 20x25x2 only.

K. Cooling coils as specified. Extend drain and vent piping through cabinets. Provide grommets at all pipe penetrations through cabinets.

L. Heating coils as specified. Extend drain and vent piping through cabinets. Provide grommets at all pipe penetrations through cabinets.

M. Provide a factory installed equalizing grid in the hot deck where heating coils are not installed.

N. Factory dynamic fan balancing shall be conducted from 16Hz to 60Hz to identify and eliminate critical speeds to ensure stable operation through the entire operating range of the fan and drive assembly. Field fan balancing is not acceptable. Forward factory balancing test report to Engineer upon request.

O. Design the entrance to the hot and cold decks and baffle to preclude wiping action of the air stream.

P. Provide units with factory fabricated mixing box section that include an additional 2" thick metal perforated inner liner which utilizes fiberglass insulation. Liner shall be installed on all walls and top surface.

Q. Provide each fan section with an additional 2" think perforated metal inner liner which utilizes fiberglass insulation. Liner shall be installed on all walls and top surface.

R. Factory dynamic fan balancing shall be conducted from 16Hz to 60Hz to identify and eliminate critical speeds to ensure stable operation through the entire operating range of the fan and drive assembly. Field fan balancing is not acceptable. Forward factory balancing test report to Engineer upon request.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air handling units according to manufacturer's instructions.

B. Provide additional drive packages as required by the Testing and Balancing firm.

C. Air leaks detectable by sound or touch are to be corrected.

D. Air handling units are to be properly supported to prevent flexing, bending or distorting base rails.

E. All coils and drain pans are to be cleaned prior to substantial completion if units are used during construction.

F. Clean all air handling units and return to original manufacturer's condition prior to substantial completion. Vacuum clean all debris from inside air handling equipment.

G. Install piping to unit with full size 6 inch long dirt leg with 1/2" valve at bottom for cleaning.

H. Provide for positive gravity drainage of coil condensate. Pipe full size of unit connection.

I. Adjust fan drives as required to obtain scheduled capacities as directed by the Test and Balance Firm to include sheave and belt replacement.

J. Align belts to eliminate wear and vibration of belts.

K. Verify correct drainage of condensate from condensate pan.

L. Verify correct rotation of fan and wiring of motor.

M. Lubricate all greaseable ball bearings with manufacturer's suggested lubricant.

N. Replace filters as required if units are used during construction.

O. Provide piping installation so that after piping is completed and insulated there is full access to service unit and remove fan housing. Piping to coils shall not block fan section access or cause damage to piping insulation during access.

P. AHU motors must be wired with Kernay connections inside motor terminal boxes. No wire nuts. Kernay connections must be wrapped with rubber and electrical tape for insulation.

3.2 IDENTIFICATION

A. Furnish each unit with a durable, deep etched, .025" thick, factory installed aluminum identification plate, permanently mounted with the following information:

1. Unit identification as indicated on Contract Drawings.
2. Serial Number.
3. Model Number.
4. Capacity (CFM) and static pressure.
5. Motor HP.
6. Unit power supply: Volts / PH / Amps.
7. Supply Fan Type.
8. Coil GPM and pressure drop.
9. Sales Order #.
10. Date unit manufactured.

END OF SECTION

SECTION 28 46 00
FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide all detailed engineering, documentation, materials and devices, installation, calibration, software programming and check-out necessary for a complete and fully operational fire detection and alarm system in accordance with the full intent and meaning of the drawings and specifications including, but not limited to, the following:

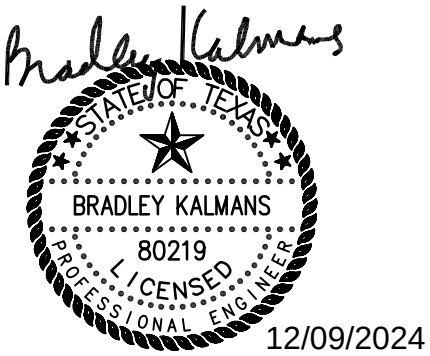
1. Supply, install and connect all hardware necessary to provide a complete and operational fire detection and alarm system.
2. Supply, install and wire all field hardware, fire alarm control panel, power supplies, power circuits, alarm initiating devices, audible and visual alarm devices, auxiliary control relays, signal initiating and signaling devices, conduits, wires, fittings and all accessories required for the system to perform as specified as required.
3. Supply, install, debug and test all software required to provide all software functions described in accordance with the full intent and meaning of the drawings and specifications.
4. Coordinate the work specified under this Section with other trades and contractors to assure a complete and fully operational system.

B. The intent of fire detection and alarm system work is specified in this section and indicated on the drawings. The installing contractor shall design and provide a complete system, meeting the requirement of this specification. The Contractor shall provide all fire alarm and initiation devices required for a complete system acceptable to all governing authorities. Provide proper spacing and coverage of all devices.

C. Replace existing system in its entirety to current district standards and code requirements. Existing system shall remain fully functional and monitored until new system is tested and accepted by the AHJ and owner, after which, all devices, panels, and wiring of existing system shall be removed. Coordinate with owner the return of equipment.

1.2 RELATED SECTIONS

A. Division 22 and Division 23
B. Sprinkler Systems
C. Elevators
D. Food Service



1.3 CODES / STANDARDS / REFERENCES (LATEST EDITIONS)

A. National Fire Protection Association (NFPA):

1.	NFPA1	Fire Code
2.	NFPA 13	Systems, Installation
3.	NFPA 17	Dry Chemical Extinguishing Systems
4.	NFPA 70	National Electrical Code
5.	NFPA 72	National Fire Alarm and Signaling Code.
6.	NFPA 80	Fire Doors and Fire Windows
7.	NFPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems.
8.	NFPA 92A	Smoke Control Systems
9.	NFPA 101	Life Safety code.
10.	NFPA 105	Smoke Control Door Assemblies
11.	NFPA 1221	Standard for the Installation, Maintenance and Use of

Emergency Services Communications Systems.

12. NFPA 2001 Fire Extinguishing Systems, Clean Agent

B. UL: Underwriters Laboratories, Inc.
   1. 217 Single and Multiple Station Smoke Detectors.
   2. 268 Smoke Detectors for Fire Protective Signaling Services.
   3. 864 Control Units for Fire Protective Signaling Services, 9th Edition.
   4 864 Transient protection
   5. 1480 Speakers for Fire Protective Signaling Systems
   6. UL Fire Protection Equipment Directory.
   7. UL Electrical Construction Materials Directory.

C. Uniform Federal Accessibility Standards (UFAS).

D. Factory Mutual P7825 Approval Guide

E. American National Standards Institute (ANSI).

F. National Electrical Manufacturer's Association (NEMA).

G. Institute of Electrical and Electronic Engineers (IEEE).

H. Electronic Industries Association (EIA-232-C): Interface between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.

I. Requirements of American Disabilities Act (Public Law 101-336).

J. Local Accessibility Standards

K. State Fire Marshall or Requirements of Local Authorities having Jurisdiction

L. State Insurance Code

M. International Building and Fire Code Adopted by Local Authority Having Jurisdiction

N. Local & State Building Codes

O. In addition the above requirements, comply with all local codes. Where discrepancies exist between codes, drawings or specifications, the more stringent requirement shall prevail. Installation shall be subject to approval, inspection and test of applicable regulatory agencies.

1.4 MANUFACTURER'S, PLANNER'S AND INSTALLER'S QUALIFICATIONS

A. The manufacturer shall regularly and presently produce, as the manufacturer's principle products, the equipment and material of the type and design specified for this project, and shall have manufactured the item for at least 5 years.

B. Manufacturer's product shall have been in satisfactory operation on three installations of similar size, type and design as this project, for approximately 3 years.

C. Manufacturer shall submit at the time of bid a list of installations where the products have been in operation.

D. The installing contractor shall have been actively engaged in the business of designing, selling, installing, and servicing fire alarm systems for at least ten (10) years.

E. The entire Fire Detection and Alarm System shall be installed by an authorized representative of the Fire Alarm Manufacturer and certified by the manufacturer to distribute, sell, and install the specified fire alarm and smoke detection system. Include all components, elements, and testing and acceptance procedures.

F. If the submitted system is being supplied by an authorized distributor of the equipment manufacturer, the distributor shall have been actively engaged in the sale, installation and service of the type of system proposed for this project for a minimum of 10 years.

G. Any proposed installer who cannot show evidence of such qualifications may be rejected. The services of a technician provided and certified by the equipment manufacturer shall be provided to supervise the installation and tests of the system.

H. Furnish evidence there is an experienced and effective service organization, which carries a stock of repair parts for the system to be furnished.

I. The installing contractor shall be licensed by the State Fire Marshall to design, sell, install, and service fire alarm systems as required by the State Insurance Code.

J. The installing contractor shall have on his staff a minimum of two (2) Fire Alarm Planning Superintendent (APS) licensed by the State Fire Marshall's office for such purpose and under whose supervision installation, final connections, and check out will take place as required by the State Insurance Code.

K. The APS shall be a certified NICET Level III state licensed fire alarm planner under whose supervision system design shall take place. In lieu of a NICET certified state licensed fire alarm planner, the contractor or supplier may provide design supervision by a registered professional engineer, who regularly engages in the design of fire alarm systems as required by the Texas Board of Professional Engineers.

L. The installing contractor shall provide 24-hour, 365 days per year emergency service with factory trained, state licensed service technicians.

M. Material shall be new and in perfect condition when installed.

N. Electrical or electronic equipment provided under this Division which has been damaged, exposed to weather, or is, in the opinion of the Architect/Engineer otherwise unsuitable because of improper fabrication, storage, or installation, shall be removed and replaced with new equipment, at no additional cost to the owner.

O. Quality Control Assurance:

1. All components of the fire alarm system shall be products of an Underwriters Laboratories, Inc. listed fire alarm manufacturer, and shall bear the UL Label. Partial listing shall not be acceptable.
2. All components of the fire alarm systems shall use the most current technology available.
3. Only new parts shall be installed at the time of initial installation and to repair the system during the warranty period. No reconditioned parts shall be used.
4. All devices shall be tested and certified that they meet or exceed the "Service Life Expectancy Rating" as outlined by UL and NFPA.

1.5 COORDINATION

A. It shall be the responsibility of the installing contractor to coordinate all requirements surrounding installation of the fire alarm system with all other trades.

B. Contractor shall schedule a pre-construction meeting with Owner/Architect regarding the Fire Detection and Alarm System.

1.6 DEFINITIONS

A. General: Wherever mentioned in this specification or on the drawings, the equipment, devices and functions shall be defined as follows:

1. Alarm Signal: A signal, which signifies a state of emergency requiring immediate action and immediate notification of the Fire Department. These are signals such as:
   a. The operation of a manual station.
   b. The operation of a fire suppression system switch.
2. Pre-Alarm Signal: A signal, which indicates a detection device, has operated. These signals require and immediate response, but do not require immediate notification of the Fire Department.
3. Supervisory Signal: A signal, which signifies the impairment of fire protection system, which may prevent its normal operation.
4. Trouble Signal: A signal, which indicates that a fault, such as an open circuit or ground, has occurred in the system.
5. Alarm Zone: An alarm initiating device or combination of devices connected to a

single alarm initiating device circuit.

6. Pre-Alarm Zone: A detector or group of detectors connected to a single detector circuit, which can send an alarm to the central control panel.
7. Supervision Zone: A supervisory signal initiating device or combination of such devices connected to a single supervisory signal circuit.
8. Communication Zone: A fire alarm indicating device or series of devices arranged to visually and/or audibly indicate a fire alarm signal.

1.7 SUBMITTALS

A. Contractor shall meet with Owner's Fire Alarm System representative prior to submission of formal/final shop drawings to Architect to allow the Owner and Architect to review a preliminary draft copy of the submittal to verify compliance with the specifications and any detailed requirements of the project. After the draft submittal has been reviewed by the Architect / Owner / Engineer, and formal shop drawings have been reviewed by Architect and returned to the Contractor, the required pre-construction meeting shall take place with Owner / Architect / Engineer.

B. Before the final set of shop drawings are submitted to Architect / Engineer, submit drawings to the jurisdictions for approval. All approvals shall be noted on the drawings or by letter from the authorities having jurisdiction (AHJ).

C. All preliminary and as-built design drawings and supporting documentation shall include: Floor Plan Drawings, riser diagrams, control unit wiring diagrams, point to point wiring diagrams, and typical wiring diagrams as described herein.

1. Name of Owner and Occupant
2. Date
3. Location, including street address.
4. Provide a complete written, item-by-item, line-by-line, specification review stating compliance or deviation in full description.
5. Device Legend
6. Input/output programming matrix
7. Licensed Designer Information – Registered Professional Engineer or Alarm Planning Superintendent (APS)
8. Battery calculations
9. Notification appliance circuit voltage drop calculations
10. Floor Plan
    a. Floor identification
    b. Point of compass
    c. Correct graphic scale
    d. All walls and doors
    e. All partitions extending to within 15 percent of ceiling height
    f. Room descriptions
    g. Fire alarm device / component locations
        1) Signal notification devices
        2) Initiation devices
        3) Smoke control systems
        4) Initiation of automatic extinguishing equipment
        5) Doors that unlock or close automatically
        6) Zone verification for detection devices
        7) Fire/Smoke damper control
        8) Fire alarm panel location
        9) Fire alarm annunciators
        10) Control valves to Fire Protection System

11) Duct smoke detectors
12) Supervisory devices
13) Elevator location
14) Elevator recall system location

h. Location of fire alarm primary power connections
i. Location of monitor/control interfaces to other systems
j. Riser locations
k. Methods for compliance with NFPA 72 24.3.13 for survivability (emergency voice systems) as required in NFPA 72 12.4 where applicable.
l. Ceiling height and ceiling construction details
m. Fire alarm system riser diagram
1) General arrangement of the system, in building cross-section
2) Number of risers
3) Type and number of circuits in each riser
4) Type and number of fire alarm components/devices on each circuit, on each floor or level

11. Control unit wiring diagrams shall be provided for all control equipment, power supplies, battery chargers, and annunciators and shall include the following:
a. Identification of control equipment depicted
b. Location(s)
c. All field wiring terminals and terminal identification
d. All indicators and manual controls, including the full text of all labels
e. All field connections to supervising station signaling equipment, releasing equipment, and fire safety control.
f. Typical Wiring Diagram shall be provided for all initiating devices, notification appliances, remote light emitting diodes (LEDs), remote test stations, and end-of-line and power supervisory devices.
12. Complete system bill of material of all hardware components.
13. Detailed system operational description. Any specification differences and deviations shall be clearly noted and marked.
14. Submittal sheets sequentially numbered with the format: sheet number of number total. For example: 1 of 3.
15. Complete set of manufacturer's operating instructions, circuit diagrams and the information necessary for proper installation, operation and maintenance.
16. Manufacturers catalog cut sheets shall be provide for each piece of equipment with the appropriate model or part number highlighted in cases where multiple model numbers or part numbers are shown.
17. Fire detection and alarm system's panel configuration complete with peripheral devices, batteries, power supplies, and interconnection diagrams.
18. Submit sound and visual level to confirm that number and location of signaling devices will provide required sound and visual levels throughout the building.
19. Sample of proposed graphic/text annunciation.

1.8 OPERATION AND MAINTENANCE MANUALS

A. Submit complete sets of operation and maintenance manuals. Manual, less as-builts, and sign-off sheets, shall be provided upon completion of the work. Approval of the manual will be required prior to substantial completion.

B. The Operation and Maintenance Manual shall consist of the following:
1. The manual shall include the names, addresses and telephone numbers of each Contractor installing products, and of the nearest service representative for each product. The manual shall have a Table of Contents and tab sheets. Update

manuals to include modifications made during installation, checkout and acceptance. The manual shall include the sections described in the following paragraphs.

2. The Functional Design Section shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. Hardware and software functions, interfaces, and requirements shall be provided for system operating modes.
3. The Hardware Section shall describe equipment provided, including general description and specifications, installation and checkout procedure, electrical schematics and layout drawings. Alignment and calibration procedures, manufacturer's repair parts list indicating source of supply, interface definition, signal identification and wiring diagrams. Also, include a complete parts list of all components as well as a list of recommended spare parts. The spare parts list shall include, for each item, the manufacturer's name, the model of the part, and serial number, if appropriate, and a physical and electrical description of the part.
4. The Software Section shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software module, to instruct the user on programming or reprogramming any portion of the system and other information necessary to enable proper system usage.
5. The Operation Section shall provide instructions for operation of the system, including system start-up procedures, use of system and applications software, alarm presentation (where applicable), failure and recovery procedures, preventive maintenance schedule, parameter schedules and sequence definition, and system access requirements.
6. The Maintenance Section shall provide descriptions of maintenance for equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
7. The Shop Drawings section shall include copies of all approved shop drawings and submittal materials updated to "AS BUILT".

1.9 AS-BUILT DRAWINGS

A. Prepare and submit detailed "As-Built" drawings. The drawings shall include certified test of the system, testing and acceptance sign-off sheets, and other items specified elsewhere to be performed after initial submission of operation and maintenance manuals, complete wiring diagrams showing connections between all devices and equipment, both factory and field wired. Include a riser diagram and drawings showing the as built location of all devices and equipment. The drawings shall show the system as installed, including all deviations from both the project drawings and the approved shop drawings. The drawings shall be prepared on uniform sized sheets, the same size as the project drawings. The plan drawings shall be 11x17 inch and inserted in the specified Operations and Maintenance Manuals. Provide electronic copies in PDF and Autocad.dwg format.

1.10 OPERATIONAL INSTRUCTIONS

A. Provide a typeset printed or a laser jet printed instruction card mounted behind a lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the Fire Alarm Control Panel (FACP). The card shall show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, and trouble. The instructions shall be approved by the Architect/Engineer before being posted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers acceptable contingent upon Products' compliance with the specifications:
   1. Notifier INSPIRE series or its successor
   2. Siemens-Cerberus PRO Modular

B. Additional Instructions
   1. All equipment, materials, accessories, devices, etc. covered by this standard and/or noted on the contract drawings shall be new and unused and be U.L. listed for their intended use.
   2. All equipment provided shall be available for purchase from at least two authorized distributors within the greater Houston metropolitan area. Single source proprietary equipment is prohibited unless approved by CFISD.

2.2 SYSTEM DESCRIPTION

A. System shall be a completely multiplexed addressable fire detection and alarm system, tested and left in first class operating condition. Voice evacuation systems where required or specified, shall have voice alarm notification wherever audible notification is required.

B. The system shall provide communication with initiating and control devices individually. All of these devices shall be individually annunciated at the fire alarm control panel. Annunciation shall include the following conditions for each point:
   1. Alarm
   2. Trouble.
   3. Open
   4. Short
   5. Device missing/failed.

C. System circuits shall be wired as follows: Notification Appliance Circuit (NAC) shall be Style B supervised and signal line circuit (SLCs) shall be Style 4 as describe in NFPA 72.

D. The system shall contain independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit. All addressable loops shall have loop isolation protection devices to maintain partial fire alarm system integrity should a fault occur. A loop isolation device shall not exceed a maximum of 20 devices.

E. There shall be supervisory service initiation device circuits for connection of all sprinkler water flow switches and valves. Device activation shall cause a general alarm at the fire alarm control panel. Each flow and tamper switch shall have an individual address.

F. There shall be independently supervised and independently fused indicating appliance circuits for all alarm signaling devices. Disarrangement conditions of any circuit shall not affect the operation of other circuits.

G. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble.

H. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the fire alarm control panel. A green "power on" LED shall be displayed continuously while incoming power is present at the building fire alarm control panel.

I. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the building fire alarm control panel.

J. The system modules shall be electrically supervised for module placement. Should a module become disconnected, the system trouble indicator shall illuminate and the audible trouble signal shall sound.

K. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

L. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal or supervisory mode for a period of 24 hours with 20 minutes of alarm operation at the end of this period as a minimum. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic. If batteries are fully discharged, the charger shall recharge them back to full charge in four hours.

M. All external circuits requiring system operating power shall be 24 VDC and shall be individually fused at the respective fire alarm control panel.

N. All addressable devices shall have the capability of being disabled or enabled individually from the fire alarm control panel.

O. A maximum of 75 percent capacity of addressable devices shall be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices within the capability of the designed system are unacceptable. Expansion of the designed system shall be accomplished by factory reprogramming.

P. The communication format to the addressable devices shall be a completely digital poll/response protocol to allow t-tapping of the circuit wiring. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol.

Q. Each addressable device must be uniquely identified by an address code. The system must verify that proper type device is in place and matches the desired software configuration. All remote or external panels shall have an individual address for monitoring.

R. Wiring type, distances, survivability, and wiring configuration types shall be approved by the equipment manufacturer. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device on a Style B circuit. Plenum rated fire alarm cable shall have an outer jacket insulation color of red.

Minimum wire size shall be:

Initiating Circuits: 18 AWG
Strobe Circuits: 14 AWG
Relay Control Circuits: 18 AWG
Voice/Speaker Circuits: 16 AWG

S. Each panel extender shall have an individual address.

2.3 FIRE ALARM CONTROL PANEL (FACP)

A. The FACP shall be capable of communicating with the types of addressable devices specified below. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the system during fire alarm conditions. Panel shall support a minimum of 500 addressable points.

B. The fire alarm control panel (FACP) shall be fully enclosed in a lockable steel enclosure as specified herein. All operations required for testing or for normal care and maintenance of the system shall be performed from the front of the enclosure. If more than a single unit is required to form a complete control panel, the unit enclosures shall match exactly. The system shall operate at 24 VDC.

C. Panel shall be large enough to accommodate all components and also to allow ample gutter space for interconnection of all panels as well as all field wiring. Each enclosure and each component shall be identified by an engraved red laminated phenolic resin nameplate. Lettering on the nameplate shall not be less than 1" high. Individual components and modules within the cabinets shall be identified by engraved laminated phenolic resin nameplates.

D. A local audible device shall sound during alarm, trouble, or supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound during each key press to provide an audible feedback to ensure that the key has been pressed properly.

E. The following primary controls shall be visible through a front access panel:
   1. Minimum 3-lines, minimum 40 alphanumeric characters per line display.
   2. Individual red system alarm LED.
   3. Individual yellow supervisory service LED.
   4. Individual yellow trouble LED.
   5. Green "power on" LED.
   6. Alarm acknowledge key.
   7. Trouble acknowledge key.
   8. Alarm silence key.
   9. System reset key.

F. Under normal condition, the front panel shall display a "SYSTEM IS NORMAL" message and the current time and date.

G. Should an abnormal condition be detected, the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

H. System Display:
   1. The system shall support the following display mode options:
   2. The display shall include a minimum 80-character backlit alphanumeric Liquid Crystal Display (LCD) or comprehensive LCD wide format display or graphic user interface (GUI).
   3. The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
   4. The display shall also provide Light-Emitting Diodes.
      a. The display shall provide minimum 8 Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters:
         AC POWER
         FIRE ALARM
         PRE-ALARM WARNING
         SECURITY ALARM
         SUPERVISORY SIGNAL
         SYSTEM TROUBLE
         DISABLED POINTS
         ALARM SILENCED
   5. The display shall also provide keypad functions.
      a. The display keypad shall be an easy to use QWERTY type keypad, similar to a lap-top PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

I. Alarm conditions shall be displayed on the alphanumeric display. The top line of 40 characters shall be the point label and the second line shall be the device type identifier. The system alarm LED shall flash on the control panel until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the control panel. The

alphanumeric display shall show the new alarm information.

J. Each independently supervised circuit shall include a discrete readout to indicate disarrangement conditions per circuit.

K. Acknowledgment for each abnormal condition shall be provided. Acknowledge keys shall not be pass code protected. Acknowledge keys shall be protected by the locked enclosure only. After all points have been acknowledged, the LEDs shall glow steady and the audible device be silenced. The total number of alarms, supervisory and trouble conditions shall be displayed, along with a prompt to review each list chronologically. The end of the list shall be indicated by the message, "END of LIST".

L. Pressing the appropriate acknowledge button shall display the first unacknowledged condition in the appropriate list (either alarm, supervisory or trouble), and shall require another acknowledge button for each subsequent alarm condition. Press to acknowledge shall only silence the displayed point.

M. Alarm silencing:
   1. Should the "Alarm Silence" button be pressed, all audible alarm signals shall cease operation.
   2. Visual signals shall not be extinguished during alarm silence inhibit mode.

N. System reset:
   1. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied. The alphanumeric display or reset LED shall step the user through the reset process with simple English Language messages.
   2. Should an alarm condition continue to exist, the system shall remain in an abnormal state. System control relays shall not reset. The audible device and the alarm LED shall be on.
   3. Should the alarm silence inhibit function be active, the System Reset and alarm silence key shall be ignored.

O. Additional function keys, or their equivalent, shall be provided to access status data and control the function for the following points:
   1. HVAC - Bypass
   2. Indicating appliance circuits bypass
   3. Auxiliary relays points bypass
   4. All other input/output points.

P. The following status data or their equivalent shall be available:
   1. Primary state of point.
   2. Device, PID and card type information.
   3. Current priority of outputs.
   4. Disable/enable status.
   5. Verification tallies of initiating devices.
   6. Automatic/manual control status of output points.
   7. Acknowledge status.
   8. Relay status.

Q. LED supervision: Where provided, all slave module LEDs shall be supervised for burnout or disarrangement. Should a problem occur the alphanumeric display shall display the module and LED location numbers to facilitate location of that LED.

R. System trouble reminder: should a trouble condition be present within the system and the audible trouble signal silenced, the trouble signal shall resound at pre-programmed time intervals to act as a reminder that the fire alarm system is not 100% operational. Both the time interval and the trouble reminder signal shall be programmable.

S. The fire alarm control panel features shall include, but not be limited to:
   1. Setting of time and date.

2. LED testing.
3. Alarm, trouble, and abnormal condition listing.
4. Enabling and disabling of each monitor point separately.
5. Activation and deactivation of each control point separately.
6. Changing operator access levels.
7. Walk test enable.
8. Running diagnostic function.
9. Displaying software revision level.
10. Displaying historical logs.
11. Displaying card status.
12. Point listing.
13. For maintenance purposes, the following lists, or their equivalent, shall be available from the system program and/or the point lists menu:
    a. All points list by address.
    b. Monitor point list.
    c. Signal list.
    d. Auxiliary control list.
    e. Feedback point list.
    f. LED/switch status list.
14. Fire Drill:
    a. Fire drill activation switch shall activate all audio/visual devices only. Fire drill shall not enter into the alarm sequence of operation, shall not close smoke or fire/smoke dampers, shall not deactivate any HVAC systems, kitchen hoods, etc.
    b. Activation of any trouble or alarm condition shall supercede the evacuation drill.
    c. Fire drill shall be canceled by the system reset key, alarm silence, or drill key.
15. Scrolling through menu options or lists shall be accomplished in a self-directing manner. These controls shall be located behind an access door.
16. The alphanumeric display shall have an alpha numeric, back-lighted LCD, LED, or gas plasma display. The display shall support numeric and both upper and lower case letters. Lower case letters shall be used for soft key titles and prompting the user. Upper case letters shall be used for system status information. A cursor shall be visible when entering information.
17. The system shall be capable of being tested by one person. The actuation of the "enable walk test" program at the fire alarm control panel shall activate the "Walk Test" mode of the system, which shall cause the following to occur:
    a. The remote monitoring circuit connection shall be bypassed.
    b. Control relay functions shall be bypassed.
    c. The control panels shall show a trouble condition.
    d. The panel shall be capable of selecting either: the alarm activation of any initiation device causing the audible signals to activate for two seconds or the alarm activation of any initiation devices causing the audible signals to code a number of pulses to match the zone number.
    e. The panel shall automatically reset itself after signaling is complete.
    f. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating a trouble condition.
    g. The control panel shall be capable of supporting up to 8 separate testing groups whereby one group of points may be in a testing mode and the

other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is considered complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.

h. Should the walk test feature be on for an inappropriate amount of time, it shall revert to the normal mode automatically.

18. Provide three (3) access levels with level 3 being the highest level. Level 1 action shall not require a pass code. Pass codes shall consist of up to ten (10) digits. Changes to pass codes shall only be made by Level 3 authorized personnel.
    a. When entering a pass code, the digits entered shall not be displayed. All key presses shall be acknowledged by a local audible sound and/or visual "*" in the 80 character display.
    b. When a correct pass code is entered, the new access level shall be in effect until the operator manually logs out or the keypad has been inactive for ten (10) minutes.
    c. Should an invalid code be input, access shall be denied.
    d. Access to a level shall only allow the operator to perform all actions within that level plus all actions of lower levels, not higher levels.
    e. The following keys/switches, or their equivalent shall have access levels associated with them:
       Set time/date.
       Manual control
       Disable/enable
       Clear historical alarm log
       Clear historical trouble log
       Walk test
       Change alarm verification
    f. The following keys/switches shall not be pass code protected and shall be protected by the lockable enclosure:
       Alarm Silence
       System Reset
       Acknowledge
19. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of being reprogrammed to accommodate system expansion and facilities changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.
20. Resident software shall allow for full configuration of initiating circuits so that additional hardware shall not be necessary to accommodate changes in, for instance, sensing of normally open contact devices to sensing of normally closed contact devices, or from sensing of normally open contact devices to sensing a combination of current limited and non-current limited devices on the same circuit and being able to differentiate between the two, or changing from a non-verification circuit to a verification circuit or vice-versa.
21. Resident software shall also allow for configuration of indicating appliance and control circuits so that additional hardware shall not be necessary to accommodate change in, for instance changing a non-coded indicating appliance circuit to a coded circuit.
22. The main fire alarm panel shall have the resident ability to store a minimum of 600 system events in chronological order of occurrence. Event history shall

include all system alarms, troubles, operator actions, unverified alarms, circuit/point alterations, and component failures. Events shall be time and date stamped. Events shall be stored in non-volatile buffer memory. Access to history buffer shall be secured via 5-digit password security code. The system shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history. Loss of primary or secondary power shall not erase the events stored in the memory. Each recorded event shall include the time and date of that event's occurrence.

a. The following Historical Alarm log events shall be stored:
   Alarms
   Alarm acknowledgment
   Alarm silence
   System reset
   Alarm historical log cleared

b. The following historical trouble log events shall be stored:
   Trouble conditions
   Supervisory alarms
   Trouble acknowledgment
   Supervisory acknowledgment
   Alarm verification tallies
   Walk tests results
   Trouble historical log cleared

23. Alarm verification shall be by device, whereby only verification from the same device will confirm the first activation and cause the alarm sequence to occur.
24. The control panel shall have the capability to display the number of times (tally) a device has gone into a verification mode. Should this verification tally reach a pre-programmed number, a trouble condition shall occur.
25. The control panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge key. Pressing the supervisory service acknowledge key shall silence the supervisory audible signal while maintaining the supervisory service LED "ON" indicating the off-normal condition.
26. Activation of an auxiliary bypass key shall override the selected automatic functions.
27. The system shall have keys that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time of each occurrence.
28. RS-232-C output: the fire alarm control panel shall be capable of operating remote generic consumer type printers; output shall be ASCII from an EIA RS-232-C connection with an adjustable baud rate. Each RS-232-C port shall be capable of supporting and supervising a remote display and printer. Data amplifiers shall be used to increase data line distance when required.
29. Panel shall be sized to accommodate all required equipment. Panel shall be equipped with locks and transparent door, providing freedom from tampering yet allowing full view of the various displays and controls.

T. The fire alarm control panel shall have a 25% spare initiating point and battery capacity for future use.

U. The power supply shall provide all control panel and peripheral power needs with filtered power as well as unregulated 24VDC power for external audio-visual devices. The audio-visual power shall be increased as needed by adding additional modular expansion power supplies. All power supplies shall be designed to meet UL and NFPA requirements for POWER-LIMITED operation on all external signaling lines, including initiating

circuits and indicating circuits. Design the system power supplies and power trunk wiring for all annunciation devices required, and to add a minimum of five (5) 110cd visual devices in the future. Individual design loading shall not exceed 70% of power supply and system wiring capacity.

1. Input power shall be 120VAC 60Hz. The power supply shall provide internal supervised batteries and automatic charger. The power supply shall provide positive and negative ground fault supervision, battery/charger fail condition, AC power fail indicators. The power supply shall also provide supervision of modular expansion power supplies as may be required.
2. Surge protection shall be integral to the control panels.
3. Each power supply shall be monitored and have an individual address.

V. Network (IP) Interface Card:

1 IP Communicator module for fire alarm panel
2. Programmed for remote monitoring of system
3. Supervise IP Ethernet connection every 90-seconds or less
4. Coordinate with owner for address for campus data network
5. Program for Point ID, providing point address/description reporting

W. Cellular Communicator:

1. UL 864 listed
2. Panel powered
3. Upload/Download capable
4. Transmit all signals and information from the DTMF communicator
5. Program for Point ID, providing point address/description reporting

X. Detector sensitivity shall be programmable from the control panel from the following sensitivities: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.7% obstruction. Detectors shall be able to be programmed to alert a trouble signal at a lower obstruction and shall report an alarm if the smoke density increases to a predetermined set point. Control Panel and Detectors shall be capable of "Day-Night" automatic sensitivity adjustments.

Y. Control Switches:

1. Acknowledge/step Switch
2. Signal Silence Switch
3. System Reset Switch
4. System Test Switch
5. Lamp Test

Z. Automatic Detector Test: The system shall include a special automatic detector test feature, which permits reading and adjustment of the sensitivity of all intelligent detectors from the main control panel. An automatic detector test shall occur automatically fourteen times each twenty-four hour period or be initiated manually from the FACP as desired. In addition, the automatic test feature shall also permit the functional testing of any "intelligent" detector or addressable interface device individually from the main control panel. Automatic detector test sequencing shall be terminated upon receipt of an alarm condition. Detector test shall report all unprogrammed devices installed and report all programmed devices not installed.

AA. Emergency voice alarm communication system:

1. The emergency voice and tone communication system shall be a pre-built system and shall only require two wires from a polarity reversal circuit or a dry contact for activation. It shall supervise the NO dry contact (if used) and provide a form C trouble relay activation in the event of a system fault. The Voice Communication System shall incorporate minimum 50 watts true RMS amplifiers for both tone and speech amplification. The system shall have a load capacity of up to 100 watts. Optionally, the Voice Communication System shall

be capable of providing 50 watts of audio with full backup. The Voice Communication System shall be capable of operating as a stand-alone system or follow the activation of the fire alarm/suppression system. The Voice Communication System shall include a regulated power supply and shall be capable of charging and housing its own batteries. There shall be no need to calculate the load requirements or draw any energy from the fire alarm/suppression system. The Voice Communication System shall come with one speaker supervisory zone as a standard and shall be capable of supervising any combination of up to 11 speaker and/or strobe monitoring modules.

2. A full set of control switches including an all call, tone interrupt, trouble silence and reset shall be available at the Voice Communications System. The Voice Communications System control panel shall also have a green POWER ON LED, a red ALARM LED, a yellow BROWN OUT LED and a yellow SYSTEM TROUBLE LED.
3. The Voice Communication System shall be able to detect a short on any speaker or strobe zone during the normal and alarm mode. The shorted zone shall be isolated from the system and a dedicated LED on the supervised zone shall indicate the short circuit condition. The system shall produce an audible and visual signal indicating that a trouble condition has occurred. Similarly an open circuit shall create a trouble condition and corresponding LED annunciation at the affected zone and at the main control module. Zones that are not shorted or opened shall remain operational.
4. The Voice Communications System shall be able to detect a brownout condition on the AC supply. In the brownout condition the Voice Communication System shall activate a dedicated LED and an audible trouble signal. Ground faults shall activate the system trouble LED and the audible trouble signal, as well as specific LEDs indicating negative and positive ground faults.
5. The Voice Communication System shall be field configurable for 25 or 70.7 volt RMS audio output via program jumpers.
6. The Voice Communication System shall have a digital message player / recorder. The digital message player / recorder shall be capable of storing alert and evacuation tones as well as an emergency voice message. It shall be possible to modify the digital message and tones in the field using a built-in acoustic microphone or headphone jack connected to an audio device. There shall be no need for the burning of eproms in order to program the digital message player / recorder. The digital message player / recorder shall be supervised by the Voice Communication System. The Voice Communications System shall provide a backup evacuation tone in the event of a digital message player / recorder failure.
7. An alarm condition shall cause an audible signal and a red LED to activate. A Voice Communication System with a digital message player / recorder shall produce an ALERT tone followed by an emergency voice message, and in turn followed by an ALARM tone. The number of tone repetitions shall be configurable by the setting of DIP switches on the digital message player / recorder.
8. The sheet metal enclosure shall include a hinged deadfront allowing easy access to all the Voice Communication System components for the purposes of wiring, setting the system configuration and servicing. A door with a key lock shall be part of the Voice Communication System enclosure.

2.4 FIELD DEVICES

A. All devices shall be supervised for trouble conditions. The fire alarm control panel shall

be capable of displaying the type of trouble condition (open, short, device missing/failed). Should a device fail, it shall not hinder the operation of other system devices.

B. Visual Signals:
   1. Strobe lights shall be of the electronic flashing xenon strobe type and operate on 24 VDC. The strobe light shall be capable of producing 75 candela on axis to comply with ADA and UL 1638 requirements, and 15, 30, or 110 candela to comply with UL 1971 requirements. Visual signals in common areas of illumination shall have synchronized flash. Provide white with red letters.
   2. If required to be mounted in student toilets / restrooms, gymnasiums, student locker / dressing rooms shall have a protective cover.

C. Combination Alarm Signal and High Intensity Visual Signals:
   1. Strobe lights shall be of the electronic flashing xenon strobe type and operate on 24 VDC. The strobe light shall be capable of producing 75 candela on axis to comply with ADA requirements, and 15, 30 or 110 candela to comply with UL 1971 requirements. Visual signals in common areas of illumination shall have synchronized flash. Each unit shall provide a Code 3 Temporal tone. The horn shall be capable of an output of 95dB at 10', and intensity adjusted accordingly for the area of coverage. Electronic Mini-Sounder or horn set on low setting shall be provided in interior rooms 900 square feet or less. Mini-sounder shall not be used in any corridors, mechanical electrical rooms and similar large spaces and areas of high ambient noise level. Provide white with red letters.
   2. All combination audio / visual devices mounted in student toilets / restrooms, gymnasiums, and student locker / dressing rooms shall have a protective cover.
   3. The audible emergency alarms shall produce a sound that exceeds the prevailing sound level in the room or space by at least 15 dba or shall exceed any maximum sound level with a duration of 60 seconds by 5 dba, whichever is louder with or without protective cover. Sound levels for alarm signals shall not exceed 110 dba at the minimum hearing distance from the audible appliance.

D. Exterior Audible / Visual Signal:
   1. Provide semi-flush mounted, molded of high impact red thermoplastic and listed for exterior weatherproof locations.

E. Combination Voice Signal and High Intensity Visual Signals:
   1. Strobe lights shall be of the electronic flashing xenon strobe type and operate on 24 VDC. The strobe light shall be capable of producing 75 candela on axis to comply with ADA requirements, and 15, 30 or 110 candela to comply with UL 1971 requirements. Visual signals in common areas of illumination shall have synchronized flash.
   2. If required to be wall mounted in student toilets, gymnasiums, corridors, student locker / dressing rooms, provide wire guard protective cover.
   3. The visual signal lens housing shall be white with red lettered FIRE or as approved by Architect. The speaker and visual signal shall be mounted to a common white speaker baffle. The visual signal shall flash at a rate of minimum of 1 Hz and maximum of 3 Hz, and shall use a xenon strobe type lamp or other high intensity long life light source. The lamp intensity shall be a minimum of 75 candela.
   4. The speaker shall be UL 1480 compatible with the control equipment. Unit shall operate within a temperature range of 150°F to -30°F. High output speakers, UL minimum 87dB at 10 feet with speaker taps of .33.66/1.25/2.5 watts. Standard output speakers, UL 75-81 dB at 10 feet with speaker taps of .5/1/1.75/2.75 watts. Capacitor for line supervision.

F. Ceiling mounted recessed mounted speakers shall be UL 1480 compatible with the control equipment. Unit shall operate within a temperature range of 150°F to -30°F. UL minimum 78-87 dB at 10 feet with speaker taps of .25, .5/1.0/2.0 watts. Round, white baffle in gypboard or plaster ceilings, provide 2x2 lay-in grid with UL enclosure, tile bridge supports when recessed in lay-in ceiling tiles Capacitor for line supervision.

G. Surface mounted speakers shall be UL 1480 compatible with the control equipment. Unit shall operate within a temperature range of 150°F to -30°F UL minimum 100 dB at 15 watts at 10 feet. Speaker taps via 7-position selector switch, 25-vol., .48/.94/1.8/7.5/15 watts. Fully enclosed wiring terminals. Capacitor for line supervision. Raco #911 Series Life Safety Appliance back box and adapter, or appliance manufacturer back box.

H. Addressable Manual Pull Stations:
   1. The manual station shall provide address-setting means using rotary decimal switches. No binary coding shall be required.
   2. Manual stations shall be designed for semi-flush mounting on standard electrical box. The station shall be constructed of hi-impact red molded Lexan with instructions for station operation in raised white letters. Stations shall be of the dual action type.
   3. Install Stopper STI1100 series covers with horns on all manual pull stations, except at the FACP and Remote Annunciator.
   4. Do not specify or use ionization only type detectors unless reviewed and approved by CFISD. Multi-criteria detectors that include ionization detection as one of the criteria to initiate and alarm are acceptable.

I. Intelligent Photoelectric Smoke Detectors:
   1. The detectors shall use the photoelectric principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the ANALOG level of smoke density. The detector shall provide automatic sensitivity "drift" compensation. The detector shall also provide a "maintenance alert" feature whereby the detector shall initiate a trouble condition should the unit's sensitivity approach the outside limits of the normal sensitivity window.
   2. The detectors shall provide address-setting means electronically and automatically at the control panel and programmed for alarm verification.
   3. The detectors shall provide operational status and alarm state LED. Under normal conditions, the LED shall flash, indicating the detector is operational and in regular communication with the control panel. An output connection shall also be provided in the base for connecting an external remote alarm LED.
   4. The detector shall be semi-flush ceiling mounted and be provided with modular detector head with twist-lock base. No radioactive material shall be used.
   5. Voltage and RF transient suppression techniques shall be employed as well as smoke signal verification circuit and an insect screen.

J. Duct photoelectric smoke detectors:
   1. Detectors shall be analog addressable type.
   2. To minimize nuisance alarms, detectors shall have an insect screen and be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive material shall be used.
   3. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel.
   4. Voltage and RF transient suppression techniques shall be employed as well as smoke signal verification circuit and an insect screen.
   5. Remote alarm/power LED indicator with test switch shall be provided. Unit shall be wall or ceiling mounted in readily visible and accessible area near the location

of detector; exact location of unit to be approved by the Architect/Engineer.

6. Detectors shall operate on the same principles and exhibit the same basic characteristics as area type photoelectric smoke sensors. The detector shall operate in air velocities of 300 FPM to 4,000 FPM. Each detector shall interface directly to the system SLC loop without the requirement of interface zone modules.
7. The unit shall consist of a clear molded plastic enclosure (or remote mounted LED status indicator shall be provided next to the smoke detector) with integral conduit knockouts to provide visual viewing of detector/sensor for monitoring sensor operation and chamber condition. The duct housing shall be provided with gasket seals to insure proper seating of the housing to the associated ductwork. Each unit's sampling tubes shall extend the width of the duct and be provided with porosity filters to reduce sensor/chamber contamination.
8. The detectors shall provide alarm and power status indication by LED. Under normal conditions, the LED shall flash, indicating the detector is operational and in regular communication with the control panel. Steady illumination of the LED shall indicate that the control panel has detected and verified an alarm condition. An output connection shall also be provided in the base for connecting an external remote alarm LED.
9. The detectors shall provide address setting means electronically and automatically from the control panel and programmed for alarm verification.

K. Intelligent Thermal Detectors:

1. The detectors shall use dual electronic thermostats to measure temperature levels in its chamber and shall, on command from the control panel, send data to the panel representing the analog temperature level.
2. The detectors shall provide address-setting means electronically and automatically at the control panel.
3. The detectors shall provide operational status and alarm state LED. Under normal conditions, the LED shall flash, indicating the detector is operational and in regular communication with the control panel. An output connection shall also be provided in the base for connecting an external remote alarm LED.
4. The detector shall be semi-flush ceiling mounted and be provided with modular detector head with twist-lock base.
5. Thermal Detectors shall be combination rate-of-rise and fixed-temperature- rated at 135°F for areas where ambient temperatures do not exceed 100°F and shall be 200°F for areas where ambient temperatures exceed 100°F but not 150°F. The fixed temperature element shall consist of a fusible alloy retainer and actuator shaft. Detectors shall have a smooth ceiling rating of 2,500 square feet. Detectors shall be located as specified and where required by local code authority.
6. Provide fixed temperature 190°F detector in kitchen and kiln room in lieu of combination rate-of-rise / fixed-temperature type.

L. Addressable Carbon Monoxide Detection:

1. System sensor #CO1224 with addressable identification of the CO Detector's alarm and trouble contact status. UL listed to Standard 2075 Standard for Gas and Vapor Detectors and Sensors.
2. Unit to be powered by the fire alarm system non-resettable 24 VDC supervised power supply.
3. Electro-chemical CO detection.
4. Integral 85db local alarm with local hush/test switch for silence or test.
5. Alarm contacts and trouble contacts for detector trouble, loss of power, and end

of life.

M. Auxiliary AHU Relays: Air Products model MR-101C relays shall be provided for HVAC and AHU control and interface. Relays shall be heavy-duty type with contacts rated up to 10 amps at 120V AC, 60 HZ. Relays shall be provided with NEMA I dust cover assembly and be provided with DPDT contacts as well as activated LED indicator.

N. Voltage sensing relays: Addressable control modules for voltage sensing relay interface shall be FCM-1.

O. Monitor Module:
   1. Addressable monitor modules shall be provided where required to interface to contact alarm devices.
   2. The monitor module shall provide address-setting means electronically and automatically at the control panel. A status/alarm LED shall be provided which shall indicate that the monitor module is operational and in regular communication with the control panel, and indicate detection of an alarm condition.

P. Control Module
   1. Control/relay modules shall be provided where required to provide audible alarm interface and/or relay control interface. The control module may be optionally wired as dry contact (form C) relay.
   2. The control module shall provide address-setting means electronically and automatically at the control panel. A status/alarm LED shall be provided which shall indicate that the control module is operational and in regular communication with the control panel and indicate when the device is actuated via the fire alarm control panel.

Q. Auxiliary Interface Points: All auxiliary input points (fire suppression hoods, water flow, fire pump, AHU shut-down points, tamper switches, fire extinguishing systems etc.) shall be connected as required, and addressed as a separate initiating point of annunciation at the fire alarm panel and any remote annunciator as required.

R. Water flow switches / Valve supervisory switches shall be provided and installed by the fire protection contractor and connected by the fire alarm contractor. Wiring of these field devices to the fire alarm system shall be the responsibility of the fire alarm contractor. It is the responsibility of this contractor to ensure the proper function of the system. Each fire protection zone (flow switch) and (Valve switch) shall be addressed electronically and automatically at the control panel as a separate point of annunciation at the fire alarm panel. Coordinate exact location with fire protection contractor and civil drawings.

2.5 VESDA – VERY EARLY WARNING ASPIRATING SMOKE DETECTION SYSTEM

A. Approved Manufacturers:
   1. System Sensor (FASAST) – Detection devices for Cooler / Freezer areas 200 square feet or larger, atriums / high ceiling areas with difficult access.
   2. Xtralis (VESDA) – Detection devices for Cooler / Freezer areas 200 square feet or larger, atriums / high ceiling areas with difficult access.

B. A Very Early Warning Smoke Detection System similar to the VESDA VLI System shall be installed throughout the cooler and freezer storage areas 200 square feet and larger, and as an alternative to beam type detectors at high ceiling areas with difficult access.. The system shall consist of highly sensitive LASER-based Smoke Detectors with aspirators connected to networks of sampling pipes, intelligent filtration arrangement with fail-safe operation, sub-sampling probe (inertial separator), built-in clean air zero capability, local USB configuration port and Ethernet networking port. VESDA detection

system shall be networked with the specified Notifier Fire Alarm Control Panel.

C. Design Requirements

1. The system shall consist of an air sampling pipe network to transport air to the detection system, supported by calculations from a computer-based design modeling tool.
2. It shall be tested and approved to cover up to 2,000m^2 (20,000 sq.ft).
3. It shall have a built-in simple user interface indicating alarm and fault status and include a reset / disable button.
4. It shall provide absolute smoke detection.
5. It shall be approved to provide very early warning smoke detection and provide four alarm levels corresponding to Alert, Action, Fire 1 and Fire 2. These levels shall be programmable and able to be set at sensitivities ranging from 0.05-20% obs/m (0.016–6.4% obs/ft.).
6. The detector shall be specifically designed for industrial applications.
7. It shall consist of a highly sensitive LASER-based smoke detector with in-field clean air zero capability, aspirator, intelligent filter and secondary filter.
8. It shall be modular, with field replaceable detection chamber, aspirator, intelligent filter and secondary filter.
9. It shall have four pipe inlets for sample air.
10. It shall incorporate per pipe ultrasonic flow monitoring and provide staged airflow faults.
11. It shall have a built-in and field replaceable intelligent filter placed after the flow monitoring circuitry.
12. Intelligent filter shall:
    a. Dilute the sampled air for prolonged detector life.
    b. Combine sample air from all pipe inlets.
    c. Divide sampled air into filtered clean air and unfiltered air before mixing them together.
    d. Use HEPA filter with more than 99% efficiency for filtered clean air i.e. removing more than 99% of contaminant particles of 0.1microns or larger, to provide clean air for dilution.
    e. Use a mesh/screen for the unfiltered air for protection against lint type of particles.
    f. Be fail-safe and supervised for correct operation with built-in capability to alert for when replacement is required.
    g. Maintain consistent detector sensitivity over time.
    h. Have ultrasonic airflow monitoring of the unfiltered sampled air through the intelligent filter.
13. It shall have a field replaceable aspirator after the intelligent filter where the diluted sampled air flows through the aspirator prolonging its life.
14. The aspirator shall be a purpose-designed rotary vane air pump. It shall be capable of allowing for multiple sampling pipe runs up to 360m (1,200ft) in total, (4 pipe runs per detector) with a transport time per applicable local codes.
15. It shall have a sub-sampling probe (inertial separator) after the aspirator for reduced dust intake in to the detection chamber.
16. It shall have a secondary foam filter after the sub-sampling probe (inertial separator) where the sub-sampled air flows through the foam filter prolonging detection chamber life. The foam filter shall be capable of filtering particles in excess of 20 microns from the sampled air.
17. It shall have a field replaceable smoke detection chamber which stores the calibration values with the chamber assembly.

18. It shall have capability for in-field clean air zero to provide absolute smoke detection.
19. It shall have capability to measure blockages in the air path in to or out of the detection chamber.
20. It shall have an enclosure rating of IP54.
21. The detector shall allow for direct wall mounting or using a supplied mounting plate.
22. It may be inverted as required in specific applications.
23. It shall be self-monitoring for filter contamination.
24. It shall be configured via local USB port with Ethernet port for remote monitoring.
25. It shall have Fire and Fault relay outputs in addition to three configurable relays. The relays shall be software programmable to the required functions and must be rated at 2 AMP at 30 VDC.
26. It shall have at least one general purpose input (GPI).
27. It shall have Power In and Power Out connections to allow powering more than one detector from one power supply.
28. Optional equipment may include a dedicated Xtralis VSM graphics package.
29. It shall report any fault on the unit by using configurable fault relay outputs or via PC based configuration and monitoring system.
30. The detector shall have built-in event and smoke logging. It shall store smoke levels, alarm conditions, operator actions and faults. The date and time of each event shall be recorded. Each detector (zone) shall be capable of storing up to 18,000 events.

D. Programming Requirements

Using either USB or Ethernet port the detector shall allow programming of:

1. IP address and related fields to support Ethernet based networking
2. Four smoke threshold alarm levels
3. Time delays
4. Configurable relay outputs for remote indication of detector conditions
5. Holidays and day/night changeover times
6. Major and minor airflow fault limits
7. Aspirator speed
8. General purpose input function
9. Alarm and fault latching

E. Sampling Pipe

1. The sampling pipe shall be smooth bore. Normally, pipe with an outside diameter (OD) of 25mm or 1.05" and internal diameter (ID) of 21mm or ¾" should be used.
2. The pipe material should be suitable for the environment in which it is installed. VESDA pipe material shall be UL 1887 Plenum rated CPVC).
3. All joints in the sampling pipe must be air tight and made by using solvent cement, except at entry to the detector.
4. The pipe shall be identified as Air Sampling/Aspirating Smoke Detector Pipe along its entire length at regular intervals not exceeding the manufacturer's recommendation or that of local codes and standards.
5. All pipes shall be supported at not less than 1.5m (5ft) centres, or that of the local codes or standards.
6. The far end of each trunk or branch pipe shall be fitted with an end-cap and made air-tight by using solvent cement. Use of an end-cap will be dependent on ASPIRE2 calculations.

F. Sampling Holes
1. Sampling holes shall not be separated by more than allowed for conventional point detectors as required by 30 feet as local codes and standards. Intervals may vary according to calculations. For NFPA the maximum allowable distance is 30ft.
2. Each sampling point port shall be identified in accordance with Codes or Standards.
3. Provide per manufacturer's recommendations and standards in relation to the number of sampling points and the distance of the sampling points from the ceiling or roof structure and forced ventilation systems.
4. Sample port size shall be as specified by ASPIRE2 calculations.

G. Detection Alarm Levels:
The laser-based ASD system shall have four (4) independently programmable alarm thresholds. The four alarm levels may be used as follows:
Alarm Level 1 (Alert)
Activate a visual and audible alarm in the fire risk area.
Alarm Level 2 (Action)
Activate the electrical/electronic equipment shutdown relay and activate visual and audible alarms in the Security Office or other appropriate location.
Alarm Level 3 (Fire 1)
Activate an alarm condition in the Fire Alarm Control Panel to call the Fire Monitoring Service and activate all warning systems.
Alarm Level 4 (Fire 2)
Activate a suppression system and/or other suitable countermeasures.
The alarm level functions as listed are possible scenarios. Program as directed by Owner to the best utilization of these facilities for each application and the requirements of local A.H.J.

H. Initial Detection Alarm Settings
1. Alarm Level 1 (Alert) 0.2% obs/m (0.064% obs/ft.)
2. Alarm Level 2 (Action) 0.3% obs/m (0.096% obs/ft.)
3. Alarm Level 3 (Fire 1) 0.40% obs/m (0.128% obs/ft.)
4. Alarm Level 4 (Fire 2) 2.0% obs/m (0.64% obs/ft.)

I. Initial (factory default) Alarm Delay Thresholds
Initial (factory default) settings for the alarm delay threshold shall be:
1. Alarm Level 1 (Alert) 10 seconds
2. Alarm Level 2 (Action) 10 seconds
3. Alarm Level 3 (Fire 1) 10 seconds
4. Alarm Level 4 (Fire 2) 10 seconds

J. Fault Alarms: The Detector Fault relay shall be connected to the appropriate alarm zone on the Fire Alarm Control Panel (FACP) in such a way that a Detector Fault would register a fault condition on the FACP. The Minor Fault and Isolate relays shall also be connected to the appropriate control system. Provide as required by local Codes, Standards or Regulations.

K. Power Supply and Batteries: The system shall be powered from a regulated supply of nominally 24V DC. The battery charger and battery shall comply with the relevant Codes, Standards or Regulations. Typically 24 hours standby battery backup is required followed by 30 minutes in an alarm condition.
1. UL 1481 Listed -provided the power supply and standby batteries have been appropriately sized / rated to accommodate the system's power requirements.
2. Provide 120-volt 20-amp circuit from the life safety branch panel to each power supply.

2.6 AUXILIARY EQUIPMENT MONITORING

A. The fire alarm system shall monitor for alarm, supervisory, and trouble conditions; and annunciate the status of the following equipment when provided, or is existing to remain, as part of this project. A failed status shall activate the trouble alarm.
   1. Emergency Generator: Run Status
   2. Emergency Generator: Trouble Signal
   3. Fire Pump: Run Status
   4. Fire Pump: Trouble Signal
   5. Emergency Service Communications Systems, as required by NFPA 72 and NFPA 1221.

2.7 MAGNETIC DOOR HOLDERS, AUTOMATIC FIRE DOORS / SHUTTERS, AND SECURITY GRILLES AND INTERIOR SPACE CONTROLLED ACCESS EGRESS DOORS WITH AUTOMATIC EMERGENCY EGRESS ELECTRIC LOCK EMERGENCY RELEASE

A. Magnetic fire door hold open devices, interface for automatic roll down fire doors/shutters, and interface for security grilles and controlled access egress doors with emergency egress shall be provided. Coordinate with Division 8 and Architectural Drawings for exact location.

B. The operation of any alarm in the fire alarm system shall cause the following:
   1. Release of the magnetic fire door holding devices, permitting the fire doors to be closed by the door closer.
   2. Permit the automatic roll down fire doors/shutters to close automatically.
   3. Permit the security grilles with emergency egress to open automatically.
   4. Unlock the electrically controlled access doors in all interior spaces.

C. The magnetic door holders, automatic roll down fire doors/shutters, security grilles, and interior electrically controlled access doors with emergency egress, shall be associated with two smoke detectors located on the ceiling with one on either side of the fire door/shutter, security grille opening, or interior egress path electrically controlled door. The operation of either of these detectors shall also cause the magnetic holder to release the fire door, the automatic fire door/shutter to close, and the security grille with emergency egress to open.

D. The operation of smoke detectors associated with a magnetic door holder, automatic roll down fire door, security grille, or electrically controlled access door shall transmit a pre-alarm signal to the fire alarm panel.

2.8 REMOTE ALPHA-NUMERIC DISPLAY ANNUNCIATORS

A. Remote alpha-numeric annunciator(s) to annunciate all system events and duplicate the displayed status at the main FACP. The annunciator(s) shall be an alphanumeric display similar to the main FACP and operate via the system RS485 or RS232 serial output terminal from the main FACP. The unit shall operate from FACP 24VDC power and function during system power failure while the system resides on standby batteries. The remote annunciator(s) shall include:
   1. Integral time-date clock
   2. System reset
   3. System silence
   4. System acknowledge
   5. Display/step switch
   6. Integral trouble buzzer
   7. LCD contrast adjust

8. Fire Drill Operation

B. Annunciator shall upon command display the first system alarm, last alarm, and system alarm count. The following primary controls shall be visible through a front access panel:
   1. 80 character alphanumeric display, LCD, LED, or gas plasma
   2. Individual red system alarm LED
   3. Individual yellow supervisory service LED
   4. Individual yellow trouble LED
   5. Green "POWER ON" LED
   6. Alarm acknowledge key
   7. Trouble acknowledge key
   8. Alarm silence key
   9. System reset key
   10. LED test

2.9 REMOTE PAGING UNIT

A. Remote all-call paging unit or to activate one of the pre-recorded messages over the speaker circuits.

2.10 PRINTER AND PRINTER STAND

A. Printer and printer stand not required by owner.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Installation shall include the delivery, storage, setting in place, fastening to the building structure, interconnection of the system components, alignment, adjustment and all other work, whether or not expressly specified, which is necessary to result in a tested and operational system.

B. All installation practices shall be in accordance with, but not limited to, the specifications and drawings. Installation shall be performed in accordance with the applicable standards, requirements and recommendations of NFPA 72 and the National Electrical Code and any authorities having jurisdiction. Proper protection against corrosion shall be provided on all electrical equipment in accordance with the requirements of the National Electrical Code. The installation shall conform to all manufacturers' recommendations.

C. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise. Fastenings and support shall be adequate to support their loads with a safety factor of at least three.

D. All boxes, equipment, etc., shall be plumb and square. The contractor must take such precautions as are necessary to prevent and guard against electrostatic hum, to supply adequate ventilation, and to install the equipment to provide reasonable safety for the operator.

E. In the installation of equipment and cables, coordinate with Architectural drawings for possible conflicts with millwork, casework, marker boards, furniture, lockers, etc., and notify the architect of any discrepancies. Verify modifications before proceeding with installation.

F. Mount end-of-line resistor for each box circuit in backbox located at the last manual alarm station or automatic initiating device in a circuit. Mark device accordingly in the field.

G. Provide three dedicated Cat 6 cables from MDF/IDF to fire alarm panel. Cable shall be installed in 3/4" conduit. Two cables for phone POT lines and one Ethernet data connection.

H. Upright and/or Wall Post-Indicating Valve: Provide conduit and wiring from fire alarm

control panel to post-indicating valve if electronically supervised, coordinate exact location of PIV with fire sprinkler contractor prior to rough-in. Coordinate final location with Civil Drawings and Fire Protection Contractor. Where equipment is located inside a vault, stub required conduit inside vault, turn up and cap.

I. Contractor shall submit on completion of system verification, a point-by-point check list indicating the date and time of each item inspected and issue a certificate confirming that the inspection has been completed and the system is installed and functioning in accordance with the Specifications prior to date of substantial completion.

J. Provide remote alphanumeric display annunciators in the administrative area in constantly attended area and additional annunciators where indicated on the drawings.

K. Provide remote paging units adjacent to each remote alphanumeric display annunciator for voice alarm systems.

L. Alarm devices shall be ceiling mounted unless indicated specifically otherwise. Alarm devices in Mechanical, Electrical, Communications, IDF / MDF Rooms and Central Plant shall be wall mounted and coordinated with other equipment, piping and ductwork.

M. Provide combination speaker strobes. Provide strobe only alarms when additional speaker placement will compromise voice intelligibility. Provide horn/strobes in coolers and freezers.

N. Detectors shall be installed per NFPA 90A and be listed with the fire alarm control panel.

O. Auxiliary Equipment Monitoring Wiring and connection to equipment shall be the responsibility of the fire alarm contractor.

P. Power for magnetic door holders shall be wired through fire alarm relay.

Q. Smoke detectors shall be mounted to a 4-inch octagon box with hanger bar or with box secured to building structure.

R. Provide power via 120-volt, 20-Amp dedicated circuits with lock-on provisions at the respective circuit breaker for the main fire alarm control panel, each panel extender and each remote power supply at no additional cost to the Owner. The complete fire alarm system shall be powered under emergency power when emergency life safety power is available at the project site. When emergency life safety power is not available at the project site, power shall originate from the nearest available 120-volt panel. Label 120V circuit origination (i.e.: "120-Volt Circuit ELA-3")

S. Provide smoke detectors in the following locations:
   1. All paths of egress and adjoining spaces within the same HVAC envelope including but not limited to: corridors, hallways, stairs, lobbies, and elevator landings.
   2. At each electrical room, telecommunications/data room, elevator machine room, kiln room, and mechanical room not subject to un-treated or un-filtered outside air.
   3. At each computer lab/room.
   4. At each library, library office and library ancillary areas.
   5. At each storage room, stock room, or warehouse space.
   6. At each pre-K and kindergarten classrooms.
   7. At nurse's area/clinic and patient care/cot areas.
   8. At each men's and women's restroom/toilet
   9. At each administrative work room or copy room.
   10. At each student toilet / restroom. Provide STI protective cover. Do not locate over plumbing fixtures or near partitions.
   11. At each special needs, life skills, adaptive behavior, developmental classrooms or similar designated areas without food preparation or cooking equipment.

T. Provide heat/thermal detectors in the following locations:
   1. At each electrical room, telecommunications/data room, elevator machine room

and mechanical room subject to un-treated or un-filtered outside air.
2. At each janitor's/custodial closets and laundry rooms.
3. At each commercial kitchen and adjoining storage rooms; at each food preparation area.
4. At each employee break room/lounge.
5. At each vocational shop.
6. At each science, physics, chemistry, or biology classroom and their associated preparation and storage rooms.
7. At each special needs, life skills, adaptive behavior, developmental classrooms or similar designated areas with food preparation or cooking equipment.

U. Provide carbon monoxide detection and smoke detection devices in all areas designated as day-care for minors.

V. Provide duct smoke detectors in all air handling units with air volumes of 2,000 cfm or larger. Where duct smoke detectors are installed above ceilings, provide external remote status/alarm LED mounted flush with ceiling in close proximity to the duct detector location. If space is open without ceiling, wall mount remote status/alarm LED in close proximity to the detector between 96 and 108-inches AFF, or as directed by Owner.

W. Provide duct smoke detectors on outside air units only as required by local Code and / or A.H.J.

X. Provide VESDA type detectors at the following locations when appropriate:
1. Atriums.
2. High ceiling corridors where maintenance of spot type detectors may be difficult.
3. Areas with skylights.

Y. Provide manual pull stations at FACP in MDF and adjacent to Fire Alarm Annunciator(s) only, unless required by code otherwise.

Z. Provide weatherproof exterior audio/visual alarm devices mounted on the building at the exact location as directed by Architect:
1. Main entry.
2. Courtyards and outdoor assembly areas adjacent to the building.
3. Mechanical yards adjacent to the building.
4. Covered playgrounds or covered assembly areas adjacent to the building.
5. Additional locations where indicated on drawings.
6. Outdoor paved play areas.

AA. Provide audio and visual alarm devices in all areas normally occupied by students or minors and all common use areas.

BB. Provide carbon monoxide detection in classrooms and other instructional spaces served by a fuel-burning appliance, fuel-burning HVAC equipment (including roof mounted equipment), or with gas fuel outlets for connection to portable fuel-burning space heaters and appliances such as Bunsen burners which are typically used in laboratories or science classrooms.

CC. Provide smoke detectors, pull stations with stopper covers, and speaker strobes in each classroom in all portable buildings, tied into the main campus fire alarm control panel.

DD. Provide properly rated and grounded surge suppression for all circuits leaving and entering the building.

3.2 CABLE AND BOXES INSTALLATION

A. All fire alarm wiring to be red. All fire alarm circuits shall be identified at each termination and at each 25 feet between terminations. Minimum Wire size shall be as follows:
1. Initiating Circuits: 18 AWG
2. Strobe Circuits: 14 AWG

3. Relay Control Circuits: 18AWG
4. Voice/Speaker Circuits: 16 AWG

B. All circuits shall be protected to avoid interruption of service due to short-circuiting or other conditions, which might adversely affect the connected devices. Each individual signaling circuit shall be classified as a circuit pair.

C. All cabling in racks, cabinets and junction boxes shall be neatly strapped, dressed and adequately supported. Cable installation shall conform to good engineering practices and to the standards of the National Electrical Code.

D. Cables shall be terminated with the proper connector required for the associated operation of the equipment to which it is connected. Screw terminal blocks shall be furnished for all cables, which interface with racks, cabinets, consoles or equipment modules.

E. All cables within a rack, console or junction box shall be grouped according to the signals being carried to reduce signal contamination.

F. Where shielded conductors enter a panel or enclosure, and where power wiring exists, provision shall be made to provide physical isolation of signal and power conductors.

G. Supply and install all fittings and accessories whether or not they are specified, required for proper, safe and reliable operation of the system.

H. All wire shall be installed in an approved conduit/raceway system (except where permitted by NEC and the local authority having jurisdiction). Maximum conduit fill shall not exceed 40%.

I. Minimum conduit size shall be 3/4" EMT with insulated bushings. Install conduit per engineered shop drawings. All conduit terminations in all boxes shall have insulated bushings.

J. Systems utilizing open wiring techniques with low smoke plenum cable shall provide conduit in all inaccessible locations, inside concealed walls, all mechanical/electrical rooms, or other areas where wiring might be exposed to view and or subject to damage.

K. All vertical wiring and all main trunk/riser wiring shall be installed in a complete raceway/conduit system. All riser boxes shall be adequately sized for the number of conductors transversing the respective box as well as the number of terminations required.

L. All junction boxes containing fire alarm wiring are to be painted red and labeled.

M. All plenum wiring is to be installed parallel and perpendicular to the building structure. Cable shall be bundled with plenum rated cable zip ties on a maximum of 2'-6". Install cable in D-ring hangers, secured to the structure at a maximum of 5' on center. Cable shall not lie on ceiling grid or ceiling tiles, light fixtures, piping, ductwork, or foreign equipment.

N. The system ground is to be connected to the local ground bus. Under no conditions shall the AC neutral either in a power panel or in receptacle outlets be used for a reference ground.

O. All wiring shall be in accordance with NFPA 72, the National Electrical Code, and Local Codes. All wiring sizes shall conform to recommendations of the equipment manufacturer, and as indicated on the engineered shop drawings.

P. All wire shall be UL Listed FPL for limited energy (300V) and fire alarm applications and shall be installed in conduit. Limited energy FPLP or MPP wire may be run open in return air ceiling plenums provided such wire is UL Listed for such applications and is of the low smoke producing fluorocarbon type and complies with NEC Article 760 and approved by the local authority having jurisdiction.

Q. No other wiring shall be run in the same conduit as fire alarm wiring.

3.3 FINISHES

A. Main Fire Alarm Panel color shall be approved by Owner / Architect.

3.4 ALARM SYSTEM SEQUENCE OF OPERATION

A. General:
   1. All fire alarm circuits shall be electrically supervised.
   2. Automatic response functions shall be accomplished by the first device initiated. Alarm functions resulting from initiation by the first device shall not be altered by subsequent alarms. An alarm signal shall be the highest priority. A pre-alarm signal shall have second priority and supervisory or trouble signals shall have third and fourth level priority. Signals of a higher level priority shall take precedence over signals of lower priority even though the lower priority condition occurred first.

B. Fire alarm operating sequences shall be as follows:
   1. Activation of any automatic detector, manual station, fire suppression system, sprinkler flow switch or any other system required by NFPA 72 to be monitored to initiate an alarm condition shall cause the location of the alarm to be identified in an audible and visual manner at the building fire alarm control panel (FACP), and shall initiate the following events:
      a. The system common alarm LED on the CPU Module shall flash. The internal audible trouble device shall sound. Acknowledging the alarm condition shall silence the audible trouble device and revert the flashing common alarm LED to a steady state.
      b. The alphanumeric display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location, and time of alarm. Location and zoning messages shall be custom field programmed to respective premises.
      c. Any remote or local annunciator LED's associated with the alarm point shall be illuminated as herein specified.
      d. The remote signaling connection shall be activated relaying the alarm signal to an approved central station (central station connection and service provided by Owner). Point ID and descriptor must be sent and received.
      e. All automatic events programmed to the alarm point shall be executed and the associated indicating devices and/or outputs activated.
      f. Activate all audible/visual alarm devices. Where prerecorded voice announcement is required or specified, the prerecorded announcement shall be preceded with attention tone(s), followed by the approved prerecorded announcement and continue in a cycle until the system is reset. Manual voice announcement shall interrupt the prerecorded cycle and the prerecorded cycle shall resume automatically after three minutes.
      g. De-activate all HVAC systems including low speed high volume (LSHV) circulating blade type fans.
      h. De-energize the kitchen hood supply/exhaust fans as required by local authority having jurisdiction.
      i. Close all related smoke dampers.
      j. Close all related smoke/fire dampers.
      k. Release all magnetic door hold open devices.
      l. Release the electric strike, unlocking, but not unlatching, locked doors controlled by an access control system.
      m. Release Counter Shutters and hold-open devices on all fire and smoke doors.
      n. Open all security grilles with emergency egress.

o. Activate to close all related fire and smoke doors and shutters.
p. Activate signaling connection to the elevator as required by the local authority having jurisdiction.
q. Signal the building automation system and Owner's security/police personnel as directed by Owner/Architect. The audible alarms shall be inhibited from being silenced for a period of 3 minutes after commencing operation unless alarm is acknowledged and appropriate action has been taken.
r. Activate automatic recall operation of elevators as required by local authority having jurisdiction.
s. Record all events on the system printer.

2. Activation of duct mounted smoke detector on the HVAC equipment, or a smoke detector mounted in the return/supply air stream of any fan shall shut down all units as required by NFPA. The activation of one of these detectors shall send an alarm signal to the control panel and also initiate the Alarm Sequence of Operation.
3. Activation of a control valve supervisory switch shall initiate the following events:
   a. The activation of any sprinkler valve supervisory (tamper) switch shall activate the system supervisory service audible signal and illuminate the LED at the building fire alarm control panel (FACP). Differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring shall be provided.
   b. Activation of a sprinkler system control valve supervisory switch shall not prevent the events listed under Article 3.4.
   c. Restoring the valve to the normal position shall cause the supervisory service audible signal to pulse, indicating the restoration to normal position. The supervisory service reset key shall be provided to silence the audible signal.
4. Activation of the smoke detector and heat detector in the elevator machine room and at top of elevator shaft shall cause the elevators' controllers to be tripped by way of the shut trip breaker, and shall also initiate the events listed under Article 3.4.
5. Any subsequent fire alarm shall reactivate the alarm indicating appliances and activate the respective control sequences described above.
6. Upon reset of the fire alarm control panel, HVAC units shall be capable of being started, and resume normal operation.
7. When the fire alarm panel is in alarm, the fire alarm panel shall signal the digital lighting control system, as required, to activate and turn all lights to full bright in all NFPA 101 paths of egress and as required by the Fire Marshall. Once the fire alarm (or drill) is cleared, the fire alarm panel shall signal the digital lighting control system as required to enable the digital lighting control system to revert to normal operation with the lights to remain illuminated until manually turned off using the digital lighting control system.

C. Activation of the manual evacuation (drill) switch shall operate the alarm indicating appliances without causing other control circuits to be activated. However, should true alarm occur, all alarm functions should occur as described.
D. ALARM VERIFICATION shall be field programmed for each respective detector. Global verification will not be acceptable. The verification sequence is activated after a "check" procedure and the panel will wait a field programmable delay period (0-50 seconds) then proceed to re-sample the detector for continued presence of smoke. If the

alarm condition still exists or a non-verified device is actuated during the verification period, the system will then initiate all alarm sequences specified herein. The system shall incorporate the ability to log in memory the number of verification events that have occurred for each selected device.

3.5 EQUIPMENT IDENTIFICATION

A. Each panel or equipment enclosure shall be provided with a permanently engraved or embossed or silkscreen identification tag. The tag shall include the following information:
   1. Name of manufacturer.
   2. Manufacturer's equipment description.
   3. Serial number and model number.
   4. Voltage and current rating.

B. All addressable devices shall be labeled with point and module number. Provide label maker style label on base of device. Verify exact requirements with Owner.

3.6 SPARE PARTS AND TOOLS

A. Interchangeable Parts: All spare parts furnished shall be directly interchangeable with the corresponding components of the installed system. Spare parts shall be packaged and identified by nameplate, tagging, or stamping. Spare parts shall be delivered to the site in unopened cartons for storage as directed by the Owner.

B. Spare Parts: Provide minimum of two, or 5% of building total, whichever is greater unless noted otherwise.
   1. Spare shut down modules
   2. Spare detectors of each type in the system
   3. Spare alarm indicating devices of each type in the system
   4. Spare manual pull stations
   5. Spare protective covers of each type in the system.
   6. Spare relays/controls required for connection to smoke and fire/smoke dampers
   7. Devices listed above are to be installed as directed by Architect/Engineer or local code authorities at no additional cost to the Owner. Unused spare parts are to be parts for Owner's cabinet.

C. Provide one smoke, heat and carbon monoxide detector testing kit. SDfire #TF2823 with Solo Testfire #2001 tester with 15-foot access pole and three 4-foot pole extensions, detector removal tool, and carrying bag.

D. Provide two copies of the final software programmed into the fire alarm system.

E. Parts list: Furnish a list, in duplicate, of all other parts and accessories the manufacturer of the system recommends to be stocked for maintenance.

3.7 KEYS

A. Keys and locks for all equipment shall be identical. Provide not less than six keys of each type required. Identify keys by an appropriate number stamped on each key or on a metal tag attached thereto. Provide a key numbering chart in each operation and maintenance manual furnished.

3.8 SMOKE DAMPERS AND FIRE/SMOKE DAMPERS

A. Smoke dampers and combination fire/smoke dampers shall be controlled by an automatic alarm initiating device. Smoke dampers installed to isolate the air handling system shall be arranged to close automatically when the system is in alarm.

B. Coordinate motor operator voltage with supplier.

C. Open all dampers prior to starting air handling equipment.

D. Provide 120V power from nearest general purpose 20A receptacle circuit as required, or as noted otherwise.

3.9 GRAPHIC FLOOR PLANS

A. Provide two (2) color coded floor plan detailed with project name, actual room names, actual graphic room numbers as directed by the Owner and adequate information to direct people to the fire alarm devices in alarm and to exits with non-fading floor plan media. Do not use architectural plan room names and numbers.

B. Each plan shall clearly relate the room numbers on the annunciator to the area description on the floor plan. All fire alarm devices located to correspond with the annunciator. Indicate location of all end-of-line resistors.

C. Provide graphic floor plans with all fire alarm devices and equipment, with labels and addresses matching system programming and reporting. The floor plan shall be provided in lexan protective covering and framed.
   1. Minimum size 30x42 inches, mounted adjacent to FACP in MDF and at remote annunciator.
   2. Provide digital copy of graphic floor plan in AutoCAD (.dwg) format.

D. Provide and mount framed signed FML certificate adjacent to FACP.

3.10 OPERATING INSTRUCTIONS

A. Coordinate with Owner for appropriate off-site monitoring service and communication technology to be used. Provide all necessary programming for interfacing with the Owner's on-site and off-site remote signaling receiving station, including programming of descriptors and addresses at the receiving station.

B. Provide Fire Alarm System Operating Instructions for the following items including, but not limited to:
   1. Alarm Signal
      a. How to open panel door
      b. What to read and follow the instruction on display
      c. How to acknowledge alarm
      d. How to silence the signals
      e. How and when to reset the system
      f. How to return system to normal operation
   2. Trouble / Supervisory
      a. How to open panel door.
      b. What to read and follow the instruction on display
      c. How to acknowledge trouble condition
      d. Appropriate personnel to respond

C. Provide laminated instructions in extruded aluminum frame. Mount adjacent to the Fire Alarm Control Panel and remote annunciator panel(s) for ready reference.

3.11 ADDITIONAL REQUIREMENTS

A. For campuses with existing fire alarm systems, the existing fire alarm system shall remain fully functional and monitored until the new system is fully installed, inspected, and accepted by the AHJ and owner.

B. The contractor is to ensure all areas of the building are covered with visual and audio alarm devices for occupant notification of a fire alarm, including remote portable or temporary buildings.

C. Coordinate door hold devices with door and door hardware.

D. Provide interface with and coordinate shunt-trip circuit breakers and control devices with

kitchen hood fire control systems and elevator equipment.

E. Alarm circuit power supplies and circuiting shall be designed and installed to accept an additional five (5) 110cd visual devices for future expansion. The initial design shall not exceed 70% of the rated power supply and circuit capability.

F. Install system event printer as directed by Owner/Architect.

G. Provide programming or re-programming of all hot keys as directed by Owner including, but not limited to, fire drill, AHU shutdown bypass, horn/strobe disable, elevator test.

H. Provide one dedicated alarm circuit for (future) portable (temporary) building(s) to the nearest main building egress exit discharge to the designated portable building location. Provide 100 feet of cable coiled and marked "FACP-ALARM-PORTABLES" above an accessible ceiling.

I. Provide one dedicated addressable initiating device circuit with a minimum capacity of 50 devices for (future) portable (temporary) building(s) to the nearest man building egress discharge to the designated portable building location. Provide 100 feet of cable coiled and marked "FACP-INITIATING PORTABLES" above an accessible ceiling.

J. Provide printer and printer stand at main FACP; exact location as directed by Owner / Architect.

K. Provide control module relays to interface with the digital lighting control system; refer to specification Section 26 09 28 Digital Lighting Control System. Provide Form C dry contacts to indicate1) Fire alarm (including fire drill activation) and 2) Fire Alarm cleared.

L. Provide 40 initiating devices and two audible circuits for portable buildings. These shall be used to service existing portable buildings and remainder shall be left as spare above accessible ceiling.

3.12 COMMISSIONING THE SYSTEM

A. The installing contractor shall be responsible for verifying that each component of the system is fully operational and in conformity with the specifications. He shall also be responsible for insuring that all elements function together as a system in accordance with the specifications.

B. A state licensed NICET II minimum and factory trained technical representative of the manufacturer shall supervise the final control panel connections and testing of the system. Upon completion of the acceptance tests, the owner and/or his representatives shall be instructed in the proper operation of the system.

C. The installing contractor shall functionally test each and every device in the entire system for proper operation and response. Field testing shall include voice intelligibility as required by the latest edition of NFPA 72 Any items found not properly installed or non-functioning shall be replaced or repaired and retested. The final test indicating a fully functional fire alarm system shall be recorded and an electronic Excel and printed copy submitted to the Architect, Engineer and Owner.

D. The installing contractor shall provide a complete written report in electronic form and printout of the functional test and intelligibility test of the entire system. A copy of the test report shall be provided with the Maintenance and Operation Manuals. The test report shall be signed and dated by the licensed fire alarm superintendent responsible for supervising the final system test and checkout. This test shall be witnessed and accepted by the Owner prior to testing for the local Fire Marshall.

E. The installing contractor's fire alarm superintendent shall test the entire system in the presence of the local authorities having jurisdiction. The contractor shall be responsible for making any changes, adjustments, or corrections, as may be required by the local authorities. The Contractor shall affix his certification label and installation certificate to the interior of the main fire alarm control panel.

F. The testing and acceptance shall be performed within 30 days after the fire alarm installation is completed. The test shall be performed by a minimum of two qualified fire alarm system technicians acceptable to the authority having jurisdiction. The test which is a comprehensive 100 percent inspection and test of all fire alarm system equipment shall include the following:

1. Fire alarm control equipment: a visual and functional test of the fire alarm control and auxiliary control equipment.
2. A visual inspection shall be conducted to establish that all electrical connections and equipment, as required, are properly installed and operating.
3. A functional fault simulation test shall be conducted on all relevant field wiring terminations to ensure that wiring is properly supervised as required.
4. Indicators shall be tested to ensure proper function and operation.
5. Control panel auxiliary functions shall be functionally tested to verify proper operation.
6. Control panel supervisory and alarm current readings shall be taken to verify that the control panel has the appropriate power supplies and standby batteries to operate the system as required. A three-minute general alarm stress test, both under AC power and standby power, shall be conducted to further ensure complete operation of the system.
7. Fire alarm peripheral devices; All fire alarm peripheral devices shall be functionally tested and the location and testing information recorded for each device.
8. Manual initiating devices:
    a. Each manual fire alarm station shall be functionally tested for alarm operation.
    b. Each manual fire alarm station shall be functionally tested for proper wiring supervision.
9. Automatic initiating devices:
    a. Each automatic initiating device shall be activated in accordance with manufacturer's instructions to ensure proper operation.
    b. Each automatic initiating device shall be functionally tested for proper wiring supervision.
    c. Each automatic initiating device shall be inspected to ensure proper placement and mounting as required by specifications.
10. Alarm signaling devices:
    a. Each alarm signaling device shall be tested and decibel reading taken at 10' from the device and recorded to ensure proper operation. Each area's voice alarm signaling devices shall be tested for intelligibility.
    b. Each alarm signaling device shall be functionally tested for proper wiring supervision.
    c. Decibel reading shall be taken to ensure that the alarm signal level can be clearly heard in all areas of the facility.
    d. All visual alarm indicators shall be functionally tested to ensure proper operation and that they are clearly visible.
11. Elevators: Each elevator shall be tested and automatic recall function verified.
12. Reporting: Upon completion of the initial verification audit, a report shall be sent to the Architect/Engineer indicating that all fire alarm equipment has been tested and is in 100 percent operation. The report shall also contain the audit testing information as to the location and operational status of each peripheral device. The 100 percent audit shall be performed by a factory-trained representative. The report shall include the voice intelligibility performance in each area and indicate

compliance with NFPA and local AHJ requirements.

G. It is the intent of these specifications and of the Architect/Engineer that a continued program of system maintenance is to be provided by the Owner in compliance with NFPA 72. It is mandatory that the installing Contractor provide such services and make available these services to the Owner upon completion of the project.

H. Upon completion of installation and full acceptance testing, submit NFPA 72 certificate of compliance that the total fire alarm system, including any subsystems, is fully functional and that the components are UL listed for function intended.

3.13 SUBSTANTIAL COMPLETION

A. Final acceptance of the FIRE ALARM SYSTEM by the owner, local code authorities and Occupancy Permit has been issued.

B. All fire alarm system shop drawings, test reports, operating and maintenance manuals, maps and as-built drawings shall be submitted in electronic format to and accepted by the Architect / Owner prior to date of substantial completion.

C. Acceptance by County or Local Fire Marshall.

3.14 WARRANTY

A. The fire alarm system, including labor and material, shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from the date of substantial completion. Major components including but not limited to the main fire alarm panel, sub-panels, panel extenders, power supplies and emote annunciators. Any equipment or workmanship shown to be defective shall be repaired, replaced or adjusted during normal working hours at no cost to the owner within 4-hour notification. Any equipment replaced shall be complete with full factory warranty for that part beginning on the date of installation.

B. Repair services and replacement parts for the system to be furnished under this Contract shall be available for a period of ten years after the date of final acceptance. Service during the warranty period shall be provided within four hours after notification and all repairs shall be corrected within 24 hours after notification throughout the warranty specified in this section.

C. The installing contractor shall provide 24 hour, 365 days per year emergency service with factory trained, state licensed service technicians.

D. The equipment manufacturer shall be represented by a local service organization and the name of such shall be furnished to the Owner, Architect, and Engineer.

E. Provide a certified fire alarm test of the complete system no earlier than 30 days prior to the end of the warranty period and correct any and all items to bring the system to an approved status at no cost to the Owner. Clean all smoke detectors and replace all defective parts at no cost to the Owner.

F. Guarantee labor, materials, and equipment provided under this contract against all defects for a period of one year after the date of final acceptance and receipt and approval of "As-Built" drawings and schematics of all equipment.

G. All manufacturer's warranties which extend past final completion shall be fully transferred to the Owner.

3.15 TRAINING

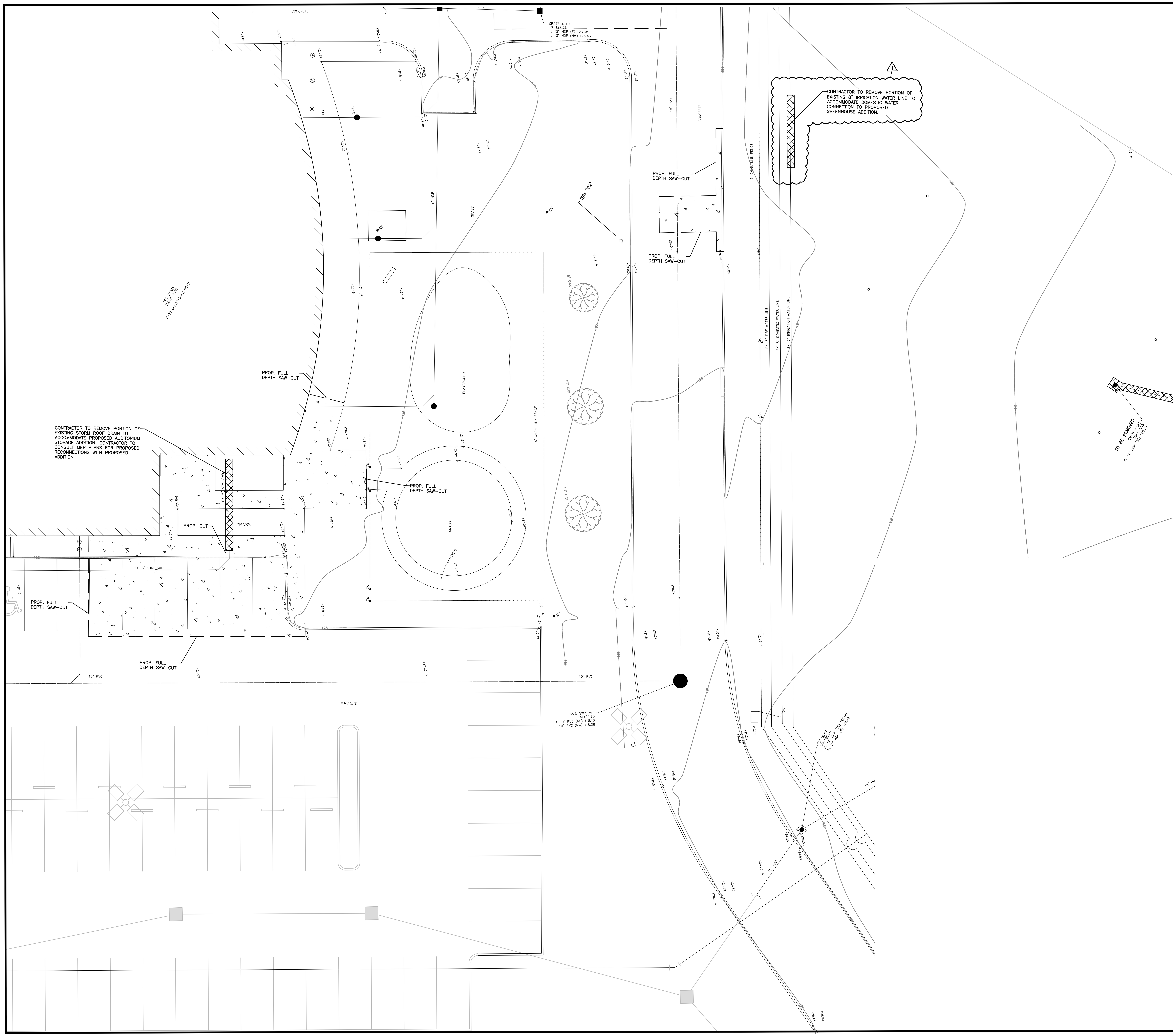
A. Provide training course to all fire personnel assigned by Owner's Representative. The training shall include a course syllabus and hands-on participation. Training shall be conducted on a system identical to the one being installed on this project. The system shall be able to perform all system operations and simulate all types or forms of alarm conditions.

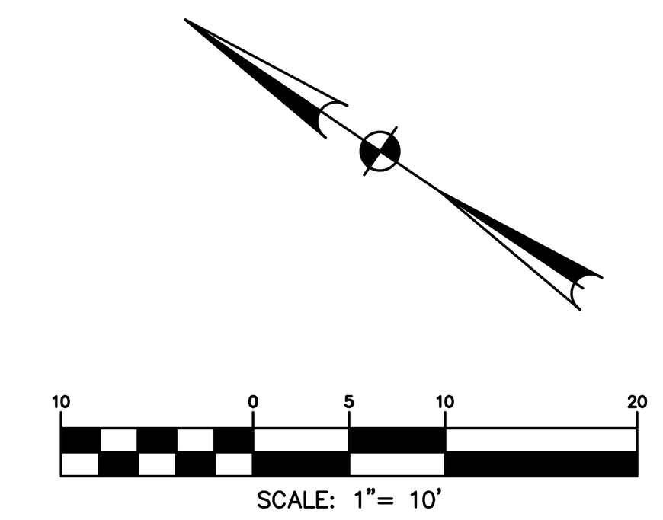
B. Provide a video of the training program to the Owner's Representative to be used for periodic refresher course, training of the local fire department and for training of new employees.

C. The training course shall include, in addition to the above, a system overview, and a review of the operation and maintenance manual.

D. The instructor shall be factory trained and shall be thoroughly familiar with all parts of the installation on which instruction is to be given. The instructor shall be trained in operating theory as well as in practical operation and maintenance work.

END OF SECTION





LEGEND:

(line)	PROP. FULL DEPTH SAWCUT
(pattern)	EXISTING CONCRETE PAVEMENT, CURB, SIDEWALK AND SLAB TO BE REMOVED.
(pattern)	EXISTING UTILITIES TO BE REMOVED.
(pattern)	EXISTING TREES AND SHRUBS TO BE REMOVED.
(pattern)	EXISTING MISCELLANEOUS EQUIPMENT/FENCING TO BE REMOVED.

FLOODPLAIN INFORMATION:

ACCORDING TO F.I.R.M. MAP NO. 48201C0605M (COMMUNITY–PANEL NO. 4802870605M), MAP REVISED DATE: NOVEMBER 15, 2019. THE SUBJECT PROPERTY LIES WITHIN THE AREA DESIGNATED AS ZONE "X" UNSHADED. AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

REFERENCE BENCHMARK:

RM200178 – HARRIS COUNTY FLOODPLAIN REFERENCE MARK NUMBER 200178 IS A BRASS DISK STAMPED "RM 200178" ON THE EAST, DOWN STREAM SIDE OF BRIDGE LOCATED ON GREENHOUSE ROAD AND BEAR CREEK, NEAR STREAM U102–00–00 IN THE ADDICKS RESERVOIR IN KEY MAP 446D.
ELEVATION = 124.88' (NAVD 88, 2001 ADJ.)

TEMPORARY BENCHMARKS:

TBM"A" – BOX CUT ON EDGE OF CONCRETE ON THE WEST SIDE OF THE TRACK LOCATED ±80 FEET NORTHEAST OF THE NORTHEAST CORNER OF THE METAL STAIRS ON THE NORTH SIDE OF BLEACHERS.
ELEVATION = 127.03'

TBM "B2" – BOX CUT ON "C" INLET LOCATED ON THE NORTHEASTERLY SIDE OF THE MOST EASTERLY DRIVEWAY TO THE CAMPUS ±40' NORTHEAST OF THE NORTHEAST CORNER OF THE MOST NORTHEASTERLY PORTABLE BUILDING.
ELEVATION = 125.58'

TBM "C" – BOX CUT ON CONCRETE BASE OF LIGHT STANDARD LOCATED AT THE NORTH CORNER OF THE PARKING LOT FOR THE ATHLETIC FIELDS.
ELEVATION = 128.78'

TBM "C2" – BOX CUT ON CONCRETE BASE OF LIGHT STANDARD LOCATED ±20' SOUTHEAST OF THE SOUTHEAST CORNER OF THE PLAYGROUND.
ELEVATION = 129.27'

TBM "D" – BOX CUT ON "C" INLET LOCATED ON THE EAST SIDE OF THE MOST EASTERLY DRIVEWAY TO THE CAMPUS ±280' NORTH OF GOLDEN WAVE DRIVE.
ELEVATION = 123.35'

TBM "E" – BOX CUT ON CONCRETE LOCATED ±6.5' WEST OF THE NORTHEAST CORNER OF THE TENNIS COURTS.
ELEVATION = 127.95'

NATEX
CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

3701 Kirby Drive, Suite 830
Houston ,TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENT

BROOKS & SPARKS, INC.
F-880

STATE OF TEXAS
FRANK E. BROOKS
49225
REGISTERED PROFESSIONAL ENGINEER
12/09/2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

LANDSCAPE
LANDSCAPE GROUP
17041 EL CAMINO REAL, STE 204
HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

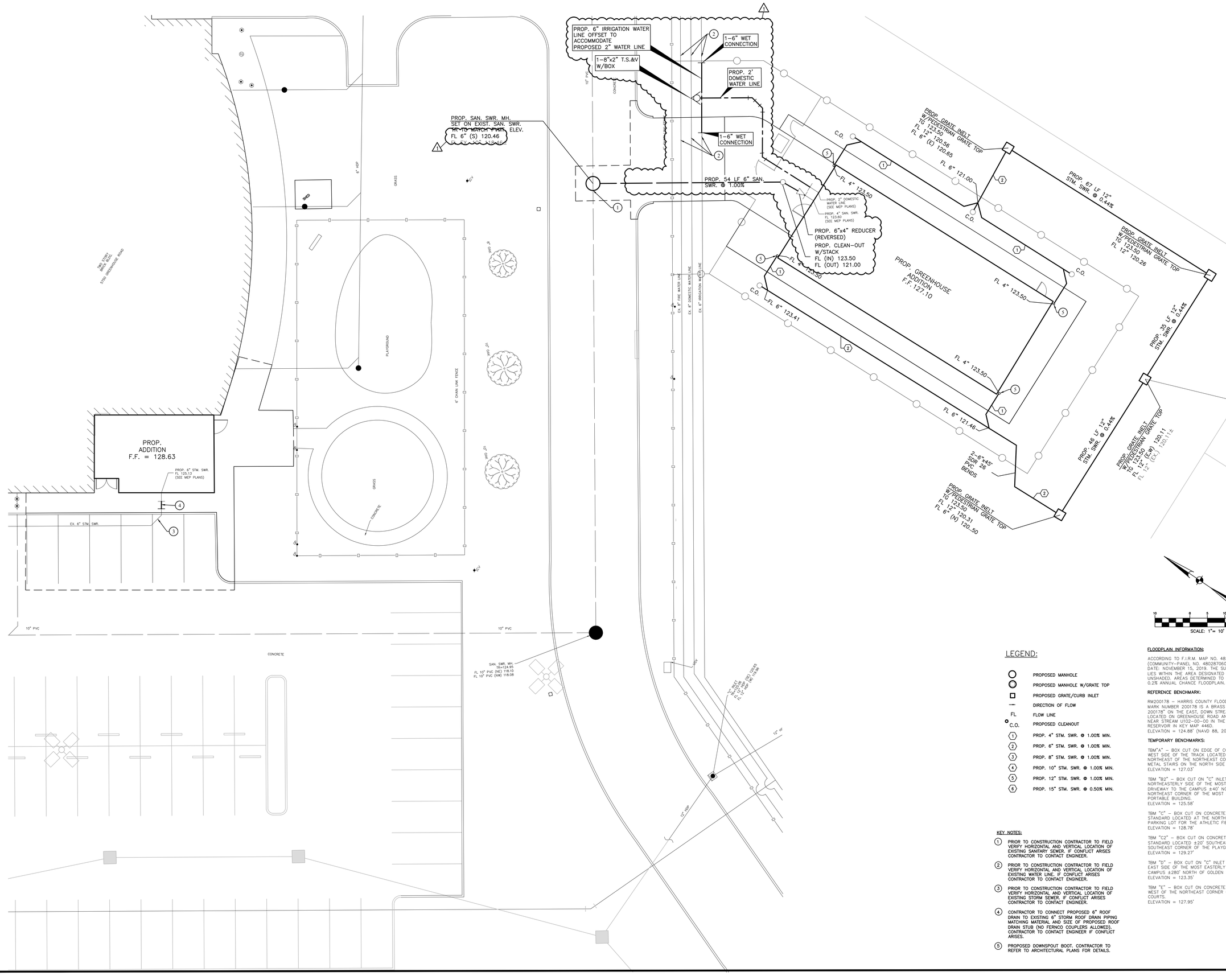
5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

Revisions / Submission	
1 ADDENDUM #2	12/09/24

Project Number: 23071
Date: 11-17-2024
Drawn by:

DEMOLITION PLAN
(SHEET 3 OF 3)

C1.05



LEGEND:

- PROPOSED MANHOLE
- PROPOSED MANHOLE W/GRATE TOP
- PROPOSED GRATE/CURB INLET
- DIRECTION OF FLOW
- FL — FLOW LINE
- C.O. — PROPOSED CLEANOUT
- (1) PROP. 4" STM. SWR. @ 1.00% MIN.
- (2) PROP. 6" STM. SWR. @ 1.00% MIN.
- (3) PROP. 8" STM. SWR. @ 1.00% MIN.
- (4) PROP. 10" STM. SWR. @ 1.00% MIN.
- (5) PROP. 12" STM. SWR. @ 1.00% MIN.
- (6) PROP. 15" STM. SWR. @ 0.50% MIN.

KEY NOTES:

1. PRIOR TO CONSTRUCTION CONTRACTOR TO FIELD VERIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING SANITARY SEWER. IF CONFLICT ARISES CONTRACTOR TO CONTACT ENGINEER.
2. PRIOR TO CONSTRUCTION CONTRACTOR TO FIELD VERIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING WATER LINE. IF CONFLICT ARISES CONTRACTOR TO CONTACT ENGINEER.
3. PRIOR TO CONSTRUCTION CONTRACTOR TO FIELD VERIFY HORIZONTAL AND VERTICAL LOCATION OF EXISTING STORM SEWER. IF CONFLICT ARISES CONTRACTOR TO CONTACT ENGINEER.
4. CONTRACTOR TO CONNECT PROPOSED 6" ROOF DRAIN TO EXISTING 6" STORM ROOF DRAIN PIPING MATCHING MATERIAL AND SIZE OF PROPOSED ROOF DRAIN STUB (NO FERNCO COUPLERS ALLOWED). CONTRACTOR TO CONTACT ENGINEER IF CONFLICT ARISES.
5. PROPOSED DOWNSPOUT BOOT. CONTRACTOR TO REFER TO ARCHITECTURAL PLANS FOR DETAILS.

FLOODPLAIN INFORMATION:

ACCORDING TO F.I.R.M. MAP NO. 48201C0605M (COMMUNITY-PANEL NO. 480287060SM), MAP REVISED DATE: NOVEMBER 15, 2019. THE SUBJECT PROPERTY LIES WITHIN THE AREA DESIGNATED AS ZONE "X" UNSHADED. AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

REFERENCE BENCHMARK:

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TEMPORARY BENCHMARKS:

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2024 CY-LAKES HIGH SCHOOL RENOVATION

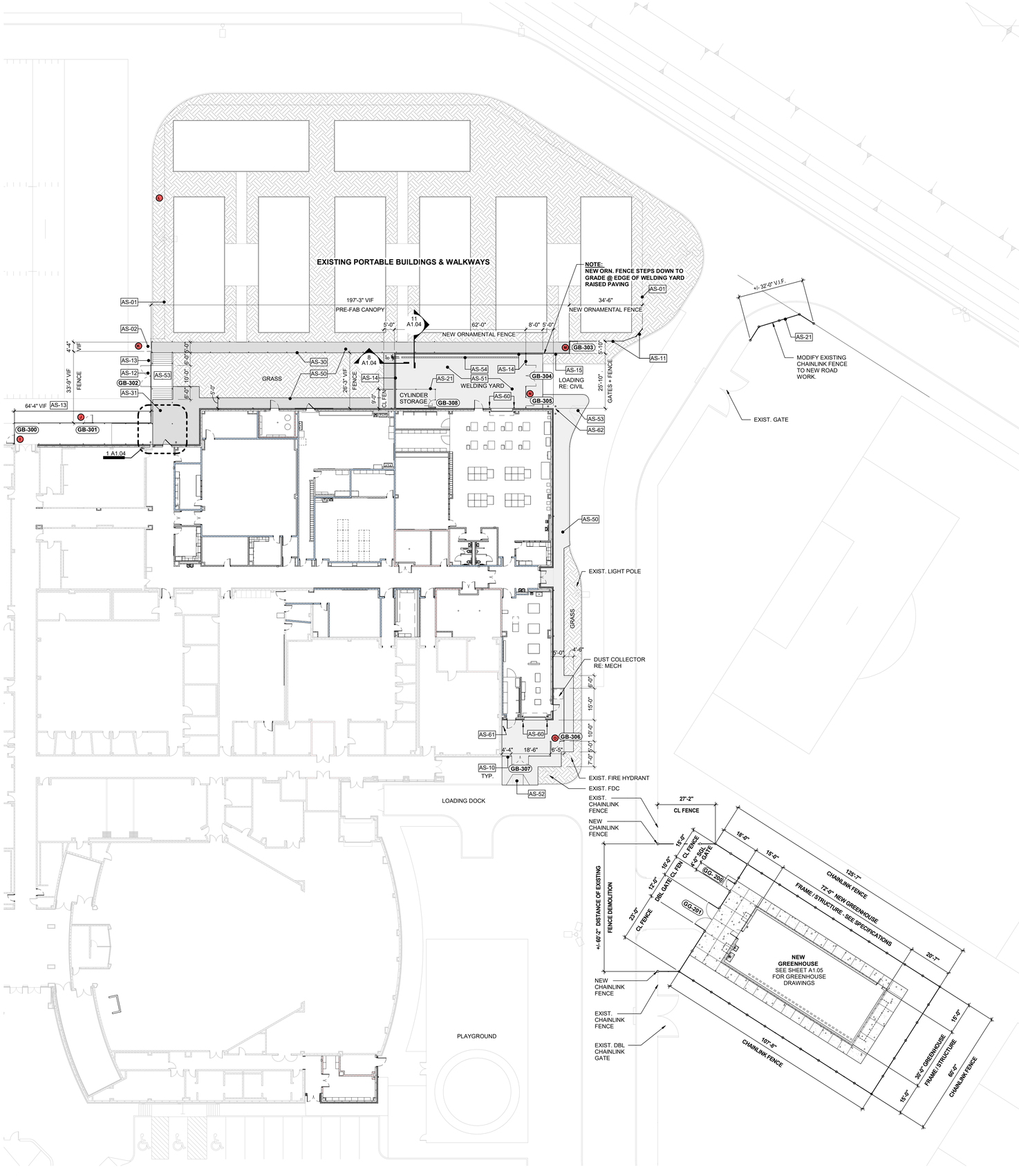
5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

ADDENDUM #2	12/09/24	Revisions / Submission

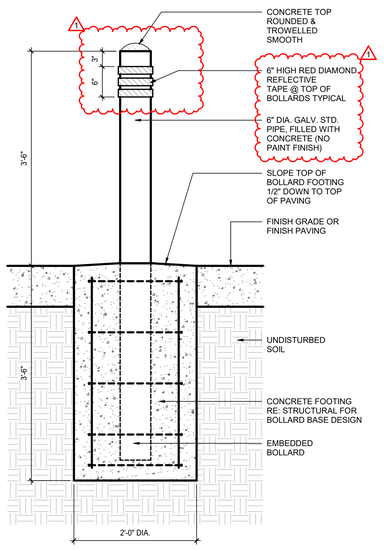
Project Number: 23071
Date: 11-17-2024
Drawn by:

UTILITY PLAN
(SHEET 3 OF 3)

C3.03



1 SITE PLAN - FINE ARTS / CTE
1" = 20'-0"



2 SITE DETAIL - BOLLARD
1" = 1'-0"

SITE PLAN SYMBOLS

- GT-104 — SITE GATE SCHEDULE SYMBOL SEE SHEET A1.01
- NEW 12'-0" HIGH CHAIN LINK FENCE @ NEW TENNIS COURTS TO MATCH EXISTING - SEE SPECIFICATIONS
- NEW CHAIN LINK FENCE & GATE AROUND CYLINDER STORAGE (6'-0" HI) & NEW CHILLER (8'-0" HI) - SEE SPECIFICATIONS & SHEET A1.10
- NEW 6'-0" HIGH CHAIN LINK FENCE & GATES AROUND GREENHOUSE & DETENTION POND - SEE SPECIFICATIONS & SHEET A1.10
- NEW 6'-0" HIGH ORNAMENTAL FENCE & GATES @ NEW BLDG ADDITION - SEE SPECIFICATIONS & SHEET A1.10
- EJ — PAVING EXPANSION JOINT - RE: CIVIL
- CJ — PAVING CONSTRUCTION JOINT / CONTRACTION JOINT - RE: CIVIL
- J — NEW GATE SIGN - RE: SHEET A12.00

KEYNOTES

AS-01	EXISTING ORNAMENTAL FENCING.
AS-02	EXISTING ORNAMENTAL GATE.
AS-10	6' H MIN. ORNAMENTAL FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE. ALIGN AND ATTACHED TO ADJACENT EXISTING FENCE / GATE.
AS-11	6' H MIN. ORNAMENTAL FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE.
AS-12	ORNAMENTAL GATE. RE: SCHEDULE
AS-13	6' H MIN. ORNAMENTAL FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE. INSTALL ON PARKING LOT SIDE OF CONCRETE CURB. ALIGN AND ATTACHED TO ADJACENT EXISTING FENCE / GATE.
AS-14	6' H MIN. ORNAMENTAL FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE. INSTALL ON WELDING YARD CONCRETE PAD.
AS-15	6' H MIN. ORNAMENTAL FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE. INSTALL ON GRADE / GRASS AREA. CONNECT TO ADJACENT HIGHER FENCING ON WELDING YARD.
AS-21	6' H MIN. CHAINLINK FENCE. HEIGHT AND STYLE TO MATCH EXISTING FENCE.
AS-30	PRE-FABRICATED WALKWAY CANOPY. HEIGHT AND STYLE TO MATCH ADJACENT CANOPY. RE: SPEC. INSTALL OVER ENTIRE LENGTH OF SIDEWALK IN FRONT OF PORTABLES. CONNECT NEW CANOPY TO EXISTING CANOPIES OVER WALKWAY RAMPS TO PORTABLE BUILDINGS.
AS-31	PRE-FABRICATED WALKWAY CANOPY. HEIGHT AND STYLE TO MATCH EXISTING. RE: SPEC. PROVIDE AND INSTALL CANOPY FROM EXTRUDED ALUMINUM WALKWAY CANOPY AT BUILDING ENTRANCE TO PORTABLE BUILDING SIDEWALK.
AS-50	SIDEWALK. RE: CIVIL
AS-51	CONCRETE PAVING ON RETAINING WALLS. RE: CIVIL AND STRUCTURAL.
AS-52	LOADING RAMP. RE: CIVIL
AS-53	ADA RAMP. RE: CIVIL
AS-54	TRENCH DRAIN. RE: CIVIL
AS-60	BOLLARDS TYP. PROVIDE AND INSTALL ON BOTH SIDES OF ROLL-UP DOOR. (X4) RE: STRUCTURAL & DETAIL 2A1.01
AS-61	PROVIDE AND INSTALL RUBBER DOOR/GATE BUMPER ON BOLLARD. COORDINATE LOCATION WITH DOOR / GATE.
AS-62	PROVIDE AND INSTALL (3) BOLLARDS ON CORNER OF BUILDING. RE: STRUCTURAL & DETAIL 2A1.01

GATE SCHEDULE

MARK	MATERIAL	WIDTH	HEIGHT	PUSH SIDE	PULL SIDE	COMMENTS
DETENTION POND (EXISTING) - CHAIN LINK FENCE & GATES						
GD-001	CHAIN LINK DBL GATE	PR 6'-0" (12'-0" CLR OPG)	6'-0"	4A1.10	4A1.10	SEE 3A1.10 FOR FENCE ELEVATION & 5A1.10 FOR SS CHAIN & PADLOCK DETAIL
TENNIS COURTS - CHAIN LINK FENCE & GATES						
GT-100	CHAIN LINK SGL GATE	3'-0"	7'-0"	ELEVATION 5A1.06	ELEVATION 5A1.06	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-101	CHAIN LINK DBL GATE	PR 3'-0" (6'-0" CLR OPG)	7'-0"	ELEVATION 3A1.06	ELEVATION 3A1.06	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-102	CHAIN LINK SGL GATE	3'-0"	7'-0"	ELEVATION 5A1.06 SIM	ELEVATION 5A1.06 SIM	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-103	CHAIN LINK SGL GATE	3'-0"	7'-0"	ELEVATION 5A1.06 SIM	ELEVATION 5A1.06 SIM	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-104	CHAIN LINK DBL GATE	PR 3'-0" (6'-0" CLR OPG)	7'-0"	ELEVATION 3A1.06	ELEVATION 3A1.06	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-105	CHAIN LINK SGL GATE	3'-0"	7'-0"	ELEVATION 5A1.06	ELEVATION 5A1.06	SEE TENNIS COURT FENCE SPECIFICATIONS & MATCH EXISTING ADJACENT TENNIS COURTS
GT-106	CHAIN LINK SGL GATE	3'-0"	6'-0"	ELEVATION 8A1.06	ELEVATION 8A1.06	SEE TENNIS COURT FENCE SPECIFICATIONS & ADD NEW SGL CHAINLINK GATE IN EXISTING FENCE
GREENHOUSE ENCLOSURE - CHAIN LINK FENCE & GATES						
GG-200	CHAIN LINK SGL GATE	4'-0"	6'-0"	7A1.10	7A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 1
GG-201	CHAIN LINK DBL GATE	PR 6'-0" (12'-0" CLR OPG)	6'-0"	4A1.10	4A1.10	SEE 3A1.10 FOR FENCE ELEVATION & 5A1.10 FOR SS CHAIN & PADLOCK DETAIL
BUILDING ADDITION & EXISTING PORTABLES - ORNAMENTAL FENCE & GATES						
GB-300	ORNAMENTAL SGL GATE	4'-0"	6'-0"	6A1.10	6A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 2
GB-301	ORNAMENTAL SGL GATE	4'-0"	6'-0"	6A1.10	6A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 2
GB-302	ORNAMENTAL DBL GATE	PR 6'-0" (12'-0" CLR OPG)	6'-0"	2A1.10	2A1.10	SEE 1A1.10 FOR FENCE ELEVATION & 5A1.10 FOR SS CHAIN & PADLOCK DETAIL
GB-303	ORNAMENTAL SGL GATE	4'-0"	6'-0"	6A1.10	6A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 2
GB-304	ORNAMENTAL DBL GATE	PR 6'-0" (12'-0" CLR OPG)	6'-0"	2A1.10	2A1.10	SEE 1A1.10 FOR FENCE ELEVATION & 5A1.10 FOR SS CHAIN & PADLOCK DETAIL
GB-305	ORNAMENTAL SGL GATE	4'-0"	6'-0"	6A1.10	6A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 2 WITH CARD READER
GB-306	ORNAMENTAL SGL GATE	4'-0"	6'-0"	6A1.10	6A1.10	PROVIDE PANIC HARDWARE ON PUSH SIDE EXIT GATE HARDWARE NO. 2
GB-307	ORNAMENTAL DBL GATE	PR 6'-0" (12'-0" CLR OPG)	6'-0"	2A1.10	2A1.10	SEE 1A1.10 FOR FENCE ELEVATION & 5A1.10 FOR SS CHAIN & PADLOCK DETAIL
GB-308	CHAIN LINK SGL GATE	3'-0"	6'-0"	ELEVATION 8A2.10 SIM	ELEVATION 8A2.10 SIM	NEW CYLINDER STORAGE GATE SIMILAR TO NEW TENNIS COURT GATE W/ 5A1.10, CHAIN & PADLOCK
NEW CHILLER YARD - CHAIN LINK FENCE & GATES						
GC-400	CHAIN LINK DBL GATE	PR 6'-0" (12'-0" CLR OPG)	8'-0"	4A1.10	4A1.10	DOUBLE GATE IS 8'-0" HIGH TYPICAL AT MECHANICAL YARDS

GATE HARDWARE SET NO. 1:
(CHAIN LINK EXIT GATE HARDWARE)

1 HINGES	MAMMOTH 180 BY DOOR MANUF		
1 EXIT DEVICE - SPAR#04971	CCSD 19 TB 43 70 8804	US32D	SA
1 VANDAL RESISTANT TRIM	826 (HAND TRIM)	US32D	SA
1 INTERCHANGEABLE CORE	I/CK-7	626	BE
1 CONST. CORE	7190224	GREEN	BE
1 BALANCE HARDWARE BY DOOR MANUFACTURER			OT
1 GATE STOP W/ RUBBER BUMPER - LOCINOX GATESTOP			

** ADD CARD READER TO STRIKE SIDE OF GATE, IF REQ'D
NOTE: TRIM IS ORDERED AS RH OR LH

GATE HARDWARE SET NO. 2:
(ORNAMENTAL EXIT GATE HARDWARE)

1 HINGES	MAMMOTH 180 BY DOOR MANUF		
1 EXIT DEVICE - SPAR#04971	CCSD 19 TB 43 70 8804	US32D	SA
1 VANDAL RESISTANT TRIM	826 (HAND TRIM)	US32D	SA
1 INTERCHANGEABLE CORE	I/CK-7	626	BE
1 CONST. CORE	7190224	GREEN	BE
1 BALANCE HARDWARE BY DOOR MANUFACTURER			OT
1 GATE STOP W/ RUBBER BUMPER - LOCINOX GATESTOP			

** ADD CARD READER TO STRIKE SIDE OF GATE, IF REQ'D
NOTE: TRIM IS ORDERED AS RH OR LH

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

Coleman Partners ARCHITECTS
cparch.com
3701 Kirby Drive, Suite 830
Houston,TX 77098
tel 832.947.1036 fax 225.214.5365

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KATY, TX 77449
tel: 281.578.9595

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SUITE 460
HOUSTON, TX 77042
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HOUSTON, TX 77064
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HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1 ADDENDUM 02 — 12.09.24 — Revisions / Submission

Project Number: 23071
Date: 11-17-2024
Drawn by: WHL / KLO

ENLARGED SITE PLAN

A1.01
of

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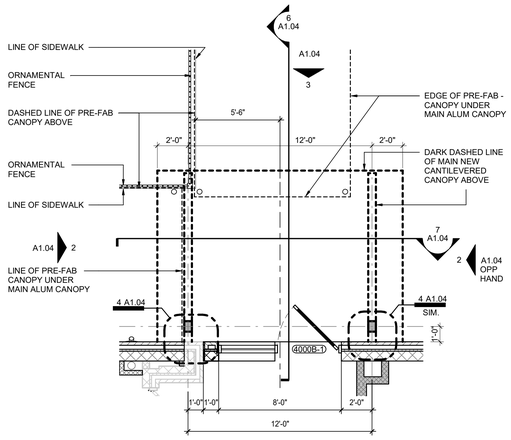
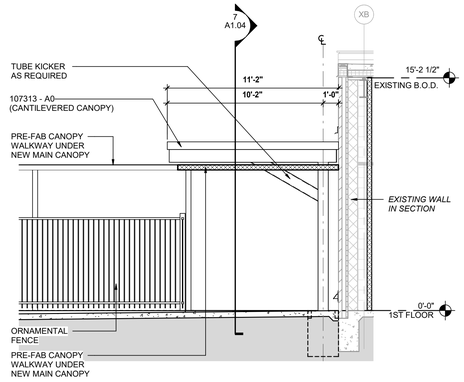
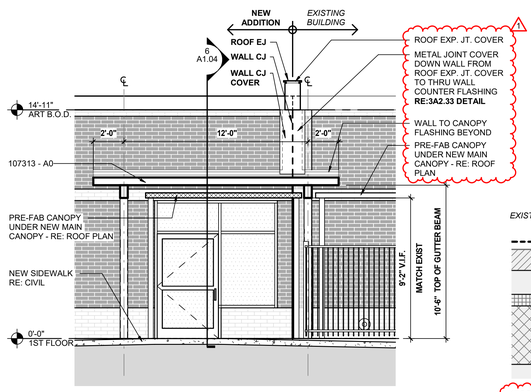


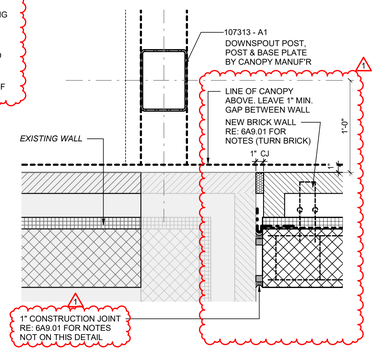
1 ENLG FLOOR PLAN - CANOPY
1/4" = 1'-0"



2 CANOPY - WEST ELEVATION
1/4" = 1'-0"



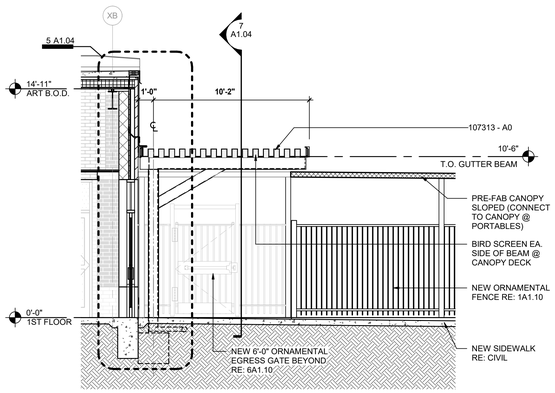
3 CANOPY - NORTH ELEVATION
1/4" = 1'-0"



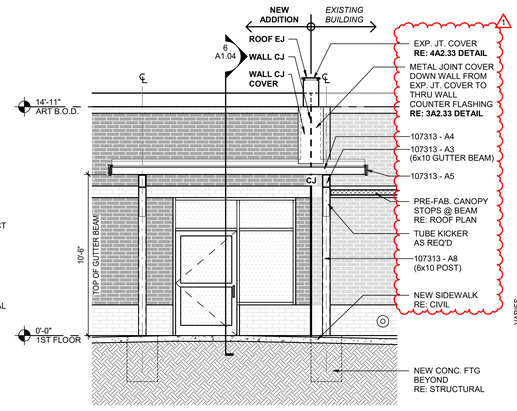
4 PLAN DETAIL - CANOPY
1 1/2" = 1'-0"

NOTE: FOR DIMENSIONS AND NOTES NOT ON THIS DETAIL, SEE 1A8.02

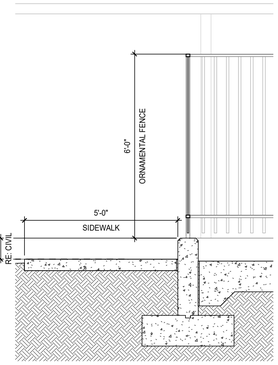
5 CANOPY WALL SECTION @ BLDG
3/4" = 1'-0"



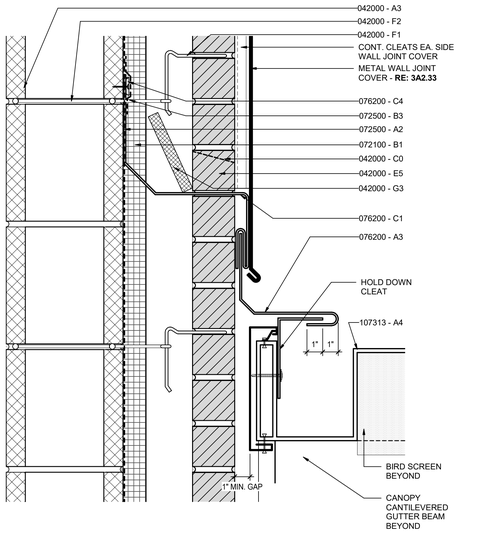
6 CANOPY SECTION
1/4" = 1'-0"



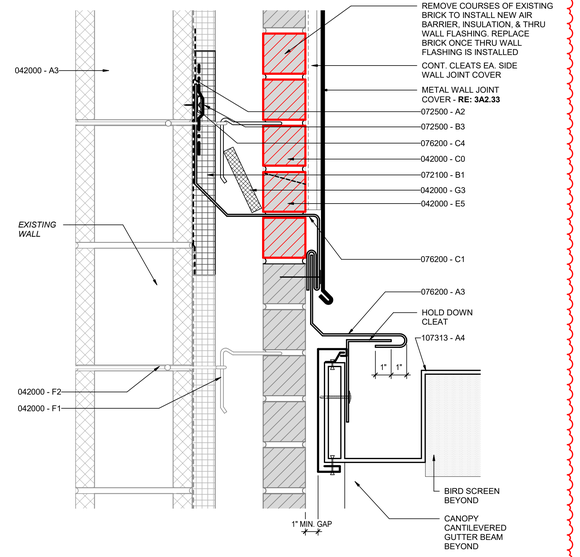
7 CANOPY CROSS-SECTION
1/4" = 1'-0"



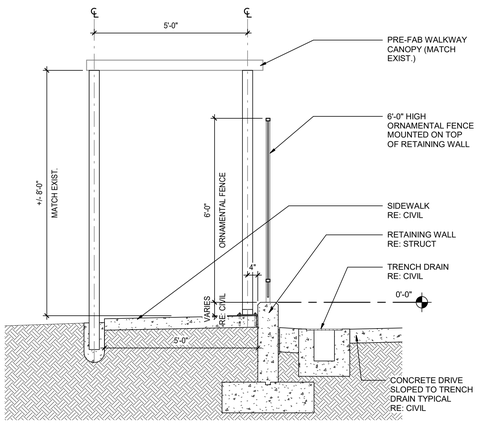
8 WALL SECTION - WELDING YARD
1/2" = 1'-0"



9 CANOPY THRU WALL FLASH - NEW ADDITION
3" = 1'-0"



10 CANOPY THRU WALL FLASH - EXISTING BLDG
3" = 1'-0"



11 WALL SECTION - WELDING YARD @ CANOPY
1/2" = 1'-0"

MATERIAL KEYNOTES

030580 - A1	UNDER-SLAB VAPOR RETARDER / BARRIER; RE: SPECIFICATIONS
042000 - A3	8X8X16 CONCRETE MASONRY UNIT - RE: STRUCT
042000 - C0	KING SIZED VENEER FACE BRICK - STRETCHER COURSES (RUNNING BOND) - SEE ELEVATIONS FOR BANDING & COLOR
042000 - E1	AIR SPACE
042000 - E5	WEEP HOLES @ 24" OC - FILLED WITH MOLDED PVC GRILLE, INSECT RESISTANT
042000 - F1	ADJUSTABLE MASONRY VENEER WALL TIES AT 15" O.C. VERTICALLY MAX (16" O.C. STD BRICK) AND 16" O.C. HORIZONTALLY MAX - FOR UNEVEN WYTHES OF BRICK & CMU
042000 - F2	ADJUSTABLE HORIZONTAL TRUSS REINFORCEMENT WITH EYE-WIRE FOR ADJUSTABLE TIES. @ 16" OC VERTICALLY MAX @ CMU - FOR WYTHES OF KING SIZED BRICK & STANDARD CMU
042000 - F5	ADJUSTABLE MASONRY WALL ANCHOR 15" OC EA WAY @ METAL STUD WALLS TYPICAL
042000 - G3	MORTAR NET TYPICAL AT ALL THRU WALL FLASHING
054000 - A1	6" METAL STUD WALL FRAMING (CFMF) - RE: STRUCTURAL
061600 - D2	5/8" GLASS-MAT GYPSUM SHEATHING BOARD - TYPE X
072100 - B1	RIGID WALL INSULATION - 1-1/2" THICK IN WALL CAVITY - RE: SPECS
072500 - A1	FLUID APPLIED AIR BARRIER OVER EXTERIOR SHEATHING
072500 - A2	FLUID APPLIED AIR BARRIER OVER EXTERIOR CMU
072500 - B3	SELF-ADHERING TRANSITION MEMBRANE @ WALL CONNECTIONS
076200 - A3	METAL COUNTER FLASHING
076200 - C1	METAL THRU-WALL FLASHING
076200 - C4	TERMINATION BAR WITH CONTINUOUS BEAD OF SEALANT (AS REQ'D AT THRU WALL FLASHING)
085100 - A2	ALUMINUM STOREFRONT ENTRANCE DOORS AND FRAME - 2" X 6" FRAME PROFILE (EXTERIOR)
092116 - D1	5/8" GYPSUM BOARD FINISH - RE: SPECS
095100 - A1	ACOUSTICAL PANEL CEILING & GRID. RE: FINISH SCHEDULE
107313 - A0	PREFINISHED ALUMINUM WALKWAY COVER
107313 - A1	PREFINISHED ALUMINUM DOWNSPOUT POST (6"X6") - OPENING IN BOTTOM OF EACH POST TO DRAIN WATER TO SURFACE
107313 - A2	PREFINISHED ALUMINUM BEAM (4"X6" OR 6"X8")
107313 - A3	PREFINISHED ALUMINUM OPEN TOP (4"X6" OR 6"X8") GUTTER BEAM
107313 - A4	PREFINISHED ALUMINUM SELF - FLASHING DECK
107313 - A5	PREFINISHED ALUMINUM FASCIA (6" OR 8")
107313 - A8	PREFINISHED ALUMINUM CANOPY POST (6"X6")
107313 - B3	PREFINISHED WALL TO ROOF DECK METAL THRU-WALL FLASHING & COUNTER FLASHING TYPICAL @ ALL NEW AWNINGS
NOTE 01 - 01	CONCRETE SLAB - RE: STRUCTURAL
NOTE 01 - 02	FOUNDATION - RE: STRUCTURAL

EXTERIOR WALL TYPE KEY LEGEND

NOTE: ALL INTERIOR WALL TYPES ARE FOUND ON SHEET A4.20

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, Texas 77007
Phone: 713-975-9525
Fax: 713-780-7824

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cparch.com
3701 Kirby Drive, Suite 830
Houston, TX 77098
tel 832.947.1036 fax 225.214.5365

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KATY, TX 77449
tel: 281.578.9595

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SUITE 460
HOUSTON, TX 77042
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2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	ADDENDUM 02 — 12.09.24 — Revisions / Submission

Project Number:	23071
Date:	11-17-2024
Drawn by:	WHL / KLO

ENLARGED CANOPY PLANS & DETAILS

A1.04

— of —

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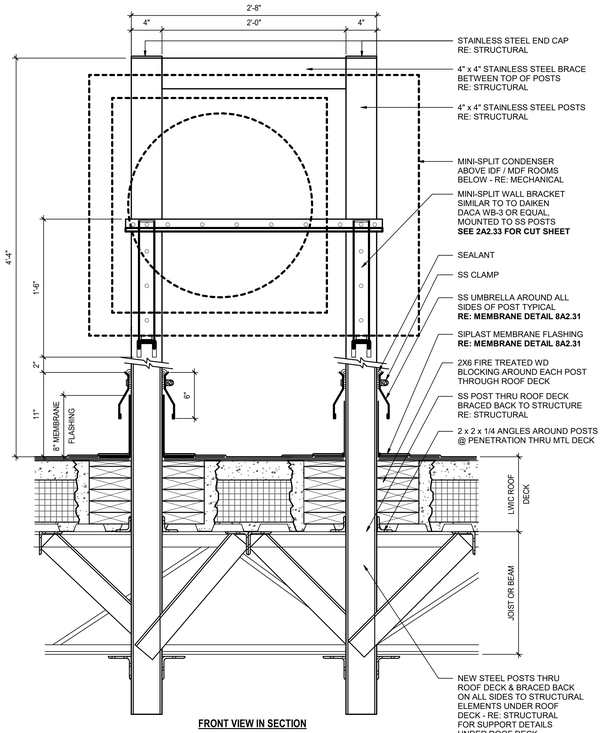
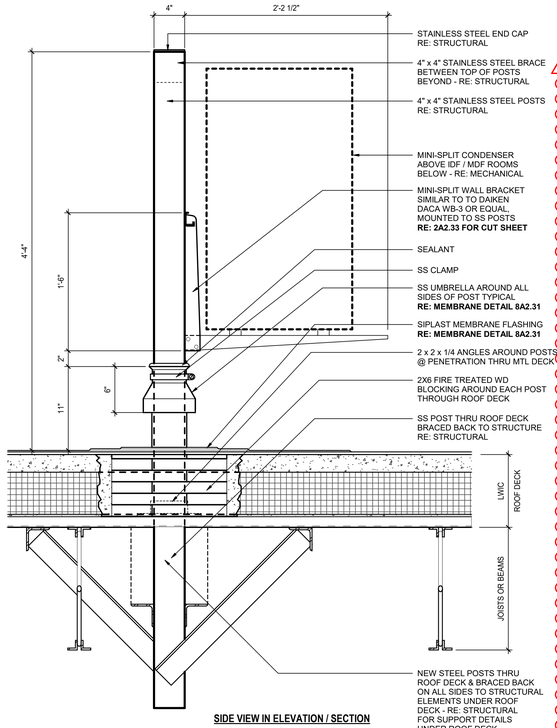


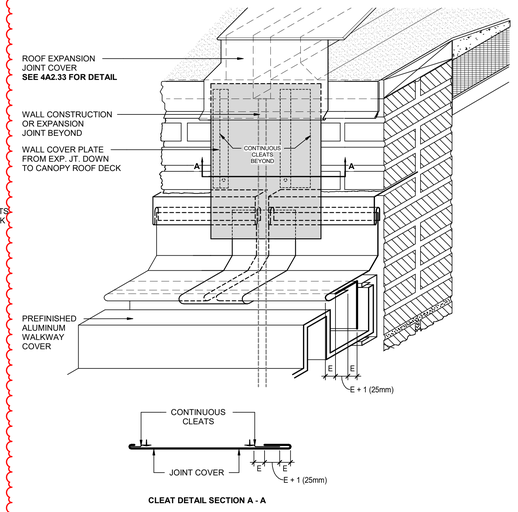
FRONT VIEW IN SECTION



SIDE VIEW IN ELEVATION / SECTION

1 TYPICAL MINI-SPLIT CONDENSER MOUNT @ ROOF

1 1/2" = 1'-0"



CLEAT DETAIL SECTION A - A

FIGURE 5-1 BUILDING EXPANSION JOINTS / CONTROL JOINTS - WALL @ ROOF EXP. JT. EDGE

3 SMACNA - WALL EXP. JT. DETAIL

1 1/2" = 1'-0"

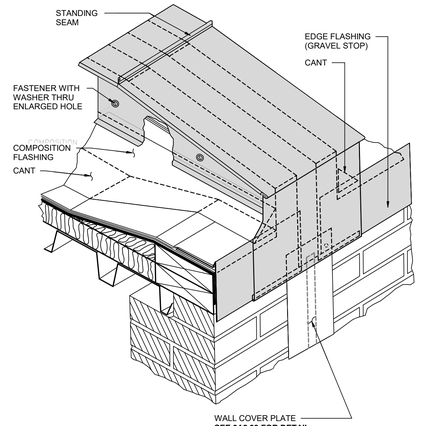
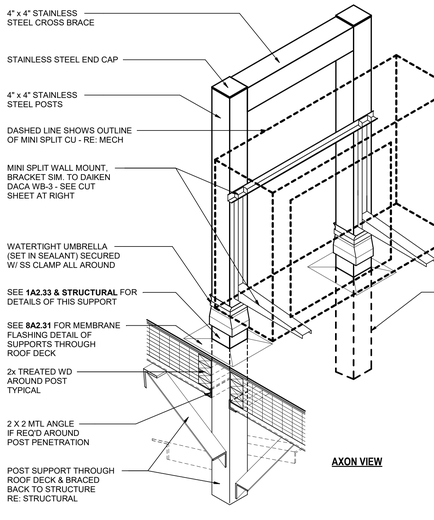


FIGURE 5-3 BUILDING EXPANSION JOINTS - ROOF AT EDGE FLASHING / GRAVEL STOP

4 SMACNA - EXP. JT. COVER END DETAIL

1 1/2" = 1'-0"



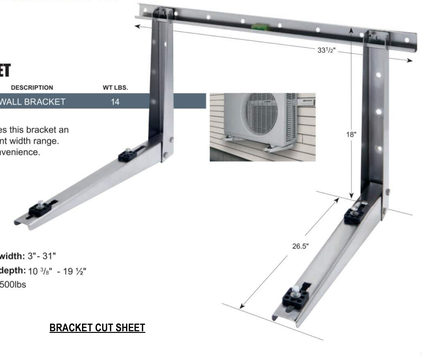
AXON VIEW

DAIKIN

WALL BRACKET

MODEL	DESCRIPTION	WT LBS.
DACA-WB-3	WALL BRACKET	14

Sliding cross bar gives this bracket an exceptional equipment width range. Includes level for convenience.



Finish: Powdercoat
Min/Max mounting width: 3"- 31"
Min/Max mounting depth: 10 ⅜" - 19 ½"
Max load capacity: 500lbs

BRACKET CUT SHEET

2 TYPICAL AXON OF THRU-ROOF PENETRATION

1" = 1'-0"

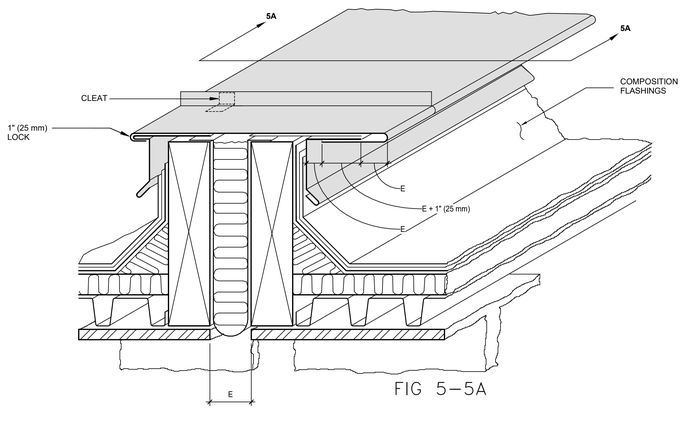
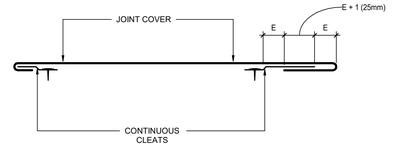


FIG 5–5A



FASTEN OR RIVET ONE SIDE WITH THE OPPOSITE SIDE PROVIDING EXPANSION

CLEAT DETAIL SECTION 5A - 5A

FIGURE 5 - 5 BUILDING EXPANSION JOINTS - ROOF

5 SMACNA - ROOF EXP. JT. DETAIL

3" = 1'-0"

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CORPORATION
ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
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CFISD PROJECT NO. 24-02-5749-R-RFP

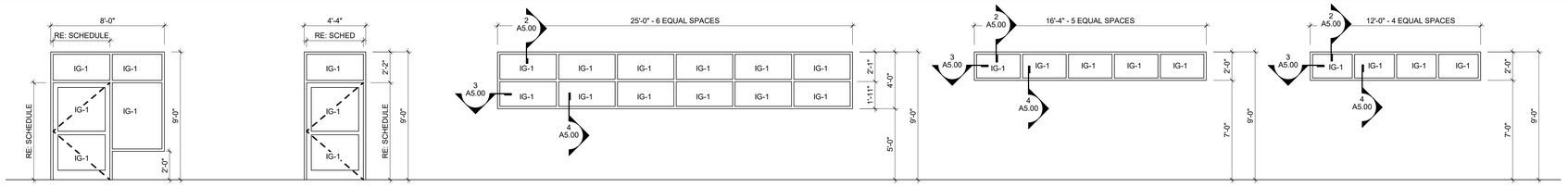
1	ADDENDUM 02 — 12.09.24
	Revisions / Submission

Project Number:	23071
Date:	11-17-2024
Drawn by:	WHL / KLO

TYPICAL ROOF ACCESSORY DETAILS

A2.33

— of —



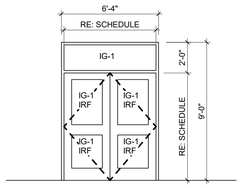
W1
NEW ALUMINUM STOREFRONT DOOR + SIDE LITE

W2
NEW ALUMINUM STOREFRONT DOOR & TRANSOM

W3
NEW ALUMINUM STOREFRONT SYSTEM

W4
NEW ALUMINUM STOREFRONT SYSTEM

W5
NEW ALUMINUM STOREFRONT SYSTEM



W6
NEW ALUMINUM STOREFRONT SYSTEM

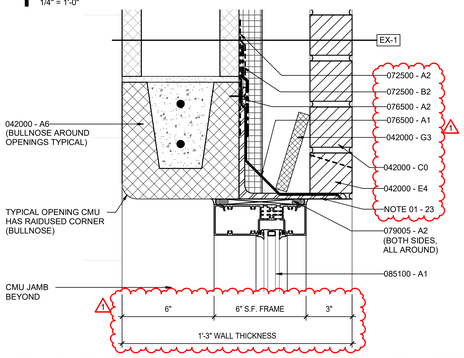
GLASS TYPE LEGEND

IG-1 INSULATED GLASS (EXTERIOR)
IR-1 9/16" THICK IMPACT RESISTANT GLASS (INTERIOR)
IR-2 3/8" THICK IMPACT RESISTANT GLASS (INTERIOR)
FR-1 FIRE-RATED GLASS
AC-1 ACOUSTICAL RATED GLASS
L-1 1/2" LAMINATED GLASS
S-3 1/4" TEMPERED GLASS
E EXISTING IR GLAZING
IRF IMPACT RESISTANT FILM (RE: SPEC)

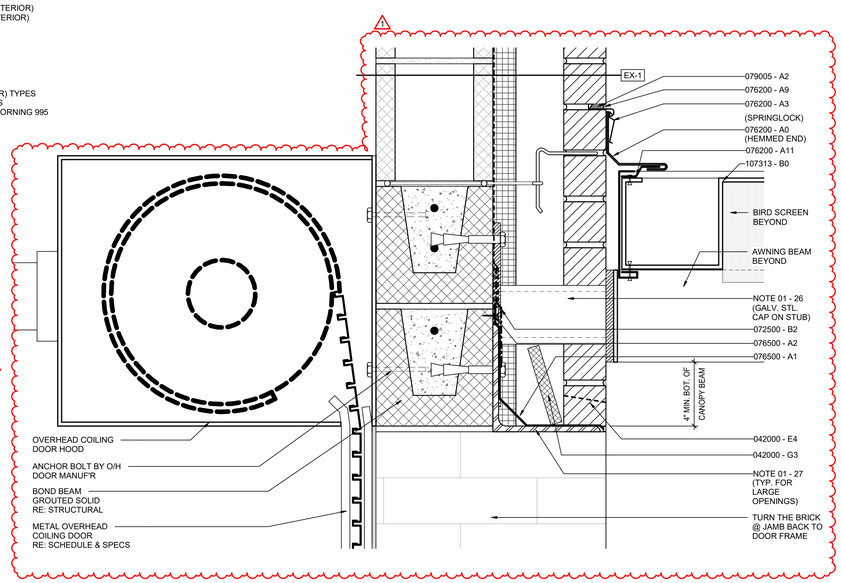
INSTALLATION OF IMPACT RESISTANT GLASS (IR) TYPES SHALL COMPLY WITH GLASS MANUFACTURER'S STANDARDS AND RECOMMENDATIONS. DOW CORNING 995 SILICON STRUCTURAL SEALANT IS REQUIRED.

REFER TO SPECIFICATION SECTION 08 80 00

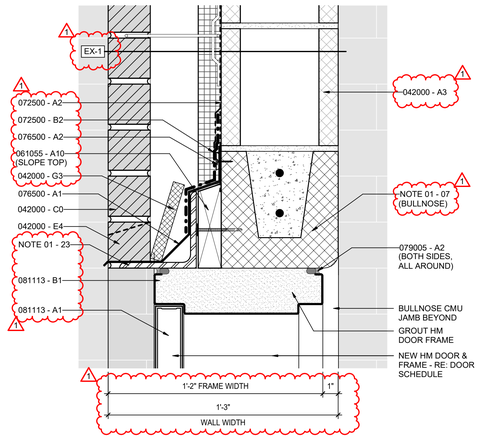
1 EXTERIOR OPENING TYPES
1/4" = 1'-0"



2 HEAD DETAIL - ALUM. S.F. & HOLLOW MTL.
3" = 1'-0"



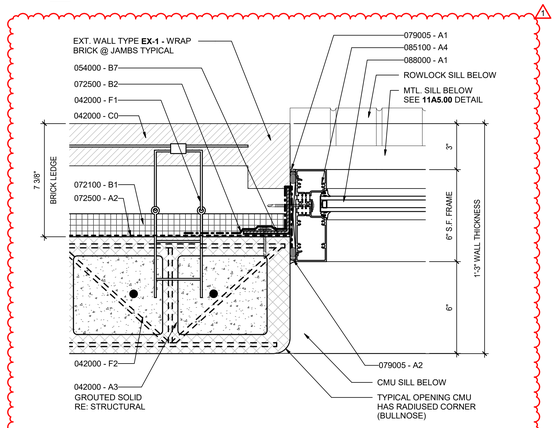
5 HEAD DETAIL - O/H DOOR
3" = 1'-0"



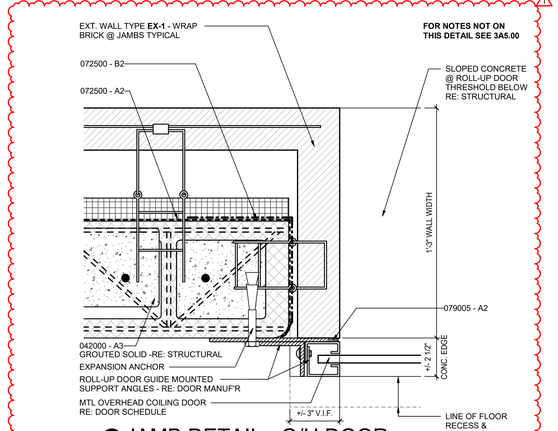
8 HEAD DETAIL - H.M. DOOR
3" = 1'-0"

KEYNOTES

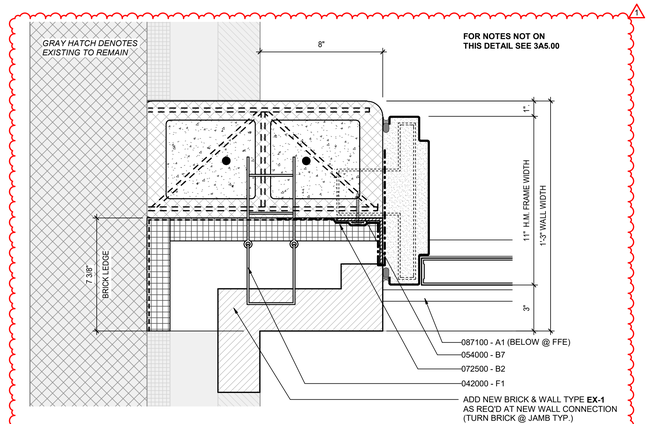
042000 - A3	8X8X16 CONCRETE MASONRY UNIT - RE: STRUCT
042000 - A6	U-SHAPED BOND BEAM BLOCK (WALL) OR LINTEL BLOCK (OPENING) - RE: STRUCT
042000 - B3	4 X 10 X 8 SOLID CMU ROWLOCK SILL W/ BULLNOSE EDGE
042000 - C0	KING SIZED VENEER FACE BRICK - STRETCHER COURSES (RUNNING BOND) - SEE ELEVATIONS FOR BANDING & COLOR
042000 - C3	KING SIZED VENEER FACE BRICK - ROWLOCK COURSE @ OPENING SILLS
042000 - E1	AIR SPACE
042000 - E4	OPEN HEAD JOINT AT 24" O.C. MAX (WEEP) - FILLED WITH MOLDED PVC GRILLE, INSECT RESISTANT
042000 - F1	ADJUSTABLE MASONRY VENEER WALL TIES AT 15" O.C. VERTICALLY MAX (16" O.C. STD BRICK) AND 16" O.C. HORIZONTALLY MAX - FOR UNEVEN WYTHES OF BRICK & CMU
042000 - F2	ADJUSTABLE HORIZONTAL TRUSS REINFORCEMENT WITH EYE-WIRE FOR ADJUSTABLE TIES. @ 16" OC VERTICALLY MAX @ CMU - FOR WYTHES OF KING SIZED BRICK & STANDARD CMU
042000 - F5	ADJUSTABLE MASONRY WALL ANCHOR 15" OC EA WAY @ METAL STUD WALLS TYPICAL
042000 - G3	MORTAR NET TYPICAL AT ALL THRU WALL FLASHING
054000 - A1	6" METAL STUD WALL FRAMING (CFMF) - RE: STRUCTURAL
054000 - B7	3" X 3" COLD FORM CONTINUOUS METAL ANGLE SPANNING AIR GAP @ OPENING JAMBS TYPICAL (16 GA MIN. CFMF)
061055 - A10	2X8 TREATED WOOD BLOCKING OR NAILER
061600 - D2	5/8" GLASS-MAT GYPSUM SHEATHING BOARD - TYPE X
072100 - B1	RIGID WALL INSULATION - 1-1/2" THICK IN WALL CAVITY - RE: SPECS
072500 - A1	FLUID APPLIED AIR BARRIER OVER EXTERIOR SHEATHING
072500 - A2	FLUID APPLIED AIR BARRIER OVER EXTERIOR CMU
072500 - B2	SELF-ADHERING FLASHING MEMBRANE @ WALL OPENINGS
076200 - A0	METAL FLASHING
076200 - A3	METAL COUNTER FLASHING
076200 - A9	METAL REGLET COUNTER FLASHING
076200 - A11	CONTINUOUS METAL CLEAT HOLD DOWN AT UNDERSIDE OF EAVE BLOCKING
076500 - A1	FLEXIBLE THRU-WALL FLASHING - STAINLESS STEEL CORE W/ POLYMER FABRIC LAMINATED TO BOTTOM OF SS FACE W/ ADHESIVE
076500 - A2	TERMINATION BAR W/ SELF TAPPING SCREWS
079005 - A0	JOINT SEALANT
079005 - A1	JOINT SEALANT AND CYLINDRICAL SEALANT. BACKING REPLACEMENT AROUND ALL SIDES OF EXTERIOR WALL OPENINGS & PENETRATIONS
079005 - A2	JOINT SEALANT AND CYLINDRICAL SEALANT BACKING
081113 - A1	FLUSH PANEL HOLLOW METAL DOOR
081113 - B1	HOLLOW METAL DOOR FRAME
085100 - A1	ALUMINUM STOREFRONT FRAMING AND GLAZING - 2" X 6" FRAME PROFILE (E (EXTERIOR WINDOWS / SIDELIGHTS / TRANSOMS)
085100 - A3	EXTRUDED ALUMINUM BREAK METAL SILL PAN FLASHING, SET IN MASTIC, WITH END DAMS AND UPTURNED. COLOR AND FINISH SHALL MATCH ALUMINUM STOREFRONT FRAMING.
085100 - A4	2" X 6" ALUMINUM STOREFRONT MULLION
085100 - A8	2" X 6" ALUMINUM STOREFRONT WINDOW SILL FRAME (SET IN SILL PAN)
087100 - A1	THRESHOLD SET IN FULL BED OF SEALANT
088000 - A1	1" INSULATING, LOW-E COATED, TINTED TEMPERED GLAZING RE: SPECS
092116 - D1	5/8" GYPSUM BOARD FINISH - RE: SPECS
107313 - B0	PREFINISHED ALUMINUM AWNING
NOTE 01 - 07	CMU LINTEL - RE: STRUCTURAL
NOTE 01 - 23	STEEL ANGLE - RE: STRUCTURAL
NOTE 01 - 26	STEEL TUBE FRAMING - RE: STRUCTURAL
NOTE 01 - 27	STEEL BENT PLATE - RE: STRUCTURAL



3 JAMB DETAIL - ALUM. STOREFRONT
3" = 1'-0"

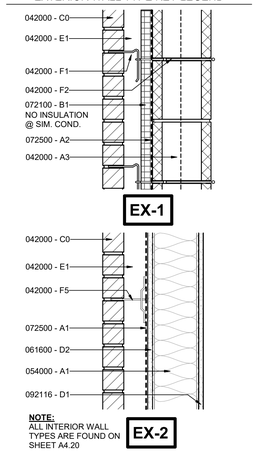


6 JAMB DETAIL - O/H DOOR
3" = 1'-0"

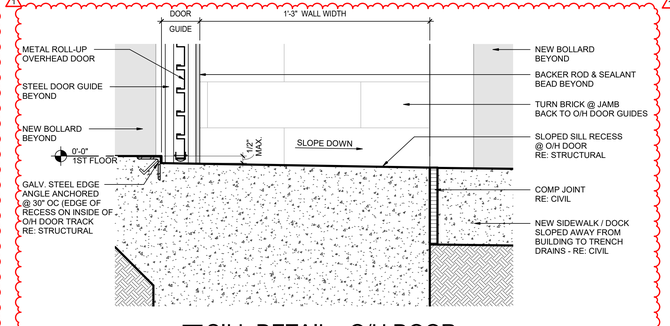


9 JAMB DETAIL - H.M. DOOR
3" = 1'-0"

EXTERIOR WALL TYPE KEY LEGEND

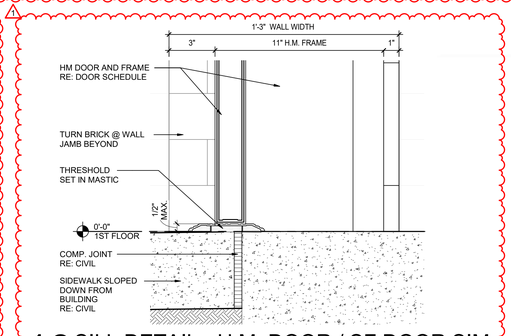


NOTE:
ALL INTERIOR WALL TYPES ARE FOUND ON SHEET A4.20

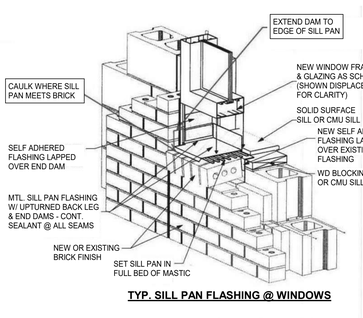


4 SILL DETAIL - ALUM. STOREFRONT
3" = 1'-0"

7 SILL DETAIL - O/H DOOR
3" = 1'-0"



10 SILL DETAIL - H.M. DOOR / SF DOOR SIM.
3" = 1'-0"



TYP. SILL PAN FLASHING @ WINDOWS

11 EXT. WINDOW SILL
12" = 1'-0"

NATEX
CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

Coleman Partners ARCHITECTS
cparch.com
3701 Kirby Drive, Suite 830
Houston,TX 77098
tel 832.947.1036 fax 225.214.5365

CONSTRUCTION DOCUMENT

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

LANDSCAPE
LANDSCAPE GROUP
17041 EL CAMINO REAL, STE 204
HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	ADDENDUM 02	12.09.24
	Revisions / Submission	

Project Number: 23071
Date: 11-17-2024
Drawn by: WHL / KLO

EXTERIOR OPENING TYPES

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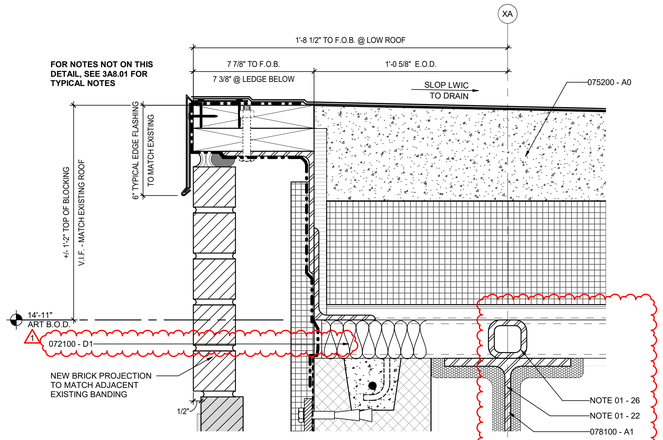
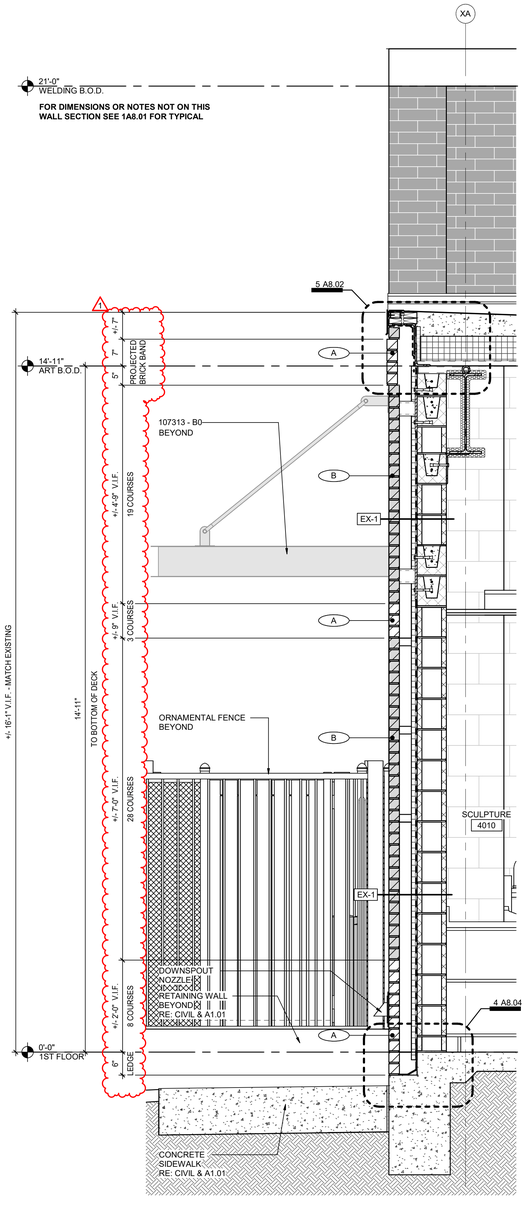
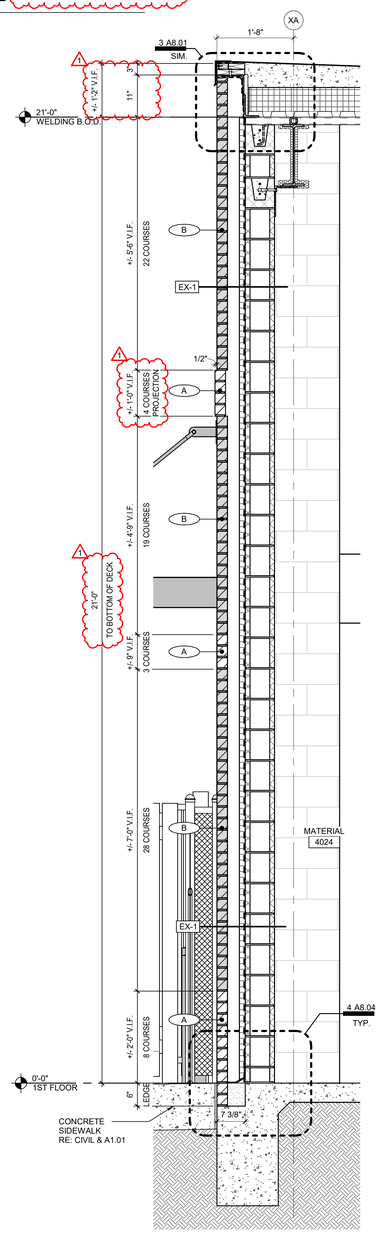


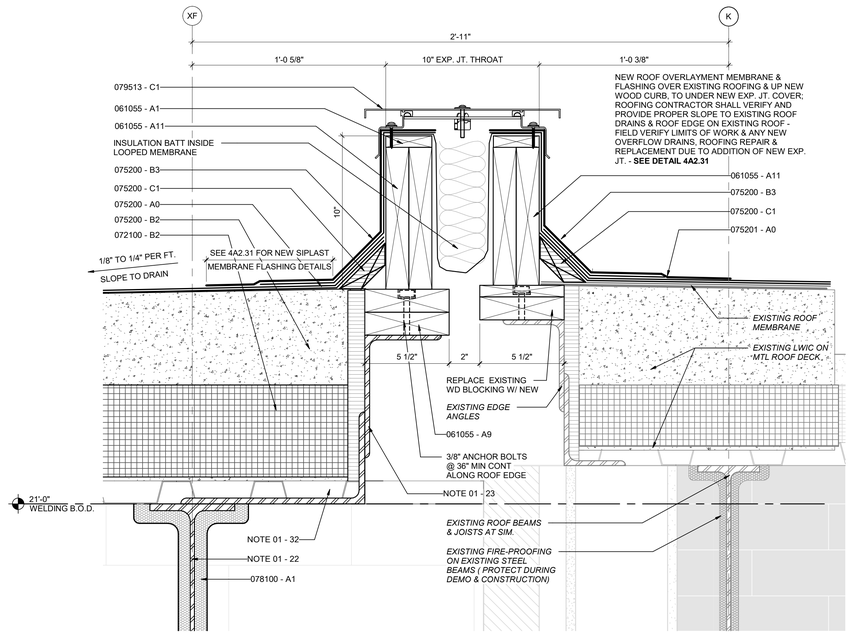
5 ROOF DETAIL - EAVE @ LOW ROOF
3" = 1'-0"



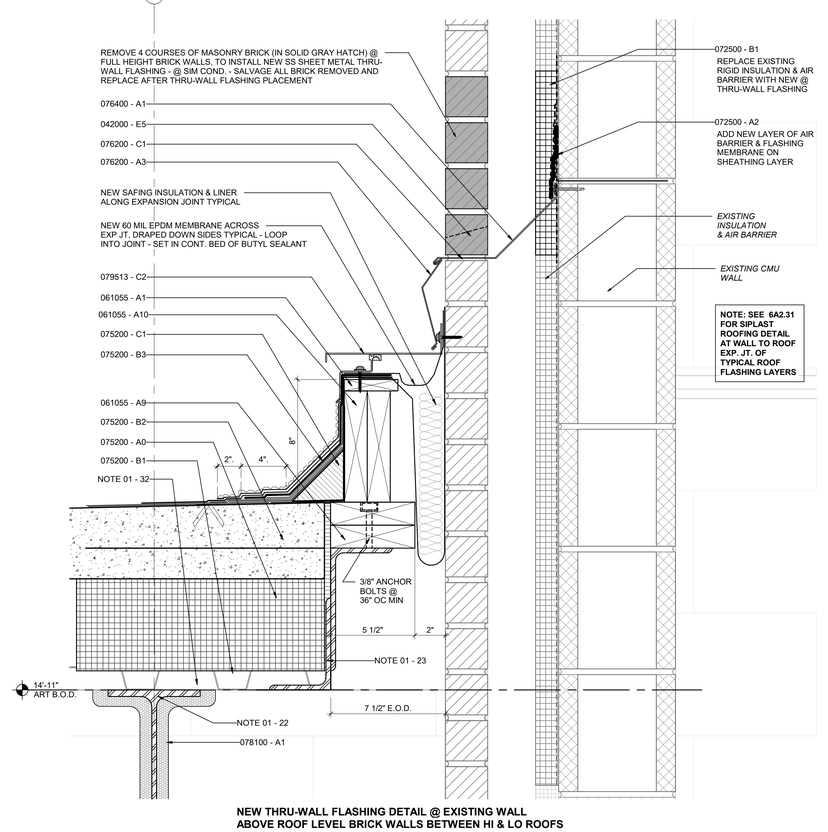
1 WALL SECTION - SCULPTURE
3/4" = 1'-0"



2 WALL SECTION - WELDING
3/4" = 1'-0"



3 ROOF DETAIL - ROOR TO ROOF EXP. JT.
3" = 1'-0"



4 ROOF DETAIL - ROOF TO WALL EXP. JT.
3" = 1'-0"

NEW THRU-WALL FLASHING DETAIL @ EXISTING WALL ABOVE ROOF LEVEL BRICK WALLS BETWEEN HI & LO ROOFS

WALL SECTION NOTES

PRIOR TO SUBMITTING SHOP DRAWINGS, CONTRACTOR SHALL FIELD VERIFY THE FOLLOWING EXISTING CONDITIONS & COMPARE WITH CONSTRUCTION DOCUMENTS:

1. TOP OF ROOF EDGE HEIGHT.
2. BOTTOM OF ROOF DECK.
3. BRICK SIZES.
4. METAL FASCIA SIZE.
5. BRICK LEDGE DEPTH

***** NEW WALL SHALL ALIGN WITH ADJACENT EXISTING WALL INCLUDING BUT NOT LIMITED TO TOP OF ROOF, MASONRY COURSING, MASONRY TYPES, BANDING, AND METAL FASCIA.***

NOTE: CONTRACTOR SHALL NOTIFY ARCHITECT OF ANY DESCREPANCIES BETWEEN DOCUMENTS & EXISTING CONDITIONS.

CY-LAKES HIGH SCHOOL BRICK LEGEND

NOTE: FOR VERTICAL HEIGHTS OF BANDING, MATCH EXISTING BUILDING ADJACENT TO NEW ADDITION - SEE WALL SECTIONS FOR DIMENSIONS & DESCRIPTIONS
MATCH BRICK LEDGE DEPTH - GC TO VERIFY IN FIELD

A — KING SIZED BRICK @ BLDG 1/3 RUNNING BOND COURSING BANDING - LIGHT GRAY
ACME BRICK - DOVE GRAY

B — KING SIZED BRICK @ BLDG 1/3 RUNNING BOND COURSING FIELD COLOR - MEDIUM GRAY
ACME BRICK - PALOMA GRAY

C — KING SIZED BRICK @ BLDG 1/3 RUNNING BOND COURSING FIELD COLOR - WHITE
ACME BRICK - GLACIER WHITE (ONLY @ MAIN ENTRY INT. WALL)

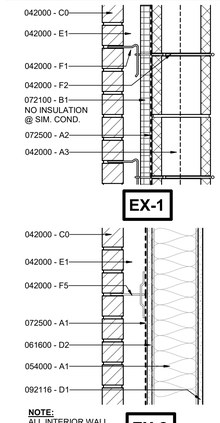
MJ — MASONRY JOINTS

CJ — WALL CONTROL JOINTS AT NEW TO EXISTING WALL CONNECTION

KEYNOTES

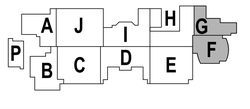
042000 - A3	8X8X16 CONCRETE MASONRY UNIT - RE: STRUCT
042000 - C0	KING SIZED VENEER FACE BRICK - STRETCHER COURSES (RUNNING BOND) - SEE ELEVATIONS FOR BANDING & COLOR
042000 - E1	AIR SPACE
042000 - E5	WEEP HOLES @ 24" OC - FILLED WITH MOLDED PVC GRILLE, INSECT RESISTANT
042000 - F1	ADJUSTABLE MASONRY VENEER WALL TIES AT 15" O.C. VERTICALLY MAX (16" O.C. STD BRICK) AND 16" O.C. HORIZONTALLY MAX - FOR UNEVEN WYTHES OF BRICK & CMU
042000 - F2	ADJUSTABLE HORIZONTAL TRUSS REINFORCEMENT WITH EYE-WIRE FOR ADJUSTABLE TIES. @ 16" OC VERTICALLY MAX @ CMU - FOR WYTHES OF KING SIZED BRICK & STANDARD CMU
042000 - F5	ADJUSTABLE MASONRY WALL ANCHOR 15" OC EA WAY @ METAL STUD WALLS TYPICAL
054000 - A1	6" METAL STUD WALL FRAMING (CFMF) - RE: STRUCTURAL
061055 - A1	1X TREATED WOOD BLOCKING OR NAILER
061055 - A9	2X6 TREATED WOOD BLOCKING OR NAILER
061055 - A10	2X8 TREATED WOOD BLOCKING OR NAILER
061055 - A11	2X10 TREATED WOOD BLOCKING OR NAILER
061600 - D2	5/8" GLASS-MAT GYPSUM SHEATHING BOARD - TYPE X
072100 - B1	RIGID WALL INSULATION - 1-1/2" THICK IN WALL CAVITY - RE: SPECS
072100 - B2	RIGID ROOF INSULATION RE: ROOFING SPECS
072100 - D1	SPRAY POLYURETHANE FOAM INSULATION
072500 - A1	FLUID APPLIED AIR BARRIER OVER EXTERIOR SHEATHING
072500 - A2	FLUID APPLIED AIR BARRIER OVER EXTERIOR CMU
072500 - B1	SELF-ADHERING THRU-WALL FLASHING MEMBRANE W/ TERMINATION BAR
075200 - A0	SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING OVER LIGHTWEIGHT INSULATED CONCRETE & SLOTTED METAL DECK SYSTEM, SLOPED 1/4" PER FOOT MIN. TO INTERNAL AND OVERFLOW DRAINS - RE: SPECS
075200 - B1	LIGHTWEIGHT INSULATING CONCRETE OVER SLOTTED METAL DECK
075200 - B2	TAPERED LIGHTWEIGHT INSULATING CONCRETE, SLOPED TO INTERNAL DRAINS ON ROOF
075200 - B3	FULLY ADHERED MEMBRANE FLASHING
075200 - C1	NON-COMBUSTIBLE CANT
075201 - A0	SBS-MODIFIED BITUMINOUS MEMBRANE OVERLAY, INCLUDING MULTI-PLY MEMBRANE ROOFING WITH GRANULE SURFACED TOP SHEET PLACED OVER PREPARED EXISTING ROOF SUBSTRATE, WITH NEW ALUMINUM FACED MEMBRANE FLASHING SYSTEM & NEW SHEET METAL COMPONENTS LIKE GRAVEL GUARD EDGES, RAISED METAL EDGES, EXPANSION JOINT COVERS, METAL CURBS, METAL PENETRATION FLASHING, METAL WALL FLASHINGS, ETC. - RE: 075200 FOR SPECIFIC MATERIALS AND SPECS
076200 - A3	METAL COUNTER FLASHING
076200 - C1	METAL THRU-WALL FLASHING
076400 - A1	COMBINATION FLEXIBLE SHEET FLASHING (076500), MORTAR DEFLECTION, & WEEP AS COMPLETE ONE-STEP SYSTEM RE: SPECS
078100 - A1	APPLIED FIRE-PROOFING TO STRUCTURAL ELEMENTS - RE: SPECIFICATIONS
079513 - C1	MANUFACTURED CURB MOUNTED EXTERIOR EXPANSION JOINT COVER W/ CENTERING BAR, AT ROOF TO ROOF CONNECTION - RE: SPECIFICATIONS
079513 - C2	MANUFACTURED CURB MOUNTED EXTERIOR EXPANSION JOINT COVER, AT ROOF TO WALL CONNECTION - RE: SPECIFICATIONS
092116 - D1	5/8" GYPSUM BOARD FINISH - RE: SPECS
107313 - B0	PREFINISHED ALUMINUM AWNING
NOTE 01 - 22	STEEL BEAM - RE: STRUCTURAL
NOTE 01 - 23	STEEL ANGLE - RE: STRUCTURAL
NOTE 01 - 26	STEEL TUBE FRAMING - RE: STRUCTURAL
NOTE 01 - 32	METAL ROOF DECK - RE: STRUCTURAL

EXTERIOR WALL TYPE KEY LEGEND



NOTE:
ALL INTERIOR WALL TYPES ARE FOUND ON SHEET A4.20

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



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447 Heights Boulevard
Houston, Texas 77007
Phone: 713-975-9525
Fax: 713-780-7824

Coleman Partners ARCHITECTS
cparch.com
3701 Kirby Drive, Suite 830
Houston, TX 77098
tel 832.947.1036 fax 225.214.5365

CONSTRUCTION DOCUMENT

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

LANDSCAPE
LANDSCAPE GROUP
17041 EL CAMINO REAL, STE 204
HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1 — ADDENDUM 02 — 12.09.24
Revisions / Submission

Project Number: 23071
Date: 11-17-2024
Drawn by: WHL / KLO

WALL SECTIONS & DETAILS

A8.02
of

Autodesk Docs://23072_CFSID_Phase_6_r22/23071_Cy-Lakes_HS_r22.rvt

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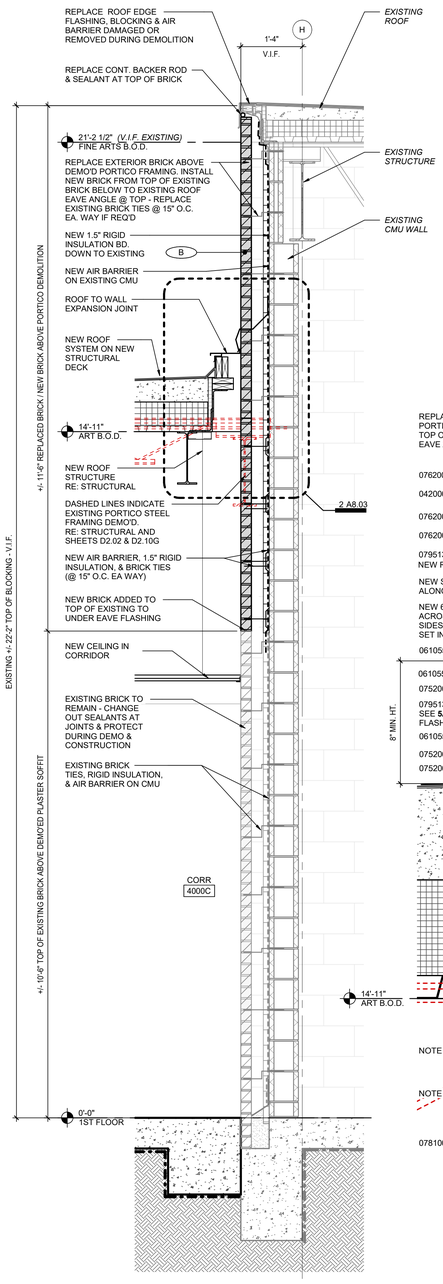
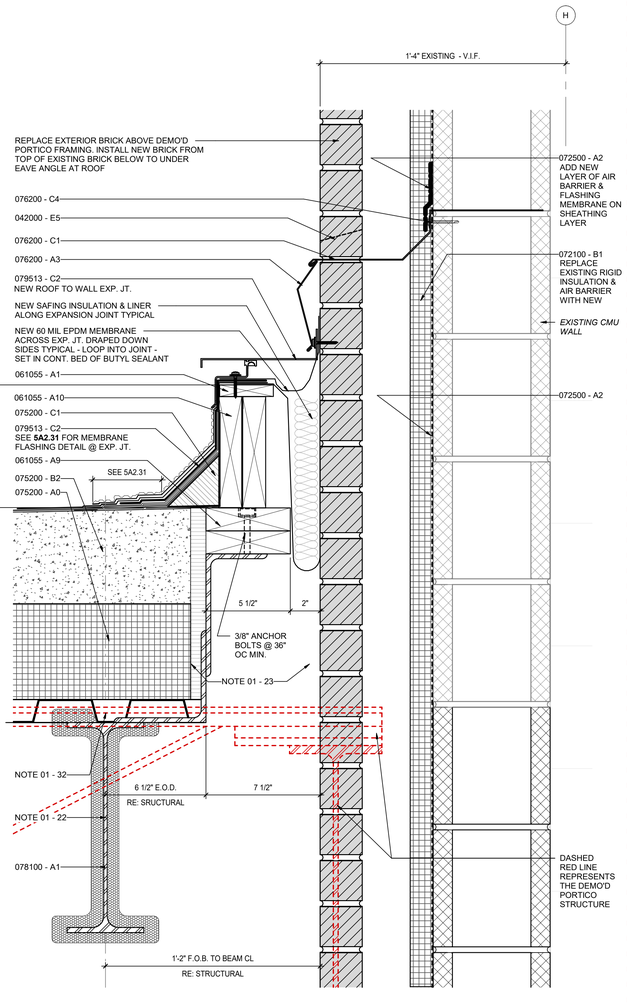
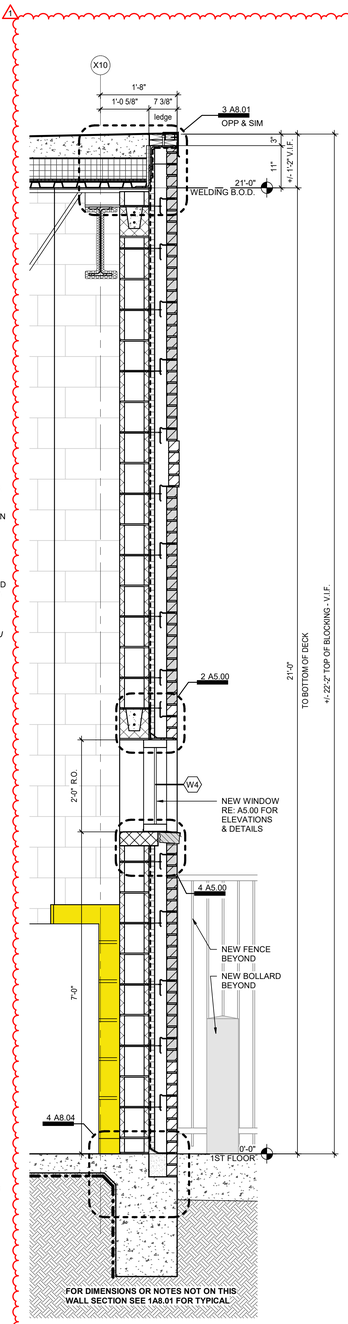


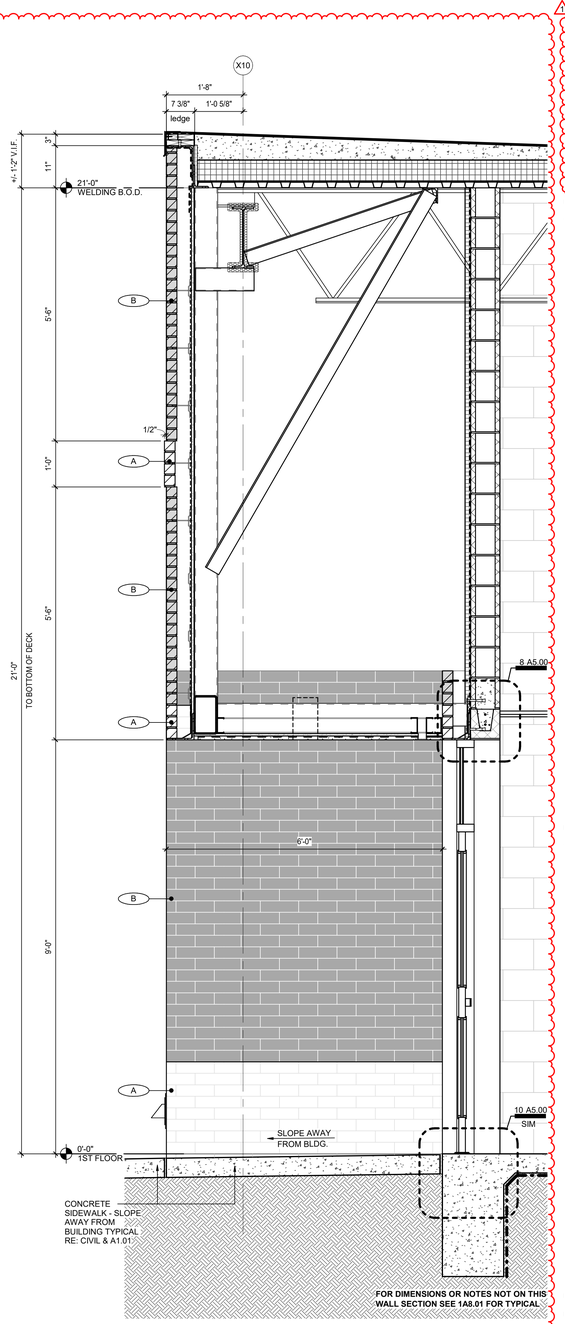
1 WALL SECTION - DEMOLISHED PORTICO
3/4" = 1'-0"



2 ROOF DETAIL - DEMOLISHED PORTICO EXP. JT.
3" = 1'-0"



3 WALL SECTION - SHOPS
3/4" = 1'-0"



4 WALL SECTION - DOOR ALCOVE CTE
3/4" = 1'-0"

CY-LAKES HIGH SCHOOL BRICK LEGEND

NOTE: FOR VERTICAL HEIGHTS OF BANDING, MATCH EXISTING BUILDING ADJACENT TO NEW ADDITION - SEE WALL SECTIONS FOR DIMENSIONS & DESCRIPTIONS MATCH BRICK LEDGE DEPTH - GC TO VERIFY IN FIELD

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1/3 RUNNING BOND COURSING
BANDING - LIGHT GRAY
ACME BRICK - DOVE GRAY

B — KING SIZED BRICK @ BLDG
1/3 RUNNING BOND COURSING
FIELD COLOR - MEDIUM GRAY
ACME BRICK - PALOMA GRAY

C — KING SIZED BRICK @ BLDG
1/3 RUNNING BOND COURSING
FIELD COLOR - WHITE
ACME BRICK - GLACIER WHITE
(ONLY @ MAIN ENTRY INT. WALL)

MJ — MASONRY JOINTS

CJ — WALL CONTROL JOINTS AT NEW TO EXISTING WALL CONNECTION

WALL SECTION NOTES

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2. BOTTOM OF ROOF DECK.
3. BRICK SIZES.
4. METAL FASCIA SIZE.
5. BRICK LEDGE DEPTH

***** NEW WALL SHALL ALIGN WITH ADJACENT EXISTING WALL INCLUDING BUT NOT LIMITED TO TOP OF ROOF, MASONRY COURSING, MASONRY TYPES, BANDING, AND METAL FASCIA.***

NOTE: CONTRACTOR SHALL NOTIFY ARCHITECT OF ANY DESCREPANCIES BETWEEN DOCUMENTS & EXISTING CONDITIONS.

KEYNOTES

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042000 - E5	WEEP HOLES @ 24" OC - FILLED WITH MOLDED PVC GRILLE, INSECT RESISTANT
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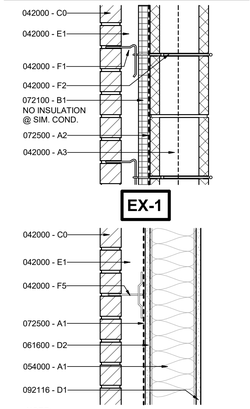
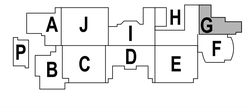
061055 - A9	2X6 TREATED WOOD BLOCKING OR NAILER
061055 - A10	2X8 TREATED WOOD BLOCKING OR NAILER
061600 - D2	5/8" GLASS-MAT GYPSUM SHEATHING BOARD - TYPE X
072100 - B1	RIGID WALL INSULATION - 1-1/2" THICK IN WALL CAVITY - RE: SPECS
072500 - A1	FLUID APPLIED AIR BARRIER OVER EXTERIOR SHEATHING
072500 - A2	FLUID APPLIED AIR BARRIER OVER EXTERIOR CMU
075200 - A0	SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING OVER LIGHTWEIGHT INSULATED CONCRETE & SLOTTED METAL DECK SYSTEM, SLOPED 1/4" PER FOOT MIN. TO INTERNAL AND OVERFLOW DRAINS - RE: SPECS
075200 - B2	TAPERED LIGHTWEIGHT INSULATING CONCRETE, SLOPED TO INTERNAL DRAINS ON ROOF
075200 - C1	NON-COMBUSTIBLE CANT
076200 - A3	METAL COUNTER FLASHING
076200 - C1	METAL THRU-WALL FLASHING
076200 - C4	TERMINATION BAR WITH CONTINUOUS BEAD OF SEALANT (AS REQ'D AT THRU WALL FLASHING)
078100 - A1	APPLIED FIRE-PROOFING TO STRUCTURAL ELEMENTS - RE: SPECIFICATIONS
079513 - C2	MANUFACTURED CURB MOUNTED EXTERIOR EXPANSION JOINT COVER, AT ROOF TO WALL CONNECTION - RE: SPECIFICATIONS
092116 - D1	5/8" GYPSUM BOARD FINISH - RE: SPECS
NOTE 01 - 22	STEEL BEAM - RE: STRUCTURAL
NOTE 01 - 23	STEEL ANGLE - RE: STRUCTURAL
NOTE 01 - 32	METAL ROOF DECK - RE: STRUCTURAL

EXTERIOR WALL TYPE KEY LEGEND



NOTE:
ALL INTERIOR WALL TYPES ARE FOUND ON SHEET A4.20

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

Coleman Partners ARCHITECTS
cparch.com
3701 Kirby Drive, Suite 830
Houston,TX 77098
tel 832.947.1036 fax 225.214.5365

CONSTRUCTION DOCUMENT

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

LANDSCAPE
LANDSCAPE GROUP
17041 EL CAMINO REAL, STE 204
HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

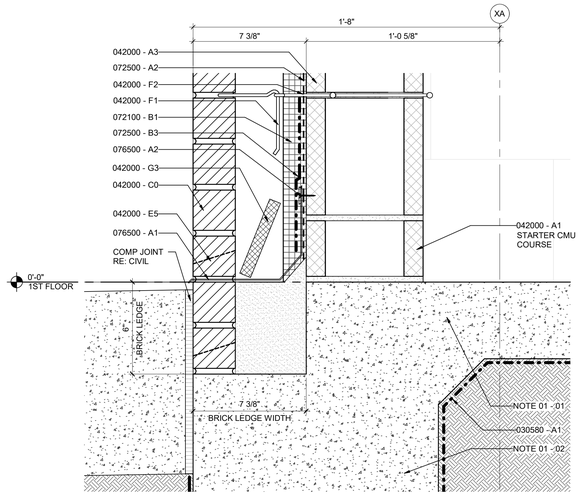
Revisions / Submission	Date
1 ADDENDUM 02	12.09.24

Project Number:	23071
Date:	11-17-2024
Drawn by:	WHL / KLO

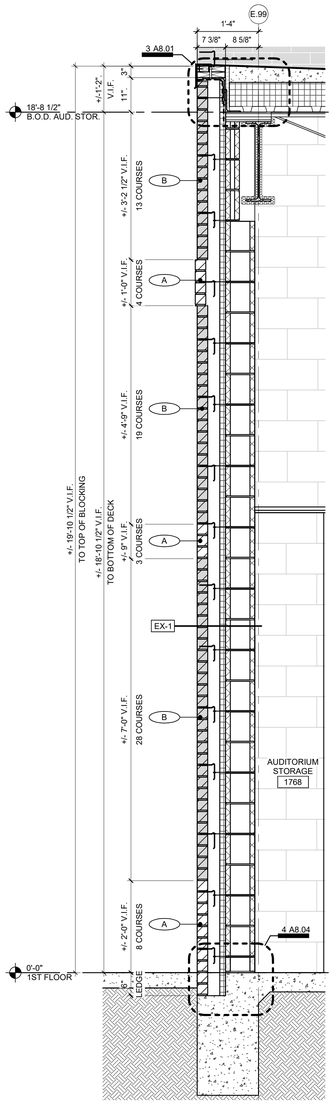
WALL SECTIONS & DETAILS

A8.03
— of —

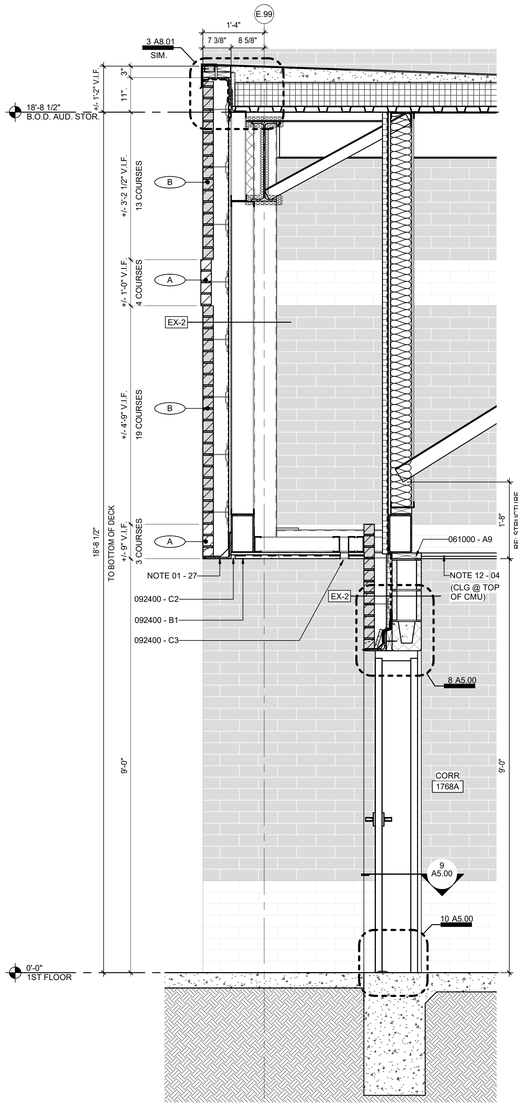
Autodesk Docs://23072_CFISD_Phase_6_/22/23071_Cy-Lakes_HS_22.rvt



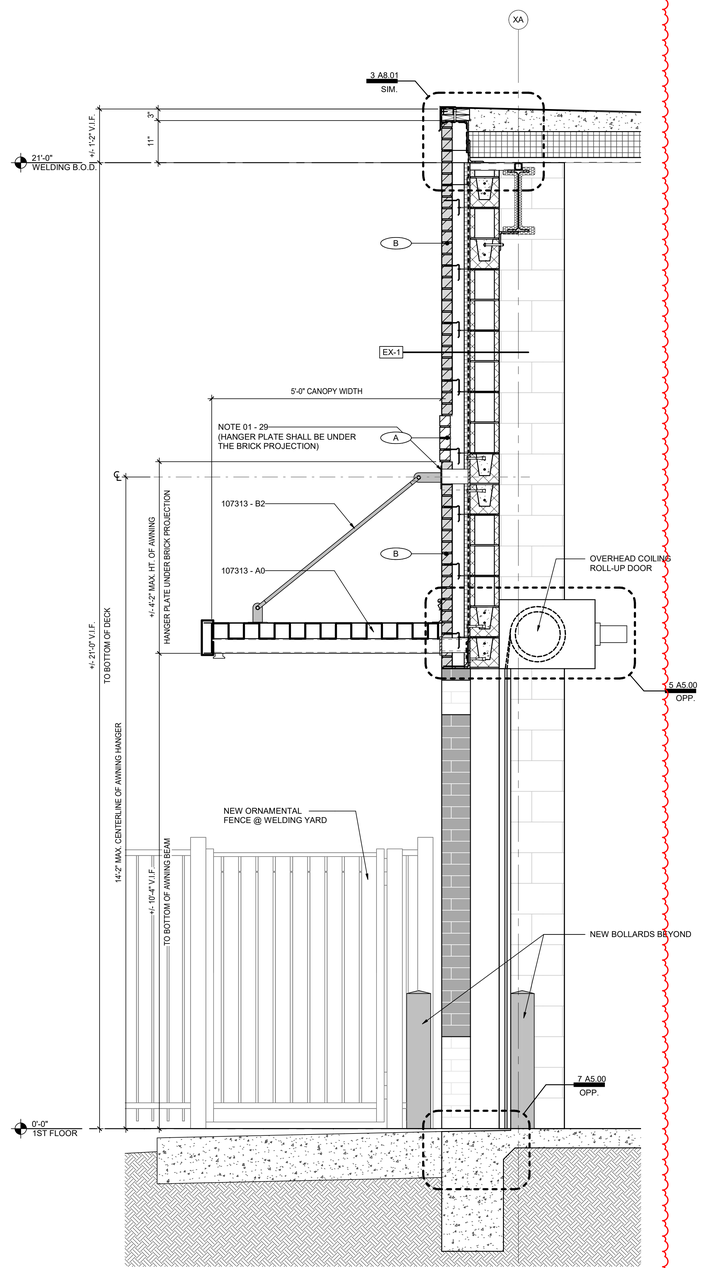
4 FOUNDATION DETAIL - TYPICAL @ FINE ARTS
3" = 1'-0"



1 WALL SECTION - AUDITORIUM STOR.
3/4" = 1'-0"



2 WALL SECTION - AUDITORIUM STOR.
3/4" = 1'-0"



3 WALL SECTION - TYPICAL AWNING
3/4" = 1'-0"

CY-LAKES HIGH SCHOOL BRICK LEGEND

NOTE: FOR VERTICAL HEIGHTS OF BANDING, MATCH EXISTING BUILDING ADJACENT TO NEW ADDITION - SEE WALL SECTIONS FOR DIMENSIONS & DESCRIPTIONS MATCH BRICK LEDGE DEPTH - GC TO VERIFY IN FIELD

A — KING SIZED BRICK @ BLDG
1/3 RUNNING BOND COURSING
BANDING - LIGHT GRAY
ACME BRICK - DOVE GRAY

B — KING SIZED BRICK @ BLDG
1/3 RUNNING BOND COURSING
FIELD COLOR - MEDIUM GRAY
ACME BRICK - PALOMA GRAY

C — KING SIZED BRICK @ BLDG
1/3 RUNNING BOND COURSING
FIELD COLOR - WHITE
ACME BRICK - GLACIER WHITE
(ONLY @ MAIN ENTRY INT. WALL)

MJ — MASONRY JOINTS

CJ — WALL CONTROL JOINTS AT NEW TO EXISTING WALL CONNECTION

WALL SECTION NOTES

PRIOR TO SUBMITTING SHOP DRAWINGS, CONTRACTOR SHALL FIELD VERIFY THE FOLLOWING EXISTING CONDITIONS & COMPARE WITH CONSTRUCTION DOCUMENTS:

1. TOP OF ROOF EDGE HEIGHT.
2. BOTTOM OF ROOF DECK.
3. BRICK SIZES.
4. METAL FASCIA SIZE.
5. BRICK LEDGE DEPTH

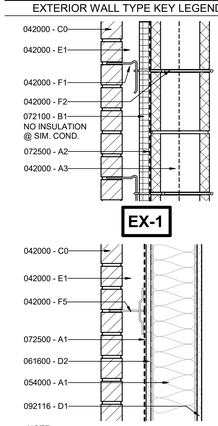
***** NEW WALL SHALL ALIGN WITH ADJACENT EXISTING WALL INCLUDING BUT NOT LIMITED TO TOP OF ROOF, MASONRY COURSING, MASONRY TYPES, BANDING, AND METAL FASCIA.***

NOTE: CONTRACTOR SHALL NOTIFY ARCHITECT OF ANY DESCREPANCIES BETWEEN DOCUMENTS & EXISTING CONDITIONS.

KEYNOTES

030580 - A1	UNDER-SLAB VAPOR RETARDER / BARRIER; RE: SPECIFICATIONS
042000 - A1	4X8X16 CONCRETE MASONRY UNIT - RE: STRUCT
042000 - A3	8X8X16 CONCRETE MASONRY UNIT - RE: STRUCT
042000 - C0	KING SIZED VENEER FACE BRICK - STRETCHER COURSES (RUNNING BOND) - SEE ELEVATIONS FOR BANDING & COLOR
042000 - E1	AIR SPACE
042000 - E5	WEEP HOLES @ 24" OC - FILLED WITH MOLDED PVC GRILLE, INSECT RESISTANT
042000 - F1	ADJUSTABLE MASONRY VENEER WALL TIES AT 15" O.C. VERTICALLY MAX (16" O.C. STD BRICK) AND 16" O.C. HORIZONTALLY MAX - FOR UNEVEN WYTHES OF BRICK & CMU
042000 - F2	ADJUSTABLE HORIZONTAL TRUSS REINFORCEMENT WITH EYE-WIRE FOR ADJUSTABLE TIES. @ 16" OC VERTICALLY MAX @ CMU - FOR WYTHES OF KING SIZED BRICK & STANDARD CMU
042000 - F5	ADJUSTABLE MASONRY WALL ANCHOR 15" OC EA WAY @ METAL STUD WALLS TYPICAL
042000 - G3	MORTAR NET TYPICAL AT ALL THRU WALL FLASHING
054000 - A1	6" METAL STUD WALL FRAMING (CFMF) - RE: STRUCTURAL
061000 - A9	2X8 TREATED WOOD BLOCKING OR NAILER @ ROOFING SEE SPEC SECTION 061055)
061600 - D2	5/8" GLASS-MAT GYPSUM SHEATHING BOARD - TYPE X
072100 - B1	RIGID WALL INSULATION - 1-1/2" THICK IN WALL CAVITY - RE: SPECS
072500 - A1	FLUID APPLIED AIR BARRIER OVER EXTERIOR SHEATHING
072500 - A2	FLUID APPLIED AIR BARRIER OVER EXTERIOR CMU
072500 - B3	SELF-ADHERING TRANSITION MEMBRANE @ WALL CONNECTIONS
076500 - A1	FLEXIBLE THRU-WALL FLASHING - STAINLESS STEEL CORE W/ POLYMER FABRIC LAMINATED TO BOTTOM OF SS FACE W/ ADHESIVE
076500 - A2	TERMINATION BAR W/ SELF TAPPING SCREWS
092116 - D1	5/8" GYPSUM BOARD FINISH - RE: SPECS
092400 - B1	7/8" PORTLAND CEMENT PLASTER SOFFIT
092400 - C2	PORTLAND CEMENT PLASTER TRIM - J MOLD EDGE SCREED
092400 - C3	PORTLAND CEMENT PLASTER TRIM - 1" WIDE CONTINUOUS SOFFIT VENT
107313 - A0	PREFINISHED ALUMINUM WALKWAY COVER
107313 - B2	AWNING HANGER ROD - COORDINATE WITH STRUCTURAL
NOTE 01 - 01	CONCRETE SLAB - RE: STRUCTURAL
NOTE 01 - 02	FOUNDATION - RE: STRUCTURAL
NOTE 01 - 27	STEEL BENT PLATE - RE: STRUCTURAL
NOTE 01 - 29	STRUCTURAL STEEL HANGERS ANCHORED TO STRUCTURE OR WALL RE: STRUCTURAL
NOTE 12 - 04	CEILING FINISH RE: CEILING PLAN AND FINISH SCHEDULE

EXTERIOR WALL TYPE KEY LEGEND



NOTE:
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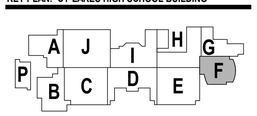
KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



NATEX
CORPORATION
ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

Coleman Partners
ARCHITECTS
cparch.com
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tel 832.947.1036 fax 225.214.5365

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CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

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9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

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SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

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LANDSCAPE GROUP
17041 EL CAMINO REAL, STE 204
HOUSTON, TX 77058
tel: 281.486.4040

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	ADDENDUM 02	12.09.24
	Revisions / Submission	

Project Number:	23071
Date:	11-17-2024
Drawn by:	WHL / KLO

WALL SECTIONS & DETAILS

A8.04
— of —

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

CONTRACTOR SHALL PROVIDE DEHUMIFICATION DURING THE CONSTRUCTION SCHEDULE. THE SCOPE IS TO MAINTAIN ACCEPTABLE HUMIDITY LEVELS WITHIN THE BUILDING: THE REMOVAL OF EXCESS HUMIDITY FROM THE AIR THROUGHTOUT THE BUILDING. PROVIDE MOISTURE CONTROL RENTAL EQUIPMENT AND SOLUTION FOR PREVENTING THE LONG-TERM EFFECTS OF MOISTURE LEVEL THAT CAN DAMAGE INTERIOR BUILDING MATERIALS, BOOKS AND ELECTRONIC EQUIPMENT.

CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL REQUIRED POWER GENERATING EQUIPMENT.

GENERAL NOTES:

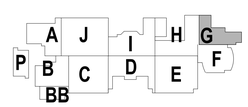
1. THESE CONSTRUCTION DRAWINGS ARE DIAGRAMMATIC, AND DO NOT NECESSARILY REFLECT ACTUAL DIMENSIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD-VERIFY ALL DIMENSIONS AND COORDINATE PLACEMENT OF ALL EQUIPMENT AND ROUTING OF ALL PIPING AND/OR DUCT SYSTEMS.
2. ALL MECHANICAL SYSTEMS SHOWN ON THIS PLAN ARE FROM EXISTING DRAWINGS AND PRELIMINARY FIELD WORK. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL LOCATIONS AND SIZES OF MECHANICAL SYSTEMS PRIOR TO THE START OF WORK.

MECHANICAL KEYED NOTES:

1. VERIFY SERVICE CLEARANCE WITH EQUIPMENT MANUFACTURER. COORDINATE WITH ALL TRADES NOT TO OBSTRUCT.
2. ROUTE REFRIGERANT LINES TO ASSOCIATED AIR COOLED CONDENSING UNIT ON ROOF. SIZE PER MANUFACTURERS RECOMMENDATIONS.
3. ROUTE FULL SIZE CONDENSATE DRAIN PIPE TO WYE TAILPIECE LOCATED IN ART 1881.
4. EXHAUST DUCTWORK (DIMENSION AS SHOWN) UP TO EXHAUST FAN. TRANSITION TO FAN INLET AS REQUIRED.
5. ROUTE KILN ALUMINUM DUCTWORK DOWN ALONG WALL TO 24" A.F.F FOR CONNECTION TO KILN FUME FAN.
6. MOUNT KILN FAN TO WALL. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
7. KILN VENTILATION SHALL BE ENVIRONET 2 BY SKUTT. PROVIDE KILN WITH ENVIROLINK CONTROLLER AND ALL WIRES WITH SUFFICIENT LENGTH TO MAKE ALL CONNECTIONS AS PER MANUFACTURER RECOMMENDATIONS.
8. ROUTE FAN DISCHARGE DUCT TO WALL CAP AS SHOW. WALL CAP COLOR / FINISH SHALL BE SELECTED BY ARCHITECT FROM MANUFACTURERS FULL COLOR RANGE.
9. PROVIDE ALUMINUM FLEX TO CONNECT KILN ALUMINUM DUCT WITH KILN FAN.
10. THERMOSTAT SHALL BE SET TO 80°F.(ADJUSTABLE).
11. PROVIDE HEAT DETECTOR. INTERLOCK WITH KILN TO SHUT OFF POWER SOURCE AT 135 F(ADJUSTABLE) MOUNT HEAT DETECTOR ON CEILING AT LOCATION SHOWN.
12. PROVIDE NEW BYPASS PIPING AND VALVES AS SHOWN TO ALLOW FOR ISOLATING THE NEW PIPING FROM THE EXISTING HYDRONIC LOOPS. TESTING, FLUSHING, AND TREATEMENT OF NEW PIPING SHALL BE PERFORMED PRIOR TO OPENING THE NEW PIPING TO THE EXISTING HYDRONIC LOOPS. PURGERITE OR COMPARABLE COMPANY SHALL PROVIDE ASSISTANCE TO THE MECHANICAL CONTRACTOR TO CONFIRM FLUSHING AND CLEANING AT DESIGN SYSTEM FLOW RATES. CHEMICAL TREATEMENT MANUFACTURER SHALL TEST WATER TO CONFIRM COMPLIANCE OF FLUSHING AND TREATMENT OF WATER PRIOR TO OPENING THE NEW PIPING VALVES TO THE EXISTING HYDRONIC LOOP.
13. REFER TO 1/M2.18 FOR REFRIGERANT LINE CONTINUATION.
14. PROVIDE 6" ROUND DUCT TO NEW 6" ROUND TELESCOPING FUME EXTRACTION ARM. FUME EXTRACTION ARM SHALL BE MONOXIVENT 15000 SERIES INTERNAL SUPPORT ARM OR APPROVED EQUAL. INSTALL MANUAL DAMPER IN DROP FOR BALANCING. COORDINATE LOCATION AND HEIGHT OF DROP WITH OWNER AND ARCITECT. PROVIDE EXTRACTION ARM WITH THE REQUIRED LENGTH FOR PROPER REACH TO THE WELDING ZONE. BALANCE AIRFLOW TO 600 CFM. EXTRACTION ARM SHALL BE MOUNTED TO A NEW BRACKET SECURED TO EXISTING WALL. PROVIDE ALL NECESSARY HARDWARE FOR CONNECTIONS. REFER TO MANUFACTURER FOR MORE INFORMATION ON INSTALLATION REQUIREMENTS.
15. 14"x14" EXHAUST AIR DUCT UP TO INDICATED EXHAUST FAN ON ROOF. TRANSITION TO UNIT INLET. END DUCT AT 6" BELOW STRUCTURE WITH ALUMINUM WIRE MESH CLOTH.
16. INTAKE AIR DUCT FULL SIZE OF OAI OUTLET AIR OPENING SHALL EXTEND 1 FEET BELOW STRUCTURE. MOTORIZED DAMPER AND ACTUATOR SHALL BE PROVIDED AND INSTALLED BELOW ROOF DECK BY BAS. COORDINATE WITH ELECTRICAL'S DRAWING FOR ACTUATOR REQUIRED 120V CONNECTION.
17. REMOVE EXISTING CHWS&R PIPING INSULATION AS INDICATED, REINSULATE AND SEAL PER SPECIFICATIONS.
18. PROVIDE DOUBLE WALL ACUSTICAL INSULATED DUCT.
19. ECOMAXX NO RETURN VALVE PROVIDED BY DUST COLLECTION SYSTEM MANUFACTURER. VALVE SHALL BE SUPPORTED FROM STRUCTURAL MEMBERS. REFER TO MANUFACTURER INSTALLATION MANUAL.

1 **MECHANICAL FLOOR PLAN - LEVEL 1 - AREA G**
Scale: 1/8" = 1'-0"

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR, SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS 80219 LICENSED PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

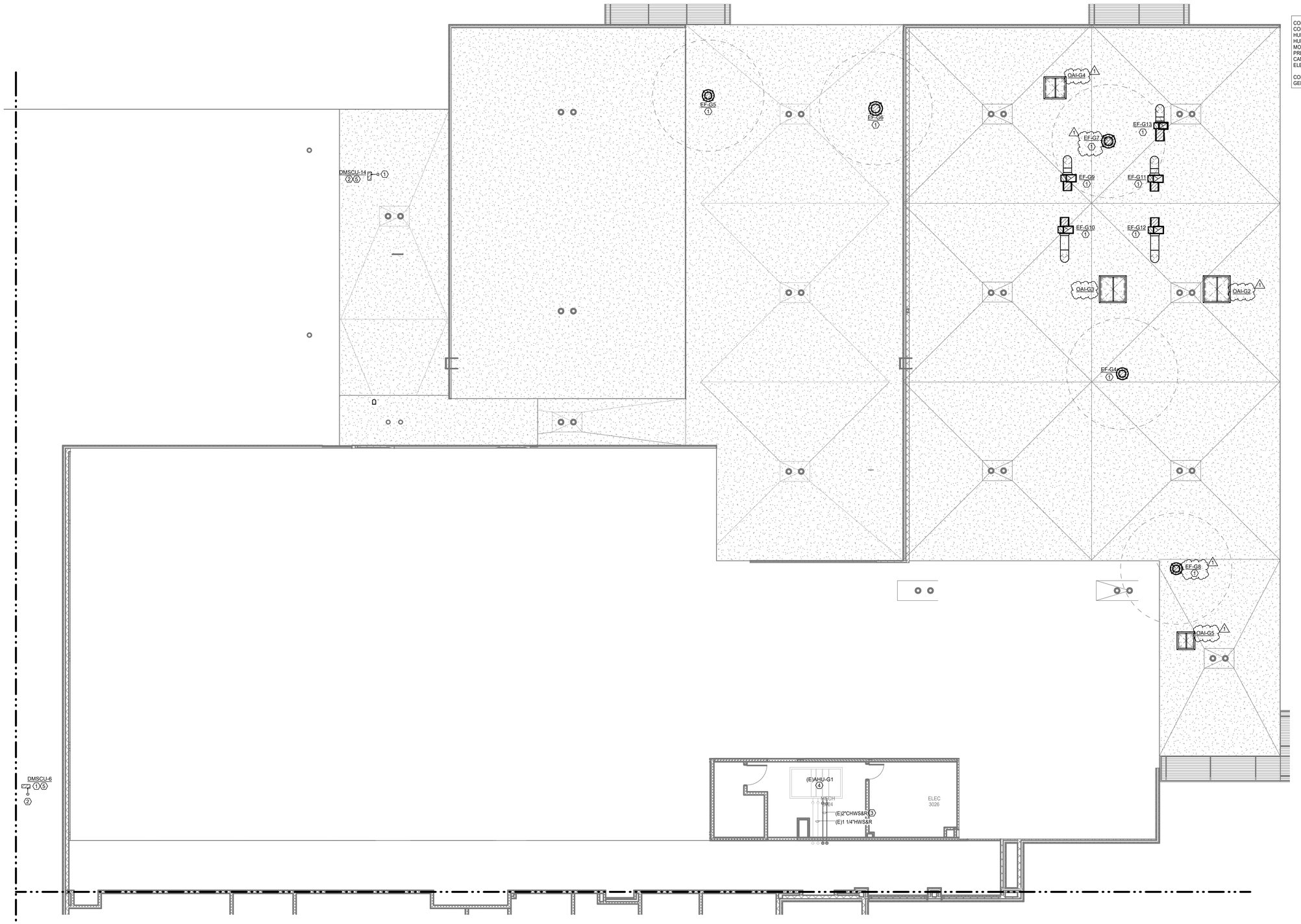
5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24
	Revisions / Submission	

Project Number: 23071
Date: 2024-11-17
Drawn By: IP

MECHANICAL FIRST FLOOR PLAN - AREA G

M2.07
of



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1 **MECHANICAL FLOOR PLAN - LEVEL 2 - AREA G**
Scale: 1/8" = 1'-0"

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MECHANICAL KEYED NOTES:

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2. REFER TO 1/M2.07, FOR REFRIGERANT LINE CONTINUATION.
3. REMOVE EXISTING CHWS&R PIPING INSULATION AS INDICATED, REINSULATE AND SEAL PER SPECIFICATIONS.
4. EXISTING EQUIPMENT TO REMAIN.
5. MOUNT CONDENSING UNIT TO UNISTRUT RACK. REFER TO ARCHITECTURAL AND STRUCTURAL EQUIPMENT SUPPORT DETAIL.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR, SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

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CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 7449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
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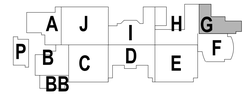
MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24
	Revisions / Submission	

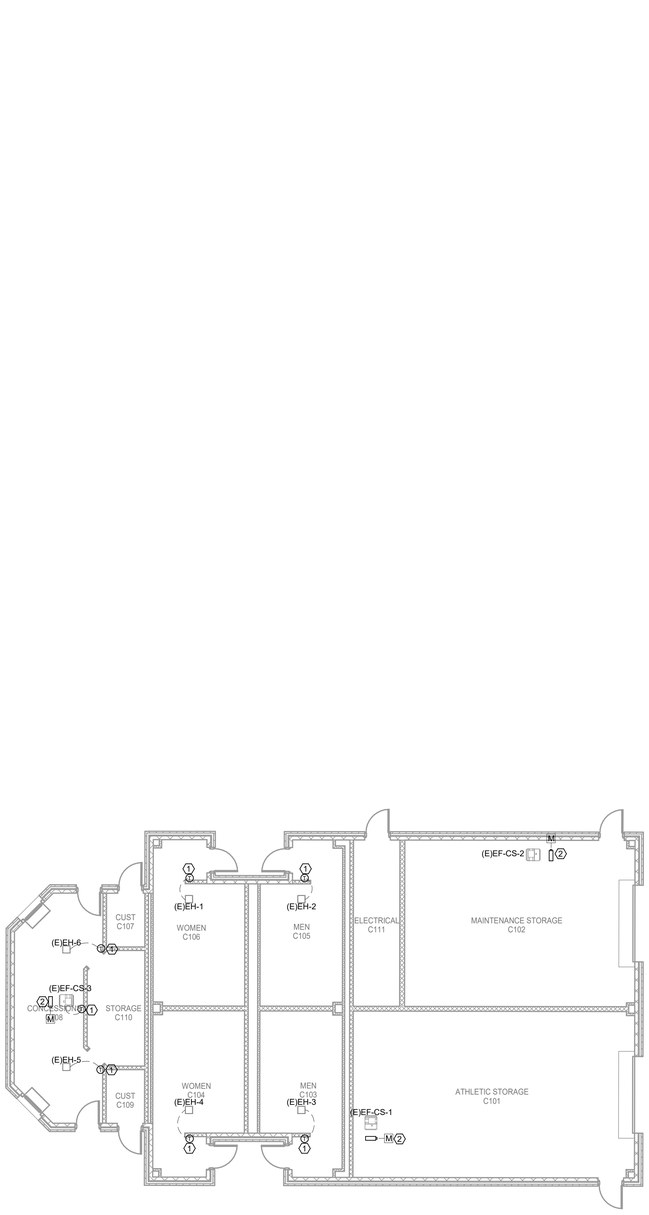
KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



Project Number: 23071
Date: 2024-11-17
Drawn By: IP

MECHANICAL SECOND FLOOR PLAN - AREA G

M2.18
of



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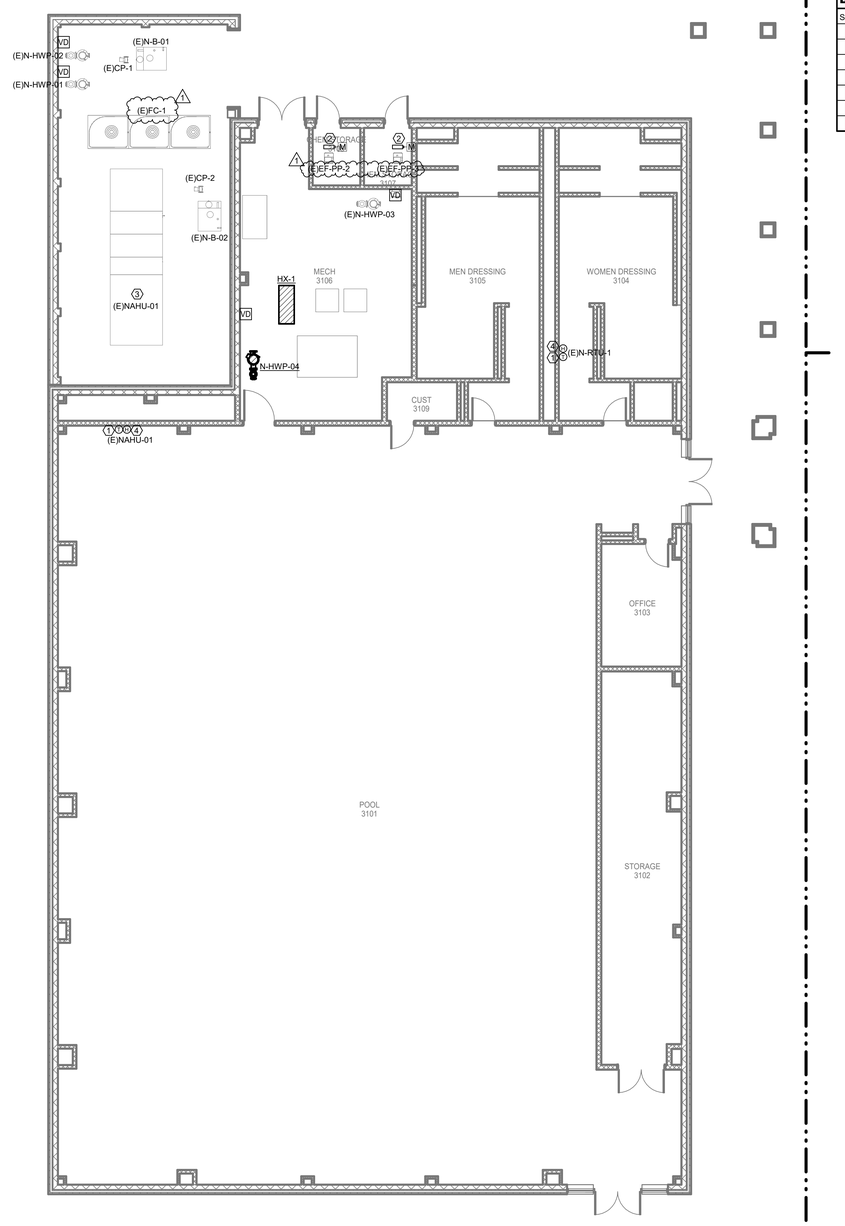
2 MECHANICAL CONTROLS FLOOR PLAN - CONCESSION

Scale: 1/8" = 1'-0"



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1 MECHANICAL CONTROLS FLOOR PLAN - LEVEL 1 - AREA P

Scale: 1/8" = 1'-0"

BMCS SYMBOL LEGEND

SYMBOL	DESCRIPTION
VD	VARIABLE FREQUENCY DRIVE
CP	CONTROL PANEL
DS	DISCONNECT SWITCH
M	MOTORIZED DAMPER
RM	REFRIGERANT MONITORING SYSTEM
PB	PURGE BUTTON
HS	FUME HOOD SWITCH

CONTRACTOR SHALL PROVIDE DEHUMIFICATION DURING THE CONSTRUCTION SCHEDULE. THE SCOPE IS TO MAINTAIN ACCEPTABLE HUMIDITY LEVELS WITHIN THE BUILDING. THE REMOVAL OF EXCESS HUMIDITY FROM THE AIR THROUGHTOUT THE BUILDING. PROVIDE MOISTURE CONTROL RENTAL EQUIPMENT AND SOLUTION FOR PREVENTING THE LONG-TERM EFFECTS OF MOISTURE LEVEL THAT CAN DAMAGE INTERIOR BUILDING MATERIALS, BOOKS AND ELECTRONIC EQUIPMENT.

CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL REQUIRED POWER GENERATING EQUIPMENT.

GENERAL NOTES:

1. OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED FROM THIS PROJECT. THIS INCLUDES BUT IS NOT LIMITED TO CHILLERS, AIR HANDLING UNITS, FANS, CONDENSING UNITS, BMCS CONTROL PANELS, TEMPERATURE SENSORS, AND CONTROL VALVES.
2. THESE CONSTRUCTION DRAWINGS ARE DIAGRAMMATIC, AND DO NOT NECESSARILY REFLECT ACTUAL DIMENSIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD-VERIFY ALL DIMENSIONS AND COORDINATE PLACEMENT OF ALL EQUIPMENT AND ROUTING OF ALL PIPING AND/OR DUCT SYSTEMS.
3. ALL MECHANICAL SYSTEMS SHOWN ON THIS PLAN ARE FROM EXISTING DRAWINGS AND PRELIMINARY FIELD WORK. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL LOCATIONS AND SIZES OF MECHANICAL SYSTEMS PRIOR TO THE START OF WORK.
4. MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL ELECTRICAL POWER REQUIREMENTS.

MECHANICAL KEYED NOTES:

1. PROVIDE NEW DDC TEMPERATURE SENSOR AND CONTROL WIRING. REFER TO SPECIFICATIONS FOR MORE INFORMATION.
2. PROVIDE NEW LOW LEAKAGE MOTORIZED DAMPER THAT SHALL CLOSE WHEN UNIT IS NOT OPERATING, ACTUATOR AND CONTROLS. PROVIDED BY BMCS INSTALLED IN DUCTWORK BY MECHANICAL CONTRACTOR. MODIFY EXISTING DUCTWORK AND INSULATION AS REQUIRED. AFFECTED DUCTWORK SHALL BE SEALED AND RE-INSULATED TO MATCH EXISTING.
3. EXISTING AIR HANDLING UNIT SHALL REMAIN. REPLACE EXISTING CHILLED AND HOT WATER ISOLATION VALVE, BALANCING VALVE AND CONTROL VALVE WITH NEW. REPLACE EXISTING CHILLED AND HOT WATER PIPING WITH NEW AS REQUIRED FOR INSTALLATION OF NEW VALVES AND APPURTENANCES. REFER TO M7.11 SPECIFICATIONS FOR WORK AT AIR HANDLING UNIT.
4. PROVIDE NEW DDC HUMIDITY SENSOR AND CONTROL WIRING. REFER TO SPECIFICATIONS FOR MORE INFORMATION.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR, SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS — 80219 — LICENSED PROFESSIONAL ENGINEER — STATE OF TEXAS
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

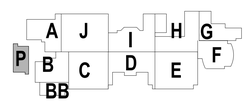
2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24
	Revisions / Submission	

Project Number: 23071
Date: 2024-11-17
Drawn By: IP

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



MECHANICAL CONTROLS FIRST FLOOR PLAN - AREA P

M7.05

FAN

MARK	CFM	EXT. STATIC PRESSURE (IN. W.C.)	MAX. FAN RPM	HORSE POWER	CURRENT CHARAC. V	P	F	LOCALLY SWITCHED BY	INTERLOCKED WITH	FAN TYPE	DRIVE TYPE	MANUFACTURER	MODEL NUMBER	REMARKS
(E)EF-B1	300	0.25	1,000	0.25	120	1	60	T-STAT	-	IN-LINE	BELT	ACME	DB	1
(E)EF-C1	2,115	0.375	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C2	1,640	0.375	1,000	0.25	120	1	60	-	OAHU-C5	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C3	1,000	1.00	1,020	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C4	1,000	1.00	1,020	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C5	1,000	1.00	1,020	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C6	1,000	1.00	1,020	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C7	1,000	1.00	1,020	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C8	1,680	0.375	1,000	0.25	120	1	60	PUSH BUTTON	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C9	1,680	0.375	1,000	0.25	120	1	60	PUSH BUTTON	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C10	1,680	0.375	1,000	0.25	120	1	60	PUSH BUTTON	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C11	1,680	0.375	1,000	0.25	120	1	60	PUSH BUTTON	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C12	1,680	0.375	1,000	0.25	120	1	60	PUSH BUTTON	-	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C13	1,640	0.375	1,000	0.25	120	1	60	-	OAHU-C5	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C14	2,400	0.375	1,000	0.33	120	1	60	-	OAHU-C5	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C15	585	0.375	1,075	0.166	120	1	60	-	CONTINUOUS	ROOF MOUNTED	DIRECT	COOK	ACRUD	1
(E)EF-C16	1,215	0.375	1,000	0.25	120	1	60	-	OAHU-C5	ROOF MOUNTED	BELT	COOK	ACRUB	1
(E)EF-C18	1,510	0.375	1,000	0.5	120	1	60	-	-	ROOF MOUNTED	BELT	COOK	HCL-B	1
(E)EF-C19	2,900	0.375	1,000	0.5	120	1	60	-	-	ROOF MOUNTED	BELT	COOK	HCL-B	1
(E)EF-C20	300	0.375	1,000	0.25	120	1	60	T-STAT	-	IN-LINE	BELT	ACME	DB	1
(E)EF-C21	300	0.375	1,000	0.25	120	1	60	T-STAT	-	IN-LINE	BELT	ACME	DB	1
(E)EF-C22	1,100	0.375	1,000	0.25	120	1	60	-	-	-	BELT	COOK	HCL-B	1
(E)EF-D1	400	0.375	1,080	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-D2	400	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-D3	600	0.25	1,000	0.25	120	1	60	-	-	IN-LINE	BELT	ACME	DB	1
(E)EF-D4	300	1.0	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	QB	1
(E)EF-D5	400	0.25	1,000	0.25	120	1	60	-	DRYER	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-D6	300	0.25	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	DB	1
(E)EF-D7	400	0.25	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	DB	1
(E)EF-E1	1,110	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-E2	2,220	0.375	1,080	0.5	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-E3	1,110	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-E4	320	0.375	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-E5	1,620	0.375	1,000	0.25	120	1	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-E6	300	1.0	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	QB	1
(E)EF-E7	300	1.0	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	QB	1
(E)EF-E8	300	0.25	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	DB	1
(E)EF-E9	300	0.25	1,000	0.25	120	1	60	-	DRYER	INLINE	BELT	ACME	DB	1
(E)EF-F1	1,050	0.375	1,080	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-F2	600	0.375	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-F3	600	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-G1	280	0.25	800	0.25	120	1	60	T-STAT	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-G2	1,600	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-G3	2,400	0.25	850	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H1	6,500	0.25	600	1.0	480	3	60	WALL SWITCH	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-H2	500	0.25	850	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H3	4,000	0.25	1,000	1.0	480	3	60	WALL SWITCH	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-H4	4,000	0.25	1,000	1.0	480	3	60	WALL SWITCH	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H5	775	0.25	920	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H6	400	0.25	850	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H7	820	1.25	1,123	0.33	120	1	60	TIMER	-	ROOF MOUNTED	BELT	COOK	ACRU	1
(E)EF-H8	900	0.25	1,000	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H9	900	0.25	1,000	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H10	200	0.25	800	0.25	120	1	60	TIMER	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H11	880	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H12	5,400	5.0	1,760	7.5	480	3	60	WALL SWITCH	-	ROOF MOUNTED	BELT	DSP MONOVENT	CPS	1
(E)EF-H13	300	0.25	800	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-H14	3,000/,6000	0.25	300/600	0.75	480	3	60	WALL SWITCH	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)SF-H1	3,000	0.1	830	0.25	120	1	60	T-STAT	-	ROOF MOUNTED	BELT	COOK	HXFL	1
(E)EF-H16	300	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DB	1
(E)EF-H17	300	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DB	1
(E)EF-H18	300	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DB	1
(E)EF-H19	820	1.25	1,123	0.33	120	1	60	T-STAT	-	ROOF MOUNTED	BELT	COOK	ACRU	1
(E)EF-I1	3,542	1.5	1,000	2.0	480	3	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	245VCR	1
(E)EF-I2	2,000	0.25	1,000	0.25	120	1	60	T-STAT	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-I3	2,770	0.25	850	0.33	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-I4	400	0.25	800	0.33	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-I5	6,500	1.5	800	3.0	480	3	60	HOOD SWITCH	-	ROOF MOUNTED	BELT	COOK	330VCR	1
(E)EF-I6	2,500	0.25	1,080	0.33	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-I7	2,400	0.25	800	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PNU	1
(E)EF-I8	500	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	COOK	DB	1
(E)EF-I9	940	0.25	1,025	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-I10	300	0.25	1,000	0.25	120	1	60	-	-	INLINE	BELT	COOK	DB	1
(E)EF-I11	5,100	-	1,725	(2) 0.5	480	3	60	DOOR SWITCH	-	WALL	DIRECT	MARS	72CH	1
(E)EF-I12	1,800	1.25	1,100	0.75	480	3	60	-	-	ROOF MOUNTED	-	COOK	225VCR	1
(E)SF-I1	2,100	0.75	800	0.75	120	1	60	-	EF-I1	ROOF MOUNTED	BELT	COOK	ASP	1
(E)SF-I2	3,900	0.75	800	1.0	480	3	60	-	EF-I5	ROOF MOUNTED	BELT	COOK	ASP	1
(E)SF-I3	900	0.75	1,000	0.33	120	1	60	-	EF-I5	ROOF MOUNTED	BELT	COOK	ASP	1
(E)EF-J1	1,700	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-J2	1,915	0.25	1,025	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-J3	1,920	0.25	1,025	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-J4	800	0.25	1,000	0.25	120	1	60	-	-	ROOF MOUNTED	BELT	ACME	PL	1
(E)EF-J5	600	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DM	1
(E)EF-J6	500	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DM	1
(E)EF-J7	300	0.25	1,000	0.25	120	1	60	T-STAT	-	INLINE	BELT	ACME	DM	1
(E)EF-CP-1	6,800	0.25	835	1.5	480	3	60	-	-	ROOF MOUNTED	BELT	COOK	VCR	1
(E)EF-CP-2	6,800	0.25	835	1.5	480	3	60	-	-	ROOF MOUNTED	BELT	COOK	VCR	1
(E)EF-BR-1	6,000	0.10	-	0.33	120	1	60	-	-	ROOF MOUNTED	BELT	-	-	1
(E)EF-PP-1	1,130	0.375	1,000	0.33	120	1	60	-	N-RTU-1	INLINE	BELT	COOK	DB	1
(E)EF-PP-2	185	0.25	1,360	0.062	120	1	60	-	N-RTU-1	INLINE	DIRECT	COOK	GN	1
(E)EF-PP-3	185	0.25	1,360	0.062	120	1	60	-	N-RTU-1	INLINE	DIRECT	COOK	GN	1
(E)EF-CS-1	3,200	0.375	500	0.75	480	3	60	-	-	INLINE	BELT	ACME	DM-15	1
(E)EF-CS-2	3,200	0.375	500	0.75	480	3	60	-	-	INLINE	BELT	ACME	DM-15	1
(E)EF-CS-3	3,000	0.50	500	0.75	480	3	60	-	-	INLINE	BELT	ACME	DM-15	1
EF-G4	450	0.35	1,225	0.25	120	1	60	TIMER	AHU-G6	ROOF MOUNTED	BELT	COOK	ACEB	2
EF-G5	400	0.35	1,050	0.25	120	1	60	TIMER	AHU-G5	ROOF MOUNTED	BELT	COOK	ACEB	2
EF-G6	900	0.45	1,200	0.5	120	1	60	TIMER	AHU-G5	ROOF MOUNTED	BELT	COOK	ACEB	2
EF-G7	1,450	0.35	1,200	0.5	120	1	60	TIMER	AHU-G6	ROOF MOUNTED	BELT	COOK	ACEB	2
EF-G8	700	0.35	1,200	0.25	120	1	60	TIMER	AHU-G6	ROOF MOUNTED	BELT	COOK	ACEB	2
EF-G9	3,600	2.50	1,700	3.0	480	3	60	TIMER	OAI-G3	VENT SET	BELT	COOK	CPS	2
EF-G10	3,600	2.50	1,700	3.0	480	3	60	TIMER	OAI-G3	VENT SET	BELT	COOK	CPS	2
EF-G11	3,600	2.50	1,700	3.0	480	3	60	TIMER	OAI-G2	VENT SET	BELT	COOK	CPS	2
EF-G12	3,600	2.50	1,700	3.0	480	3	60	TIMER	OAI-G2	VENT SET	BELT	COOK	CPS	2
EF-G13	4,800	2.50	2,000	5.0	460	3	60	TIMER	OAI-G4	VENT SET	BELT	COOK	CPS	2
EF-SB-1	1,200	0.50	1,350	0.5	120	1	60	H-STAT	-	INLINE	DIRECT	COOK	SQND	2
(E)EF-BB-3,4,7,8	1,000	1.0	1,100	0.3	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-12,14,16	1,000	1.0	1,100	0.3	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-1,6,15	1,880	0.375	1,000	0.25	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-5,17	1,925	0.375	1,000	0.25	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-10,11	1,780	0.375	1,000	0.25	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-9,13	2,250	0.375	1,000	0.3	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-2	2,355	0.375	1,000	0.3	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1
(E)EF-BB-18	1,425	0.375	1,000	0.25	120	1	60	-	AHU-BB-1	ROOF MOUNTED	BELT	-	-	1

REMARKS:

1. PROVIDE NEW LOW LEAKAGE MOTORIZED DAMPER THAT SHALL CLOSE WHEN UNIT IS NOT OPERATING, ACTUATOR AND CONTROLS. PROVIDED BY BMCS INSTALLED IN DUCTWORK BY MECHANICAL CONTRACTOR. MODIFY EXISTING DUCTWORK AND INSULATION AS REQUIRED. AFFECTED DUCTWORK SHALL BE SEALED AND RE-INSULATED TO MATCH EXISTING.
2. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR ADDITIONAL INFORMATION.

(E)AIR HANDLING UNIT

MARK	TYPE	FAN: SUPPLY AIR CFM	OUTSIDE AIR CFM	EXT. STATIC PRESSURE (IN. W.C)	HORSE POWER	CURRENT CHARAC. V	PH	F	COOLING AIR TEMPERATURE (°F): ENTERING DRY BULB	ENTERING WET BULB	LEAVING DRY BULB	LEAVING WET BULB	WATER: ENTERING TEMP (°F)	GPM	PRESSURE DROP (FT.)	VALVE TYPE	HEATING: ENTERING AIR TEMPERATURE (°F)	MIN. HEATING CAPACITY	WATER: ENTERING TEMP. (°F)	GPM	PRESSURE DROP (FT.)	VALVE TYPE	PIPE SIZE TO COIL (IN.): CHILLED WATER	HOT WATER	REMARKS
(E)AHU-A1	SZU	5,330	1,660	1.0	7.5	480	3	60	84.3	68.6	53.0	-	42	33.6	15.0	2-WAY	51.7	185,884	180.0	12.4	10.0	2-WAY	2"	1-1/2"	1,2
(E)AHU-A2	SZU	18,750	6,000	1.0	20	480	3	60	75.0	62.0	54.0	-	42	79.8	15.0	2-WAY	67.0	299,745	180.0	20.0	10.0	2-WAY	2-1/2"	1-1/2"	1,2
(E)AHU-B1	SZU	5,235	1,650	1.5	5	480	3	60	89.2	69.5	56.0	-	42	40.2	15.0	2-WAY	66.8	70,444	180.0	4.7	10.0	2-WAY	2"	1"	1,2
(E)AHU-C1	DDU	23,300	3,340	1.5	25	480	3	60	80.9	65.8	55.0	-	42	105.4	15.0	2-WAY	73.3	217,433	180.0	14.5	10.0	3-WAY	3"	1-1/2"	1,2
(E)AHU-C2	SZU	18,860	1,800	1.0	20	480	3	60	77.0	64.0	53.2	-	42	75.3	15.0	2-WAY	69.8	165,884	180.0	11.0	10.0	2-WAY	2-1/2"	1"	1,2
(E)AHU-C3	DDU	14,620	4,640	1.5	20	480	3	60	90.4	70.5	55.0	-	42	107.0	15.0	2-WAY	62.4	268,288	180.0	17.9	10.0	3-WAY	3"	2"	1,2
(E)AHU-C4	DDU	15,410	6,000	1.5	20	480	3	60	92.6	71.5	55.0	-	42	125.2	15.0	2-WAY	64.3	290,569	180.0	19.3	10.0	3-WAY	4"	1-1/2"	1,2
(E)AHU-C5	DDU	6,060	6,060	1.0	7.5	480	3	60	82.0	76.5	55.0	-	42	65.3	15.0	2-WAY	20.0	199,942	180.0	13.3	10.0	3-WAY	4"	1-1/2"	1,2,3
(E)AHU-D1	DDU	9,955	2,650	1.5	15	480	3	60	84.8	68.5	55.0	-	42	57.1	15.0	2-WAY	67.6	106,887	180.0	7.1	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-D2	DDU	8,645	1,955	1.5	10	480	3	60	83.8	67.7	55.0	-	42	47.5	15.0	2-WAY	69.7	93,191	180.0	6.2	10.0	3-WAY	2"	3/4"	1,2
(E)AHU-D3	DDU	11,760	4,350	1.5	15	480	3	60	90.1	70.9	55.0	-	42	86.6	15.0	2-WAY	61.7	215,458	180.0	14.3	10.0	3-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-D4	SZU	6,645	1,620	1.5	7.5	480	3	60	87.4	69.0	53.1	-	42	40.0	15.0	2-WAY	64.8	102,506	180.0	6.8	10.0	2-WAY	2"	1-1/4"	1,2
(E)AHU-D5	DDU	6,915	2,655	1.5	10	480	3	60	91.3	71.0	53.2	-	42	49.1	15.0	2-WAY	61.4	132,520	180.0	8.8	10.0	2-WAY	2-1/2"	1-1/2"	1,2
(E)AHU-E1	DDU	22,100	8,025	1.5	25	480	3	60	85.6	69.4	55.0	-	42	150.8	15.0	2-WAY	65.5	281,500	180.0	18.7	10.0	2-WAY	4"	2"	1,2
(E)AHU-E2	DDU	17,300	3,885	1.5	25	480	3	60	83.5	67.5	55.0	-	42	100.3	15.0	2-WAY	68.8	171,955	180.0	11.4	10.0	2-WAY	3"	1-1/4"	1,2
(E)AHU-E3	SZU	14,225	1,425	1.0	20	480	3	60	77.1	64.3	54.0	-	42	59.2	15.0	2-WAY	69.5	143,201	180.0	9.5	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-E4	DDU	14,800	5,825	1.5	20	480	3	60	92.3	71.7	55.0	-	42	119.2	15.0	2-WAY	60.9	261,865	180.0	17.4	10.0	2-WAY	3"	2"	1,2
(E)AHU-E5	DDU	15,500	4,835	1.5	20	480	3	60	90.3	70.3	55.0	-	42	112.6	15.0	2-WAY	62.8	274,520	180.0	18.3	10.0	2-WAY	3"	2"	1,2
(E)AHU-F1	SZU	14,325	650	1.0	15	480	3	60	76.1	63.5	54.0	-	42	51.5	15.0	2-WAY	72.3	148,284	180.0	9.9	10.0	2-WAY	2"	1-1/4"	1,2
(E)AHU-F2	SZU	24,890	6,480	1.0	30	480	3	60	80.6	66.8	54.0	-	42	164.0	15.0	2-WAY	60.7	463,148	180.0	30.8	10.0	3-WAY	4"	2"	1,2
(E)AHU-G1	SZU	3,035	1,555	1.5	5	480	3	60	90.5	72.1	53.0	-	42	26.2	15.0	2-WAY	41.6	132,409	180.0	8.8	10.0	2-WAY	2"	1-1/4"	1,2
(E)AHU-G2	DDU	7,550	4,200	1.5	10	480	3	60	95.9	73.4	55.0	-	42	71.1	15.0	2-WAY	56.3	176,296	180.0	11.7	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-G3	DDU	3,440	1,325	1.5	5	480	3	60	95.8	72.2	55.0	-	42	28.1	15.0	2-WAY	58.6	62,828	180.0	4.2	10.0	2-WAY	2"	3/4"	1,2
(E)AHU-G4	DDU	3,910	870	1.5	5	480	3	60	87.3	68.5	55.0	-	42	23.4	15.0	2-WAY	56.8	102,132	180.0	6.8	10.0	2-WAY	2"	1"	1,2
(E)AHU-G1-01	DDU	2,225	1,500	1.0	5	480	3	60	93.4	74.1	50.3	-	45	23.4	15.0	2-WAY	33.0	115,822	180.0	7.7	10.0	2-WAY	2-1/2"	1-1/2"	1,2
(E)AHU-H1	DDU	13,750	2,135	1.5	15	480	3	60	82.8	66.5	55.0	-	42	68.3	15.0	2-WAY	70.2	108,340	180.0	7.2	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-H2	SZU	4,365	485	1.0	5	480	3	60	77.3	64.4	53.0	-	42	18.0	15.0	2-WAY	68.9	51,453	180.0	3.4	10.0	2-WAY	1-1/4"	3/4"	1,2
(E)AHU-H3	SZU	2,385	930	1.0	3	480	3	60	88.9	70.5	53.0	-	42	18.1	15.0	2-WAY	52.9	60,336	180.0	4.0	10.0	2-WAY	1-1/2"	1"	1,2
(E)AHU-H4	SZU	6,150	375	1.0	7.5	480	3	60	76.7	63.6	53.0	-	42	21.7	15.0	2-WAY	73.1	68,649	180.0	4.6	10.0	2-WAY	2"	1"	1,2
(E)AHU-H5	DDU	15,795	4,590	1.5	15	480	3	60	87.3	69.2	55.0	-	42	100.9	15.0	2-WAY	64.7	207,438	180.0	13.8	10.0	2-WAY	3"	1-1/4"	1,2
(E)AHU-H6	SZU	11,220	1,125	1.0	15	480	3	60	77.1	64.3	53.0	-	42	47.9	15.0	2-WAY	72.5	125,055	180.0	8.3	10.0	2-WAY	2-1/2"	1"	1,2
(E)AHU-I1	SZU	12,110	5,450	1.0	15	480	3	60	76.9	63.0	53.0	-	42	47.4	15.0	2-WAY	62.5	165,401	180.0	11.0	10.0	2-WAY	2"	1-1/4"	1,2
(E)AHU-I2	SZU	8,585	3,120	1.0	10	480	3	60	79.0	64.0	53.0	-	42	41.6	15.0	2-WAY	52.9	206,426	180.0	13.7	10.0	2-WAY	2"	1-1/4"	1,2
(E)AHU-I3	SZU	5,885	1,220	1.0	7.5	480	3	60	83.1	67.0	53.0	-	42	45.0	15.0	2-WAY	60.5	89,350	180.0	5.9	10.0	2-WAY	2-1/2"	1"	1,2
(E)AHU-I4	SZU	19,900	3,750	1.0	25	480	3	60	75.0	62.5	54.0	-	42	80.5	15.0	2-WAY	70.3	414,396	180.0	27.6	10.0	2-WAY	2-1/2"	2"	1,2
(E)AHU-I5	SZU	9,200	9,200	1.0	10	480	3	60	82.0	76.5	55.0	-	42	99.1	15.0	2-WAY	20.0	303,542	180.0	20.2	10.0	2-WAY	2-1/2"	2"	1,2,3
(E)AHU-I6	SZU	19,900	3,750	1.0	25	480	3	60	75.0	62.5	54.0	-	42	80.5	15.0	2-WAY	70.3	414,396	180.0	27.6	10.0	2-WAY	2-1/2"	2"	1,2
(E)AHU-I7	SZU	6,870	6,870	1.0	7.5	480	3	60	82.0	76.5	55.0	-	42	74.0	15.0	2-WAY	20.0	226,667	180.0	15.1	10.0	2-WAY	2-1/2"	2"	1,2,3
(E)AHU-J1	SZU	15,510	5,450	1.0	20	480	3	60	74.0	62.0	53.0	-	42	73.2	15.0	2-WAY	66.5	191,440	180.0	12.7	10.0	2-WAY	2-1/2"	1-1/2"	1,2
(E)AHU-J2	SZU	15,510	5,450	1.0	20	480	3	60	74.0	62.0	53.0	-	42	73.2	15.0	2-WAY	66.5	191,440	180.0	12.7	10.0	2-WAY	2-1/2"	1-1/2"	1,2
(E)AHU-J3	DDU	8,700	1,700	1.5	10	480	3	60	85.3	66.0	55.0	-	42	51.1	15.0	2-WAY	63.2	124,763	180.0	8.3	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-J4	SZU	9,225	3,070	1.0	15	480	3	60	87.5	66.5	52.0	-	42	51.8	15.0	2-WAY	66.7	278,235	180.0	18.5	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-J5	SZU	21,670	21,670	0.75	20	480	3	60	82.0	77.8	55.0	-	42	233.4	15.0	2-WAY	20.0	303,542	180.0	20.2	10.0	2-WAY	2-1/2"	1-1/4"	1,2,3
(E)AHU-J6	DDU	6,590	2,625	1.5	7.5	480	3	60	91.0	71.0	55.0	-	42	48.6	15.0	2-WAY	63.2	121,813	180.0	8.1	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-J7	SZU	9,360	850	1.0	10	480	3	60	76.9	64.3	53.3	-	42	37.9	15.0	2-WAY	69.1	140,517	180.0	9.4	10.0	2-WAY	2-1/2"	1-1/4"	1,2
(E)AHU-A1-1	MZU	8,585	1,650	1.0	10	480	3	60	77.3	64.4	54.1	-	42	40.3	15.0	2-WAY	65.6	217,200	180.0	10.9	10.0	2-WAY	2"	1-1/4"	1,2
AHU-G5	DDU	9,495	3,000	2.5	15	480	3	60	75.0	62.5	54.0	-	45	38.0	15.0	2-WAY	64.5	250,212	180.0	12.6	10.0	2-WAY	2"	1-1/4"	4
AHU-G6	DDU	9,800	3,300	2.5	15	480	3	60	75.0	62.5	54.0	-	45	39.2	15.0	2-WAY	64.4	259,096	180.0	13.0	10.0	2-WAY	2"	1-1/2"	4
OAHU-G7	SZU	7,800	7,800	1.5	10	480	3	60	98.0	79.0	53.0	-	45	121.0	15.0	2-WAY	27.0	193,752	180.0	9.8	10.0	2-WAY	4"	1-1/4"	4
(E)AHU-BB-1	SZU	3,625	3,625	1.0	5	480	3	60	82.0	73.5	55.0	-	45	32.8	15.0	2-WAY	20.0	121,000	180.0	8.0	10.0	2-WAY	2-1/2"	1-1/4"	1,2,3

REMARKS:

1. REPLACE EXISTING CHILLED WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #10/M5.01 WITH NEW.
2. REPLACE EXISTING HEATING HOT WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #9/M5.01 WITH NEW.
3. REPLACE EXISTING OUTSIDE AIR DAMPER WITH NEW. REFER TO DAMPER SCHEDULE FOR ADDITIONAL INFORMATION.
4. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR ADDITIONAL INFORMATION.

(E) FAN COIL UNIT

MARK	TYPE	FAN: SUPPLY AIR CFM	OUTSIDE AIR CFM	EXT.STATIC PRESSURE (IN. W.C.)	HORSE POWER	CURRENT CHARAC. V	P	F	COOLING AIR TEMPERATURE (°F): ENTERING DRY BULB	ENTERING WET BULB	LEAVING DRY BULB	LEAVING WET BULB	WATER: ENTERING TEMP(°F)	GPM	PRESSURE DROP (FT.)	VALVE TYPE	HEATING: ENTERING AIR TEMPERATURE (°F)	MIN. CAPACITY (BTUH)	WATER: ENTERING TEMP.(°F)	GPM	PRESSURE DROP (FT.)	VALVE TYPE	PIPE SIZE TO COIL (IN.): CHILLED WATER	HOT WATER	REMARKS
(E)FCU-B1	SINGLE ZONE	810	0	0.5	0.75	480	3	60	83.0	66.4	55.3	-	42	2.7	15.0	2-WAY	70.1	8,284	180	0.6	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C1	SINGLE ZONE	1,470	465	0.5	1	480	3	60	74.1	62.0	54.0	-	42	5.2	15.0	2-WAY	63.1	7,671	180	0.5	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C2	SINGLE ZONE	1,535	570	0.5	1	480	3	60	73.9	62.0	54.1	-	42	5.2	15.0	2-WAY	63.1	9,403	180	0.6	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C3	SINGLE ZONE	1,095	390	0.5	0.75	480	3	60	73.9	62.0	53.9	-	42	3.8	15.0	2-WAY	65.3	6,434	180	0.4	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C4	SINGLE ZONE	1,200	465	0.5	1	480	3	60	73.8	62.0	53.6	-	42	4.0	15.0	2-WAY	65.3	7,671	180	0.5	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C5	SINGLE ZONE	1,200	465	0.5	1	480	3	60	73.8	62.0	536	-	42	4.1	15.0	2-WAY	65.3	7,671	180	0.5	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C6	SINGLE ZONE	945	375	0.5	0.75	480	3	60	73.8	62.0	53.7	-	42	3.3	15.0	2-WAY	65.3	6,186	180	0.4	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C7	SINGLE ZONE	945	375	0.5	0.75	480	3	60	73.8	62.0	53.7	-	42	3.3	15.0	2-WAY	65.3	6,186	180	0.4	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C8	SINGLE ZONE	1,320	465	0.5	1	480	3	60	73.8	62.0	53.8	-	42	4.5	15.0	2-WAY	63.1	7,671	180	0.5	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C9	SINGLE ZONE	1,320	465	0.5	1	480	3	60	73.7	62.0	53.8	-	42	4.5	15.0	2-WAY	63.1	7,671	180	0.5	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C10	SINGLE ZONE	945	375	0.5	0.75	480	3	60	73.8	62.0	53.8	-	42	3.3	15.0	2-WAY	63.1	6,186	180	0.4	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C11	SINGLE ZONE	945	375	0.5	0.75	480	3	60	73.8	62.0	53.7	-	42	3.3	15.0	2-WAY	63.1	6,186	180	0.4	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C12	SINGLE ZONE	945	375	0.5	0.75	480	3	60	73.8	62.0	54.0	-	42	3.3	15.0	2-WAY	63.1	6,186	180	0.4	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C13	SINGLE ZONE	1,500	375	0.5	1	480	3	60	74.3	62.0	53.9	-	42	4.6	15.0	2-WAY	63.8	26,299	180	1.8	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-C14	SINGLE ZONE	430	120	0.5	0.5	480	3	60	74.2	62.0	51.3	-	42	1.6	15.0	2-WAY	60.5	1,980	180	0.1	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C15	SINGLE ZONE	950	120	0.5	0.75	480	3	60	74.6	62.0	53.7	-	42	3.0	15.0	2-WAY	59.8	10,528	180	0.7	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-C16	SINGLE ZONE	1,400	375	0.5	1	480	3	60	74.2	62.0	54.0	-	42	4.5	15.0	2-WAY	63.8	14,529	180	1.0	10.0	2-WAY	3/4"	3/4"	1,2
(E)FCU-F1	SINGLE ZONE	2,335	500	0.5	1.5	480	3	60	86.3	-	55.0	-	42	14.3	15.0	2-WAY	59.3	52,433	180	3.5	10.0	2-WAY	1 1/2"	3/4"	1,2
(E)FCU-G1-2	SINGLE ZONE	1,200	42	0.5	1	480	3	60	74.9	62.0	53.6	-	42	3.2	15.0	2-WAY	63.1	19,954	180	1.3	10.0	2-WAY	1 1/2"	3/4"	1,2
(E)FCU-H1	SINGLE ZONE	1,350	100	0.5	0.75	480	3	60	82.5	-	54.0	-	42	6.3	15.0	2-WAY	64.2	30,081	180	2.0	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB1-1	SINGLE ZONE	1,430	555	0.5	0.75	480	3	60	75.0	63.0	54.0	-	42	6.3	15.0	2-WAY	64.1	20,300	180	1.4	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB1-2	SINGLE ZONE	2,180	375	0.5	1	480	3	60	75.0	63.0	54.0	-	42	10.0	15.0	2-WAY	69.5	32,375	180	2.2	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB1-3	SINGLE ZONE	1,490	555	0.5	0.75	480	3	60	75.0	63.0	54.0	-	42	7.0	15.0	2-WAY	-	-	180	-	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB1-4	SINGLE ZONE	650	120	0.5	0.5	480	3	60	75.0	63.0	52.0	-	42	3.0	15.0	2-WAY	69.0	9,295	180	0.6	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB1-5	SINGLE ZONE	1,980	375	0.5	1	480	3	60	75.0	63.0	54.0	-	42	9.0	15.0	2-WAY	60.0	30,500	180	2.0	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB2-1	SINGLE ZONE	1,580	555	0.5	1	480	3	60	80.0	64.0	54.0	-	42	7.0	15.0	2-WAY	66.5	33,025	180	2.2	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB2-2	SINGLE ZONE	2,240	375	0.5	1	480	3	60	76.5	64.0	54.5	-	42	10.0	15.0	2-WAY	64.0	40,660	180	2.7	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB2-3	SINGLE ZONE	1,180	30	0.5	0.75	480	3	60	83.5	63.6	51.0	-	42	6.0	15.0	2-WAY	62.0	38,575	180	2.0	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB2-4	SINGLE ZONE	680	150	0.5	0.5	480	3	60	80.0	64.0	53.0	-	42	3.0	15.0	2-WAY	64.3	9,875	180	0.7	10.0	2-WAY	1"	3/4"	1,2
(E)FCU-BB2-5	SINGLE ZONE	2,040	375	0.5	1	480	3	60	79.0	64.0	54.0	-	42	9.5	15.0	2-WAY	66.0	38,150	180	2.6	10.0	2-WAY	1"	3/4"	1,2

REMARKS:

1. REPLACE EXISTING CHILLED WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #10/M5.01 WITH NEW.
2. REPLACE EXISTING HEATING HOT WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #9/M5.01 WITH NEW.

COOLING TOWER

MARK	ENTERING WATER TEMP.(°F)	LEAVING WATER TEMP.(°F)	GPM	AMBIENT WET BULB TEMP. (°F)	MOTOR HP	CURRENT CHARAC. V	P	F	MANUFACTURER	MODEL	REMARKS
(E)CT-1	96.0	86.0	1800	80	40	480	3	60	-	-	1
(E)CT-2	96.0	86.0	1800	80	40	480	3	60	-	-	1
(E)CT-3	96.0	86.0	1800	80	40	480	3	60	-	-	1

REMARKS:

1. REPLACE BYPASS CONTROL VALVES ON CONDENSER WATER PIPING

SCROLL PACKAGED AIR COOLED CHILLER

MARK	ACTUAL CAPACITY (TONS)	LEAVING WATER TEMP.(°F)	GPM	PRESSURE DROP (FT.)	AMBIENT AIR TEMP. (°F)	CURRENT CHARAC. V	P	F	BASIS OF DESIGN: MOCP	MCA	REMARKS
ACCH-1	150	42	302	20.0	95 °F	480		60	400	336	1

REMARKS:

1. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR ADDITIONAL INFORMATION.

DUST COLLECTOR

MARK	CFM	MAX S.P. (IN. W.G.)	HORSE POWER	CURRENT CHARAC. V	PH	F	MANUFACTURER	MODEL #	REMARKS
DC-1	2,800	10.0	20	480	3	60	DONALDSON	DC	1

REMARKS:

1. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR MORE INFO.

(E)UNIT HEATER - ELECTRIC

MARK	MINIMUM CAPACITY (BTUH)	KW	CURRENT CHARAC. V	P	F	CFM	MANUFACTURER	MODEL	REMARKS
(E)EH-1	17,061	4.0	277	1	60	425	MARKEL	3474	-
(E)EH-2	17,061	4.0	277	1	60	425	MARKEL	3474	-
(E)EH-3	17,061	4.0	277	1	60	425	MARKEL	3474	-
(E)EH-4	17,061	4.0	277	1	60	425	MARKEL	3474	-
(E)EH-5	17,061	4.0	277	1	60	425	MARKEL	3474	-
(E)EH-6	17,061	4.0	277	1	60	425	MARKEL	3474	-

PUMP

MARK	SERVICE	TYPE	GPM	HEAD (FT.)	MOTOR HORSE POWER	MAX. RPM	CURRENT CHARAC. V	P	F	MANUFACTURER	MODEL NUMBER
PCHP-1	CHILLED WATER	HORIZONTAL SPLIT CASE	1125	120	50	1800	480	3	60	ARMSTRONG	4600
PCHP-2	CHILLED WATER	HORIZONTAL SPLIT CASE	1125	120	50	1800	480	3	60	ARMSTRONG	4600
PCHP-3	CHILLED WATER	HORIZONTAL SPLIT CASE	1125	120	50	1800	480	3	60	ARMSTRONG	4600
(E)CWP-1	COND. WATER	VERTICAL TURBINE	1800	95	75	1750	480	3	60	BELL & GOSSETT	14RJH0
(E)CWP-2	COND. WATER	VERTICAL TURBINE	1800	95	75	1750	480	3	60	BELL & GOSSETT	14RJH0
(E)CWP-3	COND. WATER	VERTICAL TURBINE	1800	95	75	1750	480	3	60	BELL & GOSSETT	14RJH0
(E)HWP-1	HEATING HOT WATER	HORIZONTAL SPLIT CASE	351	140	25	1750	480	3	60	BELL & GOSSETT	150
(E)HWP-2	HEATING HOT WATER	HORIZONTAL SPLIT CASE	351	140	25	1750	480	3	60	BELL & GOSSETT	150
N-HWP-04	HEATING HOT WATER	VERTICAL INLINE	341	50	7.5	1800	480	3	60	ARMSTRONG	4600
(E)N-HWP-01	HEATING HOT WATER	VERTICAL INLINE	64	50	2	1800	480	3	60	-	-
(E)N-HWP-02	HEATING HOT WATER	VERTICAL INLINE	64	50	2	1800	480	3	60	-	-
(E)N-HWP-03	HEATING HOT WATER	VERTICAL INLINE	85	80	3	1200	480	3	60	-	-

(E) BOILER SCHEDULE

MARK	EWT (°F)	LWT (°F)	GPM	MINIMUM INPUT (MBH)	MINIMUM HEATING OUTPUT (MBH)	GAS MANIFOLD PRESSURE (PSI)	FLUE SIZE (IN. ROUND)	ELECTRICAL: BLOWER HP	CURRENT CHARAC. (V/PH/HZ)	REMARKS
(E)B-1	150°	180°	351	8,370	6,700	-	-	-	480/3/60	1
(E)B-2	150°	180°	351	8,370	6,700	-	-	-	480/3/60	1
(E)B-3	160°	188°	120	2,000	1,700	-	12	-	480/3/60	1
(E)N-B-1	160°	180°	64	750,000	640,500	-	5	-	120/1/60	1
(E)N-B-2	160°	180°	85	1,000,000	853,000	-	6	-	120/1/60	1

REMARKS:

1. REPLACE EXISTING HEATING HOT WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES

(E) HOT WATER UNIT HEATER

MARK	CFM	GPM	MIN. CAPACITY (BTH)	MAXIMUM PRESSURE DROP: AIR (IN. W.G.)	WATER	MANUFACTURER	MODEL	HW PIPE SIZE (IN.)	REMARKS
(E)UH-H1	1,050	2.75	38,900	-	-	REZNOR	HH300	3/4"	1
(E)UH-H2	1,050	2.75	38,900	-	-	REZNOR	HH300	3/4"	1
(E)UH-H3	1,050	2.75	38,900	-	-	REZNOR	HH300	3/4"	1
(E)UH-H4	1,050	2.75	38,900	-	-	REZNOR	HH300	3/4"	1

REMARKS:

1. REPLACE EXISTING HEATING HOT WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #9/M5.01 WITH NEW.

SYMBOL LEGEND

SYMBOL	DESCRIPTION (DISREGARD ITEMS NOT SHOWN ON PLANS)
GENERAL	
#	KEY NOTE TAG
#	NOTE SPECIFIC TO DETAIL TAG
#	REVISION TAG
DH	ELECTRIC DUCT HEATER
UH	ELECTRIC UNIT HEATER
	PUMP
DS	MOTOR STARTER/DISCONNECT
VD	VARIABLE FREQUENCY DRIVE
CP	BUILDING MANAGEMENT CONTROL PANEL (EXISTING)
D	FLOW METER DISPLAY
LC	LIGHTING CONTACTOR
CONTROL	
FS	COMBINATION FIRE & SMOKE DAMPER (VERTICAL)
FS	COMBINATION FIRE & SMOKE DAMPER (HORIZONTAL)
M	MOTORIZED DAMPER
SENSORS	
T	THERMOSTAT AND TEMPERATURE SENSOR
H	HUMIDISTAT
B	LIGHTING TLO BUTTON (1)
m	HVAC TLO BUTTON (1)
E	EMERGENCY SHUTDOWN STATION (1)
CO²	CARBON DIOXIDE SENSOR
TS	TIMER SWITCH
TL	LINE VOLTAGE THERMOSTAT
KT	KILN TIMER
CO	CARBON MONOXIDE MONITOR
PB	PURGE BUTTON
HS	FUME HOOD SWITCH
SUBSCRIPTS AND ABBREVIATIONS	
AFF	ABOVE FINISHED FLOOR
BBS	BELOW BOTTOM OF STRUCTURE
CFM	CUBIC FEET PER MINUTE
EA	EXHAUST AIR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
RA	RETURN AIR
SA	SUPPLY AIR
HWC	HOT WATER COIL

REMARKS:

1. COORDINATE LOCATION WITH OWNER, COMMISSIONING AND ENGINEER.

NOTE: SCHEDULES INCLUDED ON THIS SHEET ARE SUPPLEMENTARY INFORMATION FOR THE NEW EQUIPMENT INSTALLED AS PART OF THE BUILDING RENOVATION. REFER TO BUILDING RENOVATION DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

OUTSIDE AIR INTAKE

MARK	CFM	MAX P.D. (IN. W.G.)	MIN. THROAT	ACME MODEL NUMBER	SERVES	REMARKS
(E)OAI-A1	1,610	0.10	18x18	IV	AHU-A1	1
(E)OAI-B1	1,650	0.10	18x18	IV	AHU-B1	1
(E)OAI-C1	5,140	0.10	36x18	IV	AHU-C1&C2	1
(E)OAI-C3	4,640	0.10	22x22	IV	AHU-C3	1
(E)OAI-C4	6,000	0.10	60x36	IV	AHU-C4	1
(E)OAI-D1	7,000	0.10	36x36	IV	AHU-D1&D3	1
(E)OAI-D2	4,335	0.10	30x30	IV	AHU-D2&D3	1
(E)OAI-D3	525	0.15	12x12	IV	AHU-D4	1
(E)OAI-D4	3,815	0.10	30x30	IV	AHU-D5	1
(E)OAI-E1	8,025	0.15	48x42	IV	AHU-E1	1
(E)OAI-E1A	1,425	0.10	16x14	IV	AHU-E3	1
(E)OAI-E2	3,885	0.10	36x36	IV	AHU-E2	1
(E)OAI-E2A	5,825	0.10	36x36	IV	AHU-E4	1
(E)OAI-E5	4,835	0.10	24x24	IV	AHU-E5	1
(E)OAI-F1	6,980	0.10	36x36	IV	AHU-F2 & FCU-F1	1
(E)OAI-G2	4,200	0.10	30x30	IV	AHU-G2	1
(E)OAI-G3	1,325	0.10	14x12	IV	AHU-G3	1
(E)OAI-G4	870	0.10	14x14	IV	AHU-G4	1
(E)OAI-H1	2,135	0.10	24x24	IV	AHU-H1	1
(E)OAI-H2	485	0.10	12x12	IV	AHU-H2	1
(E)OAI-H3	930	0.10	14x14	IV	AHU-H3	1
(E)OAI-H4	375	0.10	12x12	IV	AHU-H4	1
(E)OAI-H5	5,715	0.10	24x30	IV	AHU-H4	1
(E)OAI-I1	1,220	0.10	16x16	IV	AHU-I3	1
(E)OAI-J1	3,475	0.10	22x20	IV	AHU-J6&J7	1
(E)OAI-CP-1	13,600	0.10	54x54	IV	CENTRAL PLANT	1
(E)OAI-A1-01	1,650	0.10	18x18	IV	AHU-A1	1
OAI-G1	7,800	0.20	-	TRE	OAU-G7	2
OAI-G2	7,200	0.10	-	TRE	EF-G11/ EF-G12	2
OAI-G3	7,200	0.10	-	TRE	EF-G9/ EF-G10	2
OAI-G4	4,800	0.10	-	TRE	EF-G13	2
OAI-G5	2,800	0.10	-	TRE	DC-1	2

REMARKS:

1. PROVIDE NEW MOTORIZED DAMPER AND 24V ACTUATOR.
2. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR MORE INFO.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064
Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

STATE OF TEXAS
BRADLEY KALMANS
80219
LICENSED
PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24

Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: IP

MECHANICAL CONTROLS SCHEDULES

M7.11

of

(E)WATER COOLED CHILLER

MARK	TONS	EVAPORATOR			CONDENSER	VALVE TYPE	PIPE SIZE	REMARKS
		MAX GPM	MIN GPM	LWT	FLOW GPM			
(E)CH-01	600	900	450	42°	1800	2-WAY	8"	1
(E)CH-02	600	900	450	42°	1800	2-WAY	8"	1
(E)CH-03	600	900	450	42°	1800	2-WAY	8"	1

REMARKS:
1.EXISTING CONDENSER WATER AND CHILLED WATER ISOLATIONS SHALL BE REPLACED.

(E) GAS UNIT HEATER

MARK	INPUT CAPACITY (BTUH)	OUTPUT CAPACITY (BTUH)	CURRENT CHARAC.			CFM	MANUFACTURER	MODEL	REMARKS
			V	P	F				
(E)GFUH-H-1	30,000	24,300	-	-	-	440	MODINE	PAE-30	-
(E)GFUH-H-2	30,000	24,300	-	-	-	440	MODINE	PAE-30	-

DUCTLESS MINI-SPLIT - INDOOR UNIT

MARK	FAN					AIR TEMPERATURE (°F)		COOLING		HEATING			COOLING	REMARKS
	SUPPLY AIR CFM	WATTS	CURRENT CHARAC. V	P	F	ENTERING DRY BULB	ENTERING WET BULB	MIN. TOTAL CAPACITY (BTUH)	MIN. SENS. CAPACITY (BTUH)	ENTERING AIR TEMP.(°F)	MINIMUM CAPACITY (BTUH)	KW	MINIMUM SEER/ HSPF2	
DMS-1	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-2	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-3	900	40.0	208	1	60	75.0	62.5	36,000	28,800	0	0	2	15.0/-	1
DMS-4	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-5	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-6	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-7	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-8	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-9	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-10	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-11	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-12	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-13	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-14	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-15	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-16	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-17	375	40.0	208	1	60	75.0	62.5	18,000	14,400	0	0	0	15.0/-	1
DMS-18	375	40.0	208	1	60	75.0	62.5	18,000	14,400	72	7,290	2	14.3/7.5	1
DMS-19	375	40.0	208	1	60	75.0	62.5	18,000	14,400	72	7,290	2	14.3/7.5	1
DMS-20	375	40.0	208	1	60	75.0	62.5	18,000	14,400	72	7,290	2	14.3/7.5	1

REMARKS:
1. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR ADDITIONAL INFORMATION.

(E)RELIEF VENT

MARK	CFM	MAX P.D. (IN. W.G.)	MIN. THROAT	ACME MODEL NUMBER	SERVES	REMARKS
(E)RV-A-01	5,500	0.10	30x30	EV	AHU-A-2	1
(E)RV-G-01	-	0.10	12x16	LEV	AHU-G-4	1
(E)RV-F-01	5,000	0.10	36x36	EV	AHU-F-1 & AHU-F-2	1
(E)RV-J-01	9,350	0.10	48x48	EV	AHU-J-1 & AHU-J-2	1

REMARKS:
1.PROVIDE NEW MOTORIZED DAMPER AND 24V ACTUATOR.

DUCTLESS MINI-SPLIT - OUTDOOR UNIT

MARK	MIN. TOTAL CAPACITY (BTUH)	OUTDOOR AIR TEMP (°F)	MINIMUM SEER/HSPF 2	CURRENT CHARAC. V	PH	F	RELATED UNIT MARK	REMARKS
DMSCU-1	18,000	95	15.0/-	208	1	60	DMS-1	1
DMSCU-2	18,000	95	15.0/-	208	1	60	DMS-2	1
DMSCU-3	36,000	95	15.0-/-	208	1	60	DMS-3	1
DMSCU-4	18,000	95	15.0/-	208	1	60	DMS-4	1
DMSCU-5	18,000	95	15.0/-	208	1	60	DMS-5	1
DMSCU-6	18,000	95	15.0/-	208	1	60	DMS-6	1
DMSCU-7	18,000	95	15.0/-	208	1	60	DMS-7	1
DMSCU-8	18,000	95	15.0/-	208	1	60	DMS-8	1
DMSCU-9	18,000	95	15.0/-	208	1	60	DMS-9	1
DMSCU-10	18,000	95	15.0/-	208	1	60	DMS-10	1
DMSCU-11	18,000	95	15.0/-	208	1	60	DMS-11	1
DMSCU-12	18,000	95	15.0/-	208	1	60	DMS-12	1
DMSCU-13	18,000	95	15.0/-	208	1	60	DMS-13	1
DMSCU-14	18,000	95	15.0/-	208	1	60	DMS-14	1
DMSCU-15	18,000	95	15.0/-	208	1	60	DMS-15	1
DMSCU-16	18,000	95	15.0/-	208	1	60	DMS-16	1
DMSCU-17	18,000	95	15.0/-	208	1	60	DMS-17	1
DMSCU-18	18,000	95	14.3/7.5	208	1	60	DMS-18	1
DMSCU-19	18,000	95	14.3/7.5	208	1	60	DMS-19	1
DMSCU-20	18,000	95	14.3/7.5	208	1	60	DMS-20	1

REMARKS:
1. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR ADDITIONAL INFORMATION.

VARIABLE VOLUME TERMINAL BOX

MARK	MAXIMUM CFM	MINIMUM CFM	INLET DIAMETER SIZE (IN.)	REMARKS
VAV-G7-01	3,000	630	16	1
VAV-G7-02	3,300	630	16	1
VAV-G8-03	1,500	360	12	1

REMARKS:
1. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR MORE INFO.

DUAL DUCT TERMINAL BOX

MARK	COOLING			HEATING		REMARKS
	MAXIMUM CFM	MINIMUM CFM	INLET DIAMETER SIZE (IN.)	MAXIMUM CFM	INLET DIAMETER SIZE (IN.)	
DDB-G5-01	1700	540	14	1360	12	2
DDB-G5-02	1375	440	12	1100	12	2
DDB-G5-03	1875	600	14	1500	12	2
DDB-G5-04	1510	480	12	1210	12	2
DDB-G5-05	1760	560	14	1410	12	2
DDB-G5-06	600	190	8	480	7	2
DDB-G5-07	675	220	8	540	8	2
DDB-G6-01	3400	1,150	16	2720	16	2
DDB-G6-02	1650	560	14	1320	12	2
DDB-G6-03	2775	940	16	2220	16	2
DDB-G6-04	900	310	10	720	10	2
DDB-G6-05	2775	940	16	2220	16	2
(E)C1-01	1705	480	16	1025	14	1
(E)C1-02	760	260	14	455	12	1
(E)C1-03	1020	360	14	615	12	1
(E)C1-04	1350	360	14	810	12	1
(E)C1-05	1350	360	14	810	12	1
(E)C1-06	1315	360	14	790	12	1
(E)C1-07	525	180	10	315	8	1
(E)C1-08	1785	480	16	1075	14	1
(E)C1-09	960	260	12	580	10	1
(E)C1-10	520	180	10	315	8	1
(E)C1-11	880	260	12	530	10	1
(E)C1-12	1615	1575	16	970	14	1
(E)C1-13	1070	970	14	645	12	1
(E)C1-14	870	260	12	520	10	1
(E)C1-15	1350	360	14	810	12	1
(E)C1-16	870	260	12	520	10	1
(E)C1-17	870	260	12	520	10	1
(E)C1-18	915	260	12	450	10	1
(E)C1-19	1360	360	14	820	12	1
(E)C1-20	1360	360	14	820	12	1
(E)C1-21	1360	1330	14	820	12	1
(E)C1-22	420	180	10	255	8	1
(E)D2-01	730	260	12	440	10	1
(E)D2-02	250	100	8	150	6	1
(E)D2-03	985	260	12	595	10	1
(E)D2-04	1125	360	14	675	12	1
(E)D2-05	1220	360	14	735	12	1
(E)D2-06	1455	360	14	875	12	1
(E)D2-07	990	260	12	595	10	1
(E)D2-08	550	180	10	330	8	1
(E)D2-09	1650	480	16	990	14	1
(E)D2-10	500	180	10	250	8	1
(E)D1-01	530	180	10	320	8	1
(E)D1-02	700	180	12	420	10	1
(E)D1-03	530	180	10	320	8	1
(E)D1-04	390	180	10	235	8	1
(E)D1-05	1295	360	14	780	12	1
(E)D1-06	445	180	10	270	8	1
(E)D1-07	1200	360	14	720	12	1
(E)D1-08	1440	360	14	865	12	1
(E)D1-09	660	590	12	400	10	1
(E)D1-10	1515	1465	14	910	12	1
(E)D1-11	395	100	10	240	8	1
(E)D1-12	1100	360	14	660	12	1
(E)D1-13	440	180	10	265	8	1
(E)E1-01	540	180	10	325	8	1
(E)E1-02	680	180	12	410	10	1
(E)E1-03	1520	480	14	910	12	1
(E)E1-04	680	180	12	410	10	1
(E)E1-05	795	260	12	480	10	1
(E)E1-06	930	260	12	560	10	1
(E)E1-07	965	260	12	580	10	1
(E)E1-08	680	180	12	410	10	1
(E)E1-09	680	180	12	410	10	1
(E)E1-10	1520	480	14	915	12	1
(E)E1-11	680	180	12	410	10	1
(E)E1-12	680	180	12	410	10	1
(E)E1-13	1520	480	14	915	12	1
(E)E1-14	680	180	12	410	10	1
(E)E1-15	795	260	12	480	10	1
(E)E1-16	2360	630	18	1420	16	1
(E)E1-17	1660	480	16	1000	14	1
(E)E1-18	1245	360	14	750	12	1
(E)E1-19	1654	480	16	990	14	1
(E)E1-20	680	180	12	410	10	1
(E)E1-21	680	180	12	410	10	1
(E)E1-22	1850	1760	16	1110	14	1
(E)E1-23	680	180	12	410	10	1
(E)E1-24	680	180	12	410	10	1
(E)E2-01	1460	360	14	880	12	1
(E)E2-02	1095	1005	14	660	12	1
(E)E2-03	960	260	12	575	10	1
(E)E2-04	1060	360	14	635	12	1
(E)E2-05	710	620	12	430	10	1
(E)E2-06	1525	480	14	915	12	1
(E)E2-07	1055	360	14	635	12	1
(E)E2-08	580	180	10	350	8	1
(E)E2-09	1080	360	14	650	12	1
(E)E2-10	2520	2430	18	1515	16	1
(E)E2-11	2380	630	18	1430	16	1
(E)E2-12	795	260	12	480	10	1
(E)E2-13	680	180	12	410	10	1
(E)E2-14	795	260	12	480	10	1
(E)E2-15	2360	630	18	1420	16	1
(E)B1-01	1260	360	14	760	12	1
(E)B1-02	990	260	12	595	10	1
(E)B1-03	1320	1280	14	795	12	1
(E)B1-04	760	260	12	460	10	1
(E)B1-05	305	100	8	185	6	1
(E)B1-06	970	260	12	580	10	1
(E)B1-07	510	180	10	310	8	1
(E)J3-01	1550	480	14	930	12	1
(E)J3-02	1240	360	14	745	12	1
(E)J3-03	1335	1295	14	805	12	1
(E)J3-04	250	100	8	150	6	1
(E)J3-05	1350	360	14	810	12	1
(E)J3-06	1190	360	14	715	12	1
(E)J3-07	2175	630	18	1305	16	1
(E)J3-08	1825	1705	16	1095	14	1
(E)J3-09	1100	360	14	660	12	1
(E)J3-10	1405	360	14	845	12	1
(E)J3-11	370	100	8	225	6	1
(E)J3-12	370	100	8	225	6	1
(E)H1-01	310	260	8	190	6	1
(E)H1-02	800	260	12	480	10	1
(E)H1-03	1325	1275	14	800	12	1
(E)H1-04	460	180	10	275	8	1
(E)H1-05	370	200	8	225	6	1
(E)H1-06	820	260	12	490	10	1
(E)H1-07	2180	630	18	1310	16	1
(E)H1-08	2180	630	18	1310	16	1
(E)H1-09	1760	480	16	1060	14	1
(E)H1-10	1940	1900	16	1165	14	1
(E)H1-11	730	260	12	440	10	1

REMARKS:
1. REPLACE EXISTING ACTUATORS WITH NEW. CONTROL DAMPER TO REMAIN AND BE REUSED.
2. NEW EQUIPMENT PROVIDED AS PART OF BUILDING RENOVATION. REFER TO BUILDING RENOVATIONS DRAWINGS FOR MORE INFO.

DUAL DUCT TERMINAL BOX

MARK	COOLING			HEATING		REMARKS
	MAXIMUM CFM	MINIMUM CFM	INLET DIAMETER SIZE (IN.)	MAXIMUM CFM	INLET DIAMETER SIZE (IN.)	
(E)1H5-01	730	260	12	440	10	1
(E)1H5-02	730	260	12	440	10	1
(E)1H5-03	1370	360	14	825	12	1
(E)1H5-04	650	180	12	390	10	1
(E)1H5-05	1090	965	14	655	12	1
(E)1H5-06	1620	1450	16	975	14	1
(E)1H5-07	2235	630	18	1345	16	1
(E)2H5-01	970	260	12	585	10	1
(E)2H5-02	1640	480	16	985	14	1
(E)2H5-03	1640	480	16	985	14	1
(E)2H5-04	1720	480	16	1035	14	1
(E)2H5-05	1640	480	16	985	14	1
(E)2H5-06	1300	360	14	780	12	1
(E)G2-01	750	260	12	450	10	1
(E)G2-02	285	100	8	175	6	1
(E)G2-03	1380	360	14	830	12	1
(E)G2-04	450	180	10	270	8	1
(E)G2-05	435	180	10	260	8	1
(E)G2-06	1380	360	14	830	12	1
(E)G2-07	545	180	10	330	8	1
(E)G2-08	470	180	10	285	8	1
(E)G2-09	2200	630	18	1320	16	1
(E)G3-01	230	100	8	140	6	1
(E)G3-02	720	260	12	430	10	1
(E)G3-03	730	260	12	440	10	1
(E)G3-04	720	260	12	430	10	1
(E)G3-05	1265	360	14	760	12	1
(E)G4-01	1710	1640	16	1030	14	1
(E)G4-02	1485	360	14	290	12	1
(E)G4-03	1875	1750	16	1110	14	1
(E)J2-1-01	970	260	12	585	10	1
(E)J2-1-02	970	260	12	585	10	1
(E)J2-1-03	970	260	12	585	10	1
(E)J2-1-04	970	260	12	585	10	1
(E)J2-1-05	970	260	12	585	10	1
(E)J2-1-06	970	260	12	585	10	1
(E)J2-1-07	1120	360	14	675	12	1
(E)C3-01	770	260	12	465	10	1
(E)C3-02	770	260	12	465	10	1
(E)C3-03	1265	360	14	800	12	1
(E)C3-04	1045	360	14	630	12	1
(E)C3-05	770	260	12	465	10	1
(E)C3-06	2315	630	18	1390	16	1
(E)C3-07	1555	480	14	935	12	1
(E)C3-08	1020	360	14	615	12	1
(E)C3-09	955	260	12	575	10	1
(E)C3-10	955	260	12	575	10	1
(E)C3-11	1020	360	14	615	12	1
(E)C3-12	1210	1120	14	730	12	1
(E)C3-13	1045	360	14	630	12	1
(E)C3-14	630	180	12	380	10	1
(E)C3-15	770	260	12	465	10	1
(E)C3-16	920	260	12	555	10	1
(E)C4-01	770	260	12	465	10	1
(E)C4-02	830	260	12	500	10	1
(E)C4-03	770	260	12	465	10	1
(E)C4-04	770	260	12	465	10	1
(E)C4-05	770	260	12	465	10	1
(E)C4-06	770	260	12	465	10	1
(E)C4-07	770	260	12	465	10	1
(E)C4-08	830	260	12	500	10	1
(E)C4-09	1605	480	16	965	14	1
(E)C4-10	2315	630	18	1390	16	1
(E)C4-11	965	260	12	580	10	1
(E)C4-12	965	260	12	580	10	1
(E)C4-13	975	260	12	585	10	1
(E)C4-14	770	260	12	465	10	1
(E)C4-15	770	260	12	465	10	1
(E)C4-16	1075	360	14	645	12	1
(E)C4-17	880	260	12	530	10	1
(E)C4-18	770	260	12	465	10	1
(E)D3-01	1840	480	16	1105	14	1
(E)D3-02	1275	360	14	765	12	1
(E)D3-03	1185	360	14	715	12	1
(E)D3-04	1400	360	14	840	12	1
(E)D3-05	1400	360	14	840	12	1
(E)D3-06	1250	360	14	750	12	1
(E)D3-07	740	260	12	445	10	1
(E)D3-08	1080	1010	14	650	12	1
(E)D3-09	2380	630	18	1425	16	1
(E)D3-10	455	180	10	275	8	1
(E)D4-01	1700	480	16	1020	14	1
(E)D4-02	650	180	12	295	10	1
(E)D4-03	2000	480	16	1200	14	1
(E)D4-04	195	100	8	120	6	1
(E)D4-05	1605	480	16	965	14	1
(E)D4-06	850	260	12	510	10	1
(E)D5-01	1830	480	16	1100	14	1
(E)D5-02	1300	360	14	780	12	1
(E)D5-03	1245	1180	14	750	12	1
(E)D5-04	1530	480	14	920	12	1
(E)D5-05	1530	480	14	920	12	1
(E)E4-01	730	260	12	440	10	1
(E)E4-02	905	260	12	545	10	1
(E)E4-03	790	260	12	475	10	1
(E)E4-04	730	260	12	440	10	1
(E)E4-05	790	260	12	475	10	1
(E)E4-05	905	260	12	545	10	1
(E)E4-07	2315	630	18	1390	16	1
(E)E4-08	1555	480	14	935	12	1
(E)E4-09	760	260	12	460	10	1
(E)E4-10	760	260	12	460	10	1
(E)E4-11	1080	360	14	650	12	1
(E)E4-12	760	260	12	460	10	1
(E)E4-13	965	260	12	580	10	1
(E)E4-14	760	260	12	460	10	1
(E)E4-15	420	370	10	255	8	1
(E)E4-16	955	260	12	575	10	1
(E)E4-17	1045	955	14	630	12	1
(E)E4-18	1235	360	14	740	12	1
(E)E5-01	375	180	8	225	6	1
(E)E5-02	730	260	10	440	8	1
(E)E5-03	730	260	10	440	8	1
(E)E5-04	730	260	10	440	8	1
(E)E5-05	790	260	10	475	8	1
(E)E5-06	1600	480	16	1070	14	1
(E)E5-07	730	260	10	440	8	1
(E)E5-08	845	260	12	510	10	1
(E)E5-09	2315	630	18	1390	16	1
(E)E5-10	1605	480	16	965	14	1
(E)E5-11	1400	360	14	840	12	1
(E)E5-12	1045	360	14	630	12	1
(E)E5-13	730	260	12	440	10	1
(E)E5-14	1400	360	12	840	12	1
(E)E5-15	1010	360	14	610	12	1
(E)E5-16	1100	1010	14	660	12	1
(E)E5-17	1530	480	14	920	12	1
(E)E5-18	480	180	10	290	8	1

REMARKS:
1. REPLACE EXISTING ACTUATORS WITH NEW. EXISTING CONTROL DAMPER TO REMAIN AND BE REUSED.

(E) POOL DEHUMIDIFICATION UNIT REMOTE OUTDOOR AIR FLUID COOLER

MARK	MIN. TOTAL CAPACITY (BTUH)	OUTDOOR AIR TEMP (°F)	CURRENT CHARAC. V	PH	F	RELATED UNIT MARK	REMARKS
FC-01	499,100	105	460	3	60	NAHU-1	-

1

(E) PACKAGED OUTDOOR AIR HANDLING UNIT SCHEDULE

MARK	MIN. EFFICIENCY		SUPPLY BLOWER DATA				COOLING COIL DATA									HOT GAS RE-HEAT COIL DATA		GAS HEATING DATA					CURRENT CHARAC.		
	IEER @AHRI	EER @AHRI	TOTAL CFM	OUTSIDE AIR CFM	EXT. STATIC PRESSURE (IN. W.C)	HP	CFM	MAX FACE VELOCITY (FPM)	GRAND SENSIBLE BTUH	GRAND TOTAL BTUH	EAT (°F DB)	EAT (°F WB)	LAT (°F DB)	LAT (°F WB)	TOTAL BTUH	LAT (°F DB)	INPUT (BTUH)	OUTPUT (BTUH)	MODULATING RATIO	EAT (°F DB)	LAT (°F DB)	V	PH	F
(E)N-RTU-01	17.8	11.1	1,850	1,130	1.0	1.5	1,850	500	71,300	125,000	89.0°	74.2°	54.0°	54.0°	56,000	72.0°	100,000	80,000	16:1	48.4°	108.0°	480	3	60

(E) OUTDOOR POOL DEHUMIDIFICATION UNIT SCHEDULE

MARK	SUPPLY AIR FAN				MIN EXHAUST AIR FAN (EA-1 & 2)			PURGE EXHAUST AIR FAN (PEA-1 & 2)			COOLING COIL DATA					HOT-GAS RE-HEAT COIL (FULL MODULATION)			REFRIGERANT TYPE/ TOTAL LBS.	INDOOR SPACE CONDITIONS			SPACE HEATING - AUXILIARY HEATING COIL DATA									CURRENT CHARAC.			PIPE SIZE TO COIL (IN.)	REMARKS
	SUPPLY AIR CFM	MIN. OUTSIDE AIR CFM	EXT. STATIC PRESSURE (IN. W.C)	QTY/HP	EXHAUST AIR CFM	EXT. STATIC PRESSURE (IN. W.C)	QTY/HP	CFM	EXT. STATIC PRESSURE (IN. W.C)	QTY/HP	SENSIBLE CAP. (BTUH)	TOTAL CAP. (BTUH)	MOISTURE REMOVAL (LBS/HR)	EAT (°F)	LAT (°F)	REHEAT CAP. (BTUH)	EAT (°F)	LAT (°F)		SPACE SETPOINT (°F DB)	POOL WATER TEMP. (LAP POOL) (°F)	% RELATIVE HUMIDITY (EVENT MODE)	CFM	MAX FACE VELOCITY (FPM)	GRAND CAP. (BTUH)	EAT (°F)	LAT (°F)	FLOW (GPM)	EWT (°F)	LWT (°F)	MAX. PD (FT. H2O)	V	PH	F	HOT WATER	
(E)NAHU-01	15,000	2,100	1.0	1/ 20HP	2,310	0.5	2/ 3.2HP	14,190	0.5	1/ 5.3HP	243,600	399,300	144 PPH	82.0°	55.0°	499,100	55.0°	82.0°	R-410A/ 80 LBS.	82.0°	80.0°	56%	15,000	750	550,000	82.0°	120.0°	55	180.0°	160.0°	5.5	480	3	60	2-1/2"	1

REMARKS:
1. REPLACE EXISTING HEATING HOT WATER CONTROL VALVE AND ACTUATORS, BALANCING AND ISOLATION VALVES AND EXISTING PIPING AND APPURTENANCES AS INDICATED ON DETAIL #9/M5.01 WITH NEW.

SYMBOL LEGEND

SYMBOL	DESCRIPTION (DISREGARD ITEMS NOT SHOWN ON PLANS)
GENERAL	
#	KEY NOTE TAG
#	NOTE SPECIFIC TO DETAIL TAG
#	REVISION TAG
DH	ELECTRIC DUCT HEATER
UH	ELECTRIC UNIT HEATER
	PUMP
DS	MOTOR STARTER/DISCONNECT
VD	VARIABLE FREQUENCY DRIVE
CP	BUILDING MANAGEMENT CONTROL PANEL (EXISTING)
D	FLOW METER DISPLAY
LC	LIGHTING CONTACTOR
CONTROL	
FS	COMBINATION FIRE & SMOKE DAMPER (VERTICAL)
FS	COMBINATION FIRE & SMOKE DAMPER (HORIZONTAL)
M	MOTORIZED DAMPER
SENSORS	
T	THERMOSTAT AND TEMPERATURE SENSOR
H	HUMIDISTAT
B	LIGHTING TLO BUTTON (1)
m	HVAC TLO BUTTON (1)
E	EMERGENCY SHUTDOWN STATION (1)
CO^2	CARBON DIOXIDE SENSOR
TS	TIMER SWITCH
TL	LINE VOLTAGE THERMOSTAT
KT	KILN TIMER
CO	CARBON MONOXIDE MONITOR
PB	PURGE BUTTON
HS	FUME HOOD SWITCH
SUBSCRIPTS AND ABBREVIATIONS	
AFF	ABOVE FINISHED FLOOR
BBS	BELOW BOTTOM OF STRUCTURE
CFM	CUBIC FEET PER MINUTE
EA	EXHAUST AIR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
RA	RETURN AIR
SA	SUPPLY AIR
HWC	HOT WATER COIL

REMARKS:
1.COORDINATE LOCATION WITH OWNER, COMMISSIONING AND ENGINEER.

NOTE: SCHEDULES INCLUDED ON THIS SHEET ARE SUPPLEMENTARY INFORMATION FOR THE NEW EQUIPMENT INSTALLED AS PART OF THE BUILDING RENOVATION. REFER TO BUILDING RENOVATION DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064
Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

STATE OF TEXAS
BRADLEY KALMANS
80219
LICENSED
PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

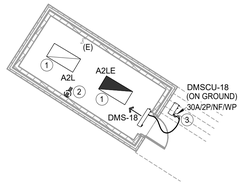
1	Addendum 02	12/09/24

Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: IP

MECHANICAL CONTROLS SCHEDULES

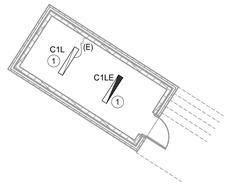
M7.12



N

1 ELECTRICAL SITE PLAN -FOOTBALL PRESSBOX - POWER AND LIGHTING

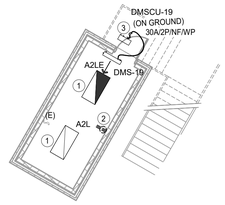
Scale: 1/8" = 1'-0"



N

2 ELECTRICAL SITE PLAN -FOOTBALL PRESSBOX - POWER AND LIGHTING - STORAGE

Scale: 1/8" = 1'-0"



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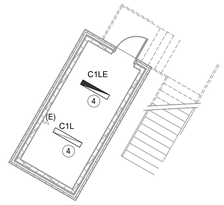
6 ELECTRICAL SITE PLAN -SOFTBALL PRESSBOX - POWER AND LIGHTING

Scale: 1/8" = 1'-0"



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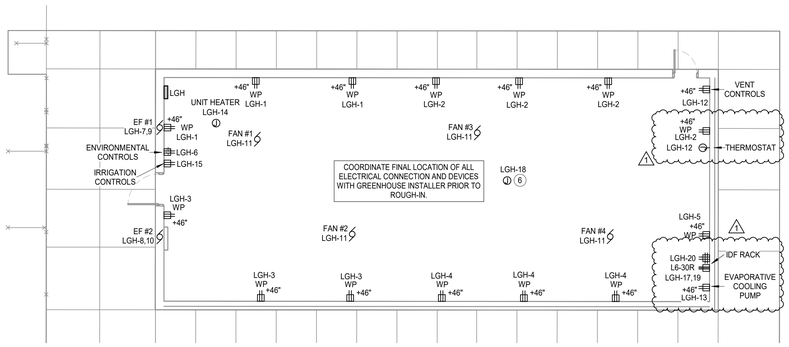
7 ELECTRICAL SITE PLAN -SOFTBALL PRESSBOX - POWER AND LIGHTING - STORAGE

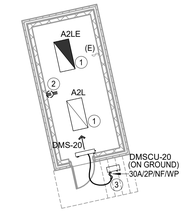
Scale: 1/8" = 1'-0"



N

3 ELECTRICAL SITE PLAN -GREENHOUSE - POWER

Scale: 1/8" = 1'-0"



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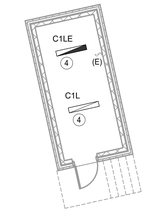
8 ELECTRICAL SITE PLAN -BASEBALL PRESSBOX - POWER AND LIGHTING

Scale: 1/8" = 1'-0"



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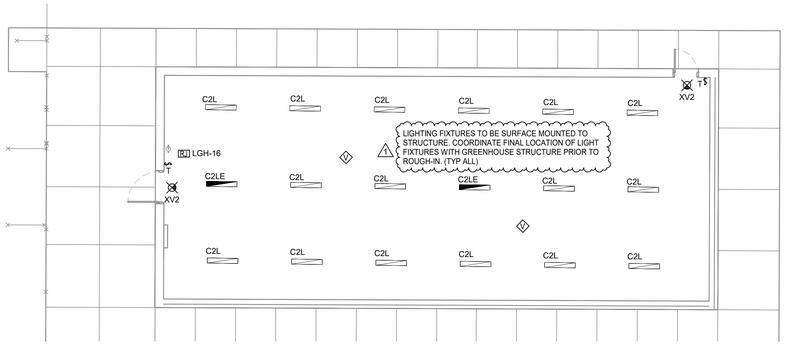
9 ELECTRICAL SITE PLAN -BASEBALL PRESSBOX - POWER AND LIGHTING - STORAGE

Scale: 1/8" = 1'-0"



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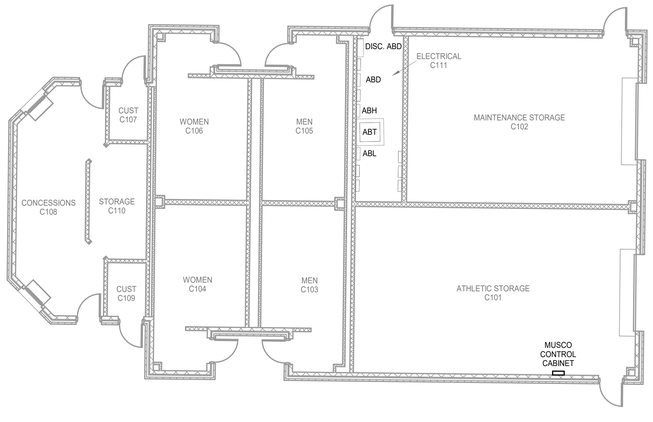
4 ELECTRICAL SITE PLAN -GREENHOUSE - LIGHTING

Scale: 1/8" = 1'-0"



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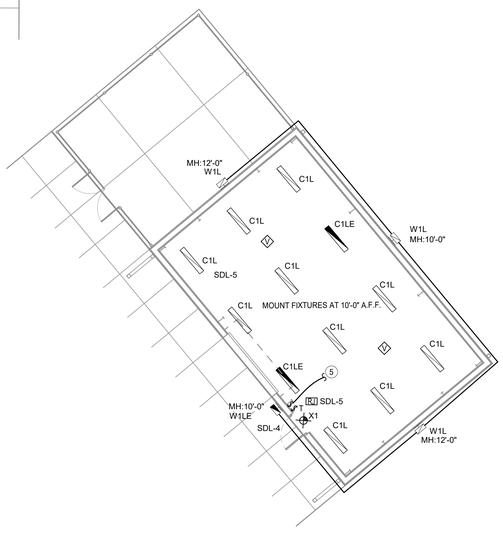
5 ELECTRICAL SITE PLAN - FIELDHOUSE

Scale: 1/8" = 1'-0"



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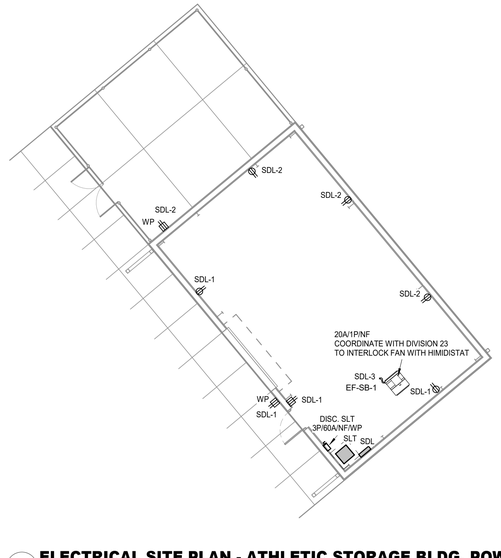
10 ELECTRICAL SITE PLAN - ATHLETIC STORAGE BLDG. LIGHTING

Scale: 1/8" = 1'-0"



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11 ELECTRICAL SITE PLAN - ATHLETIC STORAGE BLDG. POWER

Scale: 1/8" = 1'-0"

LINETYPE LEGEND

———	EXISTING TO REMAIN
- - - -	DISCONNECT AND REMOVE
———	NEW WORK

PROVIDE NEW LIGHTING DEVICES AND SWITCH BOX EXTENSIONS IN ALL AREAS WHERE GYPSUM BOARD OR OTHER WALL COVERING ADDS TO THE THICKNESS OF WALLS. SEE ARCHITECTURAL DRAWINGS FOR AREAS AFFECTED.

EXISTING RACEWAYS AND LOCATION OF ELECTRICAL OUTLETS ON EXISTING WALLS TO REMAIN SHALL BE RE-USED AS PRACTICAL FOR NEW DEVICES AS PART OF NEW WORK.

PROVIDE (1) MOMENTARY BMCS OVERRIDE TIME-OUT SWITCH FOR BUILDING OCCUPIED/UNOCCUPIED ADJACENT TO OR IN THE BMCS MASTER PANEL.

ALL PANELS, CONTACTORS, RELAYS, TRANSFORMERS, WIRING, AND CONDUIT NEEDED FOR POWER AT THE GREENHOUSE ARE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

PROVIDE POWER FOR TEMPERATURE SENSORS AND THREMOSTATS IN PRESSBOXES, GREENHOUSE, AND ATHLETIC STORAGE BUILDING FROM NEAREST ACCEPTABLE 120V CIRCUIT WITH #12 WIRE. CONTRACTOR TO ENSURE TOTAL FINAL CIRCUIT LOAD DOES NOT EXCEED 1920VA.

ELECTRICAL GENERAL NOTES

1. ELECTRICAL CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY PROBLEMS PERTAINING TO CIRCUIT AVAILABILITY OR LOAD CAPACITY PRIOR TO INSTALLATION.
2. CONTRACTOR SHALL REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND SCHEDULES. CONTRACTOR SHALL PROVIDE ALL ELECTRICAL DISCONNECTS, BRANCH CIRCUITRY, STARTERS/CONTROLS, CIRCUIT BREAKERS AND CONNECTIONS REQUIRED TO POWER EQUIPMENT.
3. CONTRACTOR TO COORDINATE EXACT LOCATION OF DISCONNECT SWITCHES, JUNCTION BOXES AND SINGLE POLE TOGGLE SWITCHES FOR MECHANICAL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO INSTALLATION.
4. ALL RECEPTACLES LOCATED WITHIN 6'-0" OF SINK SHALL BE GFCI TYPE.
5. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF RECEPTACLES AND SWITCHES WITH ARCHITECTURAL ELEVATIONS PRIOR TO ELECTRICAL ROUGH-IN. ADJUST DEVICES AS REQUIRED SO THAT NO DEVICES ARE INSTALLED BEHIND CABINETS OR SHELVES.
6. ALL BLANK FACE GFCI DEVICES SHALL BE INSTALLED IN A READILY ACCESSIBLE LOCATION AND NOT BEHIND EQUIPMENT.
7. CONTRACTOR SHALL REFER TO TECHNOLOGY SERIES CONSTRUCTION DOCUMENTS FOR EXACT LOCATION AND REQUIREMENTS OF ALL LOW VOLTAGE BACK BOXES, FITTINGS, AND CONDUITS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
8. ALL EXTERIOR OUTLETS SHALL BE WP GFI IN METAL WHILE-IN -USE LOCKABLE ENCLOSURE WITH EXCEPTION TO INTEGRAL RTU RECEPTACLES.
9. NO NEW SURFACE MOUNTED RACEWAY. ALL NEW DEVICES ON EXISTING WALLS SHALL BE CUT IN TO BE FLUSH MOUNTED.
10. PROVIDE POWER TO ALL MOTORIZED DAMPERS FROM NEAREST ACCEPTABLE 120V GENERAL PURPOSE CIRCUIT. CONTRACTOR TO ENSURE TOTAL CIRCUIT LOAD DOES NOT EXCEED 1920W.

ELECTRICAL KEYED NOTES

1	EXISTING LIGHTING TO BE REMOVED AND REPLACED. PROVIDE POWER TO NEW LIGHTS SHOWN FROM EXISTING CIRCUIT. NEW FIXTURES TO BE SURFACE MOUNTED TO CEILING. RECONNECT EXISTING LIGHTING CONTROLS TO NEW FIXTURES.
2	EXISTING HVAC UNIT AND MULTIPOLE RECEPTACLE TO BE DEMOLISHED. REMOVE EXISTING CIRCUIT BACK TO PRESSBOX PANEL. EXISTING BREAKER TO BE REUSED TO FEED NEW UNIT IN THIS AREA.
3	PROVIDE POWER TO NEW UNIT FROM EXISTING 208V 3PH PANEL LOCATED IN PRESSBOX. UTILIZE EXISTING 30A/2P BREAKER REMAINING. AFTER THE REMOVAL OF EXISTING WALL MOUNTED UNIT. PROVIDE NEW #10 WIRE TO NEW 30A/2P/NF DISCONNECT AT UNIT.
4	NEW FIXTURE TO BE MOUNTED IN MULLION.
5	PROVIDE INTERMATIC EI600XX TIME SWITCH AND CONTROL PHOTOCELL OUTSIDE FOR CIRCUIT.
6	PROVIDE POWER TO LOCAL SPEAKER SYSTEM. COORDINATE FINAL LOCATION WITH DIVISION 27.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064
Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS 80219 LICENSED PROFESSIONAL ENGINEER 12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

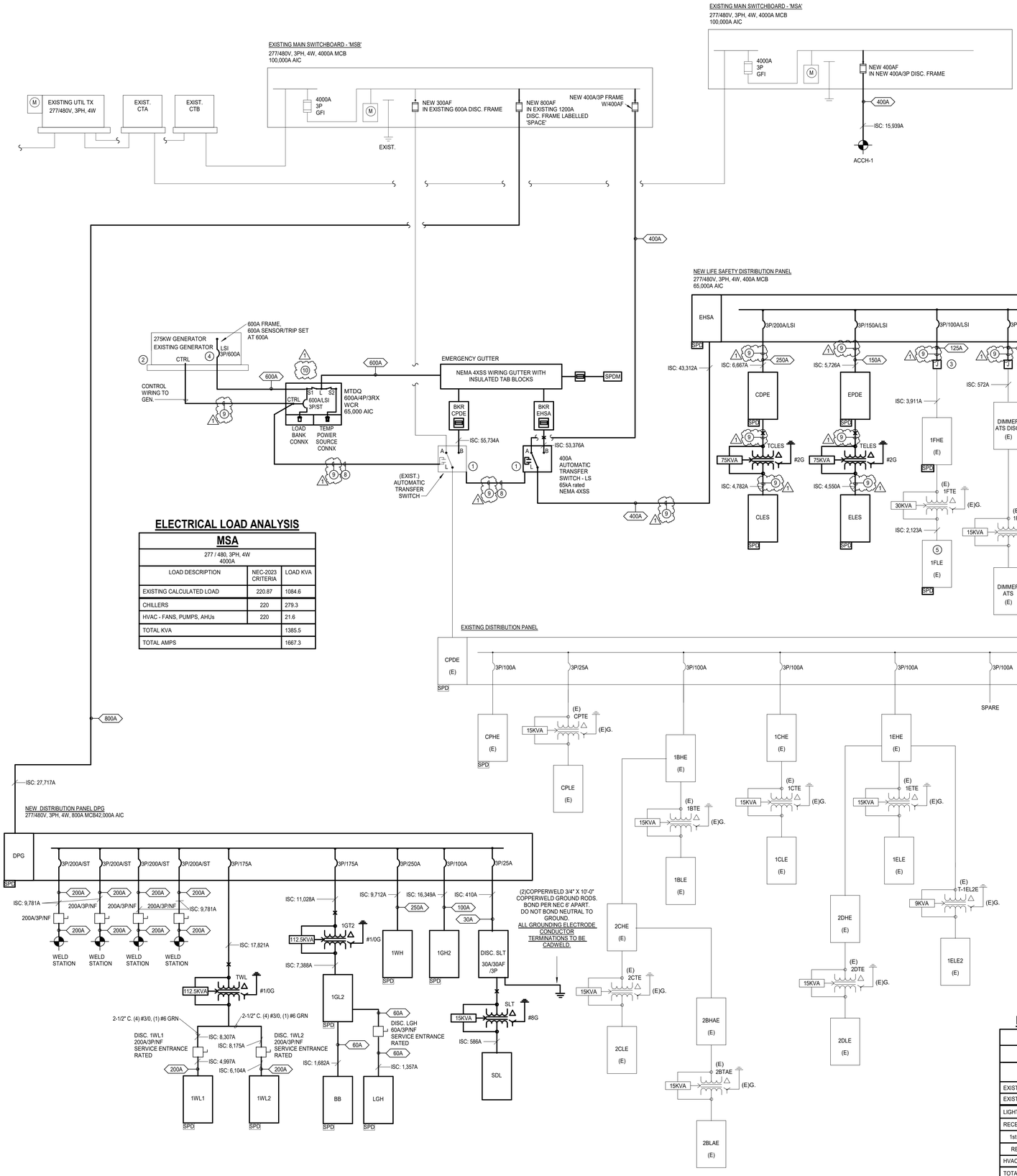
5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

No.	Revisions / Submission	Date
1	Addendum 02	12/09/24

Project Number: 23071
Date: 2024-11-17
Drawn By: KJ

ELECTRICAL SITE PLAN - ENLARGED VIEWS

E1.02



1 PARTIAL ONE LINE DIAGRAM

Scale: 12" = 1'-0"

ELECTRICAL LOAD ANALYSIS

MSA

277 / 480, 3PH, 4W
4000A

LOAD DESCRIPTION	NEC-2023 CRITERIA	LOAD KVA
EXISTING CALCULATED LOAD	220.87	1084.6
CHILLERS	220	279.3
HVAC - FANS, PUMPS, AHUs	220	21.6
TOTAL KVA		1385.5
TOTAL AMPS		1667.3

TWO-HOUR FIRE RATED CABLE:

1. TWO-HOUR FIRE RATED POWER CABLE SHALL BE APPROVED BY THE LOCAL AHJ AND INSTALLED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS IN COMPLIANCE WITH UL FIRE RESISTANCE DIRECTORY, ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS (FHIT), AND SYSTEM 27.

2. TWO-HOUR FIRE RATED POWER CABLE SHALL BE INSTALLED AS APPROVED BY THE LOCAL AHJ IN STEEL EMT OR STEEL RIGID CONDUIT WITH STEEL SET SCREW OR THREADED FITTINGS. UL LISTED FLEXIBLE METALLIC STEEL CONDUIT MAY BE USED IN LENGTHS NOT TO EXCEED 6-FEET. SUPPORT CONDUIT EVERY 5-FEET ON CONCRETE OR MASONRY WALLS OR A CONCRETE FLOOR-CEILING ASSEMBLY. THE FIRE RATING OF THE WALL OR FLOOR-CEILING ASSEMBLY MUST BE EQUAL TO OR GREATER THAN THE RATING OF THE ELECTRICAL CIRCUIT PROTECTIVE SYSTEM. PROVIDE J-BOX AT EACH END OF THE FIRE RATED CABLES IN THE FIRE RATED ROOM TO ALLOW SPLICE TO STANDARD BUILDING CABLE TO THE EQUIPMENT. PROVIDE SEALANT TO THE END OF THE RACEWAY TO PREVENT GASES FROM MIGRATING FROM THE FIRE RATED CABLE DOWN INTO THE EQUIPMENT.

INSULATION FOR TWO-HOUR FIRE RATED POWER CABLE:

1. INSULATION SHALL MEET OR EXCEED THE REQUIREMENTS OF UL 2196 FIRE TEST FOR CIRCUIT INTEGRITY OF FIRE-RESISTIVE POWER, INSTRUMENTATION, CONTROL AND DATA CABLES, AND UL 44, THERMOSET INSULATED WIRES AND CABLES.

a. INSULATION FOR CONDUCTORS SHALL BE UL TYPE RHW-2 OR RW90, 90 DEGREES C FOR WET LOCATIONS AND 90 DEGREES C FOR DRY LOCATIONS.
b. ELECTRICAL CIRCUIT PROTECTIVE SYSTEMS (FHIT) – SYSTEM 27 OF THE UL FIRE RESISTANCE DIRECTORY.

1

ELECTRICAL LOAD ANALYSIS

MSB

277 / 480, 3PH, 4W
4000A

LOAD DESCRIPTION	NEC-2023 CRITERIA	LOAD KVA
EXISTING CALCULATED LOAD	220.87	1378.6
LIGHTING (CONNECTED) x 1.25	215.2	14.2
RECEPTACLES (CONNECTED)	220.47	216
1st 10KVA @100%	220.47	10
REMAINDER @50%	220.47	103
MISCELLANEOUS	220	256.9
KITCHEN EQUIPMENT	220.56	0
HVAC - FANS, PUMPS, AHUs	220	168.4
TOTAL KVA		1931.1
TOTAL AMPS		2323.8

NOTE: EXISTING LOAD WAS REDUCED AT MSB BY REPLACING HID THEATRICAL FIXTURES WITH LED. MOST LOADS ON NEW PANELS ARE EXISTING LOADS MOVED TO NEW LIFESAFETY GENERATOR BRANCH. NEW LOADS SHOWN ARE THE NEW EMERGENCY LOADS CALCULATED FOR THE ADDITIONS.

ELECTRICAL LOAD ANALYSIS

EXIST. GENERATOR

277 / 480, 3PH, 4W
280kW/350kVA

LOAD DESCRIPTION	NEC-2023 CRITERIA	LOAD KVA
EXISTING LOAD PER OWNER	220.87	118
EXISTING CALCULATED LOAD @125%	220.87	147.5
LIGHTING (CONNECTED) x 1.25	215.2	2.7
RECEPTACLES (CONNECTED)	220.47	73
1st 10KVA @100%	220.47	10
REMAINDER @50%	220.47	31.5
HVAC - FANS, PUMPS, AHUs	220	64.6
TOTAL		256.3
TOTAL AMPS		308.4

LINE TYPE LEGEND

———	EXISTING TO REMAIN
— — — —	DISCONNECT AND REMOVE
———	NEW WORK

UNLESS NOTED OTHERWISE, RETAIN IN PLACE ALL EXISTING CIRCUITS AND FEEDER FROM SOURCE FOR ALL EXISTING PANELS LABELED TO BE REPLACED AND/OR RELOCATED. EXTEND/RE-ROUTE EXISTING BRANCH CIRCUITS AND FEEDER LEFT IN PLACE AFTER DEMOLITION FROM EXISTING PANELS TO BE RELOCATED AND/OR REPLACED.

CONTRACTOR TO FIELD VERIFY INTERRUPTING FAULT CURRENT CAPACITY OF EXISTING PANELS AND/OR SWITCHBOARDS AND TO PROVIDE NEW BREAKERS/FUSES TO MATCH EXISTING.

DEMOLITION/EXISTING DRAWINGS ARE BASED ON CASUAL FIELD OBSERVATION, AND WHEN AVAILABLE, EXISTING RECORD DOCUMENTS. REPORT DISCREPANCIES TO ARCHITECT BEFORE DISTURBING EXISTING INSTALLATION, AND IMMEDIATELY AFTER SUCH DISCREPANCIES ARE DISCOVERED. CONTRACTOR TO VERIFY EXISTING CONDITIONS ON FIELD AND NOTIFY ENGINEER IF THERE ARE ANY CONFLICTS BETWEEN EXISTING CONDITIONS AND DRAWINGS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL REMOVE SUCH EXISTING WORK AS CALLED FOR ON THE DRAWINGS OR AS REQUIRED TO CLEAR THE AREAS OF NEW CONSTRUCTION. OWNER OR ITS REPRESENTATIVE SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EUIOPMENT BEING REMOVED FROM THIS PROJECT. CONTRACTOR TO NOTIFY CAREY RAMSEY WITH DISTRICT PRIOR TO DEMOLITION WORK TO DISCUSS ALL RETURNED ITEMS TO DISTRICT.

ELECTRICAL RISER KEYED NOTES

1. PROVIDE DRY CONTACT WITH SEPARATE MONITORING INTERFACE FOR EACH ATS WITH SECURITY PANEL.
2. SELECTIVELY COORDINATE ALL EQUIPMENT DEDICATED TO THE LIFE SAFETY EMERGENCY SYSTEM, INCLUDING BUT NOT LIMITED TO, PANELBOARDS TYPE AND SIZE, BRANCH AND FEEDER CIRCUIT BREAKERS, AND GENERATOR WITH MANUFACTURER TO COMPLY WITH COORDINATION STUDY REQUIREMENTS PRIOR TO SUBMITTAL. REFER TO NEC-2023:700.
3. INTERCEPT EXISTING FEEDER AND EXTEND CONDUITS AND WIRING TO NEW UPSTREAM DISTRIBUTION PANEL. INTERCEPT EXISTING PANEL FEEDER AT CLOSEST POSSIBLE LOCATION TO NEW SUPPLY PANEL.
4. PROVIDE NEW 460V 3PH, 3POLE 600A LSI BREAKER.
5. PROVIDE NEW LSI RATED MAIN BREAKER IN EXISTING PANEL.
6. REPLACE EXISTING TRANSFORMER.
7. PROVIDE NEW 3P/25A BREAKER IN EXISTING PANEL.
8. 1" C TO ATS FOR CONTROL WIRING REFER TO SPECIFICATIONS AND COORDINATE WITH MANUFACTURER TYPICAL.
9. PROVIDE TWO-HOUR FIRE RATED CABLE.
10. DOUBLE-THROW MANUAL TRANSFER SWITCH WITH INTEGRATED QUICK-CONNECTS IN SINGLE PACKAGE. REFER TO SPECIFICATIONS.

1

FEEDER SCHEDULE

AMPERAGE	# SETS	CONDUCTOR (QTY.)/SIZE	GROUND (QTY.)/SIZE	CONDUIT
30A	1	(4) #10	#10	3/4"C
60A	1	(4) #4	#10	1-1/4"C
100A	1	(4) #3	#8	1-1/4"C
125A	1	(4) #1	#6	2"C
150A	1	(4) #1/0	#6	2"C
200A	1	(4) #3/0	#6	2-1/2"C
250A	1	(4) #250KCMIL	#4	3"C
400A	2	(4) #3/0	#3	2-1/2"C
600A	2	(4) #350KCMIL	#1/0	3-1/2"C
800A	3	(4) #300KCMIL	#1/0	3"C

1. CONDUIT QUANTITIES BASED ON 3-PHASE, 4-WIRE SYSTEM; FOR EQUIPMENT THAT DOES NOT REQUIRE A NEUTRAL OR IS SINGLE PHASE, DEDUCT
2. CONDUCTOR SIZES BASED ON NEC TABLE 310.16 - COPPER 75°.
3. GROUND SIZES BASED ON NEC TABLE 250.122 - COPPER.
4. CONDUIT FILL BASED ON NEC ANNEX C - THW CONDUCTOR INSULATION.

TRANSFORMER SCHEDULE

	PRIMARY (480V 3PH 3W)		SECONDARY (208V 3PH 4W)	
KVA	WIRE & CONDUIT	CIRCUIT BREAKER	WIRE & CONDUIT	CIRCUIT BREAKER
9KVA	3#10, 3/4"C, 1#12G	3P-15A	4#6, 1-1/4", 1#10G	3P-40A
15KVA	3#10, 3/4"C, 1#12G	3P-25A	4#6, 1-1/4", 1#10G	3P-60A
30KVA	3#6, 1"C, 1#10G	3P-45A	4#1, 2"C, 1#6G	3P-100A
45KVA	3#4, 1"C, 1#8G	3P-70A	4#1/0, 2"C, 1#6G	3P-150A
75KVA	3#1, 1-1/4"C, 1#6G	3P-125A	4#250KCMIL, 3"C, 1#4G	3P-250A
112.5KVA	3#2/0, 1-1/2"C, 1#6G	3P-175A	(2) SETS: 4#3/0, 2-1/2"C, 1#1/0G	3P-400A

TRANSFORMER SCHEDULE NOTES:
UNLESS OTHERWISE NOTED ON DRAWINGS

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064
Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

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BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1 Addendum 02 12/09/24
Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: KJ

ELECTRICAL PARTIAL ONE-LINE DIAGRAM

E4.02
of

LIGHTING FIXTURE SCHEDULE

Type Mark	CATALOG NUMBER MANUFACTURER	CATALOG NUMBER MODEL	MOUNTING	LAMP TYPE	CCT	CRI	VOLTAGE	LOAD	REMARKS
A1	DAYBRITE	2-FPZ-48L-840-4-DS-UNV-DIM	RECESSED	4800L LED	4000 K	80	277 V	37 W	LED 2x4' FLAT PANEL TROFFER. ACRYLIC DIFFUSSER. 0-10V DIMMING DRIVER. DLC CERTIFIED.
A2	DAYBRITE	2-FPZ-43L-840-4-DS-UNV-DIM	RECESSED	4300L LED	4000 K	80	277 V	30 W	LED 2x4' FLAT PANEL TROFFER. ACRYLIC DIFFUSSER. 0-10V DIMMING DRIVER. DLC CERTIFIED.
A2L	DAYBRITE	2-FPZ-43L-840-4-DS-UNV-DIM	RECESSED	4300L LED	4000 K	80	120 V	30 W	LED 2x4' FLAT PANEL TROFFER. ACRYLIC DIFFUSSER. 0-10V DIMMING DRIVER. DLC CERTIFIED.
A2LE	DAYBRITE	2-FPZ-43L-840-4-DS-UNV-DIM-BSL10LST	RECESSED	4300L LED	4000 K	80	120 V	30 W	LED 2x4' FLAT PANEL TROFFER. ACRYLIC DIFFUSSER. 0-10V DIMMING DRIVER. DLC CERTIFIED.
A3	DAYBRITE	2-FPZ-38B-840-2-DS-UNV-DIM	RECESSED	3800L LED	4000 K	80	277 V	34 W	LED 2'x2' FLAT PANEL TROFFER. ACRYLIC DIFFUSSER. 0-10V DIMMING DRIVER. DLC CERTIFIED.
ATH	ZANIBONI	LARS5-13W-RW-B-6-C-BK-X0	WALL	944L LED	RGBW	80	120 V	13 W	LED 3' CYLINDER WALL MOUNT DOWNLIGHT WITH BLACK HOUSING. RGBW WITH DMX CONTROL AND 60 DEGREE BEAM. MOUNTING HEIGHT TO MATCH EXISTING FIXTURES. PROVIDE RGB FIXTURE WITH DMX CONTROLS. FIXTURE USE FOR 'RUN OF SHOW' DEFAULT RGB COLOR SETTING TO BE BLUE.
B1	DAYBRITE	1FPZ-38L-840-4-ADS-UNV-DIM	RECESSED	3800L LED	4000 K	80	277 V	0 W	ECONOMY 1X4 FLAT LENSED TROFFER, ACRYLIC DIFFUSER, 0-10V DIMMING DRIVER. DLC CERTIFIED.
BL	ETC	BLUEDOME-BSDB-F-BSEL	WALL	870L LED	4000 K	80	277 V	8 W	BLUEDOME RUN OF SHOW LIGHTS. PROVIDE WITH DMX LOW VOLTAGE POWER SUPPLY AND EYELID ACCESSORY. PROVIDE (1) RECESSED RACO 4 SQUARE BACK BOX AT 24" AFF.
BTH	STONCO	VWXL-14-NW-G1-8	WALL	1390L LED	4000 K	80	120 V	14 W	LED 6" VAPOR TIGHT JAR LIGHT. WALL MOUNT DOWNLIGHT MOUNTING HEIGHT TO MATCH EXISTING FIXTURES. DLC CERTIFIED.
C1	DAYBRITE	FSS4-40L-840-UNV-DIM/FKR-126/FSSWG4	SURFACE / CHAIN HANG	4000L LED	4000 K	80	277 V	30 W	LED 4-FEET STRIP, ACRYLIC LENS. 0-10V DIMMING DRIVER. DLC CERTIFIED. PROVIDE WITH WIREGUARD.
C1L	DAYBRITE	FSS4-40L-840-UNV-DIM/FKR-126/FSSWG4	SURFACE / CHAIN HANG	4000L LED	4000 K	80	120 V	30 W	LED 4-FEET STRIP, ACRYLIC LENS. 0-10V DIMMING DRIVER. DLC CERTIFIED. PROVIDE WITH WIREGUARD.
C1LE	DAYBRITE	FSS4-40L-840-UNV-DIM/FKR-126/FSSWG4	SURFACE / CHAIN HANG	4000L LED	4000 K	80	120 V	30 W	LED 4-FEET STRIP, ACRYLIC LENS. 0-10V DIMMING DRIVER. DLC CERTIFIED. PROVIDE EMERGENCY BATTERY BACKUP. PROVIDE WITH WIREGUARD.
C2L	DAYBRITE	VRVT4LED-LD5-9-DR-UNV-L840	SURFACE/SUSPENDED	9000L LED	4000 K	80	120 V	64 W	LED 1x4' LUMINAIRE, STANDARD 0-10V DIMMING, DLC CERTIFIED, IP65 WET RATED, VANDAL RESISTANT HOUSING.
C2LE	DAYBRITE	VRVT4LED-LD5-9-DR-UNV-L840-EL10W	SURFACE/SUSPENDED	9000L LED	4000 K	80	120 V	64 W	LED 1x4' LUMINAIRE, STANDARD 0-10V DIMMING, DLC CERTIFIED, IP65 WET RATED, VANDAL RESISTANT HOUSING.
C3	INSIGHT	PCM-5-40K-120-SM-48-UNV-DIM-MG-FL	SURFACE	1925L LED	4000 K	80	277 V	64 W	LED 4' LINEAR DISPLAY CASE STRIP LIGHTING WITH 0-10V DIMMING DRIVER.
CTH	DAYBRITE	FSS4-40L-835-UNV-DIM/FKR-126/FSSWG4	SURFACE / CHAIN HANG	4000L LED	3500 K	80	120 V	30 W	LED 4-FEET STRIP, ACRYLIC LENS. 0-10V DIMMING DRIVER. DLC CERTIFIED. PROVIDE WITH WIREGUARD.
D2	LIGHTOLIER	6RN/P6R-DL-30-940-M-CC-Z10-U	RECESSED	3000L LED	4000 K	80	277 V	30 W	LED 6" RECESSED CAN LIGHT.0-10V DIMMING DRIVER. DLC CERTIFIED.
D3	LIGHTOLIER	6RN/P6R-DL-50-940-M-CC-BK-B-Z10-U	RECESSED	5000L LED	4000 K	80	277 V	42 W	LED 6" RECESSED CAN LIGHT. BLACK REFLECTOR AND BLACK TRIM. 0-10V DIMMING DRIVER. DLC CERTIFIED.
DTH	LIGHTOLIER	6RN/P6R-DL-30-835-M-CC-BK-B-Z10-U	RECESSED	3000L LED	3500 K	80	120 V	30 W	LED 6" RECESSED CAN LIGHT. BLACK REFLECTOR AND BLACK TRIM. 0-10V DIMMING DRIVER. DLC CERTIFIED.
DTH2	LIGHTOLIER	CALCULITE - C2RPC_DL-15-935--NS-UPZU-B	RECESSED	1500L LED	3500 K	90	120 V	25 W	LED 2" PENDANT DOWNLIGHT CYLINDER THEATRICAL ACCENT LIGHTING FIXTURE. 0-10V DIMMING DRIVER.
GTH	GARDCO	GWM-A07-840-TSM-UNV-BK	WALL	4000L LED	4000 K	80	120 V	23 W	LED ARCHITECTURAL WALLPAK, BLACK HOUSING. COORDINATE FINISH WITH ARCHITECT. DLC CERTIFIED.
L48	CORELITE	SQ4-F-0U-100D-840-1-D-E-UNV-STD-	PENDANT	983 LUMEN/FT LED	4000 K	80	277 V	400 W	DIRECT/INDIRECT CONTINOUS RUN PENDANT FIXTURE. VERIFY EXACT CABLE LENGTH WITH OWNER.
L52	CORELITE	SQ4-F-0U-100D-840-1-D-E-UNV-STD-	PENDANT	983 LUMEN/FT LED	4000 K	80	277 V	600 W	DIRECT/INDIRECT CONTINOUS RUN PENDANT FIXTURE. VERIFY EXACT CABLE LENGTH WITH OWNER.
L58	CORELITE	SQ4-F-0U-100D-840-1-D-E-UNV-STD-	PENDANT	983 LUMEN/FT LED	4000 K	80	277 V	500 W	DIRECT/INDIRECT CONTINOUS RUN PENDANT FIXTURE. VERIFY EXACT CABLE LENGTH WITH OWNER.
MTH	SSRC	LED-IRL-8-1B-1W-2-DIM	SURFACE / CHAIN HANG	4000L LED	4000 K	80	120 V	50 W	LED 8-FEET INDEX RAIL LIGHT STRIP, (1) WHITE STRIP LIGHT AND (1) BLUE STRIP LIGHT. POLYCARBONATE LENS. WITH IRL DIMMER CONTROL BOX.
PTH	KIRLIN	SSR-09620-4000L-3500K-MFL-38-ASB	PENDANT	4000L LED	3500 K	90	120 V	42 W	LED 6" PENDANT MOUNT DIRECT LED 48°. BLACK HOUSING. DMX CONTROL. MEDIUM BEAM.
PTH2	LIGHTOLIER	CALCULITE - C6-P-DL-35-935-M-DMX-U-BK-B	PENDANT	3500L LED	3500 K	90	120 V	30 W	LED 6" PENDANT MOUNT DIRECT LED 48°. BLACK HOUSING. DMX CONTROL.
T	LIGHTOLIER	6002X/9630	SURFACE	TRACK HEAD AS SPECIFIED	4000 K	80	120 V	120 W	TRACK LIGHT. PROVIDE 16 HEADS PER EACH RUN OF TRACK AS SHOWN ON PLANS. PROVIDE 60 WATT A19 LAMP FOR EACH HEAD. PROVIDE WATTSTOPPER LMPL-101 LOAD CONTROLLER FOR EACH LENGTH OF TRACK.
TR	LIGHTOLIER	LC-L-10-940-BK-LLM-RF	TRACK	TRACK HEAD AS SPECIFIED	4000 K	80	120 V	30 W	TRACK LIGHTING. PROVIDE THREE HEADS AND NEW 3' TRACK. PROVIDE WITH WIREGUARD.
W1	GARDCO	GWM-A09-840-TSM-UNV	WALL	6000L LED	4000 K	80	277 V	30 W	MOUNT FIXTURE AT 10'-6" AFF
W1L	GARDCO	GWM-A09-840-TSM-UNV	WALL	6000L LED	4000 K	80	120 V	40 W	LED ARCHITECTURAL WALLPAK, ALUMINUM HOUSING. COORDINATE FINISH WITH EXISTING EXTERIOR FIXTURES. DLC CERTIFIED.
W1LE	GARDCO	GWM-A09-840-TSM-UNV-EC	WALL	6000L LED	4000 K	80	120 V	40 W	LED ARCHITECTURAL WALLPAK, ALUMINUM HOUSING. COORDINATE FINISH WITH EXISTING EXTERIOR FIXTURES. DLC CERTIFIED.PROVIDE INTEGRAL EMERGENCY BATTERY PACK.
W2	FAILSAFE	TRO11-LD4-25W-40-OPL-XX-UNV-EDC1	SURFACE	1695L LED	4000 K	80	277 V	25 W	LED 11-INCH ARCHITECTURAL ROUND FIXTURE, SURFACE MOUNTED, WET LOCATION LISTED, ALUMINUM HOUSING, POLYCARBONATE LENS. COORDINATE FINISH WITH ARCHITECT. DLC CERTIFIED.
X1	EMERGILITE	PRESTIEGE X40	UNIVERSAL	LED	4000 K	80	277 V	3 W	UNIVERSAL LED EXIT SIGN WITH BLACK HOUSING, RED LETTERING AND EMERGENCY BATTERY BACK-UP.
XTH	EMERGILITE	SVX-BB-R	UNIVERSAL	LED	4000 K	80	277 V	3 W	UNIVERSAL LED EXIT SIGN WITH BLACK VANDAL-RESISTANT HOUSING, RED LETTERING AND EMERGENCY BATTERY BACK-UP.
XV2	EMERGILITE	SVX-BB-R	UNIVERSAL	LED	4000 K	80	277 V	3 W	DOUBLE-FACED VANDAL RESISTANT EXIT SIGN, WHITE HOUSING, RED LETTERING. PROVIDE CHEVRON DIRECTIONAL ARROWS PER PLANS OR AS DIRECTED BY AHJ.

1 FIXTURES SHOWN ON THE FLOORPLAN HAVING A DESIGNATION OF "E" FOLLOWING THE BASE DESIGNATION (I.E. - A FIXTURE TYPE "AE, C2E, FE") AND/OR A HALF SHADED REGION SHALL BE THE BASE FIXTURE TYPE EQUIPPED WITH THE APPROPRIATE BATTERY BACK-UP. BATTERY BACK-UPS SHALL BE INTEGRAL TO THE FIXTURE AND REMOTE SHALL BE SELECTED ONLY IN INSTANCES WHERE IT IS SPECIFIED OR WHEN IT IS THE ONLY AVAILABLE EMERGENCY OPTION. THE LOCATION OF REMOTE BATTERY BACKUPS SHALL BE SELECTED BY THE OWNER/ARCHITECT PRIOR TO INSTALLATION BY THE CONTRACTOR.

2 REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS NOT INDICATED IN THE LIGHTING FIXTURE SCHEDULE. WHERE THERE IS AN INCONSISTENCY BETWEEN THE LIGHTING FIXTURE SCHEDULE AND THE SPECIFICATIONS, THE GREATER QUANTITY OR HIGHER QUALITY OF WORK SHALL BE INCLUDED IN THE PROPOSAL.

3 UNLESS OTHERWISE INDICATED ON THE SCHEDULE ABOVE, THE ARCHITECT/OWNER SHALL SELECT ALL FINISHES, COLORS, AND TRIMS.

4 ALL LED FIXTURE BOARDS AND DRIVERS SHALL BE OF THE LATEST GENERATION, BASED UPON THE INDIVIDUAL MANUFACTURER'S STATED LITERATURE. IF A "GEN 5" IS AVAILABLE, "GEN 4" FIXTURES ARE NOT ACCEPTABLE.

5 EXIT SIGNS AND EMERGENCY BATTERY BACK-UPS SHALL BE CONNECTED TO THE NEAREST LIGHTING CIRCUIT AHEAD OF ALL SWITCHING AS REQUIRED TO MAINTAIN THE BATTERIES AT FULL CHARGE. THE CONTRACTOR SHALL PROVIDE ALL ADDITIONAL WIRING AS REQUIRED.

6 LIGHTING FIXTURE MANUFACTURERS OTHER THAN THOSE LISTED IN THE LIGHTING FIXTURE SCHEDULE AND DESIRING TO BID THIS PROJECT SHALL REQUEST PRIOR APPROVAL OF THE FIXTURES THEY WISH TO SUBSTITUTE. PRIOR APPROVAL REQUEST SHALL INCLUDE FIXTURE CUT SHEETS.

7 FOR PRIOR APPROVALS AND SUBMITTALS THAT DEVIATE FROM NOMINAL WATTAGE AND/OR DELIVERED LUMENS, IT SHALL BE UP THE ENGINEER'S SOLE DISCRETION TO APPROVE OR DECLINE THESE FIXTURES BASED ON ANY AND ALL FACTORS INCLUDING BUT NOT LIMITED TO INTENDED LIGHTING LEVELS FOR EACH SPACE AND IMPACT ON THE OVERALL ELECTRICAL POWER SYSTEM.

8 THE CONTRACTOR SHALL PROVIDE ALL HARDWARE AND ACCESSORIES AS REQUIRED TO INSTALL FIXTURES IN LOCATIONS AS ILLUSTRATED WITH MOUNTING METHODS DESIRED.

9 WHEN A UNIVERSAL (120-277V) VOLTAGE OPTION IS AVAILABLE, IT SHALL BE PROVIDED. OTHERWISE PROVIDE AS INDICATED IN SCHEDULE.

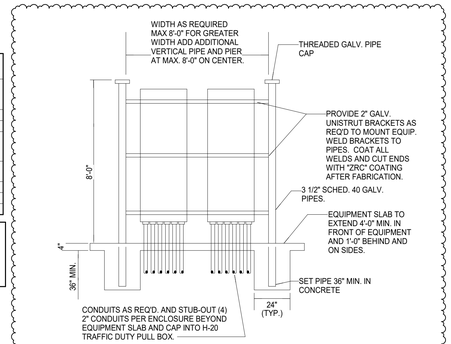
10 FOR ALL SUSPENDED FIXTURES, COORDINATE THE EXACT MOUNTING ELEVATION ABOVE FINISHED FLOOR WITH ARCHITECT PRIOR TO INSTALLATION. PROVIDE SUSPENSION HARDWARE IN LENGTHS AS REQUIRED.

APPROVED LIGHTING MANUFACTURERS:
SURFACE / RECESSED LIGHTING: SIGNIFY, LITHONIA, METALUX, AXIS, CURRENT, PINNACLE, H.E. WILLIAMS, CREE, NULITE, ALW DOWN / TRACK LIGHTING: GOTHAM, LIGHTOLIER, PORTFOLIO, CREE, CURRENT, INDY, H.E. WILLIAMS
ARCHITECTURAL WALLPACK: LITHONIA, VISIONAIRE, CURRENT, GARDCO, McGRAW EDISON, HUBBELL, LSI, LUMARK, LIGMAN
EXIT SIGNAGE: CHLORIDE, LITHONIA, EMERGI-LITE, DUAL-LITE, SURE-LITES, EVENLITE

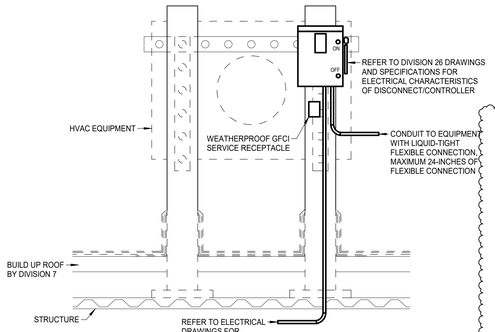
LIGHTING CONTROLS SCHEDULE

Type	Sensor Operation	# of Lighting Zones	Description
RA	VACANCY - MANUAL ON / AUTO OFF	1	ON/OFF SWITCH WITH RAISE LOWER; 0-10V DIMMING.
RB	VACANCY - MANUAL ON / AUTO OFF	1	ON/OFF MOMENTARY CONTACT SWITCH.
RE	OCCUPANCY - AUTO ON / AUTO OFF	1	CORRIDOR ROOM CONTROLLER, NO DIMMING. BMCS ON/OFF INTERFACE FOR OCCUPIED / UNOCCUPIED BUILDING OPERATION. PROVIDE OCCUPANCY BASED SENSORS WHERE SHOWN. LOCATE (1) KEYED SWITCH AT MAIN ENTRY DOOR ADJACENT TO SECURITY KEYPAD
RJ	NONE	1	MECHANICALLY WOUND TIMER SWITCH. WHERE MULTIPLE SWITCHES ARE USED, THESE SHALL BE LINKED TOGETHER FOR SIMULTANEOUS OPERATION WITHIN THE SPACE.
RT	NONE	1	DMX CONTROLS. REFER TO THEATRICAL DRAWINGS FOR MORE INFORMATION.
ER	-	-	UL924 LOAD CONTROL RELAY, PLENUM RATED, 0-10V COMPATIBLE, 16A MINIMUM
ES	-	-	UL1008 GENERATOR TRANSFER DEVICE, PLENUM RATED, 0-10V COMPATIBLE, 16A MINIMUM

1 PER IECC-2015, SECTION C405, AREAS / ROOMS WHERE AUTOMATIC SHUTOFF FOR LIGHTING WOULD ENDANGER OCCUPANT SAFETY ARE EXEMPT FROM AUTOMATIC CONTROLS.
2 PROVIDE PHOTOCELL WITHIN DAYLIGHT ZONE ONLY WHERE SHOWN ON FLOORPLANS.
3 LOCATE PHOTOSENSOR SURFACE MOUNTED ON THE NORTH SIDE OF THE BUILDING. LOCATION IS TO BE APPROVED BY ARCHITECT/OWNER REPRESENTATIVE.
4 CONTRACTOR TO COORDINATE EXACT PROGRAMING OF TIME-SCHEDULE WITH OWNER REPRESENTATIVE.
5 REFER TO LIGHTING CONTROL DETAILS FOR TYPICAL INSTALLATION.

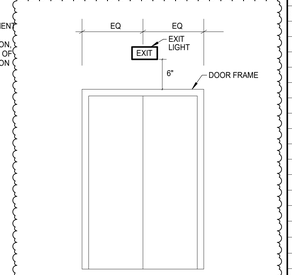


9 **ELECTRICAL EQUIPMENT RACK DETAIL**
Scale: NOT TO SCALE

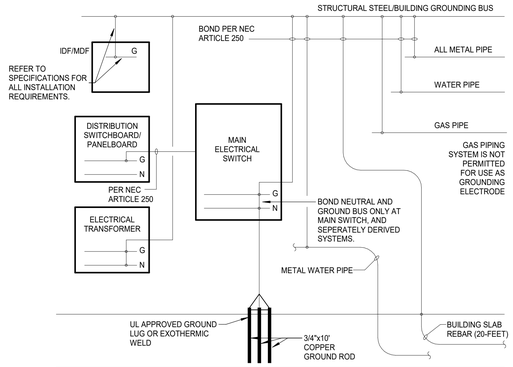


NOTES:
1. REFER TO ARCHITECTURAL, STRUCTURAL AND ROOFING DRAWINGS AND SPECIFICATIONS FOR HVAC EQUIPMENT SUPPORT CONSTRUCTION DETAILS.

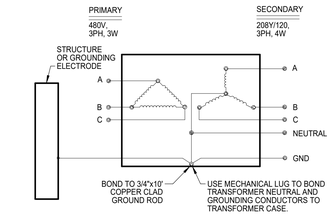
5 **ROOF DMSCU DISCONNECT SUPPORT**
Scale: NOT TO SCALE



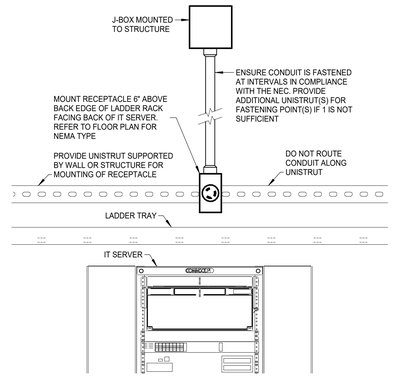
8 **EXIT SIGN LOCATION**
Scale: NOT TO SCALE



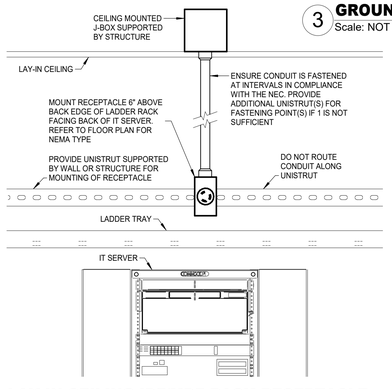
6 **SYSTEM GROUNDING**
Scale: NOT TO SCALE



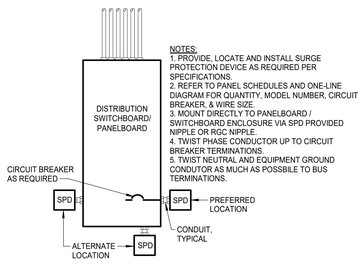
3 **GROUNDING FOR TRANSFORMERS**
Scale: NOT TO SCALE



1 **EXPOSED CEILING IDF/MDF RACK RECEPTACLE**
Scale: NOT TO SCALE

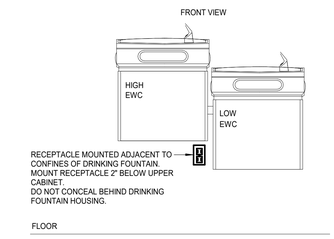


2 **LAY-IN CEILING IDF/MDF RACK RECEPTACLE**
Scale: NOT TO SCALE



NOTES:
1. PROVIDE, LOCATE AND INSTALL SURGE PROTECTION DEVICE AS REQUIRED PER SPECIFICATIONS.
2. REFER TO PANEL SCHEDULES AND ONE-LINE DIAGRAM FOR QUANTITY, MODEL NUMBER, CIRCUIT BREAKER, & WIRE SIZE.
3. MOUNT DIRECTLY TO PANELBOARD / SWITCHBOARD ENCLOSURE VIA SPD PROVIDED NIPPLE OR RGC NIPPLE.
4. TWIST PHASE CONDUCTOR UP TO CIRCUIT BREAKER TERMINATIONS.
5. TWIST NEUTRAL AND EQUIPMENT GROUND CONDUTOR AS MUCH AS POSSBILE TO BUS TERMINATIONS.

4 **SURGE PROTECTION DEVICE**
Scale: NOT TO SCALE



7 **DRINKING FOUNTAIN WITH GFCI RECEPTACLE**
Scale: NOT TO SCALE

SYMBOL SCHEDULE

SYMBOL	DESCRIPTION (DISREGARD ITEMS NOT SHOWN ON PLANS)
LIGHTING (LETTER DENOTES TYPE - SEE LIGHT FIXTURE SCHEDULE)	
	LIGHT FIXTURE
	FIXTURE ON EMERGENCY CIRCUIT
	DOWNLIGHT FIXTURE
	LIGHT FIXTURE - WALL MOUNTED
	DOWNLIGHT FIXTURE ON EMERGENCY CIRCUIT
	LIGHT FIXTURE - WALL MOUNTED ON EMERGENCY CIRCUIT
	EXIT LIGHT-CEILING MTD WITH DIRECTIONAL ARROWS AS REQUIRED
	EXIT LIGHT-WALL MTD WITH DIRECTIONAL ARROWS AS REQUIRED
SWITCHES	
$	LINE VOLTAGE SINGLE POLE SWITCH
$2	LINE VOLTAGE 2-POLE SWITCH
$3	LINE VOLTAGE 3-WAY SWITCH
$4	LINE VOLTAGE 4-WAY SWITCH
$K	LINE VOLTAGE KEYED SWITCH
$3K	LINE VOLTAGE KEYED 3-WAY SWITCH
$D	LINE VOLTAGE WALL DIMMER SWITCH, SIZE AND TYPE AS REQUIRED
$VD	LINE VOLTAGE WALL MOUNTED DIMMER SWITCH WITH VACANCY SENSOR. MANUAL ON / AUTO OFF
$V	LINE VOLTAGE WALL MOUNTED SWITCH WITH VACANCY SENSOR. MANUAL ON / AUTO OFF
$OC	LINE VOLTAGE WALL MOUNTED SWITCH WITH VACANCY SENSOR. AUTO ON / AUTO OFF
$P	LINE VOLTAGE SWITCH WITH PILOT LIGHT
$MC	MOMENTARY CONTACT SWITCH
	PUSH BUTTON
$T	SPRING WOUND MECHANICAL TIME SWITCH, 20 AMP, 12-HOUR WITH HOLD, UNLESS NOTED OTHERWISE
ER	LISTED UL924, EMERGENCY LOAD CONTROL RELAY, 0-10V DIMMING COMPATIBLE
ES	LISTED UL1008 EMERGENCY TRANSFER SWITCH, 0-10V DIMMING COMPATIBLE
LOW VOLTAGE LIGHTING CONTROLS	
$R	LOW VOLTAGE LIGHTING CONTROLLER WALL SWITCH
$B	BMCS TIMER LOCAL OVERRIDE SWITCH
	CEILING MOUNTED PHOTO SENSOR. HB= HIGH-BAY SENSOR
	CEILING MOUNTED VACANCY SENSOR, MANUAL ON / AUTO OFF. HB= HIGH-BAY SENSOR
	CEILING MOUNTED OCCUPANCY SENSOR, AUTO ON TO 100% / AUTO OFF. HB= HIGH-BAY SENSOR
RX	LIGHTING CONTROLLER. X= DENOTES CONTROL SEQUENCE. REFER TO CONTROL SCHEDULE
RECEPTACLES AND OUTLETS	
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	POWER POLE
	125/250 VOLT, 1 PHASE, 3-WIRE, 20 AMPS, UNLESS NOTED OTHERWISE
	DOUBLE DUPLEX IN 2-GANG BOX WITH SINGLE COVER PLATE
	DOUBLE DUPLEX GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE IN 2-GANG BOX WITH SINGLE COVER PLATE
	DUPLEX GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE
	CONCEALED SERVICE FLOOR BOX, DUPLEX RECEPTACLE OUTLET
	CONCEALED SERVICE FLOOR BOX, DOUBLE DUPLEX RECEPTACLE OUTLET
DPA	CONCEALED SERVICE MULTI-ACCESS FLOOR BOX WITH WIRING DEVICES AS INDICATED ON DRAWINGS. SIZE TO MATCH DEVICE QUANTITIES
MISCELLANEOUS EQUIPMENT	
FACP	FIRE ALARM CONTROL PANEL
ANNC	FIRE ALARM REMOTE ANNUCIATOR
T	TRANSFORMER FOR DOOR BELL/BUZZER
	CHIME/BUZZER
G	REMOTE BLANK FACE GFCI DEVICE
MOTOR CONTROLLERS AND EQUIPMENT	
	MOTOR, MAKE FINAL MOTOR CONNECTION
J	DISCONNECT SWITCH AS REQUIRED
J	COMBINATION MOTOR STARTER/DISCONNECT SWITCH AS REQUIRED
	MOTOR STARTER AS REQUIRED
M	MANUAL MOTOR SWITCH AS REQUIRED
	PREWIRED DEVICE, MAKE ELECTRICAL FINAL CONNECTIONS
	VARIABLE FREQUENCY DRIVE MOTOR CONTROLLER FURNISHED BY DIVISION 23, INSTALLED BY DIVISION 26
ELECTRICAL EQUIPMENT	
	ELECTRICAL DISTRIBUTION OR PANELBOARD
	DRY TYPE TRANSFORMER
CIRCUITING	
	CONDUIT
	CONDUIT BELOW FLOOR, SLAB, OR GRADE
	3/4"C. UNLESS OTHERWISE NOTED; LONG HATCH, NEUTRAL; SHORT HATCH, PHASE; "Z" HATCH OR HOOK, GROUND; ARROW INDICATES HOMERUN
SUBSCRIPTS AND ABBREVIATIONS	
WP	INDICATES WEATHERPROOF
WG	INDICATES WIREGUARD
H	INDICATES HORIZONTAL
TL	INDICATES TWIST LOCK
NL	LIGHT FIXTURE ON NIGHT LIGHT CIRCUIT
E	INDICATES EXISTING TO REMAIN
REP	INDICATES REPLACE EXISTING WITH NEW
1-L	REFER TO ONE-LINE DIAGRAM
	INDICATES WALL MOUNTED DEVICE
U	INDICATES TO PROVIDE COMBINATION USB/RECEPTACLE DEVICE
SR	SWITCH CONTROLLED RECEPTACLE. RECEPTACLE SHALL BE PERMANENTLY FACTORY MARKED AS CONTROLLED.
SPDX	X = L LOW EXPOSURE SPD; X = M MEDIUM EXPOSURE SPD; X = H HIGH EXPOSURE SPD; X = VH VERY HIGH EXPOSURE SPD.
•	NEXT TO ANY SYMBOL INDICATES FINAL ROUGH-IN FIELD COORDINATION BY CONTRACTOR WITH ARCHITECTURAL MILLWORK DRAWINGS AND OTHER TRADES

GENERAL NOTES:
-ALL EXTERIOR BUILDING ELECTRICAL EQUIPMENT TO BE WEATHERPROOF NEMA-4X MINIMUM.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064
Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, Texas 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

Professional Engineer BRADLEY KALMANS 80219 License 12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1 Addendum 02 12/09/24
Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: KJ

ELECTRICAL DETAILS, LEGENDS, AND SCHEDULES

E6.01
of

TECHNOLOGY LEGEND - 27 10 00

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
*# ▼	WALL MOUNTED NETWORK OUTLET D#: NUMBER OF DATA DROPS IN OUTLET AP: WIRELESS ACCESS POINT	+18" AFF, UNLESS OTHERWISE NOTED	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
V# ▽	COMMUNICATIONS OUTLET	FIELD COORDINATE	FIELD COORDINATE	
W ▼	WALL MOUNTED NETWORK OUTLET	+44" AFF	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
B ▽	WALL MOUNTED BOX FOR FUTURE USE.	+18" AFF UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
D# ▼	FLOOR MOUNTED NETWORK OUTLET	N/A	COORDINATE WITH ELECTRICAL CONTRACTOR	FINISHED HARDWARE PROVIDED BY DIV 27
*#	CEILING MOUNTED NETWORK OUTLET AP: WIRELESS ACCESS POINT D#': NETWORK OUTLET	ABOVE CEILING	CEILING BRACKET WITH BISCUIT BLOCK	

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. CONDUIT STUB UP AND SLEEVES SHALL HAVE A SOLID UNCUT PLASTIC PROTECTIVE BUSHING.
5. NO CONDUITS SHALL EXCEED FOR 40% MAXIMUM FILL RATIO. CONTRACTOR TO PROVIDE ADDITIONAL CONDUITS REQUIRED.

AUDIO/VIDEO LEGEND - 27 41 16.10

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
WMP ▽	WALL MOUNTED PROJECTOR AUDIO/VISUAL OUTPUT OUTLET	REFERENCE FLOOR PLANS.	4 11/16"X4 11/16"X2-1/8" BACK BOX WITH DOUBLE GANG RING, TWO(2) 1.25"C	NOTE #5
CMP ◁	CEILING MOUNTED PROJECTOR AUDIO/VISUAL OUTPUT OUTLET	CEILING MOUNTED	N/A	NOTE #5
AV-1 ▽	WALL MOUNTED AUDIO/VIDEO INPUT OUTLET	+18" AFF UNO	4 11/16"X4 11/16"X2-1/8" BACK BOX WITH DOUBLE GANG RING, TWO(2) 1.25"C	
FSD-1 ▽	WALL MOUNTED FLAT SCREEN DISPLAY AUDIO/VISUAL OUTPUT OUTLET	REFERENCE FLOOR PLAN	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	NOTE #5
FSD-2 ▽	WALL MOUNTED FLAT SCREEN DISPLAY AUDIO/VISUAL OUTPUT OUTLET ASSOCIATED WITH AV-1 INPUT OUTLET	REFERENCE FLOOR PLAN	4 11/16"X4 11/16"X2-1/8" BACK BOX WITH DOUBLE GANG RING, TWO(2) 1.25"C	NOTE #5
IVD ▽	INTERACTIVE VIDEO DISPLAY AUDIO/VISUAL OUTPUT OUTLET	REFERENCE FLOOR PLAN	4 11/16"X4 11/16"X2-1/8" BACK BOX WITH DOUBLE GANG RING, TWO(2) 1.25"C	NOTE #5
CP ▽	AV CONTROL PANEL	+48" AFF TO TOP	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
(PS)	LOCAL INSTRUCTIONAL SPACE PRESENTATION SPEAKER	CEILING	CONTRACTOR PROVIDED CEILING BOX	COORDINATE POWER WITH EC
◯◁	STREAMING CAMERA	CEILING UNO	N/A	NOTE #5

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. THE SYSTEM INTEGRATOR SHALL COORDINATE ALL BOX AND CONDUIT SIZE REQUIREMENTS PRIOR TO ROUGH-IN BY THE PROJECTS ELECTRICAL CONTRACTOR.
5. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

LOCAL SOUND SYSTEM LEGEND - 27 41 16.20

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
LS*	LOCAL SOUND SYSTEM SPEAKER P: POLE MOUNTED SPEAKER	CEILING MOUNT UNO	CONTRACTOR PROVIDED BACK BOX OR 4"X4"X2 1/8" J BOX WITH COVER, 1"C	
LSC	LOCAL SOUND SYSTEM CONTROL PLATE	+48" AFF TO TOP	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
MI	MICROPHONE INPUT	+18" AFF UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
MA	COMBINATION OUTLET CONSISTING OF ONE (1) MICROPHONE INPUT AND ONE (1) AUXILIARY INPUT	+18" AFF UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
AI	3.5MM STEREO AUDIO AUXILIARY INPUT	+18" AFF UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
(H)	HANGING MICROPHONE	CEILING MOUNT	N/A	
ABM	AUXILIARY INPUT AND BLUETOOTH MIXER	+48" AFF TO TOP	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
RACK	VENUE SPECIFIC LOCAL SOUND SYSTEM HEAD END RACK	WALL MOUNT UNO	N/A	
WA	WIRELESS ANTENNA	WALL MOUNT UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
ALA	ASSISTED LISTENING ANTENNA	WALL MOUNT UNO	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
SUB	SUBWOOFER	CEILING MOUNT UNO		

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. THE SYSTEM INTEGRATOR SHALL COORDINATE ALL BOX AND CONDUIT SIZE REQUIREMENTS PRIOR TO ROUGH-IN BY THE PROJECTS ELECTRICAL CONTRACTOR.
5. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

INTERCOM LEGEND - 27 50 00

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
ICS	INTERCOM COMMUNICATIONS SYSTEM HEAD END UNIT.	FLOOR MOUNTED	COORDINATE WITH EC	COORDINATE POWER WITH EC
(S)	CEILING MOUNT INTERCOM SPEAKER, LAY-IN CEILING	CEILING	CONTRACTOR PROVIDED	
(S2)	CEILING MOUNT INTERCOM SPEAKER, HARD CEILING.	CEILING	CONTRACTOR PROVIDED	
(S3)	WALL MOUNT INTERIOR INTERCOM SPEAKER	REFERENCE FLOOR PLANS	CONTRACTOR PROVIDED	
(S4)	WALL MOUNT EXTERIOR INTERCOM SPEAKER	+10' AFF UNO	CONTRACTOR PROVIDED	
(S5)	PENDANT MOUNT INTERCOM SPEAKER	REFERENCE FLOOR PLANS	CONTRACTOR PROVIDED	
(S6)	SURFACE MOUNT INTERCOM SPEAKER, MOUNT TO STRUCTURE	CEILING	CONTRACTOR PROVIDED	
(S7)	CEILING MOUNTED EXTERIOR INTERCOM SPEAKER	CEILING	CONTRACTOR PROVIDED	
(P)(P)	IP BASED SPEAKER 'P' TO BE REPLACED WITH S, S2, S3, S4 INDICATING THE SPECIFIC TYPE OF SPEAKER.	REFERENCE FLOOR PLANS	CONTRACTOR PROVIDED	NOTE #5
VC	WALL MOUNTED VOLUME CONTROL	+48" AFF	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
CB	INTERCOM CALL BUTTON	+48" AFF	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
(C)	SINGLE FACE CLOCK	REFERENCE FLOOR PLANS	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
(C2)	DOUBLE FACE CLOCK	REFERENCE FLOOR PLANS	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
RPS ▼	REMOTE PROGRAM SOURCE	DESK TOP	COORDINATE WITH EC	NOTE #5
AGS ▼	ADMINISTRATIVE CALL STATION.	DESK TOP	N/A	NOTE #5
LD	LOCKDOWN BUTTON	+48" AFF	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. THE SYSTEM INTEGRATOR SHALL COORDINATE ALL BOX AND CONDUIT SIZE REQUIREMENTS PRIOR TO ROUGH-IN BY THE PROJECTS ELECTRICAL CONTRACTOR.
5. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

ACCESS CONTROL LEGEND - 28 10 00 & 28 10 00.05

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
ACP	ACCESS CONTROL SYSTEM, CONTROL PANEL.	+60" AFF TO CENTER	AS REQUIRED	COORDINATE POWER. NOTE #4.
CR *#	ACCESS CONTROL PROXIMITY CARD READER. DEFAULT SYMBOL INDICATES WALL MOUNTED *M - INDICATES MULLION MOUNTED READER	+42" A.F.F.	1-G, 3/4" C	
CR	DOOR MOUNTED ACCESS CONTROL PROXIMITY CARD READER THAT IS INTEGRATED INTO THE DOOR HARDWARE.	+42" AFF	N/A	
DS *#	2-WAY AUDIO/VIDEO INTERCOM DOOR STATION. *DEFAULT INDICATES WALL MOUNTED *M - INDICATES MULLION MOUNTED DEVICE	+42" AFF	*W: 1-G, 3/4" C *M: 3/4"C	COORDINATE POWER. NOTE #4.
(DS)	DOOR MOUNTED, 2-WAY AUDIO/VIDEO INTERCOM DOOR STATION.	+42" AFF, FIELD COORDINATE		COORDINATE POWER. NOTE #4
MS	2-WAY AUDIO/VIDEO INTERCOM MASTER STATION.	DESK MOUNTED UNO		COORDINATE POWER. NOTE #4
DR	DOOR RELEASE BUTTON	COORDINATE WITH GC	1-G, 3/4" C	
REX	PIR MOTION REQUEST TO EXIT DEVICE			
DP	DOOR PROP ALARM	CEILING MOUNTED UNO	N/A	N/A
(DC)	DPDT MAGNETIC DOOR CONTACT/DOOR POSITION SENSOR.	FLUSH MOUNTED IN DOOR FRAME	N/A	PROVIDED BY ACS CONTRACTOR.
RFID	VEHICLE RFID TAG READER.		FIELD COORDINATE RACEWAYS AND BACK BOXES	PROVIDE NECESSARY EQUIPMENT FOR A FULLY FUNCTIONAL VEHICLE ENTRY POINT

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE.
4. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

VIDEO SURVEILLANCE LEGEND - 28 20 00

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
	WALL/CORNER MOUNT 4-SENSOR CAMERA	REFERENCE FLOOR PLANS	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	NOTE #5
	CEILING MOUNTED 4-SENSOR CAMERA	CEILING		NOTE #5
	2-SENSOR CAMERA	REFERENCE FLOOR PLANS	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	NOTE #5
	1-SENSOR CAMERA	REFERENCE FLOOR PLANS	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
VRS	VIDEO RECORDING SERVER			
#MU	VIDEO SURVEILLANCE MAIN UNIT	ABOVE CEILING		NOTE #5
	SYMBOL INDICATED THAT A VIDEO SURVEILLANCE DEVICE IS WALL MOUNTED			

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. THE SYSTEM INTEGRATOR SHALL COORDINATE ALL BOX AND CONDUIT SIZE REQUIREMENTS PRIOR TO ROUGH-IN BY THE PROJECTS ELECTRICAL CONTRACTOR.
5. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

INTRUSION LEGEND - 28 31 00

SYMBOL	DESCRIPTION	ELEVATION	BACK BOX/RACEWAY	NOTES
IDP	INTRUSION DETECTION SYSTEM CONTROL PANEL	+60" AFF	TWO(2) - 1"C TO CONTRACTOR PROVIDED BACK BOX	COORDINATE POWER WITH EC. NOTE #5
KP	INTRUSION DETECTION SYSTEM KEYPAD.	+48" AFF TO TOP	4"X4"X2 1/8" BACK BOX WITH 1-G MUD RING, 1"C	
	CEILING MOUNTED MOTION DETECTOR	CEILING		
MD	WALL MOUNTED MOTION DETECTOR LR: LONG RANGE	REFERENCE FLOOR PLAN	N/A	
GB	CEILING MOUNTED GLASS BREAK DETECTOR	CEILING	N/A	
(DC)	DPDT MAGNETIC DOOR CONTACT/DOOR POSITION SENSOR.	FLUSH MOUNTED IN DOOR FRAME	N/A	DEVICE PROVIDED BY ACS CONTRACTOR.
SDC	SURFACE MOUNT MAGNETIC DOOR CONTACT.	SURFACE MOUNTED ON DOOR FRAME	N/A	
ODC	OVERHEAD DOOR MOUNT MAGNETIC DOOR CONTACT.	SURFACE MOUNTED ON DOOR FRAME	N/A	
DB	DURESS PANIC BUTTON	UNDER DESK UNO	N/A	

NOTES:
1. #-G INDICATES BACK BOX SIZE.
2. #-C INDICATES CONDUIT SIZE.
3. UNO: UNLESS NOTED OTHERWISE
4. REFERENCE DIVISION 28 SPECIFICATION FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
5. PROVIDE AND INSTALL ONE (1) CATEGORY CABLE TO CONNECT DEVICE TO NETWORK

FIRE ALARM - 28 46 00

SYMBOL	DESCRIPTION
FACP	FIRE ALARM CONTROL
FAA	FIRE ALARM ANNUNCIATOR PANEL

NOTES:
1. FIRE ALARM SYSTEM IS PERFORMANCE BASED PER SPECIFICATIONS. CONTRACTOR TO REFERENCE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. A LICENSED FIRE ALARM PLANNING SUPERINTENDENT CERTIFIED TO A MINIMUM LEVEL 3, IN THE SUBFIELD OF FIRE ALARM SYSTEMS THROUGH THE NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET), SHALL PROVIDE PLANS AND CALCULATIONS FOR A MANUAL AND AUTOMATIC FIRE DETECTION AND ALARM SYSTEM TO COMPLY WITH THE BUILDING SPACE LAYOUT, BUILDING OCCUPANCY, CURRENT NFPA 72, LOCAL AND STATE CODE REQUIREMENTS, AND THE FIRE ALARM AND DETECTION SYSTEM SPECIFICATIONS.

SUBSCRIPTS AND ABBREVIATIONS

TEXT	DESCRIPTION
'WP'	DEVICE SHALL BE WEATHER PROOF AND RATED FOR EXTERIOR CONDITIONS
●	FIELD COORDINATE ELEVATION.
AFF	ABOVE FINISHED FLOOR
'UC'	DEVICE IS TO BE MOUNTED ON THE UNDERSIDE OF THE ELEVATED CANOPY.
'WM'	DEVICE IS TO BE WALL MOUNTED.
'WG'	WIRE GUARD TO BE PROVIDED AND INSTALLED TO PROTECT ASSOCIATED DEVICE.

SUBSCRIPTS LEGEND - EXISTING DEVICES

TEXT	DESCRIPTION
'E'	EXISTING TO REMAIN.
'D'	DEVICE IS EXISTING AND IS TO BE REMOVED. CONTRACTOR TO REMOVE THE DEVICE AND RETURN TO OWNER.
'R'	REMOVE EXISTING DEVICE AND RELOCATE TO A LOCATION INDICATED ON THE DRAWINGS.

NOTES TO CONTRACTOR

1. EVERY SYMBOL SHOWN ON LEGEND MAY NOT APPEAR ON DRAWINGS.
2. SYSTEM INSTALLERS SHALL COORDINATE LOCATIONS AND CONNECTIONS WITH THE PROJECT'S ELECTRICAL CONTRACTOR.
3. CONTRACTOR TO PROVIDE PROPERLY GROUNDED LIGHTING PROTECTION ON ALL CABLING ENTERING AND EXITING THE BUILDING.

TECH DEMO PLAN GENERAL NOTES

A CONTRACTOR SHALL PROVIDE NEW CEILING TILES IN INSTANCES WHERE CEILING DEVICES ARE REMOVED, REPLACED OR ADDED. CONTRACTOR SHALL COORDINATE WITH ARCHITECT ON CORRECT MANUFACTURER AND MODEL PRIOR TO REMOVAL OF EXISTING TILE.

B CONTRACTOR SHALL HAVE EACH LOW VOLTAGE SYSTEM TESTED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. SYSTEMS SHALL INCLUDE BUT NOT BE LIMITED TO:
1) FIRE ALARM
2) INTERCOM
3) STRUCTURED CABLING
4) INTRUSION DETECTION
5) ACCESS CONTROL
6) AUDIO VIDEO
7) VIDEO SURVEILLANCE
TESTING SHALL INCLUDE THE FUNCTIONALITY OF ALL FIELD DEVICES AND EQUIPMENT. ANY FAILURES OR ITEMS FOUND NOT TO BE FUNCTIONING TO SPECIFICATION, SHALL BE REPORTED PRIOR TO CONSTRUCTION. ANY ITEMS FOUND TO BE IMPROPERLY OR NON-FUNCTIONING UPON THE COMPLETION OF THE PROJECT, SHALL BE REPLACED AND/OR REPAIRED, BY THE CONTRACTOR, AT NO ADDITIONAL COST TO THE PROJECT OR THE OWNER.

C CONTRACTOR SHALL REMOVE ANY DEVICES WHERE CONSTRUCTION OCCURS TO PREVENT POSSIBLE DAMAGE TO THE DEVICE. REMOVAL OF ANY DEVICES WHICH SUPPORT USER CONNECTION OR OTHER SYSTEMS, SHALL BE COORDINATED WITH THE OWNER PRIOR TO REMOVAL AND/OR TAKING OFF LINE. REMOVAL SHALL CONSIST OF BUT NOT BE LIMITED TO THE FOLLOWING DEVICES AND ASSOCIATED SUPPORT INFRASTRUCTURE:
1) FIRE ALARM DEVICES
2) INTERCOM DEVICES
3) WIRELESS ACCESS POINTS
4) TELEPHONES
5) VIDEO SURVEILLANCE CAMERAS
6) INTRUSION DETECTION DEVICES
7) ACCESS CONTROL DEVICES
8) VIDEO PROJECTION DEVICES
9) VIDEO DISPLAY DEVICES
ANY DEVICES, NOT BEING REINSTALLED, SHALL BE RETURNED TO THE OWNER.

D CONTRACTOR SHALL DOCUMENT THE LOCATION AND ANY ID TAG, MAC ADDRESS, IP ADDRESS, OR BAR CODE OF ANY EXISTING DEVICE THAT IS TO BE REMOVED FROM ITS CURRENT LOCATION. DEVICES THAT ARE TO REMAIN, SHALL BE REINSTALLED IN THE EXACT LOCATION THAT THEY RESIDE IN PRIOR TO CONSTRUCTION, UNLESS NOTED OTHERWISE.

E ANY INDIVIDUAL THAT WILL BE REMOVING, RELOCATING, REINSTALLING, AND/OR TAMPERING WITH ANY EXISTING DEVICES; SHALL BE CERTIFIED BY THE MANUFACTURER OF THE SPECIFIC SYSTEM AND/OR LICENSED AS REQUIRED BY THE STATE TO PERFORM WORK ON THE SYSTEM. THE INDIVIDUAL SHALL BE A FULL-TIME EMPLOYEE OF THE FIRM CONTRACTED TO CONDUCT SUCH WORK ON THE PROJECT AND THAT FIRM SHALL ALSO HOLD ANY CERTIFICATIONS AND/OR LICENSES REQUIRED TO CONDUCT WORK ON THE SPECIFIC SYSTEM.

F ANY INDIVIDUAL/FIRM THAT WILL BE REMOVING, RELOCATING, REINSTALLING, OR TAMPERING WITH IN ANY DEVICES; SHALL BE LICENSED BY THE STATE, AS APPLICABLE, AND CERTIFIED BY THE MANUFACTURER OF THE SYSTEM.

G ALL CABLING ASSOCIATED WITH DEVICES THAT ARE TO BE DEMOLISHED, SHALL BE REMOVED FROM THE DEVICE LOCATION TO THE CABLES POINT OF ORIGIN. NO CABLE SHALL BE ABANDONED IN PLACE.

H ALL EXISTING DEVICES SHOWN ARE EXISTING TO REMAIN. CONTRACTOR TO REMOVE EXISTING DEVICES DURING CONSTRUCTION AND REINSTALL THE DEVICE IN THE SAME LOCATION, UNLESS NOTED OTHERWISE.

I REFERENCE EXISTING DEVICE SUBSCRIPT LEGEND ON THE NOTES AND LEGENDS SHEET.

J TOPCAT LIGHTSPEED LOCAL SOUND SPEAKERS SHALL BE BAGGED AND SUSPENDED IN THE CEILING DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER TO NOT VOID THE WARRANTY.

K CONTRACTOR TO COORDINATE WITH CFISD TECHNOLOGY DEPARTMENT PRIOR TO CONSTRUCTION ON WHICH DEVICES ARE TO BE REMOVED BY THE OWNER'S VENDER IN ORDER TO PREVENT VOID OF WARRANTY.

L ALL DEMO DEVICES WITH 'D' SUBSCRIPT SHALL DISCONNECT AND REMOVE EXISTING WIRING DEVICE BACK TO SWITCH. PATCH WALL TO MATCH EXISTING.

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, Texas 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR, SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS 80219 LICENSED PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

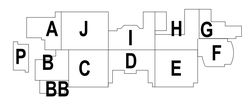
MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24
	Revisions / Submission	

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



Project Number: 23071
Date: 2024-11-17
Drawn By: NY

TECHNOLOGY LEGENDS AND SCHEDULES

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of

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1 **TECHNOLOGY DEMOLITION FLOOR PLAN - LEVEL 1 - AREA D**
Scale: 1/8" = 1'-0"

Salas O'Brien
salasobrien.com 281-664-1900
Houston
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Houston, TX 77064

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3701 KIRBY DR, SUITE 988
HOUSTON, TX 77098
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BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

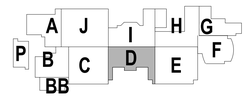
MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/03/24
	Revisions / Submission	

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



Project Number: 23071
Date: 2024-11-17
Drawn By: NY

TECHNOLOGY DEMOLITION FIRST FLOOR PLAN - AREA D

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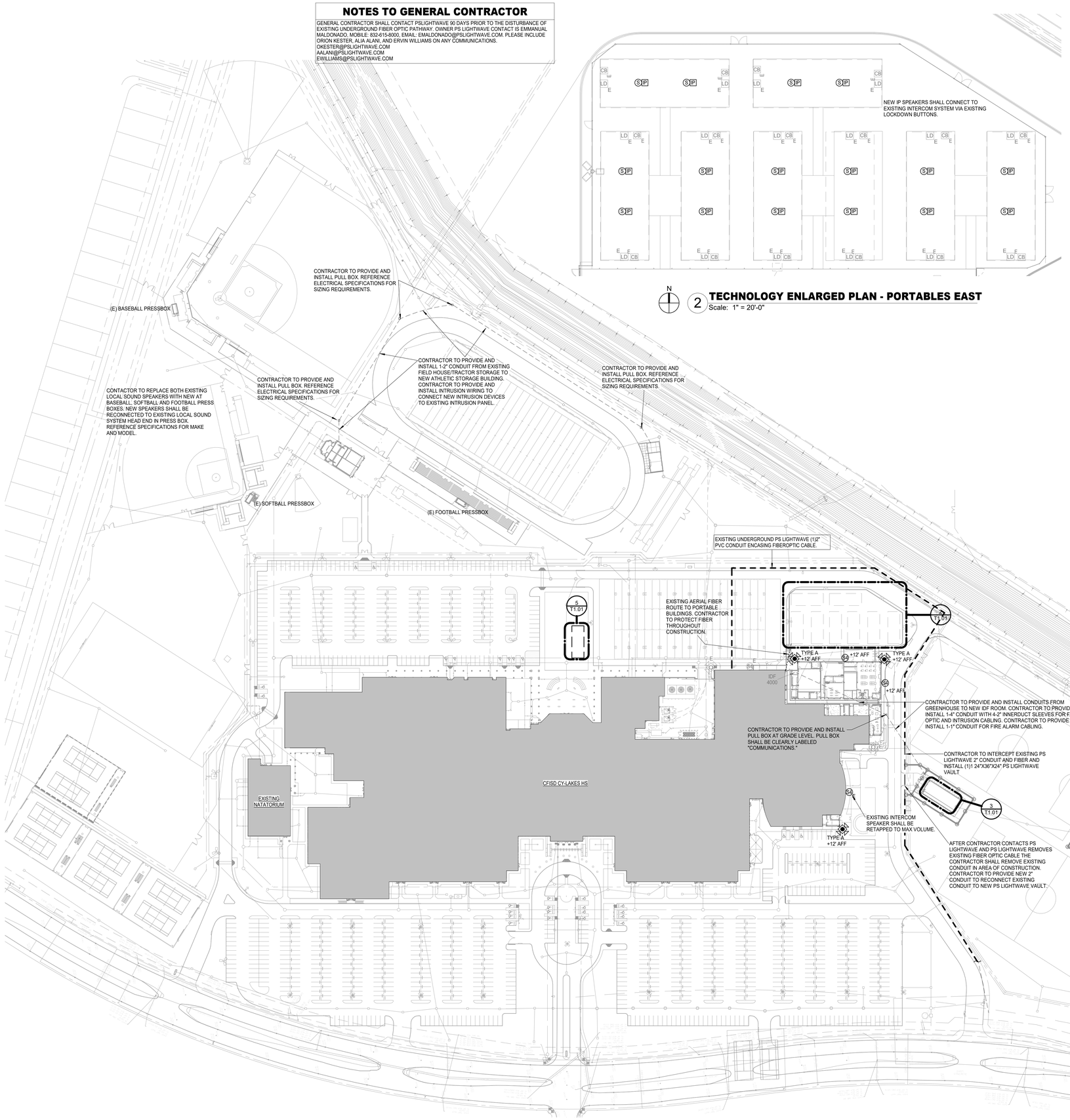
of

NOTES TO GENERAL CONTRACTOR

GENERAL CONTRACTOR SHALL CONTACT PSLIGHTWAVE 90 DAYS PRIOR TO THE DISTURBANCE OF EXISTING UNDERGROUND FIBER OPTIC PATHWAY. OWNER PS LIGHTWAVE CONTACT IS EMMANUAL MALDONADO, MOBILE: 832-615-8000, EMAIL: EMALDONADO@PSLIGHTWAVE.COM. PLEASE INCLUDE ORION KESTER. ALIA ALANI, AND ERVIN WILLIAMS ON ANY COMMUNICATIONS.
OKESTER@PSLIGHTWAVE.COM
AALANI@PSLIGHTWAVE.COM
EWILLIAMS@PSLIGHTWAVE.COM



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1 TECHNOLOGY SITE PLAN
Scale: 1" = 80'-0"

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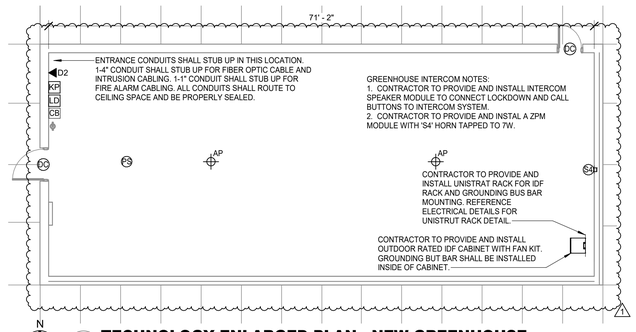
2 TECHNOLOGY ENLARGED PLAN - PORTABLES EAST
Scale: 1" = 20'-0"



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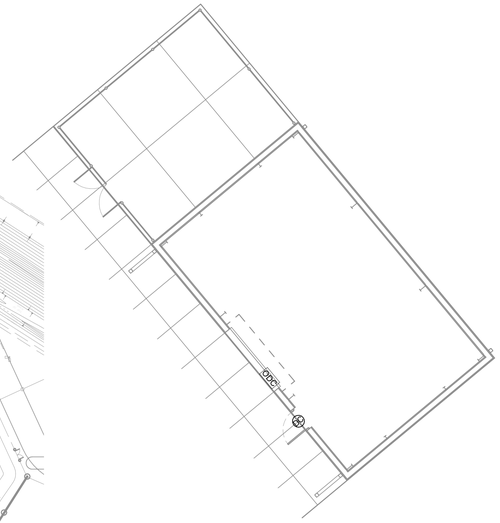
3 TECHNOLOGY ENLARGED PLAN - NEW GREENHOUSE
Scale: 1/8" = 1'-0"



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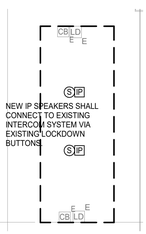
4 TECHNOLOGY SITE PLAN - ATHLETIC STORAGE BLDG.
Scale: 1/8" = 1'-0"



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5 TECHNOLOGY ENLARGED PLAN - PORTABLES CENTER
Scale: 1" = 20'-0"

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
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NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
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Houston, TX 77007
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tel 832.947.1038 fax 225.214.5365

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CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02
	12/09/24
	Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: NY

TECHNOLOGY SITE PLAN

T1.01
of

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
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NATEX
CORPORATION
ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, Tx 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS
ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

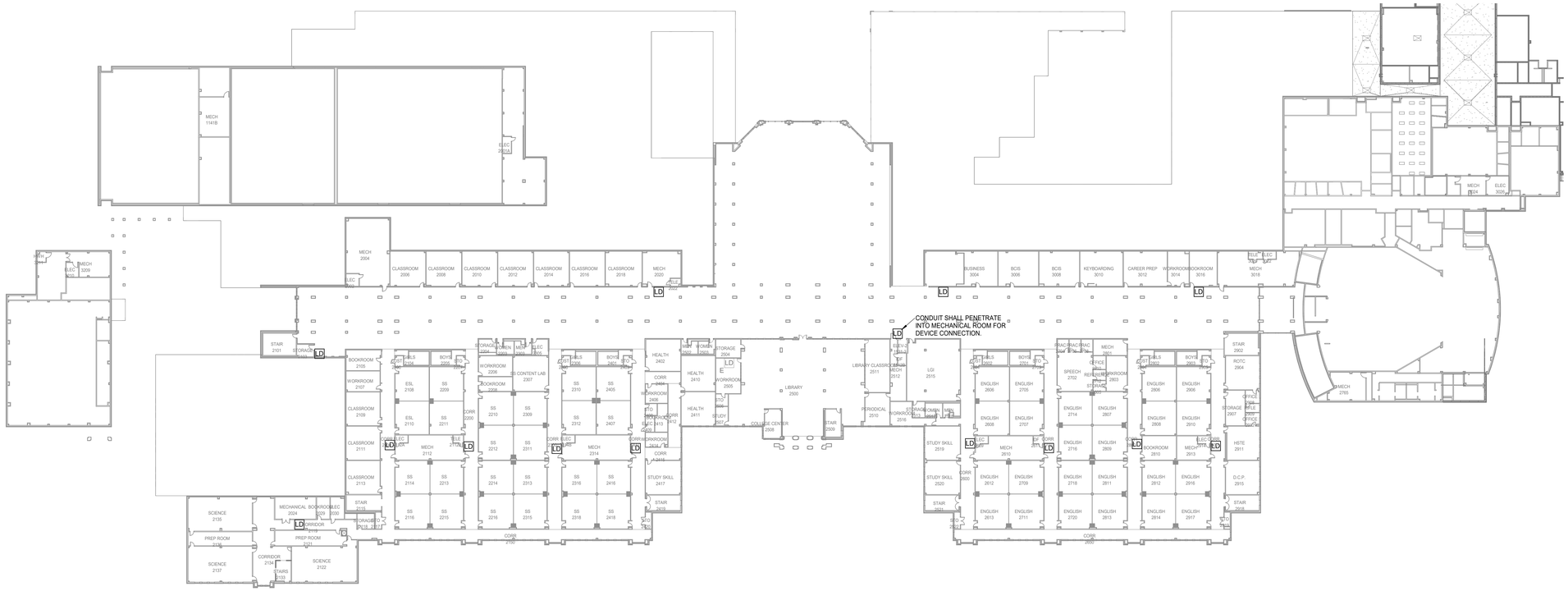
CONSTRUCTION DOCUMENTS

BRADLEY KALMANS
80219
LICENSED
PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900



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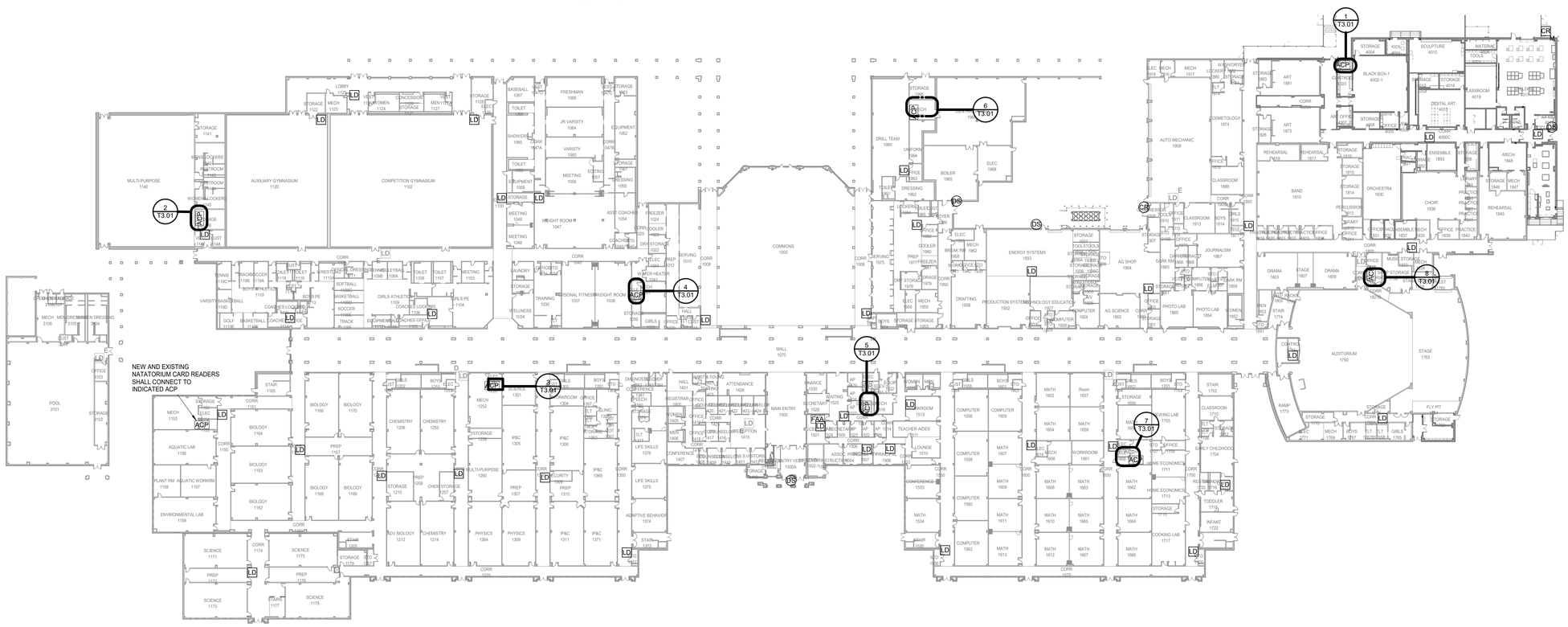
2 TECHNOLOGY COMPOSITE FLOOR PLAN - LEVEL 2
Scale: 1" = 40'-0"



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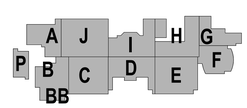
1 TECHNOLOGY COMPOSITE FLOOR PLAN - LEVEL 1
Scale: 1" = 40'-0"

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02	12/09/24
	Revisions / Submission	

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



Project Number: 23071
Date: 2024-11-17
Drawn By: NY

TECHNOLOGY COMPOSITE FLOOR PLANS

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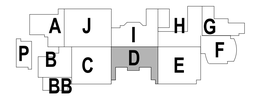
1 **TECHNOLOGY FLOOR PLAN - LEVEL 1 - AREA D**
Scale: 1/8" = 1'-0"

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

NATEX
CORPORATION
ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS
ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS
80219
LICENSED
PROFESSIONAL ENGINEER
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

No.	Revisions / Submission	Date
1	Addendum 02	12/09/24

Project Number: 23071
Date: 2024-11-17
Drawn By: NY

TECHNOLOGY FIRST FLOOR PLAN - AREA D

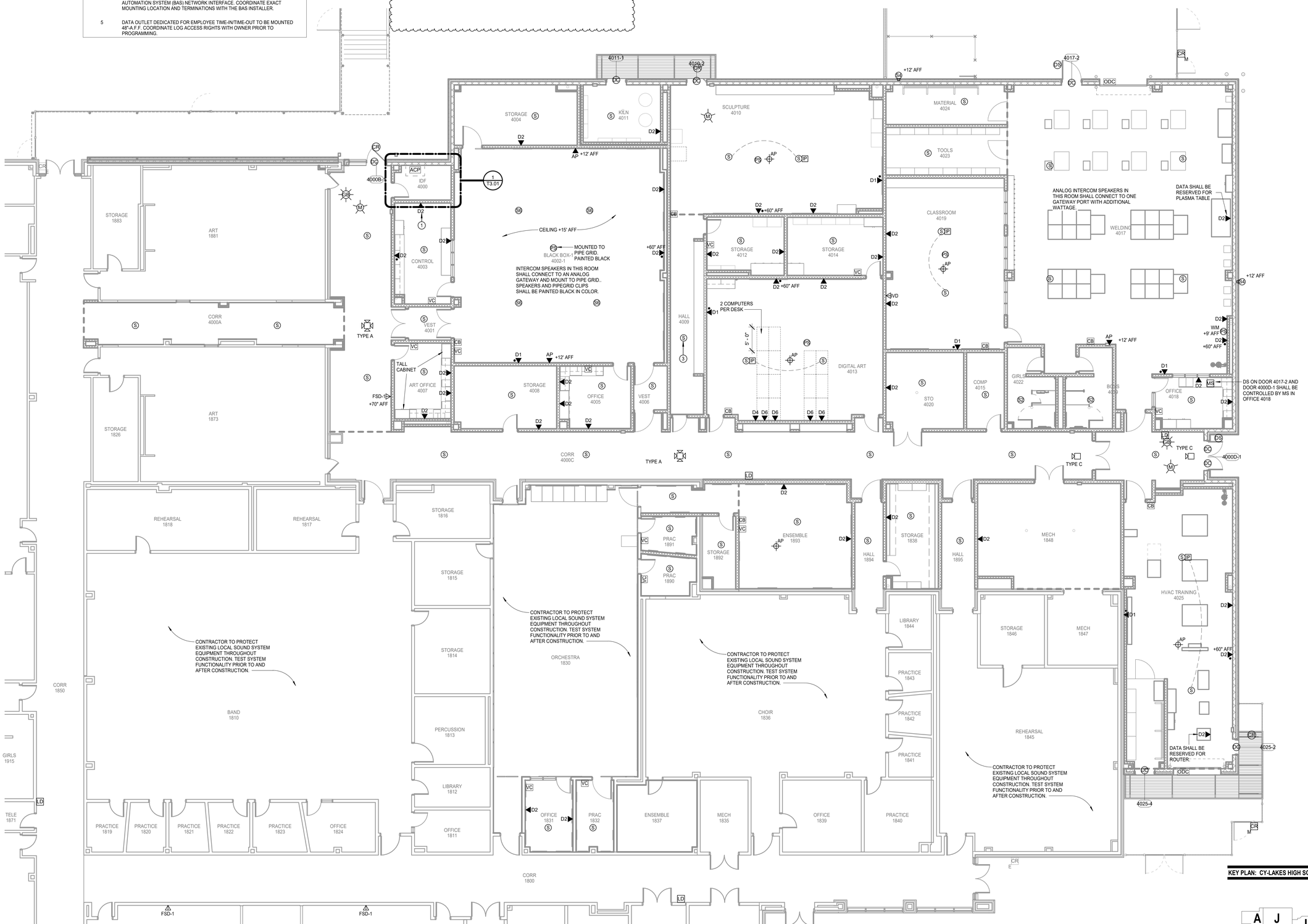
T2.04
of

TECHNOLOGY PLAN KEYED NOTES

1	CONTRACTOR TO PROVIDE AND INSTALL DATA OUTLET FOR AV CONSULTANT DISPLAY. BACKBOX TO BE MOUNTED AT +60" AFF. REFERENCE AV CONSULTANT DRAWINGS FOR FINAL MOUNTING LOCATION/HEIGHT AND DATA QUANTITIES.
2	PROVIDE A CONTACT CLOSURE TO AUDIO-VIDEO RACKS FOR EMERGENCY MUTING OF AUDIO SYSTEMS IF FIRE OR LOCKDOWN SYSTEMS ARE IN ALARM.
3	ANALOG INTERCOM SPEAKER SHALL BE ZONED TO CORRIDOR.
4	THE DESIGNATED TECHNOLOGY OUTLET IS INTENDED FOR THE BUILDING AUTOMATION SYSTEM (BAS) NETWORK INTERFACE. COORDINATE EXACT MOUNTING LOCATION AND TERMINATIONS WITH THE BAS INSTALLER.
5	DATA OUTLET DEDICATED FOR EMPLOYEE TIME-IN/TIME-OUT TO BE MOUNTED 48"-A.F.F. COORDINATE LOG ACCESS RIGHTS WITH OWNER PRIOR TO PROGRAMMING.

FIRE ALARM

A	FIRE ALARM SYSTEM IS A PERFORMANCE BASED PER SPECIFICATIONS 28 46 00. CONTRACTOR TO REFERENCE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
B	A LICENSED FIRE ALARM PLANNING SUPERINTENDENT CERTIFIED TO A MINIMUM LEVEL 3, IN THE SUBFIELD OF FIRE ALARM SYSTEMS THROUGH THE NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET), SHALL PROVIDE PLANS AND CALCULATIONS FOR A MANUAL AND AUTOMATIC FIRE DETECTION AND ALARM SYSTEM TO COMPLY WITH THE BUILDING SPACE LAYOUT, BUILDING OCCUPANCY, CURRENT NFPA 72, LOCAL AND STATE CODE REQUIREMENTS, AND THE FIRE ALARM AND DETECTION SYSTEM SPECIFICATIONS.



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1 **TECHNOLOGY FLOOR PLAN - LEVEL 1 - AREA G**

Scale: 1/8" = 1'-0"

Salas O'Brien

salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
Houston, TX 77064

Registration: F-4111
Project No: 2024-00197-00

NATEX CORPORATION ARCHITECTS
www.natexarchitects.com
447 Heights Boulevard
Houston, TX 77007
Phone: 713-975-9525
Fax: 713-780-7824

COLEMAN PARTNERS ARCHITECTS LLC
www.cparch.com
3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

CONSTRUCTION DOCUMENTS

BRADLEY KALMANS 80219 LICENSED ARCHITECT
12-09-2024

CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

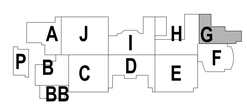
2024 CY-LAKES HIGH SCHOOL RENOVATION

5750 GREENHOUSE RD., KATY, TX 77449
CFISD PROJECT NO. 24-02-5749-R-RFP

1	Addendum 02 — 12/09/24
	Revisions / Submission

Project Number: 23071
Date: 2024-11-17
Drawn By: NY

KEY PLAN: CY-LAKES HIGH SCHOOL BUILDING



TECHNOLOGY FIRST FLOOR PLAN - AREA G

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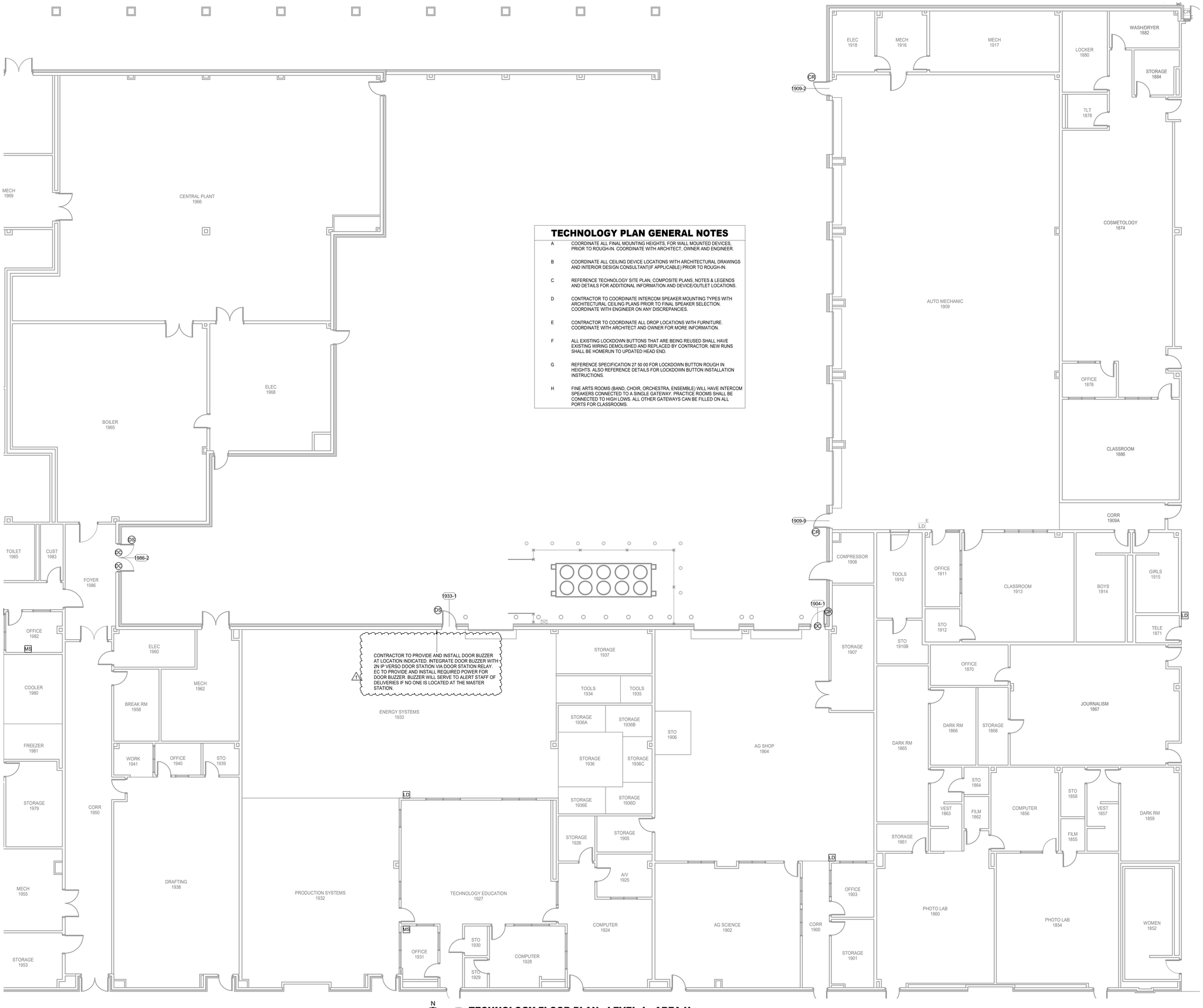
of



TECHNOLOGY PLAN GENERAL NOTES

A	COORDINATE ALL FINAL MOUNTING HEIGHTS, FOR WALL MOUNTED DEVICES, PRIOR TO ROUGH-IN. COORDINATE WITH ARCHITECT, OWNER AND ENGINEER.
B	COORDINATE ALL CEILING DEVICE LOCATIONS WITH ARCHITECTURAL DRAWINGS AND INTERIOR DESIGN CONSULTANT(IF APPLICABLE) PRIOR TO ROUGH-IN.
C	REFERENCE TECHNOLOGY SITE PLAN, COMPOSITE PLANS, NOTES & LEGENDS AND DETAILS FOR ADDITIONAL INFORMATION AND DEVICE/OUTLET LOCATIONS.
D	CONTRACTOR TO COORDINATE INTERCOM SPEAKER MOUNTING TYPES WITH ARCHITECTURAL CEILING PLANS PRIOR TO FINAL SPEAKER SELECTION. COORDINATE WITH ENGINEER ON ANY DISCREPANCIES.
E	CONTRACTOR TO COORDINATE ALL DROP LOCATIONS WITH FURNITURE. COORDINATE WITH ARCHITECT AND OWNER FOR MORE INFORMATION.
F	ALL EXISTING LOCKDOWN BUTTONS THAT ARE BEING REUSED SHALL HAVE EXISTING WIRING DEMOLISHED AND REPLACED BY CONTRACTOR. NEW RUNS SHALL BE HOMERUN TO UPDATED HEAD END.
G	REFERENCE SPECIFICATION 27 50 00 FOR LOCKDOWN BUTTON ROUGH IN HEIGHTS. ALSO REFERENCE DETAILS FOR LOCKDOWN BUTTON INSTALLATION INSTRUCTIONS.
H	FINE ARTS ROOMS (BAND, CHOIR, ORCHESTRA, ENSEMBLE) WILL HAVE INTERCOM SPEAKERS CONNECTED TO A SINGLE GATEWAY. PRACTICE ROOMS SHALL BE CONNECTED TO HIGH LOWS. ALL OTHER GATEWAYS CAN BE FILLED ON ALL PORTS FOR CLASSROOMS.

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1 **TECHNOLOGY FLOOR PLAN - LEVEL 1 - AREA H**
Scale: 1/8" = 1'-0"

Salas O'Brien
salasobrien.com 281-664-1900
Houston
10930 W. Sam Houston Pkwy North, Suite 900
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NATEX CORPORATION ARCHITECTS
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3701 KIRBY DR. SUITE 988
HOUSTON, TX 77098
tel 832.947.1038 fax 225.214.5365

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CIVIL ENGINEER
BROOKS AND SPARKS, INC.
21020 PARK ROW
KATY, TX 77449
tel: 281.578.9595

STRUCTURAL ENGINEER
DALLY + ASSOCIATES, INC.
9800 RICHMOND AVE.
SUITE 460
HOUSTON, TX 77042
tel: 713.337.8881

MEPT ENGINEER
SALAS O'BRIEN
10930 W. SAM HOUSTON PKWY. N.
SUITE 900
HOUSTON, TX 77064
tel: 281.664.1900

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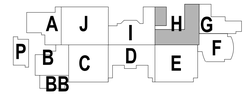

Project Number:	23071
Date:	2024-11-17
Drawn By:	NY

TECHNOLOGY FIRST FLOOR PLAN - AREA H

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