



**ADDENDUM NO. 03
September 26, 2022**

To Drawings and Specifications dated September 7, 2022.

**WINDSONG ELEMENTARY SCHOOL ADDITION & RENOVATION ISSUE FOUR PROPOSAL
FOR FRIENDSWOOD I.S.D.**

Prepared by: PBK
11 Greenway Plaza, 22nd Floor
Houston, TX 77046-1104
PBK Project No: 20380

Notice to Bidders

- A. Receipt of this Addendum shall be acknowledged on the Bid Form.
- B. This Addendum forms part of the Contract documents for the above referenced project and shall be incorporated integrally therewith.
- C. Each bidder shall make necessary adjustments and submit his proposal with full knowledge of all modifications, clarifications, and supplemental data included therein. Where provisions of the following supplemental data differ from those of the original Contract Documents, this Addendum shall govern.

RFI / CLARIFICATIONS

- Item No. 1 Could you please see about getting a soils report for this project?
 - A. **Soils Report included in addendum for reference only.**

- Item No. 2 I wanted to find out what type of skylight you want for this project. In order to make this a TDI compliant skylight we would have to replace the framing and panels. If TDI is not needed, we could simply replace with new panels and keep the frame in place.
 - A. **The replacement skylight is required to be TDI compliant. Refer to skylight specs in the addenda.**

- Item No. 3 Are there curb dimensions available they can provide?
 - A. **See revised A-301.**

- Item No. 4 I see they want to remove 1qty Kalwall unit, raise the curb to the 10" minimum, and install a new skylight. Is this accurate for the base bid or alternate? And if so, can we provide a Major industries and CPI quote? If the curb is being raised, will they be able to provide the roofing contractor to wrap the curb with their membrane after the demo of the skylights is done?
 - A. **The skylight glazing and frame replacement is alternate 08. The curb is existing to remain and is not required to be raised.**

- Item No. 5 What are the glazing specifications for the alternate.
 - A. **Reference spec 08 45 00 for skylight glazing requirement. Glazing is required to be TDI compliant.**

- Item No. 6 Can another site visit to the roof be arranged prior to this bidding.
 - A. **To be fair to all bidders, the pre-proposal conference will be the only allowed site visit prior to bidding.**

GENERAL

- Item No. 7 All window sills to be solid surface, SS-1.
Item No. 8 All tackable wall surface to have trim.
Item No. 9 Brick banding pattern to match existing. Brick selection:
A. Field Brick to match existing: Cloud Ceramics in color Greystone, texture Velour
B. Accent Brick to match existing: Kansas Brick in color 500 Mahogany

SPECIFICATIONS

- Item No. 10 **07 84 00 Firestopping:** added in its entirety.
Item No. 11 **08 45 00 Translucent Panels:** added in its entirety.
Item No. 12 **12 36 61 Solid Surface Material Fabrications:** added in its entirety
Item No. 13 **22 40 00 – PLUMBING FIXTURES**
A. Section 2.1 B and 2.2 B: Manufacturer shall be Sloan and Zurn only.
B. Section 2.3 B: Manufacturer shall be Sloan and Chicago only.
C. Section 2.3 G: Remove reference to T&S Brass.
D. Section 2.4 B: Manufacturer shall be Chicago only.
E. Section 2.4 E 1: Remove reference to T&S Brass.
F. Section 2.7 D: Fountain model number to be HTHB-HAC8SS-NF.
Item No. 14 **23 05 14 – VARIABLE FREQUENCY DRIVES**
A. Section 1.7: Delete Yaskawa.
Item No. 15 **23 09 93 – SEQUENCES OF OPERATION FOR HVAC CONTROLS**
A. Replace spec in its entirety. Changes are highlighted in yellow.
Item No. 16 **26 05 73.19 – ARC FLASH HAZARD ANALYSIS:** Delete section in it's entirety.
Item No. 17 **26 09 23 – LIGHTING CONTROL DEVICES**
A. Delete section 2.5.
Item No. 18 **26 09 43 – DIGITAL LIGHTING CONTROLS**
A. Add section in it's entirety.
Item No. 19 **26 20 00 – ELECTRICAL DISTRIBUTION EQUIPMENT**
A. Section 2.1: Remove Cutler Hammer.
Item No. 20 **27 10 00 – STRUCTURED CABLING SYSTEM**
A. Section 3.03 D and 3.03 F, colors shall be as follows:
(i) Data – blue
(ii) Security – yellow
(iii) Access points – red
(iv) CCTV – orange
(v) PA – white
(vi) Phones – dark green
B. Section 3.03 F, 3.03 G, and 3.06 C: Provide keystone jacks.
C. Section 3.04 A: Fiber to be single mode 12 strand.
D. Section 3.05 D: Rack manufacturers shall be Chatsworth or Hoffman.
E. Section 3.05 E: Cable management – vertical only.
F. Section 4.01: Provide a laminated 24x36 floor plan of the addition inside the IDF, identify all new outlets on plan.
Item No. 21 **27 41 00 – INTEGRATED AUDIO VIDEO SYSTEMS AND EQUIPMENT**
A. Section 2.2 A: 'PS' and 'AVO' outlets shall be C2G #39702 with active HDMI and USB cables. Female USB B at teacher station, female USB A at panel. Provide 15' patch cords on each end.
B. Delete section 2.2 B, 2.2 C, and 2.2 D.
C. Add to Section 2.2 E: USB cable to be C2G #38998.
Item No. 22 **28 13 00 – ACCESS CONTROL SYSTEM**
A. Include section in it's entirety.
Item No. 23 **28 16 00 – ACCESS CONTROL SYSTEM**

- Item No. 24 A. Remove section in it's entirety.
28 16 00 – INTRUSION DETECTION SYSTEM
- Item No. 25 A. Delete sections 2.5 D and 2.5 E.
28 31 00 – FIRE DETECTION AND NOTIFICATION SYSTEM
- Item No. 25 A. Delete section 1.2 K.
- Item No. 25 B. Section 1.7 A: Manufacturer shall be Notifier.
- Item No. 25 C. Section 2.3 A: Existing FACP manufacturer is Notifier.

CIVIL

- Item No. 26 **C 000 Cover Sheet**
- Item No. 26 A. Updated Sheet in its entirety per City of Friendswood request.
- Item No. 27 **C 001 Index, Notes, & Legend**
- Item No. 27 A. Updated Index of Drawings
- Item No. 28 **C 003 Demolition Plan**
- Item No. 28 A. Desilting of existing concrete pilot channel.
- Item No. 28 B. Revised callout to demolish existing sign instead of relocating sign.
- Item No. 28 C. Updated callout and hatching for stripping of soils around existing trees.
- Item No. 29 **C 101 Site Plan**
- Item No. 29 A. Updated callouts for track to include curb.
- Item No. 29 B. Updated pond 100 year water surface elevation to 31.75 from 31.50.
- Item No. 29 C. Adjusted concrete pilot channel.
- Item No. 30 **C 202 Drainage Plan**
- Item No. 30 A. Upsized 318 linear ft of 12" storm sewer pipe to 18".
- Item No. 30 B. Added 6.2 inch restrictor on storm pipe and added benchmark notes to sheet.
- Item No. 31 **C 203 Drainage Area Map**
- Item No. 31 A. Updated sheet in its entirety.
- Item No. 31 B. Added existing drainage areas per Galveston County Consolidated Drainage District request.
- Item No. 31 C. Changed scale from 1:40 to 1:60.
- Item No. 31 D. Added sheet flow arrows to show no storm water affecting adjacent properties.
- Item No. 32 **C 204 Drainage Calculations**
- Item No. 32 A. Updated sheet in its entirety.
- Item No. 32 B. Added restrictor graphs, updated storm sewer calculations per City of Friendswood request.
- Item No. 33 **C 401 Erosion Control Plan**
- Item No. 33 A. Added 20 linear ft of filter fabric fence.
- Item No. 34 **C 502 Details:** Updated track detail.
- Item No. 35 **C 503 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 36 **C 504 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 37 **C 505 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 38 **C 506 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 39 **C 507 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 40 **C 508 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 41 **C 509 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 42 **C 510 City of Friendswood Details:** Updated detail sheet to show current City of Friendswood Details per City of Friendswood Request.
- Item No. 43 **C 511 Galveston County Consolidated Drainage District Details:** Sheet Number change.
- Item No. 44 **C 512 Galveston County Consolidated Drainage District Details:** Sheet Number change.
- Item No. 45 **C 513 Galveston County Consolidated Drainage District Details:** Added sheet.

LANDSCAPE

- Item No. 46 **L2.01 Materials Plan**
A. Dimensions added to the proposed concrete sidewalk at the detention pond, refer to attachment.
- Item No. 47 **L2.02 Materials Plan**
A. Dimensions added to proposed fencing, refer to attachment.
B. Proposed athletic field updated to show track curb, by Civil, refer to attachment.
- Item No. 48 **L4.02 Planting Plan**
A. Planting legend adjusted to show proposed seeding and sod, refer to attachment.
B. Sod and seeding adjusted to accommodate track curb at athletic field, by Civil, refer to attachment.

STRUCTURAL

- Item No. 49 **SD-100 – OVERALL DEMO SCOPE SHEET**
A. Scope item #2 note changed in structural scope list. See re-issued sheet.
B. Special GC Note added to sheet. See reissued sheet.
- Item No. 50 **S-100 – OVERALL SCOPE SHEET**
A. Scope item #2 note changed in structural scope list. See reissued sheet.
B. MEP unit shown on plan. See reissued sheet.
- Item No. 51 **S-102G – ROOF FRAMING PLAN – AREA G**
A. MEP roof top unit added to plan. See reissued sheet.
- Item No. 52 **S-506 – GENERAL STEEL NOTES AND TYP DETAILS**
A. Detail 1 revised. See reissued sheet.

Architectural

- Item No. 53 **ASD101 Demolition Architectural Site Plan**
A. Existing fire lane striping to be removed, refer to attachment.
B. Revised extents of canopy demo, refer to attachment.
C. Added note to demolish conduit into building and install coverplate at brick penetration, refer to attachment.
D. Revised image for concrete pad demo.
- Item No. 54 **All Demolition Plans**
A. Added hatch to demo legend, refer to SKA-01.
B. Revised keynote 0136 to read "REMOVE EXISTING FLOOR FINISH & WALL BASE, PREP DEMOED AREA FOR NEW FLOORING."
- Item No. 55 **AD101B 1ST Floor Demolition Plan – Area B**
A. Revise keynote to read "DEMOLISH WINDOWS, WINDOWSILLS, AND BLINDS. PROTECT ADJACENT SURFACES AND CASEWORK."
- Item No. 56 **A-101D 1ST Floor Plan – Area D**
A. Added keynotes 0211 and 0212, refer to attachment.
B. Added writable surface at east walls of rooms F22 and MC3, refer to attachment.
C. Reduced replacement carpet area in library, refer to attachment.
D. Revised carpet in Library area to be CPT-1, refer to attachment.
E. Removed casework from Green Room and workroom as this is an alternate and not base bid.
F. HM frames to match existing frames on doors F21 and F22, refer to attachment.
- Item No. 57 **A-101D.1 – Alternate No. 08:** Sheet removed in it's entirety.
- Item No. 58 **A-101D.2 Alternate No. 05, 06 & 07**
A. Revise east wall of ADM16 GT, west wall of room MC2 Makerspace, and west wall of MC4A Dyslexia to read "VINYL/WRITABLE SURFACE" on the room finish schedule.
B. Revise east wall of the room MC2 Makerspace to read "GREEN WALL" on the room finish schedule.
C. Revise keynote 0151 to read "DEMOLISH EXISTING FURDOWN AND CASEWORK BELOW IN IT'S ENTIRETY."

- D. Elevation 03: Revise note to read "SUPER GRAPHIC, RE:SPEC. INCLUDED IN ALTERNATE PRICE, NOT ALLOWANCE."
- Item No. 59 **A-101F.1 Alternate No. 03**
 A. Revised ceiling plan to have Furdown, refer to attachment.
 B. Removed Cool Down room from room finish schedule, refer to attachment.
 C. Removed keynote 0134 from Life Skills and added keynote 0136, refer to attachment.
 D. Revise carpet in rooms S3 and S4 to CPT-1.
- Item No. 60 **A-101G1 1ST Floor Plan – Area G – Schedules**
 A. Revised east and east and west walls of Multipurpose to read "VWC-1/WRITABLE SURFACE" on the room finish schedule, refer to attachment.
 B. Revised material finish legend, refer to attachment.
 C. Revised plastic laminate finish on door schedule area G, refer to attachment.
 D. Added Glazing Information on schedules, refer to attachment.
- Item No. 61 **A-101G 1ST Floor Plan – Area G**
 A. Added plan detail callouts, refer to attachment.
 B. Revised column furrouts, refer to attachment.
 C. Added drinking fountain and corresponding keynote 2203, refer to attachment.
 D. Fire extinguisher to be semi-recessed.
- Item No. 62 **A-101G.1 Alternate NO.01:** Door panels and storefront finish to be Clear Anodized
- Item No. 63 **A-201D.1 Alternate No. 08 :** Sheet added in it's entirety, refer to attachment.
- Item No. 64 **A-201G 1ST Floor Ceiling Plan – Area G:** Add ceiling furdown and detail, refer to attachment.
- Item No. 65 **A-301 Roof Plan - Composite**
 A. Added skylight dimension, refer to attachment.
- Item No. 66 **A-325 Building Envelope Details (New to Exist)**
 A. Remove detail 11 in its entirety.
- Item No. 67 **A-401 Enlarged Restroom Plans & Interior Elevations**
 A. Revised casework sizes in multipurpose pod F, refer to attachment.
 B. Revised Girl's restroom sink locations, refer to attachment.
 C. Enlarged staff restrooms, refer to attachment.
 D. Revised counters with sinks to solid surface, refer to attachment.
 E. Urinal Partitions to have pilasters, refer to attachment.
- Item No. 68 **A-402 Enlarged Interior Elevations**
 A. Detail 05: Added drinking fountain, tile, and clarifying notes, refer to attachment.
 B. Detail 08: Revised callouts for tackable surface, added corner guard callout, and revised door graphic, refer to attachment.
 C. Added elevation 15 in it's entirety.
- Item No. 69 **A-602 Wall Sections:** Revised sections 01 and 06, refer to attachment.
- Item No. 70 **A-701 Plan Details**
 A. Added detail 07 in its entirety, refer to attachment.
 B. Detail 04: added callout and dimension, refer to attachment.
- Item No. 71 **A-711 Plan Details**
 A. Added detail 06 in it's entirety, refer to attachment.
 B. Revised detail 02 and 11, refer to attachment.
- Item No. 72 **AF101G 1ST Level – Finish Plan – Area G**
 A. Revised LVT flooring pattern and locations, refer to attachment.
 B. CPT-2 removed.
- Mechanical**
- Item No. 73 **SHEET M-101A – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA A**
 1. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 74 **SHEET M-101B – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA B**
 A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 75 **SHEET M-101C – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA C**
 A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 76 **SHEET M-101D – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA D**
 A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 77 **SHEET M-101E – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA E**
 A. Replace sheet in its entirety. Refer to revised sheet.

- Item No. 78 **SHEET M-101F – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA F**
A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 79 **SHEET M-101G – 1ST FLOOR MECHANICAL FLOOR PLAN – AREA G**
A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 80 **SHEET M-201 – MECHANICAL ROOF PLAN**
A. Replace sheet in its entirety. Refer to revised sheet.
- Item No. 81 **SHEET M-401 – MECHANICAL PIPING DIAGRAM**
A. Added new sheet.
- Item No. 82 **SHEET M-501 – MECHANICAL SCHEDULES**
A. Mini-Split System Air-Conditioners Schedule:
(i) Revise FCU-C8: Model Number – LDN; Type – Wall Mounted; Nominal Tonnage – 1.5 tons; Cooling Btuh – 18,000; Heating Btuh – 20,000; MCA – 13.0 & MOCP – 20.
(ii) Revise FCU-G-01: MCA – 13.0 & MOCP – 20
B. Diffusers, Registers & Grilles Schedules:
(i) Updated the description of Designations A to “24x24 module size, lay-in border type, 18"x18" neck size with round duct connection sized as indicated on plans. No opposed blade damper, all steel construction. Provide with factory mounted fire damper and thermal insulating blanket.”
(ii) Updated the description of Designations B to “24x24 module size, lay-in border type, 22"x22" neck size unless noted otherwise. No opposed blade damper, all steel construction. Provide with factory mounted fire damper and thermal insulating blanket.”
(iii) Updated the description of Designations E to “12x12 module size, lay-in border type, 18"x18" neck size with round duct connection sized as indicated on plans. No opposed blade damper, all steel construction. Provide with factory mounted fire damper and thermal insulating blanket.”
(iv) Updated the description of Designations F to “12x12 module size, lay-in border type, 22"x22" neck size unless noted otherwise. No opposed blade damper, all steel construction. Provide with factory mounted fire damper and thermal insulating blanket.”
C. HVAC Fans Schedule:
(i) Add note 8: “Provide with factory mounted disconnect switch” under “HVAC Fan Schedules.”
(ii) Add note 9: “Provide with aluminum washable filter” under “HVAC Fan Schedules.”
(iii) Add keyed note 8 to all Fans.
(iv) Add keyed note 9 to SF-01, SF-02, OASF-1, OASF-2, OASF-3, OASF-4 & OASF-5.
- Item No. 83 **SHEET M-502 – MECHANICAL SCHEDULES**
A. Existing Air Handling Unit Schedule:
(i) Revised note 3 to “Replace existing variable frequency drive with new”
(ii) Reference note 3 to AHU-1, AHU-2, AHU-4, AHU-6, AHU-7, & AHU-8.
(iii) Revise AHU-4 hp to 3.
(iv) Revise AHU-7 heating water coil valve to 3-way.
B. Series Fan-Powered Air Terminal Units With Hot Water Heat Schedule: Changed “Inlet Size” for units CVB-G-02 through 04, and CVB-G-07 through 09 from 12 to 10.
C. Existing Hot Water Coil Schedule:
(i) Revised note 3 to “Not Used.”
(ii) Revised notes for HWC-1, HWC-4, and HWC-5 from “1,3” to “1,2.”

ELECTRICAL

- Item No. 84 **SHEET ES101 – ELECTRICAL SITE PLAN**
A. Add general note 4: “Provide a contactor and BAS connection for all existing exterior lighting circuits, four total, one for parking lot lighting and three for building mounted lighting. Confirm exact location during construction.
- Item No. 85 **GENERAL – ELECTRICAL DEMO PLANS**
A. In areas where the writeable surface is to be installed as part of alternate 2, remove conflicting receptacle at each location.
- Item No. 86 **SHEET EPD-101B – 1ST FLOOR POWER DEMO PLAN – AREA B**

- A. At exterior door between column lines GB and GC, remove recessed lighting fixture and egress lighting fixture.
- Item No. 87 **SHEET EPD-101D – 1ST FLOOR POWER DEMO PLAN – AREA D**
- Item No. 88 At library circulation desk, remove floor boxes serving power and data to desk. Patch and repair concrete and prep for new floor finish.
- Item No. 89 **SHEET EP-101F – 1ST FLOOR POWER PLAN – AREA F**
- A. Note to disconnect/reconnect existing VFD-AHU-8 to be replaced. Extend existing conduit and wire as required.
- Item No. 90 **SHEET EP-101G – 1ST FLOOR POWER PLAN – AREA G**
- A. Provide power to drinking fountain outside Custodial F9. Provide dedicated 20A 120V circuit to panel LG. Provide GFCI circuit breaker.
- Item No. 91 **GENERAL – LIGHTING PLANS**
- A. Update general note 4 to remove references to power packs. Also, the system shall not receive a BAS connection.
- Item No. 92 **SHEET E-301 – ELECTRICAL ROOF PLAN**
- A. Revised circuit breaker and wire to ACCU-C8 to 20A/2P and 2#12, 1#12, 1" conduit, respectively. Revised disconnecting means to 30A rating.
- B. In keyed note 1, remove the sentence "Disconnecting means to be factory installed with exhaust fan."
- Item No. 93 **SHEET E7.01 – ELECTRICAL PANEL SCHEDULES**
- A. Revised circuit breaker and wire to ACCU-G-01 to 20A/2P and 2#12, 1#12, 1" conduit, respectively, for circuit LG-44,46.

PLUMBING

- Item No. 94 **SHEET PD101D – 1ST FLOOR PLUMBING DEMO PLAN – AREA D**
- A. Removal of sink in room MC2 is part of alternate 6.
- Item No. 95 **SHEET P-101A – 1ST FLOOR PLUMBING PLAN – AREA A**
- A. Note that existing fire sprinkler riser is located in room UM1, adjacent to door.
- B. Remove keyed note 2 from room B7.
- Item No. 96 **SHEET P-101B – 1ST FLOOR PLUMBING PLAN – AREA B**
- A. Remove keyed note 5 from rooms C7 and D7.
- Item No. 97 **SHEET P-101D – 1ST FLOOR PLUMBING PLAN – AREA D**
- A. Remove keyed note 5 from room E7.
- B. Apply keyed note 5 to rooms MC3, F21, F20, and F22.
- C. Keyed note 5 shall apply to room MC2 if alternate 6 is accepted.
- Item No. 98 **SHEET P-101G – 1ST FLOOR PLUMBING PLAN – AREA G**
- A. Provide drinking fountain EDF-1 outside Custodial F9. Provide connection to domestic water, sanitary drain and vent within adjacent chase.
- B. Provide adjustments to plumbing fixture locations as shown on architectural sketches in this addendum, Minor changes were made to fixtures in Custodial F9 and the adjacent single restroom, Girl's Restroom R1 and the adjacent area with casework and sink.

TECHNOLOGY

- Item No. 99 **SHEET T001 – TECHNOLOGY NOTES AND LEGEND**
- A. Fire Alarm Legend: Combination speaker strobe shall be updated to horn strobe.
- B. Security Systems Legend:
- (i) Add to both interior and exterior cameras: "Provide (1) CAT 6 cable from each camera to nearest IDF. RE: specification for camera model numbers."
 - (ii) Add to exterior camera: "Provide biscuit block near exterior wall."
 - (iii) Delete "Provide Altronix LPD each card reader" from Card Reader line.
 - (iv) Add "double pole/ double throw" to Door Contact line.
- Item No. 100 **Technology Legend:**
- A. Technology outlets (first three entries) shall all have '6A' removed. Cabling shall be CAT 6 except for wireless access points.
- B. Add "or AVO" to PS line.

- C. At AVO line, change height to 18" AFF. Cabling shall be CAT 6, delete 6A. Active panel is owner furnished contractor installed. Delete last sentence regarding a dedicated circuit.
- D. At wireless access point line, cabling shall be CAT 6A, delete CAT 6.
- E. Delete camera entry in this legend. Cameras are shown in the security legend.
- F. Intercom Speaker line shall read as follows: "Indicated intercom speaker, flush mounted in ceiling. All corridor, public space, and exterior speakers are conventional 25V and do not require a data drop. Otherwise, provide CAT 6 cable to IDF for each speaker.

Item No. 101 **SHEET TF-101G – 1ST FLOOR FIRE ALARM PLAN – AREA G**

- A. Add general note: Extend existing conventional fire alarm system into new addition. Existing main fire alarm control panel is manufactured by Notifier, refer to sheet TF-101 for location.

Item No. 102 **SHEET TN-101 – 1ST FLOOR TECHNOLOGY PLAN – COMPOSITE**

- A. Add general note: "Replace intercom head end in building MDF with Bogen Nyquist system, RE: specifications. In existing building, reconnect new head end to existing intercom circuits. Re-wire exterior speakers to be on dedicated zone.
- B. Delete keyed note 4.
- C. In keyed note 5, fiber shall be single mode.

Item No. 103 **SHEET TN-101C – 1ST FLOOR TECHNOLOGY PLAN – AREA C**

- A. Delete scope of work shown in room ADM3.

Item No. 104 **SHEET TN-101D – 1ST FLOOR TECHNOLOGY PLAN – AREA D**

- A. Dashed line for keyed note 12 shall extend to rooms F21, F20, and F22.
- B. Remove data drops in library circulation desk.
- C. D2 data outlet in room MC4A shall be part of alternate 5.
- D. Remove D2 at counter in room ADM16.

Item No. 105 **SHEET TN-101F – 1ST FLOOR TECHNOLOGY PLAN – AREA F**

- A. Provide a high resolution camera on the plan south exterior wall of Gym G1. Hanwha QNP-6320R.

Item No. 106 **SHEET TN-101G – 1ST FLOOR TECHNOLOGY PLAN – AREA G**

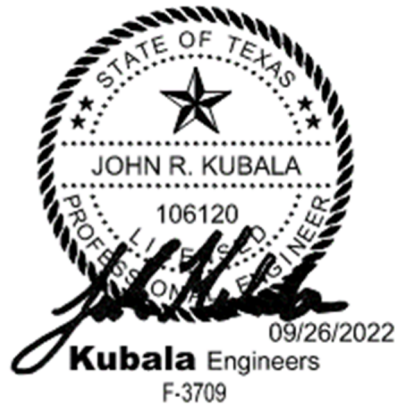
- A. Add general note: "New access control, intrusion detection, and cameras shall be tied into the existing systems on campus. Access control system is RS2, intrusion detection system is Bosch, and Video Management System is Exacq. Provide licenses and programming as required."
- B. Intercom speakers in corridors, restrooms, storage, custodial, and service type spaces shall be zoned together.
- C. Remove existing card reader at exterior entry between classrooms C6 and D5.

Attachments include 145 additional sheets ending with Sheet M-401 Mechanical Piping Plan.





9/7/2022





**Geotechnical Engineering Study
Windsong Intermediate School
Building Addition & New Paving
2100 W. Parkwood
Friendswood, Texas**

Prepared For

Friendswood ISD

Prepared By

**Paradigm Consultants, Inc.
9980 West Sam Houston Pkwy South, Suite 500
Houston, Texas 77099
TBPE Reg. No. F-001478**

June 2022

June 16, 2022
Paradigm Project No. 22-1043



Ms. Kim Dingell
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TBPE Reg. No. F-001478

**Geotechnical Engineering Study
Windsong Intermediate School
Building Addition & New Paving
2100 W. Parkwood
Friendswood, Texas**

Ms. Dingell:

Paradigm Consultants, Inc. presents this report of our geotechnical study for the above referenced project. This study was authorized with Purchase Order #0202200038 dated May 23, 2022. The performed scope of service was in general accordance with Paradigm Proposal No. 22-187, dated May 20, 2022.

Our report presents options that will affect the design, construction, performance, and cost of the structure, and involve compromises and varying levels of risk associated with movement, building distress, and other factors. These issues should be discussed with the Owner and appropriate members of the Owner's design team including the geotechnical engineer to help ensure that the issues and options are understood and applied in a manner commensurate with the Owner's budget, tolerance of risk, and expectations of performance and maintenance.

We appreciate the opportunity to work with you during the design phase of this project and look forward to continuing to work with you during the construction phase of this project. If we may be of further assistance, please call us at your convenience.

Sincerely,

A handwritten signature in black ink that reads 'SWright'.

Stephen Wright, E.I.T.
Graduate Engineer



Ray Meyer, P.E.
Vice President

A handwritten signature in blue ink that reads 'Ray Meyer'.
6/16/22

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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EXECUTIVE SUMMARY

This summary presents selected highlights of our findings and recommendations as a courtesy to the reader. It does not present crucial details needed for the proper application of our findings and recommendations. The findings of this study and recommendations are related through the full report only.

Plans are to construct a building addition to the existing school structure at Windsong Intermediate school located at 2100 West Parkwood in Friendswood, Texas. Plans also include adding new parking spaces and a drive to the existing parking lot.

The subsurface soils, based on intercepted soils from 6 exploratory soil borings, consist of a 4-ft layer of fill beginning at the ground surface. This layer is underlain by fat clay to about 10-ft below existing grade. The following layer consists of lean clay to about 18-ft below existing grade. The remainder of the explored depth consists of sand from 18-ft to the termination of the 30-ft depth. Groundwater was encountered at depths ranging from 16 to 17-ft below existing grade during our field exploration.

The foundation system for the existing is not known at this point. We will recommend a foundation system consisting of footings placed at 13-ft below existing grade. If the existing foundation is determined before construction, Paradigm should be notified to assess the new information in regard to the recommendations in this report. The principal structural loads can be supported on drilled-and-underreamed piers bearing at a depth of about 13-ft below existing grade. We do not know the depth of the existing foundation for the current building. When that information becomes available, Paradigm should be allowed to review our recommendation to determine if the recommend pier depth is compatible with the existing foundation. The foundations should be sized using net allowable bearing pressures of 4.0 kips/ft² for total load and 2.75 kips/ft² for dead load plus sustained live load. Factors of safety for these design loads are at least 2 and 3, respectively. A bell-to-shaft ratio of 3:1 may be considered. If a 3:1 bell-to-shaft ratio in the pier excavation is not possible due to the presence of sand layer at a location during construction, a reduced bell-to-shaft ratio or a straight-sided shaft with a design bell diameter will be required.

The clays within the anticipated zone of seasonal moisture change have plasticity indices ranging from 36 to 48 within the building area. These soils have high to very high shrink-swell potential with changes in moisture content. Two floor systems can be considered to address the risk and consequences of swelling for the floor: a structurally supported floor slab or a slab-on-grade. To reduce potential movements of a slab-on-grade, we recommend a 3-ft thick buffer of select fill. This method will also require that the concrete pavement is placed adjacent to the foundation with little to no exposed soil adjacent to the slab.

Paradigm recommends 5-in. thick concrete paving for passenger vehicle parking areas only, 6-in. thick concrete paving for passenger vehicle driveways, and 7-in. thick concrete paving for entrance and access to dumpster pads. For planning purposes, the pavement subgrade should be stabilized with 6% hydrated lime to an 8-in. depth. The appropriateness of stabilizer and application rate for the subgrade should be determined at the time of construction.

INTRODUCTION

Paradigm Consultants, Inc. (Paradigm) presents this report of our geotechnical study for the building addition and new paving at Windsong Intermediate School located in Friendswood, Texas. This study was authorized with Purchase Order #0202200038 dated May 23, 2022. The performed scope of service was in general accordance with Paradigm Proposal No. 22-187, dated May 20, 2022.

Project Description

Plans are to construct a building addition to the existing school structure at Windsong Intermediate school located at 2100 West Parkwood in Friendswood, Texas. Plans also include adding new parking spaces and a drive to the existing parking lot.

Our experience in this area indicates cast-in-place, drilled piers with slab-on-grade are typically preferred to support the new building. The proposed paving is expected to be concrete pavement.

Scope of Study

The objectives of this study were to develop geotechnical recommendations and construction considerations for the proposed foundations and paving. To accomplish these objectives, our study included:

- Drilling 6 borings within the project limits to explore the subsurface soil and groundwater conditions;
- Performing geotechnical laboratory tests to aid in soil classification and to determine engineering properties of the soils encountered at the site;
- Analyzing the field and laboratory test data to develop foundation and paving design recommendations and construction considerations; and
- Preparing this report presenting our findings and recommendations.

FIELD EXPLORATION AND LABORATORY TESTING

Our field exploration included drilling and sampling 6 exploratory soil borings as designated in Table 1. The client selected the boring locations and Paradigm located them in the field using approximate methods and landmarks. The approximate boring locations are shown on Figure 1.

Table 1. Boring Schedule

Structure	Soil Borings
Building Addition	2-borings @ 30-ft each
Paving	4-borings @ 5-ft each

Drilling Operations

Patino Drilling, a subcontractor to Paradigm, drilled and sampled soil borings on May 31, 2022, using truck-mounted drilling equipment. Paradigm's field representative was on-site to monitor drilling activities, direct the sampling efforts, and log the boreholes. Our field operations were performed in general accordance with ASTM International Standards (ASTM D 1452¹ and ASTM D 5783²).

Soil Sampling

Soil was sampled continuously at 2-ft intervals to 12-ft depth with additional samples taken between 13-ft and 15-ft depths, and at 5-ft interval to the complete boring depth. The sampling method is determined based on the anticipated soils.

Cohesive Soil. Soils interpreted to be cohesive soils (clay) during field operations were sampled by hydraulically pushing a 3-in. diameter, thin-walled steel tube a distance of about 24 in. Our field sampling procedures were in general accordance with ASTM D 1587.³ For each recovered sample, our representative extruded the sample in the field, visually classified the soil, and measured the penetration resistance using a pocket penetrometer. A representative portion of the recovered sample was wrapped in aluminum foil and placed into a plastic bag for transport to our laboratory.

Cohesionless Soil. Soils interpreted to be cohesionless soils (sand and silt) during field operations were sampled as part of the Standard Penetration Test (SPT) by driving a 2-in. diameter split-barrel sampler. The sampler was driven 18 in. by a 140-lb hammer falling 30 in. in general accordance with the ASTM D 1586.⁴ Our representative recorded the number of blows required to drive the sampler through three consecutive 6-in. intervals. As permitted by ASTM D 1586, sampling was terminated if 50 blows were recorded within any one 6-in. interval. The sum of blows required to penetrate the final 12 in. is the SPT "N" value. For each sample, our representative visually classified the soils within the split-barrel sampler and placed a portion of the recovered sample into a plastic bag for transport to our laboratory.

Water-Level Measurements

Drilling protocol includes dry augering from the ground surface to the depth where water or borehole sidewall instability occurs. If neither water nor instability is encountered, dry-auger drilling techniques are used to the full depth of the boring. If water is encountered, the water level within the borehole is measured at 5-minute intervals for at least 15 minutes before drilling resumes using wet rotary methods. Water level conditions are discussed in the *Surface and Subsurface Conditions* section of this report.

Laboratory Testing

Paradigm performed geotechnical laboratory tests in general accordance with ASTM methods on selected soil samples to aid in soil classification and to determine engineering properties. The performed tests with test method are presented below in Table 2.

Table 2. Laboratory Test Methods

Test Name	Test Method
Moisture Content	ASTM D 2216 ⁵
Percent Soil Finer than No. 200 Sieve	ASTM D 1140 ⁶
Liquid and Plastic Limits and Plasticity Index	ASTM D 4318 ⁷
Unconfined Compressive Strength of Cohesive Soil	ASTM D 2166 ⁸

Boring Logs

Paradigm's field representative logged the soil boring recording the drilling method, sampling method and interval, and penetration resistance. Details of the stratigraphic conditions encountered at each boring location were recorded on the field log in general accordance with ASTM D 5434.⁹ Identification and descriptions of the soils were based on visual-manual procedures described in ASTM D 2488.¹⁰

The boring log was developed using the stratigraphic and soil property data obtained during our field exploration and laboratory testing programs. Each log represents our interpretation of general soil and water conditions at the boring location. The boring log includes the type and interval depth for each sample, the corresponding penetration resistance, and the results of the index properties and strength testing. Soil classifications were based on the Unified Soil Classification System (ASTM D 2487¹¹). The boring logs and a key to the terms and symbols used on the logs are included in the Appendix.

When a penetration resistance value of 4.5 tsf is recorded and penetration resistance is used to determine soil consistency, Paradigm describes consistency as very stiff to hard. In the absence of unconfined compressive strength data, Paradigm does not expressly state that soil is hard consistency. In the absence of the appropriate test data at the interval depth, no estimate of consistency or density is noted.

Unified Soil Classification System. ASTM D 2487 classifies soil as either fine-grained or coarse-grained with the percentage of soil particles finer than the No. 200 sieve size used to differentiate between coarse-grained and fine-grained soil. Clay and silt are fine-grained soils and have 50% or more of their particles finer than the No. 200 sieve size. Gravel and sand are coarse-grained soils and have less than 50% of their particles finer than the No. 200 sieve size.

Clay has a plasticity index (PI) of 4 or greater and the plot of plasticity index (PI) versus liquid limit (LL) falls on or above the “A” line of the plasticity chart. Silt typically has a PI less than 4 and the plot of plasticity index versus liquid limit falls below the “A” line of the plasticity chart. For clay and silt, the descriptor “with sand” is used if 15% to 30% of the particles are sand size. If more than 30% of the particles within a clay or silt sample are sand size, the descriptor “sandy” is used. Fat clay has a liquid limit greater than or equal to 50, and lean clay has a liquid limit less than 50. Silty clay (CL-ML) has a PI between 4 and 7.

SURFACE AND SUBSURFACE CONDITIONS

General surface conditions were noted during our field exploration program. Discussions of the surface, subsurface, and groundwater conditions and expansiveness of soils encountered during our field exploration are presented in the following subsections.

Surface Conditions

The site was generally level and covered with grass. Surface conditions along the routes taken to access the boring locations were firm during our field exploration.

Subsurface Conditions

The subsurface soils, based on intercepted soils from 6 exploratory soil borings, consist of a 4-ft layer of fill beginning at the ground surface. This layer is underlain by fat clay to about 10-ft below existing grade. The following layer consists of lean clay to about 18-ft below existing grade. The remainder of the explored depth consists of sand from 18-ft to the termination of the 30-ft depth.

Groundwater was encountered at depths ranging from 16 to 17-ft below existing grade during our field exploration. Short-term water level observations should not be interpreted to represent long-term conditions. Water levels vary seasonally and with climatic conditions.

The clays within the anticipated zone of seasonal moisture change, the existing ground surface to a depth of about 10 ft, have a high to very high shrink/swell potential (Holtz & Gibbs¹², Raman¹³, and Chen¹⁴), as shown on Table 3. PIs for the tested clays within the upper 10-ft depth ranged from 36 to 48 in the building area. Calculations of the Potential Vertical Rise (PVR) based on the existing soil conditions (“as-is”), predict a PVR of about 2.5 to 3 inches.

Table 3. Potential for Expansion

Expansion Potential	Plasticity Index Range	Liquid Limit Range
Low	$PI < 18$	----
Medium	$15 \leq PI \leq 28$	$35 \leq LL \leq 50$
High	$25 \leq PI \leq 41$	$50 \leq LL \leq 70$
Very High	$PI > 35$	$LL > 70$

FOUNDATION SYSTEM

The foundation system for the proposed building must satisfy two independent engineering criteria with respect to the soil conditions. First, the foundation system should be designed with an appropriate factor of safety against bearing capacity failure of the foundation soils. Second, the movement of the foundation system due to compression (consolidation) or expansion (swell) of the soils supporting the foundation system must be within tolerable limits for the structure. When foundation movements are soil related, differential movement of building elements, rather than total movement of building elements, is generally responsible for structural distress.

Foundation Design

Field and laboratory test data acquired from the borings indicate that competent soils were encountered within the 30-ft depth explored. Bearing capacity failure of foundation soils is not expected provided the recommendations presented herein are properly implemented. Principal structural loads may be supported on drilled piers bearing at approximately 13-ft below the existing grade at the time borings were drilled. We do not know the depth of the existing foundation for the current building. When that information becomes available, Paradigm should be allowed to review our recommendation to determine if the recommended pier depth is compatible with the existing foundation. Recommended foundation design parameters for a drilled pier foundation system are outlined below in Table 4.

Table 4. Foundation Design Parameters

Parameter	Recommendation	Comments
Foundation Type	Drilled-and-Underreamed Pier	
Bearing Depth, ft	13	Measured below the existing grade at the time of borings drilled
Bearing Material	Lean Clay (CL)	-----
Net Allowable Bearing Pressure*, q_{all}	4.0 kips/ft ²	Includes safety factor of at least 2
Total Load		
Dead Load plus Sustained Live Load	2.75 kips/ft ²	Includes safety factor of at least 3
Pier Spacing	At least two underream diameters	Measured center-to-center
Bell-to-Shaft Ratio	3:1	2:1 or Straight-sided if sloughing is encountered
Pier Reinforcement	Minimum of 0.5% of concrete area	Extend the full depth of shaft and underream

A bell-to-shaft ratio of up to 3:1 may be considered, provided the feasibility of construction is demonstrated by test pier installation. If a 3:1 bell-to-shaft ratio in the pier excavation is not possible due to sloughing, the bell-to-shaft ratio should be reduced (2:1) or a straight-sided shaft should be considered.

Foundation Installation

Construction considerations include provisions for water conditions, test pier, reinforcing and concrete placement, and monitoring. Each of these topics is discussed in the following paragraphs.

Water Conditions. Based upon the observations during the field exploration, seepage into drilled-and-underreamed piers may not occur during the excavation. Water levels vary seasonally and with climatic conditions. Therefore, the contractor should verify that groundwater will not adversely affect pier installation prior to foundation construction.

Test Pier. We recommend test piers be drilled to determine the construction feasibility of drilled-and-underreamed piers, as planned. Due to the presence of sand layer (potential caving), a casing may be needed for the installation of the drilled piers. Test piers provide beneficial information for the contractor about cleaning, sloughing, and water conditions. Installation of underreamed piers may proceed provided the bearing surface is clean before concrete placement. If test piers are drilled, at least two piers should be installed across the site. The geotechnical engineer or his qualified representative should observe test pier installation.

Test piers should be drilled with the largest diameter shaft and bell with the largest bell to shaft ratio proposed for the project. The piers should extend to the recommended bearing elevation. Piers should be located within the footprint of the building but should not be located at working

pier locations. Test piers may be backfilled with concrete, cement-stabilized sand, or flowable fill. Cement stabilized sand should meet a specification similar to Item 400 of *TxDOT Standard Specifications for Construction of Highways, Streets and Bridges*.¹⁵ Flowable fill should meet a specification similar to Item 434 of *Specifications for the Construction of Roads and Bridges within Harris County*.¹⁶ Excavated soil may not be used to backfill test piers. For planning purposes, test piers should remain open for 2 hours to evaluate sidewall stability. Production drilling may proceed immediately after test pier installation provided no difficulty is encountered during test pier installation.

Reinforcing and Concrete Placement. Reinforcing steel should be clean and free of any bond-inhibiting coating or mud. Reinforcing steel should be properly positioned and supported to assure the design concrete cover around the reinforcing steel is achieved. Before concrete placement, the bottom of each excavation should be cleaned.

Concrete should be placed in pier excavations within 2 hr after excavation to reduce the potential for soil sloughing and/or perched water seepage from the excavation walls. If slickensided sloughing soils are encountered, it may be necessary to place reinforcing steel and concrete immediately after completion of excavation. Concrete should conform to applicable requirements of ACI 301,¹⁷ ACI 318,¹⁸ and ASTM C 94/C 94M.¹⁹ The concrete slump should be 5 in. \pm 1 in. Concrete should be placed with a tremie to direct the concrete toward the bottom of the foundation excavation. The concrete should not be allowed to ricochet off the walls of the excavation or the reinforcing steel. Pier design and placement should comply with the requirements of ACI 318, ACI 336.3R²⁰ and ACI 336.1.²¹

Monitoring. Depth to competent bearing soils is based on conditions encountered at the boring locations. Significant variations can occur over short horizontal distances from the boring location. Our representative should be present during foundation construction to verify that the proper bearing stratum has been reached, the pier dimensions are as designed, the reinforcing steel is as specified, and that the excavation is clean and dry before reinforcing and concrete placement.

Foundation Performance

The recommended depth of the pier foundation system is predicated on existing and anticipated soil and water conditions. It is generally acknowledged that the depth of seasonal moisture change or “active zone” in Harris County and surrounding areas is about 10-ft below grade. That is, the moisture content of the soils to that depth undergo moisture fluctuations caused by climatic conditions often characterized by cycles of dry then wet weather. In addition, geotechnical engineers have documented that factors other than climate can exert an influence to much greater depths. Instances of trees affecting subgrade moisture as far as 15 to 20-ft below the ground surface have been reported. The recommended bearing depth of the pier foundations will provide protection of the piers from significant influence by seasonal moisture change but will not necessarily provide protection from non-climatic factors.

Discussions of climatic and non-climatic factors affecting foundation performance as well as site specific factors are presented in the *Slab Performance* section of this report.

New Building Adjacent to Existing Structure

When excavating or digging for any reason next to the existing structure care must be exercised by the constructor so that the existing foundation and structure is not undermined. Excavations whether for shallow or deep foundations should not be carried any closer than about 15 ft to the existing foundation without an analysis of the conditions by Paradigm Consultants. It is recommended that the foundation records of the existing structure be obtained to determine the exact type and location of the existing foundation system. The designer of the new foundation should use this data to locate the new foundation system.

Building Addition Connections to Existing Structures

The additions planned for this site will be connected to the existing structures. There are several issues must be considered: the flexibility of a connecting a new structure to an existing structure and the potential of interfering with an existing footing.

The existing structures have been in place for a period sufficient to have allowed the structure to settle under its own weight along with the building contents. While long term consolidation is not an issue with using the recommendations in this report, the new soil supporting the new structure will undergo immediate or short-term settlement in response to the weight of the building. For this reason, all hard connections and brittle floor or wall coverings that will cross or span over the area between the existing building and the new structure should be made as late in the construction process as is practice. This will allow relative movement to occur before making connections.

Prior to construction, the location and depth of the existing foundation system should be determined from old as-built drawings of the original construction or verified in the field. During design, the new foundations should be located a clear distance of one foundation width or diameter from an existing foundation to reduce pressure interaction in the soils below the old and new foundations. This distance will also help to reduce the chance of undermining the existing foundation during construction. New foundations should also be placed at the same or similar depth as the existing foundations to help reduce the effects of stress interaction below the foundations.

If the existing building foundations are found to be different than the recommendations for the new foundations, Paradigm should be contacted and engaged to provide additional recommendations.

FLOOR SLAB SYSTEM

The in-situ clayey soils encountered during our field exploration program generally have a low to high shrink/swell potential with soil moisture changes. A range of options from structurally isolated floor slab to slab-on-grade are available for floor slab. The selection of a specific option depends on risk of movement and consequential damage to the structure.

Structurally Isolated Floor Slab

The use of a structurally isolated floor slab with crawl space or void form is the most effective method to avoid the effects of moisture-related soil movement. If the potential for slab movement is to be eliminated, we recommend a structural slab. Void forms should be used to provide at least a 6-in. void beneath the slab to accommodate swelling movement of the subgrade soils.

The building subgrade for a structurally isolated floor slab, if selected, should be prepared to provide a level and firm surface for placement of the collapsible void forms. Filling may be required in the building area depending upon required finished floor elevation.

Slab-on-Grade

A slab-on-grade can be constructed on a buffer consisting of 2-ft minimum of select fill or combination of select fill and stabilized on-site soils. We understand the new addition will be connected to an existing building. The buffer should be installed in a manner that does not undermine the existing building subgrade. In areas near the existing building, soil may be removed using a 2 to 1 cut to avoid disturbance of the existing subgrade. Where possible, the select fill building pad should extend 10 ft beyond the footprint of the proposed building. If possible, the select fill buffer should be elevated above grade to promote drainage. This method will also require that the concrete pavement is placed around the building perimeter with no exposed soil adjacent to the building. Recommendations for subgrade preparation, select fill soils, and moisture conditioning of natural soils are presented in the Site Development Considerations section of this report. A modulus of subgrade reaction of 75 pci may be used in the design of a slab-on-grade.

Grade Beams. Exterior (or turned down edges) and interior grade beams should be used to transfer loads to the drilled piers and to stiffen the floor slab. The depth of exterior and interior grade beams can be varied according to the structural requirements of the floor slab. We recommend the depth of the exterior grade beams be at least 2 ½ ft below the lowest adjacent grade. We do not recommend the use of void boxes below grade beams because of the potential to collect free water within the void space. Grade beams will also act as moisture barriers reducing moisture fluctuations beneath the slab. Deeper moisture barriers will provide better control of moisture fluctuations particularly during extended periods of dry or wet weather.

Finished Grade Conditions. Slab-on-grade construction should proceed as soon as possible after completion of the building pads to prevent changes in the density and moisture conditions of the building pad soils. If construction is delayed and the fill soils are exposed to inclement weather or traffic, recompaction or moisture adjustment of the pad to at least 6-in. depth may be needed to return the soils to the specified density and moisture range. Alternately, protection of the fill soils with plastic sheeting or the placement of a protective fill layer may be considered. The plastic sheeting or protective fill layer must be removed before slab construction. The final lift should be moisture adjusted and recompact before the floor slab is placed. Construction should not proceed on dry or saturated subgrade.

Leveling Course. A leveling course, typically bank sand, is commonly used beneath floor slabs in the Gulf Coast area. Because of the potential for a granular course to act as a conduit for water, we recommend that no leveling course be used.

Vapor Retarder/Barrier. It is common practice to install a vapor retarder or vapor barrier beneath a concrete slab-on-grade or a slab elevated on carton forms. The selection of the type of material, the placement location, and the installation methods must consider a variety of issues that likely include some of the following:

- Potential effects of moisture in the building (sensitive equipment)
- Permeability and moisture sensitivity of floor covering or coating (if used)
- Permeability and composition of floor covering adhesive (if used)
- Subgrade soil type and moisture condition
- Use of a capillary break
- Use of a sand cushion
- Design subgrade friction
- Slab thickness
- Concrete mixture and hardened properties
- Finishing and curing methods
- Construction schedule
- Initiation of climate control
- Site grading/drainage, during and post-construction
- Landscaping and irrigation
- Maintenance
- Climate

Thus, the vapor retarder or barrier is but a part of a flooring system – subgrade, subbase, vapor retarder/barrier, concrete slab (and possibly reinforcement), coating or flooring adhesive, and floor covering – whose ultimate goal is to satisfy performance requirements.

ACI 360R²² and 302.1R²³ provide recommendations for designing and building concrete slab-on-ground substrates that are suitable for receiving flooring materials. Those documents are supplemented with information contained in ACI 302.2R3.²⁴ These three guides provide

guidance in the selection of a vapor retarder or barrier material in concrete with the many other factors that contribute to the performance of the floor system.

ACI 302.1R recommends that the selection of a vapor retarder or barrier be made on the basis of protective requirements and the moisture-related sensitivity of any materials that are to be applied to the floor surface. Although vapor retarders with a permeance of less than 0.3 US perms (ASTM E 96²⁵ - passes 0.5 lb/1000 ft²/24 h) and a thickness of at least 10 mils has been used, the Guide recommends a vapor retarder that meets the requirements of ASTM E 1745²⁶ and has a thickness of no less than 10 mils (0.25 mm).

However, if a vapor retarder with a 0.3 perm rating is insufficient protection for the flooring material to be installed, a vapor barrier with a perm rating of 0.01 or less (passes 0.02 lb/1000 ft²/24 h) should be specified. Low permeance flooring materials or floor coverings with low moisture requirements (3 lb/1000 ft²/24 h, 75% internal relative humidity) will benefit from the use of a vapor barrier material with a perm rating of 0.01 or less, well below the current ASTM minimum requirement. ASTM E 1745 provides specifications for vapor retarders used under concrete slabs. For vinyl composite tile (VCT) and similar sensitive coverings, we suggest considering a polyolefin sheet material meeting ASTM E 1745, Class C. For more sensitive, low-permeance floor coverings such as wood, vinyl, rubber, or urethane, a multi-layered, bituminous reinforced product or metallic-cored sheeting laminated between layers of high-density polyethylene should be considered.

ACI 302.1R recommends a concrete slab to receive a moisture-sensitive floor covering be placed directly on a vapor retarder/barrier. The vapor retarder/barrier should be installed according to the ASTM E 1643²⁷. Penetrations through the vapor retarder/barrier should be sealed to ensure its integrity in accordance with the manufacture's instructions. The vapor retarder/barrier should be taped around all openings to ensure the effectiveness of the retarder/barrier. Grade stakes should not be driven through the retarder/barrier and care should be taken to avoid punctures during reinforcement and concrete placement. Punctures and tears should be repaired in accordance with the manufacture's instructions.

If blockouts, joints, or other openings in the slab will allow water from rain, wet-curing, wet-grinding or cutting, or cleaning operations to penetrate the slab during construction, it may be desirable to specify a vapor retarder that incorporates a geosynthetic backing that will adhere to the underside of the slab concrete avoiding the creation of a reservoir beneath the slab. Since the water cannot escape downward through the vapor retarder, it will significantly increase the time required for the slab to dry.

From a construction perspective, while a 10-mil thick vapor retarder may be sufficient in puncture resistance for most slab installations, a 15-mil vapor retarder should be specified under slabs to be placed by laser screed, slabs over which concrete trucks will drive during discharge, and slabs where concrete bricks will be used to chair reinforcing steel.

Utility Bedding and Backfill. Bedding and backfill within and for a distance of 10 ft from the building footprint may consist of select fill if it can be properly compacted or cement-stabilized sand; however, cement stabilized sand is a preferred bedding material for utilities within the limits of the building and paving. The caution when using select fill is that the compaction of the fill must be uniform across the trench width which may be difficult with narrow trenches. Cement stabilized sand should meet the requirements of Item 400.3 of the TxDOT Specifications (Cement Stabilized Backfill²⁸), or equivalent. Backfilling within the trench should be performed in lifts of no greater than 9-in. and the material (select fill or cement stabilized sand) should be compacted to at least 95% Standard Proctor. Additional material and placement criteria for backfill are presented in the *Select Fill* section. A testing frequency of one in-place density and moisture test for each 75 linear feet of utility trench or a minimum of two tests per lift should be included in the project specifications.

A bentonite seal should be placed within utility trenches where the trenches exit the building footprint. The seals should be located within 5 ft of the building and should be at least 2 ft in length; bentonite should not be placed under grade beams. The bentonite seal will prevent water infiltration into the utility bedding and backfill.

Slab Performance

Throughout the Gulf Coast area and much of the State, buildings supported on pier foundations use a slab-on-grade supported on a constructed building pad of relatively low-plasticity fill. This system is widely used and generally provides Owners with years, if not a lifetime, of acceptable performance. Nevertheless, a slab-on-grade presents a risk of poor long-term building performance.

The practice of most geotechnical engineers is to provide at least two options for the floor slab system: 1) a structural slab elevated above the site grade and supported by a deeper foundation system, and 2) a slab-on-grade. These two systems will not provide comparable assurance of performance. The structural slab relies on support by the foundations, typically piers that are placed at a sufficient depth to greatly reduce the risk of movement due to most causes of moisture fluctuation. A slab-on-grade, however, is susceptible to the inherent instability of the supporting clay subgrade, including any clay fill that will shrink or swell with any moisture fluctuation whether it occurs during or following construction.

Thus, the selection of the floor slab system should be made by the Owner with the counsel of the design and construction team to adequately advise the Owner of the risks each system presents and the relative costs. Owners select the least expensive system only to discover later that the performance of the system does not meet their expectations. This discussion is intended to assist the Owner in that decision.

Design methods for slab-on-grade construction consider only climatic factors and are based on average climatic conditions being present before construction and throughout the structure life. Maintaining balanced soil moisture conditions in the subgrade throughout the structure

life reduces the potential for differential movements. Early in the life of the structure, the performance of a slab-on-grade will be affected by the soil moisture conditions at the time of construction, and they may be different than the conditions that existed during the geotechnical study. The conditions will be affected by the weather before and during construction, construction techniques, and site preparation including drainage. Steps should be taken to reduce moisture content fluctuations within the near-surface soils. Positive drainage to carry runoff away from the structure will minimize excess migration into the soils.

Following construction, Owner influences begin to control soil moisture and the potential for soil movement. Rainfall, drainage, irrigation, or unintended water sources such as broken or leaking irrigation or utility lines can disrupt the post-construction moisture conditions and cause soils to swell. Landscaping, particularly trees, and dry weather can cause shrinkage of the clays and settlement.

The amount of movement considered acceptable to many Owners is less than that tolerated by the structural members. Movements often result in cracks in brick or masonry veneer or walls; cracks in drywall; separation of the joints in trim; cracks in tile floors, walls, and countertops; and distortion to windows and doors making them difficult to open and close. While these consequences of movement are annoying and may be unsightly, they do not necessarily indicate unacceptable structural performance or failure. Movements sufficient to cause those types of distress should be anticipated if a slab-on-grade floor slab is constructed on active clay soils.

Climatic Factors. Average annual climatic conditions are documented in the area, but these conditions occur in cycles of dry weather followed by wet weather. Such cycles coupled with the time of construction have a significant influence on the long-term performance of the structure. If construction proceeds during or immediately after a dry period, the soils within the upper 5-ft to 10-ft depth are expected to be dry. When moisture is introduced, such as, through infiltration of rainfall along the slab edges, the dry soils likely will swell. Conversely, if construction proceeds after a wet period, the soils likely are wet and have experienced some swell. Although additional swell may occur, the amount of swell likely will be less than that experienced by dry soils. Shrinkage of wet soils likely will occur during dry periods.

Non-Climatic Factors. Factors unrelated to climate may result in soil movements that may be greater than those resulting only from climatic influences. The presence of many non-climatic factors is generally beyond the direct influence of the design team and is often manifested during the structure life. Non-climatic factors that affect the moisture content of the site soils include the presence of trees (existing and recently removed) and landscaping, inadequate drainage or altered drainage during the structure life, and the availability of moisture from unplanned sources such as roof drains, air conditioning drains, or below-grade utility or irrigation system leaks. Design methods cannot account for movements resulting from these non-climatic factors. Since the slab performance is related to soil properties, climatic factors, non-climatic factors, and the interaction between factors that may occur during the

structure life, the actual amount of movement that can be expected over the life of the structure cannot be quantified. Non-climatic factors and their potential effects on structure performance are discussed in the following paragraphs.

Trees and Landscaping. Trees and other landscaping can have dynamic effects on soil moisture content. As a tree or other landscaping grows and matures, an increasing amount of moisture is needed to sustain its growth. If sufficient moisture is unavailable from infiltration of water from the surface, either through rainfall or irrigation, the moisture within the soil becomes the available source resulting in decreases in the soil moisture content and soil shrinkage adjacent to trees. The lower moisture contents generally are observed throughout the area of influence of the tree's root system. The lateral extent where moisture changes occur is generally taken as canopy width of the tree. If trees are anticipated, they should be located a distance away from the foundation at least equal to the mature height of the tree. Tree selection should consider the water capacity needed to sustain a mature tree. Irrigation systems may not be effective in supplying sufficient water for growth. Concrete paving around the building will serve as a continual horizontal moisture retarder.

Drainage. Improper drainage can have significant negative effects on the performance, especially if the structure were constructed during or immediately after a dry period. The following are general notes concerning proper drainage considerations:

- Positive drainage away from the structure must be designed, constructed, and maintained throughout the structure life.
- Landscaping systems must maintain the positive drainage away from the structure and not permit water to impound adjacent to the structure.
- Downspouts from roof drainage systems and air conditioning unit drains should be designed to discharge water away from, and preferably 10 ft or more from, the foundation.
- Drainage through drainpipes to the storm sewer is preferred for all roof drains.
- Splash blocks are not effective in draining water away from the foundation and should not be used.
- Water drains should be tied to the storm sewer and not be allowed to drain along the boundary of the building with discharge at the foundation.

Unplanned Water Sources. Following the effects of landscaping and improper drainage, unplanned water releases such as from poorly constructed or broken below-grade utility lines, pool leaks, irrigation system leaks, or other unintended or unanticipated water sources are the

most prevalent causes of poor foundation and slab-on-grade performance. The sources may be particularly problematic because they often go unnoticed for weeks or months causing significant movement of the soils and significant distress to the structure. Again, design methods do not account for soils movements resulting from these non-climatic factors.

Summary. Based on our experience, a slab-on-grade is selected for well over 95% of light commercial and institutional structures. Few problems may develop when subgrade moisture conditions are affected only by climatic factors. However, where non-climatic factors over which the design team has little or no control are allowed to influence the subgrade moisture variations, the result is frequently unsatisfactory foundation performance. Therefore, the selection of a slab-on-grade carries a substantially greater risk than a structurally-isolated floor slab. The Owner should understand that with the selection of a slab-on-grade, they must accept the associated risks and consequences.

PAVEMENT RECOMMENDATIONS

We understand that the pavement for the service drives and parking lot will be concrete. Design, material requirements, and maintenance considerations for the pavement and subgrade preparation are discussed in the following section.

Design Considerations

ACI 330R²⁸ was used as the basis for rigid pavement recommendations. The recommended concrete thicknesses have performed satisfactorily under similar use conditions and have an anticipated life of 15 to 20 years provided the paving sections are based on a properly prepared and stabilized subgrade as outlined in Subgrade Preparation.

Rigid Paving Section

Paradigm recommends a 5-in. thick concrete paving for vehicle parking areas only, a 6-in. thick concrete paving for passenger vehicle driveways, and a 7-in. thick concrete paving for entrance and access to dumpster pads. For planning purposes, the pavement subgrade should be stabilized with lime to an 8-in. depth as discussed below.

Concrete Mixture. The concrete paving mixture should be proportioned to achieve a compressive strength of at least 3500 lb/in.² at 28 days, and a minimum flexural strength of 500 lb/in.² in third-point loading (ASTM C 78²⁹) at 7 days.

Joints. Although the ACI 330R addresses design and construction of joints to control cracking and facilitate construction, the Guide does not consider the possible effects of joint layout on subgrade performance. The following are some general notes regarding joint placement:

- Control joint spacing should not exceed 15 ft;

- Expansion joint spacing should not exceed 60 ft;
- Avoid doveled expansion joint with winged retention plate on pavements less than 8 in. thick;
- Panels between joints should be square, or nearly so, with the ratio of length to width no greater than 1.5;
- Isolation or doveled joints should be installed between the building or penetrations such as inlets or manholes and adjoining pavement;
- Isolation joints should be installed at junctions of pavement with walks, curbs, or other obstructions where independence of movement is needed;
- Install a joint at any change in direction;
- Joints should be installed perpendicular to tangent along curve in pavement, preferably at point of smallest diameter;
- Reinforce re-entrant corners with three #3 diagonal or corner bars;
- Do not allow joints intersections to form a "T";
- Avoid, if possible, longitudinal joints in or near wheel paths, particularly where heavy vehicles are expected; and
- Avoid positioning joints where water flows along the joint since joint sealant is not 100% effective in sealing moisture infiltration. Water intrusion at joints is frequently a major contributor to subgrade damage and loss of subgrade support.

Distributed Steel Reinforcement and Dowels. Local practice is to use distributed steel reinforcement in portland cement concrete to control opening of intermediate cracks that develop between joints in response to shrinkage, temperature differentials, uneven subgrade support, or load-related stresses. The function of the distributed steel is to hold together the crack fracture faces.

ACI 330R addresses distributed steel reinforcement and provides an equation to determine the required area of distributed steel. Plain smooth dowels are recommended to provide load transfer across contraction joints while permitting the joints to move. ACI 330R contains recommendations for dowel size, length, and spacing.

Maintenance. During the paving life, maintenance to seal surface cracks and reseal joints within concrete paving should be performed to achieve the desired paving life. Adequate drainage should be provided to prevent or retard influx of surface water from areas surrounding the paving. Water penetration leads to paving degradation.

Subgrade Stabilization

The paving subgrade should be stabilized to an 8-in. depth. The purpose of this additive is to retard moisture infiltration and prevent pumping and loss of subgrade support. The appropriateness of stabilizer and application rate for the subgrade should be determined at the time of construction. The application rate for planning purposes should be 6% hydrated lime. Texas Department of Transportation (TxDOT) Specifications, Item 260, can be used as procedural guide for placing, mixing, and compacting the stabilizer and the soils. Paving should be placed within 14 days to prevent deterioration of the prepared subgrade, or the subgrade should be sealed with an emulsion-based sealer.

It is essential that adequate water be added before final mixing to ensure complete hydration and to bring the soil moisture content 3% above optimum before compaction. Additional water may be needed during final mix to meet the moisture requirement. Stabilized soils should be compacted to at least 95% of the maximum dry density determined by standard effort (ASTM D 698). Paving should be placed within 14 days to prevent deterioration of the prepared subgrade, or the subgrade should be sealed with an emulsion-based sealer.

EXTERIOR SIDEWALKS, PATIOS, AND SURFACE PAVING

Lightly-loaded exterior sidewalks, patios, and similar concrete surface paving are very susceptible to movement when supported on an expansive subgrade. If surface paving is adjacent to building slabs, differential movement may occur between the exterior concrete paving and building slabs creating problems such as binding of outward-swinging doors and trip hazards. If surface paving is attached to the building, differential movement may cause the surface paving to move upward more than the building slab and cause reverse drainage toward the buildings.

We recommend that consideration be given to stabilizing the subgrade soils supporting sidewalks, patios and, surface paving abutting the slab in a manner similar to that for vehicular pavements or by extending the low-expansion buffer beyond the building limits to support the exterior concrete to reduce differential movement between the slab (or grade beam) and abutting exterior concrete. The buffer should extend at least 5 ft beyond the limits of the exterior concrete.

SITE DEVELOPMENT CONSIDERATIONS

To plan the construction, initial earthwork will include stripping, site drainage, proofrolling, and select fill placement and testing. Recommendations for each of these preparation items are presented in the following sections. Material specifications and placement criteria for select fill soils are also provided.

Stripping

The exposed soils within and 5 ft beyond the proposed building and paving areas should be stripped of vegetation, topsoil, debris, and other deleterious materials. For planning purposes, we recommend a stripping depth of at least 6 in. Stripped soils should not be used as select fill but may be suitable for landscaping purposes.

Site Drainage

Based on our experience with similar projects, drainage should be established early in the site development and maintained as the site grades change. Drainage could be critical if construction begins following or during a period of wet weather.

Proofrolling

Proofrolling is a method to evaluate the performance of the surface soils within 12 in. to 18 in. under load application. Proofrolling should be performed using a heavy rubber-tired vehicle such as loaded dump truck, a large maintainer or pneumatic equipment weighing about 20 tons. Proofrolling operations should be observed by our representative to delineate areas that require remediation.

Select Fill

Select fill for the building pad should consist of lean clay or sandy lean clay, free of roots, organics, and deleterious materials. The select fill should have at least 50% passing the No. 200 sieve and have a PI between 12 and 20, with a liquid limit less than 40. Representative samples of the fill materials should be tested to confirm their material characteristics.

Select fill should be placed in maximum 8-in. thick loose lifts and compacted to 95% of the maximum dry density (ASTM D 698). Over-compaction should be avoided. The moisture contents for select fill should be within 1% dry to 3% wet of the optimum moisture content. Fill placement greater than one 6-in. thick compacted lift should be tested and documented by the geotechnical engineer or an experienced soils technician. A testing frequency of one in-place density and moisture test for each 2,500 ft² or less per lift of fill should be considered, with a minimum of two tests per lift.

CONSTRUCTION OBSERVATION

As dictated by common practice, our geotechnical engineering analysis and recommendations are based on the information on the subsurface conditions obtained from small diameter, widely-spaced borings and our judgment based on our education and experience. Because the borings indicate subsurface conditions only at the specific locations and time and only to the depths penetrated, they do not necessarily reflect strata variations that may exist between boring locations. Therefore, the validity of the recommendations in this report is based in part on assumptions about the stratigraphy made by the geotechnical engineer. Because variations may not be evident until construction begins, Paradigm should be retained to observe foundation installation and perform construction materials monitoring and test, particularly earthwork construction, during the construction phase of the project.

Our involvement enables Paradigm's geotechnical engineer or his/her representative to monitor the foundation and earthwork activities and be available to personally evaluate unanticipated conditions, conduct additional tests, if necessary, and to provide alternative recommendations where appropriate. Therefore, our recommendations on issues such as final bearing elevation, depth of undercutting unsuitable materials, and appropriateness of subgrade stabilization agent and quantity should be considered preliminary until actual subsurface conditions are revealed during construction.

LIMITATIONS

Opinions, conclusions, and recommendations presented in this geotechnical engineering report are based on the data obtained from the field and laboratory programs, our interpretation of the data, and information received from our client and construction professionals associated with the project. If changes in the nature, design, or location of the project are made, the opinions, conclusions, and recommendations contained in this report are not valid unless the changes are reviewed by Paradigm and the recommendations included within this report are modified or verified in writing by Paradigm. If subsurface conditions different from those described are noted during construction, recommendations in this report must be reevaluated.

The scope of our services did not include environmental assessment, compliance with applicable laws, geologic faults, and wetlands. Our scope did not include the investigation, detection, or design related to the presence of any biological pollutants. The term "biological pollutants" include, and is not limited to, mold, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Design Review

Paradigm should review the design drawings and specifications before being released for construction. Our review will confirm that the geotechnical recommendations and construction criteria presented in this report have been correctly interpreted and implemented. Paradigm

is not responsible for any claims, damages, or liability associated with non-compliance with or misinterpretation of the recommendations and construction criteria presented in our geotechnical report. Design review is not within the scope of services authorized in this study. We would be pleased to submit a budget for this activity.

Standard of Care

This study was performed in a manner consistent with the level of care and skill ordinarily exercised by reputable geotechnical engineers practicing contemporaneously in the local area. No warranty or guarantee, express or implied, is made or intended.

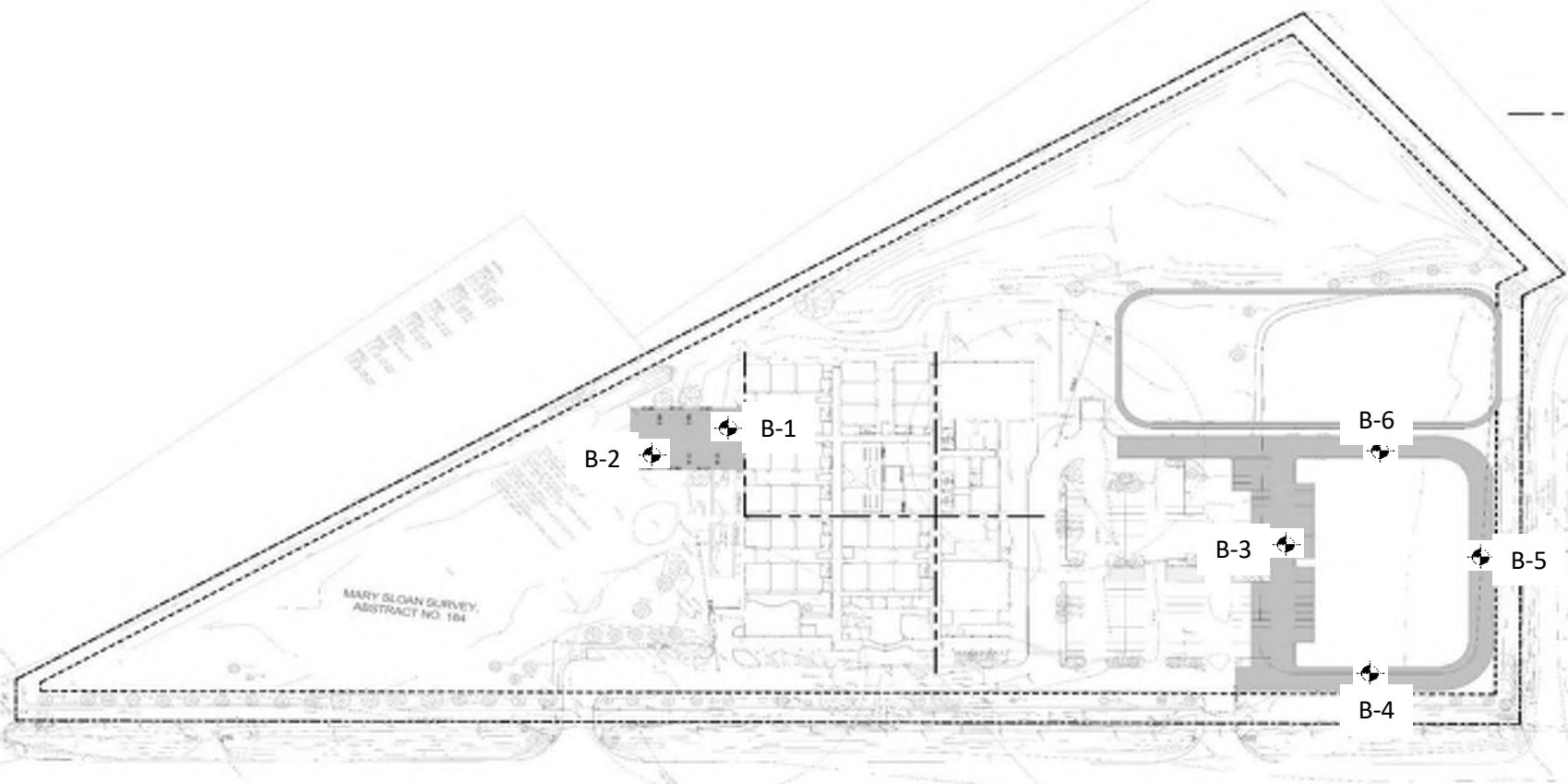
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WINDSONG INTERMEDIATE SCHOOL ADDITION AND RENOVATION
FRIENDSWOOD ISD



Reference: Base map provided by Client
 Note: Boring locations are approximate
 Legend: Boring location

Windsong Intermediate School Building Addition & New Paving 2100 W. Parkwood in Friendswood, Texas	Paradigm Consultants, Inc. 9980 West Sam Houston Parkway South, Suite 500 Houston, Texas 77099
Friendswood ISD	PROJECT NO. 22-1043 FIGURE 1 PLAN OF BORINGS






Appendix

SOIL BORING LOGS

LOG OF BORINGS

Project: Building Addition and Paving
Windsong Elementary School
Friendswood, Texas
Client: Friendswood Independent School District
Friendswood, Texas

Project No.: 22-1043
Boring Number: B-1
Surface Elevation:
Drilled: 5/31/22 - 5/31/22
Sheet 1 of 1

Soil Symbol	FIELD DATA			LABORATORY DATA								Comment	Drilling Method(s):	
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²	Failure Strain, %		Confining Pressure, lb/in²	Dry-auger drilling: 0 ft to 17 ft Wet-rotary drilling: 17 ft to 30 ft
						Liquid Limit LL	Plastic Limit PL	Plasticity Index PI						Borehole Water Levels:
														First encountered After 15 elapsed
DESCRIPTION OF STRATUM														
	5		P = 1.75	26.3									FILL: Brown, fat clay.	
			P = 3.0	22.1		64	22	42					- with sand seams, 2 to 4 ft.	
			P = 1.25	29.1									- becoming brown and gray, 2 to 6 ft.	
	10		P = 1.75	30.0									FAT CLAY (CH): Stiff, light gray and brown with ferrous nodules.	
			P = 1.25	33.6		70	28	42	86	530	3.65	Bulge, Slickensided	- becoming tan with calcareous nodules, 8 to 10 ft.	
			P = 1.75	29.3					92	500	1.94	Bulge, Slickensided		
	15		P = 1.75	21.8									LEAN CLAY (CL): Stiff, tan and gray.	
	20		P = 1.0	22.5									SAND (SP): Medium dense, tan and light gray.	
													- with clay seams, 23 to 26 ft.	
	25		N = 18	23.4										
			N = 22	22.0										

Remarks:





Borehole terminated at 30-ft depth

03GEOTECH1 22-1043 BORING LOGS.GPJ HARRIS COUNTY FLOOD CONTROL DISTRICT TEMPLATE - UPDATED.GDT 6/8/22

LOG OF BORINGS

Project: Building Addition and Paving
Windsong Elementary School
Friendswood, Texas
Client: Friendswood Independent School District
Friendswood, Texas

Project No.: 22-1043
Boring Number: B-2
Surface Elevation:
Drilled: 5/31/22 - 5/31/22
Sheet 1 of 1

Soil Symbol	FIELD DATA			LABORATORY DATA								Comment	Drilling Method(s):		
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²	Failure Strain, %		Confining Pressure, lb/in²	Dry-auger drilling: 0 ft to 16 ft Wet-rotary drilling: 16 ft to 30 ft	
						Liquid Limit	Plastic Limit	Plasticity Index						Borehole Water Levels:	
														First encountered	16.0 ft
														After 15 elapsed	N/A
Caved in at 9 ft															
DESCRIPTION OF STRATUM															
			P = 1.75	28.7		69	27	42						FILL: Brown, fat clay.	
			P = 1.75	32.4											
	5		P = 1.25	34.7										FAT CLAY (CH): Stiff, light gray and brown with ferrous nodules.	
			P = 1.25	34.1		73	30	43						- with calcareous nodules, 6 to 10 ft.	
			P = 1.0	29.1					95	590	2.98	Bulge, Slickensided			
	10		P = 2.5	20.3					111	1840	5.84	Bulge, Slickensided		LEAN CLAY (CL): Very stiff, tan.	
			P = 2.75	16.3										- becoming gray and reddish brown with calcareous nodules, 13 to 15 ft.	
				▽											
			N = 16	26.9										SAND (SP): Medium dense to dense, tan.	
	20														
			N = 26	25.3											
	25														
			N = 35	24.0											
	30														

Remarks:

Borehole terminated at 30-ft depth

LOG OF BORINGS

Project: Building Addition and Paving
Windsong Elementary School
Friendswood, Texas
Client: Friendswood Independent School District
Friendswood, Texas

Project No.: 22-1043
Boring Number: B-3
Surface Elevation:
Drilled: 5/31/22 - 5/31/22
Sheet 1 of 1

Soil Symbol	FIELD DATA			LABORATORY DATA							Comment	Drilling Method(s):						
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²		Failure Strain, %	Confining Pressure, lb/in²	Dry-auger drilling: 0 ft to 5 ft				
						Liquid Limit	Plastic Limit	Plasticity Index						Borehole Water Levels:				
														LL	PL	PI	First encountered	N/A
																	After elapsed	No water encountered
DESCRIPTION OF STRATUM																		
	1		P = 2.0	26.7		56	20	36	97	2790	5.93		Bulge, Multiple Shear	FILL: Brown and gray, fat clay.				
	2		P = 4.5	23.4														
	3																	
	4		P = 1.75	28.1														
	5																	

Remarks:

Borehole terminated at 5-ft depth

LOG OF BORINGS

Project: Building Addition and Paving
Windsong Elementary School
Friendswood, Texas
Client: Friendswood Independent School District
Friendswood, Texas

Project No.: 22-1043
Boring Number: B-4
Surface Elevation:
Drilled: 5/31/22 - 5/31/22
Sheet 1 of 1

Soil Symbol	FIELD DATA			LABORATORY DATA								Comment	Drilling Method(s):		
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²	Failure Strain, %		Confining Pressure, lb/in²	Dry-auger drilling: 0 ft to 5 ft	
						Liquid Limit	Plastic Limit	Plasticity Index						Borehole Water Levels:	
														First encountered	After elapsed
DESCRIPTION OF STRATUM															
	1		P = 1.75	29.4									FILL: Brown and gray, fat clay.		
	2		P = 1.5	32.8		66	26	40	86	810	4.88	Bulge, Slickensided			
	3														
	4		P = 1.25	35.6									- with ferrous nodules, 4 to 5 ft.		
	5												Borehole terminated at 5-ft depth		

Remarks:

Borehole terminated at 5-ft depth

LOG OF BORINGS

Project: Building Addition and Paving
Windsong Elementary School
Friendswood, Texas
Client: Friendswood Independent School District
Friendswood, Texas

Project No.: 22-1043
Boring Number: B-5
Surface Elevation:
Drilled: 5/31/22 - 5/31/22
Sheet 1 of 1

Soil Symbol	FIELD DATA			LABORATORY DATA								Comment	Drilling Method(s): Dry-auger drilling: 0 ft to 5 ft		
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²	Failure Strain, %		Confining Pressure, lb/in²	Borehole Water Levels: First encountered After elapsed	
						Liquid Limit	Plastic Limit	Plasticity Index						N/A	
														No water encountered	
														DESCRIPTION OF STRATUM	
		P = 1.5	27.9		66	25	41							FILL: Brown and gray, fat clay with ferrous nodules.	
	1														
	2		P = 1.75	28.5					91	1320	2.78		Slickensided		
	3														
	4		P = 0.75	32.8										FAT CLAY (CH): Firm, light gray and tan.	

Remarks:

Borehole terminated at 5-ft depth

LOG OF BORINGS

Project: Building Addition and Paving
 Windsong Elementary School
 Friendswood, Texas
 Client: Friendswood Independent School District
 Friendswood, Texas

Project No.: 22-1043
 Boring Number: B-6
 Surface Elevation:
 Drilled: 5/31/22 - 5/31/22
 Sheet 1 of 1























Soil Symbol	FIELD DATA			LABORATORY DATA							Comment	Drilling Method(s):			
	Depth, ft	Sample Interval, Sampler Type	Penetration Resistance, P, tsf Standard Penetration Test N, blows/ft or blows/interval	Moisture Content, %	Finer than No. 200 sieve, %	ATTERBERG LIMITS			Dry Density, lb/ft³	Undrained Shear Strength, c _u , lb/ft²		Failure Strain, %	Confining Pressure, lb/in²	Dry-auger drilling: 0 ft to 5 ft	
						Liquid Limit	Plastic Limit	Plasticity Index						Borehole Water Levels:	
														First encountered	N/A
														After elapsed	
No water encountered															
DESCRIPTION OF STRATUM															
			P = 4.0	29.0		76	28	48	96	2760	5.29		Bulge, Slickensided	FILL: Brown and gray, fat clay.	
	1														
	2		P = 4.5	24.0											
	3														
	4		P = 1.5	25.5										- with ferrous nodules, 4 to 5 ft.	
	5														

Remarks:






Borehole terminated at 5-ft depth

KEY TO BORING LOG TERMS AND SYMBOLS

MATERIAL SYMBOLS

	Fat Clay (CH)		Lean Clay (CL)		Sandy Lean Clay (CL)		Silty Clay (CL-ML)		Silt (ML)
	Sandy Silt (ML)		Elastic Silt (MH)		Organic Clay or Silt (OH) High Plasticity		Organic Clay or Silt (OL) Low Plasticity		Peat (PT)
	Well Graded Sand (SW)		Poorly Graded Sand (SP)		Silty Sand (SM)		Clayey Sand (SC)		Well Graded Gravel (GW)
	Poorly Graded Gravel (GP)		Silty Gravel (GM)		Clayey Gravel (GC)		Fill		Asphalt
			Base				Concrete		



SAMPLER SYMBOLS

	Auger		Thin-walled tube		Split barrel		Core		No recovery
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STANDARD PENETRATION TEST (SPT)

N = 25	The sampler was seated 6 in. with blows from a 140-lb hammer then 25 blows were required to advance the sampler through the two 6-in. intervals of the test. The "N" value is the sum of the blows needed to penetrate the final 12 in.
12, 26, 50/3"	The sampler was seated 6 in. by 12 blows from a 140-lb hammer then 76 blows were required to advance the sampler a distance of 9 in. Full penetration of 12 in. below the seating interval could not be achieved before the 50 blow limit was recorded in one interval.
50/4"	Sampler was driven 4 in. of the 6-in. seating interval by blows of a 140-lb hammer before the 50 blow limit was reached.

WATER SYMBOLS

	Depth where water was first encountered during drilling
	Depth where water was encountered within the open borehole after completion of drilling (see log for elapsed time)

DESCRIPTIVE TERMS

Fine-Grained (Major portion passing No. 200 sieve) Silt and Clay			Coarse-Grained (Major portion retained on No. 200 sieve) Gravel and Sand		
Consistency	Undrained Shear Strength, ksf	SPT "N" Value	Description	Relative Density	SPT "N" Value
Very soft	Less than 0.25	Less than 2	Very loose	0 to 15%	Less than 4
Soft	0.25 to 0.50	2 to 4	Loose	15% to 35%	4 to 10
Firm	0.50 to 1.00	4 to 8	Medium dense	35% to 65%	10 to 30
Stiff	1.00 to 2.00	9 to 15	Dense	65% to 85%	30 to 50
Very stiff	2.00 to 4.00	15 to 30	Very dense	85% to 100%	Greater than 50
Hard	Greater than 4.00	Greater than 31			

PCI's geotechnical engineer reviewed and compiled the field and laboratory data to develop each boring log. Each log represents our interpretation of general soil and water conditions at the boring location. Strata lines on the log may be transitional and are approximate in nature. Water levels refer only to those conditions observed at the time and location indicated.

SECTION 07 84 00 - FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements including but not limited to:
 - 1. Penetration firestop systems.
 - 2. Fire resistive joint systems.
 - 3. Repair of firestop assemblies disturbed by the work.
 - 4. Smoke barriers.
 - 5. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Penetration Fire Resistance Systems:
 - 1. For penetrations through vertical and horizontal fire resistance rated constructions, including both empty openings and openings containing penetrating items, provide firestop systems produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and gases, and maintain original fire resistance rating of construction penetrated.
 - 2. Rated Systems: Provide penetration firestop systems with ratings determined in accordance with UL 1479 for C-AJ, C-BJ, C-BK, F-A, F-B, F-C, W-J, W-K, and W-L classified systems.
 - a. F Rated Systems: Provide penetration firestop systems with F ratings indicated, but not less than that equaling or exceeding fire resistance rating of constructions penetrated.
 - b. T Rated Systems: For specified conditions, provide penetration firestop systems with T ratings indicated, as well as F ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.
 - c. L Rated Systems: Where penetration firestop systems are indicated in smoke barriers, provide penetration firestop systems with L ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 degrees F (204 degrees C).
 - d. For penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to conditions both during and after construction.
 - e. For piping penetrations for plumbing and wet pipe sprinkler systems, provide moisture resistant penetration firestop systems.
 - f. For penetrations involving insulated piping, provide penetration firestop systems not requiring removal of insulation.
 - 3. For penetration firestop systems exposed to view, provide products with flame spread and smoke developed indexes of less than 25 and 450, respectively, determined in accordance with ASTM E 84.
- B. Fire Resistive Joint Systems: System produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and gases, and maintain original fire resistance rating of assembly in which fire resistive joint systems are installed.

1. Joint Systems in and between Fire Resistance Rated Constructions: Provide systems with assembly ratings equaling or exceeding fire resistance ratings of construction that are join, with movement capabilities and L ratings] indicated determined by UL 2079.
2. Perimeter Fire Resistive Joint Systems: For joints between edges of fire resistance rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated determined by NFPA 285 and UL 2079.
3. For fire resistive systems exposed to view, provide products with flame spread and smoke developed indexes of less than 25 and 450, respectively determined in accordance with ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: Technical data including installation recommendations, construction conditions, applicable UL assemblies.
- B. Shop Drawings: For each penetration firestop or fire resistive joint system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetration. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 1. Submit documentation, including illustrations, from qualified testing and inspecting agency, applicable to each firestop system configuration for construction and penetrating items.
- C. Product Certificates: For penetration firestop system products, signed by product manufacturer.
- D. Product Test Reports: From a qualified testing agency indicating penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. Building Code: Comply with applicable requirements of the IBC and the fire code.
 2. Fire Test Response Characteristics: Provide firestop systems complying with requirements:
 - a. Penetration Firestopping: Penetration firestop systems are identical to those tested in accordance with UL. Provide rated systems complying with requirements.
 - 1) Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2) Penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - 3) Penetration firestop systems correspond to those indicated by reference to penetration firestop system designations listed by UL in its *Fire Resistance Directory* and FM Global in its *Building Materials Approval Guide*.
 - b. Fire Resistive Joints: Perform fire resistance tests by UL with follow up inspection services for fire resistive joint systems acceptable to authorities having jurisdiction.
 - 1) Fire resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - 2) Fire resistive joint systems correspond to those indicated by reference to penetration firestop system designations listed by UL in its *Fire Resistance Directory*.
- B. Installer Qualifications: A firm experienced in installing firestop systems and who has been approved by FM Global according to FM Global 4991 *Approval of Firestop Contractors* or been evaluated by UL and found to comply with UL *Qualified Firestop Contractor Program Requirements* and has minimum 5 years documented experience in installing firestopping assemblies

1. Manufacturer's willingness to sell its penetration firestop system products to Contractor or to Installer engaged by Contractor does not qualify buyer/installer.
- C. Installation Responsibility: Assign installation of penetration firestop systems and fire resistive joint systems to a single qualified installer.
- D. Source Limitations: Obtain firestop systems, for each kind of penetration and construction condition indicated, one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop system products to site in original, unopened containers or packages with intact and legible manufacturer labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install firestop systems when ambient or substrate temperatures are outside limits permitted by firestop system manufacturer or when substrates are wet due to rain, frost, condensation, or causes.
- B. Install and cure fire resistive joint systems in accordance with manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced air circulation.
- C. Ventilate firestop systems per manufacturer's written instructions by natural means or, where inadequate, forced air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that firestop resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core drilled holes, or cut openings to accommodate penetration firestop systems.
- C. Joint System: Coordinate sizing of joints to accommodate fire resistive joint systems.
- D. Do not cover up penetration firestop system or fire resistive joint system installations that will become concealed behind other construction until building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturer: Subject to compliance with requirements, provide firestop systems by one of the following for each application required:
 1. Hilti, Inc.
 2. Nelson Firestop Products.
 3. RectorSeal Corporation (The).
 4. Specified Technologies Inc.

5. 3M; Fire Protection Products Division.
 6. USG Corporation.
 7. Tremco Commercial Sealants and Waterproofing.
- B. Compatibility: Provide firestop systems compatible with each other; with substrates forming openings; and with items penetrating penetration firestop systems, under conditions of service and application, demonstrated by penetration firestop system manufacturer based on testing and field experience.
- C. Accessories: Provide components for each firestop system necessary to install fill materials. Use components specified by penetration firestop or fire resistive joint system manufacturer and UL. Accessories include, but are not limited to:
1. Penetration Firestop Systems: Provide penetration firestopping produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and gases, and maintain original fire resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with substrates forming openings, and with penetrating items if any.
 2. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - a. Permanent forming/damming/backing materials, including the following:
 - 1) Slag wool fiber or rock wool fiber insulation.
 - 2) Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - 3) Fire rated form board.
 - 4) Fillers for sealants.
 - b. Temporary forming materials.
 - c. Substrate primers.
 - d. Collars.
 - e. Steel sleeves.
- D. Fill Materials: Penetration firestop systems containing types of fill materials indicated. Fill materials are those referenced in directories of referenced testing and inspecting agencies as *fill*, *void*, or *cavity* materials.
1. Cast in Place Firestop Devices: Factory assembled devices for use in cast in place concrete floors and consisting of an outer metallic sleeve lined with intumescent strip, radial extended flange attached to one end of sleeve for fastening to concrete formwork, and neoprene gasket.
 2. Latex Sealants: Single component latex formulations that after cure do not reemulsify during exposure to moisture.
 3. Firestop Devices: Factory assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
 4. Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.
 5. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
 6. Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.
 7. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at site to form nonshrinking, homogeneous mortar.
 8. Pillows/Bags: Reusable heat expanding pillows/bags consisting of glass fiber cloth cases filled with combination of mineral fiber, water insoluble expansion agents, and fire retardant additives.

9. Silicone Foams: Multicomponent, silicone based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
 10. Silicone Sealants: Single component, silicone based, neutral curing elastomeric sealants of grade indicated.
 - a. Grade: Pourable (self-leveling) formulation for openings in floors and horizontal surfaces, and nonsag formulation for openings in vertical and surfaces requiring nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
- E. Fire Resistive Joint Systems: Sealants complying with UL 1479 including F, T, and L ratings.
- F. Fire Safing Insulation:
1. Semirefractory Blanket: Semirigid blankets designed for use as fire stops at openings between edge of slab and exterior wall panels, glass mat faced, low density; having nominal density of 4 lb/cu. ft. (64 kg/cu. m); complying with ASTM C 612, Type 1A and 1B and ASTM E 136 for combustion characteristics; thermal resistivity of 4 degrees F x h x sq. ft./Btu x in. at 75 degrees F (27.7 K x m/W at 24 degrees C).; with maximum flame spread and smoke developed values of 10 and 5. Use for floor perimeter fire and smoke containment. Install blanket with 20 gauge impaling clips recommended by manufacturer.
 2. Caulking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
 3. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.
- G. Duct Wrap for Ducts: Materials listed in the UL Fire Resistance Directory under File R8418, Category CAJ7009, File R14229 Categories CAJ 7013, CAJ 7015, CAJ 7020, CAJ 7022, YYET, and Grease Duct Enclosures and having minimum 2 hour fire resistive rating for grease or air duct enclosure materials.
- H. Composition Edge Banding: Materials listed in UL Fire Resistance Directory UL 10c standard.

2.2 FIRE STOPPING SYSTEMS

- A. Penetration System:
1. Penetrations in Fire Resistance Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - a. Fire resistance rated walls include fire walls, fire barrier walls, smoke barrier walls, and fire partitions.
 - b. F Rating: Minimum fire resistance rating of constructions penetrated.
 2. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - a. Horizontal assemblies include floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
 - b. F Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - c. T Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - a. L Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.

- b. W Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
 - 4. Exposed Penetration Firestopping: Provide products with flame-spread and smoke developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- B. Joint Resistive Systems:
 - 1. Joints in Smoke Barriers: Provide fire resistive joint systems with ratings determined per UL 2079.
 - a. L Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
 - 2. Exposed Fire Resistive Joint Systems: Provide products with flame-spread and smoke developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
 - 3. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

2.3 MIXING

- A. For products requiring mixing before application, comply with penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and conditions affecting performance of work. Proceed with installation after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestop systems complying with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by penetration firestop system manufacturer complying with manufacturer's recommended. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of work and that would be permanently stained or damaged by contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 INSTALLATION

- A. Penetration Firestop System: Install penetration firestop systems to comply with requirements and with firestop system manufacturer written installation instructions and published drawings for products and applications indicated.
 - 1. Install forming/damming/backing materials and accessories of types required to support fill materials during application and in the position needed to produce cross sectional shapes and depths required to achieve fire ratings indicated. After installing fill materials and allowing them to fully cure, remove combustible forming materials and accessories not indicated as permanent components of firestop systems.
 - 2. Install fill materials for firestop systems by proven techniques to produce results:
 - a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire resistance ratings indicated.
 - b. Apply materials for full contact and adhere to substrates formed by openings and penetrating items.
 - c. For fill materials that remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- B. Fire Resistive Joint System: Install fire resistive joint systems to comply requirements and manufacturer's written installation instructions for products and applications indicated.
 - 1. Install forming/packing/backing materials and accessories of types required to support fill materials during application and in position needed to produce cross sectional shapes and depths required to achieve fire ratings indicated.
 - 2. Install fill materials for joint systems by proven techniques to produce the following results:
 - a. Fill voids and cavities formed by openings and forming/packing/backing materials required to achieve fire resistance ratings indicated.
 - b. Apply fill materials to contact and adhere to substrates formed by joints.
 - c. For fill materials remaining exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so labels are visible at removal.
 - 1. Use mechanical fasteners for metal labels. For plastic labels, use self adhering type with adhesives capable of permanently bonding labels to surfaces and, in combination with label material, resulting in partial destruction of label if removal is attempted. Include information on labels:
 - a. The words *Warning - Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage.*
 - b. Contractor's name, address, and phone number.
 - c. Firestop system designation of applicable testing and inspecting agency.
 - d. Date of installation.
 - e. Penetration firestop system manufacturer's name.
 - f. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire resistive joint systems are damaged or removed due to testing, repair or replace fire resistive joint systems so they comply with requirements.

- C. Proceed with enclosing fire resistive joint systems with construction after inspection reports are issued and installations comply with requirements.

3.6 CUTTING AND PATCHING

- A. Cut, patch, and repair firestopping to accommodate work. Repair cracks and indented surfaces. Repair surfaces around items built into or penetrate surfaces. Repair and replace work to eliminate blister, buckles, dry outs, and similar imperfections. Repair and replace work required to comply fire resistance ratings.
- B. After completion of work in and around the areas of firestopping, repair and replace damaged firestopping.

3.7 CLEANING AND PROTECTION

- A. Clean excess fill materials adjacent to openings as work progresses by methods and with cleaning materials approved in writing by penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation ensuring penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce systems complying with requirements.

END OF SECTION 07 84 00

SECTION 08 45 00

INSULATED TRANSLUCENT SANDWICH PANEL ASSEMBLIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Insulated translucent sandwich panels; battens and perimeter closure system; aluminum structure; flashing; fasteners and accessories.

1.2 RELATED WORK

- A. Section 05 12 00 - Structural Steel
- B. Section 05 50 00 - Miscellaneous Metals
- C. Division 7 - Roofing Systems: Roofing, and accessories
- D. Section 07 62 00 - Sheet Metal Flashing, Gutters, Downspouts and Trim
- E. Section 07 92 00 - Building Sealants

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA)
 - 1. 501.2, Quality Assurance and Diagnostic water Leakage Field Check of Installed Storefronts, Curtain walls, and Sloped Glazing Systems.
 - 2. 611, Voluntary Specification for Anodized Architectural Aluminum
- B. American Society for Testing and Materials (ASTM)
 - 1. B221, Standard Specification for Aluminum-alloy Extruded Bars, Rods, Wires, Profiles, and Tubes
 - 2. C297, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
 - 3. D395, Standard Test Methods for Rubber Property – Compression Set
 - 4. D572, Standard Test Method for Rubber - Deterioration by Heat and Oxygen
 - 5. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supported Plastics in a Horizontal Position (Burn Extent)
 - 6. D1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading - Metal-to-Metal (Bond Shear Strength)
 - 7. D1037, Standard Test Methods for Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials
 - 8. D1149, Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
 - 9. D1435, Standard Practice for Outdoor Weathering of Plastics
 - 10. D1929, Standard Test Method for Determining Ignition Temperature of Plastics
 - 11. D2244, Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates (Color Difference)
 - 12. D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
 - 13. E72, Standard Test Methods for Conducting Strength Tests of Panels for Building Construction (Beam Bending Strength)

14. E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 15. E108, Standard Test Methods for Fire Tests of Roof Coverings
 16. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 17. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- C. International Code Council
1. Evaluation Service (ICC-ES)
 - a. ICC AC-04 "Acceptance Criteria for Sandwich Panel"
 - b. ICC AC-05 "Acceptance Criteria for Sandwich Panel Adhesive"
 2. International Building Code (IBC), latest edition
- D. National Fenestration Rating Council (NFRC)
1. 100, System Certification
- E. Underwriters Laboratories, Inc. (UL)
1. 790, Standard Test Methods for Fire Tests of Roof Coverings (Listed Class A)
 2. 972, Burglary-Resisting Glazing Material

1.4 SUBMITTALS

- A. Product Data:
1. Manufacturer's product data, including construction details, material descriptions, profiles and finishes of skylight components, and manufacturer's installation instructions.
- B. Shop Drawings:
1. Indicate size, material, and finish. Show locations and installation procedures.
 2. Include details of joints, dimensions, and attachment to adjacent construction.
- C. Samples:
1. Actual material or color chart to show colors of aluminum and panel materials for Architect's selection and approval.
- D. Manufacturers Project References: List of completed projects of similar scope and size, including project name and location, name of installer, and project owner's contact information.
- E. Structural Calculations: Structural analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation to certify conformance with project specific design loads and governing code requirements as described herein and indicated on the drawings.
- F. Installer Qualifications: signed by erector, certifying compliance with project qualification requirements.
- G. System Certification:
1. Manufacturer's Certification: Certify that system complies with specified performance characteristics and referenced standards.

2. In addition, provide valid certified product test reports from a qualified independent testing agency and other data needed to prove compliance with the specified requirements for the following:
 - a. Flame Spread and Smoke Development: ASTM E84 - Class A Flame Spread Index not to exceed 25, with no evidence of progressive combustion after 30 minutes, and smoke development not to exceed 200.
 - b. Color Stability: ASTM D2244/D1435 - 4.0 Delta E, maximum
 - c. Burning Brand: ASTM E108 - Class A
 - d. Roof System Class: UL 790 - Class A, Listed Roof System
 - e. Impact Strength: UL 972 - 230 ft-lbs
 - f. Delamination: IBC 803.2
 - g. ICC-ES Evaluation Report - Current as of date of submission.
 - h. NFRC 100 - U Value Certification (Framing and Panel) - meet requirements of the specification

1.5 SYSTEM REQUIREMENTS

- A. Design Requirements:
 1. Self Supporting Structure: Provide self supporting, translucent panel and aluminum structure installed over structural curbs and supports.
 2. Design Loads: Unless otherwise indicated, design framing components to support the following loads:
 - a. Live load of 20 psf plus dead loads.
 - b. Dead load plus wind load of 150 mph
 3. Safety factor:
 - a. 1.65 for load carrying members
 - b. 2.0 for load carrying fasteners.
 4. Allowable deflection (ASTM E72):
 - a. Structural members: not to exceed L/180 of the clear span.
 - b. Panel assemblies: not to exceed L/180 of the clear span.
- B. Performance Requirements:
 1. Manufacturer:
 - a. Configure and fabricate complete translucent panel assembly.
 - b. Prepare structural analysis data and calculations to certify conformance with project specific design loads and governing code requirements concerning uplift, positive windload plus dead load, and negative windload plus dead load.
 2. Erector (Installer):
 - a. Coordinate translucent panel assembly with roofing system and associated work.
 - b. Coordinate translucent panel assembly with adjacent materials.
 - c. Install complete watertight translucent panel assembly.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 1. Specialized in manufacturing translucent panel assemblies of type specified with minimum ten (10) consecutive years experience. Show evidence of materials specified being satisfactorily used on at least ten (10) projects of similar size and type within that time period. At least three (3) projects shall be local and have been in successful use for ten (10) years or longer.
 2. Listed by ICC-ES which requires yearly quality control inspections of sandwich panel construction by an approved testing agency.

- a. Quality control inspections and required testing shall include manufacturing facilities, sandwich panel system production, and system components as required by ICC-ES.
- B. Erector's Qualifications:
 - 1. Specialized in installing translucent panel assemblies of type specified with minimum five (5) consecutive years experience and show evidence of satisfactory completion of projects of similar size, scope, and type.

1.7 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01 31 13 – Project Coordination.
- B. In addition, notify Architect for observation of fasteners when fasteners are in place, but prior to covering such fasteners with flashings or closures.

1.8 PRODUCT HANDLING

- 1. Pre-assemble and seal panel units at the factory. Deliver translucent panel assemblies to the job site in rugged shipping units ready for erection.
- 2. Storage, Handling and Protection:
 - 1. Store panel units on the long edge, on blocking or dunnage, several inches above the ground, blocked and under cover to prevent warping
 - 2. Store, handle and protect materials in accordance with manufacturer's instructions.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- B. When practical, take accurate field measurements before preparation of shop drawings and fabrication, so as to not delay job progress. Work from dimensions verified in field.

1.10 WARRANTY

- A. Manufacturer's Warranty: Warrant the work specified herein against becoming unserviceable, causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship, or failure to perform as required.
 - 1. System Warranty: Defects are defined to include uncontrolled leakage of water, abnormal aging or deterioration, or delamination of face sheet from core.
 - a. Warranty period: 5 years from date of Substantial Completion
 - 2. Translucent Facing Material Warranty: Defects are defined to include fiberbloom, delamination of coating from exterior sheet, abnormal cracking, abnormal aging, or more than 4.0 Delta E units of discoloration as described herein.
 - a. Warranty period: 10 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers listed whose products meet or exceed the specifications are acceptable for use on the Project. Other manufacturers must comply with Paragraph 1.6 A, Manufacturer Qualifications, must manufacture equivalent products to those specified and must comply with requirements of Division 1 regarding substitutions to be considered.
 - 1. Major Industries, Inc.
 - 2. Skywall Translucent Systems

2.2 SYSTEM DESCRIPTION

- A. Pre-finished, factory assembled panel system consisting of flat translucent sandwich panel units, battens and perimeter closures, flashing, and related accessories installed over structural curbs and supports with the following properties:
 - 1. Dimensions: As indicated on drawings.
 - 2. Thickness: 2-3/4 inches
 - 3. Grid Size: 12 inch X 24 inch
 - 4. Grid Pattern: Shoji
- B. Conform to ICC AC-04 "Acceptance Criteria for Sandwich Panels".
- C. Physical Properties:
 - 1. Water penetration:
 - a. ASTM E331- None, when water is applied to entire panel surface at 5 gal/sf./hr for 15 minutes at 15 psf air pressure, and
 - b. AAMA 501.2 - None, when subjected to 100 mph wind-driven water.
 - 2. Air infiltration: ASTM E283 - Not to exceed 0.04 cfm/ft of unit perimeter at 15 psf air pressure.
 - 3. Burning Brand: ASTM E108 - Class A rating
 - 4. Roofing Class: UL 790 - UL listed, Class A.

2.3 SYSTEM COMPONENTS

- A. Insulated Translucent Sandwich Panel Units:
 - 1. Architectural grade glass fiber reinforced polymer facings bonded to an aluminum grid core under a controlled process of heat and pressure to form a double-faced, self-supporting, true sandwich panel with the following properties:
 - a. Exterior face sheet:
 - 1) Thickness: 0.070 inch
 - 2) Color: White
 - b. Interior face sheet:
 - 1) Thickness: 0.045 inch, minimum [Verify thickness for protected openings]
 - 2) Color: White
 - c. Light Transmission: Not less than 15%
 - d. Shading Coefficient (SC): Not to exceed 0.18
 - e. Solar Heat Gain Coefficient: Not to exceed SC divided by 1.15
 - f. Certified NFRC-100 U-value:
 - 1) Roofs / Sloped: Not to exceed 0.43
 - 2) Walls: Not to exceed 0.38
- B. Translucent Facing:
 - 1. Manufactured from glass fiber reinforced thermoset resin polymers, formulated specifically for architectural use. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
 - 2. Flammability of face sheets:
 - a. ASTM E84 - Interior face sheet shall have a flame spread rating not to

- exceed 25 and smoke development not to exceed 200.
 - b. ASTM D635 - Burn extent shall not exceed one (1) inch per minute tested in the horizontal position.
 - c. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
 - d. IBC 803.2 - Face sheets shall not delaminate or become detached when subjected to 200 degrees F for 30 minutes (300 degrees F for 25 minutes per UBC and SBC).
 - 3. Weatherability of exterior face sheets:
 - a. Color stability: ASTM D2244 - Full thickness and unaffected by abrasion or scratching. Color change shall not exceed 4.0 Delta E units.
 - 1) ASTM D1435 - Panels shall pass test with and without protective coatings. Results shall be determined by the average of at least three (3) white samples.
 - 4. Fiber blooming: ASTM D4060 - Exterior face sheet shall have a permanent erosion barrier to provide maximum long term resistance to reinforcing fiber exposure.
 - 5. Self-ignition: ASTM D1929 - Greater than 650 degrees F
 - 6. Appearance:
 - a. Face sheets shall be uniform in color and shall be completely free of ridges and wrinkles. Clusters of air bubbles/pinholes are not acceptable.
 - b. Exterior face sheets shall be smooth, and shall not vary more than plus or minus ten (10) percent in thickness
 - 7. Strength: UL 972 - Exterior face sheet shall be uniform in strength and repel an impact equal to 230 ft-lbs for High Impact without fracture or tear when testing according to the free-falling ball test.
- C. Grid Core:
 - 1. Aluminum I-beams: 6063-T6 or 6063-T5 with provisions for direct mechanical interlocking of muntin-mullion and perimeter.
 - a. Facing material shall have full contact with bonding surface.
 - b. Ferrous metals are not allowed.
 - c. Width of I-beam grid shall be machined to tolerance of not greater than plus or minus 0.002 inch.
 - d. Fabricate to prevent variations in alignment at intersections.
 - 2. Insulation: No. 1 Dry Class glass fiber, in density to achieve specified performance requirements.
- D. Adhesive:
 - 1. Factory applied to adhere translucent facing to grid core.
 - 2. Conform to ICC AC-05 "Acceptance Criteria for Sandwich Panel Adhesive".
 - a. Tensile strength: ASTM C297 - show no significant change in bond strength after accelerated aging in accordance with ASTM D1037.
 - b. Shear strength: in accordance with ASTM D1002 after exposure to five (5) separate aging conditions.
 - 3. Adhesive bonding lines shall be straight with a neat, sharp edge, and shall cover the entire width of the I-beam. White spots at intersections of muntins and mullions shall not exceed four (4) for each 50 square feet of panel, nor shall they be more than 3/64 inch in width.
- E. Gaskets:

1. Provide factory installed continuous extruded black rubber gaskets above and below translucent panels. Gasket profiles shall be keyed into the framing members.
 - a. Ozone Resistance: Type I - No cracks for one part per million, at minimum 20 percent elongation, at 104 degrees F for 100 hours in accordance with ASTM D1149.
 - b. Compression set shall not exceed 30 percent in accordance with ASTM D395.
- F. Battens and Perimeter Closure System
 1. Closure system: extruded aluminum alloy 6063-T5 and 6063-T6 screw clamp-tight closure system. Field install aluminum battens and cap plates.
 2. Aluminum perimeter frame, including rafters, shall be self-draining of water infiltration and condensation by means of internal gutters which direct moisture to exterior.
- G. Structural Framing: ASTM B221, Extruded aluminum alloy 6063-T5/T6 or 6061-T5/T6. Size and shape shall conform to requirements for structural support.

2.4 ACCESSORIES

- A. Anchors and Fasteners: as instructed by manufacturer
- B. Other materials, components: As required for a complete watertight and airtight installation as instructed by manufacturer.
- C. Flashing: Refer to Section 07 62 00, Sheet Metal Flashing
- D. Sealants: Refer to Section 07 92 00, Building Sealants

2.5 ALUMINUM FINISH

- A. Exposed aluminum to be manufacturer's factory applied finish meeting the performance requirements of AAMA 2604. Color shall be as selected by Architect from manufacturer's standard colors.

2.6 FABRICATION

- A. Fabricate system free of visual distortion and defects.
- B. Provide for removal of condensation to exterior.
- C. Provide weathertight assembly.
- D. Fabricate to drain water entering joints, or migrating moisture occurring within unit, to exterior.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide, set up, and maintain all staging, lifts and hoists required for the installation of complete assemblies, including staging, etc. necessary for field measuring.
- B. Provide structural framing and support curbs as indicated on the drawings and required by the translucent panel system manufacturer.

- C. Prepare openings including isolating dissimilar materials from aluminum system which may cause damage by electrolysis.
- D. Provide temporary enclosures, if required.

3.2 ERECTION

- A. Verify acceptability of structural framing and curbs for support of panel system prior to commencement of installation. Commencement indicates acceptance of conditions.
- B. Erect panel systems in locations indicated on the drawings in accordance with approved shop drawings and manufacturers printed instructions.
- C. Install, fasten and seal assembly in accordance with manufacturer's printed instructions. Clean aluminum prior to application of sealants.
- D. After other trades have completed work on adjacent material, inspect translucent panel installations and make adjustments necessary to insure proper installation.
- E. Install complete system water and air tight.

END OF SECTION

SECTION 12 36 61 - SOLID SURFACE MATERIAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Solid surface materials as top cap of low walls.

1.3 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 12 35 50 - Educational Casework.
- C. Division 22 – Plumbing.

1.4 REFERENCES

- A. Applicable Standards:
 - 1. American National Standards Institute (ANSI)
 - 2. ASTM International (ASTM)
 - 3. National Electrical Manufacturers Association (NEMA)

1.5 SUBMITTALS

- A. Product Data:
 - 1. Indicate product description, fabrication information, and compliance with specified performance requirements.
 - 2. Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.
- B. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions, and coordination requirements with adjacent work.
- C. Samples:
 - 1. Submit minimum 2 inches by 2 inches samples. Indicate full range of color and pattern variation for Architect's selection.
 - 2. Submit 12 inch long by 4 inches wide sample in color and pattern selected and approved by Architect. Approved sample will be retained as standards for work.

1.6 QUALITY ASSURANCE

- A. Allowable Tolerances:
 - 1. Variation in Component Size: Plus or minus 1/8 inch.
- B. Fabricator/Installer Qualifications: Approved by manufacturer of solid polymer manufacturer.
- C. Mock-Up(s):

1. Prior to final approval of shop drawings, erect one full-size mock-up of each component at project site for Architect review.
 2. Rework or remake mock-up until accepted; remove rejected units from project site. Acceptable mock-ups shall remain as part of finished work.
- D. Provide all solid polymer fabrications from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components to project site when areas are ready for installation. Store components indoors prior to installation.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.8 WARRANTY

- A. Warrant the work specified herein for fifteen (15) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to the following:
1. Shrinking, warping, cracking, chipping, splitting, or deteriorating excessively.
 2. Becoming loose from substrate.
 3. Inadequate color depth

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Specifications are based on Corian manufactured by E. I. du Pont de Nemours and Company; (800) 426-7426, or Architect approved equal. Listed manufacturers whose products meet or exceed those specified are approved for use on this Project. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
1. LG HiMacs 100% Acrylic Solid Surface manufactured by LG Chem; Peoria, AZ

2.2 MATERIALS

- A. Material, General: Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 & .6, Type Six.
1. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and polishing.
- B. Performance Characteristics:
1. Tensile Strength: 5,500 psi, minimum, ASTM D638
 2. Flexural Strength: 11,424 psi, minimum, ASTM D790
 3. Color Stability: No change, 100 hours minimum, NEMA LD3.1
 4. Abrasion Resistance: No loss of pattern, NEMA LD3.1
 5. Flame Spread / Smoke Development: Class I/Class A, ASTM E-84

2.3 ACCESSORY PRODUCTS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, nonporous joints, with chemical bond.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in color-matching or clear formulations.
- C. Sink/bowl Hardware: Manufacturer's approved bowl clips, inserts and fasteners.

1.9 FABRICATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- B. Form joints between components using manufacturer's standard joint adhesive, joints inconspicuous in appearance and without voids. Attach 2 inch wide reinforcing strip of solid polymer material under each joint.
- C. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.
- D. Finish all surfaces uniformly, matte: Gloss rating of 5-20.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install components plumb and level, in accordance with approved shop drawings and product installation details.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.

3.2 CLEANING AND PROTECTION

- A. Keep components and hands clean during installation. Remove adhesives, sealants, and other stains. Components shall be clean on Date of Substantial Completion.
- B. Protect surfaces from damage until Date of Substantial Completion. Repair or replace damaged work that cannot be repaired to architect's satisfaction and invoice for the cost of repairs; before repairs are made, cost estimates are subject to architect's approval.

3.3 MAINTENANCE INFORMATION

- A. Provide Care and Maintenance information to Owner upon completion of Project.
- B. Review maintenance procedures and warranty details with the Owner upon completion of project.

END OF SECTION 12 36 61

SECTION 23 09 93 - SEQUENCES OF OPERATION FOR HVAC CONTROLS

GENERAL:

- The BAS contractor shall provide all points listed under “Equipment Control Points” as well as any points required to accomplish the sequences of operation listed below. Refer to Specification 23 09 23 for input/output device specifications. Refer to contract drawings for additional items that may not be included in this specification. At the 11 month walk-thru, BAS contractor shall provide an additional DDC demonstration (in addition to the demonstration before substantial completion) and re-verification of point to point control of all equipment points and sequences with Owner and Engineer; no exceptions.
- BAS contractor shall schedule and participate in a pre-construction integration meeting with all vendors providing BACnet/Modbus or other equipment that is being integrated to the BAS. Sample graphics shall be submitted for owner review. The meeting is a requirement and shall include but not limited to:
 - Communications Requirements (MSTP/IP)
 - Points (Read/Write)
 - Connection Requirements (CAT5/6, 2-wire, 4-wire)
 - Coordinate Communication speeds when devices are MSTP.
 - Coordinate or Establish Device Instance Numbering System
 - Coordinate final points list(s) with owner/engineer
- BAS contractor shall provide and install all low voltage control wiring (with conduit if located outdoors or exposed below ceiling) for equipment such as but not limited to: chillers, boilers, split systems, rooftop units, IDF/MDF units, unit heaters, dust collectors, welding equipment, etc. to facilitate communication between equipment.
- All exposed control wiring below the ceiling and especially outdoors shall be in conduit; furnished and installed by bas subcontractor
- All equipment and wiring, including panels, controllers, auxiliary control devices and sensors, communication wire, and I/O wire shall be provided new. No existing or re-manufactured parts shall be re-used.
- Provide completely new DDC controls upgrade for all existing equipment as scheduled and shown on plans and / or specifications. Existing controllers, control wiring, control cabinets, sensing devices, control valve and damper actuators, etc. shall be brand new and shall not reused.
- Air handling units existing to remain shall be provided with all new sensing devices and wiring as listed under Equipment Control Points below. Remove existing and provide new Belimo control valves modulating Belimo actuators (valve bodies to remain); match existing characteristics (size, GPM, 2-way or 3-way etc.).
- All sensing devices and control wiring shall be new; conduit shall remain and be reused at the renovated areas. Broken, unsupported, rusted, or damaged conduits are to be demoed and reinstalled. If the condition of conduit being reused is questionable, it shall be submitted for approval before wire is pulled. If the owner/ENGR determines that any reused conduit is not acceptable, it will be the contractor's responsibility to provide new conduit and repull any wires at no additional cost to the owner.
- Provide new front-end system, system architecture, etc. with new thermographics illustrating current floor plan with current room names.

- Add discharge air temperature control points on all boxes.
- Following units' existing controls and sequence to remain. Tie into new front end system.
 - Central Plant (Chillers & Chilled Water Pumps)
- Provide campus-wide controls upgrade – wiring sensors, motorized dampers, control valves, actuators, control modules etc – refer to keyed notes on drawings for individual scope of work for each piece of equipment, and specifications for sequence of operation. Existing building system is served by legacy Automated Logic DDC. Provide the latest version of WEBctrl software and integrate all equipment noted.
- Provide connection to all existing exterior lighting contactors on campus, and integration into BAS. Four contactors total – three for building mounted lighting and one for parking lot lighting.

1. COOLING ONLY VAV AIR TERMINAL UNITS

Equipment Control Points

Space temperature – AI
Discharge air temperature - AI
Cold deck flow - AI
Cooling damper – FM (floating motor)

Zone Occupancy

Each VAV shall have an occupancy/vacancy schedule, occupied cooling setpoints and unoccupied cooling setpoints assigned to it. As the occupancy time approaches, an optimum start/stop program shall calculate a start time based on current space temperature versus the occupied heating or cooling setpoint, assigned recovery rate, and outdoor air temperature -- all variables are operator assignable from the central site. The VAV control program shall have the ability to learn its recovery rate whenever the operator enables the learning feature.

Temperature Control

When the zone becomes active, the VAV controller shall determine based on the space temperature, if cooling is required. If cooling is required, the cooling air damper shall be modulated open to its maximum cooling CFM setpoint (adjustable) and a run request shall be sent to the air handling unit serving the VAV. As the space temperature returns to setpoint, the VAV cooling air damper shall modulate to its operator adjustable minimum cooling CFM setpoint (30% of maximum).

Unoccupied Control

During the unoccupied time period, the VAV cooling damper shall be closed (adjustable). If the space temperature reaches the operator adjustable unoccupied setpoint of 95°F cooling, the required equipment shall be started and run to maintain the space temperature within the setpoints.

2. SERIES FAN POWERED AIR TERMINAL UNITS (CVB) – WITH HOT WATER HEAT

Equipment Control Points

Space temperature – AI
Discharge air temperature - AI
Cold deck flow – AI
Fan Start/stop - DO
Cooling damper – FM
Re-heat valve – FM

Zone Occupancy

Each CVB shall have an occupancy/vacancy schedule, occupied heating/cooling setpoints and unoccupied heating/cooling setpoints assigned to it. As the occupancy time approaches, an optimum

start/stop program shall calculate a start time based on current space temperature verses the occupied heating or cooling setpoint, assigned recovery rate, and outdoor air temperature -- all variables are operator assignable from the central site. The CVB control program shall have the ability to learn its recovery rate whenever the operator enables the learning feature.

When the CVB Boxes calculated start time arrives its internal fan motor shall be energized and continue to run until the unoccupied period arrives.

Temperature Control

When the zone becomes active, the CVB controller shall determine, based on the space temperature, whether heating or cooling is required. If cooling is required, the cooling air damper shall be modulated open to its operator adjustable maximum cooling CFM setpoint and a run signal shall be sent to the air handling unit serving the CVB. As the space temperature returns to setpoint, the CVB cooling air damper shall modulate to its operator adjustable minimum cooling CFM setpoint.

The cooling damper actuator shall use a stepper motor so its position can be accurately tracked for display on the CVB graphic and collected by the air-handling unit serving the CVB to reset the air handling unit static pressure setpoint.

If heating is required, a run request will be sent to the heating water system (See Hot Water Sequence of Operation). The CVB terminal damper will be maintained at its adjustable minimum heating CFM setpoint and the hot water reheat valve will be modulated to maintain the space temperature.

Unoccupied Control

During the unoccupied time period, the CVB cooling damper shall be closed (operator adjustable) and its fan shall be de-energized. If the space temperature reaches the operator adjustable unoccupied setpoints of 55°F heating and 95°F cooling, the required equipment shall be started and run to maintain the space temperature within the setpoints.

3. SINGLE DUCT VARIABLE AIR VOLUME AIR HANDLING UNITS (AHU-11)

Equipment Control Points

Supply air temperature – AI
Discharge air temperature (each coil) – AI
Supply air static pressure – AI
CO2 sensors (refer to plans for quantity and location) - AI
Fan status – DI
Static pressure high limit – DI
Air Handling Unit Fan start/stop – DO
Fan speed control – AO
Chilled water valve control - AO
Exhaust fan start/stop – DO
Dirty Filter DP Sensor – DI
Freeze alarm - AI
HW pre-heat valve control - AO
Outdoor air damper (Damper provided with unit, BAS to provide actuator) – DO
Damper End Switch – DI

AHU Activation

Each Single Duct variable air volume air handler shall be activated by a request to run from any Air Terminal Unit it serves.

Fan Control

When the air handler is requested to run, the B.A.S. control module will send signal to the air handler inverter, which will energize the fan. An airflow sensing switch will prove status to the Building

Automation System (BAS) and alarm the central site if the switch is not made within 20 seconds (operator adjustable). There will also be a 10 second (operator adjustable) de-bounce time to prevent nuisance alarms from a bouncing switch. A run request will be sent to the Chilled Water System when the air-handling unit is active and cooling is required.

Cold Deck Temperature Control

When the air handling unit is in occupied mode and cooling is required, the BAS shall send a request for cooling to the chiller plant and shall modulate the chilled water control valve to maintain leaving air temperature setpoint (55 °F, adjustable).

Air Volume Control

While the air handling unit is active, the BAS shall maintain the duct static pressure setpoint 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 air handling unit shall be de-energized via hard-wire interlock to the VFD safety circuit. The BAS shall monitor the high static limit switch and shall display an alarm at the central site. The static pressure high limit switch must be manually reset.

Air Volume Demand Control Ventilation

When the air handler is running in the occupied mode, the O.A. damper control shall be enabled and a request to run shall be sent to the OAHU that supplies the unit with outside air. CO2 sensors mounted in the return air stream shall monitor the CO2 level to the AHU. The B.A.S. shall select the highest level to modulate the OA damper. The B.A.S. shall modulate the outdoor air damper from its minimum position to its maximum position as required to maintain the CO2 level at between 850 ppm and 1,000 ppm (all adjustable). The OA dampers minimum and maximum positions shall be determined with the T.A.B. contractor to be the positions that allow the scheduled minimum and maximum OA CFM. The B.A.S. shall select the highest level when more than one CO2 sensor is used to modulate the damper. The outside air damper shall remain closed during a scheduled occupancy time based on a global command from a shelter in place (building shutdown) button activation or based on a summer mode schedule.

Unoccupied Control

If the space temperature reaches the operator adjustable unoccupied setpoints of 55°F (adjustable) heating and 95°F (adjustable) cooling, the required equipment shall be started and run to maintain the space temperature within the setpoints. All values are operator adjustable.

Associated Equipment

During the occupied time period, the outside air damper shall be open. The exhaust fans associated with the air handler shall also be energized only during the occupied time period. The outside air dampers shall remain closed & exhaust fans shall remain off, even during a scheduled occupancy time based on a global command from a shelter in place (building shutdown) button activation or based on a summer mode schedule.

An airflow switch shall monitor the pressure across the air filter. A contact closure from the air filter switch will alarm and notify maintenance through the B.A.S. of a dirty filter.

Equipment off Conditions

When the air handling unit is de-energized, the cooling valve shall be closed, the outside air damper shall be closed, and any associated exhaust fans shall be de-energized.

4. SINGLE DUCT VARIABLE AIR VOLUME AIR HANDLING UNITS (AHU-1, AHU-2, AHU-5, AHU-8 & AHU-10)

Equipment Control Points

Supply air temperature – AI
Discharge air temperature (each coil) – AI
Supply air static pressure – AI
Fan status – DI
Static pressure high limit – DI
Air Handling Unit Fan start/stop – DO
Fan speed control – AO
Chilled water valve control - AO
Exhaust fan start/stop – DO

AHU Activation

Each Single Duct variable air volume air handler shall be activated by a request to run from any Air Terminal Unit it serves.

Fan Control

When the air handler is requested to run, the B.A.S. control module will send signal to the air handler inverter, which will energize the fan. An airflow sensing switch will prove status to the Building Automation System (BAS) and alarm the central site if the switch is not made within 20 seconds (operator adjustable). There will also be a 10 second (operator adjustable) de-bounce time to prevent nuisance alarms from a bouncing switch. A run request will be sent to the Chilled Water System when the air-handling unit is active and cooling is required.

Cold Deck Temperature Control

When the air handling unit is in occupied mode and cooling is required, the BAS shall send a request for cooling to the chiller plant and shall modulate the chilled water control valve to maintain leaving air temperature setpoint (55 °F, adjustable).

Air Volume Control

While the air handling unit is active, the BAS shall maintain the duct static pressure setpoint 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 air handling unit shall be de-energized via hard-wire interlock to the VFD safety circuit. The BAS shall monitor the high static limit switch and shall display an alarm at the central site. The static pressure high limit switch must be manually reset.

Unoccupied Control

If the space temperature reaches the operator adjustable unoccupied setpoints of 55°F (adjustable) heating and 95°F (adjustable) cooling, the required equipment shall be started and run to maintain the space temperature within the setpoints. All values are operator adjustable.

Associated Equipment

During the occupied time period, the outside air damper shall be open. The exhaust fans associated with the air handler shall also be energized only during the occupied time period. The outside air dampers shall remain closed & exhaust fans shall remain off, even during a scheduled occupancy time based on a global command from a shelter in place (building shutdown) button activation or based on a summer mode schedule.

An airflow switch shall monitor the pressure across the air filter. A contact closure from the air filter switch will alarm and notify maintenance through the B.A.S. of a dirty filter.

Equipment off Conditions

When the air handling unit is de-energized, the cooling valve shall be closed, the outside air damper shall be closed, and any associated exhaust fans shall be de-energized.

5. SINGLE ZONE CV WITH HUMIDITY CONTROL (AHU-3, AHU-4, AHU-6, AHU-7 & AHU-9)

Equipment Control Points

Space temperature – AI
Space humidity – AI
Discharge air temperature – AI
CHW Coil Temp – AI
HW Coil Temp - AI
Fan status – DI
Air Handling Unit Fan start/stop – DO
Exhaust fan start/stop - DO
Chilled water valve control – AO
Hot water valve control - AO
Outside air damper control – AO

AHU Activation

The air-handling unit shall have an occupancy/vacancy schedule, occupied heating/cooling setpoints and unoccupied heating/cooling setpoints assigned to it. As the occupancy time approaches, an optimum start/stop program shall calculate a start time based on current space temperature verses the occupied heating or cooling setpoint, assigned recovery rate, and outside air temperature -- all variables are operator assignable from the central site. The air-handling unit control program shall have the ability to learn its recovery rate whenever the operator enables the learning feature.

Fan Control

When the air handler is requested to run, the B.A.S. control module shall send an enable signal to the air handler inverter, which will energize the fan. A current switch shall prove status to the Building Automation System (BAS) and alarm the central site if the switch is not made within 20 seconds (operator adjustable). There shall also be a 10 second (operator adjustable) de-bounce time to prevent nuisance alarms from a bouncing switch. A run request shall be sent to the Chilled Water System when the air-handling unit is active, and cooling is required. A run request shall be sent to the Heating Water System when the air-handling unit is active, and heating is required.

Temperature Control

A wall mounted space temperature sensor shall monitor the air temperature in the space. The B.A.S. shall output separate signals to modulate the chilled water and heating water control valve actuators in sequence to maintain the space temperature within its operator adjustable heating and cooling setpoints. As the zone temperature rises, the fan will modulate from its minimum speed (determined by the TAB contractor) to its maximum speed. As the zone temperature falls below the heating setpoint the fan will run at a fixed speed (determined by the TAB contractor) and the hot water valve will modulate to maintain the space heating temperature setpoint.

Space Humidity Control

A space humidity sensor, monitored by the B.A.S., shall set the cooling coil discharge air setpoint to 55°F (adjustable) and modulate the chilled water valve to maintain the setpoint if the humidity rises above 60% (adjustable) and continue until it falls by 5% (adjustable). The B.A.S. shall modulate the hot water reheat valve to maintain the space temperature between its heating and cooling setpoints. If the B.A.S. control module is receiving a broadcast from the HW system that heating water is not available (see Heating Water System sequence of operations) the chilled water valve shall not be overridden until heating water is available.

Unoccupied Control

If the space temperature reaches the operator adjustable unoccupied setpoints of 55°F (adjustable) heating and 95°F (adjustable) cooling, the required equipment shall be started and run to maintain the space temperature within the setpoints. All values are operator adjustable.

Associated Equipment

During the occupied time period, the outside air damper shall be open. The exhaust fans associated with the air handler shall also be energized only during the occupied time period. The outside air dampers shall remain closed, the exhaust fans shall remain off, even during a scheduled occupancy time based on a global command from a shelter in place (building shutdown) button activation or based on a summer mode schedule. The Exhaust fans shall be commanded (off) during morning cool down / warm up and shall only turn on during the occupied time periods. General exhaust fans may require a separate schedule to accomplish this sequence and will be part of the commissioning sequence of operations to be demonstrated.

Equipment off Conditions

When the air-handling unit is de-energized, its chilled water valve, hot water valve and OA damper shall be closed. The related exhaust fans shall be de-energized and the request to run to the OAHU shall be canceled. While the units are off if the outside air temperature falls below 34°F (operator adjustable) the chilled water valve and hot water valves shall be opened to 20% (adjustable) and the secondary pumps shall run for freeze protection.

6. COOL-DOWN CONTROL

ON-OFF: Prior to the start of the occupied mode, all air handling units shall be started and be controlled as specified except that the outside air dampers shall remain closed and the exhaust fans shall be OFF. The duration of the cool-down cycle shall be regulated by the BAS optimum start/stop routine. The cool-down cycle shall continue until all space temperatures are at or below the setpoint. Cool-down cycle shall not be initiated when outside air temperature is less than 80°F.

7. WARM-UP CONTROL

ON-OFF: Prior to the start of the occupied mode, all air handling units shall be started and be controlled as specified except that the outside air dampers shall remain closed and the exhaust fans shall be OFF. The duration of the warm-up cycle shall be regulated by the BAS optimum start/stop routine. The warm-up cycle shall continue until all space temperatures are at or above the setpoint. Warm-up cycle shall not be initiated when outside air temperature is greater than 70°F.

8. GENERAL EXHAUST FANS

Equipment Control Points

Exhaust fan status – Current switch - DI

Exhaust fan start/stop – DO

Interlock exhaust fans to run with AHU's serving the same area and run when the AHU's are operating in the occupied mode with their OA Dampers open. The exhaust fans shall remain off even during the scheduled occupancy time based on a global command from a shelter in place (building shutdown) button or based on a summer mode schedule.

9. THERMOSTAT CONTROLLED EXHAUST FANS

Equipment Control Points

Exhaust fan status – Current switch – DI

Provide a line-voltage adjustable thermostat to energize fan whenever the space temperature increases above 85°F (adjustable) setpoint.

10. KITCHEN HOOD EXHAUST FANS / MAKE-UP AIR UNIT

Equipment Control Points

Exhaust/Supply fan status (each fan) - Current switch – DI

Exhaust/Supply fan enable – DO

The kitchen hood supply fan and exhaust fans shall be interlocked to operate together. The hood fans shall be enabled to run by the BAS based on an operator assigned schedule. When the fans are enabled to run they shall be controlled via a local switch mounted at the hood. The fans shall remain off even during the scheduled operating time based on a global command from a shelter in place (building shutdown) button or based on a summer mode schedule.

11. DISHWASHER EXHAUST

Equipment Control Points

Exhaust/Supply fan status (each fan) - Current switch – DI

When the fan is enabled to run it shall be controlled via a local contact in the dishwasher through a delay on break time delay relay which shall continue to run the fan for ten (10) minutes (adjustable at the time delay relay) after the dishwasher is off. The fan shall remain off even during a scheduled operating time based on a global command from a shelter in place (building shutdown) button or based on a summer mode schedule.

12. OUTSIDE AIR INTAKE HOODS

Equipment Control Points

Damper open/close – DO

When the associated Air Handling Unit is in occupied mode, the BAS controller shall open the outside air damper. Damper and actuators provided by BAS.

13. RELIEF DAMPERS

Equipment Control Points

Damper open/close - DO

The BAS contractor shall furnish dampers at each relief air opening and shall provide controls to open the dampers whenever the associated zone is in occupied mode. The dampers shall remain closed based on a global command from a shelter-in-place button or based on a summer mode schedule.

14. INTERIOR / EXTERIOR LIGHTING CONTROL

Equipment Control Points

Lighting contactor enable/disable - DO

Lighting controllers

The BAS contractor shall provide separate outputs for each contactor. Field verify existing contactor location. Coordinate with lighting contactor schedule on electrical drawings for the new addition. Each contactor shall be able to be controlled via operator defined schedule independently or in groups defined by the operator. Provide a photocell for monitoring by the BAS. Exterior lighting shall be turned off if the photocell senses light levels above a pre-determined limit. If the building fire alarm system or intrusion detection system goes into alarm all corridor lights shall turn "ON".

Contractor shall program to allow the operator to select whether the system utilizes a boundary schedule and sunrise/sunset calculations. If the exterior lights are scheduled to operate, the operator shall have the option to select to enable them for an adjustable time period before or after sunset and disable for an adjustable time period before or after sunrise.

Override

Provide a method of manual override in an easily accessible location (i.e., control relay with integral hand-off-auto in control panel).

15. LIGHTING TLO

Equipment Control Points

Override button input – DI

A local override button located as directed by owner shall allow temporary override of the interior lighting. Each press of the button shall override the system for 30 minutes (adjustable), to a maximum of 90 minutes (adjustable).

16. CARBON MONOXIDE (CO) MONITORING – BOILER ROOM

Equipment Control Points

CO Monitoring – DI

Carbon Monoxide Monitoring

A carbon monoxide space sensor will alarm the BAS and shutdown the domestic water heater and heating boiler (via hardwired interlock) and notify district maintenance personnel via e-mail and text message when the level of carbon monoxide rises above 100 ppm (adjustable). The sensor shall also alarm the BAS and shutdown the water heater and heating boiler upon loss of power to the sensor. A strobe light and audible alarm at the panel will be activated during an event. A pushbutton on the panel will silence the alarm and reset the system. Carbon monoxide sensor shall be calibrated every eighteen months and a record of calibration shall be posted in a conspicuous place.

17. OUTSIDE AIR SUPPLY FANS

Equipment Control Points

Fan status – Current switch - DI

Fan enable – DO

Interlock fans to run with air handling equipment serving (refer to mechanical schedule) and run only during the occupied mode with their OA Dampers open. The fans shall remain off even during the scheduled occupancy time based on a global command from a shelter in place (building shutdown) button.

Fans shall have motorized dampers, BAS contractor shall provide damper, actuator and necessary interlock wiring to allow damper to open whenever the fan is running. Provide all necessary mechanical work to install dampers if they do not exist.

18. HOT WATER COIL

Equipment Control Points

Low temperature limit switch – DI (and hardwire interlock)

Heating valve control – AO

Freeze stat – DI

When the air handling unit is active the preheat coil shall modulate the heating water control valve actuator to maintain discharge air temperature setpoint of 50°F (adjustable).

19. MINI-SPLIT-SYSTEM AIR CONDITIONERS (IDF / MDF)

The split systems shall have a factory furnished controller and operate stand-alone based on unit thermostat. The BAS shall monitor the space temp only.

Equipment Control Points

Space temperature – AI

20. HEATING WATER SYSTEM

Equipment Control Points:

Building HW supply temperature – AI

Building HW return temperature – AI

Boiler start / stop - DO

Boiler supply temperature – AI

Boiler status – DI

Boiler alarm – DI

HW Pump status – DI

Mixing Valve - AO

HW pump start/stop (each pump) – DO

Heating Water System Activation

The heating water system shall be activated by a request for heating from any air handler supplied with heating water and if the outdoor air temperature is below 70°F (adjustable).

Heating Water Temperature Control

The Building Management and Control System (BMCS) control module shall receive inputs from sensors located in the building hot water supply and return piping. The BMCS control module shall send a floating motor signal to the boiler 3-way mixing valve to maintain the hot water supply setpoint. The hot water setpoint shall be reset based on the outdoor air temperature between 180°F (adjustable) when the outdoor air is at 20°F and reset to maintain 160°F (adjustable) when the outdoor air temperature is 70°F.

Heating Water System Control

The BMCS shall send a 24 VAC output signal to a relay mounted at the hot water pump starter which shall complete the auto side of the control circuit and start the pump. A current sensitive switch mounted in the pump starter shall prove status and alarm at the central site if the pump does not start in 40 seconds (adjustable). After 2 minutes (adjustable) the BMCS shall send a 24 VAC output signal to a remote relay interfaced with the operating temperature control in the boiler control circuit which shall enable the boiler to fire. An alarm relay mounted at the boiler control panel shall provide status and alarm the central site if the boiler fails to start in 30 seconds (adjustable).

Heating Water Shutdown Sequence

When incoming requests for heating are less than 5 minutes (adjustable), the boiler shall be de-energized and the mixing valve shall fully open to the boiler to provide cool-down period while the heating water pump continues to operate.

Minimum on / off times shall be assigned to the boiler and hot water pump to prevent short cycling.

Equipment off Conditions

When the heating water system is inactive the hot water boiler and pump shall be off and the boiler mixing valve shall be closed to the boiler.

Freeze Protection

When the outdoor air temperature drops to 35°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 85°F (adjustable) while running the boiler only until the low ambient temperature ceases to exist or the building start-up time arrives.

21. DOMESTIC WATER HEATER

Equipment Control Points

Domestic HW circulation pump enable/disable – DO

Domestic HW heaters enable/disable – DO

Domestic HW circulation pump status – DI

Domestic HW heaters status – DI

The BAS shall provide enable/disable control of each gas water heater (GWH). Heaters shall be enabled / disabled based on an operator defined occupancy schedule. A current switch will monitor the status of each system and report back to the BAS.

END OF SECTION 23 09 93

26 09 43 – DIGITAL LIGHTING CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Distributed Digital Lighting Control System: System includes
 - 1. Digital Lighting and Plug Load Controls
 - 2. Relay Panels
 - 3. Emergency Lighting Control.

1.2 RELATED SECTIONS

- A. Section 27 05 39 - Surface Raceways for Communications Systems
- B. Section 26 50 00 - Lighting.
- C. Section 26 52 00 - Emergency Lighting.

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code; National Fire Protection Association.
- B. NEMA - National Electrical Manufacturers Association
- C. FCC emission standards
- D. UL - Underwriters Laboratories, Inc. Listings
- E. UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products Installed in Air-Handling Spaces.
- F. UL 20 - General Use Switches, Plug Load Controls
- G. UL 924 - Standard for Emergency Lighting and Power Equipment
- H. ULC - Underwriter Laboratories of Canada Listings

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Digital Lighting Management System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.
- B. System shall conform to requirements of NFPA 70.
- C. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.
- D. System shall be listed under UL sections 916 and/or 508.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Catalog sheets and specifications.
 - 2. Ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation instructions.
- C. Shop Drawings: Wiring diagrams a for the various components of the System specified including:
 - 1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
 - 2. Show location of all devices, including at minimum sensors, load controllers, and switches/dimmers for each area on reflected ceiling plans.
 - 3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
 - 4. Network riser diagram including floor and building level details. Include network cable specification. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals:
 - 1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
 - 2. Operation and Maintenance Manual:
 - a. Include approved Shop Drawings and Product Data.
 - b. Include Sequence of Operation, identifying operation for each room or space.
 - c. Include manufacturer's maintenance information.
 - d. Operation and Maintenance Data: Include detailed information on device programming and setup.
 - e. Include startup and test reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing of centralized and distributed lighting control systems with a minimum of 10 years documented experience.
- B. Installer Qualifications: Company certified by the manufacturer and specializing in installation of networked lighting control products with minimum three years documented experience.
- C. System Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.

1.7 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to commencing Work of this section. Meeting to be attended by Contractor, Architect, system installer, factory authorized manufacturer's representative, and representative of all trades related to the system installation.
- B. Review installation procedures and coordination required with related Work and the following:
 - 1. Confirm the location and mounting of all devices, with special attention to placement of switches, dimmers, and any sensors.
 - 2. Review the specifications for low voltage control wiring and termination.
 - 3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
 - 4. Discuss requirements for integration with other trades

- C. Inspect and make notes of job conditions prior to installation:
 - 1. Record minutes of the conference and provide copies to all parties present.
 - 2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
 - 3. Installation shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 - 1. Ambient temperature: 32 to 104 degrees F (0 to 40 degrees C).
 - 2. Relative humidity: Maximum 90 percent, non-condensing.

1.10 WARRANTY

- A. Products Warranty: Manufacturer shall provide a 5 year limited warranty on products within this installation, except where otherwise noted, and consisting of a one for one device replacement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Wattstopper Digital Lighting Management (DLM). System shall not be integrated to BAS.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

- A. System General: Provide a WattStopper, Provide Digital Lighting Management System (DLM) complete with all necessary enclosures, wiring, and system components to ensure a complete and properly functioning system as indicated on the Drawings and specified herein. If a conflict is identified, between the Drawing and this Specification, contact the Architect for clarification prior to proceeding.
 - 1. Daylit Areas: Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
 - a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
 - b. Daytime setpoints for total ambient illumination (combined daylight and electric

- light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
 - c. Multiple-level switched daylight harvesting controls may be utilized for areas marked on drawings.
 - d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
- B. Equipment Required: Lighting Control and Automation system as defined under this section covers the following equipment.
- 1. Digital Lighting Management (DLM) local network: Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
 - 2. Digital Room Controllers: Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
 - 3. Digital Occupancy Sensors: Self-configuring, digitally addressable, calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 - 4. Digital Switches: Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
 - 5. Handheld remotes for personal control: On/Off, dimming and scene remotes for control using infrared (IR) communications. Remote may be configured in the field to control selected loads or scenes without special tools.
 - 6. Digital Daylighting Sensors: Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications for daylight harvesting using switching, bi-level, tri-level or dimming control.
 - 7. Configuration Tools: Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away.
 - 8. Emergency Lighting Control Unit (ELCU): Allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building
- C. Local Network LMRJ-Series: DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.
- 1. Features of the DLM local network include:
 - a. Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
 - b. Simple replacement of any device in the local DLM network with a standard off the shelf unit without requiring significant commissioning, configuration or setup.
 - c. Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
 - d. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
 - 2. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from

individual end devices are not acceptable.

3. If manufacturer's pre-terminated Cat5e cables are not used for the installation each cable must be individually tested and observed by authorized service representative following installation.

2.3 DIGITAL LOAD CONTROLLERS (ROOM, PLUG LOAD AND FIXTURE CONTROLLERS)

- A. Digital Load Controllers: Digital controllers for lighting zones, fixtures and/or plug loads automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements. Controllers are simple to install, and do not have dip switches/potentiometers, or require special configuration for standard Plug n' Go applications. Control units include the following features
 1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
 2. Simple replacement using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf device.
 3. Multiple room controllers connected together in a local network must automatically arbitrate with each other, without requiring any configuration or setup, so that individual load numbers are assigned starting with load 1 to a maximum of 64, assigned based on each controller's device ID's from highest to lowest.
 4. Device Status LEDs to indicate:
 - a. Data transmission
 - b. Device has power
 - c. Status for each load
 - d. Configuration status
 5. Quick installation features including:
 - a. Standard junction box mounting
 - b. Quick low voltage connections using standard RJ-45 patch cable
 6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
 - a. Turn on to 100 percent
 - b. Turn off
 - c. Turn on to last level
 7. Each load be configurable to operate in the following sequences based on occupancy:
 - a. Auto-on/Auto-off (Follow on and off)
 - b. Manual-on/Auto-off (Follow off only)
 8. Polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.
 9. BACnet object information shall be available for the following objects:
 - a. Load status
 - b. Schedule state, normal or after-hours
 - c. Demand Response enable and disable
 - d. Room occupancy status
 - e. Total room lighting and plug loads watts
 - f. Electrical current
 - g. Total watts per controller
 - h. Total room watts/sq ft.
 - i. Force on/off all loads
 10. UL 2043 plenum rated
 11. Manual override and LED indication for each load
 12. Zero cross circuitry for each load
 13. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
 14. Dimming Room Controllers shall share the following features:

- a. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
 - b. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
 - c. The following dimming attributes may be changed or selected using a wireless configuration tool:
 - 1) Establish preset level for each load from 0-100 percent
 - 2) Set high and low trim for each load
 - 3) Initiate lamp burn in for each load of either 0, 12 or 100 hours
 - d. Override button for each load provides the following functions:
 - 1) Press and release for on/off control
 - 2) Press and hold for dimming control
 - e. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver. LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
 - f. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100 percent dimming range defined by the minimum and maximum calibration trim.
 - g. Calibration and trim levels must be set per output channel. Devices that set calibration or trim levels per controller (as opposed to per load) are not acceptable.
 - h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.
- B. On/Off Room Controllers shall include:
1. Dual voltage (120/277 VAC, 60 Hz) capable rated for 20A total load
 2. One or two relay configuration
 3. Simple 150 mA switching power supply (Only 4 100 series devices on a Cat 5e local network)
 4. Three RJ-45 DLM local network ports with integral strain relief and dust cover
 5. WattStopper product numbers: LMRC-101, LMRC-102
- C. On/Off/0-10V Dimming KO Mount Room Controllers shall include:
1. Dual voltage (120/277 VAC, 60 Hz) capable rated for 10A total load
 2. Optional real time current and voltage monitoring (with - M Monitoring option).
 3. One or two relays configurations
 4. Smart 150 mA switching power supply
 5. Two RJ-45 DLM local network ports. Provide molded strain relief ring
 6. One dimming output per relay
 - a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting
 7. Units capable of providing both Class 1 or Class 2 wiring for the 0-10V output
 8. WattStopper product numbers: LMRC-111, LMRC-111-M, LMRC-112, or LMRC-112-M.

2.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

- A. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
1. Digital calibration and pushbutton configuration for the following variables:

- a. Sensitivity, 0-100 percent in 10 percent increments
 - b. Time delay, 1-30 minutes in 1 minute increments
 - c. Test mode, Five second time delay
 - d. Detection technology, PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 2. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
 3. Programmable control functionality including:
 - a. Each sensor may be programmed to control specific loads within a local network.
 - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
 - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
 - d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - e. Ultrasonic and Passive Infrared
 - f. Ultrasonic or Passive Infrared
 - g. Ultrasonic only
 - h. Passive Infrared only
 - i. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
 4. One or two RJ-45 port(s) for connection to DLM local network.
 5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
 6. Device Status LEDs, which may be disabled for selected applications, including:
 - a. PIR detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
 7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
 8. Manual override of controlled loads.
 9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
 - B. BACnet object information shall be available for the following objects:
 1. Detection state
 2. Occupancy sensor time delay
 3. Occupancy sensor sensitivity, PIR and Ultrasonic
 - C. Units shall not have any dip switches or potentiometers for field settings
 - D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
 - E. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC
- 2.5 Wired Low Voltage Isolated Relay Interface:
1. Module provides a single Form C contact relay rated for 24VAC or VDC.
 2. Relay module will provide a contact closure on the Normally Open side of the relay (and contact open on the Normally Closed side) while any occupancy sensor on the

- local Cat 5e IRB network is in the occupied mode. This function is non-programmable and works automatically using the unit's internal circuitry.
3. LED on the device to provide status of the relay
 4. This device is ideally suited to connect to HVAC inputs in the space that are looking for a dry contact whenever the space is occupied to enhance their specific sequence of operation.
 5. Wattstopper product number LMRL-100

2.6 DIGITAL WALL SWITCHES

- A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:
 1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 3. Configuration LED on each switch that blinks to indicate data transmission.
 4. Load/Scene Status LED on each switch button with the following characteristics:
 - a. Bi-level LED
 - b. Dim locator level indicates power to switch
 - c. Bright status level indicates that load or scene is active
 - d. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
 5. Programmable control functionality including:
 - a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
 - b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
 6. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.
- B. BACnet object information shall be available for the following objects:
 1. Button state
 2. Switch lock control
 3. Switch lock status
- C. Two RJ-45 ports for connection to DLM local network.
- D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.
- E. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa.
 1. Individual button function may be configured to Toggle, On only or Off only.
 2. Individual scenes may be locked to prevent unauthorized change.
 3. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 4. Ramp rate may be adjusted for each dimmer switch.
 5. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.
 6. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104,

LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.7 DLM HANDHELD USER INTERFACE REMOTES

- A. Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:
 - 1. Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet.
 - 2. LED on each button confirms button press.
 - 3. Load buttons may be bound to any load on a load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.
 - 4. Inactivity timeout to save battery life.
- B. Provide with a wall mount holster and mounting hardware for each remote.
- C. WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105.

2.8 DIGITAL DAYLIGHTING SENSORS

- A. Digital daylighting sensors shall work with load controllers and relay panels to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to the controller or panel. Daylighting sensors shall be interchangeable without the need for rewiring.
 - 1. Closed loop sensors measure the ambient light in the space and control a single lighting zone.
 - 2. Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.
 - 3. Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone
- B. Digital daylighting sensors shall include the following features:
 - 1. Sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. Photodiode shall not measure energy in either the ultraviolet or infrared spectrums. Photocell shall have a sensitivity of less than 5 percent for any wavelengths less than 400 nanometers or greater than 700 nanometers.
 - 2. Sensor light level range shall be from 1-6,553 foot-candles (fc).
 - 3. Capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of load controller(s) and load binding to controller(s).
 - 4. For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
 - 5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
 - 6. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
 - 7. Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.
 - 8. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
 - 9. Configuration LED status light on device that blinks to indicate data transmission.
 - 10. Status LED indicates test mode, override mode and load binding.

11. Recessed switch on device to turn controlled load(s) ON and OFF.
 12. BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
 - a. Light level
 - b. Day and night setpoints
 - c. Off time delay
 - d. On and off setpoints
 - e. Up to three zone setpoints
 - f. Operating mode - on/off, bi-level, tri-level or dimming
 13. One RJ-45 port for connection to DLM local network.
 14. A choice of accessories to accommodate multiple mounting methods and building materials. Photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62 inch thick (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62 to 1.25 inches thick (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.
 15. Any load or group of loads in the room can be assigned to a daylighting zone
 16. Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).
 17. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.
- C. Closed loop digital photosensors shall include the following additional features:
1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
 2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
 3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.
 4. WattStopper Product Number: LMLS-400, LMLS-400-L.
- D. Open loop digital photosensors shall include the following additional features:
1. An internal photodiode that measures light in a 60-degree angle (cutting off the unwanted light from the interior of the room).
 2. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
 3. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
 4. WattStopper Product Number: LMLS-500, LMLS-500-L.

2.9 DIGITAL PARTITION CONTROLS

- A. Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors.
- B. Four-button low voltage pushbutton switch for manual control.
1. Two-way infrared (IR) transceiver for use with configuration remote control.

2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 3. Configuration LED on each switch that blinks to indicate data transmission.
 4. Each button represents one wall; Green button LED indicates status.
 5. Two RJ-45 ports for connection to DLM local network.
 6. WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening.
- C. Coordinate contact closure interface for automatic control via input from limit switches on movable walls specified in Section 10 22 43 - Sliding Partitions .
1. Operates on Class 2 power supplied by DLM local network.
 2. Includes 24VDC output and four input terminals for maintained third party contract closure inputs.
 3. Input max. sink/source current: 1-5mA
 4. Logic input signal voltage High: > 18VDC
 5. Logic input signal voltage Low: < 2VDC
 6. Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.
 7. Two RJ-45 ports for connection to DLM local network.
 8. WattStopper part number: LMIO-102

2.10 HANDHELD CONFIGURATION TOOLS

- A. Provide a wireless configuration tool to facilitate customization of DLM local networks using two-way infrared communications, and/or PC software that connects to each local network via a USB interface.
- B. Features and functionality of the wireless configuration tool shall include but not be limited to:
1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
 2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
 3. Must be able to read and modify parameters for load controllers and relay panels, occupancy sensors, wall switches, daylighting sensors, network bridges, and identify DLM devices by type and serial number.
 4. Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
 5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
 6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
 7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
 8. Verify status of building level network devices.
- C. WattStopper Product Numbers: Handheld LMCT-100

2.11 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

- A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handheld IR configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing

standard BACnet/IP communication.

- B. Additional parameters exposed through this method include but are not limited to:
 - 1. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
 - 2. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
 - 3. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
 - 4. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
 - 5. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
 - 6. Load control polarity reversal so that on events turn loads off and vice versa.
 - 7. Per-load DR (demand response) shed level in units of percent.
 - 8. Load output pulse mode in increments of 1second.
 - 9. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.
- C. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
 - 1. Device list report: All devices in a project listed by type.
 - 2. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
 - 3. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
 - 4. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.
 - 5. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
 - 6. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100 percent, 2 = all loads 75 percent, 3 = all loads 50 percent, 4 = all loads 25 percent, 5-16 = same as scene 1).
 - 7. Occupancy sensor report: Basic settings including time delay and sensitivities for all occupancy sensors.
- D. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
 - 1. Set, copy/paste an entire project site of sensor time delays.
 - 2. Set, copy/paste an entire project site of sensor sensitivity settings.
 - 3. Search based on room name and text labels.
 - 4. Filter by product type (i.e. LMRC-212) to allow parameter set by product.
 - 5. Filter by parameter value to search for product with specific configurations.
- E. Network-wide firmware upgrading remotely via the BACnet/IP network.
 - 1. Mass firmware update of entire rooms.
 - 2. Mass firmware update of specifically selected rooms or areas.
 - 3. Mass firmware upgrade of specific products
- F. WattStopper Product Number: LMCS-100, LMCI-100

2.12 EMERGENCY LIGHTING CONTROL DEVICES

- A. Emergency Lighting Control Unit - A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
 - 1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
 - 2. Push to test button
 - 3. Auxiliary contact for remote test or fire alarm system interface
- B. WattStopper Product Numbers: ELCU-100, ELCU-200.

PART 3 EXECUTION

3.1 PREPARATION

- A. Do not begin installation until measurements have been verified and work areas have been properly prepared.
- B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that required pre-installation meeting specified in Part 1 of this specification has been completed, recorded meeting minutes have been distributed and all outstanding issues noted have been resolved prior to the start of installation.

3.2 INSTALLATION

- A. Install system in accordance with the approved system shop drawings and manufacturer's instructions.
- B. Install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors.
 - 1. If pre-terminated cable is not used for room/area wiring, each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the Work.
 - 2. If fixtures have internal DLM Control Modules, ensure that they are also connected with Cat 5e cable.
 - 3. Install all room to room network devices using manufacturer-supplied LM-MSTP network wire or wireless devices. Network wire substitution is not permitted and may result in loss of product warranty.
 - 4. Low voltage wiring topology must comply with manufacturer's specifications.
 - 5. Route network wiring as indicated on the Drawings as closely as possible. Document final wiring location, routing and topology on as built drawings.
- C. All line voltage connections shall be tagged to indicate circuit and switched legs.
- D. Test all devices to ensure proper communication.
- E. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.
- F. Provide written or computer-generated documentation on the configuration of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 3. Load Parameters (e.g. blink warning, etc.)
- G. Post start-up tuning - Adjust sensor time delays and sensitivities to meet the Owner's requirements 30 days from beneficial occupancy. Provide a detailed report to the Architect / Owner of post start-up activity.
- H. Tighten all panel Class I conductors from both circuit breaker and to loads to torque ratings as marked on enclosure UL label.
- I. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.
- J. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.
- K. Verify all non-panel-based lighting loads to be free from short circuits prior to connection to room controllers.
- L. Remote Access for Network Systems: If "REMOTE ACCESS AND ENHANCED WARRANTY FOR NETWORKED SYSTEMS" is specified in Part 1 of this specification, ensure Segment Manager enclosure is installed in a location with good to excellent cellular phone coverage based on building orientation and geographic location, and mount magnetic antenna for the modem. For cases where alternate mounting locations are not available and a stronger cellular signal is needed, the manufacturer shall offer additional antenna options to improve signal quality. Verify final mounting location with Engineer and Owner prior to proceeding with the Work.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Notify Architect and Manufacturer in writing a minimum of 3 weeks prior to system start-up and testing.
- B. Tests and Inspections: Manufacturer's service representative shall perform the following inspections and prepare reports.
1. Verify Class I and II wiring connections are terminated properly by validating system performance.
 2. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
 3. Verify / complete task programming for all switches, dimmers, time clocks, and sensors.
 4. Verify that the control of each space complies with the Sequence of Operation.
 5. Correct any system issues and retest.
- C. Provide a report in table format with drawings, or using a software file that can be opened in the manufacturer's system software including each room or space that has lighting control installed. Indicate the following:
1. Date of test or inspection.
 2. Loads per space, or Fixture Address identification.
 3. Quantity and Type of each device installed
 4. Reports providing each device's settings.

3.4 DEMONSTRATION AND TRAINING

- A. Before Substantial Completion, arrange and provide a one-day Owner instruction period to designated Owner personnel. Set-up, starting of the lighting control system and Owner instruction includes:
 - 1. Confirmation of entire system operation and communication to each device.
 - 2. Confirmation of operation of individual relays, switches, and sensors.
 - 3. Confirmation of system Programming, photocell settings, override settings, etc.
 - 4. Provide training to cover installation, programming, operation, and troubleshooting of the lighting control system.

3.5 PRODUCT SUPPORT AND SERVICE

- A. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

END OF SECTION 26 09 43

SECTION 28 13 00 - ACCESS CONTROL SYSTEM

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 RELATED WORK

- A. Division 26 Sections

1.2 WORK INCLUDED

- A. The Contractor shall furnish and install a complete microprocessor based access control system as specified herein. The system shall include, but not be limited to, all control equipment, power supplies, power circuits, signal initiating and signaling devices, conduit, wire, network cabling, fittings, and all other accessories required to provide a complete and operable system.
- B. Security system devices indicated are for reference and coordination purposes only. The installing contractor shall design and provide a complete system, meeting the requirement of specification. The Contractor shall provide all security system devices required for complete system perimeter coverage acceptable to all governing authorities, Architect and Owner.
- C. The system shall include security for all access into building, including but not limited to doors, roof hatches, windows and interior space motion detection. Card reader access interface must also be provided at locations noted.
 - 1. The Control System shall be the product of a single manufacturer.
 - 2. Tag all conductors or cables at each end.
 - 3. Installation of security panels.
 - 4. Interconnection of security panels.
 - 5. Installation of new security devices.
 - 6. Preconstruction meeting with Owner's personnel, installing technician and project superintendent.
 - 7. Card reader hardware and components.
- D. The contractor shall connect this location to the district monitoring station as designated by the owner.
- E. Additional Responsibilities of the Access control contractor are as follows:
 - 1. Input all Access Control Doors, Door Position switches, Door Release buttons, Key Pads and all other devices into SMS and Mapping Feature.
 - 2. Mapping feature shall be programmed for complete monitoring of all devices, as well as, complete functionality of Doors. Features shall include but shall not be limited to
 - a. Lock
 - b. Unlock
 - c. Lockdown
 - d. Position
 - e. Alarm for Propped Door
 - f. Alarm for Forced Door
 - 3. The contractor shall provide and install cover plates manufactured by the door hardware manufacturer to cover any holes left by device removal. Refer to 087100 specification for additional information.
 - 4. Install AXIS A8105-E Network Video Door Station with recessed mounting plate and license for Digital Watchdog Spectrum VMS. Locations are at main entrance

vestibule and each campus kitchen entrance. Refer to architectural plans for correct locations. Before installing field verify location with owner for correct positioning of device.

5. Package and return all door hardware that has been removed to the owner.
6. Package and return all unused door hardware installation components. All components that are turned over to owner must be inventoried by integrator.

1.3 CODES AND STANDARDS

The system shall comply with the applicable Codes and Standards as follows:

- A. National Fire Protection Association Standards:
 1. NFPA 70 National Electric Code
 2. NFPA 72 National Fire Alarm Code
 3. NFPA 101 Life Safety Code
- B. Local & State Building Codes
- C. Requirements of Local Authorities having Jurisdiction
- D. Underwriters Laboratory Requirements and Listings for use in Security Alarm Systems.
- E. Requirements of American Disabilities Act (Public law 101-336).
- F. Texas Accessibility Standards
- G. State Fire Marshall.
- H. Texas Insurance Code.

1.4 QUALITY ASSURANCE

- A. Contractor Qualifications:
 1. The installing contractor shall be the authorized representative of the Access Control Manufacturer to sell, install, and service RS2 and all related equipment. The installing contractor shall have represented the security alarm manufacturer's product for at least five years.
 3. The installing contractor shall be licensed by the State of Texas as a security services contractor to design, sell, install, and service security alarm systems.
 4. The installing contractor shall provide 24 hour, 365 day per year emergency service with factory trained service technicians.
 5. The installing contractor shall have personnel on their staff that has been actively engaged in the business of designing, selling, installing, and servicing security alarm systems for at least ten (10) years.
 6. All Contractors must submit to the owner prior to starting any work the factory training certificates for all personnel that will be working on the access control system. No person is allowed to work on the system without proper manufacturer's certification.
 7. The proposing contractor for this system and the installing contractor of this system shall be of the same organization.
 8. Contractor must be a current integrator of solution in the closest major metropolitan area marketplace, have a permanent office located within 75 miles of the project, and be able to include information on current support staff to be able to service this client.
 9. The proposing/installing contractor of this system must be an authorized

dealer/integrator for the project's specified RS2 Access Control System.

1.5 SUBMITTALS

- A. The installing contractor and/or equipment supplier shall provide complete and detailed shop drawings and include:
 - 1. Control panel wiring and interconnection schematics for all devices including intrusion detection points.
 - 2. Complete point to point wiring diagrams.
 - 3. Riser diagrams.
 - 4. Complete floor plan drawings locating all system devices.
 - 5. Factory data sheets on each piece of equipment proposed.
 - 6. Detailed system operational description. Any specification differences and deviations shall be clearly noted and marked.
 - 7. Complete system bill of material.
 - 8. **Line by line specification review stating compliance or deviation.**
- B. All submittal data will be in bound form with Contractor's name, supplier's name, project name, and state security license number adequately identified.

PART 2 - PRODUCTS

A. MANUFACTURERS

- 1. SMS Software
 - a. Access it! Software by RS2.

B. SMS Field Hardware as needed

- 1. System Control Processors SCP shall be EP-1502, EP-2500
- 2. System Input Output (SIO) units shall be – MR-51e or MR-52
- 3. System Input/output module (SIO) 16 Inputs shall be – MR-16IN
- 4. System Output module (SIO) 16 Outputs – MR-16OUT
- 5. Communications Multiplexer RS-485 shall be – MUX-8
- 6. Provide RS2 NCL-12UL enclosures in quantities as required.

C. SMS Authentication Hardware

- 1. AptiQ MT15 – Card Readers
- 2. AptiQ MTK15 – Card Readers with Integrated keypad
- 3. Schlage AD300 – Every door scheduled to receive a card reader shall receive an AD300 network wired lock. **Security contractor shall provide and install hardware.**
- 4. Readers shall be proximity style readers for all doors scheduled to receive card reader interface.
- 5. Provide multi-technology proximity/keypad reader module (aptiQ MT15, color: cream) on at least three door locations for Elementary 's (front door, faculty parking entrance, and kitchen entrance), 3 for Junior High Schools (front door, faculty parking entrance, and kitchen entrance) and 5 for High Schools (front main entrance, ninth grade center entrance,, faculty parking entrance, athletics field house entrance, and kitchen entrance). Refer to floor plans for additional card reader door locations that may require additional multi-technology readers be installed.
 - Include standard clear cover model: STI-13010CW with custom label: ARM BURGLAR ALARM. OR
 - Include standard smoke color cover for keyless locks model: STI-6520-S without custom verbiage.
- 8. Provide yellow push button for "in and out" door model: SS205ZA-EN with custom label: PUSH TO ENTER for asylum door at office

D. SMS Third Party Integrated Devices

1. The contractor shall provide a relay and contacts to arm and disarm the intrusion system using card swipe. Provide all required components, cabling and programming required.

2.1 MANUFACTURED UNITS

A. System Control Processor (SCP)

1. The System Control Processor (SCP) shall link the SMS Software to all "down-stream" field hardware components (SIOs,). The SCP shall provide full distributed processing of access control / Alarm Monitoring rules and operations. A fully loaded and configured SCP shall respond in less than one-half (0.5) second to grant or deny access to cardholder.
 2. The SCP shall continue to function normally (stand-alone) in the event that it loses communication with the SMS software. While in this off-line state, the SCP shall make access granted/denied decisions and maintain a log of the events which occur. Events shall be stored in the SCP local memory, and then uploaded automatically to the SMS database after communication has been restored.
 3. In addition, the SCP shall incorporate the following features:
 - a) UL 294, ULC, and CE Certified
 - b) Support for Host Communications Speed of 115,200 bps
 - c) Support Direct Connect, Remote Dial Up, or Local Area Network (LAN) Connection
 - d) Support for up to 6 MB of On-Board Memory for the EP-1502, and 12 MB for the EP2500
 - e) LAN Support shall utilize RJ45 (10/100baseT) Ethernet Interface
 - f) Flash Memory for real time program updates and overall host communications
 - g) Support 2 wire RS-485 downstream ports, Downstream ports shall be for connecting SIO panels via RS-485 multi-drop wiring configuration
 - h) Memory storage of up to 6 MB for the EP-1502 and 12 MB for the EP-2500
 - i) Initial base memory download between SCP with standard memory from the SMS shall require no more than ten (10) seconds
 - j) Support for up to 32 SIO devices
 - k) Support of multiple card technologies
 - l) Supervised Communications between SCP and SMS Software
 - m) AES 256 bit Symmetrical Block Encryption conforming to the FIPS-197 standard between SCP and SMS Software communications driver.
 - n) Support of up to eight card formats and facility codes
 - o) Support for SEIWG card formats
 - p) Integration to other manufacturer's OSDP (Open Supervised Device Protocol), Magnetic (Clock and Data) and Wiegand (Data 1, Data 0) card readers
 - q) Uninterruptible Power Supply (UPS) with battery backup (** Specify the amount of Backup Time Required)
 - r) 32-bit Microprocessor
 - s) Biometric Interface Support
 - t) An SCP downstream serial port shall multi-drop up to 32 access control SIO field hardware devices using an RS-485 UL 1076 Grade A communication format allowing a distance of 4,000 feet using Belden 9842 cable or equivalent
 - u) 12-24 VDC input power for the EP-1502 or EP-2500 and 12 VDC
 - v) Issue Code Support for OSDP (Open Supervised Device Protocol), Magnetic (Clock and Data) and Wiegand (Data 1, Data 0) Card Formats
 - w) Individual Shunt Times (ADA Requirement)
 - x) Up to Nine Digit PIN Codes
 - y) Downstream serial RS-485 device support over CAT 5, 6e cable
 - z) Status LEDs for normal component and communication status
- i. RoHS ComplianceMR-16IN 16 Input Sub Input/Output module (SIO)

1. The Input Control Module shall provide 16 UL 1076 Grade B, A or AA alarm input zones and monitor / report line fault conditions, alarm conditions, power faults and tampers. Status LEDs shall provide information about the sixteen alarm zone inputs, cabinet tamper, and power fault.
 2. In addition, the SIO shall incorporate the following features:
 - a. UL 294, ULC, and CE Certified
 - b. Alarm contact status scanning at up to 180 times per second for each zone
 - c. Eight configuration DIP switches to assign unit addresses and communications speed
 - d. Elevator control support for 64 Floors using floor Tracking
 - e. Variable resistor values for line supervision
 - f. A low power CMOS microprocessor
 - g. Filtered data for noise rejection to prevent false alarms
 - h. Up to 16 Grade B, A, or AA Supervised Inputs in any Combination
 - i. 12 or 24 VDC Input Power
 - j. 2 Form C 5A, 30 VDC Contacts for load switching
 - k. 2 dedicated inputs for tamper and power status
 - l. RoHS Compliance
 - m. Support for RS-485 over CAT 5, 6e cable
- ii. MR-16OUT 16 Output Sub Input/output module (SIO)
1. 2.2.6.1 The Output Control Modules shall provide 16 Form-C 5A 30 VDC relay contacts for load switching. The relays shall be configurable for fail-safe or fail-secure operation. Each relay shall support "On" "Off" and "Pulse" operation.
 - a. 12 or 24 VDC input power
 - b. Two dedicated digital inputs for tamper and power failure status
 - c. RS-485 communications, multi-dropped (2-wire or 4-wire RS-485)
 - d. Up to 16 MR-16OUTs per SCP
 - e. Onboard termination jumpers
 - f. DIP switch selectable addressing
 - g. Status LEDs for communication to the host, heartbeat and relay status
 - h. Elevator control, support for 64 floors
 - i. RoHS Compliance
 - j. Support for RS-485 over CAT 5, 6e cable
- iii. MR-52 Reader Sub I/O module (SIO)
1. The MR-52 shall provide a dual interface between the SCP and authentication devices. The MR-52 must operate with any authentication device that produces a standard Wiegand, Magnetic or OSDP (Data 1 / Data 0 or Clock and Data) communication output.
 2. In addition the MR-52 shall incorporate the following features:
 - a. 12 or 24 VDC power supply
 - b. Reader communications (Magnetic Clock/Data, Wiegand Data1/Data0 or OSDP) - more than 150 different readers approved for use
 - c. Six Form-C 5 A at 30 VDC relay outputs
 - d. Up to 8 different formats
 - e. Issue code support for Magnetic, Wiegand or OSDP formats
 - f. Door contact supervision (Open/Closed)
 - g. REX push-button monitor (Open/Closed, Supervised or Non-Supervised).
 - h. Strike Control output
 - i. Bi-color status LED support and 2-wire LED support
 - j. Beeper control
 - k. Dedicated tamper and power failure circuits
 - l. Support for offline reader access mode
 - m. Onboard jumpers for termination

- n. Onboard jumpers for 5 VDC or 12 VDC reader support
- o. Elevator control, native support for 6 floors without Floor Tracking.
- p. DIP switch selectable addressing
- q. UL 294 listed and CE approved
- r. RoHS Compliance
- s. Support for RS-485 over CAT 5, 6e cable

2.2 COMPONENTS

A. SMS Software Capabilities

1. The SMS Software shall support 64,000 card readers, 512,000, input points, detection points, and relay outputs. The SMS database server shall support an unlimited number of cardholders, and visitors, limited only by the available memory on the SCP. The database server shall also support an unlimited number of system events and System Operator transactions in the history file limited only by available hard disk space. Client Workstations shall be limited only by the limitations of the operating system server software.
2. SMS Software Functionality
 - a. Time Intervals
 - I. The SMS shall be capable of creating and storing an unlimited number of Time Intervals, limited only by the available hard drive space.
 - II. Each Interval may be defined with a 50 character name.
 - III. Each Interval will consist of a start time, an end time and the selected days the interval is to be active. Selected from a 15 day per week Calendar consisting of Sun thru Sat for 7 days and 8 Holiday Types / Categories which together will produce the 15 day per Interval Week for the individual Time Interval. Time Intervals shall be allowed to belong to any or all Time Zones so that the Time Interval only has to be defined once.
 - b. Time Zones
 - I. The SMS shall be capable of creating and storing up to two hundred fifty five (255) time zones. Each time zone shall have a minimum of Twelve (12) Time Intervals. Each Time Interval shall be assignable to each and every Time Zone.
 - II. Each time zone shall be assignable to an alphanumeric name of up to 50 characters. Time zones shall be applied to access levels, card reader modes, alarm inputs, and alarm outputs. Time zones shall be allowed to belong to any or all access levels so that the time zone only has to be defined once.
3. Access Levels
 - a. The SMS shall be capable of defining a minimum of 32,000 access levels with a minimum of 32 access levels per cardholder card. Access Levels shall consist of a combination of card readers and time zones.
 - b. Each Access Level shall be assignable to an alphanumeric name using up to 50 characters.
 - c. Card readers shall have the ability to be assigned to any or all access levels defined in the SMS. Individual card readers shall be capable of having a distinct time zone assigned to it.
 - d. The SMS shall allow a 'First Card Unlock with keypad entry' option to be assigned on a Combination of Time Zone and Allowed Card Group.
 - e. Add appropriate doors and timezones to the following access levels for campus.
 - ***POLICE ONLY***
 - ALL ACCESS DISTRICT WIDE 24/7
 - ALL ACCESS DISTRICT WIDE Mon-Fri 6:00am-8:00pm
 - Campus Level (initials) Staff Mon-Fri 6:30am-6:45pm (Elementary)
 - Campus Level (initials) Staff Mon-Fri 6:00am-8:00pm (Junior High/High School)
 - Campus Level (initials) Staff Select Mon-Sun 5:00am-11:00pm
 - Campus Level (initials) Always 24/7

4. Temporary Access Levels shall be enabled at the Site level.
 - a. The SMS shall be capable of assigning Temporary Access Levels inclusive of the 32,000 assignable Access Levels.
 - b. Each Temporary Access Level shall be assignable to an alphanumeric name using up to 50 characters.
 - c. Each Temporary Access Level shall be definable with a start and end date.
 - d. Temporary Access Levels shall be stored in the SCP and functionality shall be maintained in the event of disconnection with the SCP.
5. Precision Access is enabled at the Site level and allows each Cardholder to have a Time Zone assigned separately for Access to each Reader.
6. Holidays
 - a. The SMS shall provide a minimum of 255 Holiday assignments using an embedded calendar. Holidays shall be assigned an alphanumeric name using up to 50 characters and shall be grouped into eight (8) types of holidays, and shall be assignable individually. Access rights, card reader modes, and schedules must be able to be altered when the current date is designated a Holiday.
 - b. Daylight Savings Time changes shall take effect automatically, based on the SMS Server time which may be synchronized using an NTP Server or the NIST Time synchronization.
 - c. The SMS shall support Holiday Ranges that allow a single holiday to span across multiple calendar days.
7. First Card Unlock
 - a. The SMS shall provide a First Card Unlock feature that when configured retards a pre-determined time zone activated unlock command until a valid credential has been presented and granted access to the portal. See appendix A for programming.
8. Database Segmentation
 - a. The SMS shall be required to support data Sites (segmentation, partition) whereby each Site (segmentation, partition) shall have its own set of cardholders, field hardware and system parameters (time zones, access levels etc.). This Site (segmentation, partition) shall expand the limitations of the SMS parameters (i.e. access levels and time zones) to the maximum capacity of each parameter multiplied by the number of Sites. The following list shall be made available for segmentation:

2.3 FIELD DEVICES

- A. Card Access Equipment
 1. For new installations, card readers shall be Schlage AD300 locksets to be provided and installed by the contractor. Access control contractor shall provide and install all equipment, wiring, reader, software, programming, licenses to ensure full functionality of all devices shown on drawings.
 2. For any locations where door will not allow AD300 hardware to be installed, contractor shall install wall mounted, 2 gang proximity reader and interface to new electrified door hardware and interface with control panel. Provide all wiring, reader, programming and licenses required to ensure full functionality of system.
 3. Provide Request to Exit on all egress doors to shunt alarm during egress. If door hardware has request to exit module in panic hardware, the access control system shall interface with that associated wiring connections. If ceiling mount device required, provide one request to exit per pair of doors. Contractor shall provide request to exit devices either thru integrated panic hardware or thru above door request to exit that is tied to all doors of a given exit.
 4. For entry doors that have automatic slider doors, access control contractor shall interface with slider door hardware motion detector and interlock slider doors to operate upon card reader swipe authentication.
 5. For doors that have ADA motor operated door hardware installed, the auto operator shall activate upon authentication of card reader.
 6. Any doors that are magnetically held, shall be interfaced with the building fire alarm

- system and shall communicate with a relay to release the magnet upon fire alarm activation.
7. Provide local power at door locations as required to operate all modules.
 8. Provide Physical Access Input Modules for any additional control points required to be installed to monitor additional locations as indicated on drawings. Provide enclosure for any exposed areas with no ceiling where devices shall be installed.
 9. Provide a GE/Interlogix/Sentrol 1076D-M door contact for each exterior door, and other doors as located on plans. Door Contact shall monitor door position at all times. Program the system to shunt alarm on authenticated card read. Send system into full alarm during forced door. Send system into trouble for Propped door with messaging to designated user groups for all alarm types. At a pair of doors, contractor shall wire each door contact together as one common program point within the access control system.
 10. Provide Door contact at each roof hatch. Refer to room plans for locations.
 11. Provide Keypads as shown on drawings. Keypads shall be used for after-hours Pin/Prox authentication and associated with swipe/keypad disarming of system.
 12. The contractor shall provide programming to send all data from the system to the preferred after hours monitoring system.
 13. Alarm activations including forced door, Duress alarms and Lock downs shall send pre-recorded alarm messaging to Monitoring station for police dispatch.
 14. Provide Door release buttons at each receptionist knee space refer to plans for locations and quantities.
 15. Provide an emergency lock down button in the reception office on the wall behind the reception desk. The button shall be programmed to send entire campus into lockdown. Program all AD locks to initiate full building lockdown in 10 seconds or less. Model SS2434LD-EN Blue Lockdown button with cover.
 16. Provide a total of five hundred (500) 9520 smart cards for each High School, (300) 9520 smart cards for each Junior High School and (200) 9520 smart cards for each Elementary Schools
 17. Provide all necessary hardware/controller/software/licenses required to operate and manage system effectively for the locations indicated on the drawings.
 18. Security contractor is responsible to input all database information for initial installation and configuration of system for users that will be using the system at the campus or administration building. Contractor shall coordinate names and locations of authorization on system with Owner once system is ready for demonstration. **See Appendix A for proper programming. INTIGRATOR SHALL NOT DEVIATE FROM SPECIFIED PROGRAMMING WITHOUT OWNER APPROVAL.**
 19. Altronix AL400ACMCB220 power supplies as required
 20. Provide Push to Exit mushroom button for any doors that will be magnetically held.
 21. Provide Request to Exit motion detector for any doors that will be magnetically held.
 22. The contractor shall provide card readers for each campus to arm and disarm Intrusion detection system adjacent to the campus intrusion keypads. All locations shall be coordinated with owner prior to installation. In the case of a high school with an attached ninth grade center the High School and Ninth grade center shall be considered separate campus. Provide all required programming to alarm and disarm intrusion panel upon cardswipe.
 23. The contractor shall provide and install a wall mounted enclosure for all Door Controllers/Gateways/Input Modules that shall be installed. The contractor shall provide enclosure to accommodate 120% of devices that shall be installed. Provide conduit from the Power supply to the enclosure that no cable is exposed. Acceptable panels for consideration are:
 1. Life Safety panel
 2. RS2 Panel

2.4 WIRING

- A. **All Access control wiring shall be yellow in color, no exceptions.**
- B. Wire scheme and conductor quantity shall be as required by the manufactures specifications. Contractor to provide and install shielded cable as required.
- C. All 120v Power shall be furnished by the Division 26 contractor. In the event that a division 26 contractor is not contracted for the project, the system installing contractor shall contract a licensed electrical firm to provide and install all materials required to furnish a complete and operational system. The contractor shall provide the installation of a 120V outlet at each Access Control Panel location. Outlet shall be connected to emergency power where available.
- D. All Security Conduit as required for a complete installation of this system shall be furnished by the contractor as part of their scope of work. Conduit shall be minimum of 1/2 inch and shall be painted to match surrounding area.
- E. Coordination with the Division 26 contractor is the responsibility of the Security Contractor to ensure all conduit is in place for a complete installation.
- F. All systems shall be connected to a dedicated circuit and on an emergency power source if available.
- G. Color code of all access control wiring shall be yellow in color.
Approved Products:
 - 1. Banana Peel Access Control Cable: Belden #658AFJ (all access control cable shall be homerun from the card reader locations to the location designated for the future access control system.)
 - 2. Approved Equivalent
The following manufacturer's equivalent cable shall be acceptable. All cable shall be in a banana peel/composite construction, minimum conductor size of 18awg, shielded, and must be yellow in color. NO EXCEPTIONS.
 - a. Tappan Wire and Cable
 - 3 All cable shall bare the name of the approved manufacturer. NO PRIVATE LABELED CABLE WILL BE ACCEPTED

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All wiring shall be in accordance with the National Electrical Code, Local Codes, and article 760 of NFPA Standard 70. All wiring sizes shall conform to recommendations of the equipment manufacturer, and as indicated on the engineered shop drawings.
- B. All wire shall be UL Listed CL2 for limited energy (300V) applications and shall be installed in conduit. Limited energy 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 if so approved by the local authority having jurisdiction.
- C. No AC wiring or any other wiring shall be run in the same conduit as security alarm wiring.
- D. 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% per NEC.
- E. Minimum conduit size shall be 1/2" EMT. Provide engineered shop drawings for approval prior to installation.
- F. 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 or subject to damage.
- G. Contractor is required to provide all mapping and software configuration showing reader and door interface locations as well as current camera views that are associated with specific door locations required to operate system.

3.2 CABLE PATHWAYS

- A. Cable Support:
1. All wire not installed inside conduit or a designated cable tray system shall be installed in a dedicated cable support system for the entire run of each cable. Including, but not limited to service loops.
 - a. Approved Cable Support Product:
PANDUIT® Corporation J-MOD™ modular support system (sized appropriately for the number of wires being installed. Reference the manufacturer's specifications for the suggested maximum cables per support size.
 2. The approved cable support system shall be attached directly to the building steel at a serviceable height. In the event that the building steel is not 5' of the finished ceiling, the contractor shall provide a dedicated threaded rod extending within 5' of the finished ceiling and mount the J-MOD™ support hook to the treaded rod.
 3. J-MOD™ cable support shall be installed at a maximum of 5' on center.
 4. All cable installed shall be attached to the J-MOD™ support system with plenum rated Velcro and a plenum rated Velcro tie shall be installed between each J-MOD™ cable support to keep wires neatly bundled throughout the entire run. Tiewraps will only be allowed to be used inside the control panels as required to manage the wires within each type of panel.
 5. ABSOLUTELY NO CABLE, NOT INSTALLED IN CONDUIT, WILL BE ALLOWED TO BE ATTACHED DIRECTLY TO THE BUILDING'S STEEL OR SUPPORTED IN ANY OTHER METHOD THAN THAT STATED ABOVE.
 6. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES ON THE PROJECT TO INSURE THAT THE PATHWAY OF THIS SYSTEM DOES NOT INTERFERE WITH THE INSTALLATION OF THE OTHER TRADES AND TO PREVENT THE INSTALLED PRODUCT OF OTHER TRADES FROM PUTTING STRAIN ON THE INSTALLED WIRING.
- B. Conduit / Raceway:
1. 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% per NEC.
 2. Conduit and raceway system shall be installed as specified under the general electrical section of the specifications, and per NEC.
 3. Minimum conduit size shall be 1/2" EMT. Install conduit per engineered shop drawings.
 4. 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 or subject to damage.
 5. All conduit ends shall have a protective bushing to prevent cable damage. BUSHINGS MUST BE INSTALLED PRIOR TO INSTALLING CABLE. CUTTING BUSHING TO INSTALL AROUND INSTALLED CABLES WILL NOT BE ACCEPTED.

3.3 TESTING

- A. Submit a written test report from an authorized representative of the equipment manufacturer that the system has been 100% tested and approved. Final test shall be witnessed by Owner, Engineer, Electrical Contractor and performed by the equipment supplier. Final test report must be received and acknowledged by the Owner prior to substantial completion.
- B. Provide instruction as to proper use and operation of system, for the Owner's designated

personnel.

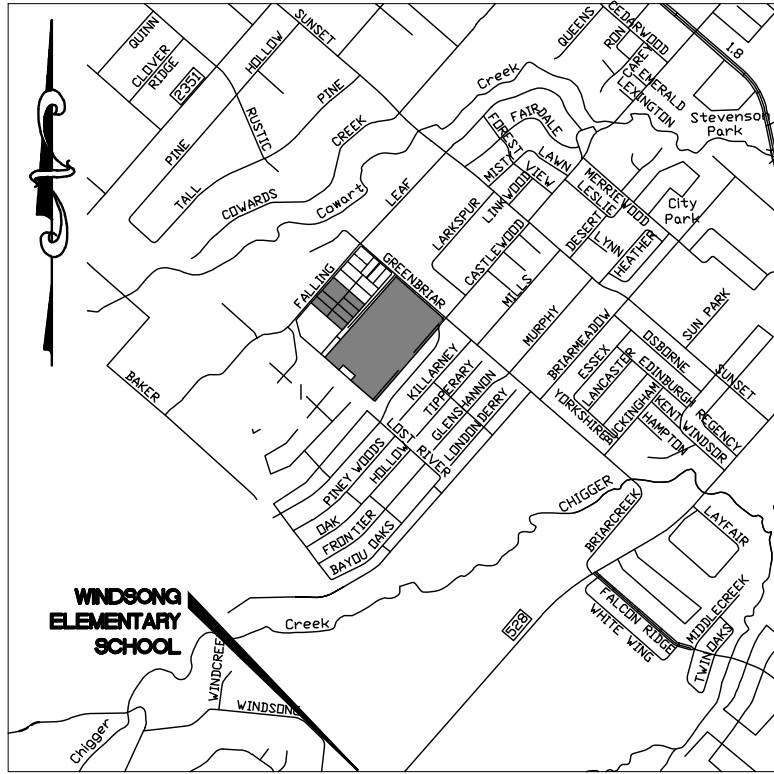
WARRANTY

- A. Entire system shall be warranted against defects in materials and workmanship for a period of one (1) year from the date of substantial completion.

3.4 SOFTWARE

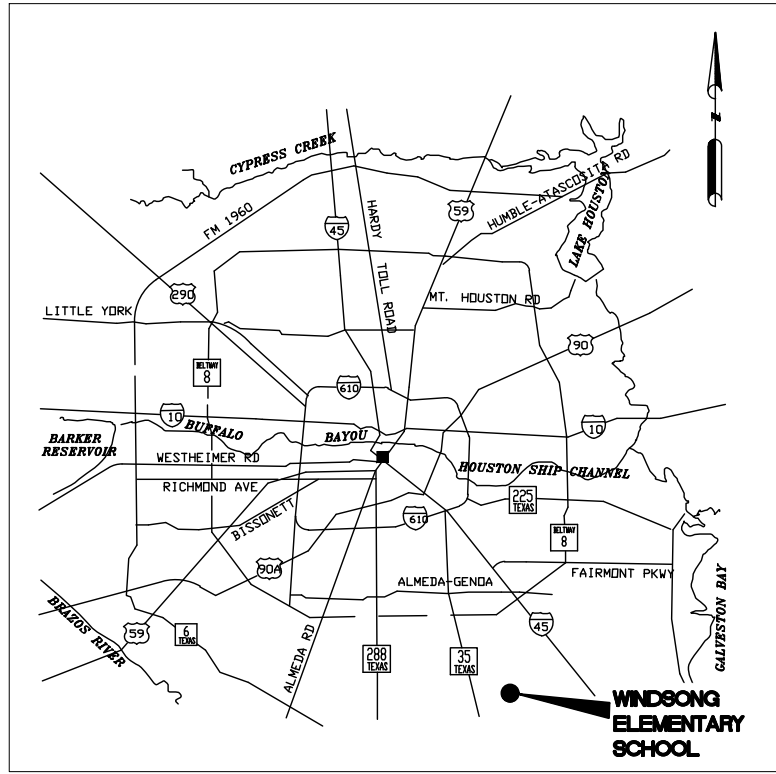
Provide two electronic copies of the final programming and program software to the Owner's Security Supervisor after final approval.

END OF SECTION



LOCATION MAP
KEY MAP: 656G
SCALE: 1"= 500'

GALVESTON COUNTY
CITY OF FRIENDSWOOD, TEXAS
WINDSONG ELEMENTARY SCHOOL
ADDITIONS AND RENOVATIONS



VICINITY MAP
KEY MAP: 656Q&U



SHEET INDEX

C 000	COVER SHEET
C 001	INDEX, NOTES, AND LEGEND
C 002A	SURVEY (FOR INFORMATION ONLY)
C 002B	SURVEY (FOR INFORMATION ONLY)
C 003	DEMOLITION PLAN
C 101	SITE PLAN
C 102	DIMENSIONAL CONTROL PLAN
C 201	UTILITY PLAN
C 202	DRAINAGE PLAN
C 203	DRAINAGE AREA MAP
C 204	DRAINAGE CALCULATIONS
C 205	DETENTION POND PLAN
C 301	PAVING AND JOINTING PLAN
C 302	GRADING PLAN
C 401	EROSION CONTROL PLAN
C 402	EROSION CONTROL DETAILS
C 501	DETAILS
C 502	DETAILS
C 503	CITY OF FRIENDSWOOD DETAILS
C 504	CITY OF FRIENDSWOOD DETAILS
C 505	CITY OF FRIENDSWOOD DETAILS
C 506	CITY OF FRIENDSWOOD DETAILS
C 507	CITY OF FRIENDSWOOD DETAILS
C 508	CITY OF FRIENDSWOOD DETAILS
C 509	CITY OF FRIENDSWOOD DETAILS
C 510	CITY OF FRIENDSWOOD DETAILS
C 511	GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT DETAILS
C 512	GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT DETAILS
C 513	GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT DETAILS

APPENDIX A

PRELIMINARY Signature Block

For Drainage Plans

Approved by the GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT

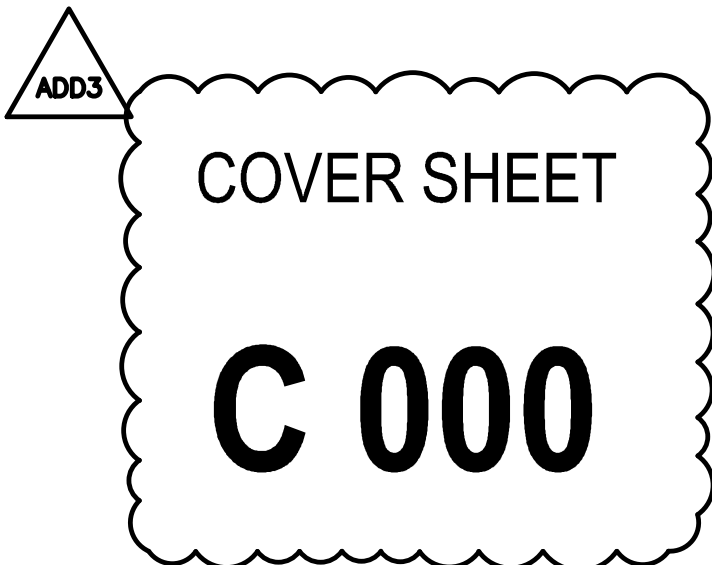
Director _____ Date _____

Director _____ Date _____

The approval granted by these signatures does not constitute the District's approval for the granting of any construction or building permit. This preliminary approval shall expire in (6) months.

GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT # G220026

ADD 3 ADDENDUM 3 9/26/2022




NOTES:
1. WHERE CITY AND PROJECT TYPICAL DETAILS AND NOTES CONFLICT, THE STRICTER OF THE TWO SHALL SUPERSEDE

SEPTEMBER 26, 2022

FRIENDSWOOD ISD
302 LAUREL DRIVE
FRIENDSWOOD, TX 77546
P 281-482-1267

DIG ENGINEERS
TPBE FIRM 18326
11 GREENWAY PLAZA, 22ND FLOOR
HOUSTON, TX 77046
P 713-965-0608

REV. NO.	DATE	DESCRIPTION	P.E. APPR.
△			
△			



Jildardo Arrias, PE, CFM
Director of Engineering/
City Engineer

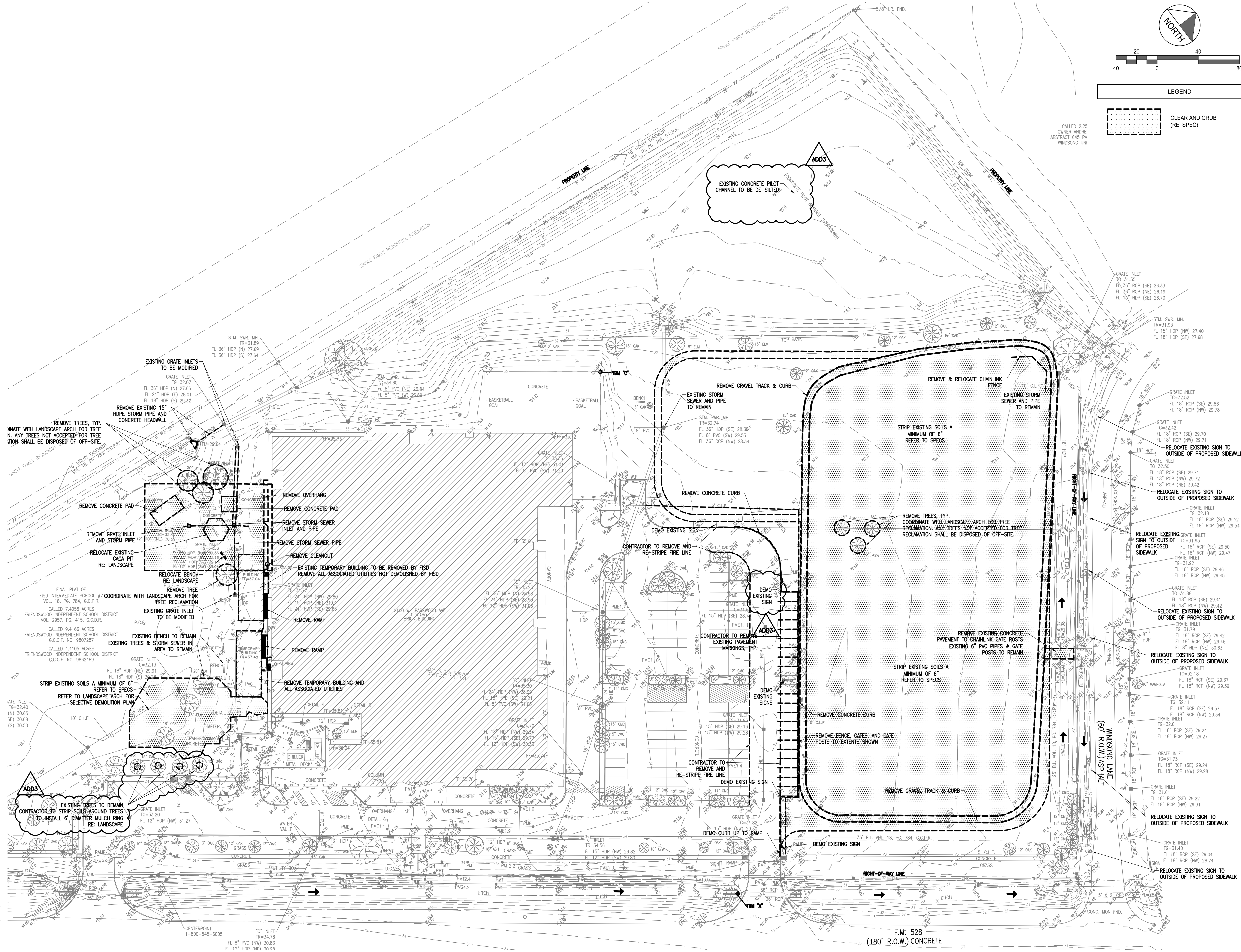
Date

Rene Ibarra, CFM, CFM
Director of Public Works

Date

NOTE:
This is to certify that the above signed have reviewed all sheets provided and found them to be in general conformance with the requirements established by the City of Friendswood. This approval is only valid for three hundred sixty-five (365) calendar days. Please note, this does not necessarily mean that all the calculations provided in the plans have been completely checked and verified. The plans submitted have been prepared, signed and sealed by a professional engineer licensed to practice engineering in the State of Texas, which conveys the engineer's responsibility and accountability.

EFFECTIVE DATE: SEPTEMBER 3, 2022



ARCHITECT

HOUSTON

11 Greenway Plaza, 22nd Floor

Houston, TX 77046

713-965-0608 P

713-961-4571 F

TX Firm: BR 1608

OWNER

ANDRE

ABSTRACT 645 PA

WINDSONG UNI

DESIGNERS

713-961-3238

STRUCTURAL

KURAKA ENGINEERS

713-961-3238

MEP

LEAF ENGINEERS

713-961-3238

FOOD SERVICE DESIGN PROFESSIONALS

281-292-2229

BUILDING ENVELOPE

BEAM

713-961-3238

WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.

FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

ISSUE FOR PROPOSAL

TRACE C. ORYER

143668

PROFESSIONAL ENGINEER

09/26/2022

CLIENT

FRIENDSWOOD ISD

DATE

2022/09/07

PROJECT NUMBER

220083

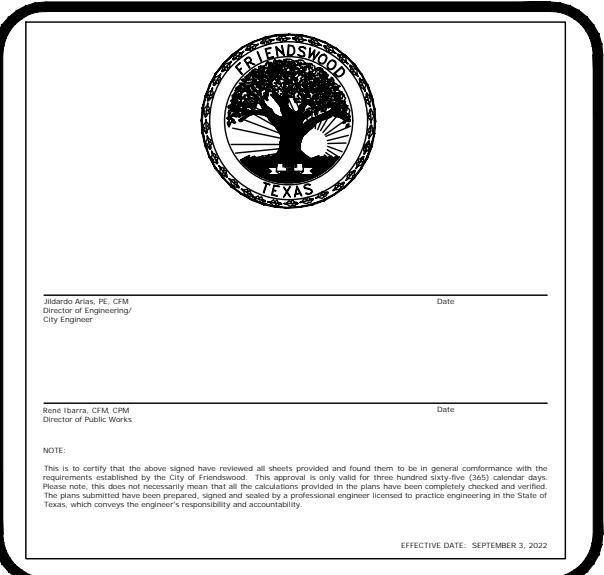
DRAWING HISTORY

No.	Description	Date
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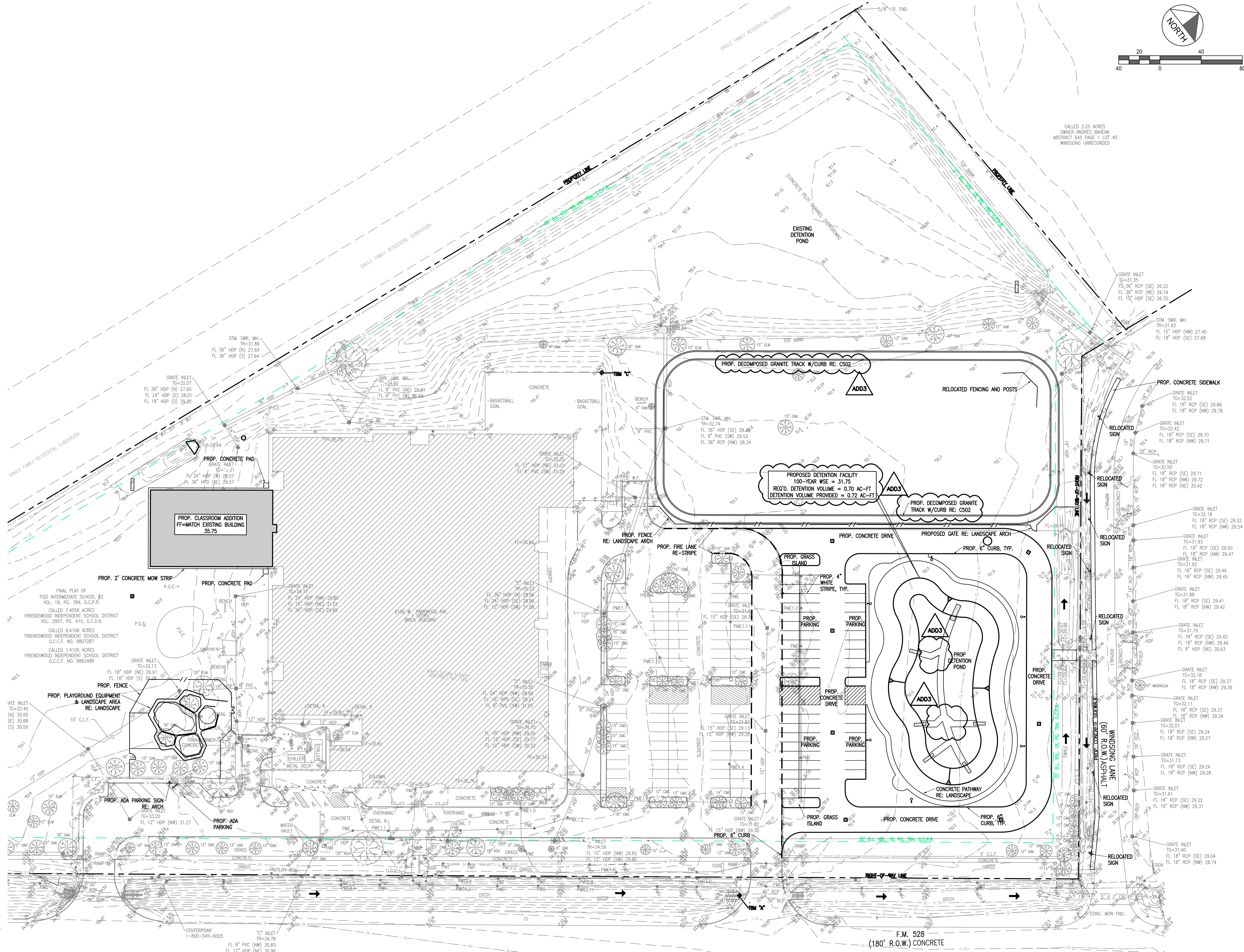
ISSUE FOR PROPOSAL

DEMOLITION
PLAN

C 003

[illegible]

SITE PLAN





Project: Windsong Elementary Friendswood ISD			
DRAINAGE DESIGN (100 yr Storm) - Malcoms Method			
EXISTING CONDITIONS			
AREA			
Total Area=	16.92 acre 737,035.20 Fk ²		
C COEFFICIENT		Existing Impervious Area	
Existing Pervious Area	A _p = 9.5 acre 413,820.00 Fk ²	Existing Impervious Area	A _{ip} = 7.42 acre 323,215.20 Fk ²
C _p =	0.3	C _{ip} =	0.9
Cp=	0.563120567		
TRAVEL TIME			
TC=DIST./VEL.+15	37.61 min.	TC MINIMUM IS 15 min.	
INTENSITY			
i=	6.76 in/yr (GCCDD IDF)	e=	0.641
		b=	76.2
		d=	6.2
		j=	6.76
FLOW			
Flow: Q = CIA * 1.25			
Existing Q =	80.47 cfs		
EXCESS RAINFALL RUN-OFF			
% Impervious = 43.853428 %			
	9.93 in. (FBC DCM Table 2-5)		
	167.93 acre-in		
TIME TO PEAK			
Tp=	90.83 min.	1.25Tp=	113.54
Ti = Tp / 10		Ti MINIMUM IS 20 min.	
Ti=	9		
DEVELOPED CONDITIONS			
AREA			
Total Area=	16.92530073 acre 737,266.10 Fk ²		
C COEFFICIENT		Proposed Impervious Area	
Proposed Pervious Area	A _p = 8.347339302 acre 363,610.10 Fk ²	Proposed Impervious Area	A _{ip} = 8.577961433 acre 373,656.00 Fk ²
C _p =	0.3	C _{ip} =	0.9
Cp=	0.604087764		
TRAVEL TIME			
TC=DIST./VEL.+15	39.55 min.	TC MINIMUM IS 15 min.	
INTENSITY			
i=	6.57 in/yr (TXDOT IDF)	e=	0.641
		b=	76.2
		d=	6.2
		j=	6.57
FLOW			
Flow: Q = CIA * 1.25			
Developed Q =	83.98 cfs		
Proposed Outfall Rate =	74.20 cfs		
EXCESS RAINFALL RUN-OFF			
% Impervious = 50.681294 %			
	9.41 in. (FBC DCM Table 2-5)		
	159.27 acre-in		
TIME TO PEAK - Developed Q			
Tp=	82.54 min.	1.25Tp=	103.18
Ti = Tp / 10		Ti MINIMUM IS 20 min.	
Ti=	8		
TIME TO PEAK - Outfall Q			
Tp=	98.51 min.	1.25Tp=	123.13
Ti = Tp / 10		Ti MINIMUM IS 20 min.	
Ti=	10		
When Ti <= 1.25 Tp use		Ti (min)	Q _{unadjusted} (cfs)
$Q_i = \frac{Q_p}{2} \left[1 - \cos \left(\pi \frac{T_i}{T_p} \right) \right]$		0	0.00
		10	1.60
		20	11.60
		40	39.95
		60	69.48
		80	83.79
		100	75.01
		120	55.07
		140	40.15
		160	29.33
		180	21.40
		200	15.62
		220	11.40
		240	8.32
		260	6.07
		280	4.43
		When Ti > 1.25 Tp use	
320	2.36		
340	1.72		
360	1.26		
380	0.92		
400	0.67		
420	0.45		
440	0.36		
460	0.26		
480	0.15		
500	0.14		
520	0.10		
540	0.07		
560	0.05		
580	0.04		
600	0.03		

Hydrology Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Tuesday, Sep 20 2022

5-YR ORIFICE DIAMETER

Hydrograph type	= Rational	Peak discharge (cfs)	= 7.222
Storm frequency (yrs)	= 5	Time interval (min)	= 1
Drainage area (ac)	= 1.920	Runoff coeff. (C)	= 0.8
Rainfall Inten (in/hr)	= 4.702	Tc by User (min)	= 26
IDF Curve	= SampleExpress.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 11,266 (cuft); 0.259 (acft)

Pond Depth vs Orifice Diameter

Target Q = 2.19 (cfs); Req Stor = 7,843 (cuft)

Hydrology Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Sep 20 2022

100-YR POND SIZING CALCULATIONS W/RESTRICTED OUTFALL

Hydrograph type	= Rational	Peak discharge (cfs)	= 12.64
Storm frequency (yrs)	= 100	Time interval (min)	= 1
Drainage area (ac)	= 1,920	Runoff coeff. (C)	= 0.8
Rainfall Intn (in/hr)	= 8.230	Tc by User (min)	= 26
IDF Curve	= SampleExpress.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 19,721 (cuft); 0.453 (acft)

Runoff Hydrograph

100-yr frequency

Q (cfs) 14.00 12.00 10.00 8.00 6.00 4.00 2.00 0.00

Time (min) 0 5 10 15 20 25 30 35 40 45 50 55

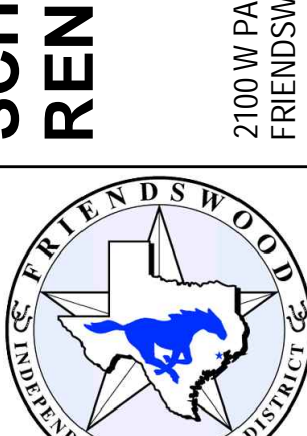
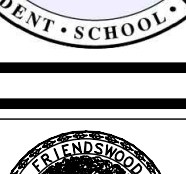
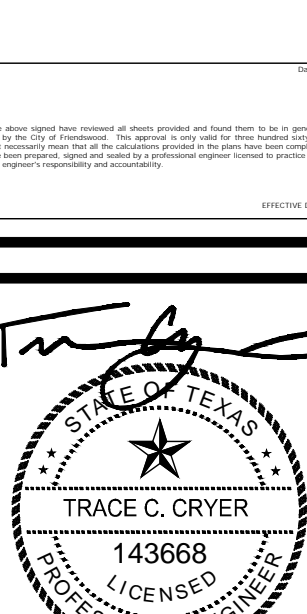
Runoff Hyd - $Q_p = 12.64$ (cfs) Outflow Hyd * Req. Stor = 16,276 (cuft) *

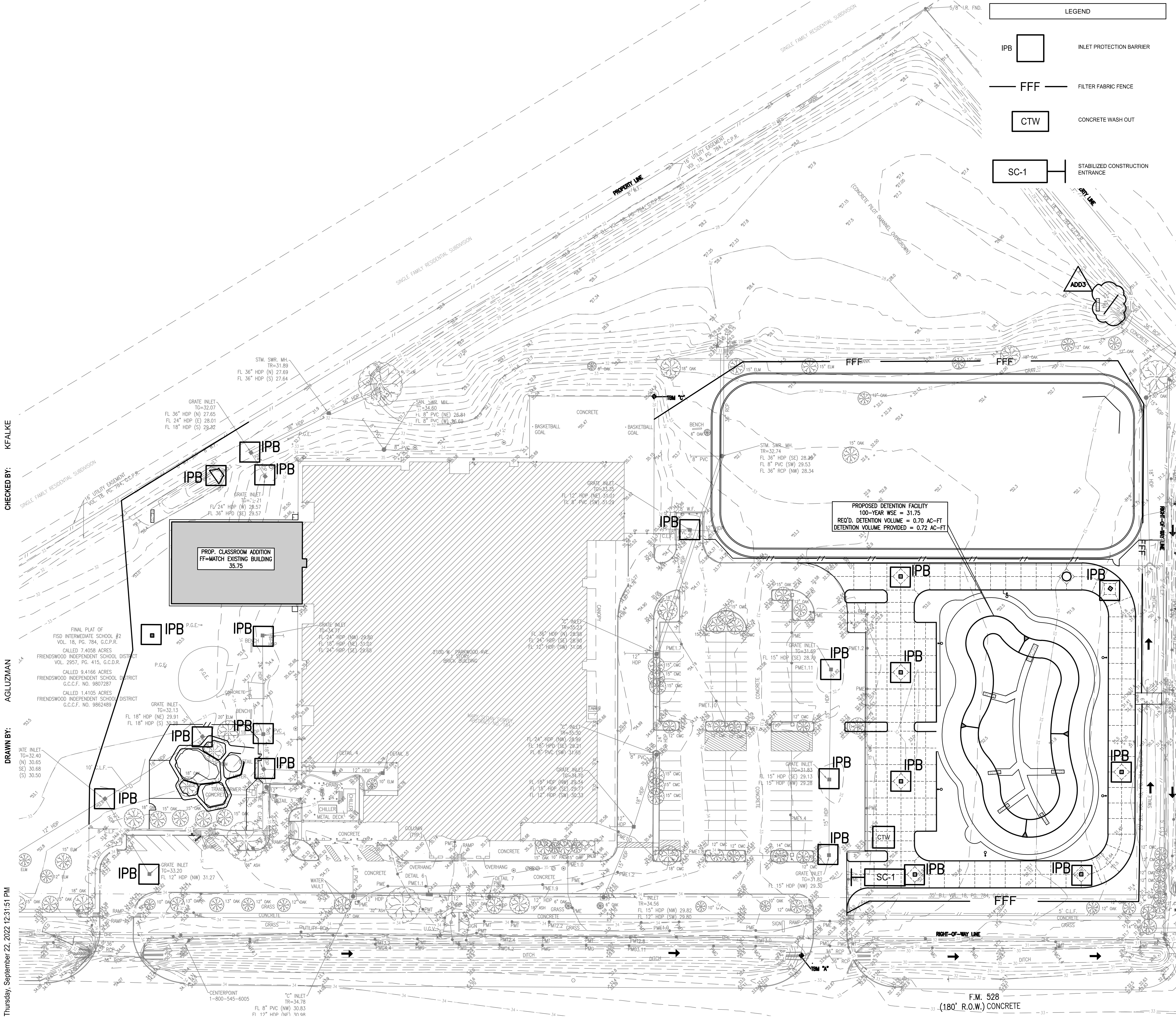
* Estimated

NOTES TO SHEET

1. CONTACT THE DISTRICT 48 HOURS PRIOR TO COMMENCING CONSTRUCTION AND UPON COMPLETION FOR THE FINAL INSPECTION.
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5. ALL DRAINAGE FACILITIES SHALL HAVE EROSION CONTROL ESTABLISHED UPON COMPLETION. CONTRACTOR TO PROVIDE THE DISTRICT WITH PROPOSED GRASS TYPE, APPLICATION RATE, AND METHOD FOR APPROVAL PRIOR TO COMMENCING. GRASS SHALL BE 95% GERMINATED PRIOR TO ACCEPTANCE OF THE FACILITY.
6. PLANTINGS, FLOWERS, OR OTHER LANDSCAPING IS NOT PERMITTED WITHIN SIDE LOT DRAINAGE OR DETENTION EASEMENTS.
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10. PROPOSED INCREASE IN IMPERVIOUS AREA:
 - 10.1. 50.439 SQFT. OR 1.15 ACRES
11. EXISTING Q OF AREA WHERE PROPOSED POND WILL BE BUILT:
 - 11.1. 0.938 BENHART, 89 AC = 2.19 CFS
 - 11.2. DEPTH OF PROPOSED POND = 4 FT
 - 11.3. ORIFICE EQUATION (GCCDD DDM)
 - 11.3.1. $Q = C A (2GH)^{1.5}$
 - 11.3.1.1. Q = ALLOWABLE OUTFLOW (CFS) = 2.19 CFS
 - 11.3.2. C = PIPE COEFFICIENT = 1
 - 11.3.3. A = PIPE CROSS-SECTIONAL AREA (FT²)
 - 11.3.4. G = ACCELERATION DUE TO GRAVITY= (32.2FT/S²)
 - 11.3.5. H = HEAD DIFFERENTIAL = 2 FT
14. $Q_{\text{ORIFICE}} = 0.21\text{FT}^3/\text{S}$ TO WHICH $D_{\text{ORIFICE}} = 6.2$ INCHES

[illegible]

PBK																						
ARCHITECT	PBK Architects, Inc. <small>PBK.com</small>																					
HOUSTON 11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-961-0608 P 713-961-4571 F TX Firm: BR 1808																						
<div style="display: flex; justify-content: space-between;"><div><small>Civil</small> DGC ENGINEERS T 713 940 3238</div><div><small>Structural</small> KUDALA ENGINEERS F 800 236 3612</div><div><small>MED</small> LEAF ENGINEERS T 713 940 3300</div><div><small>Food Service</small> FOODSERVICE DESIGN PROFESSIONALS F 281 390 2323</div></div> <div style="display: flex; justify-content: space-between;"><div><small>Bldg Envelope</small> BLVD T 713 940 3201</div><div></div></div>																						
<div style="display: flex; align-items: center; justify-content: space-between;"><div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: 24pt; font-weight: bold;">WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION</div><div style="flex-grow: 1; text-align: right; padding-right: 50px;"><div style="font-size: 18pt; font-weight: bold;">ISSUE FOR PROPOSAL</div><div style="margin-top: 20px;">2100 W PARKWOOD AVE, FRIENDSWOOD, TX 77546</div></div></div>																						
																						
 <small>State of Texas Department of Transportation Division of Design & Construction</small>																						
 <small>09/26/2022</small>																						
<div style="display: flex; justify-content: space-around;"><div><small>CLIENT</small> FRIENDSWOOD ISD</div><div><small>DATE</small> 2022/09/07</div><div><small>PROJECT NUMBER</small> 220083</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div><small>DRAWING HISTORY</small></div><div></div></div> <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>No.</th><th>Description</th><th>Date</th></tr></thead><tbody><tr><td>ADD 2</td><td>ADDENDUM 2</td><td>9/26/2022</td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></tbody></table> <div style="text-align: center; margin-top: 10px; font-weight: bold;">ISSUE FOR PROPOSAL</div>		No.	Description	Date	ADD 2	ADDENDUM 2	9/26/2022															
No.	Description	Date																				
ADD 2	ADDENDUM 2	9/26/2022																				
<div style="font-size: 36pt; font-weight: bold;">DRAINAGE CALCULATIONS</div>																						
C 204																						



LEGEND

IPB INLET PROTECTION BARRIER

FFF FILTER FABRIC FENCE

CTW CONCRETE WASH OUT

SC-1 STABILIZED CONSTRUCTION ENTRANCE

NOTES TO SHEET

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9. INSTALL STORM WATER CONTROL AROUND PERIMETER, EGRESS PROTECTION AND TEMPORARY FACILITIES PRIOR TO START OF CLEARING, GRUBBING, OR ROUGH CUT. TEMPORARY FACILITIES SHALL INCLUDE SECONDARY CONTAINMENT, STRAPPED, 20' AWAY FROM DOWNSLOPE.

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PBK ARCHITECTS, INC. HOUSTON 11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608

ARCHITECT: HOUSTON 11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608

WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION

2100 W PARKWOOD AVE. FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

TRACE C. CRYER 143668 LICENSED PROFESSIONAL ENGINEER 09/26/2022

CLIENT: FRIENDSWOOD ISD DATE: 2022/09/07 PROJECT NUMBER: 220083

DRAWING HISTORY

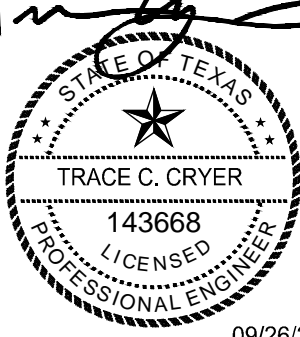
No.	Description	Date
ADD 3	ADDENDUM 3	9/26/2022

ISSUE FOR PROPOSAL

EROSION CONTROL PLAN

C 401

2100 W PARKWOOD AVE,
FRIENDSWOOD, TX 77546

[illegible]

C 502



GENERAL NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISED CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS.
- ELEVATION AND CONTOURS SHOWN, UNLESS OTHERWISE DEFINED, ARE BASED ON NAD 83.
- TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATIONS PART 1926, SUBPART P.
- EXISTING UNDERGROUND UTILITIES ARE NOT SHOWN. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (713-223-4567) FOR CENTERPOINT, TEXAS-NEW MEXICO POWER AND AT&T TELEPHONE AND TEXAS ONE-CALL SYSTEM (811) FOR PIPELINES AND CABLE TV.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE DEPTH, LOCATION AND EXISTENCE OF ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED CONSTRUCTION.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER AND THE ENGINEER IN A TIMELY MANNER.
- CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS, OTHER PERMANENT OBJECTS AND ADJOINING PROPERTY.
- NO OPEN EXCAVATIONS SHALL BE LEFT OPEN OVERNIGHT. ALL EXCAVATIONS WHICH CANNOT BE BACKFILLED OVERNIGHT SHALL BE COVERED, AS A MINIMUM, WITH STEEL PLATING WHEN IN PAVED AREAS; 3/4 INCH PLYWOOD, WOOD PLANKING WITH OSHA ORANGE PLASTIC EXPANDED MESH BARRIER AROUND PERIMETER IN UNPAVED AREAS, OR AS APPROVED BY THE CITY OF FRIENDSWOOD.
- EXISTING PAVEMENTS, CURBS, SIDEWALKS AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION BY THE CONTRACTOR FOR THEIR CONVENIENCE SHALL BE REPLACED PER CURRENT TECHNICAL SPECIFICATIONS BY THE CONTRACTOR AT HIS EXPENSE.
- CONTRACTOR SHALL PLAN, SCHEDULE, AND PERFORM HIS WORK SO AS TO PROVIDE AND MAINTAIN SAFE PUBLIC TRAFFIC (INGRESS AND EGRESS) AS WELL AS NON-INCONVENIENCE TO ALL PROPERTY OWNERS ALONG THE PROJECT IN A TIMELY MANNER.
- FOR LOCATIONS WHERE OPEN CUT CONSTRUCTION IS REQUIRED IN STREETS THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE BARRICADES, WARNING AND DIRECTING SIGNS, FLAGS, AND LIGHTS, NOTIFY CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411.
- ALL SIGNS, BARRICADES, PAVEMENT MARKINGS, TRAFFIC SIGNALS, AND CHANNELIZING DEVICES USED TO HANDLE TRAFFIC SHALL BE SHOWN ON A TRAFFIC CONTROL PLAN TO BE APPROVED BY THE CITY AND TxDOT IF APPLICABLE) AND SHALL CONFORM TO THE LATEST REVISIONS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS (TMUTCD), "PART VI-TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS."
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 48 HOURS PRIOR TO THE START OF CONSTRUCTION.

PAVING:

- PAVEMENT SUBGRADE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS, LATEST REVISIONS.
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 TWENTY-FOUR (24) HOURS PRIOR TO ALL LIMING AND PAVING OPERATIONS.
- ALL RETURNS SHALL HAVE A TWENTY-FIVE (25) FOOT RADIUS AT BACK OF CURB UNLESS OTHERWISE NOTED.
- GUIDELINES SET FORTH IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
- ALL FILL IN EXISTING OR PROPOSED RIGHTS-OF-WAY, INCLUDING BACKDRESSING BEHIND THE CURB, SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF EIGHT (8) INCHES OR LESS AND COMPACTED TO NINETY-FIVE PERCENT (95%) STANDARD PROCTOR DENSITY WITH AN OPTIMUM MOISTURE CONTENT OF ± 3%.
- MINIMUM PAVEMENT REINFORCEMENT REQUIREMENT SHALL BE GRADE 60, NO. 4 REBAR, SPACED AT SIXTEEN (16) INCH ON CENTERS EACH WAY.
- PAVING EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM OF FORTY (40) FEET WITH CONTROL JOINTS NO GREATER THAN EVERY TEN (20) FEET.
- ALL CONCRETE USED FOR PAVEMENT SHALL BE CLASS "A" CONCRETE WITH A MINIMUM 5.0 SACK OF CEMENT PER CUBIC YARDS AND A MINIMUM 3,000 PSI COMPRESSIVE STRENGTH AT TWENTY-EIGHT (28) DAYS.
- CLASS "A" HYDRATED LIME SHALL BE APPLIED FOR SUBGRADE STABILIZATION AT A MINIMUM OF 6%.
- CONTRACTOR SHALL INSTALL STREET SIGNS AND STOP SIGNS PER CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS.
- ALIGNMENTS, CENTERLINE CURVE DATA, AND STATIONING FOR ALL CONSTRUCTION SHALL BE DETERMINED FROM SUBDIVISION PLAT.
- FOR ALL CONCRETE TO BE REMOVED, A THREE (3) INCH DEEP SAW CUT SHALL BE PROVIDED PRIOR TO REMOVAL.
- REPRESENTATIVES FROM THE CITY, THE OWNER AND THE TESTING LABORATORY SHALL BE PRESENT FOR ALL DENSITY TESTS, LIME OPERATIONS AND PLACEMENT OF CONCRETE PAVING.
- UNDER NO CIRCUMSTANCES SHALL WATER BE ADDED TO A CONCRETE LOAD AFTER SLUMP TEST AND/OR CONCRETE CYLINDERS HAVE BEEN TAKEN.
- BLUE REFLECTIVE PAVEMENT MARKERS SHALL BE PLACED AT FIRE HYDRANT LOCATIONS AND OFFSET SIX (6) INCHES FROM THE CENTERLINE OF THE ROADWAY. REFLECTORS SHALL FACE FLOW OF TRAFFIC.
- FOR PAVEMENT WIDTHS LESS THAN OR EQUAL TO TWENTY-EIGHT (28) FEET B/B OF CURB:
 - MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE SIX (6) INCHES.
 - MINIMUM CONCRETE SLAB THICKNESS SHALL BE SIX (6) INCHES.
- FOR PAVEMENT WIDTHS GREATER THAN TWENTY-EIGHT (28) FEET B/B OF CURB AND ALL MAJOR ARTERIAL THOROUGHFARES:
 - MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE EIGHT (8) INCHES.
 - MINIMUM CONCRETE SLAB THICKNESS SHALL BE SEVEN (7) INCHES.

SANITARY SEWERS

- FINISHED ELEVATION ON SANITARY MANHOLE RIMS SHALL BE THREE (3) INCHES ABOVE FINISHED GRADE WITHIN THE UTILITY EASEMENT. IF MANHOLE IS LOCATED ADJACENT TO A PUBLIC STREET, THE FINAL ELEVATION OF THE MANHOLE RIM SHALL BE TWO (2) INCHES ABOVE THE CURB OR CENTERLINE OF STREET FOR STREETS WITHOUT PERIMETER CURB.
- WATER LINES AND SANITARY SEWERS SHALL BE INSTALLED IN SEPARATE TRENCHES AND BE A MINIMUM SEPARATION OF NINE (9) FEET.
- POLYVINYL CHLORIDE (PVC) SHALL BE IN ACCORDANCE WITH ASTM D3034, SDR 26 FOR ALL DEPTHS.
- ALL PVC PIPES (ALL TYPES AND SDR/DR WALL THICKNESS TO BE USED) SHALL HAVE A RUBBER GASKET EQUIPPED BELL AND SPIGOT JOINTS CONFORMING TO ASTM D3212. THE GASKET MATERIAL SHALL CONFORM TO ASTM F477, SOLVENT WELDED JOINTS WILL NOT BE APPROVED FOR CITY SANITARY SEWER LINES.
- ALL DUCTILE IRON (DI) PIPE SHALL BE ONE HUNDRED FIFTY (150) PSI WITH EIGHT (8) MIL, BLACK VIRGIN POLYETHYLENE WRAP AS SPECIFIED IN ANSI/AWWA A21.5/C105.

SANITARY SEWERS (CONT.)

- SANITARY SEWER MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD DESIGN STANDARDS. CONTRACTOR TO FURNISH TEST PLUGS AND RISERS. ALL SANITARY SEWER LINES TO BE AIR TESTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.
- SANITARY SEWER TRENCHES UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT ARE TO BE BACKFILLED WITH CEMENT-STABILIZED SAND BACKFILL, AS SPECIFIED, TO WITHIN ONE (1) FOOT OF SUBGRADE. BEDDING WILL BE CEMENT-STABILIZED SAND BACKFILL (1.1 SACKS CEMENT PER TON OF SAND) FOR ALL SANITARY SEWERS.
- WATER LINE/NEW SEWER LINE SEPARATION. WHEN NEW SANITARY SEWERS ARE INSTALLED, THEY SHALL BE INSTALLED NO CLOSER TO WATER LINES THAN NINE (9) FEET IN ALL DIRECTIONS. SEWERS THAT PARALLEL TO WATER LINES MUST BE INSTALLED IN SEPARATE TRENCHES. WHEN NINE (9) FEET OF SEPARATION CANNOT BE MAINTAINED, THE FOLLOWING GUIDELINES APPLY:
 - WHEN THE SANITARY SEWER PARALLELS A WATER LINE, THE SANITARY SEWER SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC MEETING ASTM SPECIFICATIONS WITH A PRESSURE RATING FOR BOTH THE PIPE AND JOINTS OF 150 PSI. THE VERTICAL SEPARATION SHALL BE A MINIMUM OF TWO (2) FEET BETWEEN OUTSIDE DIAMETERS AND THE HORIZONTAL SEPARATION SHALL BE A MINIMUM OF FOUR (4) FEET BETWEEN OUTSIDE DIAMETERS. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE.
 - WHEN A SANITARY SEWER CROSSES A WATER LINE AND THE SEWER IS CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC WITH A MINIMUM PRESSURE RATING OF 150 PSI, AN ABSOLUTE MINIMUM OF SIX (6) INCHES BETWEEN OUTSIDE DIAMETERS SHALL BE MAINTAINED. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE WHEN POSSIBLE AND ONE (1) LENGTH OF THE SANITARY SEWER PIPE MUST BE CENTERED ON THE WATER LINE.
 - WHEN A SANITARY SEWER CROSSES UNDER A WATER LINE AND THE SEWER IS CONSTRUCTED OF ABS TRUSS PIPE, SIMILAR SEMI-RIGID PLASTIC COMPOSITE PIPE, CLAY PIPE OR CONCRETE PIPE WITH GASKETED JOINTS, A MINIMUM OF TWO (2) FEET OF SEPARATION SHALL BE MAINTAINED. THE INITIAL BACKFILL SHALL BE CEMENT-STABILIZED SAND (MINIMUM 1.1 SACKS OF CONCRETE PER TON OF SAND) FOR ALL SECTIONS OF SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE. THE INITIAL BACKFILL SHALL BE FROM ¾ DIAMETER BELOW THE CENTERLINE OF THE PIPE TO ONE PIPE DIAMETER (BUT NOT LESS THAN TWELVE (12) INCHES) ABOVE THE PIPE.
 - WHEN A SANITARY SEWER CROSSES OVER A WATER LINE, ALL PORTIONS OF THE SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC PIPE WITH A PRESSURE RATING OF AT LEAST 150 PSI USING APPROPRIATE ADAPTERS. IN LIEU OF THIS PROCEDURE THE NEW SANITARY SEWER MAY BE ENCASED IN A JOINT OF 150 PSI PRESSURE CLASS PIPE AT LEAST EIGHTEEN (18) FEET LONG AND TWO (2) NOMINAL SIZES LARGER THAN THE NEW SANITARY SEWER. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT INTERVALS OF FIVE (5) FEET WITH SPACERS OR BE FILLED TO THE SPRINGLINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL.
- ALL PROPOSED SANITARY SEWER LINES SHALL BE DUCTILE IRON OR SDR 26 PVC. DUCTILE IRON PIPE SHALL ONLY BE USED AS APPROVED BY THE CITY OF FRIENDSWOOD.
- FOR ALL PVC PIPE, USE MANHOLE WATER STOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS.
- SANITARY SEWER MANHOLES SHALL BE STANDARD TYPE, UNLESS OTHERWISE NOTED. ALL SANITARY SEWER MANHOLES SHALL BE AT LEAST THREE (3) INCHES ABOVE FINISHED GRADE OR ABOVE THE 100 YEAR BASE FLOOD ELEVATION (BFE). FOR MANHOLES LOCATED IN THE 100-YEAR FLOOD PLAIN, VENT AND SEAL (BOLTED MANHOLE LID W/ FOUR (4) BOLTS, NO HOLES IN LID) THE MANHOLE TOP AND PROVIDE INFLOW PROTECTOR INSERT UNDER COVER. SECTIONS OF PRECAST MANHOLES SHALL BE JOINED WITH "RAM NEK" IN FLOOD PLAIN.
- SANITARY SEWER LINES IN PIPE ZONE INSIDE LOT EASEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND OR SELECT FILL MATERIAL WITH A PI BETWEEN 20 AND 40.
- IF WET SAND IS ENCOUNTERED IN TRENCH, USE SPECIAL BEDDING. UNDER NO CIRCUMSTANCES IS SAND TO BE ADDED TO A TRENCH UNDER WATER.
- SANITARY SEWERS CROSSING UTILITIES OTHER THAN WATER LINES SHALL HAVE A MINIMUM CLEARANCE OF SIX (6) INCHES.
- ALL PRECAST MANHOLES SHALL HAVE A TOP ADJUSTMENT CONSTRUCTED OF PRECAST PCC RINGS NO GREATER THAN TWENTY-FOUR (24) INCHES IN HEIGHT, SEALED WITH NON-SHRINK GROUT, INSIDE AND OUTSIDE. BRICK AND FIBERGLASS MANHOLES SHALL NOT BE ALLOWED.
- ALL SANITARY SEWER MANHOLE COVERS MUST INCLUDE THE WORD "SANITARY SEWER" AND "CITY OF FRIENDSWOOD". THEY MUST ALSO HAVE THE CITY SEAL.
- SANITARY SEWER MANHOLE COVERS SHALL BE A MINIMUM OF THIRTY-TWO (32) INCHES IN DIAMETER.
- ALL SANITARY SEWER MANHOLES SHALL HAVE AN INFLOW PROTECTOR.

STORM SEWERS:

- STORM SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS, LATEST REVISIONS.
- ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP), ASTM C76, CLASS III, TONGUE AND GROOVE, RAM-NEK JOINTS UNLESS OTHERWISE NOTED.
- REINFORCED CONCRETE STORM SEWER (PIPE, BOX, ETC.) SHALL BE INSTALLED, BEDDED AND BACKFILLED IN CONFORMITY WITH CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS. STORM SEWER PIPE INSTALLED UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR EXISTING PAVEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND, (1.1 SACKS OF CEMENT PER TON OF SAND), TO THE BOTTOM OF THE SUBGRADE.
- CONCRETE FOR INLETS AND MANHOLES SHALL BE CLASS "A" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT TWENTY-EIGHT (28) DAYS.
- ALL MANHOLES SHALL BE ADJUSTED TO FINISHED GRADE BEFORE PAVING IS COMPLETE.
- MINIMUM STORM SEWER SIZE IS TWENTY-FOUR (24) INCH DIAMETER. MINIMUM UPSTREAM ROADSIDE DITCH CULVERT SIZE IS EIGHTEEN (18) INCH DIAMETER.
- ALL STORM SEWER MANHOLE COVERS MUST INCLUDE THE WORDS, "STORM SEWER" AND "CITY OF FRIENDSWOOD" AND HAVE THE "CITY SEAL." MANHOLE COVERS SHALL BE THIRTY-TWO (32) INCHES IN DIAMETER EXCEPT AT CURB INLET COVERS WHICH ARE TWENTY-FOUR (24) INCHES.
- CONTRACTOR SHALL PROVIDE A MINIMUM OF SIX (6) INCHES CLEARANCE AT ALL UTILITY CROSSINGS WITH STORM SEWERS.
- ALL INLETS IN RESIDENTIAL DEVELOPMENTS TO BE TYPE "H-2" OR TYPE "B-B" WITH GRATES. ALL INLETS IN COMMERCIAL DEVELOPMENTS AND ON MAJOR THOROUGHFARES TO BE TYPE "H-2" ONLY, UNLESS OTHERWISE APPROVED BY THE CITY OF FRIENDSWOOD.
- ALL DISTURBED AREAS IN DRAINAGE EASEMENTS OR DETENTION PONDS, SHALL BE HYDROMULCHED AS PER TECHNICAL SPECIFICATIONS SECTION 02910 – HYDROMULCH SEEDING OR APPROVED EQUAL.

WATER LINES:

- WATER LINE CONSTRUCTION AND TESTING IS TO BE PERFORMED IN ACCORDANCE WITH CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.

WATER LINES (CONT.):

- ALL WATER MAINS SHALL HAVE A MINIMUM COVER OF FOUR (4) FEET MEASURED FROM CENTERLINE OF STREET OR EXISTING NATURAL GROUND WHICHEVER DEPTH IS GREATER, UNLESS OTHERWISE NOTED.
- PRESSURE TEST OF ALL WATER LINES SHALL BE AT 150 PSI FOR FOUR (4) HOURS AND WITNESSED BY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT, EXCEPT FIRE LINES WHICH SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS AND WITNESSED BY THE FIRE MARSHAL.
- SINGLE METER SERVICE LINES SHALL BE ONE (1) INCH MINIMUM I.D., C.T.S. POLYETHYLENE, SDR-9.
- CONTRACTOR TO FURNISH AND INSTALL SINGLE SERVICE METER BOXES AT FINISH GRADE.
- FIRE HYDRANT ASSEMBLIES SHALL INCLUDE ONE (1) EACH LINE SIZE BY SIX (6) INCH TEE, ONE (1) EACH SIX (6) INCH GATE VALVE AND BOX, ONE (1) EACH FIRE HYDRANT WITH SIX (6) INCH LEAD PIPING AND TIE BACKS.
- WATER VALVES ON MAIN LINES SHALL BE LOCATED AS CLOSE AS POSSIBLE TO EXTENDED PROPERTY LINE AND SHALL CONFORM TO AWWA C-500, OPEN COUNTER CLOCKWISE LEFT, EQUIPPED WITH TWO (2) INCH SQUARE OPERATING NUT. OPERATING NUT SHALL BE A MAXIMUM OF FIVE (5) FEET BELOW FINISH GRADE.
- WATER LINES FOUR (4) INCH THROUGH TWELVE (12) INCH I.D. SHALL COMPLY THE REQUIREMENTS OF AWWA STANDARD C-300-75, CLASS 150, SDR-18, WITH CAST IRON OUTSIDE DIAMETER AND GASKET BELL END. FITTINGS ARE TO BE MECHANICAL JOINTS IN ACCORDANCE WITH AWWA C-100 OR C-110.
- ALL CONCRETE THRUST BLOCKING SHALL BE PLACED TO FORM A SOLID CONNECTION BETWEEN FITTINGS, VALVES, AND FIRE HYDRANTS AND UNDISTURBED EARTH. CONCRETE FOR THRUST BLOCKING SHALL BE CLASS "C" AND HAVE A MINIMUM OF 2,500 PSI COMPRESSIVE STRENGTH AT TWENTY-EIGHT (28) DAYS AND CONFORM TO CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS.
- GRAY IRON AND DUCTILE IRON FITTINGS SHALL CONFORM TO AWWA C-110 AND END JOINTS OF FITTINGS AND MAIN VALVES SHALL CONFORM TO AWWA C-111. FOR RUBBER GASKETED JOINTS, END JOINTS TO FITTINGS AND MAIN LINE VALVES SHALL CONFORM TO AWWA C-111. GRAY IRON AND DUCTILE IRON FITTINGS SHALL BE CEMENT LINED OR EPOXY COATED.
- MINIMUM BURY FOR ALL FIRE HYDRANTS SHALL BE FOUR (4) FEET UNLESS OTHERWISE NOTED. ALL FIRE HYDRANTS AND VALVE BOXES ARE TO BE ADJUSTED TO FINISH GRADE AFTER PAVING IS COMPLETE. PUMPER SERVICE CONNECTION TO FACE CURB.
- INSTALL CONCRETE BLOCK BENEATH FIRE HYDRANTS BEFORE PLACING CONCRETE THRUST BLOCKING TO INSURE THAT FIRE HYDRANTS ARE INSTALLED LEVEL.
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 SEVENTY-TWO (72) HOURS PRIOR TO START OF CONSTRUCTION.
- ALL WATER LINES TO BE BACKFILLED TO ONE (1) FOOT ABOVE TOP OF PIPE WITH BANK SAND. FOR PORTIONS OF PIPE LOCATED UNDER PAVEMENT, BACKFILL FROM INITIAL BACKFILL OF BANK SAND TO ONE (1) FOOT BELOW PROPOSED SUBGRADE UNDER PAVEMENT WITH CEMENT-STABILIZED SAND (1.1 SACKS OF CEMENT PER TON OF SAND).
- ALL FIRE HYDRANTS ARE TO BE LOCATED AS SHOWN ON THE PLANS AND SET THREE (3) FEET BEHIND THE CURB, ONE (1) FOOT FROM PROPERTY LINE FOR STREETS WITH DITCHES OR AT AN APPROVED LOCATION ON RURAL SECTION ROADS. ALL FIRE HYDRANTS SHALL BE AUDITED AND PAINTED AS PER CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.
- ALL TAPPING SLEEVES SHALL BE STAINLESS STEEL FULL CIRCLE WITH MECHANICAL JOINT TAPPING SLEEVE.
- THE CONTRACTOR SHALL NOT OPERATE EXISTING CITY WATER VALVES. THE CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 TWENTY-FOUR (24) HOURS MINIMUM FOR ANY VALVE OPERATION NECESSARY FOR THE PROJECT. IF ANY VALVE CLOSING RESULTS IN INTERRUPTED SERVICE TO RESIDENTS OR BUSINESSES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER NOTICE TO THE AFFECTED PARTIES TWENTY-FOUR (24) HOURS IN ADVANCE OF THE INTERRUPTION.
- FOR ALL CONSTRUCTION WATER USAGE ON THE PROJECT, A FIRE HYDRANT METER SHALL BE OBTAINED FROM THE CITY PUBLIC WORKS DEPARTMENT AT 15355 BLACKHAWK BLVD (281-996-3380). A DEPOSIT SHALL BE REQUIRED FOR THE METER AND A FEE SHALL BE CHARGED FOR ALL METERED WATER USAGE. THE CONTRACTOR SHALL SUPPLY A BACKFLOW PREVENTER FOR THE FIRE HYDRANT METER.

TESTING

ALL TESTING SHALL CONFORM WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS SECTION 01470 – TESTING LABORATORY SERVICES AND SECTION 01475 – TESTING PROCEDURES.

- SECTION 02125 – EXCAVATION AND BACKFILL FOR UTILITIES:
 - BACKFILL SHALL BE PLACED IN MAXIMUM LIFTS OF EIGHT (8) INCHES AND COMPACTED TO A DENSITY OF NOT LESS THAN 95% STANDARD PROCTOR WITH OPTIMUM MOISTURE BETWEEN PLUS 3% AND MINUS 3% OR AS OTHERWISE SPECIFIED BY THE SOILS LABORATORY. TEST SHALL BE TAKEN EVERY LIFT, EVERY 500 LINEAR FEET, OR BETWEEN MANHOLES, WHICHEVER RESULTS IN THE GREATEST NUMBER OF DENSITY TESTS.
 - FIELD MOISTURE/DENSITY TEST SHALL BE PERFORMED AT A FREQUENCY OF AT LEAST ONE (1) TEST PER 500 SQUARE YARDS OF COMPACTED LIFT. THE DENSITY SHALL NOT BE LESS THAN 95% OF STANDARD PROCTOR WITH A MOISTURE CONTENT OF BETWEEN PLUS 3% AND MINUS 3% OPTIMUM MOISTURE, OR AS DETERMINED BY SOILS LABORATORY. MAXIMUM LIFT FOR TESTING COMPACTED FILL SHALL NOT EXCEED TWELVE (12) INCHES.
- SECTION 02300 – CAST-IN-PLACE CONCRETE MANHOLES AND SECTION 02305 – PRECAST CONCRETE MANHOLES:
 - EXFILTRATION TEST SHALL BE REQUIRED ON EACH MANHOLE SYSTEM.
 - EACH MANHOLE IS TO BE PLUGGED, FILLED TO THE TOP OF THE RIM WITH WATER FOR THIRTY (30) MINUTES WITH THE ALLOWABLE LEAKAGE OF NOT MORE THAN ½ INCH/ DR
 - PLUG MANHOLE AND VACUUM TEST AT TEN (10) INCHES OF MERCURY WITH A LOSS OF NO MORE THAN ONE (1) INCH OF MERCURY FOR THE TIME TO BE DETERMINED BY THE WIDTH AND DEPTH OF THE MANHOLE.
 - SECTION 02400 – WATER LINES
 - PRESSURE TEST:
 - A TEST, TO BE SUCCESSFUL SHALL BE WITNESSED BY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT FOR A FOUR (4) HOUR PERIOD, DURING REASONABLE HOURS. THE ALLOWABLE LEAKAGE SHALL BE NO GREATER THAN DETERMINED BY THE FOLLOWING FORMULA:
$$L = SD\sqrt{P} / 148,000$$
IN WHICH L IS THE ALLDOWABLE LEAKAGE, IN GALLONS PER HOUR OF TESTING; S IS THE LENGTH OF PIPE BEING TESTED, IN FEET; D IS THE NOMINAL INSIDE DIAMETER OF THE PIPE, IN INCHES; AND P IS THE AVERAGE TEST PRESSURE DURING THIS TEST, IN POUNDS PER SQUARE INCH. THE TEST PRESSURE SHALL BE 150 PSI FOR FOUR (4) HOURS. ALL VALVES, FIRE HYDRANTS, AND SERVICES ARE TO BE TESTED TOGETHER.
 - FIRE LINES SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS AND SHALL BE WITNESSED BY THE FIRE MARSHAL. LEAKAGE SHALL BE CALCULATED AS STATED ABOVE.

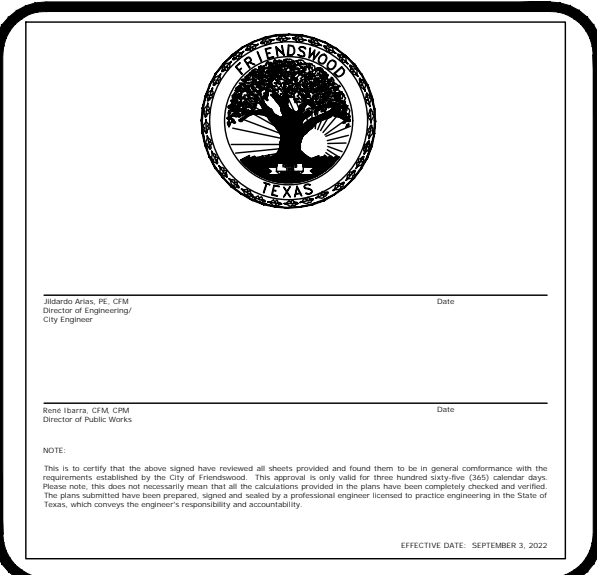
GENERAL CONSTRUCTION NOTES				ENGINEERING DEPARTMENT				
FILE NAME: 2-GCN1-2022.DWG		DATE APPROVED: SEPTEMBER 3, 2022		PROJECT NUMBER:		DATE SUBMITTED:	SHEET:	
		SCALE: NTS REVISED DATE: SEPT. 2022					1 OF 2	

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WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION

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ISSUE FOR PROPOSAL



CLIENT FRIENDSWOOD ISD		
DATE 2022/09/07		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
ADD 3	ADDENDUM 3	9/26/2022

CITY OF FRIENDSWOOD DETAILS

C 503



TESTING (CONT.)

- 3.2 BACTERIAL TEST (BAC-T):
- 3.2.1 BACTERIAL SAMPLE IS REQUIRED FOR EACH 1,200 FEET OF WATER MAIN, OR CLOSER DEPENDING ON FIRE HYDRANT LOCATIONS, OR PORTION THEREOF. ALSO DEAD ENDS ARE SUBJECT TO TESTING, SUCH AS CUL-DE-SAC. THE FORM NEEDS TO BE LABELED "CONSTRUCTION" OR "SPECIAL." BOTH FORM AND SAMPLE ARE TESTED AT A LABORATORY APPROVED BY TCEQ. PAYMENT SHALL BE EXPECTED AT TIME OF SAMPLING. SAMPLINGS SHALL ONLY BE CONDUCTED ON TUESDAYS AND THURSDAYS WITH FORTY-EIGHT (48) HOUR NOTIFICATION TO THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411.
4. SECTION 02500 - GRAVITY SANITARY SEWERS:
- 4.1 LOW PRESSURE AIR TEST - THE PIPE SHALL UNDERGO A LOW PRESSURE AIR TEST WHICH SHALL CONFORM TO ASTM C828 AND ASTM C494. THE PRESSURE SHALL BE FIVE (5) PSI FOR A DURATION AS DETERMINED BY THE LENGTH AND NOMINAL I.D. OF THE PIPE BEING TESTED.
- 4.2 MANDREL DEFLECTION TEST - FLEXIBLE AND SEMI-RIGID PIPE DIAMETER DEFLECTION TEST SHALL BE DONE NO SOONER THAN THIRTY (30) DAYS AFTER FINAL BACKFILL. RUN TEST WITH A MANDREL HAVING A DIAMETER EQUAL TO 95% OF THE INSIDE NOMINAL DIAMETER OF THE PIPE BEING TESTED. MANDREL SHALL BE NINE (9) ARM WITH STEEL PROVING RING 2 1/2 INCH RING WIDTH. TO PASS, MANDREL SHALL PASS FREELY THROUGH THE PIPE, PULLED BY ONE (1) WORKER. NO MECHANICAL MEANS SHALL BE ALLOWED TO PULL THE MANDREL.
5. SECTION 02720 - LIME-STABILIZED SUBGRADE:
- 5.1 LIME
- 5.1.1 PERCENT LIME DETERMINATION TEST SHALL BE TAKEN BY A CERTIFIED TESTING LABORATORY IN ACCORDANCE WITH ASTM C977-92, BUT SHALL NOT BE LESS THAN 6%.
- 5.1.2 THE PERCENT LIME USED SHALL BRING THE SOIL TO A P.I. OF NOT MORE THAN 15.
- 5.1.3 HYDRATED LIME SHALL BE SAMPLED AND TAKEN AT THE DISTRIBUTION AREA OF THE TANKER TRUCK AND TESTED.
- 5.2. SUBGRADE
- 5.2.1. ALL SUBGRADE SHALL MEET THE FOLLOWING REQUIREMENTS WHEN TEST DRY BY LABORATORY SIEVES:
- MINIMUM PASSING 1 1/4 INCH SIEVE - 100%
MINIMUM PASSING 3/4 INCH SIEVE - 85%
MINIMUM PASSING #4 SIEVE - 60%
- 5.2.2. ALL SUBGRADE SHALL PASS A DENSITY TEST OF NOT LESS THAN 95% STANDARD PROCTOR. METHOD OF TESTING AS PER ASTM D698. TEST TO BE TAKEN EVERY 200 FEET AS MEASURED ALONG CENTERLINE OF THE ROADWAY AT VARYING DISTANCES FROM CENTERLINE OF THE ROADWAY, OR AS DIRECTED BY THE CITY.
- 5.2.3. THICKNESS TESTS SHALL BE TAKEN AT EVERY 200 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.
- 5.2.4. IF A SINGLE STORM EVENT PRODUCES ONE (1) INCH OR MORE OF RAINFALL, CONTRACTOR SHALL RETEST THE SUBGRADE FOR DENSITY. THE INTERVAL FOR DENSITY RETESTS SHALL BE NOT LESS THAN 500 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.
6. SECTION 02805 - CONCRETE PAVING:
- 6.1 THE CONCRETE PAVEMENT WILL BE TESTED FOR DEPTHS IN ACCORDANCE WITH ASTM C174 TEST. THICKNESS SHALL NOT BE DEFICIENT BY MORE THAN 1/4 INCH.
7. SECTION 03300 - STRUCTURAL CONCRETE:
- 7.1 THE SLUMP, WHEN PLACING CONCRETE, SHALL NOT BE GREATER THAN FIVE (5) INCHES. THIS TEST SHALL BE TAKEN FOR EVERY 100 CUBIC YARDS OF CONCRETE, BUT MAY BE TAKEN MORE FREQUENTLY IF THE CONSISTENCY OF THE CONCRETE APPEARS TO VARY PER THE TESTING LABORATORY TECHNICIAN OR THE CITY PROJECT MANAGER.
- 7.2 TEMPERATURE OF THE CONCRETE WILL BE TAKEN AS DIRECTED BY THE CITY PROJECT MANAGER AND SHALL BE LESS THAN 90° F.
- 7.3 THERE SHALL BE CYLINDERS TAKEN BY THE TESTING LABORATORY TECHNICIAN, IN ACCORDANCE WITH ASTM C31 TEST, NUMBERING FOUR (4) CYLINDERS PER 150 CUBIC YARDS OF PAVING OR PART THEREOF FOR EACH DAYS PLACEMENT. TWO (2) CYLINDERS SHALL BE TESTED AT SEVEN (7) DAYS AND TWO (2) CYLINDERS SHALL BE TESTED AT TWENTY-EIGHT (28) DAYS TO ASSURE THE MINIMUM DESIGN STRENGTH IS ACHIEVED.

PRIVATE UTILITY NOTES:

AT&T TEXAS/SWBT FACILITIES:

1. THE LOCATION OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL (800) 344-8377 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT.
6. PLEASE CONTACT AT&T TEXAS DAMAGE PREVENTION MANAGER MR. ROOSEVELT LEE JR. AT (713) 567-4452 OR EMAIL HIM AT RL7259@ATT.COM, IF THERE ARE ANY QUESTIONS ABOUT BORING OR EXCAVATING NEAR OUT AT&T TEXAS/SWBT FACILITIES.

CENTERPOINT ENERGY EASEMENT:

NO APPROVAL TO USE, CROSS, OR OCCUPY CENTERPOINT FEE OF EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT CENTERPOINT ENERGY SURVEYING & RIGHT OF WAY DIVISION AT (713) 207-6248 OR (713) 207-5769.

CENTERPOINT ENERGY ELECTRIC FACILITIES:

1. CAUTION - OVERHEAD ELECTRICAL LINES. OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN DRAWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:
- 1.1 ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
- 1.2 OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN TEN (10) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
2. PARTIED RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

PRIVATE UTILITY NOTES(CONT.):

CENTERPOINT ENERGY GAS FACILITIES:


1. CAUTION - UNDERGROUND GAS FACILITIES. LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC WHERE APPLICABLE) ARE SHOWN IN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (800) 223-545-6001 OR 811 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.
2. WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE CALL (713) 945-8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
3. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
4. WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
5. FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200.
6. THE CONTRACTOR IS FULLY RESPONSIBLE FOR DAMAGES CAUSED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

COMCAST FACILITIES:

1. CONTACT MR. BILL LEOPARD AT (281) 802-1679 OR MR. MOHAMMAD WOHEIDY AT (713) 895-1213 BEFORE PROCEEDING WITH CONSTRUCTION WORK IN THE VICINITY OF COMCAST/TIME WARNER CABLE FACILITIES.
2. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF THE INDICATED LOCATION OF UNDERGROUND FACILITY, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.

TEXAS-NEW MEXICO POWER COMPANY ELECTRIC FACILITIES:

1. CAUTION - OVERHEAD ELECTRICAL LINES. TEXAS LAW, ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OR EQUIPMENT MAY COME WITHIN SIX (6) FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATIONS, TITLE 29, PART 1910.180(1) AND PART 1926.550(a)(15) REQUIRE A MINIMUM CLEARANCE OF TEN (10) FEET FROM THESE FACILITIES. ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES. IF THE CONTRACTOR PERFORMS ANY WORK NEAR OVERHEAD POWER LINES THEY MUST CALL (281) 996-0453 FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT THEIR EXPENSE PRIOR TO PERFORMING WORK.
2. NOTE: LOCATION OF TEXAS-NEW MEXICO POWER COMPANY FACILITIES ARE APPROXIMATE AND HAVE NOT BEEN VERIFIED BY ACTUAL FIELD CHECK.
3. OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES HAS SINCE THEY ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING CONSTRUCTION.
4. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE FORBIDS ACTIVITIES WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
5. CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL TEXAS-NEW MEXICO POWER COMPANY AT (281) 996-0453.
6. CONTRACTOR TO NOTIFY THE "UNDERGROUND COORDINATING COMMITTEE" TELEPHONE (713) 223-4567 FORTY-EIGHT (48) HOURS BEFORE STARTING WORK IN STREET RIGHTS-OF-WAY OR EASEMENTS.

GENERAL CONSTRUCTION NOTES (CONTINUED)			ENGINEERING DEPARTMENT	PROJECT NUMBER: DATE SUBMITTED: SHEET:		
FILE NAME: 3-GCN2-2022.DWG	DATE APPROVED: MARCH 30, 2022			2 OF 2		
SCALE: NTS		REVISED DATE: MARCH 2022				

ARCHITECT	PBK Architects, Inc.
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MEP	
LEAF ENGINEERS	
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FOOD SERVICE	
FOODSERVICE PROFESSIONALS	
281 292 2223	
BUILDING ENVELOPE	
TEAM	
T 713 940 3001	

WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2700 W PARKWOOD AVE,
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

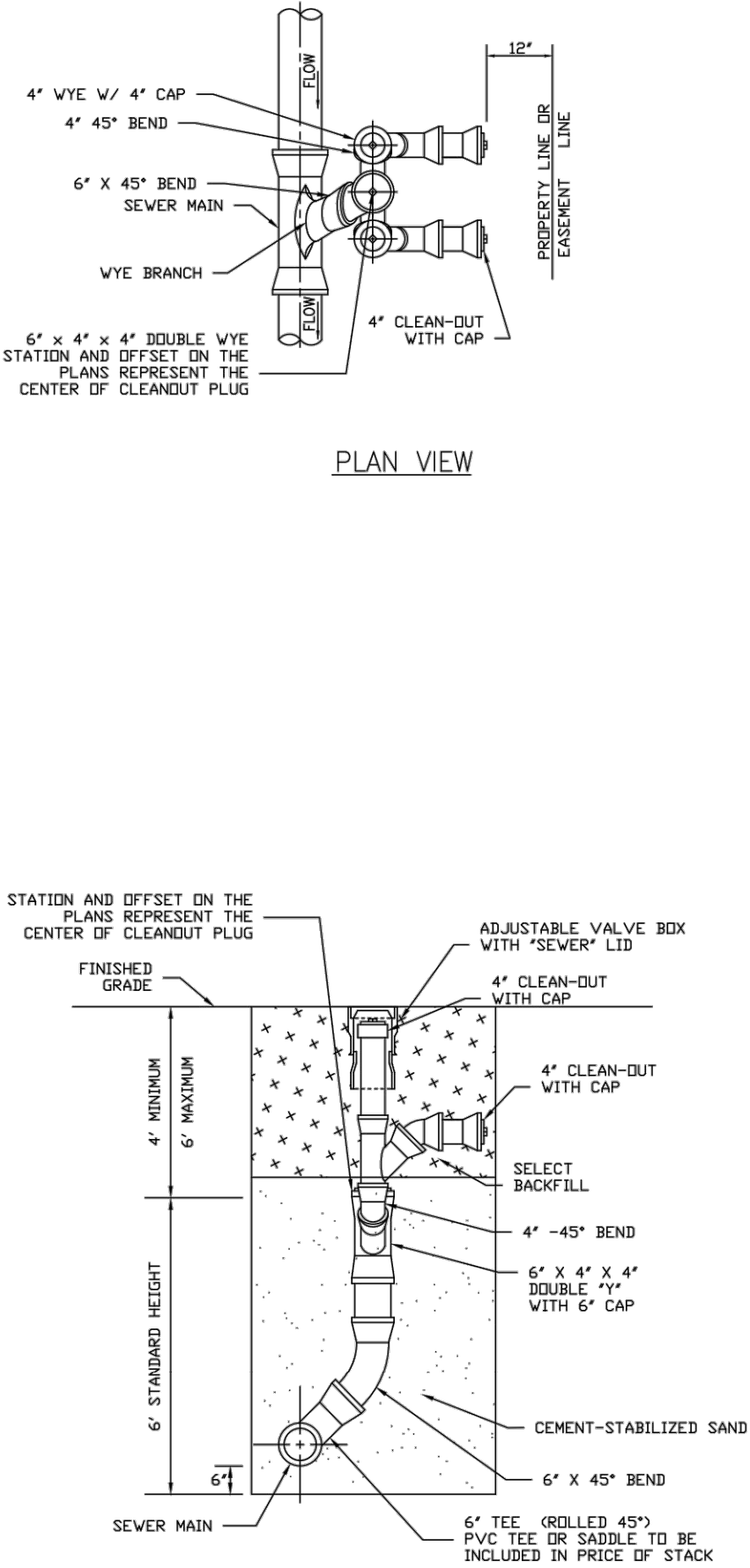
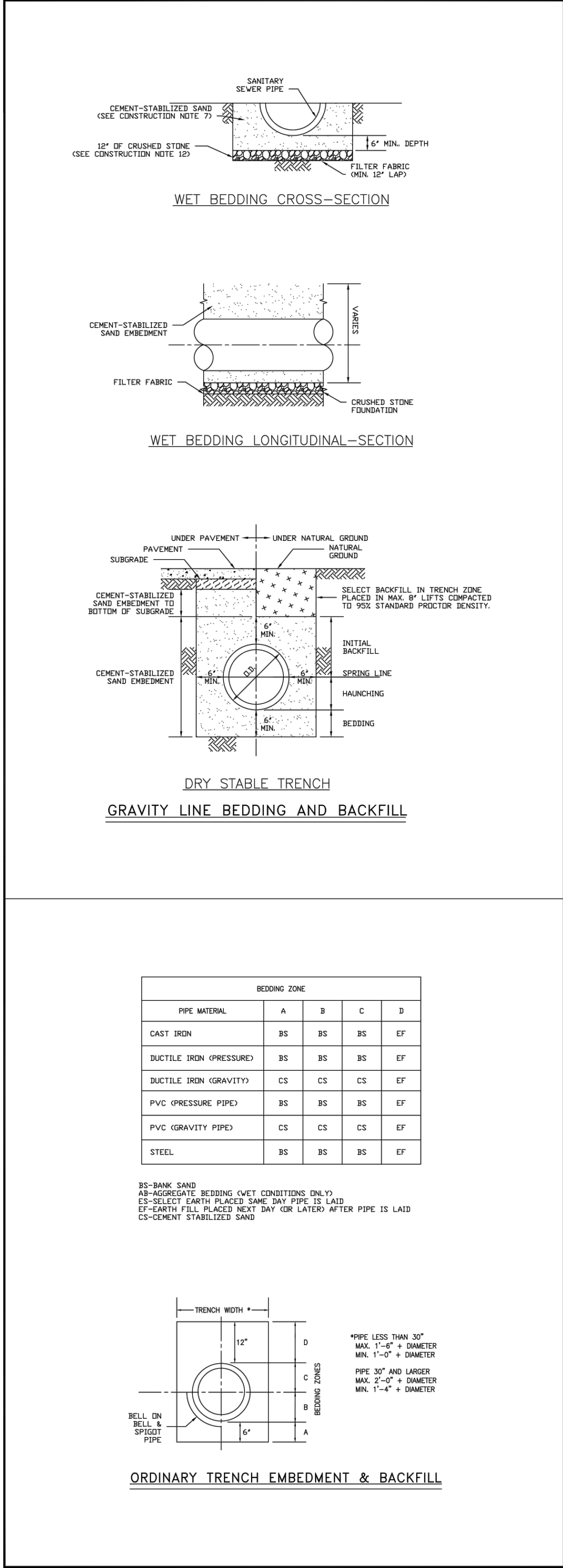


CLIENT		
FRIENDSWOOD ISD		
DATE	PROJECT NUMBER	
2022/09/07	220083	
DRAWING HISTORY		
No.	Description	Date
ADD 3	ADDENDUM 3	9/26/2022
ISSUE FOR PROPOSAL		

CITY OF
FRIENDSWOOD
DETAILS

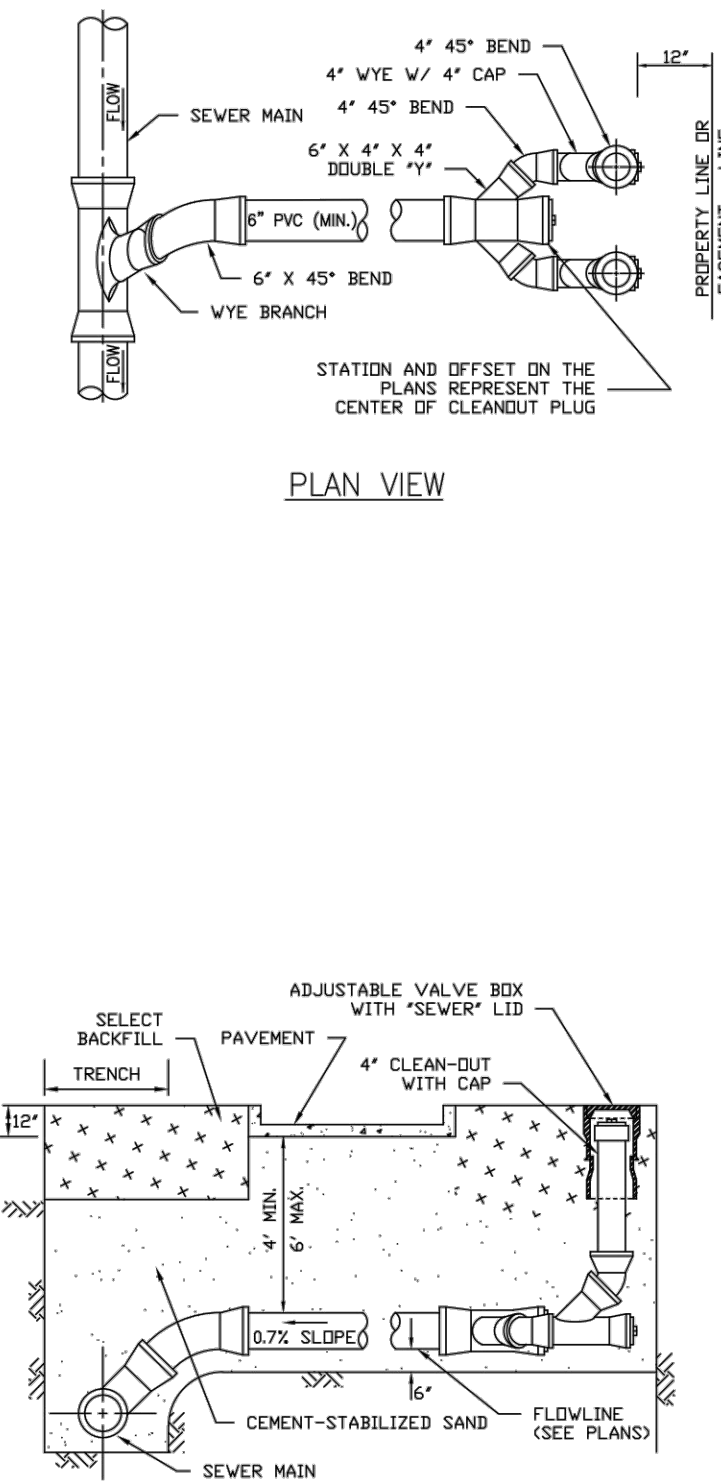
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- NOTES:
- ONLY SDR26 PVC OR EQUIVALENT SHALL BE USED UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
 - USE SINGLE WYE BRANCH FOR SINGLE SERVICE AND DOUBLE WYE BRANCH FOR DOUBLE SERVICE.
 - ALL CONNECTIONS TO THE MAIN SANITARY SEWER SHALL BE APPROVED BY THE CITY OF FRIENDSWOOD PUBLIC WORKS AT (281) 996-5080.
 - ALL SEWER LINES SHALL BE TESTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS, LATEST REVISION.
 - INDIVIDUAL RESIDENTIAL CLEANDUTS SHALL BE 4" PVC.

- NOTES:
- ONLY SDR26 PVC OR EQUIVALENT SHALL BE USED UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
 - USE SINGLE WYE BRANCH FOR SINGLE SERVICE AND DOUBLE WYE BRANCH FOR DOUBLE SERVICE.
 - MAIN STACKS SHALL BE A MINIMUM OF 6" IN DIAMETER.
 - ALL CONNECTIONS TO THE MAIN SANITARY SEWER SHALL BE APPROVED BY THE CITY OF FRIENDSWOOD PUBLIC WORKS AT (281) 996-5080.
 - ALL SEWER LINES SHALL BE TESTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS, LATEST REVISION.
 - INDIVIDUAL RESIDENTIAL CLEANDUTS SHALL BE 4" PVC.



- SANITARY SEWER SYSTEM CONSTRUCTION NOTES**
- FINISHED ELEVATION ON SANITARY MANHOLE RIMS SHALL BE THREE (3) INCHES ABOVE FINISHED GRADE IN UTILITY EASEMENTS. IF THE MANHOLE IS LOCATED ADJACENT TO A PUBLIC STREET, THE FINAL ELEVATION SHALL BE TWO (2) INCHES ABOVE THE TOP OF THE CURB OR TWO (2) INCHES ABOVE THE CENTERLINE OF THE STREET FOR STREETS WITH NO PERIMETER CURB (TOP OF CURB SHOULD EQUAL CENTERLINE OF STREET).
 - WATER LINES AND SANITARY SEWER LINES SHALL BE INSTALLED IN SEPARATE TRENCHES, PER ITEM EIGHT (8) BELOW.
 - ALL PROPOSED SANITARY SEWER LINES SHALL BE DUCTILE IRON OR PVC. PVC PIPE SHALL CONFORM TO ASTM D3034, SDR 26 FOR ALL DEPTHS.
 - ALL PVC PIPE (ALL TYPES SDR/DR WALL THICKNESS TO BE USED) SHALL HAVE RUBBER GASKET EQUIPPED BELL AND SPIGOT JOINTS CONFORMING TO ASTM D212. THE GASKET MATERIAL SHALL CONFORM TO ASTM F477. SOLVENT WELDED JOINTS WILL NOT BE APPROVED FOR CITY SANITARY SEWER LINES.
 - ALL DUCTILE IRON PIPE SHALL BE 150 PSI WITH EIGHT (8) MIL BLACK VIRGIN POLYETHYLENE WRAP AS SPECIFIED IN ANSI A21.5/AWWA C105.
 - SANITARY SEWER MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD DESIGN STANDARDS AND TECHNICAL SPECIFICATIONS, LATEST REVISION. CONTRACTOR TO FURNISH TEST PLUGS AND RISERS. ALL SANITARY SEWER LINES TO BE AIR TESTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.
 - SANITARY SEWER TRENCHES WITHIN OR UNDER ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT TO BE BACKFILLED WITH CEMENT-STABILIZED SAND BACKFILL (1.1 SACKS OF CEMENT PER TON OF SAND) TO THE BOTTOM OF THE SUBGRADE. BEDDING, HAUNCHING, AND INITIAL FILL SHALL BE CEMENT-STABILIZED SAND FOR GRAVITY SANITARY SEWERS AND BANK SAND FOR FORCE MAIN SANITARY SEWERS.
 - WATER LINE/NEW SANITARY SEWER LINE SEPARATION. WHEN NEW SANITARY SEWERS ARE INSTALLED, THEY SHALL BE INSTALLED NO CLOSER THAN NINE (9) FEET IN ALL DIRECTIONS. SANITARY SEWERS THAT PARALLEL WATER LINES SHALL BE INSTALLED IN SEPARATE TRENCHES. WHEN NINE (9) FEET OF SEPARATION CANNOT BE MAINTAINED, THEN THE FOLLOWING GUIDELINES APPLY:
 - WHEN THE SANITARY SEWER PARALLELS A WATER LINE, THE SANITARY SEWER SHALL BE CONSTRUCTED OF CAST IRON OR PVC MEETING ASTM SPECIFICATIONS WITH THE PRESSURE RATING FOR BOTH THE PIPE AND JOINTS OF 150 PSI. THE VERTICAL SEPARATION SHALL BE A MINIMUM OF TWO (2) FEET BETWEEN THE OUTSIDE DIAMETERS OF THE PIPE AND THE HORIZONTAL SEPARATION SHALL BE A MINIMUM OF FOUR (4) FEET BETWEEN THE OUTSIDE DIAMETERS OF THE PIPE. THE SANITARY SEWER LINE SHALL BE LOCATED BELOW THE WATER LINE.
 - WHEN A SANITARY SEWER CROSSES A WATER LINE AND THE SANITARY SEWER IS CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC WITH A MINIMUM PRESSURE RATING OF 150 PSI; AN ABSOLUTE MINIMUM DISTANCE OF SIX (6) INCHES BETWEEN THE OUTSIDE DIAMETERS SHALL BE MAINTAINED. THE SANITARY SEWER LINE SHALL BE LOCATED BELOW THE WATERLINE WHEN POSSIBLE AND ONE (1) LENGTH OF THE SANITARY SEWER PIPE SHALL BE CENTERED ON THE WATER LINE.
 - WHEN A SANITARY SEWER LINE CROSSES UNDER A WATER LINE AND THE SANITARY SEWER IS CONSTRUCTED OF ABS TRUSS PIPE, SIMILAR SEMI-RIGID PLASTIC COMPOSITE PIPE, CLAY PIPE OR CONCRETE PIPE WITH GASKETED JOINTS, A MINIMUM OF TWO (2) FEET OF SEPARATION SHALL BE MAINTAINED. THE INITIAL BACKFILL SHALL BE CEMENT-STABILIZED SAND (1.1 SACKS OF CONCRETE PER 1 TON OF SAND) FOR ALL SECTIONS OF SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE. THIS INITIAL BACKFILL SHALL BE FROM ONE QUARTER (¼) DIAMETER BELOW THE CENTERLINE OF THE PIPE TO ONE (1) PIPE DIAMETER, BUT NOT LESS THAN TWELVE (12) INCHES ABOVE THE TOP OF PIPE.
 - WHEN A SANITARY SEWER CROSSES OVER A WATER LINE, ALL PORTIONS OF THE SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON, OR PVC PIPE WITH A PRESSURE RATING OF AT LEAST 150 PSI USING APPROPRIATE ADAPTERS. IN LIEU OF THIS PROCEDURE THE NEW SANITARY SEWER MAY BE ENCASED IN A JOINT OF 150 PSI CLASS PIPE AT LEAST EIGHTEEN (18) FEET LONG AND A MINIMUM OF TWO (2) NOMINAL SIZES LARGER THAN THE NEW SANITARY SEWER. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT INTERVALS OF FIVE (5) FEET WITH SPACERS OR BE FILLED TO THE SPRING LINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH CEMENT GROUT OR WITH AN APPROVED MANUFACTURER SEAL.
 - FOR ALL PVC PIPE, USE MANHOLE WATER STOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS. CLAMP SHALL BE STAINLESS STEEL MATERIAL.
 - SANITARY SEWER MANHOLES SHALL BE STANDARD TYPE, UNLESS OTHERWISE NOTED. TOP OF RIMS OF ALL SANITARY SEWER MANHOLES SHALL BE AT LEAST THREE (3) INCHES ABOVE FINISHED GRADE OR ABOVE THE 100-YEAR BASE FLOOD ELEVATION AND HAVE INFLOW PROTECTORS UNDER THE COVERS. FOR MANHOLES LOCATED IN THE 100-YEAR FLOOD PLAIN, VENT AND SEAL THE MANHOLE COVERS. SECTIONS OF PRECAST MANHOLES SHALL BE JOINED WITH "RAM NEK" GASKET MATERIAL OR AS APPROVED BY THE CITY OF FRIENDSWOOD.
 - SANITARY SEWER LINES LOCATED IN OTHER AREAS NOT SPECIFIED IN ITEM 7 SHALL BE BACKFILLED ABOVE THE INITIAL BACKFILL WITH CEMENT-STABILIZED SAND OR SELECT BACKFILL MATERIAL WITH A PI BETWEEN TWENTY (20) AND FORTY (40).
 - IF WET SAND IS ENCOUNTERED IN THE FIELD, USE SPECIAL BEDDING.
 - SANITARY SEWERS CROSSING UTILITIES OTHER THAN WATER SHALL HAVE A MINIMUM CLEARANCE OF SIX (6) INCHES (ADDRESSED IN CITY OF FRIENDSWOOD TECHNICAL SPECIFICATION 02125 - EXCAVATION AND BACKFILL FOR UTILITIES).
 - ALL PRECAST CONCRETE MANHOLES SHALL HAVE THE TOP ADJUSTMENT CONSTRUCTED OF PRECAST PCC RINGS, SEALED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE, AND BETWEEN EACH SECTION AND MANHOLE COVERS.
 - ALL SANITARY SEWER MANHOLE COVERS SHALL INCLUDE THE WORDS "SANITARY SEWER" AND "CITY OF FRIENDSWOOD" AND INCLUDE THE CITY OF FRIENDSWOOD SEAL. ALL MANHOLE COVERS SHALL HAVE A MINIMUM DIAMETER OF THIRTY-TWO (32) INCHES, AS SHOWN IN THE DETAIL ON THIS SHEET.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATION OF ALL EXISTING UTILITIES PRIOR TO EXCAVATION. DURING THE COURSE OF ANY AND ALL CLEARING, GRUBBING, FILL, GRADING, EXCAVATION OR OTHER CONSTRUCTION, CONTRACTOR SHALL ENSURE THAT STORM SEWER DRAINAGE PATHWAYS ARE MAINTAINED AND REMAIN OPEN TO ENSURE POSITIVE DRAINAGE AND THAT SUCH CONVEYANCES ARE NOT IMPEDED OR BLOCKED IN ANY WAY. STORM SEWER INLETS SHALL BE PROTECTED FROM ENTRY OF SILT, TRASH, DEBRIS AND ANY SUBSTANCES DELETERIOUS TO THE STORM SEWER SYSTEM AND/OR WATERWAYS RECEIVING STORM WATER RUNOFF. CONTRACTOR SHALL, AT COMPLETION OF WORK, FILL LOW SPOTS AND GRADE ALL RIGHTS-OF-WAY AND UTILITY EASEMENTS AND RE-GRADE/RESTORE DITCHES AS NECESSARY TO MAINTAIN AND/OR ESTABLISH POSITIVE DRAINAGE.

SANITARY SEWER
STANDARD DETAILS



ENGINEERING
DEPARTMENT

FILE NAME:
9-SSSD1-2022.DWG

DATE APPROVED: MARCH 30, 2022
SCALE: NTS
REVISED DATE: MARCH 2022

PROJECT NUMBER:
DATE SUBMITTED:
SHEET:
1 OF 2


PBK


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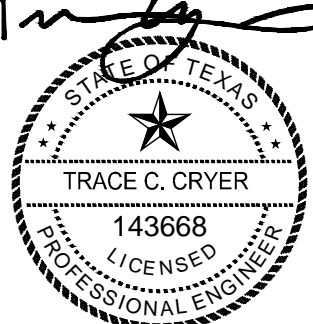
OWNER
713-940-3238
STRUCTURAL
KURAKA ENGINEERS
780-48-3014
MEP
LEAF ENGINEERS
713-940-3300
ELECTRICAL
FOOD SERVICE DESIGN PROFESSIONALS
281-350-2229
BUILDING ENVELOPE
TEAM
713-940-3001

WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546
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09/26/2022

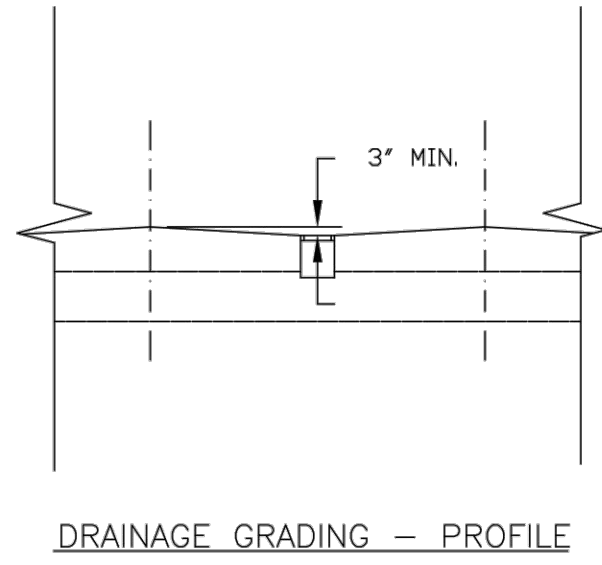
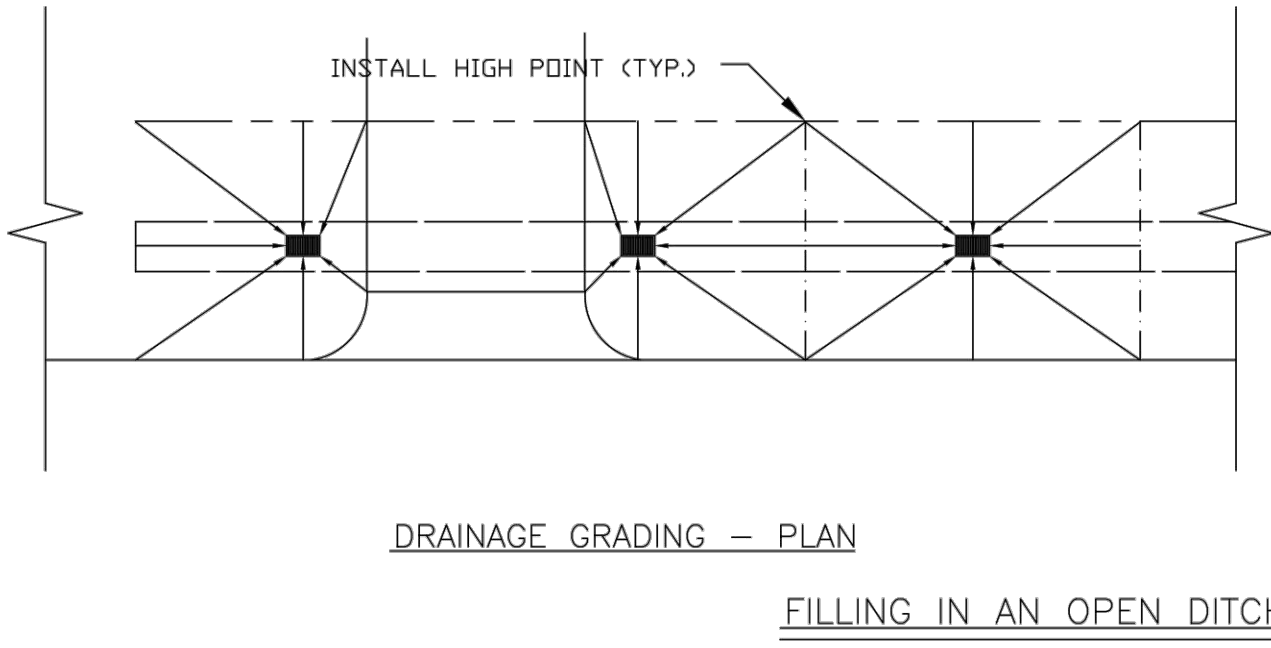
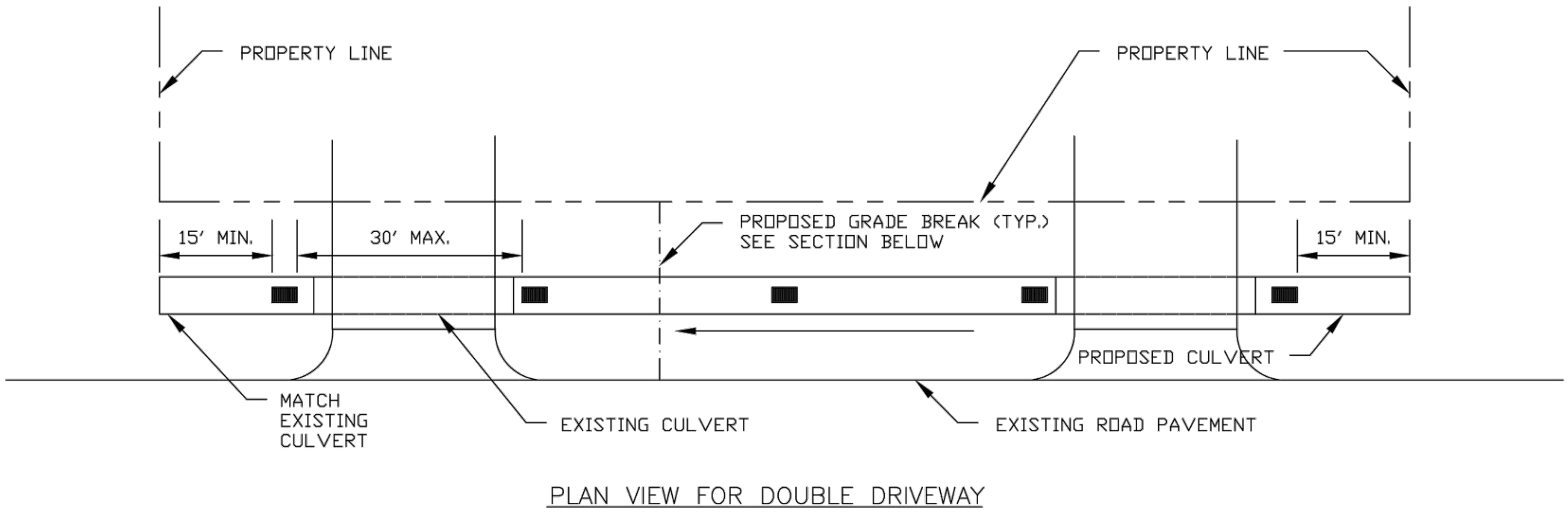
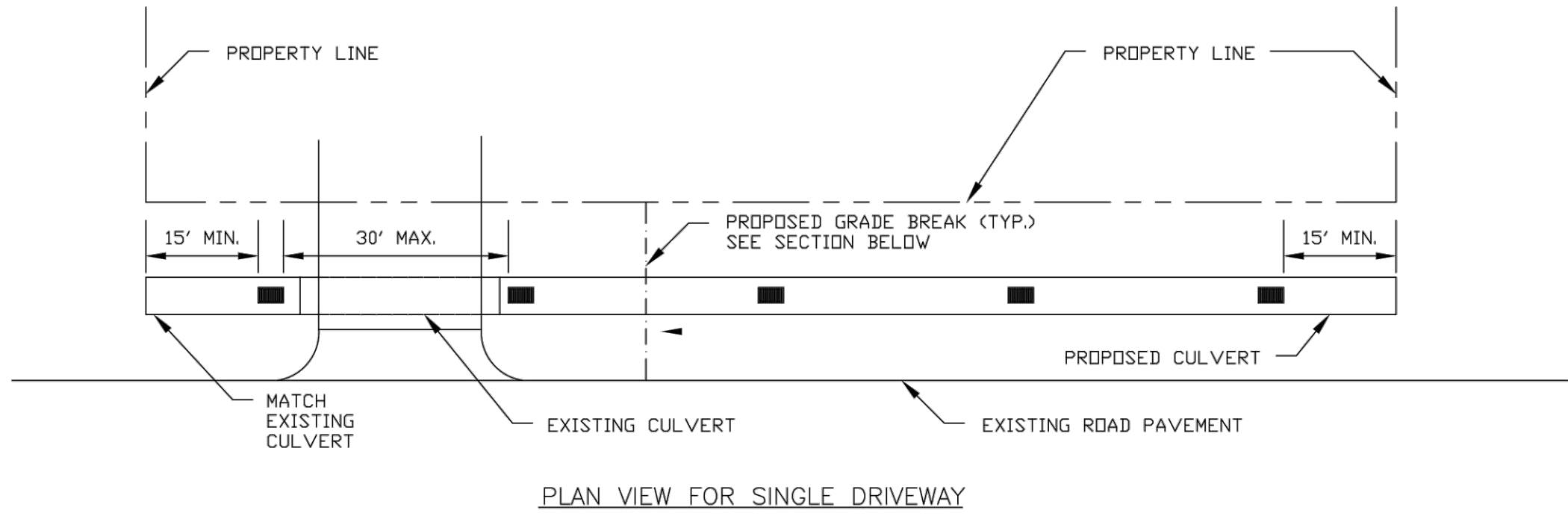
CITY OF
FRIENDSWOOD
DETAILS

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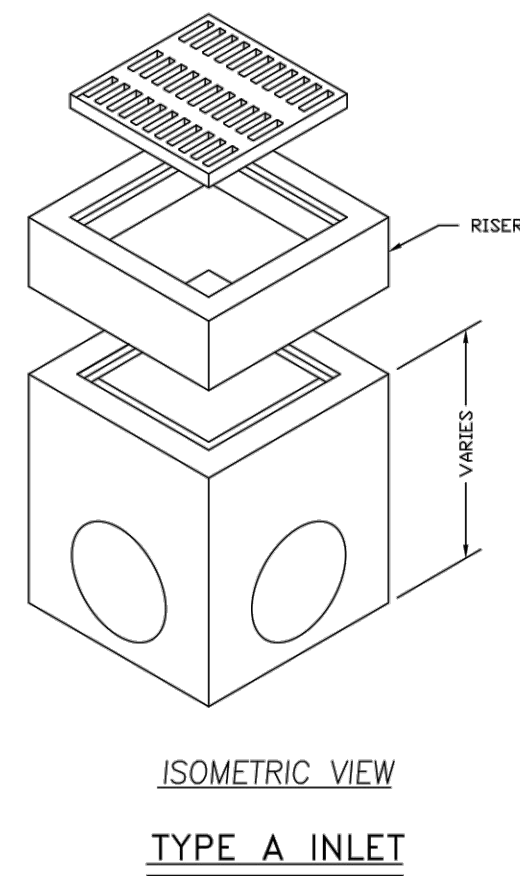
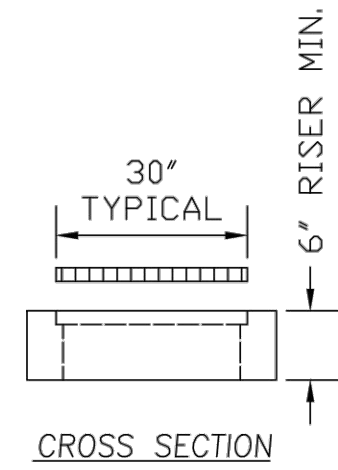
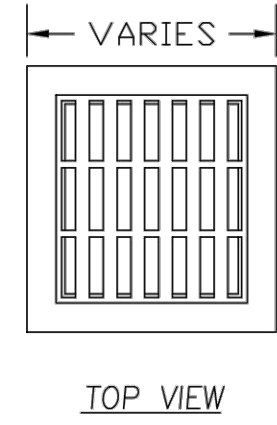
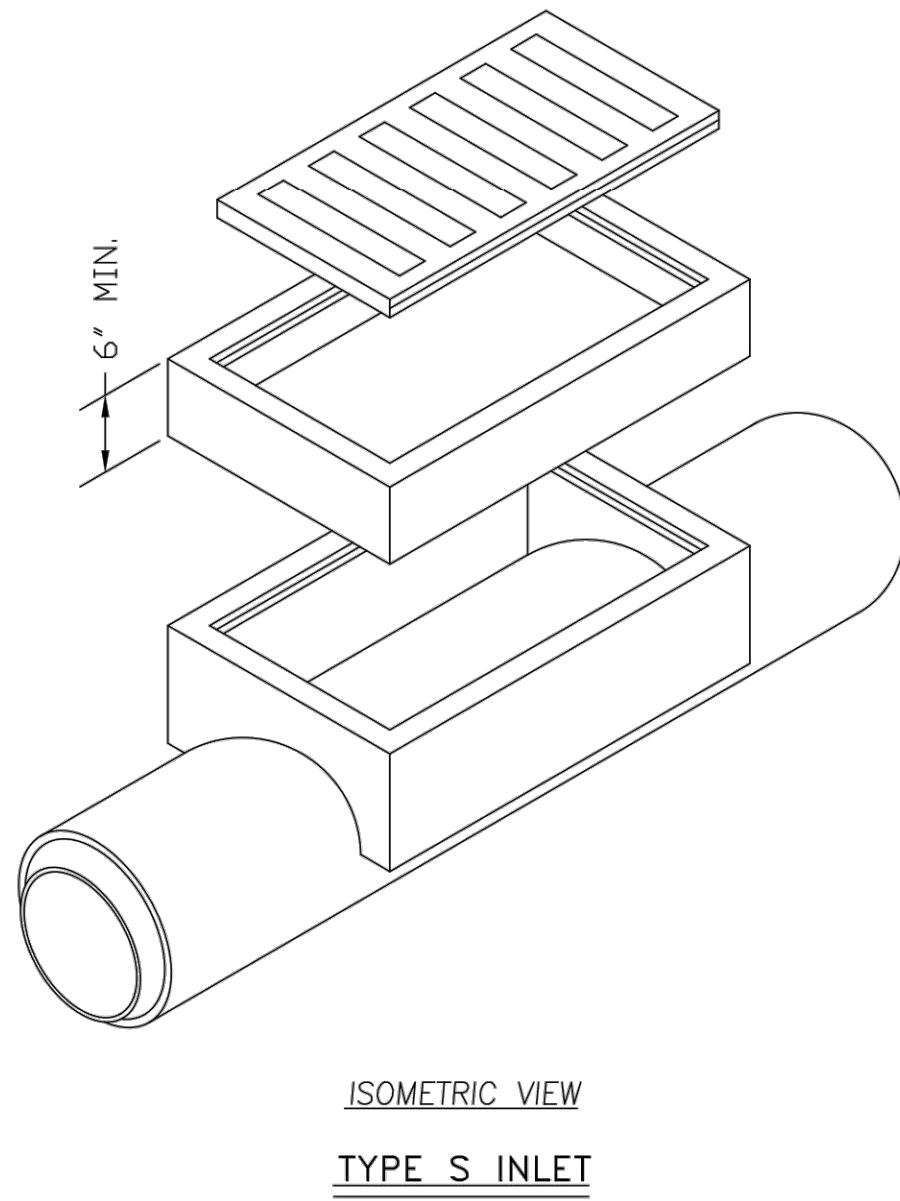
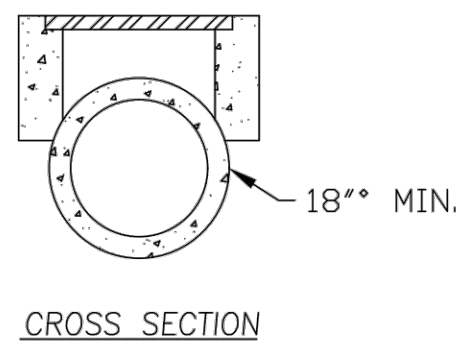
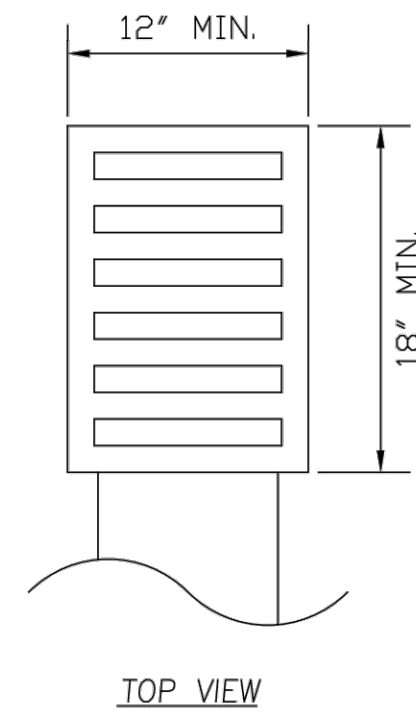
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NOTES:

1. MINIMUM LOT FRONTAGE SHALL BE ONE HUNDRED (100) FEET.
2. MINIMUM DISTANCE BETWEEN DRIVEWAYS SHALL BE FORTY-FIVE (45) FEET EDGE TO EDGE.



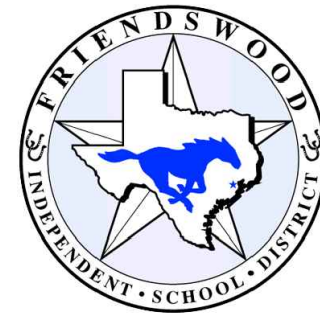
STORM SEWER STANDARD DETAILS (CONTINUED)			DEPARTMENT OF ENGINEERING & PROJECTS			
FILE NAME: 14-SWSSD2-2022.DWG	DATE APPROVED: MARCH 30, 2022 SCALE: NTS REVISED DATE: MARCH 2022		PROJECT NUMBER:	DATE SUBMITTED:	SHEET: 1 OF 1	

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MEP	
LEAF ENGINEERS	
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FOOD SERVICE DESIGN PROFESSIONALS	
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BUILDING ENVELOPE	
TEAM	
T 713 940 3201	

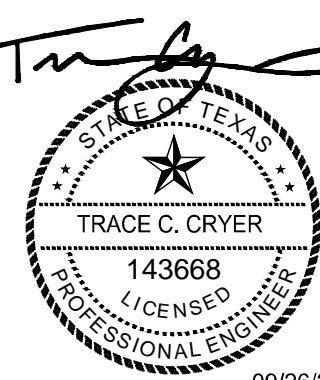
WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2700 W PARKWOOD AVE.
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CHECKED BY: [Signature]	DATE: [Blank]
DRAWN BY: [Signature]	DATE: [Blank]
DATE: [Blank]	DATE: [Blank]



09/26/2022

CLIENT FRIENDSWOOD ISD		
DATE 2022/09/07		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
ADD 3	ADDENDUM 3	9/26/2022
ISSUE FOR PROPOSAL		

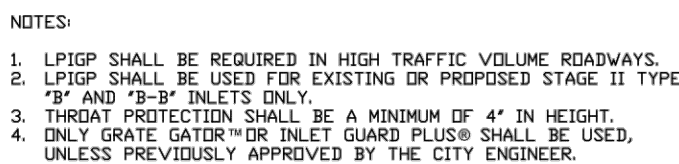
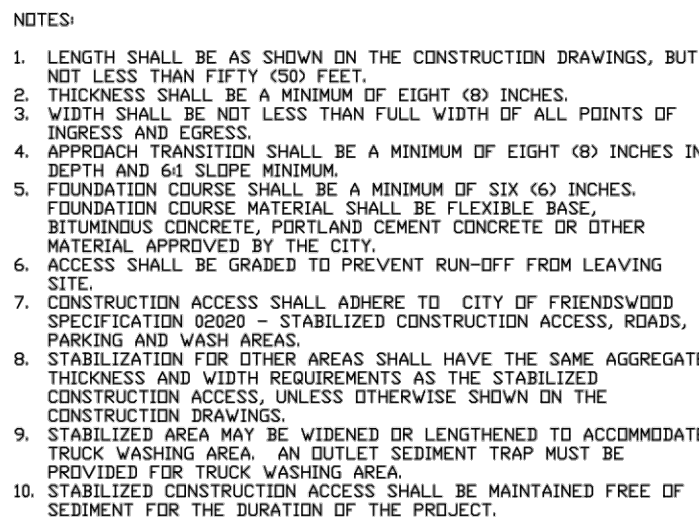
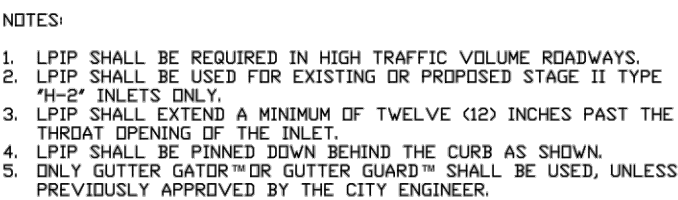
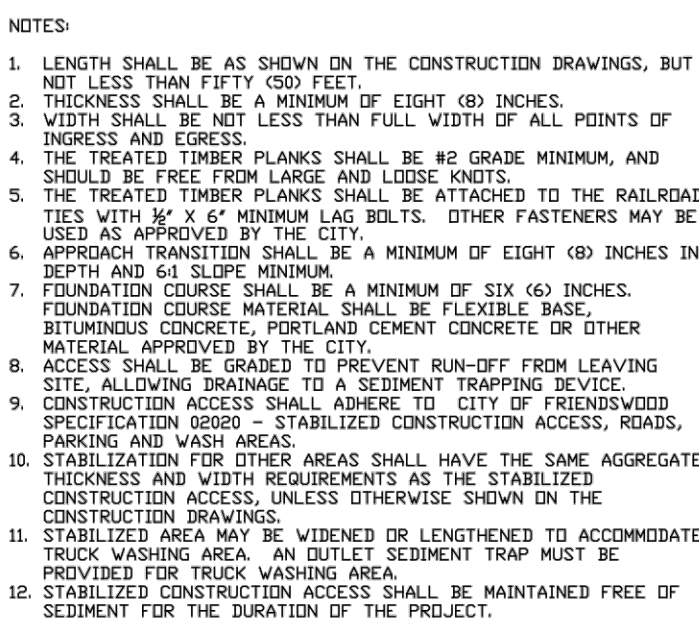
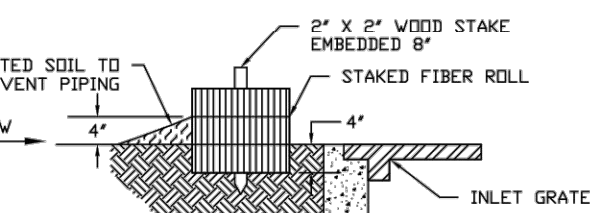
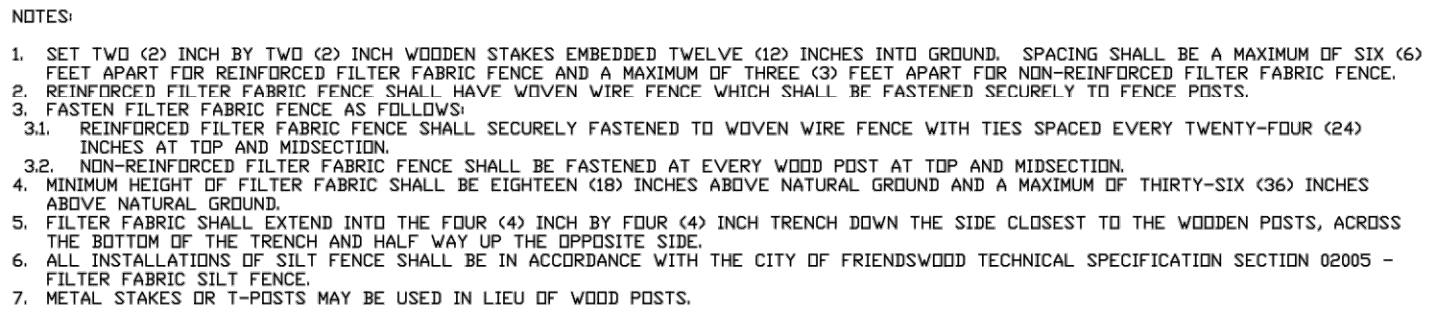
CITY OF
FRIENDSWOOD
DETAILS

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ADD3

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DRAWN BY: AGLUZMAN

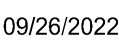
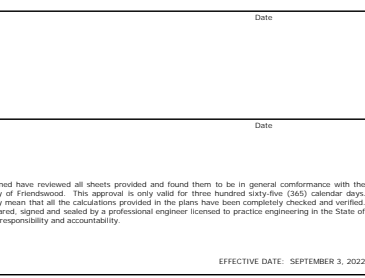


SWPPP SYMBOLS

FILE NAME: 11-SW3PSD1-2022.DWG	DATE APPROVED: MARCH 30, 2022
SCALE: NTS	REVISED DATE: MARCH 2022



PROJECT NUMBER:	DATE SUBMITTED:	SHEET: 1 OF 2
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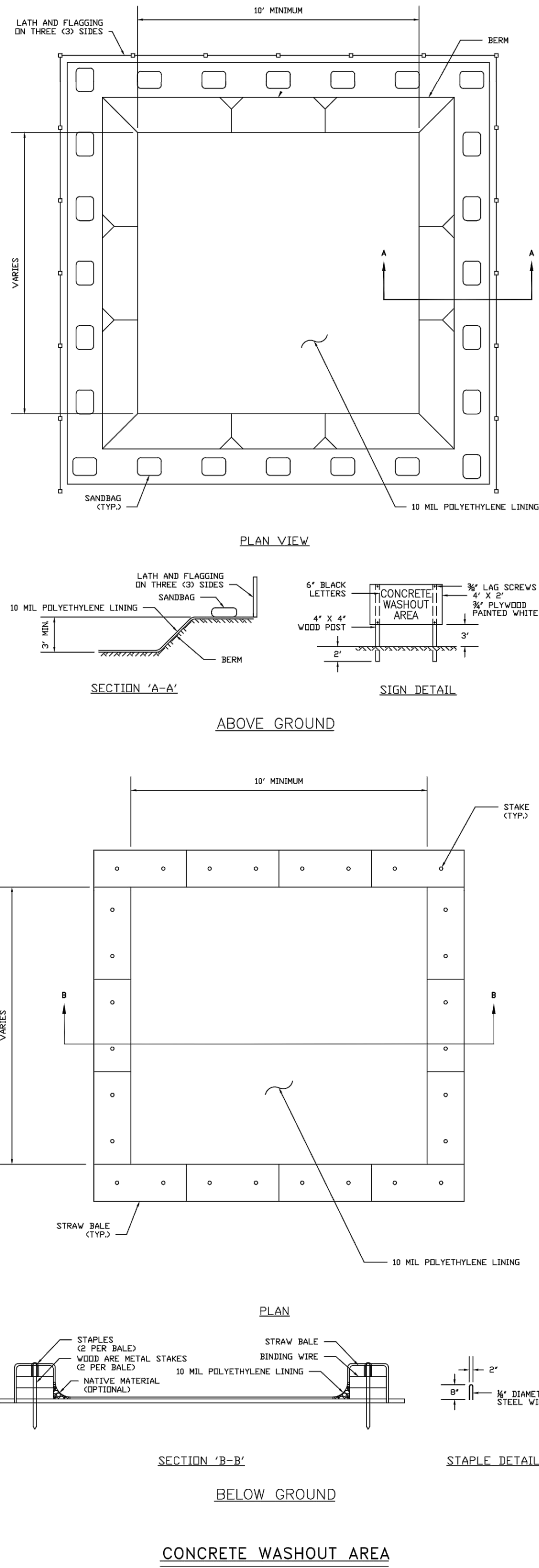
DATE	PROJECT NUMBER
2022/09/07	220083

ISSUE FOR PROPOSAL

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CHECKED BY: K FALKE

DRAWN BY: AGLUZMAN



NOTES:

1. ACTUAL LAYOUT TO BE DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN THREE (3) FEET OF THE CONCRETE WASHOUT FACILITY.

STORM WATER POLLUTION
PREVENTION PLAN (SWPPP)
STANDARD DETAILS (CONT.)



ENGINEERING
DEPARTMENT

PROJECT NUMBER:	DATE SUBMITTED:	SHEET: 2 OF 2
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ARCHITECT **PKB Architects, Inc.** **PKB.com**

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713-961-4571 F
TX Firm: BR 1608

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T 713-940-3238

STRUCTURAL

KUBALA ENGINEERS
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MET

LEAF ENGINEERS
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FOOD SERVICE

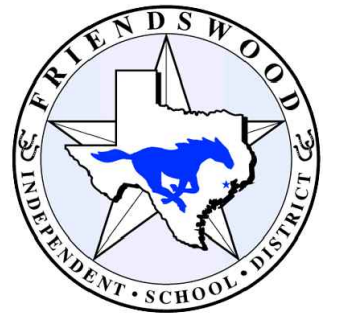
FOODSERVICE DESIGN PROFESSIONALS
T 800-259-2727

BUILDING ENVELOPE

BEM
T 713-940-3301

WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION

2100 W PARKWOOD AVE,
FRIENDSWOOD, TX 77546

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09/26/2022

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DETAILS

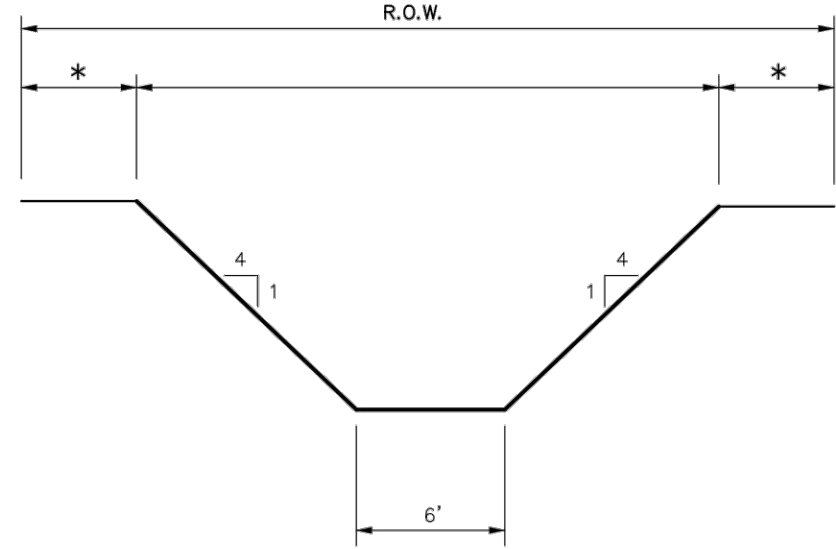
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CHECKED BY: KfAlKE

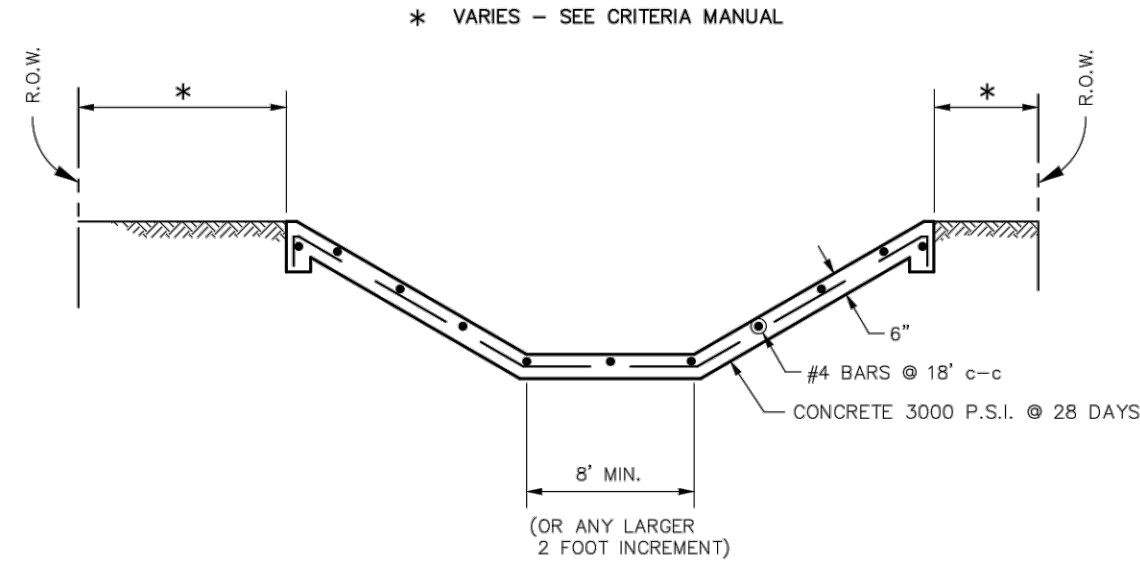
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F:\Users\2026-DRAINAGE-DISTRICTS\GCD\STD DETAILS-1.dwg 2/12/2007 4:05:01 PM CST



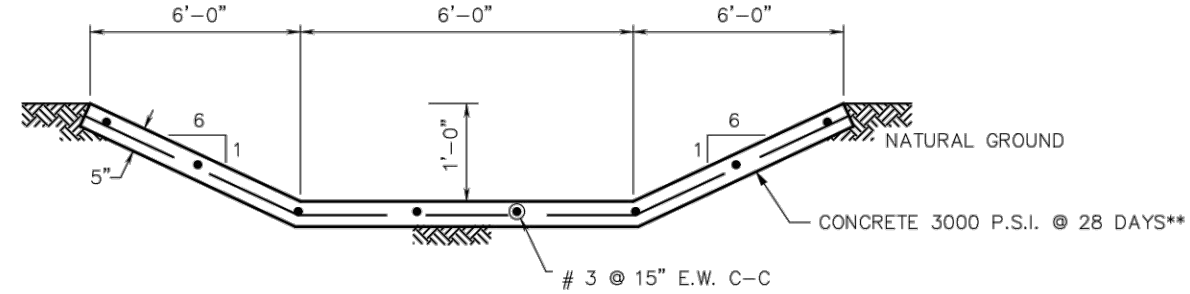
TYPICAL CHANNEL SECTION
N.T.S.

- * 25' MINOR CHANNELS
- * 30' MAJOR CHANNELS



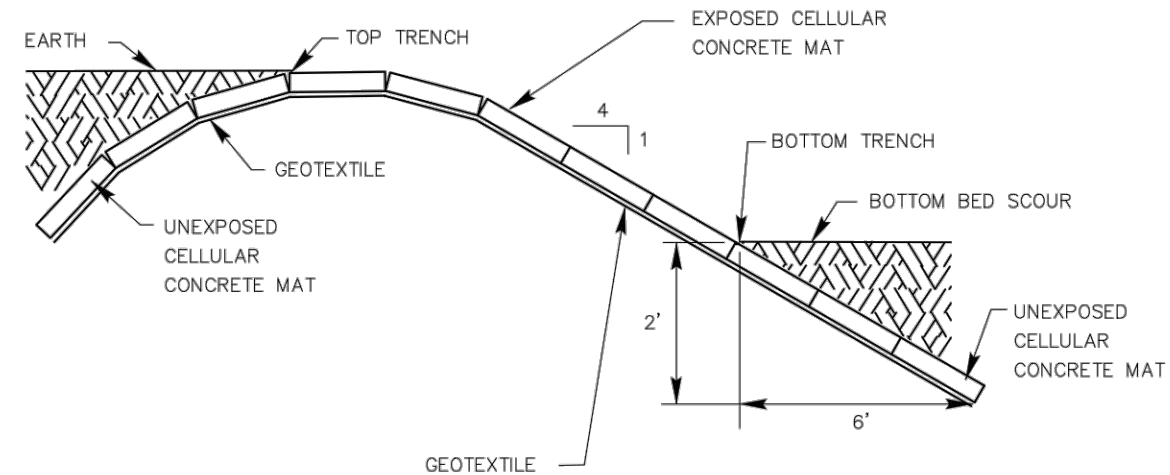
TYPICAL SECTION
CONCRETE TRAPEZOIDAL
N.T.S.

- A) MAX. SIDE SLOPE 1-1/2 : 1 (CONFIRMED WITH GEOTECHNICAL ANALYSIS)
- B) WELDED WIRE MESH IS NOT ALLOWED.



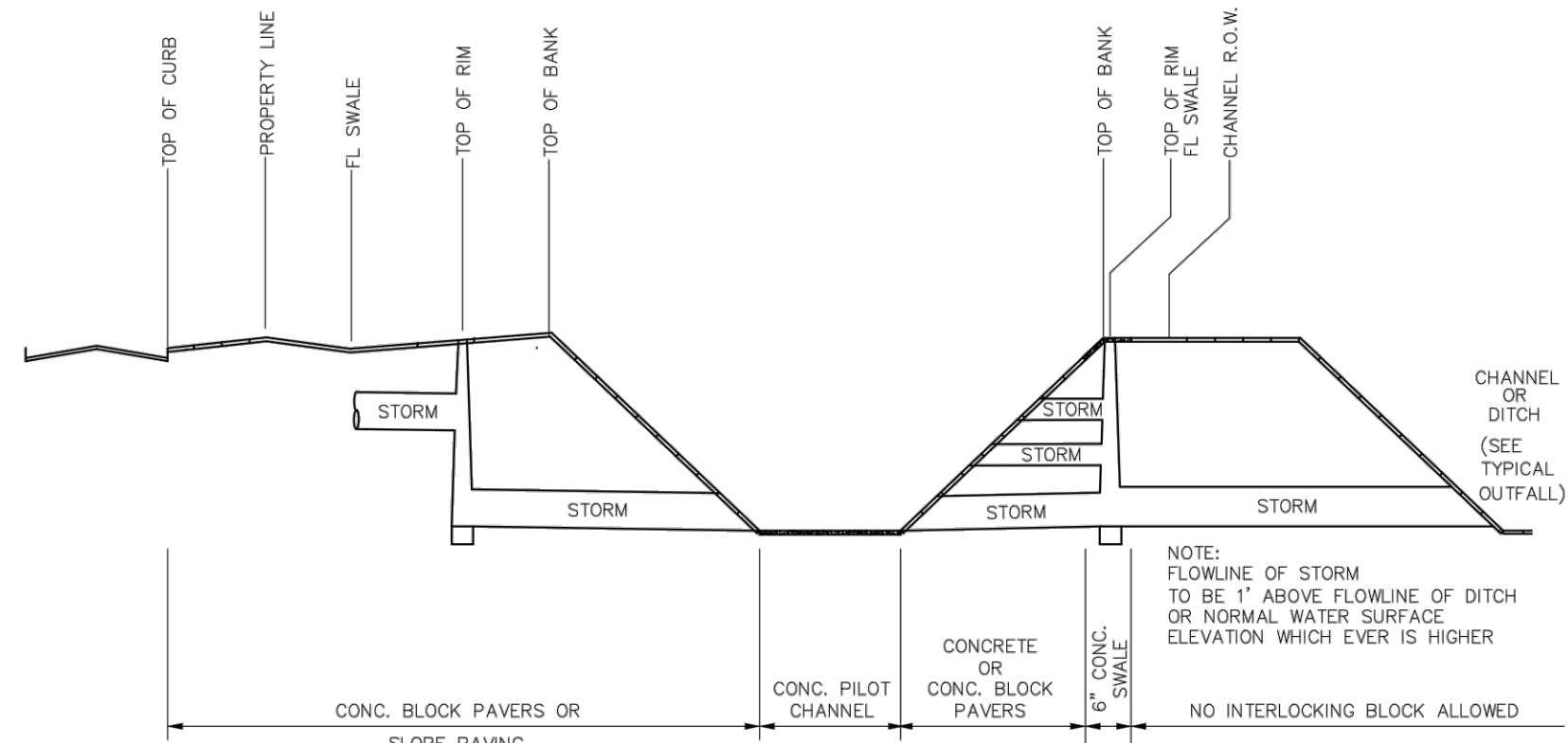
EMERGENCY OVERFLOW SWALE
N.T.S.

- ** : INTERLOCKING BLOCK MAY BE SUBSTITUTED FOR USE ON PRIVATE PROPERTY BUT NEVER IN DISTRICT MAINTAINED PONDS OR CHANNELS.



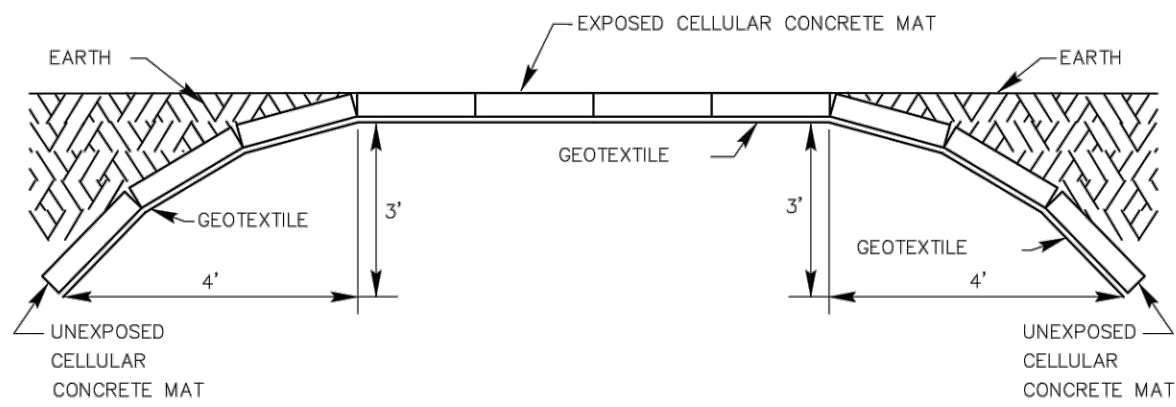
INTERLOCKING BLOCK
STANDARD SLOPE 4:1
N.T.S.

- NOTE : THIS DETAIL CAN NOT BE USED IN DISTRICT MAINTAINED CHANNELS OR PONDS.



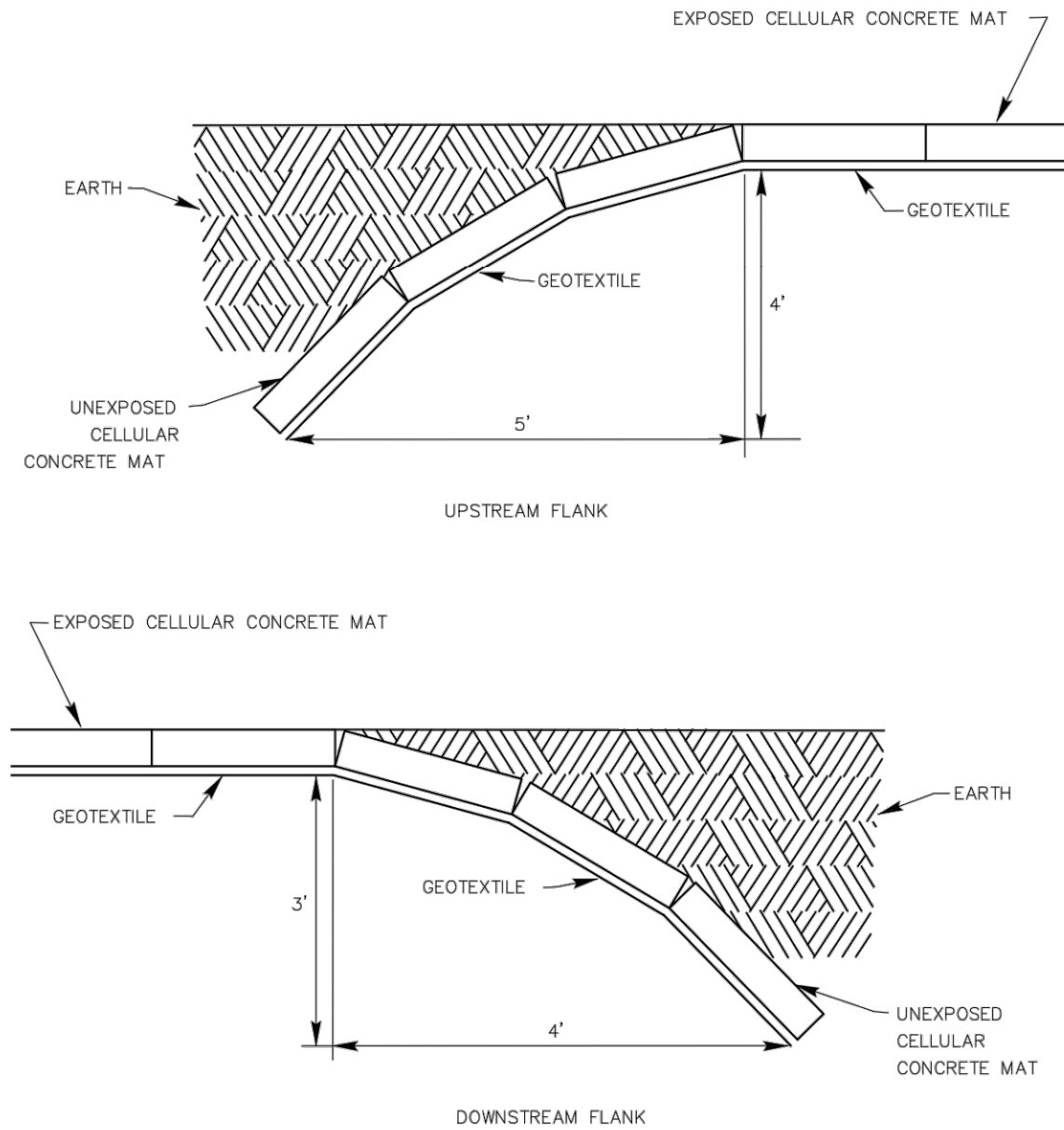
TYPICAL POND SECTION
N.T.S.

- NOTE: FLOWLINE OF STORM TO BE 1" ABOVE FLOWLINE OF DITCH OR NORMAL WATER SURFACE ELEVATION WHICH EVER IS HIGHER
- NO INTERLOCKING BLOCK ALLOWED



SIDE TURNDOWN
N.T.S.

- NOTE : THIS DETAIL CAN NOT BE USED IN DISTRICT MAINTAINED CHANNELS OR PONDS.

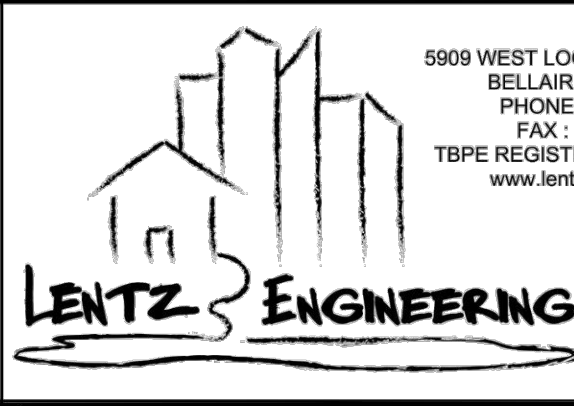


UPSTREAM AND DOWNSTREAM FLANK
N.T.S.

- NOTE : THIS DETAIL CAN NOT BE USED IN DISTRICT MAINTAINED CHANNELS OR PONDS.

NO.	DATE	REVISIONS	APP.
1	07/28/10	EFFECTIVE	AEL

GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT



5909 WEST LOOP SOUTH, SUITE 200
BELLAIRE, TEXAS 77401
PHONE : 713.638.8900
FAX : 713.638.8920
TBPE REGISTRATION No. F-001378
www.lentzengineering.net

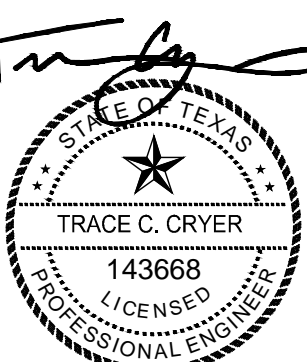
UNIT NO.:	GALVESTON COUNTY, TEXAS	
DRAWN BY:	STANDARD DETAILS	
DESIGNED BY:	A.E.L.	
APPROVED BY:	A.E.L.	
JOB NO.:	1 OF 3	



ARCHITECT	PBK Architects, Inc.
HOUSTON	11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608
OWNER	
DESIGNERS	
STRUCTURAL	
ELECTRICAL	
M.E.P.	
MECHANICAL	
FOOD SERVICE	
FOODSERVICE DESIGN PROFESSIONALS	
BUILDING ENVELOPE	
BEAM	

WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546
ISSUE FOR PROPOSAL



09/26/2022

CLIENT FRIENDSWOOD ISD		
DATE 2022/09/07	PROJECT NUMBER 220083	
DRAWING HISTORY		
No.	Description	Date
ADD 3	ADDENDUM 3	9/26/2022
ISSUE FOR PROPOSAL		

GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT DETAILS

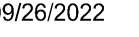
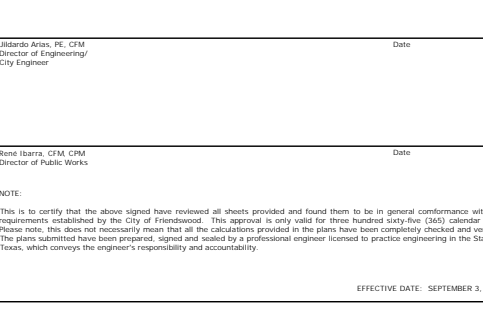
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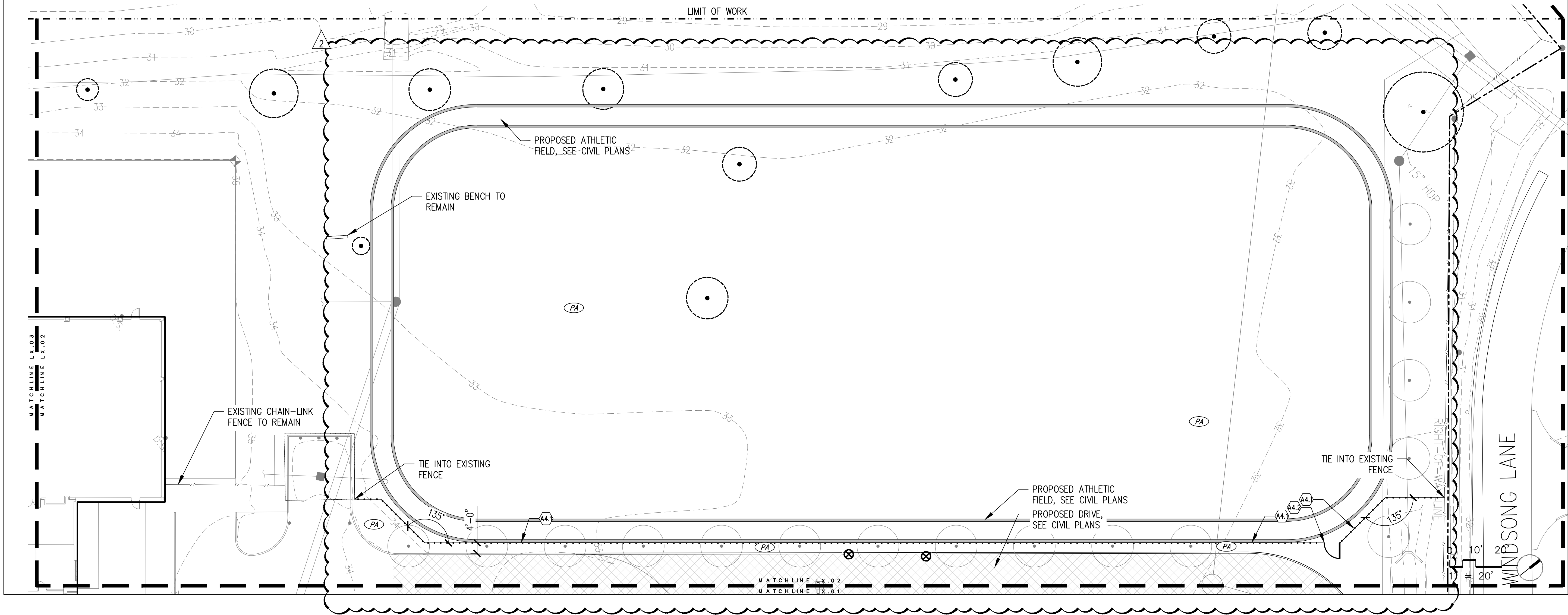
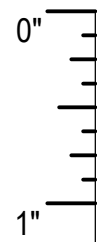
GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT

UNIT NO.			
00	DRUM BY:	GALVESTON COUNTY, TEXAS	
8	DESIGNED BY:	STANDARD DETAILS	SCALE: N.T.S.
	APPROVED BY:	A.E.L.	DATE: JULY 28, 2010
	JOB NO.		SHEET NO.: 2 OF 3



GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT DETAILS



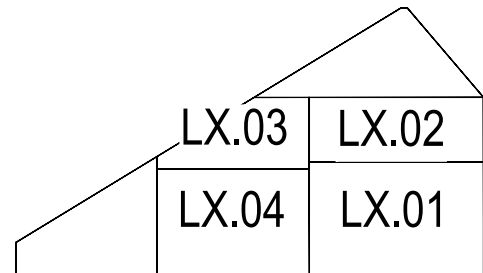


ARCHITECT	PBK Architects, Inc.
HOUSTON	11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608
CIVIL	ONE ENGINEERS 713 940 3238
STRUCTURAL	KUBALK ENGINEERS 713 940 3238
MECH	LEAF ENGINEERS 713 940 3238
FOOD SERVICES	FOODSERVICE DESIGN PROFESSIONALS 261 552 2293
BUILDING ENVELOPE	TEAM 713 940 3238
LANDSCAPE ARCHITECTURE	EDGELAND GROUP 713 460 0588

WINDSONG
ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL



KEY PLAN
NORTH: PLAN TRUE



CLIENT FRIENDSWOOD ISD		
DATE 2022/09/07		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM 03	09/26/22
ISSUE FOR PROPOSAL		

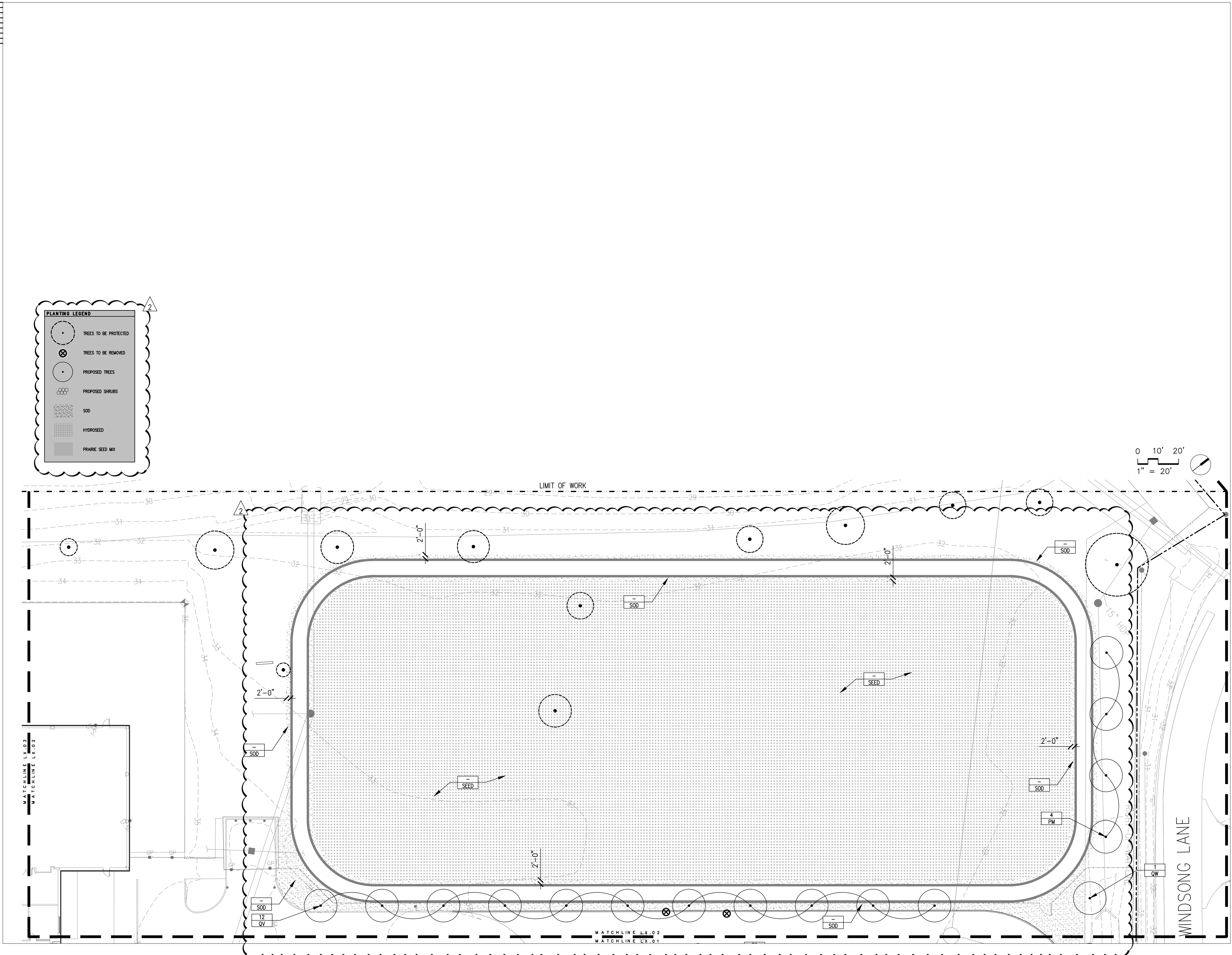
MATERIALS PLAN

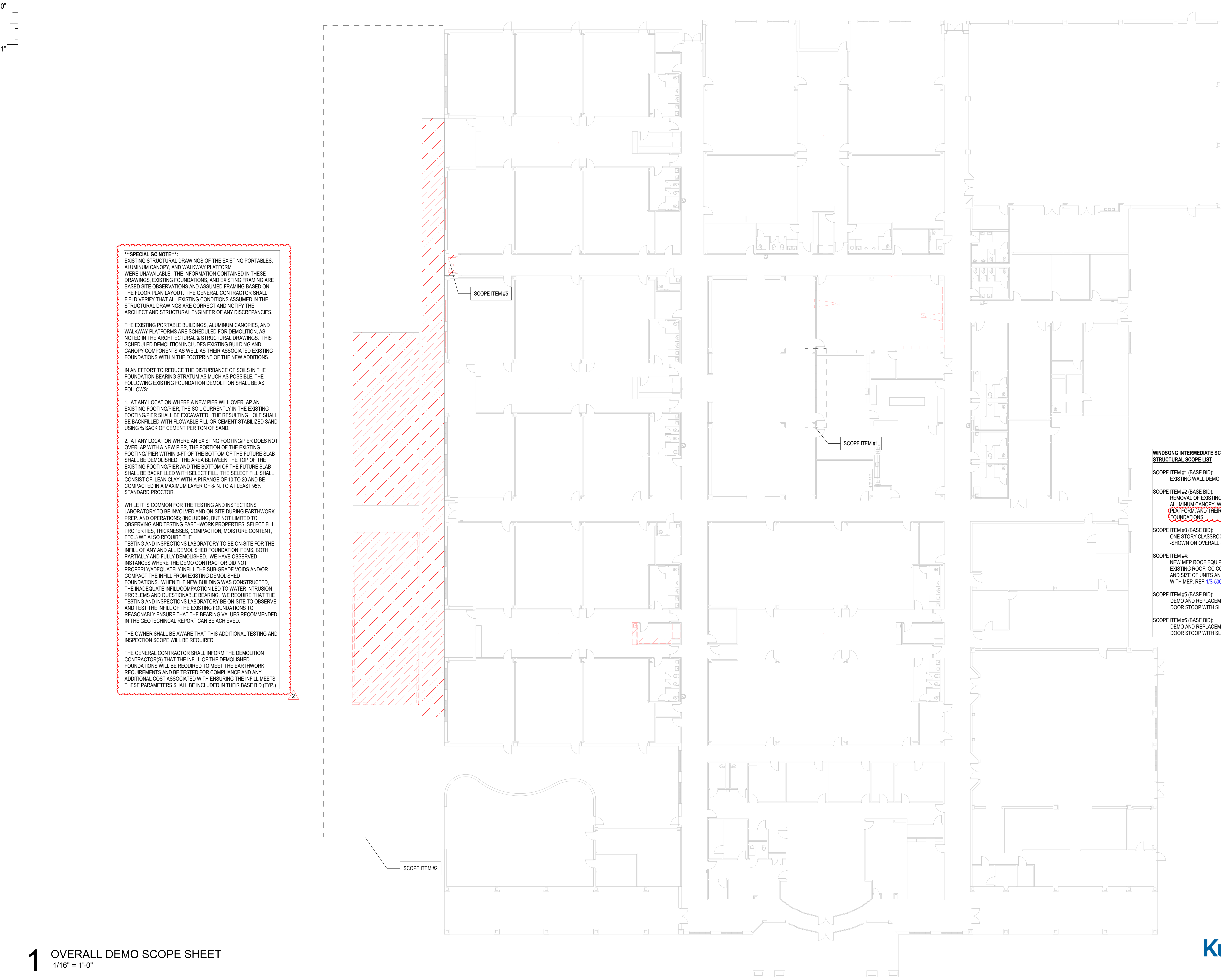
L2.02



CLIENT		
FRIENDSWOOD ISD		
DATE	PROJECT NUMBER	
2022/09/07	220083	
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM 03	09/26/22
ISSUE FOR PROPOSAL		

L4.02





SPECIAL GC NOTE:
EXISTING STRUCTURAL DRAWINGS OF THE EXISTING PORTABLES, ALUMINUM CANOPY, AND WALKWAY PLATFORM WERE UNAVAILABLE. THE INFORMATION CONTAINED IN THESE DRAWINGS, EXISTING FOUNDATIONS, AND EXISTING FRAMING ARE BASED ON SITE OBSERVATIONS AND ASSUMED FRAMING BASED ON THE FLOOR PLAN LAYOUT. THE GENERAL CONTRACTOR SHALL FIELD VERIFY THAT ALL EXISTING CONDITIONS ASSUMED IN THE STRUCTURAL DRAWINGS ARE CORRECT AND NOTIFY THE ARCHIECT AND STRUCTURAL ENGINEER OF ANY DISCREPANCIES.

THE EXISTING PORTABLE BUILDINGS, ALUMINUM CANOPIES, AND WALKWAY PLATFORMS ARE SCHEDULED FOR DEMOLITION AS NOTED IN THE ARCHITECTURAL & STRUCTURAL DRAWINGS. THIS SCHEDULED DEMOLITION INCLUDES EXISTING BUILDING AND CANOPY COMPONENTS AS WELL AS THEIR ASSOCIATED EXISTING FOUNDATIONS WITHIN THE FOOTPRINT OF THE NEW ADDITIONS.

IN AN EFFORT TO REDUCE THE DISTURBANCE OF SOILS IN THE FOUNDATION BEARING STRATUM AS MUCH AS POSSIBLE, THE FOLLOWING EXISTING FOUNDATION DEMOLITION SHALL BE AS FOLLOWS:

1. AT ANY LOCATION WHERE A NEW PIER WILL OVERLAP AN EXISTING FOOTING/PIER, THE SOIL CURRENTLY IN THE EXISTING FOOTING/PIER SHALL BE EXCAVATED. THE RESULTING HOLE SHALL BE BACKFILLED WITH FLOWABLE FILL OR CEMENT STABILIZED SAND USING ¾ SACK OF CEMENT PER TON OF SAND.
2. AT ANY LOCATION WHERE AN EXISTING FOOTING/PIER DOES NOT OVERLAP WITH A NEW PIER, THE PORTION OF THE EXISTING FOOTING/PIER WITHIN 3-FT OF THE BOTTOM OF THE FUTURE SLAB SHALL BE DEMOLISHED. THE AREA BETWEEN THE TOP OF THE EXISTING FOOTING/PIER AND THE BOTTOM OF THE FUTURE SLAB SHALL BE BACKFILLED WITH SELECT FILL. THE SELECT FILL SHALL CONSIST OF LEAN CLAY WITH A PI RANGE OF 10 TO 20 AND BE COMPACTED IN A MAXIMUM LAYER OF 6-IN. TO AT LEAST 95% STANDARD PROCTOR.

WHILE IT IS COMMON FOR THE TESTING AND INSPECTIONS LABORATORY TO BE INVOLVED AND ON-SITE DURING EARTHWORK PREP AND OPERATIONS, (INCLUDING, BUT NOT LIMITED TO: OBSERVING AND TESTING EARTHWORK PROPERTIES, SELECT FILL PROPERTIES, THICKNESSES, COMPACTION, MOISTURE CONTENT, ETC.) WE ALSO REQUIRE THE TESTING AND INSPECTIONS LABORATORY TO BE ON-SITE FOR THE INFILL OF ANY AND ALL DEMOLISHED FOUNDATION ITEMS, BOTH PARTIALLY AND FULLY DEMOLISHED. WE HAVE OBSERVED INSTANCES WHERE THE DEMO CONTRACTOR DID NOT PROPERLY/ADEQUATELY INFILL THE SUB-GRADE VOIDS AND/OR COMPACT THE INFILL FROM EXISTING DEMOLISHED FOUNDATIONS. WHEN THE NEW BUILDING WAS CONSTRUCTED, THE INADEQUATE INFILL/COMPACTION LED TO WATER INTRUSION PROBLEMS AND QUESTIONABLE BEARING. WE REQUIRE THAT THE TESTING AND INSPECTIONS LABORATORY BE ON-SITE TO OBSERVE AND TEST THE INFILL OF THE EXISTING FOUNDATIONS TO REASONABLY ENSURE THAT THE BEARING VALUES RECOMMENDED IN THE GEOTECHINCAL REPORT CAN BE ACHIEVED.

THE OWNER SHALL BE AWARE THAT THIS ADDITIONAL TESTING AND INSPECTION SCOPE WILL BE REQUIRED.

THE GENERAL CONTRACTOR SHALL INFORM THE DEMOLITION CONTRACTOR(S) THAT THE INFILL OF THE DEMOLISHED FOUNDATIONS WILL BE REQUIRED TO MEET THE EARTHWORK REQUIREMENTS AND BE TESTED FOR COMPLIANCE AND ANY ADDITIONAL COST ASSOCIATED WITH ENSURING THE INFILL MEETS THESE PARAMETERS SHALL BE INCLUDED IN THEIR BASE BID (TYP.)

- WINDSONG INTERMEDIATE SCHOOL
STRUCTURAL SCOPE LIST**
- SCOPE ITEM #1 (BASE BID):
EXISTING WALL DEMO
- SCOPE ITEM #2 (BASE BID):
REMOVAL OF EXISTING PORTABLES,
ALUMINUM CANOPY, WALKWAY
PLATFORM, AND THEIR ASSOCIATIVE
FOUNDATIONS.
- SCOPE ITEM #3 (BASE BID):
ONE STORY CLASSROOM ADDITION
-SHOWN ON OVERALL SCOPE
- SCOPE ITEM #4:
NEW MEP ROOF EQUIPMENT ADDED TO
EXISTING ROOF. GC COORDINATE LOCATION
AND SIZE OF UNITS AND MECH OPENINGS
WITH MEP REF 1/S-506, 2/S-506, 3/S-506, 4/S-506
- SCOPE ITEM #5 (BASE BID):
DEMO AND REPLACEMENT OF EXISTING
DOOR STOOP WITH SLAB-ON-GRADE.
- SCOPE ITEM #6 (BASE BID):
DEMO AND REPLACEMENT OF EXISTING
DOOR STOOP WITH SLAB-ON-GRADE.

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CIVIL

DIG FOUNDERS

713-960-3238

HOUSTON

KUBALA ENGINEERS

1-800-248-3674

MECH

LEAF ENGINEERS

713-960-3300

FOOD SERVICE DESIGN PROFESSIONALS

781-350-2235

BUILDING ENVELOPE

BEAM

713-960-3301

WINDSONG
ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

FRIENDSWOOD
INDEPENDENT SCHOOL DISTRICT

A

B

C

D

E

F

G

KEY PLAN

NORTH: PLAN TRUE

STATE OF TEXAS

JOHN R. KUBALA

106120

09/07/2022

Kubala Engineers

F-3709

CLIENT

FRIENDSWOOD ISD

DATE

09/07/2022

PROJECT NUMBER

220083

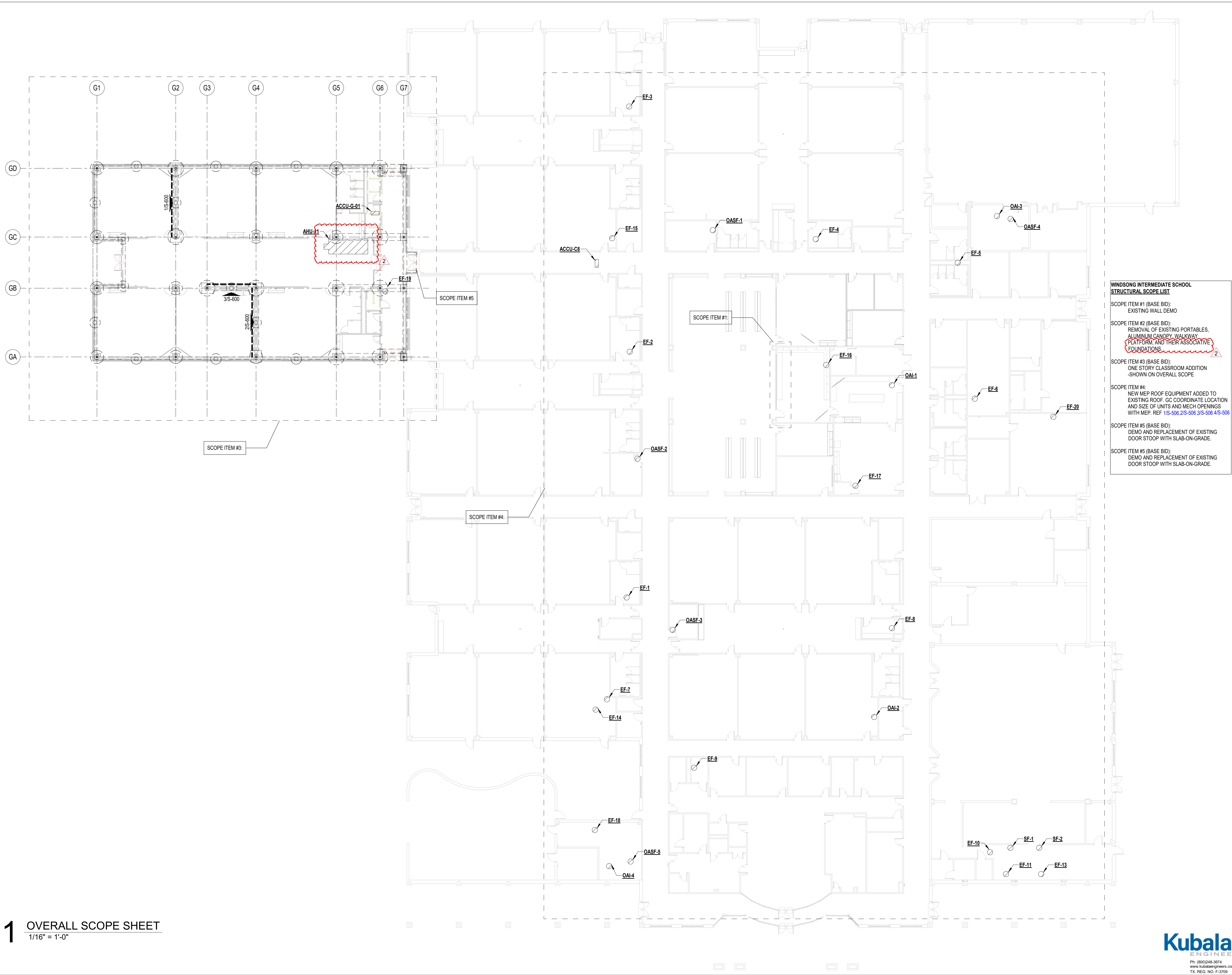
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2	ADDENDUM 03	09/26/2022

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OVERALL DEMO
SCOPE SHEET

SD-100



ARCHITECT

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DIG FOUNDERS

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KUBALA ENGINEERS

713-960-3674

MEP

LEAP ENGINEERS

713-960-3300

FOODSERVICE DESIGN PROFESSIONALS

881-592-2250

BUILDING ENVELOPE

BEAM

713-960-3001

WINDSONG INTERMEDIATE SCHOOL ADDITION AND RENOVATION

2100 W PARKWOOD AVE.

FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

2022

FRIENDSWOOD ISD

INDEPENDENT SCHOOL DISTRICT

KEY PLAN

NORTH: PLAN TRUE

STATE OF TEXAS

JOHN R. KUBALA

106120

09/07/2022

Kubala Engineers

F-3709

CLIENT

FRIENDSWOOD ISD

DATE

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220083

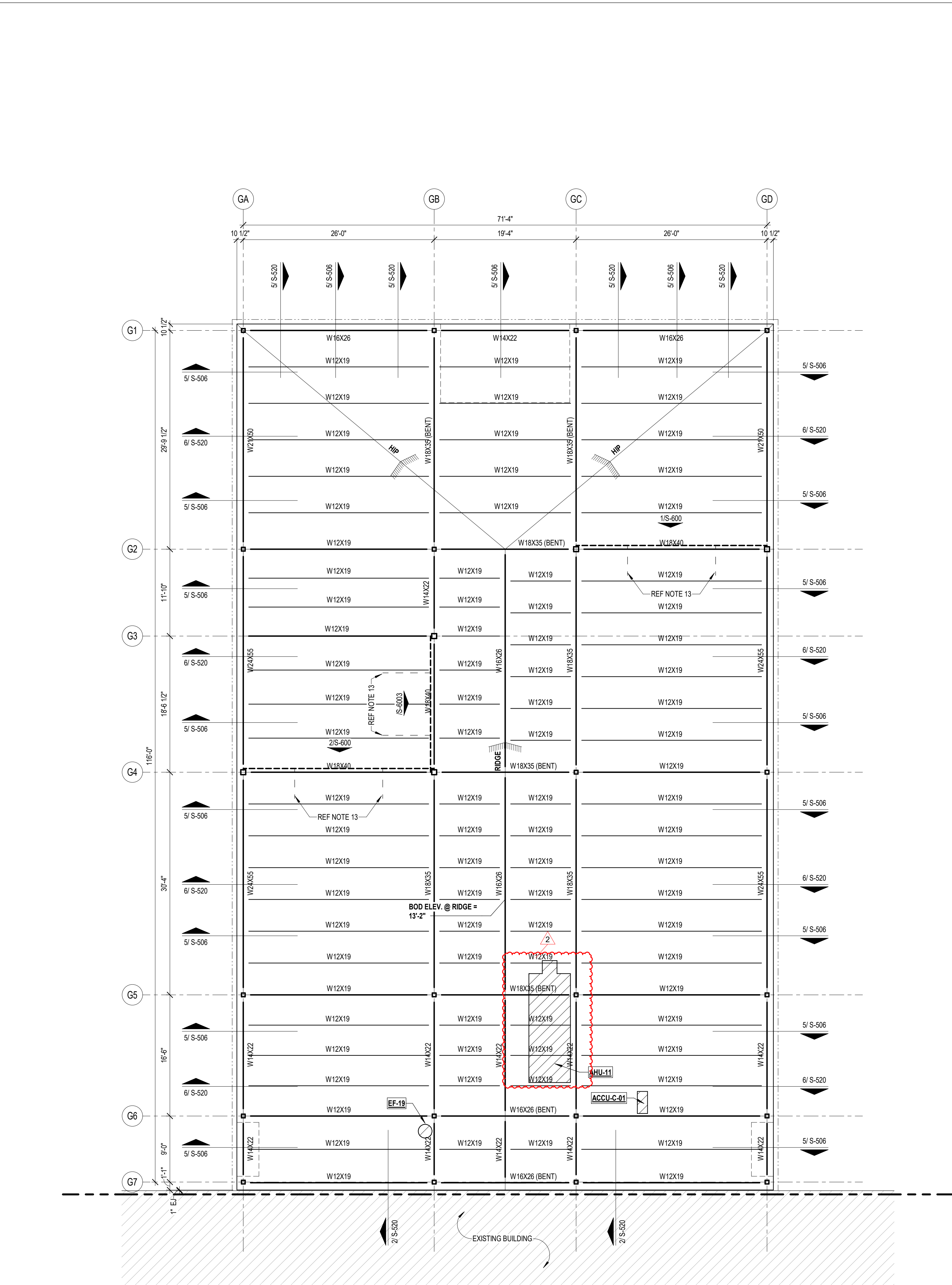
DRAWING HISTORY

No.	Description	Date
2	ADDENDUM 03	09/26/2022

ISSUE FOR PROPOSAL

OVERALL SCOPE SHEET

S-100



1

ROOF FRAMING PLAN - AREA G

1/8" = 1'-0"

- ROOF PLAN NOTES
1. REF PLAN FOR TOP OF SLAB ELEVATION.

2. ALL ELEVATIONS ARE BASED ON TOSC EL = 0'-0".

3. TOP OF ROOF STRUCTURE IS SLOPED FOR DRAINAGE. REF ELEVATIONS NOTED ON PLAN. SLOPES SHALL BE UNIFORM BETWEEN COLUMN CENTERLINES UNLESS SHOWN OTHERWISE.

4. JOIST MFR NOTE:
BRIDGING NOT SHOWN ON PLAN. MANUFACTURER SHALL PROVIDE STANDARD BRIDGING COMPLYING WITH SJI SPECIFICATIONS OF LATEST ADOPTION, TYPICAL FOR GRAVITY AND UPLIFT LOADS SUPERIMPOSED ON ALL JOISTS. DIAGONAL BRIDGING SHALL BE PROVIDED BETWEEN ADJACENT JOISTS WHENEVER BOTTOM CHORD HORIZONTAL BRIDGING IS CONTINUOUS.

5. REFER TO THE ROOF DIAPHRAGM CONNECTION SCHEDULE FOR DECK ATTACHMENT TO ROOF FRAMING MEMBERS AND DECK FASTENER TYPE, SIZE AND SPACING.

6. REF ARCH FOR TOP OF WALL ELEVATIONS.

7. DETAILING OF ALL MEMBER CONNECTIONS TO THE SUPPORTS SHALL BE PERFORMED TO SATISFY LATEST OSHA ERECTION REQUIREMENTS.

8. REF EL = BOTTOM OF DECK.

9. UNLESS SHOWN OTHERWISE, STEEL BEAMS OR JOISTS ARE CENTERED ON AND EQUALLY SPACED BETWEEN COLUMN CENTERLINES.

10. ALL STRUCTURAL STEEL THAT IS PERMANENTLY EXPOSED TO THE EXTERIOR OR IS PERMANENTLY IN UNCONDITIONED SPACE SHALL BE HOT-DIPPED GALVANIZED.

11. GC COORDINATE ALL PENETRATIONS AND UNDERGROUND UTILITIES WITH MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS. REFER TO TYPICAL DETAILS FOR ADDITIONAL REINFORCEMENT REQUIREMENTS.

12. CONTRACTOR TO VERIFY ALL SLAB EDGE DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO CONSTRUCTION.

13. INDICATES WIND BRACE BEAM BOTTOM FLANGE BRACING PER 7/S-505 ,TYP ALONG ENTIRE GRID AT ALL BRACE FRAMES. NOT SHOWN IN PLAN FOR CLARITY.

14. REF DETAIL 1/S-504 WHERE ROOF TOP EQUIPMENT REQUIRES A STRUCTURAL CURB. JOISTS THAT ARE SUPPORTING ROOF TOP EQUIPMENT SHALL BE DESIGNED FOR AN ADDITIONAL CONCENTRATED DEAD LOAD (AS SHOWN ON PLAN AT ANY POINT ALONG JOIST SPAN). GC SHALL COORDINATE WITH MEP, ARCHITECTURE AND EQUIPMENT CUTSHEETS FOR FINAL WEIGHT, DIMENSIONS, LOCATION, ETC.

15. ----- INDICATES PIPING RUN. REF MEP DRAWINGS; GC SHALL COORDINATE GIVEN LOAD WITH JOIST MANUFACTURER. REF SHEET S-011.

16. REF S0.xx SERIES DRAWINGS FOR GENERAL NOTES AND TYP DETAILS

17. REF S4.xx SERIES DRAWINGS FOR CMU DETAILS.

18. REF S5.xx SERIES DRAWINGS FOR STEEL FRAMING DETAILS.

19. REF S6.xx SERIES DRAWINGS FOR STEEL BRACE ELEVATIONS AND DETAILS.

20. - INDICATES COLUMN BRACING PER 6/S-502. TYPICAL AT COLUMNS UNBRACED BY FRAMING MEMBER ABOUT THEIR LOCAL AXIS. NOT ALL SHOWN ON PLAN FOR FOR CLARITY.

- METAL ROOF DECK TYPES
- ROOF DECK TYPE 1:
1.0 GSV 22 GA (GALV.) VENTED MTL DECK.
- NOTES
1. STEEL DECK SHALL BE PLACED WITH TWO-SPAN CONDITION MINIMUM. NO SINGLE SPANS ARE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER-OF-RECORD.

2. REF METAL ROOF DECKING GENERAL NOTES AND METAL DECK SCHEDULE ON SHEET S-506 FOR MORE INFORMATION REGARDING ROOF DECK REQUIREMENTS.

ARCHITECT

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MEP

LEAF ENGINEERS

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PKB Architects, Inc.

PKB.com

WINDSONG
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SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

FRIENDSWOOD ISD

A

B

C

D

E

F

G

KEY PLAN

NORTH: PLAN TRUE

JOHN R. KUBALA
106120
09/07/2022
Kubala Engineers
F-3709

CLIENT

FRIENDSWOOD ISD

DATE

09/07/2022

PROJECT NUMBER

220083

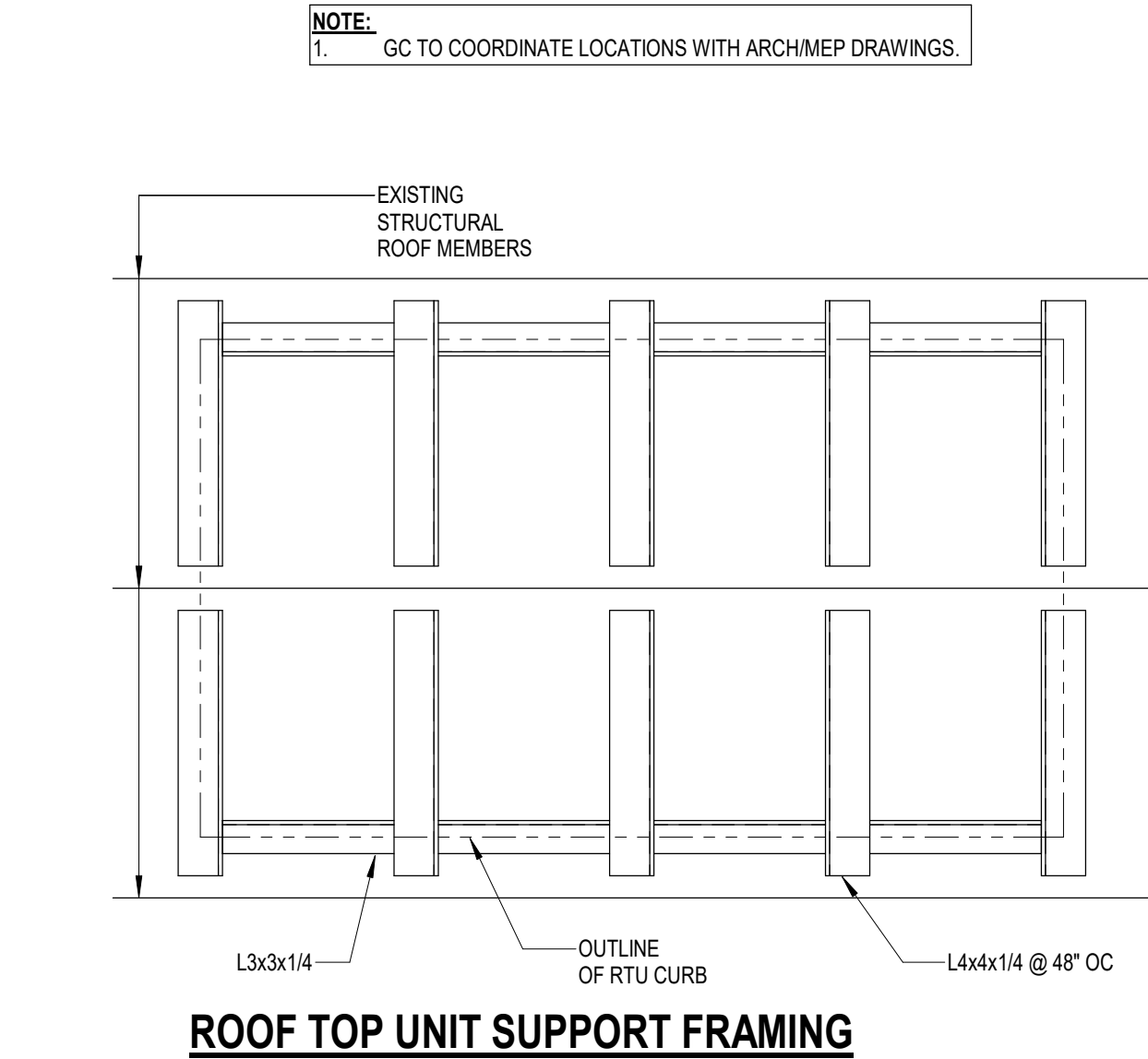
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No.	Description	Date
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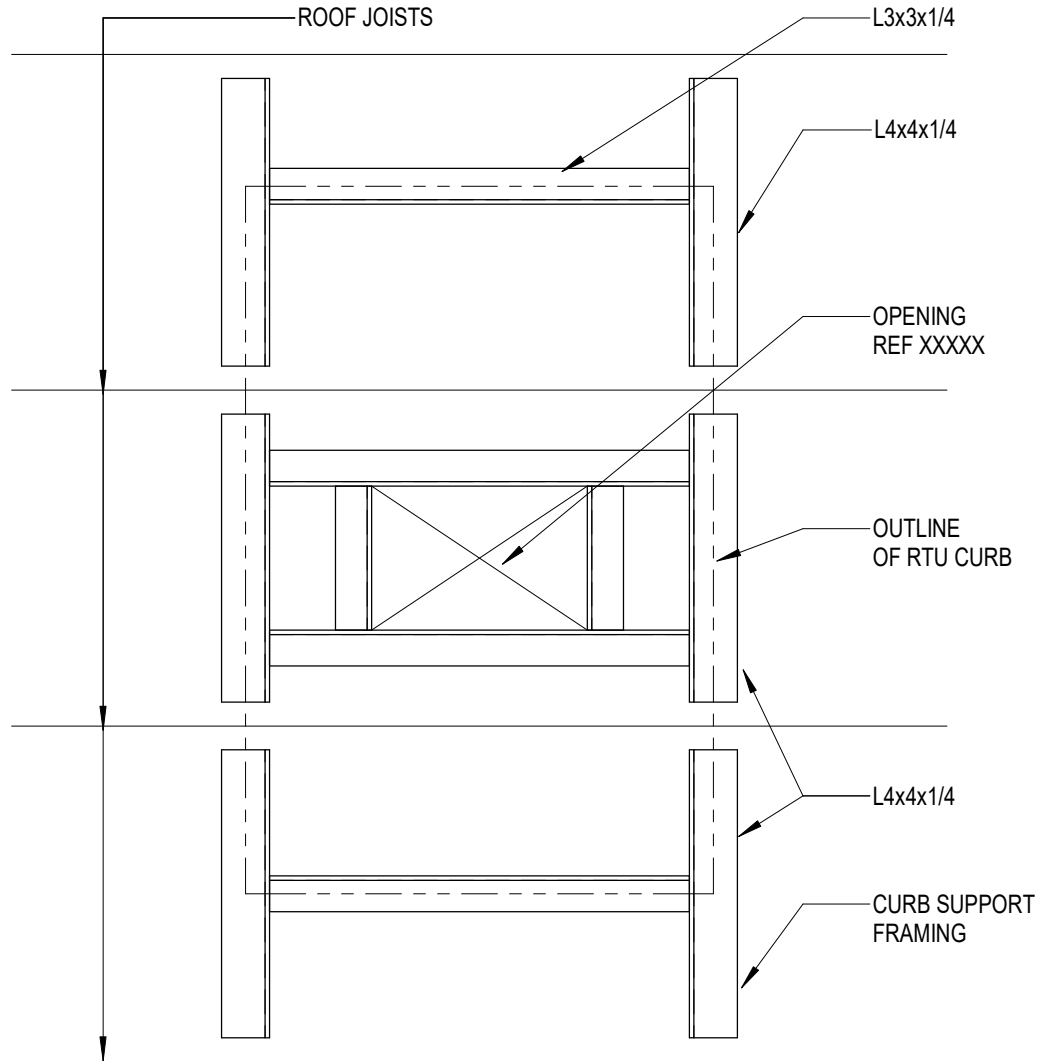
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ROOF FRAMING PLAN
- AREA G

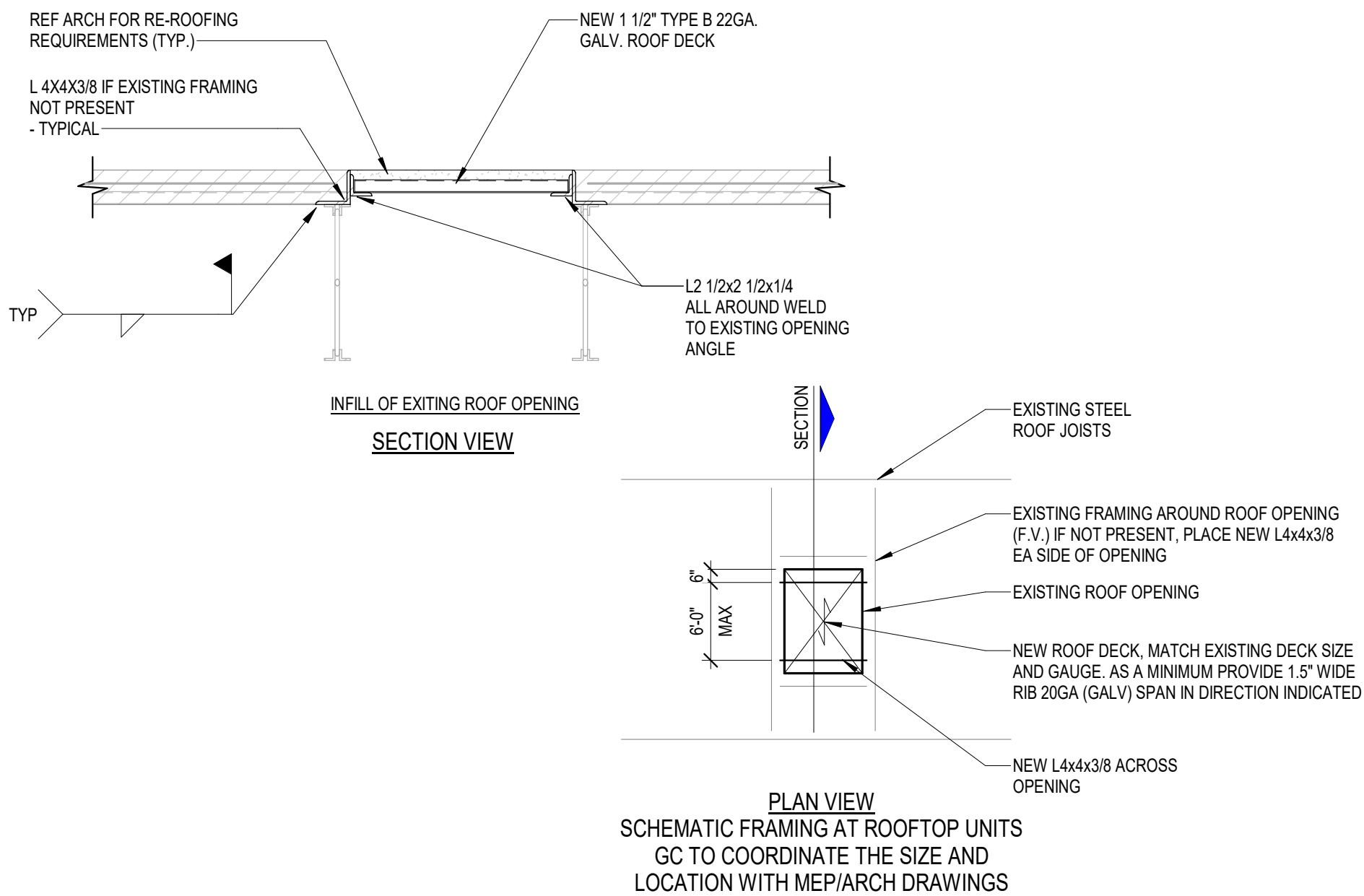
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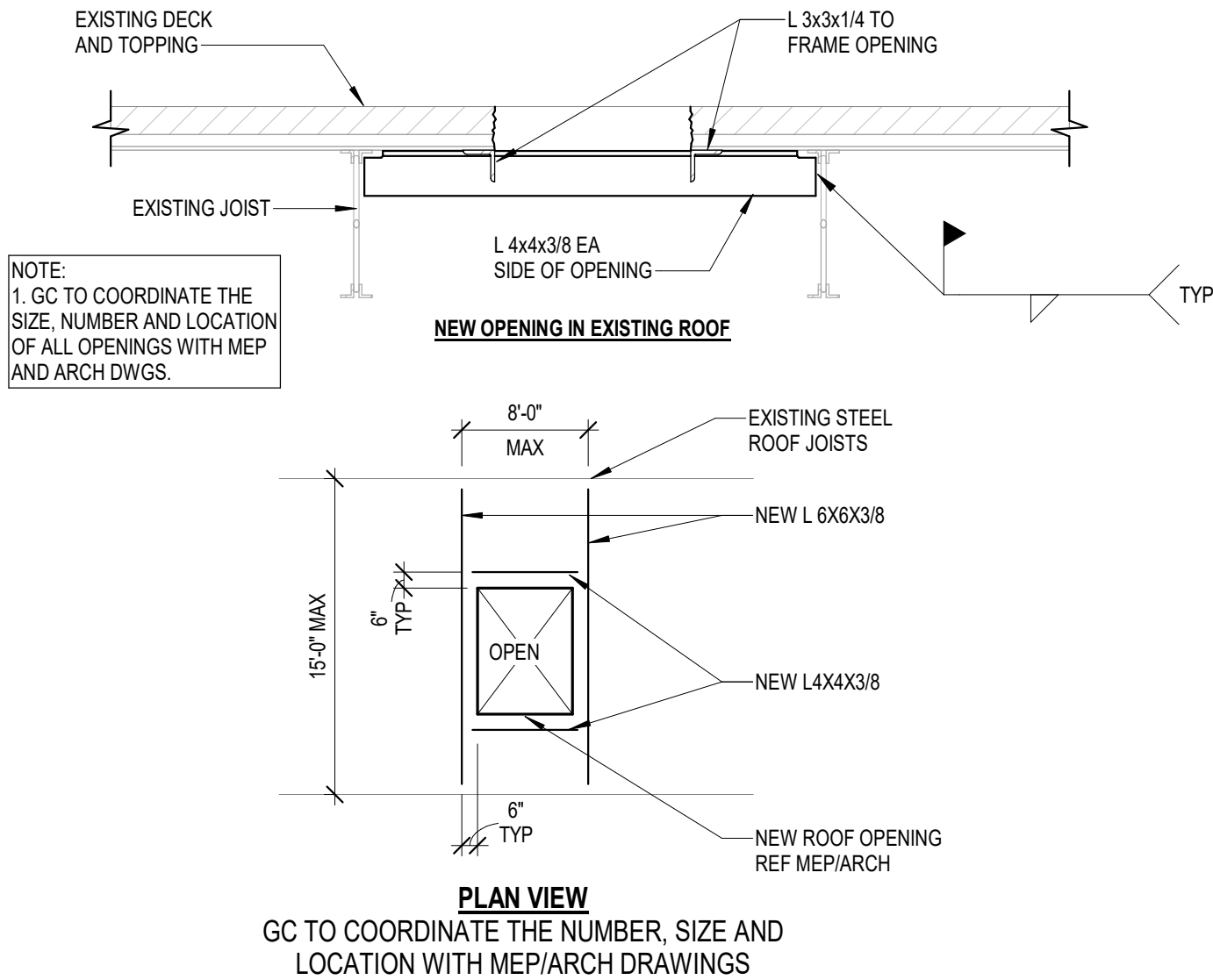
1 ROOF TOP UNIT SUPPORT AT EXISTING ROOF
3/4" = 1'-0"



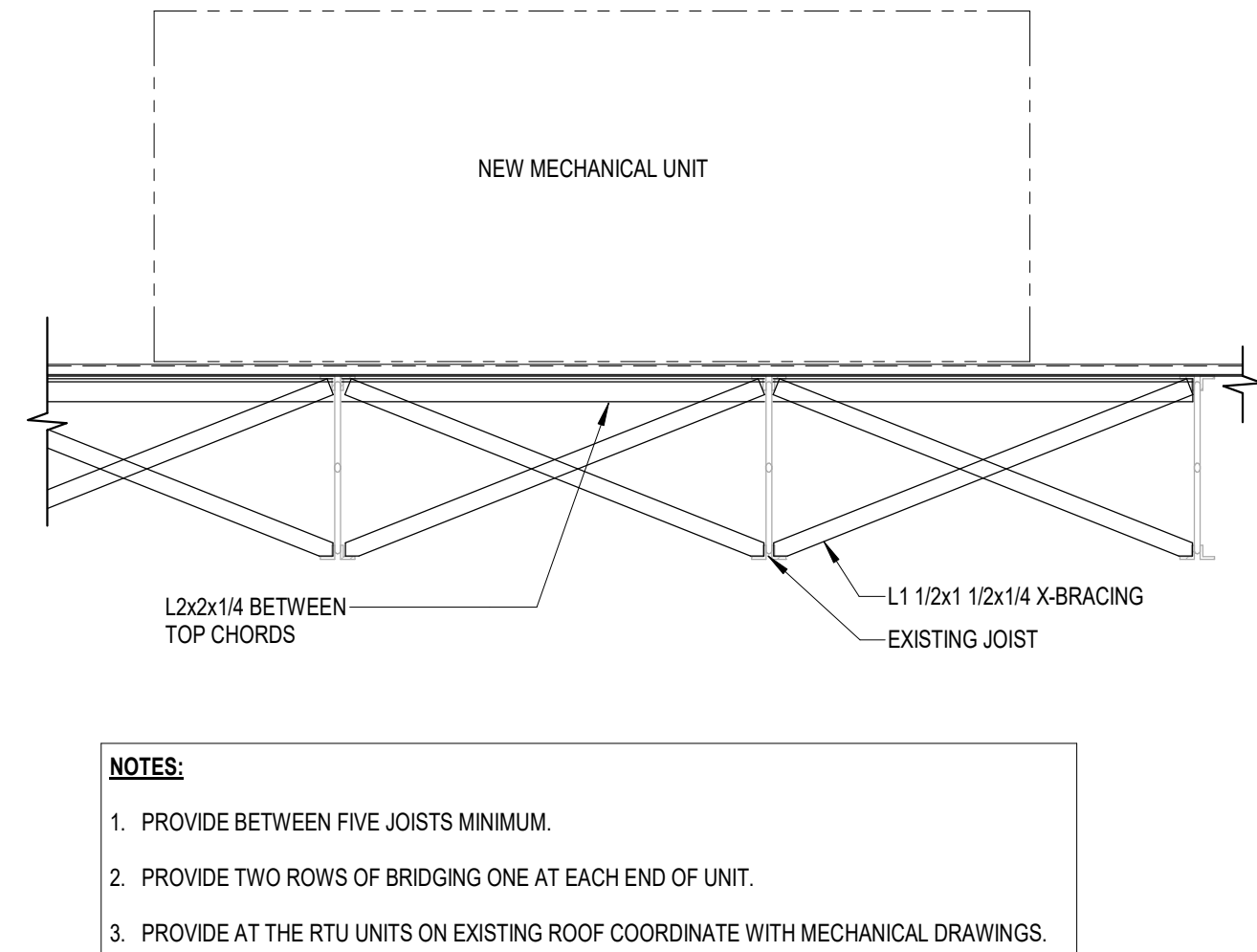
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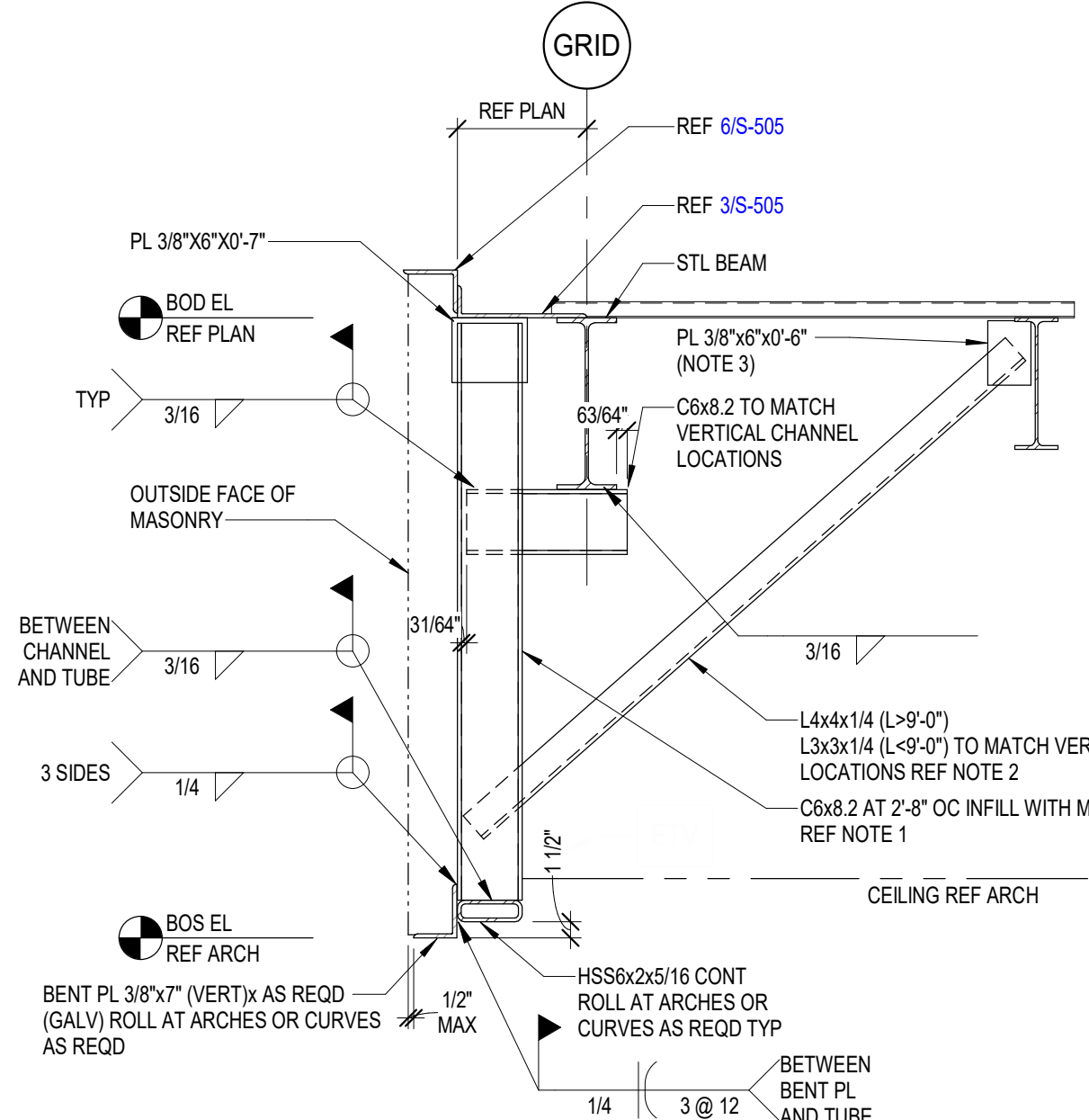
2 TYPICAL INFILL DETAIL AT EXISTING MECH PENETRATION
3/4" = 1'-0"



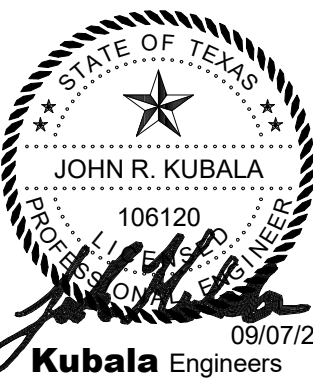
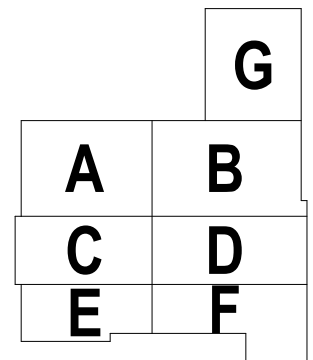
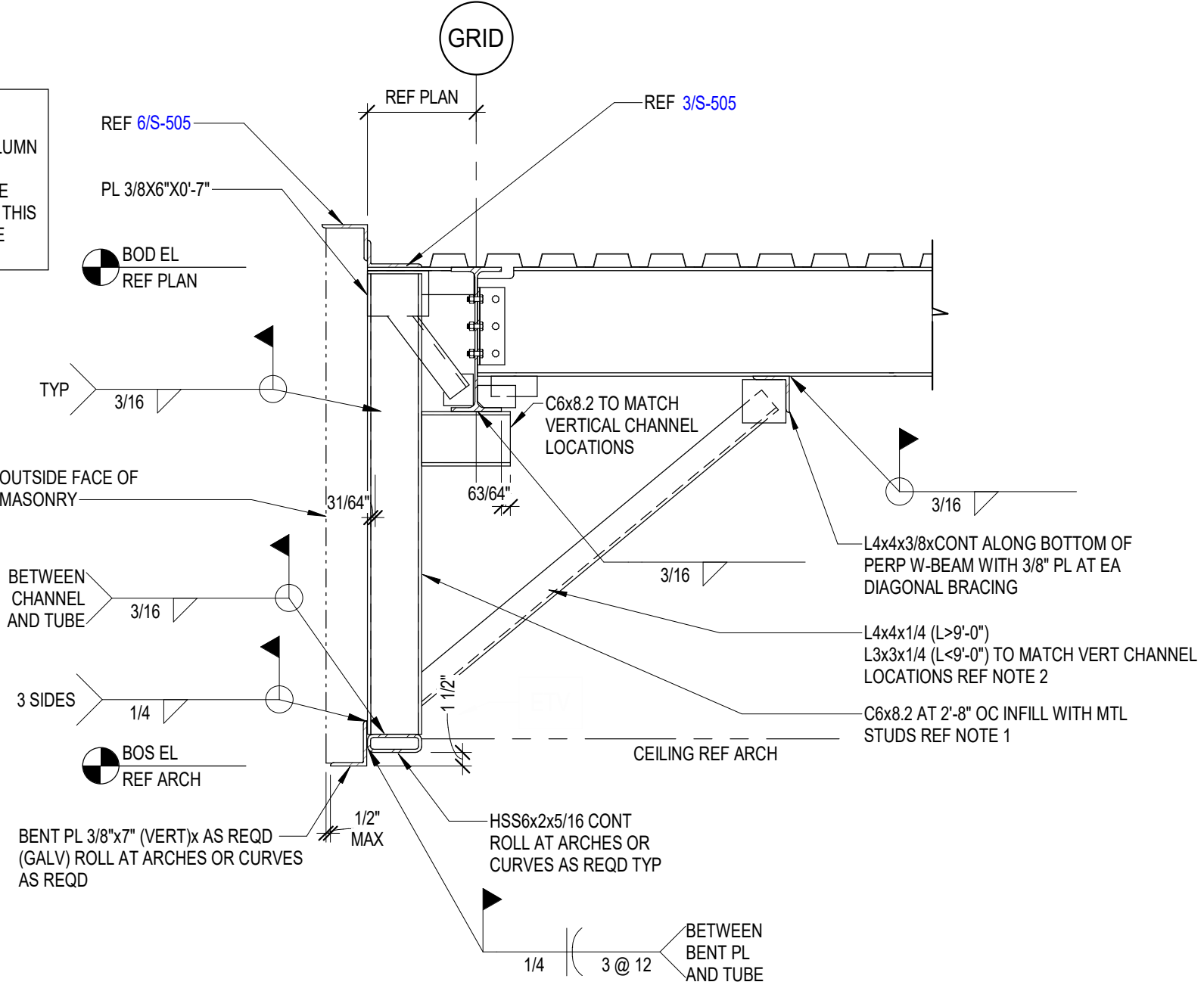
3 NEW ROOF PENETRATION / OPENING IN EXISTING
3/4" = 1'-0"



4 REINFORCING DETAIL AT NEW MECHANICAL UNITS
NO SCALE



5 TYPICAL MASONRY SUPPORT OVER OPENINGS GREATER THAN 8'-0"
3/4" = 1'-0"



CLIENT		
FRIENDSWOOD ISD		
DATE	09/07/2022	PROJECT NUMBER
		220083
DRAWING HISTORY		
No.	Description	Date
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GENERAL DEMOLITION NOTES

1. DEMOLITION PLANS INDICATE SOME OF THE SCOPE-OF-WORK INVOLVED FOR THE DEMOLITION PHASE OF THIS PROJECT. CONTRACTOR SHALL REVIEW ALL SHEETS FOR ADDITIONAL DEMOLITION SCOPE.

2. CONTRACTOR SHALL VERIFY EXISTING SITE AND BUILDING CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO DEMOLITION ACTIVITIES AND WORK.

3. CONTRACTOR SHALL NOTIFY ARCHITECT OF ANY DISCREPANCIES IN WRITING.

4. CONTRACTOR SHALL NOTIFY ARCHITECT AND OWNER OF ANY POSSIBLE ASBESTOS CONTAINING MATERIALS DISCOVERED BEFORE PROCEEDING WITH WORK, PROTECT INTERIOR CONSTRUCTION TO REMAIN DURING DEMOLITION AND CONSTRUCTION.

5. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS BEFORE COMMENCING WORK.

6. AFTER AWARD OF THE CONTRACT, CHANGE ORDER REQUESTS FOR ADDITIONAL MONEY WILL NOT BE APPROVED IF THE WORK COULD HAVE BEEN ANTICIPATED DURING A SITE VISIT BY THE CONTRACTOR.

7. CONTRACTOR SHALL NOT SCALE DRAWINGS.

8. CONTRACTOR SHALL PROVIDE ALL NECESSARY TEMPORARY SHORING, TEMPORARY BRACING, AND OR TEMPORARY SUPPORTS AS REQUIRED TO MAINTAIN STRUCTURAL INTEGRITY OF EXISTING STRUCTURE TO REMAIN AND OR EXISTING BUILDING ELEMENTS TO REMAIN.

9. CONTRACTOR IS TO VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO DEMOLITION ACTIVITIES AND WORK.

10. CONTRACTOR SHALL REMOVE TRASH AND DEBRIS REGULARLY AS NECESSARY TO ELIMINATED INTERFERENCE WITH ROADS, STREET, WALKS, AND ALL OTHER ADJACENT FACILITIES.

11. CONTRACTOR SHALL REMOVE TRASH AND DEBRIS FROM THE SITE ON A DAILY BASIS.

12. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION OF TEMPORARY DUST AND OR SOUND PARTITION BETWEEN CONSTRUCTION AREA AND AREAS NOT IN SCOPE AS NECESSARY. DEMOLITION ACTIVITIES SHALL BE PERFORMED SO AS TO PRODUCE MINIMAL DISTURBANCE TO EXISTING FACILITY AND OCCUPANTS (I.E. MINIMIZE EXCESSIVE AND PROLONGED NOISE LEVELS AND DUST).

13. CONTRACTOR SHALL REPAIR, REPLACE, OR PATCH EXISTING BUILDINGS, DRIVEWAYS, SIDEWALKS, CANOPIES, AND OR PARKING AREAS DAMAGED, MODIFIED, AND OR DISTURBED BY DEMOLITION WORK AT NO COST TO THE OWNER.

14. ALL EXISTING EQUIPMENT THAT REMAINS SHALL BE PROTECTED DURING DEMOLITION AND OR CONSTRUCTION TO PREVENT DAMAGE. ANY DAMAGE TO REMAINING EXISTING EQUIPMENT SUSTAINED DURING DEMOLITION AND OR CONSTRUCTION SHALL BE EQUIVALENTLY REPLACED OR EQUIVALENTLY REPAIRED AT NO COST TO THE OWNER.

15. CONTRACTOR SHALL PROVIDE TRAFFIC HANDLING MEASURES TO PROTECT THE GENERAL PUBLIC AT ALL TIMES, AS NECESSARY AND AS REQUIRED BY AUTHORITIES HAVING JURISDICTION.

16. DO NOT INTERRUPT EXISTING UTILITIES, EXCEPT WHEN AUTHORIZED IN WRITING BY AUTHORITIES HAVING JURISDICTION. PROVIDE TEMPORARY SERVICES DURING INTERRUPTIONS TO EXISTING UTILITIES, AS ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
17. WHEN UTILITY SERVICES ARE REQUIRED TO BE REMOVED, RELOCATED, OR ABANDONED, PROVIDE BYPASS CONNECTIONS TO MAINTAIN CONTINUITY OF SERVICE BEFORE PROCEEDING WITH DEMOLITION.

18. CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES INCLUDING BUT NOT LIMITED TO THE FOLLOWING: ELECTRIC, GAS, WATER, TELEPHONE, STORM SEWER, AND SANITARY SEWER FOR FIELD LOCATION OF ALL UNDERGROUND AND OVERHEAD UTILITY LINES. PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK, CONTRACTOR SHALL IDENTIFY ALL ELECTRICAL CIRCUITS SERVING THE AREA INVOLVED WITH THIS DEMOLITION. THOSE CIRCUITS SHALL THEN BE LOCKED OUT AND TAGGED OUT IF THEY DO NOT SERVICE ANY OF THE REMAINING BUILDING. THOSE CIRCUITS WHICH ARE IDENTIFIED TO SERVICE BOTH THE AREA TO BE DEMOLISHED AND THE REMAINING BUILDING SHALL BE SPLIT SO AS TO KILL ALL ELECTRICAL POWER TO THE AREA TO BE DEMOLISHED WHILE MAINTAINING POWER TO THE REMAINDER OF THE BUILDING.

19. CONTRACTOR SHALL RELOCATE UTILITIES AND EQUIPMENT AS REQUIRED TO ACCOMMODATE NEW HVAC, ELECTRICAL, PLUMBING, AND TECHNOLOGY REQUIREMENTS FOR NEW WORK.

20. PROTECT EXISTING SITE ELEMENTS AND EXISTING LANDSCAPING TO REMAIN. PROTECTION SHALL INCLUDE BUT NOT BE LIMITED TO EXISTING TREES AND OTHER EXISTING VEGETATION INDICATED TO REMAIN IN PLACE AGAINST UNNECESSARY CUTTING, BREAKING, OR SKINNING OF ROOTS, SKINNING OR BRUISING OF BARK, SMOOTHING OF TREES BY STOCKPILING CONSTRUCTION MATERIAL OR EXCAVATED MATERIAL WITHIN DRIP LINES.

21. CONTRACTOR SHALL REGRADE AND HYDROMULCH AREAS AFFECTED BY DEMOLITION.

22. OWNER HAS RIGHT OF FIRST REFUSAL OF ALL ITEMS REMOVED AS PART OF THE SCOPE OF WORK, WHETHER IDENTIFIED AS SALVAGE OR NOT.

23. NOTIFY THE BUILDING OWNER OF ANY MATERIALS, FIXTURES, ETC. TO BE REMOVED THAT ARE DEEMED SALVAGEABLE. TURN OVER ANY REQUESTED ITEMS TO THE BUILDING OWNER IN GOOD AND CLEAN CONDITION.

24. ALL FURNITURE WILL BE REMOVED OR RELOCATED BY THE OWNER AS NECESSARY PRIOR TO THE DEMOLITION WORK OF THIS PROJECT. CONTRACTOR SHALL COORDINATE WITH OWNER AS REQUIRED.

25. REMOVE EXISTING CONSTRUCTION TO THE EXTENT INDICATED ON THE DRAWINGS. SHOULD ANY DAMAGE OCCUR TO ANY EXISTING CONSTRUCTION TO REMAIN, THE CONTRACTOR SHALL REPAIR THE DAMAGE TO MATCH EXISTING AND OR ADJACENT CONSTRUCTION AT NO COST TO THE OWNER.

26. MAINTAIN ANY AND ALL EXISTING FIRE-RATED ASSEMBLIES THAT ARE TO REMAIN, AND THEIR ASSOCIATED FIRE-RATINGS, INCLUDING BUT NOT LIMITED TO ALL ASSOCIATED EXISTING FIRE-RATED OPENINGS, ALL ASSOCIATED EXISTING FIRE-RATED PENETRATIONS, AND ALL ASSOCIATED EXISTING FIRE-RATED FIRESTOPPING CONDITIONS.
1. WHEN UNANTICIPATED MECHANICAL, ELECTRICAL, OR STRUCTURAL ELEMENTS THAT CONFLICT WITH THE INTENDED FUNCTION OR DESIGN ARE ENCOUNTERED, DETERMINE THE NATURE AND EXTENT OF THE CONFLICT AND NOTIFY THE ARCHITECT IMMEDIATELY FOR RESOLUTION.

2. REMOVE, PATCH, AND REPAIR ALL ABANDONED ROOF PENETRATIONS RESULTING FROM WORK.

3. SAW-CUT AND REMOVE EXISTING FLOOR FINISHES AND FLOOR SLAB AS REQUIRED TO INSTALL NEW FIXTURES, ITEMS, AND OR DEVICES FOR ALL SCOPE-OF-WORK PERTAINING TO NEW MECHANICAL WORK, NEW PLUMBING UTILITIES, NEW PLUMBING WORK, NEW ELECTRICAL WORK, AND NEW TECHNOLOGY WORK. SPICE NEW REINFORCING BARS DOWELED INTO EXISTING CONCRETE AND PROVIDE NEW VAPOR RETARDER AND NEW CONTINUOUS WATERSTOPS AT JOINT BETWEEN NEW CONCRETE AND PREPARE FLOOR, INCLUDING NEW CONCRETE, TO RECEIVE NEW FLOOR FINISHES. COORDINATE WITH STRUCTURAL.

4. EXISTING WALLS (OR PORTIONS OF WALLS) TO BE REMOVED SHALL BE CUT FLUSH WHERE INTERSECTING WITH WALLS TO REMAIN. REMAINING WALLS TO BE PATCHED AND FINISHED SMOOTH.

5. NEW OPENING TO BE CUT IN EXISTING WALLS SHALL BE SAW-CUT AT LOCATIONS INDICATED TO THE HEIGHT AND WIDTH INDICATED. NEW LINTELS SHALL BE INSTALLED TO SUPPORT EXISTING WALL CONSTRUCTION ABOVE AS INDICATED ON THE DRAWINGS. OR IF NOT INDICATED, AS REQUIRED FOR NEW WALL CONSTRUCTION PER STRUCTURAL DRAWINGS. COORDINATE LOCATIONS OF ALL NEW OPENINGS IN EXISTING WALLS AND PARTITIONS WITH ARCHITECTURAL PLANS.

6. WHERE EXISTING WALL OPENINGS ARE TO BE NEWLY CLOSED-OFF, REMOVE ANY EXISTING OPENING FRAME AND PATCH AND REPAIR EXISTING WALL TO MATCH EXISTING ADJACENT MATERIALS AND FINISHES, UNLESS NOTED OTHERWISE.

7. WHERE EXISTING INTERIOR WALLS ARE REPLACED OR REMOVED, REMOVE MEPT SYSTEMS BACK TO PANEL, OR MECHANICAL ROOM, OR FARTHEST POSSIBLE POINT WITHOUT DISTURBING EXISTING CONSTRUCTION. REMOVE EXISTING MECHANICAL EQUIPMENT, RELOCATE POWER PER MEPT DRAWINGS.

8. REFER TO MEPT DRAWINGS FOR DEMOLITION OF MEPT SYSTEMS. IDENTIFY WORK REQUIRED BY THIS CONTRACTOR WHICH MAY AFFECT DEMOLITION AND OR REPAIRS OF ARCHITECTURAL ELEMENTS. COORDINATE WITH RELATED SUBCONTRACTORS THE EXTENT OF ALL DEMOLITION WORK.

9. PATCH FLOORS, WALLS, CEILINGS WHICH REMAIN AT LOCATIONS WHERE PIPES, CONDUITS, ETC. ARE REMOVED AS REQUIRED TO MATCH EXISTING CONDITIONS OR TO RECEIVE NEW FINISHES.

10. WHERE EXISTING FINISH FLOOR IS REMOVED, PREPARE FLOOR SURFACE TO RECEIVE NEW FLOORING.

11. ALL DASHED LINES ARE DEMOLITION LINES U.N.O.

DEMOLITION SITE PLAN LEGEND

EXISTING SITE & SITE ELEMENTS TO BE DEMOLISHED IN THEIR ENTIRETY UNLESS NOTED OTHERWISE

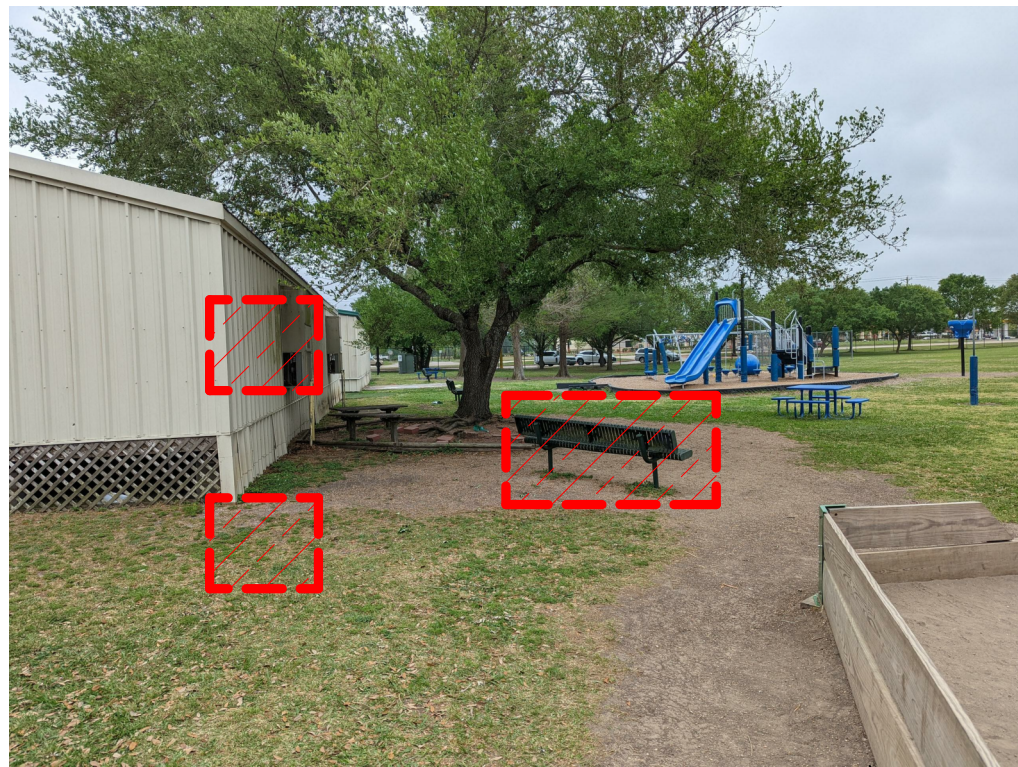
EXISTING BUILDING/STRUCTURE TO REMAIN, PROTECTED IN PLACE

EXISTING TO REMAIN

DEMOLITION



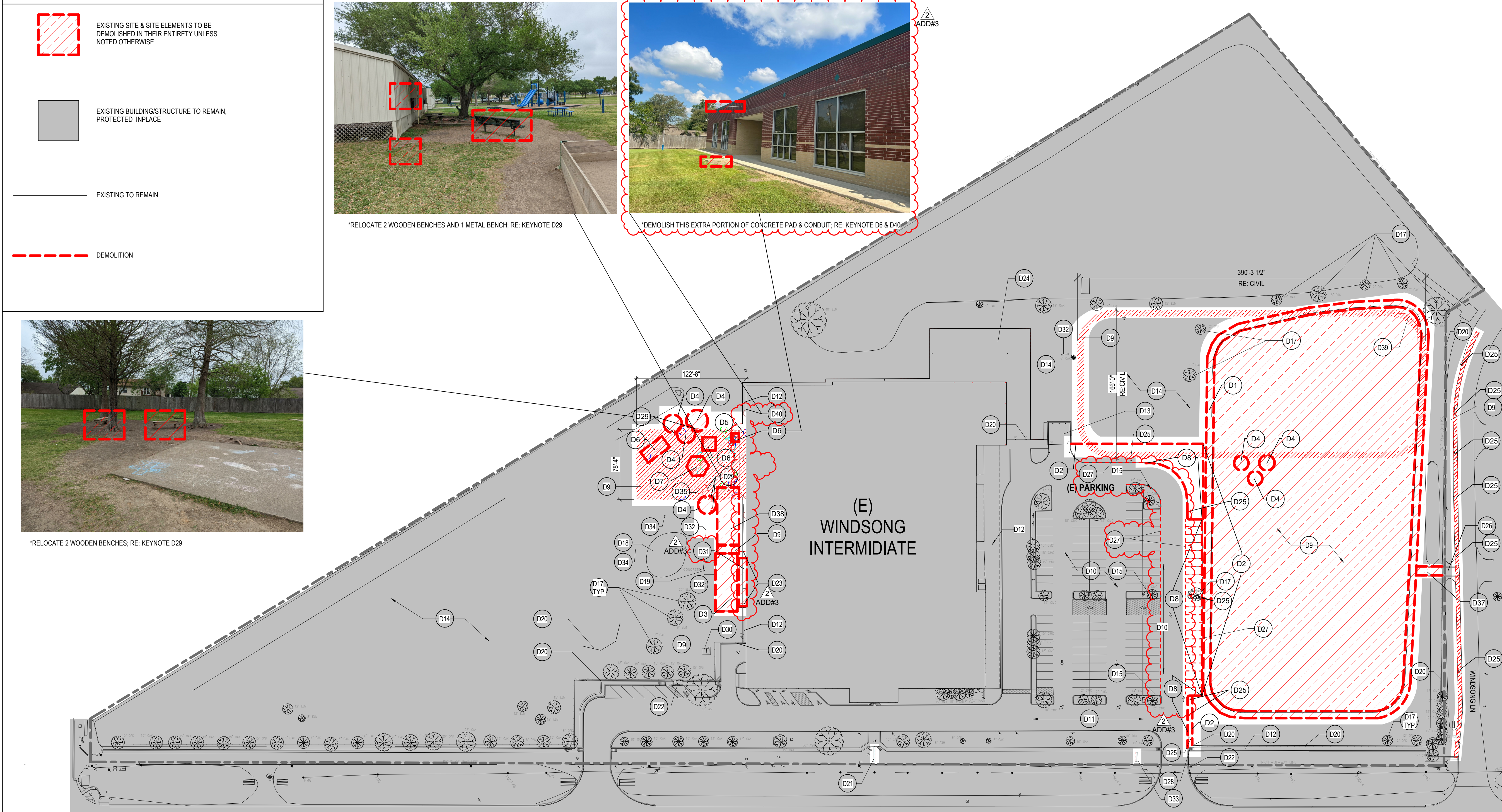
*RELOCATE 2 WOODEN BENCHES; RE: KEYNOTE D29



*RELOCATE 2 WOODEN BENCHES AND 1 METAL BENCH; RE: KEYNOTE D29



*DEMOLISH THIS EXTRA PORTION OF CONCRETE PAD & CONDUIT; RE: KEYNOTE D6 & D40



DEMOLITION PLAN KEYNOTES

- D1 EXISTING DECOMPOSED GRAVEL TRACK AND CONCRETE CURBS TO BE DEMOLISHED; RE: CIVIL.

D2 EXISTING CHAINLINK FENCE, POST AND FOUNDATION TO BE DEMOLISHED.

D3 EXISTING PORTABLE TO BE DEMOLISHED INCLUDING RAMP, STAIRS, AND CONCRETE LANDINGS, PREP FOR NEW IMPROVEMENTS. INSTALL COVERPLATE OVER ALL DEMOLISHED CONDUIT BRICK PENETRATIONS AT BUILDING.

D4 EXISTING TREE TO BE DEMOLISHED, GC TO COORDINATE RECLAIMED TREES WITH LANDSCAPE ARCHITECT, RE: LANDSCAPE

D5 EXISTING ALUMINUM CANOPY, POSTS, FOUNDATIONS AND ASSOCIATED ELEMENTS TO BE DEMOLISHED.

D6 EXISTING CONCRETE PAD TO BE DEMOLISHED.

D7 EXISTING GAGA PIT TO BE RELOCATED, RE: LANDSCAPE.

D8 EXISTING CURB TO BE DEMOLISHED AND PREP FOR IMPROVEMENTS; RE: CIVIL.

D9 DEMOLISH EXISTING TURF AND PREP SURFACE FOR NEW IMPROVEMENTS.

D10 EXISTING PARKING LOT TO REMAIN, PROTECT IN PLACE.

D11 EXISTING DRIVE TO REMAIN, PROTECT IN PLACE.

D12 EXISTING SIDEWALK TO REMAIN, PROTECT IN PLACE.

D13 EXISTING DUMPSTER ENCLOSURE AND DUMPSTER TO REMAIN, PROTECT IN PLACE.

D14 EXISTING LANDSCAPE TO REMAIN, PROTECT IN PLACE.

D15 EXISTING ISLAND TO REMAIN, PROTECT IN PLACE.

D16 EXISTING LIGHT POLE TO REMAIN, PROTECT IN PLACE; RE: ELEC.

D17 EXISTING TREE TO REMAIN, PROTECT IN PLACE.

D18 EXISTING PLAYGROUND TO REMAIN, PREP FOR IMPROVEMENTS.

D19 EXISTING CONCRETE PAD TO REMAIN, PREP FOR IMPROVEMENTS.

D20 EXISTING FENCING TO REMAIN, PROTECT IN PLACE.

D21 EXISTING MARQUEE SCHOOL NAME "WINDSONG INTERMEDIATE SCHOOL" TO BE DEMOLISHED, PROTECT OTHER SIGNAGE, BRICK MARQUEE, AND SURROUNDING LANDSCAPING.

D22 EXISTING SIGN TO REMAIN, PROTECT IN PLACE.

D23 EXISTING ORNAMENTAL FENCE INCLUDING GATE, POSTS, AND FOUNDATION TO BE REMOVED. SALVAGE GATE AND GATE HARDWARE FOR DISTRICT REUSE.

D24 EXISTING CONCRETE PAD TO REMAIN, PROTECT IN PLACE.

D25 EXISTING SIGN, POST, AND FOUNDATION TO BE DEMOLISHED.

D26 EXISTING CONCRETE SIDEWALK, PREP AND REPAIR EDGES FOR CONNECTION TO NEW CONCRETE SIDEWALK.

D27 EXISTING STRIPING TO BE REMOVED, PREP FOR NEW STRIPING, RE: CIVIL FOR NEW FIRE LANE STRIPING.
- D28 EXISTING CURB, PREP AND REPAIR EDGES FOR CONNECTION TO NEW CURB.

D29 EXISTING BENCH TO BE REMOVED AND RELOCATED; RE: LANDSCAPE

D30 TRANSFORMER TO REMAIN, PROTECT IN PLACE.

D31 EXISTING CANOPY TO BE REMOVED.

D32 EXISTING BENCH TO REMAIN, PROTECT IN PLACE.

D33 EXISTING MARQUEE STATIC SIGN TO BE DEMOLISHED, PROTECT MARQUEE DIGITAL DISPLAY, STRUCTURE, SURROUNDING LANDSCAPING, AND CIRCUIT AND ASSOCIATED ELEMENTS.

D34 EXISTING PLAYGROUND EQUIPMENT TO REMAIN, PROTECT IN PLACE.

D35 EXISTING PICNIC TABLE TO BE REMOVED AND RELOCATED; RE: LANDSCAPE

D36 EXISTING SIGN AND POST TO BE RELOCATED, DEMOLISH POST FOUNDATION

D37 EXISTING SIDEWALK TO BE DEMOLISHED, RE: CIVIL

D38 DEMOLISH UTILITIES, PREP AREA FOR NEW IMPROVEMENTS

D39 EXISTING FENCE POSTS AND FENCE FABRIC TO BE REMOVED AND SALVAGED FOR REUSE.

D40 DEMOLISH CONDUIT INTO BUILDING AND INSTALL COVERPLATE AT BRICK PENETRATION.

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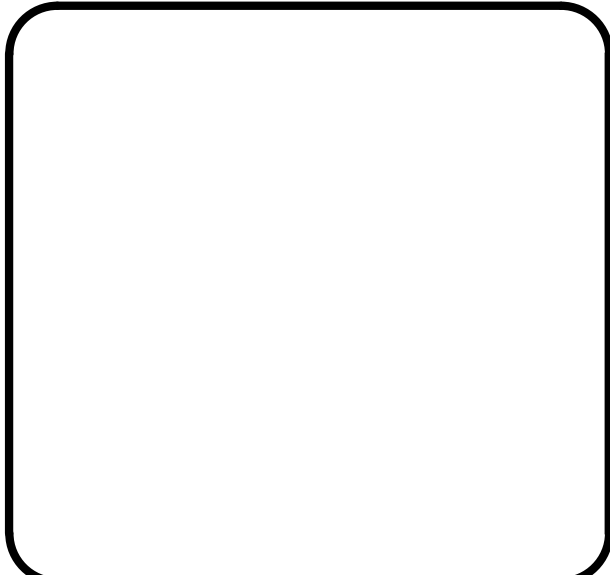
WINDSONG ELEMENTARY
SCHOOL ADDITION AND
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ISSUE FOR PROPOSAL

FRIENDSWOOD
INDEPENDENT SCHOOL DISTRICT

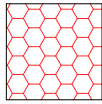
Melissa Hunsbaugh
09/07/2022



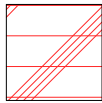
CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022

DEMOLITION ARCHITECTURAL SITE PLAN

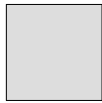
DEMO LEGEND



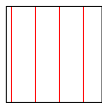
INTERIOR FLOOR FINISH TO BE DEMOLISHED



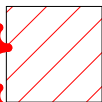
INTERIOR FLOOR FINISH AND CEILING TO BE DEMOLISHED



EXISTING BUILDING TO REMAIN



CEILING TO BE DEMOLISHED



GENERAL DEMOLITION


ADD#3



DEMOLISH WALL



EXISTING WALL TO REMAIN



DEMOLISH DOOR AND FRAME



11 Greenway Plaza
Suite 2210
Houston, Texas 77046-1104
Telephone: 713-965-0608
Fax: 713-961-4571

Project :

Project No. :

Description:

Date :

Drawn By :

Drawing:

Drawing Reference:

GENERAL ARCH PLAN NOTES

1. DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS TAKE PRECEDENCE. CONTACT ARCH IF CLARIFICATION IS NECESSARY IN ORDER TO DETERMINE THE INTENT OF THE CONTRACT DOCUMENTS

2. DRAWINGS NOTED AS "N.T.S" OR "NTS" ARE NOT TO SCALE

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7. DIMENSIONS NOTED AS "CLEAR" OR "CLEAR INSIDE" REQUIRE SPECIFIC COORDINATION AMONG DISCIPLINES AND OR MANUFACTURERS

8. REFER TO PARTITION TYPES ON A-800 SERIES SHEETS

9. ALL INTERIOR PARTITIONS THIS SHEET, EXCEPT FOR FURR-OUT PARTITIONS, SHALL BE PARTITION TYPE S3 U.N.O.

10. ALL INTERIOR FURR-OUT PARTITIONS THIS SHEET SHALL BE PARTITION TYPE S5 U.N.O.

11. ALIGN FINISHED FACE OF WALLS WHERE WALL PARTITIONS OF DIFFERING THICKNESS ABUT AND OR ADJOIN IN THE SAME PLANE

12. PROVIDE AND INSTALL CONT. REVEAL TRIM AT JOINT WHERE GYPSUM BOARD WALL PARTITIONS ABUT AND OR ADJOIN MASONRY WALL PARTITIONS IN THE SAME PLANE

13. ALL INTERIOR CMU OUTSIDE CORNERS SHALL HAVE BULLNOSE U.N.O.

14. ALL DOORS SHALL BE SET 6 INCHES OFF THE ADJACENT PERPENDICULAR WALL ON THE HINGE SIDE OF THE DOOR U.N.O.. NOTIFY ARCH. OF ANY DOOR-RELATED CONFLICTS, INCLUDING BUT NOT LIMITED TO CONFLICTS CONCERNING ACCESSIBILITY STANDARDS

15. ALL DOOR THRESHOLDS AT ALL EXTERIOR DOORS SHALL BE SET IN FULL BED OF SEALANT

16. COORD. ALL ROOF DRAIN LEADER LOCATIONS WITH FLOOR PLAN PRIOR TO FLOOR SLAB CONSTRUCTION

17. ALL FLOOR SLOPES TO FLOOR DRAINS SHALL NOT EXCEED 1:48
18. PROVIDE AND INSTALL SELF-LEVELING UNDERLAYMENT WHERE UNEVEN FLOOR SLAB EXISTS PRIOR TO INSTALLATION OF FLOOR FINISHES

19. COORD. HOUSEKEEPING PAD LOCATIONS AND DIMENSIONS WITH EQUIPMENT TO BE INSTALLED

20. LL FLOOR FINISH CHANGES SHALL OCCUR AT THE CENTERLINE OF DOORS U.N.O.

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22. ALL REQUIRED ACCESSIBLE CLEARANCES FOR ALL ITEMS, INCLUDING BUT NOT LIMITED TO ALL COUNTER TOPS, ALL PLUMBING FIXTURES, ALL DRINKING FOUNTAINS, ALL ELECTRIC WATER COOLERS, ALL LAVATORIES, ALL URINALS, ALL TOILETS SHALL BE STRICTLY ENFORCED

23. APPLY BITUMINOUS COATING TO ALL CONCEALED STRUCTURAL STEEL MEMBERS AT ALL EXTERIOR CANOPY LOCATIONS

24. REFER TO OTHER DISCIPLINE DOCUMENTS FOR ADDITIONAL SCOPE OF WORK

KEYNOTE LEGEND

NUMBER	DESCRIPTION
0201	EXISTING DOOR AND FRAME TO REMAIN; PROTECT IN PLACE
0204	EXISTING COLUMN WRAP & COLUMN TO REMAIN; PROTECT IN PLACE
0207	EXISTING WINDOW AND FRAME TO REMAIN; PROTECT IN PLACE
0211	EXISTING CORRIDOR WALL TO REMAIN; PROTECT IN PLACE
0212	EXISTING LIBRARY WALL TO REMAIN; PROTECT IN PLACE
0908	PREP DEMOLISHED AREA FOR NEW FLOORING
0909	PATCH FLOORING AND CEILING TO MATCH EXISTING
1001	PORTABLE DISPLAY; OFOI

DOOR SCHEDULE AREA D

DATA		PANEL				FRAME				GENERAL			
MARK	ROOM NAME	WIDTH	HEIGHT	ELEVATION	MATERIAL	FINISH	TYPE	MATERIAL	FINISH	SILL	JAMB	HEAD	REMARKS
F21	DYSLEXIA	3'-0"	7'-0"	NV-1	SCPL	PL-2	001	HM	PAINT				103-X (HM TO MATCH EXISTING DOOR FRAMES)
F22	OFFICE	3'-0"	7'-0"	NV-1	SCPL	PL-2	001	HM	PAINT				103-X (HM TO MATCH EXISTING DOOR FRAMES)

ROOM FINISH SCHEDULE AREA D

ROOM DATA		FLOOR FINISH	BASE FINISH	WALL FINISHES				CEILINGS FINISH	COMMENTS
No	NAME			NORTH	EAST	SOUTH	WEST		
F20	OFFICE	CPT-1	4" RUBBER BASE	VINYL	VINYL	VINYL	VINYL	2' X 2' ACT	BASE AND VINYL TO MATCH EXISTING
F21	DYSLEXIA	CPT-1	4" RUBBER BASE	VINYL	VINYL	VINYL	VINYL	2' X 2' ACT	BASE AND VINYL TO MATCH EXISTING
F22	OFFICE	CPT-1	4" RUBBER BASE	VINYL	VINYL	VINYL	VINYL	2' X 2' ACT	BASE AND VINYL TO MATCH EXISTING
MC1	LIBRARY	CPT-1	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN	CARPET ONLY IN AREA SHOWN IN PLAN
MC3	CLASSROOM	CPT-1	4" RUBBER BASE	VINYL	VINYL	VINYL	VINYL	2' X 2' ACT	BASE AND VINYL TO MATCH EXISTING



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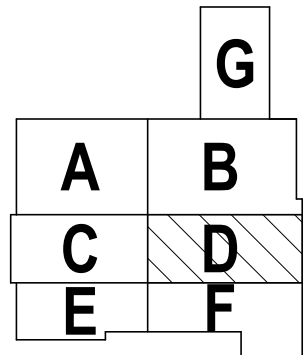
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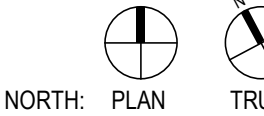


2100 W PARKWOOD AVE.
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ISSUE FOR PROPOSAL



KEY PLAN



CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022

ISSUE FOR PROPOSAL

1ST FLOOR PLAN -
AREA D

A-101D

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18. PROVIDE AND INSTALL SELF-LEVELING UNDERLAYMENT WHERE UNEVEN FLOOR SLAB EXISTS PRIOR TO INSTALLATION OF FLOOR FINISHES

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DEMO LEGEND

- INTERIOR FLOOR FINISH TO BE DEMOLISHED
- INTERIOR FLOOR FINISH AND CEILING TO BE DEMOLISHED
- EXISTING BUILDING TO REMAIN

KEYNOTE LEGEND

NUMBER	DESCRIPTION
<div>0134</div> <div>ADD#3</div>	DEMOLISH EXISTING FLOOR FINISH, CEILING, GRID AND LIGHTS. PATCH/REP/PAINT/REPAIR FLOORS/WALLS THAT ARE EXISTING TO REMAIN AS REQUIRED TO MATCH SCHEDULED FINISHES
<div>0136</div> <div>0145</div>	REMOVE EXISTING FLOOR FINISH & WALL BASE, PREP DEMOED AREA FOR NEW FLOORING. DEMOLISH EXISTING WALL
0201	EXISTING DOOR AND FRAME TO REMAIN; PROTECT IN PLACE
0202	EXISTING WALL TO REMAIN; PREP FOR NEW WALL FINISH AND BASE AT WORKROOM SIDE ONLY

DEMOLISH WALL

EXISTING WALL TO REMAIN

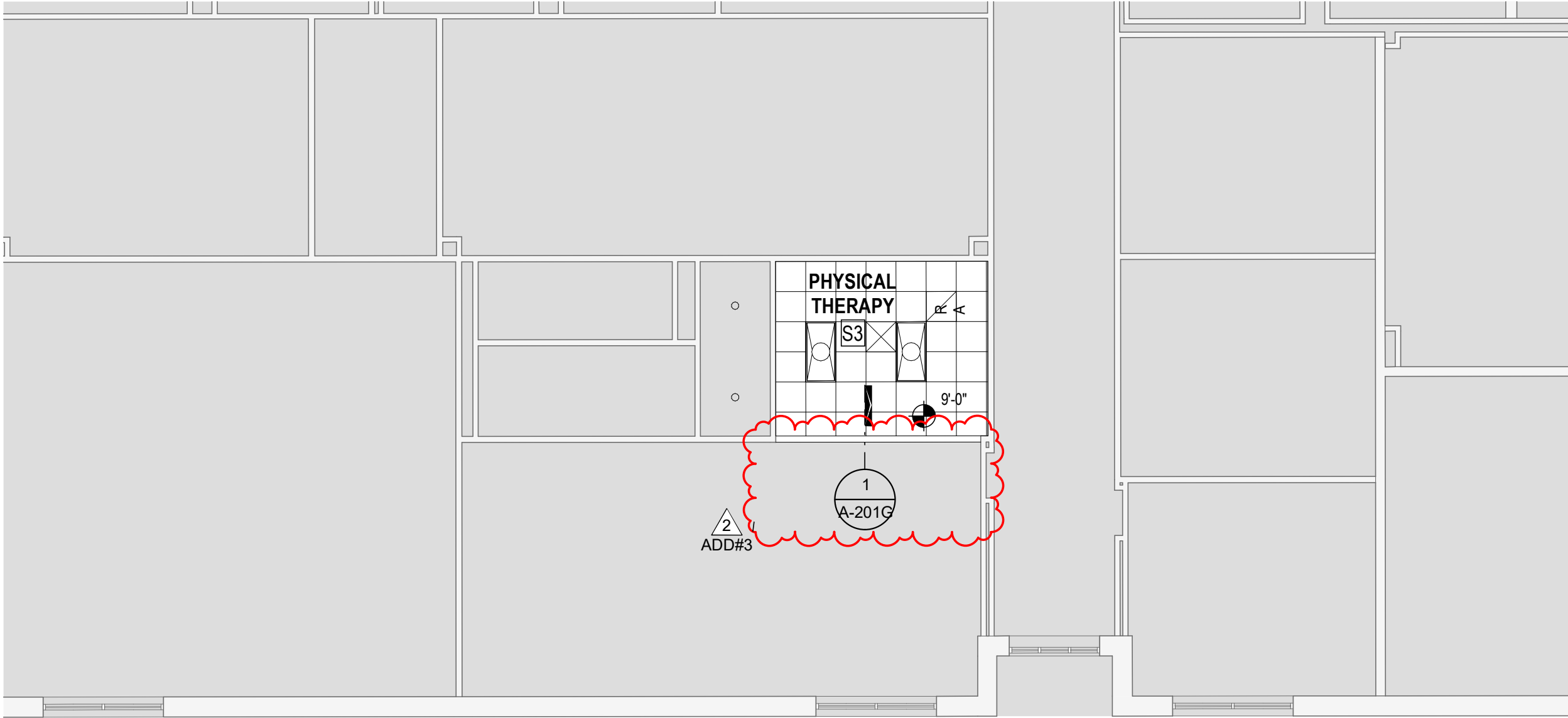
DEMOLISH DOOR AND FRAME

FIXTURE LEGEND

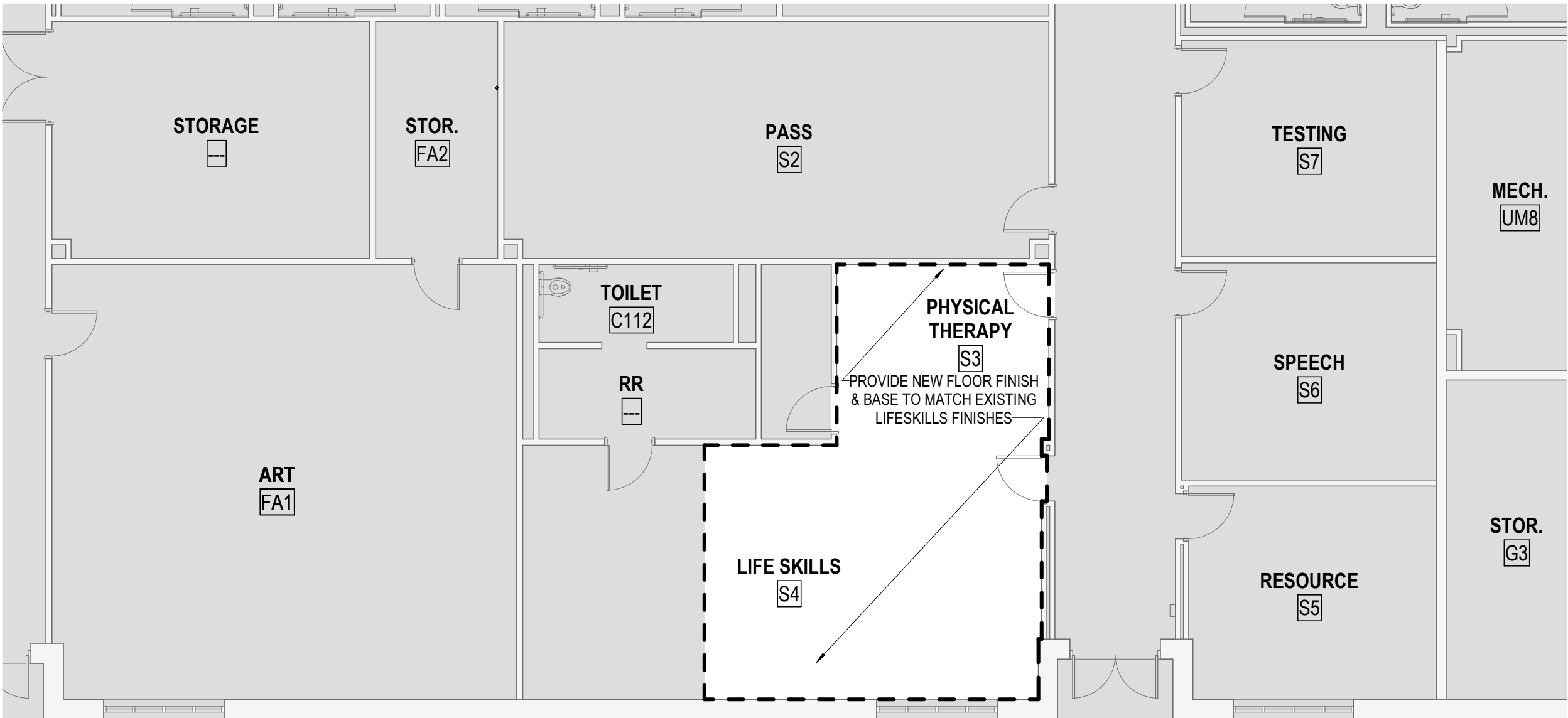
2'x4' RECESSED LIGHT FIXTURE

ROOM FINISH SCHEDULE AREA F

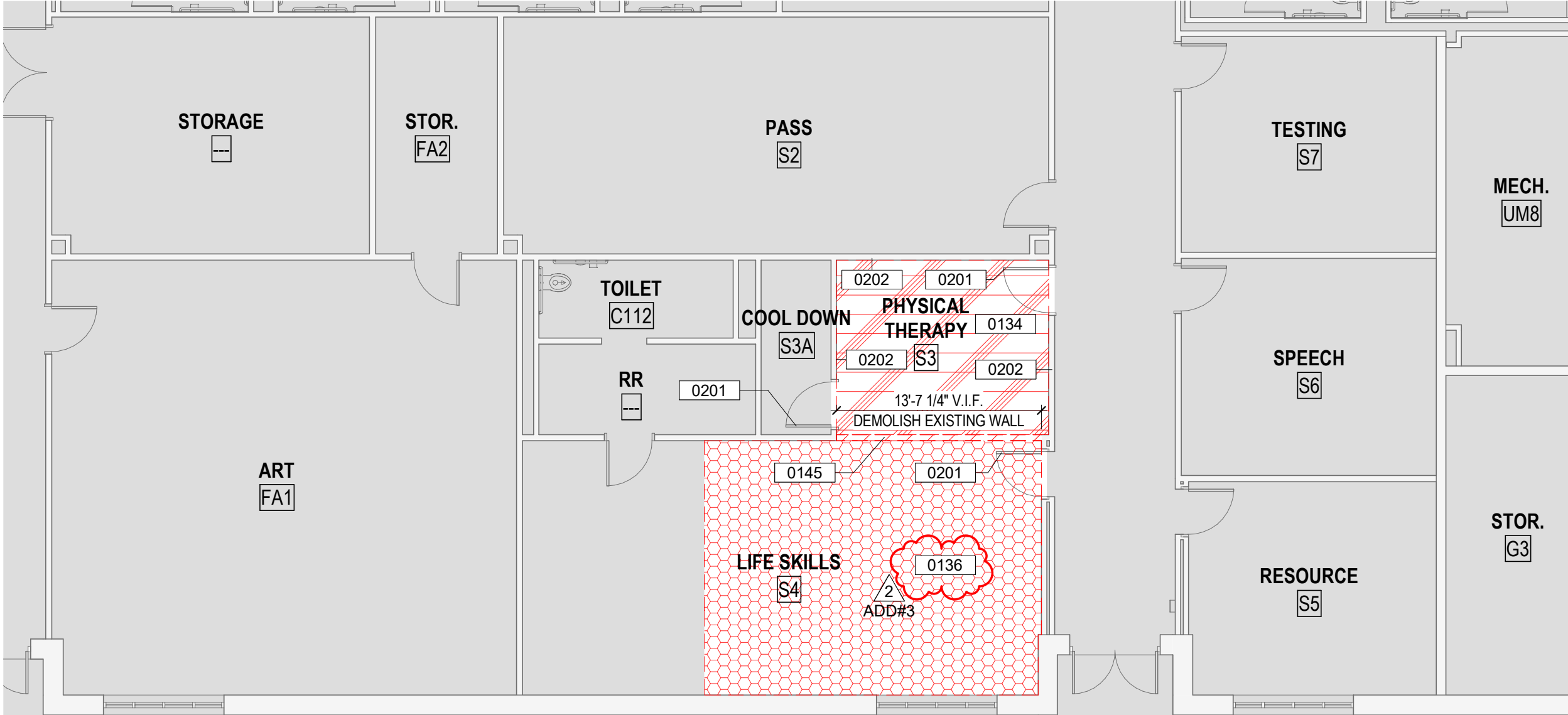
ROOM DATA		FLOOR FINISH	BASE FINISH	WALL FINISHES					CEILINGS FINISH	COMMENTS
№	NAME			NORTH	EAST	SOUTH	WEST			
S3	PHYSICAL THERAPY	CPT-1	MATCH LIFE SKILLS	MATCH LIFE SKILLS	MATCH LIFE SKILLS	NA	MATCH LIFE SKILLS	MATCH LIFE SKILLS		
S4	LIFE SKILLS	CPT-1	MATCH EXISTING	EXIST. TO REMAN	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN	EXIST. TO REMAIN		NEW BASE IN ENTIRE ROOM



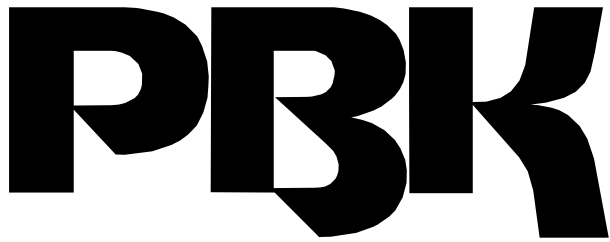
13 1ST LEVEL - CEILING PLAN - AREA F ALTERNATE NO. 03
1/8" = 1'-0"



08 1ST LEVEL - FLOOR PLAN - AREA F ALTERNATE NO. 03
1/8" = 1'-0"

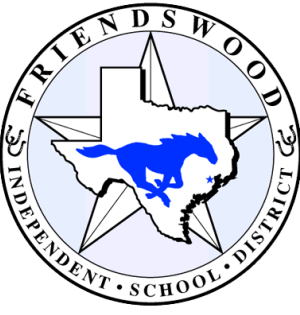


03 1ST LEVEL - FLOOR PLAN - AREA F DEMO ALTERNATE NO. 03
1/8" = 1'-0"



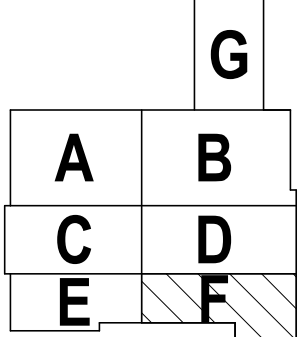
ARCHITECT	PBK Architects, Inc. PBK.com
HOUSTON	11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608
CIVIL	DRG ENGINEERS T 713 560 3238
STRUCTURAL	KURALA ENGINEERS T 800 285 3074
MEPT	LEAF ENGINEERS T 713 965 3300
LANDSCAPE ARCHITECT	ROSLAND T 713 965 7609
BUILDING ENVELOPE	BEAM T 713 560 3201

WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION



2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL



KEY PLAN

NORTH: PLAN TRUE



CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022
ISSUE FOR PROPOSAL		

ALTERNATE NO. 03

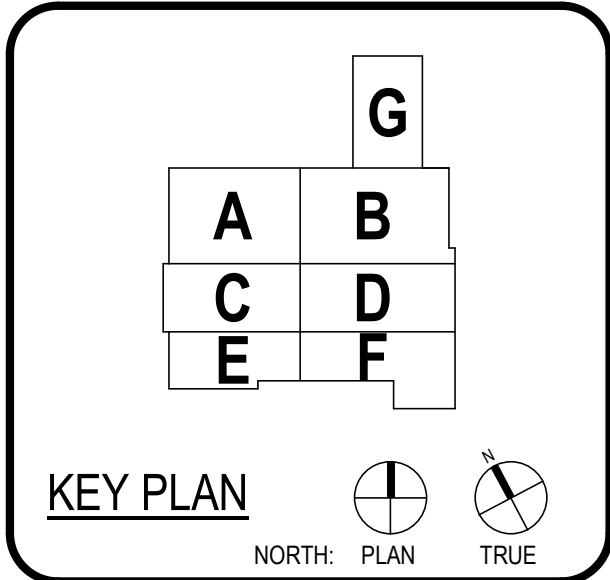
A-101F.1



ARCHITECT
PBK Architects, Inc.
HOUSTON
11 Greenway Plaza, 22nd Floor
Houston, TX 77046
713-965-0608 P
713-961-4571 F
TX Firm: BR 1608

CIVIL ENGINEERS
713-960-3258
STRUCTURAL
KUBALA ENGINEERS
713-960-3054
MEP
LEAF ENGINEERS
713-960-3000
LANDSCAPE ARCHITECT
KODOLAND
713-965-0608
BUILDING ENVELOPE
BEAM
713-960-3001

WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION
2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546
ISSUE FOR PROPOSAL



CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022
ISSUE FOR PROPOSAL		
BUILDING NUMBER		

1ST FLOOR PLAN -
AREA G - SCHEDULES

A-101G1

WINDOW SCHEDULE - 1ST LEVEL - AREA G									
MARK	FRAME		ELEVATION	MATERIAL	FINISH	DETAILS			REMARKS
	WIDTH	HEIGHT				SILL	JAMB	HEAD	
F1A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F1B	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F2A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F2B	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F3A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F3B	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F4A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F4B	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F5A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F5B	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F5C	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F6A	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F6C	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F6D	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING
F10	8'-0"	8'-0"	A	AL	CLR ANO	06/A-812	05/A-812	04/A-812	G-1 GLAZING

ROOM FINISH SCHEDULE AREA G									
ROOM DATA		FLOOR FINISH	BASE FINISH	WALL FINISHES				CEILINGS FINISH	COMMENTS
No	NAME			NORTH	EAST	SOUTH	WEST		
-	BOYS	EPF-1	EPF-1	WT-1/WT-2	WT-1/WT-2	WT-1/WT-2	VWC-1	PAINTED GYP	
-	GIRLS	EPF-1	EPF-1	WT-1/WT-3	WT-1/WT-3	WT-1/WT-3	VWC-1	PAINTED GYP	
-	RESTROOM	EPF-1	EPF-1	WT-1/WT-3	WT-1/WT-3	WT-1/WT-3	VWC-1	PAINTED GYP	
F1	SCIENCE CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1	VWC-1	VWC-1/WRITABLE SURFACE	VWC-1	2" X 2" ACT TYPE A	
F2	SCIENCE CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1	VWC-1	VWC-1/WRITABLE SURFACE	VWC-1	2" X 2" ACT TYPE A	
F3	CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1/WRITABLE SURFACE	VWC-1	VWC-1	VWC-1	2" X 2" ACT TYPE A	
F4	CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1/WRITABLE SURFACE	VWC-1	VWC-1	VWC-1	2" X 2" ACT TYPE A	
F5	CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1	VWC-1	VWC-1/WRITABLE SURFACE	VWC-1	2" X 2" ACT TYPE A	
F6	CLASSROOM	CPT-1	4" RUBBER BASE	VWC-1	VWC-1	VWC-1/WRITABLE SURFACE	VWC-1	2" X 2" ACT TYPE A	
F7	IDF	SEALED CONCRETE	4" RUBBER BASE	VWC-1	VWC-1	VWC-1	VWC-1	OPEN CEILING	
F8	ELECTRICAL	SEALED CONCRETE	4" RUBBER BASE	VWC-1	VWC-1	VWC-1	VWC-1	OPEN CEILING	
F9	CUSTODIAL	SEALED CONCRETE	4" RUBBER BASE	FRP	FRP	FRP	FRP	OPEN CEILING	
F10	RESOURCE	CPT-1	4" RUBBER BASE	VWC-1	VWC-1	VWC-1	VWC-1	2" X 2" ACT TYPE A	
F14	CORRIDOR	LVT-1/LVT-2	4" RUBBER BASE	VWC-1	VWC-1	VWC-1	VWC-1	2" X 2" ACT TYPE A	
POD F	MULTIPURPOSE	LVT-1/LVT-2	4" RUBBER BASE	VWC-1	VWC-1	VWC-1	VWC-1	2" X 2" ACT TYPE A	

MATERIAL FINISH LEGEND

FLOORS: LUXURY VINYL TILE LVT-1 LVT-2 CARPET CPT-1 CPT-3 SEALED CONCRETE EPOXY EPF-1 BASE: RUBBER BASE RB-1 EPOXY BASE EB-1 SCHLUTER EDGE TRIM SCH-1	LVT-1 LVT-2 CPT-1 CPT-3 SC-1 EPF-1 RB-1 EB-1 SCH-1 TP-1	PATCRAFT: TIMBER GROVE 2: 00572 HEMLOCK-V2 (MULTIPURPOSE AND CORRIDOR) PATCRAFT: TIMBER GROVE 2: 00450 INDIGO-V2 (MULTIPURPOSE AND CORRIDOR) TARKETT: 11498 FABRICATE 36205 CEDAR DECK (FIELD) TARKETT: 04837 ASSERTIVE ACTION 26213 FORGE, WALK OFF MATT STORAGE KEY RESIN COMPANY; QUARTZ B-125; FOG (RESTROOMS) ROPPE; CHARCOAL:123 (FIELD AT ADDITION) KEY RESIN COMPANY; QUARTZ B-125; FOG (RESTROOMS) PER SPECS SCRANTON; CHARCOAL GREY (TOILET PARTITIONS)	WALLS: PAINT PT-1 VINYL WALL COVERING VWC-1 WRITABLE SURFACE PER SPECS TACKWALL TW-1 CORNER GUARD CG-1 TILE: PORCELAIN TILE WT-1 WT-2 WT-3 DAL TILE, NATURAL HUES, QH83 LACE, 6"X12" (RESTROOM, WET WALL FIELD) DAL TILE, NATURAL HUES, QH73 ATLANTIS, 6"X12" (RESTROOM ACCENT) DAL TILE, NATURAL HUES, QH68 STARLIGHT, 6"X12" (RESTROOM ACCENT) CASEWORK: PL-1 PL-2 PL-3 PL-4 PL-5 SS-1	PT-1 VWC-1 PER SPECS TW-1 CG-1 WT-1 WT-2 WT-3 FORMICA; 5488-26, SMOKEY BROWN PEAR (DOORS AT ADDITION AND CASEWORK) (DOORS TO MATCH EXISTING DOOR PLASTIC LAMINATE) WILSONART; D388-60 CRYSTAL, (COUNTER) WILLSONART; D321-60 BRITANNY BLUE (SIGNS AT ADDITION) MATCH EXISTING SIGNAGE CORIAN; CAMEO WHITE (WINDOW SILLS, COUNTER)
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NOTE: ALL FINISHES TO MATCH EXISTING ARE TO SUBMITTED FOR REVIEW AND ARE NOT LISTED ON THE MATERIAL FINISH LEGEND

DOOR SCHEDULE AREA G																
DATA		PANEL				FRAME				DETAIL			GENERAL			
MARK	ROOM NAME	WIDTH	HEIGHT	ELEVATION	MATERIAL	FINISH	TYPE	MATERIAL	FINISH	SILL	JAMB	HEAD	FIRE RATING	HDW SET	REMARKS	
F1	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F2	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F3	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F4	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F5	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F6	CLASSROOM	9'-6"	7'-2"	OP	AL	CLR ANO	--	AL	CLR ANO	10/A-811	12/A-811	14/A-811		001	OPERABLE PARTITION; RE: SPECS	
F7	IDF	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		201		
F8	ELEC	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		201		
F9	CUSTODIAL	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		201		
F10	RESOURCE	3'-0"	7'-0"	NV-1	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		103		
F14	CORRIDOR	6'-0"	7'-0"	F	SCPL	PL-1	001	NONE	HM	PAINT	01/A-711	09/A-812	10/A-812	738R	PAINT TO MATCH ALUMINUM FRAME	
F14A	CORRIDOR	6'-0"	7'-0"	HG-2	AL	CLR ANO	NONE	AL	CLR ANO	01/A-812	02/A-812	03/A-812		CW714AM		
PODFA	POD F	6'-0"	7'-0"	HG-2	AL	CLR ANO	NONE	AL	CLR ANO	01/A-812	02/A-812	03/A-812		710ACM		
PODFB	POD F	6'-0"	7'-0"	HG-2	AL	CLR ANO	NONE	AL	CLR ANO	01/A-812	02/A-812	03/A-812		CW714AM		
R1	GIRLS	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		801L		
R2	BOYS	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		807L		
R3	RESTROOM	3'-0"	7'-0"	F	SCPL	PL-1	001	AL	CLR ANO	20/A-811	02/A-811	01/A-811		341L		

STOREFRONT SCHEDULE AREA G									
MARK	FRAME		ELEVATION	MATERIAL	FINISH	DETAILS			REMARKS
	WIDTH	HEIGHT				SILL	JAMB	HEAD	
F14	6'-4"	9'-0"	D	HM	PAINT	-			90 MIN. FIRE RATED; G-4 GLAZING
F14A	6'-4"	9'-0"	D	AL	CLR ANO	07/A-812	05/A-812	04/A-812	
F14B	6'-4"	9'-0"	D	AL	CLR ANO	07/A-812	05/A-812	04/A-812	
PODFA	18'-5"	9'-0"	B	AL	CLR ANO	01/A-812	08/A-812	08/A-711	
PODFB	17'-6"	9'-0"	C	AL	CLR ANO	01/A-812	05/A-812	04/812 SIM	

FINISH SCHEDULE REMARKS

ALL SCHEDULED DIRECTIONS (NORTH, EAST, SOUTH, WEST) ARE PER PLAN DIRECTIONS, NOT TRUE COMPASS DIRECTIONS.

ALL SCHEDULED CEILING HEIGHTS ARE FROM THE PRIMARY FLOOR LEVEL WITHIN THE ROOM AND OR SPACE, AND ARE NOT FROM AN ELEVATED FLOOR LEVEL, AND ARE NOT FROM A RECESSED FLOOR LEVEL.

ALL FINISH MATERIALS SHALL MEET THE FLAME SPREAD RATINGS PER THE BUILDING CODE.

ALL CARPET PATTERNS TO RUN PARALLEL TO CORRIDOR, U.N.O.

PROTECT ALL FINISHED FLOORING SURFACES FROM DAMAGE DURING ALL CONSTRUCTION PHASES.

CARPET PATTERNS SHALL RUN PARALLEL TO CORRIDOR U.N.O.

PROVIDE AND INSTALL BULLNOSE TRIM AT ALL TRANSITIONS FROM CERAMIC WALL TILE TO OTHER MATERIALS U.N.O.

REFER TO TYPICAL FLOORING TRANSITION DETAILS FOR FLOORING MATERIAL TRANSITIONS.

ALL FLOORING TRANSITIONS AT DOORS SHALL BE LOCATED UNDER THE DOOR IN THE CLOSED POSITION, U.N.O.

PAINT ALL NON-FACTORY FINISHED EXPOSED METAL.

PAINT ALL H.M. DOORS TO MATCH EXISTING U.N.O.

PAINT ALL H.M. DOOR FRAMES TO MATCH ADJACENT WALL COLOR U.N.O.

LAY-IN CEILING TYPES
TYPE A: STANDARD MINERAL FIBER, ANTIMICROBIAL, 24"X24"
TYPE B: GLASS FIBER, HIGH NRC, ANTIMICROBIAL, 24"X24"
TYPE C: VINYL-FACED MINERAL FIBER, ANTIMICROBIAL, 24"X24"
TYPE D: IMPACT RESISTANT, MINERAL FIBER, ANTIMICROBIAL, 24"X24"
TYPE E: WOOD FIBER, 24"X24"
TYPE F: MINERAL FIBER, ANTIMICROBIAL, 24"X24"

REFER TO FLOOR PATTERN PLANS

REFER TO INTERIOR ELEVATIONS

REFER TO CEILING PLANS

FRP 8" HIGH

PAINT ALL EXPOSED CEILING-RELATED ITEMS, INCLUDING BUT NOT LIMITED TO, STRUCT. MEMBERS, STRUCT. DECK, DUCTWORK, DIFFUSERS, PIPING, CONDUIT, EQUIP. HOUSINGS, LIGHT FIXTURE HOUSINGS, CABLE SUPPORTS, CABLE TRAYS, EQUIP. SUPPORTS, HANGERS

PAINT ALL EXPOSED CEILING-RELATED ITEMS FLAT BLACK, INCLUDING BUT NOT LIMITED TO, STRUCT. MEMBERS, STRUCT. DECK, DUCTWORK, DIFFUSERS, PIPING, CONDUIT, EQUIP. HOUSINGS, LIGHT FIXTURE HOUSINGS, CABLE SUPPORTS, CABLE TRAYS, EQUIP. SUPPORTS, HANGERS

PAINT ALL EXPOSED CEILING-RELATED ITEMS WHITE, INCLUDING BUT NOT LIMITED TO, STRUCT. MEMBERS, STRUCT. DECK, DUCTWORK, DIFFUSERS, PIPING, CONDUIT, EQUIP. HOUSINGS, LIGHT FIXTURE HOUSINGS, CABLE SUPPORTS, CABLE TRAYS, EQUIP. SUPPORTS, HANGERS




1. DO NOT SCALE DRAWINGS, WRITTEN DIMENSIONS TAKE PRECEDENCE, CONTACT ARCH IF CLARIFICATION IS NECESSARY IN ORDER TO DETERMINE THE INTENT OF THE CONTRACT DOCUMENTS
2. DRAWINGS NOTED AS "N.T.S." OR "N.T.S." ARE NOT TO SCALE
3. ALL DIMENSIONS ARE TO STRUCTURAL COLUMN LINES OR THE SURFACE OF PARTITION ASSEMBLY U.N.O.
4. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE COMMENCING WORK. NOTIFY ARCH. OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH AFFECTED WORK
5. NOTES OR DIMENSIONS NOTED AS "TYPICAL" OR "TYP." OR "TYP." SHALL APPLY TO CONDITIONS THAT ARE THE SAME OR SIMILAR
6. DIMENSIONS NOTED AS "FIELD VERIFY" OR "V.I.F." OR "V.I.F." SHALL BE MEASURED AND CONFIRMED AT THE FIELD SITE BY THE CONTRACTOR AND REVIEWED WITH THE ARCH. BEFORE INCORPORATING INTO THE WORK
7. DIMENSIONS NOTED AS "CLEAR" OR "CLEAR INSIDE" REQUIRE SPECIFIC COORDINATION AMONG DISCIPLINES AND/OR MANUFACTURERS
8. REFER TO PARTITION TYPES ON A-800 SERIES SHEETS
9. ALL INTERIOR PARTITIONS THIS SHEET, EXCEPT FOR FURR-OUT PARTITIONS, SHALL BE PARTITION TYPE SS U.N.O.
10. ALL INTERIOR FURR-OUT PARTITIONS THIS SHEET SHALL BE PARTITION TYPE SS U.N.O.
11. ALIGN FINISHED FACE OF WALLS WHERE WALL PARTITIONS OF DIFFERING THICKNESS ABUT AND OR ADJOIN IN THE SAME PLANE
12. PROVIDE AND INSTALL CONT. REVEAL TRIM AT JOINT WHERE GYPSUM BOARD WALL PARTITIONS ABUT AND/OR ADJOIN MASONRY WALL PARTITIONS IN THE SAME PLANE
13. ALL INTERIOR CMU UNDER CORNERS SHALL HAVE BULLNOSE U.N.O.
14. ALL DOORS SHALL BE SET 6 INCHES OFF THE ADJACENT PERPENDICULAR WALL ON THE HINGE SIDE OF THE DOOR U.N.O. NOTIFY ARCH. OF ANY DOOR-RELATED CONFLICTS, INCLUDING BUT NOT LIMITED TO CONFLICTS CONCERNING ACCESSIBILITY STANDARDS
15. ALL DOOR THRESHOLDS AT ALL EXTERIOR DOORS SHALL BE SET IN FULL BED OF SEALANT
16. COORD. ALL ROOF DRAIN LEADER LOCATIONS WITH FLOOR PLANE PRIOR TO FLOOR SLAB CONSTRUCTION
17. ALL FLOOR SLOPES TO FLOOR DRAINS SHALL NOT EXCEED 1/48
18. PROVIDE AND INSTALL SELF-LEVELING UNDERLAYMENT WHERE UNEVEN FLOOR SLAB EXISTS PRIOR TO INSTALLATION OF FLOOR FINISHES
19. COORD. HOUSEKEEPING PAD LOCATIONS AND DIMENSIONS WITH EQUIPMENT TO BE INSTALLED
20. ALL FLOOR FINISH CHANGES SHALL OCCUR AT THE CENTERLINE OF DOORS U.N.O.
21. ALL FLOOR FINISH MATERIAL CHANGES SHALL HAVE REDUCER STRIPS
22. ALL REQUIRED ACCESSIBLE CLEARANCES FOR ALL ITEMS, INCLUDING BUT NOT LIMITED TO ALL CLOTHING CABINETS, ALL DRINKING FOUNTAINS, ALL ELECTRIC WATER COOLERS, ALL LAVATORIES, ALL URINALS, ALL TOILETS SHALL BE STRICTLY ENFORCED
23. APPLY BITUMINOUS COATING TO ALL CONCEALED STRUCTURAL STEEL MEMBERS AT ALL EXTERIOR CANOPY LOCATIONS
24. REFER TO OTHER DISCIPLINE DOCUMENTS FOR ADDITIONAL SCOPE OF WORK

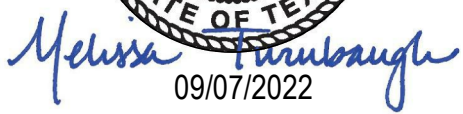
WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION



ISSUE FOR PROPOSAL



NORTH:  PLAN  TRUE



ISSUE FOR PROPOSAL

1ST FLOOR PLAN - AREA G

A-101G

- GENERAL ARCH PLAN NOTES
1. DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS TAKE PRECEDENCE, CONTACT ARCH IF CLARIFICATION IS NECESSARY IN ORDER TO DETERMINE THE INTENT OF THE CONTRACT DOCUMENTS

2. DRAWINGS NOTED AS "N.T.S" OR "NTS" ARE NOT TO SCALE

3. ALL DIMENSIONS ARE TO STRUCTURAL COLUMN LINES OR THE SURFACE OF PARTITION ASSEMBLY U.N.O.

4. FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE COMMENCING WORK. NOTIFY ARCH. OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH AFFECTED WORK

5. NOTES OR DIMENSIONS NOTED AS "TYPICAL" OR "TYP" OR "TYP" SHALL APPLY TO CONDITIONS THAT ARE THE SAME OR SIMILAR

6. DIMENSIONS NOTED AS "FIELD VERIFY" OR "V.I.F" OR "VIP" SHALL BE MEASURED AND CONFIRMED AT THE PROJECT SITE BY THE CONTRACTOR AND REVIEWED WITH THE ARCH. BEFORE INCORPORATING INTO THE WORK

7. DIMENSIONS NOTED AS "CLEAR" OR "CLEAR INSIDE" REQUIRE SPECIFIC COORDINATION AMONG DISCIPLINES AND OR MANUFACTURERS

8. REFER TO PARTITION TYPES ON A-800 SERIES SHEETS

9. ALL INTERIOR PARTITIONS THIS SHEET, EXCEPT FOR FURR-OUT PARTITIONS, SHALL BE PARTITION TYPE S3 U.N.O.

10. ALL INTERIOR FURR-OUT PARTITIONS THIS SHEET SHALL BE PARTITION TYPE S5 U.N.O.

11. ALIGN FINISHED FACE OF WALLS WHERE WALL PARTITIONS OF DIFFERING THICKNESS ABUT AND OR ADJOIN IN THE SAME PLANE

12. PROVIDE AND INSTALL CONT. REVEAL TRIM AT JOINT WHERE GYPSUM BOARD WALL PARTITIONS ABUT AND OR ADJOIN MASONRY WALL PARTITIONS IN THE SAME PLANE

13. ALL INTERIOR CMU OUTSIDE CORNERS SHALL HAVE BULLNOSE U.N.O.

14. ALL DOORS SHALL BE SET 6 INCHES OFF THE ADJACENT PERPENDICULAR WALL ON THE HINGE SIDE OF THE DOOR U.N.O. NOTIFY ARCH. OF ANY DOOR-RELATED CONFLICTS, INCLUDING BUT NOT LIMITED TO CONFLICTS CONCERNING ACCESSIBILITY STANDARDS

15. ALL DOOR THRESHOLDS AT ALL EXTERIOR DOORS SHALL BE SET IN FULL BED OF SEALANT

16. COORD. ALL ROOF DRAIN LEADER LOCATIONS WITH FLOOR PLAN PRIOR TO FLOOR SLAB CONSTRUCTION

17. ALL FLOOR SLOPES TO FLOOR DRAINS SHALL NOT EXCEED 1:48

18. PROVIDE AND INSTALL SELF-LEVELING UNDERLAYMENT WHERE UNEVEN FLOOR SLAB EXISTS PRIOR TO INSTALLATION OF FLOOR FINISHES

19. COORD. HOUSEKEEPING PAD LOCATIONS AND DIMENSIONS WITH EQUIPMENT TO BE INSTALLED

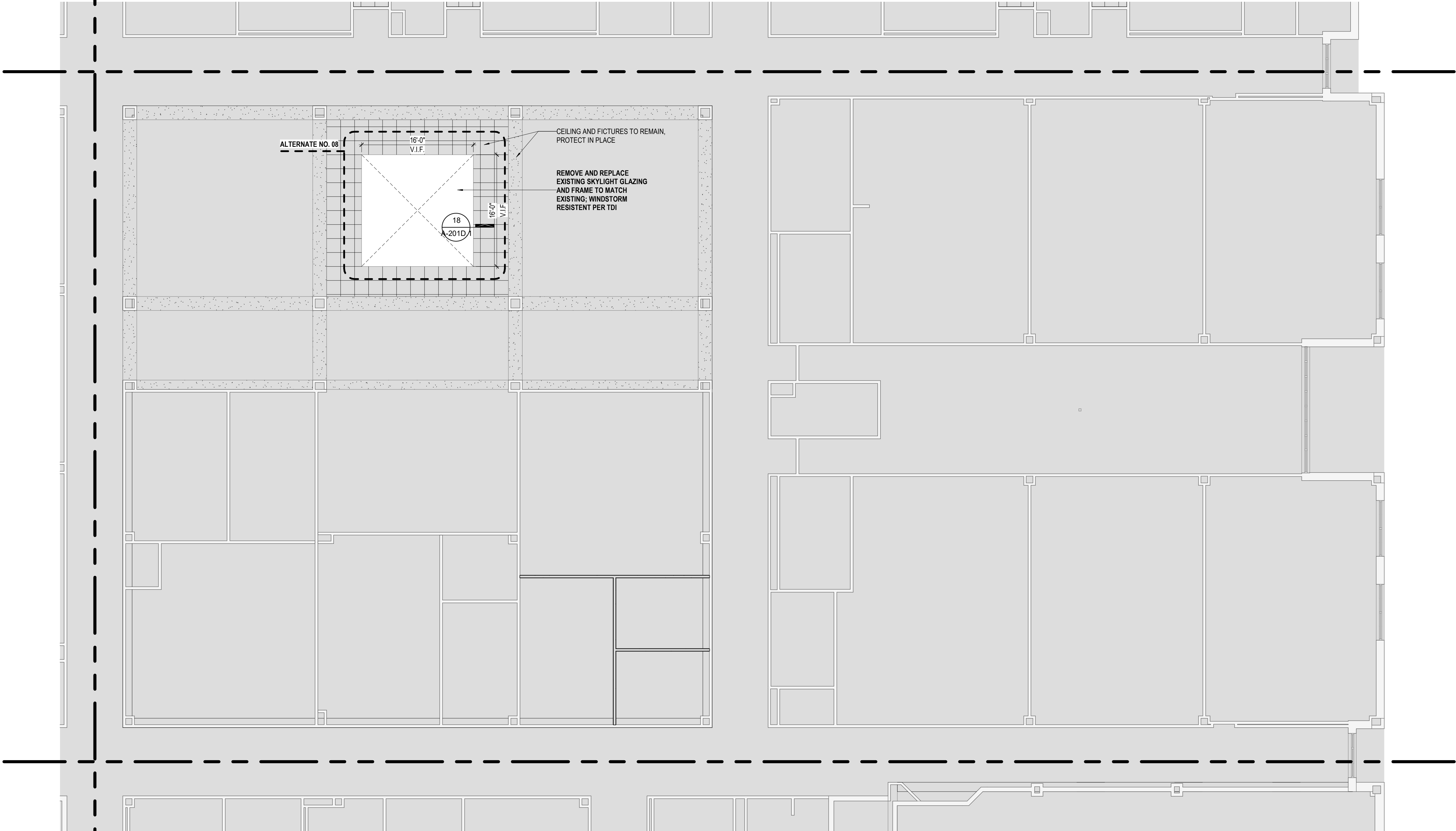
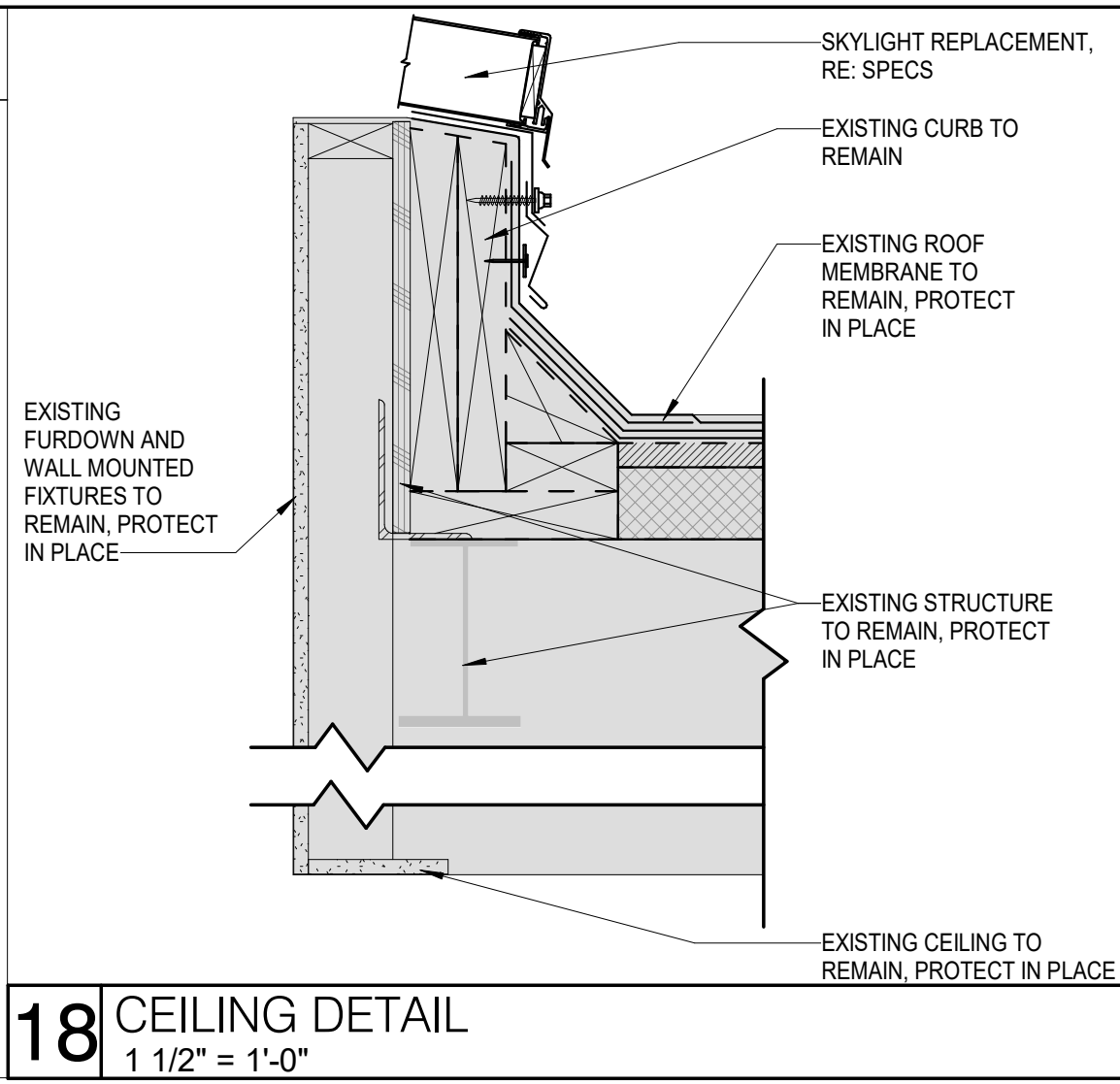
20. LL FLOOR FINISH CHANGES SHALL OCCUR AT THE CENTERLINE OF DOORS U.N.O.

21. LL FLOOR FINISH MATERIAL CHANGES SHALL HAVE REDUCER STRIPS

22. ALL REQUIRED ACCESSIBLE CLEARANCES FOR ALL ITEMS, INCLUDING BUT NOT LIMITED TO ALL COUNTER TOPS, ALL PLUMBING FIXTURES, ALL DRINKING FOUNTAINS, ALL ELECTRIC WATER COOLERS, ALL LAVATORIES, ALL URINALS, ALL TOILETS SHALL BE STRICTLY ENFORCED

23. APPLY BITUMINOUS COATING TO ALL CONCEALED STRUCTURAL STEEL MEMBERS AT ALL EXTERIOR CANOPY LOCATIONS

24. REFER TO OTHER DISCIPLINE DOCUMENTS FOR ADDITIONAL SCOPE OF WORK



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WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION

2100 W PARKWOOD AVE. FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

ISSUED

2025

FRIENDSWOOD ISD

INDEPENDENT • SCHOOL • DISTRICT

KEY PLAN

NORTH: PLAN TRUE

REGISTERED ARCHITECT

MELISSA TURNBAUGH

2017

09/07/2022

CLIENT

FRIENDSWOOD ISD

DATE

09/07/2022

PROJECT NUMBER

220083

DRAWING HISTORY

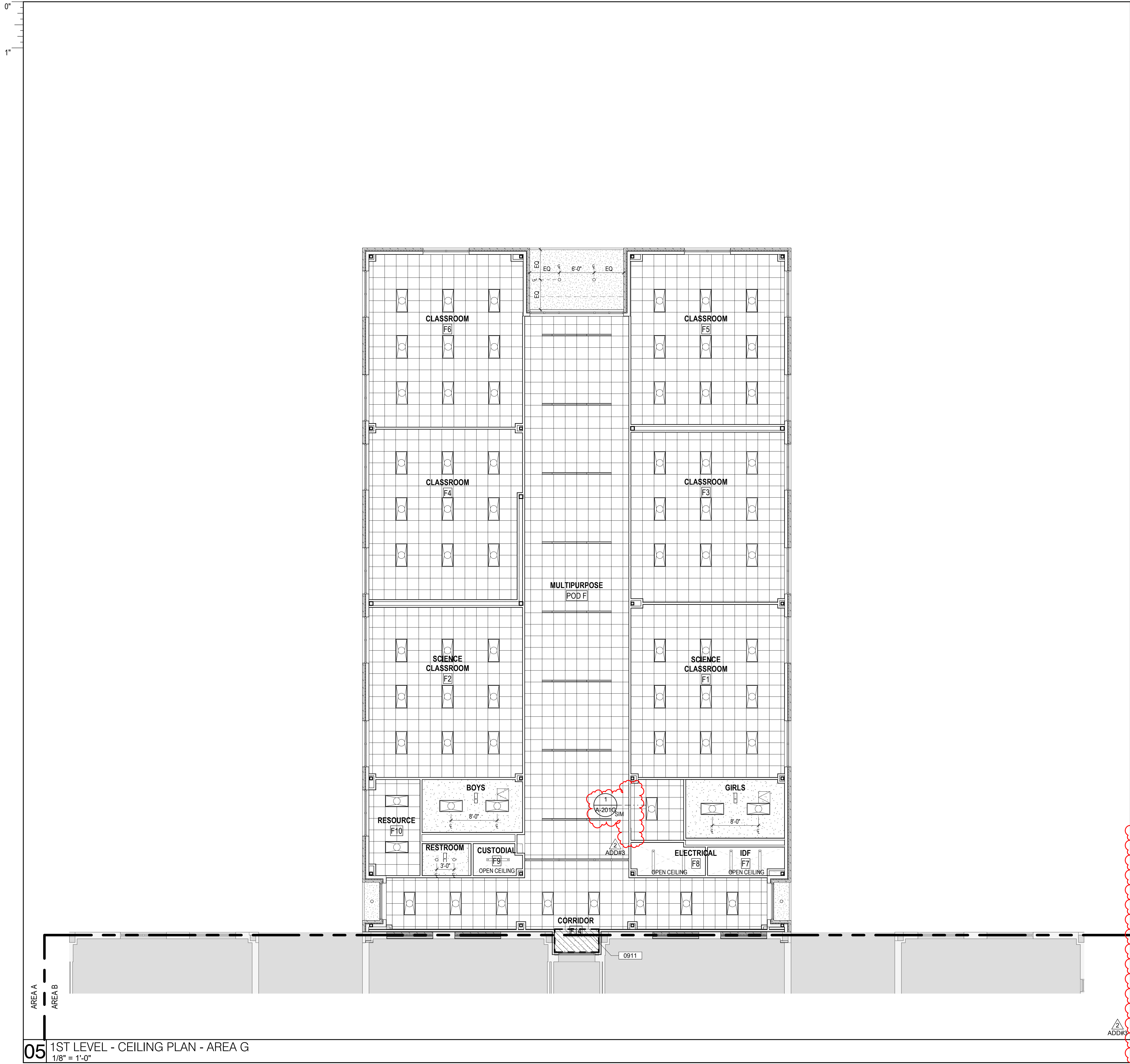
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ALTERNATE NO. 08

A-201D.1

ADD#3



GENERAL CEILING PLAN NOTES

- REFER TO AND COORD. WITH ROOM FINISH SCHEDULES FOR SPECIFIC CEILING TYPES.
- ALL SCHEDULED CEILING HEIGHTS ARE FROM THE MAIN FLOOR LEVEL WITHIN THE ROOM AND OR SPACE, AND ARE NOT FROM AN ELEVATED FLOOR LEVEL, AND ARE NOT FROM A RECESSED FLOOR LEVEL.
- NO FIRE SPRINKLER HEADS ARE SHOWN ON ARCH. CEILING PLANS. ALL SPRINKLER HEADS SHALL BE CENTERED WITHIN CEILING TILES U.N.O.
- ONLY CEILING MOUNTED FIXTURES AND EQUIP. IS SHOWN ON ARCH. CEILING PLANS. REFER TO INTERIOR ELEVATIONS FOR WALL MOUNTED FIXTURES. REFER TO MEPT DOCUMENTS FOR ADDITIONAL INFORMATION CONCERNING CEILING MOUNTED FIXTURES AND OR WALL MOUNTED FIXTURES.
- CEILING MOUNTED LIGHT FIXTURES ARE SHOWN FOR LOCATION PURPOSES ONLY. COORD. WITH ELEC. DOCUMENTS FOR LIGHT FIXTURE DESIGNATIONS.
- CEILING MOUNTED LIGHT FIXTURES WITHIN FIRE RATED CEILING ASSEMBLIES SHALL HAVE LIGHT FIXTURE PROTECTION AND BE TENTED OR OTHERWISE FIRE RATED TO MATCH CEILING ASSEMBLY FIRE RATING.
- VERIFY LOCATIONS OF ALL CEILING ACCESS PANELS WITH MEPT DOCUMENTS. COORD. LOCATIONS OF CEILING ACCESS PANELS WITH ARCH. PRIOR TO INSTALLATION. CEILING ACCESS PANEL FIRE RATINGS SHALL MATCH CEILING ASSEMBLY FIRE RATINGS.
- REFER TO WALL SECTIONS FOR WALL-CEILING INTERFACE
- ALL CEILING HEIGHTS TO BE 9'-0" U.N.O.

CEILING MATERIALS LEGEND

2' x 2' ACOUSTIC PANEL TYPE 1
(TYPICAL) RE: FINISH SCHEDULE

GWB - GYPSUM BOARD
RE: FINISH SCHEDULE

PS - CEMENT PLASTER SYSTEM
RE: FINISH SCHEDULE

FIXTURE LEGEND

2'x4' RECESSED LIGHT FIXTURE

LED LINEAR LIGHT FIXTURE

6" RECESSED LIGHT FIXTURE

SUSPENDED LINEAR LIGHT FIXTURE

2"x2" ACCESS PANEL

KEYNOTE LEGEND

NUMBER	DESCRIPTION
0911	PROVIDE FIRE RATED CEILING. UL-P251

3-5/8" MTL. STUD FRAMING @ 16" O.C. - PROVIDE ATTACHMENT / BRACING TO STRUCTURE ABOVE

5/8" GYP. BOARD ON 3-5/8" MTL. STUDS AT 16" O.C. TYP. CEILING AS SCHED., RE: RCP

CEILING AS SCHED., RE: RCP

CORNER BEAD, TYP.

PRE-FINISHED METAL TRIM BY CEILING MANUFACTURER, TYP

1 CEILING FURDOWN
1 1/2" = 1'-0"

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ISSUE FOR PROPOSAL

A

B

C

D

E

F

G

KEY PLAN

NORTH

PLAN

TRUE

REGISTERED ARCHITECT
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21779
STATE OF TEXAS
09/07/2022

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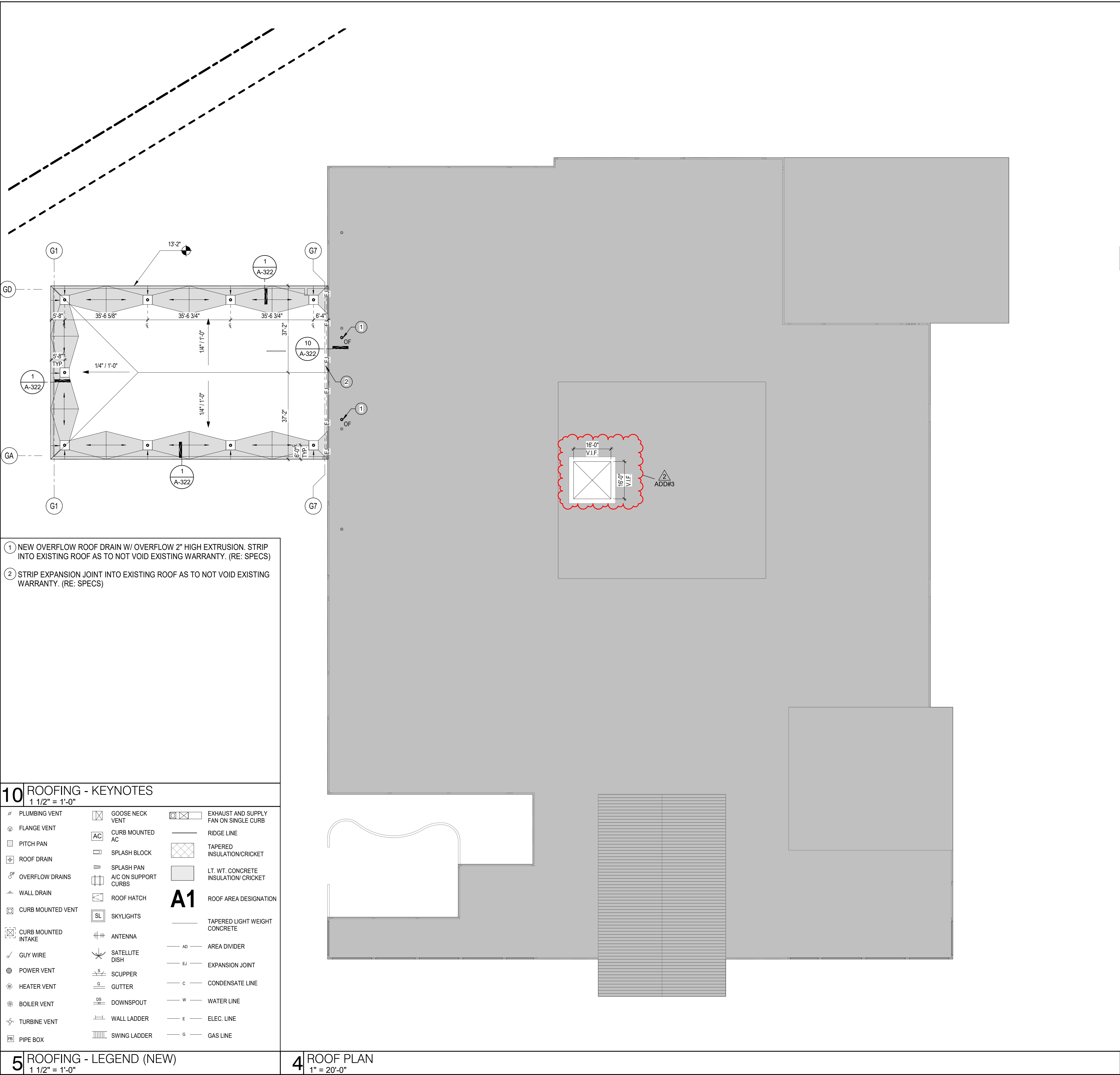
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1ST FLOOR CEILING
PLAN - AREA G

A-201G



MODIFIED BITUMEN FINISH
PLY (RE: SPECS)

MODIFIED BITUMEN BASE
PLY (RE: SPECS)

MECHANICALLY ATTACHED
BASE SHEET (RE: SPECS)

2" MIN LIGHT WEIGHT INSULATING
CONCRETE AND 6" EPS BOARD
(RE: SPECS)

LIGHT WEIGHT CONCRETE 1/4"
SLURRY (RE: SPECS)

METAL DECK
(RE: STRUCTURAL)

16 ROOFING (MB) - NOMENCLATURE
1 1/2" = 1'-0"

1. CONTRACTOR SHALL VISIT SITE TO ASCERTAIN EXACT EXISTING CONDITIONS AND COMPONENTS RELATED TO THE WORK DESCRIBED BY THESE DOCUMENTS. AFTER AWARD OF THE CONTRACT, CHANGE ORDER REQUEST FOR ADDITIONAL MONEY SHALL NOT BE APPROVED IF THE WORK COULD HAVE BEEN ANTICIPATED DURING THE SITE VISIT BY THE CONTRACTOR. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ACCEPTED MANUFACTURER'S PRINTED INSTRUCTIONS AND WARRANTY REQUIREMENTS.

2. DIMENSIONS, DETAILS, EQUIPMENT SIZE AND LOCATION SHOWN IN THESE CONSTRUCTION DOCUMENTS ARE FOR CONVEYANCE OF DESIGN INTENT ONLY. EXACT SIZE, LOCATION, TYPE OF MATERIAL AND TYPE OF CONSTRUCTION OF EXISTING CONDITIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR TO ASCERTAIN AND CONFIRM.

3. INDICATED ROOF HEIGHTS ARE GENERAL IN NATURE.

4. REFER TO NOMENCLATURE FOR TYPE OF ROOF SYSTEM. AREAS ARE MARKED WITH DESIGNATED LETTER ON ROOF PLAN.

5. NOTE THAT THE DETAILS DRAWN ARE GENERIC IN NATURE AND ARE NOT NECESSARILY LOCATED AND KEYED TO THE ROOF PLANS.

6. REMOVE ALL ABANDONED EQUIPMENT IDENTIFIED ON SITE AND AS SHOWN OTHERWISE ON THESE DOCUMENTS.

7. ALL NEW CRICKETS AND TAPERED INSULATION SHALL BE INSTALLED WITH A FINISHED 1/4" PER FOOT MIN. SLOPE. CRICKET THE UP SLOPE SIDE OF ALL SQUARE CURBS AND PROJECTIONS OVER 20' IN WIDTH.

8. REPLACE ROTTED AND / OR OTHERWISE DETERIORATED ROOF DECK MATERIALS (AS APPLICABLE) WITH LIKE MATERIAL AND THICKNESS.

9. REPLACE ROTTEN AND / OR OTHERWISE DETERIORATED WOOD NAILER MATERIAL WITH NEW LIKE MATERIAL AND THICKNESS.

10. PATCH EXISTING METAL ROOF DECK (AS APPLICABLE) FOR HOLES LESS THAN 10" WIDE BY ANCHORING 22 GA. STAINLESS STEEL SHEET METAL TO BOTTOM OF EXISTING METAL ROOF DECK AND ADDING NEW INSULATION TO MATCH THICKNESS. PATCH EXISTING METAL ROOF DECK FOR HOLES GREATER THAN 10" WIDE BY ANCHORING 22 GA. STAINLESS STEEL SHEET METAL TO BOTTOM OF EXISTING METAL ROOF DECK SPANNING FROM JOIST TO JOIST.

11. AS APPLICABLE, ALL HVAC AND / OR DX UNITS, ELECTRICAL TRANSFORMERS, ROOF TOP EQUIPMENT, ETC. THAT ARE ON SLEEPERS SHALL BE DISCONNECTED / REMOVED, RAISED, AND PLACED ON NEW CURBED PLATFORMS AS DETAILED AND REINSTALLED / RECONNECTED. ALL CURB MOUNTED HVAC UNITS, EQUIPMENT, ETC. SHALL HAVE A MINIMUM 10" CURB HEIGHT AND ARE TO BE RAISED AS REQUIRED.

12. WORK TO ANY UTILITY CONDUIT OR PIPE SHALL BE PERFORMED BY SPECIFIC LICENSED SUBCONTRACTORS SPECIALIZING IN HVAC, PLUMBING AND ELECTRICAL WORK. PERMITS AND INSPECTIONS ARE REQUIRED. REROUTE AND / OR MODIFY UTILITY CONDUIT OR PIPE AS REQUIRED TO BE INSTALLED AS DETAILED.

13. PROVIDE A "MERCURY" GAS LINE TEST (COORDINATE WITH OWNER AND ARCHITECT FOR WITNESS OF TEST). REPAIR ANY FOUND LEAKS AND RETEST AS REQUIRED.

14. UNLESS INDICATED OTHERWISE ON THE CONSTRUCTION DOCUMENTS, REPLACE AND RAISE ALL EXISTING EXPANSION JOINTS / AREA DIVIDERS / CURB MOUNTED EQUIPMENT / SKYLIGHTS (AS APPLICABLE) A MIN. 10" ABOVE ROOF DECK.

15. ALL SOIL STACK FLASHING SHALL BE A MIN. 10" ABOVE FINISHED ROOF SURFACE. COUPLE PVC PIPE ABOVE DECK AND COUPLE CAST IRON PIPE BELOW DECK.

16. ALL PIPING/ CONDUITS/ ETC. SHALL BE A MIN. 10" ABOVE ROOF SURFACE, NEW AND EXISTING. PROVIDE PORTABLE PIPE HANGERS WITH PROTECTION PADS AS SPECIFIED. RAISE EXISTING PIPING/ CONDUIT/ ETC. AS REQUIRED. MEP CONTRACTORS SHALL PROVIDE SUPPORTS FOR UTILITY LINES.

17. PROVIDE SHEET METAL HOODED (WITH METAL FACE CLOSURE) CAPS, WOOD CURB, BOX COVER AT ALL GAS AND WATER PIPE ROOF PENETRATIONS AS DETAILED. PROVIDE POSITIVE SLOPE AWAY FROM FACE COVER.

18. PROVIDE WALKWAY PROTECTION PADS AS SPECIFIED AROUND ALL ROOF HATCHES, HVAC ROOFTOP UNITS, DOORS THAT OPEN ONTO ROOF AND AT TOP AND BOTTOM OF ALL ROOF TOP ACCESS LOCATIONS.

19. INSTALL NEW SPLASH PAN AT ALL LOCATIONS WHERE ROOF DRAINAGE DISCHARGES ONTO ROOF AREA. INSTALL NEW SPLASH BLOCKS WHERE ROOF DRAINAGE DISCHARGES ON GROUND.

20. ISOLATE ALL HEAT PIPES / FLUES AS DETAILED AND RECOMMENDED AND OUTLINED IN THE NRCA MANUAL FOR HOT STACK FLASHING AND AS DETAILED.

21. ALL OUTSIDE AIR INTAKES SHALL BE COVERED TO ELIMINATE ODORS AND FUMES FROM ENTERING INTO THE BUILDING DURING CONSTRUCTION WORK.

22. AFTER SUBSTANTIAL COMPLETION, THE GENERAL CONTRACTOR SHALL EXAMINE AND CLEAN NEW DRAIN LINES AND NEW AND EXISTING (AS APPLICABLE) GUTTERS OF DEBRIS AND BLOCKAGE, FLUSH WITH WATER TO ENSURE THAT DRAINS AND GUTTERS FLOW FREELY.

23. OWNER WILL VERIFY PROPER OPERATION OF ALL ROOF TOP EQUIPMENT BEFORE AND AFTER THE PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL INOPERABLE EQUIPMENT PRIOR TO RELEASE OF RETAINAGE.

24. PRIOR TO COMMENCEMENT OF WORK, COORDINATE WALK OF ENTIRE ROOF WITH ROOFING MANUFACTURER'S TECHNICAL REPRESENTATIVE TO IDENTIFY AND LOCATE ALL AREAS OF HIGH SLOPE OR OTHER CONDITIONS WHICH MIGHT REQUIRE SPECIAL PROCEDURES FOR SYSTEM ATTACHMENT.

25. REFER TO MEP DRAWINGS FOR SIZE AND LOCATION OF DECK PENETRATIONS AND ROOF TOP EQUIPMENT.

26. REFER TO GENERAL DETAILS FOR TYPICAL SPLASH PAN, ROOF DRAIN AND OVERFLOW DRAIN DETAILS.

27. REPLACE ALL RUSTED AND / OR DETERIORATED EXISTING METAL VENT FLASHING AND FLUES.

28. GENERAL CONTRACTOR TO ENSURE ALL ROOFTOP PENETRATIONS (SOIL STACKS, VENTS, ETC.) ARE INSTALLED MIN. 4'-0" FROM OTHER DECK PENETRATIONS, RISE WALLS, AND ROOF EDGE. MECHANICAL EQUIPMENT TO BE LOCATED MIN. 10'-0" FROM PERIMETER EDGE AND NO CLOSER THAN 4'-0" FROM RISE WALLS, OR ANY OTHER ROOF PENETRATION.

29. LOCATE PERIMETER DRAINS MAX. 6'-0" FROM EDGE TYPICAL UNLESS SHOWN OTHERWISE. (GENERAL CONTRACTOR TO COORDINATE WITH ROOFING AND PLUMBING CONTRACTOR.)

30. THROUGH WALL BASE FLASHING MIN. HEIGHT 10" AND MAX. HEIGHT 20" FROM FINISH DECK. DO NOT STEP THROUGH WALL FLASHING CLOSER THAN 5'-0" FROM CORNERS.

31. GENERAL CONTRACTOR SHALL COORDINATE LOCATION AND ORIENTATION OF ROOF HATCH AND ACCESS LADDER.

32. GENERAL CONTRACTOR SHALL COORDINATE ALL TOP OF STEEL TO TOP OF BLOCKING AND SUBSTRATE BOARD DIMENSIONS IN FIELD PRIOR TO ORDERING MATERIALS. NO ADDITIONAL COMPENSATION WILL BE GRANTED FOR FAILURE TO COORDINATE THESE DIMENSIONS.

33. GENERAL CONTRACTOR SHALL VERIFY ROOF SLOPES WILL PROPERLY DRAIN AS SHOWN. TAPERED INSULATION HATCHING SHOWN IS NOT INTENDED TO ILLUSTRATE THE ENTIRE LIMITS OF TAPERED INSULATION. ROOF AREAS NOT SLOPED BY STRUCTURE SHALL BE SLOPED WITH TAPERED INSULATION TO ACHIEVE PROPER DRAINAGE.

34. PROVIDE ONE WAY MOISTURE VENTS AT ALL LIGHTWEIGHT CONCRETE OR GYPSUM OVER POUR AREAS AS RECOMMENDED BY THE ROOFING SYSTEM MANUFACTURER.

35. PAINT ALL EXISTING GAS PIPE TO REMAIN.

36. PROVIDE RETROFIT DRAIN KIT FOR EACH EXISTING ROOF DRAIN. RE: SPECS.

37. ALL ROOFING WORK SHALL OCCUR IN SUCH A MANNER AS NOT TO VOID ANY EXISTING ROOF WARRANTIES. CONTRACTOR TO CONTACT ROOFING MANUFACTURER PRIOR TO COMMENCING THE WORK. NO EXCEPTIONS.

1 GENERAL NOTES (EXISTING AND NEW)
1 1/2" = 1'-0"

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KEY PLAN

NORTH: PLAN TRUE

REGISTERED ARCHITECT

Melissa Turnbaugh

09/07/2022

CUSTOMER

FRIENDSWOOD ISD

DATE
09/07/2022

PROJECT NUMBER
220083

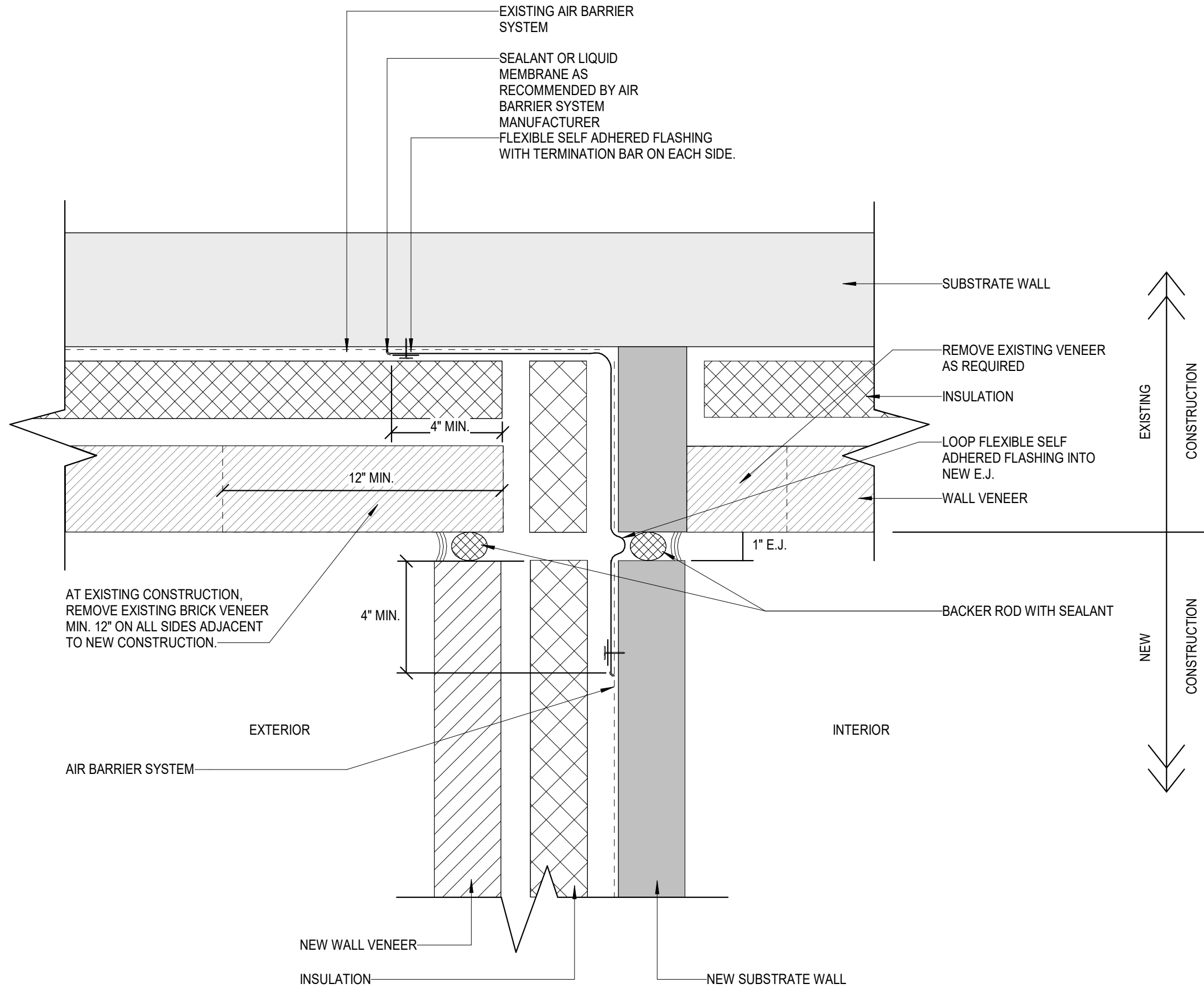
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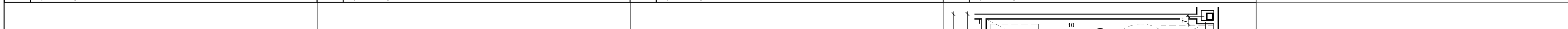
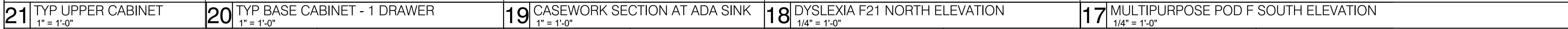
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022

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ROOF PLAN -
COMPOSITE

A-301





KEY PLAN

NORTH:  PLAN  TRUE

Melissa Turmbaugh
09/07/2022

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**ENLARGED
RESTROOM PLANS &
INTERIOR
ELEVATIONS**

7'-2"

4'-0"

4'-0"

COLUMN FURROUT

FINISH AS SCHEDULED

COLUMN FURROUT

CU

WRITABLE MAGNETIC SURFACE; RE: SPECS

SEAM

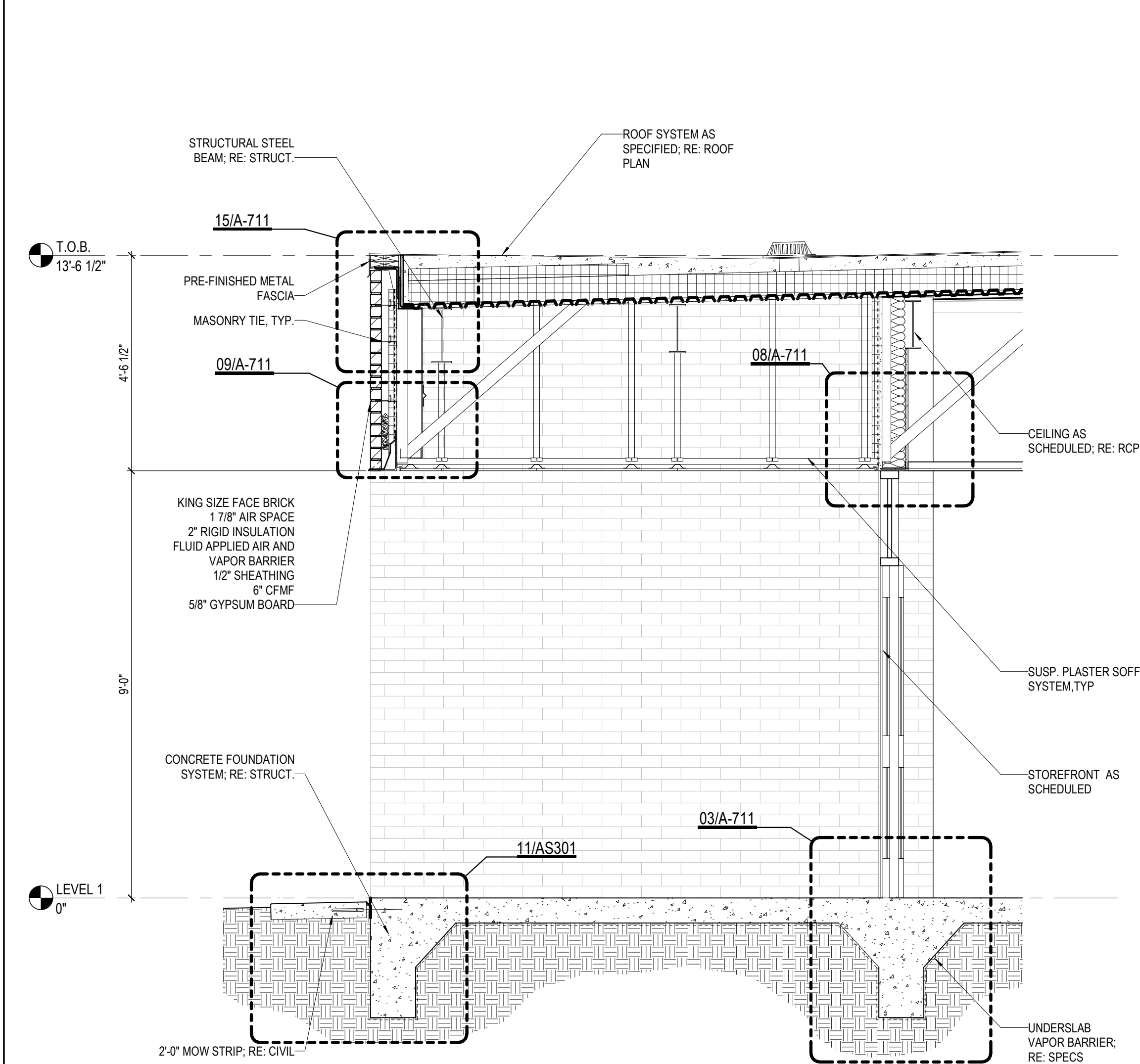
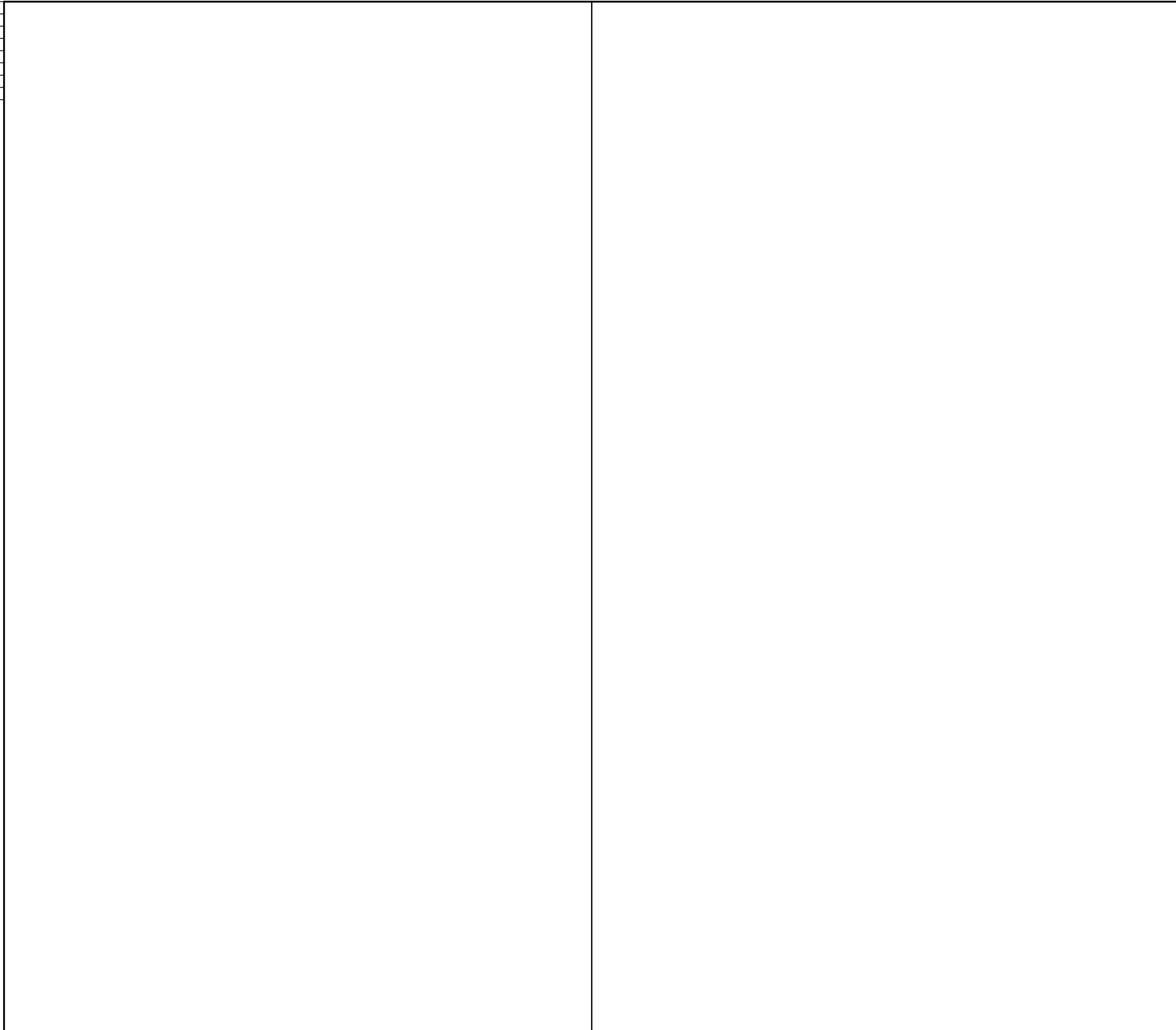
BASE AS SCHEDULED

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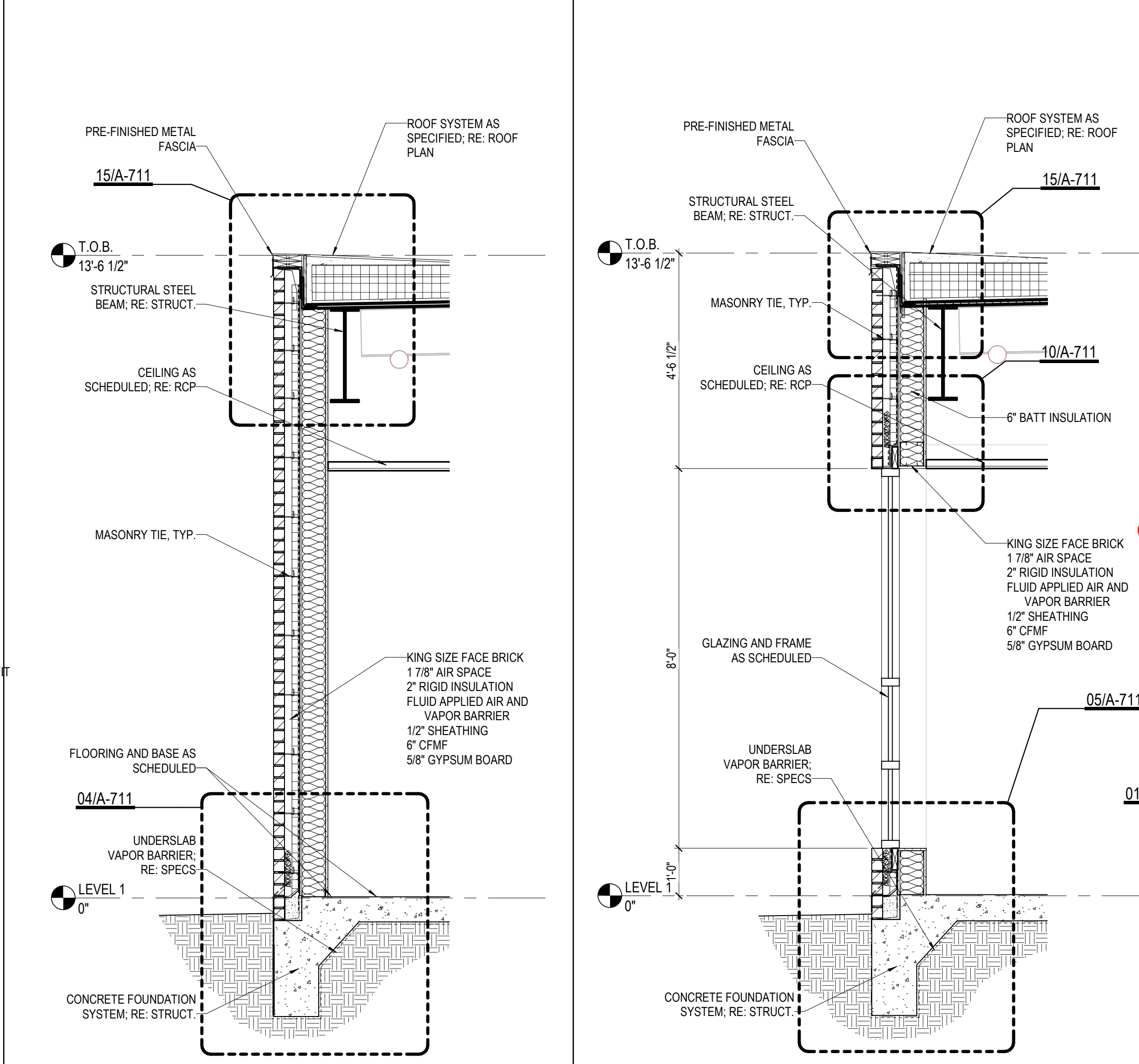
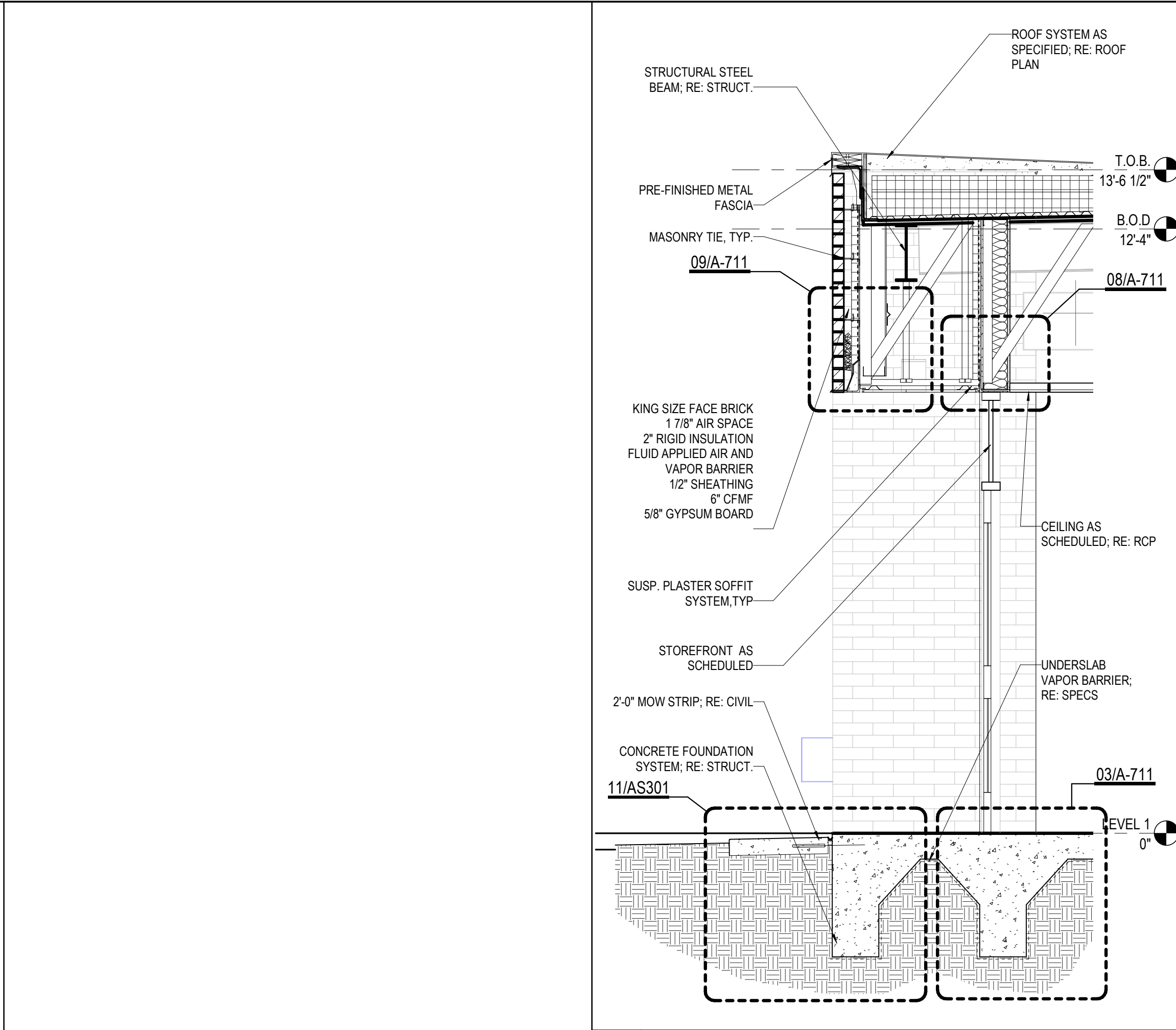
Architectural elevation drawing of a long wall section. The drawing includes the following elements and annotations:

- Dimensions:**
 - Two large horizontal dimensions of $19'-8 \frac{1}{8}"$ are indicated at the top.
 - Vertical dimensions on the right side include $1'-6"$, $4'-0"$, $7'-2"$, and $4'-1'-4"$.
- Annotations:**
 - WALL FINISH AS SCHED.** (top left)
 - WT-1, WRAP TO SIDES** (top left, near a red clouded area)
 - SCHLUTER TRIM** (top left, near a red clouded area)
 - DRINKING FOUNTAIN, RE: PLUMBING DOOR AS SCHED.** (bottom left, near a red clouded area)
 - ADD#3** (bottom left, near a red clouded area)
 - OP. DOOR AS SCHED.** (bottom center-left)
 - ALIGN** (top center, pointing to a red clouded area)
 - WRITABLE MAGNETIC SURFACE, RE: SPECS** (center, pointing to a large grey rectangular area)
 - BASE AS SCHED.** (bottom center-right)
 - FIRE EXTINGUISHER CABINET** (bottom right, pointing to a small cabinet icon)
- Other Features:**
 - Two sets of double doors with dashed green lines indicating swing.
 - A large central grey rectangular area labeled "WRITABLE MAGNETIC SURFACE".
 - Various lines and markers (CU, C) indicating construction details.

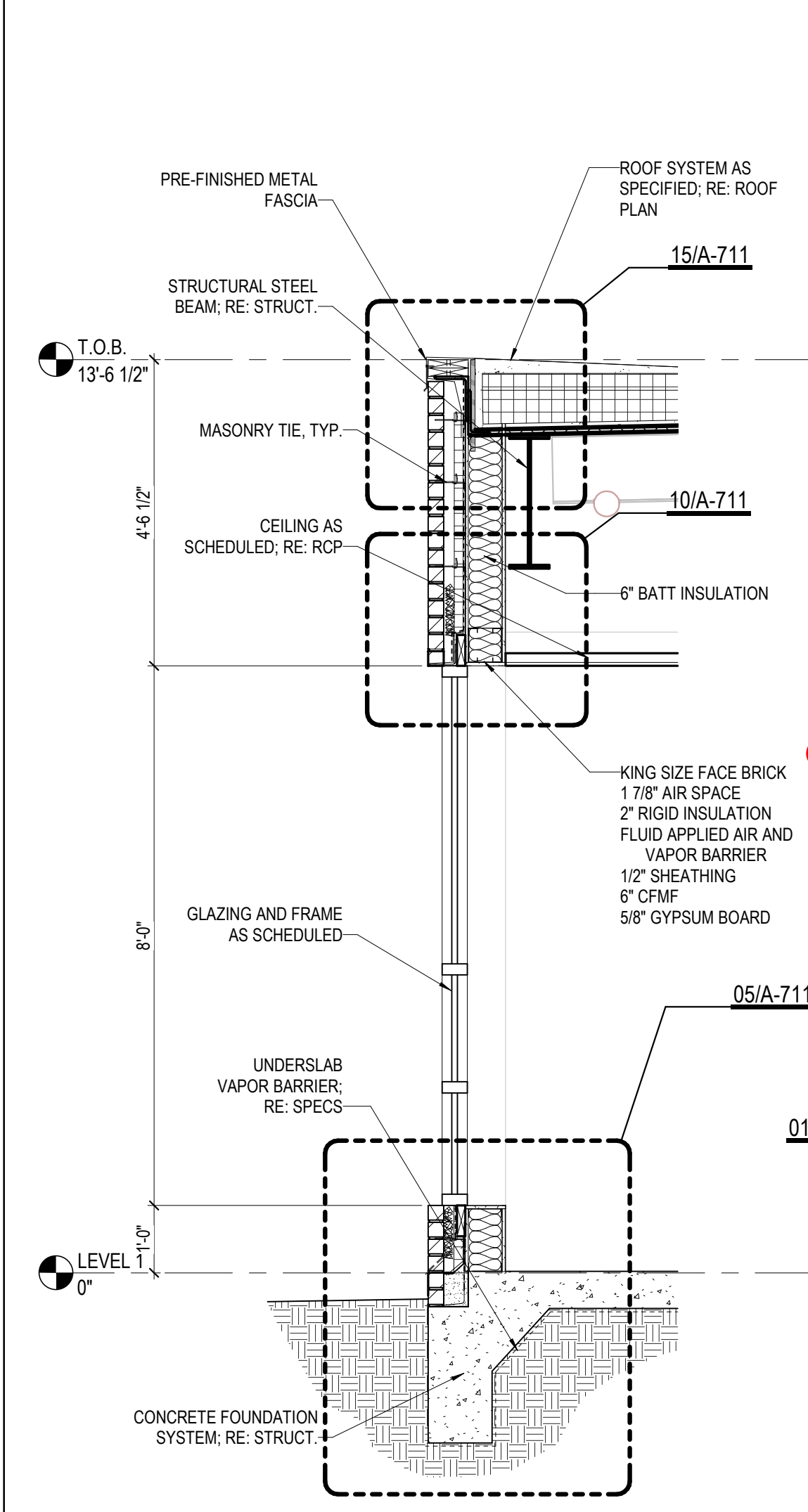
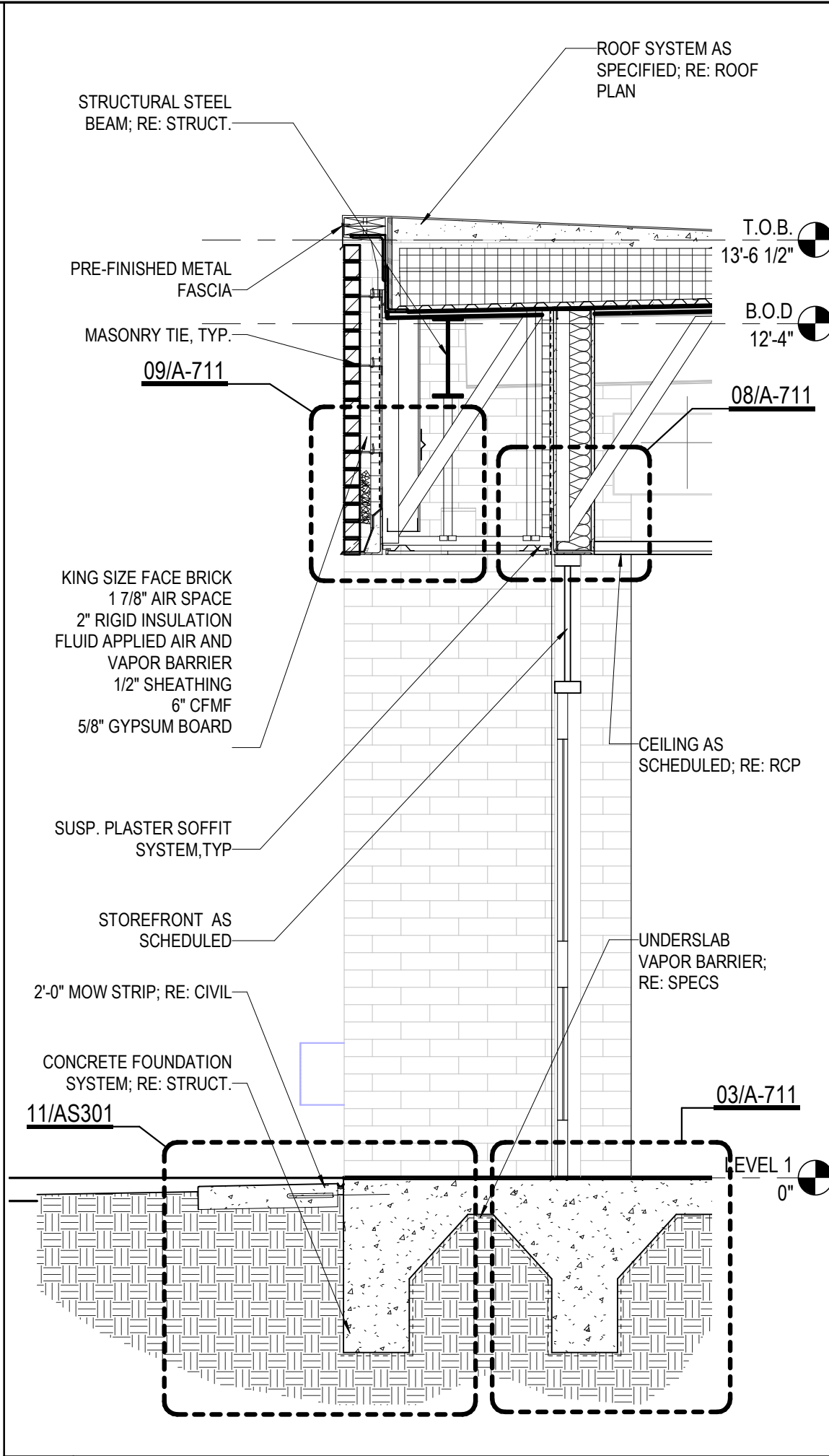
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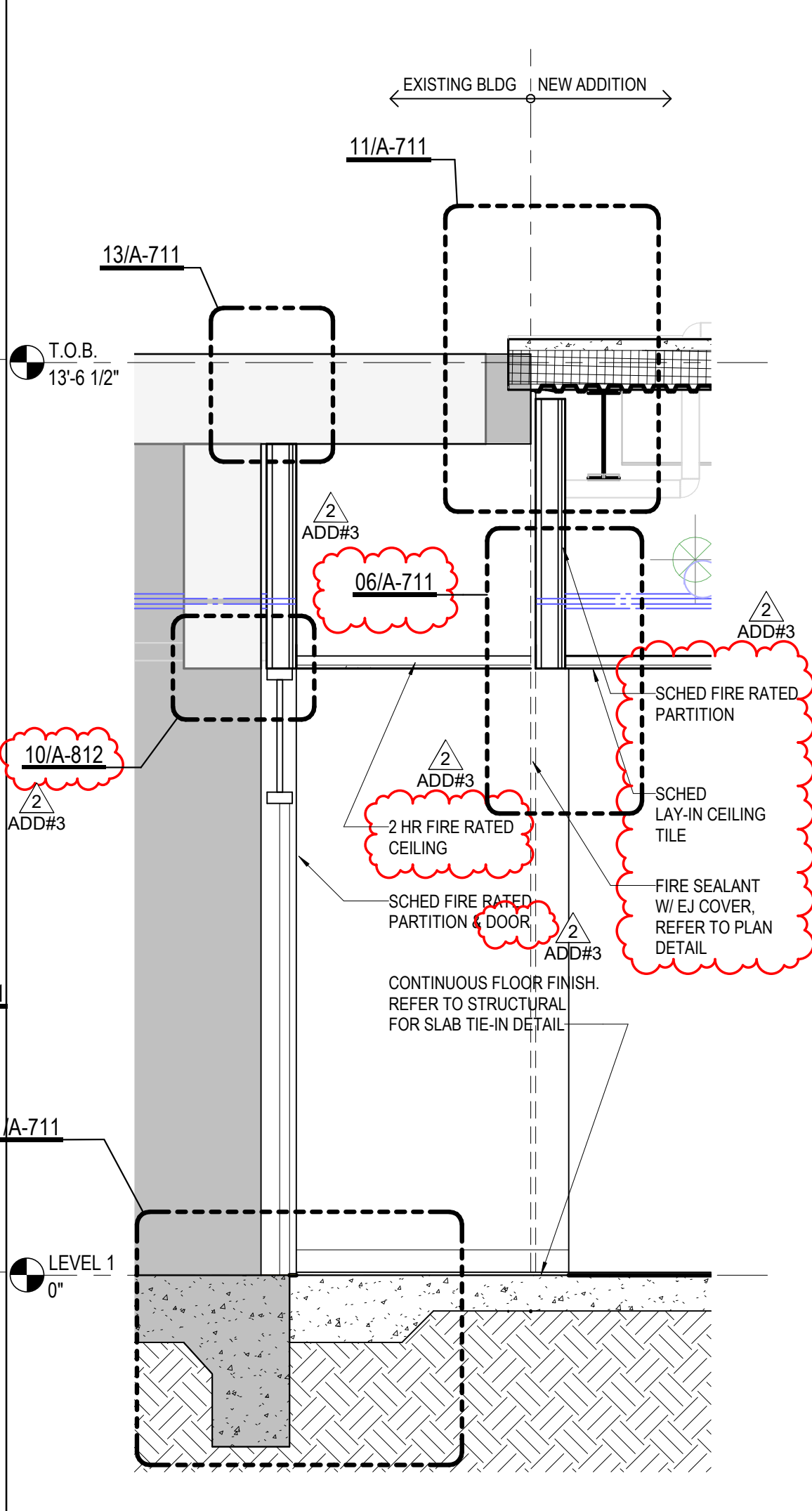
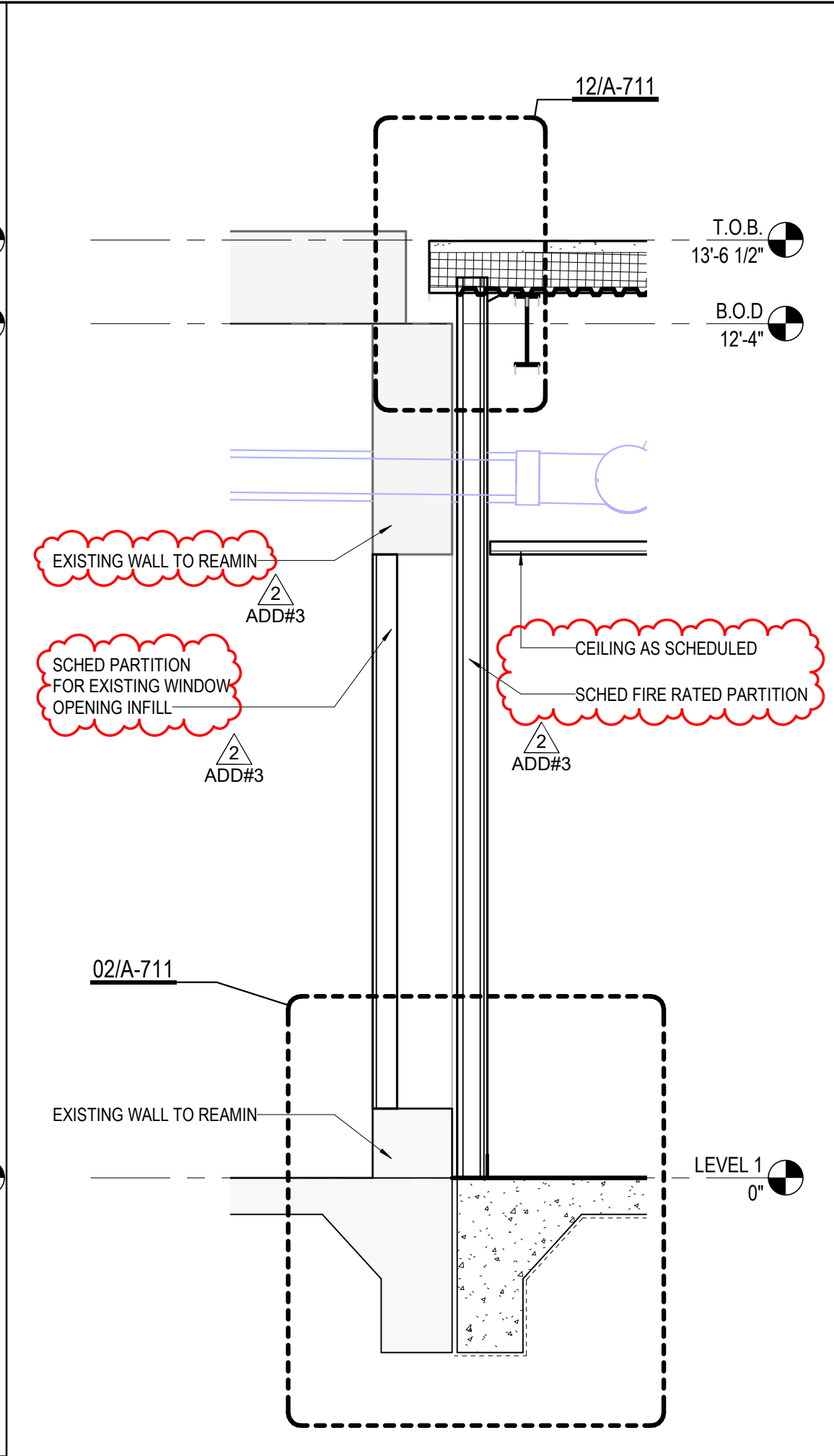
05 SECTION AT BLDG NORTH COVE
1/2" = 1'-0"



03 SECTION AT TYP BRICK VENEER WALL
1/2" = 1'-0"



02 SECTION AT WINDOW
1/2" = 1'-0"



01 SECTION AT FIRE WALL COVE CONDITION
1/2" = 1'-0"

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A B

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E F

KEY PLAN

NORTH: PLAN TRUE

REGISTERED ARCHITECT

MELISSA TURNBULL

2017

09/07/2022

CLIENT

FRIENDSWOOD ISD

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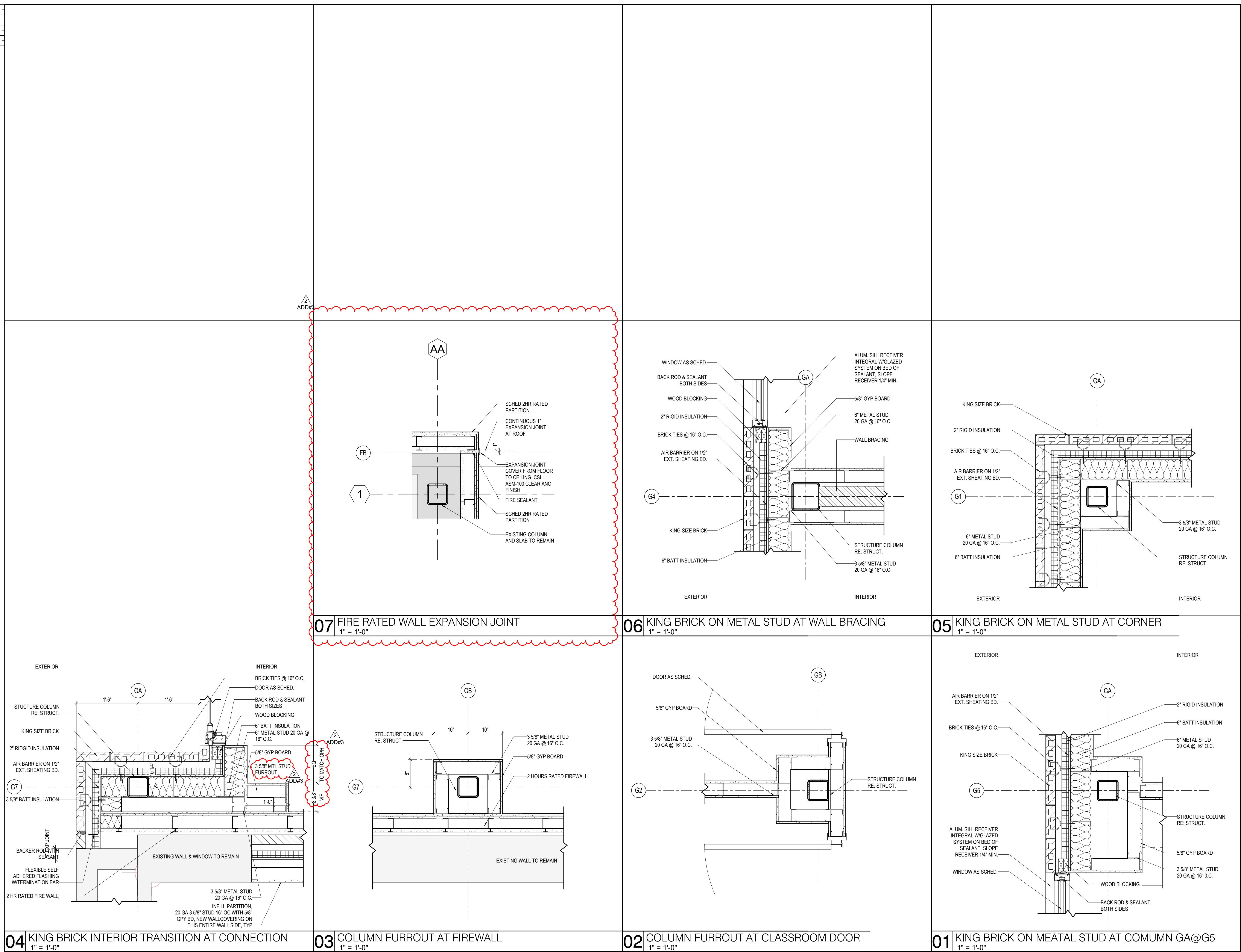
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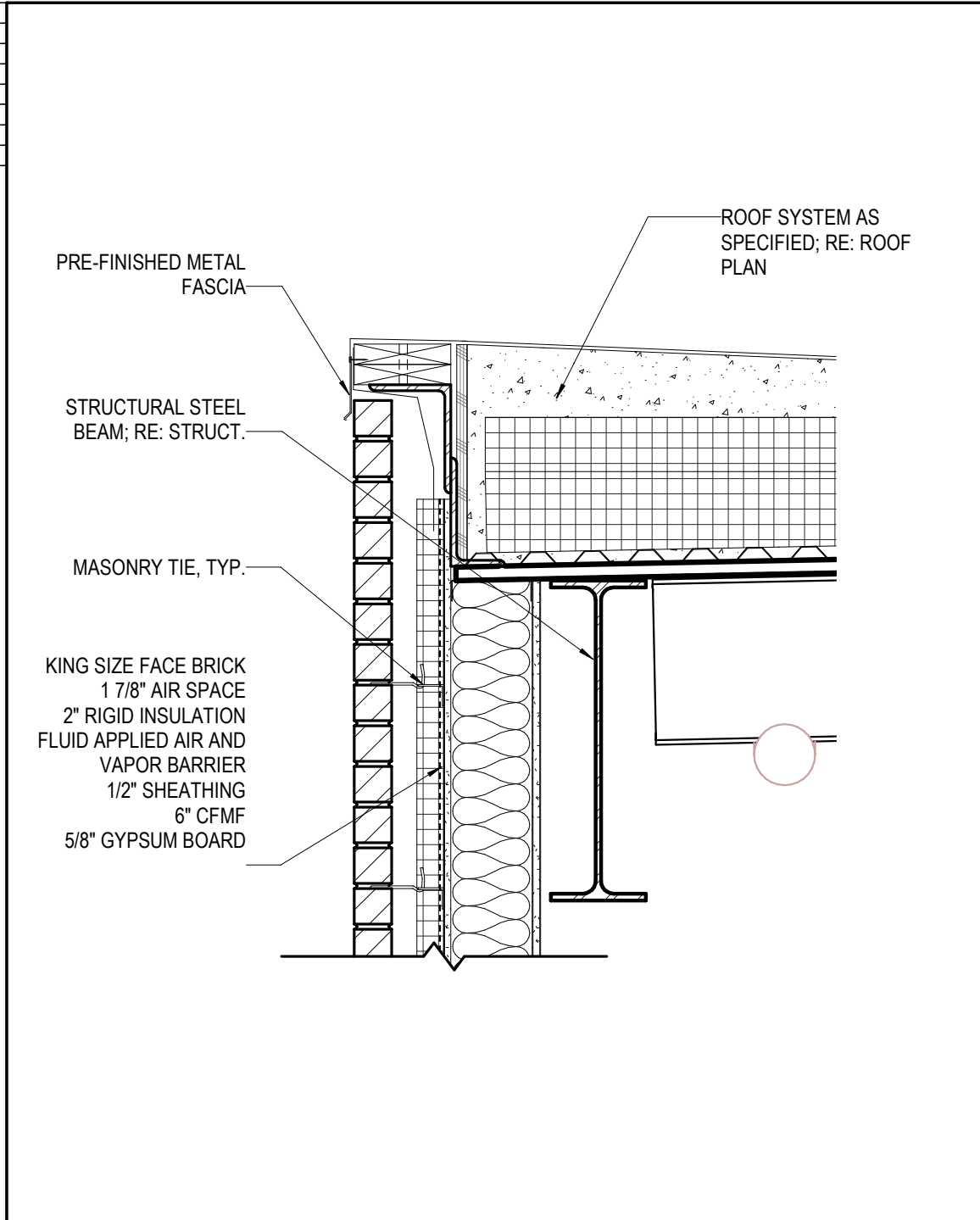
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WALL SECTIONS

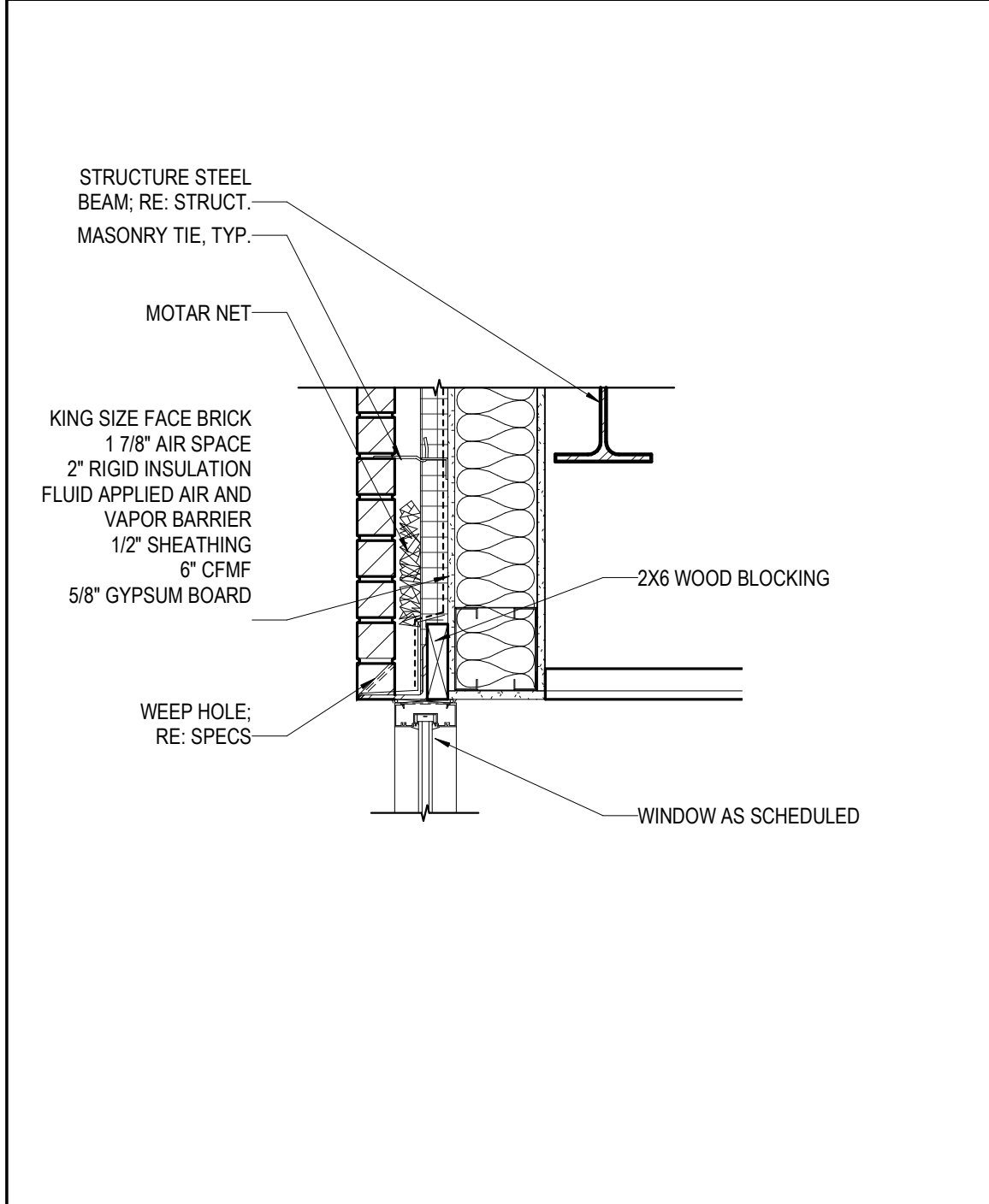
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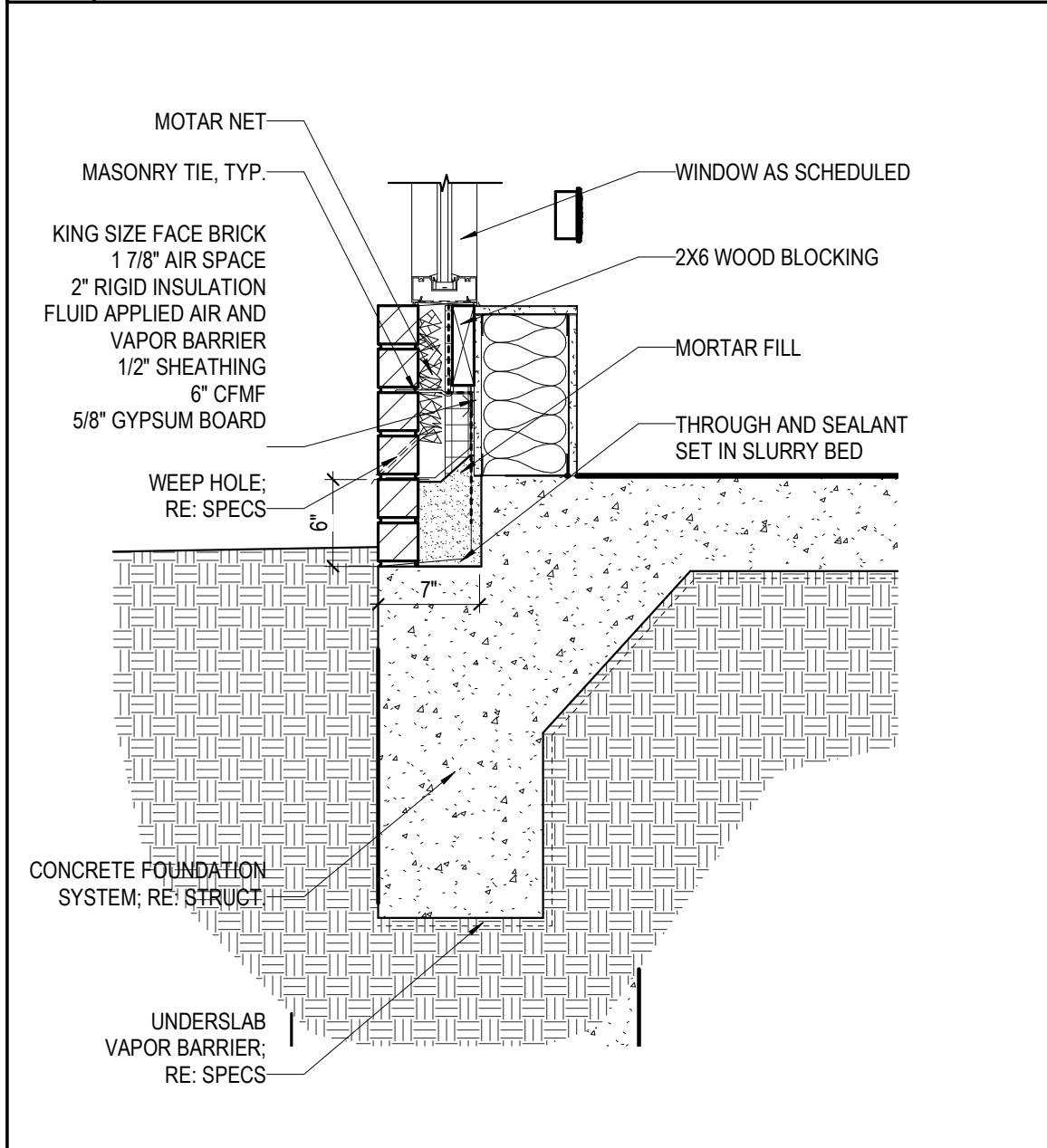
ARCHITECT		PBK Architects, Inc.	
HOUSTON		PBK.com	
11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0606 P 713-961-4571 F TX Firm: BR 1608			
<div>CIVIL DIB ENGINEERS T 713 940 3238</div> <div>STRUCTURAL KURALLA ENGINEERS T 800 286 2674</div> <div>MIST LEAF ENGINEERS T 713 960 1300</div> <div>LANDSCAPE ARCHITECT ETOLAND T 713 965 0008</div> <div>BUILDING ENVELORE BEAM T 713 940 3201</div>			
<div>WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION</div> <div>2100 W PARKWOOD AVE. FRIENDSWOOD, TX 77546</div> <div>ISSUE FOR PROPOSAL</div>			
<div></div>			
<div><div>G A B C D E F</div><div>KEY PLAN</div><div><div>NORTH: PLAN TRUE</div></div></div>			
<div><div></div><div>Melissa Turnbaugh 09/07/2022</div></div>			
CLIENT FRIENDSWOOD ISD			
DATE 09/07/2022		PROJECT NUMBER 220083	
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ISSUE FOR PROPOSAL			
PLAN DETAILS			



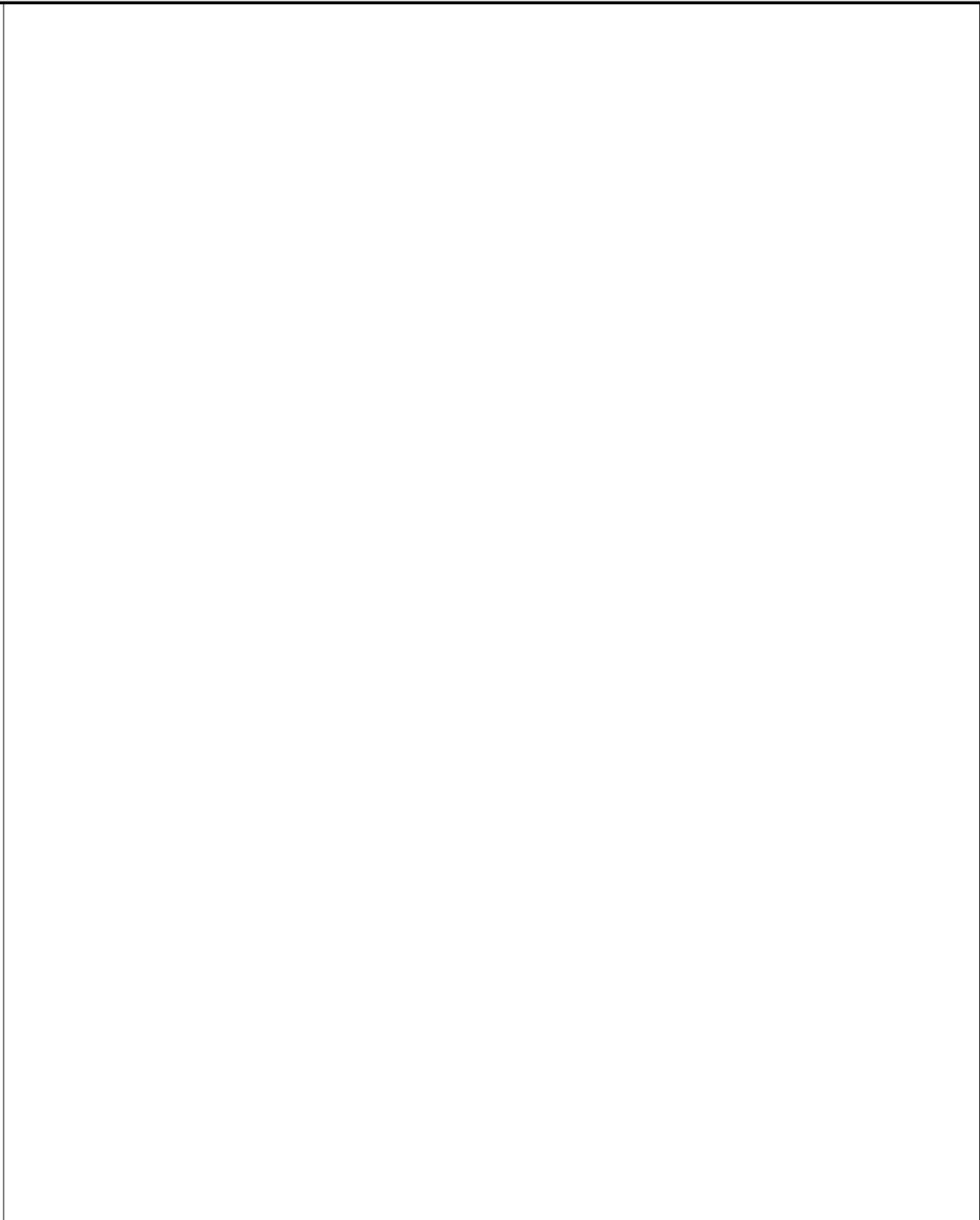
15 SECTION AT TYP BRICK VENEER WALL - ROOF
1" = 1'-0"



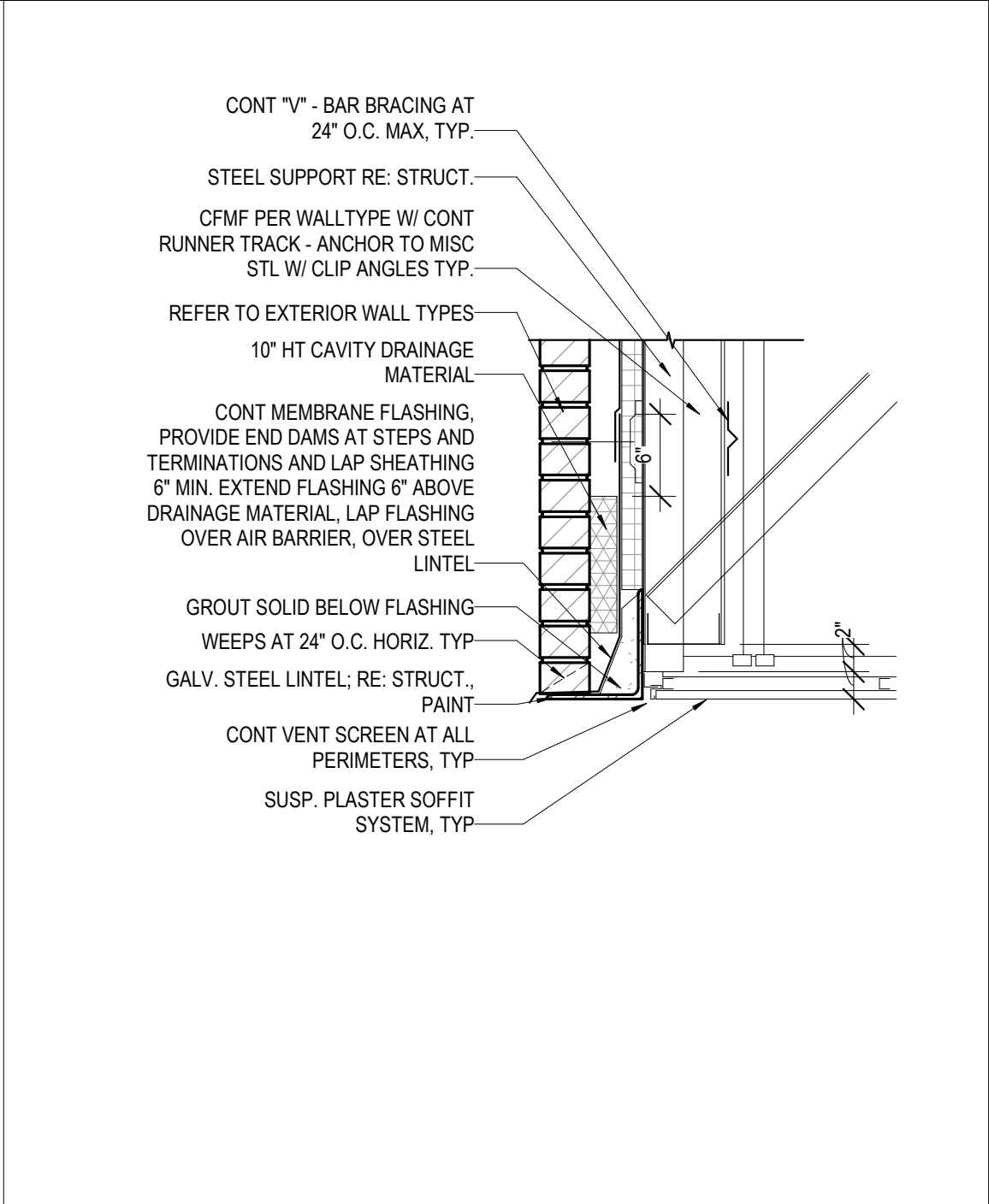
10 SECTION AT WINDOW DETAIL
1" = 1'-0"



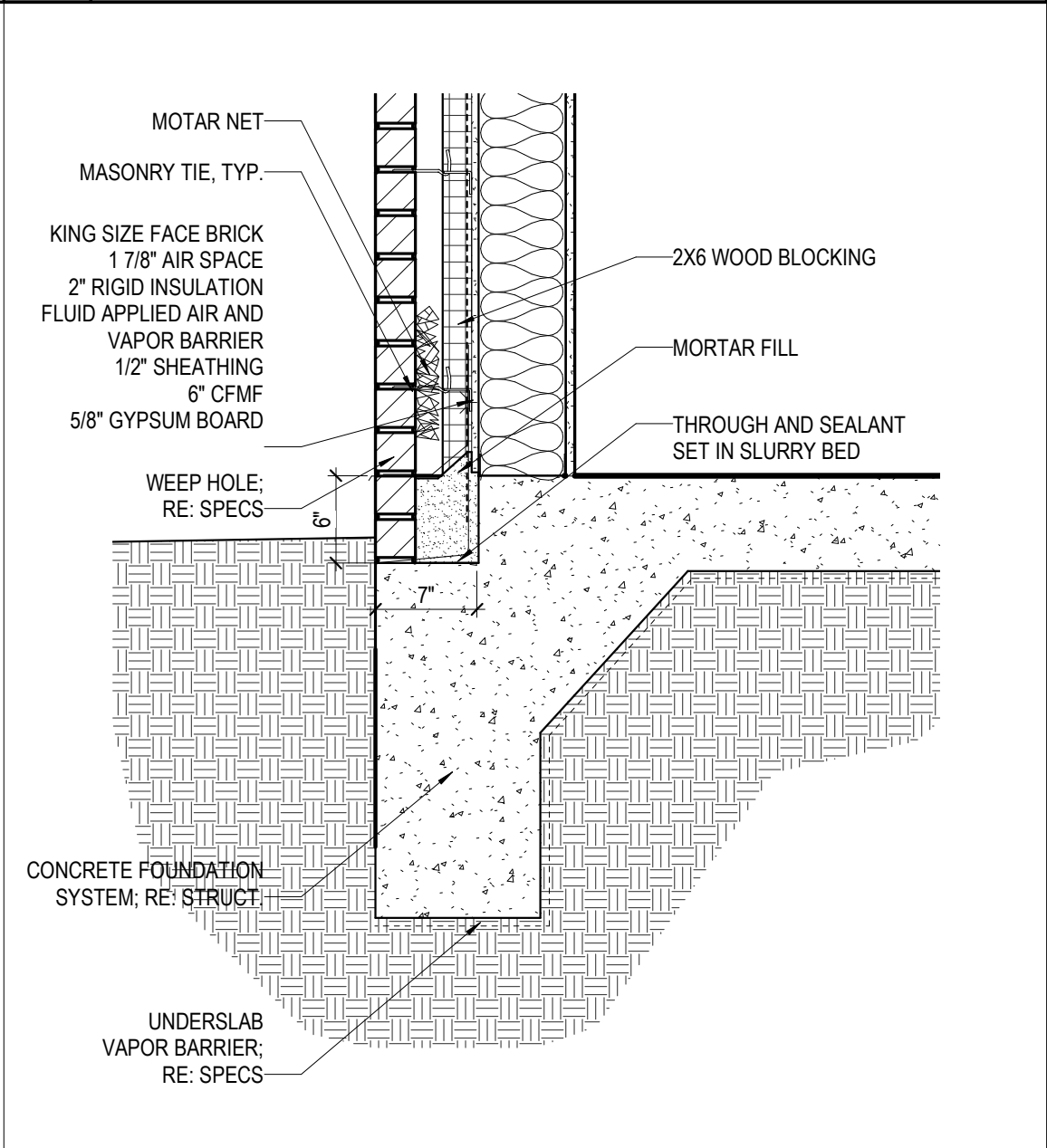
05 SECTION AT WINDOW - BASE
1" = 1'-0"



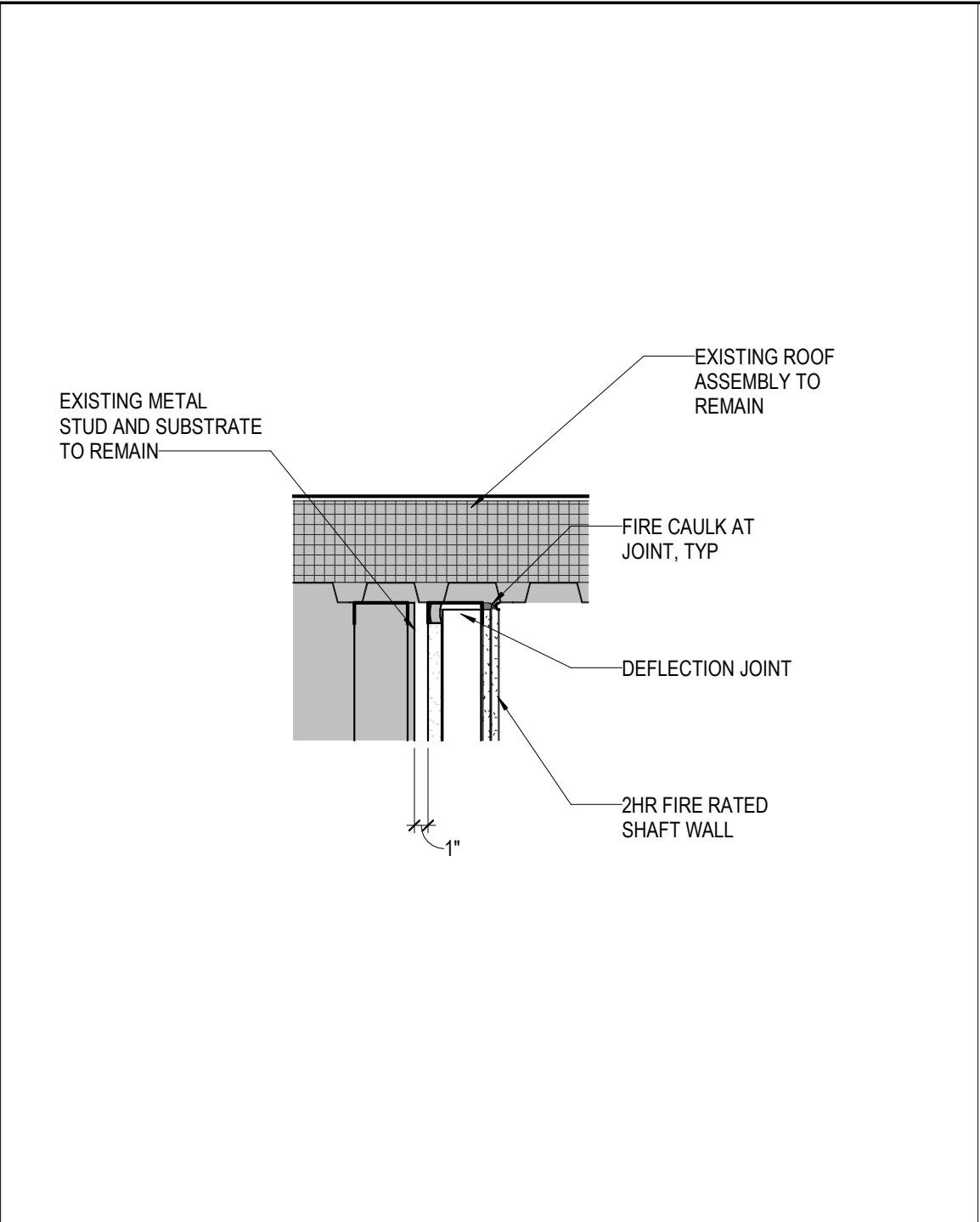
09 SECTION AT BUILDING SOUTH COVE DETAIL
1" = 1'-0"



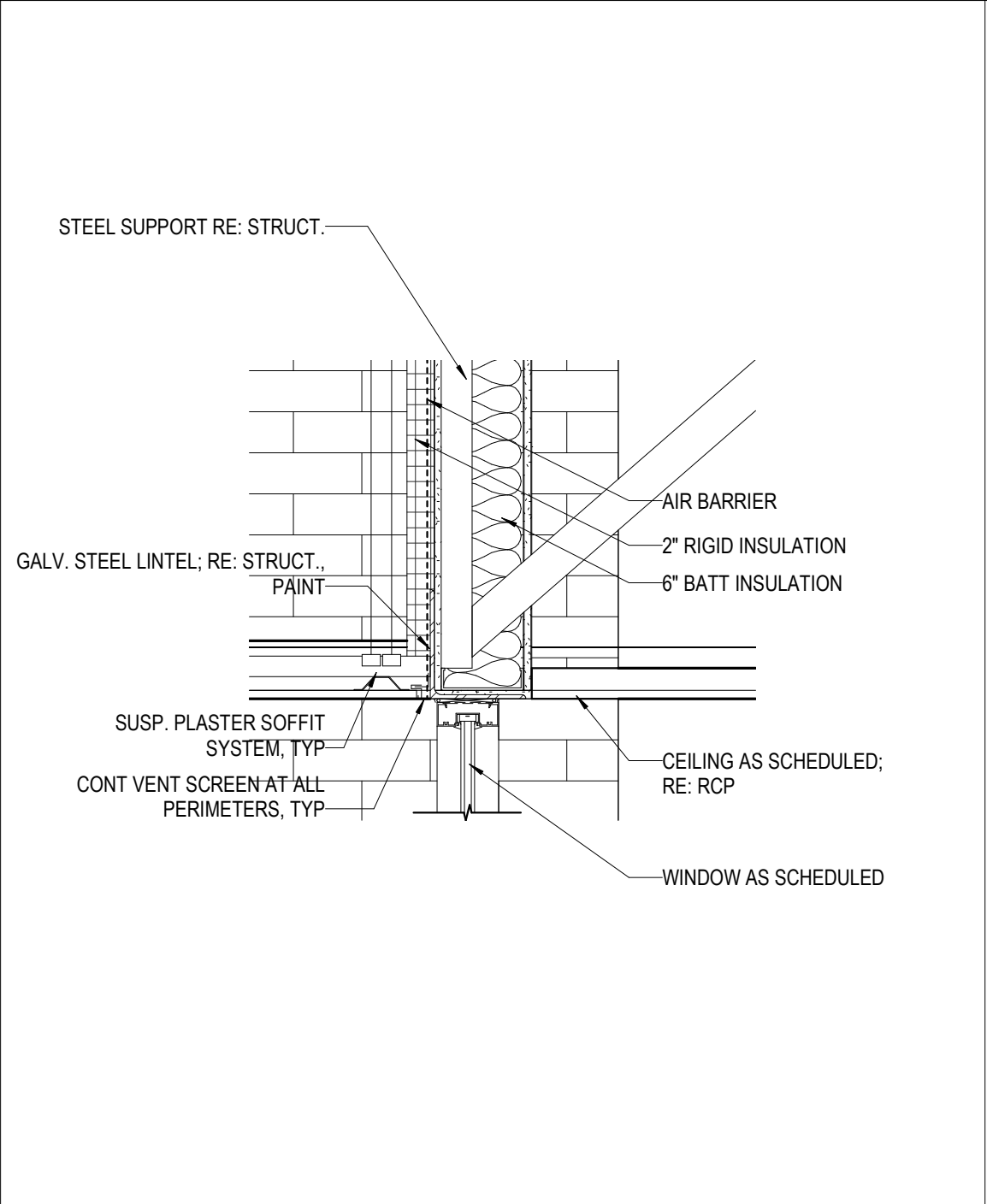
04 SECTION AT TYP BRICK VENEER WALL BASE
1" = 1'-0"



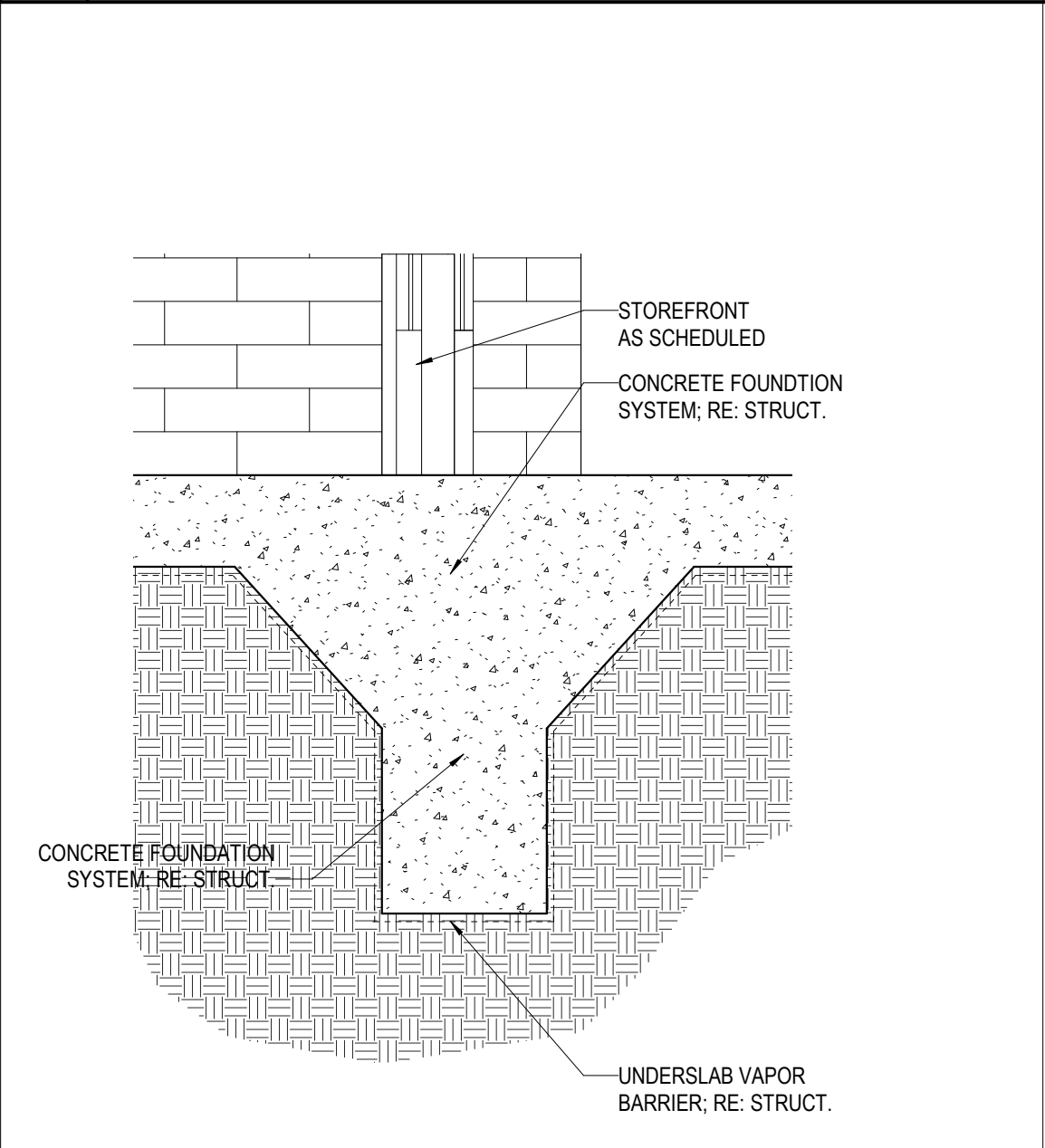
03 SECTION AT NORTH COVE BASE DETAIL
1" = 1'-0"



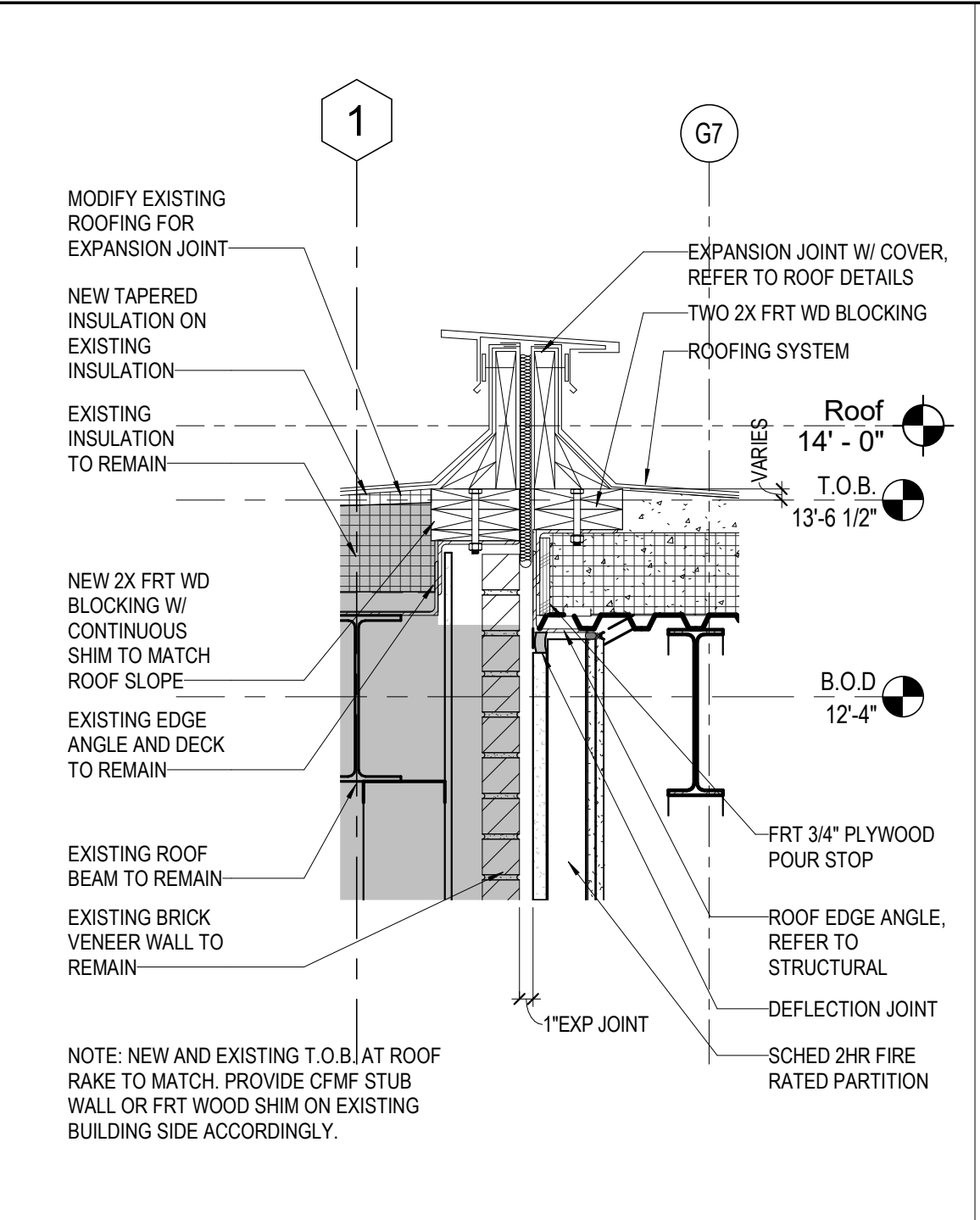
13 SECTION AT FIRE WALL AT EXISTING ROOF
1" = 1'-0"



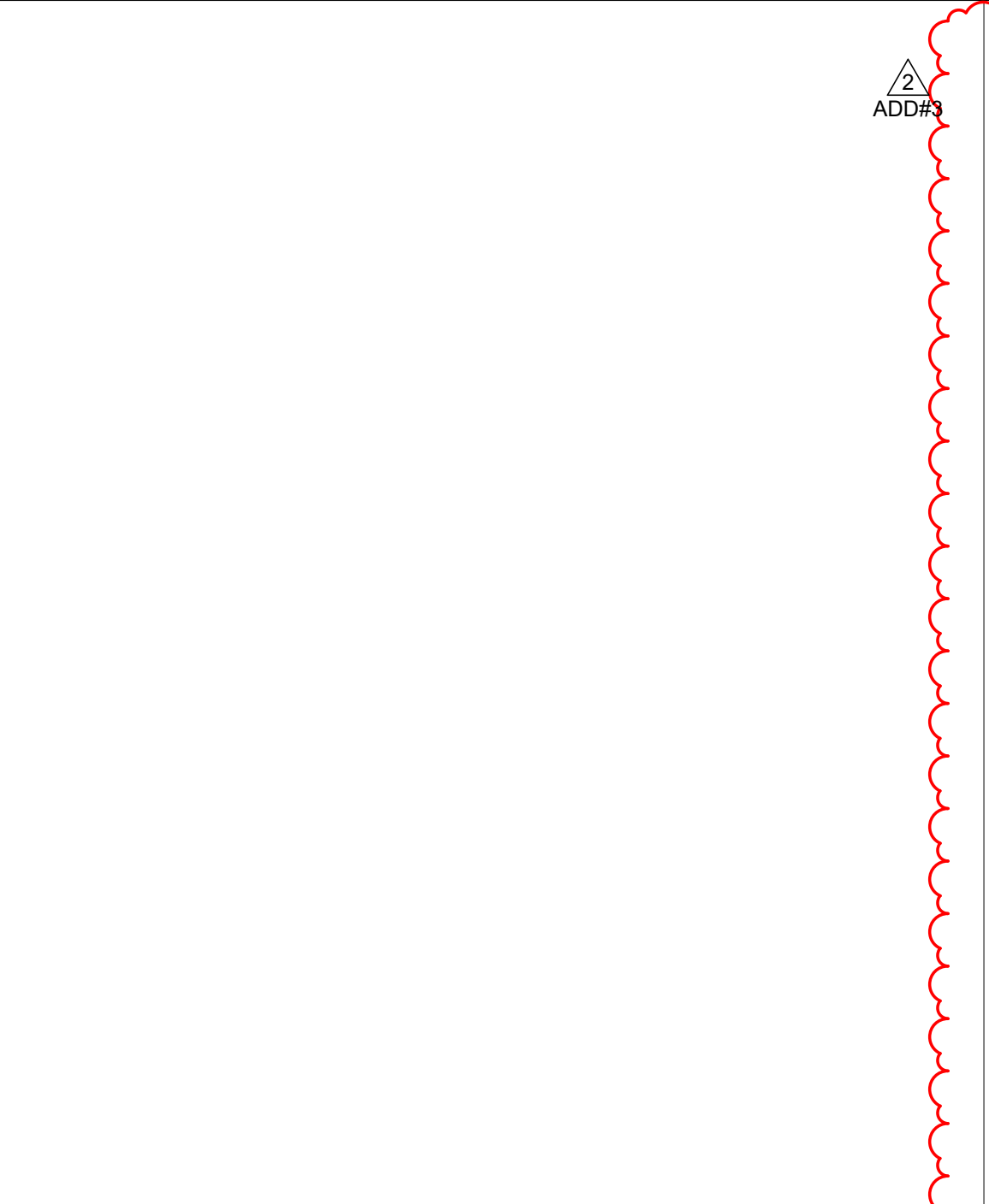
08 SECTION AT BLDG NORTH COVE DETAIL
1" = 1'-0"



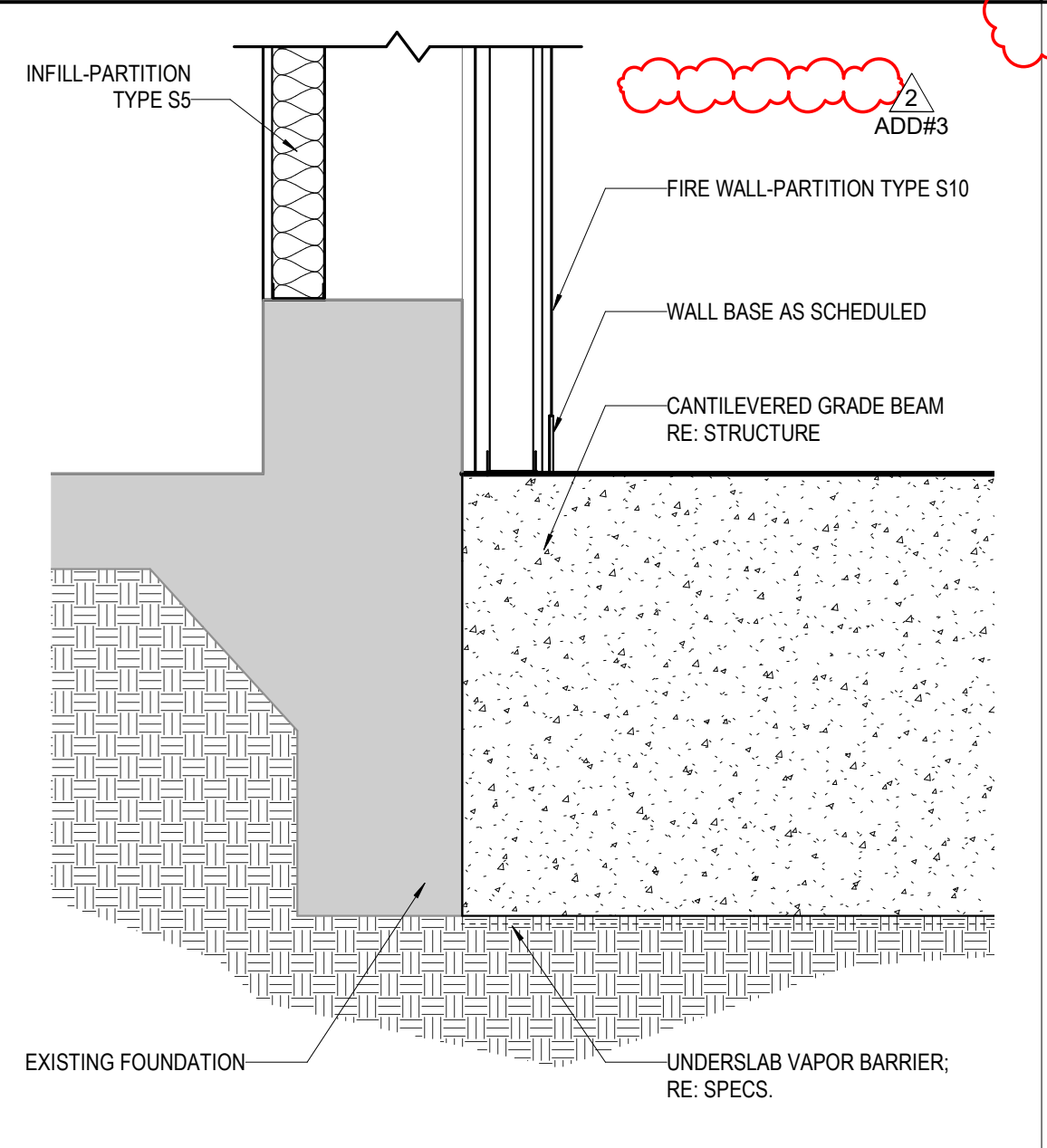
02 GRADE BEAM AT EXISTING GRADE BEAM
1" = 1'-0"



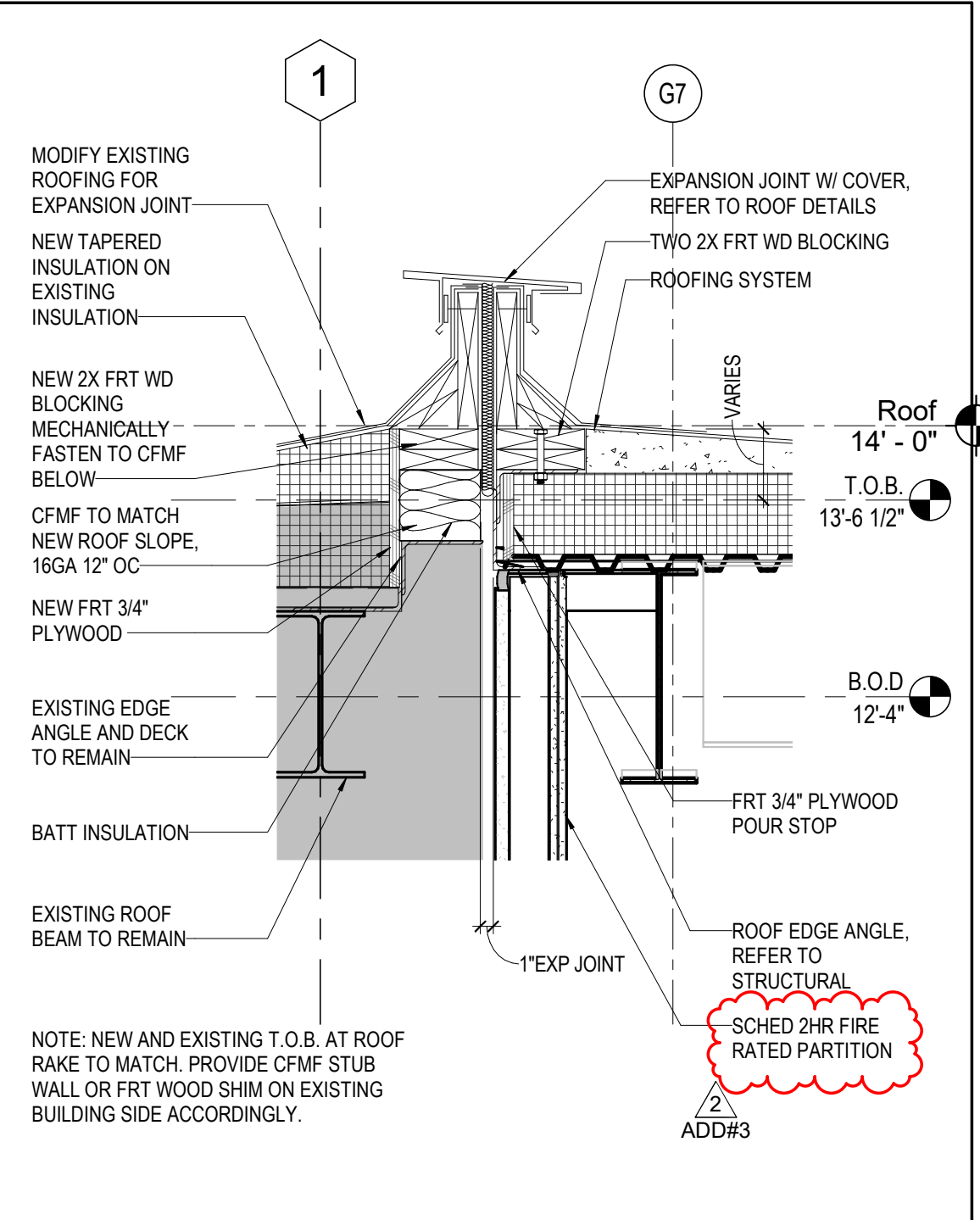
12 SECTION AT EXPANSION JOINT 2
1" = 1'-0"



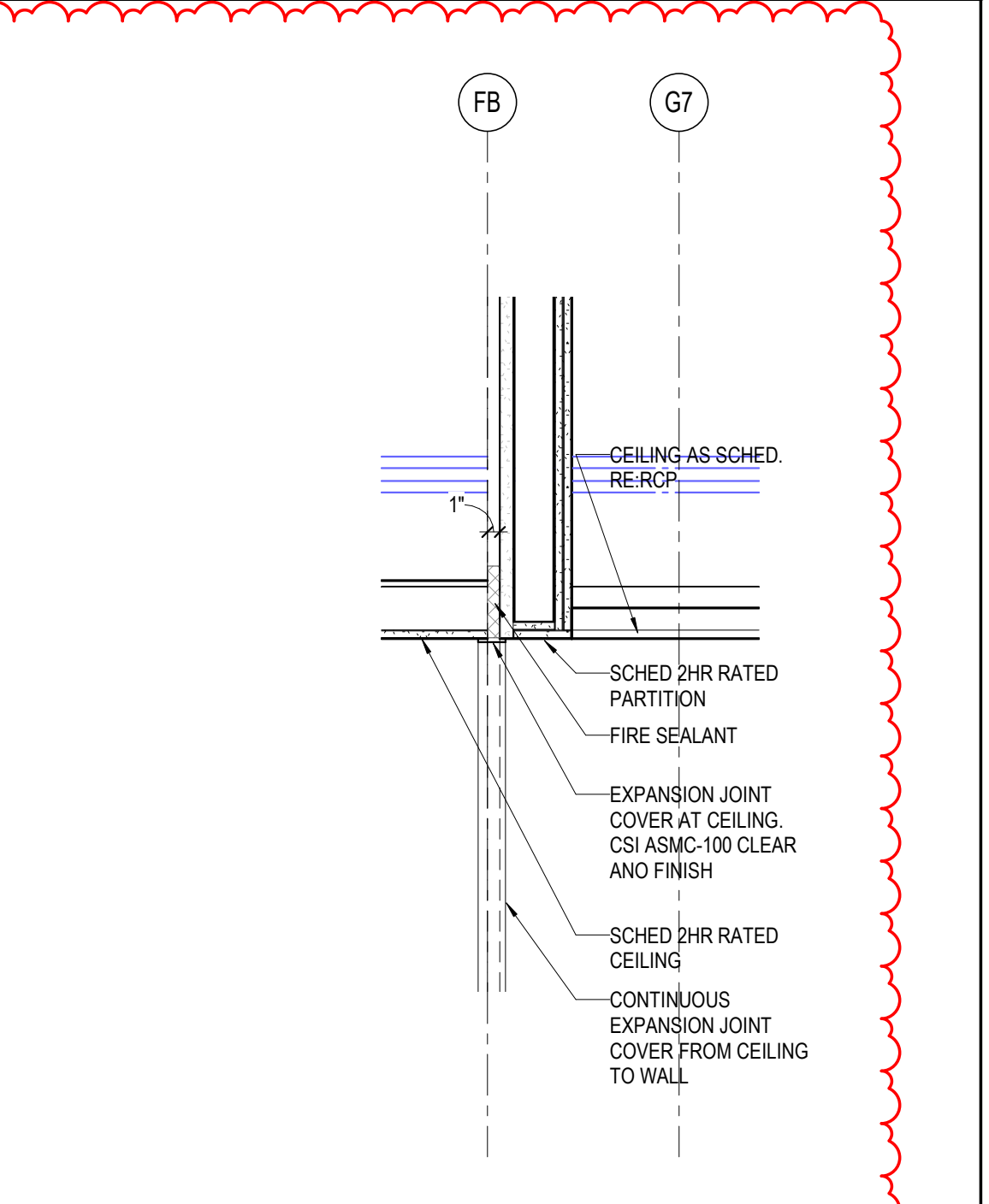
06 SECTION AT CEILING EXP JOINT
1" = 1'-0"



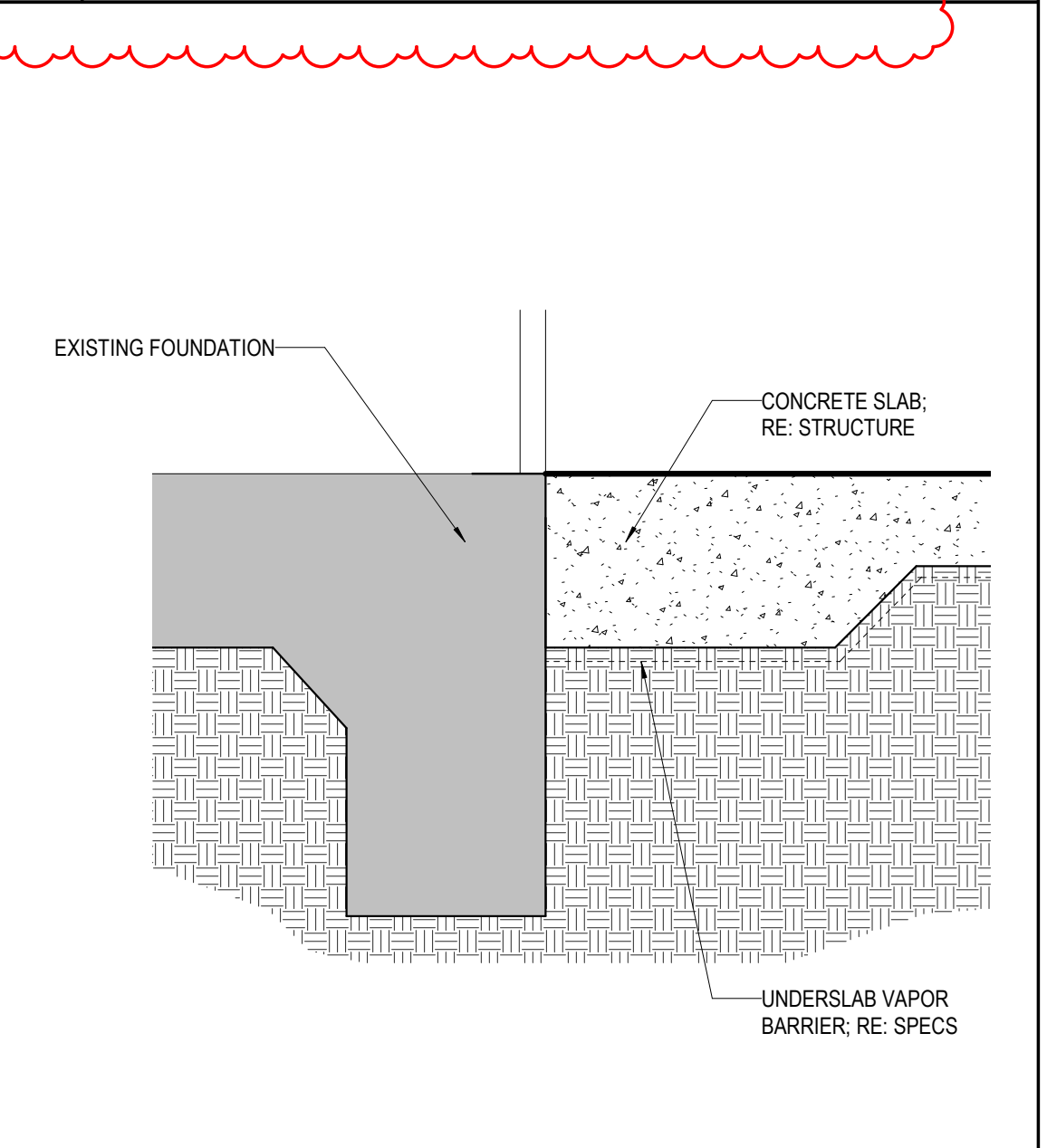
01 CONTINUOUS GRADE BEAM DETAIL
1" = 1'-0"



11 SECTION AT EXPANSION JOINT 1
1" = 1'-0"



06 SECTION AT CEILING EXP JOINT
1" = 1'-0"



01 CONTINUOUS GRADE BEAM DETAIL
1" = 1'-0"

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LANDSCAPE ARCHITECT

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BUILDING ENVELOPE

BEAM

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WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

KEY PLAN

NORTH: PLAN TRUE

CEILING AS SCHED.
RE: RCP

SCHED 2HR RATED
PARTITION

FIRE SEALANT

EXPANSION JOINT
COVER AT CEILING.
CSI ASMC-100 CLEAR
AND FINISH

SCHED 2HR RATED
CEILING

CONTINUOUS
EXPANSION JOINT
COVER FROM CEILING
TO WALL

REGISTERED ARCHITECT

MELISSA TURNER

STATE OF TEXAS

21779

Melissa Turner

09/07/2022

CLIENT

FRIENDSWOOD ISD

DATE

09/07/2022

PROJECT NUMBER

220083

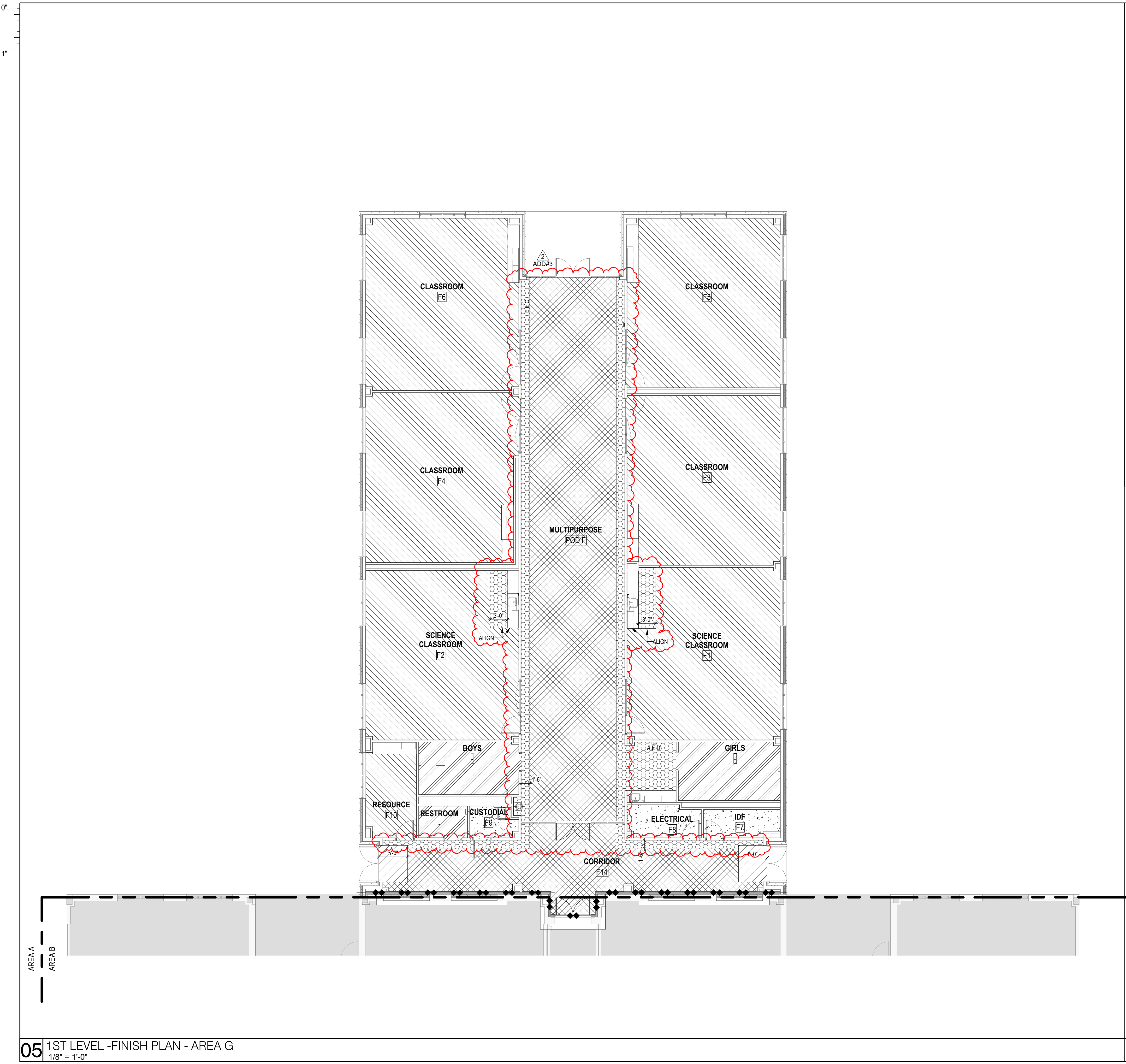
DRAWING HISTORY

No.	Description	Date
2	ADDENDUM NO.03	09/26/2022

ISSUE FOR PROPOSAL

WALL SECTIONS
DETAILS

A-711



FLOOR FINISH LEGEND

- LVT-1, LUXURY VINYL TILE
RE: FINISH SCHEDULE
- SC-1 SEALED CONCRETE
RE: FINISH SCHEDULE
- CPT-1, CARPET
RE: FINISH SCHEDULE
- CPT-3, WALK OFF MAT
RE: FINISH SCHEDULE
- EPF-1, EPOXY FLOORING
RE: FINISH SCHEDULE



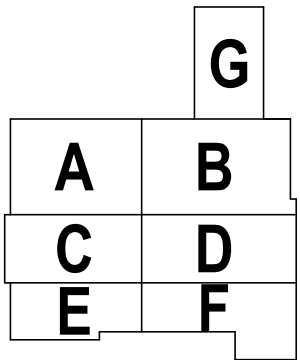
ARCHITECT	PBK Architects, Inc.
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STODLAND	
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BUILDING ENVELOPE	
BEAM	
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WINDSONG ELEMENTARY
SCHOOL ADDITION AND
RENOVATION

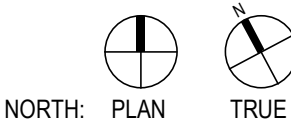


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KEY PLAN

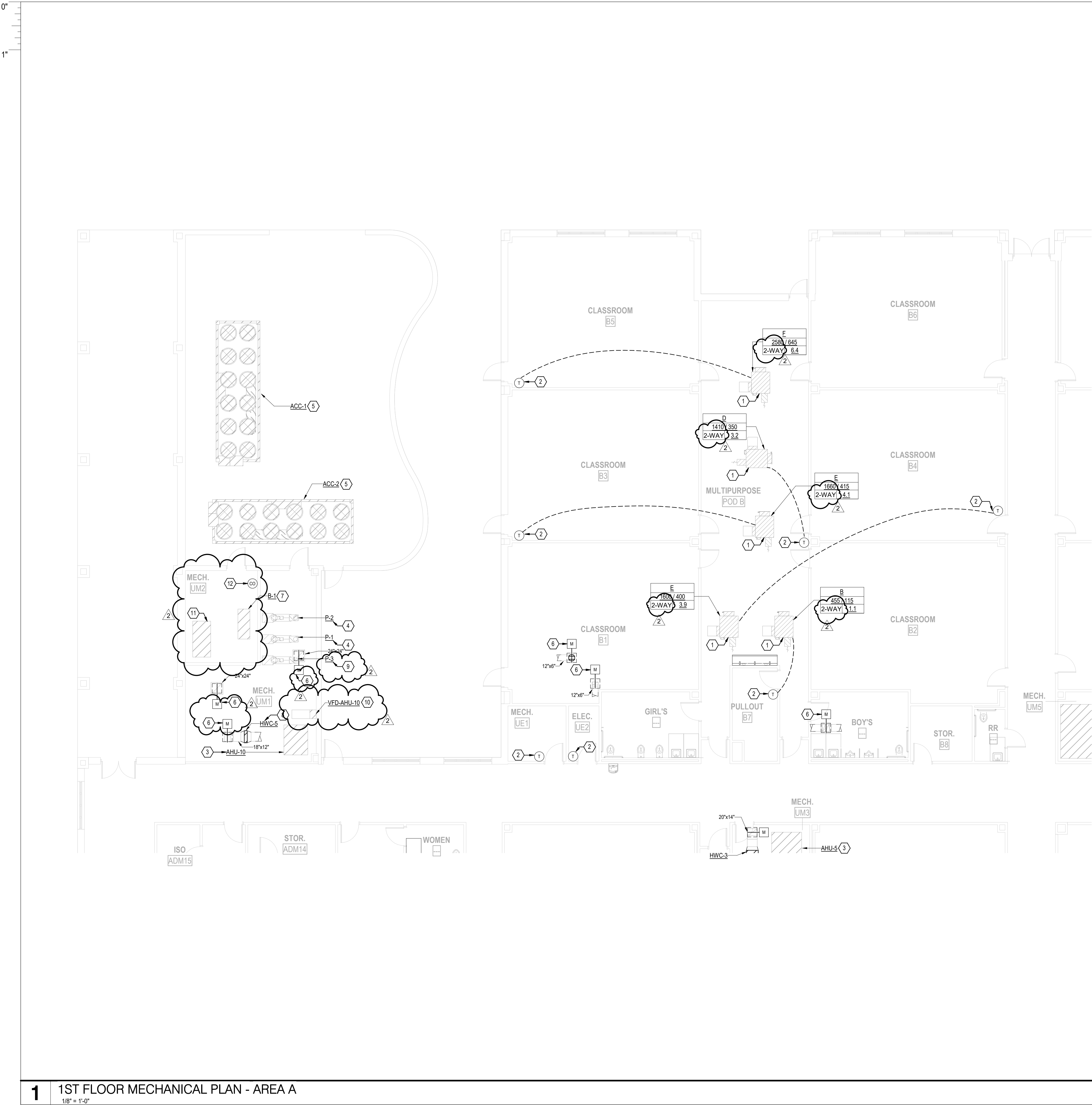


Melissa Turnbaugh
09/07/2022

CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM NO.03	09/26/2022
ISSUE FOR PROPOSAL		

1ST LEVEL - FINISH
PLAN - AREA G

AF101G



- KEYED NOTES:
- 1

EXISTING FAN POWERED TERMINAL UNITS TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, HOT WATER CONTROL VALVE AND ACTUATOR, WIRING AND INTEGRATION TO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.

2
- 2

EXISTING SENSOR AND WIRING TO BE REMOVED AND REPLACED WITH NEW.

2
- 3

EXISTING AIR HANDLING UNIT TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, CONTROL VALVES AND ACTUATORS, SENSORS, MOTORIZED DAMPERS AND ACTUATORS, WIRING AND INTEGRATION INTO BAS. PROVIDE NEW CHILLED AND HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.

2
- 4

EXISTING CHILLED WATER PUMP TO REMAIN. CONTROL MODULE AND WIRING EXISTING TO REMAIN. INTEGRATE INTO BAS.

2
- 5

EXISTING AIR-COOLED CHILLER. CONTROL MODULE AND WIRING TO REMAIN. INTEGRATE INTO BAS.

2
- 6

EXISTING MOTORIZED DAMPER AND ACTUATOR TO BE REPLACED WITH NEW AND TIE INTO NEW DDC SYSTEM.

2
- 7

EXISTING BOILER TO REMAIN. PROVIDE CONTROL MODULE, WIRING AND INTEGRATION INTO BAS. REPLACE EXISTING 3-WAY VALVE ACTUATOR WITH NEW.

2
- 8

EXISTING HEATING WATER COIL TO REMAIN. PROVIDE CONTROL VALVE AND ACTUATOR, WIRING AND INTEGRATE INTO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.

2
- 9

EXISTING HEATING WATER PUMP TO REMAIN. PROVIDE CONTROL MODULE, WIRING AND INTEGRATION INTO BAS.

2
- 10

VARIABLE FREQUENCY DRIVE TO REMAIN. UPGRADE TO NEW DDC CONTROLS, TIE INTO CONTROLS FRONT END SYSTEM.

2
- 11

EXISTING DOMESTIC WATER BOILER TO REMAIN. PROVIDE CONTROL MODULE, WIRING AND INTEGRATION INTO BAS. START/ STOP ONLY.

2
- 12

PROVIDE NEW CARBON MONOXIDE SENSOR. REFER TO SEQUENCE OF OPERATION.

2

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WINDSONG ELEMENTARY SCHOOL

ADDITION AND RENOVATION

2100 W PARKWOOD AVE.

FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL

LEAF ENGINEERS

111622

09/07/2022

LEAF ENGINEERS

F-18872

CLIENT

FRIENDSWOOD ISD

DATE

09/07/2022

PROJECT NUMBER

220083

DRAWING HISTORY

No.	Description	Date
2	ADDENDUM 3	09/26/2022

ISSUE FOR PROPOSAL

1ST FLOOR MECHANICAL PLAN - AREA A

M-101A



EXISTING FAN POWERED TERMINAL UNITS TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, HOT WATER CONTROL VALVE AND ACTUATOR, WIRING AND INTEGRATION TO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT. 2

EXISTING SENSORS, WIRING AND INTEGRATION TO REMAIN. 2

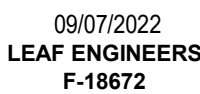
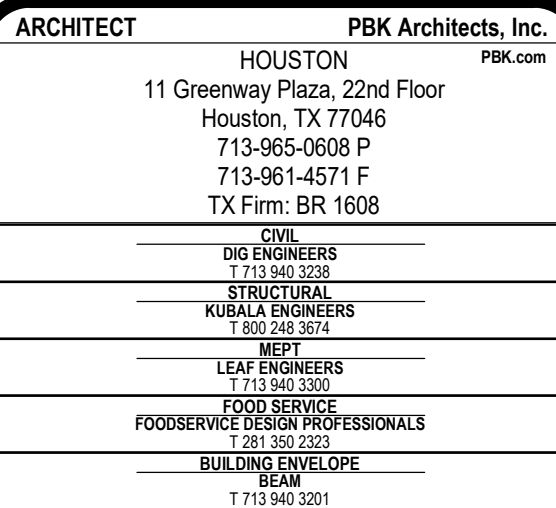
EXISTING AIR HANDLING UNIT TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, CONTROL VALVES AND ACTUATORS, SENSORS, MOTORIZED DAMPERS AND ACTUATORS, WIRING AND INTEGRATION INTO BAS. PROVIDE NEW CHILLED AND HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT. 2

EXISTING HEATING WATER COIL TO REMAIN. PROVIDE CONTROL VALVE AND ACTUATOR, WIRING AND INTEGRATE INTO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT. 2

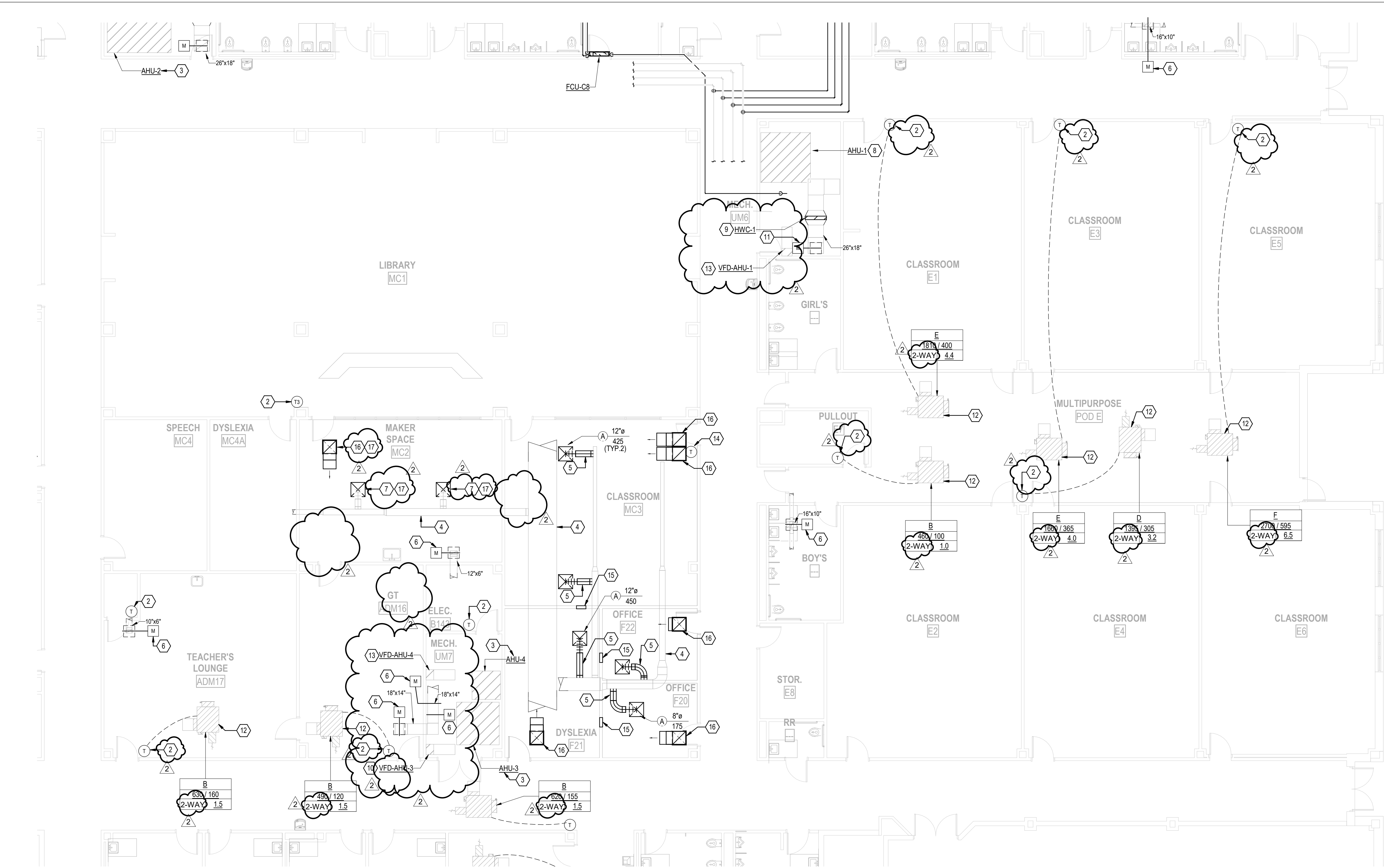
EXISTING MOTORIZED DAMPER AND ACTUATORS TO BE REPLACED WITH NEW AND NEW WIRING TO BAS. 2

EXISTING VARIABLE FREQUENCY DRIVE TO BE REPLACED WITH NEW. MATCH EXISTING HORSEPOWER. 2

EXISTING VARIABLE FREQUENCY DRIVE TO REMAIN; UPGRADE TO NEW DDC CONTROLS. 2

ISSUE FOR PROPOSAL

M-101C



KEYED NOTES:

- 1

EXISTING FAN POWERED TERMINAL UNITS TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, HOT WATER CONTROL VALVE AND ACTUATOR. WIRING AND INTEGRATION TO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.
- 2

EXISTING SENSOR AND WIRING TO BE REMOVED AND REPLACED WITH NEW.
- 3

EXISTING AIR HANDLING UNIT TO REMAIN. REMOVE EXISTING CONTROLS, CONTROL VALVES, DAMPER ACTUATORS, ETC. AND PROVIDE NEW DDC UPGRADE. PROVIDE NEW CHILLED AND HOT WATER PIPING INSULATION.
- 4

EXISTING DUCTWORK TO REMAIN.
- 5

CONNECT NEW SUPPLY TAP TO EXISTING DUCTWORK.
- 6

EXISTING MOTORIZED DAMPER AND ACTUATOR TO BE REPLACED WITH NEW AND TIE INTO NEW DDC SYSTEM.
- 7

EXISTING SUPPLY AIR DIFFUSER TO BE REMOVED AND REPLACED WITH NEW; MATCH EXISTING 9" NECK SIZE.
- 8

EXISTING AIR HANDLING UNIT TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, CONTROL VALVES AND ACTUATORS, SENSORS, MOTORIZED DAMPERS AND ACTUATORS. WIRING AND INTEGRATION INTO BAS. PROVIDE NEW CHILLED AND HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.
- 9

EXISTING HEATING WATER COIL TO REMAIN. PROVIDE CONTROL VALVE AND ACTUATOR. WIRING AND INTEGRATE INTO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.
- 10

EXISTING VARIABLE FREQUENCY DRIVE TO REMAIN; TIE INTO NEW FRONT END DDC SYSTEM.
- 11

EXISTING MOTORIZED DAMPER AND ACTUATOR TO REMAIN; TIE INTO NEW FRONT END DDC SYSTEM.
- 12

EXISTING FAN POWERED TERMINAL UNITS AND ASSOCIATED CONTROLS TO REMAIN. PROVIDE HOT WATER CONTROL VALVE AND ACTUATOR AND TEMPERATURE SENSORS. INTEGRATE UNIT INTO BAS. PROVIDE NEW INSULATION AFTER VALVE REPLACEMENT.
- 13

EXISTING VARIABLE FREQUENCY DRIVE TO BE REPLACED WITH NEW. MATCH EXISTING HORSEPOWER.
- 14

PROVIDE NEW SENSOR AT NEW LOCATION WITH NEW WIRING. EXISTING SENSOR AND ASSOCIATED WIRING TO BE REMOVED.
- 15

16x16 RETURN AIR OPENING IN WALL ABOVE CEILING.
- 16

PROVIDE NEW TYPE 'B' RETURN AIR GRILLE WITH 22"x22" RETURN AIR BOOT. REFER TO DETAIL.
- 17

PROVIDE UNDER ALTERNATE. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION.



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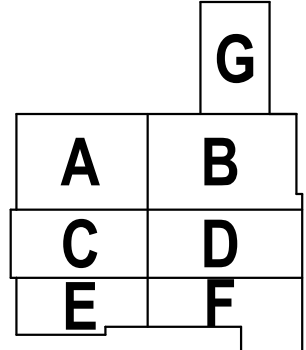


WINDSONG ELEMENTARY SCHOOL
ADDITION AND RENOVATION

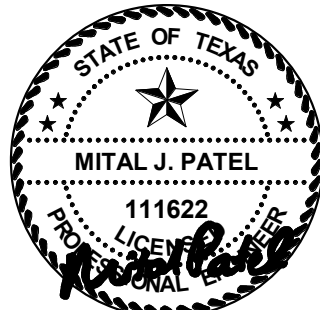
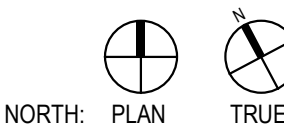


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FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL



KEY PLAN



09/07/2022
LEAF ENGINEERS
F-18872

CLIENT
FRIENDSWOOD ISD

DATE 09/07/2022 PROJECT NUMBER 220083

DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM 3	09/26/2022

ISSUE FOR PROPOSAL

1ST FLOOR
MECHANICAL PLAN -
AREA D

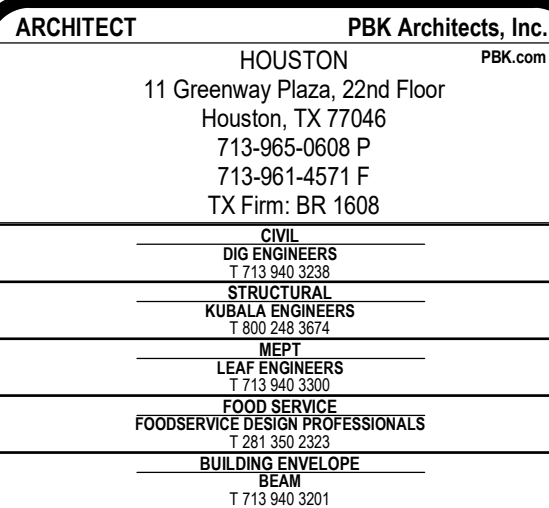
M-101D



- 1 EXISTING FAN POWERED TERMINAL UNITS AND ASSOCIATED CONTROLS TO REMAIN. PROVIDE HOT WATER CONTROL VALVE AND ACTUATOR AND TEMPERATURE SENSORS. INTEGRATE UNIT INTO BAS. PROVIDE NEW INSULATION AFTER VALVE REPLACEMENT.
- 2 EXISTING SENSOR AND WIRING TO BE REMOVED AND REPLACED WITH NEW
- 3 EXISTING MOTORIZED DAMPER AND ACTUATOR TO BE REPLACED WITH NEW AND TIE INTO NEW DDC SYSTEM.

 \triangle^2

- 1 EXISTING FAN POWERED TERMINAL UNITS AND ASSOCIATED CONTROLS TO REMAIN. PROVIDE HOT WATER CONTROL VALVE AND ACTUATOR AND TEMPERATURE SENSORS. INTEGRATE UNIT INTO BAS. PROVIDE NEW INSULATION AFTER VALVE REPLACEMENT.
- 2 EXISTING SENSOR AND WIRING TO BE REMOVED AND REPLACED WITH NEW
- 3 EXISTING MOTORIZED DAMPER AND ACTUATOR TO BE REPLACED WITH NEW AND TIE INTO NEW DDC SYSTEM.

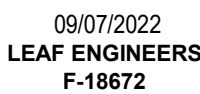
1ST FLOOR MECHANICAL PLAN - AREA E
1/8" = 1' 0"
$$1/8" = 1'-0"$$


2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL



NORTH: PLAN TRUE

ISSUE FOR PROPOSAL

M-101E



KEYED NOTES:

- 1

RETURN GRILLE TO BE REPLACED UNDER ALTERNATE. PROVIDE RETURN AIR BOOT; REFER TO DETAIL. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL ALTERNATE INFORMATION.
- 2

EXISTING DUCTWORK TO REMAIN.
- 3

EXISTING AIR HANDLING UNIT TO REMAIN. PROVIDE CONTROLS UPGRADE - PROVIDE CONTROL MODULE, CONTROL VALVES AND ACTUATORS, SENSORS, MOTORIZED DAMPERS AND ACTUATORS, WIRING AND INTEGRATION INTO BAS. PROVIDE NEW CHILLED AND HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.
- 4

DIFFUSERS TO BE REPLACED UNDER ALTERNATE 2. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
- 5

EXISTING MOTORIZED DAMPER AND ACTUATOR TO BE REPLACED WITH NEW AND TIE INTO NEW DDC SYSTEM.
- 6

EXISTING HEATING WATER COIL TO REMAIN. PROVIDE CONTROL VALVE AND ACTUATOR, WIRING AND INTEGRATE INTO BAS. PROVIDE NEW HOT WATER PIPING INSULATION AFTER VALVE REPLACEMENT.
- 7

EXISTING VARIABLE FREQUENCY DRIVE TO REMAIN; UPGRADE TO NEW DDC CONTROLS.
- 8

NOT USED.
- 9

EXISTING FAN POWERED TERMINAL UNITS AND ASSOCIATED CONTROLS TO REMAIN. PROVIDE HOT WATER CONTROL VALVE AND ACTUATOR AND TEMPERATURE SENSORS, INTEGRATE UNIT INTO BAS. PROVIDE NEW INSULATION AFTER VALVE REPLACEMENT.
- 10

EXISTING SENSOR AND WIRING TO BE REMOVED AND REPLACED WITH NEW.
- 11

EXISTING FAN POWERED TERMINAL UNIT TO REMAIN; UPGRADE TO NEW DDC CONTROLS.
- 12

EXISTING VARIABLE FREQUENCY DRIVE TO BE REPLACED WITH NEW. MATCH EXISTING HORESPOWER.



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ORR, BOYD & ASSOCIATES

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BEAM

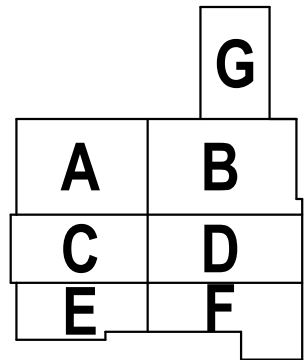
713-560-3201



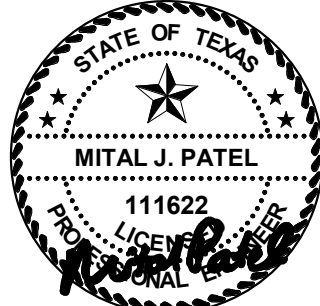
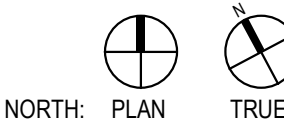
WINDSONG ELEMENTARY SCHOOL
ADDITION AND RENOVATION

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ISSUE FOR PROPOSAL



KEY PLAN



09/07/2022
LEAF ENGINEERS
F-18872

CLIENT
FRIENDSWOOD ISD

DATE
09/07/2022

PROJECT NUMBER
220083

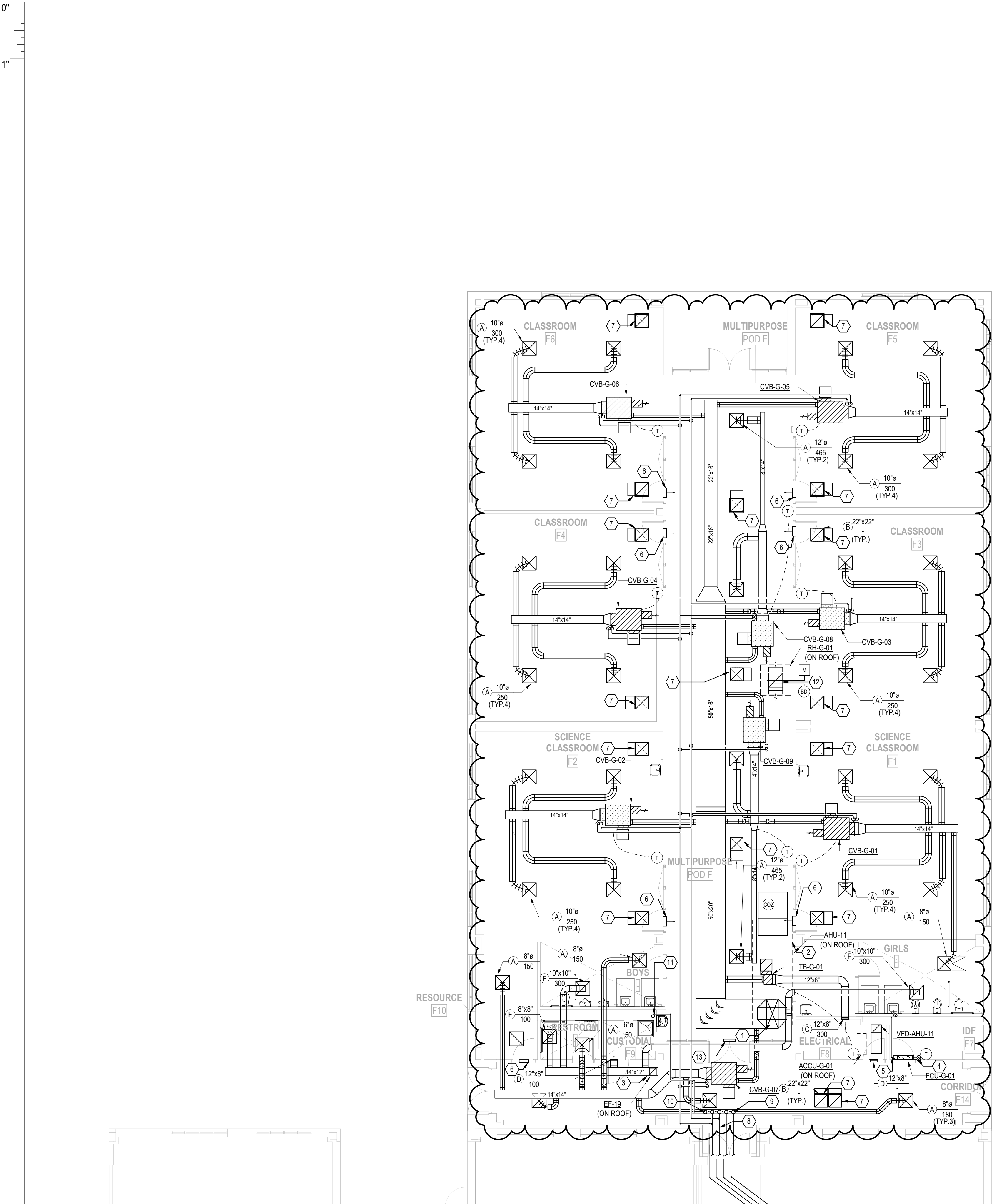
DRAWING HISTORY

No.	Description	Date
2	ADDENDUM 3	09/26/2022

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1ST FLOOR
MECHANICAL PLAN -
AREA F

M-101F



KEYED NOTES:

- 50x20 SUPPLY DUCT FROM AIR HANDLING UNIT ON ROOF, TRANSITION TO UNIT INLET.
- 50x20 RETURN DUCT FROM AIR HANDLING UNIT ON ROOF, TRANSITION TO UNIT INLET.
- 14x12 EXHAUST DUCT UPTO EXHAUST FAN EF-19 ON ROOF, TRANSITION TO UNIT INLET.
- REFRIGERANT PIPING UPTO AIR-COOLED CONDENSING UNIT ACCU-G-01 ON ROOF. SIZE PIPING PER MANUFACTURER RECOMMENDATION.
- ROUTE 3/4" CONDENSATE PIPING TO SINK TAIL PIECE. REFER TO PLUMBING DRAWINGS FOR CONNECTION DETAIL.
- 16x16 RETURN AIR OPENING IN WALL ABOVE CEILING.
- PROVIDE RETURN AIR BOOT ATTACHED TO THE GRILLE. REFER TO DETAIL.
- 3" CHWS/R & 1-1/2" HWS/R PIPING. REFER TO M-101B FOR CONTINUATION.
- CHWS/R & HWS/R PIPING UPTO AIR HANDLING UNIT ON ROOF. REFER TO ROOF PLAN FOR CONTINUATION.
- 1-1/4" CONDENSATE PIPING FROM AIR HANDLING UNIT ON ROOF. REFER TO ROOF PLAN FOR CONTINUATION.
- ROUTE CONDENSATE PIPING TO NEAREST DRAIN. REFER TO PLUMBING DRAWINGS FOR EXACT DRAIN LOCATION. SUPPORT VERTICAL PIPING FROM WALL EVERY 2'-0" INTERVAL.
- 24x24 RELIEF AIR DUCT UPTO RELIEF HOOD RH-G-01 ON ROOF, TRANSITION TO UNIT INLET.
- 20x16 RETURN AIR OPENING IN WALL ABOVE CEILING.



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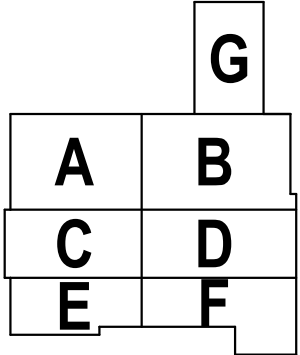


WINDSONG ELEMENTARY SCHOOL
ADDITION AND RENOVATION

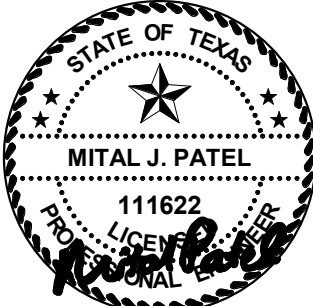
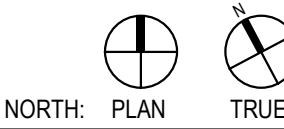


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KEY PLAN



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LEAF ENGINEERS
F-10872

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FRIENDSWOOD ISD

DATE 09/07/2022 PROJECT NUMBER 220083

DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM 3	09/26/2022

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1ST FLOOR
MECHANICAL PLAN -
AREA G

M-101G

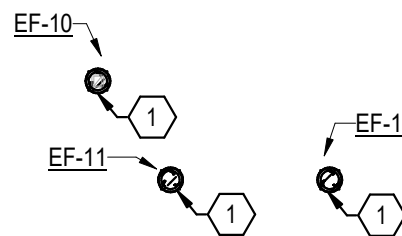
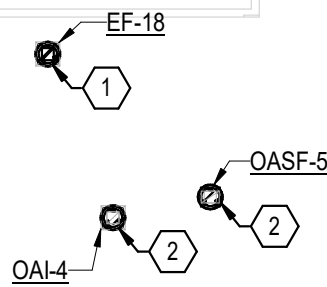
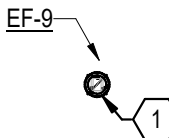
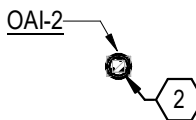
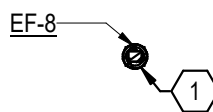
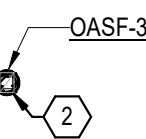
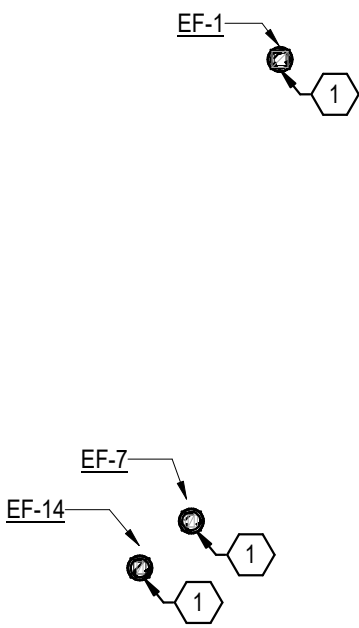
REFRIGERANT PIPING DOWN TO FIRST FLOOR. PROVIDE STAINLESS STEEL HOOD AT PIPE PENETRATION. PROVIDE ALUMINUM JACKET OVER PIPING INSULATION. _____

- PROVIDE PIPE SUPPORTS

ACCU-G-01

REFRIGERANT PIPING DOWN TO FIRST FLOOR. PROVIDE STAINLESS STEEL HOOD AT PIPE PENETRATION. PROVIDE ALUMINUM JACKET OVER PIPING INSULATION.

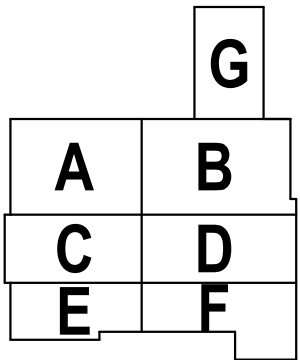
- PROVIDE PIPE SUPPORTS



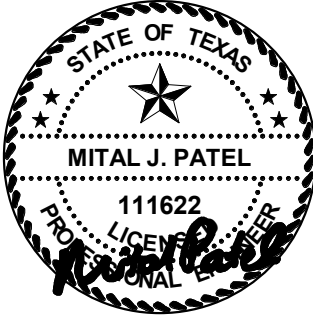
- 1 EXISTING EXHAUST FAN TO BE REMOVED AND REPLACED WITH NEW. EXISTING ROOF CURB TO REMAIN AND PROVIDE NEW CURB ADAPTER. PROVIDE MOTORIZED DAMPER, ACTUATOR AND INTEGRATION TO BAS. DAMPER TO MOUNT WITHIN DUCTWORK.
- 2 EXISTING INTAKE ROOF CURB TO BE REPLACED WITH NEW. EXISTING ROOF CURB TO REMAIN AND PROVIDE NEW CURB ADAPTER. PROVIDE MOTORIZED DAMPER AND ACTUATOR, AND INTEGRATION INTO BAS. DAMPER TO MOUNT WITHIN DUCTWORK.
- 3 PORTABLE PIPE SUPPORTS. TYPICAL.
- 4 CHILLED, HEATING WATER AND CONDENSATE PIPING DOWN TO FIRST FLOOR THRU STAINLESS STEEL HOOD. REFER TO ARCHITECTURAL DRAWINGS FOR HOOD INFORMATION.



WINDSONG ELEMENTARY SCHOOL ADDITION AND RENOVATION



KEY PLAN



09/07/2022
LEAF ENGINEERS
F-18672

CLIENT
FRIENDSWOOD ISD

DATE	PROJECT NUMBER
9/07/2022	220083

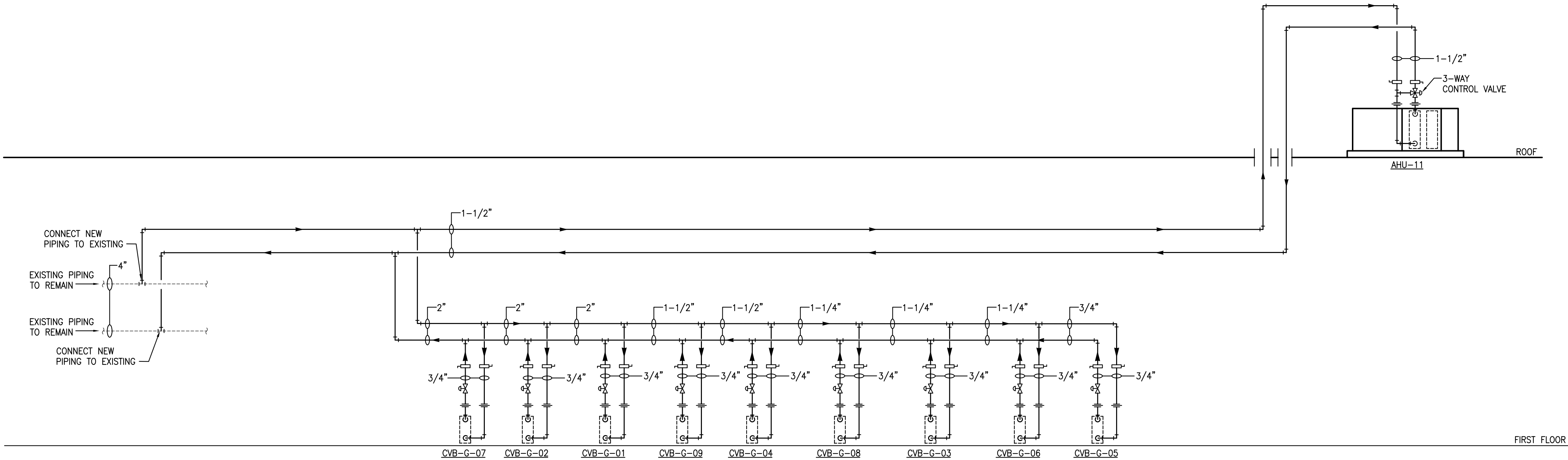
DRAWING HISTORY

No.	Description	Date
2	ADDENDUM 3	09/26/2022

ISSUE FOR PROPOSAL

MECHANICAL ROOF PLAN

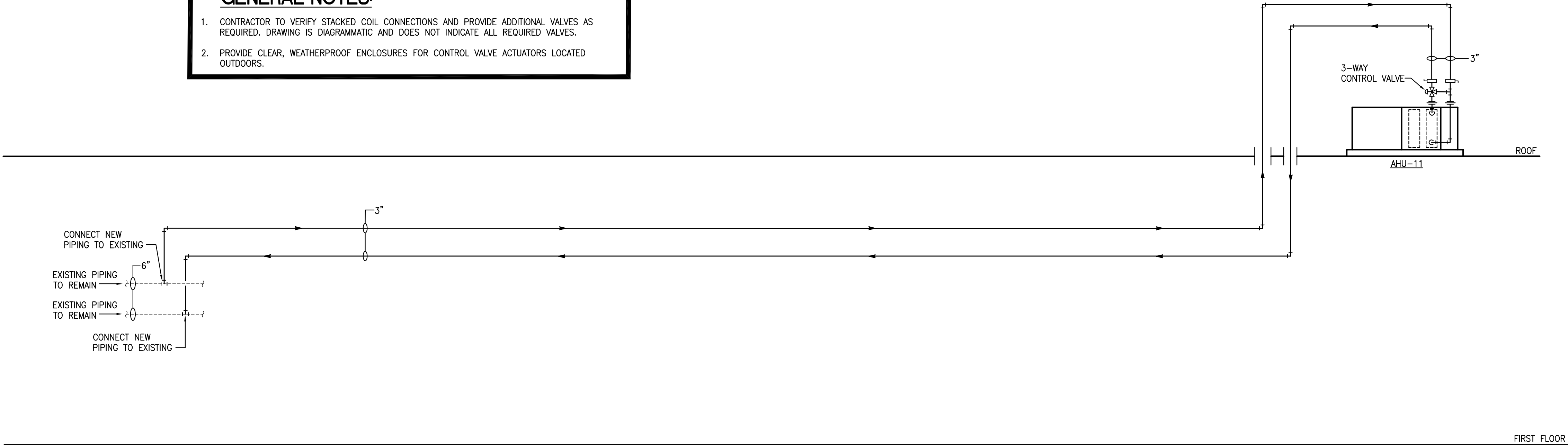
M-201



02 MECHANICAL HEATING WATER PIPING DIAGRAM - ADDITION
SCALE: NONE

GENERAL NOTES:

1. CONTRACTOR TO VERIFY STACKED COIL CONNECTIONS AND PROVIDE ADDITIONAL VALVES AS REQUIRED. DRAWING IS DIAGRAMMATIC AND DOES NOT INDICATE ALL REQUIRED VALVES.
2. PROVIDE CLEAR, WEATHERPROOF ENCLOSURES FOR CONTROL VALVE ACTUATORS LOCATED OUTDOORS.



01 MECHANICAL CHILLED WATER PIPING DIAGRAM - ADDITION
SCALE: NONE



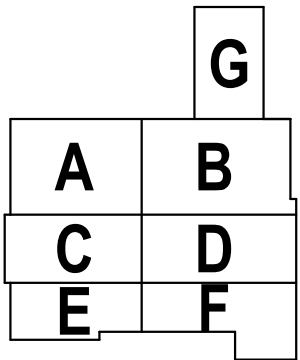
ARCHITECT	PBK Architects, Inc. HOUSTON 11 Greenway Plaza, 22nd Floor Houston, TX 77046 713-965-0608 P 713-961-4571 F TX Firm: BR 1608
CIVIL	DIG ENGINEERS T 713 560 3238
STRUCTURAL	KURALA ENGINEERS T 800 286 3074
MERIT	LEAF ENGINEERS T 713 560 3300
FOOD SERVICE DESIGN PROFESSIONALS	FOODSERVICE DESIGN PROFESSIONALS PH: 501 228 0000
BUILDING ENVELOPE	BEAM T 713 560 3201



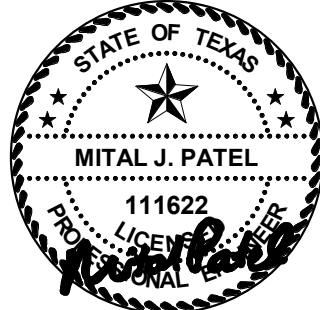
WINDSONG ELEMENTARY SCHOOL
ADDITION AND RENOVATION

2100 W PARKWOOD AVE.
FRIENDSWOOD, TX 77546

ISSUE FOR PROPOSAL



KEY PLAN



09/07/2022
LEAF ENGINEERS
F-18872

CLIENT FRIENDSWOOD ISD		
DATE 09/07/2022		PROJECT NUMBER 220083
DRAWING HISTORY		
No.	Description	Date
2	ADDENDUM 3	09/26/2022

ISSUE FOR PROPOSAL

MECHANICAL PIPING
PLAN