INTREPID ARCHITECTURE, pa
114 East Third Street
Greenville, NC 27858
Phone : 252.270.5330

06/02/2025

ADDENDUM NUMBER TWO

Date: June 2nd, 2025

Re: Maysville Fire Station
INTREPID Architecture Project #: 24008

The following items supersede the bid documents dated April 30th, 2025, and shall become a part of those bid documents with full force and effect, as though set forth therein. Bidders shall acknowledge receipt of this Addendum No. 2 in the appropriate place on the "Bid/Acceptance Form".

Addendum #2 includes the following:

1. Pre-Bid Requests for Information received with responses by design team.
2. Ark Consulting Addendum #2 cover page and associated specification and drawing updates.
3. EnTech Engineering Addendum #2 cover page and associated specification and drawing updates.

Clarifications:

1. The pre-engineered metal building is delegated design, and the engineer-of-record for the metal building shall submit design and calculations to architect, owner, and AHJ for review and approval during submittal process.

Drawings:

1. G0.00 – Vicinity Map, Drawing Index, Symbols, Abbreviations, & General Notes
    a. Drawing Index updated to reflect sheets that are revised as part of this addendum.
2. G0.01 – General Notes & Interior Partition Schedule
    a. General Note 1 added under "exterior general notes"
3. C1.0 – Site Plan
    a. See Ark Cover Sheet
4. C3.0 – Utilities Plan
    a. See Ark Coversheet
5. C4.0 – Grading Plan
    a. See Ark Coversheet
6. C6.1 – Details
    a. See Ark Cover Sheet
7. A2.01 – Exterior Elevations
    a. Masonry expansion/control joints added to exterior elevations.
    b. Exterior finish schedule added to sheet.

8. A5.01 – Proposed Reflected Ceiling Plan – Base Bid
    a. Ceiling tag added in Training Room 101 to indicate TMP ceiling finish and height.
9. A8.01 – Opening, Window, And Hardware Scheduled, Typ. Framing Details.
    a. Door fire ratings updated to reflect 20 minutes when in 30 minute rated partitions.
    b. Hardware Sets updated for doors 117C and 117D.
    c. Glazing Schedule updated description for G3 removing fire rating requirement.
    d. Removed reference to basis-of-design storefront in Door/Opening General Notes. Added note related to rated glass requirements in rated doors.
10. A8.02 – Door Types & Frame Elevations
    a. Glass tags updated in frame elevations to match schedule and expected glass for those locations.
    b. Included basis-of-design information for sliding transaction window (SW-1)
11. A9.00 – Finish Plan & Schedule
    a. Added ACT2 to finish schedule
    b. Added description information for TMP to finish schedule.
12. P1.01 – Plumbing Plans
    a. See EnTech Cover Sheet
13. M101 – Mechanical Duct & Equipment Plan
    a. See EnTech Cover Sheet
14. E1.01 – Electrical Plans
    a. See EnTech Cover Sheet
15. E3.01 – Electrical Schedules
    a. See EnTech Cover Sheet
16. E3.02 – Electrical Schedules
    a. See EnTech Cover Sheet
17. E4.01 – Electrical Notes
    a. See EnTech Cover Sheet

Specifications (updates in bold and red)**:**

1. Table of Conetents
    a. Updated to include sections revised as part of this addendum.
2. 08 33 23 – Overhead Coiling Doors
    a. General: Where baked enamel and Powder coat finishes were noted, Powder Coat shall be used. No baked enamel shall be included in this section.
    b. 2.2.A.1 -Included alternate manufacturers for equal.
    c. 2.2.G.1 – Removed from Section.
    d. 2.2.H – Bottom bar shall be stainless steel.
    e. 2.10.C – Clarified door operator mounting location.
    f. 2.10.F.3 – Removed pneumatic sensor edge requirement.
    g. 3.4 – Removed maintenance service requirements.
3. 08 41 13 – Aluminum-Frames Entrances & Storefronts
    a. 2.2.M – Removed requirement related to Windborne Debris Impact Resistance.
    b. 2.3.B.5 – Storefront finish clarified to indicate clear anodized.
4. 08 71 00 – Door Hardware
    a. Manufacturer lists updated for several products
    b. Note: Door hardware contractor to coordinate with owner's access control contractor.
5. 10 15 26 – Plastic Lockers
    a. 2.2.A.1 - Alternate manufacturers for equals included.
6. 13 34 19 – Metal Building Systems
    a. General – Painted finishes may be two-coat fluoropolymer finish.
    b. 2.4.K.2 – indicating red primer to be used.
    c. 2.7.2.a – updated to indicate smooth wall panels to be used.
7. 22 07 19 – Plumbing Piping Insulation

   a. See Entech coversheet
8. 22 13 16 – Sanitary Waste & Vent Piping
   a. See Entech cover sheet
9. 28 31 11 – Digital, Addressable Fire-Alarm System
   a. See Entech coversheet.

By submitting a bid, contractors are acknowledging they understand the contract documents, existing project conditions, the user-driven schedule and sequencing constraints, and have visited the site.

INTREPID ARCHITECTURE

INTREPID ARCHITECTURE, pa
114 East Third Street
Greenville, NC 27858
Phone : 252.270.5330

Date: June 2nd, 2025

Re: Maysville Fire Station
INTREPID Architecture Project #: 24008

Pre-Bid Questions with Designer Responses:

1. There are several doors indicated as "30 minute rated". This rating does not exist.
    a. Response: Door schedule updated to reflect 20 minute doors required.

2. Specs. 08 41 13 – 7/ Blast Resistance states "Windborne-Debris Impact Resistance", the system for the storefront is Kawneer 601 2" x 6" which is not a hurricane Impact System. Please advise what the aluminum system needs to be, does it need to be hurricane impact or non-hurricane impact 2" x 6" system?
    a. Response: Hurricane Impact resistant glass is not required. Specifications included in addendum 2 updated to remove this requirement.

3. What color finish dopes the aluminum storefront need to be, specs. 08 41 10 – 8 states Clear Anodic, Baked-Enamel or Powder-Coat. All three of these have a major price difference and we will need to know the correct finish to price accordingly.
    a. Response: Storefront finish to be clear anodized. Specifications updated accordingly in addendum 2.

4. Sheet A8.01/ Glazing Schedule states the Ext. SF. Glass to be 1" Tempered Insulated Low-E, if the system gets changed to hurricane impact, then the Ext. SF. Glass will need to be 1-5/16" Impact Resistant. Please advise if the Ext. Glazing glass needs to be 1" Ins. Or 1-5/16" Hurricane Impact?
    a. Response: Impact resistant glass not required. Specification updated accordingly in addendum 2.

5. Paragraph 2.2A calls for doors by Mckeon, will doors manufactured by Cornell/Cookson be acceptable for use on this project provided they meet or exceed specified product?
    a. Response: alternate acceptable manufacturers included in updated specification in addendum 2.

6. Paragraph 2.2G calls for perforated and fenestrated slats which are not shown on drawings. Are perforated and fenestrated slats required?
    a. Response: Fenestrated slats on overhead door required. Specification updated accordingly in addendum 2.

7. Paragraph 2.2H,I calls for bottom bar and guides to be either stainless steel or galvanized steel and finished to match curtain slats. A finish will not adhere to these components with stainless and galvanized steel. Please address how we should handle this conflict in spec.
    a. Response: Bottom bar to be stainless steel. Specification updated accordingly in addendum 2.

8. Paragraph 2.2N calls for baked enamel or Powdercoat finish. Which is required?
    a. Response: Powdercoat finish required. Specification updated accordingly in addendum 2.

9. Paragraph 2.10C calls for multiple motor mounting locations. Which is required?
    a. Response: Motor to be wall mounted. Specification updated accordingly in addendum 2.

10. Paragraph 2.10F calls for electric and pneumatic sensor edges. Which is required?
    a. Response: Electric sensor edge required. Specification updated accordingly in addendum 2.

11. Paragraph 3.4 calls for a maintenance service which will add alot of cost for the owner. Is this required?
    a. Response: No maintenance service is required. Specification updated accordingly in addendum 2.

12. Do the panel need a 3 coat PVDF finish, or can we supply our standard PVDF 2 coat finish? The finish warranties only call for 25 yr warranty and our 2-coat system has a 35 yr warranty? If 3 coat finishes are required, we will have to order special coils for this project. Please advise.
    a. Response: Two-coat Fluoropolymer finish is acceptable for roof and wall panels. Specification updated accordingly in addendum 2.

13. Need the panel thickness for the Insulated wall panels required? No U or R values listed on the drawings. We do not do Com Check. This needs to be by the EOR.
    a. Response: Metal panel thick ness is identified as 2" in 2.7.3 of metal building system specification. The metal building is delegated design, so the engineer of record for the metal building is by the contractor/metal building company, including the com check. The metal building is required to meet the North Carolina Building Code, Energy Code, Etc.

14. What type of Panel Profile is required. The specs call for a light V style panel? Are the panels to be suppled with a smooth finish or embossed finish. Please visit Metal Span for insulated panel options we can offer.
    a. Response: Wall panels are specified in section 2.7 of the metal building system specification. Panels to be smooth. Specification updated accordingly in addendum 2.

15. The Drawings call out the building to have a H/180 Deflection and the Specs call out a H/400 Deflection. Which is to be used?
    a. Response: A maximum drift of L/180 is adequate for a building with metal wall panels, but with brick veneer, the tighter drift limit of L/400 is needed.

16. Bracing? Portal frames or Fixed Base columns? If we use portal frames, they will need to go in the last bay along the front and back sidewall between frame line 7 to 9.
    a. Response: Portal frames versus fixed base columns, this is something that the metal building vendor needs to decide through the engineering process. They also need to determine the number of them required and the locations.

17. Do you want gray or red primer? Specs only call out standard primer.
    a. Response: Red primer shall be used. Specification updated accordingly in addendum 2.

18. Sheet A8.02/Elevation INF-1 shows "G-2" 1" Ins. Spandrel glass inside a vestibule door sidelites, is this correct?
    a. Vestibule sidelights updated to non-spandrel glass. Drawings updated accordingly in addendum 2.

19. Sheet A8.02/Elevation SW-1 shows a sliding window in the entry of the vestibule. There are no specs. for the sliding window. Please advise what sliding window system needs to be quoted along with the finish color and glass make-up.

a. Sliding Glass window basis-of-design added to window elevation sheet. Drawings updated accordingly in addendum 2.

20. Sheet A8.01/ Door/Openings General Notes: #2 states Basis of Design for Ext. SF. Is YKK 45XT 2" x 4.5" for the Doors & YKK 45XT 2" x 6" for the Ext. SF. Openings. However, the Aluminum Framed Entrances & Storefront specs. stated Kawneer Trifab 601 2" x 6" which is not a "ultra thermal" system. Please advise if the Ext. SF. System needs to be 2" x 6" thermal, 2" x 6" Ultra Thermal or Hurricane-Impact system.
    a. Basis-of-design noted in drawings governs. Drawings updated accordingly in addendum 2. As noted in responses to questions above, hurricane impact systems are not required for the project.

21. The Door hardware specs. do not have part numbers to allow us to price accordingly. What vendor part numbers do each hardware set of functions need to be?
    a. Response: Basis-of-design for door hardware is Falcon MA Series, Grade 1 mortise locksets, or equal by acceptable alternate manufacturer as listed in specification.

22. What is the spec for ACT-2. It is called out on the RCP but not in the finish schedule.
    a. Response: ACT-2 added to finish schedule to identify the correct product. Drawings updated accordingly in addendum 2.

23. Is there a spec for the TMP on the finish schedule? Location? Possible training area?
    a. Response: TMP added to finish schedule, and is noted in First Floor RCP in Training Room. Drawings updated accordingly in addendum 2.

24. Just want to confirm that the sound batt over ceiling is standard R-11?
    a. Response: R-11 over ceiling is acceptable.

25. The specs state an existing EST2 system that is to be connected to. Is this spec correct or will there be an all new system where Edwards would be the preferred brand?
    a. Response: Specification has been revised. There are no existing Fire Alarm Systems and all equipment will be new.

26. Received this from an electrical supplier regarding the SPD. They have them noted under each panel schedule as internally mounted but those are very expensive and the lead time is much longer. We can offer a lot of savings by using externally mounted and cut down on the lead time. Also, there are no SPD's shown on the riser and none of the panel schedules have breakers in them for SPD's, so we are not 100% sure they are even needed. Please advise when you can.
    a. Response: Drawings will remain as-is. The internal ones bolt directly to the bus and do not require a separate breaker.

27. Drawings show several duct smoke detectors that are not required by code (NFPA 90A). Will these be required?
    a. Response: No, these smoke duct detectors will be removed from the plans.

28. Provide a location on the drawings for the new utility transformer
    a. Response: See updated civil drawings included in addendum 2.

29. Where do the (2) 3" conduits for the phone service terminate?
    a. Response: At property line. Coordinate with utility provider.

30. Please confirm this is a conduit-only job, and MC cable is unacceptable.
    a. Response: That is correct, MC cable is not allowed.

31. Please provide a part number for the floor boxes if possible.
    a. Response: For the Program Room, the electrical floor box is based on a Hubbell "SystemOne" series.

32. Can you please inquire about the dumpster enclosure that's shown on the civil/site layout? We do not see any details clarifying what the enclosure is made of, etc.
    a. Response: Dumpster enclosure to be white vinyl fence with open front. Drawings updated accordingly in addendum 2.

33. Also, can you please have them clarify the following: These two details show the different sections of the building. The bay side has CMU backup w/ the 6" tall sill piece & the admin/bunk side has metal framing with the 8" tall sill piece. Where these two sections of the building meet – the sills will not be at the same height? Is this their intent? Or should the two different sill pieces actually be the same height all the way around the building? On the elevations – the walls all look the same height.
    a. Response: These are two different heights intentionally to allow for the metal panel and air barrier to terminate approximately where the metal panel walls are located. The portions of the building with brick above can be typical masonry coursing.

ADDENDUM COVER SHEET

Project Name: Maysville Fire Station
Project Number: 24008
Date: June 02, 2025
Addendum No.: 2

Subject: Civil Sheet Revision – Response to RFI

Description of Revisions:
In response to a Request for Information (RFI), the following revision has been made to the civil drawings:

- Sheet C 1.0 – Transformer Pad location has been added
- Sheet C 3.0 – Transformer Pad location has been added
- Sheet C 4.0 – Transformer Pad location has been added
- Sheet C6.1 – A detail has been added for the Dumpster Enclosure, specifying that the enclosure shall be constructed of a 6-foot high solid vinyl fence on the rear and sides.

Attachments:

- Sheet C 1.0
- Sheet C 3.0
- Sheet C 4.0
- Sheet C6.1

6/2/2025

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EnTech ENGINEERING
EnTech Engineering, PA PO Box 11527 Goldsboro, NC 27532 919.778.9064

Maysville Fire Department MEP Addendum #2:

P1.01 - Reissued sheet to change draw order of elements in enlarged view. Items were showing on the plans that were intended to be hidden and shown only in an enlarged view.

M1.01 – Revised the duct arrangement in the day room and training room to swap supply and return locations which allow for straighter duct runs.

E1.01 - Added receptacle to laundry room 113

E3.01 – Updated automatic transfer switch schedule to read "3-pole". Updated generator schedule to include "42 Hour" fuel tank.

E3.02 - Changed circuits in the mezzanine residential area to arc fault breakers

E4.01 - Corrected flag light fixture model number listed in lighting schedule

Specification 220719 - Section 3.9 – Revise all subsections to read "Glass Fiber" rather than "Cellular Glass"

Specification 221316 - Section 3.10 – Revised piping material note to match plans:

Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
Solid-Wall PVC Pipe and PVC Socket Fittings.

Specification 283111 – Fire Alarm – Revised specification in entirety.

MAYSVILLE FIRE STATION

603 4TH STREET

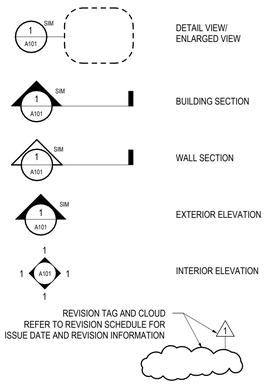
MAYSVILLE, NC 28555

GENERAL ABBREVIATIONS:

ACT	ACOUSTICAL CEILING TILE
ADA	AMERICANS WITH DISABILITIES ACT OF 1992
ADJ.	ADJACENT
AFF	ABOVE FLOOR FINISH
AFG	ABOVE FINISHED GRADE
ARA	AREA OF RESCUE ASSISTANCE
BD	BOARD
B/W	BETWEEN
BOF	BOTTOM OF FOOTING
BOT	BOTTOM
CAN	CANOPY
CI	CAST IRON
CPT	CARPET
CLG. HT.	CEILING HEIGHT
CL	CENTER LINE
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
CONC.	CONCRETE
CONT.	CONTINUOUS
CRS	CHAIN ROLLER SHADE
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DO	DOOR OPENING
DS	DOWNSPOUT
DWG.	DRAWINGS
EA	EACH
EC	ELECTRICAL CONTRACTOR
E.J.	EXPANSION JOINT
ELEC.	ELECTRICAL
EQ	EQUAL
EXIST	EXISTING
EXP	EXPOSED
EXT	EXTERIOR
FACP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FD	FLOOR DRAIN
FFE	FINISHED FLOOR ELEVATION
GYP	GYPSUM
GC	GENERAL CONTRACTOR
HB	HOSE BIB
HDW	HARDWARE
HLB	HORIZONTAL LOUVER BLIND
HM	HOLLOW METAL
HT	HEIGHT
HVAC	HEAT, VENTILATION & AIR CONDITIONS
HWC	HOLLOW CORE WOOD DOOR
INSUL	INSULATION
INT	INTERIOR
LVL	LAMINATED VENEER LUMBER
LVT	LUXURY VINYL TILE
MAX	MAXIMUM
MANUF	MANUFACTURER
MECH.	MECHANICAL
MIN.	MINIMUM
MO	MASONRY OPENING
MRS	MOTORIZED ROLLER SHADE
N.I.C.	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.P.C.I.	OWNER PROVIDED CONTRACTOR INSTALLED
OPP.	OPPOSITE
PLAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PGB	PAINTED GYPSUM BOARD
PT	PAINT
RB	RUBBER BASE
RD	ROOF DRAIN
REINF	REINFORCED
REQD	REQUIRED
RM	ROOM
RO	ROUGH OPENING
SAB	SOUND ABATING BATTING
SD	SMOKE DETECTOR
SF	SQUARE FEET
SIM	SIMILAR
SPECS	SPECIFICATIONS
SS	STAINLESS STEAL
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURAL DRAWINGS
SWC	SOLID WOOD CORE DOOR
SY	SQUARE YARD
CT	CERAMIC TILE
TERM	TERMINATION/TERMINATE
THRESH	THRESHOLD
T&G	TONGUE AND GROOVE
TO	TOP OF
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY
TOP	TOP OF PLATE
TOS	TOP OF STEEL
TOW	TOP OF WALL
TS	TRANSITION STRIP
TWF	THROUGH-WALL FLASHING
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VAR	VARIES
VCT	VINYL COMPOSITE TILE
WC	WATER CLOSET
WB	WOOD BASE
WD	WOOD
W/	WITH
W/O	WITHOUT

GENERAL SYMBOLS:

VIEW TYPE SYMBOLS:



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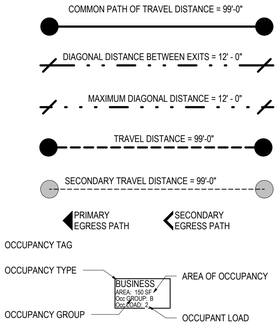

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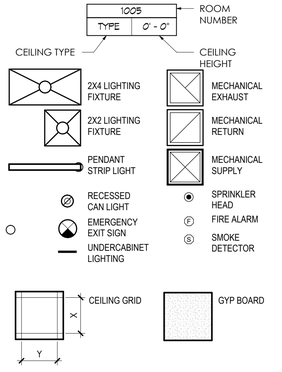
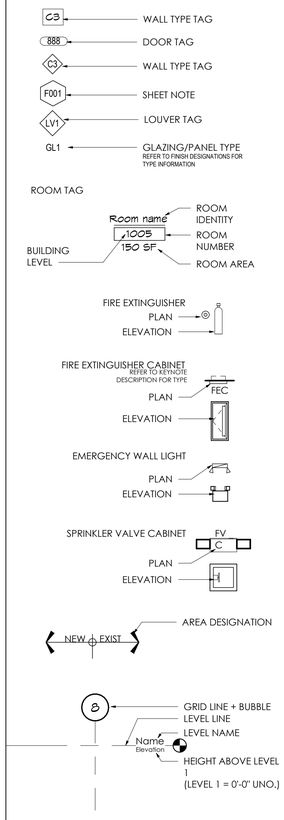


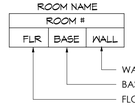
FIRE RATING LEGEND:

GENERAL ANNOTATION SYMBOLS:



FINISH SYMBOLS

ROOM FINISH TAG



FLOOR MATERIALS/FINISH LEGEND

C	CARPET
VCT	VINYL COMPOSITION TILE
CT	CERAMIC TILE
PT	PAVER TILE
EC	EXPOSED CONCRETE, SEALED
LVT	LUXURY VINYL TILE
EP	EPOXY
EX	EXPOSED

BASE MATERIALS/FINISH LEGEND

RB	RUBBER BASE
PW	PAINTED WOOD
SW	STAINED WOOD
CTB	CERAMIC TILE BASE

WALL MATERIALS/FINISH LEGEND

PM	PAINTED MASONRY
PT	PAINTED
VW	VINYL WALL COVERING
CT	CERAMIC TILE GLAZED WALL
E	EXPOSED CONSTRUCTION, UNPAINTED
EP	EXPOSED CONSTRUCTION, PAINTED
ES	EXPOSED STEEL, UNPAINTED
PS	EXPOSED STEEL, PAINTED
PGB	PAINTED GYPSUM BOARD

CEILING MATERIALS/FINISH LEGEND

ACT	ACOUSTICAL PANEL CEILING
GYP	PAINTED GYPSUM BOARD
EX	EXPOSED CONSTRUCTION, UNPAINTED
EP	EXPOSED CONSTRUCTION, PAINTED
VAR	VARIES, HEIGHT
MSP	FIBER CEMENT BOARD SOFFIT PANEL - PERFORATED
WD	WOOD-LOOK METAL SOFFIT PANELING

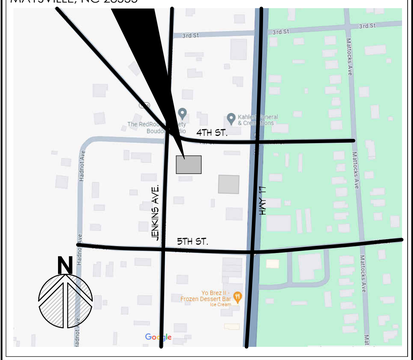
*NOTE REGARDING ALL FINISH TAGS - IF DESIGNATION IS FOLLOWED BY NUMERAL, DENOTES SPECIFIC MATERIAL TYPE WITHIN CATEGORY (REFER TO FINISH SCHEDULE)

VICINITY MAP:

603 4TH STREET
MAYSVILLE, NC 28555

LOCATION MAP:

603 4TH STREET
MAYSVILLE, NC 28555



DRAWING SHEET INDEX

INTREPID ARCHITECTURE

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REGISTERED ARCHITECT
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NORTH CAROLINA
GREENVILLE, NC
06/02/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM #2	06/02/2025

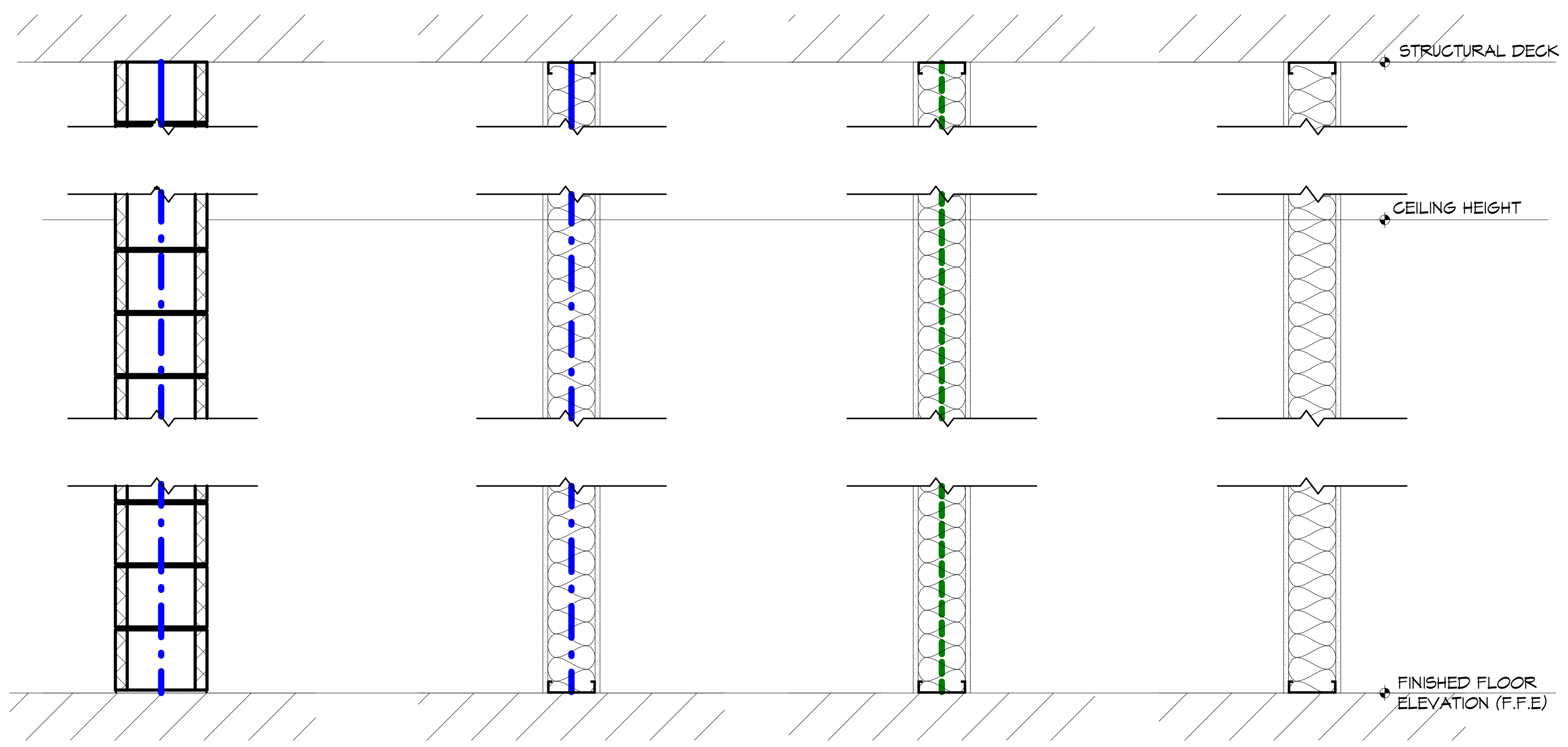
DRAWN BY: DJH
PROJECT #: 24008
ISSUE DATE: 04/30/2025

PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER

VICINITY MAP, DRAWING INDEX, SYMBOLS, ABBREVIATIONS, & GENERAL NOTES

G0.00

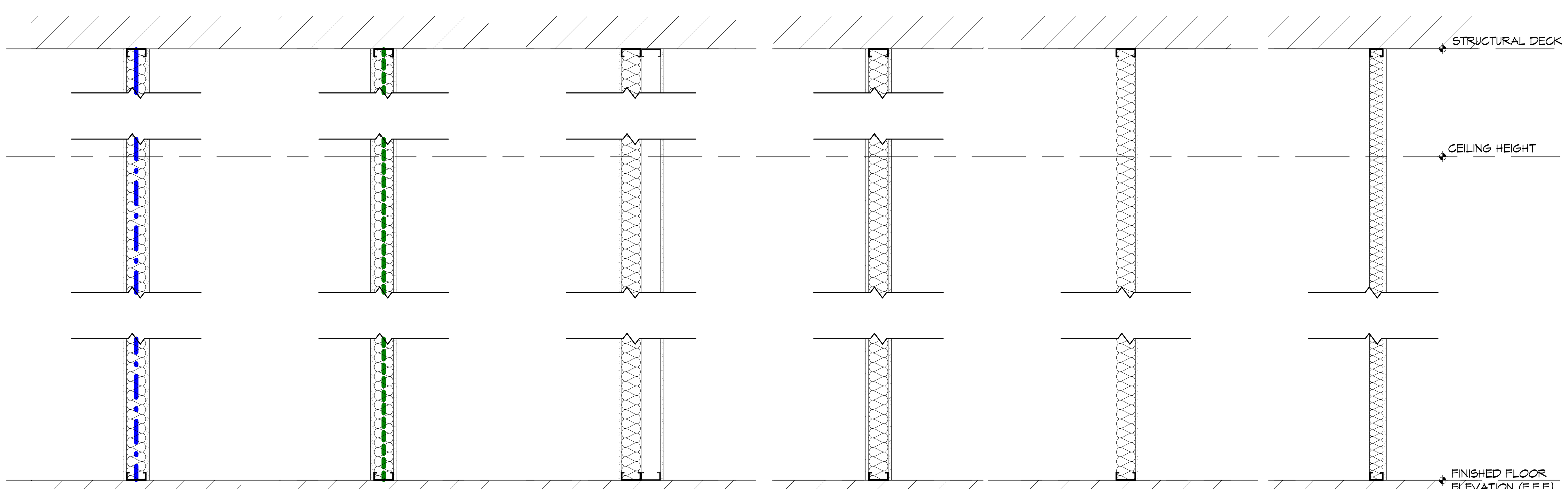


12X 12" CMU, TIGHT TO STRUCTURAL DECK. PAINTED ON BOTH SIDES UNLESS ABOVE CEILING. PROVIDE HORIZONTAL JOINT REINFORCEMENT AT 1'4" O.C. VERTICALLY
1-HOUR RATED ASSEMBLY, UL U906 (1-HOUR)

6X 6" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 6" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.
1-HOUR RATED ASSEMBLY, UL U419

6Y 6" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 6" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.
30 MINUTE RATED ASSEMBLY, UL U419 (1-HOUR)

6A 6" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 6" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.



4X 3 5/8" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.
1-HOUR RATED ASSEMBLY, UL U419

4Y 3 5/8" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.
30 MINUTE RATED ASSEMBLY, UL U419 (1-HOUR)

4D 2 STAGGERED 3 5/8" METAL STUDS SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.

4B 3 5/8" METAL STUD SPACED 16" O.C. TO STRUCTURAL DECK* WITH DEFLECTION TRACK WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON BOTH SIDES TO STRUCTURAL DECK WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.
*IF WALL IS BELOW 2ND FLOOR, WALL SHALL TERMINATE AT THE UNDERSIDE OF THE 2ND FLOOR DECK. BEARING WALLS REF. STRUCT.
ALL PARTITIONS SHALL BE 4B UNLESS NOTED OTHERWISE

4A 3 5/8" METAL STUD SPACED 16" O.C. TO 4"ABOVE CEILING WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON ONE SIDE WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.

2A 2 1/2" METAL STUD SPACED 16" O.C. TO 4"ABOVE CEILING WITH 3 1/2" MINERAL WOOL SOUND ATTENUATION BLANKETS WITH STRAPPING TO SECURE BETWEEN STUDS. WITH 5/8" GWB ON ONE SIDE WITH CONTINUOUS ACOUSTICAL JOINT SEALANT AT CEILING GRID.

INTERIOR PARTITION SCHEDULE (1)

3/4" = 1'-0"

GENERAL NOTES

1. CONTRACTOR REQUIRED TO MAKE A SITE VISIT PRIOR TO SUBMITTING BID. UPON SUBMITTING A BID, THE CONTRACTOR ACKNOWLEDGES THEIR FAMILIARITY WITH THE PROJECT SITE AND EXISTING CONDITIONS.
2. DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS GOVERN. IN CASE OF CONFLICT, CONSULT THE ARCHITECT FOR DIRECTION.
3. ALL WORK TO COMPLY WITH CURRENT APPLICABLE LOCAL CODES INCLUDING, BUT NOT LIMITED TO, THE NORTH CAROLINA BUILDING CODE, THE NORTH CAROLINA EXISTING BUILDING CODE, AND ANSI A117.1, ETC. REFER TO MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION SHEETS FOR ADDITIONAL APPLICABLE CODES FOR THEIR RESPECTIVE SCOPES OF WORK.
4. IF CONTRACTOR REQUESTS PRESENCE OF ARCHITECT ON SITE, CONTRACTOR TO GIVE ARCHITECT MINIMUM OF 48 HOURS NOTICE.
5. INTERIOR PARTITIONS ARE DIMENSIONED FROM FACE OF STUD TO FACE OF STUD, UNLESS NOTED OTHERWISE. MAINTAIN DIMENSIONS MARKED "CLEAR". ALLOW FOR THICKNESS OF FINISHED WALL MATERIAL WHEN LAYING OUT WALLS NOTED TO BE "CLEAR". DOT AT DIMENSION TICK INDICATES MEASUREMENT TO FACE OF FINISHED SURFACE. PLAN NORTH/SOUTH DIMENSION STRINGS ARE ON THE PLAN NORTH FACE OF INTERIOR STUD. PLAN EAST/WEST DIMENSION STRINGS ARE PICKED FROM THE PLAN EAST FACE OF INTERIOR STUD. ALL INTERIOR DIMENSION STRINGS AT EXTERIOR WALLS PICK FROM INSIDE FACE OF STUD OR WALL U.N.O.
6. CONTRACTOR RESPONSIBLE FOR FIELD VERIFYING ALL UTILITIES AND UNDERGROUND ITEMS AS REQUIRED FOR THIS SCOPE OF WORK. CONDITIONS THAT PROHIBIT THE WORK FROM BEING PERFORMED AS SHOWN SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT FOR EVALUATION BEFORE CONTINUING WITH WORK.
7. CONTRACTOR RESPONSIBLE FOR VERIFYING ALL DIMENSIONS AND SIZES PRIOR TO CONSTRUCTION. ANY DISCREPANCIES FROM THE DRAWINGS SHALL BE CONVEYED TO THE ARCHITECT FOR EVALUATION PRIOR TO CONTINUING WORK.
8. CONTRACTOR RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AS WELL AS COORDINATING AND SCHEDULING ALL REQUIRED INSPECTIONS. ARCHITECT AND OWNER TO BE NOTIFIED OF SCHEDULED INSPECTION WITH 3 DAYS' NOTICE SO THEY CAN WITNESS THE INSPECTION IF DESIRED.
9. CONTRACTOR RESPONSIBLE FOR COORDINATING ALL SCHEDULES WITH OWNER AND ARCHITECT PRIOR TO START OF CONSTRUCTION.
10. SEE DOOR AND WINDOW SCHEDULES FOR ALL DOOR AND WINDOW SIZES. CONTRACTOR RESPONSIBLE TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO FABRICATION AND INSTALLATION.
11. CLEAN ALL SPACES WHERE DEMOLITION/CONSTRUCTION HAS OCCURRED AT THE CLOSE OF EACH DAY. MAINTAINING A CLEAN AND SAFE SITE IS THE RESPONSIBILITY OF THE GC.
12. COORDINATE ALL PLUMBING, MECHANICAL, ELECTRICAL WORK. REPORT ANY DISCREPANCIES TO THE ARCHITECT FOR EVALUATION PRIOR TO CONTINUING WORK.
13. PROVIDE SOLID BLOCKING FOR ALL WOOD CASINGS, TRIM, CASEWORK, AND ANY OTHER WALL-MOUNTED ITEM OR ACCESSORY. ALL BLOCKING TO BE FIRE RETARDANT TREATED WOOD.
14. DISCREPANCIES WITHIN THE CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGNER IMMEDIATELY. IF REQUIRED, THE CONTRACTOR SHALL PRICE/PROVIDE THE MORE EXPENSIVE OPTION UNTIL FURTHER CLARIFICATION CAN BE GIVEN.
15. ACCESS PANELS SHALL BE LOCATED AS REQUIRED TO ACCESS ITEMS ABOVE CEILING OR WITHIN WALLS. A SHOP DRAWING SHALL BE SUBMITTED TO ARCHITECT AND OWNER FOR REVIEW AND APPROVAL SHOWING LOCATION OF ALL ACCESS PANELS.
16. PROVIDE PROJECT SITE SIGN ERECTED IN PROMINENT LOCATION ON SITE, IN A LOCATION APPROVED BY THE OWNER. SIGN SHALL BE 4'X8' AND SHALL INCLUDE THE NAME AND RENDERING OF PROJECT, LOGOS AND NAMES OF THE FOLLOWING: ALL DESIGN TEAM MEMBERS, THE OWNER, AND THE GENERAL CONTRACTOR. SIGN SHALL BE CONSTRUCTED OF A MATERIAL THAT WILL STAND UP TO THE ELEMENTS OVER THE COURSE OF THE PROJECT CONSTRUCTION WITHOUT FAILURE OR DETERIORATION. IMAGES AND LOGOS SHALL BE SHARED BY THE ARCHITECT FOR USE IN THE SIGN CREATION.
17. PROVIDE AND INSTALL MOCK-UP PANEL OF NEW EXTERIOR WALL ASSEMBLIES INCLUDING HEAD AND SILL CONDITIONS, TRANSITIONS BETWEEN ADJACENT WALL ASSEMBLIES, ROOFING TRANSITION, COPING, ETC. FOR REVIEW AND APPROVAL BY DESIGN TEAM AND OWNER PRIOR TO OVERALL CONSTRUCTION.
18. ALL NEW DOOR FRAMES TO BE LOCATED 4" FROM FACE OF ADJACENT PERPENDICULAR WALL, UNO.
19. INSTALL NEW ROOM SIGNAGE THROUGH BUILDING. OWNER TO REVIEW ROOM NAMES AND NUMBERS PRIOR TO ORDERING AND FABRICATION. SEE A4 SERIES FOR SIGN TYPES.
20. PROVIDE AND INSTALL NEW CORDLESS MINI BLINDS ON ALL WINDOWS THROUGHOUT BASEMENT, UNO. REFER TO RCP AND ELECTRICAL DRAWINGS FOR EXTENT OF LIGHTING REMOVAL AND REPLACEMENT.

GENERAL FINISH NOTES:

1. TRANSITION STRIPS BETWEEN DISSIMILAR FLOOR TYPES REQUIRED (IE – BETWEEN CARPET AND TILE, VCT AND TILE, ETC). TRANSITIONS TO BE ADA COMPLIANT, UTILIZE REDUCERS, FLOAT THE SUBSURFACE, ETC TO PROVIDE COMPLIANT TRANSITIONS BETWEEN DIFFERING FLOOR THICKNESSES. SEE A7 SERIES AND FINISH SCHEDULE/PLANS FOR TRANSITION STRIP TYPES. CONTRACTOR SHALL ASSUME A TRANSITION STRIP SIMILAR TO OTHERS IN THE PROJECT FOR PRICING PURPOSES UNTIL FURTHER CLARIFICATION CAN BE GIVEN BY THE DESIGNER.
2. PROVIDE AND INSTALL SEALANT MATCHING COLOR OF GRID AT JOINT BETWEEN ACT GRID AND WALL. FINAL WALL PAINT CUT IN AFTER SEALANT INSTALLATION IS REQUIRED.
3. PAINT PRE-INSTALL MEETING IS REQUIRED. ARCHITECT AND OWNER SHALL WALK WITH PAINTING CONTRACTOR AND GC TO REVIEW PAINT COLOR LOCATIONS PRIOR TO START OF PAINT.
4. NEW FLOORING IN BATHROOMS AND ACCESS CORRIDORS SHALL BE AS NOTED ON FINISH SCHEDULE. MUD BED WILL BE INSTALLED TO ACCOMMODATE FLOOR SLOPES TO DRAINS AS SHOWN IN ENLARGED PLANS IN A4 SHEETS. COORDINATE DOOR FRAME HEIGHT WITH SLOPES.
5. PRIOR TO INSTALLING NEW FLOORING, ENSURE SUBSURFACE IS PREPPED TO ACCOMMODATE NEW FINISH. THIS MAY INCLUDE CEMENTITIOUS FLOOR LEVELING, ETC, PER FLOORING MANUFACTURER REQUIREMENTS. IF A SURFACE IS NOT APPROPRIATELY PREPPED, THE INSTALLING CONTRACTOR SHALL ALERT THE CMR PRIOR TO INSTALLATION.

ALL BATHROOMS AND WET AREAS THAT ARE TO RECEIVE TILE OR EPOXY FLOORING SYSTEMS SHALL RECEIVE A WATERPROOFING/CRACK ISOLATION MEMBRANE. EVERY BATHROOM POD WILL PASS A FLOOD TEST PRIOR TO THE INSTALLATION OF THE FINISH FLOOR MATERIAL. SEE TYPICAL DETAILS FOR FINISHES/INTERIORS IN THE A7 SERIES.

GENERAL PARTITION NOTES:

1. ALL INTERIOR GYPSUM BOARD SURFACES SHALL HAVE TYPE X 5/8" GYPSUM BOARD. ALL CORRIDORS, CLASSROOMS, AND TRAINING ROOMS, SHALL HAVE IMPACT RESISTANT GYPSUM BOARD INSTALLED. ALL WET AREAS INCLUDING BATHROOMS, KITCHENS, ETC SHALL HAVE MR GYPSUM BOARD INSTALLED WHERE THE WALL FINISH IS INDICATED TO BE PAINT. ANYWHERE TILE IS INDICATED TO BE INSTALLED SHALL RECEIVE 5/8" GLASSMAT SHEATHING UNDERLAYMENT.

GENERAL RCP NOTES:

1. FOR AREAS OF THE PROJECT WHERE CEILING LOADS DO NOT EXCEED 5 POUNDS PER SQUARE FOOT AND WHERE PARTITIONS ARE NOT CONNECTED TO THE CEILING SYSTEM, THE FOLLOWING MAY BE UTILIZED: 1) ALLOW FOR LATERAL MOVEMENT OF THE SYSTEM. ATTACH MAIN RUNNERS AND CROSS RUNNERS AT TWO ADJACENT WALLS; MAINTAIN CLEARANCE BETWEEN THE WALL AND THE RUNNERS AT THE OTHER TWO WALLS. IF MANUFACTURER RECOMMENDATIONS CONFLICT, INFORM THE ARCHITECT IMMEDIATELY PRIOR TO CONTINUING WORK FOR FURTHER DIRECTION.
2. PROVIDE VERTICAL SUPPORT AS REQUIRED IN BUILDING CODES. IN ADDITION, VERTICALLY SUPPORT ENDS OF RUNNERS WITHIN 8" OF DISCONTINUITIES SUCH AS MAY OCCUR WHERE THE CEILING IS INTERRUPTED BY A WALL, OR WHERE A FLOATING CEILING TERMINATES.
3. SUPPORT LIGHT FIXTURES AND AIR DIFFUSERS/GRILLES DIRECTLY BY WIRES TO THE STRUCTURE ABOVE.
4. LOCATE REGISTERS AND LIGHTING FIXTURES WITHIN GRID LINES. CENTER SPRINKLER HEADS, SPEAKERS, RECESSED FIXTURES, AND ALL OTHER CEILING ELEMENTS IN ACOUSTICAL TILES, UNLESS OTHERWISE NOTED.
5. FINISH HVAC DIFFUSERS, DRAPERY/SHADE POCKETS, SPEAKER GRILLES AND OTHER ITEMS LOCATED IN CEILING TO MATCH ADJACENT FINISH, UNLESS OTHERWISE NOTED.
6. LOCATION OF ELECTRICAL, MECHANICAL, AND PLUMBING FIXTURES INDICATED ON ARCHITECTURAL BACKGROUNDS ARE FOR LOCATIONS PURPOSES ONLY. REFER TO ENGINEERING DRAWINGS FOR FINAL TYPES AND QUANTITIES. IF A DISCREPANCY EXISTS, INFORM THE ARCHITECT FOR CLEAR DIRECTION.
7. UNLESS NOTED OTHERWISE, ALL EXPOSED CONDUIT AND PIPING PERMITTED TO BE PAINTED PER THE NORTH CAROLINA STATE BUILDING CODE SHALL BE PAINTED. REFER TO FINISH SCHEDULE FOR PAINT SELECTIONS. CONFER WITH OWNER TO CONFIRM STANDARD PAINT COLORS AS WELL.
8. UNLESS NOTED OTHERWISE, ALL ELECTRICAL LIGHTING TO BE CENTERED IN THE SPACE.

GENERAL FIRE PREVENTION NOTES:

1. INTERIOR WALL AND CEILING FINISHES IN STAIRWAYS, EXIT PASSAGEWAYS, AND CORRIDORS ARE SPECIFIED TO BE CLASS A (FLAME SPREAD 0-25, SMOKE DEVELOPMENT 450 OR LESS) OR BETTER, UNLESS NOTED OTHERWISE.
2. INTERIOR WALL AND CEILING FINISHES IN ROOMS AND OTHER ENCLOSED SPACES ARE SPECIFIED TO BE CLASS B (FLAME SPREAD INDEX 26-75; SMOKE-DEVELOPED INDEX LESS THAN 450) OR BETTER, UNLESS OTHERWISE NOTED.
3. INTERIOR TRIM IS SPECIFIED TO BE CLASS 3 (FLAME SPREAD 76 TO 200, SMOKE DEVELOPMENT OF 450 OR LESS) OR BETTER.
4. THIS PROJECT DOES NOT INCLUDE STORAGE, DISPENSING OR USE OF ANY FLAMMABLE OR COMBUSTIBLE LIQUIDS, FLAMMABLE GAS, OR HAZARDOUS SUBSTANCES.
5. ALL WOOD BLOCKING, CLEATS, GROUNDS, SHEATHING AND OTHER MISC. CARPENTRY ITEMS SHALL BE FIRE RETARDANT TREATED.
6. FLOOR COVERING FOR CORRIDORS, LOBBIES, STAIRS, OTHER EXIT PATHS OR EXIT AREAS ARE SPECIFIED TO BE CLASS B OR BETTER.

GENERAL FIRE PROTECTION, PLUMBING, MECHANICAL, ELECTRICAL, FIRE ALARM & TELECOM NOTES:

1. REFERENCE ALL PME/FP SHEETS FOR ALL STANDARDS AND DESIGN INFORMATION.
2. INDICATED DIMENSIONS ARE TO THE CENTER LINE OF OUTLETS OR SWITCHES, OR CLUSTERS OF OUTLETS OR SWITCHES, UNLESS NOTED OTHERWISE.
3. PROVIDE MATCHING COVER PLATES AND DEVICES, UNLESS NOTED OTHERWISE.
4. GC TO COORDINATE FINAL LAYOUT OF ELECTRICAL AND DATA OUTLETS WITH FINAL SELECTION OF FURNITURE AND CASEWORK PRIOR TO INSTALLATION OF FLOOR BOXES AND RECEPTACLES U.N.O.
5. GC RESPONSIBLE FOR COORDINATING AND SCHEDULING INSPECTIONS BY THE STATE ELECTRICAL INSPECTOR PRIOR TO RE-ENERGIZING CIRCUITS AFTER ELECTRICAL ITEMS ARE COMPLETE.

EXTERIOR GENERAL NOTES:

1. PROVIDE CONTROL/EXPANSION JOINTS PER MASONRY INDUSTRY STANDARDS, AND AS SPECIFIED OR NOTED ON DRAWINGS, AND AT ALL INSIDE CORNERS.SEALANT COLOR TO BE SELECTED BY ARCH FROM MANUF. FULL RANGE.

1

INTREPID ARCHITECTURE
114 E. 3RD STREET; GREENVILLE, NC 27858
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MAYSVILLE FIRE STATION
603 4TH STREET
MAYSVILLE, NC 28555

INTREPID Architecture, PA — Registered Architectural Corporation — 53628 — North Carolina — GREENVILLE, NC

ALBRECHT M. CRAWFORD — REGISTERED ARCHITECT — 11208 — NORTH CAROLINA — GREENVILLE, NC
06/02/2025

REVISIONS:

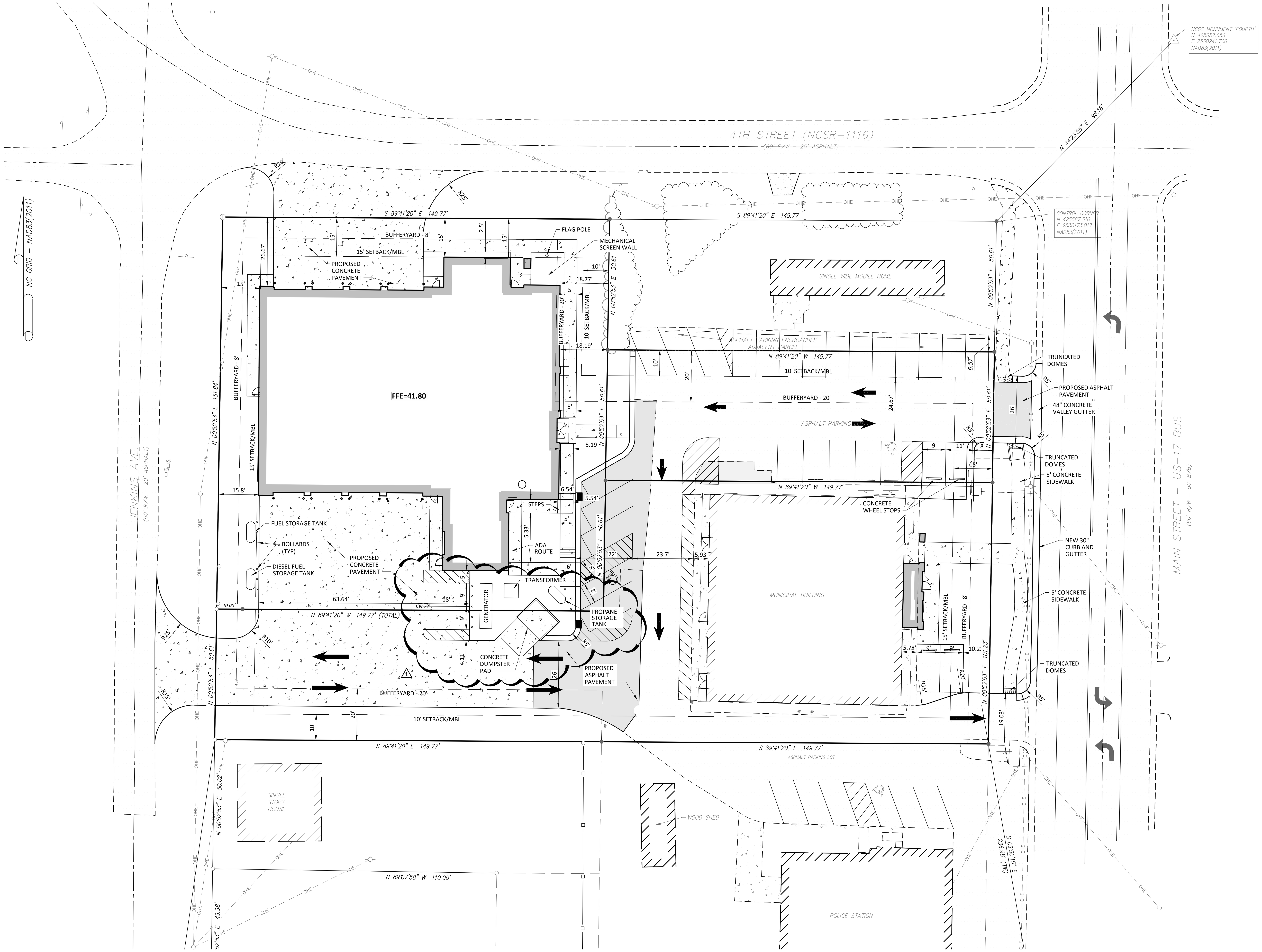
#	DESC:	DATE
1	ADDENDUM #2	06/02/2025

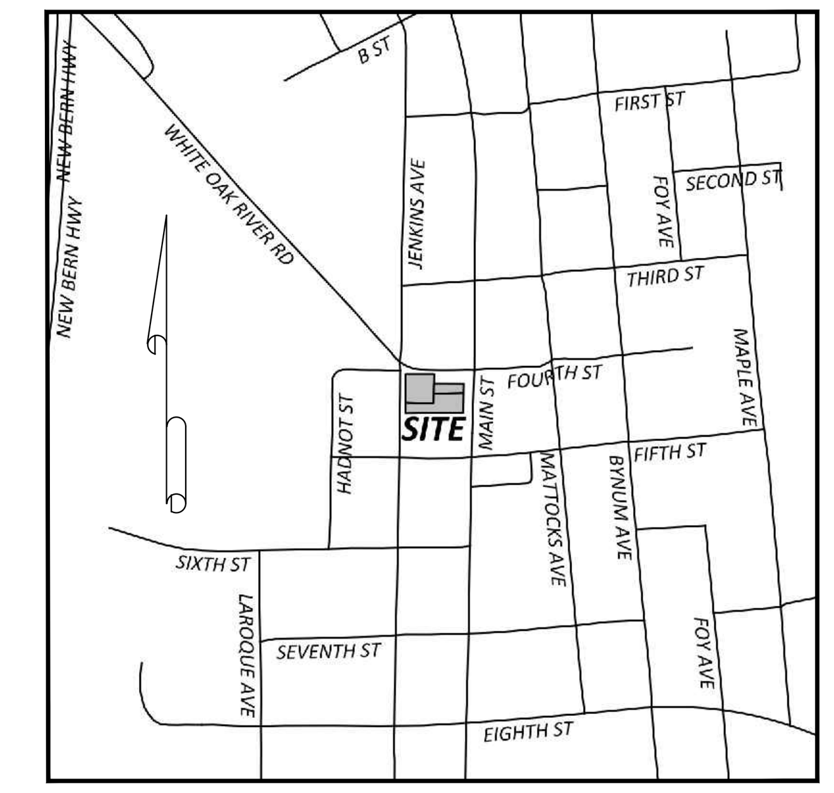
DRAWN BY: DJH
PROJECT #: 24008
ISSUE DATE: 04/30/2025

PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
GENERAL NOTES & INTERIOR PARTITION SCHEDULE

G0.01





Vicinity Map

SCALE: 1" = 1000'

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REV 6/2/25

MAYSVILLE FIRE STATION

603 4TH STREET
MAYSVILLE, NC 28555

Legend

EXISTING		PROPOSED
	GEODETIC CONTROL MONUMENT	
	EXISTING IRON PIPE	
MN	EXISTING MAG NAIL	
	EXISTING REBAR	
	IRON PIPE SET	
	CATCH BASIN	
	SIGN	
FOM	FIBER OPTIC MONUMENT	
TP	TELEPHONE PEDESTAL	
	ELECTRIC POWER POLE	
WM	WATER METER	WM
SV	SEWER VALVE	
WV	WATER VALVE	
FH	FIRE HYDRANT	FH
	STORM PIPE	
	BACK OF CURB	
	EDGE OF PAVEMENT	
	PROPERTY BOUNDARY	
	ADJOINER (NOT SURVEYED)	
	ADJOINER (SURVEYED)	
X	FENCE	
OHE	OVERHEAD ELECTRIC LINE	
OHC	OVERHEAD COMMUNICATION LINE	
	CONTOUR LINE– MINOR	69
	CONTOUR LINE – MAJOR	70
W	WATER MAIN/SERVICE	W
S	SANITARY SEWER MAIN/SERVICE	S
	SILT FENCE	SF
	LIMIT OF DISTURBANCE	LOD
	DEMOLISH / REMOVE	
00.00 DESC	SPOT ELEVATION (HARD SURFACE)	
00.0	SPOT ELEVATION (GROUND)	
00.0	TOP OF BACK OF CURB	BC 22.00
	TOP OF CONCRETE	TC 22.00
	TOP OF ASPHALT	TA 22.00
	FINISHED FLOOR ELEVATION	FFE=22.00
	INLET PROTECTION	
	GRAVEL	
	CONCRETE	
	BUILDING	

Sheet Index

General Notes:

1. NCDOT DRIVEWAY APPROVAL PERMIT IS REQUIRED.
2. CONTACT NORTH CAROLINA ONE-CALL CENTER, INC. (NC ONE-CALL) AT 811 TO HAVE ALL UNDERGROUND UTILITIES LOCATED PRIOR TO EXCAVATING OR TRENCHING.
3. ALL REQUIRED IMPROVEMENTS SHALL CONFORM TO THE TOWN OF MAYSVILLE AND JONES COUNTY MANUAL OF STANDARD DESIGNS AND DETAILS (MSDD) AND UTILITIES PROVIDERS DESIGN STANDARDS FOR THE DESIGN AND CONSTRUCTION OF WATER AND WASTEWATER SYSTEM EXTENSIONS.
4. THIS PROPERTY IS LOCATED IN A FLOOD ZONE X (AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN), ZONE X SHADED (AREA OF 0.2% ANNUAL CHANCE FLOOD) AS SHOWN ON THE FEMA FLOOD INSURANCE RATE MAP NUMBER 3720542200K, EFFECTIVE NOVEMBER 3, 2005.
5. ELECTRIC AND TELEPHONE UTILITIES SHALL BE INSTALLED UNDERGROUND.
6. PAVEMENT SECTIONS ARE AS INDICATED ON PLAN SHEET.
7. PROVIDE ALL NECESSARY SIGNAGE FOR HANDICAP PARKING.
8. PARKING LOT SHALL BE STRIPED IN ACCORDANCE WITH PLAN.
9. REFER TO ARCHITECTURAL PLANS FOR BUILDING DIMENSIONS.
10. REFER TO M.E.P. PLANS FOR COORDINATION OF BUILDING UTILITY SERVICES.
11. CONTRACTOR SHALL STOCKPILE TOPSOIL FOR USE IN LANDSCAPE AREAS.
12. STORMWATER MANAGEMENT FOR THIS SITE IS NOT REQUIRED.
13. THIS PROJECT DISTURBS MORE THAN 1 ACRE. EROSION CONTROL PLAN APPROVAL IS REQUIRED.
14. REFUSE COLLECTION SHALL BE PROVIDED BY PRIVATE SERVICE.
15. ALL DIMENSIONS ARE TO BACK OF CURB UNLESS OTHERWISE NOTED.
16. A REDUCED PRESSURE PRINCIPAL BACKFLOW DEVICE IS REQUIRED ON THE DOMESTIC WATER SERVICE.
17. SITE SHALL MEET ALL RELATED ACCESSIBILITY CODE REQUIREMENTS.
18. NEW BUILDINGS MUST COMPLY WITH NC FIRE CODE SECTION 510 - EMERGENCY RESPONDER RADIO COVERAGE.

811
KNOW WHAT'S BELOW
CALL BEFORE YOU DIG!
1-800-632-4949
WWW.NC811.ORG

Parking Requirements:

PARKING REQUIRED:	OFFICE SPACE	
	OFFICE SPACE: 8,000 SF @ 1 SPACE / 300 SF	27 SPACES
	VEHICLES USED IN COURSE OF BUSINESS: 2	2 SPACES
	TOTAL REQUIRED PARKING:	29 SPACES
	REQUIRED HANDICAP PARKING:	2 SPACES

Site Data

TOTAL ACREAGE IN SITE:	1.22± AC
TOTAL ACREAGE IN PROJECT LIMITS:	1.48± AC
DISTURBED ACREAGE:	1.34± AC
CURRENT ZONING:	C-1
TAX PARCEL NUMBER:	542295953100, 543205042200, 543205059100
LAND USE:	FIRE STATION / GOVERNMENT
GROSS FLOOR AREA EXISTING:	6,054 SF
GROSS FLOOR AREA PROPOSED:	10,005 SF
GROSS FLOOR AREA TOTAL:	16,059 SF
BUILDING LOT COVERAGE:	70.96% EXIST., 93.66% PROPOSED
BUILDING HEIGHT:	TBD' (TBD STORY)
TOTAL NUMBER OF PARKING SPACES REQUIRED:	29 SPACES (INCL. 2 H/C)
TOTAL NUMBER OF PROPOSED PARKING SPACES:	30 SPACES (INCL. 2 H/C)
TOTAL SQ. FEET OF EXIST. IMPERVIOUS AREA:	30,911.83 SF
TOTAL SQ. FEET OF PROP. IMPERVIOUS AREA:	52,303.19SF
REFERENCES:	D.B. 191, PG. 204, D.B. 217, PG. 15 D.B. 287, PG. 650, D.B. 415, PG. 615
ADDRESS:	404 MAIN STREET, MAYSVILLE, NC 28555

Survey Note:

BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN HEREON WAS PREPARED BY ARK CONSULTING GROUP, PLLC, AS SHOWN ON DRAWING ENTITLED BOUNDARY AND TOPOGRAPHICAL SURVEY FOR MAYSVILLE FIRE STATION, DATED JULY 9, 2024, ATTACHED TO THIS DRAWING SET FOR REFERENCE.

20' 0 10' 20'
SCALE 1 inch = 20 ft

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	06/02/25

DRAWN BY: CEW
PROJECT #: 24008
ISSUE DATE: 04/30/25

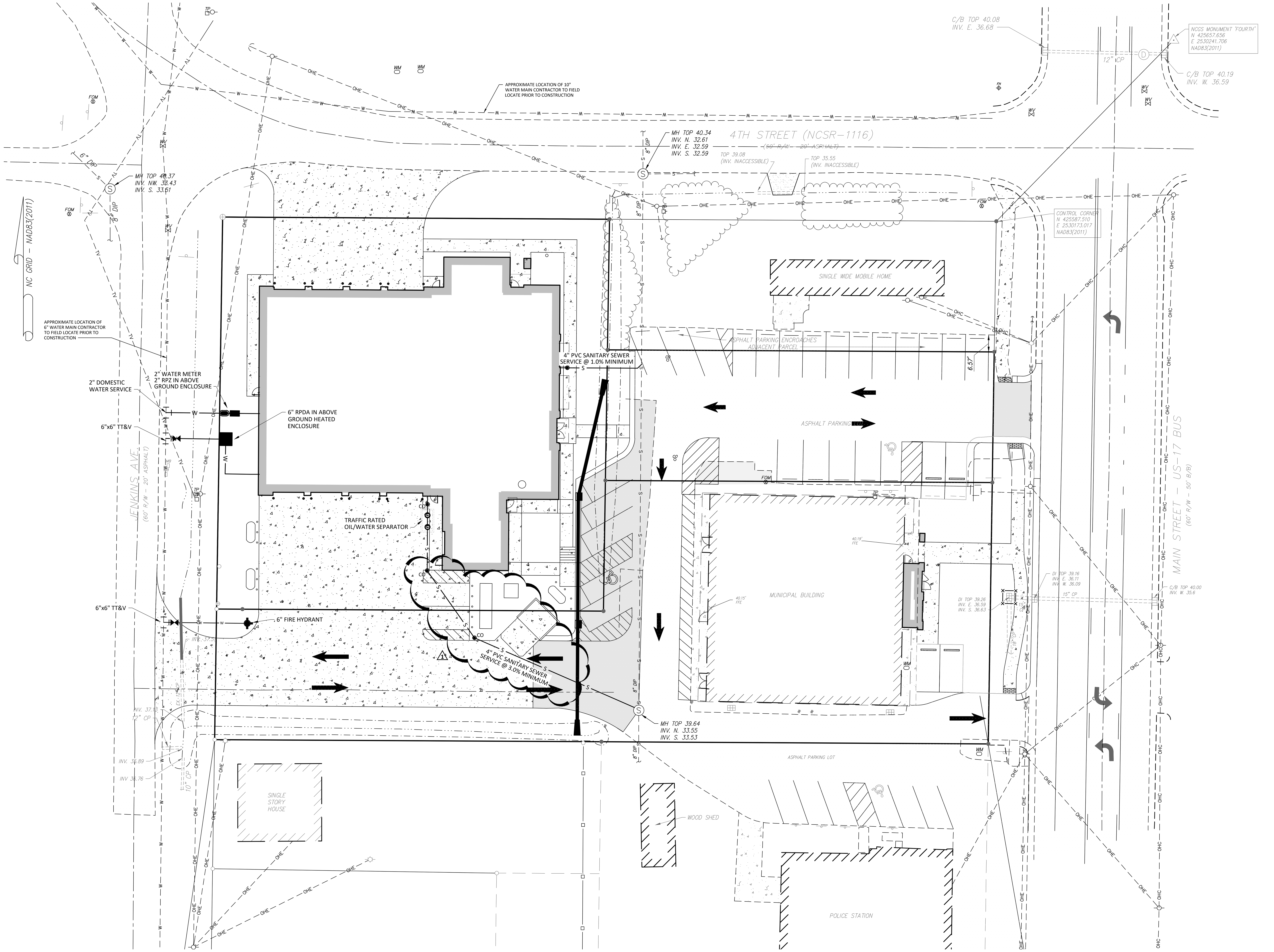
PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER

SITE PLAN

C1.0

D:\ARK DROPBOX\01 - PROJECTS\ACTIVE\INTREPID ARCHITECTURE\24113 - MAYSVILLE FIRE STATION\D - DWG\03 - FINAL\D-1544-SP_MAYSVILLE.DWG, 1 Site, Eric Webb, Tue, Jun 03, 2025 @ 12:47 PM



Utility Separation Requirements

A. SEWERS SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER MAIN. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. IN CASES WHERE IT IS NOT PRACTICAL TO MAINTAIN A 10 FOOT SEPARATION, THE APPROPRIATE REVIEWING AGENCY MAY ALLOW DEVIATION ON A CASE BY CASE BASIS, IF SUPPORTED BY DATA FROM THE DESIGN ENGINEER. SUCH DEVIATION MAY ALLOW INSTALLATION OF THE SEWER CLOSER TO A WATER MAIN, PROVIDED THAT THE WATER MAIN IS IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF LOCATED ON ONE SIDE OF THE SEWER AND AT AN ELEVATION SO THE BOTTOM OF THE WATER MAIN IS AT LEAST 24 INCHES ABOVE THE TOP OF THE SEWER.

B. IF IT IS IMPOSSIBLE TO OBTAIN PROPER HORIZONTAL AND VERTICAL SEPARATION AS DESCRIBED ABOVE OR ANYTIME THE SEWER IS OVER THE WATER MAIN, BOTH WATER MAIN AND SEWER MUST BE CONSTRUCTED OF FERROUS PIPE COMPLYING WITH PUBLIC WATER SUPPLY DESIGN STANDARDS AND BE PRESSURE TESTED TO 150 PSI TO ASSURE WATERTIGHTNESS BEFORE BACKFILLING.

C. A 24 INCH VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES OR FERROUS PIPE SPECIFIED.

CROSSINGS:

A. SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 24 INCHES BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF THE SEWER. THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER MAIN JOINTS.

B. WHEN IT IS IMPOSSIBLE TO OBTAIN PROPER HORIZONTAL AND VERTICAL SEPARATION AS STIPULATED ABOVE, ONE OF THE FOLLOWING METHODS MUST BE SPECIFIED:

I. THE SEWER SHALL BE DESIGNED AND CONSTRUCTED OF FERROUS PIPE AND SHALL BE PRESSURE TESTED AT 150 PSI TO ASSURE WATERTIGHTNESS PRIOR TO BACKFILLING, OR

II. EITHER THE WATER MAIN OR THE SEWER LINE MAYBE ENCASED IN A WATERTIGHT CARRIER PIPE WHICH EXTENDS 10 FEET ON BOTH SIDES OF THE CROSSING, MEASURED PERPENDICULAR TO THE WATER MAIN. THE CARRIER PIPE SHALL BE OF MATERIALS APPROVED BY THE REGULATORY AGENCY OF USE IN WATER MAIN CONSTRUCTION.

Utility Notes:

1. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH UTILITY PROVIDERS FOR THE RELOCATION / ABANDONMENT OF EXISTING UTILITIES AND INSTALLATION OF NEW UTILITY SERVICES AS WELL AS FEES ASSOCIATED WITH SUCH WORK.
2. COORDINATE WITH MEP PLANS FOR ELECTRICAL SERVICE INFORMATION.
3. ANY CLEANOUT THAT FALLS IN PAVEMENT WILL NEED TO BE TRAFFIC RATED SEE ATTACHED DETAILS.

Legend

EXISTING		PROPOSED
	GEODETIC CONTROL MONUMENT	
	EXISTING IRON PIPE	
MN	EXISTING MAG NAIL	
	EXISTING REBAR	
	IRON PIPE SET	
	CATCH BASIN	
	SIGN	
FOM	FIBER OPTIC MONUMENT	
TP	TELEPHONE PEDESTAL	
	ELECTRIC POWER POLE	
WM	WATER METER	WM
SV	SEWER VALVE	
WV	WATER VALVE	
FH	FIRE HYDRANT	FH
	STORM PIPE	
	BACK OF CURB	
	EDGE OF PAVEMENT	
	PROPERTY BOUNDARY	
	ADJOINER (NOT SURVEYED)	
	ADJOINER (SURVEYED)	
X	FENCE	
OHE	OVERHEAD ELECTRIC LINE	
OHC	OVERHEAD COMMUNICATION LINE	
	CONTOUR LINE- MINOR	69
	CONTOUR LINE - MAJOR	70
W	WATER MAIN/SERVICE	W
S	SANITARY SEWER MAIN/SERVICE	S
	SILT FENCE	SF
	LIMIT OF DISTURBANCE	LOD
	DEMOLISH / REMOVE	
00.00 DESC	SPOT ELEVATION (HARD SURFACE)	
00.0	SPOT ELEVATION (GROUND)	
00.0	TOP OF BACK OF CURB	BC 22.00
	TOP OF CONCRETE	TC 22.00
	TOP OF ASPHALT	TA 22.00
	FINISHED FLOOR ELEVATION	FFE=22.00
	INLET PROTECTION	
	GRAVEL	
	CONCRETE	
	BUILDING	

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20' 0 10' 20'
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MAYSVILLE FIRE STATION
603 4TH STREET
MAYSVILLE, NC 28555

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	06/02/25

DRAWN BY: CEW
PROJECT #: 24008
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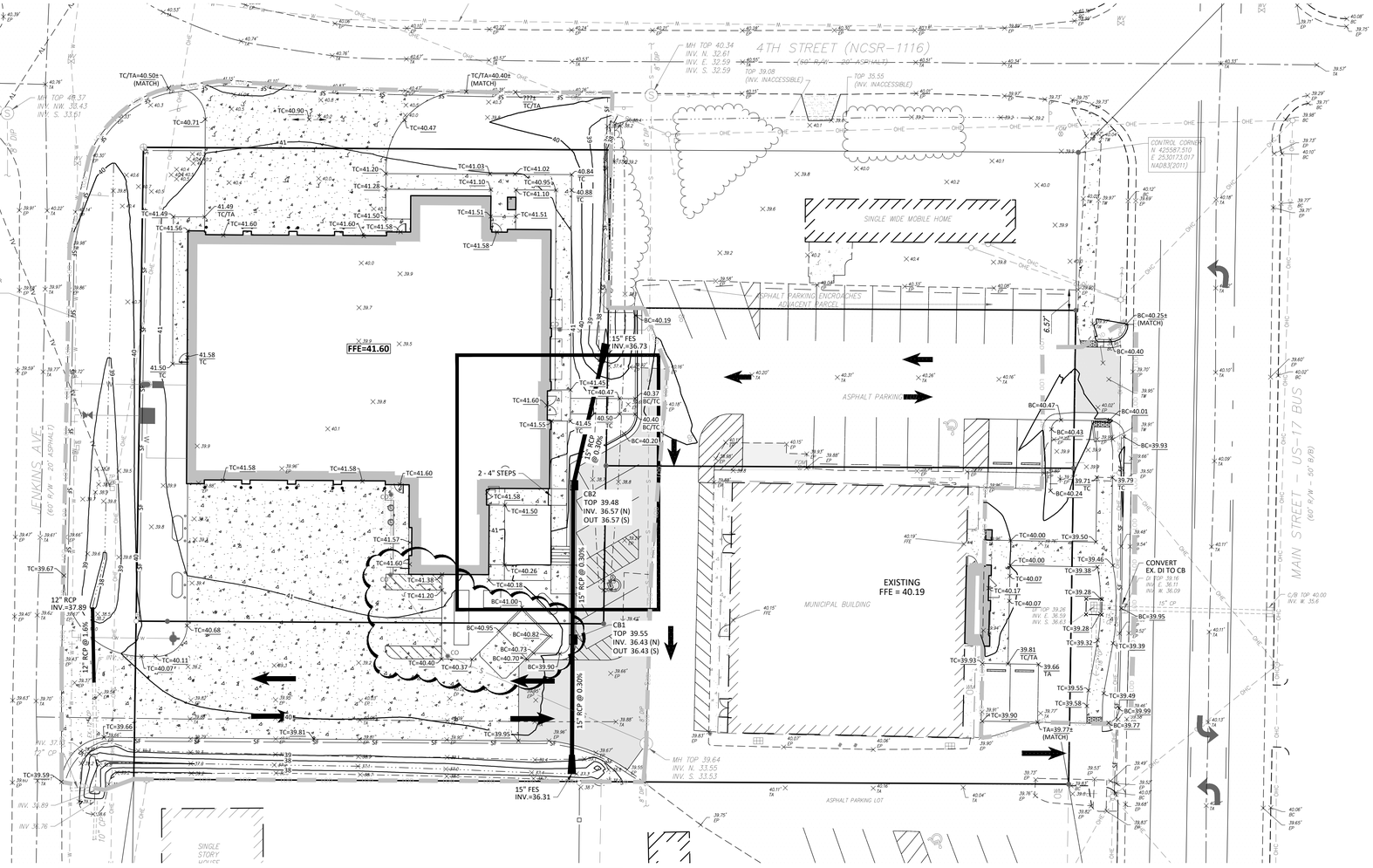
PHASE:
CONSTRUCTION DOCUMENTS

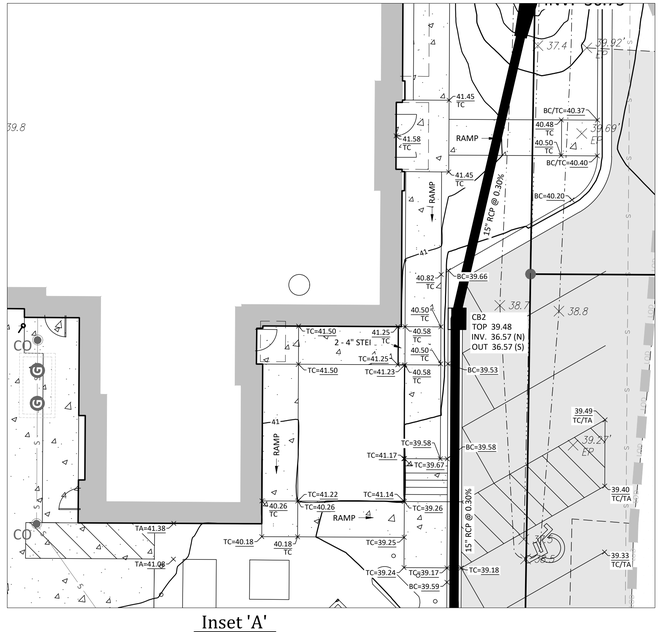
SHEET NAME & NUMBER

UTILITIES PLAN

C3.0

D:\ARK DROPBOX\01 - PROJECTS\ACTIVE\INTREPID ARCHITECTURE\24113 - MAYSVILLE FIRE STATION\D - DWG\03 - FINAL\D-1544-SP_MAYSVILLE.DWG, 3 Util, Eric Webb, Tue, Jun 03, 2025 @ 12:47 PM





Inset 'A'

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Grading Notes:

1. ALL AREAS WITHIN LIMITS OF DISTURBANCE SHALL BE CLEARED AND GRUBBED.
2. TREES OUTSIDE OF CONSTRUCTION LIMITS OR TREES NOT INDICATED TO BE REMOVED SHALL BE PROTECTED.
3. CONTRACTOR TO GRADE ALL AREAS WITHIN THE LIMITS OF DISTURBANCE FROM BUILDING TO PROPERTY LINES AND TO EDGE OF PAVEMENT ON STREET SIDES, INCLUDING ROW.
4. TOP SOIL SHALL BE STRIPPED FROM ALL CUT AND FILL AREAS, STOCKPILED AND REDISTRIBUTED OVER GRADED AREAS. PROVIDE EROSION AND SEDIMENTATION CONTROLS AROUND STOCKPILES DURING CONSTRUCTION.
5. TILL SOIL TO A DEPTH OF 4" MINIMUM.
6. REMOVE ALL ROCKS LARGER THAN 1" MEASURED IN LARGEST DIRECTION.
7. GRADE ALL AREAS TO MAINTAIN POSITIVE SLOPE AWAY FROM BUILDING.
8. ALL GRADED AREAS TO RECEIVE SEED OR SOD, TOP SOIL, STRAW AND WATER UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.
9. INSTALL TEMPORARY TURF REINFORCEMENT MATTING ON ALL SLOPES STEEPER THAN 3:1. MATTING SHALL BE CONTECH LANDLOK C2 OR EQUAL.
10. DUMPSTER PAD AND APRON SHALL BE 6" THICK 4,000 PSI CONCRETE OVER NOT LESS THAN 4" OF COMPACTED AGGREGATE BASE COURSE. REINFORCING SHALL BE #4 REBAR @ 12" ON CENTER IN EACH DIRECTION. REBAR SHALL BE LOCATED IN UPPER 1/3 OF SLAB AND SUPPORTED ON CHAIRS.
11. ALL SIDEWALKS SHALL BE CONSTRUCTED OF 4" THICK 3,000 PSI CONCRETE REINFORCED WITH 6x6 W1.4xW1.4 WELDED WIRE FABRIC. ALL SIDEWALKS SHALL HAVE TOOLED CONTROL JOINTS NOT EXCEEDING 5' SPACING IN ANY DIRECTION.
12. ALL BUILDING, SIDEWALK, AND PAVEMENT SUB-GRADES SHALL BE COMPACTED TO 100% OF ASTM D698 TO A DEPTH OF 24" AND TO 95% OF ASTM D698 BELOW 24" DEPTHS. ALL OTHER NON-STRUCTURAL AREAS SHALL BE COMPACTED TO 90% OF ASTM D698.
13. ALL BUILDING, SIDEWALK, AND PAVEMENT SUB-GRADE COMPACTIONS SHALL BE INTERMEDIATELY TESTED AND APPROVED BY THE GEOTECHNICAL ENGINEER. ALL SUB-GRADES SHALL BE THOROUGHLY PROOF-ROLLED TO IDENTIFY SMALL LOCALIZED AREAS OF UNSUITABLE SOILS. ALL UNSUITABLE SOILS SHALL BE UNDERCUT, REPLACED WITH STRUCTURAL FILL, AND COMPACTED AS DESCRIBED ABOVE.

Permanent Seeding Schedule

SEED BED PREPARATION	
LIME	- 2 TONS PER ACRE
FERTILIZER (10-20-20)	- 500 POUNDS PER ACRE
SEEDING MIXTURE:	
(JANUARY 1 - MARCH 31)	
COMMON BERMUDA GRASS (UNHULLED)	- 20 POUNDS PER ACRE
RYE (GRAIN)	- 25 POUNDS PER ACRE
(APRIL 1 - JULY 31)	
COMMON BERMUDA GRASS (HULLED)	- 15 POUNDS PER ACRE
WEEPING LOVEGRASS	- 5 POUNDS PER ACRE
CENTIPEDE	- 8 POUNDS PER ACRE
(AUGUST 1 - DECEMBER 31)	
COMMON BERMUDA GRASS (UNHULLED)	- 20 POUNDS PER ACRE
TALL FESCUE	- 60 POUNDS PER ACRE
RYE (GRAIN)	- 25 POUNDS PER ACRE
SEED BED PROTECTION:	
STRAW MULCH	- 2 TONS PER ACRE (VISUAL)
ASPHALT TACK	- 0.03 GALLONS PER SQUARE YARD

Legend

EXISTING	PROPOSED
GEODETIC CONTROL MONUMENT	
EXISTING IRON PIPE	
EXISTING MAG NAIL	
EXISTING REBAR	
IRON PIPE SET	
CATCH BASIN	
SIGN	
FIBER OPTIC MONUMENT	
TELEPHONE PEDESTAL	
ELECTRIC POWER POLE	
WATER METER	WM
SEWER VALVE	
WATER VALVE	
FIRE HYDRANT	FH
STORM PIPE	
BACK OF CURB	
EDGE OF PAVEMENT	
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INLET PROTECTION	
GRAVEL	
CONCRETE	

20' 0 10' 20'

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MAYSVILLE, NC 28555

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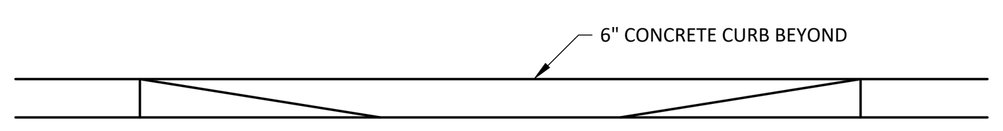
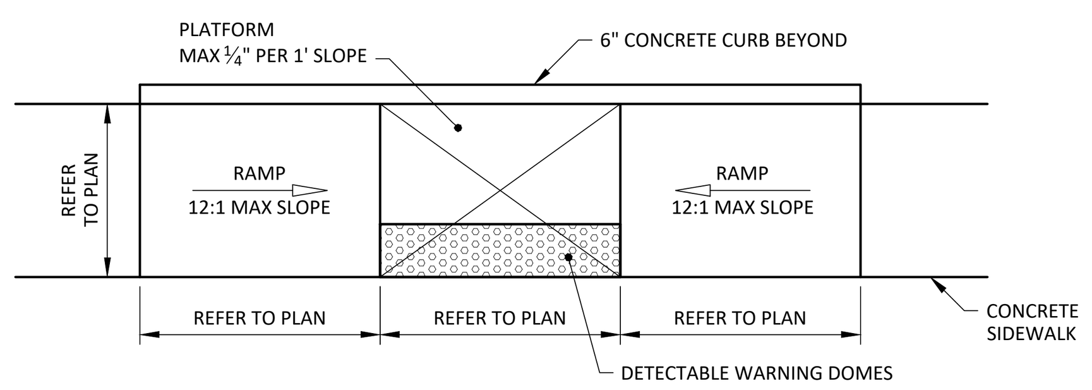
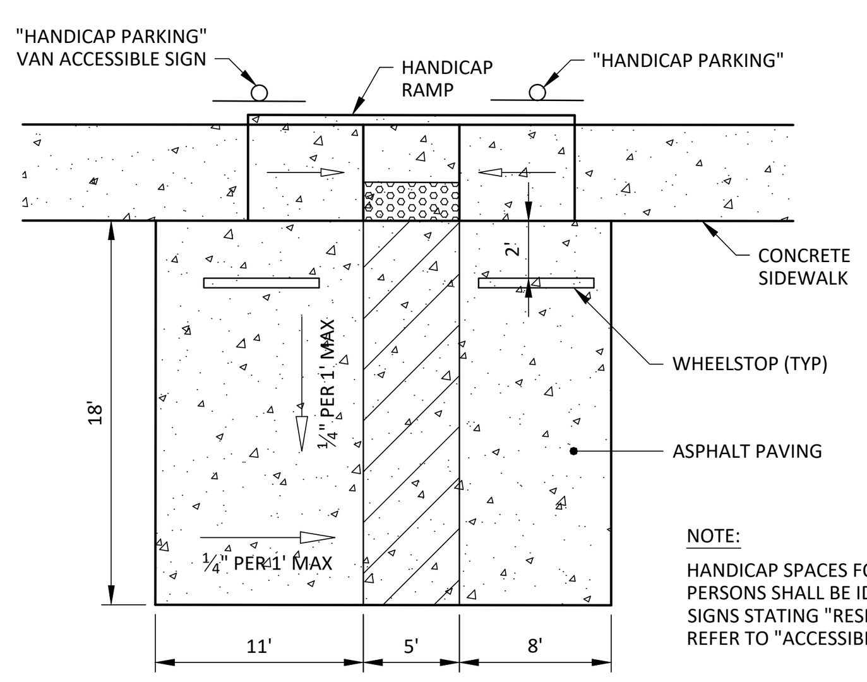


RAMP DETAIL - SECTION



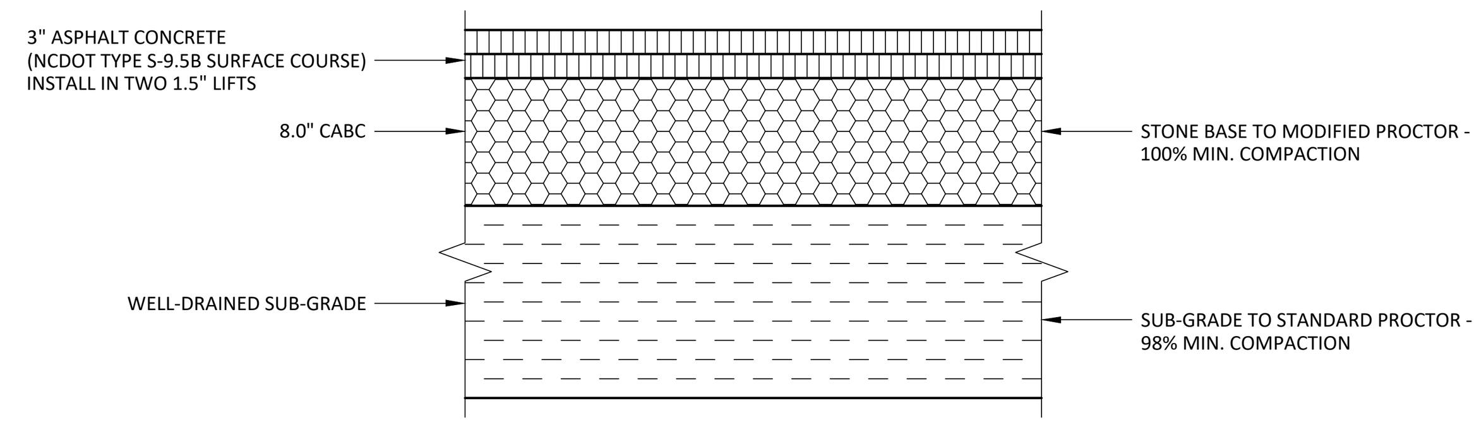
RAMP DETAIL - PLAN



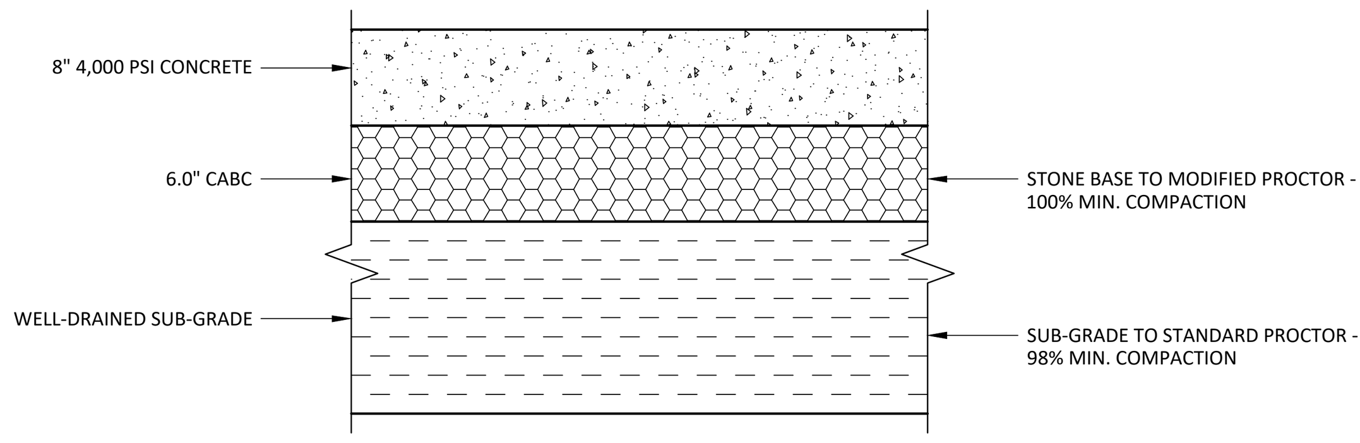
NOTE:
HANDICAP SPACES FOR PHYSICALLY HANDICAPPED PERSONS SHALL BE IDENTIFIED BY ABOVE-GRADE SIGNS STATING "RESERVED PARKING". REFER TO "ACCESSIBLE PARKING SIGN" DETAIL.

TYPICAL PARKING DETAIL - (REFER TO PLAN)

ACCESSIBLE PARKING DETAIL
NOT TO SCALE

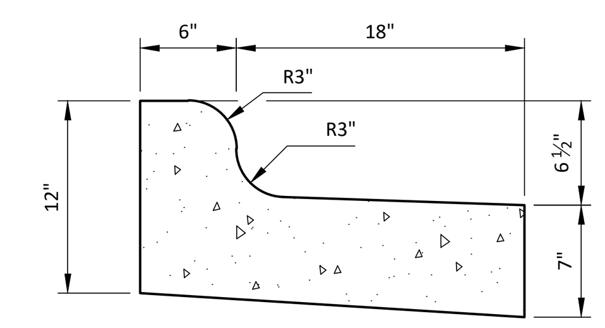


ASPHALT PAVEMENT SECTION
NOT TO SCALE

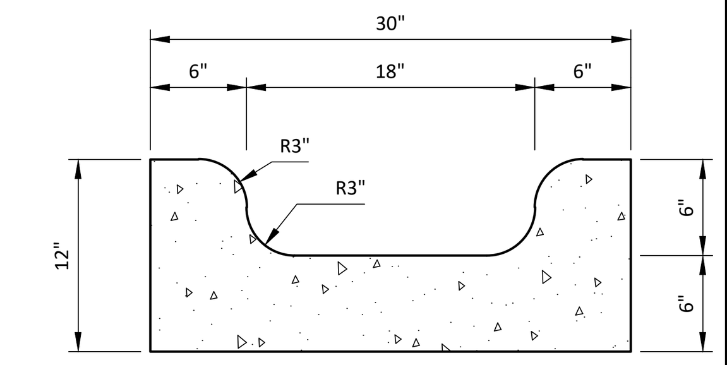


NOTES:
1. REINFORCEMENT: INSTALL #4 BARS AT 12" O.C. EACH WAY.

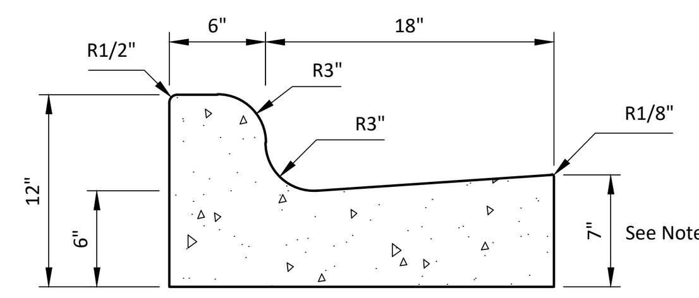
CONCRETE PAVEMENT SECTION
NOT TO SCALE



24" CONCRETE CURB AND GUTTER - SPILL

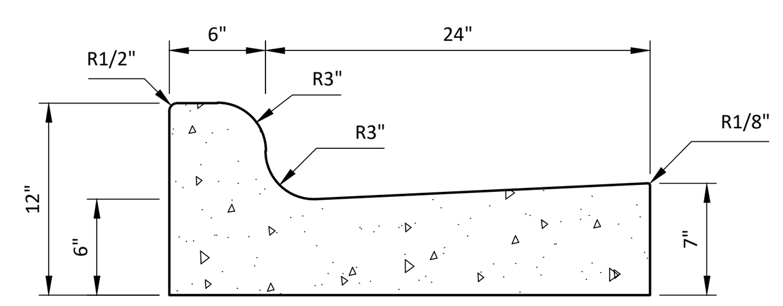


SPECIAL GUTTER

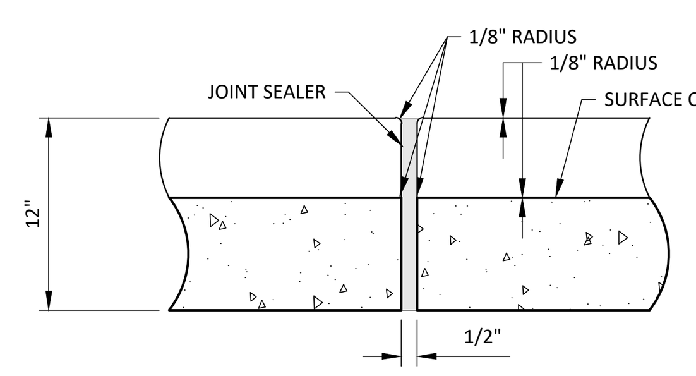


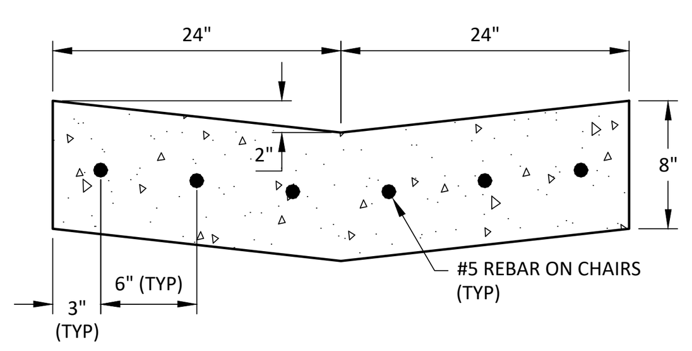
24" CONCRETE CURB AND GUTTER

GENERAL NOTES:
1. CONTRACTION JOINTS SHALL BE SPACED AT 10' INTERVALS, EXCEPT THAT A 15' SPACING MAY BE USED WHEN A MACHINE IS USED OR WHEN SATISFACTORY SUPPORT FOR THE FACE FORM CAN BE OBTAINED WITHOUT THE USE OF TEMPLATES AT 10' INTERVALS. JOINT SPACING MAY BE ALTERED BY THE ENGINEER TO PREVENT UNCONTROLLED CRACKING.
2. CONTRACTION JOINTS MAY BE INSTALLED BY THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. WHERE SUCH JOINTS ARE NOT FORMED BY TEMPLATES, A MINIMUM DEPTH OF 1 1/2" SHALL BE OBTAINED.
3. ALL CONTRACTION JOINTS SHALL BE FILLED WITH JOINT FILLER.
4. EXPANSION JOINTS SHALL BE SPACED AT 90' INTERVALS, AND ADJACENT TO ALL RIGID OBJECTS.
5. ALL CURB AND GUTTERS ARE TO BE POURED WITH CLASS "A" CONCRETE. (3000 PSI)
6. FLEXIBLE FORMS ARE TO BE USED WHEN RADII IS LESS THAN 200.



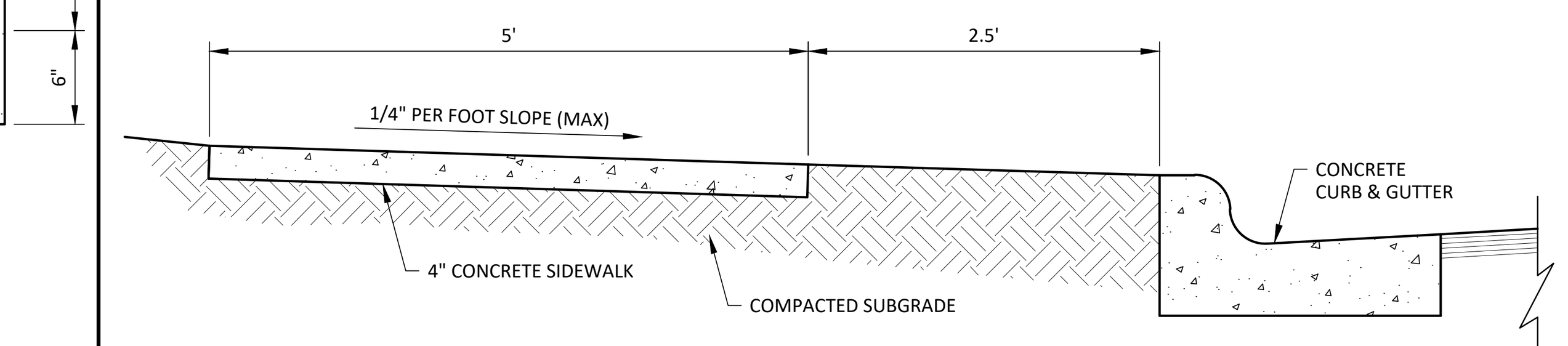
30" CONCRETE CURB AND GUTTER



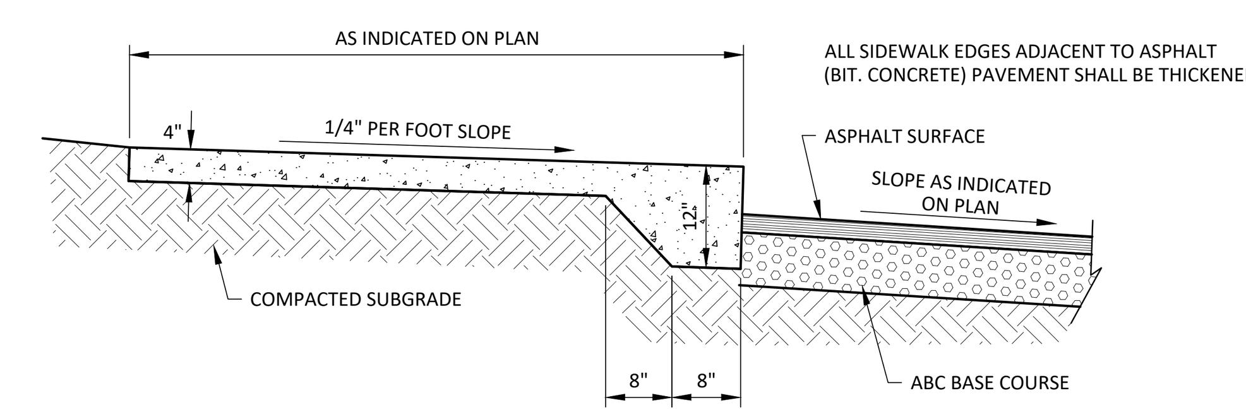


CONCRETE VALLEY GUTTER

CURB AND GUTTER DETAIL
NOT TO SCALE

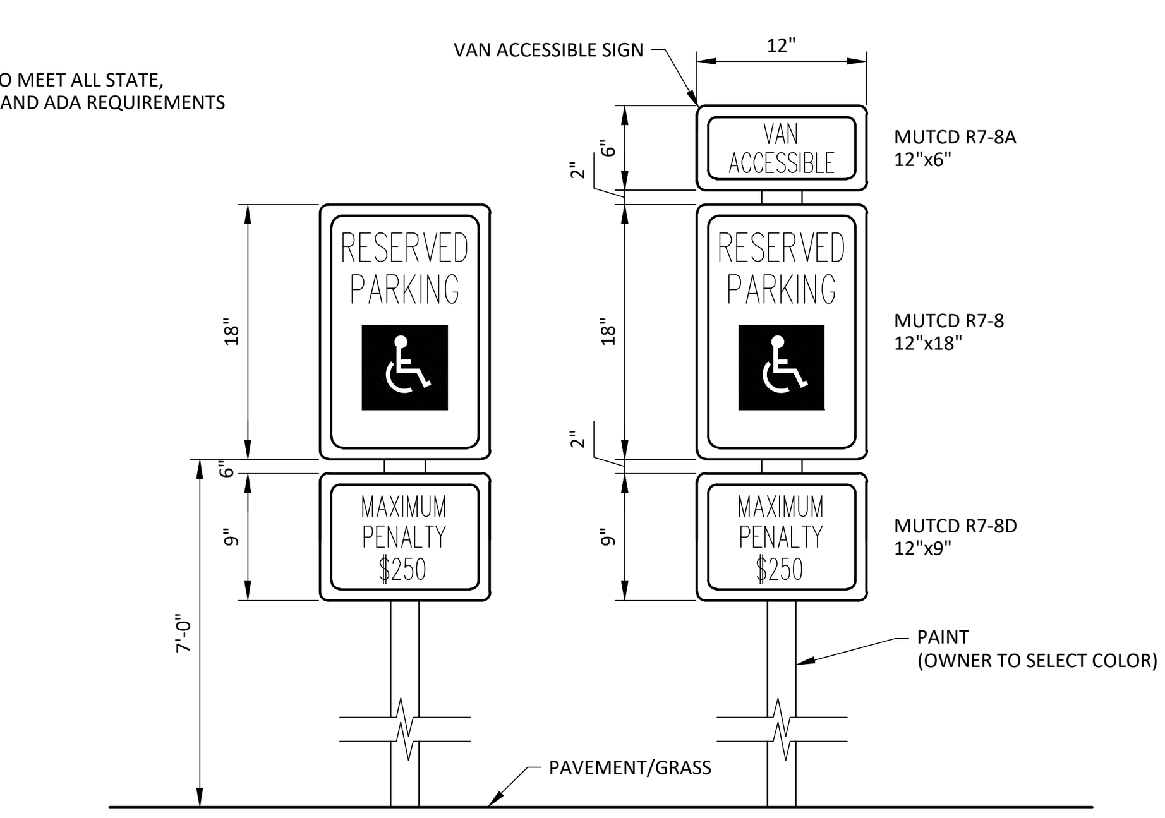


SIDEWALK DETAIL
NOT TO SCALE



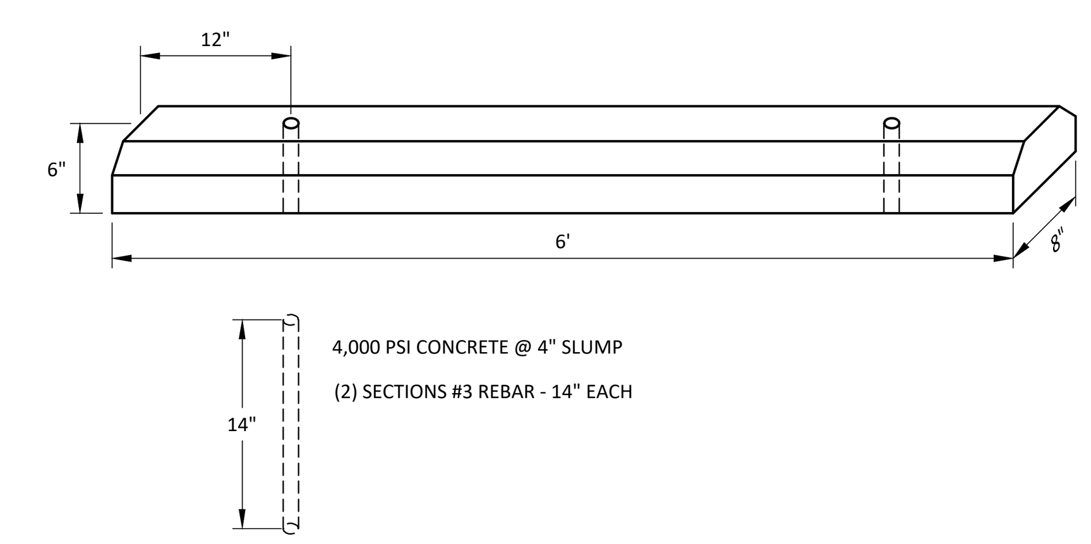
RAISED THICKENED EDGE CONCRETE WALK
NOT TO SCALE

NOTE:
SIGN TO MEET ALL STATE, LOCAL AND ADA REQUIREMENTS



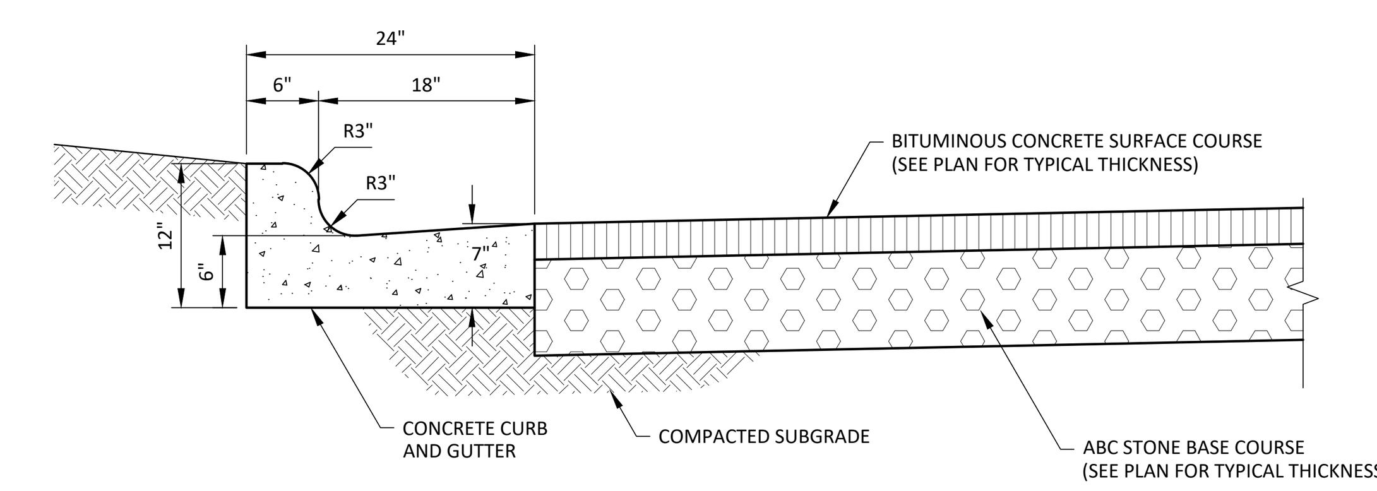
NOTES:
1. MOUNT POST IN SIDEWALK. PROVIDE PROTECTION FOR POST.
2. PAINT STEEL/METAL POST TO MATCH BUILDING.

ACCESSIBLE PARKING SIGN
NOT TO SCALE

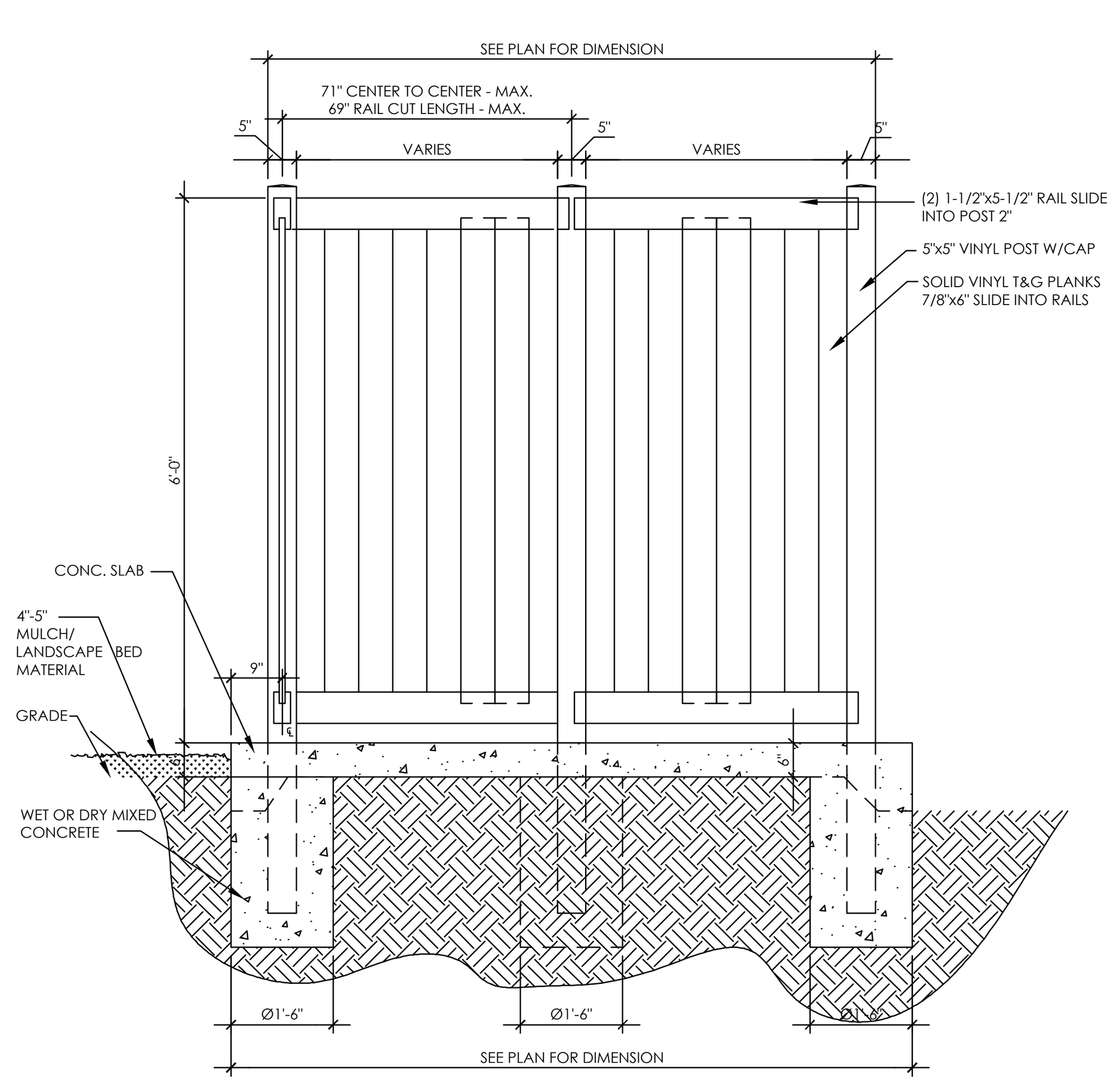


NOTES:
1. WHEEL STOPS SHALL BE PAINTED "SAFETY YELLOW"
2. WHEEL STOPS SHALL BE INSTALLED 2' FROM EDGE OF OBSTRUCTION, EDGE OF PAVEMENT, OR FACE OF CURB

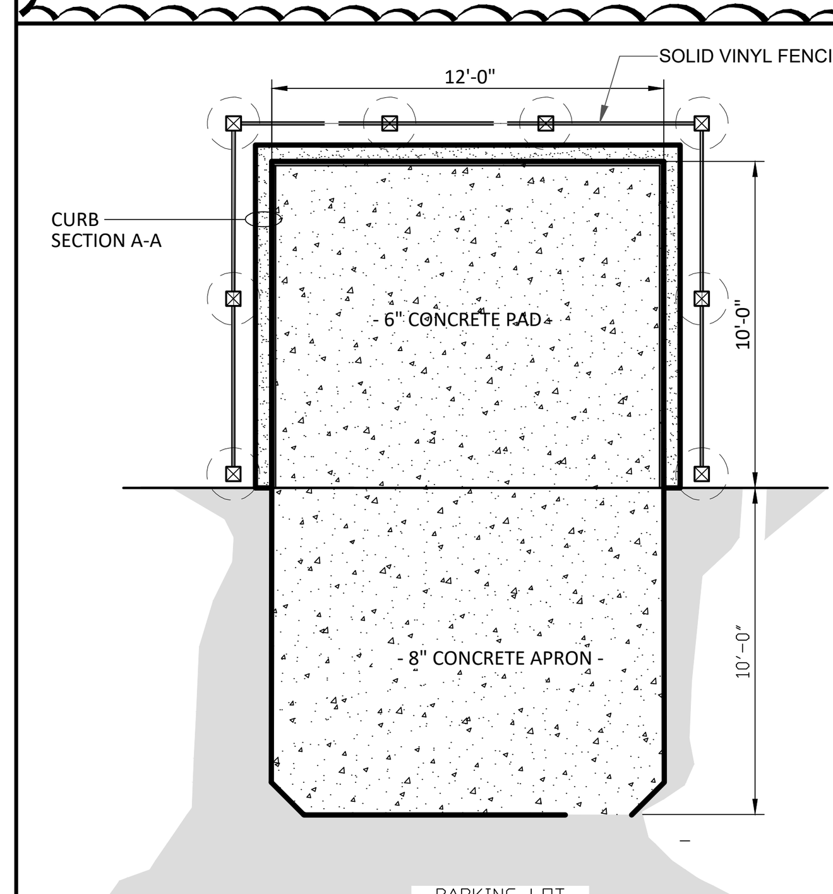
CONCRETE WHEEL STOP
NOT TO SCALE



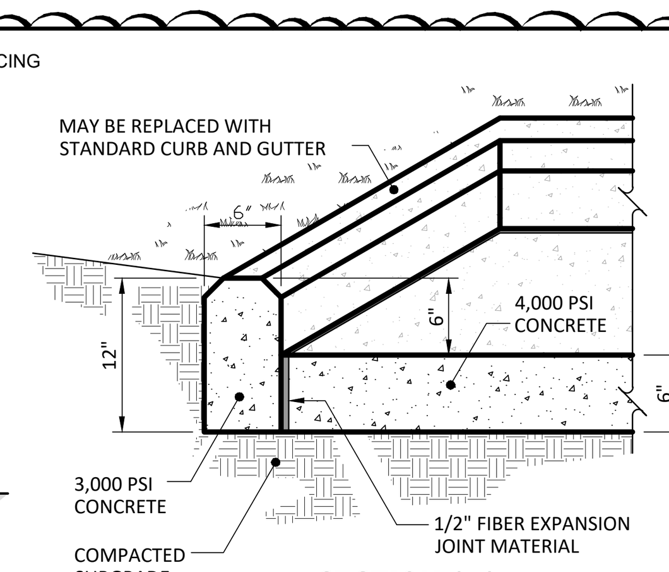
CURB AND GUTTER AND PAVEMENT DETAIL
NOT TO SCALE



⚠ DUMPSTER VINYL SLATS



PLAN VIEW



SECTION A-A

NOTES:
1. Container pad must be flush with parking lot pavement.

DUMPSTER PAD ⚠
NOT TO SCALE

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DETAILS

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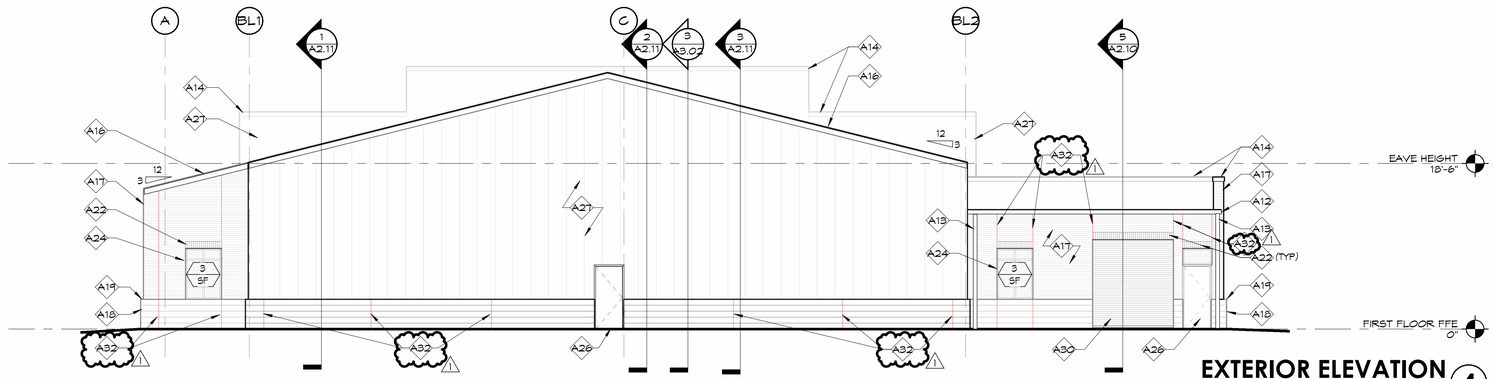
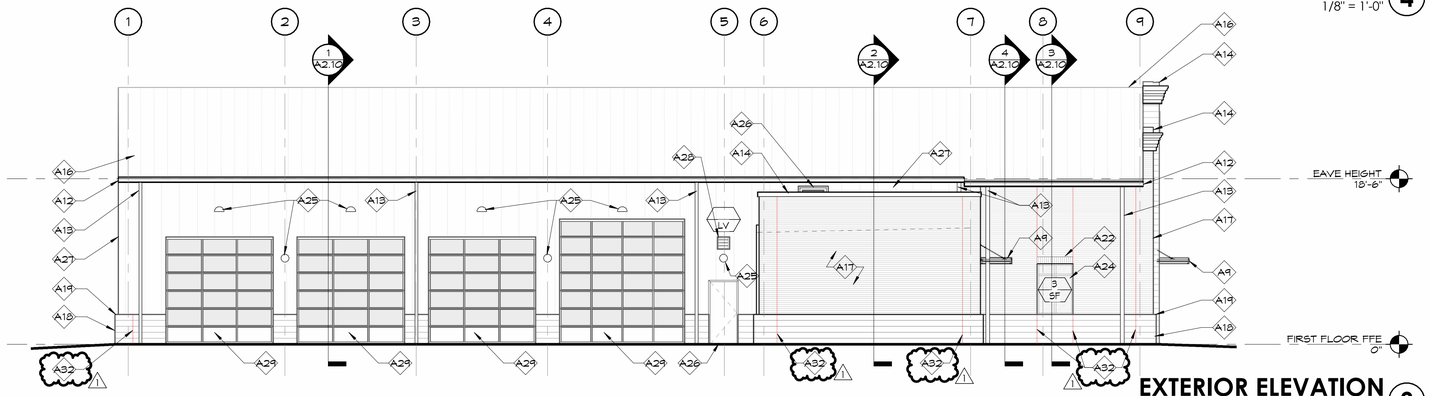
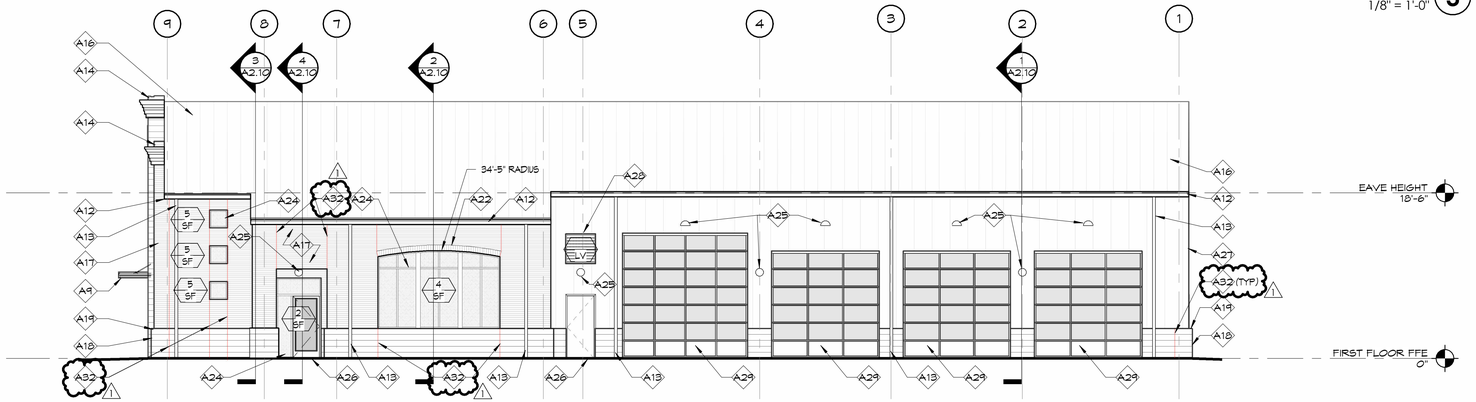


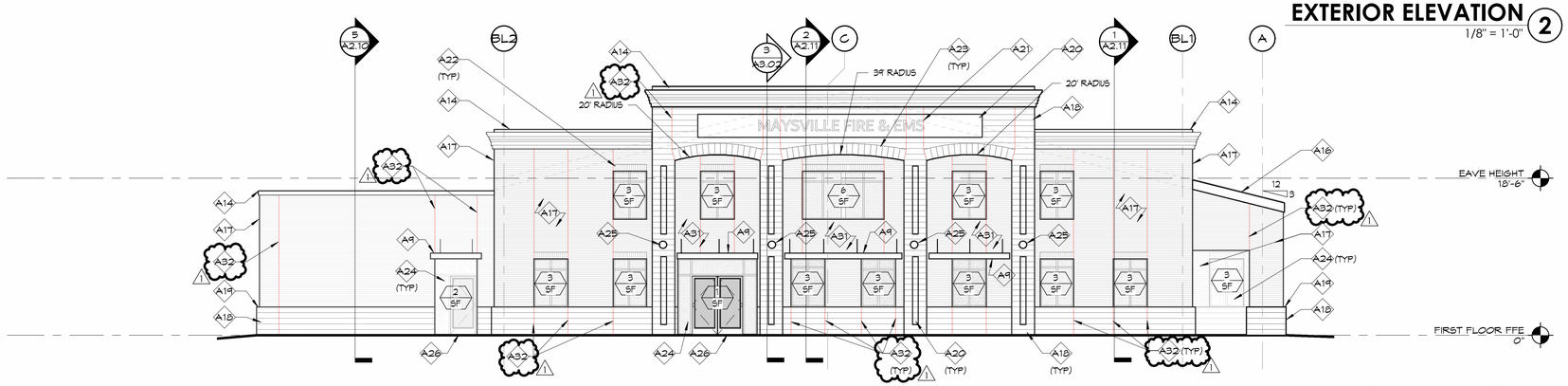
EXTERIOR ELEVATION 4
1/8" = 1'-0"



EXTERIOR ELEVATION 3
1/8" = 1'-0"



EXTERIOR ELEVATION 2
1/8" = 1'-0"



EXTERIOR ELEVATION 1
1/8" = 1'-0"

KEY NOTES

A1 – OWNER PROVIDED, CONTRACTOR INSTALLED TV AND WALL MOUNT. MOUNTED 48" TO CENTER OF TV. COORDINATE TV SIZES WITH OWNER. BOX FOR POWER AND DATA TO BE LOCATED ON TOP LEFT OF TV OUT OF THE MOUNT AREA.

A2 – CONCRETE FILLED, STEEL TUBE BOLLARD, PAINTED SAFETY YELLOW.

A3 – OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT/APPLIANCE.

A4 – CONTRACTOR PROVIDED, CONTRACTOR INSTALLED EQUIPMENT/APPLIANCE.

A5 – OWNER PROVIDED, CONTRACTOR INSTALLED LOCKERS IN TRUCK BAY.

A6 – CONTRACTOR PROVIDED, CONTRACTOR INSTALLED PLASTIC LOCKERS IN LAUNDRY ROOM.

A7 – HIGH/LOW WATER FOUNTAIN W/ BOTTLE FILLER, SEE PLUMBING DRAWINGS.

A8 – CONTRACTOR PROVIDED, CONTRACTOR INSTALLED WHITE BOARD, REF. INTERIOR ELEVATIONS.

A9 – PRE-MANUFACTURED ROD-HUNG CANOPY. COORDINATE WITH PEMB AND CFMF DELEGATED DESIGNS TO PROVIDE STRUCTURAL SUPPORTS/CONNECTIONS AND LOADING INFORMATION.

A10 – 5' TALL CHAIN LINK FENCE W/ VINYL INSERTS AROUND MECHANICAL YARD. PROVIDE MIN. 4 ' SWINGING WIDE GATE ON ONE SIDE TO ACCESS INSIDE OF YARD.

A11 – FIRE POLE, CONTRACTOR PROVIDED, CONTRACTOR INSTALLED. COORDINATE WITH STAIR DELEGATED DESIGN TO PROVIDE STRUCTURAL SUPPORTS/CONNECTIONS AND LOADING INFORMATION. BASIS-OF-DESIGN TO BE SELF-SUPPORTED MODEL 20 BY MCINTIRE BRASS WORKS INC W/ SELF-CLOSING SHUTTERS, SAFETY KIT, AND WEIGHTED BASE PAD. **FIRE POLE TO BE PROVIDED AND INSTALLED AS PART OF ALTERNATE #3**. BASE BID TO INCLUDE PREP OF STAIR LANDING TO INSTALL FIRE POLE IN THE FUTURE, WITH STEEL COVER FOR FASTENED SECURELY TO LANDING IN THE INTERIM.

A12 – PREFINISHED ALUMINUM GUTTER.

A13 – PREFINISHED ALUMINUM DOWNSPOUT, PIPED TO SUB-SURFACE DRAINAGE SYSTEM. SEE CIVIL.

A14 – PRE-FINISHED ALUMINUM PARAPET CAP.

A15 – LOW-SLOPE MEMBRANE ROOF SYSTEM, SINGLE SLOPE TO GRAVEL STOP EDGE WITH CONTINUOUS GUTTER AND DOWNSPOUTS AS SHOWN.

A16 – STANDING SEAM METAL ROOF SYSTEM TO TYPICAL PEMB EAVE WITH CONTINUOUS GUTTER AND DOWNSPOUTS AS SHOWN.

A17 – BRICK VENEER, STANDARD SIZE, RUNNING BOND. COLOR 1.

A18 – GROUND FACE CMU VENEER, RUNNING BOND.

A19 – GROUND FACE CMU, SPECIAL SHAPE SILL, PROVIDE BOND BREAK BETWEEN CMU AND BRICK.

A20 – RECESS CMU, REFERENCE WALL SECTIONS AND DETAILS.

A21 – 1'-4" TALL CAST ALUMINUM EXTERIOR SINGAGE, PIN-MOUNTED, ANCHORED TO CMU WITH EPOXY CEMENT, OR PER MANUF. RECOMMENDATIONS.

A22 – SOLDIER COURSE BRICK VENEER.

A23 – SOLDIER COURSE CMU ON ARCH. VARY GROUT JOINTS TO ACHIEVE ARCH.

A24 – STOREFRONT FRAMING AND GLASS AS SCHEDULED.

A25 – WALL SCONE LIGHT FIXTURE AS SCHEDULED, SEE ELECTRICAL DRAWINGS.

A26 – DOOR AND FRAME AS SCHEDULED.

A27 – PEMB WALL PANEL SYSTEM, JOINTS TO RUN VERTICALLY.

A28 – LOUVER AS SCHEDULED.

A29 – OVERHEAD SECTIONAL DOOR AS SCHEDULED.

A30 – OVERHEAD COILING DOOR AS SCHEDULED.

A31 – BRICK VENEER, STANDARD SIZE, RUNNING BOND. COLOR 2 (SIM TO CMU COLOR).

A32 – MASONRY CONTROL/EXPANSION JOINT. 1

EXTERIOR FINISH SCHEDULE

BRICK COLOR 1 - PALMETTO, BILTMORE, STANDARD BRICK, OR EQUAL BY ALTERNATE MANUF.

BRICK COLOR 2 - PALMETTO, WIRE CUT, STANDARD BRICK, COLOR TO BE SIMILAR TO CMU, OR EQUAL BY ALTERNATE MANUF.

GROUND FACE CMU - ECHELON MASONRY, MESASTONE GROUND FACE, COLOR SELECTED BY ARCH FROM MANUF. FULL RANGE; OR EQUAL BY ALTERNATE MANUF.

METAL WALL PANEL - BY METAL BUILDING SUPPLIER, COLOR SELECTED BY ARCH FROM MANUF. FULL RANGE

ROOF WALL PANEL - BY METAL BUILDING SUPPLIER, COLOR SELECTED BY ARCH FROM MANUF. FULL RANGE 1

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DRAWN BY: DJH
PROJECT #: 24008
ISSUE DATE: 04/30/2025

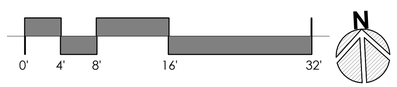
PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
EXTERIOR ELEVATION

A2.01

GENERAL RCP NOTES

1. ALL WINDOWS SHALL RECEIVE ALUMINUM MINI BLINDS.



PROPOSED FIRST FLOOR RCP (1)

1/8" = 1'-0"

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GREENVILLE, NC

06/02/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM #2	06/02/2025

DRAWN BY: DJH
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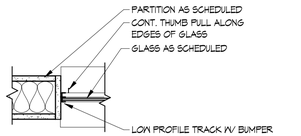
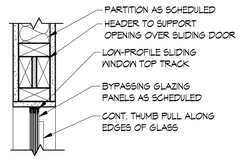
PROPOSED REFLECTED CEILING PLAN - BASE BID

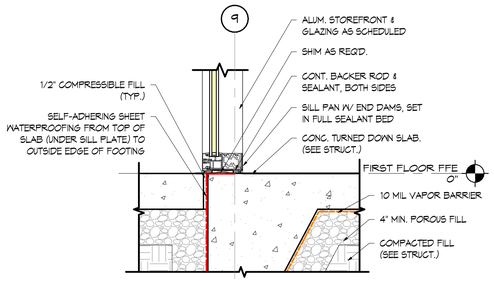
A5.01



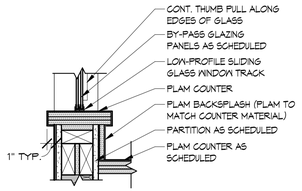
PLAN DETAIL 9
1 1/2" = 1'-0"



SECTION DETAIL 8
1 1/2" = 1'-0"



TYP. SF SILL DETAIL 10
1 1/2" = 1'-0"



SECTION DETAIL 7
1 1/2" = 1'-0"

GLAZING SCHEDULE

G1	CLEAR 1" TEMPERED INSULATED LOW-E GLASS
G2	1" INSULATED TEMPERED SPANDREL GLASS UNIT SPANDREL COATING ON SURFACE 3 OF IGU.
G3	1/4" CLEAR TEMPERED GLASS
G4	1/4" CLEAR TEMPERED GLASS FACTORY FROSTED
G5	CLEAR 1" TEMPERED INSULATED LOW-E GLASS, PRIVACY FILM APPLIED TO INTERIOR OF GLASS

DOOR/OPENINGS GENERAL NOTES:

1. GC TO FIELD VERIFY ALL OPENINGS PRIOR TO FRAME ORDERING AND FABRICATION.
2. SEE SPECIFICATION FOR BASIS-OF-DESIGN FOR STOREFRONT.
3. SEE SPECIFICATION FOR BASIS-OF-DESIGN FOR ALUMINUM ENTRANCES.
4. BASIS OF DESIGN FOR HOLLOW METAL INTERIOR FRAME MULLIONS ARE 2" SIGHTLINES, U.N.O.
7. LIGHTS IN INTERIOR DOORS TO BE G3 U.N.O.
8. "SFF" TAGS INDICATES EXTERIOR STOREFRONT FRAMES - REFER TO PLANS FOR LOCATIONS. FRAME ELEVATIONS FOR DIMENSIONS, GLAZING TAGS, ETC.
9. WOOD VENEER FOR SOLID WOOD CORE DOORS SHALL BE AAA PREMIUM GRADE. SPECIES SHALL BE WHITE BIRCH U.N.O.
10. DOOR ASSEMBLIES TO COMPLY WITH REQ'D FIRE RATINGS.
11. GLASS TYES IN RATED DOORS SHALL MATCH RATING OF DOOR. SIZE OF VISION LITE IN DOORS TO MEET NCBC REQUIREMENTS.

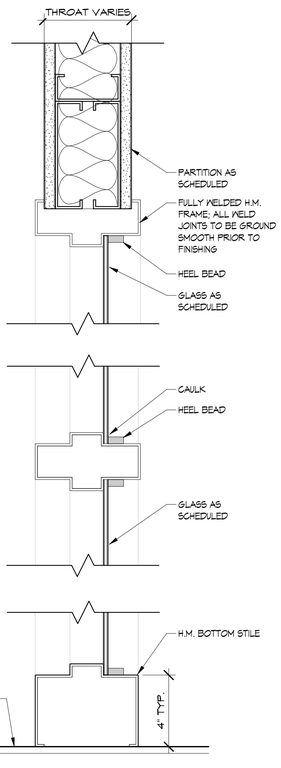
ABBREVIATIONS:

D.O. DOOR OPENING
R.O. ROUGH OPENING

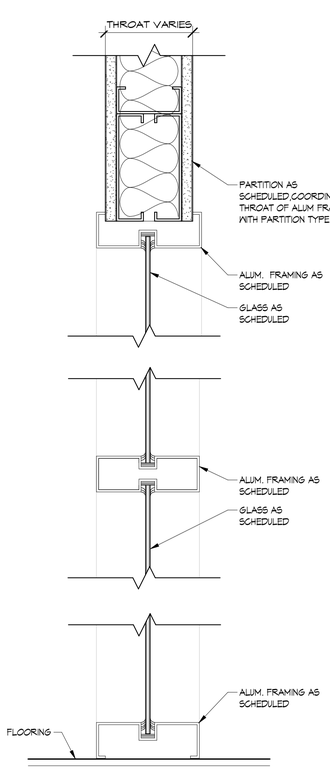
DOOR SCHEDULE

DOOR NO.	SIZE WIDTH	SIZE HEIGHT	SIZE THICKNESS	DOOR TYPE	DOOR MATERIAL	DOOR FINISH	FRAME ELEVATION	FRAME MATERIAL	FRAME FINISH	FRAME DETAILS HEAD	FRAME DETAILS JAMB	FRAME DETAILS SILL	FIRE RATING	HARDWARE SET	REMARKS
101	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	1	
101A	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	2	
101B	3'-0"	7'-0"	1 3/4"	A	AL	ANOD	SF2	AL	ANOD	4/A6.10	5/A6.01	3/A8.01, 10/A8.01	N/A	3A	ELECTRIC ACCESS CONTROL HARDWARE
102	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	4	
103	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	4	
103A	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	1	
103B	6'-0"	4'-0"	1"	CH4	AL	ANOD	-	-	-	6/A7.01	13/A7.01	6/A7.01	N/A	KEYED	OVERHEAD COUNTER COILING DOOR
104	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	4	
105	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	20 MIN.	5	
106A	6'-0"	7'-0"	1 3/4"	AA	AL	ANOD	SF1	AL	ANOD	4/A6.10	5/A6.01	3/A8.01, 10/A8.01	N/A	6	ELECTRIC ACCESS CONTROL HARDWARE
106B	6'-0"	7'-0"	1 3/4"	AA	AL	ANOD	ISF1	AL	ANOD	5/A8.01	5/A8.01	5/A8.01, 1/A8.01	N/A	7	ELECTRIC ACCESS CONTROL HARDWARE
107	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	5	
108	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	4	
109	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	20 MIN.	1	
110	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	N/A	4	
112	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	45 MIN.	4	
113	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	45 MIN.	8A	ELECTRIC ACCESS CONTROL HARDWARE
113A	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	N/A	5	
113B	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	N/A	9	
114	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	45 MIN.	4	
115A	3'-0"	7'-0"	1 3/4"	A	AL	ANOD	SF2	AL	ANOD	4/A6.10	5/A6.01	3/A8.01, 10/A8.01	N/A	3A	ELECTRIC ACCESS CONTROL HARDWARE
115B	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	45 MIN.	10	ELECTRIC ACCESS CONTROL HARDWARE
116	9'-0"	10'-0"	5/8"	CH3	AL	ANOD	-	-	-	4/A8.11	9/A8.01	B/A8.10	N/A	KEYED	INSULATED OVERHEAD COILING DOOR
116A	3'-0"	7'-0"	1 3/4"	C	HM	PT	F1	HM	PT	4/A6.10	9/A6.01	3/A8.01	N/A	11	ELECTRIC ACCESS CONTROL HARDWARE
116F	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F1	HM	PT	4/A8.01	4/A8.01	1/A8.01	20 MIN.	12	
117A	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT		B/A6.01	3/A8.01	N/A	3A	ELECTRIC ACCESS CONTROL HARDWARE
117B	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT		B/A6.01	B/A8.01	N/A	3A	ELECTRIC ACCESS CONTROL HARDWARE
117C	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	45 MIN.	1	
117D	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	45 MIN.	1	
118	14'-0"	14'-0"	2 1/5"	CH1	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
119	14'-0"	14'-0"	2 1/5"	CH1	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
120	12'-0"	12'-0"	2 1/5"	CH2	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
122	12'-0"	12'-0"	2 1/5"	CH2	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
123	12'-0"	12'-0"	2 1/5"	CH2	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
124	12'-0"	12'-0"	2 1/5"	CH2	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
125	12'-0"	12'-0"	2 1/5"	CH2	AL	ANOD	-	-	-	1/A6.11	1/A6.01	B/A6.10	N/A	KEYED	OVERHEAD SECTIONAL DOOR
127	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT		/A6.01B	3/A8.01	N/A	3	
201	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A8.01	4/A8.01	1/A8.01	20 MIN.	2	
201A	3'-0"	3'-0"	1 3/4"	B	HM	PT	F3	HM	PT				20 MIN.	13	ROOF ACCESS DOOR, 4-SIDED FRAME
203	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	1	INCLUDED IN ALTERNATE #1
204	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
205	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	5	INCLUDED IN ALTERNATE #1
206	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
207	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	N/A	5	INCLUDED IN ALTERNATE #1
208	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	12	INCLUDED IN ALTERNATE #1
209	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	2	
210	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
211	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	45 MIN.	1	
212	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
213	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	2	
214	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
215	3'-0"	7'-0"	1 3/4"	C	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	45 MIN.	10	ELECTRIC ACCESS CONTROL HARDWARE
216	3'-0"	7'-0"	1 3/4"	B	SMG	ST	F2	HM	PT	4/A9.01	4/A9.01	1/A9.01	20 MIN.	4	INCLUDED IN ALTERNATE #1
217	3'-0"	7'-0"	1 3/4"	C	HM	PT	F2	HM	PT	4/A9.01	4/A9.01	1/A8.01	45 MIN.	8A	ELECTRIC ACCESS CONTROL HARDWARE

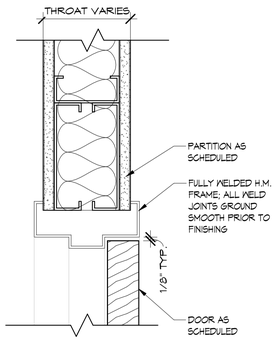
DOOR TYPES 2
1/4" = 1'-0"



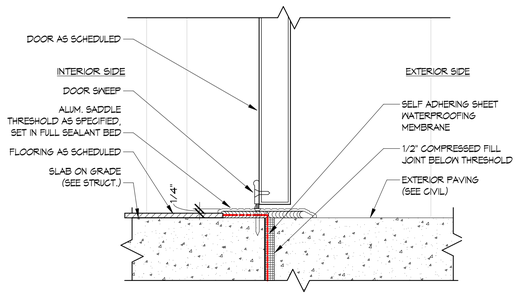
TYP. HM WINDOW FRAMING 6
3" = 1'-0"



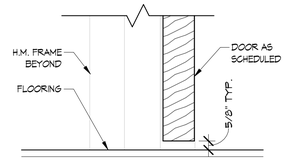
TYP INTERIOR SF FRAMING 5
3" = 1'-0"



TYP. HM FRAME HEAD/JAMB 4
3" = 1'-0"



TYP. EXT. DOOR SILL DETAIL 3
3" = 1'-0"



TYP. INT. THRESHOLD 1
3" = 1'-0"

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OPENING, WINDOW, AND HARDWARE SCHEDULES, TYP. FRAMING DETIALS

A8.01

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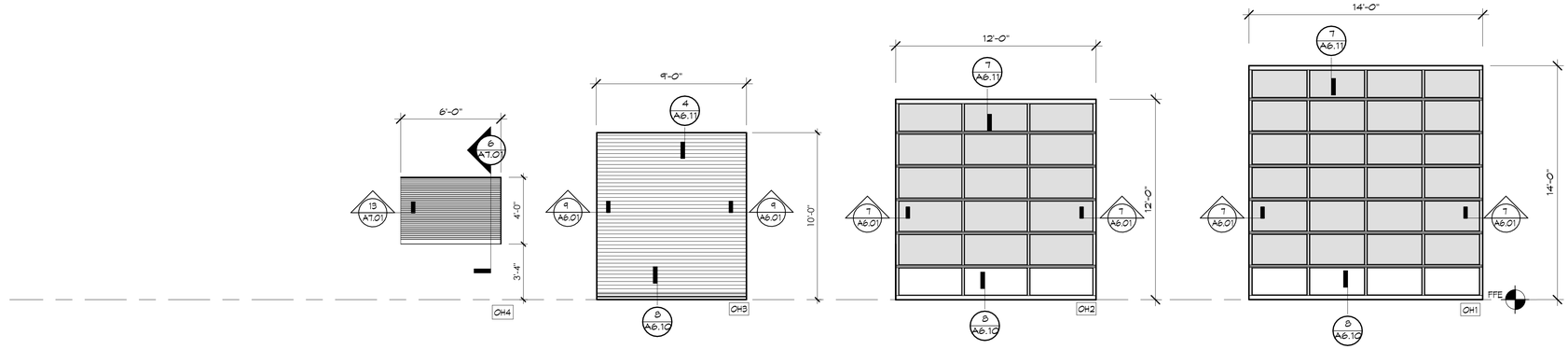

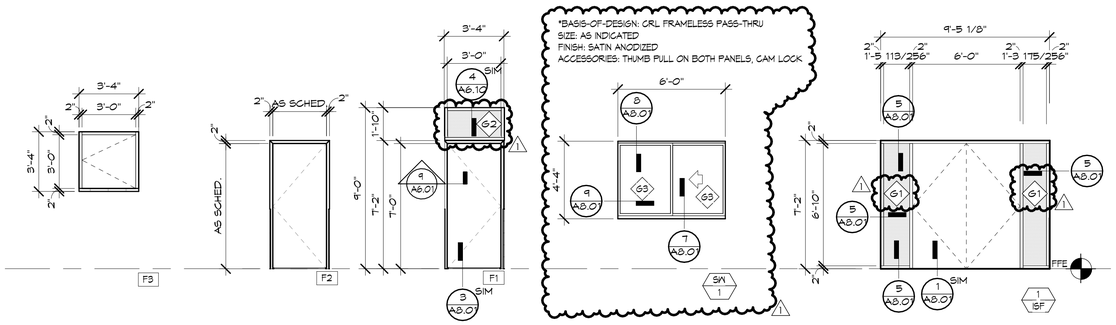

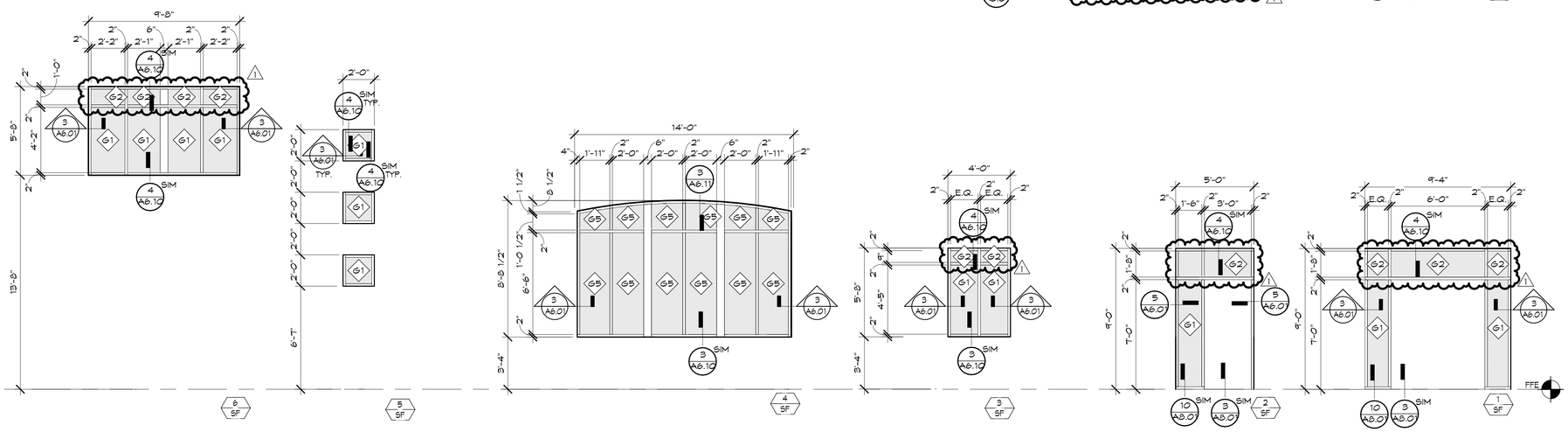

FRAME TYPE 1
1/4" = 1'-0"

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SHEET NAME & NUMBER

DOOR TYPES & FRAME ELEVATION

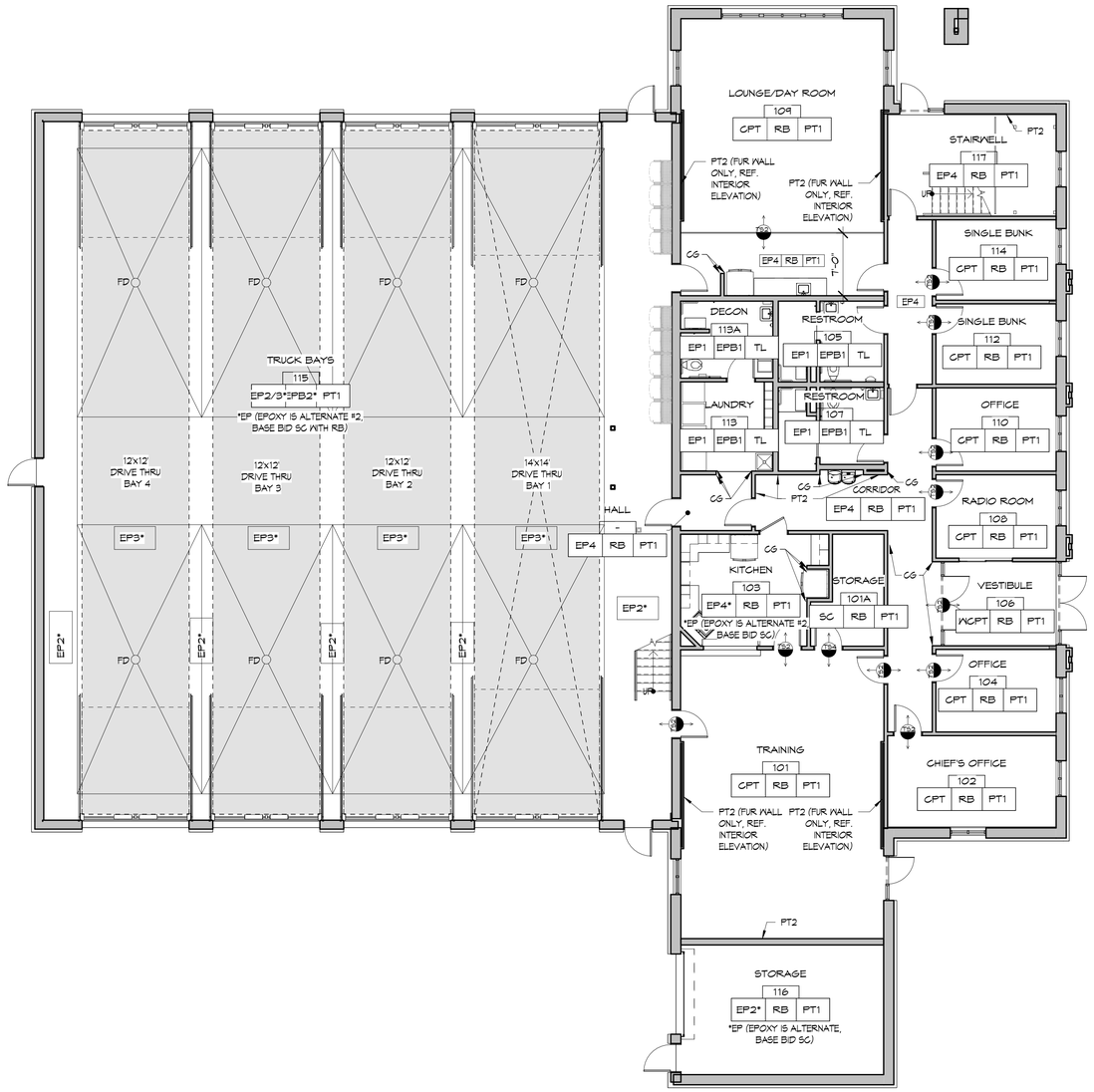
A8.02

FINISH SCHEDULE

	TAG	FINISH TYPE	MANUFACTURER	STYLE/COLOR	ALTERNATE MANUFACTURERS	REMARKS
FLOOR	CPT	CARPET TILE	MOHAWK GROUP	COLLECTION: EMERGING DIRECTIONS STYLE NAME: LINEAR EFFECT 815B9 COLOR: ARCH TO SELECT FROM FULL RANGE	MANNINGTON COMMERCIAL, INTERFACE	VERTICAL ASHLAR LAYMENT PATTERN
	WCPT	WALK OFF CARPET TILE	MOHAWK GROUP	COLLECTION: STEP UP II COLOR: COBALT SIZE: 24"X24"	MANNINGTON COMMERCIAL, INTERFACE	
	EP1	EPOXY 1	TRISOLUTIONS	COLLECTION: SOY STEP COLOR: SP 262 GRAY	STONHARD, LATICRETE	TROWEL APPLIED EPOXY
	EP2	EPOXY 2	TRISOLUTIONS	FLOW RESIN, BY KEY RESIN CO. COLOR: ARCH. TO SELECT FROM STANDARD COLOR RANGE.	STONHARD, LATICRETE	INCLUDE IN ALTERANTE #2. BASE BID TO BE SC.
	EP3	EPOXY 3	TRISOLUTIONS	FLOW RESIN, BY KEY RESIN CO. COLOR: ARCH. TO SELECT FROM STANDARD COLOR RANGE.	STONHARD, LATICRETE	INCLUDE IN ALTERANTE #2. BASE BID TO BE SC.
	EP4	EPOXY 1	TRISOLUTIONS	FULL BROADCAST, 1/8" FLAKE W/ POLYASPARTIC TOP COAT BY TIRSOLUTIONS COLOR: ARCH. TO SELECT FROM FULL STANDARD COLOR RANGE. BROADCAST - ARCH TO SELECT FROM FULL RANGE	STONHARD, KEY RESIN CO	BROADCAST APPLIED EPOXY INCLUDE IN ALTERANTE #2. BASE BID TO BE SC
	SC	SEALED CONCRETE				
	SV	SHEET VINYL	MOHAWK	COLLECTION: EPHEMERAL II C2056 COLOR: ARCH TO SELECT FROM FULL RANGE	MANNINGTON COMMERICAL, INTERFACE	
WALL	T1	WALL TILE	DALTILE	COLLECTION: COVE CREEK COLOR: GRAY CC10 SIZE: 10 X 14	CAESAR, TILE BAR	RUNNING BOND, LONG SIDE RUN HORIZONTALLY, GROUT: MAPEI OR EQUAL ARCH TO SELECT FROM FULL RANGE, USE LARGE FORMAT TILE GROUT
	T2	ACCENT BAND TILE	DALTILE	COLLECTION: CURRANT LATTICE WEAVE COLOR: SH17 SIZE: 1X3	CAESAR, TILE BAR	GROUT: MAPEI OR EQUAL ARCH TO SELECT FROM FULL RANGE.
	T3	ACCENT TILE	DALTILE	COLLECTION: COVE CREEK COLOR: GRAY CC10 SIZE:2X2 MOSAIC		STACK BOND, GROUT: MAPEI OR EQUAL ARCH TO SELECT FROM FULL RANGE.
	PT1	PAINT	SHERWIN WILLIAMS	NATURAL CHOICE - SW7011	BENJAMINE MOORE, VALSPAR	PRIMARY PAINT IN ALL LOCATIONS, UNO ALL PAINT IN WET LOCATIONS, USE EPOXY FINISH
	PT2	PAINT	SHERWIN WILLIAMS	SENSUOUS GRAY SW 7081	BENJAMINE MOORE, VALSPAR	
	PT3	PAINT	SHERWIN WILLIAMS	PRIMER: PRO INDUSTRIAL PRO-CRYL UNIVERSAL PRIMER B66-1300 SERIES. INTERMEDIATE & FINISH COAT : PRO INDUSTRIAL ACROLON 100, WATERBASED URETHANE HIGH GLOSS	BENJAMINE MOORE, VALSPAR	STAIRS HANDRAIL PAINT- COLOR TO BE SELECTED BY ARCH. FROM FULL RANGE
	PT4	PAINT	SHERWIN WILLIAMS	NATURAL CHOICE - SW7011	BENJAMINE MOORE, VALSPAR	REQUIRES MIN. 2 COATS OF BLOCK FILLER PRIMER
BASE	RB1	RUBBER BASE	JOHNSONITE	63 BURNT UMBER	ROPPE, MOHAWK	INSTALLED THROUGHOUT SCOPE AREA, UNO
	EPB1	EPOXY BASE	TRISOLUTIONS	COLLECTION: SOY STEP COLOR: SP 626 GRAY	STONHARD, LATICRETE	INTEGRAL BASE W/ S.S. TOP TRIM. BASE TO BE MIN. 4". TOP OF BASE TO BE LEVEL, HEIGHT OF BASE TO VARY WITH SLOPE OF FLOOR
	EPB2	EPOXY BASE	TRISOLUTIONS	COLLECTION: BROADCAST EPOXY COLOR: MANUF. FULL RANGE	STONHARD, LATICRETE	*INCLUDE IN ALTERANTE #2. INTEGRAL BASE W/ S.S. TOP TRIM.
	CTB	TILE BASE	DALTILE	COLLECTION: COVE CREEK COLOR: GRAY CC10 SIZE: 10 X 14	STONEPEAK, TILE BAR	
CASEWORK	PLAM	PLASTIC LAMINATE	FORMICA	AGED ASH	WILSON ART, PANOLAM	
	QZ	QUARTZ	HANSTONE	DRIFT BA271	CORIAN, CAMBRIA	COUNTERS
CEILING	ACT1	ACOUSTICAL CEILING TILE	USG	STYLE: RADAR SIZE: 2'X2', EDGE SQ COLOR: WHITE	ARMSTRONG, CERTAINTEED	USE COORDINATING GRID DONN 15/16 SUSPENSION. INSTALL SOUND BATTS OVER CEILING
	ACT2	ACOUSTICAL CEILING TILE	USG	STYLE: CLIMAPLUS PERFORMACE, KITCHEN LAY-IN PANEL SIZE: 2'X2', EDGE SQ COLOR: WHITE, WASHABLE SURFACE	ARMSTRONG, CERTAINTEED	USE COORDINATING GRID DONN 15/16 SUSPENSION. INSTALL SOUND BATTS OVER CEILING (R-11)
	PGB	PAINTED GYPSUM BOARD	SHERWIN WILLIAMS	HIGH REFLECTIVE WHITE SW 7757	BENJAMINE MOORE, VALSPAR	FOR USE ON HORIZONTAL SURFACES OF GYP. BD. CEILINGS AND BULKHEADS, UNO
	TMP	DURABLE ACOUSTIC PANEL	ARMSTRONG	TECTUM - DIRECT ATTACH COLOR: FACTORY PRIMED, FIELD PAINT - ARCH TO SELECT FROM FULL RANGE SIZE: 4'X4'	USG, CERTAINTEED	
OTHER	CG	S.S. CORNER GUARDS	SCHLUTER OR EQUAL MANUFACTURER			
	TS-1	TRANSITION STRIP	MATCH TO RUBBER BASE MANUFACTURER		LATICRETE, KUBERTI	ADA COMPLIANT
	TS-2	MARBLE THRESHOLD	HANSTONE			
	TS-3	TRANSITION STRIP	MATCH TO RUBBER BASE MANUFACTURER		LATICRETE, KUBERTI	ADA COMPLIANT

GENERAL FINISH NOTES

1. ALL CORNER GUARDS SHALL BE INSTALLED IN OUTSIDE GYPSUM BOARD WALL CORNERS.
2. ALL TILE CORNERS SHALL HAVE A STAINLESS STEEL GUARDS (NOTED IN FINISH SCHEDULE.
3. SEE INTERIOR ELEVATIONS FOR SPECIFIC TILE LOCATIONS, TYPES, AND OTHER MATERIALS NOT NOTED ON FINISH PLAN.
4. LOUVERS, VENTS, GRILLES, AND OTHER MISCELLANEOUS MECHANICAL AND ELECTRICAL DEVICES SHALL BE PAINTED TO MATCH SURFACE WHICH THEY APPEAR, UNLESS OTHERWISE NOTED.
5. CONTRACTOR IS RESPONSIBLE FOR MAKING SMOOTH, FLAT JOINTS BETWEEN TRANSITION OF DIFFERENT FLOORING MATERIALS.
6. FLOOR FINISHES SHALL CHANGE UNDER CENTERLINE OF DOOR UNLESS NOTED OTHERWISE.
7. SEE A4.00 FOR TYP. MOUNTING HEIGHTS, DETAILS, & SIGN TYPES.
8. S.S. CORNER GUARDS TO BE 42" AFF, ON ALL OUTSIDE GYP. BOARD WALL CORNERS, AND AS NOTED IN FINISH PLANS.
9. ALL OUTSIDE CORNERS OR CHANGING OF MATERIAL TO HAVE S.S. TRIM EDGING.



FIRST FLOOR FINISH PLAN (1)

1/8" = 1'-0"

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ALBRECHT W. WAHORN REGISTERED ARCHITECT 11208 NORTH CAROLINA GREENVILLE, NC

06/02/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM #2	06/02/2025

DRAWN BY: OWP
PROJECT #: 24008
ISSUE DATE: 04/30/2025

PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
FINISH PLAN & SCHEDULE

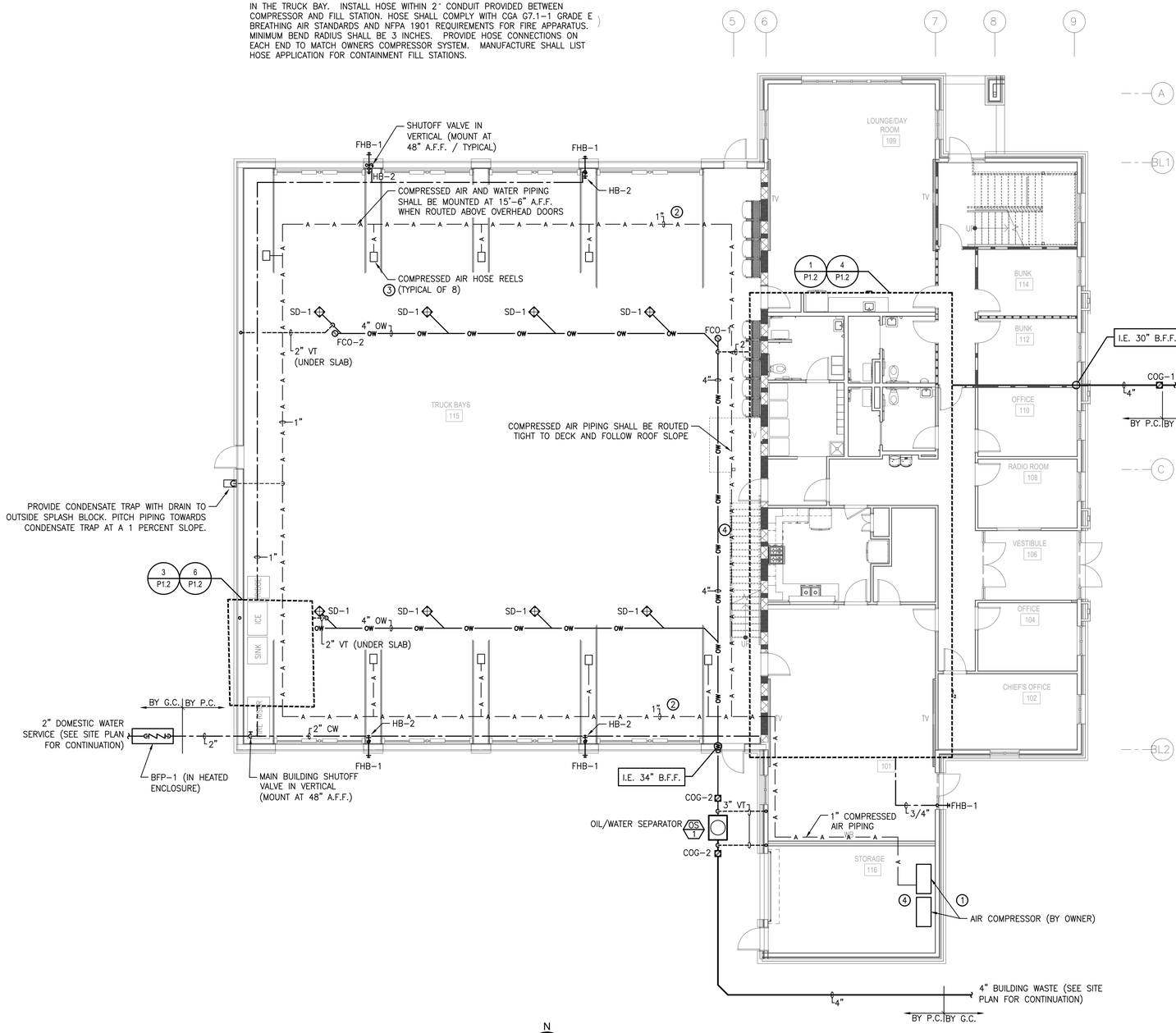
A9.00

INSTALLATION KEYED NOTES "#":

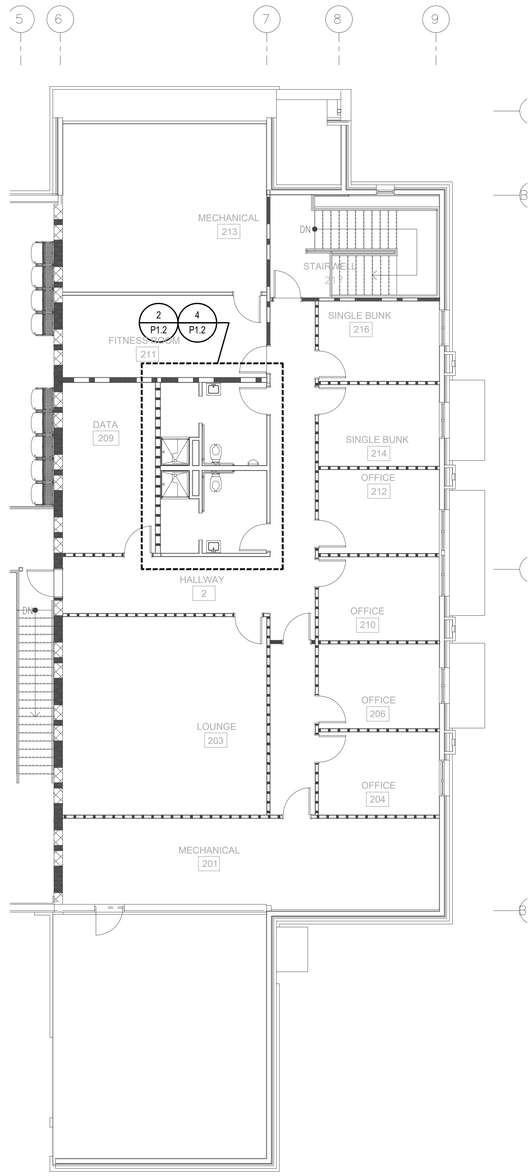
1. PROVIDE FLEXIBLE PIPE CONNECTION TO OWNER FURNISHED AIR COMPRESSOR. VERIFY SIZE.
2. PROVIDE 1 1/4" COMPRESSED AIR LOOP. PITCH PIPING TOWARDS CONDENSATE TRAPS AT 1 PERCENT DROP.
3. PROVIDE COMPRESSED AIR HOSE REEL EQUAL TO REELCRAFT MODEL 83050-0;P WITH 75 FEET OF 3/4" HOSE (250 PSI RATED). COORDINATE HOSE REEL MOUNTING WITH ELECTRICAL DEVICES. PROVIDE SLOTTED CHANNEL SUPPORTS FROM ROOF BEAMS.
4. PROVIDE A 1/4" HIGH PRESSURE (7,000PSI MAXIMUM OPERATING PRESSURE) HOSE FROM THE SCBA COMPRESSOR TO THE TANK CASCADE SYSTEM UNDER THE STAIRS IN THE TRUCK BAY. INSTALL HOSE WITHIN 2" CONDUIT PROVIDED BETWEEN COMPRESSOR AND FILL STATION. HOSE SHALL COMPLY WITH CGA G7.1-1 GRADE E BREATHING AIR STANDARDS AND NFPA 1901 REQUIREMENTS FOR FIRE APPARATUS. MINIMUM BEND RADIUS SHALL BE 3 INCHES. PROVIDE HOSE CONNECTIONS ON EACH END TO MATCH OWNERS COMPRESSOR SYSTEM. MANUFACTURE SHALL LIST HOSE APPLICATION FOR CONTAINMENT FILL STATIONS.

GENERAL NOTE:

1. ENTIRE FLOOR/CEILING ASSEMBLY IS 1-HOUR FIRE RATED. REFERENCE ARCHITECTURAL DRAWINGS.



1 PLUMBING OVERALL PIPING PLAN - 1ST FLOOR
SCALE: 1/8" = 1'-0"



2 PLUMBING OVERALL PIPING PLAN - 2ND FLOOR
SCALE: 1/8" = 1'-0"

FIRE RATING LEGEND
1 - HR FIRE BARRIER
0.5 - HR FIRE PARTITION

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PROJECT NO. 224010 | PROJECT MGR. D. HAM | DRAWN BY D. HILL

NORTH CAROLINA PROFESSIONAL SEAL 31466 ENGINEER JAMES D. HAM
6/2/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	6/2/2025

DRAWN BY: DEH
PROJECT #: 24008
ISSUE DATE: 04/30/2025
PHASE: CONSTRUCTION DOCUMENTS
SHEET NAME & NUMBER
PLUMBING PLANS

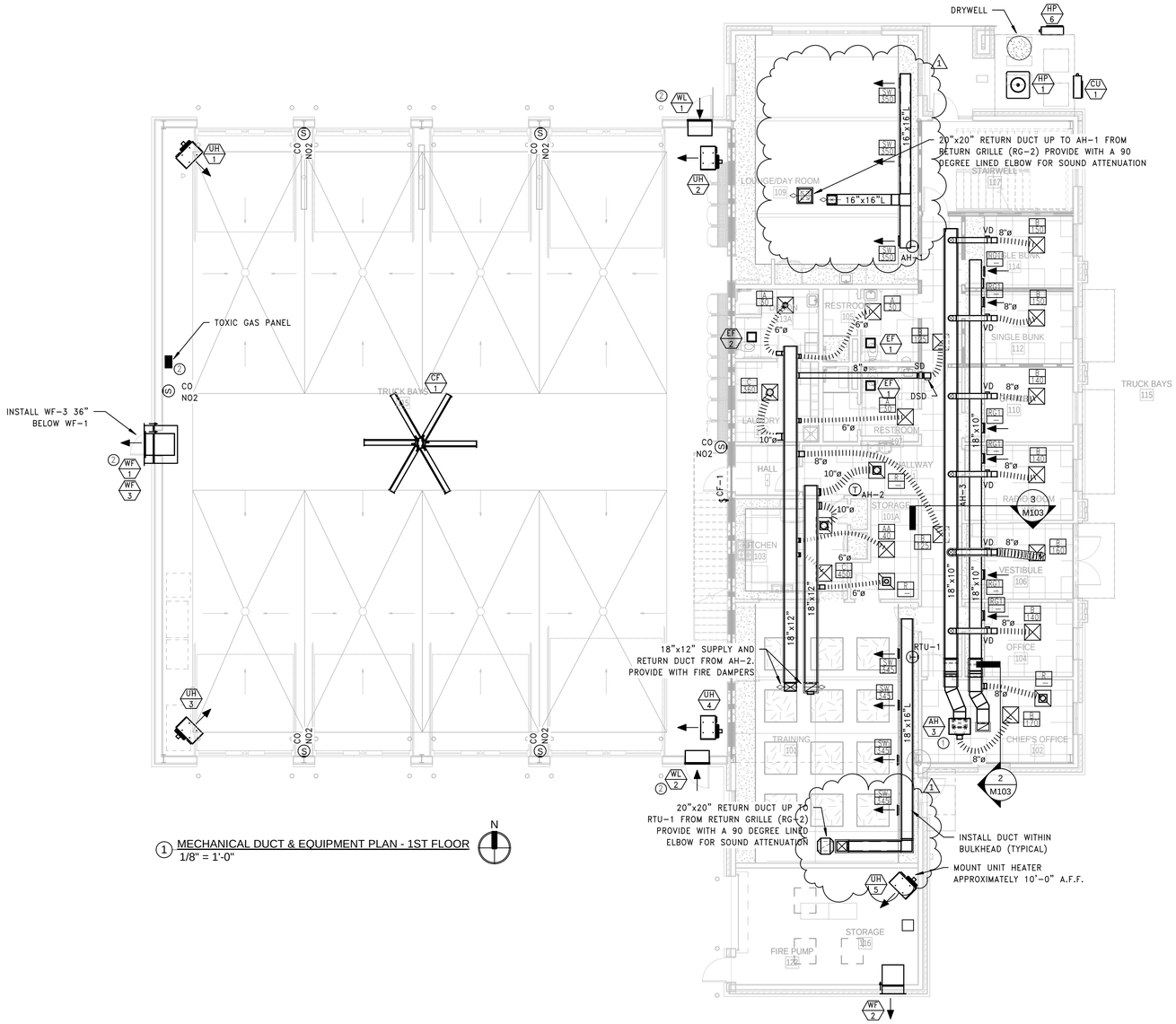
P1.01

INSTALLATION KEYED NOTES:

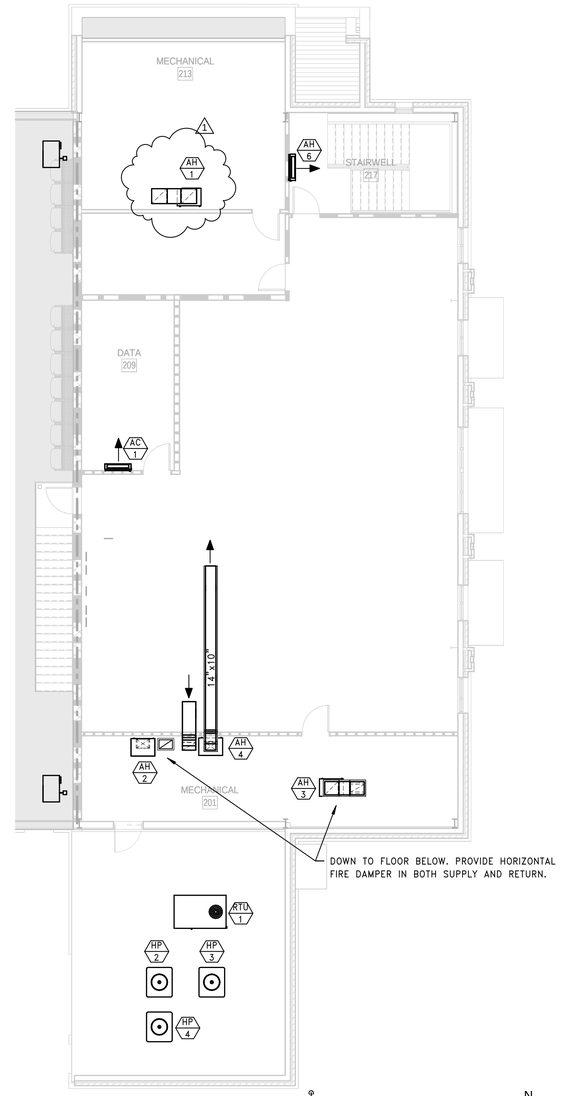
1. INSTALL AH-3 DUCT ABOVE CEILING IN ROOM 102 TIGHT TO FLOOR JOIST. PROVIDE 45 DEGREE TRANSITIONS TO ALLOW FOR ELEVATION CHANGE (SEE SECTION VIEW). RETURN DUCT NORTH OF OFFICE 102 SHALL BE LOCATED WITHIN BULKHEAD.
2. WALL LOUVERS & EXHAUST FAN (EF-1) CONTROLLED BY TOXIC GAS PANEL. WALL FAN (WF-3) CONTROLLED BY WALL SWITCH.

GENERAL NOTES:

1. ENTIRE FLOOR/CEILING ASSEMBLY IS 1-HOUR FIRE RATED. REFERENCE ARCHITECTURAL DRAWINGS.
2. EXPOSED DUCT SHALL BE PAINTED TO MATCH ARCHITECTURAL CEILING. COORDINATE COLOR SELECTION WITH ARCHITECT PRIOR TO PAINTING.



1 MECHANICAL DUCT & EQUIPMENT PLAN - 1ST FLOOR
1/8" = 1'-0"



2 MECHANICAL DUCT & EQUIPMENT PLAN - 2ND FLOOR (BASE BID)
1/8" = 1'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 31466 ENGINEER JAMES D. HAM 6/2/2025

REVISIONS:

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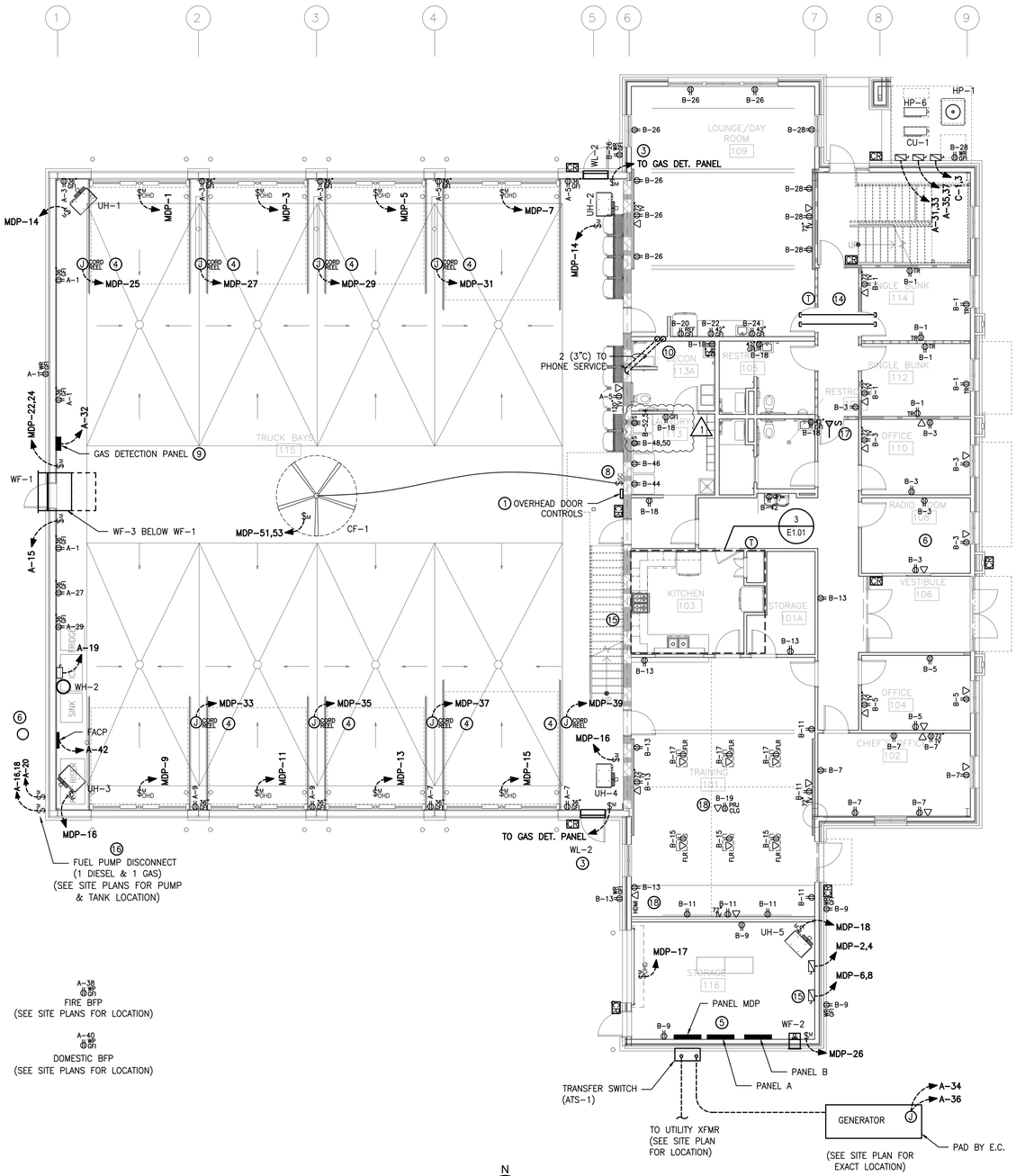
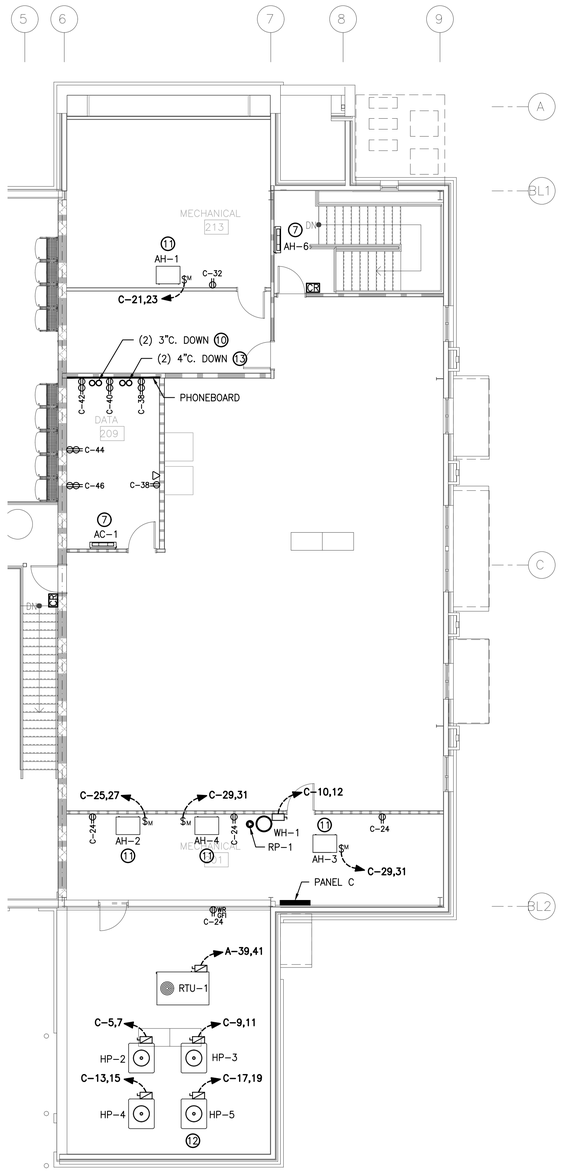
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
MECHANICAL DUCT & EQUIPMENT PLAN

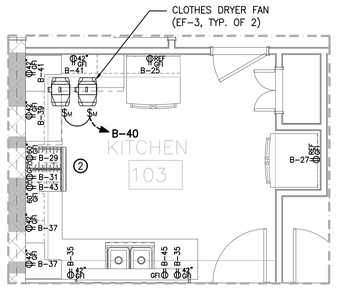
M101



1 ELECTRICAL POWER AND RECEPTACLE PLAN - FIRST FLOOR (BASE BID)
SCALE: 1/8" = 1'-0"



2 ELECTRICAL POWER AND RECEPTACLE PLAN - MEZANINE (BASE BID)
SCALE: 1/8" = 1'-0"



3 ELECTRICAL POWER PLAN - ENLARGED KITCHEN
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. COORDINATE ALL FINAL TV LOCATIONS WITH OWNER PRIOR TO ROUGH-IN.
2. FLOOR/CEILING ASSEMBLY IS 1-HR FIRE RATED, REFERENCE ARCHITECT DRAWINGS.
3. ALL EXPOSED CONDUIT SHALL BE PAINTED. COORDINATE COLOR SELECTION WITH ARCHITECT.

INSTALLATION KEYED NOTES "(#)":

1. INSTALL THE EIGHT DOOR CONTROLLERS IN TWO ROWS OF FOUR TO SAVE WALL SPACE. PROVIDE 1/2"C. WITH CONTROL WIRES TO EACH DOOR CONTROLLER. PROVIDE ALL REQUIRED CONTROL WIRING AND RACEWAY FOR MOTION SENSORS, ETC. PER MANUFACTURE'S INSTALLATION DOCUMENTS. NOTE DOOR CONTROLS INSTALLED AT (2) LOCATIONS.
2. PROVIDE RACEWAY AND WIRING FOR RANGE HOOD ADA CONTROLS INSTALLED ABOVE COUNTERTOP.
3. PROVIDE 2#14 & 1#14G IN 3/4"C FROM LOUVER TO GAS DETECTION PANEL. PROVIDE DISCONNECT NEXT TO LOUVER MOTOR. 120V POWER FOR LOUVER SHALL COME FROM SAME CIRCUIT AS GAS DETECTION PANEL. GAS DETECTION PANEL HAS A RELAY FOR DAMPER CONTROL.
4. PROVIDE AND INSTALL ELECTRIC CORD REELS MODEL: REELCRAFT L 4545 123 3A OR EQUAL REEL SHALL HAVE 5-20R PLUG. COORDINATE FINAL LOCATION OF CORD REELS WITH OWNER.
5. PROVIDE (3) SPARE 1"C FROM PANEL A TO EXTERIOR OF BUILDING. RACEWAYS SHALL BE ROUTED DOWN FROM PANEL AND INTO BUILDING SLAB, THROUGH FOOTING AND CAPPED UNDERGROUND.
6. PROVIDE 2"C. FROM RADIO TO RELOCATED ANTENNA. INSTALLATION OF ANTENNA BY OTHERS. COORDINATE WITH OWNER FOR FINAL LOCATION OF RADIO WITHIN ROOM. PROVIDE WIRING FROM RADIO TO ANTENNA.
7. LOW VOLTAGE POWER WIRING BY M.C.. WALL MOUNTED DUCTLESS UNIT RECEIVES POWER FROM OUTDOOR UNIT AS SCHEDULED.
8. PROVIDE 1"C FROM CONTROLLER TO NEAR CEILING JOIST FOR CONTROL WIRING TO HVLS FAN (CF-1).
9. REFERENCE MECHANICAL DRAWINGS FOR WIRING REQUIREMENTS OF GAS DETECTION SYSTEM. PROVIDE WIRING AND RACEWAYS FOR SENSORS, ALARM STROBE/HORN, AND FAN/DAMPER CONTROL.
10. SHIFT PHONE CONDUITS OUT OF FIRST FLOOR WALL ABOVE CEILING TO ENTER DATA ROOM FLOOR 3" FROM WALL.
11. WIRE CONDENSATE PUMP FROM NEAREST RECEPTACLE CIRCUIT.
12. PROVIDE HP-5 AND AH-5 UNDER ALTERNATE BID.
13. PROVIDE TWO 4" CONDUITS FROM 12 INCHES ABOVE DATA ROOM FLOOR TO LOUNGE/DAY ROOM. THESE RACEWAYS SHALL BE USED FOR CABLE ACCESS FROM FIRST FLOOR TO SECOND FLOOR DATA ROOM.
14. PROVIDE TWO 4" CONDUITS FROM LOUNGE/DAY ROOM TO BUNK 114 FOR DATA CABLE ACCESS.
15. PROVIDE 2" SCH. 40 UNDERGROUND CONDUIT FROM SCBA COMPRESSOR TO AIR BOTTLE CASCADE SYSTEM UNDER STAIRS IN TRUCK BAYS FOR CONTAINMENT OF HIGH PRESSURE HOSE.
16. THE AREA AROUND THE FUEL TANK AND DISPENSING DEVICE ARE CLASS I LOCATIONS (SEE SHEET E4.02). THE OWNER'S STORAGE TANK WILL BE USED FOR GASOLINE. THE EMERGENCY SHUT-OFF DEVICE SHALL BE LOCATED OUTSIDE THIS ZONE, AT LEAST 20' BUT NO MORE THAN 100' FROM THE PUMP MOTOR (NEC 514.11(A)). COORDINATE LOCATION WITH SITE/CIVIL PLANS AND OWNER. INSTALL THE SHUT-OFF DEVICE AND DISCONNECTS ON THE SIDE OF THE BUILDING AND WIRE BACK TO THE SHUNT TRIP BREAKER. CLEARLY LABEL THE SHUT OFF DEVICE "FUEL SYSTEM EMERGENCY SHUTOFF" WITH WHITE LETTERS ON RED BACKGROUND. PROVIDE A LISTED CONDUIT SEAL AT EACH END OF THE RACEWAY. A SEAL SHALL BE PROVIDED AT THE PUMP AND ONE AT THE DISCONNECT. THE SEALING FITTING SHALL BE THE FIRST FITTING AFTER THE CONDUIT EMERGES FROM EARTH OR CONCRETE. RACEWAY INSTALLED UNDER CLASSIFIED AREA SHALL BE THREADED RGS OR IMC. SCHEDULE 80 PVC MAY BE INSTALLED IF UNDER 24 INCHES OF COVER. WHERE PVC IS USED, RGS SHALL BE USED FOR THE LAST 2 FEET OF THE UNDERGROUND RUN TO THE ABOVE GRADE RACEWAY. OWNER WILL PROVIDE A FUEL MANAGEMENT SYSTEM WHICH WILL INCLUDE A DIGITAL METER BETWEEN THE TANK AND PUMP. PROVIDE WIRING AND RACEWAYS AS REQUIRED BY MANUFACTURER.
17. WIRE SMOKE DAMPER MOTOR TO NEAREST RECEPTACLE CIRCUIT.
18. PROVIDE 2"C. FROM PROJECTOR LOCATION TO WALL BOX. PROVIDE BOX EQUAL TO HUBBELL HRWB25. COVER COLOR SELECTED BY ARCHITECT. PROVIDE HDMI CABLE BETWEEN WALL BOX AND PROJECTOR. PROVIDE CAT 6 CABLE AT WALL BOX AND PROJECTOR LOCATION.

FIRE RATING LEGEND
1 - HR FIRE BARRIER
0.5 - HR FIRE PARTITION

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PROJECT NO. 224010 | PROJECT MGR. D. HAM | DRAWN BY B. TRENT

NORTH CAROLINA PROFESSIONAL SEAL 31466 ENGINEER JAMES D. HAM
6/2/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	6/2/2025

DRAWN BY: DEH
PROJECT #: 24008
ISSUE DATE: 04/30/2025
PHASE: CONSTRUCTION DOCUMENTS
SHEET NAME & NUMBER
ELECTRICAL PLANS

E1.01

SERVICE LOAD SUMMARY

OCCUPANCY TYPE – MIXED			BUILDING AREA – 15,180 SQUARE FEET		
CONTINUOUS LOAD DESCRIPTION	LOAD (KVA)	NEC REFERENCE	DEMAND FACTOR	NEC REFERENCE	LOAD (KVA)
INDOOR LIGHTING (1.3 W/SF)	19.7	TABLE 220.12	100%	TABLE 220.42	19.7
OUTDOOR LIGHTING	1.0	--	100%	--	1.0
SIGN LIGHTING	1.2	220.14 F	100%	--	1.2
ELECTRIC UNIT HEATERS	6.6	ARTICLE 440	100%	--	6.6
AIR HANDLER FANS (SPLIT SYSTEMS)	6.0	ARTICLE 440	100%	--	6.0
AIR HANDLER ELECTRIC HEAT	28.0	422.12	100%	--	28.0
HVAC OUTDOOR UNIT	17.9	ARTICLE 440	100%	--	17.9
EXHAUST FANS & WALL FANS	2.0	ARTICLE 440	100%	--	2.0
WATER HEATERS	7.5	422.13	100%	--	7.5
SUBTOTAL CONTINUOUS LOADS					89.9
				230.42 A 1	x 125%
				CONT. LOAD TOTAL	112.4
NON CONTINUOUS LOAD DESCRIPTION					
RECEPTACLES UP TO 10 KVA	10.0	220.14 1	100% OF 1st 10 KVA		10.0
RECEPTACLES OVER 10 KVA	19.0	220.14 1	50% ABOVE 10 KVA		9.5
KITCHEN EQUIPMENT	13.8	--	x 70% DIVERSITY FOR 5 PCS OF EQUIP	TABLE 220.56	9.7
WASHER/EXTRACTOR	2.9	--	NONCONTINUOUS LOAD x 100%		2.9
DRYERS	10.0	--	NONCONTINUOUS LOAD x 100%		10.0
MISC. LOADS	5.0	--	NONCONTINUOUS LOAD x 100%		5.0
AIR COMPRESSOR & SCBA	15.0	--	NONCONTINUOUS LOAD x 100%		15.0
TRUCK BAY DOORS	14.0	--	NONCONTINUOUS LOAD x 100%		14.0
SUBTOTAL NON-CONTINUOUS LOADS					76.1
TOTAL CONTINUOUS AND NON-CONTINUOUS LOADS					188.4

FAULT CURRENT @ TRANSFORMER SECONDARY TERMINALS		SERVICE LOAD		
167 KVA (X-FORMER) / 0.240 x 1.7 %Z	= 40,900 AMPS	188 KVA / 0.240	=	783 AMPS

PACKAGE GENERATOR SYSTEM SCHEDULE

MARK	VOLTS/PH	KW RATING	FIRE DEPT. BREAKER	MUNICIPAL BREAKER	RATING	FUEL TYPE	TANK SIZE
MG-1	120/240 1ø	300 KW	800A	600A	STANDBY	DIESEL	42 HOUR

1

NOTES:

1. PROVIDE THE FOLLOWING OPTIONS AND ACCESSORIES:
   - ALTERNATOR SHALL BE PROTECTED PER THE REQUIREMENTS OF NFPA 70 SECTION 445.12
   - THE GENERATOR SET SHALL BE PROVIDED WITH AN OVERCURRENT PROTECTIVE DEVICE THAT IS COORDINATED WITH THE ALTERNATOR TO PREVENT DAMAGE ON ANY POSSIBLE OVERLOAD OR OVERCURRENT CONDITION EXTERNAL TO THE MACHINE. THE PROTECTIVE DEVICE SHALL BE LISTED AS A UTILITY GRADE PROTECTIVE DEVICE UNDER UL CATEGORY NRGU
   - PERMANENT MAGNET EXCITATION
   - MIN. 10 AMP BATTERY CHARGER, AUTOMATIC, SOLID-STATE, CURRENT LIMITING, FLOAT/EQUALIZING CHARGER WITH 4-STATE CHARGING ALGORITHM, 120-VOLT INPUT, OVERLOAD PROTECTION, D.C. AMMETER, D.C. VOLTMETER, LOW D.C. VOLTAGE ALARM RELAY, AND BE NCBCC APPROVED THIRD-PARTY LISTED AND LABELED.
   - CLASS H INSULATION (150 DEG C.)
   - SYNCHRONOUS, FOUR POLE, WITH 2/3 PITCH WINDING.
   - DUAL WALL SUB-BASE FUEL TANK, UL142 LISTED AND LABELED
   - MICROPROCESSOR-BASED CONTROL FOR AUTOMATIC STARTING, MONITORING, AND CONTROL FUNCTIONS
   - CONTROL SHALL ALLOW FOR REMOTE MONITORING
   - **PROVIDE REMOTE SHUTDOWN BUTTON LOCATED ON EXTERIOR OF FIRE DEPARTMENT BUILDING.**
   - DIGITAL METERING SET, 100% ACCURACY, TO INDICATE RMS VOLTAGE AND CURRENT, FREQUENCY, OUTPUT KW, OUTPUT KVA, AND POWER FACTOR
   - TWO CIRCUIT BREAKERS PROVIDED WITH LOCKOUT KITS.
   - OUTDOOR WEATHER-PROTECTIVE AND LEVEL 2 SOUND ATTENUATED ENCLOSURE , NOT TO EXCEED 75dB @ 23 FEET FROM ENCLOSURE. ENCLOSURE SHALL BE RATED FOR ASCE/SEI 7 WIND LOAD OF 140MPH.
   - THE ENGINE-GENERATOR ASSEMBLY SHALL BE FASTENED TO A WELDED STEEL BASE WHICH SHALL ALLOW MOUNTING TO A RAISED CONCRETE PAD OR THE SUB-BASE FUEL TANK. ANCHOR BOLTS AND VIBRATION ISOLATORS SHALL BE USED TO MOUNT THE HEAVY STEEL BASE TO THE CONCRETE PAD. VIBRATION ISOLATORS, EITHER INTEGRAL OR EXTERNAL, SHALL BE PROVIDED AND INSTALLED AS RECOMMENDED BY THE MANUFACTURER. VIBRATION ISOLATORS SHALL BE ONE-PIECE UNITS, RESISTANT TO CORROSION AND ENVIRONMENTAL DEGRADATION. WHEN SUB-BASE TANKS ARE SPECIFIED, VIBRATION ISOLATORS SHALL BE LOCATED BETWEEN THE GENERATOR SET AND THE FUEL TANK
   - A THERMOSTATICALLY CONTROLLED, IMMERSION TYPE ENGINE COOLANT HEATER SHALL BE PROVIDED. MINIMUM COOLANT TEMPERATURE SHALL NOT BE LESS THAN 120 DEGREES F. EACH HEATER SHALL BE PROVIDED WITH CONTACTOR IN A RATED NEMA ENCLOSURE. HEATER(S) SHALL NOT OPERATE WHILE THE ENGINE IS RUNNING.
   - 120 VAC GFCI DUPLEX RECEPTACLE
   - AC/DC INTERIOR LED LIGHTING KIT WITH BACK-UP POWER FROM GENERATOR BATTERY
   - ISO 8528 RATED
   - 5 YEAR COMPREHENSIVE WARRANTY
   - UL2200 LISTED FOR STATIONARY ENGINE GENERATOR ASSEMBLY.

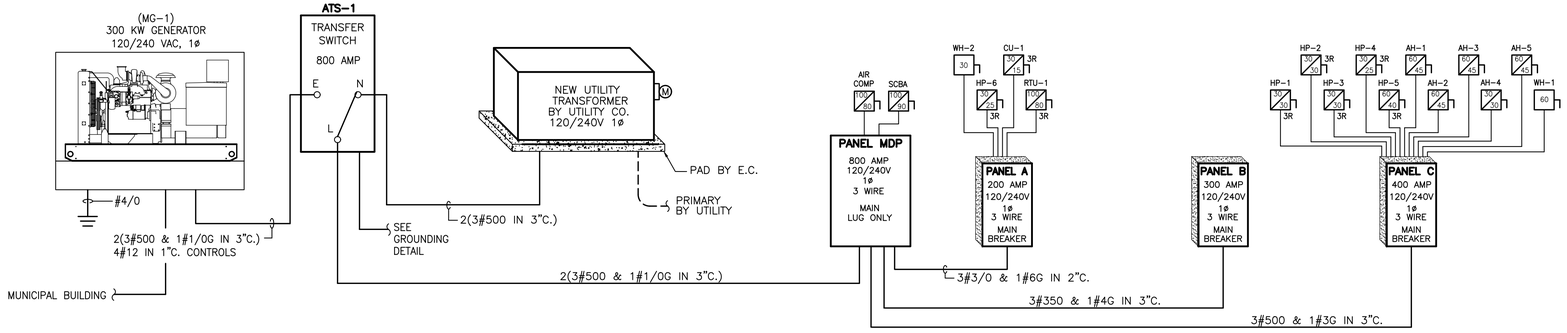
AUTOMATIC TRANSFER SWITCH SCHEDULE

MARK	TRANSITION TYPE	VOLTS/PH/WIRES	RATING	ENCLOSURE	S.C. WITHSTAND	NO. POLES	S.E. RATED
ATS-1	DELAYED TRANSITION	120/240 1ø 3W	800A	NEMA 3R	65 kAIC	3	YES

1

NOTES:

1. PROVIDE THE FOLLOWING OPTIONS AND ACCESSORIES:
   - MICROPROCESSOR BASED CONTROLLER
   - 3 POSITION CONTACTOR
   - UL1008 LISTED
   - GENERATOR AND UTILITY UNDER VOLTAGE CONTROL SETPOINT
   - UTILITY RETURN TIMER
   - ENGINE START CONTACT
   - SHORT CIRCUIT RATING BASED ON ANY UPSTREAM BREAKER
   - 5 YEAR WARRANTY



1 ELECTRICAL RISER
SCALE: N.T.S.

NOTE: E.C. SHALL PROVIDE ALTERNATE PRICING FOR OWNER FURNISHED GENERATOR AND TRANSFER SWITCH, E.C. INSTALLED; VERSES ALL E.C. PROVIDED.

PANELBOARD SCHEDULE

PANEL MDP	SURFACE MOUNTED							800 AMP (FEEDER SIZE)			1ø, 3 WIRE
MAIN LUG ONLY	BOTTOM FEED				42K AIC			120/240 VOLT			BOLT ON BREAKER
NEMA 1	COPPER BUS							800 AMP (BUS RATING)			SURGE PROTECTION
LOAD SERVED	WIRE SIZE	CONDUIT SIZE	LOAD A	LOAD B	CKT NO.	PHASE A	PHASE B	CKT NO.	LOAD A	LOAD B	CONDUIT SIZE	WIRE SIZE	LOAD SERVED
OVERHEAD DOOR	2#8 & 1#8G	3/4"	12		1	20	80	2	40		3/4"	2#8 & 1#8G	AIR COMPRESSOR ①
OVERHEAD DOOR	2#8 & 1#8G	3/4"		12	3	20	90	4		40			
OVERHEAD DOOR	2#8 & 1#8G	3/4"	12		5	20		6	50		3/4"	3#6 & 1#8G	SCBA COMPRESSOR ①
OVERHEAD DOOR	2#8 & 1#8G	3/4"		12	7	20		8		50			
OVERHEAD DOOR	2#10 & 1#10G	3/4"	12		9	20	20	10	–		–	–	SPARE
OVERHEAD DOOR	2#10 & 1#10G	3/4"		12	11	20		12		–	–	–	SPARE
OVERHEAD DOOR	2#10 & 1#10G	3/4"	12		13	20		14	10		–	2#10 & 1#10G	UH-1 & UH-2
OVERHEAD DOOR	2#12 & 1#12G	3/4"		12	15	20		16		10	–	2#10 & 1#10G	UH-3 & UH-4
OVERHEAD DOOR	2#12 & 1#12G	3/4"	12		17	20		18	4		–	2#12 & 1#12G	UH-5
SPARE	–	–		–	19	20		20		–	–	–	SPARE
SPARE	–	–	–		21	20	25	22	13		3/4"	2#10 & 1#10G	WF-1
SPARE	–	–		–	23	20		24		13			
② CORD REEL	2#10 & 1#10G	3/4"	3		25	20	20	26	2		3/4"	2#12 & 1#12G	WF-2
② CORD REEL	2#10 & 1#10G	3/4"		3	27	20		28		–	–	–	SPARE
② CORD REEL	2#10 & 1#10G	3/4"	3		29	20		30	–		–	–	SPARE
② CORD REEL	2#12 & 1#12G	3/4"		3	31	20		32		–	–	–	SPARE
② CORD REEL	2#12 & 1#12G	3/4"	3		33	20		34	–		–	–	SPARE
② CORD REEL	2#12 & 1#12G	3/4"		3	35	20		36		–	–	–	SPARE
② CORD REEL	2#12 & 1#12G	3/4"	3		37	20		38	–		–	–	SPARE
② CORD REEL	2#12 & 1#12G	3/4"		3	39	20		40		–	–	–	SPARE
SPARE	–	–	–		41	20	200	42	–		–	–	SPARE
SPARE	–	–		–	43	20		44		154	2"	3#3/0 & 1#6G	PANEL A
SPARE	–	–	–		45	20		46	152				
SPARE	–	–		–	47	20	300	48		191	3"	3#350 & 1#4G	PANEL B
SPARE	–	–	–		49	20		50	150				
CF-1	2#12 & 1#12G	3/4"		7	51	20	400	52		339	3"	3#500 & 1#3G	PANEL C
			7		53			54	331				

COORDINATE HVAC BREAKERS AND WIRE SIZES WITH HVAC SUBMITTALS.
COORDINATE BREAKERS, DISCONNECTS, AND WIRE SIZES FOR OWNER FURNISHED EQUIPMENT WITH SUBMITTALS.
PROVIDE SEPARATE NEUTRALS FOR ALL CIRCUITS.

① VERIFY AIR COMPRESSOR BREAKERS, DISCONNECTS, AND WIRE SIZES WITH OWNERS EQUIPMENT.

② PROVIDE WITH CLASS "A" (6mA) GFCI BREAKER IN ACCORDANCE WITH UL 489.

SURGE PROTECTION NOTES:

1. SURGE SUPPRESSION SHALL BE RATED AS FOLLOWS:
   - FACTORY INSTALLED AS AN INTEGRAL PART OF INDICATED PANELBOARDS, COMPLYING WITH UL 1449, 5TH EDITION, SPD TYPE 2
   - MINIMUM SINGLE-PULSE SURGE CURRENT WITH STAND RATING PER PHASE SHALL NOT BE LESS THAN 250kA FOR SERVICE ENTRANCE PANELS AND 150kA FOR SUB-PANELS. THE PEAK SURGE CURRENT RATING SHALL BE THE ARITHMETIC SUM OF THE RATINGS OF THE INDIVIDUAL MOVS IN A GIVEN MODE.
   - LET-THROUGH VOLTAGES BASED ON IEEE TEST WAVES SHALL BE CAT C1 (6KV, 3KA) 400V FOR 208V PANEL AND 800V FOR 480V PANELS.
   - PROTECTION MODES AND UL1449VPR SHALL BE: 700V LINE TO NEUTRAL, 700V LINE TO GROUND, 600V NEUTRAL TO GROUND, & 1000V LINE TO LINE.
   - SHORT CIRCUIT CURRENT RATING GREATER THAN PANELBOARD
   - INOMINAL RATING OF 20KA.

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NC LIC #: C-1132

PROJECT NO. 224010 | PROJECT MGR. D. HAM | DRAWN BY B. TRENT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 31466 JAMES D. HAM
9/5/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	6/2/2025

DRAWN BY: DEH
PROJECT #: 24008
ISSUE DATE: 04/30/2025

PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
ELECTRICAL SCHEDULES

E3.01

PANELBOARD SCHEDULE — PANEL A

PANEL A	SURFACE MOUNTED		200 AMP (FEEDER SIZE)	1ø, 3 WIRE
MAIN BREAKER	BOTTOM FEED	22K AIC *	120/240 VOLT	BOLT ON BREAKER
NEMA 1	COPPER BUS		200 AMP (BUS RATING)	SURGE PROTECTION

NOTE	LOAD SERVED	WIRE SIZE	CONDUIT SIZE	LOAD A	LOAD B	CKT NO.	PHASE (L)	PHASE (R)	CKT NO.	LOAD A	LOAD B	CONDUIT SIZE	WIRE SIZE	LOAD SERVED	NOTE
	TRUCK BAY RECEPT	2#8 & 1#8G	3/4"	5		1	20	20	2	12		3/4"	2#8 & 1#8G	BAY LIGHTS	
	TRUCK BAY RECEPT	2#8 & 1#8G	3/4"		5	3	20	20	4		12	3/4"	2#8 & 1#8G	BAY LIGHTS	
	TRUCK BAY RECEPT	2#8 & 1#8G	3/4"	3		5	20	20	6	–		–	–	SPARE	
	TRUCK BAY RECEPT	2#10 & 1#10G	3/4"		3	7	20	20	8		–	–	–	SPARE	
	TRUCK BAY RECEPT	2#10 & 1#10G	3/4"	3		9	20	20	10	–		–	–	SPARE	
	SPARE	–	–		–	11	20	20	12		–	–	–	SPARE	
	SPARE	–	–	–		13	20	20	14	–		–	–	SPARE	
	WF–3	2#12 & 1#12G	3/4"		3	15	20	20	16		5				
	SPARE	–	–	–		17	20		18	5		1"	2#8 & 1#8G	FUEL PUMP (SHUNT TRIP)	(4)
	WH–2	2#8 & 1#8G	3/4"		13	19	20	ST	20		–				
	SPARE	–	–	–		21	20	20	22	5		1"	2#8 & 1#8G	FUEL PUMP (SHUNT TRIP)	(4)
	SPARE	–	–		–	23	20	ST	24		–				
	SPARE	–	–	–		25	20	20	26	–		–	–	SPARE	
(1)	REFRIGERATOR	2#10 & 1#10G	3/4"		5	27	20	20	28		–	–	–	SPARE	
(1)	ICE MACHINE	2#10 & 1#10G	3/4"	5		29	20	20	30	–		–	–	SPARE	
	HP–6	2#8 & 1#8G	3/4"		16	31	25	20	32		2	3/4"	2#12 & 1#12G	GAS DET. PANEL	
				16		33		20	34	12		3/4"	2#12 & 1#12G	GEN HEAT	
	CU–1	2#8 & 1#8G	3/4"		12	35	15	20	36		2	3/4"	2#12 & 1#12G	GEN BATT	
				12		37		20	38	16		3/4"	2#8 & 1#12G	FIRE PROT BFP	(2)
	RTU–1	2#4 & 1#8G	1"		67	39	80	20	40		12	3/4"	2#12 & 1#12G	DOMESTIC BFP	(2)
				67		41		20	42	3		3/4"	2#12 & 1#12G	FACP	(3)

COORDINATE HVAC BREAKERS AND WIRE SIZES WITH HVAC SUBMITTALS.
COORDINATE BREAKERS, DISCONNECTS, AND WIRE SIZES FOR OWNER FURNISHED EQUIPMENT WITH SUBMITTALS.
PROVIDE SEPARATE NEUTRALS FOR ALL CIRCUITS.
* PROVIDE SERIES COMBINATION RATING WITH PANEL A BREAKER FOR 42KA.

(1) PROVIDE WITH CLASS "A" (6mA) GFCI BREAKER IN ACCORDANCE WITH UL 489.

(2) PROVIDE 30mA GFPE BREAKER FOR EQUIPMENT PROTECTION.

(3) PROVIDE WITH LOCKING BREAKER & IDENTIFY WITH A RED MARKING PER NFPA 72–10.6.5.2 (2013).

(4) COORDIANTE WITH OWNER FOR SIZE AND QUANTITY OF FUEL PUMPS.

	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
INDOOR LIGHTING	= 2.9	100%	= 2.9
OUTDOOR LIGHTING	= __	100%	= __
RECEPTACLES (1ST 10 KVA)	= 2.3	100%	= 2.3
RECEPTACLES (ABV 10 KVA)	= __	50%	= __
HVAC	= 23.2	100%	= 23.2
HVAC (NON–COINCIDENTAL)	= __	0%	= __
WATER HEATERS	= 1.6	100%	= 1.6
DEDICATED RECP/EQUIP	= 6.8	100%	= 6.8
TOTALS:	= 36.7 KVA		= 36.7 KVA

MINIMUM PANEL SIZE: 37 KVA X 125% = 46 KVA (111 AMPS)

GROSS PHASE TOTALS (AMPS) A = 164 B = 157

SURGE PROTECTION NOTES:

1. SURGE SUPPRESSION SHALL BE RATED AS FOLLOWS:
   - FACTORY INSTALLED AS AN INTEGRAL PART OF INDICATED PANELBOARDS, COMPLYING WITH UL 1449, 5TH EDITION, SPD TYPE 2
   - MINIMUM SINGLE–PULSE SURGE CURRENT WITH STAND RATING PER PHASE SHALL NOT BE LESS THAN 250kA FOR SERVICE ENTRANCE PANELS AND 150kA FOR SUB–PANELS. THE PEAK SURGE CURRENT RATING SHALL BE THE ARITHMETIC SUM OF THE RATINGS OF THE INDIVIDUAL MOVS IN A GIVEN MODE.
   - LET–THROUGH VOLTAGES BASED ON IEEE TEST WAVES SHALL BE CAT C1 (6KV, 3KA) 400V FOR 208V PANEL AND 800V FOR 480V PANELS.
   - PROTECTION MODES AND UL1449VPR SHALL BE: 700V LINE TO NEUTRAL, 700V LINE TO GROUND, 600V NEUTRAL TO GROUND, & 1000V LINE TO LINE.
   - SHORT CIRCUIT CURRENT RATING GREATER THAN PANELBOARD
   - INOMINAL RATING OF 20KA.

PANELBOARD SCHEDULE — PANEL B

PANEL B	SURFACE MOUNTED		300 AMP (FEEDER SIZE)	1ø, 3 WIRE
MAIN BREAKER	BOTTOM FEED	22K AIC *	120/240 VOLT	BOLT ON BREAKER
NEMA 1	COPPER BUS		400 AMP (BUS RATING)	SURGE PROTECTION

NOTE	LOAD SERVED	WIRE SIZE	CONDUIT SIZE	LOAD A	LOAD B	CKT NO.	PHASE (L)	PHASE (R)	CKT NO.	LOAD A	LOAD B	CONDUIT SIZE	WIRE SIZE	LOAD SERVED	NOTE
(2)	BUNK RECEPT	2#10 & 1#10G	3/4"	11		1	20	20	2	10		3/4"	2#12 & 1#12G	LIGHTS	
	OFFICE/RADIO RECEPT	2#10 & 1#10G	3/4"		11	3	20	20	4		5	3/4"	2#12 & 1#12G	LIGHTS	
	OFFICE RECEPT	2#10 & 1#10G	3/4"	6		5	20	20	6	9		3/4"	2#12 & 1#12G	LIGHTS	
	OFFICE RECEPT	2#10 & 1#10G	3/4"		9	7	20	20	8		7	3/4"	2#12 & 1#12G	EXTERIOR LIGHTS	(3)
	STORAGE RECEPT	2#12 & 1#12G	3/4"	6		9	20	20	10	1		3/4"	2#12 & 1#12G	FLAG LIGHTS	(3)
	TRAINING RECEPT	2#12 & 1#12G	3/4"		11	11	20	20	12		–	–	–	SPARE	
	TRAINING RECEPT	2#10 & 1#10G	3/4"	9		13	20	20	14	–		–	–	SPARE	
	TRAINING RECEPT	2#12 & 1#12G	3/4"		5	15	20	20	16		–	–	–	SPARE	
	TRAINING RECEPT	2#12 & 1#12G	3/4"	5		17	20	20	18	6		3/4"	2#10 & 1#10G	RESTROOMS	
	PROJECTOR	2#12 & 1#12G	3/4"		8	19	20	20	20		5	3/4"	2#10 & 1#10G	REFRIGERATOR	(1)
	SPARE	–	–	–		21	20	20	22	12		3/4"	2#10 & 1#10G	LOUNGE RECEPT	
	SPARE	–	–		–	23	20	20	24		12	3/4"	2#10 & 1#10G	LOUNGE RECEPT	
(1)	REFRIGERATOR	2#12 & 1#12G	3/4"	5		25	20	20	26	10		3/4"	2#8 & 1#8G	LOUNGE RECEPT	
(1)	REFRIGERATOR	2#12 & 1#12G	3/4"		5	27	20	20	28		6	3/4"	2#10 & 1#10G	LOUNGE RECEPT	
	STOVE/HOOD	2#12 & 1#12G	3/4"	8		29	20	20	30	–		–	–	SPARE	
	STOVE	2#12 & 1#12G	3/4"		1	31	20	20	32		–	–	–	SPARE	
	SPARE	–	–	–		33	20	20	34	–		–	–	SPARE	
	KITCHEN RECEPT	2#10 & 1#10G	3/4"		4	35	20	20	36		–	–	–	SPARE	
	KITCHEN RECEPT	2#10 & 1#10G	3/4"	12		37	20	20	38	–		–	–	SPARE	
	KITCHEN RECEPT	2#10 & 1#10G	3/4"		12	39	20	20	40		1	3/4"	2#12 & 1#12G	DRYER EXH FAN	
	KITCHEN RECEPT	2#10 & 1#10G	3/4"	4		41	20	20	42	4		3/4"	2#12 & 1#12G	WATER COOLER	
	MICROWAVE	2#10 & 1#10G	3/4"		12	43	20	20	44		10	3/4"	2#10 & 1#10G	WASHER	(1)
	DISHWASHER	2#10 & 1#10G	3/4"	12		45	20	20	46	10		3/4"	2#10 & 1#10G	WASHER	(1)
	SPARE	–	–		–	47	20	30	48		22	3/4"	3#8 & 1#10G	DRYER	(1)
	SPARE	–	–	–		49	20		50	22					
	SPARE	–	–		–	51	20	30	52		22	3/4"	3#8 & 1#10G	DRYER	(1)
	SPARE	–	–	–		53	20		54	22					

COORDINATE HVAC BREAKERS AND WIRE SIZES WITH HVAC SUBMITTALS.
COORDINATE BREAKERS, DISCONNECTS, AND WIRE SIZES FOR OWNER FURNISHED EQUIPMENT WITH SUBMITTALS.
PROVIDE SEPARATE NEUTRALS FOR ALL CIRCUITS.
* PROVIDE SERIES COMBINATION RATING WITH PANEL A BREAKER FOR 42KA.

(1) PROVIDE WITH CLASS "A" (6mA) GFCI BREAKER IN ACCORDANCE WITH UL 489.

(2) ARC FAULT BREAKER.

(3) WIRE THROUGH PHOTOCELL.

	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
INDOOR LIGHTING	= 2.3	100%	= 2.3
OUTDOOR LIGHTING	= 1.0	100%	= 1.0
RECEPTACLES (1ST 10 KVA)	= 10.0	100%	= 10.0
RECEPTACLES (ABV 10 KVA)	= 9.1	50%	= 4.5
HVAC	= 0.1	100%	= 0.1
HVAC (NON–COINCIDENTAL)	= __	0%	= __
KITCHEN EQUIPMENT **	= 5.0	80%	= 4.0
DEDICATED RECP/EQUIP	= 14.2	100%	= 14.2
TOTALS:	= 41.6 KVA		= 36.1 KVA

MINIMUM PANEL SIZE: 36 KVA X 125% = 45 KVA (109 AMPS)

GROSS PHASE TOTALS (AMPS) A = 181 B = 166

** 80 % DIVERSITY FOR 4 PCS OF EQUIPMENT

SURGE PROTECTION NOTES:

1. SURGE SUPPRESSION SHALL BE RATED AS FOLLOWS:
   - FACTORY INSTALLED AS AN INTEGRAL PART OF INDICATED PANELBOARDS, COMPLYING WITH UL 1449, 5TH EDITION, SPD TYPE 2
   - MINIMUM SINGLE–PULSE SURGE CURRENT WITH STAND RATING PER PHASE SHALL NOT BE LESS THAN 250kA FOR SERVICE ENTRANCE PANELS AND 150kA FOR SUB–PANELS. THE PEAK SURGE CURRENT RATING SHALL BE THE ARITHMETIC SUM OF THE RATINGS OF THE INDIVIDUAL MOVS IN A GIVEN MODE.
   - LET–THROUGH VOLTAGES BASED ON IEEE TEST WAVES SHALL BE CAT C1 (6KV, 3KA) 400V FOR 208V PANEL AND 800V FOR 480V PANELS.
   - PROTECTION MODES AND UL1449VPR SHALL BE: 700V LINE TO NEUTRAL, 700V LINE TO GROUND, 600V NEUTRAL TO GROUND, & 1000V LINE TO LINE.
   - SHORT CIRCUIT CURRENT RATING GREATER THAN PANELBOARD
   - INOMINAL RATING OF 20KA.

PANELBOARD SCHEDULE — PANEL C

PANEL C	SURFACE MOUNTED		400 AMP (FEEDER SIZE)	1ø, 3 WIRE
MAIN BREAKER	BOTTOM FEED	22K AIC *	120/240 VOLT	BOLT ON BREAKER
NEMA 1	COPPER BUS		400 AMP (BUS RATING)	SURGE PROTECTION

NOTE	LOAD SERVED	WIRE SIZE	CONDUIT SIZE	LOAD A	LOAD B	CKT NO.	PHASE (L)	PHASE (R)	CKT NO.	LOAD A	LOAD B	CONDUIT SIZE	WIRE SIZE	LOAD SERVED	NOTE
	HP–1	2#10 & 1#10G	3/4"	14		1	30	20	2	8		3/4"	2#10 & 1#10G	LIGHTS	
					14	3		20	4		10	3/4"	2#12 & 1#12G	LIGHTS	(1)
	HP–2	2#12 & 1#10G	3/4"	20		5	40	20	6	–		–	–	SPARE	
					20	7		20	8		–	–	–	SPARE	
	HP–3	2#12 & 1#10G	3/4"	14		9	30	35	10	25		3/4"	2#10 & 1#10G	WH–1	
					14	11			12		25				
	HP–4	2#12 & 1#10G	3/4"	11		13	25	20	14	–		–	–	SPARE	
					11	15		20	16		–	–	–	SPARE	
(1)	HP–5	2#12 & 1#10G	3/4"	20		17	40	20	18	12		3/4"	2#10 & 1#10G	BUNK RECEPT	(2)
					20	19		20	20		12	3/4"	2#12 & 1#12G	OFFICE RECEPT	(1) (2) △1
	AH–1	2#6 & 1#8G	3/4"	36		21	45	20	22	12		3/4"	2#12 & 1#12G	OFFICE RECEPT	(1) (2)
					36	23		20	24		6	3/4"	2#12 & 1#12G	MECHANICAL RECEPT	
	AH–2	2#8 & 1#10G	3/4"	36		25	45	20	26	9		3/4"	2#12 & 1#12G	LOUNGE RECEPT	(1) (2)
					36	27		20	28		9	3/4"	2#12 & 1#12G	LOUNGE RECEPT	(1) (2)
	AH–3	2#8 & 1#10G	3/4"	36		29	45	20	30	–		–	–	SPARE	
					36	31		20	32		6	3/4"	2#12 & 1#12G	RESTROOM RECEPT	(2)
	AH–4	2#10 & 1#10G	3/4"	24		33	30	20	34	–		–	–	SPARE	
					24	35		20	36		–	–	–	SPARE	
(1)	AH–5	2#8 & 1#10G	3/4"	36		37	45	20	38	5		3/4"	2#12 & 1#12G	DATACOM RECEPT	
					36	39		20	40		3	3/4"	2#12 & 1#12G	DATACOM RECEPT	
	SPARE	–	–	–		41	20	20	42	3		3/4"	2#12 & 1#12G	DATACOM RECEPT	
	SPARE	–	–		–	43	20	20	44		3	3/4"	2#12 & 1#12G	DATACOM RECEPT	
	SPARE	–	–	–		45	20	20	46	3		3/4"	2#12 & 1#12G	DATACOM RECEPT	
	SPARE	–	–		–	47	20	20	48		6	3/4"	2#10 & 1#10G	FITNESS RECEPT	(1)
(1)	FITNESS RECEPT	2#10 & 1#10G	3/4"	6		49	20	20	50	6		3/4"	2#10 & 1#10G	FITNESS RECEPT	(1)
(1)	FITNESS RECEPT	2#10 & 1#10G	3/4"		6	51	20	20	52		6	3/4"	2#10 & 1#10G	FITNESS RECEPT	(1)
(1)	FITNESS RECEPT	2#10 & 1#10G	3/4"	6		53	20	20	54	6		3/4"	2#10 & 1#10G	FITNESS RECEPT	(1)

COORDINATE HVAC BREAKERS AND WIRE SIZES WITH HVAC SUBMITTALS.
COORDINATE BREAKERS, DISCONNECTS, AND WIRE SIZES FOR OWNER FURNISHED EQUIPMENT WITH SUBMITTALS.
PROVIDE SEPARATE NEUTRALS FOR ALL CIRCUITS.
* PROVIDE SERIES COMBINATION RATING WITH PANEL A BREAKER FOR 42KA.

(1) PROVIDE UNDER BID ALTERNATE #1.

(2) ARC FAULT BREAKER.

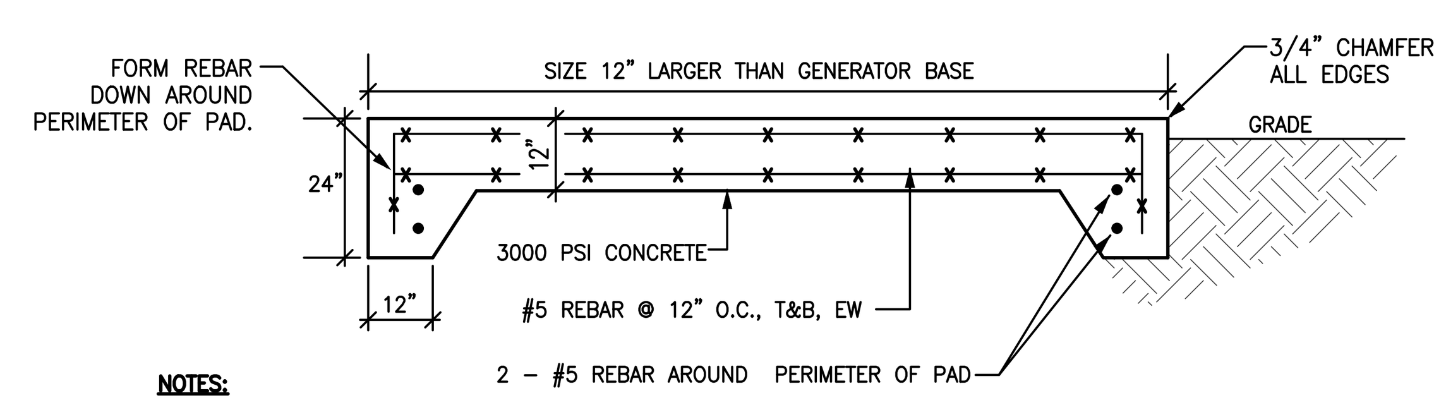
	CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
INDOOR LIGHTING	= 2.2	100%	= 2.2
OUTDOOR LIGHTING	= __	100%	= __
SIGN	= __	100%	= __
RECEPTACLES (1ST 10 KVA)	= 10.0	100%	= 10.0
RECEPTACLES (ABV 10 KVA)	= 4.5	50%	= 2.3
HVAC	= 59.3	100%	= 59.3
HVAC (NON–COINCIDENTAL)	= __	0%	= __
WATER HEATERS	= 6.0	100%	= 6.0
TOTALS:	= 82.0 KVA		= 79.7 KVA

MINIMUM PANEL SIZE: 80 KVA X 125% = 100 KVA (240 AMPS)

GROSS PHASE TOTALS (AMPS) A = 348 B = 339

SURGE PROTECTION NOTES:

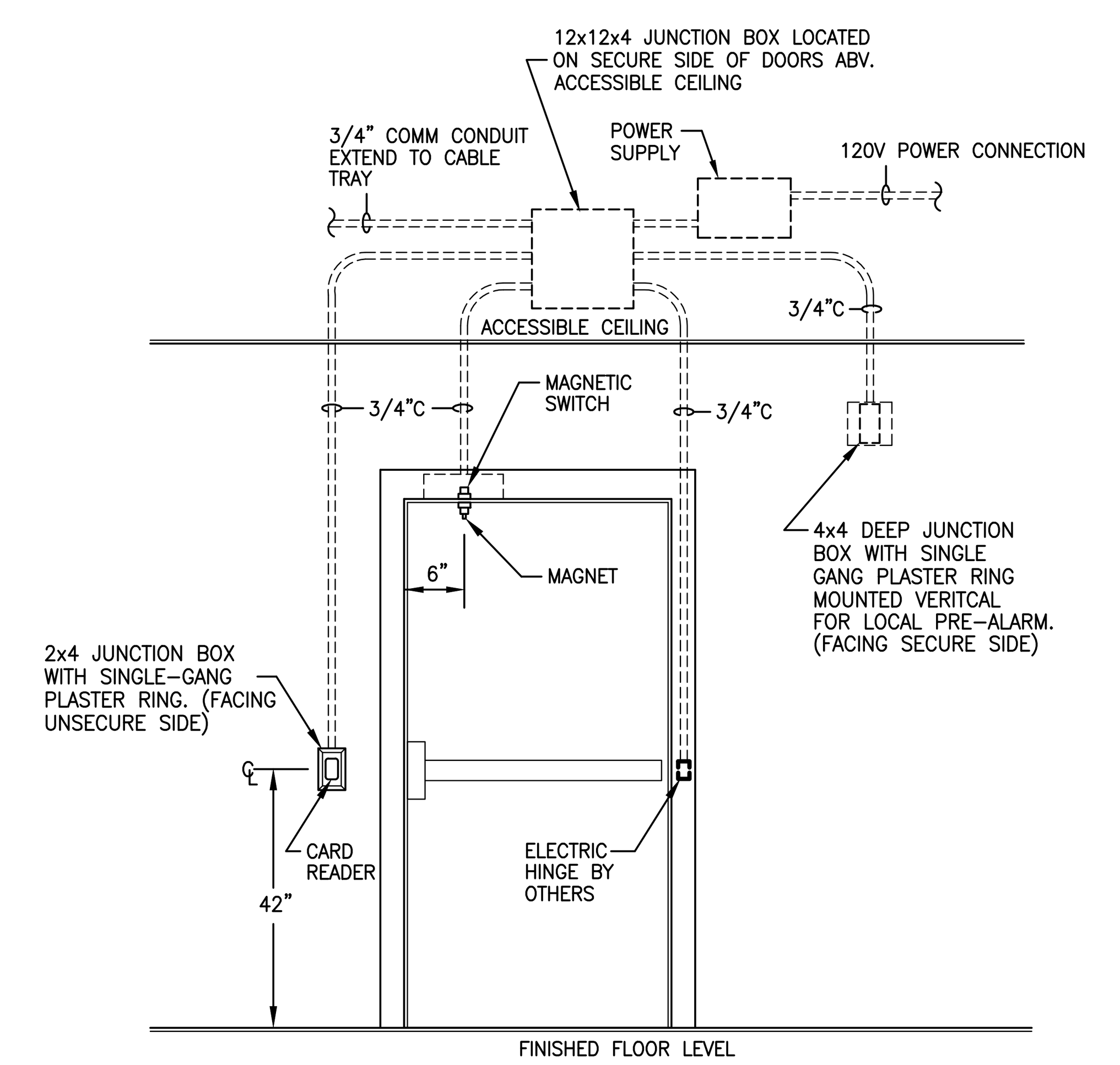
1. SURGE SUPPRESSION SHALL BE RATED AS FOLLOWS:
   - FACTORY INSTALLED AS AN INTEGRAL PART OF INDICATED PANELBOARDS, COMPLYING WITH UL 1449, 5TH EDITION, SPD TYPE 2
   - MINIMUM SINGLE–PULSE SURGE CURRENT WITH STAND RATING PER PHASE SHALL NOT BE LESS THAN 250kA FOR SERVICE ENTRANCE PANELS AND 150kA FOR SUB–PANELS. THE PEAK SURGE CURRENT RATING SHALL BE THE ARITHMETIC SUM OF THE RATINGS OF THE INDIVIDUAL MOVS IN A GIVEN MODE.
   - LET–THROUGH VOLTAGES BASED ON IEEE TEST WAVES SHALL BE CAT C1 (6KV, 3KA) 400V FOR 208V PANEL AND 800V FOR 480V PANELS.
   - PROTECTION MODES AND UL1449VPR SHALL BE: 700V LINE TO NEUTRAL, 700V LINE TO GROUND, 600V NEUTRAL TO GROUND, & 1000V LINE TO LINE.
   - SHORT CIRCUIT CURRENT RATING GREATER THAN PANELBOARD
   - INOMINAL RATING OF 20KA.



NOTES:

1. CONFIRM FINAL LOCATION OF POWER AND CONTROL CONDUITS WITH MANUFACTURER DATA PRIOR TO INSTALLATION.
2. MAINTAIN MINIMUM 48" SPACING AROUND GENERATOR ENCLOSURE AREA FOR REFUELING AND FUTURE SERVICE REQUIREMENTS.
3. PROVIDE 4/0 AWG BARE COPPER GROUND RING 24" FROM EDGE OF GENERATOR PAD BURIED 30" BELOW GRADE. PROVIDE 10' X 3/4" COPPER CLAD GROUND ROD AT EACH CORNER OF GENERATOR PAD AND EXOTHERMICALLY WELDED TO THE COPPER RING. PROVIDE MINIMUM 36" PIGTAIL THROUGH PAD FOR CONNECTION TO THE GENERATOR FRAME. PROVIDE 4/0 BARE COPPER CONDUCTOR FROM THE COPPER RING TO EITHER THE BUILDING GROUND OR MAIN ELECTRICAL SERVICE GROUND BUS.
4. PROVIDE MINIMUM 2" CONCRETE COVER FOR TOP REBAR AND 3" COVER TO EARTH FOR LOWER LEVEL OF REBAR.
5. IF UNSUITABLE MATERIAL IS ENCOUNTERED, REMOVE ALL UNSUITABLE MATERIAL FROM BELOW THE PROPOSED SLAB AND BASE, AND PLACE COMPACTED STRUCTURAL FILL MATERIAL TO THE BOTTOM OF GRAVEL BASE LAYER. ALTERNATELY, REMOVE ALL UNSUITABLE MATERIAL AND REPLACE WITH COMPACTED GRAVEL

(1) GENERATOR CONCRETE PAD INSTALLATION DETAIL
N.T.S.



NOTES:

1. COORDINATE THE EXACT LOCATION OF SECURITY DEVICES, CONDUIT, AND JUNCTION BOXES WITH ARCHITECT, AND SECURITY VENDOR.
2. EC SHALL PROVIDE ALL JUNCTION BOXES AND CONDUITS AS SHOWN INCLUDING APPROPRIATE EXTENSION RINGS, COVERS, ETC. EC SHALL INCLUDE PULL STRINGS IN ALL CONDUITS. COORDINATE ACTUAL LOCATION OF ALL DEVICES AND JUNCTION BOX SIZES WITH HARDWARE VENDOR PRIOR TO INSTALLATION. HARDWARE VENDOR SHALL PROVIDE ALL DEVICES AND ALL WIRING OTHER THAN 120 VOLT POWER WIRING.
3. COORDINATE CONDUITS TO DOOR DEVICES WITH DOOR FRAMING FOR CONCEALED MAGNETIC DOOR POSITION SWITCHES AND ELECTRIC HINGES.
4. ALL SECURITY ELECTRONICS JUNCTION BOXES SHALL BE MOUNTED ON THE SECURE SIDE OF DOOR.

(2) CARD ACCESS AT DOOR
SCALE: N.T.S.

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PROJECT NO.	PROJECT MGR.	DRAWN BY
224010	D. HAM	B. TRENT

NORTH CAROLINA PROFESSIONAL SEAL 31466 ENGINEER JAMES D. HAM 6/2/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	6/2/2025

DRAWN BY: DEH
PROJECT #: 24008
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PHASE: CONSTRUCTION DOCUMENTS
SHEET NAME & NUMBER
ELECTRICAL SCHEDULES

E3.02

ELECTRICAL LEGEND

SYM.	DESCRIPTION	REF. MODEL NO.	REMARKS
(J)	JUNCTION BOX	–	DOUBLE GANG UNO
(T) (S)	THERMOSTAT OR SENSOR JUNCTION BOX	–	MOUNT 48" TOD AFF UNO
	NON-FUSED DISCONNECT	–	–
	FUSED DISCONNECT	–	–
(OS)DT	CEILING OCCUPANCY SENSOR DUAL TECHNOLOGY (LOW VOLTAGE)	WATTSTOPPER DT-305	CONTRACTOR SHALL VERIFY COVERAGE OF SENSORS
(OS)DT	CEILING OCCUPANCY SENSOR DUAL TECHNOLOGY (LINE VOLTAGE – 800W)	WATTSTOPPER DT-355	CONTRACTOR SHALL VERIFY COVERAGE OF SENSORS
(OS)US	CEILING OCCUPANCY SENSOR (LOW VOLTAGE)	WATTSTOPPER WT-1105 OR WT-2205	CONTRACTOR SHALL VERIFY COVERAGE OF SENSORS
$OS	WALL SWITCH WITH OCCUPANCY SENSOR (PASSIVE INFRARED)	WATTSTOPPER PW-100, OR EQUAL	–
$D,OS	DIMMING WALL SWITCH WITH OCC SENSOR (0-10VDC DIMMING & DUAL TECH)	WATTSTOPPER DW-311	MULTI-WAY CONTROL UP TO FOUR SWITCH LOCATIONS
$	SWITCH	HUBBELL CSB120x	–
$D	0-10V DIMMER SWITCH	HUBBELL PSD710-UNV	STAND ALONE CONTROL
$3	3 WAY SWITCH	HUBBELL CS320x	–
$4	4 WAY SWITCH	HUBBELL CS420x	–
$M	MANUAL MOTOR SWITCH	SIEMENS MMS	MOUNT AS REQUIRED
$SC	SPEED CONTROL SWITCH	–	PROVIDED BY M.C., INSTALLED BY E.C.
$OHD	OVERHEAD DOOR CONTROL	–	MOUNT AS REQUIRED
	EMERGENCY LIGHT	–	SOLID FILL HATCHING
	RECEPTACLE	HUBBELL HBL5352x	HBL5362C2x FOR CONTROLLED RECEPTACLE
TR	TAMPER RESISTANT RECEPTACLE	HUBBELL BR20xTR	–
GFI	GROUND FAULT RECEPTACLE	HUBBELL GFRST20x	SELF TESTING PER UL 943
WR GFI	GROUND FAULT, WEATHER RESIST RECEPT.	HUBBELL GFTWRST20x W/"IN USE" COVER	SELF TESTING PER UL 943
CLG	CEILING RECEPTACLE	–	–
PRJ	CEILING RECEPTACLE FOR PROJECTOR	–	COORDINATE LOCATION WITH ARCHITECT
	SPECIAL RECEPTACLE	–	COORDINATE WITH EQUIPMENT
FLR	FLOOR RECEPTACLE	–	REFER TO FLOOR BOX DETAILS
FLR	FLOOR RECEPTACLE	–	REFER TO FLOOR BOX DETAILS
	DOUBLE DUPLEX RECEPTACLE	HUBBELL (2) HBL5352x	–
XX-YY	XX=PANEL YY=CIRCUIT IDENTIFIER	–	–
#	DATA/PHONE OUTLET	–	DOUBLE GANG UNO # INDICATES CABLE QUANTITY. IF NUMBER NOT SHOWN, SEE DETAIL FOR QUANTITY.
CR	DOOR CARD READER	–	SEE SECURITY DOOR DETAILS
S	SMOKE DAMPER	–	–

NOTES:
1. STANDARD MOUNTING HEIGHTS OF DEVICES SHALL BE AS LISTED IN LEGEND. SPECIFIC MOUNTING HEIGHT OF A DEVICE MAY VARY AS NOTED ON PLANS.
2. E.C. SHALL COORDINATE COLOR SELECTION OF DEVICES AND COVERPLATES WITH ARCHITECT, OWNER AND/OR G.C.
3. PROVIDE EQUIPMENT SHOWN BY HUBBELL, PASS & SEYMOUR, COOPER WIRING DEVICES, OR EQUAL PRODUCT.
4. PROVIDE LOW VOLTAGE OCCUPANCY SENSORS WITH POWER PACKS AS REQUIRED.

ABBREVIATIONS:

G.C.	GENERAL CONTRACTOR	AFG	ABOVE FINISHED GRADE
P.C.	PLUMBING CONTRACTOR	UNO	UNLESS NOTED OTHERWISE
M.C.	MECHANICAL CONTRACTOR	℄	CENTERLINE OF DEVICE
E.C.	ELECTRICAL CONTRACTOR	BOD	BOTTOM OF DEVICE
AFF	ABOVE FINISHED FLOOR	TOD	TOP OF DEVICE

ELECTRICAL ENERGY SUMMARY
ELECTRICAL SYSTEMS AND EQUIPMENT:

METHOD OF COMPLIANCE:

NC ENERGY CODE 2018: ☒ **PRESCRIPTIVE** ☐ **PERFORMANCE** ~~**(C101.2 EXEPT #2)**~~
ASHRAE 90.1 2016: ☐ **PRESCRIPTIVE** ☐ **PERFORMANCE**

LIGHTING SCHEDULE

LAMP TYPE REQUIRED IN FIXTURE	SEE LIGHTING SCHEDULE ON PLANS
NUMBER OF LAMPS IN FIXTURE	SEE LIGHTING SCHEDULE ON PLANS
BALLAST TYPE USED IN THE FIXTURE	SEE LIGHTING SCHEDULE ON PLANS
NUMBER OF BALLASTS IN THE FIXTURE	SEE LIGHTING SCHEDULE ON PLANS
TOTAL WATTAGE PER FIXTURE	SEE LIGHTING SCHEDULE ON PLANS
TOTAL INTERIOR WATTAGE SPEC. VS ALLOWED	7859 WATTS SPEC. VS 10305 WATTS ALLOWED

☐ **WHOLE BLDG** ☒ **SPACE BY SPACE**

TOTAL EXTERIOR WATTAGE SPEC. VS ALLOWED: 828 WATTS SPEC. VS. 1215 WATTS ALLOWED

ZONE: 3 ALLOWANCE: 750 WATTS

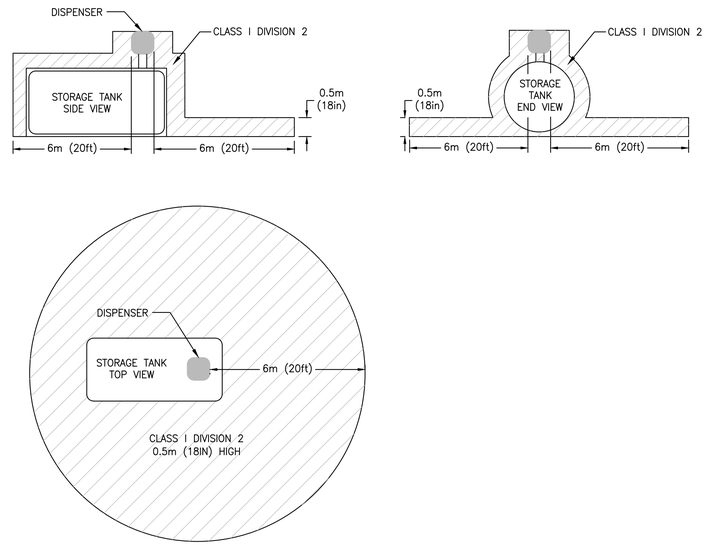
ADDITIONAL PRESCRIPTIVE COMPLIANCE
(WHEN USING THE 2018 NCECC; NOT REQUIRED FOR ASHRAE 90.1)

☐ C406.2.1 MORE EFFICIENT MECHANICAL EQUIPMENT
☐ C406.2.2 REDUCED LIGHTING POWER DENSITY
☐ C406.2.3 ENHANCED LIGHTING CONTROLS
☐ C406.2.4 ON-SITE SUPPLY OF RENEWABLE ENERGY
☐ C406.2.5 PROVISION OF A DEDICATED OUTDOOR AIR SYSTEM
☐ C406.2.6 HIGH-EFFICIENCY SERVICE WATER HEATING

LIGHT FIXTURE SCHEDULE

MARK	DESCRIPTION	REF MANF	MODEL NUMBER FOR FIXTURE REFERENCE QUALITY AND APPEARANCE	SOURCE	LED LUMENS	COLOR TEMP	CRI	FIXTURE INPUT WATTS	VOLTS	MULTI-VOLT INPUT	DIMMING TO 10%	STEP LEVEL DIMMING	BATTERY BACK-UP	BATTERY BACK-UP - 1400 LUMENS	DAMP LOCATION LISTED	WET LOCATION LISTED	STANDARD COLOR SELECTED BY ARCH.	CUSTOM COLOR SELECTED BY ARCH.	REMARKS
A	2x2 LED FLAT PANEL	LITHONIA	CPANL 2X2 ALO1 SWW7 M4	LED	4,000	40K	80	30	120	●	●								
A1	2x2 LED FLAT PANEL (EMERGENCY)	LITHONIA	CPANL 2X2 ALO1 SWW7 M4 ILB CP10A	LED	4,000	40K	80	30	120	●	●			●					
B	2x4 LED FLAT PANEL	LITHONIA	CPANL 2X4 ALO6 SWW7 M2	LED	5,000	40K	80	44	120	●	●								
B1	2x4 LED FLAT PANEL (EMERGENCY)	LITHONIA	CPANL 2X4 ALO6 SWW7 M2 ILB CP10A	LED	5,000	40K	80	44	120	●	●			●					
C	2x4 LED FLAT PANEL	LITHONIA	CPANL 2X4 ALO6 SWW7 M2	LED	4,000	40K	80	35	120	●	●								
C1	2x4 LED FLAT PANEL (EMERGENCY)	LITHONIA	CPANL 2X4 ALO6 SWW7 M2 ILB CP10A	LED	4,000	40K	80	35	120	●	●			●					
F	6" RECESSED DOWNLIGHT	LITHONIA	LDN6 ALO3 SWW1 LO6 AR LSS MVOLT UGZ	LED	2,500	40K	80	32	120	●	●								
F1	6" RECESSED DOWNLIGHT (EMERGENCY)	LITHONIA	LDN6 ALO3 SWW1 LO6 AR LSS MVOLT UGZ E10WCP	LED	2,500	40K	80	32	120	●	●			●					
G	LINEAR DIRECT/INDIRECT	PEERLESS	EGRM4L LLP 28FT MSL8 80CRI 40K 1000LMF MIN1 ZT 120 SCT 72A	LED	55/FT	40K	80	9/FT	120	●	●								
G1	LINEAR DIRECT/INDIRECT (EMERGENCY)	PEERLESS	EGRM4L LLP 28FT MSL8 80CRI 40K 1000LMF MIN1 ZT 120 SCT_E10WLCP 72A	LED	55/FT	40K	80	9/FT	120	●	●			●					
H	8' LED STRIPLIGHT	LITHONIA	CLX L96 20000LM SEF RDL MVOLT GZ10 40K 80CRI SPD ZACVH M100	LED	20,000	40K	80	141	120	●	●								
H1	8' LED STRIPLIGHT (EMERGENCY)	LITHONIA	CLX L96 20000LM SEF RDL MVOLT GZ10 40K 80CRI E10W SPD ZACVH M100	LED	20,000	40K	80	141	120	●	●			●					
J	4' LED STRIPLIGHT	LITHONIA	CLX 48 7000LM SEF RDL MVOLT GZ10 40K 80CRI	LED	7,000	40K	80	47	120	●	●								
J1	4' LED STRIPLIGHT (EMERGENCY)	LITHONIA	CLX 48 7000LM SEF RDL MVOLT GZ10 40K 80CRI E10W	LED	7,000	40K	80	47	120	●	●			●					
K	8' LED STRIPLIGHT	LITHONIA	CLX L96 10000LM SEF RDL MVOLT GZ10 40K 80CRI	LED	10,000	40K	80	64	120	●	●								
K1	8' LED STRIPLIGHT (EMERGENCY)	LITHONIA	CLX L96 10000LM SEF RDL MVOLT GZ10 40K 80CRI E10W	LED	10,000	40K	80	64	120	●	●			●					
L1	4' STAIR WALL MOUNT (EMERGENCY)	PRUDENTIAL	FLAIR-PRO LED4 SO 4' SAL UNV SUR X3 STEP EMHE	LED	4,700	40K	80	37	120	●		●		●			●		
M	2' LED STRIP LIGHT	LITHONIA	ZL1D L24 2500LM FST MVOLT 40K 80CRI WH	LED	2800	40K	80	24	120	●	●								
EXIT	EXIT LIGHT	LITHONIA	LQM LED R	LED	–	–	–	4	120	●	●								
	EXTERIOR LIGHTS																		
XA	EXTERIOR WALL PACK	LITHONIA	ARC2 LED P2 40K MVOLT	LED	2,000	40K	80	16	120	●						●	●		
XA1	EXTERIOR WALL PACK (EMERGENCY)	LITHONIA	ARC2 LED P2 40K MVOLT E4WH	LED	2,000	40K	80	16	120	●			●			●	●		
XB	EXTERIOR WALL PACK	LITHONIA	ARC2 LED P5 40K MVOLT	LED	6,500	40K	80	51	120	●						●	●		
XC	EXTERIOR PENDANT	STERNBERG	1W GL1960 GWR 12L 40 T3 MDL006	LED	2800	40K	70	20	120	●						●	●		
1 XD	FLAG LIGHT	LITHONIA	DSXF1 LED P2 40K MSP MVOLT IS DDBXD AFTM	LED	5200	40K	70	42	120	●						●	●		

NOTES:
1. PROVIDE EXIT LIGHTS WITH SINGLE OR DOUBLE-FACE AS REQUIRED, CHEVRON DIRECTIONAL INDICATORS, MOUNTING BRACKETS AND NICKEL CADMIUM BATTERY BACKUP.
2. BATTERIES INSTALLED OUTDOORS SHALL BE RATED -4°F TO 130°F.
3. BATTERIES SHALL BE UL924 LISTED FOR 90 MINUTES PER NC FIRE CODE SECTION 1006.3 & 1011.5.3. BATTERIES SHALL BE TESTED PER NEC 700.12(A).
4. PRODUCTS LISTED ARE DESIGN BASIS. EQUAL SUBSTITUTION SUBMITTALS FROM ACUITY, PHILIPS, COOPER, OR HUBBELL WILL BE EVALUATED.
5. **CONTRACTOR SHALL SUBMIT LIGHTING PLAN SHEET(S) WITH SCHEDULE TO SUPPLIER FOR FIXTURE SELECTION.**



1 CLASSIFIED AREA ADJACENT TO DISPENSER MOUNTED ABOVE GROUND STORAGE TANK
SCALE: N.T.S.

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PROJECT NO. 224010 | PROJECT MGR. D. HAM | DRAWN BY B. TRENT

NORTH CAROLINA PROFESSIONAL SEAL 31466 ENGINEER JAMES D. HAM
6/2/2025

REVISIONS:

#	DESC:	DATE
1	ADDENDUM 2	6/2/2025

DRAWN BY: DEH
PROJECT #: 24008
ISSUE DATE: 04/30/2025

PHASE:
CONSTRUCTION DOCUMENTS

SHEET NAME & NUMBER
ELECTRICAL NOTES

E4.01

06/02/2025

TABLE OF CONTENTS

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulated service doors.
2. Uninsulated service counter doors.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
5. Show locations of controls, locking devices, and other accessories.
6. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats, including full vision window secured to slat.

2. Bottom bar with sensor edge.
3. Guides.
4. Brackets.
5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.3 CLOSEOUT SUBMITTALS

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of final acceptance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in ICC A117.1.

B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:

1. Design Wind Load: As indicated on Drawings.
2. Testing: According to ASTM E330/E330M.
3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

2.2 INSULATED OVERHEAD DOOR ASSEMBLY

A. Basis-of-Design: IS3000 by McKeon

1. Or Equal by alternate manufacturer. Acceptable manufacturers include Cornell/Cookson and Overhead Door Company.

B. Operation Cycles: Door components and operators capable of operating for not less than 100,000 cycles. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1. Include tamperproof cycle counter.

C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. (2.03 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h) when tested according to ASTM E283.

D. STC Rating: 26.

E. Insulated Door Curtain R-Value: 4.5 deg F x h x sq. ft./Btu (0.792 K x sq. m/W).

F. Door Curtain Material: Galvanized steel.

G. Door Curtain Slats: Flat profile slats of 2-5/8-inch (67-mm) center-to-center height.

1. ~~Perforated Slats: Approximately 7/8 inch (22 mm) wide by 3/8 inch (10 mm) high slots.~~
2. Fenestrated Slats: Approximately 3- by 5/8-inch (76- by 16-mm) openings spaced approximately 1-1/2 inches (38 mm) apart and beginning 12 inches (305 mm) from jamb guides.
3. Insulated-Slat Interior Facing: Metal.
4. Gasket Seal. Manufacturer's standard continuous gaskets between slats.

H. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from stainless steel ~~and finished to match door.~~

I. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

J. Hood: Match curtain material and finish.

1. Shape: Round.
2. Mounting: As indicated on Drawings.

K. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone-type, both jamb sides locking bars, operable from inside and outside with cylinders.

L. Electric Door Operator:

1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
2. Operator Location: Front of hood.
3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. (2.44 m) or lower.
4. Motor Exposure: Interior.
5. Motor Electrical Characteristics:

    a. Horsepower: 2 hp.
    b. Voltage: Per manuf. recommendations for size and use.

6. Emergency Manual Operation: Chain type.
7. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.

a. Sensor Edge Bulb Color: Black.

8. Control Station(s): Interior mounted.

M. Curtain Accessories: Equip door with weatherseals.

N. Door Finish:

1. ~~Baked Enamel or~~ Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Interior Curtain-Slat Facing: Finish as selected by Architect from manufacturer's full range.

2.3 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 INTERIOR COILING SHUTTERS:

a. Manufacturer: Coiling security counter shutters shall be model CS3000-HK-A as manufactured by McKEON, or equal.

B. MATERIALS

a. Curtain: Shall be assembled of 18 gauge extruded aluminum interlocking slats. Slats shall have endlocks locking each end of alternate slats to act as a wearing surface and maintain slat alignment.
b. Slats: Shall be of a cross section not less than 1½" wide by ½" deep.
c. Bottom Bar: Shall consist of a custom aluminum tubular extrusion formed to fit slats. Provide slide locks with hasps on both jambs to allow for locking.
d. Guides: Each guide assembly shall be fabricated of a custom aluminum extrusions formed in a box type configuration.
e. Mounting Brackets: Fabricated of hot rolled 1/8" steel plate minimum, brackets shall be provided to house ends of the counterbalance barrel assembly.
f. Hood: Shall be provided to entirely enclose curtain and counterbalance barrel assembly. Hood shall be fabricated 18 gauge aluminum and designed to match brackets. Top and bottom shall be bent and reinforced for stiffness.
g. Counterbalance Assembly: Counter shutter shall be counterbalanced by means of adjustable steel helical torsion springs attached to shaft enclosed in pipe with required mounting blocks or rings for attachment of curtain. Grease sealed bearings or self-lubricating graphite bearings shall be attached to the spring barrel which shall be fabricated of hot formed structural quality carbon steel seamless pipe.
h. Hand Crank Operator: Counter shutter shall be provided with a compact reduction geared unit designed as an integral part of the assembly. The hand crank mechanism shall not require more than 35 pounds of operational force to move the counter shutter in either the open or close position.
i. Finish: After completion of fabrication, clean all metal surfaces to remove dirt and chemically treat to provide for paint adhesion. All steel components shall receive a coat of prime paint finish and all exposed aluminum shall be of a clear ano-

dized finish.

2.5 HOODS

2.6 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized-steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.
2. Stainless Steel: 0.025-inch- (0.64-mm-) thick, stainless steel sheet, Type 304, complying with ASTM A240/A240M or ASTM A666.
3. Aluminum: 0.040-inch- (1.02-mm-) thick aluminum sheet complying with ASTM B209 (ASTM B209M), of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
4. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
5. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling unless otherwise indicated.

2.7 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Owner Standard, keyed to building keying system.
2. Keys: Three for each cylinder.

C. Chain Lock Keeper: Suitable for padlock.

D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.8 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with

an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic-closing device operates.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.9 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf (111 N).

C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf (111-N) force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.10 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.

2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

~~1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.~~
~~2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.~~
3. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall-mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
~~4. Bench Mounted: Operator is mounted to the right or left door head plate and connected to the door drive shaft with drive chain and sprockets. Side room is required for this type of mounting.~~
~~5. Through-Wall Mounted: Operator is mounted on other side of wall from coil side of door.~~

D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.

1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

    a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained or constant pressure on close button.

2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

    a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.

~~3. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device.~~

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weather-proof type, NEMA ICS 6, Type 4 enclosure, key operated.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

L. Portable Radio-Control System: Consisting of two of the following per door operator:

1. Three-channel universal coaxial receiver to open, close, and stop door.
2. Portable control device to open and stop door may be momentary-contact type; control to close door is to be sustained- or constant-pressure type.
3. Remote-antenna mounting kit.

2.11 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

1. Adjust exterior doors and components to be weather resistant.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

~~3.4 MAINTENANCE SERVICE~~

~~A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service includes 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.~~

~~1. Perform maintenance, including emergency callback service, during normal working hours.~~
~~2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.~~

END OF SECTION 08 33 23

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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:

1. Storefront framing.
2. Manual-swing entrance doors.

B. Related Requirements:

1. Section 084126 "All-Glass Entrances and Storefronts" for systems without aluminum support framing.
2. Section 081216 "Aluminum Frames" for interior aluminum framing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
4. Include point-to-point wiring diagrams showing the following:

    a. Power requirements for each electrically operated door hardware.
    b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

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

G. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Mockup Testing Submittals:

1. Testing Program: Developed specifically for Project.
2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

B. Qualification Data: For Installer.

C. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

D. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.

E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C1401. Include periodic quality-control reports.

F. Field quality-control reports.

G. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

D. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of storefront systems.

1.8 MOCKUPS

A. Mockups: Build mockups in place to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall.
2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Warranty: manufacturer or Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures, including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

    a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

    a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans of less than 11 feet 8-1/4 inches (3.6 m).

E. Structural: Test according to ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E283 for infiltration as follows:

1. Fixed Framing and Glass Area:

a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).

2. Entrance Doors:

a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

G. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft. (720 Pa).

H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft. (480 Pa).
2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

I. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.

J. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than as noted on energy summary in drawings, as determined according to NFRC 100.
2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have SHGC of no greater than as shown in energy summary in drawings, as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 65 as determined according to NFRC 500.

K. Noise Reduction: Test according to ASTM E90, with ratings determined by ASTM E1332, as follows.

1. Outdoor-Indoor Transmission Class: Minimum 30.

L. Blast Resistance:

1. Hazard Rating: Low Hazard according to ASTM F2912.

~~M. Windborne-Debris-Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for enhanced protection.~~

N. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).
c. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

O. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

P. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed, aluminum-framed entrances and storefronts without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.3 STOREFRONT SYSTEMS

A. Basis of Design: Kawneer Trifab VersaGlaze 601 Framing System (2"x6"). Or provide equal by one of the following manufacturers:
1. Oldcastle
2. YKK

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Exterior Framing Construction: Thermally broken.
2. Interior Vestibule Framing Construction: Nonthermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Front.

5. Finish: Clear anodic finish ~~or Baked-enamel or powder-coat finish~~ as selected by architect and owner from manufacturer's full range.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

A. As noted in Storefront Systems above.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) overall thickness, with minimum 0.188-inch- (4.8-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: As indicated in drawings.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule and specifications for each entrance door, to comply with requirements in this Section.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer and shall Comply with Section 088000 "Glazing."

D. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. Color: Selected from manufacturer's full range.

2.7 MATERIALS

A. Sheet and Plate: ASTM B209 (ASTM B209M).

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).

C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

D. Structural Profiles: ASTM B308/B308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, complying with ASTM A240/A240M, of type recommended by manufacturer.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

E. Rigid PVC Filler.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using shear-block system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer's full range, semi-gloss.

2.11 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

a. Perform a minimum of three tests in areas as directed by Architect.
b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 70 percent completion.

2. Air Infiltration: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. (0.45 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

a. Perform a minimum of three tests in areas as directed by Architect.
b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 70 percent completion.

3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa), and shall not evidence water penetration.

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

END OF SECTION 08 41 13

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hinges.
2. Continuous, gear-type hinges.
3. Mortise locks.
4. Operating trim.
5. Thresholds.
6. Metal protective trim units.
7. Auxiliary door hardware.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
2. Section 083113 "Access Doors and Frames" for access door hardware, except cylinders.
3. Section 084113 "Aluminum-Framed Entrances and Storefronts" for entrance door hardware, except cylinders.

1.2 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field-verify existing conditions and coordinate installation of door hardware to suit opening

conditions and to provide proper door operation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Wiring Diagrams: For power, signal, and control wiring and including the following:

a. Details of interface of electrified door hardware and building safety and security systems.
b. Schematic diagram of systems that interface with electrified door hardware.
c. Point-to-point wiring.
d. Risers.
e. Elevations doors controlled by electrified door hardware.

2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

C. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware indicated.

D. Samples for Verification: For each type of exposed product, in each finish specified.

1. Sample Size: Full-size units or minimum **2-by-4-inch** Samples for sheet and **4-inch** long Samples for other products.

E. Other Action Submittals:

1. Door Hardware Sets: Prepared by Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
b. Format Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
c. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.

2) Type, style, function, size, quantity, and finish of each door hardware item.
3) Complete designations of every item required for each door or opening including name and manufacturer.
4) Fastenings and other pertinent information.
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.
9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

10) List of related door devices specified in other Sections for each door and frame.

d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
e. Submittal Sequence Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

F. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish 3 dozen extra screws and other fasteners of each size, type, and finish used with the hardware items provided.
2. Extra materials shall be stored on-site as directed by Owner.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer..

1. Installer's responsibilities include supplying and installing door hardware.
2. Warehousing Facilities: In Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedule.
4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys to Owner by registered mail or overnight package service.

1. Permanent cores shall be installed by General Contractor at date of acceptance by Owner.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Final Acceptance unless otherwise indicated below:

a. Electromagnetic and Delayed-Egress Locks: Five years from date of of Final Acceptance.

b. Exit Devices: Three years from date of Final Acceptance.
c. Manual Closers: 10 years from date of Final Acceptance.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

C. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

F. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1 for door hardware on doors in an accessible route.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

G. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

2.2 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated on Floor Plans and Door Hardware Sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products and products equivalent in function and comparable in quality to named products and products complying with BHMA standard referenced.
2. Sequence of Operation Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing mini-

mum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.3 HINGES

A. Hinges: ANSI/BHMA A156.1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies
b. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
c. PBB, Inc
d. STANLEY; dormakaba USA, Inc.
e. Ives.

B. Template Hinge Dimensions: BHMA A156.7.

C. Quantity: Provide the following, unless otherwise indicated:

1. Three Hinges: For doors with heights 61 to 90 inches.

D. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

E. Hinge Weight: Unless otherwise indicated, provide the following:

1. Doors with Closers: Antifriction-bearing hinges.
2. Interior Doors: Standard-weight hinges.

F. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Interior Hinges: Steel, with steel pin.
2. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

G. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

2.4 CONTINUOUS HINGES

A. Continuous, Gear-Type Hinges: ANSI/BHMA A156.26; minimum **0.120-inch-** thick, extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings. Minimum overall width of **4 inches (102 mm)**; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete. Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. Manufacturers Subject to compliance with requirements, provide products by one of the following

    a. Hager Companies.
    b. **ABH**; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
    c. Ives.
    d. Pemko

2.5 MECHANICAL LOCKS AND LATCHES

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and 2012 North Carolina State Building Code.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with 2012 North Carolina Building Code. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum **3/4-inch** latchbolt throw.

D. Lock Trim:

1. Levers: Forged.

2. Escutcheons (Roses): Forged.
3. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Use existing locations at existing frames Custom strikes shall be made to fit existing holes in frames. Strikes shall have curved lip extended to protect frame, and shall be finished to match door hardware set. Modify and reinforce existing frames as required for new strike plate requirements.

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2.6 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows

1. Fire-Rated Surface Bolts: Minimum 1-inch throw; listed and labeled for fire-rated doors.
2. Mortise Flush Bolts: Minimum 3/4-inch throw.

B. Dustproof Strikes: BHMA A156.16, Grade 1.

1. Manufacturers

a. Hager Companies (HAG).
b. Ives.
c. Trimco (TBM).
d. Rockwood.

C. Manual Flush Bolts: BHMA A156.16, Grade 1; designed for mortising into door edge.

1. Manufacturers

a. Hager Companies (HAG).
b. IVES.
c. Trimco (TBM).
d. Rockwood.

2.7 EXIT DEVICES

A. Exit Devices: BHMA A156.3, Grade 1

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and North Carolina State Building Code, Vol. 1-C.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Removable Mullions BHMA A156.3.

G. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

H. Outside Trim: Lever with cylinder and Pull with cylinder; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

I. Through Bolts: For exit devices and trim on all doors.

J. Manufacturers:

1. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
2. Precision Hardware, Inc. (PH).
3. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
4. Von Duprin; an Ingersoll-Rand Company (VD).
5. **Falcon**
6. **Yale**

2.8 LOCK CYLINDERS

A. Standard Lock Cylinders: ANSI/BHMA A156.5, Grade 1 .

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Seven.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Manufacturers: Same manufacturer as for locks and latches.

2.9 KEYING

A. Keying System: Unless otherwise indicated, provide factory registered keying system, complying with the following requirements

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "STATE OF NC DUPLICATION PROHIBITED (KS603)."
b. Quantity: Supply three (3) extra key blanks for each lock.

2.10 KEY CONTROL SYSTEM

A. Key Lock Boxes: Recessed Mounted, 6" x 3-1/4" x 2", satin aluminum.

1. Manufacturers Subject to compliance with requirements, provide products by the following

a. Lund.
b. Knox company.
c. Salsbury Industries.

2.11 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and North Carolina State Building Code, Vol. 1-C.

1. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Fire Doors Minimum opening force allowable by authorities having jurisdiction.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

C. Power-Assist Closers: As specified in Division 08 Section "Automatic Door Operators" for access doors for people with disabilities or where listed in the door hardware sets.

D. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

E. Surface Closers: BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated. Closers shall be through bolted to the doors.

1. Manufacturers

    a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
    b. LCN Closers; an Ingersoll-Rand Company (LCN).
    c. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    d. Falcon
    e. Yale/Norton

2.12 OPERATING TRIM

A. Standard: BHMA A156.6.

B. Materials: Fabricate from stainless steel, unless otherwise indicated.

C. Manufacturers

1. Hager Companies (HAG).
2. Rockwood Manufacturing Company (RM).
3. Trimco (TBM).
4. IVES.

2.13 FLUSHBOLTS

A. Flush Bolts: ANSI / BHMA A156.16

1. Manufacturers; Subject to compliance with requirements, provide products by one of the following

   a. DCI; 780F
   b. Ives; FB458
   c. Trimco; 13917

2. Provide minimum 1/2" diameter rods of brass or stainless steel, with minimum 12" long rods for doors up to 7'-0" in height. Provide longer rods as needed for doors exceeding 7'-0" in height.
3. Provide dustproof strikes for bottom flush bolt applications, except where special threshold construction provide non-recessed strike for bolt.

B. Combination Flush Bolts: ANSI / BHMA A156.16

1. Manufacturers; Subject to compliance with requirements, provide products by one of the following:

   a. DCI; 962
   b. Ives; FB41P
   c. Trimco; 3815

2. Provide combination flush bolts using two automatic flush bolts for top and bottom of the door. When active leaf is opened, flush bolts are opened. Automatic flush bolts engage each time inactive leaf is closed.
3. Provide dust-proof strikes for bottom flush bolt applications.

2.14 PROTECTIVE TRIM UNITS

A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.

B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material.

1. Material: 0.050-inch- thick stainless steel.
2. Manufacturers

   a. Hager Companies (HAG).
   b. Rockwood Manufacturing Company (RM).

c. Trimco (TBM).
d. IVES.

2.15 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: ANSI/BHMA A156.3; consisting of active-leaf, hold-open lever, and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

B. Carry-Open Bars: ANSI/BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

2.16 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1.

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Electromagnetic Door Holders: BHMA A156.15.

1. Coordinate with fire detectors and interface with fire alarm system for labeled fire door assemblies.

C. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch fabricated for drilled-in application to frame.

D. Heavy Duty Hinge Pin Stop for Apartment Doors: Must meet ANSI A156.16; wrought steel with rubber bumpers, US26D finish. Positive slip-proof design. Adjustable from 70 to 100 degree opening.

1. Coordinate type of Hinge required for use with stops.

E. Manufacturers:

1. Hager Companies (HAG).
2. Rockwood Manufacturing Company (RM).
3. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
4. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
5. Trimco (TBM).
6. IVES.

2.17 DOOR GASKETING

A. Standard: BHMA A156.22

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

C. Smoke-Labeled Gasketing: Provide in locations where indicated on Drawings.

D. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

E. Replaceable Seal Strips Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

G. Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Zero International (ZRO).

2.18 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies (HAG).
b. National Guard Products (NGP).
c. Pemko Manufacturing Co. (PEM).
d. **Zero International (ZRO).**

2. Except as otherwise indicated, provide standard threshold units of type, size, and profile as shown or indicated.
3. Metal shall be extruded aluminum, 6063-T5 alloy.
4. If possible, provide thresholds that are 1" wider than depth of frame except as

otherwise noted.

B. Thresholds at exterior doors and entrance systems:

1. Provide adjustable thresholds with integrated, gasketed thermal breaks.
2. Provide finished dimension that is equal to width of adjacent framing system.

2.19 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: ANSI/BHMA A156.6; fabricated from **0.050-inch-** thick stainless steel; With manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Rockwood
b. Hager
c. Ives.
d. Trimco

2. Fabricate protection plates not more than 2" less than door width on stop side.
3. Protection plates shall be beveled on three edges.
4. Furnish protection plates for concealed mounting where possible. Where exposed fasteners are used, they shall be countersunk.

2.20 AUXILIARY DOOR HARDWARE

A. Auxiliary Door Hardware: ANSI/BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Rockwood.
b. Hager.
c. Ives
d. Trimco

B. Silencers:

1. Furnish tamper proof resilient cushions designed to absorb shock and noise at openings without gaskets.
2. Provide three (3) silencers per door.

C. Wall Bumpers:

1. 2-1/2" diameter, 1" nominal projection.

D. Interior Floor-Mounted Stops:

1. Dome stops with risers, 1" height.

2.21 ELETRICALLY OPERATED HARDWARE

A. General Requirements

1. Electrically operated locking devices shall be connected to building fire and smoke/heat alarm systems. Activation of alarm system, or loss of power, shall disengage electrical locking mechanism allowing free unrestricted egress through opening.
2. Coordinate installation of electrically operated hardware to insure proper size wire is used to power load(s).

a. Voltage drop shall not exceed 5% of load's stated voltage.
b. Voltage drop shall be calculated by first determining resistance of load (R=E/I voltage divided by AMP draw). Next, determine resistance of wire (per below chart). Divide this number by resistance of load. If result exceeds 5%, wire thickness shall be increased.
c. Wire length shall equal distance to load and back to supply (lock 50ft. from power supply; wire length = 100ft.). Two loads powered by one pair of wires draw double current and have half (50%) of resistance.
d. Wire Size; Resistance per 1,000 feet

1) 12 gauge; 1.6 Ohm
2) 14 gauge; 2.5 Ohm
3) 16 gauge; 4.1 Ohm
4) 18 gauge; 6.4 Ohm
5) 20 gauge; 10.1 Ohm
6) 22 gauge; 16.0 Ohm

3. Furnish electrically operated hardware with power supply units, junction boxes, and other accessories needed for complete, efficient installation.

B. Power Supply Units (PSU)

1. PSU shall be designed for electromagnetic locks, electric locking or monitoring exit devices and/or electric strikes as needed.
2. Output power shall be field selectable for either 24 volts DC at 1 ampere or 12 volts DC at 2 amperes. Input power shall be 120 volts AC at 0.6 ampere, unless otherwise indicated.
3. Units shall have a terminal block that shall accept 14 gauge stranded wire.
4. Enclosure shall have not less than six, 1/2" knock-out holes for conduit connection.

C. Power Transfer Devices:

1. Provide a means to transfer power from frame to door stile. Devices shall be reversible and allow a full 180 degree door swing with 4-1/2" x 4-1/2" butt hinges or 3/4" offset pivots. When door is in closed position, transfer unit shall be concealed.
2. Transfer units shall contain ten 24 awg UL approved conductors.
3. Rating: 10 Amps at 24vdc (Class 1 low voltage).
4. Acceptable Manufacturers

    a. Securiton
    b. Von Duprin
    c. Security Door Controls
    d. ABH

D. Electro-Magnetic Door Holders:

1. Provide floor mounted units to hold doors in open position and to release and automatically close under alarm conditions.
2. Electromagnet shall be protected against transients and voltage surges up to 600 volts.
3. Power Requirements: 24V AC/DC nominal + 10% -15% @.110 amp maximum.
4. Acceptable Manufacturers

    a. ABH
    b. LCN
    c. Rixon

2.22 POWER DOOR OPERATORS

A. Electro-Hydraulic Operators: ANSI A156.19

1. Power door operator shall conform to ADA law, Section 4.13.12; ANSI A177.1.
2. Power operator shall combine an electronic control system with heavy-duty electrically power hydraulic door closer to provide easy access for physically handicapped persons and shall provide full closing force to close and latch door.
3. System shall have a motor/clutch assembly control by a microprocessor based control module to open doors slowly to 90 degrees. Control System shall be designed to provide adjustable opening force, delay times adjustable up to 60 seconds, adjustable closing power, and shall comply with ADA reduced opening force requirements.
4. Operator shall be provided with "Power Boost" to improve door latching.
5. Furnish system complete with components necessary for proper installation, including door closer (operator), actuators at each side of door, connectors, wiring, on/off switch, and other components as needed.
6. Unit to have a built-in power supply with maximum output load of 1.0 amperes at 12VDC or 24VAC.
7. Both high voltage and low voltage output circuits to be protected by electronic circuit breakers that will reset to normal operation after a fault is corrected. The use of replaceable fuses is not acceptable.
8. Coordination of power operator and security hardware shall be the responsibility

of the power operator supplier and installer.

9. Acceptable Manufacturers

    a. LCN
    b. Horton
    c. Stanley

B. Activation and Safety Devices:

1. Microwave-Scanner Motion Detector:

    a. Provide a self-contained motion detector consisting of a microwave-scanner-sensing device to activate door operator.
    b. Sensing device shall be adjustable to provide detection patterns and sensitivity equivalent to those required for control mats.
    c. Provide time delay for closing set at no less than 1.5 seconds.
    d. Provide metal or plastic housing with black finish for sensing device.

2. Infrared-Scanner Presence Detector:

    a. Provide a self-contained presence detector consisting of an infrared-scanner-sensing device to activate door operator.
    b. Sensing device shall be adjustable to provide detection patterns and sensitivity equivalent to those required for control mats.
    c. Provide metal or plastic housing with black finish for sensing device.

3. Wall Push-Plate Switch:

    a. Provide manufacturer's standard semi-flush, wall mounted, door control switch; consisting of round or square, flat push plate; of material indicated; and actuator mounted in recessed junction box.
    b. Provide engraved message as indicated.

2.23 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

    a. Mortise hinges to doors.
    b. Strike plates to frames.

3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:

    a. Surface hinges to doors.
    b. Closers to doors and frames.
    c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.24 FINISHES

A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.

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

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames:Comply with DHI A115 Series. For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

C. Door and Frame Preparation

1. Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware.
2. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8"high), hinge preps will be mortised and reinforced with a minimum of 10 gauge reinforcement material; minimum of 14 gauge reinforcement material for closer.
3. Hollow metal doors shall be properly prepared and reinforced with a minimum of 16 gauge material for either mortised or cylindrical locks as specified. It is preferred that all hollow metal doors receiving door closers have 14 gauge reinforcement. If this is not possible, the use of sex bolts is mandatory.
4. Wood doors shall be factory prepared to receive the scheduled hardware.

3.3 INSTALLATION OF DOOR HARDWARE

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and re-installation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every **30 inches (750-mm-)** of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
2. Furnish permanent cores to Owner for installation.

E. Closers: When mounted to door face, shall be installed with through-bolts.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

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

1. Door Closers:Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant is to examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE.

A. Hardware Set 1:

1. Single Interior Door, rating to match door
2. Hardware:
   a. 1 Classroom mortise lockset w/ lever trim
   b. 3 Hinges
   c. 1 kickplate
   d. 1 door silencer
   e. 1 wall-mounted bumper
   f. Closer (if in rated assembly)

B. Hardware Set 2:

1. Single Interior Door, rating to match door
2. Hardware:
   a. 1 Storage mortise locket w/ lever trim
   b. 3 hinges
   c. 1 kickplate
   d. 1 door silencer
   e. 1 wall-mounted bumper
   f. Closer (if in rated assembly)

C. Hardware Set 3:

1. Single Exterior Entrance Door
2. Hardware:
   a. 1 continuous hinge
   b. 1 closer
   c. 1 exit device
   d. 1 Rim Cylinder
   e. 3 weather stripping
   f. 1 threshold
   g. 1 sweep

D. Hardware Set 3A:

1. Single Exterior Entrance Door, w/ electronic access control
2. Hardware:
   a. 1 continuous hinge
   b. 1 closer
   c. 1 exit device
   d. 1 motorized electric latch retraction
   e. 1 Power Supply
   f. 1 Rim Cylinder
   g. 3 weather stripping
   h. 1 threshold
   i. 1 sweep
   j. 1 card/proximity reader

E. Hardware Set 4:

1. Single Interior Door, rating to match door.
2. Hardware:
   a. 1 office locket w/ lever trim
   b. 3 hinges
   c. 1 kickplate
   d. 1 door silencer
   e. 1 wall-mounted bumper
   f. Closer (if in rated assembly)

F. Hardware Set 5:

1. Single Interior Door, rating to match door
2. Hardware:
   a. 1 privacy lockset w/ lever trim
   b. 3 hinges
   c. 1 kickplate
   d. 2 door protection plates at lever & deadlatch

e. 1 door silencer
f. 1 wall-mounted bumper
g. Closer (if in rated assembly)

G. Hardware Set 6:

1. Double Exterior Entrance Door, w/ electronic access control
2. Hardware:
   a. 2 continuous hinges
   b. 2 closers
   c. 2 exit devices
   d. 1 motorized electric latch retraction
   e. 1 Power Supply
   f. 1 keyed removable mullion
   g. 1 rim cylinder (for removable mullion)
   h. 6 weather stripping
   i. 1 threshold
   j. 2 sweep
   k. 1 card/proximity reader

H. Hardware Set 7:

1. Double Interior Door, Passage Set w/ electronic access control
2. Hardware:
   a. 2 passage locksets w/ lever trim
   b. 6 Hinges
   c. 2 Closers
   d. 1 keyed-removable mullion
   e. 1 Rim cylinder (for removable mullion)
   f. 2 exit devices
   g. 1 motorized electric latch retraction
   h. 1 Power Supply
   i. 2 kickplates
   j. 2 silencers
   k. 2 wall-mounted bumpers
   l. 1 card/proximity reader

I. Hardware Set 8:

1. Single Interior Door, rating to match door
2. Hardware:
   a. 1 Entrance lockset w/ lever trim
   b. 3 Hinges
   c. 1 Closer
   d. 1 exit device
   e. 1 kickplate
   f. 1 silencer
   g. 1 wall-mounted bumper

J. Hardware Set 8A:

1. Single Interior Door, rating to match door, w/ electronic access control
2. Hardware:
   a. 1 Entrance lockset w/ lever trim
   b. 3 Hinges
   c. 1 Closer

d. 1 exit device
e. 1 motorized electric latch retraction
f. 1 Power Supply
g. 1 kickplate
h. 1 silencer
i. 1 wall-mounted bumper
j. 1 card/proximity reader

K. Hardware Set 9:

1. Single Interior Door, push/pull only – no latching hardware
2. Hardware:
   a. 3 Hinges
   b. 1 Closer
   c. 1 push bar
   d. 1 pull handle
   e. 1 kickplate
   f. 1 silencer
   g. 1 wall-mounted bumper

L. Hardware Set 10:

1. Single Interior Door, Egress door into stairs, rating to match door, w/ electronic access control.
2. Hardware:
   a. 1 Lockset, passage w/ lever trim
   b. 1 exit device
   c. 1 motorized electric latch retraction
   d. 1 Power Supply
   e. 3 hinges
   f. 1 closer
   g. 1 kickplate
   h. 1 silencer
   i. 1 wall-mounted bumper
   j. 1 card/proximity reader

M. Hardware Set 11:

1. Single Exterior Storage Door, w/ electronic access control.
2. Hardware:
   a. 1 Storage Locket w/ lever trim
   b. 1 continuous hinge
   c. 1 motorized electric latch retraction
   d. 1 Power Supply
   e. 3 weather stripping
   f. 1 threshold
   g. 1 sweep
   h. 1 card/proximity reader

N. Hardware Set 12:

1. Single Interior Door, rating to match door.
2. Hardware:
   a. 1 passage lockset w/ lever trim
   b. 1 exit device
   c. 3 hinges

d. 1 closer
e. 1 kickplate
f. 1 silencer
g. 1 wall-mounted bumper

O. Hardware Set 13:

1. Single Roof Access door in 4-sided frame
2. Hardware:
   a. 1 storage locket w/ lever trim, free egress from roof-side of door.
   b. 1 continuous hinge
   c. 4 weather stripping
   d. 1 sweep

3.8 ELECTRONIC DOOR HARDWARE NOTES AND DIAGRAM

A. All raceways and boxes provided by electrical contractor. Verify requirements with hardware and access control equipment.

B. All raceways shall be concealed above ceilings or within walls where possible. Exposed raceways shall be permitted in areas with exposed overhead construction.

C. Responsibilities:

1. Owner - is providing and installing wall card readers, and low voltage cable only. All other materials and work is by contractor.
2. Hardware Contractor – Door Hardware, Door Contacts, Electrical Strikes, Electrical Latches, Power Transfer Hinges, Sounders/Power Supplies, Door Operators/Power Supplies, Push Pad Actuators.
3. Security Contractor – Security Panel to Monitor Door Contacts.
4. Access Control Contractor – Card Readers, Low Voltage Cabling, Site Controller Program
5. Electrical Contractor – Back Box and Raceway Provisions, 120 VAC Provisions, Fire Alarm Connections

D. Diagrams and Keyed Notes: See Electrical Drawings

E. **END OF SECTION 08 71 00**

SECTION 10 51 26 - PLASTIC LOCKERS AND BENCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Solid plastic lockers.

1.2 RELATED SECTIONS

A. Division 06 Section "Rough Carpentry" for locker anchorage.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for each type of product indicated include fabrication details, description of materials and finishes.

1. Product Test Reports: When requested by Architect, provide documentation indicating compliance of products with requirements, from a qualified independent testing agency.

B. Shop Drawings: Include overall locker dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.

C. Samples for Selection: Furnish samples of manufacturer's full range of colors for initial selection.

D. Color Samples for Approval: Furnish a sample chip in the selected color.

1. Size: 2 by 3 inch (50 by 76 mm) in type of finish specified.

1.5 INFORMATIONAL SUBMITTALS

A. Installation instructions.

B. Warranty: Sample of special warranty.

1.6 MAINTENANCE SUBMITTALS

A. Operation and Maintenance Data.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum 5 years experience in the manufacture of plastic lockers. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:

1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
2. Samples of each component of product specified.
3. List of successful installations of similar products available for evaluation by Architect.
4. Submit substitution request not less than 15 days prior to bid date.

B. Installers Qualifications: An experienced Installer regularly engaged in the installation of lockers for a minimum of 3 years.

C. Source Limitations: Obtain plastic lockers and trim accessories from single manufacturer.

D. Accessibility Requirements: Comply with requirements of ADA/ABA and with requirements of authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver plastic lockers to the site until the building is enclosed and HVAC systems are in operation. Deliver plastic lockers in manufacturer's original packaging. Store in an upright condition. Protect plastic lockers from exposure to direct sunlight.

B. Ship plastic lockers fully assembled.

C. Lift and handle plastic lockers from the base not the sides.

1.9 WARRANTY

A. Special Manufacturer's Warranty: 20 year against rust, delamination or breakage of plastic parts under normal use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of Bradley Corporation. Equal by alternate manufacturer must be approved by architect.

1. Provide basis of design products or comparable products of one of the following approved manufacturers:

a. **Lenox Locker, 12" wide, double.**

b. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements.

B. MATERIALS

1. High Density Polyethylene (HDPE): 100 percent pre-consumer or post-consumer recycled content polyethylene thermoplastic formed under high pressure into solid plastic components.
2. Stainless-Steel Sheet: ASTM A 666, Type 304.
3. Fasteners: Tamper-Resistant Fasteners: Stainless steel torx-head screws.

   a. Locker Connectors: No. 10-24 sex bolts.
   b. Anchors: Type and size required for secure anchorage.
   c. Drilled-in-place Masonry Anchors: Minimum 1/4 by 1-3/4 inch (6 by 44 mm) screws.

2.2 STANDARD PLASTIC LOCKERS

A. Basis-of-Design Product: **Bradley LENOXLOCKER**.
1.Alternate acceptable manufacturers include Summit Lockers, or equal.

B. Locker Configuration: Two tier.

C. Locker Dimensions

1. Height, Nominal: 36 inch (914 mm).
2. Width: 12 inch (305 mm).
3. Depth: 12 inch (381 mm).

D. Material: HDPE plastic, 100 percent recycled material.

E. Sides, Tops, Bottoms, Dividers, and Shelves: 3/8 inch (10 mm) thick HDPE plastic with smooth finish.

F. Locker Shelves: 3/8 inch (10 mm) HDPE plastic, mortised into sides and back.

G. Locker Tops: Slope top.

H. Doors: Fabricate from a single piece 1/2 inch (13 mm) HDPE plastic.

1. Doors and Frame: 1/2 inch (13 mm) thick HDPE plastic with matte texture finish with ventilation slots with cross-hatch mesh pattern.

2. Logo on Door: Indicate accessible lockers.
3. Handle: ADA/ABA Compliant handle fabricated from injection molded plastic.
4. Locks: Standard hasp.

5. Hinges: Continuous piano hinges, .05 inch/18 gauge (1.27 mm) thick type 304 stainless steel fabricated to wrap around edges of door and frame and attached with stainless steel tamper-resistant screws.

   a. Finish: Powder coated to match color of locker.

6. Latch Bar: Full-height latch bar constructed of 1/2 inch (13 mm) Black HDPE plastic secured to locker with stainless steel tamper-resistant screws.

I. Color: As selected by Architect from manufacturer's full range.

Specifier: Retain accessories required for project.

J. Accessories:

1. Coat Hooks: Black polycarbonate double hook.
2. End Panels: **[**3/8 inch (10 mm)**]** **[**1/2 inch (13mm)**]** thick, with color and finish matching locker body.
3. Filler Panels: 1/2 inch (13 mm) HDPE filler panel, with color and finish matching locker body, attached with 3/8 inch (10 mm) thick HDPE solid plastic angle bracket.
4. Wall Hooks: Black powder coated, cast zinc hook **[**one**]** **[**two**]** **[**three**]** per locker.
5. Number Plate: White acrylic with black film coating, laser etched with number specified. Provide one per locker.
6. Locker Base: 1 inch (26 mm) solid HDPE plastic, with black or finish matching locker body, **[**3 inch (76 mm) **]** **[**4 inch (101 mm)**]** high.
7. Coat Rod: Schedule 40 PVC with plastic pole sockets and stainless-steel tamper-resistant screws. Provided in **[**18 inch (457 mm)**]** **[**21 inch (533 mm)**]** **[24** inch (610 mm)**]** depth.

2.3 LOCKER FABRICATION

A. Fabricate locker box from a single sheet of HDPE solid plastic with corners fused together. Weld frames and shelves to box assembly. Provide all welded construction of locker parts without dovetail slots or metal fasteners. Add welded gussets in single tier full height lockers.

B. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

C. Hardware Attachment: All hinges, handles, hasps, hooks, latch bars, and locks attached with tamper-resistant screws.

D. Provide ventilated panels where indicated.

E. Continuous Base: Set toe clearance 3 inch (76 mm) from locker front. Notch end caps for ease of installation.

F. Continuous Sloping Tops: Fabricated in lengths indicated, without visible fasteners at splice locations; and finished to match lockers.

G. Filler Panels: Finished to match lockers.

H. Finished End Panels: Fabricated with **[**3/8 inch (10 mm)**]** **[**1/2 inch (13 mm)**]** wide edge dimension, configured to conceal fasteners and holes at exposed ends of plastic lockers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lockers in climate-controlled environment, shielded from direct sunlight.

B. General: Install on floor or other firm support. Install level, plumb, and true.

1. Position locker base per approved shop drawing. Using fasteners provided by manufacturer, anchor base sections to the floor.
2. Attach filler pieces to lockers with male-female sex bolts.
3. Position first locker according to submittal layout. Square and plumb the locker using concealed shims. Secure the locker to the wall at the top and bottom of the locker. Position second locker next to first, square and plumb to align the tops and bottoms; and temporarily clamp lockers together. Drill four holes through the sides of the lockers and connect lockers using sex bolts provided by manufacturer.

C. Accessories: Fit exposed connections of trim, fillers, and closures together to form tight, hairline joints, with concealed fasteners and splice plates furnished by locker manufacturer. Install as indicated on approved shop drawings.

1. Coat Hooks: Attached with at least two fasteners.
2. Coat Rods: Attached at height indicated.
3. Identification Plates: Identify plastic lockers with approved identification numbers. Attach plates to each locker door.
4. Filler Panels: Attach with concealed fasteners.
5. Sloping Tops: Attach sloping-tops to plastic lockers, with closures at exposed ends.
6. Finished End Panels: Attach at ends exposed.

3.2 FINAL CLEANING

A. Clean locker interior and exterior surfaces.

B. Remove packaging and construction debris and legally dispose of off-site.

END OF SECTION 10 51 26

SECTION 13 34 19 - METAL BUILDING SYSTEMS

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:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Foamed-insulation-core metal wall panels.
5. Metal soffit panels.
6. Thermal insulation.
7. Personnel doors and frames.
8. Accessories.

B. Related Requirements:

1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface.
2. Section 083323 "Overhead Coiling Doors" for coiling vehicular doors in metal building systems.
3. Section 083613 "Sectional Doors" for sectional vehicular doors in metal building systems.

1.3 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to metal building systems including, but not limited to, the following:

    a. Condition of foundations and other preparatory work performed by other trades.
    b. Structural load limitations.
    c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
    d. Required tests, inspections, and certifications.
    e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

    a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
    b. Structural limitations of purlins and rafters during and after roofing.
    c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
    d. Temporary protection requirements for metal roof panel assembly during and after installation.
    e. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

    a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    b. Structural limitations of girts and columns during and after wall panel installation.
    c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    d. Temporary protection requirements for metal wall panel assembly during and after installation.
    e. Wall observation and repair after metal wall panel installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

    a. Metal roof panels.
    b. Metal wall panels.
    c. Foamed-insulation-core metal panels.
    d. Metal soffit panels.
    e. Thermal insulation and vapor-retarder facings.
    f. Personnel doors and frames.
    g. Windows.
    h. Roof ventilators.
    i. Louvers.

B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:

1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

    a. Show provisions for attaching mezzanines.

3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

    a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
    b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
    c. Show translucent panels.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):

    a. Flashing and trim.
    b. Gutters.
    c. Downspouts.
    d. Service walkways.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For the following products:

1. Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch- (150-mm-) square Samples.
4. Windows: Full-size, nominal 12-inch- (300-mm-) long frame Samples showing typical profile.
5. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.

E. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

F. Delegated-Design Submittal: For metal building systems.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

2. Engineer must be licensed in the State of North Carolina.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector, manufacturer, and land surveyor.

B. Welding certificates.

C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:

1. Name and location of Project.
2. Order number.
3. Name of manufacturer.
4. Name of Contractor.
5. Building dimensions including width, length, height, and roof slope.
6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
7. Governing building code and year of edition.
8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.

10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

D. Erector Certificates: For qualified erector, from manufacturer.

E. Material Test Reports: For each of the following products:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

F. Source quality-control reports.

G. Field quality-control reports.

H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

I. Sample Warranties: For special warranties.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups for typical wall metal panel including accessories.

a. Size: 48 inches (1200 mm) long by 48 inches (1200 mm).

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 25 years from date of Substantial Completion.

B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

B. Primary-Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of [primary frame, capable of supporting one-half of a bay design load, and end-wall columns] [load-bearing end-wall and corner columns and rafters].

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and flush-framed girts.

E. Eave Height: as indicated by nominal height on Drawings.

F. Bay Spacing: As indicated on Drawings.

G. Roof Slope: As indicated on drawings.

H. Roof System: Manufacturer's standard standing-seam, vertical-rib metal roof panels.

I. Exterior Wall System: Manufacturer's standard foamed-insulation-core metal wall panels.

1. Liner Panels: Flush profile.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.

B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: As indicated on Drawings.
2. Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
3. Deflection and Drift Limits: No greater than the following:

a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
b. Girts: Horizontal deflection of 1/240 of the span.
c. Metal Roof Panels: Vertical deflection of 1/240 of the span.
d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
f. Lateral Drift: Maximum of 1/400 of the building height.

C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] <Insert requirement>.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.

F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.

G. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.

H. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa)] [6.24 lbf/sq. ft. (300 Pa).

I. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

J. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646[or ASTM E331] at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

K. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

L. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

M. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-120.
2. Hail Resistance: SH.

N. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:

1. Three-year, aged, solar reflectance of not less than shown in code summary in drawings.
2. Three-year, aged, Solar Reflectance Index of not less than shown in code summary in drawings when calculated according to ASTM E1980.

O. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C1363 or ASTM C518:

1. Roof:

   a. U-Factor: As shown in drawings.
   b. R-Value: As shown in drawings

2. Walls:

   a. U-Factor: As shown in drawings.
   b. R-Value: As shown in drawings.

2.4 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

   a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.

2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Frame Configuration: Single gable.
4. Exterior Column: Tapered.
5. Rafter: Tapered.

E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:

1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch- (64-mm-) wide flanges.

    a. Depth: [As indicated on Drawings] [As needed to comply with system performance requirements] <Insert dimension>.

2. Purlins: Steel joists of depths indicated on Drawings.
3. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch- (64-mm-) wide flanges.

    a. Depth: [As indicated on Drawings] [As required to comply with system performance requirements] <Insert dimension>.

4. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
5. Flange Bracing: Minimum 2-by-2-by-1/8-inch (51-by-51-by-3-mm) structural-steel angles or 1-inch- (25-mm-) diameter, cold-formed structural tubing to stiffen primary-frame flanges.
6. Sag Bracing: Minimum 1-by-1-by-1/8-inch (25-by-25-by-3-mm) structural-steel angles.
7. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch (76-by-51-mm), fabricated from zinc-coated (galvanized) steel sheet.
8. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
9. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

G. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.

1. Type: [Straight-beam, eave type] [Purlin-extension type] [Tapered-beam, below-eave type] [As indicated].

H. Bracing: Provide adjustable wind bracing [using any method] as follows:

1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade 50 (345); or ASTM A529/A529M, Grade 50 (345); minimum 1/2-inch- (13-mm-) diameter steel; threaded full length or threaded a minimum of 6 inches (152 mm) at each end.
2. Cable: ASTM A475, minimum 1/4-inch- (6-mm-) diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.

I. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

J. Materials:

1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade 50 or 55 (345 or 380); or ASTM A529/A529M, Grade 50 or 55 (345 or 380).
4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or HSLAS, Grades 45 through 70 (310 through 480).
7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80 (230 through 550), or HSLAS or HSLAS-F, Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80 (230 through 550), or HSLAS or HSLAS-F, Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.

9. Joist Girders: Manufactured according to "Standard Specifications for Joist Girders," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for primary framing.

10. Steel Joists: Manufactured according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for secondary framing.
11. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 (ASTM A563M) carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.

    a. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

12. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M,Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

    a. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

13. Unheaded Anchor Rods: [ASTM F1554, Grade 36] [ASTM A572/A572M, Grade 50 (345)] [ASTM A36/A36M] [ASTM A307, Grade A].

    a. Configuration: Straight.
    b. Nuts: ASTM A563 (ASTM A563M) [heavy-]hex carbon steel.
    c. Plate Washers: ASTM A36/A36M carbon steel.
    d. Washers: ASTM F436 (ASTM F436M) hardened carbon steel.
    e. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

14. Headed Anchor Rods: [ASTM F1554, Grade 36] [ASTM A307, Grade A].

    a. Configuration: Straight.
    b. Nuts: ASTM A563 (ASTM A563M) [heavy-]hex carbon steel.
    c. Plate Washers: ASTM A36/A36M carbon steel.
    d. Washers: ASTM F436 (ASTM F436M) hardened carbon steel.
    e. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

15. Threaded Rods: [ASTM A193/A193M] [ASTM A572/A572M, Grade 50 (345)] [ASTM A36/A36M] [ASTM A307, Grade A].

    a. Nuts: ASTM A563 (ASTM A563M) [heavy-]hex carbon steel.
    b. Washers: [ASTM F436 (ASTM F436M) hardened] [ASTM A36/A36M] carbon steel.
    c. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

K. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.

    1. Clean and prepare in accordance with SSPC-SP2.

2. Coat with manufacturer's standard primer (red). Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil (0.025 mm).

    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil (0.013 mm) on each side.

2.5 METAL ROOF PANELS

A. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, as indicated on the drawings. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Exterior Finish: ~~Three~~ **Two**-coat fluoropolymer.
    b. Color: As selected by Architect from manufacturer's full range.

2. Clips: Two-piece floating to accommodate thermal movement.
3. Joint Type: Panels snapped together.
4. Panel Coverage: 16 inches (406 mm).
5. Panel Height: 2 inches (51 mm).

B. Finishes:

1. Exposed Coil-Coated Finish:
    a. ~~Three~~ **Two**-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.6 METAL WALL PANELS

2.7 FOAMED-INSULATION-CORE METAL WALL PANELS

A. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. Panel Thermal-Resistance Value (R-Value): As noted in building code summary in drawings.

2. Facing Material: Fabricate panel with exterior and interior facings of same material and thickness. Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

    a. Exterior Surface: Shallow V grooves, **smooth.**
    b. Exterior Finish: ~~**Three**~~ **Two**-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 36 inches (914 mm) nominal.
4. Panel Thickness: 2 inches (51 mm).
5. Insulation Core: Modified polyisocyanurate or polyurethane foam using a non-CFC blowing agent, foamed-in-place or board type, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

    a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
    b. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D1622.
    c. Compressive Strength: Minimum 20 psi (140 kPa) when tested according to ASTM D1621.
    d. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C273/C273M.

6. Fire-Test-Response Characteristics: Class A according to ASTM E108.
7. Surface-Burning Characteristics: Flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E84.

B. Finishes:

1. Exposed Coil-Coated Finish:
    a. ~~**Three**~~ **Two**-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.8 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof panels.

1. Finish: As selected by Architect from manufacturer's full range.

C. Concealed-Fastener, Flush-Profile, Metal Soffit Panels: Formed with vertical panel edges and flush surface; with flush joint between panels; with 1-inch- (25-mm-) wide flange for attaching interior finish; designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

   a. Exterior Finish: Fluoropolymer.
   b. Color: As selected by Architect from manufacturer's full range.

2. Panel Coverage: 16 inches (406 mm).
3. Panel Height: 1 inch (25 mm).

2.9 THERMAL INSULATION

A. Unfaced Metal Building Insulation: ASTM C991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

B. Retainer Strips: For securing insulation between supports, 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

C. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E96/E96M, Desiccant Method.
1. Composition: White polypropylene film facing and fiberglass-polyester-blend fabric backing.

D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.10 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames: As specified in Section 081113 "Hollow Metal Doors and Frames."

2.11 STOREFRONT & OPENING SYSTEMS

A. Storefront Systems: As specified in Section 084113 "Aluminum-Framed Entrances & Storefronts."

B. Glazing: Comply with requirements specified in Section 088000 "Glazing."

2.12 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fascia, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.030-inch (0.76-mm) nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Roof Ventilators: Gravity type, complete with hardware, flashing, closures, and fittings.

1. Circular-Revolving Type: Minimum [20-inch- (508-mm-)] <Insert dimension> diameter throat opening; zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness, with coil coating; finished to match metal roof panels; with matching base and rain cap.

    a. Type: Directional revolving.
    b. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire; or aluminum, 1/2-inch- (13-mm-) square mesh, 0.063-inch (1.6-mm) wire.
    c. Dampers: Spring-loaded, butterfly type; pull-chain operation; with pull chain of length required to reach within 36 inches (914 mm) of floor.
    d. Reinforce and brace units, with joints properly formed and edges beaded to be watertight under normal positive-pressure conditions.
    e. Mount ventilators on square-to-round bases for ridge or on-slope mounting, designed to match roof pitch and roll formed to match metal roof panel profile.

H. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch (1.21-mm) nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.036-inch (0.91-mm) nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.

1. Blades: Fixed.
2. Blades: Adjustable type, with weather-stripped edges, and manually operated by hand crank or pull chain.
3. Free Area: as noted in mechanical drawings.
4. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire; with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.

    a. Mounting: Interior face of louvers.

5. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.

I. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch (1.21-mm) nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.

1. Curb Subframing: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.060-inch (1.52-mm) nominal uncoated steel thickness, angle-, C-, or Z-shaped metallic-coated steel sheet.
2. Insulation: 1-inch- (25-mm-) thick, rigid type.

J. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

K. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

    a. Fasteners for Metal Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM sealing washer.
    b. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
    c. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with EPDM sealing washers bearing on weather side of metal panels.
    d. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.
    e. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    f. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive

compound free of asbestos fibers, sulfur components, and other deleterious impurities.

3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:

    a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.13 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.

2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.14 SOURCE QUALITY CONTROL

A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.

1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.

a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Steel Joists and Joist Girders: Install joists, girders, and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Joist Installation: Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
5. Joist Installation: Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for high-strength structural bolt installation and tightening requirements.
6. Joist Installation: Weld joist seats to supporting steel framework.
7. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL PANEL INSTALLATION, GENERAL

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-

formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
6. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.

4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Insulated Metal Wall Panels: Install insulated metal wall panels on exterior side of girts. Attach panels to supports at each panel joint using concealed clip and fasteners at maximum 42 inches (1067 mm) o.c., spaced not more than manufacturer's recommendation. Fully engage tongue and groove of adjacent insulated metal wall panels.

1. Install clips to supports with self-tapping fasteners.
2. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels as weather seal.

D. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), noncumulative; level, plumb, and on location lines; and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.7 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.

2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.
2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.
3. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.

    a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.

    a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

5. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

D. Board Wall Insulation: Extend board insulation in thickness indicated to cover entire wall. Hold in place by metal wall panels fastened to secondary framing. Comply with manufacturers' written instructions.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.9 DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

B. Personnel Doors and Frames: Install doors and frames according to NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

1. Between Doors and Frames at Jambs and Head: 1/8 inch (3 mm).
2. Between Edges of Pairs of Doors: 1/8 inch (3 mm).
3. At Door Sills with Threshold: 3/8 inch (9.5 mm).
4. At Door Sills without Threshold: 3/4 inch (19.1 mm).
5. At fire-rated openings, install frames according to, and doors with clearances specified in, NFPA 80.

C. Sliding Service Doors: Bolt support angles to opening head members through factory-punched holes. Bolt door tracks to support angles at maximum 24 inches (610 mm) o.c. Set doors and operating equipment with necessary hardware, jamb and head mold stops, continuous hood flashing, anchors, inserts, hangers, and equipment supports.

D. Field Glazing: Comply with installation requirements in Section 088000 "Glazing."

E. Door Hardware:

1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 "Joint Sealants."

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

E. Circular Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Mount ventilators on flat level base. Install preformed filler strips at base to seal ventilator to metal roof panels.

F. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

G. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

H. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

B. Product will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

D. Roof Ventilators and Adjustable Louvers: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.

1. Adjust louver blades to be weathertight when in closed position.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

G. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.

H. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 13 34 19

SECTION 22 07 19 - PLUMBING PIPING INSULATION

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 insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Roof drains and rainwater conductors.
5. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Block Insulation: ASTM C 552, Type I.
2. Special-Shaped Insulation: ASTM C 552, Type III.
3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.

4. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

E. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.4 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.

5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.7 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures,:

1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Keep insulation materials dry during application and finishing.

F. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

G. Install insulation with least number of joints practical.

H. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

I. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

J. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above-ambient services, do not install insulation to the following:
1. Testing agency labels and stamps.
2. Nameplates and data plates.
3. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations: Install insulation continuously through walls and partitions.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

C. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their

installation. Extent of inspection shall be limited to three locations of straight pipe and three locations of threaded fittings.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS ½ and Smaller: Insulation shall be the following:

a. Glass Fiber: 1/2 inch thick.

2. NPS 3/4 and Larger: Insulation shall be the following:

a. Glass Fiber: 1 inch thick.

B. Domestic Hot Water:

1. NPS 1-1/2 and Smaller: Insulation shall be the following:

a. Glass Fiber: 1 inch thick.

2. NPS 1-3/4 and Larger: Insulation shall be the following:

a. Glass Fiber: 1.5 inch thick.

C. Domestic Recirculated Hot Water Loop:

1. NPS ½ and Larger: Insulation shall be the following:

a. Glass Fiber: 1 inches thick.

END OF SECTION 220719

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

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:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C 1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.

2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:

    a. Standard: ASTM C 1173.
    b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    c. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
        2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
        3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

    a. Standard: ASTM C 1460.
    b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

    a. Standard: AWWA C219.
    b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
    c. Center-Sleeve Material:Stainless steel
    d. Gasket Material: Natural or synthetic rubber.
    e. Metal Component Finish: Corrosion-resistant coating or material.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 and smaller; **1 percent** downward in direction of flow for piping NPS 3and larger.
2. Vent Piping: 1 **percent** down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

N. Install aboveground PVC piping according to ASTM D 2665.

O. Install underground PVC piping according to ASTM D 2321.

P. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

Q. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

S. Install sleeves for piping penetrations of foundation walls. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 and larger: Use dielectric flanges or flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install galvanized carbon-steel pipe hangers for horizontal piping in corrosive and noncorrosive environments.
2. Install galvanized carbon-steel pipe support clamps for vertical piping in corrosive and noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

B. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.

4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for backwater valves, cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure

must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

A. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
   1. Solid-Wall PVC Pipe and PVC Socket Fittings.

B. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
   1. Solid-Wall PVC Pipe and PVC Socket Fittings.

END OF SECTION 221316

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Addressable fire-alarm system.
2. Fire-alarm control unit (FACU).
3. Manual fire-alarm boxes.
4. System smoke detectors.
5. Duct smoke detectors.
6. Carbon monoxide detectors.
7. Heat detectors.
8. Multicriteria and multisensor fire detectors.
9. Notification appliances.
10. Fire-alarm remote annunciators.
11. Fire-alarm addressable interface devices.
12. Digital alarm communicator transmitters (DACTs).
13. Cellular communications

B. The fire alarm system shall comply with applicable provisions of the NC Building Code (available for sale at NCDoI), and the 2013 National Fire Alarm Code (NFPA 72). The Contractor shall furnish all parts, materials, and labor required for a complete and operating system in accordance with all the applicable requirements, even if each needed item is not specifically shown or described in the project plans or specs.

1.2 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. NICET: National Institute for Certification in Engineering Technologies.

C. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

D. Authority Having Jurisdiction (AHJ), Building Permits, Submittal Approval. For private sector, Community College or local government projects the AHJ is the local

government entity that approves project plans, issues building permits and inspects construction.

1.3 SUBMITTALS

A. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.

B. Product Data: For each type of product indicated. Submittals shall provide the mA draw for each device submitted and the listed minimum voltage required to operate.

C. Shop Drawings: For fire-alarm system. Include plans, details, and attachments to other work. Engineer's approval (with or without corrections) of contractor's Shop Drawings, cut sheets, etc., is for general conformance with the contract documents and design concept. It shall not relieve the contractor of responsibility of full compliance with the project plans and specifications, EXCEPT for any specific non-compliant features for which the engineer gives written authorization.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
    a. Use manufacturer's battery discharge curve to determine expected battery voltage after 60/24 hours of providing standby power. Then use calculated Notification Appliance Circuit current draw in the alarm mode to determine expected voltage drop at End of the Line Resistor (EOL), based on conductor resistance per manufacturer's data sheet or NEC.
    b. The voltage drop at EOL must not exceed 14% of the expected battery voltage, after the required standby time plus alarm time. (Typically, for a 24 volt system, this limits the voltage drop from the battery to the EOL to 3 volts). Determine "worst case" voltage at far end of each NAC, by subtracting its calculated V-drop from the expected battery voltage. The result must be no less than the minimum listed operating voltage for the alarm notification appliances used.
    c. Calculations shall be placed on a dedicated sheet of as-built drawings for future reference by fire alarm service technicians. NAC voltage drop shall be verified during system test.
4. Include input/output matrix with any non-compliant features clearly described.
5. System riser diagram with device addresses, candela rating, conduit sizes, and cable and wire types and sizes.
6. Provide control wiring diagrams for fire-alarm interface to HVAC; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring and equipment required for HVAC unit shutdown on alarm.
    c. Locate detectors in accordance with manufacturer's written instructions.
    d. Show air-sampling detector pipe routing.

7. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
8. Manufacturer's detailed installation instructions for the Fire Alarm Control Panel and all duct mounted smoke detectors, flow switches, tamper switches, supervisory switches, and similar items which require mechanical installation.
9. Include alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
10. Provide floor plans with audible alarm device sound power and alarm sound level for each space or contractor shall certify that design meets NFPA 72 for sound levels. Any additional devices required while verifying the system shall be at the contractor's expense
11. Provide plans showing each device and device identification number. Wire type, color and size between devices shall be shown with proposed conduit routing. The distance and route for each NAC shall be shown.

D. Qualification Data: For qualified Installer. Copies of the training and certification within the last 24 months, except that a NICET Level III certification shall extend this to 36 months, must be submitted to the Designer prior to installation. Submittals will not be approved without this information.

E. Field quality-control reports.

F. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide hard copies of the "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter to the Owner, Architect, and Authorities having jurisdiction.
3. Record copy of site-specific software.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Copy of NFPA 25.

1.4 CLOSEOUT SUBMITTALS

A. In addition to the Shop Drawing submittal described above, the fire alarm system contractor shall provide the engineer two bound copies of the following technical information, for transmittal to the owner:

1. As-Built wiring diagram showing all loop numbers and device addresses, plus terminal numbers where they connect to control equipment.
2. As-Built wiring and conduit layout diagrams, including wire color code and/or label numbers, and showing all interconnections in the system.
3. Electronic circuit diagrams of all control panels, modules, annunciators, communications panels, etc.
4. Manufacturer's detailed maintenance requirements.
5. Technical literature on all control equipment, isolation modules, power supplies, batteries, detectors, manual stations, alarm/supervisory signal initiating devices, alarm notification appliances, relays, remote alarm transmission means, etc.
6. The as-built "calculations" sheet

B. Electronic Archive: Complete configuration data (site-specific programming) for the system must be stored on electronic media and archived by the fire alarm system manufacturer or authorized distributor. A diskette or CD copy of this data shall be submitted to the engineer for transmission to the owner on the day the system is commissioned

C. The manufacturer, or authorized distributor, must maintain software version (VER) records on the system installed. The system software shall be upgraded free of any charge if a new VER is released during the warranty period. For new VER to correct operating problems, free upgrade shall apply during the entire life of the system.

D. The contractor shall provide the owner with one copy of the following:

1. All software required, both for the installed fire alarm system necessary to access the fire alarm system for trouble shooting, programming, modifications, monitoring, de-bugging, or similar functions.
2. Complete documentation for all software for both the installed fire alarm system and for any interface PC software necessary for system functions as described above.
3. Interconnection cable where such is required to connect the fire alarm system to a PC.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project. The company shall specialize in performing the required work and making the final terminations. Minimum of 5 years documented experience installing fire detection and alarm systems similar in size and scope to this project. Only the installer (original programmer) may make program changes and must be present for the 100% test, Designer's pre-final review and Owner inspections. All connections to the FACP and the system's programming shall be done only by the manufacturer, or by an authorized distributor.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by third-party testing agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to Label Electrical and Mechanical Equipment

http://www.ncdoi.com/osfm/Engineering_and_Codes/default.aspx?field1=Code_Enforcement_-_Third_Party_Testing_agencies&user=Code_Enforcement_Resources

D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match existing products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamperproofed components.
6. Audible and Visual Notification Appliances: Two of each type installed.
7. Fuses: Two of each type installed in system. Provide in box or cabinet with compartments marked with fuse types and sizes.
8. Filters for Air-Sampling Detectors: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

A. Cable Manufactures:

1. Comtran Corporation.

2. Atlas
3. Helix/HiTemp Cables, Inc.; a Draka USA Company.
4. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
5. West Penn Wire/CDT; a division of Cable Design Technologies.

2.2 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:
1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn-and-strobe notification for evacuation.

B. Performance Criteria:
1. Regulatory Requirements:
a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:
a. Automatic sensitivity control of certain smoke detectors.

b. Fire-alarm signal initiation must be by one or more of the following devices:
1) Manual stations.
2) Heat detectors.
3) Smoke detectors.
4) Duct smoke detectors.
5) Carbon monoxide detectors.
6) Automatic sprinkler system water flow.

c. Fire-alarm signal must initiate the following actions:
1) Continuously operate alarm notification appliances.
2) Identify alarm and specific initiating device at FACU and remote annunciators.
3) Transmit alarm signal to remote alarm receiving station.
4) Unlock electric door locks in designated egress paths.
5) Release fire and smoke doors held open by magnetic door holders.
6) Activate voice/alarm communication system.
7) Switch HVAC equipment controls to fire-alarm mode.
8) Close smoke dampers in air ducts of designated air-conditioning duct systems.
9) Activate emergency lighting control.
10) Record events in system memory.
11) Record events by system printer.
12) Indicate device in alarm on graphic annunciator.

d. Supervisory signal initiation must be by one or more of the following devices and actions:
1) Valve supervisory switch.
2) Alert and Action signals of air-sampling detector system.
3) Independent fire-detection and -suppression systems.
4) Zones or individual devices have been disabled.
5) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:
   1) Open circuits, shorts, and grounds in designated circuits.
   2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
   4) Loss of primary power at FACU.
   5) Ground or single break in internal circuits of FACU.
   6) Abnormal ac voltage at FACU.
   7) Break in standby battery circuitry.
   8) Failure of battery charging.
   9) Abnormal position of switch at FACU or annunciator.

f. System Supervisory Signal Actions:
   1) Initiate notification appliances.
   2) Identify specific device initiating event at FACU[, connected network control panels, off-premises network control panels,] [and remote annunciators].
   3) Record event on system printer.
   4) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
   5) Transmit system status to building management system.

2.3 FIRE-ALARM CONTROL UNIT (FACU)

A. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

B. MANUFACTURERS
   1. FACP and Equipment Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, limited to the following:

      a. Gamewell-FCI.
      b. NOTIFIER; a Honeywell company.
      c. Firelight
      d. Silent Knight.

C. Performance Criteria:
   1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
   2. General Characteristics:
      a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining information through failure of primary and secondary power supplies.
      b. Include real-time clock for time annotation of events on event recorder and printer.
      c. Provide communication between FACU and remote circuit interface panels, annunciators, and displays.

d. FACU must be listed for connection to central-station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. System must require no manual input to initialize in the event of complete power down condition. FACU must provide minimum 500-event history log.
f. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.
    1) Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: FACU must be listed for releasing service.
g. Fire-Alarm Annunciator: Arranged for interface between human operator at FACU and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and programming and control menu.
    1) Annunciator and Display: LCD, two lines of 80 characters, minimum.
    2) Keypad: Arranged to permit entry and execution of programming, display, and control commands.
h. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
    1) Pathway Class Designations: NFPA 72, Class B.
    2) Install no more than 50 addressable devices on each signaling-line circuit.
    3) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.
i. Notification-Appliance Circuit:
    1) Audible appliances must sound in three-pulse temporal pattern, as defined in NFPA 72.
    2) Where notification appliances provide signals to sleeping areas, alarm signal must be 520 Hz square wave with intensity 15 dB above average ambient sound level or 5 dB above maximum sound level, or at least 75 dB(A-weighted), whichever is greater, measured at pillow.
    3) Visual alarm appliances must flash in synchronization where multiple appliances are in same field of view, as defined in NFPA 72.
j. Water-flow alarm connected to sprinkler in elevator shaft and elevator machine room must shut down elevators associated with location without time delay.
    1) Water-flow switch associated with sprinkler in elevator pit may have delay to allow elevators to move to designated floor.
k. Remote Smoke-Detector Sensitivity Adjustment: Controls must select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out final adjusted values on system printer.
l. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to remote alarm station.
m. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual

transmission of announcements by use of central-control microphone. Amplifiers must comply with UL 1711.

1) Allow application of, and evacuation signal to, indicated number of zones and simultaneously allow voice paging to other zones selectively or in combination.
2) Programmable tone and message sequence selection.
3) Standard digitally recorded messages for "Evacuation" and "All Clear."
4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of FACU.

n. Status Annunciator: Indicate status of various voice/alarm speaker zones and status of firefighters' two-way telephone communication zones.
o. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, must be powered by 24 V(dc) source.
p. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.
q. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit. Glass-break rods are not allowed. Mount operating mechanism between 42-inces and 48-inces above finished floor.
2. Station Reset: Key-operated switch.
3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
4. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Unless suitably protected against dust, paint, etc., spot type smoke detectors shall not be installed until the final construction clean-up has been completed. In the event of contamination during construction, the detectors must be replaced.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Sounder Base: Provide bases with a built-in (local) sounder rated at 85 dBA minimum, measured at 10ft. Configure sounder bases such that sounders are activated under conditions as described in the Matrix. Provide low frequency sounder bases in sleeping areas.
6. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
7. Integral Visual-Indicating Light: Addressable initiation devices shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions, indicating that the device is operational and in regular communication with the control panel. Both LEDs shall be placed into steady illumination by the FACP to indicate that an alarm condition has been detected. The flashing mode operation of the detector LEDs shall be optional through the system field program. An output connection shall also be provided in the device base to connect an external remote alarm LED.
8. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually, automatically, adjustable for sensitivity by fire-alarm control unit due to ambient conditions and dust build-up within the detectors.

    a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
    b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
    c. Provide multiple levels of detection sensitivity for each sensor. Sensitivity shall be set through the FACP and shall be adjustable in the field through field programming of the system. Sensitivity shall be capable of being automatically adjusted by the FACP on a time-of-day basis.

9. Spot type smoke detector shall have a built-in locking device to secure the head to the base, for tamper resistance. For detectors mounted within 12 feet of the floor, activate this lock after the system has been inspected and given final acceptance.
10. Detectors shall store an internal identifying type code that the control panel shall use to identify the type of device

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

3. Shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control pane, send data to the panel representing the analog level of products of combustion.

2.6 DUCT SMOKE DETECTORS

A. Description: Photoelectric-type, duct-mounted smoke detector.

B. Performance Criteria:

1. Regulatory Requirements:

   a. NFPA 72.
   b. UL 268A.

2. General Characteristics:

   a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
   b. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   c. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
   d. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
   e. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

      1) Primary status.
      2) Device type.
      3) Present average value.
      4) Present sensitivity selected.
      5) Sensor range (normal, dirty, etc.).

   f. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with supplied detector for smoke detection in HVAC system ducts.
   g. Each sensor must have multiple levels of detection sensitivity.

h. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
i. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 CARBON MONOXIDE DETECTORS

A. Description: Carbon monoxide detector listed for connection to fire-alarm system.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72
b. NFPA 720.
c. UL 2075.

2. General Characteristics:

a. Mounting: Adapter plate for outlet box mounting.
b. Testable by introducing test carbon monoxide into sensing cell.
c. Detector must provide alarm contacts and trouble contacts.
d. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
e. Locate, mount, and wire in accordance with manufacturer's written instructions.
f. Provide means for addressable connection to fire-alarm system.
g. Test button simulates alarm condition.

2.8 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated. Up to 99 intelligent heat detectors may connect to one SLC loop.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F. Non-rate of rise detectors is indicated by NRR adjacent to the thermal detector symbol. Where used in elevator machine rooms or hoist ways, select temperature rating nominal 10 degrees F less than the adjacent fire sprinkler

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.9 MULTICRITERIA AND MULTISENSOR FIRE DETECTORS

A. Description: Fire-sensing detectors using multiple means of detection.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
b. Automatically adjusts its sensitivity by means of drift compensation and smoothing algorithms. Detector must send trouble alarm if it is incapable of compensating for existing conditions.
c. Test button tests sensors in detector.
d. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present sensitivity selected.
4) Sensor range (normal, dirty, etc.).

e. Detector must have functional humidity range within 10 to 90 percent relative humidity.
f. Color: White.
g. Comply with UL requirements.
h. Sensors (Multisensor Type): Detector must be comprised of four sensing elements including smoke sensor and carbon monoxide sensor.

1) Smoke sensor must be photoelectric type as described in "System Smoke Detectors" Article.
2) Carbon monoxide sensor must be as described in "Carbon Monoxide Detectors" Article.
3) Each sensor must be separately listed in accordance with requirements for its detector type.

2.10 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters.

1. Mounting: Wall mounted unless otherwise indicated.
2. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
3. Flashing shall be synchronized with other units, with duration of 2/10ths of one second. Minimum intensity Candela (Cd) rating of 15 Cd, or grater as indicated on Drawings. Notify the designer of any coverage deficiencies.
4. Strobe Leads: Factory connected to screw terminals.
5. Mounting Faceplate: Factory finished, white.

2.11 FIRE-ALARM REMOTE ANNUNCIATORS

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 12.
2. Annunciator shall communicate with the fire alarm control panel via an EIA-485 communications loop (four-wire) and shall individually annunciate all zones in the system. System zones shall be as indicated on the Drawings. Up to 10 annunciators may be connected to the EIA-485 communications loop

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

1. The annunciator shall provide a red Alarm LED per zone, and a yellow Trouble LED per zone. The annunciator shall also have an "ON-LINE" LED, local piezo sounder, local acknowledge/lamp test switch, and custom zone/function identification labels. Annunciator switches may be used for System control such as, Global Acknowledge, Global Signal Silence, and Global System Reset. All annunciator switches and indicators shall be software programmable
2. The Alphanumeric Display Annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text. The LCD Annunciator shall display all alarms and trouble conditions in the system
3. The system shall allow a minimum of four LCD annunciators. In addition to annunciation functions, each LCD annunciator shall be capable of the following software programmed system functions: Acknowledge, Signal Silence and Reset.
4. The annunciator shall connect to a two-wire EIA-485 interface. The two-wire connection shall be capable operation at distances of 6,000 feet. Provide interface to fiber optic cable systems and/or repeater units where such are indicated on the Drawings

2.12 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES

A. General: These devices either monitor a set of dry contacts, or provide contacts for control of equipment. All devices may not be shown on the drawings for the required system configuration, however contractor shall provide quantity required for complete operation

1. Include address-setting means on the module utilizing dip switches.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.
4. Indication of Operation: An LED shall be provided that shall flash under normal conditions, indicating that the Monitor Module is operational and in regular communication with the control panel.
5. A magnetic test switch shall be provided to test the module without opening or shorting its NAC wiring.

B. Description: Microelectronic monitor module, NRTL listed for use to connect one supervised zone (either Style D or Style B) of non-addressable Alarm Initiating Devices (any Normally Open [N.O.] dry contact device) to one of the Fire Alarm Control Panel Signaling Line Circuit Loops.

C. Addressable Control Module: Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual (A/V) Notification Appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay. The control module shall provide address-setting means.

1. Configuration: The control module NAC circuit may be wired for (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form C) relay. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
2. Power Source: Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, 3rd party listed remote power supply. A/V power sources and connections are not shown on the Drawings.

D. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

E. Isolator Module: Isolator Modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The Isolator Module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop to

20 addressable devices. Modules must be readily accessible (not above ceiling) and clearly labeled.

1. Operation: Isolator Modules shall operate such that if a wire-to-wire short occurs, the Isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the Isolator Module shall automatically reconnect the isolated section. The Isolator Module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an Isolator Module after its normal operation.
2. The Isolator Modules shall provide a single LED that shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

F. Water Flow Switch: Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds. Flow switches shall be located a minimum of one (1) foot from a fitting that changes the direction of the flow and a minimum of three (3) feet from a valve as required per NFPA 13. Installation: Water Flow Switches shall be connected by the Division 26 (Electrical) Contractor but furnished and installed by the Division 23 (Mechanical) Contractor.

G. Sprinkler and Standpipe Valve Supervisory Switch: Supervisory switch mechanisms shall be contained in a weatherproof housing that shall provide a 3/4-inch tapped conduit entrance and shall incorporate the necessary facilities for attachment to the valves. Switch housing shall be finished in red baked enamel. Mounting: Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs)

A. Performance Criteria:

1. Regulatory Requirements:

   a. NFPA 72.

2. General Characteristics:

   a. DACT must be acceptable to remote central station and must be listed for fire-alarm use with UL 632 and be listed and labeled by an NRTL.
   b. Functional Performance: Unit must receive alarm, supervisory, or trouble signal from FACU and automatically capture one telephone line(s) and dial preset number for remote central station. When contact is made with central station(s), signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate local trouble signal and transmit signal indicating loss of telephone line to remote alarm receiving station over remaining line. Transmitter must automatically report telephone service restoration to central station. If service is lost on both telephone lines, transmitter must initiate local trouble signal.

c. Local functions and display at DACT must include the following:

1) Verification that both telephone lines are available.
2) Programming device.
3) LED display.
4) Manual test report function and manual transmission clear indication.
5) Communications failure with central station or FACU.

d. Digital data transmission must include the following:

1) Address of alarm-initiating device.
2) Address of supervisory signal.
3) Address of trouble-initiating device.
4) Loss of ac supply or loss of power for at least 1 hour but not more than 3 hours.
5) Low battery.
6) Abnormal test signal.
7) Communication bus failure.

e. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.14 CELLULAR COMMUNICATIONS

A. Provide cellular communications device for fire-alarm system with the following:
1. 97 second supervisory heartbeat
2. 60 minute supervision window
3. SIM card included
4. UL listed power supply with backup battery and transformer.
5. Available with remote antenna option
6. Operates over the following communication protocols: HSPA+ (4G), HSPA (HSDPA & HSUPA) (3G), EDGE (2G), GPRS (2G).
7. Provide signal strength and status indicators.
8. UL 864 listed – Standard for Control Units and Accessories for Fire Alarm Systems.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Smoke- or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.

4. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

C. Smoke Detectors: Photo type detectors shall be installed in all areas shown on plans with the exception that Ionization type shall be installed in the elevator equipment rooms. Smoke detectors shall not be installed in non-conditioned spaces.

D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

E. Remote Status and Alarm Indicators: Install near each smoke detector that is not readily visible from normal viewing position.

F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

G. Visible Alarm-Indicating Devices: Install adjacent to each or alarm horn and at least 6 inches below the ceiling.

H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

I. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor. Provide framed and protected floor plan with device numbering and layout near FACP location. The unique device number shall match those represented on the as-built plans and those reported at the FACP and Annunciator.

J. Annunciator: Install with top of panel not more than 60 inches above the finished floor. Provide framed and protected floor plan with device numbering and layout near Annunciator location. The unique device number shall match those represented on the as-built plans and those reported at the FACP and Annunciator.

K. In multistory buildings, all circuits leaving the riser on each floor shall feed through a labeled terminal block in a hinged enclosure accessible from the floor. If building layout requires the terminal cabinet to be above a drop ceiling, its location must be clearly and permanently identified with a placard readable from the floor. Terminal block screws shall have pressure wire connectors of the self-lifting or box lug type.

L. All fire alarm system wiring shall be in **RED** metal conduit with compression fittings. All junction boxes shall be painted red prior to pulling the wire; interior shall not be painted. Or, junction box covers may be painted on both sides. Those installed in finished areas are permitted to be painted outside to match the finish color. Box covers shall be labeled using an electronic labeling system with black letters on white background to indicate the circuit(s) or function of the conductors contained therein. Handwritten labels or labels made from embossed tape are not acceptable There shall be no splices in the system other than at device terminal blocks, or on terminal blocks in cabinets. "Wire nuts" and crimp splices will **NOT** be permitted. Permanent wire markers shall be used to identify all connections at the FACU and other control equipment, at power supplied, in terminal cabinets, and junction boxes. Provide enough wiring excess to pull devices out of junction boxes for testing.

M. All wiring shall be checked for grounds, opens, and shorts, prior to termination at panels and installation of detector heads. The minimum resistance to ground or between any two conductors shall be ten (10) megaohms, as verified with a megger. Provide advance notice to the Engineer of record of these tests

N. The system shall be electrically supervised for open or (+/-) ground fault conditions in SLC, alarm circuits, and control circuits. Removal of any detection device, alarm appliance, plug-in relay, system module, or standby battery connection shall also result in a trouble signal. Fire alarm signal shall override trouble signals, but any pre-alarm trouble signal shall reappear when the panel is reset.

O. Addressable loop (signaling line) circuits shall be wired with type FPL/FPLR/FPLP fire alarm cable, AWG 18 minimum, low capacitance, twisted shielded copper pair. Cable shield drain wires are to be connected at each device on the loop to maintain continuity, taped to insulate from ground, and terminated at the FACU. The cable jacket color shall be red, with red (+) and black (-) conductor insulation. Acceptable cables included Atlas 228-18-1-1STP, BSCC S1802s19, West Penn D975, D991 (16 AWG), D995 (14 AWG), or equal wire having capacitance of 30pf/ft. maximum between conductors. Belden 5320FJ acceptable if only FPL rating needed. Unshielded cable, otherwise equal to the above, is permitted to be used if the manufacture's installation manual requires, or states preference for, unshielded cables. In underground conduit, use Type TC or PLTC cable (PE insulated) to avoid problems from moisture.

P. All wiring shall be color coded. All other circuits in the system shall be wired with AWG 14, solid copper, THHN/THWN conductors, installed in conduit. Color code as shown below throughout the system, without color change in any wire run:

1. Initiating Circuits, General…Red (+)/White (-)
2. Initiating Circuits, Smoke Only…Violet (+)/Gray (-)
3. Signal Line Circuit cable…Red jacket with Red(+)/Black(-)
4. Alarm notification Appliance Circuits (horns/strobes)…Blue (+)/Black (-)
5. Separate 24vdc Operating Power (for equipment)…Yellow (+)/Brown (-)
6. AHU Shutdown Circuits…Yellow (+)/Brown (-)
7. Door Control Circuits…Orange
8. Elevator Capture Circuits…Brown
9. Circuits from ZAM's to Monitored Devices (AWG 14/16)…Violet (+)/Grey (-)

Q. All conduits that penetrate outside walls from air-conditioned space must have internal sealing (duct-seal), to prevent condensation from infiltrating humid air.

R. Junction box covers shall be labeled to indicate the circuit(s) or function of the conductors contained therein. Labels shall be neatly applied black lettering on a clear background. Handwritten labels or labels made from embossed tape are not acceptable.

S. The branch circuit breaker(s) supplying the system must be physically protected by panelboard lock or handle lock and each must be identified with a 1/4" permanent red dot applied to handle or exposed body area.

T. Provide an engraved label at each fire alarm system control unit, system sub-panel or data gathering panel, supplementary notification appliance (SNAC) panel, digital

alarm communicator, etc., identifying its 120vac power source, as follows: Panelboard location, Panelboard identification, and branch circuit number.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.
2. Alarm-initiating connection to elevator recall system and components.
3. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
4. Security door release at the security control panel.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit. Provide floor plans with device numbers with a separate sheet provided for each floor. Plans shall be reduced in size from engineering plans in order to fit on 11 x 14 sheets. All device addresses shall be clearly labeled on plans. Indicate locations of all cabinets, modules and end of line devices. Sheets shall be laminated. Provide legend for symbols. Provide holder for plan book in FACP or in a locked box adjacent to panel keyed to match FACP. Provide label for box and book. Plans shall include the following:

1. Name of building or business
2. Address of building or business
3. North Arrow
4. Fire Alarm symbol legend
5. Date when plans were installed

C. Requirements for fire alarm plan color coding of symbols:

1. Manual fire alarm pull stations shall be colored Red
2. Water flow switches shall be colored Dark Blue
3. Smoke Detectors shall be colored Pink
4. Duct Detectors shall be colored Purple
5. Heat Detectors shall be colored Orange
6. Beam Smoke Detectors shall be colored Brown

7. Fire Alarm Control Panels and Remote Annunciators shall be Red
8. Tamper Switches, High and Low-Pressure Switches shall be colored Cyan
9. Fire Dampers shall be colored Yellow.

D. Identification of individual detectors is required. Assign each a unique number as follows, in sequence starting at the FACU: (Addressable Loop # -- Device #) Show on the as-built plans, and also permanently mount on each detectors base so that it's readable standing on the floor. Loop 1 shall be assigned to the first floor devices and loop number shall increase with floor number. Device numbering starts in the same location on each floor and increases accordingly as circuit location increases.

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. All connections to the FACU and the system's programming shall be done only by the manufacturer, or by an authorized distributor that stocks a full compliment of spare parts for the system. The technicians who do this are required to be trained and individually certified by the manufacturer, for the FACU model/series being installed. This training and certification must have occurred within the most recent 24 months, except that a NICET Level III certification will extend this to 36 months.

C. When programming the system, activate the automatic drift compensation feature for all spot-type smoke detectors. Systems with alarm verification are **not** to have this feature activated without written direction for the owner's representative or the AHJ. Alarm verification must **not** be used with mulit-sensor / mulit-criteria detectors under any circumstances.

D. Set spot-type smoke detector sensitivities to normal/medium, unless directed otherwise by the design engineer / owner's rep.

E. Print a complete "System Status and Programming Report", after the above steps have been done. This must include the program settings for each alarm initiating device and the current sensitivity of each analog addressable smoke detector. The manufacturer or authorized installer and the Contractor shall conduct a 100% performance test of each and every alarm initiating device and confirm address identification at the FACP. The system shall operate 48 hours prior to the start of the test. Contractor shall be present for the full 100% test. Submit in writing to the engineer a detailed report or check list showing the system's operational matrix. This document must be part of the "System Status and Programming Report".

F. Upon completion of the installation and its programming, the installer's technician shall test every alarm initiating device for proper response and indication, and all alarm notification appliances for effectiveness. Contractor shall provide two-way radios, ladders, suitable smoke source, and other materials required for testing of the system.

G. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

   a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
   b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
7. The digital communicator shall be on-line and tested for proper communication with the receiving station.

H. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances. All testing shall be repeated in the event that subsequent software or wiring modifications are determined necessary to meet the requirements of the contract documents. Such re-testing shall be included as part of the base bid and provided at no additional cost to the owner.

I. Test Documentation: The installer must fill out and submit the following documentation to the owner, through the engineer, prior to the AHJ's system acceptance inspection.

1. Written verification that this 100% system test was done with copy of print out generated during test.
2. The NFPA 72, "Record of Completion" Form. Use this form (no substitutes) to detail the system installation and also to certify that: (a.) It was done per Code, and (b.) The Code-required 100% test was performed. The fire alarm installer (manufacturer or authorized distributor's technician) must sign this form. If a representative of the AHJ, owner, or engineer witnesses the tests, in whole or in part, they must also sign the form to signify that fact only (annotating the form as needed to clarify their limited role).
3. For buildings with a smoke control or smoke purge system, an HVAC balance report, in the smoke control / smoke purge mode.

4. The System Status and Programming Report described in NFPA 72. This must be generated on the day of the system acceptance inspection and shall include the measured sensitivity of each smoke detector.
5. The purpose of doing Item (iv) on the day of the inspection is to assure detector sensitivity has not been affected by construction dust. Prudent contractors will have taken measures to prevent detector contamination during construction, and will also have had the system do a detector sensitivity test and printout prior to the day of the inspection, to make certain all devices are properly programmed and operating within their limits.

J. After completion of the 100% system test and submission of documentation as described above the installer is to request the local fire marshal to set up an inspection. The system must operate for at least two days prior to this inspection. The responding Fire Department shall be notified of this, for pre-fire planning purposes.

K. **Pre-final Inspection**: At the Owner's request and after passing the Designer's pre-final inspection, the Contractor and Manufacturer's authorized installer will conduct system test in the presence of the Owner.

L. **Final Inspection**: The fire alarm system will be inspected, with portions of it functionally tested. This will normally include the use of appropriate means to simulate smoke for testing detectors, as well as functionally testing the system interface with building controls, fire extinguishing systems and any off-premises supervising station. Operation of any smoke removal system will be checked as instructed by the AHJ. This statistical (sampling) inspection is intended to assure that the contractor has properly installed the system and performed the 100% operational test as required by NFPA 72. The electrical contractor shall provide two-way radios, ladders, and any other materials needed for testing the system, including a suitable smoke source.

1. Smoke control and smoke management systems are normally tested by measuring air flow rates and pressure differentials, plus observing any effect the system has on the operation of exit, elevator, and stairway doors. Testing with smoke "bombs" (smoke candles) is NOT appropriate because they produce cold chemical smoke that lacks buoyancy and, therefore, does not rise like the smoke from a fire.
2. The test will be conducted entirely by the Contractor. A copy of the final database software must be presented to the Owner before this test. The software shall be loaded from these disks into the system in the presence of the Owner. The review will then be conducted using this software. Any deficiencies shall be recorded and corrected. After the items have been corrected, the system shall be tested again.
3. In the event of malfunctions or excessive nuisance alarms, the Contractor must take prompt corrective action. The Owner may require a repeat of the Contractor's 100% system test, or other inspections.
4. Test Report: Upon successful completion of the Inspection and after the correction of all efficiencies, the manufacturer's authorized representative shall issue a test report to the Engineer and Owner, detailing and certifying the test.
5. System Acceptance: After successful completion of the Final Inspection and recommendation of the Engineer, the system will be accepted by the Owner. At this time the warranty period begins.

M. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

N. Annual Test and Inspection: One year after date of final acceptance, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.6 TRAINING

A. The manufacturer's authorized representative must instruct the owner's designated employees in operation of the system, and in all required periodic maintenance. A minimum of 8 hours on-site time will be allocated for this purpose. Two copies of a written, bound summary will be provided for future reference.

1. Scheduling of training must be arranged to meet the Owner's schedule. Additional training shall be available at a cost to be mutually agreed upon by the Owner and the Contractor.
2. Training shall be in the Owner's provided classroom
3. The training may not be waived, deleted or reduced in the number of hours required.
4. Training shall cover as minimum the following topics:

    a. Preventive maintenance service techniques and schedules, including historical data trending of alarm and trouble records.
    b. Overall system concepts, capabilities, and functions. Training shall be in depth, so that the owner shall be able to take any device out of service and return any device to service without need of Manufacture's approval or assistance.
    c. Explanation of all control functions, including training to program and operate the system software.
    d. Methods and means of troubleshooting and replacement of all field wiring devices.
    e. Methods and procedures for troubleshooting the main fire alarm control panel, including field peripheral devices at the programming, bussing systems, internal panel and unit wiring, circuitry and interconnections.
    f. Manuals, drawings, and technical documentation. Actual system software used for training shall be provided in digital form and shall be left with the Owner at the completion of training for the Owner's us in the future.

END OF SECTION 283111