CITY OF YALE

YALE SENIOR CENTER

111 N B ST **YALE, OK 74085**

09/11/24 COA 5964 06/30/2023

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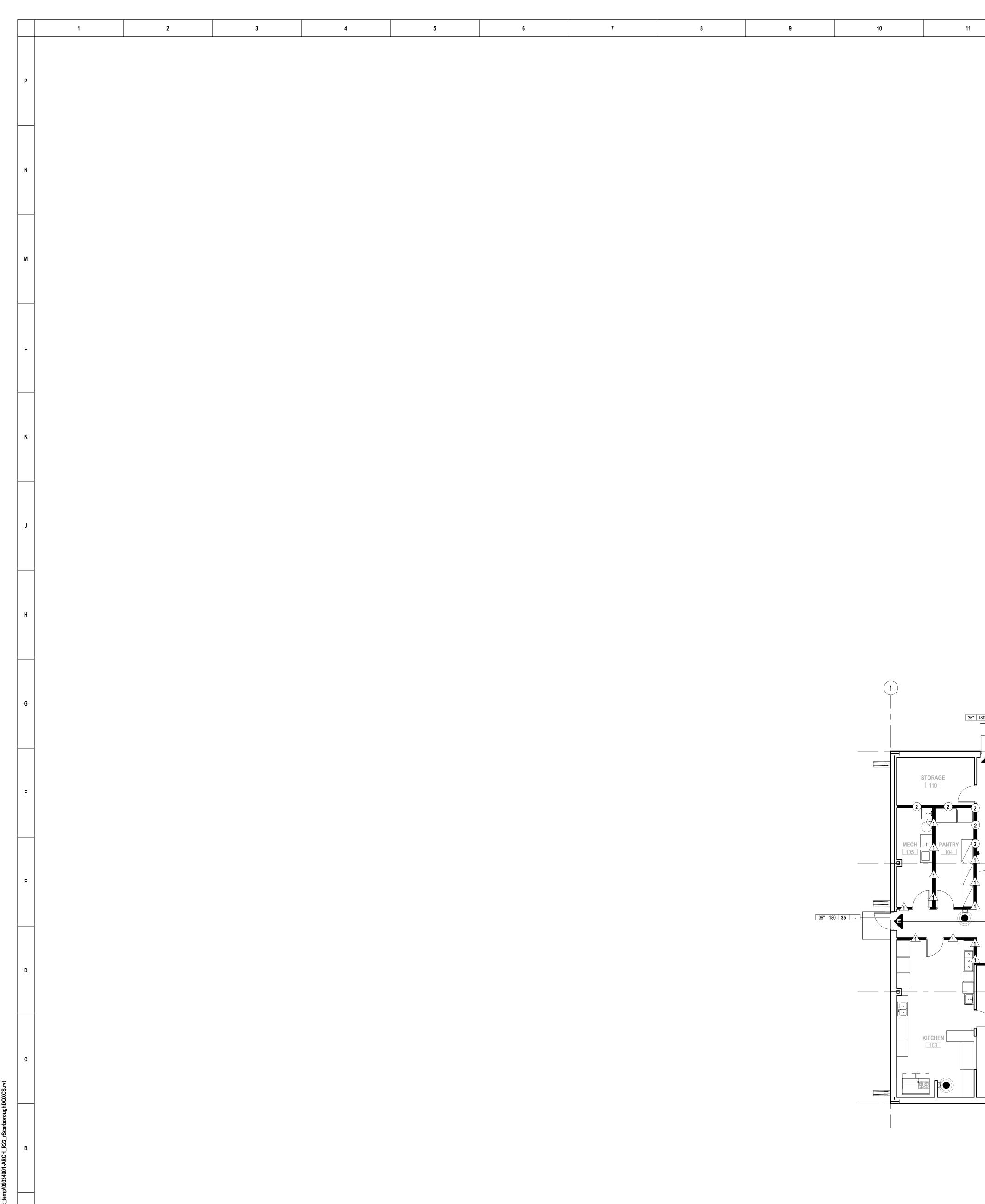
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ARCHITECTURAL CODE COMPLIANCE

09334001-0-ACC01

ROOM NO	ROOM NAME	FUNCTION OF SPACE	CALC (SQF/OCC) OCCUPANT LC
			AREA / OCC	
FIRST FLOOR ASSEMBLY (A-2	2)			
101	CORRIDOR	(none)	623 SF 0	
102	CAFETERIA	ASSEMBLY UNCONCENTRATED (TABLE AND CHAIRS)	1017 SF / 15 N	NET SF 68
103	KITCHEN	KITCHEN, COMMERCIAL	393 SF / 200 S	SF 2
104	PANTRY	STORAGE AREAS	123 SF / 300 S	SF 0
105	MECH	MECHANICAL EQUIPMENT ROOM	113 SF / 300 S	SF 0
106	WOMENS	(none)	142 SF / 200 S	SF 1
107	MENS	(none)	142 SF / 200 S	SF 1
108	OFFICE	BUSINESS AREAS	171 SF / 100 S	SF 2
: 8	•			74
ASSEMBLY (A-2	2): 8			74
ASSEMBLY (A-3	PARTY ROOM	ASSEMBLY UNCONCENTRATED (TABLE AND CHAIRS)	997 SF / 15 N	NET SF 66
110	STORAGE	STORAGE AREAS	120 SF / 300 S	SF 0
: 2				67
ASSEMBLY (A-3	3): 2			67
	10			141
FIRST FLOOR:	10			171

BUILDING STATISTICS

AREA (GROSS SQUARE FOOTAGE) :

FIRST FLOOR

NUMBER OF STORIES :

X	FIRE BARRIER (X HOURS)
<u>x</u>	FIRE PARTITION (X HOURS)
	INCIDENTAL OCCUPANCY
	——ACCESSORY OCCUPANCY
	NOT HABITABLE OCCUPANCY
36" 180 9 90"	DOOR RATING (MIN) ANTICIPATED LOAD EXIT CAPACITY DOOR WIDTH (IN)
36" 180 9	ANTICIPATED LOAD EXIT CAPACITY STAIR WIDTH (IN)
E E	TRAVEL DISTANCE XXX'-XX"
	EXIT LOCATION SYMBOL
•	DEAD-END DISTANCE XXX'-XX"
75'	NEW FIRE EXTINGUISHER- INSIDE RECESSED CABINET - (FE1)
NOTES: CONTRACTOR SHALL P SIGNAGE OR STENCILIN PLENUM AT ALL FIRE R. BARRIERS & SMOKE PA SHALL BE AT LEAST 3" I WORDING: "FIRE AND/O PROTECT ALL OPENING INTERVALS NOT EXCEE HORIZONTALLY ALONG SEAL PENETRATIONS IN BARRIERS, FIRE RATED BARRIERS.	IG WITHIN CEILING ATED WALLS, SMOKE RTITIONS. LETTERING N HEIGHT WITH THE IR SMOKE BARRIER - SS:. REPEAT AT DING 30'-0" MEASURED THE PARTITION WALL. I FIRE RATED SMOKE

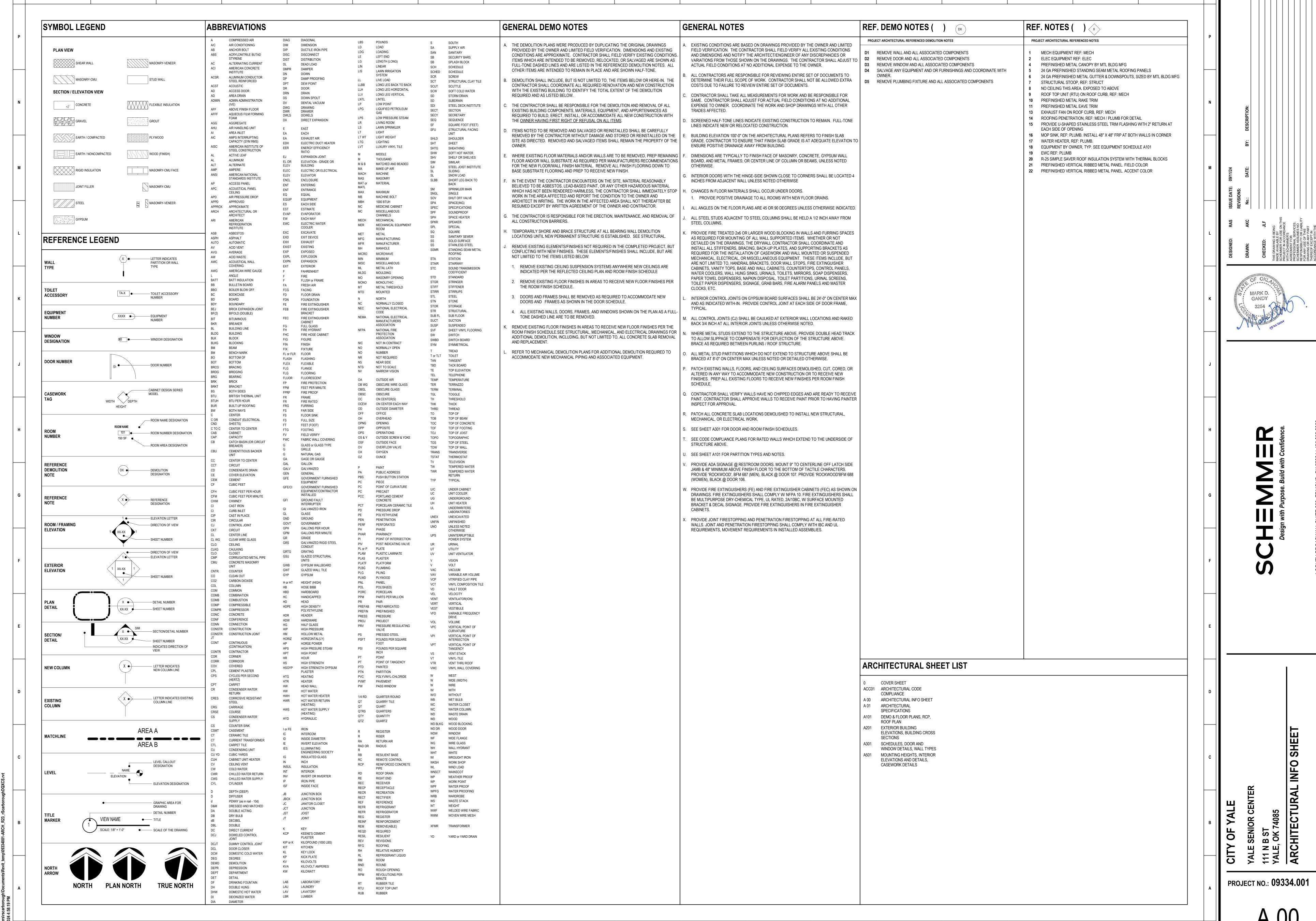
APPLICABLE CODES			
BUILDING :		2018 IBC	
ACCESSIBILITY:		2010 ADA	1
LIFE SAFETY :		2009 NFP	A 101
ENERGY:		2006 IEC	2
MECHANICAL :		2018 IMC	
PLUMBING :		2018 IPC	
ELECTRICAL:		2020 NEC	;
OCCUPANCY GROUP :		A-2 / A-3	
TYPE OF CONSTRUCTION :		IIB	
HEIGHT AND AREA LIMITS			
MAXIMUM ALLOWED HEIGHT		120'	
MAXIMUM ALLOWED AREA		50,000 SF	=
MIXED USE SEPARATIONS :		2 HR	
EXTERIOR WALL OPENING LIMITS :			
DRAFTSTOPS:		NA	
FIRE PROTECTIVE SYSTEMS			
AUTO FIRE SUPPRESSION :		NA	
STANDPIPE :		NA	
FIRE ALARM SYSTEM :		NFPA 72	
AUTO FIRE DETECTION :		NFPA 13	
SMOKE DETECTION :		NFPA 72	
FIRE RESISTANCE OF STRUCTURAL ELEMENTS		RATING (HOURS)	DESIGI NUMBE
EXTERIOR WALLS			
LOAD BEARING WALLS		0	
NON-LOAD BEARING WALLS		0	
FIRE SEPARATION ASSEMBLIES			
EXITS		0	
SHAFTS / HOISTWAYS		NA	
DWELLING UNIT SEPARATIONS		NA	
INTERIOR LOAD BEARING WALLS, COLUMNS, FRAMING		0	
FLOOR CONSTRUCTION		0	
ROOF CONSTRUCTION		0	
FIRE WALLS		NA	
CALCULATIONS			
CALCULATIONS	0.2" / OCC		

PLUMBING FIXTURE REQUIREMENTS									
	OCC	TYPE							
NUMBER OF OCCUPANTS			141						
MEN			70.5						
WOMEN			70.5						
	wc	LAV	URINALS	TUB/ SHOWER					
	1 PER 75	1 PER 200							
MEN - REQUIRED	0.92	0.35	0	-					
MEN - PROVIDED	2	2	0	-					
WOMEN - REQUIRED	0.92	0.35	-	-					
WOMEN - PROVIDED	2	2	-	-					
	DRI	NKING FOUNT	AINS	1					
		1 PE	R 500						
REQUIRED		1							
PROVIDED		2)						

PROJECT NO.: **09334.001**

FIRST FLOOR - CODE REVIEW PLAN

SCALE: 1/8" = 1'-0"



ARCHITECTURAL INFO SHEET

, EDMOND, () 06/30/2023

200,

ECIFICATION

PROJECT NO.: 09334.001

to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

Hardware Group No. 9.0 Doors: 110 DESCRIPTION **CATALOG NUMBER** FINISH MFR US26D MK Hinge, Full Mortise TA27144-1/2"x4-1/2" 626 YA AU5405LN Storeroom Lock 400/403 US26D RO Wall Stop 608-RKW Silencer Hardware Group No. 10.0 Doors: 108-1 DESCRIPTION CATALOG NUMBER FINISH MFR US26D MK Hinge, Full Mortise TA27144-1/2"x4-1/2" 626 YA AU5407LN Entry Lock 400/403 US26D RO Wall Stop 608-RKW Silencer Hardware Group No. 11.0 QTY DESCRIPTION CATALOG NUMBER FINISH MFR Hinge, Full Mortise, Hvy Wt T4A37864-1/2"x4-1/2" US26D MK AU5407LN Entry Lock 626 YA CPS7500 689 NO Surface Closer US32D RO Kick Plate K105010"x2"LDWCSKBEV Silencer 608-RKW Hardware Group No. 12 Provide each SGL door(s) with the following: Doors: 103-1 DESCRIPTION CATALOG NUMBER FINISH MFR Hardware supplied with door **END OF SECTION 087100** SECTION 09-2116 - GYPSUM BOARD ASSEMBLIES PART 1 GENERAL 1.01 SECTION INCLUDES A. Non-load-bearing steel framing systems for interior gypsum board assemblies. B. Suspension systems for interior gypsum ceilings and soffits. C. Interior gypsum board 1.02 SUBMITTALS A. Product Data: for each type product. PART 2 PRODUCTS 2.01 FRAMING SYSTEMS A. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness. 1. Minimum Base-Metal Thickness: 0.033 inches. Depth: As indicated on Drawings. B. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs: 1. Double-Runner System: ASTM C 645 top runners, inside runner with 51-mm- (2-inch-) deep flanges and fastened to studs, and outer runner sized to friction fit inside runner. C. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum (1/2-inch-) wide flanges. 1. Depth: 1-1/2 inches. 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel. 2.02 SUSPENSION SYSTEMS A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire. B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter. C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges. D. Furring Channels: 1. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness. a. Minimum Base-Metal Thickness: 0.033 inch. b. Depth: As indicated on Drawings. 2.03 BOARD MATERIALS A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following 1. American Gypsum. 2. Georgia-Pacific Gypsum LLC National Gypsum Company. USG Corporation. B. Gypsum Board, Type X: ASTM C 1396/C 1396M. 1. Thickness: 15.9 mm5/8 inch. 2. Long Edges: Tapered. 3. All fire rated assemblies and as noted. C. Gypsum Ceiling Board: ASTM C 1396/C 1396M 1. Thickness: 15.9 mm5/8 inch, Type X. 2. Long Edges: Tapered. All ceilings. D. Tile Backing Panels: 1. Cementitious Backer Units - ASTM C1288 with manufacturer's standard edges. 5/8 inch. 2. Glass-Mat, Water-Resistant backer Units – ASTM C 1178 with manufacturer's standard edges, 5/8 inch. 2.04 TRIM ACCESSORIES A. Interior Trim: ASTM C 1047. 1. Material: Paper-faced galvanized steel sheet or plastic. a. L-Bead: L-shaped; exposed long flange receives joint compound. b. Expansion (control) joint. 2.05 JOINT TREATMENT MATERIALS A. General: Comply with ASTM C 475/C 475M. B. Joint Tape: 1. Interior Gypsum Board: Paper. 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh. C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats. 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound. 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound. 3. Fill Coat: For second coat, use drying-type, all-purpose compound. 4. Finish Coat: For third coat, use setting-type, sandable topping compound. 2.06 AUXILIARY MATERIALS A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates. B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated. C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing). PART 3 EXECUTION 3.01 INSTALLATION, GENERAL A. Installation Standard: ASTM C 754. B. Standards listed in "Gypsum Plaster Assemblies," "Portland Cement Plaster Assemblies," "Gypsum Veneer Plaster Assemblies," and "Gypsum Board Assemblies" subparagraphs below include framing installation requirements not in ASTM C 754. Retain applicable subparagraphs to suit Project. 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation. C. Install supplementary framing and blocking to support fixtures and furnishings. D. Install bracing at terminations in assemblies.

3.02 INSTALLING FRAMED ASSEMBLIES A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types. B. Where runners are installed directly against masonry walls or dissimilar metals at exterior walls. install isolation strip between studs and wall. C. Install studs so flanges within framing system point in same direction. D. Install tracks (runners) at assembly perimeter. 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies. 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs. a. Install two studs at each jamb unless otherwise indicated. b. Install cripple studs at head adjacent to each jamb stud, with a minimum 13-mm (1/2-inch) clearance from jamb stud to allow for installation of control joint in finished assembly. c. Extend jamb studs through suspended ceilings and attach to underside of overheadstructure. 3. Other Framed Openings: Frame openings other than door openings the same as requiredfor door openings unless otherwise indicated. Install framing below sills of openings tomatch framing required above door heads. 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-ratedassembly indicated and support closures and to make partitions continuous from floor tounderside of solid structure. E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by 3.03 INSTALLING SUSPENSION SYSTEMS A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types. B. Isolate suspension systems from building structure where they abut or are penetrated bybuilding structure to prevent transfer of loading imposed by structural movement C. Suspend hangers from building structure as follows: 1. Install hangers plumb and free from contact with insulation or other objects within ceilingplenum that are not part of supporting structural or suspension system. a. Splay hangers only where required to miss obstructions and offset resulting horizontalforces by bracing, countersplaying, or other equally effective means. 2. Where width of ducts and other construction within ceiling plenum produces hangerspacings that interfere with locations of hangers, install supplemental suspension membersand hangers in the form of trapezes or equivalent devices. 3. Do not attach hangers to steel roof deck. 4. Do not connect or suspend steel framing from ducts, pipes, or conduit. 5. Installation Tolerances: Install suspension systems that are level to within (1/8 inch in 12 feet) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes. 3.04 APPLYING AND FINISHING PANELS A. Comply with ASTM C 840. B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member. C. Do not place tapered edges against cut edges or ends. D. Examine panels before installation. Reject panels that are wet or damaged. E. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions. 1. Edge Trim: Install at perimeter edge of gypsum board where it meets masonry walls. 2. Control Joints: Install control joints at locations indicated on Drawings. F. Form control joints, with double joists spaced (1/2 inch) apart. G. Prefill open joints and damaged surface areas H. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not I. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840: 1. Level 4: At all interior ceiling surfaces. 2. Level 4: At all interior wall surfaces. J. Protect adjacent surfaces from drywall compound and finishes and promptly remove from non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywallapplication. K. Remove and replace panels that are wet or damaged. **END OF SECTION** SECTION 09-3000 - TILING PART 1 GENERAL 1.01 SECTION INCLUDES A. Tile for wall applications. B. Extruded polystyrene foam panel backer board as tile substrate. C. Non-ceramic trim. 1.02 SUBMITTALS A. Product Data: For each type of product indicated. B. Samples: Each type of tile and grout indicated. Include Samples of accessories involving color 1.03 MAINTENANCE MATERILA SUBMITTALS A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents. 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated. 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated. 1.04 PROJECT CONDITIONS A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions. PART 2 PRODUCTS 2.01 TILE PRODUCTS A. As indicated in the Material Schedule on Sheet A301 2.02 GROUT MATERIALS A. Sand-Portland Cement Grout: ANSI A108.10 B. Polymer-Modified Tile Grout: ANSI A118.7. 1. As indicated in the Material Schedule on Sheet A301. 2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix. 2.03 ACCESSORY MATERIALS A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated. B. Metal Edge Strips: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge material. C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout. 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following: a. Bonsal American, an Oldcastle company; Grout Sealer. c. MAPEI Corporation; d. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.

e. TEC, a subsidiary of H. B. Fuller Company. D. Backer Board: High density polystyrene with reinforcement layer on both sides; with compatible alkaline resistant joint tape; to be covered with waterproofing prior to installation of tile. 1. Thickness: 5/8 inches. Products: a. Schluter-KERDI-BOARD. PART 3 EXECUTION 3.01 EXAMINATION A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile. 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated. B. Verify that required floor-mounted utilities are in correct location. A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer. B. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing. C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces. 3.03 INSTALLATION A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used. 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage: a. Tile floors in wet areas. b. Tile floors composed of tiles (8 by 8 inches) or larger. Tile floors composed of rib-backed tiles. B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments. C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile. D. Provide trim shapes where necessary to eliminate exposed tile edges. E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated. F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths: 1. Ceramic Tile: (1/8 inch). G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated. H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints. Where feasible, do not place joints in conspicuous locations Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles. 1. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants." I. Metal Edge Strips: Install where needed to conceal exposed tile edges, including at top of wainscot, top of base, at outside corners, and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile. J. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth. 3.04 INTERIOR TILE INSTALLATION SCHEDULE A. Interior Wall Installations, backerboard on metal stud wall: 1. Tile Installation W243 a. Tile Types: As indicated on the drawings. b. Thin set mortar: Latex-portland cement mortar c. Grout: Polymer-modified sanded grout. 3.05 CLEANING AND PROTECTING A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. 1. Remove grout residue from tile as soon as possible. 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are sate to use b testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning. B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls. C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces. **END OF SECTION** SECTION 09-5100 - ACOUSTICAL CEILINGS PART 1 GENERAL 1.01 SECTION INCLUDES A. Suspended metal grid ceiling system. B. Acoustical units. 1.02 SUBMITTALS A. Product Data: For each type of product. B. Samples: For each exposed product and for each color and texture specified. C. Samples: Submit two full size samples illustrating material and finish of acoustical units. D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project. 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed. PART 2 PRODUCTS 2.01 PERFORMANCE REQUIREMENTS A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency. 1. Flame-Spread Index: Class A according to ASTM E 1264. Smoke-Developed Index: 50 or less. 2.02 ACOUSTICAL PANELS A. As indicated in the Material Schedule on Sheet A301. 2.03 SUSPENSION SYSTEM(S) A. Manufacturers: Subject to compliance with requirements, provide products by one of the Armstrong World Industries, Inc.

B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension

galvanized, G30 coating designation; with prefinished 9/16-inch-wide metal caps on flanges.

C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll

formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M,

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

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not

indicated, manufacturer's standard moldings for edges and penetrations that comply with

seismic design requirements; formed from sheet metal of same material, finish, and color as

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at

A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.

opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless

B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and

1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

system and accessories according to ASTM C 635/C 635M.

1. Structural Classification: Intermediate-duty system.

5. Cap Finish: Painted to match color of acoustical unit.

that used for exposed flanges of suspension-system runners.

C. Touch-up Paint: Type and color to match acoustical and grid units.

B. Layout openings for penetrations centered on the penetrating items.

where necessary to conceal edges of acoustical panels.

End Condition of Cross Runners: butt-edge type.

Face Design: Flat, flush.

2.05 METAL EDGE MOLDINGS AND TRIM

2.04 ACCESSORIES

PART 3 EXECUTION

3.02 INSTALLATION

END OF SECTION

otherwise indicated.

4. Cap Material: Cold-rolled steel

Armstrong World Industries, Inc.

ECIFICATION

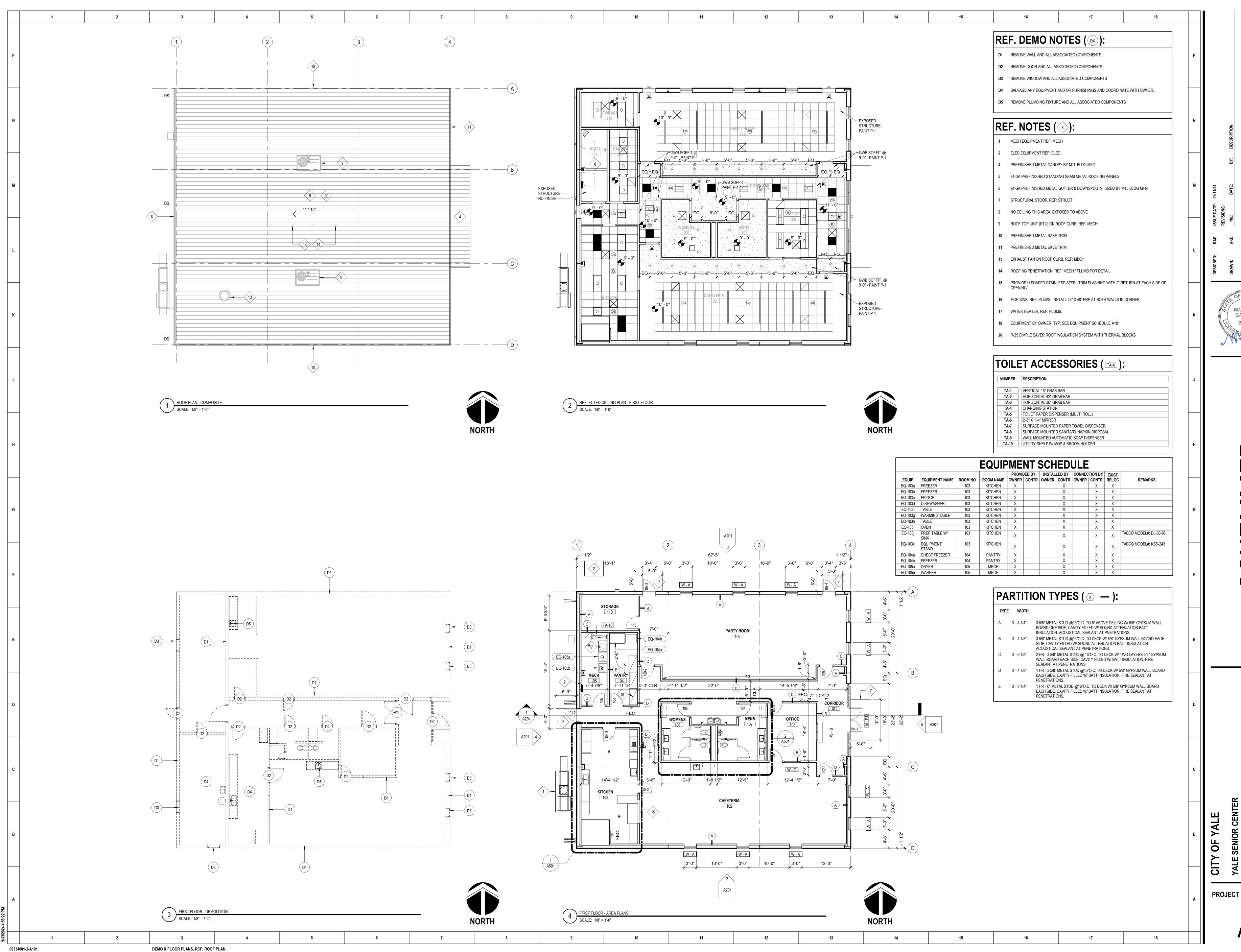
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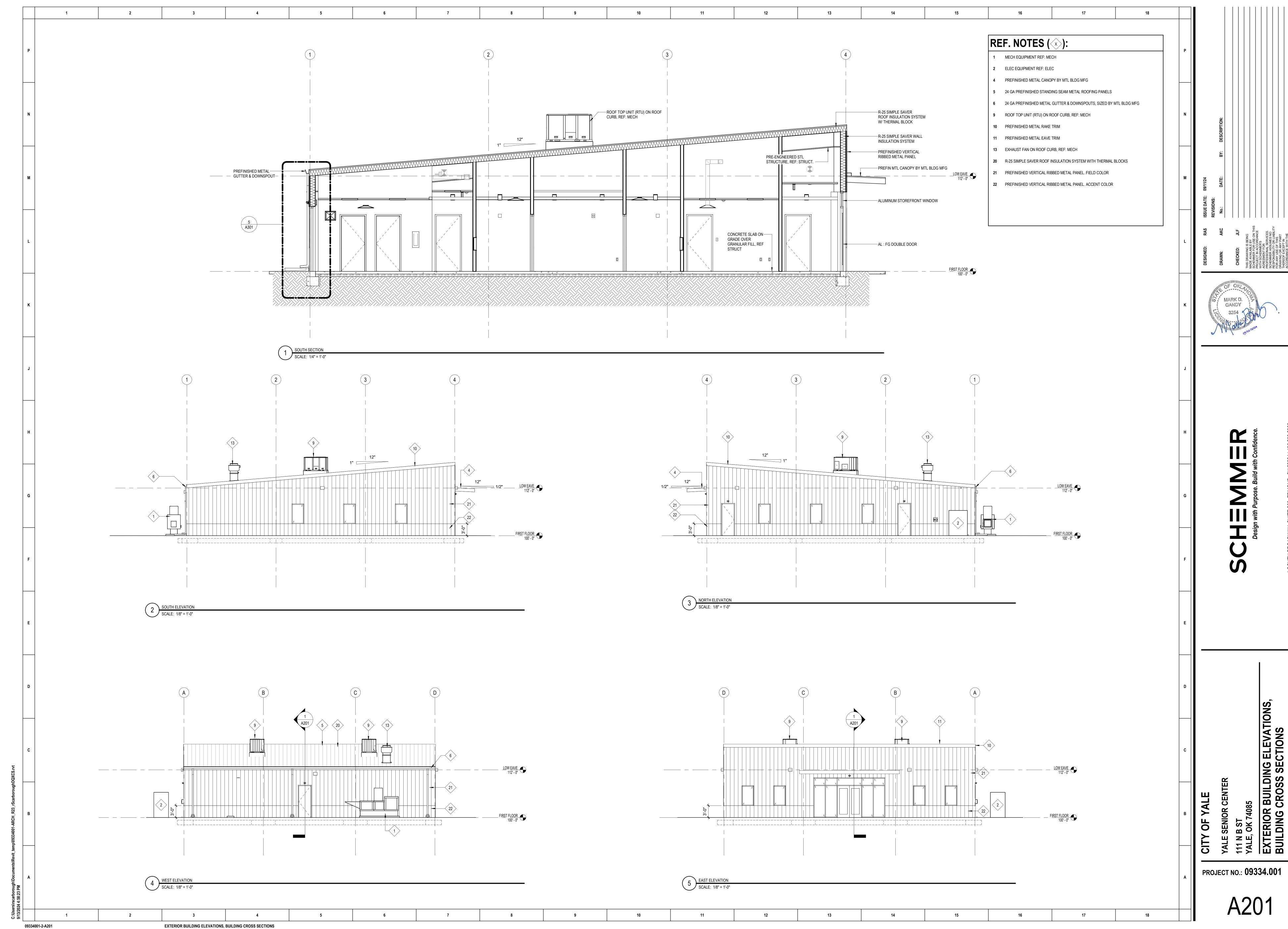
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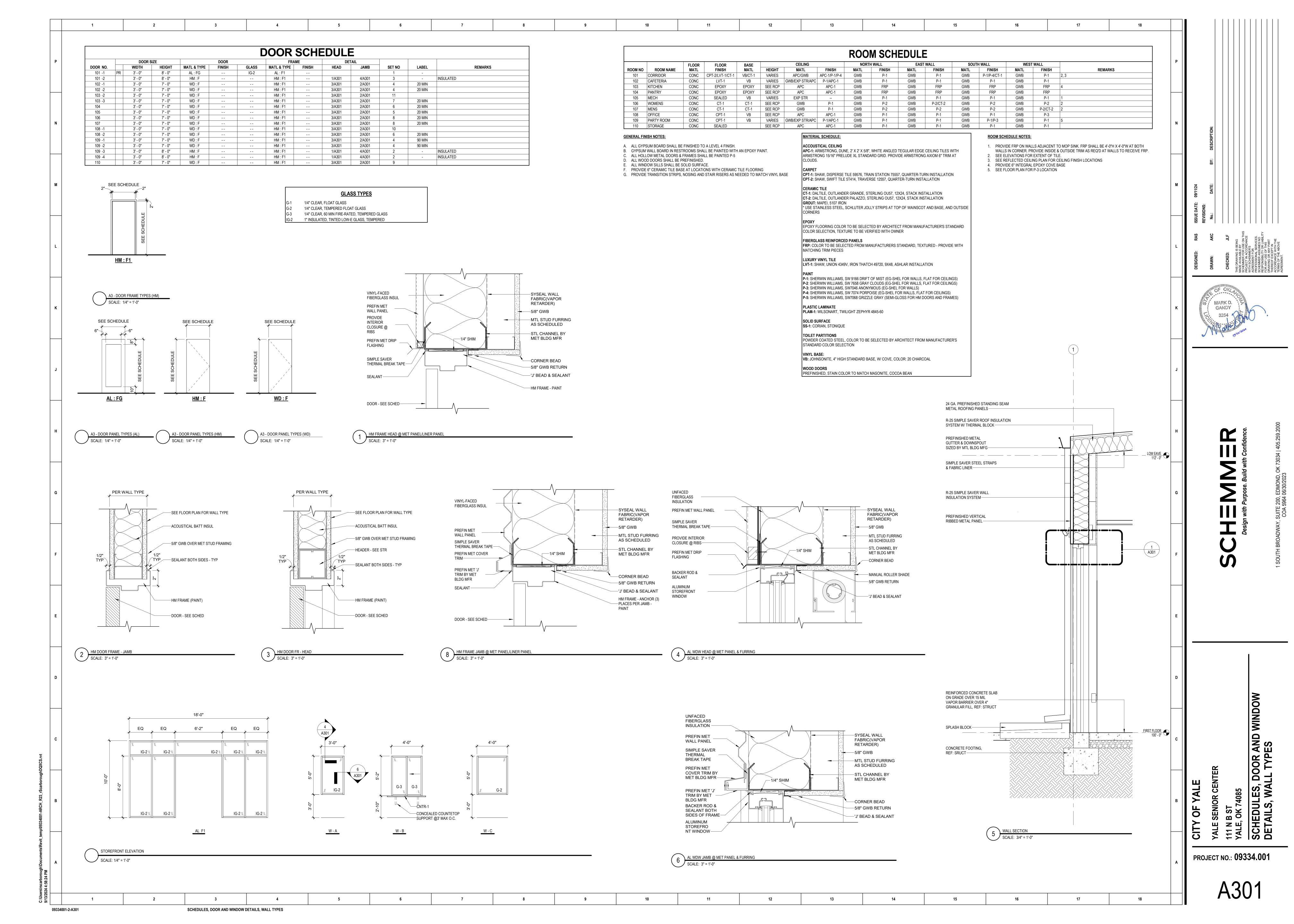
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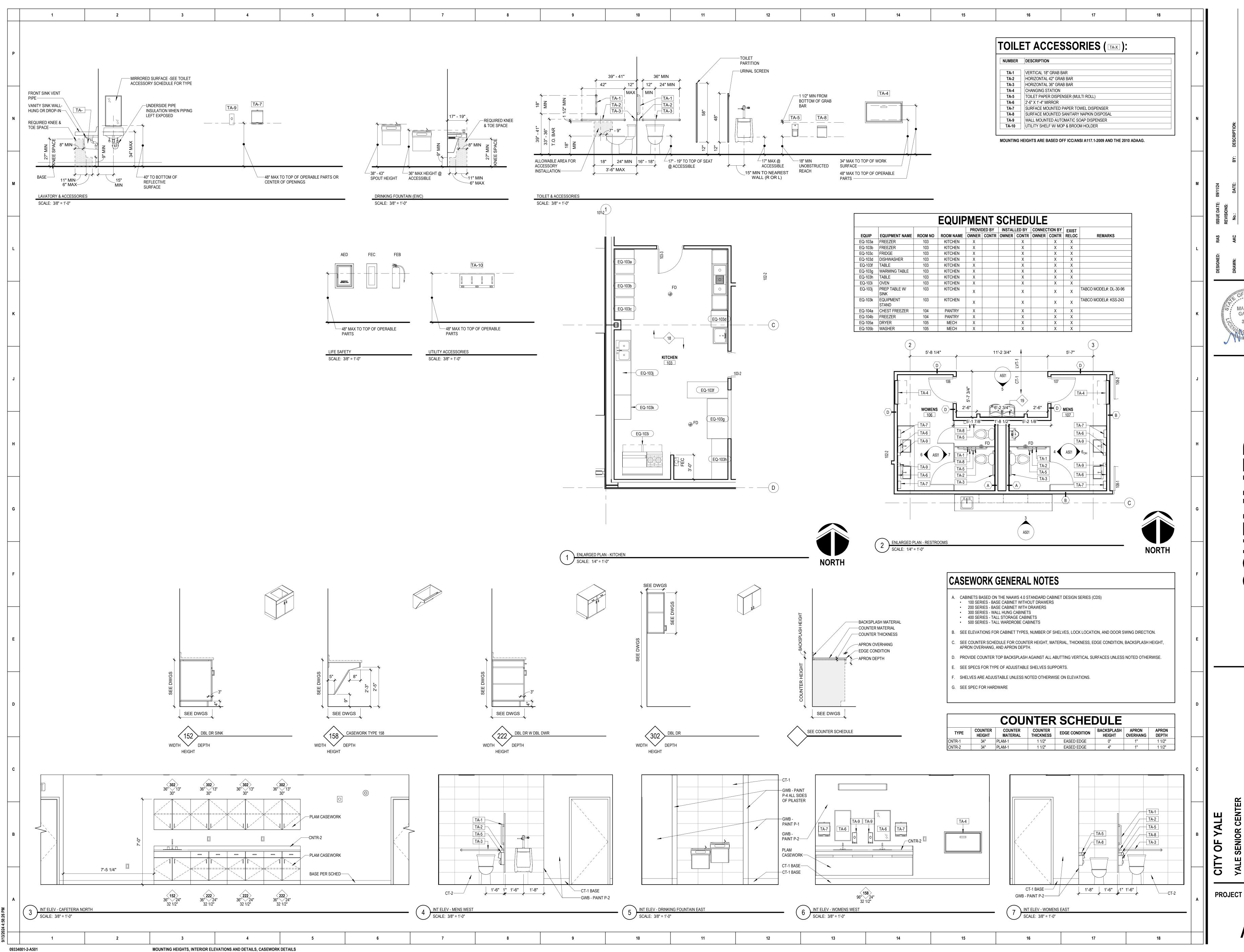
ARCHITECTURAL SPECIFICATIONS

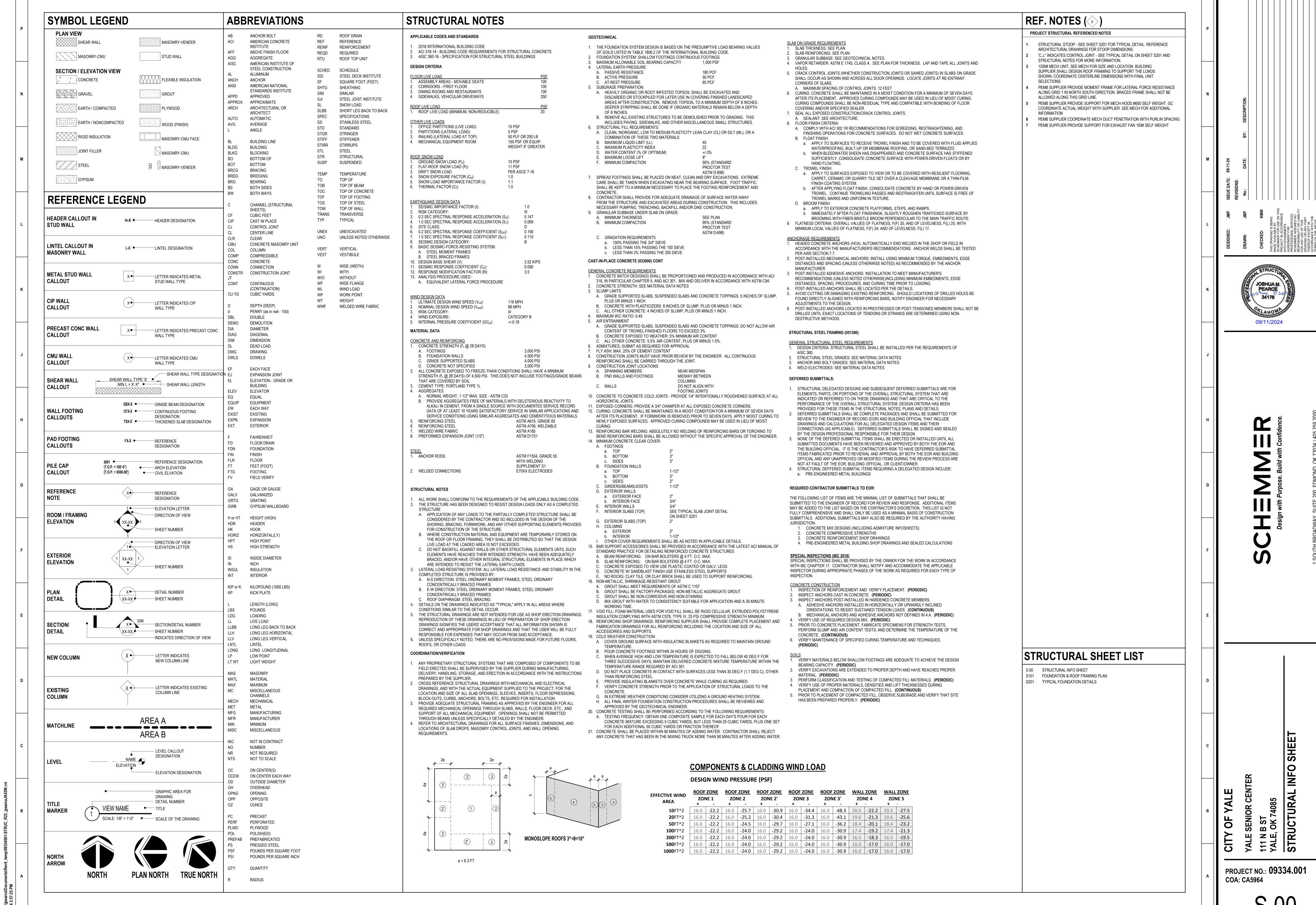
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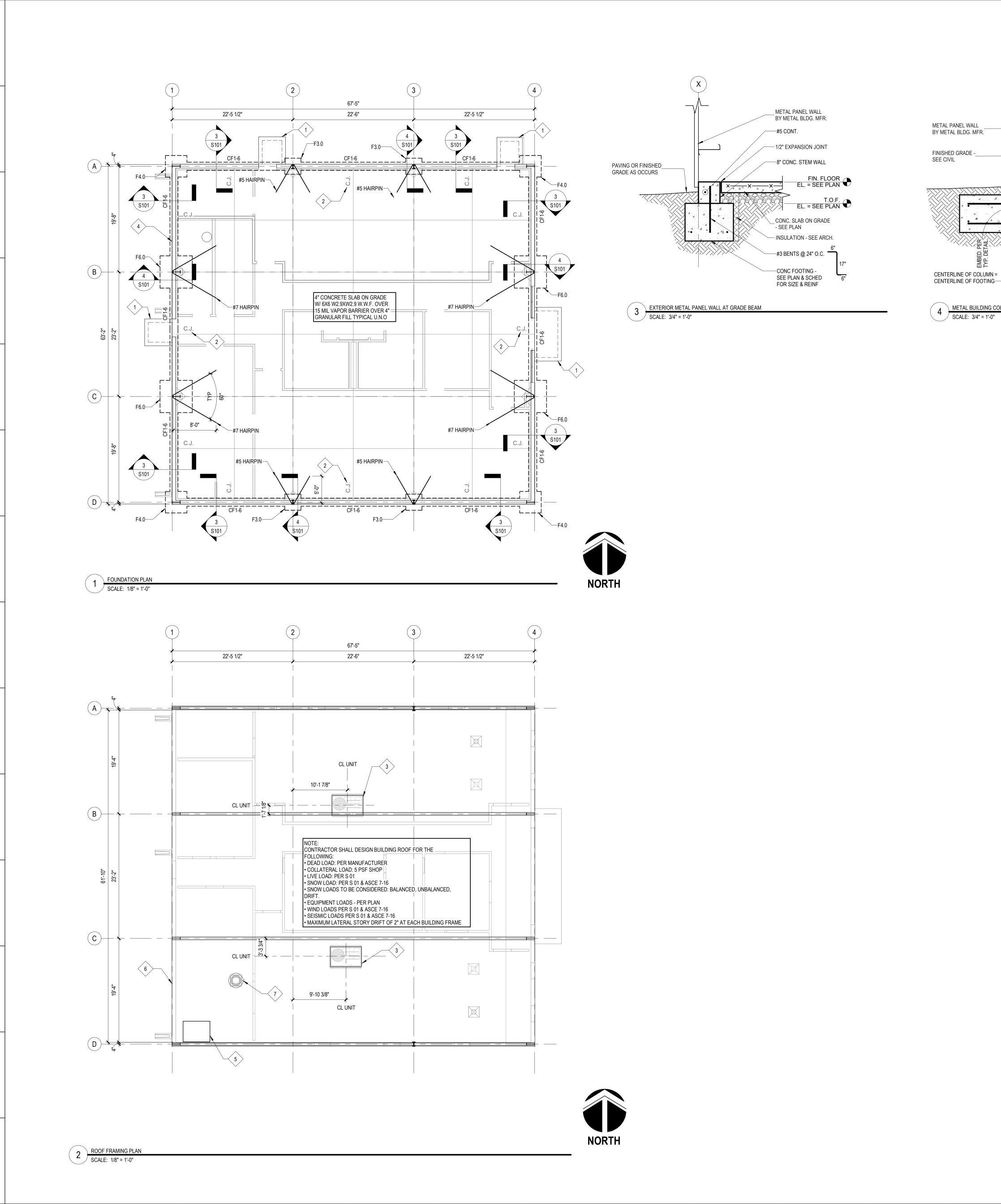




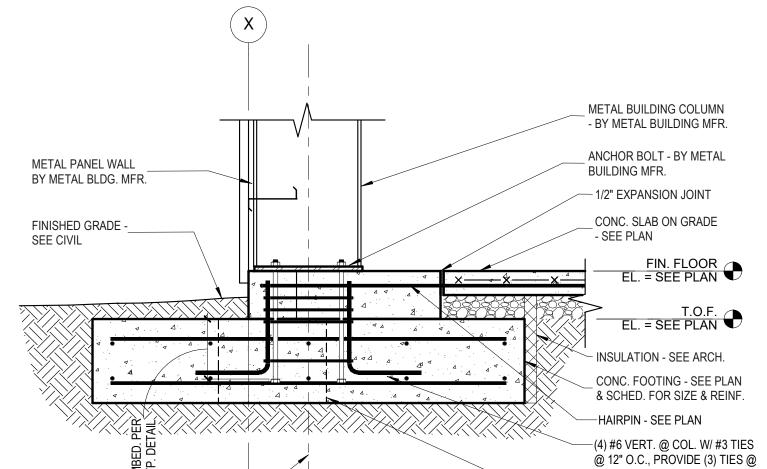


S 00

09334001-3-S 00 STRUCTURAL INFO SHEET



FOUNDATION & ROOF FRAMING PLAN



2" O.C. TOP

-LINE OF FOOTING BEYOND -

CONTINUE REINF. THRU PAD

4 METAL BUILDING COLUMN AT CONCRETE PAD FOOTING

FOUNDATION PLAN NOTES:

- A. REFERENCE SHEET S00 FOR STRUCTURAL NOTES. SEE THIS SHEET FOR SCHEDULES.
- B. REFERENCE SHEET S201 FOR TYPICAL FOUNDATION DETAILS NOT NECESSARILY INDICATED
- C. VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
- . TOP OF FOOTING (T.O.F.) ELEVATION IS 99'-4", TYPICAL U.N.O.
- E. FINISHED FLOOR ELEVATION (F.F.E.) IS 100'-0", TYPICAL U.N.O.
- F. CONTINOUS FOOTINGS ARE REQUIRED AT ALL EXTERIOR WALLS. BOTTOM OF CONTINUOUS FOOTING SHALL HAVE A MINIMUM DEPTH OF 20" BELOW EXTERIOR GRADE.
- G. PAD FOOTINGS ARE REQUIRED BELOW ALL STRUCTURAL COLUMNS.
- H. STRUCTURAL STOOPS ARE REQUIRED AT ALL EXTERIOR SWING DOORS. SEE TYPICAL DETAIL ON SHEET S201.
 I. THE METAL BUILDING FOUNDATION HAS BEEN DESIGNED BASED ON A SCHEMATIC METAL BUILDING LAYOUT AND PRELIMINARY COLUMN REACTIONS. THE CONTRACTOR SHALL

SUBMIT STAMPED/SIGNED PLANS OF THE METAL BUILDING (INCLUDING ACTUAL COLUMN REACTIONS) TO THE ENGINEER OF RECORD. THE ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE FOOTINGS AS SHOWN ON THE FOUNDATION PLAN BASED ON THE ACTUAL COLUMN REACTIONS. IF REQUIRED, THE FOOTING DESIGNS WILL BE ADJUSTED TO RESIST THE ACTUAL COLUMN REACTIONS.

REF. NOTES (\times) :

- 1 STRUCTURAL STOOP SEE SHEET S201 FOR TYPICAL DETAIL. REFERENCE
- 'C.J.' INDICATES CONTROL JOINT SEE TYPICAL DETAIL ON SHEET S201 AND STRUCTURAL NOTES FOR MORE INFORMATION.
- 3 1200# MECH UNIT, SEE MECH FOR SIZE AND LOCATION. BUILDING SUPPLIER SHALL DESIGN ROOF FRAMING TO SUPPORT THE LOADS SHOWN. COORDINATE CENTERLINE DIMENSIONS WITH FINAL UNIT

ARCHITECTURAL DRAWINGS FOR STOOP DIMENSIONS.

- 4 PEMB SUPPLIER PROVIDE MOMENT FRAME FOR LATERAL FORCE RESISTANCE ALONG GRID 1 IN NORTH SOUTH DIRECTION. BRACED FRAME SHALL NOT BE ALLOWED ALONG THIS COURS IN FIGURE 1.100 COUR
- 5 PEMB SUPPLIER PROVIDE SUPPORT FOR MECH HOOD #600 SELF WEIGHT. GC COORDINATE ACTUAL WEIGHT WITH SUPPLIER. SEE MECH FOR ADDITIONAL INFORMATION
- PEMB SUPPLIER COORDINATE MECH DUCT PENETRATION WITH PURLIN SPACING
- 7 PEMB SUPPLIER PROVIDE SUPPORT FOR EXHAUST FAN 100# SELF WEIGHT

CONT. FOOTING SCHEDULE

MARK	WIDTH	DEPTH		REIN
CF1-6	1' - 6"	1' - 2"	(3) #5 BARS LONG BOT	

	PAD F	OOTII	NG SCHEDULE
MARK	PLAN SIZE	DEPTH	REINFORCING
F3.0	3'-0" X 3'-0"	1' - 2"	(4) #5 BARS EACH WAY, BOTTOM
F4.0	4'-0" X 4'-0"	1' - 2"	(5) #5 BARS EACH WAY, BOTTOM
F6.0	6'-0" X 6'-0"	1' - 2"	(5) #5 BARS EACH WAY, TOP & BOTTOM

JOSHUA M. PEARCE 34176

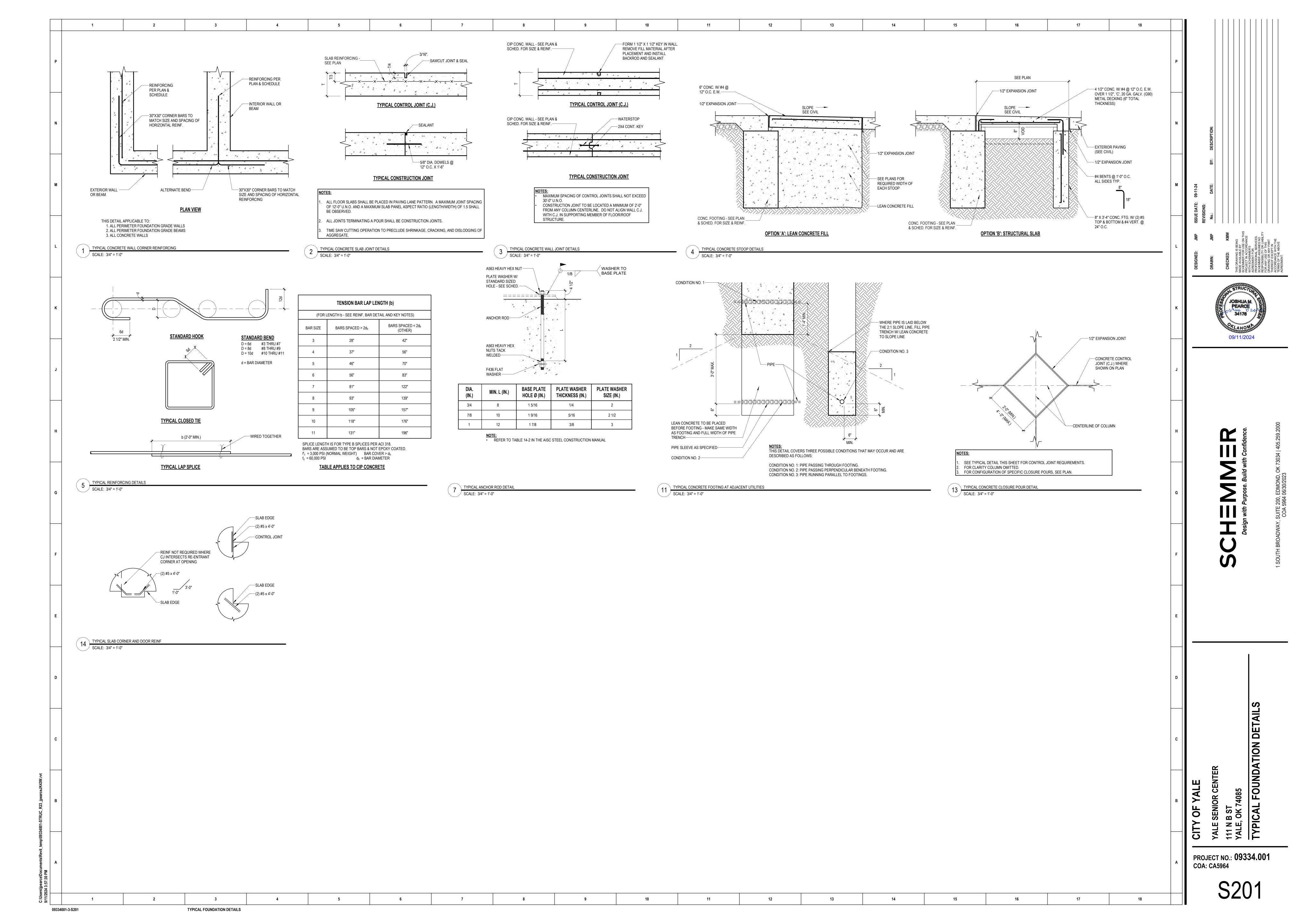
SCHIP Series Build with Confidence

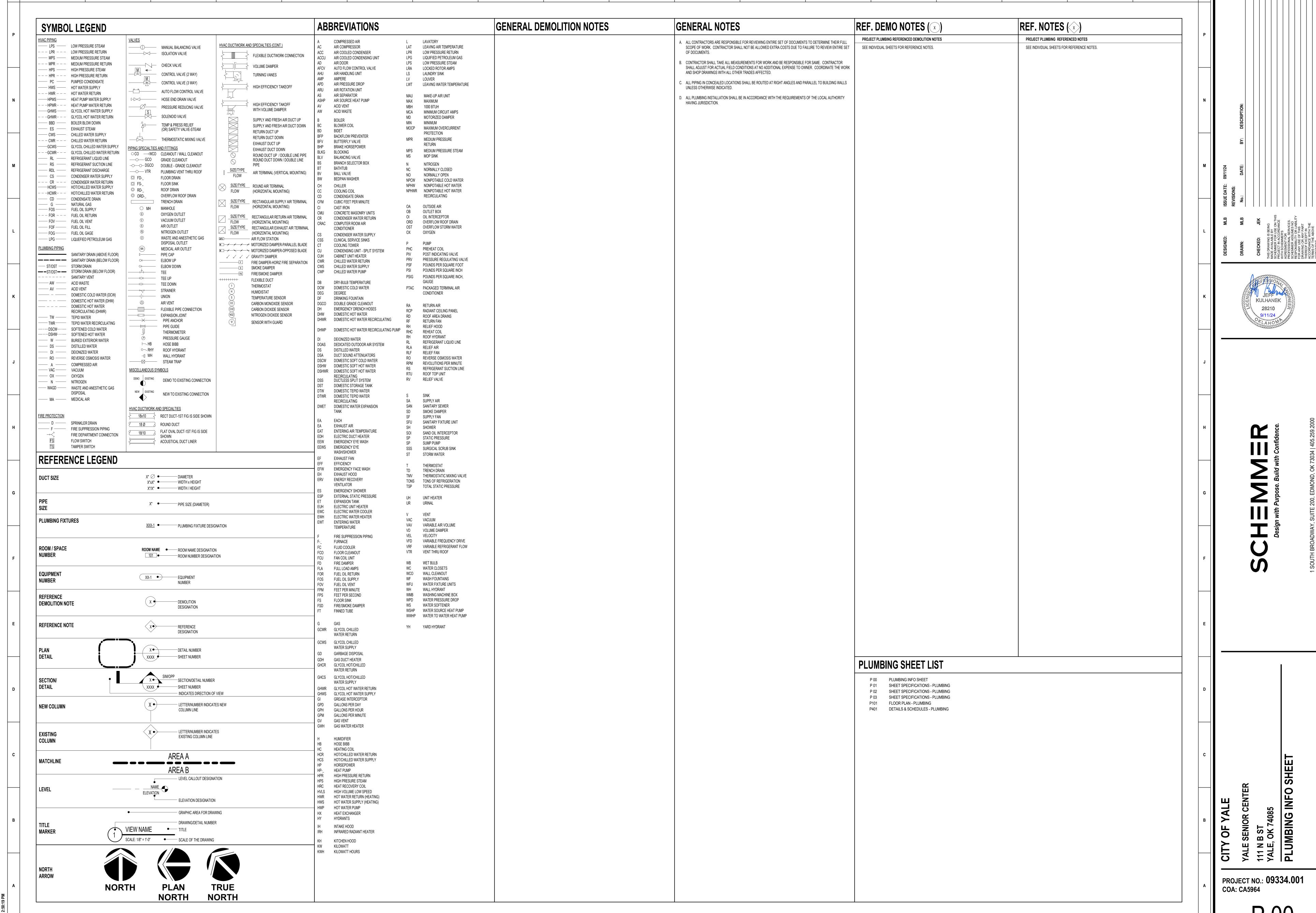
ROOF FRAMING PLAN

E SENIOR CENTER N B ST E, OK 74085

PROJECT NO.: **09334.001** COA: CA5964

S101





12

P00

PLUMBING INFO SHEET

Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers. fied for individual pipe hangers. loads being supported. Weld steel according to AWS D1.1/D1.1M. and support together on field-assembled metal framing systems. Fastener System Installation: instructions. rods, nuts, washers, and other accessories. Equipment Support Installation: Fabricate from welded-structural-steel shapes. of expansion joints, expansion loops, expansion bends, and similar units. crete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts. Load Distribution: Install hangers and supports so that piping live and dead loads 1.1 ACTION SUBMITTALS and stresses from movement will not be transmitted to connected equipment

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services Insulated Piping: Attach clamps and spacers to piping. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert. Do not exceed pipe stress limits allowed by ASME B31.9 for building Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining 2.2 ADHESIVES insulation.

weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees. Option: Thermal-hanger shield inserts may be used. Include steel 2.3 MASTICS weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90L): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick. Thermal-Hanger Shields: Install with insulation same thickness as piping in-

Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor. Grouting: Place grout under supports for equipment and make bearing surface

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following: Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap. Remove welding flux immediately Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

to achieve indicated slope of pipe. 2.4 SEALANTS B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches 3.5 HANGER AND SUPPORT SCHEDULE Specific hanger and support requirements are in Sections specifying piping sys-

Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections ment that will not have field-applied finish.

C. Use hangers and supports with galvanized metallic coatings for piping and equip-Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Use galvanized steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications. Use copper-plated pipe hangers and copper attachments for copper piping and tub-

lated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750). noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).

Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers 3.1 EXAMINATION NPS 3/4 to NPS 24 (DN 24 to DN 600). Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for Hanger-Rod Attachments: Unless otherwise indicated and except as specified in

Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) 3.2 PREPARATION for heaw loads. 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg CL) piping installations Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe

Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

Install insulation continuously through hangers and around anchor attach-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. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended

Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attachby insulation material manufacturer. Cover inserts with jacket material matching adjacent pipe insulation. Install Welded-Steel Brackets: For support of pipes from below or for suspending shields over jacket, arranged to protect jacket from tear or puncture by hangfrom above by using clip and rod. Use one of the following for indicated er, support, and shield.

> Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses. Install insulation with factory-applied jackets as follows: Draw jacket tight and smooth.

> > wall surface and seal with joint sealant.

Insulation Installation at Floor Penetrations:

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

Insulation Installation on Straight Pipes and Tubes:

mastic and flashing sealant.

plus twice the thickness of pipe insulation.

Insulation Installation on Pipe Flanges:

Rated): Install insulation continuously through walls and partitions.

tion continuously through penetrations of fire-rated walls and partitions.

1. Pipe: Install insulation continuously through floor penetrations.

with finishing cement, mastic, and flashing sealant.

and tighten bands without deforming insulation materials.

laps with outward clinched staples at 6 inches (150 mm) o.c.

Install preformed pipe insulation to outer diameter of pipe flange.

For insulation with factory-applied jackets on above-ambient surfaces, secure

For insulation with factory-applied jackets on below-ambient surfaces, do not

staple longitudinal tabs. Instead, secure tabs with additional adhesive as rec-

ommended by insulation material manufacturer and seal with vapor-barrier

protrusions with vapor-barrier mastic and joint sealant.

Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insula-

Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same mate-Saddles and Shields: Unless otherwise indicated and except as specified in piping rial as insulation jacket. Secure strips with adhesive and outward clinching system Sections, install the following types: staples along both edges of strip, spaced 4 inches (100 mm) o.c. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insuwith insulation that matches adjoining insulation. lation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along Protection Shields (MSS Type 40): Of length recommended in writing by edge at 4 inches (100 mm) o.c.

manufacturer to prevent crushing insulation. For below-ambient services, apply vapor-barrier mastic over staples. Thermal-Hanger Shield Inserts: For supporting insulated pipe. Cover joints and seams with tape, according to insulation material manufac-Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that turer's written instructions, to maintain vapor seal. are not specified in piping system Sections. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and Comply with MFMA-103 for metal framing system selections and applications that joints and at ends adjacent to pipe flanges and fittings. are not specified in piping system Sections.

Cut insulation in a manner to avoid compressing insulation more than 75 percent of Use mechanical-expansion anchors instead of building attachments where required its nominal thickness. in concrete construction. Finish installation with systems at operating conditions. Repair joint separations and P. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support cracking due to thermal movement. supply and waste piping for plumbing fixtures. M. Repair damaged insulation facings by applying same facing material over damaged **END OF SECTION**

SECTION 220719—PLUMBING PIPING INSULATION staple, and seal patches similar to butt joints. PART 1—GENERAL 3.4 PENETRATIONS Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations. Product Data: For each type of product indicated. Include thermal conductivity, wa-

ter-vapor permeance thickness, and jackets (both factory- and field-applied, if any). Seal penetrations with flashing sealant. PART 2—PRODUCTS For applications requiring only indoor insulation, terminate insulation inside 2.1 INSULATION MATERIALS Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire

Comply with requirements in "Piping Insulation Schedule, General," and "Indoor Piping Insulation Schedule articles for where insulating materials shall be applied. Products shall not contain asbestos, lead, mercury, or mercury compounds. Mineral-Fiber, Preformed Pipe Insulation:

Center-Beam Clamps (MSS Type 21): For attaching to center of bottom

Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is re-

Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom

Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom

C-Clamps (MSS Type 23): For structural shapes.

Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

of steel I-beams for heaw loads, with link extensions.

Light (MSS Type 31): 750 lb (340 kg).

Medium (MSS Type 32): 1500 lb (680 kg).

Heavy (MSS Type 33): 3000 lb (1360 kg).

quired tangent to flange edge.

of steel I-beams for heavy loads.

ing to structural steel.

Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory 3.5 GENERAL PIPE INSULATION INSTALLATION Applied Jackets" Article.

Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indi-

Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient ser- A.

Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus

Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by

Color: White. C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient ser-

Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35mil (0.9-mm) dry film thickness. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C). Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by

Make width of insulation section same as overall width of flange and bolts, 3. Fill voids between inner circumference of flange insulation and outer circum-Color: White.

Breather Mastic: Water based; suitable for indoor and outdoor use on above-Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus

82 deg C). Solids Content: 60 percent by volume and 66 percent by weight. Color: White.

A. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants: Materials shall be compatible with insulation materials, jackets, and sub-Fire- and water-resistant, flexible, elastomeric sealant Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus

Color: White. 2.5 FACTORY-APPLIED JACKETS

Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following: ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136. Width: 3 inches (75 mm). Thickness: 11.5 mils (0.29 mm).

Adhesion: 90 ounces force/inch (1.0 N/mm) in width. Elongation: 2 percent. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape. 2.7 SECUREMENTS

Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel. Wire: 1.6-mm (0.062-inch) soft-annealed, stainless steel.

PART 3—EXECUTION A. Examine substrates and conditions for compliance with requirements for installation

tolerances and other conditions affecting performance of insulation application. Verify that systems to be insulated have been tested and are free of defects. Verify that surfaces to be insulated are clean and dry. Proceed with installation only after unsatisfactory conditions have been corrected.

als that will adversely affect insulation application. 3.3 GENERAL INSTALLATION REQUIREMENTS Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings,

Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system 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.

Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered.

 Full-face or ring type unless otherwise indicated. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable. 2.4 TRANSITION FITTINGS

Solder-joint or threaded ends.

Same size as pipes to be joined. Pressure rating at least equal to pipes to be joined.

End connections compatible with pipes to be joined Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping

Sleeve-Type Transition Coupling: AWWA C219.

Manufacturers: Subject to compliance with requirements, provide products by one of the following: Cascade Waterworks Mfg. Co.

b. Dresser, Inc. Ford Meter Box Company, Inc. (The). Jay R. Smith Mfg. Co.

e. JCM Industries, Inc.

Romac Industries, Inc. Smith-Blair, Inc. 2.5 DIELECTRIC FITTINGS General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with

Dielectric Nipples: Standard: IAPMO PS 66. Electroplated steel nipple complying with ASTM F 1545. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107

End Connections: Male threaded or grooved. Lining: Inert and noncorrosive, propylene.

PART 3—EXECUTION

pipes to be joined.

3.1 PIPING INSTALLATION Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination

Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

> Rough-in domestic water piping for water-meter installation according to utility company's requirements Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service

> 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.

> Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space. Install piping to permit valve servicing. Install nipples, unions, special fittings, and valves with pressure ratings the same as

or higher than the system pressure rating used in applications below unless other-A. Insulation Installation on Fittings, Valves, Strainers, Flanges, Unions, and Instru-Install piping free of sags and bends. Install fittings for changes in direction and branch connections. Install insulation over fittings, valves, strainers, flanges, unions, and other

specialties with continuous thermal and vapor-retarder integrity unless other-Install unions in copper tubing at final connection to each piece of equipment, mawise indicated, utilizing preformed fitting insulation and jackets with the same thickness as used for adjacent pipe. Fill joints and seams with insulating ce-M. Install pressure gages on suction and discharge piping for each plumbing pump. Insulate instrument connections for thermometers, pressure gages, pressure N. Install thermostats in hot-water circulation piping.

temperature taps, test connections, flow meters, sensors, switches, and Install thermometers on inlet and outlet piping from each water heater.

transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish Install sleeves for piping penetrations of walls, ceilings, and floors. Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. 3.2 JOINT CONSTRUCTION

 Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe. Secure each layer of preformed pipe insulation to pipe with wire or bands Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly. 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and

Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows: Apply appropriate tape or thread compound to external pipe threads. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded

D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook." Extruded-Tee Connections are not allowed. Flanged Joints: Select appropriate as-

bestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to

Joints for Dissimilar-Material Piping: Make joints using adapters compatible with ference of adjacent straight pipe segments with mineral-fiber blanket insulamaterials of both piping systems.

Install jacket material with manufacturer's recommended adhesive, overlap 3.3 TRANSITION FITTING INSTALLATION Install transition couplings at joints of dissimilar piping.

3.4 DIELECTRIC FITTING INSTALLATION

Vertical Piping: MSS Type 8 or 42, clamps.

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tub-Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples.

3.5 HANGER AND SUPPORT INSTALLATION A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

Base of Vertical Piping: MSS Type 52, spring hangers.

Individual, Straight, Horizontal Piping Runs: 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hang-Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hang-

Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cush-

Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

 B. Support vertical piping and tubing at base and at each floor. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm)

Install hangers for copper tubing with the following maximum horizontal spacing

and minimum rod diameters: NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-

inch (10-mm) rod. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8inch (10-mm) rod.

Install supports for vertical copper tubing every 10 feet (3 m). Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.6 CONNECTIONS Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance. Connect domestic water piping to exterior water-service piping. Use transition fitting

to join dissimilar piping materials. D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

Piping Tests:

gram of portion of piping tested.

 Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water. Test for leaks and defects in new piping and parts of existing piping

segments, submit a separate report for each test, complete with dia-

that have been altered, extended, or repaired. If testing is performed in

COA: CA5964

Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used. Cut sleeves to length for mounting flush with both surfaces. 2.6 EQUIPMENT SUPPORTS Exception: Extend sleeves installed in floors of mechanical equipment

Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89.

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install

hangers, supports, clamps, and attachments as required to properly support piping

Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-

shrink and nonmetallic grout; suitable for interior and exterior applications.

Properties: Nonstaining, noncorrosive, and nongaseous

Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

2.7 MISCELLANEOUS MATERIALS

and galvanized.

3.1 HANGER AND SUPPORT INSTALLATION

from the building structure.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as speci-Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for

Metal Framing System Installation: Arrange for grouping of parallel runs of piping, Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated pip-

Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written Install hangers and supports complete with necessary attachments, inserts, bolts,

Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install con-

Option: Thermal-hanger shield inserts may be used. Include steel

Shield Dimensions for Pipe: Not less than the following:

3.3 METAL FABRICATIONS

Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and

Use thermal-hanger shield inserts for insulated piping and tubing

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types: Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsu-Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of

Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

piping system Sections, install the following types:

Building Attachments: Unless otherwise indicated and except as specified in piping

Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom

A. General Requirements:

Insulation Installation on Pipe Fittings and Elbows: Install preformed sections of same material as straight segments of pipe insulation when available.

When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands. Insulation Installation on Valves and Pipe Specialties:

seams at least 1 inch (25 mm), and seal joints with flashing sealant.

Install preformed sections of same material as straight segments of pipe insulation when available. When preformed sections are not available, install mitered sections of pipe insulation to valve body

Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. 4. Install insulation to flanges as specified for flange insulation application. 3.7 INDOOR PIPING INSULATION SCHEDULE Domestic Cold Water:

 NPS 1 (DN 25) and Smaller: Insulation shall be the following: Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) 2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be the following: Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

Domestic Hot and Recirculated Hot Water: Any size: Insulation shall be the following: a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick. **END OF SECTION**

SECTION 221116—DOMESTIC WATER PIPING

PART 1—GENERAL (NOT REQUIRED) PART 2—PRODUCTS 2.1 PIPING MATERIALS

Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS Hard Copper Tube: ASTM B 88M, Type B (ASTM B 88, Type L) water tube, drawn

Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure

C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materi-Copper Unions: MSS SP-123. Cast-copper-alloy, hexagonal-stock body.

Ball-and-socket, metal-to-metal seating surfaces.

Comply with NSF Standard 372 for low lead.

A. Pipe-Flange Gasket Materials:

Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger. 3.7 FIELD QUALITY CONTROL A. Perform the following tests and inspections:

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SHEET SPECIFICATIONS - PLUMBING

Using grout, seal the space outside of sleeves in slabs and walls without

areas or other wet areas 2 inches (50 mm) above finished floor level.

slabs and walls are constructed

sleeve-seal system

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cyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barri-Insulation-Insert Material for Hot Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength. C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumfer-

system Sections, install the following types:

flange of beams, channels, or angles.

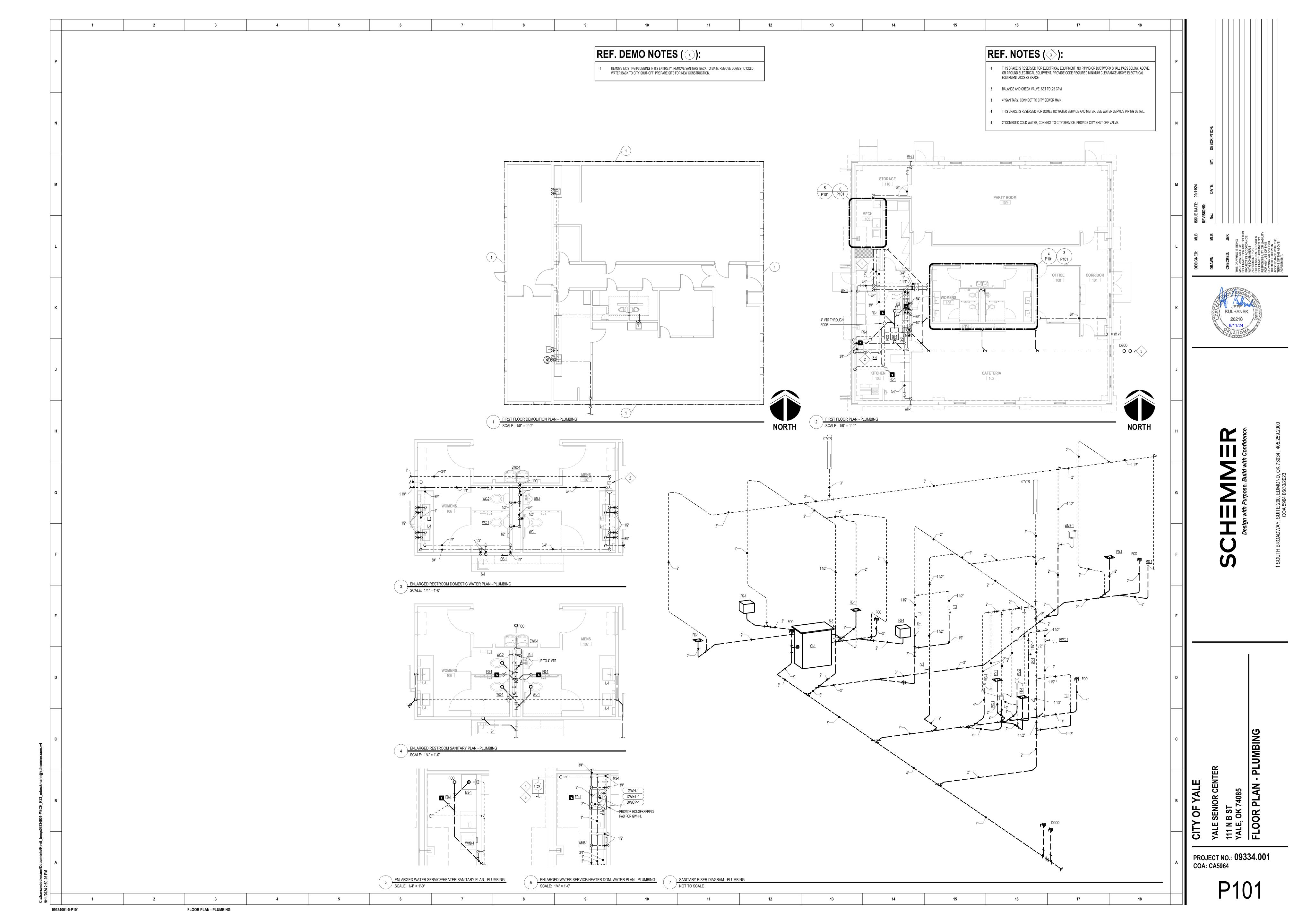
Do not weld brackets, clips, or other attachment devices to piping, fittings, and spe-

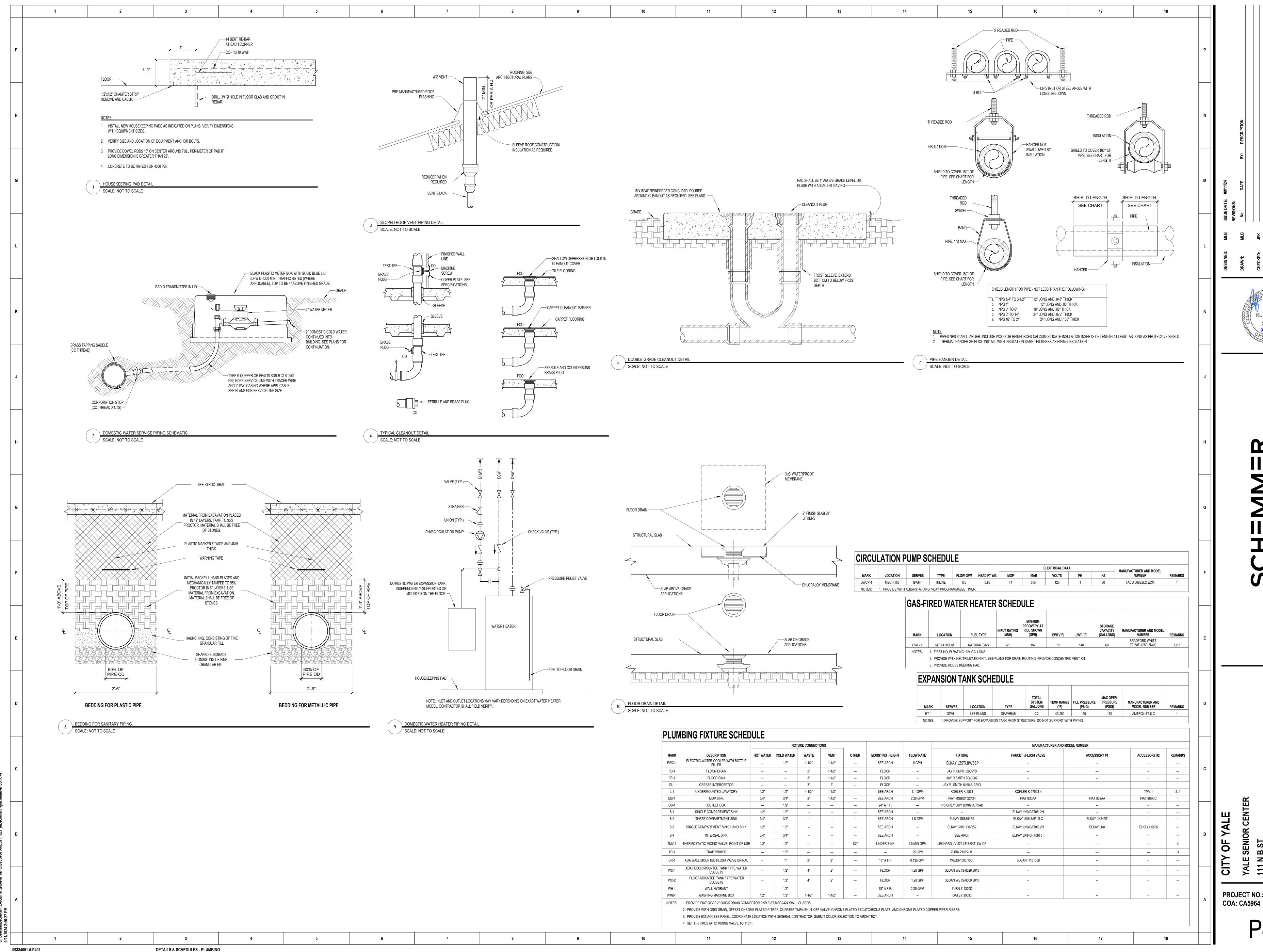
b. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.	2.7 WALL HYDRANTS A. Nonfreeze Wall Hydrants:	8. Open discharge valve slowly. 9. Adjust temperature settings on thermostats.	3.3 SPECIALTY PIPE FITTING INSTALLATION A. Transition Couplings:	4. Body or Ferrule: Cast iron. 5. Clamping Device: Not required.	6. Direct-Vent System: Through-wall, coaxial- or double-channel vent assembly with domestic-water heater manufacturers' outside intake/exhaust screen.	
 d. Cap and subject piping to static water pressure of 50 psig (345 kPa) 	Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.	- 10. Adjust timer settings.	 Install transition couplings at joints of piping with small differences in ODs. 	6. Outlet Connection: Match piping.	2.3 DOMESTIC-WATER HEATER ACCESSORIES A. Domestic-Water Expansion Tanks:	
above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be	2. Pressure Rating: 125 psig (860 kPa).	3.2 ADJUSTINGA. Adjust inline, domestic-water pumps to function smoothly, and lubricate as recom-	 In Waste Drainage Piping: Unshielded, nonpressure transition couplings. 3.4 HANGER AND SUPPORT INSTALLATION 	 Closure: Brass plug with tapered threads. Adjustable Housing Material: Cast iron with threads. 	Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.	P
repaired. e. Repair leaks and defects with new materials, and retest piping or por-	 Operation: Loose key. Casing and Operating Rod: Of length required to match wall thickness. In- 	mended by manufacturer. B. Adjust initial temperature set points.	A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equip-	9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy. 10. Frame and Cover Shape: Round.	Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum	
tion thereof until satisfactory results are obtained. f. Prepare reports for tests and for corrective action required.	clude wall clamp. 5. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).	C. Set field-adjustable switches and circuit-breaker trip ranges as indicated. END OF SECTION	ment." 1. Install galvanized steel pipe hangers for horizontal piping in noncorrosive	10. Frame and Cover Shape: Round.11. Top Loading Classification: Medium Duty.	system-operating pressure at tank. 3. Construction:	
Domestic water piping will be considered defective if it does not pass tests and inspections.	 Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7. 		environments. 2. Install galvanized steel pipe support clamps for vertical piping in noncorrosive	 Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout. 	a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.	
3.8 ADJUSTING	7. Box: Deep, flush mounted with cover.	PART 1—GENERAL 1.1 ACTION SUBMITTALS	environments. 3. Vertical Piping: MSS Type 8 or Type 42, clamps.	C. Cast-Iron Wall Cleanouts: Standard: ASME A112.36.2M. Include wall access.	b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through	
A. Perform the following adjustments before operation:1. Close drain valves, hydrants, and hose bibbs.	 Box and Cover Finish: Polished nickel bronze. Outlet: Exposed, with integral vacuum breaker and garden-hose thread com- 		4. Install individual, straight, horizontal piping runs:	2. Size: Same as connected drainage piping.	tank fittings and outlets.	
Open shutoff valves to fully open position.	plying with ASME B1.20.7. 2.8 DRAIN VALVES	PART 2—PRODUCTS 2.1 PERFORMANCE REQUIREMENTS	100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.	 Body: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. 	B. Piping-Type Heat Traps: Field-fabricated piping arrangement in accordance with	IIION:
 Open throttling valves to proper setting. Adjust balancing valves in hot-water-circulation return piping to provide ade- 	A. Ball-Valve-Type, Hose-End Drain Valves:1. Standard: MSS SP-110 for standard-port, two-piece ball valves.	A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:	 Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. 	 Closure Plug: A. Brass, countersunk head drilled and threaded for cover attachment 		ESCRIP
quate flow. c. Manually adjust ball-type balancing valves in hot-water-circulation re-	2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.	 Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa). 2.2 PIPING MATERIALS 	 Base of Vertical Piping: MSS Type 52, spring hangers. Support horizontal piping and tubing within 12 inches (300 mm) of each fit- 	screw B. Size: Same as or not more than one size smaller than cleanout size.	tion in piping. D. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 2-psig	
turn piping to provide hot-water flow in each branch. b. Adjust calibrated balancing valves to flows indicated.	3. Size: NPS 3/4 (DN 20).4. Body: Copper alloy.	A. Piping materials shall bear label, stamp, or other markings of specified testing	ting, valve, and coupling. C. Support vertical piping and tubing at base and at each floor.	 Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw. 	E. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at	BY:
 Remove plugs used during testing of piping and for temporary sealing of pip- ing during installation. 	5. Ball: Chrome-plated brass.	agency. B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube,	D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-	PART 3—EXECUTION	least as great as heat input, and include pressure setting less than working- pressure rating of domestic-water heater. Select relief valves with sensing element that extends into storage tank.	
Remove and clean strainer screens. Close drain valves and replace drain plugs.	6. Seats and Seals: Replaceable.7. Handle: Vinyl-covered steel.	fitting materials, and joining methods for specific services, service locations, and pipe sizes.	E. Install hangers for cast-iron soil piping with the following maximum horizontal spac-	Install floor drains at low points of surface areas to be drained. Set grates of drains	1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4.	M //1/24 DATE:
 Remove filter cartridges from housings and verify that cartridges are as spec- ified for application where used and are clean and ready for use. 	8. Inlet: Threaded or solder joint.9. Outlet: Threaded, short nipple with garden-hose thread complying with	2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS A. Pipe and Fittings: ASTM A 74, Service class(es).	ing and minimum rod diameters: 1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-	flush with finished floor, unless otherwise indicated. 1. Position floor drains for easy access and maintenance.	2.4 SOURCE QUALITY CONTROL A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be	6
 Check plumbing specialties and verify proper settings, adjustments, and operation. 	ASME B1.20.7 and cap with brass chain. PART 3—EXECUTION	B. Gaskets: ASTM C 564, rubber. C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.	inch (10-mm) rod. 2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.	Set floor drains below elevation of surrounding finished floor to allow floor drainage.	ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.	JE DAT ISIONS
3.9 CLEANING	3.1 INSTALLATION	2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS	 NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod. 	3. Set with grates depressed according to the following drainage area radii:	 Hydrostatically test commercial domestic-water heaters to minimum of one and one -half times pressure rating before shipment. 	
 A. Clean and disinfect potable domestic water piping as follows: 1. Purge new piping and parts of existing piping that have been altered, extend- 	A. Backflow Preventers: Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be	· · ·	 Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm). 	 Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression. 	 C. Domestic-water heaters will be considered defective if they do not pass tests and inspections. 	ILB ILB
ed, or repaired before using. 2. Use purging and disinfecting procedures prescribed by authorities having	sources of contamination. Comply with authorities having jurisdiction. 1. Locate backflow preventers in same room as connected equipment or sys-	1. Standards: ASTM C 1277 and CISPI 310.	F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).	 Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope. 	D. Prepare test and inspection reports. PART 3—EXECUTION	T L S BEING S L S E BING S L USE ON SYRDS ON SYR
jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:	tem. 2. Install drain for backflow preventers with atmospheric-vent drain connection	2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe	 G. Install supports for vertical steel piping every 15 feet (4.5 m). H. Support piping and tubing not listed above according to MSS SP-58 and manufac- 	 Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression. 	3.1 DOMESTIC-WATER HEATER INSTALLATION	GNED: CKED: AWN: WALNUG B WAR FORER
 Flush piping system with clean, potable water until dirty water does not appear at outlets. 	with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are	2.5 PVC PIPE AND FITTINGS	turer's written instructions. 3.5 CONNECTIONS	 Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring. 	heaters on concrete base. Comply with requirements for concrete base specified in	DESI DESI DRAV THIS DRA MADE AN SCHEMAN PROJEC
 b. Fill and isolate system according to either of the following: 1) Fill system or part thereof with water/chlorine solution with at 	unacceptable for this application.	A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic	A. Drawings indicate general arrangement of piping, fittings, and specialties.	 a. Maintain integrity of waterproof membranes where penetrated. 5. Install individual traps for floor drains connected to sanitary building drain, 	Section 033000 "Cast-in-Place Concrete." 1. Maintain manufacturer's recommended clearances.	
least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.	3. Do not install bypass piping around backflow preventers.B. Balancing Valves: Install in locations where they can easily be adjusted.	drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping. B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.	Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.	unless otherwise indicated. B. Install cleanouts in aboveground piping and building drain piping according to the	Arrange units so controls and devices that require servicing are accessible.	ANTESSION
Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand	C. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet. Install cabinet-type units recessed	f C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent	C. Connect waste and vent piping to the following:1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller	following, unless otherwise indicated: 1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100)	wise indicated, install dowel rods on 18-inch (450-mm) centers around the	K JEFF
for three hours. c. Flush system with clean, potable water until no chlorine is in water	in or surface mounted on wall as specified.	D. Adhesive Primer: ASTM F 656.	than required by plumbing code. 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes	for larger drainage piping unless larger cleanout is indicated.	For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.	KULHANEK
coming from system after the standing time. d. Repeat procedures if biological examination shows contamination.	A. Drawings indicate general arrangement of piping, fittings, and specialties.	E. Solvent Cement: ASTM D 2564. 2.6 SPECIALTY PIPE FITTINGS	indicated, but not smaller than required by authorities having jurisdiction. 3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but	 Locate at each change in direction of piping greater than 45 degrees. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping. 	E Discours and accura anchorage devices. He cotting drawings tompletes dis	28210
e. Submit water samples in sterile bottles to authorities having jurisdiction.	B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.	A. Transition Couplings: 1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified	not smaller than required by plumbing code. 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts	smaller and 100 feet (30 m) for larger piping.4. Locate at base of each vertical soil and waste stack.	6. Install anchor bolts to elevations required for proper attachment to supported equipment.	OF A HOM
B. Prepare and submit reports of purging and disinfecting activities. Include copies of	3.3 ADJUSTINGA. Set field-adjustable flow set points of balancing valves.	piping system fitting. 2. Unshielded, Nonpressure Transition Couplings:	with cover flush with floor. 5. Comply with requirements for cleanouts and drains specified in Sec-	 For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor. 	7 Anchor domestic-water heaters to substrate.	
water-sample approvals from authorities having jurisdiction. C. Clean interior of domestic water piping system. Remove dirt and debris as work	 Set field-adjustable temperature set points of temperature-actuated, water mixing valves. 	a. Standard: ASTM C 1173.	tion 221319 "Sanitary Waste Piping Specialties." 6. Equipment: Connect waste piping as indicated.	D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.	original design, and referenced standards. Maintain manufacturer's recommended	
progresses. 3.10 PIPING SCHEDULE	END OF SECTION SECTION 221123—DOMESTIC-WATER PLIMPS	b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and	a. Provide shutoff valve if indicated and union for each connection.	END OF SECTION	clearances. Arrange units so controls and devices needing service are accessible. 1. Install shutoff valves on domestic-water-supply piping to domestic-water besters and an demestic bet water sutlet piping.	l l
A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.	SECTION 221123—DOMESTIC-WATER PUMPS PART 1—GENERAL	tightening mechanism on each end. c. End Connections: Same size as and compatible with pipes to be	 b. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger. 	SECTION 223400—FUEL-FIRED, DOMESTIC-WATER HEATERS PART 1—GENERAL	heaters and on domestic-hot-water outlet piping. C. Install gas-fired, domestic-water heaters in accordance with NFPA 54.	
 Flanges and unions may be used for aboveground piping joints unless otherwise indicated. 		joined. d. Sleeve Materials:	 Where installing piping adjacent to equipment, allow space for service and mainte- nance of equipment. 	I.1 RELATED DOCUMENTS A. Drawings and general provisions of the Contract, including General and Supple-	Install gas shutoff valves on gas supply piping to gas-fired, domestic-water	
C. Aboveground domestic water piping, all sizes, shall be one of the following:	PART 2—PRODUCTS	1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.	 E. Make connections according to the following unless otherwise indicated: 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve 1. 	mentary Conditions and Division 01 Specification Sections, apply to this Section.	Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are re-	
 Hard copper tube, ASTM B 88M, Type B (ASTM B 88, Type L); wrought-copper, solder-joint fittings; and soldered joints. 	2.1 PERFORMANCE REQUIREMENTS A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in	For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC. For Plastic Pipes: ASTM D 5006, PVC or other restoriel series.	and at final connection to each piece of equipment.	A. Section Includes:	quired to reduce gas pressure at burner. 3. Comply with requirements for gas shutoff valves, gas pressure regulators,	
6.11 VALVE SCHEDULE A. Drawings indicate valve types to be used. Where specific valve types are not indi-	NFPA 70, by a qualified testing agency, and marked for intended location and application.	patible with pipe materials being joined.	 Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment. 	 Commercial, direct-vent, gas-fired, storage, domestic-water heater. Domestic-water heater accessories. 	 Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 231123 "Facility Natural-Gas Piping." 	н
cated, the following requirements apply: 1. Shutoff Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use but-	B. UL Compliance: UL 778 for motor-operated water pumps. C. Drinking Water System Components - Health Effects and Drinking Water System.	Standard, ASTM C 1460	A. Test salitary waste and vent piping according to procedures of authorities naving	Domestic-water heater accessories. 1.3 ACTION SUBMITTALS	D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend do-	
terfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger. 2. Throttling Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use	 C. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372. 2.2 INJUNE SEALLESS CENTRELIGAL RUMPS 	b. Description: Elastomeric or rubber sleeve with full-length, corrosion- resistant outer shield and corrosion-resistant-metal tension band and	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	A. Product Data: For each type of product.B. Shop Drawings:	mestic-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.	
butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.	2.2 IN-LINE, SEALLESS CENTRIFUGAL PUMPSA. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor,	tightening mechanism on each end.	been altered, extended, or repaired. a. If testing is performed in segments, submit separate report for each	Include diagrams for power, signal, and control wiring.	floor drain. E. Install water-heater drain piping as indirect waste to spill by positive air gap into	
Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves. Drain Duty: Head and drain valves.	sealless, overhung-impeller centrifugal pumps. B. Manufacturers: Subject to compliance with requirements, available manufacturers	c. End Connections: Same size as and compatible with pipes to be joined.	a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested. 1. Leave uncovered and unconcealed new, altered, extended, or replaced	I.4 INFORMATIONAL SUBMITTALS A. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale, on	open drains or over floor drains. Install hose-end drain valves at low points in water	
 Drain Duty: Hose-end drain valves. Use check valves to maintain correct direction of domestic water flow to and from 	offering products that may be incorporated into the Work include, but are not limited to the following:	4 Pressure Transition Colinings	waste and vent piping until it has been tested and approved.	which the items described in this Section are shown and coordinated with all building trades.	Piping Specialties."	Bu Bu
equipment. END OF SECTION	 Amtrol. Armstrong. 	 Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined. 	a. Expose work that was covered or concealed before it was tested. 3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing in	B. Product Certificates: For each type of commercial, gas-fired domestic-water heater.C. Domestic-Water Heater Labeling: Certified and labeled by testing agency accepta-	 F. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping." 	
SECTION 221119—DOMESTIC WATER PIPING SPECIALTIES PART 1—GENERAL	3. Aurora. 4. Bell & Gossett.	c. Gasket Material: Natural or synthetic rubber.d. Metal Component Finish: Corrosion-resistant coating or material.	outside leaders on completion of roughing-in. a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa)	ble to authorities having jurisdiction. D. Field quality-control reports.	G. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.	# H Pu
1.1 ACTION SUBMITTALS	5. Taco.	PART 3—EXECUTION	 but not less than 10-foot head of water (30 kPa). b. From 15 minutes before inspection starts to completion of inspection, water level must not drop. 	E. Sample Warranty: For special warranty.	H. Fill domestic-water heaters with water.	gn wii
A. Product Data: For each type of product. PART 2—PRODUCTS	Pump Construction: Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with material and impoller on common shaft and designed for installation with	7. Drawing plans, schematics, and diagrams maleute general location and alrange-	water level must not drop. c. Inspect joints for leaks.	I.5 CLOSEOUT SUBMITTALSA. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include	Charge domestic-water expansion tanks with air to required system pressure. J. Install dielectric fittings in all locations where piping of dissimilar metals is to be initial. The wetted surface of the dielectric fitting contacted by potable water shall.	
2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES	with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.	ment of piping systems. 1. Indicated locations and arrangements were used to size pipe and calculate	 Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained. 	in emergency, operation, and maintenance manuals.	joined. The wetted surface of the dielectric fitting contacted by potable water shall contain less than 0.25 percent of lead by weight.	
A. Potable-water piping and components shall comply with NSF 61 and NSF 14.B. Comply with NSF 372 for low lead.	 Casing: Cast Iron or bronze, with threaded or companion-flange connections. Impeller: non-metallic. 	friction loss, expansion, pump sizing, and other design considerations. 2. Install piping as indicated unless deviations to layout are approved on coordi-	5. Prepare reports for tests and required corrective action.	A. Coordinate sizes and locations of concrete bases with actual equipment provided.	3.2 PIPING CONNECTIONS A. Comply with requirements for domestic-water piping specified in Section 221116	
2 PERFORMANCE REQUIREMENTS A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860)	4. Motor: single, unless otherwise noted.	nation drawings. B. Install piping in concealed locations unless otherwise indicated and except in equip-	A. Flanges and unions may be used on aboveground pressure piping unless other-	I.7 WARRANTY A. Special Warranty: Manufacturer agrees to repair or replace components of fuel-	"Domestic Water Piping." B. Comply with requirements for gas piping specified in Section 231123 "Facility Natu-	
kPa) unless otherwise indicated. 3 BACKFLOW PREVENTERS	A. Comply with NEMA designation, temperature rating, service factor, enclosure type,	ment rooms and service areas.	wise indicated. B. Aboveground, soil and waste piping, any size shall be any of the following:	fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.	ral-Gas Piping." C. Drawings indicate general arrangement of piping, fittings, and specialties.	
Reduced-Pressure-Principle Backflow Preventers:	and efficiency requirements. 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so	areas at right angles or parallel to building walls. Diagonal runs are prohibited un- less specifically indicated otherwise.	 Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and 	PART 2—PRODUCTS 2.1 PERFORMANCE REQUIREMENTS	D. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of	
 Standard: ASSE 1013. Operation: Continuous-pressure applications. 	driven load will not require motor to operate in service factor range above 1.0.	D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.	coupled joints. 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.	 A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use. 	demostic water heaters	
Pressure Loss: 12 psig (83 kPa) maximum, through middle third of flow range.	2.4 CONTROLS A. Thermostats: Electric; adjustable for control of hot-water circulation pump.	E. Install piping at indicated slopes.	4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition cou-	ASHRAE/IES Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IES 90.1.	A. Tests and Inspections:	
 Body: Bronze for NPS 2 (DN 50) and smaller. End Connections: Threaded for NPS 2 (DN 50) and smaller. 	Type: Water-immersion temperature sensor, for installation in piping.	F. Install piping free of sags and bends.G. Install fittings for changes in direction and branch connections.	plings. C. Aboveground, vent piping, any size shall be any of the following:	C. ASME Compliance:	 Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist. 	E
6. Configuration: Designed for horizontal, straight-through flow.	 Range: 65 to 200 deg F (18 to 93 deg C) Enclosure: NEMA 250, Type 4X 	 H. Install piping to allow application of insulation. I. Make changes in direction for soil and waste drainage and vent piping using appro- 	 Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and 	 Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pres- sure Vessel Code: Section VIII. Division 1. 	confirm proper operation.	
 Accessories: a. Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on 	 Operation of Pump: On or off. Transformer: Provide if required. 	priate branches, bends, and long-sweep bends. 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if	coupled joints. 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.	 Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pres- 		
inlet and outlet. b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connec-	6. Power Requirement: 24 V ac.	change in direction of flow is from horizontal to vertical.	Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.	sure Vessel Code: Section IV. D. NSF Compliance: Fabricate and label equipment components that will be in contact	 B. Domestic-water heaters will be considered defective if they do not pass tests and inspections 	
tion. ## BALANCING VALVES	Settings: Start pump at 105 deg F (41 deg C) and stop pump at 120 deg F (49 deg C).	stalled back to back or side by side with common drain pipe.	D. Underground, soil, waste, and vent piping, any size shall be the following:	with potable water to comply with NSF 61 and NSF 372.	t C. Prepare test and inspection reports. 3.4 DEMONSTRATION	
A. Memory-Stop Balancing Valves:	B. Timers: Electric, for control of hot-water circulation pump.1. Type: Programmable, seven-day clock with manual override on-off switch.	a. Straight tees, elbows, and crosses may be used on vent lines.3. Do not change direction of flow more than 90 degrees.	 Service class, cast-iron soil piping; gaskets; and gasketed joints. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition cou- 	2.2 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS A. Commercial, Direct-Vent, Gas-Fired, Storage, Domestic-Water Heaters:	A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters. Training shall be a minimum of one	D
 Standard: MSS SP-110 for two-piece, copper-alloy ball valves. Pressure Rating: 400-psig (2760-kPa) minimum CWP. 	2. Enclosure: NEMA 250, Type 1, suitable for wall mounting.	 Use proper size of standard increasers and reducers if pipes of different sizes are connected. 	plings. END OF SECTION	Manufacturers: a. A. O. Smith Corporation.	hour(s).	
3. Size: NPS 2 (DN 50) or smaller.	3. Operation of Pump: On or off.4. Transformer: Provide if required.	a. Reducing size of waste piping in direction of flow is prohibited.	SECTION 221319—SANITARY WASTE PIPING SPECIALTIES	b. Bradford White Corporation.	END OF SECTION SECTION 224213—COMMERCIAL WATER CLOSETS AND URINALS	
 Body: Copper alloy. Port: Full port. 	5. Power Requirement: 24 V ac. 6. Programmable Sequence of Operation: Up to two op-off cycles each day for	1. Install true to grades and alignment indicated, with unbroken continuity of	PART 1—GENERAL 1.1 ACTION SUBMITTALS	c. PVI; A WATTS Brand.d. State Industries.	PART 1—GENERAL 1.1 ACTION SUBMITTALS	
6. Ball: Chrome-plated brass.7. Seats and Seals: Replaceable.	 Programmable Sequence of Operation: Up to two on-off cycles each day for seven days. 	Install required gaskets according to manufacturer's written instructions for	A. Product Data: For each type of product.	Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.	A. Product Data: For each type of product.	
 Seats and Seals: Replaceable. End Connections: Solder joint or threaded. 	PART 3—EXECUTION 3.1 INSTALLATION		PART 2—PRODUCTS 2.1 ASSEMBLY DESCRIPTIONS	3. Standard: ANSI Z21.10.1/CSA 4.1.	PART 2—PRODUCTS 2.1 WATER CLOSETS	_c
9. Handle: Vinyl-covered steel with memory-setting device. 5 TEMPERATURE-ACTUATED, WATER MIXING VALVES	A. Comply with HI 1.4.B. Mount pumps in orientation complying with manufacturer's written instructions.	K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:	 Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency. 	4. Storage-Tank Construction: Steel.a. Tappings: ASME B1.20.1 pipe thread.	A. Water Closets.	
A. Primary, Thermostatic, Water Mixing Valves:	C. Install continuous-thread hanger rods and vibration isolation of size required to sup-	NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for pip-	B. Comply with NSF 14 for plastic sanitary waste piping specialty components. 2.2 FLOOR DRAINS	b. Pressure Rating: 150 psig (1035 kPa).	Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal:	
	port pump weight. D. Install thermostats in hot-water return piping.	ing NPS 4 (DN 100) and larger. 2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.	A. Cast-Iron Floor Drains:	 Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining material into tap- pings. 	a American Standard	<u></u>
 Standard: ASSE 1017. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. 	E. Install timers on wall near pump.F. Perform startup service.	Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.	 See plans for individual product requirements. FLOOR SINKS 	5. Factory-Installed Storage-Tank Appurtenances:	c. Kohler Co. d. Sloan Valve Company.	
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. 	Complete installation and startup checks according to manufacturer's written	Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."	A. Cast-Iron Floor Sinks:	a. Anode Rod: Replaceable magnesium.b. Dip Tube: Required unless cold-water inlet is near bottom of tank.	2. See plans for exact requirements.	YALE YALE OR CEN
2. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.	instructions.	3.2 JOINT CONSTRUCTIONA. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's	 See Plans for individual product requirements. 2.4 CLEANOUTS 	c. Drain Valve: Corrosion-resistant metal with hose-end connection.	2.2 TOILET SEATS A. Toilet Seats:	
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. 	instructions. 2. Check piping connections for tightness.	"Cast Iron Soil Pipe and Fittings Handbook" for compression joints.	A. Cast-Iron Exposed Cleanouts:	d. Insulation: Comply with ASHRAE/IES 90.1.e. Jacket: Steel with enameled finish.	 Manufacturers: Subject to compliance with requirements, provide products by one of the following: 	SEN OF SEN
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and coldwater supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. 	instructions.	f B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron	 Standard: ASME A112.36.2M for cast iron for cleanout test tee. 	 f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot- water outlet. 		
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and coldwater supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. 	 Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. 	 B. 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. C. Threaded Joints: Thread pipe with tapered pipe threads according to 	Size: Same as connected drainage piping	water outlet.	3 4 7	
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. STRAINERS FOR DOMESTIC WATER PIPING Y-Pattern Strainers: Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. 	 Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. Perform the following startup checks for each pump before starting: Verify bearing lubrication. 	Soil Pipe and Fittings Handbook" for hubless-piping coupling joints. C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.	 Size: Same as connected drainage piping Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. 	g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and natural-gas fuel.		
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and coldwater supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. STRAINERS FOR DOMESTIC WATER PIPING Y-Pattern Strainers: Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 (DN 65) and larger. 	 instructions. Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. Perform the following startup checks for each pump before starting: Verify bearing lubrication. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or 	Soil Pipe and Fittings Handbook" for hubless-piping coupling joints. C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. 1. Cut threads full and clean using sharp dies. 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fit-	 Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. Closure: Countersunk, brass plug. 	g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and	d. TOTO USA, INC. e. Zum Industries, LLC.	
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. STRAINERS FOR DOMESTIC WATER PIPING Y-Pattern Strainers: Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 (DN 65) and larger. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger. 	 Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. Perform the following startup checks for each pump before starting: Verify bearing lubrication. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected. 	Soil Pipe and Fittings Handbook" for hubless-piping coupling joints. C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. 1. Cut threads full and clean using sharp dies. 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows: a. Apply appropriate tape or thread compound to external pipe threads	 Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. Closure: Countersunk, brass plug. Closure Plug Size: Same as or not more than one size smaller than cleanout size. 	 g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and natural-gas fuel. h. Ignition: Standing pilot or ANSI Z21.20/CSA C22.2 No. 60730-2-5, electric, automatic, gas-ignition system. i. Temperature Control: Adjustable thermostat. 	d. TOTO USA, INC. e. Zum Industries, LLC. 2. See plans for exact requirements. 2.3 WALL-HUNG URINALS	PROJECT NO.: 093
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. STRAINERS FOR DOMESTIC WATER PIPING Y-Pattern Strainers: Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 (DN 65) and larger. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for 	 Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. Perform the following startup checks for each pump before starting: Verify bearing lubrication. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected. Verify that pump is rotating in the correct direction. Prime pump by opening suction valves and closing drains, and prepare pump 	Soil Pipe and Fittings Handbook" for hubless-piping coupling joints. C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. 1. Cut threads full and clean using sharp dies. 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows: a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified. b. Damaged Threads: Do not use pipe or pipe fittings with threads that	 Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. Closure: Countersunk, brass plug. 	 g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and natural-gas fuel. h. Ignition: Standing pilot or ANSI Z21.20/CSA C22.2 No. 60730-2-5, electric, automatic, gas-ignition system. i. Temperature Control: Adjustable thermostat. j. Combination Temperature-and-Pressure Relief Valve: ANSI Z21.22/CSA 4.4. Include relieving capacity at least as great as heat input, and 	d. TOTO USA, INC. e. Zum Industries, LLC. 2. See plans for exact requirements. 2.3 WALL-HUNG URINALS A. Urinals.	
 Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Type: Exposed-mounted, thermostatically controlled, water mixing valve. Material: Bronze body with corrosion-resistant interior components. Connections: Threaded inlets and outlet. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle. Valve Finish: Rough bronze. STRAINERS FOR DOMESTIC WATER PIPING Y-Pattern Strainers: Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 (DN 65) and larger. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger. Screen: Stainless steel with round perforations unless otherwise indicated. 	 Check piping connections for tightness. Clean strainers on suction piping. Set thermostats and timers for automatic starting and stopping operation of pumps. Perform the following startup checks for each pump before starting: Verify bearing lubrication. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected. Verify that pump is rotating in the correct direction. 	Soil Pipe and Fittings Handbook" for hubless-piping coupling joints. C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. 1. Cut threads full and clean using sharp dies. 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows: a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.	 Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping. Closure: Countersunk, brass plug. Closure Plug Size: Same as or not more than one size smaller than cleanout size. Cast-Iron Exposed Floor Cleanouts: 	 g. Burner: For use with direct-vent, gas-fired, domestic-water heaters and natural-gas fuel. h. Ignition: Standing pilot or ANSI Z21.20/CSA C22.2 No. 60730-2-5, electric, automatic, gas-ignition system. i. Temperature Control: Adjustable thermostat. j. Combination Temperature-and-Pressure Relief Valve: ANSI Z21.22/ 	d. TOTO USA, INC. e. Zum Industries, LLC. 2. See plans for exact requirements. 2.3 WALL-HUNG URINALS A. Urinals. 1. Manufacturers: Subject to compliance with requirements, provide products by	PROJECT NO.: 093

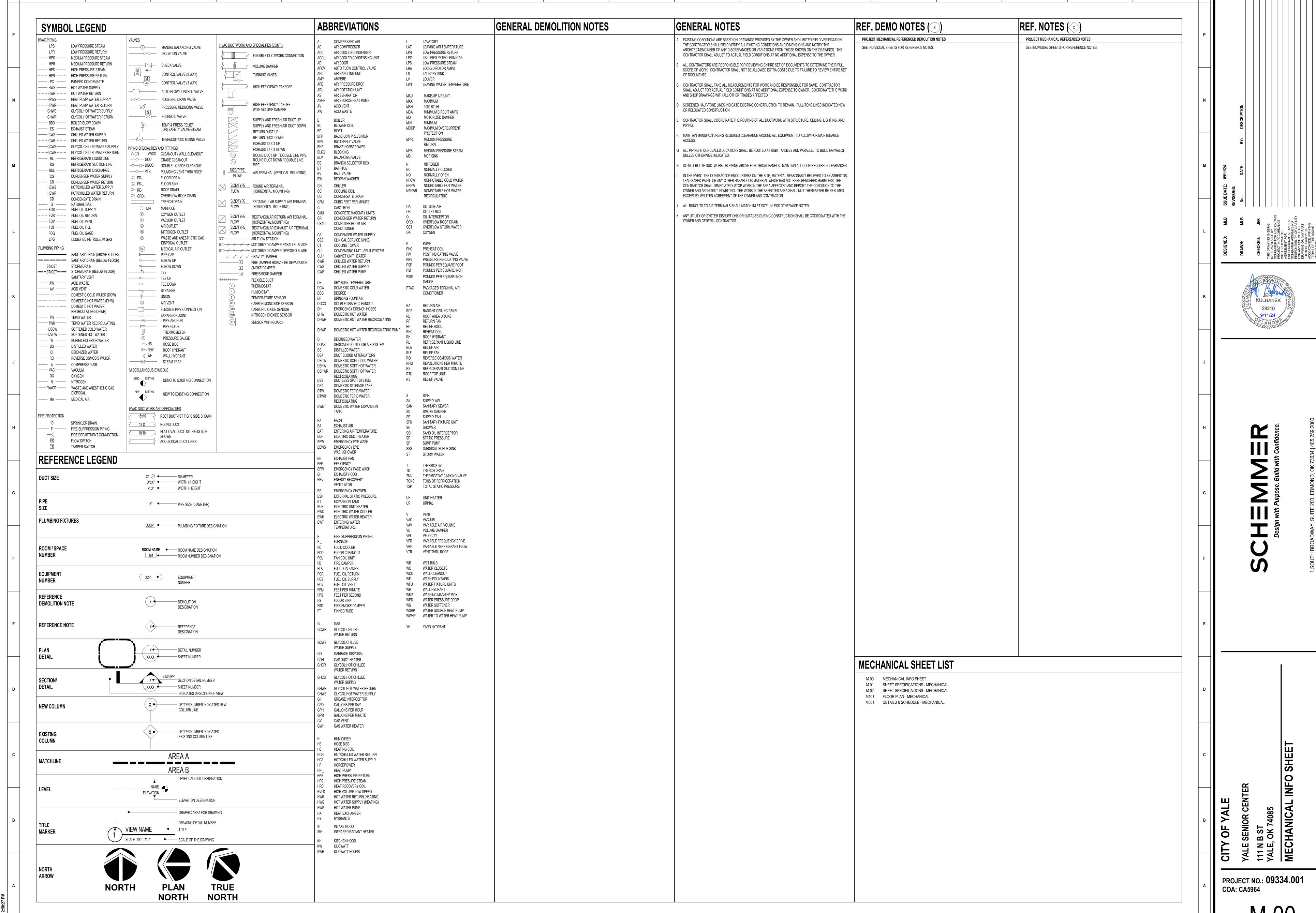


09334001-5-P 03

SHEET SPECIFICATIONS - PLUMBING







MECHANICAL INFO SHEET

09334001-6-M 00

M 00

J. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts." SECTION 230000—GENERAL HVAC REQUIREMENTS 3.3 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer. A. This Division includes all labor, materials, equipment, tools, supervision, start-up Measure total airflow services, Owner training, etc., including all incidental and related items, necessary a. Set outside-air, return-air, and relief-air dampers for proper position to complete installation and successfully test and start up and operate the HVAC systems indicated on the drawings, and as described in each Section of Division that simulates minimum outdoor-air conditions. Where duct conditions allow, measure airflow by Pitot-tube traverse. If All work shall be completed in compliance with local codes, rules, and regulations necessary, perform multiple Pitot-tube traverses to obtain total airflow. In the event that the plans conflict with any rules, regulation, or codes, the rules, Where duct conditions are not suitable for Pitot-tube traverse measregulations, and codes shall govern. Where the plans exceed code requirements, urements, a coil traverse may be acceptable. If a reliable Pitot-tube traverse or coil traverse is not possible, measure The Contractor and his Subcontractors shall include all materials, labor, and necesairflow at terminals and calculate the total airflow. Measure fan static pressures as follows: Measure static pressure directly at the fan outlet or through the flexible A. The drawings are generally diagrammatic and show general location and arrangement of equipment, ductwork, piping, and accessories. The contractor shall provide and install all necessary equipment, fittings, offsets and other components required Measure static pressure directly at the fan inlet or through the flexible to adapt to field conditions, interferences, and code requirements to deliver a comconnection Measure static pressure across each component that makes up the air Deviations from the drawings, with the exception of changes to field conditions, and -handling system. do not effect system functionality, shall not be made without the written approval of Report artificial loading of filters at the time static pressures are meas-Architectural and Structural drawings take precedence in all matters pertaining to Review Record Documents to determine variations in design static pressures the building structure. HVAC drawings take precedence in all matter pertaining to versus actual static pressures. Calculate actual system-effect factors. Rec-HVAC work and electrical drawings to electrical work. Where conflicts between ommend adjustments to accommodate actual conditions. trades exist, report conflicts or differences to the Architect and Engineer. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-The Contractor shall examine the plans and coordinate with other trades for schedhandling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance. Coordinate all penetrations with architectural and structural trades. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers Refer to architectural plans for exact locations and heights of fixtures. and measure fan-motor amperage to ensure that no overload occurs. Meas- PART 3-EXECUTION ure amperage in full-cooling, full-heating, economizer, and any other operat-Refer to architectural plans for coordination of all ceiling mounted access panels for ing mode to determine the maximum required brake horsepower. All HVAC equipment and piping located above ceiling shall be installed to preserve B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to ceiling heights listed on architect ceiling plans. indicated airflows. Measure airflow of submain and branch ducts. Contractor shall guarantee that all labor, materials and equipment are free from Adjust submain and branch duct volume dampers for specified airflow. defects. Contractor shall agree to replace or repair any part of their project scope Re-measure each submain and branch duct after all have been adjusted. that becomes defective with one year from substantial completion and following Adjust air inlets and outlets for each space to indicated airflows. Set airflow patterns of adjustable outlets for proper distribution without drafts. A. The Contractor shall be responsible for coordinating and obtaining all applicable Measure inlets and outlets airflow. agency approvals for utility connections and permits. Adjust each inlet and outlet for specified airflow. Re-measure each inlet and outlet after they have been adjusted. Provide product submittals for all required specification sections. Submittals shall Set HVAC system's airflow rates and water flow rates within the following toleranc-B. Contractor shall review and mark with approval stamp before submitting to Archi-Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 1.7 EQUIPMENT AND MATERIAL MANUFACTURERS All equipment shall be provided with normally supplied accessories needed for Air Outlets and Inlets: Plus or minus 10 percent. Maintaining pressure relationships as designed shall have priority over the toleranc-All equipment shall be new and shall be standard products from the current manues specified above. If an alternate manufacturer to the basis of design is submitted and approved, the 3.5 FINAL REPORT Contractor shall assume all costs required to adapt the system to the submitted General: Prepare a certified written report; tabulate and divide the report into sepapiece of equipment, including, but not limited to: piping, sheet metal, electrical rate sections for tested systems and balanced systems. work, and building alterations. Alternate equipment shall conform to all space re-Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer. Include a list of instruments used for procedures, along with proof of calibra-Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel." Certify validity and accuracy of field data. B. Final Report Contents: In addition to certified field-report data, include the following: Pump curves. Fan curves. The Contractor shall be responsible for ensuring all equipment and materials deliv-Manufacturers' test data. ered to the site are protected from theft and damage until time of project turnover to Field test reports prepared by system and equipment installers. B. All HVAC fixtures, ductwork, and piping shall be protected from damage and use Other information relative to equipment performance; do not include Shop Drawings and Product Data. END OF SECTION Field Service: Engage a trained service representative to test and inspect all in-SECTION 230713—DUCT INSULATION stalled equipment, assemblies and installations. PART 1—GENERAL Perform functional tests on all installed equipment. 1.1 ACTION SUBMITTALS Any equipment that does not pass tests and inspections shall be considered defec- Product Data: For each type of product indicated. Prepare test and inspection reports. Reports shall be included in Operation and PART 2—PRODUCTS 2.1 INSULATION MATERIALS A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insula-Prior to final inspections, the Contractor shall provide training to the Owner on opertion Schedule" articles for where insulating materials shall be applied. ation, adjustment, and maintenance on all installed equipment. Products shall not contain asbestos, lead, mercury, or mercury compounds. The Contractor shall prepare and turnover to the Owner a binder with all operation and maintained manuals for all equipment installed. facturing process. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermoset-All equipment installed shall fit within the designated space with adequate access ting resin. Comply with ASTM C553, Type II and ASTM C1290, Type III with factory for service and maintained and required by the manufacturer. -applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

Foam insulation materials shall not use CFC or HCFC blowing agents in the manu-

2.2 FIRE-RATED INSULATION SYSTEMS Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to

authorities having jurisdiction. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indi-

Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A. FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient ser-Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions

Materials shall be compatible with insulation materials, jackets, and substrates.

Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 3. Comply with MIL-PRF-19565C, Type II, for permeance requirements Color: White.

Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services Water-Vapor Permeance: ASTM E96, greater than 1.8 perm at manufactur-

er's recommended dry film thickness Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C)

Color: White.

2.5 SEALANTS FSK and Metal Jacket Flashing Sealants:

ic adhesive; complying with ASTM C1136.

Width: 3 inches (75 mm).

Width: 2 inches (50 mm).

Materials shall be compatible with insulation materials, jackets, and sub-

Fire- and water-resistant, flexible, elastomeric sealant. 3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus

Color: Aluminum. Insulation system schedules indicate factory-applied jackets on various applica-

tions. When factory-applied jackets are indicated, comply with the following: FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acryl-

Thickness: 6.5 mils (0.16 mm). Adhesion: 90 ounces force/inch (1.0 N/mm) in width. Elongation: 2 percent. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams Tensile Strength: 40 lbf/inch (7.2 N/mm) in width. and end joints with insulation by removing 2 inches (50 mm) from one edge 6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape. and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive

Thickness: 3.7 mils (0.093 mm). Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal. Adhesion: 100 ounces force/inch (1.1 N/mm) in width. Elongation: 5 percent. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm). Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maxi-

mum of 18 inches (450 mm) o.c. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate

inches thick and 1.5-lb/cu. ft. nominal density. Minimum total R value: R-6.

tion: Fire-rated blanket; thickness as required to achieve 2-hour fire rating.

END OF SECTION

duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c. 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insula- 3.5 FIRE-RATED INSULATION SYSTEM INSTALLATION Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to sub-Insulate duct access panels and doors to achieve same fire rating as duct. strates indicated without damaging insulation, hangers, and sub-Install firestopping at penetrations through fire-rated assemblies.

Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- 3.6 INDOOR DUCT AND PLENUM INSULATION SCHEDULE (0.41-mm-) thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter. a. Protect ends with capped self-locking washers incorporating a spring

steel insert to ensure permanent retention of cap in exposed locations. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel

Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules. 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. Install insulation with longitudinal seams at top and bottom of horizontal runs. Install multiple layers of insulation with longitudinal and end seams staggered.

Keep insulation materials dry during application and finishing. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer. Install insulation with least number of joints practical.

Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation 2.2 PIPES, TUBES, AND FITTINGS at hangers, supports, anchors, and other projections with vapor-barrier mastic. Install insulation continuously through hangers and around anchor attach-

For insulation application where vapor barriers are indicated, extend insula-

tion 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 2.3 PIPING SPECIALTIES vapor-barrier mastic. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended ov insulation material manufacture

Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

Install insulation with factory-applied jackets as follows: Draw jacket tight and smooth.

rial as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.

Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same mate-

Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c. For below ambient services, apply vapor-barrier mastic over staples. Cover joints and seams with tape, according to insulation material manufac-

turer's written instructions, to maintain vapor seal. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings. Cut insulation in a manner to avoid compressing insulation more than 75 percent of A. Joint Compound and Tape: Suitable for natural gas. its nominal thickness

2.5 MANUAL GAS SHUTOFF VALVES Finish installation with systems at operating conditions. Repair joint separations and

cracking due to thermal movement. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations

Seal penetrations with flashing sealant. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 B. mm) below top of roof flashing. Seal jacket to roof flashing with flashing sealant. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation

continuously through wall penetrations. Seal penetrations with flashing sealant. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm). Seal jacket to wall flashing with flashing sealant

Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insu- 2.6 PRESSURE REGULATORS lation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

Insulation Installation at Floor Penetrations: Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at east 2 inches (50 mm).

Seal penetrations through fire-rated assemblies. 3.4 INSTALLATION OF MINERAL-FIBER INSULATION

Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces. Apply adhesive to entire circumference of ducts and to all surfaces of fittings

Install either capacitor-discharge-weld pins and speed washers or cuppedhead, capacitor-discharge-weld pins on sides and bottom of horizontal ducts a. On duct sides with dimensions 18 inches (450 mm) and smaller, place 2.7 DIELECTRIC UNIONS

pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c. b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

c. Pins may be omitted from top surface of horizontal, rectangular ducts Do not overcompress insulation during installation.

vapor-barrier mastic, and sealant at joints, seams, and protrusions.

 e. Impale insulation over pins and attach speed washers. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

Comply with NFPA 54 for installation and purging of natural-gas piping. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawduring progress of construction, to allow for mechanical installations. Install vapor barrier consisting of factory- or field-applied jacket, adhesive,

Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

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. Install piping above accessible ceilings to allow sufficient space for ceiling panel

Locate valves for easy access. Install natural-gas piping at uniform grade of 2 percent down toward drip and sedi-Install piping free of sags and bends.

Install fittings for changes in direction and branch connections. Verify final equipment locations for roughing-in.

Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

 Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap. Supply-Air and Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 O. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with

Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insula-Connect branch piping from top or side of horizontal piping. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment. Insulation materials and thicknesses are identified below. If more than one material

 R. Do not use natural-gas piping as grounding electrode. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve. 3.2 VALVE INSTALLATION

Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector. Install regulators and overpressure protection devices with maintenance access

space adequate for servicing and testing.

Ream ends of pipes and tubes and remove burrs. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings be C. Threaded Joints:

 Thread pipe with tapered pipe threads complying with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter of

4. Apply appropriate tape or thread compound to external pipe threads unless 3.1 DUCT INSTALLATION dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open

Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat. Install hangers for steel piping, with maximum horizontal spacing and minimum rod diameter, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

Support horizontal piping within 12 inches (300 mm) of each fitting.

Support vertical runs of steel piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent. 3.5 CONNECTIONS

 Connect to utility's gas main according to utility's procedures and requirements. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to

C. Install piping adjacent to appliances to allow service and maintenance of applianc-

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.6 FIELD QUALITY CONTROL A. Test, inspect, and purge natural gas according to NFPA 54 and authorities having

Natural-gas piping will be considered defective if it does not pass tests and inspec-

 C. Prepare test and inspection reports. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply 3.7 INDOOR PIPING SCHEDULE

A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be the following: Steel pipe with malleable-iron fittings and threaded joints. B. Aboveground, distribution piping shall be on of the following:

 Steel pipe with malleable-iron fittings and threaded joints Steel pipe with wrought-steel fittings and welded joints.

3.8 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE Valves for all pipe sizes shall be the following: Two-piece, full-port, bronze ball valve with bronze trim.

END OF SECTION SECTION 233113—METAL DUCTS

PART 1—GENERAL (NOT USED)

PART 2—PRODUCTS 2.1 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with per- B. formance requirements and design criteria indicated in "Duct Schedule" Article. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMAC-

NA's "HVAC Duct Construction Standards - Metal and Flexible". Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment," and Section 7 - "Construction and System Startup."

ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation." Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on

Drawings are inside clear dimensions and do not include insulation or duct wall 2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

General Fabrication Requirements; Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless E.

Construct ducts of galvanized sheet steel unless otherwise indicated. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/ Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC 3.4 CONNECTIONS

Duct Construction Standards - Metal and Flexible." 1. For ducts with longest side less than 36 inches (914 mm), select joint types in accordance with Figure 2-1. Longitudinal Seams: Select seam types and fabricate in accordance with SMAC-NA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable seal-

ng requirements, materials involved, duct-support intervals, and other provisions in A SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction 3.6 DUCT SCHEDULE Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for staticpressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards -

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

based on indicated static-pressure class unless otherwise indicated. Construct ducts of galvanized sheet steel unless otherwise indicated. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's

"HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Longitudinal Seams: Select seam types and fabricate in accordance with SMAC-NA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round

Duct Longitudinal Seams," for static-pressure class, applicable sealing require-

ments, materials involved, duct-support intervals, and other provisions in SMAC-NA's "HVAC Duct Construction Standards - Metal and Flexible.

Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall

be free of pitting, seam marks, roller marks, stains, discolorations, and other imper-

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

Galvanized Coating Designation: G90. Finishes for Surfaces Exposed to View: Mill phosphatized

bars; black and galvanized. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and

Tie Rods: Galvanized steel, 1/4-inch- (6-mm-) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch- (10-mm-) minimum diameter for lengths longer than 36 inches (900 mm). 2.5 SEALANT AND GASKETS

General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene

Round Duct Joint O-Ring Seals:

Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative. EPDM O-ring to seal in concave bead in coupling or fitting spigot.

Double-lipped, EPDM O-ring seal, mechanically fastened to factoryfabricated couplings and fitting spigots. 2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct." Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates. PART 3—EXECUTION

Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards -

Metal and Flexible" unless otherwise indicated. C. Install ducts in maximum practical lengths with fewest possible joints. D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape

and for branch connections. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines. Install ducts close to walls, overhead construction, columns, and other structural

and permanent enclosure elements of building. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thick-

Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosure: Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insu-

lation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm). Install fire, combination fire/smoke, and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.

Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings. Protect duct interiors from moisture, construction debris and dust, and other foreign

materials both before and after installation. M. Elbows: Use long-radius elbows wherever they fit.

Fabricate 90-degree rectangular mitered elbows to include turning vanes. Fabricate 90-degree round elbows with a minimum of three segments for 12

inches (300 mm) and smaller and a minimum of five segments for 14 inches N. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK A. Protect ducts exposed in finished spaces from being dented, scratched, or dam-

Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 HANGER AND SUPPORT INSTALLATION Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

Building Attachments: Concrete inserts, powder-actuated fasteners, or structuralsteel fasteners appropriate for construction materials to which hangers are being attached.

Where practical, install concrete inserts before placing concrete. Install powder-actuated concrete fasteners after concrete is placed and com-

Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick Do not use powder-actuated concrete fasteners for lightweight-aggregate

concretes or for slabs less than 4 inches (100 mm) thick. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1220 mm) of each branch intersection.

Hangers Exposed to View: Threaded rod and angle or channel supports Support vertical ducts with steel angles or channel secured to the sides of the duct

with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m). Install upper attachments to structures. Select and size upper attachments with pull -out, tension, and shear capacities appropriate for supported loads and building

Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

Fabricate ducts with galvanized sheet steel except as otherwise indicated and as Fabricate all ducts to achieve SMACNA pressure class, seal class, and leak-

age class as indicated below.

Ducts Connected to Constant-Volume Air-Handling Units:

Minimum SMACNA Seal Class: A. SMACNA Leakage Class for Rectangular: 4. SMACNA Leakage Class for Round and Flat Oval: 2.

Ducts Connected to Equipment Not Listed Above:

Return Ducts:

OF

SHEET SPECIFICATIONS - MECHANICAL

Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

Verify that motor starters are equipped with properly sized thermal protection.

Check dampers for proper position to achieve desired airflow path.

H. Check condensate drains for proper connections and functioning.

Check for proper sealing of air-handling-unit components.

G. Check for airflow blockages.

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2.8 SECUREMENTS

Aluminum Bands: ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with wing seal or Insulation Pins and Hangers:

Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements: Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76

mm) thick by 2 inches (50 mm) square. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed,

tion indicated

7 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

is listed for a duct system, selection from materials listed is Contractor's option. D. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel. Concealed and Exposed, Supply-Air and Return Air Duct and Plenum Insulation: Mineral-fiber blanket, 3 inches thick and 1.5-lb/cu. ft. nominal density.

SECTION 231123—FACILITY NATURAL-GAS PIPING PART 1—GENERAL 3.2 GENERAL INSTALLATION REQUIREMENTS .1 QUALITY ASSURANCE

Steel Support Welding Qualifications: Qualify procedures and personnel according
3.3 PIPING JOINT CONSTRUCTION to AWS D1.1/D1.1M, "Structural Welding Code - Steel." Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and appli-

PART 2—PRODUCTS 2.1 PERFORMANCE REQUIREMENTS A. Minimum Operating-Pressure Ratings: Piping and Valves: 100 psig (690 kPa) minimum unless otherwise indicated.

Service Regulators: 100 psig (690 kPa) minimum unless otherwise indicated. B. Natural-Gas System Pressure within Buildings: More than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa).

Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern. 3.4 HANGER AND SUPPORT INSTALLATION

ground joint, and threaded ends. A. Appliance Flexible Connectors: Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.

Corrugated stainless-steel tubing with polymer coating. Operating-Pressure Rating: 0.5 psig (3.45 kPa). End Fittings: Zinc-coated steel. Threaded Ends: Comply with ASME B1.20.1

Maximum Length: 72 inches (1830 mm). B. Y-Pattern Strainers: Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain

Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.

End Connections: Threaded ends for NPS 2 (DN 50) and smaller. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.

CWP Rating: 125 psig (862 kPa). 2.4 JOINING MATERIALS

with ASME B16.33.

CWP Rating: 125 psig (862 kPa). Threaded Ends: Comply with ASME B1.20.1. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3

Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.

Service: Suitable for natural-gas service with "WOG" indicated on valve

Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

Body: Bronze, complying with ASTM B 584. Ball: Chrome-plated bronze. Stem: Bronze; blowout proof.

Seats: Reinforced TFE; blowout proof. Packing: Threaded-body packnut design with adjustable-stem packing Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.

CWP Rating: 600 psig (4140 kPa). Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.

General Requirements: Single stage and suitable for natural gas.

Steel jacket and corrosion-resistant components. Elevation compensator. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller.

B. Appliance Pressure Regulators: Comply with ANSI Z21.18. Body and Diaphragm Case: Die-cast aluminum Springs: Zinc-plated steel; interchangeable.

proved by authorities having jurisdiction.

8. Maximum Inlet Pressure: 2 psig (13.8 kPa).

Diaphragm Plate: Zinc-plated steel.

Seat Disc: Nitrile rubber. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon. 6. Factory-Applied Finish: Minimum three-layer polyester and polyurethane Regulator may include vent limiting device, instead of vent connection, if ap-

A. Dielectric Unions: a. Standard: ASSE 1079.

Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82

End Connections: Solder-joint copper alloy and threaded ferrous. PART 3—EXECUTION 3.1 INDOOR PIPING INSTALLATION

Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure

Metal and Flexible.' General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct,"

Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories." B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections. 3.5 PAINTING

Pressure Class: Positive 3- inch wg (750 Pa).

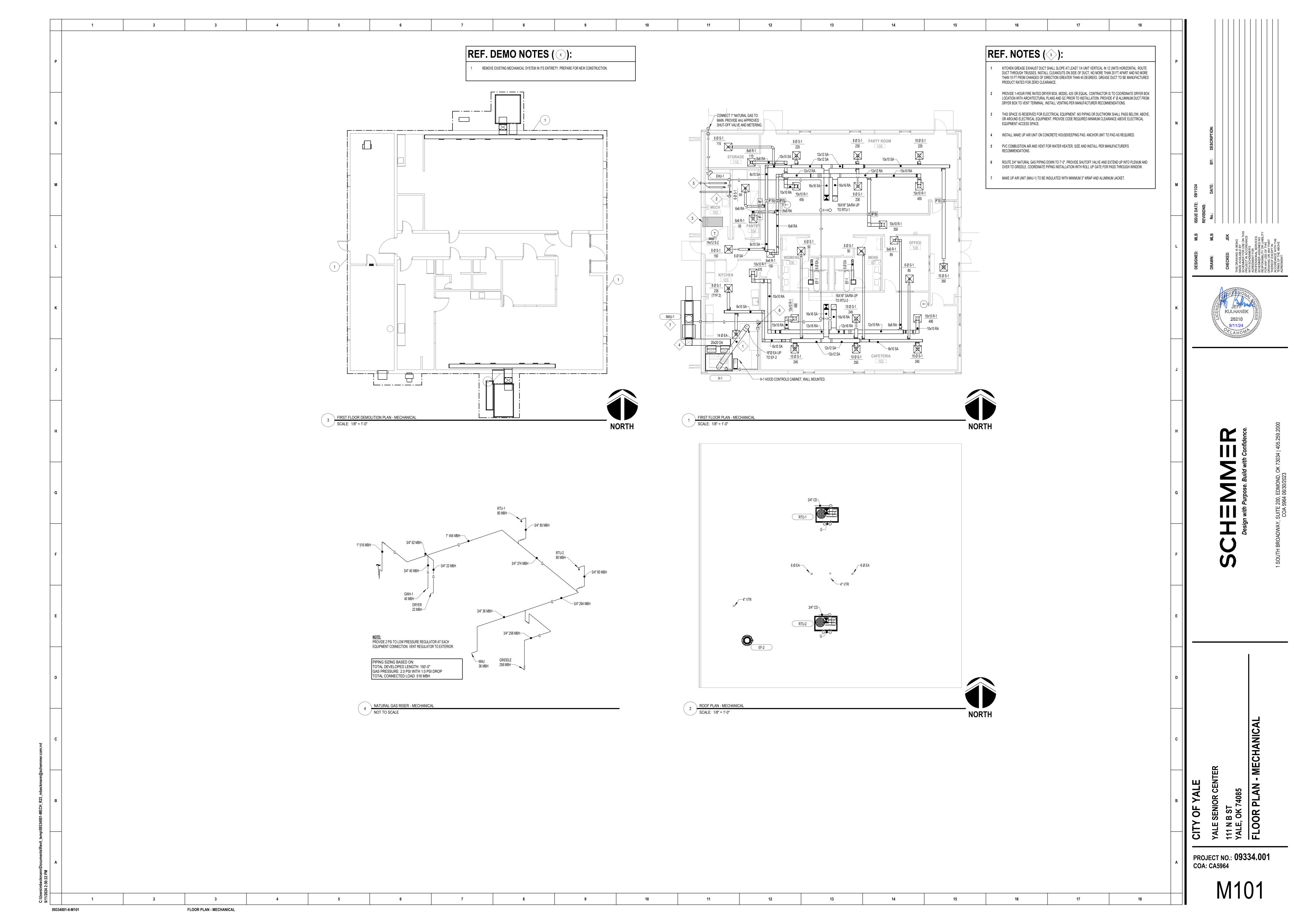
 a. Pressure Class: Positive 2- inch wg (500 Pa). Minimum SMACNA Seal Class: A. SMACNA Leakage Class for Rectangular: 4. SMACNA Leakage Class for Round and Flat Oval: 2.

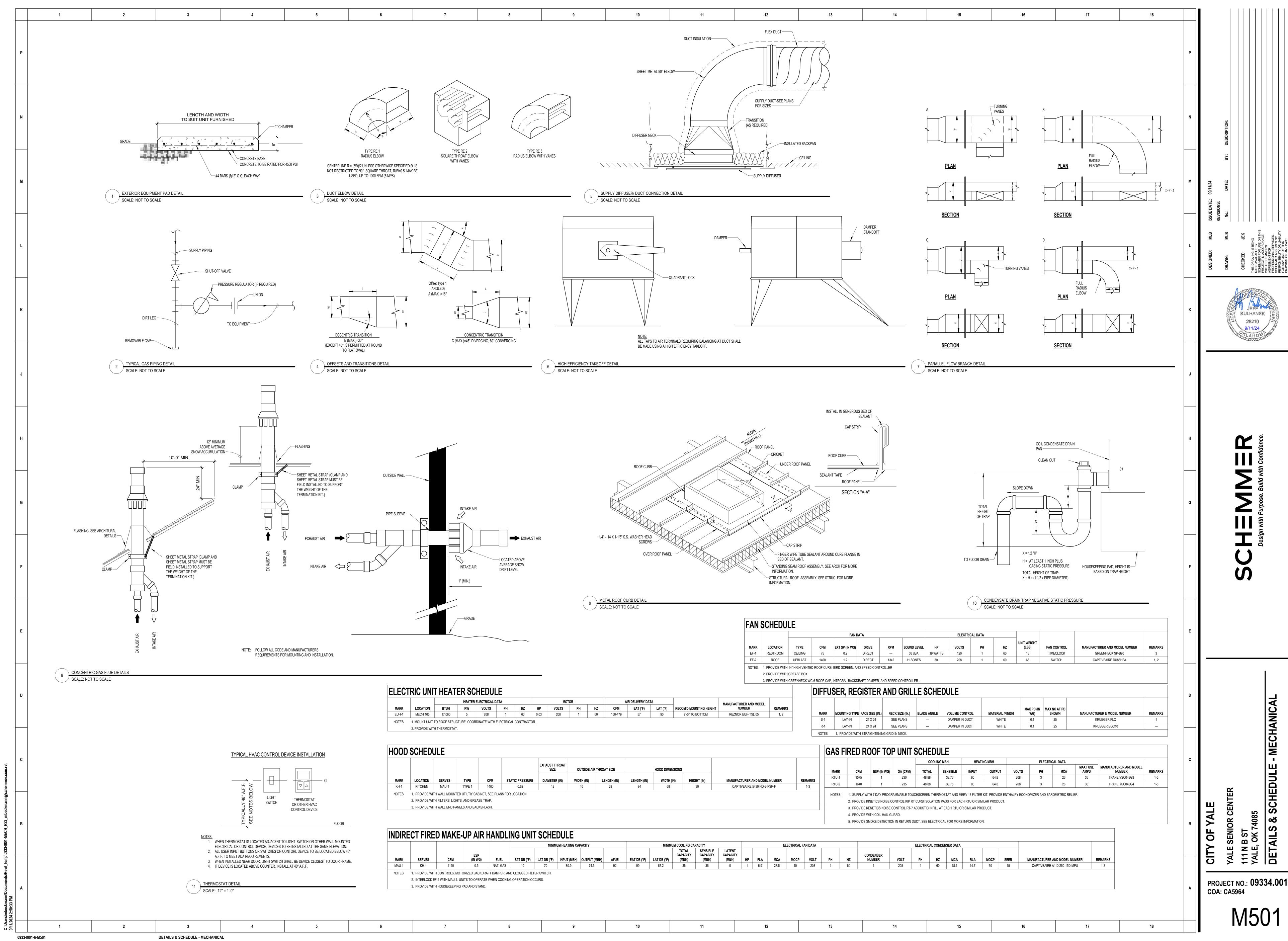
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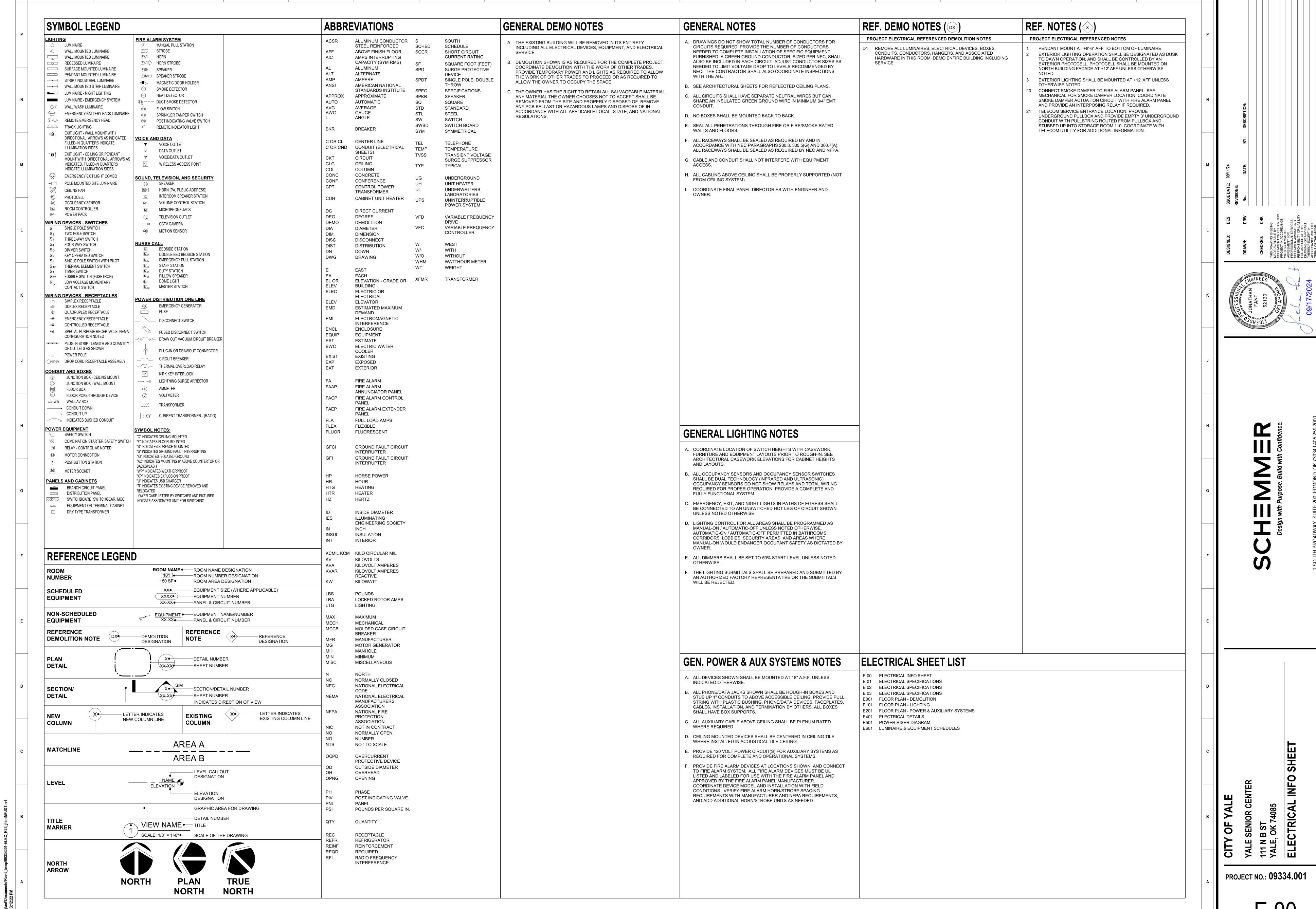
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PROJECT NO.: 09334.00° COA: CA5964

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Ducts Connected to Air-Handling Units: a. Pressure Class: Positive or negative 3- inch wg (750 Pa). Minimum SMACNA Seel Class: A	 Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0. 	 Configuration: Self-flashing without a cant strip, with mounting flange. Overall Height: Minimum 12 inches. 	6. Minimum off-time relay.7. Automatic-reset compressor motor thermal overload.	 C. Where installing piping adjacent to RTUs, allow space for service and maintenance. 1. Gas Piping: Comply with applicable requirements in Section 231123 "Facility 		
 b. Minimum SMACNA Seal Class: A. c. SMACNA Leakage Class for Rectangular: 4 	 Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital 	 Hinged sub-base to provide access to damper or as cleanout for grease ap plications. 	Brass service valves installed in compressor suction and liquid lines. 2.7 AIR FILTRATION	Natural-Gas Piping." Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.		
P d. SMACNA Leakage Class for Round and Flat Oval: 2 2. Ducts Connected to Equipment Not Listed above:	Control (DDC) System for HVAC" 3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and	 Pitch Mounting: Manufacture curb for roof slope. Metal Liner: Galvanized steel. 	A. Minimum arrestance and MERV according to ASHRAE 52.2.	 Install nameplate for each electrical connection indicating electrical equipment designation and circuit number feeding connection. 		P
a. Pressure Class: Positive or negative 2- inch wg (500 Pa).b. Minimum SMACNA Seal Class: A.	sealed gear trains. 4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where	6. Mounting Pedestal: Galvanized steel with removable access panel.	A. Description: Factory assembled, piped, and wired; complying with ANSTZ21.47/	3.3 FIELD QUALITY CONTROL		
c. SMACNA Leakage Class for Rectangular: 4. d. SMACNA Leakage Class for Round and Flat Oval: 2.	indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).	 Vented Curb: For kitchen exhaust; 12-inch- (300-mm-) high galvanized steel unlined, with louvered vents in vertical sides. 	l; CSA 2.3 and NFPA 54. 1. CSA Approval: Designed and certified by and bearing label of CSA.	A. Tests and Inspections: After installing RTUs and after electrical circuitry has been energized, test units for		
D. Exhaust Ducts: 1. All exhaust ducts (ASHRAE 62.1, Class 1 and 2) Air:	5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets	8. NFPA 96 code requirements for commercial cooking operations.9. Kitchen Hood Exhaust: UL 762 listed for grease-laden air.	B. Burners: Stainless steel.1. Fuel: Natural gas.	compliance with requirements. 1. Inspect for and remove shipping bolts, blocks, and tie-down straps.		
a. Pressure Class: Negative 2- inch wg (500 Pa). b. Minimum SMACNA Seal Class: A if negative pressure, and A if posi-	designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus minus 40 deg F (40 deg C). PA 6. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size 3.	ART 3—EXECUTION	Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.	Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.		
N tive pressure. c. SMACNA Leakage Class for Rectangular: 4.	motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).	Install power ventilators level and plumb.	C. Heat-Exchanger and Drain Pan: Stainless steel.	 Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. 		N
d. SMACNA Leakage Class for Round and Flat Oval: 2. E. Intermediate Reinforcement:	7. Electrical Connection: 115 V, single phase, 60 Hz.	B. Secure roof-mounted fans to roof curbs with zinc-plated hardware.C. Ceiling Units: Suspend units from structure; use metal straps or threaded rod.	D. Power Vent: Integral, motorized centrifugal fan interlocked with gas valve .E. Gas Valve Train: Single-body, regulated, redundant, 24-V ac gas valve assembly	B. RTU will be considered defective if it does not pass tests and inspections.C. Prepare test and inspection reports.		SIPTION
Galvanized-Steel Ducts: Galvanized steel.	Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's	D. Install units with clearances for service and maintenance. END OF SECTION		3.4 CLEANING AND ADJUSTING		
F. Elbow Configuration: 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Stand-	4 Danie	SECTION 233113—AIR DIFFUSERS, REGISTERS, AND GRILLES	2.9 DAMPERS A. Leakage Rate: Comply with ASHRAE/IES 90.1.	A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occu-		
ards - Metal and Flexible, Figure 4-2, "Rectangular Elbows." a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.	Devide well makes and a	ART 1—GENERAL I ACTION SUBMITTALS	Damper Motor: Modulating with adjustable minimum position. 2.10 ELECTRICAL POWER CONNECTIONS	pancy hours for this purpose. B. After completing system installation and testing, adjusting, and balancing RTU and		
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.	for duct pressure class.	A. Product Data: For each type of product. ART 2—PRODUCTS	A. RTU shall have a single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in over-	air-distribution systems, clean filter housings and install new filters. END OF SECTION		м <u>4</u> ій 14
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and	c. Vision panel.	I DIFFUSERS, GRILLES, AND REGISTERS:	current protection. 2.11 CONTROLS	EIND OF GEOTION		DAT
Vane Runners," and Figure 4-4, "Vane Support in Elbows." 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards -	and cam latches. e. Fabricate doors airtight and suitable for duct pressure class.	A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:	S			ONS:
Metal and Flexible," Figure 3-4, "Round Duct Elbows." a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply	2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.	to the following: 1. Carnes Company.	 Control-voltage transformer. Wall-mounted thermostat or sensor with the following features: 			SSUE [
with SMACNA's "HVAC Duct Construction Standards - Metal and Flex- ible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.	a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and	2. Kreuger.3. Price.	a. Heat-cool-off switch.			m m ≥
1) Radius-to Diameter Ratio: 1.5.	two sash locks. b. Access Doors up to 18 Inches (460 mm) Square: Continuous and two	4. Titus.	b. Fan on-auto switch.c. Fan-speed switch.			MLE MLE MLE MLE MLE NG Y Y SE ON THE SNO THE MIS MIN
b. Round Elbows, 12 Inches (305 mm) and Smaller in Diameter: Stamped or pleated.	c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Continuous 3.	INSTALLATION	d. Automatic changeover.e. Adjustable deadband.			NED: (ED: (ED: NING IS E NACCO N
c. Round Elbows, 14 Inches (356 mm) and Larger in Diameter: Standing seam.	and two compression latches. d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Con-	A. Install diffusers level and plumb.B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of	of f. Exposed set point.			DESIGI DESIGI CHECK HIS DRAW HIS DRAW H
G. Branch Configuration: 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Stand-	tinuous and two compression latches with outside and inside handles. 2.7 FLEXIBLE CONNECTORS	ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw and pressure drop. Make final locations where indicated, as much as practical. For				
ards - Metal and Flexible," Figure 4-6, "Branch Connection." a. Rectangular Main to Rectangular Branch: 45-degree entry.	Materials: Flame-retardant or noncombustible fabrics. Coatings and Adhesives: Comply with UL 181, Class 1.	units installed in lay-in ceiling panels, locate units in the center of panel. Where are chitectural features or other items conflict with installation, notify Architect for a de	i. Unoccupied-period-override push button.			ASSESSION.
b. Rectangular Main to Round Branch: High Efficiency Takeoff. 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction."	C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89	termination of final location. C. Install diffusers with airtight connections to ducts and to allow service and mainte	and unoccupied periods, and output room temperature, supply-air tem-			The state of the s
K 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.	mm) wide attached to two strips of 2-3/4 inch- (70 mm-) wide, 0.028 inch- (0.7 mm-) thick, galvanized sheet steel or 0.032 inch- (0.8 mm-) thick aluminum sheets. Provide metal compatible with connected ducts.	nance of dampers, air extractors, and fire dampers. 2 ADJUSTING	B. Electronic Controller:			K JEFF KULHANEK
a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.	D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neo- prene.	 After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing. 	 Controller shall have volatile-memory backup. Safety Control Operation: 			28210
b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap. a. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.	1. Minimum Weight: 26 oz/sq. yd (880 g/sq. m).	END OF SECTION SECTION 237416—PACKAGED ROOFTOP AIR-CONDITIONING UNITS	Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire-alarm control papel.			O LA HON
END OF SECTION SECTION 233300—AIR DUCT ACCESSORIES		ART 1—GENERAL	b. Firestats: Stop fan and close outdoor-air damper if air greater than 130			
PART 1—GENERAL	3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).	A. Product Data: For each RTU.	deg F (54 deg C) enters unit. Provide additional contacts for alarm interface to fire-alarm control panel.			
J 1.1 ACTION SUBMITTALS A. Product Data: For each type of product.		ART 2—PRODUCTS	Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence. School and Constitute Control and Cont			J
PART 2—PRODUCTS 2.1 ASSEMBLY DESCRIPTION	2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp and 440 lbf/inch (77 N/	I DESCRIPTION A. AHRI Compliance:	 Scheduled Operation: Occupied and unoccupied periods on seven]-day clock with a minimum of four programmable periods per day. 			
A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems,"	mm) in the filling. 3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121	 Comply with AHRI 210/240 for testing and rating energy efficiencies fo RTUs. 	4. Unoccupied Period: a. Heating Setback: 10 deg F (5.6 deg C).			
and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems." B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"	deg C). 2.8 DUCT ACCESSORY HARDWARE	 Comply with AHRI 340/360 for testing and rating energy efficiencies for RTUs. 	b. Cooling Setback: System off. c. Override Operation: Two hours.			
for acceptable materials, material thicknesses, and duct construction methods un- less otherwise indicated. Sheet metal materials shall be free of pitting, seam marks,	A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instru-	 Comply with AHRI 270 for testing and rating sound performance for RTUs. Comply with AHRI 1060 for testing and rating performance for air-to-air ex 	5. Supply Fan Operation:			
roller marks, stains, discolorations, and other imperfections. H 2.2 MATERIALS	ments and of length to suit duct-insulation thickness. B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant	changer. B. AMCA Compliance:	a. Occupied Periods: Run fan continuously.b. Unoccupied Periods: Cycle fan to maintain setback temperature.			н В 8.2000
A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.	to gasoline and grease. PART 3—EXECUTION	Comply with AMCA 11 and bear the AMCA-Certified Ratings Seal for air and sound performance according to AMCA 211 and AMCA 311.	d 6. Refrigerant Circuit Operation: a. Occupied Periods: Cycle or stage compressors to match compressor			fiden fiden 15.259
B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless- steel ducts.	3.1 INSTALLATION A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct	Damper leakage tested according to AMCA 500-D.	output to cooling load to maintain room temperature. Cycle condenser fans to maintain maximum hot-gas pressure.			Con 34 40
C. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than	Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116,	3. Operating Limits: Classify according to AMCA 99.C. ASHRAE Compliance:	b. Unoccupied Periods: Compressors off.7. Gas Furnace Operation:			With
36 inches (900 mm). 2.3 MANUAL VOLUME DAMPERS	B. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having	Comply with ASHRAE 15 for refrigeration system safety.	a. Occupied Periods: Modulate burner to maintain room temperature.			Buila Buila
A. Standard, Steel, Manual Volume Dampers:	duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.	 Comply with ASHRAE 33 for methods of testing cooling and heating coils. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "System 	 b. Unoccupied Periods: Cycle burner to maintain setback temperature. 8. Electric-Heating-Coil Operation: 			ose. I
 Standard leakage rating. Suitable for horizontal or vertical applications. 	C. Install fire and smoke dampers according to UL listing.D. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and	and Equipment" and Section 7 - "Construction and Startup." D. ASHRAE/IES Compliance: Comply with applicable requirements in ASHRAE	a. Occupied Periods: Modulate coil to maintain room temperature.			Purp 8364 0
3. Frames: a. Frame: Hat-shaped, 0.094 inch- (2.4 mm-) thick, galvanized sheet	maintaining accessories and equipment at the following locations:	IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning." E. NFPA Compliance: Comply with NFPA 90A or NFPA 90B.	b. Unoccupied Periods: Energize coil to maintain setback temperature.9. Fixed Minimum Outdoor-Air Damper Operation:			With UITE SOA 5
steel. b. Mitered and welded corners.	fusible links. Access doors for access to fire or smoke dampers having fusi- ble links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for	F. UL Compliance: Comply with UL 1995.G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in	 a. Occupied Periods: Open to meet minimum outdoor air requirements b. Unoccupied Periods: Close the outdoor-air damper. 			Sign Sign
c. Flanges for attaching to walls and flangeless frames for installing in ducts.	access deep installed dewastroom from democra	NFPA 70, by a qualified testing agency, and marked for intended location and application.				DADW
4. Blades:	F. Install flexible connectors to connect ducts to equipment.	2 MANUFACTURERS A. Manufacturers: Subject to compliance with requirements, available manufacturers	 a. Morning cool-down cycles. b. Occupied Periods: Open to fixed minimum intake, and maximum 100 			
F a. Multiple or single blade. b. Parallel- or opposed-blade design.	G. Connect flexible ducts to metal ducts with draw bands.H. Install duct test holes where required for testing and balancing purposes.	offering products that may be incorporated into the Work include, but are not limited to the following:				
c. Stiffen damper blades for stability. d. Galvanized-steel, 0.064 inch (1.62 mm) thick.	END OF SECTION	 Carrier Corporation; a unit of United Technologies Corp. Lennox Industries, Inc.; Lennox International. 	switch on outdoor-air damper. During economizer cycle operation, lock out cooling.			
5. Blade Axles: Galvanized steel.	SECTION 233223—HVAC POWER VENTILATORS PART 1—GENERAL	 Trane. YORK; a Johnson Controls company. 	 c. Unoccupied Periods: Close outdoor-air damper and open return-air damper. 			
6. Bearings: a. Oil-impregnated bronze.	1.1 ACTION SUBMITTALS A. Product Data: For each type of product.	3 CASINGS	2.12 ACCESSORIES A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. In-			
c. Dampers in ducts with pressure classes of 3 inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both	PART 2—PRODUCTS	A. General Fabrication Requirements for Casings: Formed and reinforced double-wa insulated panels, fabricated to allow removal for access to internal parts and com- ponents, with joints between sections sealed.	alude transformer if required. Outlet shall be energized even if the unit main discen			
E ends of operating shaft. 7. Tie Bars and Brackets: Galvanized steel.	A. Manufacturers: Subject to compliance with requirements, provide products by one	Exterior Casing Material: Galvanized steel with factory-painted finish, with pitcher roof panels and knockouts with grommet seals for electrical and piping connections.				E
B. Jackshaft: 1. Size: 0.5 inch (13 mm) diameter.	of the following: 1. Broan-NuTone LLC. 3. Creenback For Corporation	and lifting lugs. C. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.	D. Hail guards of galvanized steel, painted to match casing.			
Size: 0.5 inch (13 mm) diameter. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assem-	 Greenheck Fan Corporation. Loren Cook Company. 	Materials: ASTM C 1071, Type I.	E. Door switches to disable heating or reset set point when open.F. Outdoor-air intake weather hood.			
blies. 3. Length and Number of Mountings: As required to connect linkage of each	 PennBarry. S & P USA Ventilation Systems, LLC. 	 Thickness: 1 inch. Liner materials shall have airstream surface coated with erosion- and temperature registant coating or faced with a plain or coated fibrous mat or fall 				
Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly. C. Damper Hardware:	B. See plans for individual product performance requirements.	perature-resistant coating or faced with a plain or coated fibrous mat or fabric.	A. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.			
Damper Hardware: 4. Zinc-plated, die-cast core with dial and handle made of 3/32 inch- (2.4 mm-) thick zinc-plated steel, and a 3/4 inch (19 mm) hexagon locking nut.	2.2 CEILING-MOUNTED VENTILATORS A. Housing: Steel, lined with acoustical insulation.	 4. Liner Adhesive: Comply with ASTM C 916, Type I. D. Condensate Drain Pans: Fabricated using stainless-steel sheet 0.025 inch (0.71s) mm) thick a minimum of 2 inches (50 mm) doop, and complying with ASHRAE 62. 	 Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B. 			
Include center hole to suit damper operating-rod size.	Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.	mm) thick, a minimum of 2 inches (50 mm) deep, and complying with ASHRAE 62. for design and construction of drain pans.	a. Materials: ASTM C 1071, Type I or II.b. Thickness: 1-1/2 inches (38 mm)			
Include elevated platform for insulated duct mounting. 2.4 FIRE DAMPERS	C. Back-draft damper: Integral.	 Drain Connections: Threaded nipple. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHBAE 62.1 	2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.			
A. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.		quirements in ASHRAE 62.1. FANS	 a. Liner Adhesive: Comply with ASTM C 916, Type I. b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attach- 			
 B. Closing rating in ducts up to 4 inch wg (1 kPa) static pressure class and minimum 2000 fpm (10 m/s) velocity. C. Fire Rating: Meet or exceed wall or floor rating. 	ceptacle for motor plug-in.	A. Supply-Air Fans: Aluminum or painted-steel wheels, and galvanized- or painted steel fan scrolls.	ment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and			
C. Fire Rating: Meet or exceed wall or floor rating. C. D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034 inch- (0.85 mm-) thick galvanized steel; with mitered and interlocking corners.	Accessories, provide when indicated on plans: Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.	 Direct-Driven Supply-Air Fans: Motor shall be resiliently mounted in the fai inlet. 	c. Liner materials applied in this location shall have airstream surface			c
E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.	from 100 to less than 50 percent. 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.	B. Condenser-Coil Fan: propeller, mounted on shaft of permanently lubricated motors. COILS	coated fibrous mat or fabric depending on service air velocity.			
F. Mounting Orientation: Vertical or horizontal as indicated. G. Blades: Roll-formed, interlocking, 0.024 inch- (0.61 mm) thick, galvanized sheet	3. Isolation: Rubber-in-shear vibration isolators.	 A. Supply-Air Refrigerant Coil: 1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing 	d. Liner Adhesive: Comply with ASTM C 916, Type I. B. Curb Dimensions: Minimum height of 14 inches (355 mm) Adaptable horizontal dimensions as required for existing roof openings.			
	 Manufacturer's standard roof jack or wall cap, and transition fittings. 2.3 CENTRIFUGAL VENTILATORS - ROOF UPBLAST OR SIDEWALL 	 Aluminum-plate fin and seamless copper tube in steel casing with equalizing type vertical distributor. Polymer strip shall prevent all copper coils from contacting steel coil frame or 	PART 3—EXECUTION			
H. Horizontal Dampers: Include blade lock and stainless-steel closure spring. I. Heat-Responsive Device: Replaceable, 165 deg F (74 deg C) rated, fusible links.	A. Configuration: See plans for configuration of fan installation	 Polymer strip shall prevent all copper coils from contacting steel coil frame of condensate pan. Coil Split: Interlaced. 	3.1 INSTALLATION A. Roof Curb: Install on roof structure or concrete base, level and secure, according to			ALE CENTE
2.5 SMOKE DAMPERS B A. General Requirements: Label according to UL 555S by an NRTL.	Housing: Removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone. 1 Unblast Units: Provide spun-aluminum discharge baffle to direct discharge air.	B. Outdoor-Air Refrigerant Coil:	NRCA's "NRCA Roofing Manual: Membrane Roof Systems." Secure RTUs to upper curb rail, and secure curb base to roof framing with anchor bolts.			A
B. Smoke Detector: Integral, factory wired for single-point connection.	 Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains. 2 Provide grease collector for kitchen exhaust fan.	 Aluminum-plate fin and seamless copper tube in steel casing with equalizing type vertical distributor. 	flashing with roof construction. Secure RTUs to structural support with anchor bolts.			
C. Frame: Hat-shaped, 0.094 inch- (2.4 mm-) thick, galvanized sheet steel, with welded corners.	 Fan Wheels: Aluminum hub and wheel with backward-inclined blades. 	Polymer strip shall prevent all copper coils from contacting steel coil frame of condensate pan.	A. Comply with duct installation requirements specified in other HVAC Sections. Draw-			
D. Blades: Roll-formed, horizontal, overlapping, [0.034 inch- (0.85 mm-)] [0.063 inch- (1.6 mm)] thick, galvanized sheet steel.	Variable-Frequency Motor Controller: Solid-state control to reduce speed	A. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcur	ings indicate general arrangement of ducts. The following are specific connection			S
E. Leakage: Class I. F. Rated pressure and velocity to exceed design airflow conditions.	from 100 to less than 50 percent. 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mount-	rent and high-temperature protection, and internal pressure relief. B. Refrigeration Specialties:	 Install ducts to termination at top of roof curb. Remove roof decking only as required for passage of ducts. Do not cut out 			
G. Mounting Sleeve: Factory-installed, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.	and a stable of the section of the section of the second part of the second of the sec	 Refrigerant: R-410A. Expansion valve with replaceable thermostatic element. 	decking under entire roof curb. 3. Connect supply ducts to RTUs with flexible duct connectors specified in Sec-			PROJECT NO.: 09334.001
H. Damper Motors: Modulating action. I. Comply with NEMA designation, temperature rating, service factor, enclosure type,	Grease Hood Kitchen Exhaust: UL 762 listed for grease-laden air exhaust. E. Prefabricated Kitchen Exhaust Roof Curbs: Galvanized steel: mitered and welded	3. Refrigerant filter/dry er.	tion 233300 "Air Duct Accessories." 4. Install return-air duct continuously through roof structure.			COA: CA5964
I. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment." 1 2 3		 Manual-reset high-pressure safety switch. Automatic-reset low-pressure safety switch. 	B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.			
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ELECTRICAL INFO SHEET

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A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this A. Sections Included: Refer to Table of Contents. A. National Electrical Contractors Association (NECA). B. National Electrical Manufacturer's Association (NEMA). C. National Electrical Testing Association (NETA). D. National Fire Protection Association (NFPA). 1. NFPA 70 – National Electrical Code. A. Product Data: For each of the following products. 2. Panelboards and Circuit Breakers. B. Shop Drawings: For each of the following products. 2. Panelboards and Circuit Breakers. C. Submittals shall be grouped and submitted by spec section or they will be A. Operation and Maintenance Data: For each of the following products. 2. Panelboards and Circuit Breakers. B. A single submittal containing all O&M data submitted under Section 260500 1.7 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 1. Keys: Two spares for each type of panelboard cabinet lock. 2. Circuit Breakers Including GFCI Types: Two spares for each panelboard. 3. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type. 4. Fuse Pullers: For each size of fuse, where applicable and available, from 5. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type. 6. Indicating Lights: Two of each type and color installed. DELIVERY, STORAGE, AND HANDLING A. Store equipment indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage. 1. Rate equipment for continuous operation under the following conditions a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F. b. Altitude: Not exceeding 6600 feet. B. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service 1. Notify Owner no fewer than seven days in advance of proposed 2. Do not proceed with interruption of electric service without Owner's A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace the following products that fail in materials or workmanship within a period of one year from date of substantial completion. 1. Panelboards and Circuit Breakers. **PART2 - PRODUCTS** 2.1 - COPPER BUILDING WIRE B. Special Warranty: Manufacturer's standard form in which Manufacturer agrees to repair or replace the following products that fail in materials or workmanship within specified warranty period from date of substantial completion. Full warranty shall apply for the entire warranty period. Lighting Control Devices: Two years. A. Source Limitations: Obtain electrical gear, components, and accessories, within same product category, from single manufacturer. B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and 2.2 FIRE-ALARM WIRE AND CABLE E. All electrical materials shall be new. Use of reconditioned, remanufactured, or second-hand materials is not permitted without prior written approval from the 2.3 CONNECTORS AND SPLICES B. Manufacturers: Subject to compliance with requirements, provide products by **PART 3 - EXECUTION** 3.1 CONDUCTOR MATERIAL APPLICATIONS A. Comply with the following standards for application and installation requirements, except where requirements on drawings or specifications are 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS 3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS A. Provide enclosures at installed locations with the following environmental 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1. 2. Outdoor Locations: NEMA 250, Type 3R. 3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel. 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4. 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive 3.3 INSTALLATION OF CONDUCTORS AND CABLES A. Perform standard NETA ATS tests and inspections for the following products: Low-Voltage Power and Control Conductors and Cables.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections for the following products: 1. Lighting Control Devices. D. Perform the following tests and inspections for wiring devices: 1. Line Voltage: Acceptable range is 105 to 132 V. 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is 3. Ground Impedance: Values of up to 2 ohms are acceptable. 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943. 5. Using the test plug, verify that the device and its outlet box are securely 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path. defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified E. Perform the following tests and inspections for lighting: 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal. F. Products will be considered defective if they do not pass tests and inspections. G. Prepare test and inspection reports to record the following: 1. Procedures used. Results that comply with requirements. 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements. 3.4 STARTUP SERVICE A. Complete startup checks according to manufacturer's written instructions for the following products: Lighting. a. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test. b. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test. B. Engage a factory-authorized service representative to perform startup service for the following products: 1. Lighting Control Devices. 3.5 ADJUSTING A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting, lighting control devices, and relay-based lighting control to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. 3.6 DEMONSTRATION A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the following products: 1. Lighting Control Devices. 3.7 SIGNS A. Warning signs: Baked-Enamel Signs. B. Warning signs shall include, but are not limited to, the following legends: 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES." Workspace Clearance Warning: "WARNING - OSHA REGULATION -AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES." Entrances to dedicated Electrical Rooms: "DANGER - ELECTRICAL ROOM – NO STORAGE PERMITTED." 3.8 LABELS A. Equipment Labels: Laminated acrylic sign. B. Equipment to Be Labeled: Panelboards. 2. Enclosures and electrical cabinets. Access doors and panels for concealed electrical items. 4. Emergency system boxes and enclosures. 5. Enclosed switches. Push-button stations. 7. Monitoring and control equipment. SECTION 26-05-19 - LOW-VOLTAGE POWER AND CONTROL CONDUCTORS AND **CABLES PART 1 - GENERAL** 1.1 SUMMARY A. Section Includes: Copper building wire rated 600 V or less. 2. Fire-alarm wire and cable.

2.4 GROUNDING ELECTRODES A. Ground Rods: Copper-clad steel; 3/4 by 120 inches. **PART 3 - EXECUTION** 3.1 APPLICATIONS

3. Connectors, splices, and terminations rated 600 V and less.

B. Standards:

D. Conductor Insulation:

a two-hour rating.

Material: Copper.

Termination: Compression.

larger. No. 12 AWG minimum.

be used for any other wire or cable.

3.4 INSTALLATION OF FIRE-ALARM WIRING

AND WIRING METHODS

application.

ELECTRICAL SPECIFICATIONS

Section.

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying

conductor with an overall insulation layer or jacket, or both, rated 600 V or

Conductor and Cable Marking: Comply with wire and cable marking

according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and

3. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.

4. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12

with ASTM B 8 for stranded conductors. Minimum sizes as follows:

2. Class 1 remote-control and signal circuits; No 14 AWG.

Type THHN and Type THWN-2: Comply with UL 83.

A. Signaling Line Circuits: Twisted, shielded pair, not less than size as

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.

2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

B. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity

B. Lugs: One piece, seamless, designed to terminate conductors specified in this

rating, material, type, and class for application and service indicated.

A. Copper: Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and

B. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

B. Feeders and Branch Circuits: Type THHN/THWN-2, single conductors in

C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord

with stainless-steel, wire-mesh, strain relief device at terminations to suit

system shall be installed in a dedicated pathway system. This system shall not

D. Fire-alarm circuits and equipment control wiring associated with fire-alarm

A. Use manufacturer-approved pulling compound or lubricant where necessary;

manufacturer's recommended maximum pulling tensions and sidewall

B. Use pulling means, including fish tape, cable, rope, and basket-weave

wire/cable grips, that will not damage cables or raceway.

compound used must not deteriorate conductor or insulation. Do not exceed

A. Service Entrance: Type XHHW-2, single conductors in raceway.

deg C, color-coded insulation, and complying with requirements in UL 2196 for

1. Power Circuits: No. 12 AWG.

2. Type XHHW-2: Comply with UL 44.

recommended by system manufacturer.

Type: Two hole with long barrels.

conductors for No. 6 AWG and larger unless otherwise indicated. B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded

A. Wiring within Enclosures: Separate power-limited and non-power-limited

pressure-type terminal blocks, or plug connectors.

indicated, use those specified in UL 486A-486B.

insulation ratings than unspliced conductors.

3.5 CONNECTIONS

slack.

PART 1 - GENERAL

PART 2 - PRODUCTS

2.2 CONDUCTORS

2.3 CONNECTORS

direct burial.

Water Pipe Clamps:

a. Material: Bronze

b. Listed for direct burial.

2.1 SYSTEM DESCRIPTION

jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8

3. Tinned Conductors: ASTM B 33.

C. Grounding Bus: As shown on drawings.

connection to ground bus bar.

1.1 SUMMARY

conductors as recommended by manufacturer. Install conductors parallel with

terminated, spliced, or interrupted in any enclosure associated with fire-alarm

or at right angles to sides and back of the enclosure. Bundle, lace, and train

conductors to terminal points with no excess. Connect conductors that are

system to terminal blocks. Mark each terminal according to system's wiring

diagrams. Make all connections with approved crimp-on terminal spade lugs,

building power wiring. Use one color-code for alarm circuit wiring and another

for supervisory circuits. Color-code audible alarm-indicating circuits differently

from alarm-initiating circuits. Use different colors for visible alarm-indicating

published torque-tightening values. If manufacturer's torque values are not

B. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes;

C. Color-Coding: Color-code fire-alarm conductors differently from the normal

devices. Paint fire-alarm system junction boxes and covers red.

A. Tighten electrical connectors and terminals according to manufacturer's

B. Make splices, terminations, and taps that are compatible with conductor

material and that possess equivalent or better mechanical strength and

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of

SECTION 26-05-26 - GROUNDING AND BONDING

A. Comply with UL 467 for grounding and bonding materials and equipment

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for

4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

A. Welded Connectors: Exothermic-welding kits of types recommended by kit

manufacturer for materials being joined and installation conditions.

C. Beam Clamps: Mechanical type, terminal, ground wire access from four

D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with

H. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for

Mechanical type, two pieces with stainless-steel bolts.

directions, with dual, tin-plated or silicon bronze bolts.

F. Conduit Hubs: Mechanical type, terminal with threaded hub.

B. Bus-Bar Connectors: Compression type, copper, long-barrel, two-bolt

600 V unless otherwise required by applicable Code or authorities having

A. Section includes grounding and bonding systems and equipment.

cabinets; or equipment enclosures where circuit connections are made.

3. Connections to Structural Steel: Welded connectors. 3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and

heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components. 3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any. Use exothermic welds for all below-grade connections. For grounding electrode system, install at least three rods spaced at least

one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor. C. Bonding Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts. 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted

3. Use exothermic-welded connectors for outdoor locations; if a disconnecttype connection is required, use a bolted clamp. D. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not

more than 60 feet apart. E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series. Make connections with clean, bare metal at points of contact. 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps. 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

SECTION 26-05-29 - HANGERS AND SUPPORTS PART 1 - GENERAL 1.1 SUMMARY

actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

A. Section Includes:

1. Steel slotted support systems.

Conduit and cable support devices.

3. Support for conductors in vertical conduit.

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least

4. Mounting, anchoring, and attachment components, including powder-

1. Standard: Comply with MFMA-4 factory-fabricated components for field Material for Channel, Fittings, and Accessories: Galvanized steel. Channel Width: 1-5/8 inches.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported. hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following: 1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are specifically designed for material and size involved. similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element. 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M, Grade A325. 5. Toggle Bolts: All-steel springhead type.

6. Hanger Rods: Threaded steel. PART 3 - EXECUTION 3.1 APPLICATION A. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT and GRC as required by NFPA 70. Minimum rod size

shall be 1/2 inch in diameter. B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits. 1. Secure raceways and cables to these supports with two-bolt conduit

3.2 SUPPORT INSTALLATION A. Raceway Support Methods: In addition to methods described in NECA 1, EMT and GRC may be supported by openings through structure members, according to NFPA 70.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb. C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts. 2. To New Concrete: Bolt to concrete inserts. 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units. 4. To Existing Concrete: Expansion anchor fasteners. 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with

lock washers and nuts. 6. To Light Steel: Sheet metal screws. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures,

pull and junction boxes, transformers, and other devices on slottedchannel racks attached to substrate. D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 PAINTING A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas

and apply galvanizing-repair paint to comply with ASTM A 780.

SECTION 26-05-33 - ABOVEGROUND RACEWAYS AND BOXES PART 1 - GENERAL

1.1 SUMMARY A. Section Includes: Metal conduits and fittings.

2. Boxes, enclosures, and cabinets. PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS A. Metal Conduit: 1. GRC: Comply with ANSI C80.1 and UL 6.

2. EMT: Comply with ANSI C80.3 and UL 797 3. FMC: Comply with UL 1; zinc-coated steel. 4. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360. B. Metal Fittings:

1. Comply with NEMA FB 1 and UL 514B. 2. Fittings, General: Listed and labeled for type of conduit, location, and use. Fittings for EMT: a. Material: Steel.

b. Type: Setscrew or compression. C. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes,

enclosures, and cabinets installed in wet locations shall be listed for use in wet B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A. C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight. E. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

F. Floor Boxes and Poke-Thru Devices: As specified on drawings. G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1. H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover. I. Box extensions used to accommodate new building finishes shall be of same

material as recessed box. J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep. K. Gangable boxes are prohibited. L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, with

continuous-hinge cover with flush latch unless otherwise indicated. 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

Nonmetallic Enclosures: Fiberglass. 3. Interior Panels: Steel; all sides finished with manufacturer's standard

PART 3 - EXECUTION 3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise

1. Underground Conduit: Comply with Section 260543 "Underground Raceways and Boxes". 2. All Others: GRC. 3. Connection to Vibrating Equipment (Including Transformers and

Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): B. Indoors: Apply raceway products as specified below unless otherwise 1. Damp, Wet, or Exposed and Subject to Severe Physical Damage: GRC.

a. Mechanical rooms. b. Gymnasiums. All Others: EMT or GRC. 3. Connection to Vibrating Equipment (Including Transformers and

FMC, except use LFMC in damp or wet locations.

Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment):

C. Embedded in Slab: Comply with Section 260543 "Underground Raceways and D. Minimum Raceway Size: 3/4-inch trade size. E. Raceway Fittings: Compatible with raceways and suitable for use and location. 1. GRC: Use threaded rigid steel conduit fittings unless otherwise indicated.

Raceway locations include the following:

Comply with NEMA FB 2.10. 2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10. 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20. 3.2 INSTALLATION

A. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment B. Do not fasten conduits onto the bottom side of a metal deck roof. C. Keep raceways at least 6 inches away from parallel runs of flues and steam or D. Complete raceway installation before starting conductor installation. E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed.

Support within 12 inches of changes in direction. F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment

G. Conceal conduit within finished walls, ceilings, and floors unless otherwise

indicated. Install conduits parallel or perpendicular to building lines. H. Support conduit within 12 inches of enclosures to which attached. I. Stub-Ups to Above Recessed Ceilings: 1. Use EMT, IMC, or RMC for raceways.

2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions. K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch

trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits. L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path. N. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the

O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use. P. Install raceway sealing fittings at accessible locations according to NFPA 70

and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70. Q. Install devices to seal raceway interiors at accessible locations. Locate seals

so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points: 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service raceway enters a building or structure. 3. Conduit extending from interior to exterior of building. 4. Conduit extending into pressurized duct and equipment. 5. Conduit extending into pressurized zones that are automatically

controlled to maintain different pressure set points.

6. Where otherwise required by NFPA 70. R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel. V. Locate boxes so that cover or plate will not span different building finishes.

W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the

X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits. Y. Set metal floor boxes level and flush with finished floor surface. 3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration. 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer. 2. Repair damage to PVC coatings or paint finishes with matching touchup

coating recommended by manufacturer.

SECTION 26-05-43 - UNDERGROUND RACEWAYS AND BOXES PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Nonmetallic conduits and fittings. 2. Polymer concrete handholes and boxes with polymer concrete cover. **PART 2 - PRODUCTS**

2.1 NONMETALLIC CONDUITS AND FITTINGS A. Nonmetallic Conduit: 1. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

B. Nonmetallic Fittings: 1. Fittings RNC: Comply with NEMA TC 3; match to conduit or tubing type

2. Solvents and Adhesives: As recommended by conduit manufacturer. 2.2 POLYMER CONCRETE HANDHOLES AND BOXES WITH POLYMER CONCRETE COVER

A. Description: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two. B. Standard: Comply with SCTE 77. Comply with tier requirements in

"Underground Enclosure Application" Article. C. Color: Gray. D. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated. E. Cover: Weatherproof, secured by tamper-resistant locking devices and having

structural load rating consistent with enclosure. F. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of

G. Cover Legend: Molded lettering, as indicated for each service. H. Handholes 12 inches wide by 24 inches long and larger shall have factoryinstalled inserts for cable racks and pulling-in irons.

PART 3 - EXECUTION 3.1 PREPARATION A. Coordinate layout and installation of underground conduits, handholes, and

boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict

between areas of excavation and existing structures or archaeological sites to 3.2 RACEWAY APPLICATION A. RNC unless otherwise indicated.

B. Stub-ups: GRC. C. Minimum Raceway Size: 1-inch trade size. 3.3 UNDERGROUND ENCLOSURE APPLICATION A. Handholes and Boxes for 600 V and Less:

Tier 8 structural load rating.

foot intervals.

1. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating. 2. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer concrete units, SCTE 77,

3. Cover design load shall not exceed the design load of the handhole or 3.4 UNDERGROUND RACEWAY INSTALLATION

A. Where indicated on Drawings, install conduits, spacers, and accessories as

B. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane. C. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand

at least 15-psig hydrostatic pressure. D. Pulling Cord: Install 200-lbf-test nylon cord in empty ducts. E. Raceways Embedded in Slabs: 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit

close to slab support. Secure raceways to reinforcement at maximum 10-

2. Arrange raceways to cross building expansion joints at right angles with

expansion fittings. 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all

4. Do not embed threadless fittings in concrete unless specifically approved

by Architect for each specific location.

5. Change from RNC to GRC before rising above floor. 3.5 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. As shown on drawings. 3.6 CLEANING

SECTION 26-05-44 - SLEEVES AND SLEEVE SEALS

PART 1 - GENERAL 1.1 SUMMARY

A. Clean and lubricant underground raceways.

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors. 2. Sleeve-seal systems

Sleeve-seal fittings. Grout. Silicone sealants. **PART 2 - PRODUCTS**

A. Section Includes

2.1 SLEEVES

A. Wall Sleeves: 1. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless

otherwise indicated. B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the

C. Sleeves for Rectangular Openings: 1. Material: Galvanized sheet steel

Minimum Metal Thickness: a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch. b. For sleeve cross-section rectangle perimeter 50 inches or more and

one or more sides larger than 16 inches, thickness shall be 0.138 2.2 SLEEVE-SEAL SYSTEMS A. Description: Modular sealing device, designed for field assembly, to fill annular

1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe. Pressure Plates: Stainless steel.

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for

3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. 2.3 SLEEVE-SEAL FITTINGS

embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD. A. Description: Nonshrink; recommended for interior and exterior sealing

openings in non-fire-rated walls or floors. B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volumeadjusting, dry, hydraulic-cement grout.

space between sleeve and raceway or cable.

C. Design Mix: 5000-psi, 28-day compressive strength. D. Packaging: Premixed and factory packaged. 2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below. 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors: a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool

exposed surfaces smooth; protect material while curing. 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed 4. Install sleeves for wall penetrations unless core-drilled holes or formed

openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting. 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening. 2. Seal space outside of sleeves with approved joint compound for gypsum

board assemblies C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve

E. Underground, Exterior-Wall and Floor Penetrations: Install Sleeve-Seal System and Fitting.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-ongrade at raceway entries into building. B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space

between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal. 3.3 SLEEVE-SEAL-FITTING INSTALLATION A. Install sleeve-seal fittings in new walls and slabs as they are constructed. B. Assemble fitting components of length to be flush with both surfaces of

concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms. D. Using grout, seal the space around outside of sleeve-seal fittings.

SECTION 26-05-53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS PART 1 - GENERAL 1.1 SUMMARY

A. Section Includes: 1. Color and legend requirements for raceways, conductors, and warning labels and signs.

Tapes and stencils. Signs. 5. Paint for identification. PART 2 - PRODUCTS

Labels.

2.1 PERFORMANCE REQUIREMENTS A. Comply with ASME A13.1 and IEEE C2.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145. C. Comply with ANSI Z535.4 for safety signs and labels. D. Comply with NFPA 70E requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969. F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces. 2.2 COLOR AND LEGEND REQUIREMENTS A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field. 2. Legend: Indicate voltage.

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ELECTRICAL SPECIFICATIONS



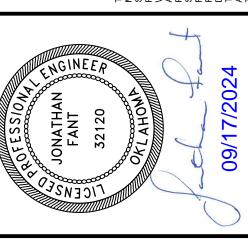
ELECTRICAL SPECIFICATIONS

CAL SPECIFICATIONS

REF. DEMO NOTES (DX): D1 REMOVE ALL LUMINAIRES, ELECTRICAL DEVICES, BOXES, CONDUITS, CONDUCTORS, HANGERS, AND ASSOCIATED HARDWARE IN THIS ROOM. DEMO ENTIRE BUILDING INCLUDING SERVICE. 1 FIRST FLOOR PLAN - ELECTRICAL DEMOLITION
SCALE: 1/8" = 1'-0"

FLOOR PLAN - DEMOLITION

09334001-7-E001



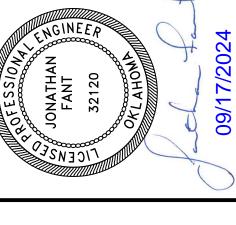
REF. NOTES (🐼): ALL LUMINAIRES SHOWN SHALL BE CIRCUITED AS OUTLINED IN THIS NOTE, UNLESS INDICATED OTHERWISE. PANELBOARD CIRCUITING IS DELINEATED WITH A DASH-DOT LINE BOUNDARY, WITH PANELBOARD NAMES AND CIRCUIT 1 PENDANT MOUNT AT +8'-6" AFF TO BOTTOM OF LUMINAIRE. NUMBERS IDENTIFIED AT BOUNDARY LINE. REFER TO PANEL SCHEDULES FOR ADDITIONAL INFORMATION.
CIRCUITING AND LOW-VOLTAGE WIRING BETWEEN LUMINAIRES, OCCUPANCY 2 EXTERIOR LIGHTING OPERATION SHALL BE DESIGNATED AS DUSK TO DAWN OPERATION, AND SHALL BE CONTROLLED BY AN EXTERIOR PHOTOCELL. PHOTOCELL SHALL BE MOUNTED ON NORTH BUILDING SENSORS, PUSH BUTTON STATIONS, SWITCHES, POWER PACKS, ETC. OMITTED WHERE CONTROL SCHEME IS APPARENT OR DETAILED. CONTROL FACADE AT +12' AFF UNLESS OTHERWISE NOTED. SHALL BE BY OCCUPANCY SENSOR / CONTROL DEVICE(S) IN SAME REGION / ZONE AS ASSOCIATED LUMINAIRES AND SHALL NOT TRANSCEND REGION / ZONE UNLESS NOTED OTHERWISE. (A REGION / ZONE IS A SPACE BOUND BY 3 EXTERIOR LIGHTING SHALL BE MOUNTED AT +12' AFF UNLESS OTHERWISE NOTED. FLOORS, WALLS, AND CEILINGS. REGION / ZONE MAY BE FURTHER IDENTIFIED BY A DASHED LINE BOUNDARY, OR WITH A LOWERCASE LETTER FOR CLARITY). PANELBOARD CIRCUITING — — — — REGION / ZONE NORTH

BY: DESCRIPTION:

ISSUE DATE: 09/11/24
REVISIONS:
No.: DATE:

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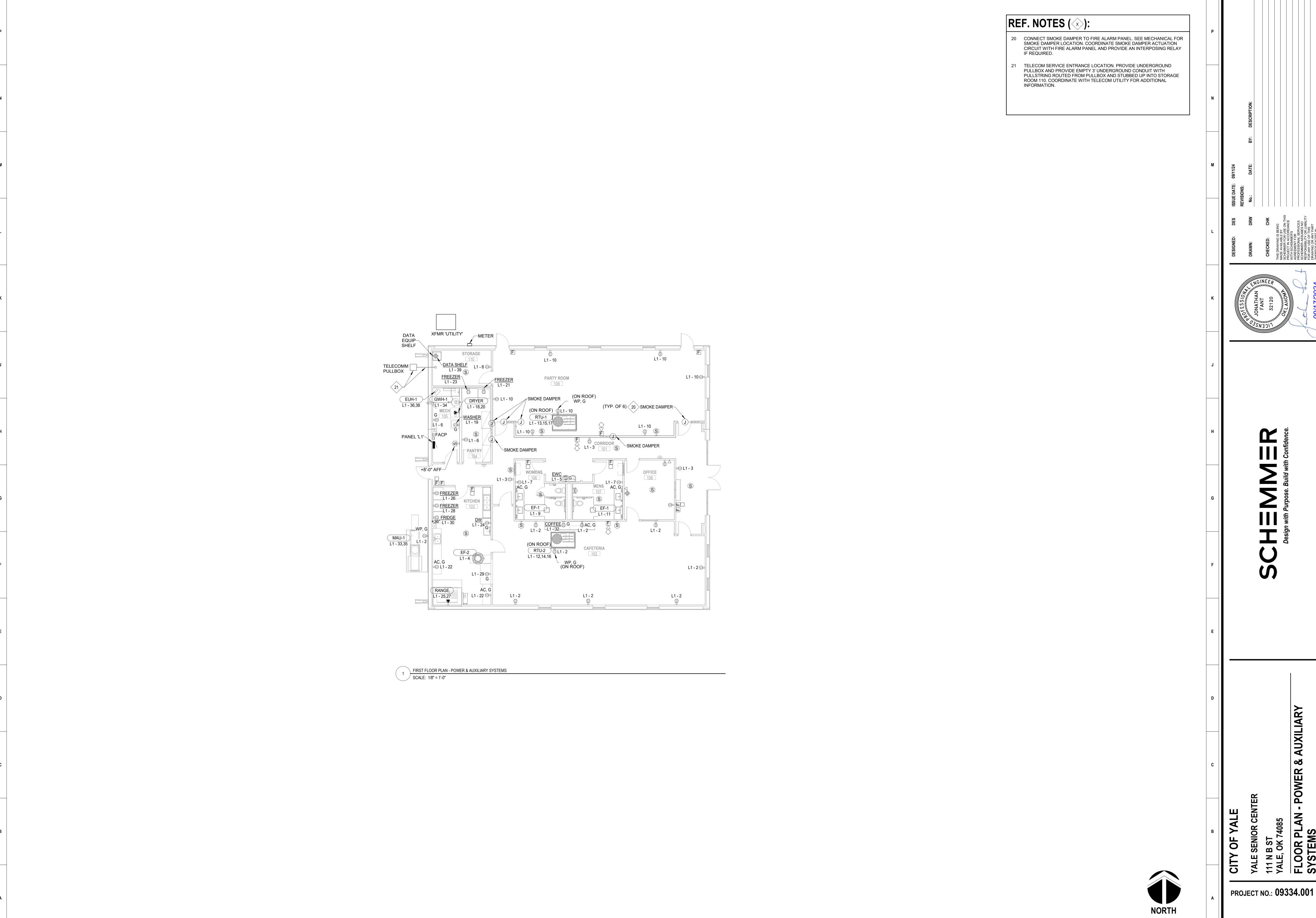
Design with Purpose. Build with Confidence.

74085 PLAN - LIGHTING

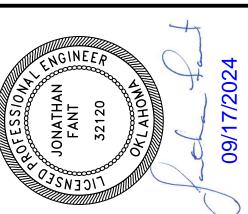
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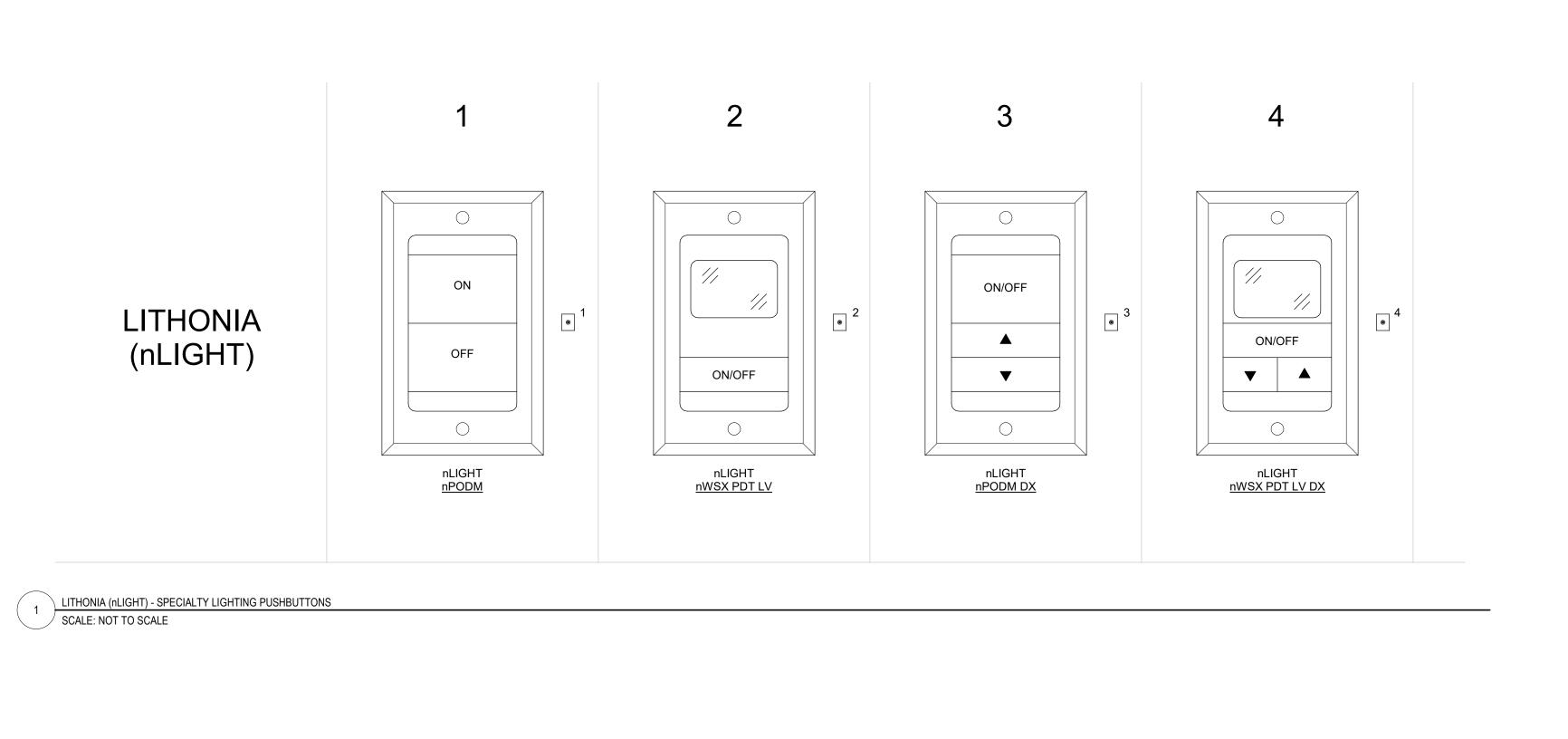
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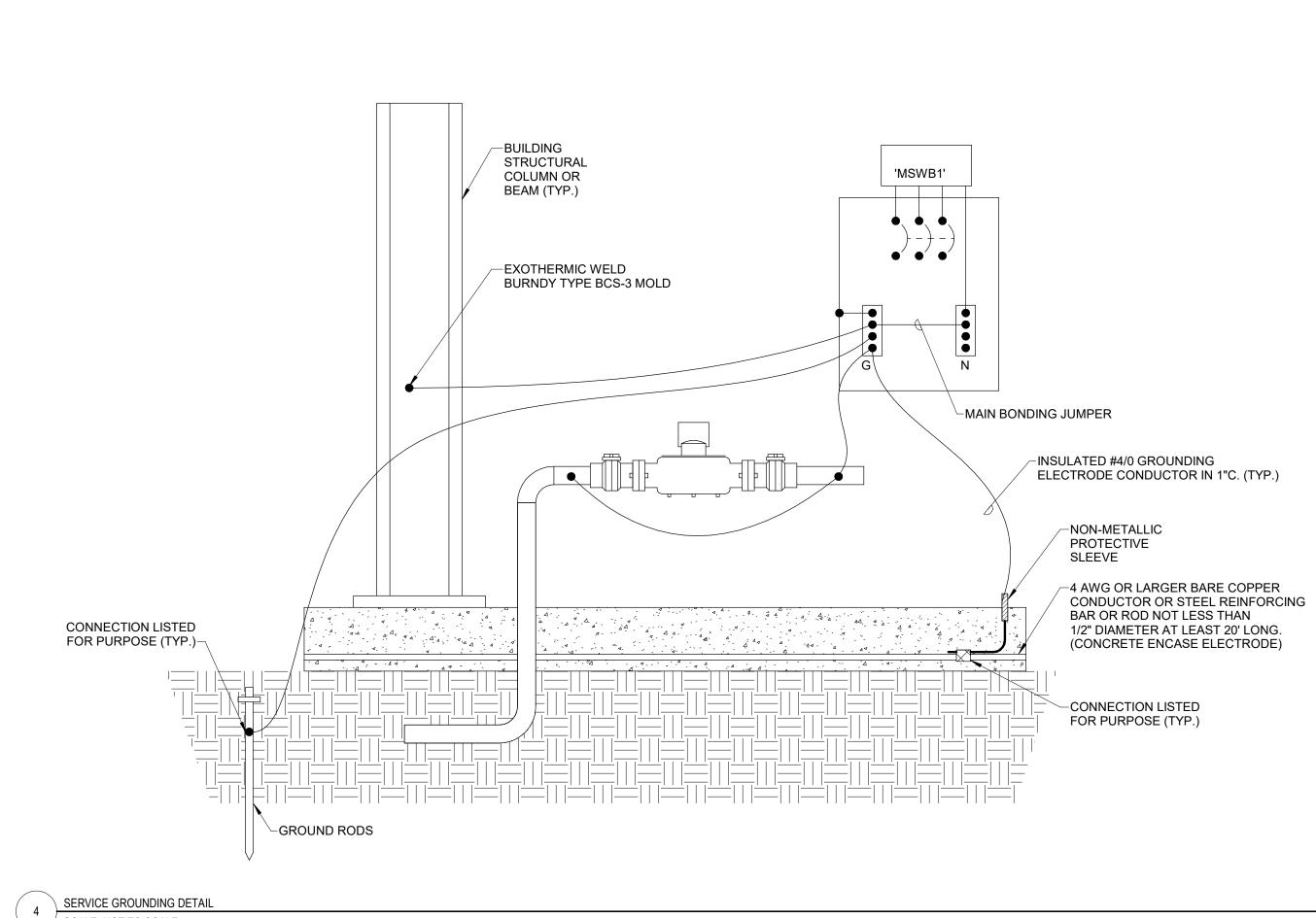
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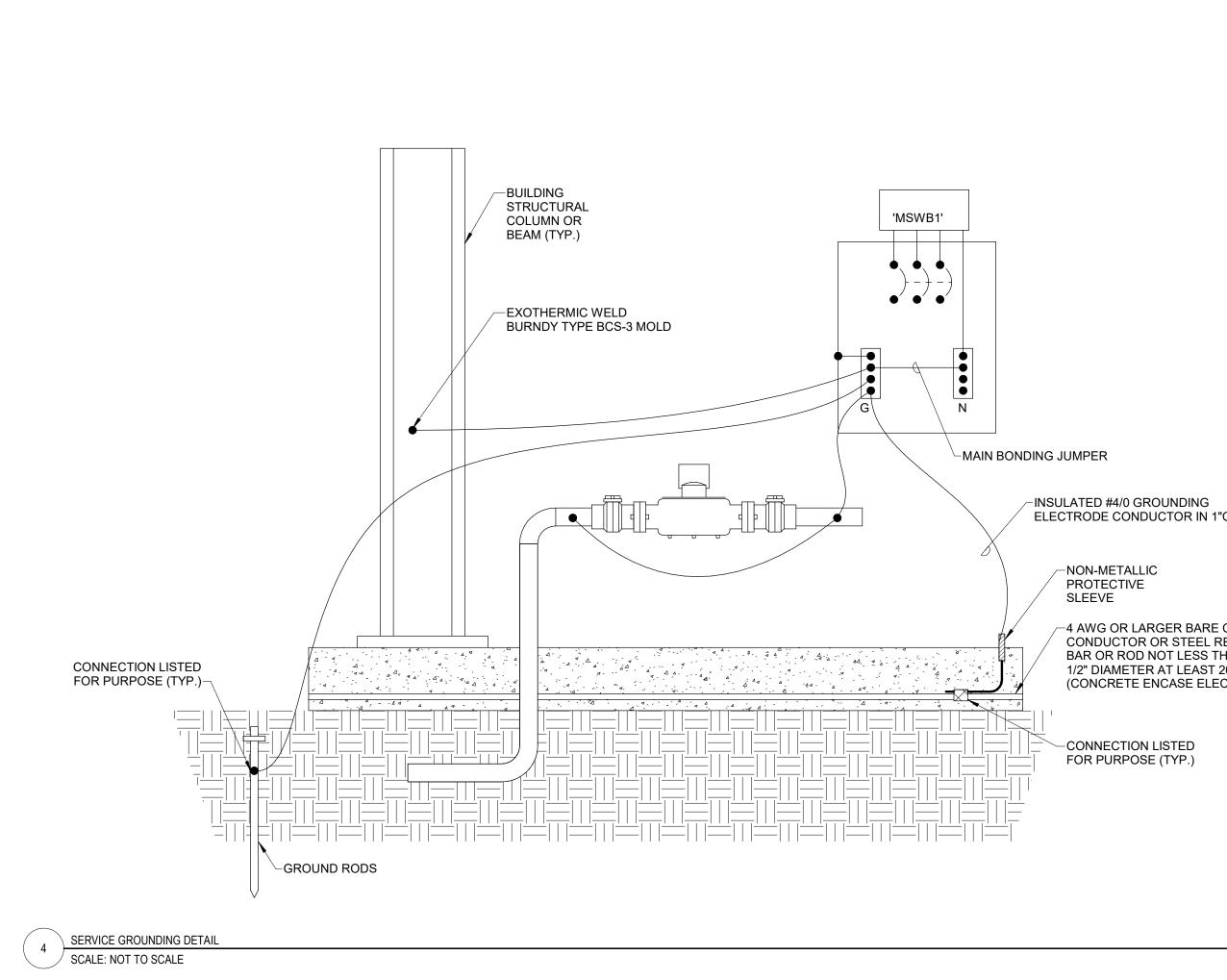


FLOOR PLAN - POWER & AUXILIARY SYSTEMS









NOTE 6 -

FOR MORE INFORMATION.

SCALE: NOT TO SCALE

CAT5E CABLE (TYP.)—

1. POWER PACK (nPP20 PL) SHALL CONTROL "CONTROLLED" RECEPTACLES THROUGH

PHOTÒCELL CONTROL DEVICE: nCM ADCX RJB (AS REQUIRED. SEE PLANS).
 OCCUPANCY SENSOR DEVICE: nCM-PDT-9/10-RJB (AS REQUIRED. SEE PLANS).

2. POWER PACK (nPP16D) REQUIRED TO CONTROL EACH DIMMABLE REGION / ZONE, INCLUDING DAYLIGHTING ZONES. WHERE DIMMING IS NOT SHOWN / REQUIRED, POWER PACK (nPP16) SHALL BE USED. CONTROLS AND REGIONS / ZONES SHOWN ON PLANS.

5. LOW VOLTAGE LIGHT CONTROL / DIMMER PUSHBUTTON SWITCH. SEE PLANS AND 1/E501

6. POWER PACKS LABELED "NSP5": nSP5 PCD POWER PACKS FOR LINE-VOLTAGE SWITCHING & DIMMING OF DECORATIVE INCANDESCENT LUMINAIRES. (AS REQUIRED. SEE PLANS).

7. WALL OCCUPANCY SENSOR DEVICE: nWV-PDT-16 (AS REQUIRED. SEE PLANS).

OCCUPANCY SENSOR. (AS REQUIRED. SEE PLANS).

LITHONIA (nLIGHT) - SPECIALTY LIGHTING WIRING DIAGRAM

(TYP.)— │

SYSTEM IDENTIFICATION DECAL PANEL IDENTIFICATION DECAL SYSTEM CONDUCTOR IDENTIFICATION 208Y/120V 3Φ 4W SYSTEM CONDUCTOR IDENTIFICATION **►** H1 DESIGNATION FED FROM MDP A – PHASE – BLACK A – PHASE – BLACK B - PHASE - RED B - PHASE - RED CR = CRITICAL OS = OPTIONAL STANDBY C - PHASE - BLUE NEUTRAL – WHITE EQ = EQUIPMENT H = 480VNEUTRAL – WHITE GROUND – GREEN LS = LIFE SAFETY L = 208V GROUND – GREEN EM = EMERGENCY BRANCH/FEEDER IDENTIFICATION DECAL SYSTEM CONDUCTOR IDENTIFICATION SYSTEM CONDUCTOR IDENTIFICATION 240V DELTA 3Ф 3W PANEL H1 A – PHASE – BROWN A – PHASE – PINK B – PHASE – PURPLE B – PHASE – ORANGE C – PHASE – YELLOW C - PHASE - TAN NEUTRAL – GRAY GROUND – GREEN GROUND – GREEN **DISCONNECT IDENTIFICATION DECAL** FED FROM MDP SYSTEM IDENTIFICATION DECAL TO BE DISCONNECT IDENTIFICATION PERMANENTLY POSTED.
SIZE: 1-1/2"H x 3"W. TEXT HEIGHT: 1/8" DECAL TO BE PERMANENTLY POSTED. SEE DETAILS AT RIGHT. SIZE: 1"H x 3"W. TEXT HEIGHT: 1/4"— TRANSFORMER IDENTIFICATION DECAL PANEL IDENTIFICATION DECAL TO BE PERMANENTLY POSTED. SEE DETAILS AT RIGHT. FED FROM MDP SIZE: 1"H x 3"W. TEXT HEIGHT: 1/4" FEEDS L1 TRANSFORMER IDENTIFICATION DECAL TO BE PERMANENTLY BRANCH/FEEDER IDENTIFICATION POSTED. SEE DETAILS AT RIGHT. DECAL TO BE PERMANENTLY SIZE: 1"H x 3"W. TEXT HEIGHT: 1/4" POSTED. SEE DETAILS AT RIGHT. SIZE: 1"H x 3"W. TEXT HEIGHT: 1/4"— 1. DECALS SHALL BE LAMINATED ACRYLIC WITH WHITE ENGRAVED LETTERING ON A BLACK BACKGROUND. PANELS OR EQUIPMENT CONNECTED TO AN ALTERNATE POWER SOURCE SHALL HAVE WHITE ENGRAVED LETTERING ON A RED BACKGROUND. 2. DECALS SHALL BE SIZED TO ACCOMMODATE SPECIFIED LEGENDS BUT NO SMALLER THAN SIZES SHOWN, MINIMUM OF 1/16" THICK. 3. DECALS SHALL BE PUNCHED OR DRILLED FOR MECHANICAL FASTENERS WITH 1/4" GROMMETS IN CORNERS FOR MOUNTING. 4. COLORS FOR 240V DELTA SYSTEMS BASED ON AVAILABLE COLORS OFFERED BY SOUTHWIRE. OTHER COLORS THAT DO NOT CONFLICT WITH OTHER VOLTAGE SYSTEMS PERMITTED.

PANELBOARD & EQUIPMENT IDENTIFICATION DETAIL

SCALE: 1/8" = 1'-0"

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PROJECT NO.: 09334.001

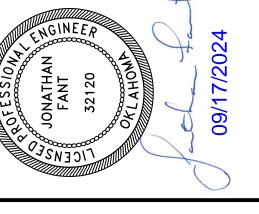
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ELECTRICAL DETAILS

REF. NOTES (🐼): F200A3G 3#3/0, 1#6G - 2"C EXTERIOR MECH RM 105 FIRST FLOOR TO UTILITY POLE $\, \succeq \,$ COORDINATE
REQUIREMENTS
WITH UTILITY 1 POWER RISER DIAGRAM
SCALE: NOT TO SCALE PROJECT NO.: 09334.001

POWER RISER DIAGRAM

09334001-7-E501



		EC	UII	PME	TI	SC	HED)UL	E				
							STARTE	R / DISCO	NNECT		RECEPT		
DEVICE	DEVICE DESCRIPTION	VOLTAGE	PH	KW	FLA	HP	TYPE	SIZE	FUSE	PLUG CONFIG	CONFIG	FEEDER SIZE	NOTES
DRYER	DRYER	208 V	1	-	24	-	-	-	1	14-30P	14-30R	F30A3G 3#10, 1#10G - 3/4"C	
EF-1	EXHAUST FAN	120 V	1	-	.19	-	BCU	15A/1	-	-	-	2#12, 1#12G - 3/4"C	1
EF-2	EXHAUST FAN	120 V	1	-	-	1/2	BCU	20A/1	-	-	-	2#12, 1#12G - 3/4"C	3
EUH-1	ELECTRIC UNIT HEATER	208 V	1	-	19.4	-	NFD	25A/2P	-	-	-	2#12, 1#10G - 3/4"C	2
GWH-1	GAS WATER HEATER	120 V	1	-	-	-	BCU	15A/1	-	-	-	2#12, 1#12G - 3/4"C	
MAU-1	MAKE UP AIR UNIT	208 V	1	-	6.9	-	NFD	30A/2P	-	-	-	3#10, 1#10G - 3/4"C	3
RANGE	RANGE	208 V	1	-	40	-	-	-	-	14-50P	14-50R	F50A3G 3#6, 1#10G - 1"C	
RTU-1	ROOF TOP UNIT	208 V	3	-	22	-	NFD	30A/3P	-	-	-	3#10, 1#10G - 3/4"C	
RTU-2	ROOF TOP UNIT	208 V	3	-	22	-	NFD	30A/3P	-	-	-	3#10, 1#10G - 3/4"C	

GENERAL EQUIPMENT SCHEDULE NOTES:

A. THIS SCHEDULE DISPLAYS SIZING INFORMATION THAT IS GENERIC IN NATURE. SCHEDULE DOES NOT ITEMIZE ALL INSTANCES OF EQUIPMENT. CONTRACTOR SHALL REFER TO THE PLANS FOR FINAL QUANTITIES AND LOCATIONS.

- B. MOUNT ALL DISCONNECTS AND STARTERS ON ASSOCIATED EQUIPMENT UNLESS SHOWN OTHERWISE. MAINTAIN WORKING CLEARANCES PER NEC; COORDINATE WITH MECHANICAL CONTRACTOR.
- C. BCU = BOX COVER UNIT (COOPER #SSY / #STY OR EQUAL) WITH FUSE.
- D. NFD OR FD = NON-FUSED OR FUSED DISCONNECT SWITCH.
- E. CS/NFD, FD = COMBINATION STARTER/ NON OR FUSED DISCONNECT SWITCH.
- F. INT = INTEGRAL DISCONNECT FURNISHED WITH EQUIPMENT.
- G. FHPMC = FRACTIONAL HORSEPOWER MANUAL CONTROLLER.
- H. IHPMC = INTEGRAL HORSEPOWER MANUAL CONTROLLER.
- I. STE = THERMAL ELEMENT SWITCH. PROVIDE THERMAL UNIT.
- J. EXP = DEVICE TO BE EXPLOSION-PROOF.
- K. ALL SWITCHES, DISCONNECTS, ETC SHALL BE LOCKABLE.
- L. ALL SWITCHES, DISCONNECTS, ETC SHALL BE NEMA 3R WHERE REQUIRED.
- M. PROVIDE FUSES AS SHOWN; REVISE SIZES PER ACTUAL NAMEPLATE
- N. STARTER ACCESSORIES: STARTER ACCESSORIES:
- CONTROL TRANSFORMER
 H-O-A SWITCH

PER NFPA AND AHJ.

- RED RUN LIGHT 4. 2 NO CONTACTS; 2 NC CONTACTS
- O. PROVIDE DUCT DETECTOR, SHUTDOWN RELAY, AND ACCESSORIES AS REQUIRED TO SHUTDOWN HVAC EQUIPMENT 2000 CFM OR HIGHER

- EQUIPMENT SCHEDULE NOTES:
 1. EXHAUST FAN SHALL BE CONTROLLED BY LOCAL LIGHTING
 OCCUPANCY SENSOR AND ASSOCIATED POWER PACK. SEE LIGHTING
 CONTROL DETAILS FOR ADDITIONAL INFORMATION.
 2. UNIT HEATER SHALL BE CONTROLLED BY THERMOSTAT (PROVIDED BY

- DESIGNATED MECHANICAL EQUIPMENT SHALL BE CONTROLLED BY HOOD CONTROLLER SYSTEM (PROVIDED BY OTHERS).

	LUMINAIRE SCHEDULE										
TYPE NO	DESCRIPTION / SPEC NO	TOTAL WATTS	VOLT	MOUNTING	NOTES						
A1	2X4 - FLAT PANEL - 3000 LUMENS LITHONIA EPANL 2X4 3000LM 80CRI 40K MIN1 EZT MVOLT	26 VA	MVOLT	CEILING							
A2	2X4 - FLAT PANEL - 4000 LUMENS LITHONIA EPANL 2X4 4000LM 80CRI 40K MIN1 EZT MVOLT	39 VA	MVOLT	CEILING							
A2E	2X4 - FLAT PANEL - 4000 LUMENS - EMERGENCY LITHONIA EPANL 2X4 4000LM 80CRI 40K MIN1 EZT MVOLT E10WCP	39 VA	MVOLT	CEILING							
A5	2X2 - FLAT PANEL - 3300 LUMENS LITHONIA EPANL 2X2 3300LM 80CRI 40K MIN1 EZT MVOLT	31 VA	MVOLT	CEILING							
A6	2X2 - FLAT PANEL - 4000 LUMENS LITHONIA EPANL 2X2 4000LM 80CRI 40K MIN1 EZT MVOLT	34 VA	MVOLT	CEILING							
B1	2X4 - BASKET - 3000 LUMENS LITHONIA STAK 2X4 3000LM 80CRI 40K COLT MIN1 EZT MVOLT	25 VA	MVOLT	CEILING							
В7	2X2 - BASKET - 3000 LUMENS LITHONIA STAK 2X2 3000LM 80CRI 40K COLT MIN1 EZT MVOLT	25 VA	MVOLT	CEILING							
B7E	2X2 - BASKET - 3000 LUMENS - EMERGENCY LITHONIA STAK 2X2 3000LM 80CRI 40K COLT MIN1 EZT MVOLT E10WLCP	25 VA	MVOLT	CEILING							
B8	2X2 - BASKET - 4000 LUMENS LITHONIA STAK 2X2 4000LM 80CRI 40K COLT MIN1 EZT MVOLT	34 VA	MVOLT	CEILING							
B8E	2X2 - BASKET - 4000 LUMENS - EMERGENCY LITHONIA STAK 2X2 4000LM 80CRI 40K COLT MIN1 EZT MVOLT E10WLCP	34 VA	MVOLT	CEILING							
C1	6" RECESSED CAN - 1000 LUMENS LITHONIA LDN6 40 10 LO6 AR LSS MVOLT EZ1	13 VA	MVOLT	CEILING							
l1	INDUSTRIAL STRIP LED - 4' - 5000 LUMEN - ZL1N LITHONIA ZL1N L48 5000LM FST MVOLT 40K 80CRI WH ZACVH	34 VA	MVOLT	SURFACE / CABLE							
I1E	INDUSTRIAL STRIP LED - 4' - 5000 LUMEN - ZL1N - EMERGENCY LITHONIA ZL1N L48 5000LM FST MVOLT 40K 80CRI E10WLCP WH ZACVH	34 VA	MVOLT	SURFACE / CABLE							
P1	LINEAR PENDANT 8' MARK ARCHITECTURAL S4PID LLP 8FT MLS8 80CRI 40K 800LMF I80CRI I40K I400LMF SCT MIN1 FLL DC MVOLT SLVT ZT	32 VA	120 V								
P1E	LINEAR PENDANT 8' EMERGENCY MARK ARCHITECTURAL S4PID LLP 8FT MLS8 80CRI 40K 800LMF I80CRI I40K I400LMF SCT MIN1 FLL DC MVOLT SLVT ZT E10WLCP	32 VA	120 V								
W2	4' WALL MOUNTED RECTANGULAR – RESTROOM LITHONIA BLWP4 20L ADSMT EZ1 LP840	32 VA	120 V	WALL / SURFACE							
X1	EXIT SIGN LITHONIA LQM S W 3 R 120/277 EL N SD	2 VA	MVOLT	WALL / CEILING							
X1C	EXIT SIGN WITH BUGEYE - COMBO LITHONIA LHQM LED R HO SD	5 VA	MVOLT	WALL / CEILING							
X5	EMERGENCY BUGEYE REMOTE HEAD - DUAL - WEATHERPROOF LITHONIA ELA T QWP L0309 SD	3 VA	120 V	WALL / SURFACE							

LUMINAIRE SCHEDULE NOTES:

1. VERIFY CABLE / CHAIN LENGTH AND ADJUST ACCORDINGLY.

- 2. COORDINATE MOUNTING HEIGHT BEFORE ROUGH-IN.
- MOUNT ABOVE MIRROR.
- 4. SEE ARCHITECTURAL EXTERIOR BUILDING ELEVATIONS.
- 5. PROVIDE GYPSUM TRIM RING WHERE REQUIRED. (SUPPORT TRIM RING FROM STRUCTURE.) SEE ARCH A6 SERIES SHEETS FOR REFLECTED CEILING PLANS.

	Branch Panel: L1 Location: MECH 105					Volts:	208Y/12	0				A.I.C. Rating: 14,000		
	Supply From: UTILITY Mounting: SURFACE					Phases: Wires:					FCI	MLO / MCB: MCB B / MCB Rating: 225 A		
CKT	Circuit Description	Trip	Р		1		В		;	Р	Trip	Circuit Description		CK
1	LTG	20 A	1	1380	1620					1	20 A	REC - RM 102		2
3	REC - RM 101	20 A	1			540	1176			1	20 A	EF-2 - RM 103		4
5	EWC - RM 101	20 A	1					370	540	1		REC - RM 104, 105, 110		6
7	REC - RM 106, 107	20 A		360	720					1		REC - RM 108		8
	EF-1 - RM 106	15 A				23	1260			1		REC - RM 109		10
	EF-1 - RM 107	15 A						23	2642	3	35 A	RTU-2 - (ROOF)		12
	RTU-1 - (ROOF)	35 A	3	2642	2642									14
						2642	2642							16
								2642	2496	2	30 A	(GFI) DRYER - RM 105		18
	WASHER - RM 105	20 A	1	1500	2496									20
	(GFI) FREEZER - RM 104	20 A				800	360			1		REC - RM 103		22
	(GFI) FREEZER - RM 104	20 A						800	1200	1		DW - RM 103		24
	(GFI) RANGE - RM 103	50 A	_	4160	800	1100				1		(GFI) FREEZER - RM 103		26
27						4160	800	100	200	1		(GFI) FREEZER - RM 103		28
	REC - RM 103 (DED.)	20 A		000	4000			180	800	1		(GFI) FRIDGE - RM 103		30
	FACP - RM 105	20 A		360	1000	740	500			1		COFFEE - RM 102		32
	MAU-1	30 A				718	500	740	2040	1		GWH-1 - RM 105		34
35	LTC DM 402 400			596	2010			718	2018	2		EUH-1 - RM 105		36
	LTG - RM 102, 109	20 A	1	596	2018	000	0					SPARE		38
	DATA SHELF - RM 110	20 A				600	0	-	0	1				40
	SPARE SPARE	20 A		0				0	0	1		SPARE SPARE		42
	SPARE	20 A 20 A		U	0	0	0			1		SPARE		44
	SPARE	20 A				U	U	0		1		SPACE		48
	SPARE	20 A		0				0		1		SPACE		50
	SPARE	20 A		U		0				1		SPACE		52
	SPARE	20 A				0		0		1		SPACE		54
))	OI AIL	Total Lo		2229	4 \/Δ	1622	1 21 VA	1442		'		OI AGE		1 34
		Total An		18			7 A	120		J				
	d Classification	Со		ted Load	D	emand Fa		Estimate		d		Panel Totals	1	
TG				6 VA		100.00%			6 VA			Total Est. Demand:		
EC				60 VA		100.00%			0 VA		Tot	tal Est. Demand Current (100% Rated):	147 A	
	CONT			18 VA		100.00%			18 VA			N 0 1 0 10 1000	20.4	
QF	_NON CONT		120	O VA		100.00%	o	120	0 VA			Non-Cont. Current @ 100%:		
												Continuous Current @ 125%:	157 A	
											To	otal Est. Demand Current (80% Rated):	178 A	
D C14	end:						Notes:							
. eg CB		B. Mold	1 ₂ 4 C	ase Circu	t Breaker		NOLES:							
GB FI:				ase Circu Only	прівакег									
	K: Lockable Circuit Breaker EXTO		-	Circuit Bre	aker									
	IN. LOURADIE CITCUIT DIEAREI EATO	. LXISI	ung C	JII CUIL DI C	andi									

PROJECT NO.: **09334.001**

09334001-7-E601

LUMINAIRE & EQUIPMENT SCHEDULES