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# SAFIRE

# 1475 SW MARKET ST LEE'S SUMMIT, MO 64081

PERMIT



HIVE DESIGN COLLABORATIVE, INC.

601 E. 63rd St., Suite 440 Kansas City, MO 64110 816.581.6363

F.S.P.

F.V.C.

Fire Stand Pipe

Fire Valve Cabinet

**ABBREVIATIONS** 

O.R.D.

Overflow Roof Drain

. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE GOVERNING LAWS AND CODES, AND IN ACCORDANCE WITH AUTHORITIES HAVING JURISDICTION.

2. GC TO VERIFY ALL DIMENSIONS AND NOTIFY ARCHITECT OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR ACKNOWLEDGES REVIEW OF CONDITIONS AND INTENT OF ALL CONSTRUCTION DOCUMENTS UPON SUBMITTING BID.

3. CALCULATE AND MEASURE REQUIRED DIMENSIONS. DO NOT SCALE DRAWINGS UNLESS OTHERWISE INDICATED. ALL DIMENSIONS TO BE TAKEN FROM DESIGNATED DATUM POINT. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER GRAPHIC REPRESENTATION. DETAIL DIMENSIONS TAKE PRECEDENCE OVER PLAN DIMENSIONS.

4. ALL ITEMS SUPPLIED BY THE OWNER AND INSTALLED BY THE CONTRACTOR WILL BE COORDINATED BY THE CONTRACTOR FROM DELIVERY TO INSTALLATION.

5. DIMENSIONS ON DRAWINGS ARE TO FACE OF FINISH AND CENTERLINE OF COLUMNS UNLESS OTHERWISE NOTED.

6. THE GENERAL CONTRACTOR (GC, HEREAFTER) UPON SIGNING THE OWNER/GC AGREEMENT, 9. ALL VERTICAL DIMENSIONS SHALL BE TAKEN FROM "BENCH MARK" OR OTHER SIMILAR GUIDE ACCEPTS THE CD (INCLUDING THESE DRAWINGS W/ THE INCLUDED NOTES & DESCRIPTIVE MATERIAL) & AGREES TO EXECUTE THE NECESSARY WORK IN MANNER DESCRIBED THEREIN. A) UPON EXAMINATION / FAMILIARIZATION OF CD & JOB SITE VISIT, ANY DISCREPANCIES,

OMISSIONS, AMBIGUITIES AND/OR CONFLICTS NOTED, SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT IN WRITING, FOR CORRECTION. B) ANY ELEMENT, WHATSOEVER, REQUIRED BY BUILDING TO BE INCORPORATED IN CONSTRUCTION BUT NOT SPECIFIED IN CD SHALL BE BROUGHT TO ATTENTION OF ARCHITECT FOR REVIEW/ACTION.

C) NO MODIFICATIONS / REVISIONS / CHANGES SHALL BE UNDERTAKEN UNLESS SPECIFICALLY SO INSTRUCTED AND APPROVED BY OWNER. D) DURING COURSE OF PROJECT, GENERAL CONTRACTOR SHALL MAKE EVERY EFFORT TO FULLY INFORM ALL CONCERNED PARTIES REGARDING DECISIONS/ACTIONS TAKEN

ADJACENT FLOOR SURFACE, IN A MANNER ACCEPTABLE TO OWNER AND ARCHITECT.

WHICH, IN ANY WAY, MIGHT AFFECT ANY SAID CONSTRUCTION CONDITIONS. 7. ALL EXISTING HOLES/CRACKS IN SLAB AND THOSE RESULTING FROM THE CONSTRUCTION PROCESS SHALL BE FILLED/REPAIRED AND THE SURFACE PATCHED SMOOTH AND LEVEL WITH

8. GC SHALL BE RESPONSIBLE FOR FIELD MEASURING OF EXISTING CONDITIONS PRIOR TO START OF WORK AND DURING CONSTRUCTION, AS NECESSARY, TO ASSURE CONSTRUCTION ADHERENCE TO DRAWINGS. BY ENTERING INTO A CONSTRUCTION CONTRACT FOR THIS WORK, GC SHALL INDICATE HIS FAMILIARITY WITH THE SITE/FIELD CONDITIONS.

A) ALL "HOLD" DIMENSIONS SHALL BE MONITORED TO ASSURE CORRECTNESS B) ANY DIMENSION REVISIONS/MODIFICATIONS ARE TO BE BROUGHT TO ATTENTION OF THE ARCHITECT FOR REVIEW/APPROVAL.

ESTABLISHED PRIOR TO START OF CONSTRUCTION. HIGH POINTS, LOW POINTS, IRREGULARITIES IN FLOOR SLAB, PARTICULARLY, WHICH COULD IN ANY WAY AFFECT

FABRICATION/INSTALLATION WORK OF OTHER TRADES OR VENDORS (I.E., CABINET CONTRACTORS), SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT. A) VARIATIONS IN FLOOR LEVEL IN EXCESS OF 1/2" FOR EVERY 10'-0" IN EVERY DIRECTION WILL REQUIRE LEVELING OF SLAB BY GC LEVELING OF SLAB TO BE DONE AS REQUIRED READY TO RECEIVE FLOOR FINISHES, (I,E, VINYL TILE FLOORS, CARPETING, ETC). GC TO VERIFY SLAB CONDITION PRIOR TO BID SUBMISSION AND CONTACT LANDLORD.

10. GC, SUBCONTRACTORS, AND ALL VENDORS ARE TO VERIFY ALL CLEARANCES (CORRIDORS, STAIRS, ELEVATORS, ETC.) REQUIRED FOR DELIVERIES AND PASSAGE OF ALL JOB MATERIALS/EQUIPMENT.

11. ALL NECESSARY WOOD BLOCKING / GROUNDS, ETC., ARE TO BE SUPPLIED AS FIREPROOFED ELEMENTS. GC SHALL FULLY COORDINATE SETTING/PLACEMENT OF THESE ELEMENTS AS REQUIRED

BY LOCAL CODE/BUILDING OR SURROUNDINGS. A) GROUND/BLOCKING MAY NOT BE WHOLLY SHOWN ON DRAWINGS AND GOOD CONSTRUCTION PRACTICE SHALL GOVERN/DETERMINE SAID USE WHERE A QUESTION ARISES. B) GC TO PAY PARTICULAR ATTENTION TO ALL LOCATIONS OF DRYWALL PARTITION CONSTRUCTION THAT ABUT OR RECEIVE MILLWORK OR CABINET WORK CONSTRUCTION. INTERNAL WOOD BLOCKING SHALL BE SUPPLIED FOR STURDY ANCHORAGE AT INTERSECTIONS

12. THE CONTRACTOR SHALL INSTALL DUST PROOF CURTAINS BETWEEN THE AREAS TO BE REMODELED AND THE AREAS TO REMAIN UNTIL ALL DUST PRODUCING WORK IS COMPLETED AND ALL DEBRIS IS CLEANED UP.

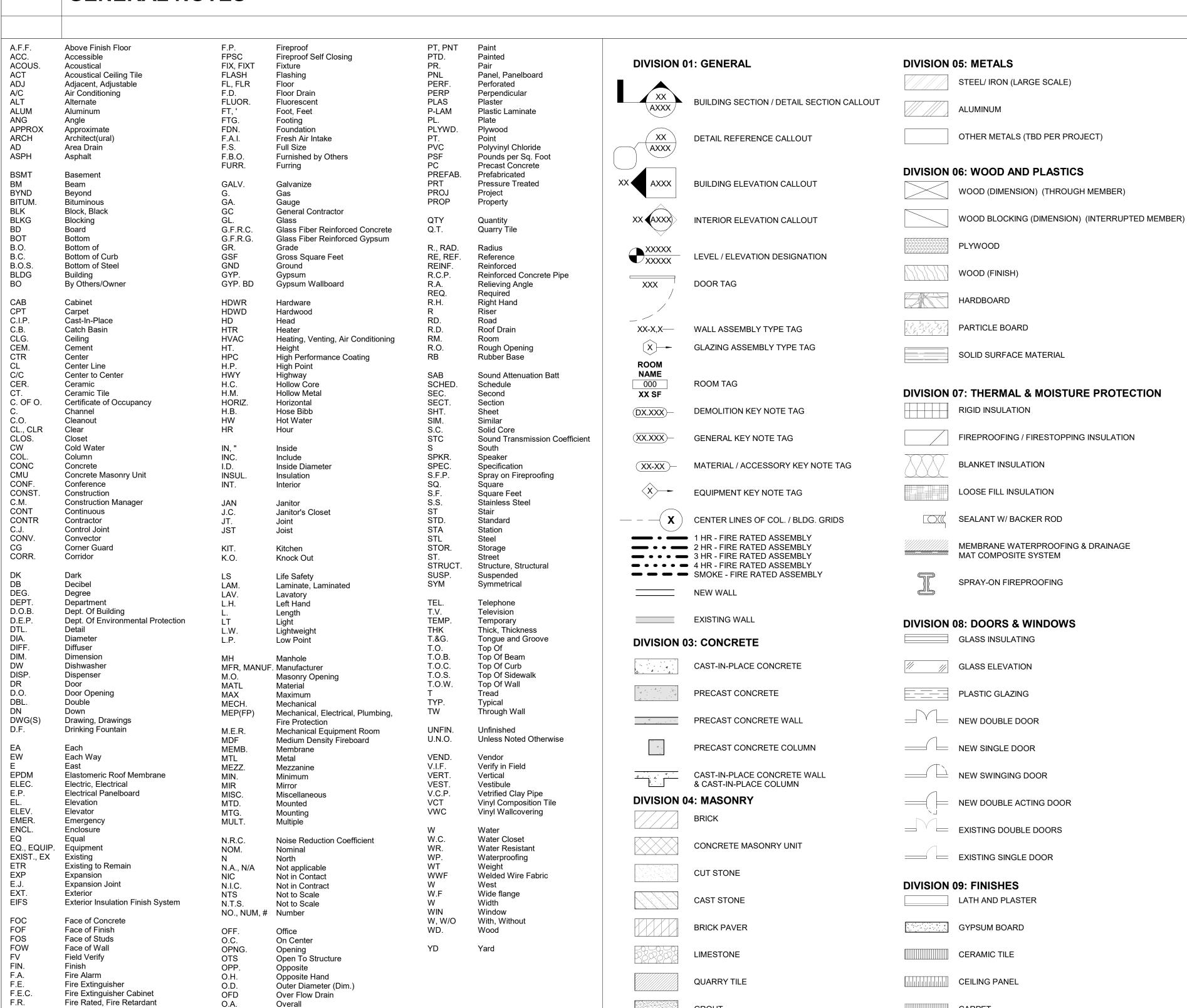
OF WOOD/GLASS BORROWED LIGHT PARTITIONS AND ADJACENT DRYWALL CONSTRUCTION AS

13. PROTECT THE AREAS OF THE BUILDING NOT BEING REMODELED FROM DAMAGE AT ALL TIMES.

14. KEEP ACCESS TO EMERGENCY EXITS AVAILABLE AT ALL TIMES.

15. CONTRACTOR SHALL REMOVE ALL DEBRIS FROM THE PROJECT SITE AND DISPOSE IN A LICENSED LANDFILL.

**GENERAL NOTES** 



**GROUT** 

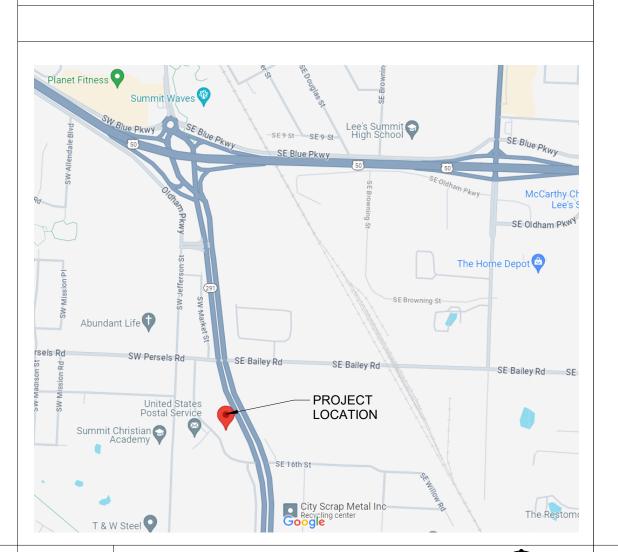
**SYMBOLS** 

CARPET

**WALL TYPE KEY:** - WALL TYPE C = CONCRETE M = MASONRY S = METAL STUD W = WOOD STUD — WALL SIZE 0 = 7/8" HAT CHANNEL or 3/4" WOOD FURRING STRIP 1 = 15/8" METAL STUD 2 = 21/2" METAL STUD or 1 1/2" WOOD STUD 3 = 35/8" METAL STUD 4 = 4" METAL STUD or 3 1/2" WOOD STUD or 3 5/8" CMU 6 = 6" METAL STUD or 5 1/2" WOOD STUD or 5 5/8" CMU 8 = 8" METAL STUD or7 5/8" CMU 10 = 9 5/8" CMU 12 = 11 5/8" CMU - WALL FINISH A = GYP ONE SIDE AA = GYP BOTH SIDES F = TILE ON CEMENT BOARD K = SHAFTWALL • WALL TAG WALL MODIFIERS -WALLS CONSIDERED FULL HEIGHT TO STRUCT. UNLESS MODIFIED PER BELOW 1 = SOUND ATTENUATION BATTS FULL CAVITY

WIDTH, APPLY ACOUS. SEALANT @ TOP &

BASE OF WALL, EACH SIDE



**ABBREVIATIONS** 

sheet number

G001

**LOCATION MAP** 

CONSTRUCTION As Noted on Plans Review

Lee's Summit, Missouri 07/03/2024

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NUMBER

A-20/15040635

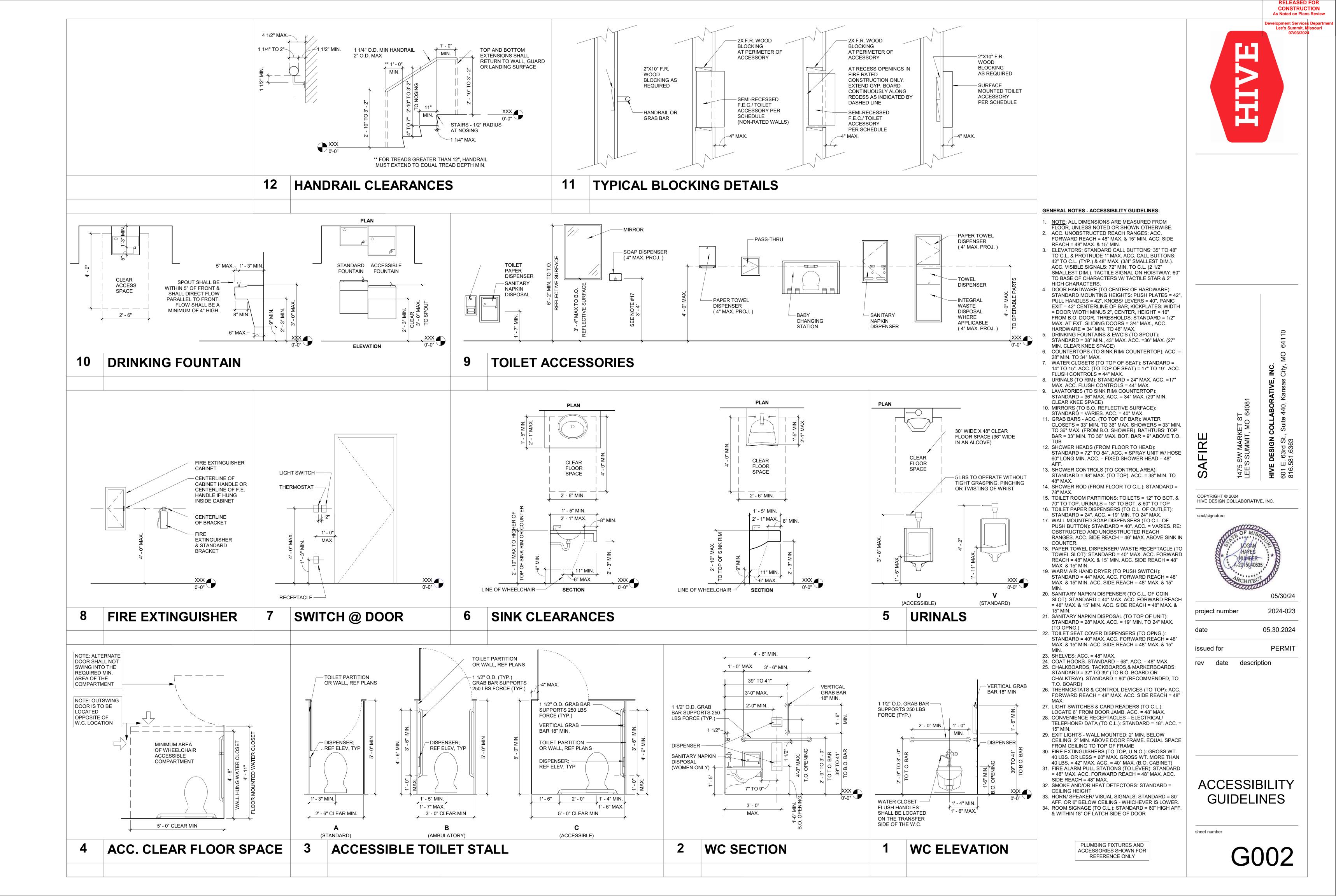
05/30/24 2024-023

05.30.2024 **PERMIT** issued for

rev date description

project number

SYMBOLS AND



### CODE INFORMATION SUMMARY:

SUBJECT	DAT	TA	REFERENCE
PROJECT DESCRIPTION	RENOVATION OF AN EXISTHAT WILL CONNECT WIT EXISTING TENANT		
JURISDICTION	CITY OF LEE	'S SUMMIT	
APPLICABLE CODE	2018 INTERNATIONAL BUIL 2018 INTERNATIONAL PLU 2018 INTERNATIONAL MEC 2018 INTERNATIONAL FUE 2018 INTERNATIONAL FIRE 2017 NATIONAL ELECTRIC	MBING CODE CHANICAL CODE IL GAS CODE E CODE	
ADA STANDARDS	2010 ADA STANDARDS FO	R ACCESSIBLE DESIGN	
OCCUPANCY CLASS	B (BUSINE) IN A SEPARATED, MIX	SECTION 303	
CONSTRUCTION TYPE	V-	SECTION 601	
FIRE RESISTANCE	STRUCTURAL FRAME BEARING WALLS, EXT. NON BEARING WALLS FLOOR CONSTRUCTION ROOF CONSTRUCTION	0 0 0 0	SECTION 601
FIRE PROTECTION	AUTOMATIC SPRINKLER FIRE ALARM SYSTEM FIRE EXTINGUISHER(S)	NO EXISTING REQUIRED	CHAPTER 9
ALLOWABLE HEIGHT AND AREA	40 9,000 S	SECTIONS 504 & 506	
FLOOR AREA (GROSS)	1,487	TABLE 1004.5	
OCCUPANT LOAD	2	6	TABLE 1004.5
EXITS REQUIRED	1		SECTION 1006
EXITS PROVIDED	2	2	
EXIT ACCESS TRAVEL DISTANCE	20	0'	SECTION 1017

#### PLUMBING FIXTURE REQUIREMENT: 2018 IBC TABLE 2902.1

OCCUF	PANCY	WATER (	CLOSETS	LAVAT	ORIES	DRINKING	SERVICE
TOTAL	PER SEX	MALE	FEMALE	MALE	FEMALE	FOUNTAINS	SINK
ASSEMBLY		1 PER 125	1 PER 65	1 PER 200	1 PER 200	1 PER 500	1
16 OCC	8 EA	.064	.123	.04	.04	.032	
BUSINESS		1 PER 25*	1 PER 25*	1 PER 40*	1 PER 40*	1 PER 100	1
7 OCC	4 EA	.16	.16	.1	.1	.07	
STORAGE		1 PER 100	1 PER 100	1 PER 100	1 PER 100	1 PER 1000	1
2 OCC	1 EA	.01	.01	.01	.01	.001	
25 OCC		.234	.293	.15	.15	.103	1
PLUMBING FIXTURES		MALE	FEMALE	MALE	FEMALE		
REQUIRED		1	1	1	1	1	1
PROVIDED		1*	1*	1*	1*	0**	0***

- \* SEPARATE FACILITIES NOT REQUIRED PER IBC 2902.2 EXCEPTION 4

  \*\* OWNER TO PROVIDE BOTTLED WATER AT ALL TIMES FOR EMPLOYEES & GUESTS

  \*\*\* SERVICE SINK LOCATED IN CONNECTED SPACE THAT IS NOT IN CONTRACT

EGRESS (MAXIMUM TRAVEL DISTANCE) **DISTANCE** 

61' - 0" Egress Path A

		C	ODE - OC	CUPANCY CALCULATION	IS		
#	ROOM	AREA	OCCUPANCY	SPACE FUNCTION (1004.1.2)	LOAD FACTOR	NET / GROSS	OCCUPANT LOAD
	L  EL 1				TACTOR	GROSS	LOAD
	OPEN OFFICE	592 SF	BUSINESS	Business areas	150	gross	
101	CONFERENCE	165 SF	ASSEMBLY	Assembly, without fixed, Unconcentrated (tables and chairs)	15	net	12
102	OFFICE	148 SF	BUSINESS	Business areas	150	gross	1
103	OFFICE	126 SF	BUSINESS	Business areas	150	gross	1
104	STORAGE	192 SF	STORAGE	Accessory storage areas, mechanical equipment rooms	300	gross	1
105	BREAK	49 SF	ASSEMBLY	Assembly, without fixed, Unconcentrated (tables and chairs)	15	net	4
106	CLOSET	14 SF	STORAGE	Accessory storage areas, mechanical equipment rooms	300	gross	1
107	RESTROOM	56 SF	BUSINESS	Business areas	150	gross	1

### **CODE PLAN LEGEND**

#### ROOM OCCUPANT LOAD OFFICE - ROOM NAME 101 ROOM NUMBER

150 SF — SQUARE FEET OF ROOM

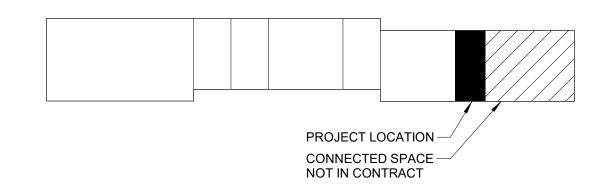
FIRE EXTINGUISHER

### EGRESS CAPACITY FACTORS

STAIRWAYS: 0.3" PER OCCUPANT SERVED\* DOORWAYS: 0.2" PER OCCUPANT SERVED\*

— PROVIDED EXIT WIDTH
IN DECIMAL INCHES
— PROVIDED EXIT WIDTH
OCCUPANT CAPACITY

NOTE: FURNITURE AND EQUIPMENT SHOWN FOR REFERENCE ONLY. \* REF IBC SECTIONS 1005.3.1 & 1005.3.2 FOR CAPACITY FACTOR EXCEPTIONS.



CODE FLOOR PLAN

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05/30/24

2024-023

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sheet number

	STORAGE BI	REAK 105 49 SF				
	OFFICE 103 126 SF					
57' - 10"	A — J					
2-/+	OFFICE 102 148 SF					
	OPEN O	0		1		
	CONFERENCE 101 165 SF					
	i †A					
	33" 165	   	NOT IN CONTRACT			

RESTROOM NOT IN CONTRACT

14 SF

**CODE PLAN** 1/8" = 1'-0"

**KEY PLAN** 

18. Framing Member Tolerances: 1/4 inch from true position, maximum.

SECTION 06 20 00 - FINISH CARPENTRY

quality suitable for transparent finish.

type as recommended for application

type as recommended for application.

Protect work from moisture damage.

having jurisdiction.

Woodwork Standards for Premium Grade.

11. Wood fabricated from old growth timber is not permitted.

resin binders; of grade to suit application; sanded faces.

suitable for transparent finish.

recommended for application

19. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as

1. Softwood Lumber: As indicated on Drawings, maximum moisture content of 6 percent; with vertical grain, of quality

Hardwood Lumber: As indicated on Drawings, maximum moisture content of 6 percent; with vertical grain, of

Softwood Plywood Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; glue

Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; glue

Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof

Hardboard: AHA A135.4: Pressed wood fiber with resin binder. Class 1 - Tempered. 1/4 inch thick, smooth one

9. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural

13. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing

10. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by authority

12. Shop assemble work for delivery to site, permitting passage through building openings.

7. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated

1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

8. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. Match color, texture, and appearance.

2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces,

3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

4. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not

3. Provide temporary and removable protection for installed products. Control activity in immediate work area to

6. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain

7. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

5. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by

9. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work.

material in accordance with Section 07 84 00, to full thickness of the penetrated element.

If defects are due to condition of substrate, repair substrate prior to repairing finish.

burn or bury.

prevent damage.

PROTECTION OF INSTALLED WORK

protecting with durable sheet materials.

1. Protect installed work from damage by construction operations.

2. Provide special protection where specified in individual specification sections.

4. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

recommendations for protection from waterproofing or roofing material manufacturer.

1. Adjust operating products and equipment to ensure smooth and unhindered operation.

14. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints 10. Hardboard Facing for Opaque Finish: AHA A135.4, Class 1 - Tempered, S2S (smooth two sides) hardboard, hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from composition face, 1/8 inch thick. 11. Package, deliver and store doors in accordance with specified quality standard. 15. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade 12. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one indicated. week. Break seal on site to permit ventilation. 16. Set and secure materials and components in place, plumb and level. 17. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay 13. Provide manufacturer's warranty for the life of the installation. trim to conceal larger gaps. 14. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, 18. Maximum Variation from True Position: 1/16 inch. and telegraphing core construction. 15. Fabricate doors in accordance with door quality standard specified. 19. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch. 16. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK requirements and dimensions. 1. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural 17. Provide edge clearances in accordance with the quality standard specified. Woodwork Standards for Premium Grade. 18. Install doors in accordance with manufacturer's instructions and specified quality standard. Install fire-rated doors 2. Wood Veneer Faced Cabinets: Premium grade. in accordance with NFPA 80 requirements. 3. Plastic Laminate Faced Cabinets: Custom grade. 19. Use machine tools to cut or drill for hardware. 20. Coordinate installation of doors with installation of frames and hardware. 4. Protect units from moisture damage. 5. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy. SECTION 08 31 00 - ACCESS DOORS AND PANELS 6. Wood fabricated from old growth timber is not permitted. 1. Manufacturers: Acudor Products Inc, Milcor, or equal. 7. Adhesive: Type recommended by fabricator to suit application. 2. Door and Frame Units: Steel factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in. 8. Grommets: Standard plastic grommets for cut-outs, in color as indicated. 9. Hardware: BHMA A156.9, types as indicated for quality grade specified. Verify that rough openings are correctly sized and located. 10. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes 4. Install units in accordance with manufacturer's instructions. for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments. 5. Install frames plumb and level in openings. Secure rigidly in place. 11. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers, unless otherwise indicated 6. Position units to provide convenient access to the concealed work requiring access. on Drawings. 12. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish, unless otherwise SECTION 08 71 00 - DOOR HARDWARE indicated on Drawings. 1. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed. 13. Catches: Magnetic 2. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal 14. Drawer Slides: Full extension, Static load capacity as required by drawer size, side mounted, steel with polished reinforcement for door hardware. 3. Convey Owner's keying requirements to manufacturers. 15. Hinges: European style concealed self-closing type, steel with polished finish, unless otherwise indicated on 4. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and Drawings. secure to the extent indicated. 16. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through Provide all items of a single type of the same model by the same manufacturer. 6. Provide products that comply with the following: building openings 17. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any A. Applicable provisions of federal, state, and local codes. B. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities. 18. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide C. Applicable provisions of NFPA 101, Life Safety Code. D. Fire-Rated Doors: NFPA 80. matching trim for scribing and site cutting. E. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and SECTION 07 84 00 - FIRESTOPPING F. Hardware for Smoke and Draft Control Doors: Provide hardware that enables door assembly to comply with air 1. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after leakage requirements of the applicable code. installation G. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified 2. Firestopping: Any material meeting requirements 3. Fire Ratings: See Drawings for required systems and ratings. and indicated. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and 4. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material. interfaces required for proper operation; provide wiring between hardware and control components and to building 5. Remove incompatible materials that could adversely affect bond. power connection 6. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, 8. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and completely closing openings. properly installed, and dimensions are as instructed by the manufacturer. 7. Do not cover installed firestopping until inspected by authority having jurisdiction. 9. Verify that electric power is available to power operated devices and of the correct characteristics. 8. Install labeling required by code. 10. Install hardware in accordance with manufacturer's instructions and applicable codes. 9. Clean adjacent surfaces of firestopping materials. 11. Use templates provided by hardware item manufacturer. 10. Protect adjacent surfaces from damage by material installation. 12. Do not install surface mounted items until finishes applied to substrate are complete. 13. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80. SECTION 07 90 05 - JOINT SEALERS 14. Mounting heights for hardware from finished floor to center line of hardware item: 1. General Purpose Interior Sealant for interior wall and ceiling control joints, joints between door and window frames A. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel and wall surfaces, and other interior joints for which no other type or sealant is indicated: Acrylic emulsion latex; B. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush ASTM C834, Type OP, Grade NF single component, paintable. 2. Bathtub/Tile Sealant for joints between plumbing fixtures and floor and wall surfaces and joints between kitchen Doors." and bath countertops and wall surfaces.: White silicone; ASTM C920, Uses I, M and A; single component, mildew 15. Adjust work under provisions of Section 01 70 00. 16. Adjust hardware for smooth operation. 3. Acoustical Sealant bead between top stud runner and structure and between bottom stud track and floor: 17. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal. Permanently tacky non-hardening butyl sealant. Interior Floor Joint Sealant for use at expansion joints in floors: Polyurethane, self-leveling; ASTM C920, Grade P, SECTION 08 80 00 - GLAZING Class 25, Uses T, M and A; single component. 1. Single Vision Glazing: Fully tempered float glass, clear tint, ¼ inch thickness. 5. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content A. Applications: All interior glazing unless otherwise indicated. than required by South Coast Air Quality Management District Rule No.1168. 2. Fire-Rated Safety Glazing: Glass-ceramic safety glazing, ¼ inch thickness, fire rating as indicated on Drawings. A. Applications: Provide this type of glazing in the following locations: 6. Sealant colors to be selected by Architect from manufacturer's standard range. 7. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation. 3. Single Safety Glazing: Non-fire-rated, fully tempered float glass, clear tint, ¼ inch thickness. 8. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material A. Applications: Provide this type of glazing in the following locations: Glazed lights in doors, except fire doors. installation instructions. 9. Perform installation in accordance with ASTM C1193. b. Glazed sidelights to doors, except in fire-rated walls and partitions. 10. Perform acoustical sealant application work in accordance with ASTM C919. Other locations required by applicable federal, state, and local codes and regulations. 11. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond d. Other locations indicated on the drawings. area as recommended by manufacturer. 4. Float Glass: All glazing is to be float glass unless otherwise indicated. A. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select). 2. Install bond breaker where joint backing is not used. B. Heat-Strengthened and Fully Tempered Types: ASTM C1048. 13. Install sealant free of air pockets, foreign embedded matter, ridges, and sags. 14. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be 5. Glass-Ceramic Safety Glazing: UL- or WH-listed as fire-protection-rated glazing and complying with 16 CFR 1201 test requirements for Category II without the use of a surface-applied film. applied within these temperature ranges. 6. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; 15. Tool joints concave. 16. Protect sealants until cured. non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected. SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C864 Option I. Length of 0.1 inch for Steel Door and Frame Manufacturers: Assa Abloy, Steelcraft or equal, unless otherwise indicated on Drawings. each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit 2. Requirements for All Doors and Frames: Comply with ANSI/ICC A117.1, door top closures flush with top of faces glazing method and pane weight and area. and edges, beveled on both edges, smooth texture, factory primed for field finishing. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C864 Option I. Minimum 3 inch long x . Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. one half the height of the glazing stop x thickness to suit application, self adhesive on one face. 4. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to 9. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer other requirements specified in door grade standard. hardness; coiled on release paper; black color. 5. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), 10. Glazing Clips: Manufacturer's standard type. 11. Verify that openings for glazing are correctly sized and within tolerance. manufacturer's standard coating thickness. 12. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture 6. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; where two requirements conflict, comply movement, weeps are clear, and ready to receive glazing. 13. Prime surfaces scheduled to receive sealant. . Exterior Steel Doors: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless. All components 14. Install sealants in accordance with ASTM C1193 and FGMA Sealant Manual. hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's 15. Install sealant in accordance with manufacturer's instructions. INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE) standard coating thickness. 8. Interior Steel Doors, Non-Fire-Rated: ANSI A250.8 Level 1, physical performance Level C, Model 2, seamless, 1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line. 2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners. 1-3/4 inches thick. 9. Interior Steel Doors, Fire-Rated: ANSI A250.8 Level 2, physical performance Level B, Model 2, seamless. Fire 3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit. Rating as indicated on Door and Frame Schedule, tested in accordance with applicable code. Provide units listed 4. Place glazing tape on free perimeter of glazing in same manner described above. and labeled by UL. Attach fire rating label to each fire rated unit. 5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact. 10. Interior Steel Doors, Sound-Rated: ANSI A250.8 Level 2, physical performance Level B, Model 2, seamless. STC 6. Knife trim protruding tape. Rating of Entire Door, Frame, and Hardware Assembly as indicated on Drawings, calculated in accordance with INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND) ASTM E413, tested in accordance with ASTM E90 or ASTM E1408. 1. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch 11. Interior Door Frames: Fully welded type complying with the requirements of grade specified for corresponding centers, kept 1/4 inch below sight line. Locate and secure glazing pane using glazers' clips. 12. Frames for Wood Doors: Fully welded type complying with frame requirements specified in ANSI A250.8 for Level 3. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line. INSTALLATION - PLASTIC FILM 13. Frames for Sound-Rated Wood Doors: Fully welded type complying with frame requirements specified in ANSI Install plastic film with adhesive, applied in accordance with film manufacturer's instructions. Place without air bubbles, creases or visible distortion. A250.8 for Level 1, 16 gage 14. Exterior Door Frames: Face welded, seamless with joints filled. All components hot-dipped zinc-iron alloy-coated 3. Fit tight to glass perimeter with razor cut edge. (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness. **CLEANING AND PROTECTION** 15. Interior Door Frames, Fire-Rated: Fully welded type, fire rating same as door, labeled. 1. Remove glazing materials from finish surfaces. 16. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, unless Remove labels after Work is complete. otherwise indicated on Drawings. Clean glass and adjacent surfaces. 17. Removable Stops: Formed sheet steel, mitered corners. 4. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or 18. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, nd 2 reflective glass units. on head of pairs without center mullions. 19. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames. 20. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard. 21. Store in accordance with NAAMM HMMA 840. 22. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion. 23. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840. 24. In addition, install fire rated units in accordance with all applicable codes. 25. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner. 26. Adjust for smooth and balanced door movement. 27. Adjust sound control doors so that seals are fully engaged when door is closed. Test sound control doors for force to close, latch, and unlatch in accordance with ASTM E1408; adjust as required to comply.

SECTION 08 14 16 - FLUSH WOOD DOORS (CONTINUED)

SECTION 06 20 00 - FINISH CARPENTRY (CONTINUED)

SECTION 08 14 16 - FLUSH WOOD DOORS

tested in accordance with ASTM E1408.

plies and faces as indicated on Drawings.

indicated on Drawings

1. Wood Veneer Faced Door Manufacturers: Graham Wood Doors, Eggers Industries or equal, unless otherwise

3. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction. Provide solid core doors at all

5. Sound Retardant Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413,

8. Sound Retardant Doors: Equivalent to Type PC construction with core as required to achieve rating specified;

4. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with jurisdiction having authority; UL or

6. Non-Rated Solid Core and 20 Minute Rated Doors: Particleboard core, Type PC, plies and faces as indicated on

7. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated on Drawings; with core blocking as required

5-ply or 7-ply Wood Veneer Faced Doors, unless otherwise indicated on Drawings.

WH (ITS) labeled without any visible seals when door is open.

to provide adequate anchorage of hardware without through-bolting.

9. Wood Veneer Facing for Transparent Finish: As indicated on Drawings.

2. All Doors: Premium Grade Quality Level, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.

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SHEET SPECS

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G30′

19. Colors: As indicated on Drawings. In finished areas, finish pipes, ducts, conduit, and equipment the same color as

22. Paint for Wood, Transparent, Varnish, Stain: Filler coat (for open grained wood only). One coat of stain. One coat

27. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and cleanup materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

31. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the

20. Paint for Wood, Opaque: One coat of latex primer sealer. Two coats of latex enamel.

23. Paint for Concrete/Masonry, Opaque: One coat of block filler. Two coats of alkyd enamel.

24. Paint for Ferrous Metals, Unprimed: One coat of latex primer. Two coats of latex enamel.25. Paint for Ferrous Metals, Primed: Touch-up with latex primer. Two coats of latex enamel.26. Paint for Gypsum Board/Plaster: One coat of latex primer. Two coats of latex enamel.

the wall/ceiling they are mounted on/under.

sealer. One coat of varnish.

28. Patching Material: Latex filler.

29. Fastener Head Cover Material: Latex filler.

substrate under the project conditions.

21. Paint for Wood, Transparent, Varnish, No Stain: One coat sealer.

30. Clean surfaces thoroughly and correct defects prior to coating application.

18. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

mortar bed floor, and W244, thin-set over cementitious backer unit walls.

22. Do not permit traffic over finished floor surface for 4 days after installation.

19. Over interior concrete substrates, install in accordance with The Tile Council of North America Handbook Method

Handbook Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

20. At tiled shower receptors install in accordance with The Tile Council of North America Handbook Method B415,

21. Over gypsum wallboard on wood or metal studs install in accordance with The Tile Council of North America

F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

SECTION 09 90 00 - PAINTING AND COATING (CONTINUED) 32. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing. 33. Seal surfaces that might cause bleed through or staining of topcoat. 34. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry. 35. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry. 36. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair. 37. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of 38. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning). 39. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs. 40. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Reprime entire shop-primed item. 41. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation. 42. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner. 43. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer. 44. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint 45. Apply products in accordance with manufacturer's instructions. 46. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied. 47. Apply each coat to uniform appearance. 48. Sand wood and metal surfaces lightly between coats to achieve required finish. 49. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next 50. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface. 51. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing. SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES 1. Fire Extinguishers. Fire Extinguisher Cabinets and Accessories: Ansul. Inc. Pyro-Chem. or equal. 2. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent. Provide extinguishers labeled by UL for the purpose specified and indicated. 3. Extinguisher Brackets: Formed steel, galvanized and enamel finished. 4. Install in accordance with manufacturer's instructions. 5. Install cabinets plumb and level in wall openings, 54 inches from finished floor to inside bottom of cabinet. 6. Secure rigidly in place. 7. Place extinguishers and accessories in cabinets and on wall brackets. SECTION 11 31 00 - RESIDENTIAL APPLIANCES Verify utility rough-ins are present and correctly located. 2. Install in accordance with manufacturer's instructions. 3. Anchor built-in equipment in place. 4. Adjust operating equipment to efficient operation. 5. Remove packing materials from equipment. 6. Wash and clean equipment. SECTION 12 36 00 - COUNTERTOPS 1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. 2. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards. 3. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2. 4. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined. 5. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush. Join lengths of tops using best method recommended by manufacturer. 7. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or 8. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions. 9. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings. 10. Do not begin installation until substrates have been properly prepared. 11. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations. 12. Clean surfaces thoroughly prior to installation. 13. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions 14. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required. 15. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch. 16. Seal joint between back/end splashes and vertical surfaces. 17. Variation From Horizontal: 1/8 inch in 10 feet, maximum. 18. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum. 19. Field Joints: 1/8 inch wide, maximum. 20. Clean countertops surfaces thoroughly. 21. Protect installed products until completion of project. 22. Touch-up, repair or replace damaged products before Substantial Completion. SECTION 12 24 13 - ROLLER WINDOW SHADES 1. Provide product as indicated on drawings or approved equal by Architect. Product shall have a manual operation. 3. Mounting: Inside mount and top mount.

4. Configuration: Single Solar Shadecloth

9. Maximum Offset From Level: 1/8 inch.

10. Adjust window treatment for smooth operation.

5. Solar Shadecloth: 3% Openness. Color as indicated on drawings.

11. Clean shade and valance surfaces just prior to occupancy.

6. Hardware Finish: To be selected by architect from manufacturer's full range.

7. Install window treatment in accordance with manufacturer's instructions.

8. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.

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A-20/150/40635

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project number 2024-023

05.30.2024

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Lee's Summit, Missouri

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SHEET SPECS

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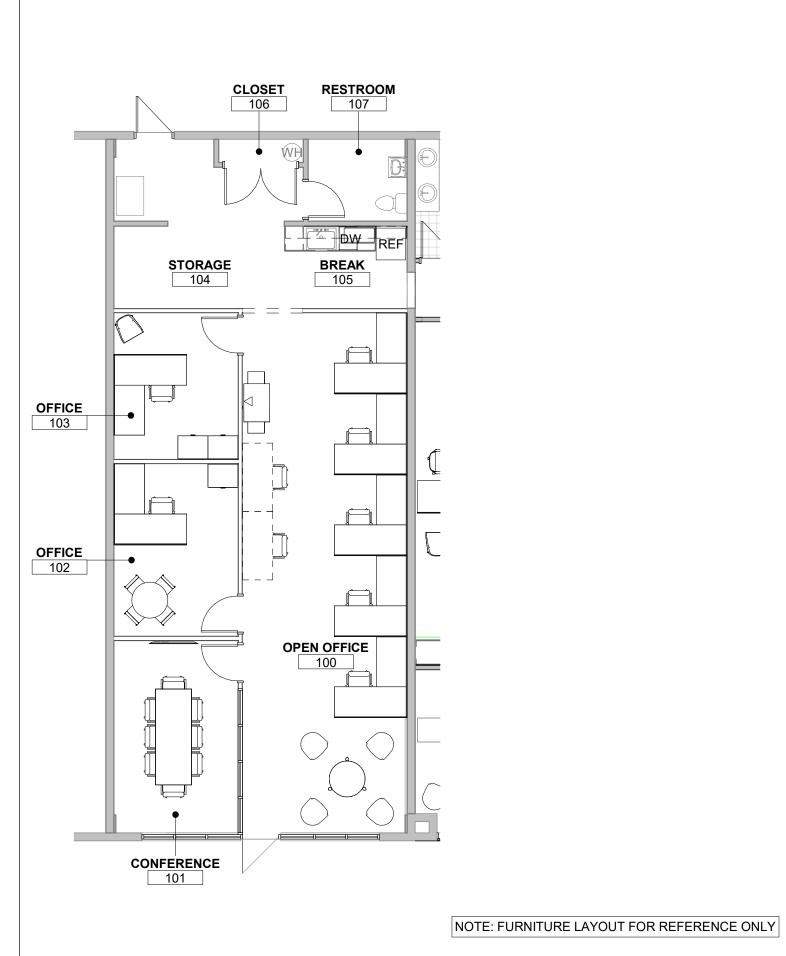
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CONSTRUCTION

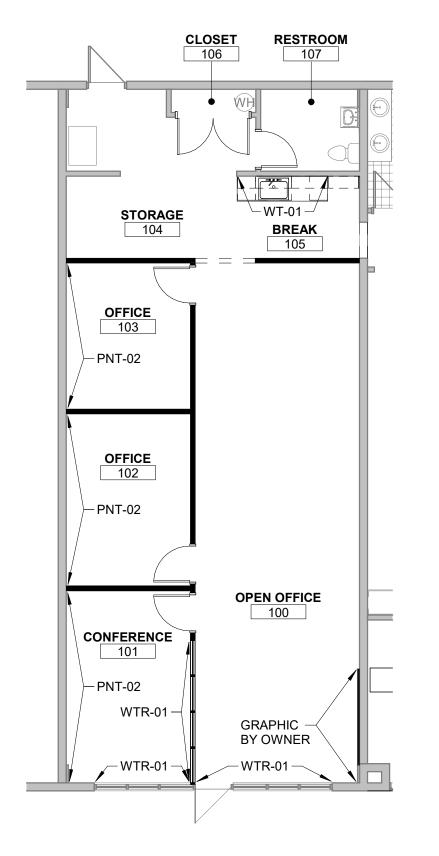
CONSTRUCTION

Lee's Summit, Missouri 07/03/2024

ROOM FINISH SCHEDULE												
		FLOORS		WALL FINISH					CASEWORK			
RM. NO.	ROOM NAME	FLOOR	WALL BASE	NORTH WALL	EAST WALL	SOUTH WALL	WEST WALL	CEILING FINISH	COUNTER TOP	BASE CABINET	UPPER CABINET	NOTES
100	OPEN OFFICE	SC-01	RWB-01	PNT-01	PNT-01	PNT-01	PNT-01	OTS, PNT-01				
101	CONFERENCE	SC-01	RWB-01	PNT-01	PNT-01	PNT-02	PNT-01	ACT-01				
102	OFFICE	SC-01	RWB-01	PNT-01	PNT-01	PNT-02	PNT-01	ACT-01				
103	OFFICE	SC-01	RWB-01	PNT-01	PNT-01	PNT-02	PNT-01	ACT-01				
104	STORAGE	SC-01	RWB-01	PNT-01	PNT-01	PNT-01	PNT-01	ACT-01				
105	BREAK	SC-01	RWB-01	PNT-01	PNT-01	PNT-01	PNT-01	ACT-01	SSM-01	CSW-01	CSW-01	
106	CLOSET	SC-01	RWB-01	PNT-01	PNT-01	PNT-01	PNT-01	ETR				
107	RESTROOM	SC-01	RWB-01	PNT-01	PNT-01	PNT-01	PNT-01	ACT-01				



1/8" = 1'-0"



- WHERE MULTIPLE FINISHES ARE LISTED IN ONE AREA OR ROOM ON THE FINISH SCHEDULE, REFER TO FINISH PLANS FOR CLARIFICATION.
- 2. ALL FINISHES SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURERS LATEST WRITTEN

KEYNOTE LEGEND

- INSTRUCTIONS.
- CONTRACTOR SHALL INDICATE ACCEPTANCE OF WALL AND FLOOR PREPARATION, AND FULL
- CONTRACTOR SHALL SUBMIT TO TENANT, FOR REVIEW AND APPROVAL, SAMPLES OR DRAW DOWNS OF FINISHES AND MATERIALS SPECIFIED IN "FINISH SCHEDULE".
- EXISTING SUB FLOOR SHALL BE FLASH-PATCHED AT ALL AREAS WHERE FLOOR IS NOT LEVEL OR
- TENANT THE PLACEMENT OF ALL ATTIC STOCK OF NEW FINISH MATERIALS, I.E.: CARPET, VINYL COMPOSITION TILE, VINYL BASE, ETC. FOR TENANT STORAGE.
- TILE MEETS PAINTED GYP. BD. WALL IN ALL VERTICAL AND/ OR HORIZONTAL CONDITIONS, UNLESS NOTED OTHERWISE.
- . HOLLOW METAL FRAMES SHALL RECEIVE PNT-03 PAINT WITH SEMI-GLOSS FINISH.

FINISH PLAN

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05/30/24

2024-023

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**FINISH PLAN FFE PLAN** 

1/8" = 1'-0"

**GENERAL NOTES - INTERIOR FINISHES:** 

SPECIFICATIONS AND INITIAL MAINTENANCE

NEW DRYWALL SURFACES SHALL RECEIVE (1) COAT OF PRIMER AND (2) FINISH COATS. . INSTALLATION OF NEW FINISHES BY THE

RESPONSIBILITY FOR COMPLETED WORK.

GENERAL CONTRACTOR SHALL VERIFY WITH . INSTALL METAL TRANSITION STRIP WHERE WALL

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DENSATE (STEAM) TRANSFER UNIT  DENSING UNIT  STANT VOLUME TERMINAL BOX  IWASER EXHAUST FAN  PER /N
DENSING UNIT STANT VOLUME TERMINAL BOX IWASER EXHAUST FAN PER //N
STANT VOLUME TERMINAL BOX IWASER EXHAUST FAN PER /N
IWASER EXHAUST FAN PER /N
PER /N H
/ <b>N</b> H
Н
<u>'</u>
CTRIC DUCT-MOUNTED HEATER
AUST FAN
AUST GRILLE
AUST REGISTER
CTRIC UNIT HEATER
AUST
DAMPER
COIL UNIT
CED-FLOW CABINET HEATER
FILTER UNIT
POWERED TERMINAL BOX  ONE DED MINISTE
LONS PER MINUTE
TING COIL
IDIFIER TING WATER DUMP
TING WATER PUMP
T EXCHANGER
HEN (GREASE HOOD) EXHAUST FAN
WATTS
AR SUPPLY DIFFUSER
ORIZED
NTED
NTED E-UP AIR FAN

OPG OR OPNG

OPENING

NOT ALL ABBREVIATIONS ON THIS LIST ARE NECESSARILY USED ON THIS PROJECT

# MECHANICAL ABBREVIATIONS CONT.

	(ALPHABETICAL BY ABBREVIATION)
ABBREVIATION	LONG FORM
PF	PRE-FILTER
PLNM	PLENUM
RA	RETURN AIR
RAF	RETURN AIR FAN
RAG OR RG	RETURN AIR GRILLE
RAR OR RR	RETURN AIR REGISTER
RAS	RETURN AIR SILENCER
RE:	IN REFERENCE TO
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SAF OR SF	SUPPLY AIR FAN
SAG OR SG	SUPPLY AIR GRILLE
SAR OR SR	SUPPLY AIR REGISTER
SAS	SUPPLY AIR SILENCER
SCHP	SECONDARY CHILLED WATER PUMP
SD	SMOKE DAMPER OR DETECTOR
SPCHP	SPECIAL PROCESS CHILLED WATER PUMP
TA	THROW AWAY (FILTER TYPE)
TDEF	TRUCK DOCK EXHAUST FAN
TEF	TOILET EXHAUST FAN
TRANS	TRANSITION OR TRANSFER
TYP	TYPICAL
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
VF	VENTILATION FAN
VFD	VARIABLE FREQUENCY DRIVE
VV	VARIABLE VOLUME TERMINAL BOX
W/	WITH

NOT ALL ABBREVIATIONS ON THIS LIST ARE NECESSARILY USED ON THIS PROJECT

TRANSFORMER

EXPANSION TANK

XFMR OR TFMR

# MECHANICAL GENERAL NOTES

- PRIOR TO SUBMITTING BID, VISIT THE SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW GENERAL NOTES, SPECIFICATIONS AND ALL OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- COORDINATE THE INSTALLATION OF MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. DUCTWORK AND PIPING SHALL BE ROUTED TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC.
- TAKE NECESSARY PRECAUTIONS TO AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION DURING WORK. REPAIR ANY DAMAGE CAUSED DURING CONSTRUCTION AT NO COST TO THE OWNER.
- 4. ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR UNLESS OTHERWISE NOTED.

  5. NEW MECHANICAL EQUIPMENT DUCTWORK AND PIPING IS SHOWN AT APPROXIMATE LOCATIONS.
- 5. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING IS SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND SHALL MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. FIELD VERIFY FINAL LOCATIONS TO INSTALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
- EQUIPMENT.

  6. REFER TO ARCHITECTURAL DRAWINGS FOR ALL RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. CHASE AND PENETRATIONS INTENDED FOR DUCTWORK AND PIPING SHALL BE
- VERIFIED WITH ARCHITECTURAL DRAWINGS PRIOR TO INSTALLATION.
  7. COORDINATE LOCATION OF ROOF PENETRATIONS WITH THE EXISTING CONDITIONS AND ARCHITECTURAL DRAWINGS.
- 8. SEAL ALL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS. FIREPROOF ALL PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
- COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL, AND DUCT INSTALLATION REQUIREMENTS.
   LOCATION OF CEILING DIFFUSERS, REGISTERS, AND GRILLES SHALL BE ADJUSTED AS REQUIRED TO ACCOMMODATE FINAL CEILING AND LIGHTING LOCATIONS.
- GAUGE SHEET METAL.

  12. PROVIDE FIRE AND/OR FIRE/SMOKE DAMPERS IN DUCTWORK AT CEILINGS AND WALLS AS REQUIRED BY BUILDING CODE AUTHORITY HAVING JURISDICTION. FIRE AND FIRE/SMOKE DAMPERS SHALL CONFORM TO NFPA AS APPLICABLE.

DUCTWORK CROSSING FIRE RATED WALL OR OTHER FIRE RATED ASSEMBLIES SHALL BE MINIMUM 26

- 13. PROVIDE WALL AND/OR DUCT ACCESS PANELS OR DOORS FOR ACCESS TO ALL FIRE AND/OR FIRE/SMOKE DAMPERS. ACCESS PANEL OR DOOR SHALL BE MINIMUM SIZE OF 6"x6" AND SHALL BE INSTALLED WITH 12" OF DAMPER. PROVIDE A REMOVABLE DUCT SECTION WHERE DUCT SIZE IS TOO SMALL FOR A 6"x6" ACCESS DOOR.
- 14. THERMOSTATS AND HUMIDISTATS SHALL BE LOCATED AND SET BY MECHANICAL CONTRACTOR AND WIRED IN CONDUIT BY ELECTRICAL CONTRACTOR. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. MOUNTING HEIGHTS SHALL BE 48" AFF TO MEET ADA REQUIREMENTS UNLESS OTHERWISE NOTED ON PLANS.
- OTHERWISE NOTED ON PLANS.

  15. COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH ANY WALL MOUNTED ITEMS INDICATED ON THE ARCHITECTURAL DRAWINGS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF ANY WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
- 16. ALL BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS, AND
  GRILLES SHALL HAVE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY. RECTANGULAR/ROUND BRANCH
  DUCT TAKEOFF FITTING WITH MANUAL BALANCING DAMPER AND LOCKING QUADRANT.
   17. BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE
- NOTED.

  18. RIGID DUCTWORK INSULATION: PROVIDE R-6 MINIMUM INSULATION WRAP ON ALL CONCEALED DUCTWORK. PROVIDE R-6 MINIMUM INTERNAL DUCT LINER ON ALL EXPOSED DUCTWORK. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE DIMENSIONS, SHEET METAL SIZES SHALL INCREASE ACCORDINGLY. PROVIDE R-12 MINIMUM INSULATION ON ALL DUCTWORK INSTALLED IN UNCONDITIONED
- SPACES. REFER TO SPECIFICATIONS FOR MORE INFORMATION.

  19. FLEXIBLE DUCT WORK SHALL BE THERMAFLEX TYPE MKE, FLEXMASTER TYPE 8M, OR APPROVED EQUAL SHALL BE LISTED UNDER 181 AS CLASS 1 AIR DUCT AND SHALL BE PROVIDED WITH INTEGRAL R-6 MINIMUM FIBERGLASS INSULATION. FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND
- SHALL BE INSTALLED AND SUPPORT TO AVOID SHARP BENDS AND SAGGING.

  20. WALL MOUNTED DIFFUSERS AND GRILLES SHALL BE PROVIDED WITH SUITABLE MOUNTING FRAME TO MATCH WALL CONSTRUCTION. COORDINATE WITH ARCHITECTURAL DRAWINGS.

DUCTWORK LEGEND (REFER TO SPECIFICATIONS SECTIONS 15815 AND 15820 FOR ADDITIONAL INFORMATION)								
SINGLE LINE	DESCRIPTION	DOUBLE LINE						
<del></del>	ROUND ELBOW DOWN							
<b>—</b>	ROUND ELBOW UP							
<del>-)</del>	OFFSET TO CHANGE ELEVATION (AT 30° WHEN POSSIBLE. ARROW SLOPES DN, U.N.O.)							
	ROUND RADIUS ELBOW							
	90° STRAIGHT TEE							
	90° CONICAL TEE							
	45° LATERAL TAP							
	45° LATERAL CONICAL TEE							
<b>—</b>	SIZE OR SHAPE TRANSITION							
<b>-</b> ₩₩	ROUND FLEXIBLE DUCT	8B						
	RECTANGULAR ELBOW DOWN	<b> </b>						
<b>─X</b>	RECTANGULAR ELBOW UP	<b>X</b>						
<del>]</del>	OFFSET TO CHANGE ELEVATION (AT 30° WHERE POSSIBLE. ARROW SLOPES DN., U.N.O.)							
	RECTANGULAR RADIUS ELBOW							
Γ	RECTANGULAR ELBOW WITH TURNING VANES	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \						
	SPLIT BRANCH TAKE-OFF WITH SQUARE ELBOW & SPLITTER DAMPER							
	SPLIT BRANCH TAKE-OFF WITH RADIUS ELBOW & SPLITTER DAMPER							
	SPLIT BRANCH TAKE-OFF TEE WITH STATIONARY SPLITTER DAMPER							
	BRANCH TAKE-OFF WITH 45° LEAD IN TAP							
	INSULATED/LINED DUCTWORK (U.N.O.)							
	SQUARE FACED CEILING DIFFUSER 4-WAY DIRECTIONAL THROW (U.N.O.)	<b>\</b> [[]						
<del>-</del>	ROUND FACED CEILING DIFFUSER	¥ (O)						
OR OR	CEILING RETURN OR EXHAUST AIR GRILLE OR REGISTER	<b>*</b>						
<u></u>	SIDEALL SUPPLY GRILLE OR REGISTER	<b>†</b>						
	SUPPLY DUCT RISER							
	RETURN, EXHAUST OR OUTSIDE AIR DUCT RISER							
+	MANUAL BALANCING DAMPER	<u> </u>						
+	AUTOMATIC (MOTOR-OPERATED) DAMPER							
+	FIRE DAMPER	<b>-</b> - <b>-</b> - <b>-</b>						
	GRAVITY BACKDRAFT DAMPER							
+	COMBINATION FIRE AND SMOKE DAMPER WITH SMOKE DETECTOR	<b></b>						
+	SMOKE DAMPER (AUTOMATIC) WITH SMOKE DETECTOR	<b>T</b> \ <b>T</b> \\						
<u>©</u>	DUCT MOUNTED SMOKE DETECTOR	S OR						

NOT ALL SYMBOLS ON THIS LIST ARE NECESSARILY USED ON THIS PROJECT

# STANDARD MECHANICAL SYMBOLS BOL DESCRIPTION GATE VALVE

SYMBOL	DESCRIPTION	
<u> </u>	GATE VALVE	
<del>    </del>	BALL VALVE	
_ <b>XX</b>	GLOBE VALVE	
<u>-+∰+</u> 	BUTTERFLY VALVE	
— <del> ■ </del> —	PLUG VALVE	
	ANGLE VALVE	
	CHECK VALVE	
	AUTOMATIC CONTROL VALVE (STRAIGHT THROUGH)	
<u> </u>	AUTOMATIC CONTROL VALVE (3-WAY)	
<b>*</b> —	AUTOMATIC CONTROL VALVE (ANGLE)	
<u> </u>	AUTOMATIC CONTROL VALVE (STRAIGHT THROUGH)	
	SOLENOID VALVE	
	PRESSURE REDUCING VALVE	
<u> </u>	PRESSURE RELIEF VALVE	
_ <del> _</del>	GAUGE COCK	
. <u>.</u> . ©	PRESSURE GAUGE WITH GAUGE COCK	
	THERMOMETER	
<u> </u>	THERMOMETER WELL	
<u> </u>	TEST PLUG	
<u> </u>	FLOW METER	
<u> </u>	TEMPERATURE SENSOR	
P	PRESSURE SENSOR	
DP -	DIFFERENTIAL PRESSURE SWITCH	
<u> </u>	IMMERSION THERMOSTAT	
	MANUAL AIR VENT	
<u>~</u>	AUTOMATIC AIR VENT	
<u>FS</u>	FLOW SWITCH	
	ORIFICE	
<del></del>	PIPE SLEEVE THRU WALL OR FLOOR	
<del></del>	EXPANSION JOINT	
<u>~</u>	FLEXIBLE PIPE JOINT	
<del>_=</del> _	PIPE GUIDE	
$\stackrel{\times}{\underline{\hspace{1cm}}}$	ANCHOR	
	STRAINER (Y-TYPE)	
<u> </u>	STRAINER (BASKET TYPE)	
	UNION	
<u> </u>	CONCENTRIC REDUCER	
<del></del>	ECCENTRIC REDUCER	
	DIRECTION OF FLOW	
	DIRECTION OF SLOPE	
<u> </u>	THERMOSTAT	
$\oplus$	HUMIDISTAT	
(FSC)	FAN SPEED CONTROLLER	
— cs —	CONDENSER WATER SUPPLY	
— CR —	CONDENSER WATER RETURN	

	OTHER SYMBOLS	
SYMBOL	DESCRIPTION	
•	INDICATES CONNECTION TO EXISTING DUCT OR PIPE	

# GENERAL EQUIPMENT DESIGNATION KEY:

AHU-R-2 SCHEDULE DESIGNATION NUMBER.



RELEASED FOR CONSTRUCTION As Noted on Plans Review

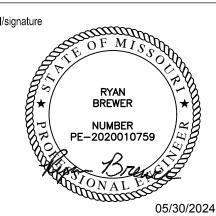
ENGINEERED BUILDING SOLUTIONS, LLC
P.O. BOX 11101
OVERLAND PARK, KS 66207
913-735-5654
MO Certificate of Authority #E-2021006522

JMMIT, MO 64081

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project number 2024-023

date 05.30.2024

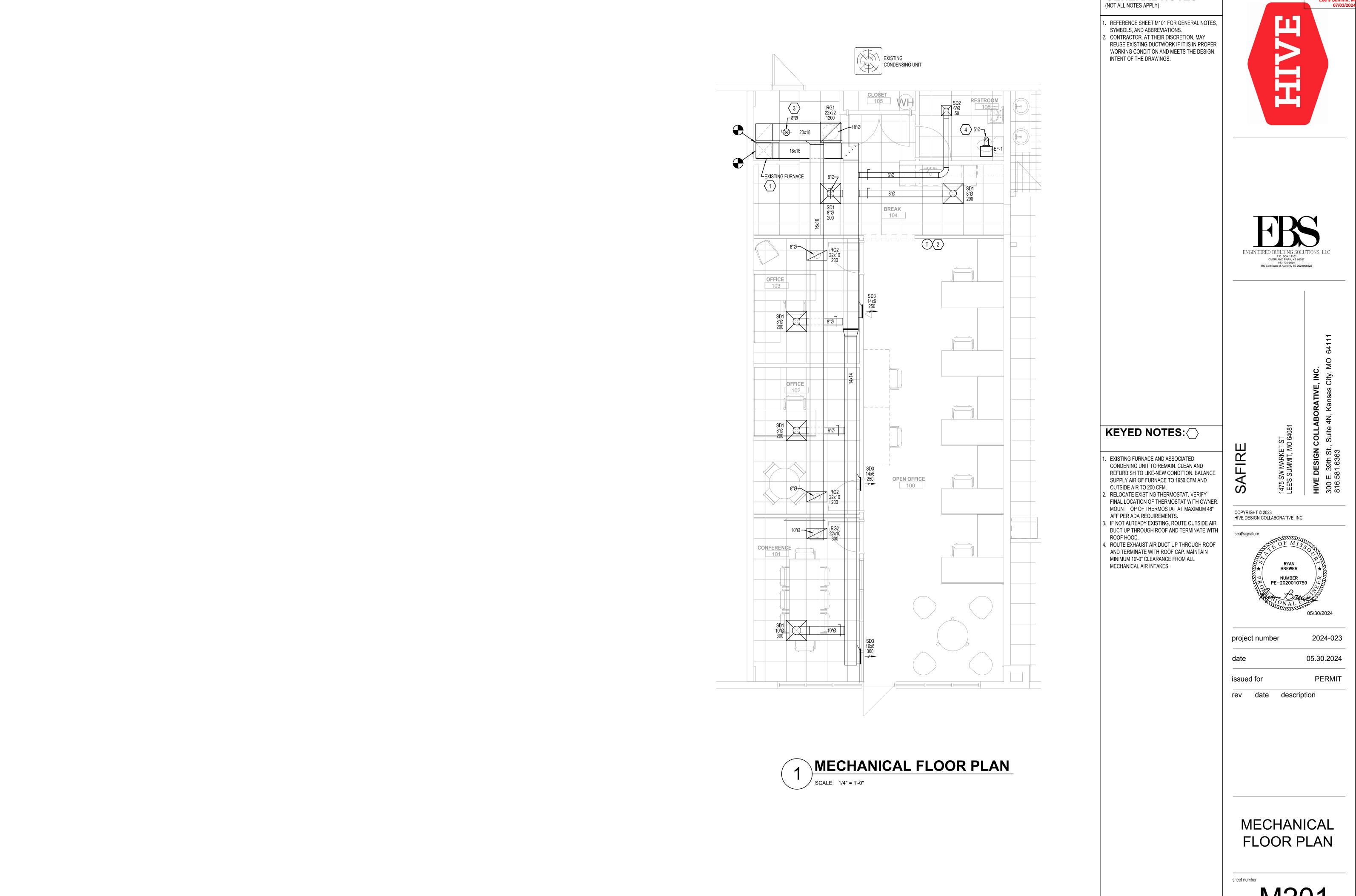
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rev date description

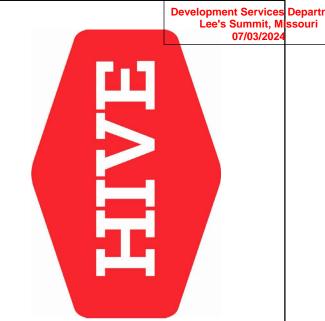
MECHANICAL NOTES, SYMBOLS, & ABBREVIATIONS

sheet num

M101



GENERAL NOTES
(NOT ALL NOTES APPLY)



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As Noted on Plans Review

M201

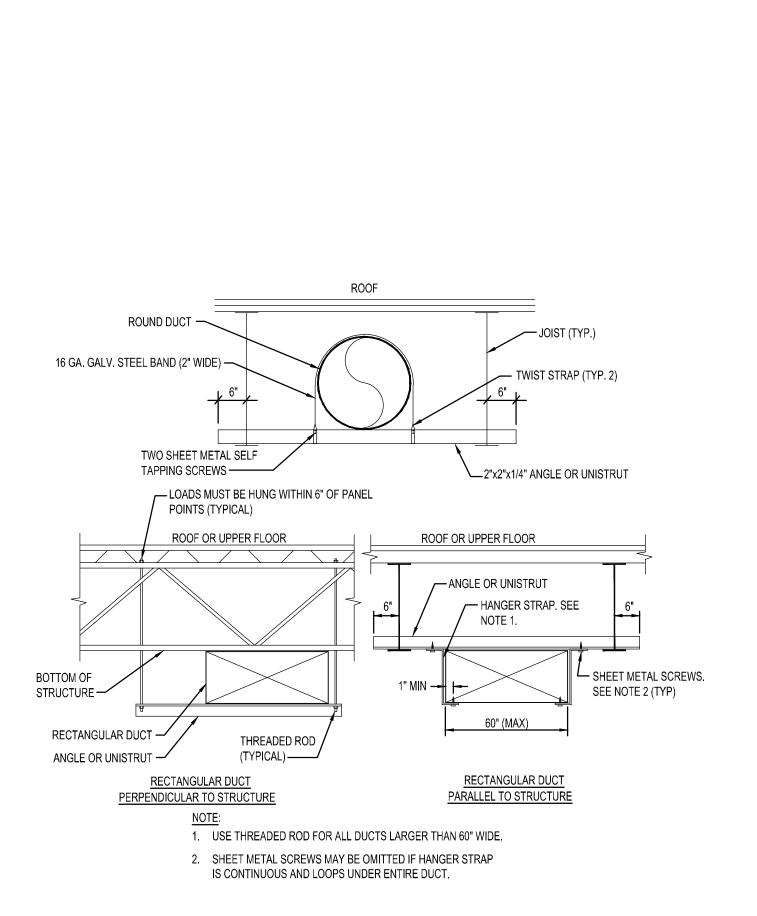
<b>(H</b> /	<b>AUST FA</b>	N SC	HEDU	JLE							
				VOLUME	ESP	FAN	DRIVE	MOTOR	ELECTRICAL	WEIGHT	
ARK	MANUFACTURER	MODEL	MOUNTING	(CFM)	(IN)	RPM	(BELT/DIRECT)	WATTS	VOLTS/PH	(LBS)	NOTE
<del>-</del> 1,2	GREENHECK	SP-B70	CEILING	70	0.25	660	DIRECT	15	120/1	15	1,2
	_								_		_

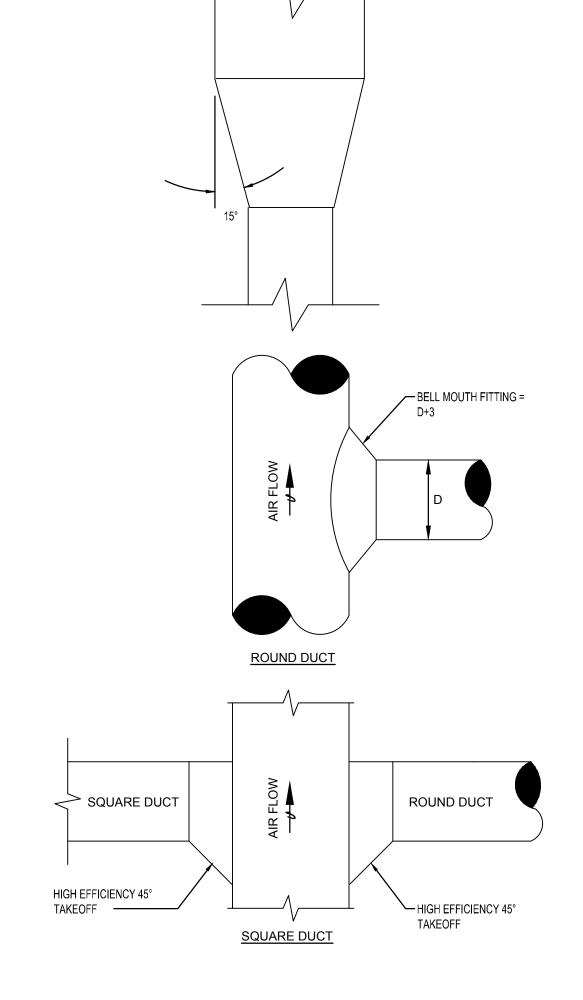
1 PROVIDE WITH BACK DRAFT DAMPER, SPEED CONTROLLER FOR BALANCING, AND DISCONNECT SWITCH. COORDINATE GRILLE FINISH WITH OWNER. 2 FAN SHALL BE INTERLOCKED WITH RESTROOM LIGHTS.

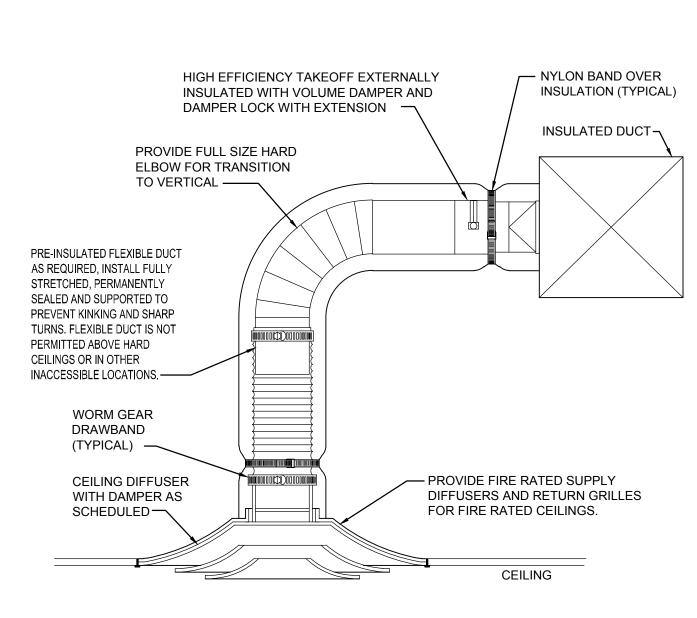
				VOLUME	ESP	FAN	DRIVE	MOTOR	ELECTRICAL	WEIGHT	
	MANUFACTURER	MODEL	MOUNTING	(CFM)	(IN)	RPM	(BELT/DIRECT)	WATTS	VOLTS/PH	(LBS)	NOTE
2	GREENHECK	SP-B70	CEILING	70	0.25	660	DIRECT	15	120/1	15	1,2
							_		_		

C	GRILL	.E, REGI	STER,	AND DIFFUSE	R SCH	EDULE	
				FACE	MOUNTING	FACE SIZE	
	MARK	MANUFACTURER	MODEL	TYPE	LOCATION	(IN)	NOTES
	SD1	PRICE	SCD	SQUARE CONE	CEILING	24"x24"	1,2,3,4,5,6
	SD2	PRICE	SCD	SQUARE CONE	CEILING	12"x12"	1,3,4,5,6
	SD3	PRICE	520D	LOUVERED	DUCT	NECK + 2"	1,3,4,5,6
	RG1	PRICE	80	EGGCRATE	CEILING	24"x24"	1,3,4,6
	RG2	PRICE	80	EGGCRATE	CEILING	24"x12"	1,3,4,6

- 1 NECK SIZE SHOWN ON DRAWINGS.
- 2 4-WAY THROW PATTERN, UNLESS SHOWN OTHERWISE ON DRAWINGS. 3 BAKED ENAMEL FINISH TO MATCH CEILING/WALL COLOR, COORDINATE WITH ARCHITECTURAL PLANS.
- 4 PROVIDE NECK FOR DUCT CONNECTION.
- 5 BRANCH DUCT SIZE SHALL BE SAME AS NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
- 6 FRAME TYPE TO MATCH CONSTRUCTION OF MOUNTING LOCATION, COORDINATE WITH ARCHITECTURAL PLANS.



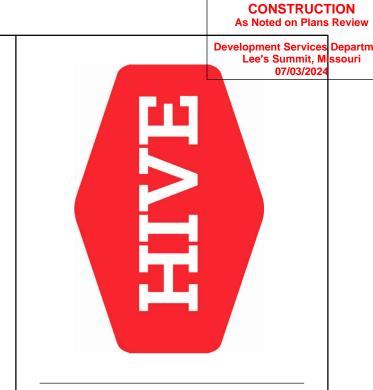












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2024-023

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MECHANICAL SCHEDULES & **DETAILS** 

project number

date

issued for

rev date description

M301

READ THE SPECIFICATIONS AND REVIEW DRAWINGS FOR ALL DIVISIONS OF WORK AND COORDINATE AND THE WORK OF SUBCONTRACTORS WITH ALL DIVISIONS OF WORK. PROVIDE SUBCONTRACTORS WITH A COMPLETE SET OF BID DOCUMENTS.

SCHEDULE THE COMPLETION AND INSPECTION OF WORK AND THE WORK OF SUBCONTRACTORS WORK TO COMPLY WITH THE SCHEDULE AND THE PROJECT

VISIT THE SITE PRIOR TO SUBMITTAL OF BID TO DETERMINE CONDITIONS AFFECTING THE WORK. ANY ITEMS WHICH ARE NOT COVERED IN THE BID DOCUMENTS OR ANY PROPOSED SUBSTITUTIONS SHALL BE LISTED SEPARATELY AND QUALIFIED IN THE BID. SUBMITTAL OF BID SHALL SERVE AS EVIDENCE OF KNOWLEDGE OF EXISTING CONDITIONS AND ANY MODIFICATIONS WHICH ARE REQUIRED TO MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS. FAILURE TO VISIT THE SITE DOES NOT RELIEVE RESPONSIBILITY IN PERFORMANCE OF WORK.

READ ALL RELEVANT DOCUMENTS, BECOME FAMILIAR WITH THE JOB, SCOPE OF WORK, TYPE OF GENERAL CONSTRUCTION, AND THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS. ALSO UNDERSTAND THE PURPOSE FOR WHICH THESE DOCUMENTS HAVE BEEN PREPARED AND BECOME COGNIZANT OF ALL THE HVAC, PLUMBING OR FIRE PROTECTION SYSTEMS. DETAILS INVOLVED. COORDINATE WORK WITH THAT OF OTHERS

#### DEFINITIONS:

FURNISH - PURCHASE AND DELIVER TO PROJECT SITE COMPLETE WITH EVERY NECESSARY INSTALL - UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT. PROVIDE - FURNISH AND INSTALL

#### GENERAL REQUIREMENTS

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION, INCIDENTALS AND DETAILS NECESSARY TO PROVIDE A COMPLETE MECHANICAL SYSTEM AS SHOWN ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS. ALL WORK NOT SPECIFICALLY NOTED AS BEING BY THE OTHERS SHALL BE PROVIDED. CLOSELY COORDINATE THE ENTIRE INSTALLATION WITH THE ARCHITECT-ENGINEER, AS REQUIRED.

THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO SUPPLEMENT EACH OTHER AND ANY MATERIAL OR LABOR CALLED FOR IN ONE SHALL BE FURNISHED AND INSTALLED EVEN THOUGH NOT SPECIFICALLY MENTIONED IN BOTH. ANY MATERIAL OR LABOR WHICH IS NEITHER SHOWN ON THE DRAWINGS NOR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH IS OBVIOUSLY NECESSARY TO COMPLETE THE WORK, AND WHICH IS USUALLY INCLUDED IN WORK OF SIMILAR CHARACTER, SHALL BE FURNISHED AND INSTALLED AS PART OF

WHERE THE DRAWINGS OR SPECIFICATIONS CALL FOR ITEMS WHICH EXCEED CODES OR THE OWNERS CRITERIA, PROVIDE THE SYSTEM WITH THE MORE STRINGENT REQUIREMENTS AS DESIGNED AND DESCRIBED ON THESE DRAWINGS, UNLESS SPECIFICALLY NOTED OTHERWISE.

ALL MECHANICAL WORK SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATING, SERVICING, MAINTAINING, AND REPAIRING. THIS CONTRACTOR IS RESPONSIBLE FOR PROVIDING SUFFICIENT SERVICE ACCESS TO ALL EQUIPMENT.

ALL WORK SHALL BE PERFORMED IN A NEAT PROFESSIONAL MANNER USING GOOD ENGINEERING PRACTICES.

UNLESS SPECIFICALLY NOTED OTHERWISE, MATERIALS, PRODUCTS, AND EQUIPMENT. INCLUDING ALL COMPONENTS THEREOF, SHALL BE NEW, UNDERWRITERS LABORATORIES LISTED AND LABELED AND SIZED IN CONFORMITY WITH REQUIREMENTS OF STATE AND LOCAL CODES, WHICHEVER IS MORE STRINGEN

ALL WORK SHALL CONFORM TO THE OWNER'S CRITERIA, THE STATE'S, COUNTY'S, CITY'S AND LOCAL CODES AND ORDINANCES, SAFETY AND HEALTH CODES, NFPA CODES, ENERGY CODES AND ALL OTHER APPLICABLE CODES AND REQUIREMENTS. INQUIRE INTO AND COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, AND REGULATIONS. INCLUDE ANY CHANGES REQUIRED BY CODES IN THE BID AND IF THESE CHANGES ARE NOT INCLUDED IN THE BID, THEY MUST BE QUALIFIED AS A SEPARATE LINE ITEM IN THE BID. AFTER CONTRACT IS ISSUED. NO ADDITIONAL COST DUE TO CODE ISSUES SHALL BE REIMBURSED BY THE OWNER.

### LICENSES, PERMITS, COMMISSIONING, INSPECTIONS & FEES

OBTAIN AND PAY FOR ALL LICENSES. PERMITS. COMMISSIONING. INSPECTIONS, AND FEES REQUIRED OR RELATED TO THIS WORK.

PROVIDE TO THE OWNER-ARCHITECT A COMMISSIONING PLAN, PRELIMINARY COMMISSIONING REPORT. FINAL COMMISSIONING REPORT. AND CERTIFICATES OF INSPECTION AND FINAL INSPECTION APPROVAL AT COMPLETION OF PROJECT.

### TRADE NAMES, MANUFACTURERS AND SHOP DRAWINGS

WHERE TRADE NAMES AND MANUFACTURERS ARE USED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE EXACT EQUIPMENT SHALL BE USED AS A MINIMUM FOR THE BASE BID. MANUFACTURERS CONSIDERED AS AN EQUAL OR BETTER IN ALL ASPECTS TO THAT SPECIFIED WILL BE SUBJECT TO APPROVAL IN WRITING BY ARCHITECT-ENGINEER PRIOR TO BID THROUGH SHOP DRAWING SUBMITTAL PROCESS, FOR ACCEPTANCE PRIOR TO INSTALLATION. ANY CHANGES TO ELECTRICAL SERVICE, STRUCTURAL FRAMING, ETC. OR ANY OTHER MODIFICATION THAT IS REQUIRED BY THE USE OF ALTERNATE EQUIPMENT SHALL BE COORDINATED WITH OTHER TRADES AND SHALL INCLUDE ALL COSTS IN BID FOR THE REQUIRED CHANGES. THE USE THE USE OF ANY UNAUTHORIZED EQUIPMENT SHALL BE SUBJECT TO REMOVAL AND REPLACEMENT AT NO EXPENSE TO THE OWNER.

GUARANTEE ALL MATERIALS AND WORK PROVIDED UNDER THIS CONTRACT AND MAKE GOOD, REPAIR OR REPLACE AT NO EXPENSE TO THE OWNER, ANY DEFECTIVE WORK, MATERIAL, OR EQUIPMENT WHICH MAY BE DISCOVERED WITHIN A PERIOD OF TWELVE (12) MONTHS FROM THE DATE OF ACCEPTANCE (IN WRITING) OF THE INSTALLATION. EXTENDED WARRANTIES ARE AS SPECIFIED WITH INDIVIDUAL EQUIPMENT.

### QUALITY ASSURANCE

INDUSTRY STANDARDS AND CODES: UNLESS MODIFIED BY THESE SPECIFICATIONS, THE DESIGN, MANUFACTURER, TESTING AND METHOD OF INSTALLING ALL MATERIALS, APPARATUS AND EQUIPMENT SHALL CONFORM TO THE FOLLOWING:

- 1. ARI CODE FOR REFRIGERATION APPARATUS
- 2. ANSI B9.1 SAFETY CODE FOR MECHANICAL REFRIGERATION 3. STANDARDS OF NATIONAL FIRE PROTECTION ASSOCIATION
- SMACNA 5. ASHRAE

### RECORD DRAWINGS

MAINTAIN ONE COPY OF DRAWINGS ON THE JOB SITE TO RECORD DEVIATIONS FROM CONTRACT DRAWINGS, SUCH AS: LOCATION OF CONCEALED PIPING VALVES AND DUCTS, REVISIONS, ADDENDUMS, AND CHANGE ORDERS, AND SIGNIFICANT DEVIATIONS MADE

NECESSARY BY FIELD CONDITIONS, APPROVED EQUIPMENT SUBSTITUTIONS, AND CONTRACTOR'S COORDINATION WITH OTHER TRADES.

AT COMPLETION OF THE PROJECT AND BEFORE FINAL APPROVAL, MAKE ANY FINAL CORRECTIONS TO DRAWINGS AND CERTIFY THE ACCURACY OF EACH PRINT BY SIGNATURE

THE REVIEW OF SUBMITTALS DOES NOT RELIEVE RESPONSIBILITY OF SHOP DRAWING THEREON. A SET OF REPRODUCIBLE DRAWINGS ALONG WITH ONE SET OF BLULINES OF THE MOST RECENT SET OF DRAWINGS WITH TEMPERATURE CONTROL DRAWINGS INCLUDED SHALL BE DELIVERED TO THE ARCHITECT UPON COMPLETION OF THE WORK AND JOB CONDITIONS AS THEY EXIST. PRIOR TO FINAL ACCEPTANCE OF THE PROJECT.

#### DISCREPANCIES IN DOCUMENTS

GENERAL LOCATION AND INTENT OF THE MECHANICAL SYSTEMS. WHERE DRAWINGS. EXISTING SITE CONDITIONS, SPECIFICATIONS OR OTHER TRADES CONFLICT OR ARE UNCLEAR, ADVISE THE ARCHITECT-ENGINEER IN WRITING, OF VARIATIONS TO CONTRACT DOCUMENTS PRIOR TO SUBMISSION OF BID. OTHERWISE, ARCHITECT-ENGINEER'S INTERPRETATION OF CONTRACT DOCUMENTS OR CONDITIONS SHALL BE FINAL WITH NO ADDITIONAL COMPENSATION PERMITTED.

INCLUDE IN BID ALL NECESSARY SERVICE REQUIRED TO KEEP THE OPERATING PHASE OF THE PROJECT'S HVAC, PLUMBING AND SPRINKLER SERVICE IN OPERATION. IF APPLICABLE, SCHEDULE IN WRITING WITH ARCHITECT ONE WEEK PRIOR TO ANY SHUT DOWN OF THE

COORDINATE THE DEMOLITION OF EXISTING WORK AND THE DEMOLITION PROVIDED BY OTHER. COORDINATE ANY EXISTING EQUIPMENT REQUIRED TO BE LEFT INTACT.

VERIFY SCOPE OF AND THE REMOVAL OF ALL EXISTING FIRE PROTECTION, PLUMBING FIXTURES, PIPING, HVAC UNITS, REFRIGERANT RECAPTURE, EXHAUST FANS, ETC. AND ASSOCIATED ROOF CURBS NOT TO BE REUSED ON THIS PROJECT, UNLESS SPECIFICALLY NOTED OTHERWISE. VERIFY ALL PRESUMED ABANDONED EQUIPMENT, PIPES, DUCTWORK, AND EQUIPMENT PRIOR TO REMOVAL. ROOF CURBS SHALL BE REMOVED AND THE ROOF PATCHED. ALL EXTRANEOUS ITEMS IN THE SPACE OR ON THE ROOF NOT APPLICABLE TO THE NEW WORK MUST BE REMOVED AND ROOF/WALL/FLOOR PATCHED/REPAIRED TO MATCH EXISTING STRUCTURE. EXISTING ABANDONED PIPES, DUCTS, OR EQUIPMENT IN THE FLOOR, EMBEDDED IN CONCRETE, OR OTHERWISE INACCESSIBLE ARE TO BE CUT OFF AND SEALED BELOW OR WITHIN FLOOR OR WALL LEVEL WHEN THEY ARE NOT TO BE REUSED IN THIS PROJECT. ABANDONED PIPING AND/OR DUCTWORK MUST BE REMOVED TO POINT OF ORIGIN. CONFIRM THE EXTENT OF DEMOLITION PRIOR TO BID AND INCLUDE IN

#### CUTTING AND PATCHING

PERFORM ALL CUTTING AND PATCHING AS REQUIRED FOR THE INSTALLATION OF THE WORK UNDER THIS SPECIFICATION. NO CUTTING OF THE STRUCTURE SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER OR ARCHITECT.

PATCHING SHALL BE OF THE SAME WORKMANSHIP, MATERIAL AND FINISH AND SHALL MATCH ACCURATELY ALL SURROUNDING CONSTRUCTION IN A MANNER SATISFACTORY TO

EXISTING UTILITIES, ETC. THAT ARE DAMAGED DURING THE CONSTRUCTION PERIOD, WHETHER OR NOT DUE TO NEGLIGENCE SHALL BE REPAIRED OR REPLACED AND LEFT IN A CONDITION SUITABLE TO THE ARCHITECT.

PROVIDE SLEEVES TO PROTECT EQUIPMENT OR FACILITIES IN THE INSTALLATION. EACH SLEEVE SHALL EXTEND THROUGH ITS RESPECTIVE FLOOR, WALL OR PARTITION AND SHALL BE CUT FLUSH WITH EACH SURFACE EXCEPT SLEEVES THAT PENETRATE THE FLOOR, WHICH SHALL EXTEND 2" ABOVE THE FLOOR. COORDINATE THROUGH THE ARCHITECT ANY CORE DRILLING OR CUTTING OF OPENINGS IN MASONRY FLOORS OR WALLS.

ALL SLEEVES AND OPENINGS THROUGH FIRE RATED WALLS AND/OR FLOORS SHALL BE FIRE SEALED WITH CALCIUM SILICATE, SILICONE "RTV" FOAM, "3M" FIRE RATED SEALANTS OR EQUAL, SO AS TO RETAIN THEIR FIRE RATING.

SLEEVES IN BEARING AND MASONRY WALLS, FLOORS, AND PARTITIONS SHALL BE STANDARD WEIGHT STEEL PIPE FINISHED WITH SMOOTH EDGES. FOR OTHER THAN MASONRY PARTITIONS, THROUGH SUSPENDED CEILINGS, OR FOR CONCEALED VERTICAL PIPING. SLEEVES SHALL BE NO. 22 U.S.G. GALVANIZED STEEL MINIMUM.

HANGERS SHALL INCLUDE ALL MISCELLANEOUS STEEL SUCH AS ANGLE IRON, BANDS, C-CLAMPS WITH RETAINING CLIPS, CHANNELS, HANGER RODS, ETC., NECESSARY FOR THE INSTALLATION OF WORK.

HANGERS SHALL BE FASTENED TO BUILDING STEEL, CONCRETE, OR MASONRY, BUT NOT TO PIPING. HANGING FROM METAL DECK IS NOT PERMITTED. HANGERS MUST BE ATTACHED TO UPPER CHORD OF BAR JOIST. WHERE INTERFERENCES OCCUR, AND IN ORDER TO SUPPORT DUCTWORK OR PIPING. INSTALL TRAPEZE TYPE HANGERS OR SUPPORTS WHICH SHALL BE LOCATED WHERE THEY DO NOT INTERFERE WITH ACCESS TO FIRE DAMPERS, VALVES, AND OTHER EQUIPMENT, HANGER TYPES AND INSTALLATION METHODS ARE ALSO SUBJECT TO LANDLORD CRITERIA.

HANGERS FOR ALL INSULATED PIPING SHALL BE SIZED AND INSTALLED FOR THE OUTER DIAMETER OF INSULATION. INSTALL 6" LONG SPLIT CIRCLE GALVANIZED SADDLE BETWEEN THE HANGER AND THE PIPE INSULATION.

HANGERS AND PIPING OF DISSIMILAR METALS SHALL BE DI-ELECTRICALLY SEPARATED.

PROVIDE SWAY AND SEISMIC BRACING WHERE REQUIRED BY CODE.

PROTECT MATERIALS, APPARATUS AND EQUIPMENT FROM DAMAGE, MOISTURE, DIRT. DEBRIS AND WORK OF OTHER TRADES.

### OPERATION MANUALS AND INSTRUCTIONS

PROVIDE OPERATING AND MAINTENANCE INSTRUCTIONS AT THE COMPLETION OF THE PROJECT. SUBMIT THREE HARD BOUND COPIES TO ARCHITECT.

SCHEDULE A MEETING WITH THE OWNER'S REPRESENTATIVE AT THE SITE TO PROVIDE DETAILED INFORMATION ON THE OPERATING AND MAINTENANCE OF EQUIPMENT.

SUBMIT WITHIN THIRTY (30) DAYS AFTER THE DATE OF NOTICE TO PROCEED AND BEFORE PURCHASING ANY MATERIALS OR EQUIPMENT, SUBMIT TO THE ARCHITECT FOR REVIEW, A COMPLETE LIST, IN SIX (6) COPIES, OF ALL MATERIALS INCORPORATED IN THE WORK. THIS LISTING SHALL BE ARRANGED BY THE ORDER OF OCCURRENCE IN THE SPECIFICATIONS, FOLLOWED BY THE ITEMS ON THE DRAWING NOT SPECIFICALLY INCLUDED IN THE SPECIFICATIONS.

AFTER THE LIST HAS BEEN PROCESSED BY THE ARCHITECT, SUBMIT COMPLETE SHOP DRAWINGS AND PRODUCT DATA OF ALL EQUIPMENT. THESE SUBMITTALS SHALL BE SUBMITTED WITHIN THIRTY (30) DAYS AFTER THE PROCESSING DATE OF THE ORIGINAL SUBMITTAL LIST. SUBMISSIONS SHALL BE MADE EARLY ENOUGH IN PROJECT TO ALLOW FOR (10) WORKING DAYS FOR REVIEW BY ARCHITECT-ENGINEER WITHOUT CAUSING DELAYS OR CONFLICTS IN THE PROJECT'S PROGRESS.

ALL SUBMITTALS SHALL BE COMPLETE AND SHALL BE IN THREE-RING, LOOSE -LEAF BINDERS, NO CONSIDERATION WILL BE GIVEN TO PARTIAL SUBMITTALS, UNLESS NOTED OTHERWISE BY ARCHITECT. EACH ITEM SHALL HAVE A COVER PAGE STATING PROJECT SPECIFICATION AND PARAGRAPH REFERENCE NUMBER, OR DRAWING REFERENCE NUMBER, AND SCHEDULED EQUIPMENT IDENTIFICATION NUMBER, IF APPLICABLE.

ERRORS IN DETAILS, SIZES, QUANTITIES, WIRING DIAGRAM ARRANGEMENTS AND DIMENSIONS WHICH DEVIATE FROM THE SPECIFICATIONS, CONTRACT DRAWINGS AND/OR

IF APPARATUS OR MATERIALS ARE SUBSTITUTED FOR THOSE SPECIFIED UNDER THIS SECTION, AND SUCH SUBSTITUTIONS NECESSITATE CHANGES IN OR ADDITIONAL CONNECTIONS, PIPING SUPPORTS OR CONSTRUCTIONS, SAME SHALL BE PROVIDE AT NO DRAWINGS (PLANS, SPECIFICATIONS, AND DETAILS) ARE DIAGRAMMATIC AND INDICATE THE ADDITIONAL COST TO THE OWNER. ASSUME COST AND ENTIRE RESPONSIBILITY THEREOF. ARCHITECT'S PERMISSION TO MAKE SUCH SUBSTITUTION SHALL NOT RELIEVE FULL RESPONSIBILITY FOR WORK.

> TEST AND BALANCE REPORT: SUBMIT AT FINAL INSPECTION OPERATION AND MAINTENANCE MANUALS: SUBMIT COPIES IN COMPLIANCE WITH SECTION, OPERATION AND MAINTENANCE MANUALS.

### 15400 - HEATING VENTILATION AND & AIR CONDITIONING

ALL MATERIALS AND EQUIPMENT SHALL BE NEW. SYSTEMS SHALL FUNCTION CORRECTLY AS A WHOLE, AND IN ALL ITS PARTS, UP TO THE SPECIFIED CAPACITY. SYSTEMS OR DEVICES FAILING TO MEET PERFORMANCE REQUIREMENTS SHALL BE REPLACED, ALTEREI OR REPAIRED AS REQUIRED TO BRING PERFORMANCE UP TO SPECIFIED REQUIREMENTS. WORK DAMAGED OR MARRED BY SUCH REPLACEMENTS, ALTERATIONS, OR REPAIRS SHALL BE RESTORED TO PRIOR CONDITIONS, AT NO ADDITIONAL COST TO THE OWNER. WHERE MULTIPLE ITEMS OF EQUIPMENT OR MATERIALS ARE REQUIRED. THEY SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER. BEFORE ORDERING EQUIPMENT, THE PHYSICAL DIMENSIONS SHALL BE CHECKED TO VERIFY FIT IN SPACES ALLOTTED ON THE DRAWINGS. INSERTS, PIPE SLEEVES, AND SUPPORTS OF AIR CONDITIONING EQUIPMENT SHALL BE PROVIDED AS SPECIFIED. WHERE SUCH ITEMS ARE TO BE SET OR EMBEDDED IN CONCRETE, MASONRY OR SIMILAR WORK, THE ITEMS SHALL BE FURNISHED AT THE PROPER TIME FOR SETTING OR EMBEDMENT SO AS TO CAUSE NO DELAY, DUCTWORK AND EQUIPMENT ASSEMBLIES SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. ADDITIONAL DUCTWORK AND APPURTENANCES REQUIRED FOR PROPER OPERATION OF EQUIPMENT SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST.

#### NUFACTURER'S NAMES AND CATALOG NUMBERS

SPECIFIC REFERENCES HAVE BEEN MADE TO ONE OR MORE MANUFACTURER'S NAMES AND HVAC/HYDRONIC PIPING MODEL OR CATALOG NUMBERS. THIS DOES NOT INDICATE THAT THE MATERIAL AND EQUIPMENT SPECIFIED IS NECESSARILY AN "OFF THE SHELF" ITEM; REQUIREMENTS FOR SPECIFIC FINISHES, MATERIALS OR OTHER MODIFICATIONS MAY INTRODUCE VARIANCES FROM MANUFACTURER'S STANDARDS. ASCERTAIN THAT SUCH MODIFICATIONS ARE FULLY CONSIDERED.

EACH MAJOR COMPONENT OF EQUIPMENT SHALL HAVE THE MANUFACTURER'S NAME, ADDRESS AND CATALOG NUMBER ON A PLATE SECURELY AFFIXED IN A CONSPICUOUS PLACE. THE NAMEPLATE OF A DISTRIBUTING AGENT WILL NOT BE ACCEPTED. ALL PIECES OF EQUIPMENT, VALVES, STARTERS, DISCONNECTS, AND ALL PNEUMATIC AND ELECTRIC CONTROL INSTRUMENTS AND APPARATUS SHALL BE IDENTIFIED WITH 1/16" THICK BLACK LAMINATED PLASTIC NAMEPLATES, WITH 3/16" HIGH WHITE LAMINATED LETTERS. SIMILAR AND LIKE EQUIPMENT SHALL BE DESIGNATED WITH NUMERICAL SUFFIX (EXAMPLE: THERMOSTAT, T-1). THE NAMEPLATE IDENTIFICATIONS SHALL COINCIDE WITH ITEMS APPEARING ON DIAGRAMS. PROVIDE A LABEL FOR THE MECHANICAL SYSTEM STATING: (NAME, ADDRESS AND PHONE NUMBER OF CONTRACTOR). LETTERS SHALL BE 1/4" HIGH AND LOCATED IN A CONSPICUOUS PLACE NEAR THE HVAC EQUIPMENT.

THE WORK SHALL BE PERFORMED BY QUALIFIED MECHANICS. ALL MATERIALS, APPARATUS AND EQUIPMENT SHALL BE INSTALLED IN NEAT, WORKMANLIKE MANNER. MATERIALS, DEVICES OR EQUIPMENT WHICH, IN THE OPINION OF THE ARCHITECT-ENGINEER, IS IMPROPERLY INSTALLED SHALL BE REMOVED AND REINSTALLED IN AN APPROVED MANNER AT NO ADDITIONAL COST TO THE OWNER. THE WORK SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES. WHERE THE WORK IS DEPENDENT UPON WORK OF OTHER TRADES OR WORK ALREADY IN PLACE, SUCH OTHER WORK AND WORK IN PLACE SHALL BE EXAMINED AND SHALL BE IN PROPER CONDITION AND STATE OF COMPLETION BEFORE CONTINUING THE INSTALLATION. THE INSTALLATION OF WORK SHALL, IN GENERAL, BE AS HIGH AS POSSIBLE AND LOCATED IN ACCORDANCE WITH THE DRAWINGS. DUCTWORK INDICATED SHALL BE FOLLOWED AS ACCURATELY AS POSSIBLE. ANY NECESSARY DEVIATIONS SHALL BE CALLED TO THE ATTENTION OF THE ARCHITECT-ENGINEER. PROVIDE DRAWINGS SHOWING PROPOSED CHANGES. APPROVAL IS REQUIRED BEFORE CHANGES SHALL TAKE EFFECT.

### **CUTTING AND PATCHING**

LAYOUT OPENINGS FOR CUTTING BY OTHER TRADES AS REQUIRED. CUTTING OF STEEL. CONCRETE OR ANY OTHER STRUCTURAL PART MUST BE APPROVED IN WRITING BY ARCHITECT-ENGINEER PRIOR TO CUTTING.

DO NOT CUT OR PENETRATE WATERPROOFED SURFACES, OR WATERPROOFING MEMBRANES, WITHOUT FIRST MAKING ARRANGEMENTS FOR REPAIR BY A METHOD APPROVED BY ARCHITECT-ENGINEER.

PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.

# POWER WIRING FROM PANELS TO MOTOR CONTROLLERS AND FROM CONTROLLERS TO MOTORS IS SPECIFIED IN DIVISION 16. MOTOR STARTERS NOT SPECIFIED TO BE

FURNISHED WITH THE MOTORS FROM THE FACTORY ARE SPECIFIED IN DIVISION 16. SUBMIT WIRING DIAGRAMS FOR APPROVAL AND FURNISH APPROVED DIAGRAMS TO THE ELECTRICAL CONTRACTOR FOR COORDINATION. ELECTRICAL CONTROL WIRING FOR CONNECTION OF TEMPERATURE CONTROLLERS, PUSH BUTTONS, INTERLOCKS IN MOTOR CONTROLLERS, AND LIKE ITEMS IS SPECIFIED IN THE CONTROL SECTION(S) IN THIS DIVISION. FURNISH ALL EQUIPMENT WITH COMPLETE INTERNAL CONTROL WIRING. ELECTRICAL WORK SPECIFIED IN THIS DIVISION SHALL CONFORM TO APPLICABLE PROVISIONS OF DIVISION 16. ALL CONTROL WIRING SHALL BE IN CONDUIT. PROVIDE MOTORS CONFORMING TO CHARACTERISTICS SHOWN ON ELECTRICAL DRAWINGS.

### ACCESS DOORS (ACCESS PANELS)

PROVIDE ACCESS REQUIRED FOR MAINTENANCE, ADJUSTMENT, REMOVAL AND REPAIR OF VALVES, CONTROLS, DAMPERS, EQUIPMENT AND LIKE ITEMS. PROVIDE ACCESS DOORS (ACCESS PANELS) CONFORMING TO REQUIREMENTS OF DIVISION 8 SPECIFICATIONS. PANELS SHALL BE LOCATED TO MAKE ALL ITEMS EASILY ACCESSIBLE.

REFER TO GENERAL CONDITIONS FOR CLEAN-UP. CLEAN ALL MATERIALS AND EQUIPMENT OF DIRT, DUST, PAINT, SPOTS AND STAINS, SOIL MARKS AND OTHER FOREIGN MATTER.

### GIVE NOTICE TO THE ARCHITECT-ENGINEER THAT THE WORK IS READY FOR FINAL

INSPECTION. 1. SUBMIT TEST AND BALANCE REPORT AND COMPLETE REQUIREMENTS AS NOTED. 2. SUBMIT LETTER FROM CONTROL MANUFACTURER CERTIFYING THAT CONTROLS HAVE BEEN CHECKED FOR OPERATION AND CALIBRATION, AND THAT THE SYSTEM IS OPERATING AS INTENDED.

FURNISH NECESSARY MECHANICS TO OPERATE SYSTEM, MAKE NECESSARY ADJUSTMENTS AND ASSIST WITH FINAL INSPECTION.

#### NSTRUCTION OF OWNER'S OPERATING PERSONNE

INCLUDE THE COST OF THE SERVICES OF QUALIFIED INSTRUCTOR(S) TO INSTRUCT THE OWNER'S OPERATING PERSONNEL IN THE OPERATION, ADJUSTMENT, CARE AND MAINTENANCE OF ALL HVAC EQUIPMENT AND SYSTEMS. INSTRUCTION SHALL BE PERFORMED AT A TIME APPROVED BY THE OWNER AND AFTER ALL HVAC EQUIPMENT AND CURVED TYPE WITH A DYNAMICALLY BALANCED WHEEL. FAN HOUSE SHALL BE SYSTEMS ARE INSTALLED, COMPLETE, ADJUSTED AND OPERATING TO SPECIFIED REQUIREMENTS. NOTIFY THE ARCHITECT-ENGINEER WHEN INSTRUCTIONS WILL BE GIVEN. QUALIFICATIONS OF INSTRUCTORS SHALL BE SUBJECT TO APPROVAL OF THE OWNER AND EQUIPMENT MANUFACTURER. ADDITIONAL REQUIREMENTS CONCERNING OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT AND SYSTEMS MAY BE SPECIFIED IN OTHER SECTIONS. TWO COPIES OF ACKNOWLEDGMENT OF ALL REQUIRED INSTRUCTIONS TO OWNER'S OPERATING PERSONNEL. SIGNED BY THE OWNER OR HIS AUTHORIZED REPRESENTATIVE, SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER PRIOR TO SUBMITTING APPLICATION FOR FINAL PAYMENT. AN ADDITIONAL COPY OF THIS ACKNOWLEDGMENT IS REQUIRED IN EACH COPY OF OPERATION AND MAINTENANCE MANUALS REQUIRED IN THE SECTION, OPERATION AND MAINTENANCE MANUALS.

#### OPERATION AND MAINTENANCE MANUALS

FURNISH THREE COPIES OF COMPLETE OPERATION AND MAINTENANCE MANUALS TO THE ARCHITECT-ENGINEER, FOR APPROVAL AND FOR THE OWNER, ON ALL EQUIPMENT AND SYSTEMS. THE MANUALS SHALL BE BOUND IN HARD-BACK, THREE RING LOOSE-LEAF BINDERS. MANUALS SHALL CONTAIN A TITLE SHEET WITH JOB NAME, AND THE NAMES, ADDRESSES AND PHONE NUMBERS OF THE CONTRACTOR, SUBCONTRACTOR, CONTROL SUBCONTRACTOR, RELATED CONTRACTORS AND MATERIAL AND EQUIPMENT SUPPLIERS

A COPY OF ACKNOWLEDGMENT OF INSTRUCTION TO THE OWNER'S OPERATING PERSONNEL IN THE OPERATION OF ALL MECHANICAL EQUIPMENT AND SYSTEMS, SIGNED BY THE OWNER OR HIS AUTHORIZED REPRESENTATIVE. TYPEWRITTEN OPERATING INSTRUCTIONS FOR THE OWNER'S PERSONNEL DESCRIBING HOW TO STOP AND START EACH PIECE OF EQUIPMENT; HOW TO SET THE TEMPERATURE CONTROL SYSTEM FOR NORMAL OPERATION AND NORMAL RESTARTING PROCEDURES, CAUTION AND WARNING NOTICES. APPROVED SHOP DRAWINGS, PRODUCT DATA AND PARTS AND MAINTENANCE BOOKLET FOR EACH ITEM OF MATERIAL AND EQUIPMENT FURNISHED UNDER DIVISION 15000. RECORD DRAWINGS OF ALL SYSTEMS INCLUDING ELECTRICAL AND CONTROL DIAGRAMS. TEST AND BALANCE REPORT. COPIES OF CERTIFICATES OF INSPECTION. GUARANTEES, INCLUDING EXTENDED GUARANTEES.

DELIVER THE MANUALS TO THE OWNER PRIOR TO SUBMITTING APPLICATION FOR FINAL

PROVIDE CONDENSATE DRAINS FOR ALL AIR CONDITIONING UNITS AND PIPE AS DENOTED ON DRAWINGS. CONDENSATE DRAIN PIPING SHALL BE INSTALLED WITH TRAP AT THE COIL CONNECTION AND SHALL HAVE A MINIMUM SEAL DEPTH EQUAL TO THE RESPECTIVE AIR HANDLING UNIT FAN STATIC PRESSURE. DEPTH SHALL BE A MINIMUM OF 2".

EXTERNAL INSULATION SHALL BE R-6 MINIMUM SCHULLER TYPE SMALLLITE, FSK SPIN-GLAS OR APPROVED EQUAL WITH AN EMBOSSED ALUMINUM FOIL FACING. INTERNAL INSULATION SHALL BE R-6 MINIMUM LINER WITH A COATED AIR SIDE SURFACE TO PREVENT EROSION. APPLY ADHESIVES AND FASTENERS PER SMACNA AND THE MANUFACTURER. ALL TRANSVERSE EDGES TO BE COATED WITH ADHESIVE. ALL CONCEALED DUCTWORK SHALL HAVE EXTERNAL INSULATION, UNCONCEALED DUCTWORK SHALL BE INTERNALLY LINED. DUCTWORK INSTALLED IN UNCONDITIONED SPACES SHALL BE R-12 MINIMUM SCHULLER TYPE SMALLLITE, FSK SPIN-GLAS OR APPROVED EQUAL WITH AN EMBOSSED ALUMINUM

ALL AIR SUPPLY DIFFUSERS BACKS AND NECKS, SHALL BE INSULATED WITH R-6 MINIMUM MANVILLE R-SERIES SMALLITE, OR APPROVED EQUAL FIBERGLASS BLANKET INSULATION.

### ADHESIVE SHALL BE FOSTER'S 85-20. STUDWELD PINS SHALL BE SEALED WITH FOSTER'S

30-36 ADHESIVE. ALL JOINTS, SEAMS AND BREAKS IN THE VAPOR BARRIER SHALL BE SEALED WITH FOSTER'S 35-00. REINFORCED WITH 4 INCH WIDE GLASS FABRIC

### TERMINAL HEAT TRANSFER UNITS

INSTALL AIR CONDITIONING UNITS OF THE CAPACITIES INDICATED, COMPLETE WITH GAS-FIRED HEATING SYSTEM, WHERE INDICATED ON THE DRAWINGS. UNIT SHALL BE CONSTRUCTED IN ACCORDANCE WITH APPLICABLE ASME AND ANSI CODES AND SHALL BE LISTED BY UNDERWRITER'S LABORATORIES. UNIT SHALL BE RATED IN ACCORDANCE WITH THE LATEST ARI STANDARD 21. WHERE SPECIFIED OPERATING CONDITIONS ARE OTHER THAN ARI STANDARD CONDITIONS, CAPACITIES SHALL BE INTERPOLATED FROM ARI CONDITIONS.

# UNITS SHALL BE TRANE, LENNOX, AAON OR APPROVED EQUAL.

NSTALL DIRECT DRIVE CENTRIFUGAL INLINE EXHAUST FAN BY GREENHECK OR APPROVED EQUAL WITH GALVANIZED STEEL HOUSING, BACKWARD INCLINED ALUMINUM WHEEL, ACCESS PANELS, INTEGRAL DUCT CONNECTION FLANGES, BALL BEARING MOTORS, AND CORROSION RESISTANT FASTENERS. FAN SHALL COME INSTALLED WITH NEMA-1 TOGGLE SWITCH, MOUNTED AND WIRED. SOLID STATE SPEED CONTROLLER SHIPPED LOOSE AND PSC MOTOR.

### WATER SOURCE HEAT PUMPS

INSTALL WATER SOURCE HEAT PUMP OF CAPACITIES INDICATED MANUFACTURED BY FLORIDA HEAT PUMP, MCQUAY OR AN APPROVED EQUAL. FACTORY ASSEMBLED AND RATED ACCORDING TO ARI-ISO13526-1. GALVANIZED-STEEL CASING WITH ACCESS PANELS FOR MAINTENANCE AND FILTER REPLACEMENT, KNOCKOUTS FOR ELECTRICAL AND PIPING CONNECTIONS, FLANGED DUCT CONNECTIONS AND CABINET INSULATION OF 1/2" THICK, MULTI DENSITY, COATED GLASS FIBER. THE UNIT SHALL BE DESIGNED TO OPERATE WITH ENTERING FLUID TEMPERATURES BETWEEN 50°F AND 100°F IN COOLING AND BETWEEN 50°F AND 80°F IN HEATING.

#### THE UNITS SHALL BE WARRANTED BY THE MANUFACTURER AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR ON ALL PARTS AND FIVE (5) YEARS ON COMPRESSOR.

REFRIGERATION CIRCUITS SHALL UTILIZE R-410A. THE UNIT SHALL CONTAIN SEALED REFRIGERANT CIRCUITS INCLUDING HERMETIC COMPRESSORS, THERMAL EXPANSION VALVE METERING DEVICES, REFRIGERANT DRIER, FINED TUBE AIR-TO-REFRIGERANT HEAT EXCHANGERS, REFRIGERANT REVERSING VALVES AND SERVICE PORTS. COMPRESSORS SHALL BE HIGH EFFICIENCY, DESIGNED FOR HEAT PUMP DUTY, INTERNALLY SPRING ISOLATED (EXCEPT FOR SCROLL TYPE COMPRESSORS) FOR MAXIMUM SOUND ATTENUATION AND MOUNTED ON RUBBER VIBRATION ISOLATORS. COMPRESSOR MOTORS SHALL BE EQUIPPED WITH OVERLOAD PROTECTION. THE FINNED TUBE COIL SHALL BE CONSTRUCTED OF LANCED ALUMINUM FINS NOT EXCEEDING 14 FINS PER INCH. COILS SHALL HAVE A BAKED POLYESTER ENAMEL COATING FOR PROTECTION AGAINST MOST AIRBORNE CHEMICALS. THE COAXIAL WATER-TO-REFRIGERANT HEAT EXCHANGERS SHALL BE CONSTRUCTED OF A CONVOLUTED COPPER INNER TUBE AND STEEL OUTER TUBE WITH A DESIGNED REFRIGERANT WORKING PRESSURE OF 450 PSIG AND A DESIGNED WATER SIDE WORKING PRESSURE OF NO LESS THAN 400 PSIG.

UNITS 6 TONS AND LARGER: THE FANS SHALL BE BELT DRIVEN FORWARD CURVE TYPE NITH DYNAMICALLY BALANCED WHEEL(S). THE FAN HOUSINGS SHALL BE REMOVABLE FROM THE UNIT WITHOUT DISCONNECTING THE SUPPLY AIR DUCTWORK FOR SERVICING OF EXTEND STRAIGHT AWAY FROM CONNECTORS FOR A FEW INCHES PRIOR TO INITIATING FAN MOTORS. MOTORS SHALL BE PERMANENTLY LUBRICATED AND HAVE THERMAL OVERLOAD PROTECTION.

UNITS SMALLER THAN 6 TONS: THE FAN SHALL BE DIRECT DRIVE CENTRIFUGAL FORWARD REMOVABLE FROM UNIT WITHOUT DISCONNECTING THE SUPPLY AIR DUCTWORK FOR SERVICING OF FAN MOTOR. THE MOTOR SHALL BE THREE SPEED PSC TYPE AND BE PERMANENTLY LUBRICATED AND HAVE THERMAL OVERLOAD PROTECTION.

#### DUCTWORK, LOW PRESSURE, GALVANIZED STEEL

DUCTS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH "HVAC DUCT CONSTRUCTION STANDARDS" PUBLISHED BY THE SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC. (SMACNA)

INSPECT THE DRAWINGS AND VERIFY EXISTING CONDITIONS IN THE FIELD. REPORT CONFLICTS BEFORE STARTING FABRICATION.

### WEIGHTS AND GAGES SHALL BE IN ACCORDANCE WITH TABLE I OF "HVAC DUCT

CONSTRUCTION STANDARDS" PUBLISHED BY SMACNA. DUCT MATERIAL SHALL BE GALVANIZED STEEL.

#### PLITTERS SHALL BE 18 GAGE GALVANIZED STEEL WITH HORIZONTAL AND VERTICAL

BEARINGS AND VENTLOK NO. 690 DAMPER ASSEMBLY. VOLUME DAMPERS SHALL BE 18 GAGE STEEL; SINGLE BLADE UP TO 8" X 8", OPPOSED

VENTLOK NO. 641 SELF-LOCKING REGULATOR. DAMPER RODS SHALL BE 1/2" SQUARE BARS

DIMENSIONS SUFFICIENT TO CLOSE OFF AIR TO BRANCH. PROVIDE VENTLOK NO. 607 END

SQUARE AND RECTANGULAR ELBOWS SHALL CONTAIN TITUS NO. AG-225 TURNING VANES.

BLADE ON ALL DUCTS OVER 8" X 8". PROVIDE VENTLOK NO. 607 END BEARINGS AND

### IN ACCORDANCE WITH CHAPTER IV OF SMACNA.

WITH BLADES SECURELY RIVETED TO BAR.

FLEXIBLE CONNECTIONS SHALL BE PROVIDED FOR EACH AIR HANDLING DEVICE TO PREVENT TRANSMISSION OF VIBRATIONS. MAKE FLEXIBLE CONNECTION A MINIMUM OF 4 INCHES WIDE OF VENTGLAS AS MADE BY VENTFABRICS, INC.

GENERAL: SPLIT, DIVIDE OR TURN DUCTS AS NECESSARY TO AVOID OBSTRUCTIONS AND, IN SUCH CASES, PROVIDE AIR STREAM DEFLECTORS AND INCREASE SIZE OF DUCT TO AN EQUIVALENT AREA.

SPLITTERS: RIGIDLY ATTACH SPLITTERS TO PIVOT ROD AND OPERATING LINKAGE, SET DAMPER ASSEMBLY ON RAISED INSULATED BASE ON INSULATED DUCTWORK. VOLUME

DAMPERS: SUPPLY AND MAKE-UP AIR DUCTWORK IN CONCEALED SPACES. SET REGULATOR ON RAISED BASE ON INSULATED DUCTWORK. MARK END OF DAMPER ROD TO SHOW

FLEXIBLE CONNECTIONS: SECURE FLEXIBLE CONNECTIONS TO DUCT AND UNIT WITH GALVANIZED STEEL STRAPS HOLDING THE MATERIAL IN FORMED GALVANIZED STEEL CHANNELS. TEST TO ENSURE PROPER INSTALLATION.

PLUGS: PROVIDE SQUARE HEAD TYPE TEST PLUGS AS REQUIRED FOR INSERTION OF TEST APPARATUS. PROVIDE A RING AND A REMOVABLE INSULATION PLUG WHERE DUCTS ARE

PAINTING: PAINT INTERIOR OF DUCTWORK FLAT BLACK WHERE VISIBLE THROUGH GRILLES

SEALING: DUCTWORK SHALL BE SEALED IN ACCORDANCE WITH SMACNA "SEAL CLASS B".

REMOVE ALL DUCTWORK FOUND TO VIBRATE, CHATTER OR PULSATE AND REPLACE WITH

### DUCTWORK, LOW PRESSURE, FLEXIBLE

PROVIDE WHERE INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN, FACTORY

### FABRICATED AND PRE INSULATED FLEXIBLE DUCTS.

NEW DUCTWORK.

QUALITY ASSURANCE FLEXIBLE DUCTS, INCLUDING INSULATION AND SEALANTS, SHALL CONFORM TO THE REQUIREMENTS OF NFPA 90A AND UL STANDARD 181 FOR CLASS 1 DUCTS. PERFORMANCE DATA SHALL BE BASED ON TEST PERFORMED IN ACCORDANCE WITH AIR DIFFUSION COUNCIL FLEXIBLE AIR DUCT TEST CODE FD72.

OW PRESSURE FLEXIBLE DUCTWORK SHALL CONSIST OF CORROSION RESISTANT SPRING. STEEL HELIX BONDED TO A GLASS REINFORCED NEOPRENE SLEEVE INSULATED WITH A MINIMUM OF 1 INCH THICK, 1 POUND DENSITY FIBERGLASS INSULATION WHICH IS IN TURN COVERED WITH AN OUTER VAPOR BARRIER OF FIBER REINFORCED FOIL-SCRIM-KRAFT LAMINATE. INSULATION SHALL HAVE A THERMAL CONDUCTIVITY (K) NO GREATER THAN 0.25 AT 75 DEGREES F. DUCT FOR LOW VELOCITY SYSTEM CONNECTORS SHALL HAVE A WORKING PRESSURE OF NOT LESS THAN 1-1/2 INCHES OF WATER GAGE AND A MAXIMUM OPERATING TEMPERATURE OF NOT LESS THAN 250 DEGREES F

WHERE FLEXIBLE DUCTS CONNECT TO LOW PRESSURE DUCTS TO FORM RUNOUTS TO INDIVIDUAL OUTLETS, PLENUMS OR LOW PRESSURE TERMINALS, PROVIDE FACTORY FABRICATED FITTINGS COMPLETE WITH MANUAL BALANCING DAMPERS HAVING LOCKING QUADRANTS. WHERE LOW PRESSURE DUCTS ARE INTERNALLY INSULATED THE CONNECTOR SHALL BE FURNISHED WITH AIR EXTENSION TO PROJECT THROUGH AND PROTECT THE INSULATION. FOR CONNECTION TO EQUIPMENT, AUXILIARY SLEEVES SHALL BE PROVIDED TO ALLOW AT LEAST 2 INCHES OF SURFACE FOR CLAMPING OF FLEXIBLE DUCTWORK. SLEEVES SHALL BE SCREWED OR BOLTED TO EQUIPMENT LIP FRAME.

#### PROVIDE GALVANIZED SPRING STEEL CLAMPS OR PANDUIT STRAPS AT CONNECTIONS TO DUCT FITTINGS OR DEVICES.

FLEXIBLE DUCTWORK AND COMPONENTS SHALL BE AS MANUFACTURED BY GENERAL ENVIRONMENTAL CORPORATION OR APPROVED EQUAL.

INSTALL DUCT CONNECTORS TO LOW PRESSURE DUCTS USING MANUFACTURER'S TEMPLATE FOR ALL HOLES AND SECURE THE CONNECTOR WITH SHEET METAL SCREWS HAVING FIRST APPLIED FOSTER'S 30-02 DUCT SEALANT TO THE ADJOINING SURFACES. DO NOT PRESSURIZE THE SYSTEM FOR 48 HOURS. STRETCH NEW DUCT WHEN REMOVING IT FROM CARTONS WHERE IT MAY HAVE BEEN SHIPPED IN A COMPRESSED STATE. USE THE MINIMUM LENGTH OF FLEXIBLE DUCT REQUIRED TO MAKE THE SPECIFIC CONNECTION UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. THE MAXIMUM DEVELOPED LENGTH OF FLEX DUCT IS 5'-0". AVOID SHARP BENDS. USE A MINIMUM INSIDE BEND RADIUS EQUAL TO (1) TIMES THE INSIDE DIAMETER OF THE DUCT. SUPPORT HORIZONTAL DUCT RUNS AS DETAILED IN THE CONSTRUCTION DOCUMENTS. ALLOW THE FLEXIBLE DUCT TO

ANY BEND. MAKE CONNECTIONS OF FLEXIBLE DUCT TO RIGID DUCT OR TERMINALS AS

- 1. APPLY FOSTER'S 30-02 SEALANT TO THE INSIDE OF THE FLEXIBLE DUCT TO DEPTH OF
- 2. SLIDE THE FLEXIBLE DUCT OVER THE CONNECTOR AND WRAP WITH MINIMUM OF TWO REVOLUTIONS OF REINFORCED FOIL DUCT TAPE STARTING ABOUT 2 INCHES BACK
- 3. PLACE A CLAMP OR STRAP OVER THE TAPED END AND SECURE FIRMLY 4. REPAIR ALL DAMAGE TO VAPOR BARRIER WITH FOSTER'S 35-00 REINFORCED WITH 4

FROM END OF FLEXIBLE DUCT AND SEALING OVERLAP WITH LAST WRAP.

### INCH WIDE GLASS FABRIC AND A SECOND COAT OF FOSTER'S 35-00.

#### AIR DISTRIBUTION DEVICES

#### AIR DISTRIBUTION DEVICES SHALL BE PROVIDED TO DELIVER THE INDICATED VOLUME OF SUPPLY AIR WITHOUT EXCEEDING THE NC RATING AS FOLLOWS: EMPLOYEE AND CUSTOMER AREAS: NC-30.

MANUFACTURER SHALL BE TITUS OR APPROVED EQUIVALENT. FOR MODEL NUMBERS AND TYPES SEE AIR DISTRIBUTION SCHEDULE ON DRAWING. DIFFUSERS, GRILLES, AND REGISTERS SHALL BE OF THE SURFACE, FLUSH, OR LAY-IN MOUNTING CORRESPONDING TO THE CEILING IN WHICH THEY ARE LOCATED. THE FINISH OF THE DIFFUSERS, GRILLE, OR REGISTER FACE PANEL SHALL BE BAKED ENAMEL, OFF WHITE COLOR. WHERE MOUNTING SCREWS ARE REQUIRED IN AIR DISTRIBUTION DEVICES. THEY SHALL BE FINISHED TO MATCH THE ADJACENT SURFACE OF THE DEVICES. SUPPLY AND RETURN GRILLES AND REGISTERS WHICH ARE SURFACE MOUNTED SHALL BE PROVIDED WITH SPONGE RUBBER GASKETED FRAMES TO PREVENT SMUDGING.

#### MANUFACTURER SHALL BE RUSKIN OR APPROVED EQUAL. FOR MODEL NUMBER AND TYPE SEE DRAWING, LOUVER FINISH SHALL BE SANDSTONE COLORED BAKED ENAMEL CONTAINING 50% KYNAR RESINS. LOUVER SHALL INCLUDE GASKETED BACKDRAFT DAMPERS WITH ADJUSTABLE WEIGHTS OR SPRINGS TO PREVENT OUTWARD AIR FLOW. ADJUST AS DIRECTED BY OWNER OR AUTHORITY HAVING JURISDICTION.

INSTALL WHERE SHOWN ON DRAWINGS. DIFFUSERS, REGISTERS AND FITTINGS SHALL BE SECURELY ATTACHED TO FINISH SURFACES, OR STRUCTURAL MEMBERS BEHIND FINISH SURFACES. LAY-IN DIFFUSERS MOUNTED IN ACOUSTICAL TILE CEILINGS SHALL BE RIGIDLY MOUNTED, ABOVE THE FACE PANEL, TO THE CEILING SUSPENSION SYSTEM. DRAINABLE LOUVERS SHALL BE INSTALLED AS RECOMMENDED BY MANUFACTURER.

#### CONTROLS, ELECTRIC

THE WORK CONSISTS OF INSTALLING CONTROLS FOR THE HVAC SYSTEM.

#### ELECTRICAL WORK AND MATERIALS ASSOCIATED WITH THE CONTROL SYSTEM SHALL BE INSTALLED AS WORK OF THIS SECTION BUT IN ACCORDANCE WITH DIVISION 16. POWER WIRING IS SPECIFIED UNDER DIVISION 16 AND SHOWN ON ELECTRICAL DRAWINGS. ELECTRICAL CONTROL WIRING CONDUIT AND FITTINGS ASSOCIATED WITH THE SPACE TEMPERATURE AND HUMIDITY CONTROL INCLUDING INTERLOCKING WITH MOTOR CONTROLLERS, CONTROL ACCESSORIES AND APPURTENANCES ARE TO BE PROVIDED

# THERMOSTAT SHALL BE AS SPECIFIED IN THE DRAWINGS, THERMOSTATS FOR WATER

SOURCE HEAT PUMPS SHALL HAVE AUTOMATIC HEATING/COOLING CHANGEOVER AND

UNDER THIS SECTION. CONTROL WIRING SHALL BE IN CONDUIT IF REQUIRED BY LOCAL

### SHALL E PROVIDED WITH A LOCKABLE COVER.

SMOKE DETECTOR SHALL BE FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR AS SHOWN IN THE DRAWINGS. WIRING AND REMOTE ALARM INDICATOR FOR DUCT MOUNTED SMOKE DETECTOR SHALL BE BY ELECTRICAL CONTRACTOR. SMOKE DETECTOR SHALL BE POWERED AS SPECIFIED IN

### TESTING, ADJUSTING AND BALANCING

AUTHORITY HAVING JURISDICTION.

TESTING, ADJUSTING AND BALANCING OF ALL WORK SHALL BE MADE BY AN INDEPENDENT CONTRACTOR, WHO IS A CURRENTLY LICENSED ASSOCIATED AIR BALANCING COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) BALANCING CONTRACTOR. NO OTHER BALANCE REPORTS WILL BE REVIEWED OR ACCEPTED. ALL BALANCING WORK MUST BE COMPLETE AND DONE IN ACCORDANCE WITH THE MOST RECENT STANDARDS OF THEIR SOCIETY AND AS A MINIMUM SHALL INCLUDE THE INFORMATION AS SHOWN IN THE AIR BALANCE REVIEW CHECKLIST BELOW. PAYMENT OF ALL COSTS FOR TESTING AND BALANCING SHALL BE INCLUDED IN THE BID.

TESTING, ADJUSTING AND BALANCING REPORT MUST BE COMPLETE AND TURNED OVER TO TENANT'S PROJECT MANAGER ONE (1) WEEK PRIOR TO MERCHANDISING DATE. VERIFY THAT ALL EQUIPMENT AND SYSTEMS ARE COMPLETE AND OPERATIONAL ONE WEEK PRIOR TO FINAL BALANCING. IF ALL SYSTEMS ARE NOT OPERATIONAL AT THE TIME OF THE SCHEDULED BALANCING, ADDITIONAL TESTING AND BALANCING, INCLUDING ALL LABOR, TRAVEL EXPENSES, MEALS, HOTEL COSTS, ETC SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE OWNER.

PRESENT FOR AIR BALANCE TO VERIFY ACCESSIBILITY TO ALL DEVICES, VERIFY ALL OPERATING SEQUENCES AND INSTALL NEW FILTERS IN ALL UNITS JUST PRIOR TO THE AIR BALANCE. ALLOW TWO DAYS ON SITE FOR BALANCING. THE COMPLETE AIR BALANCE SHALL TAKE PLACE WITH OUTSIDE AIR DAMPERS IN MINIMUM POSITION, EXCEPT AS NOTED OTHERWISE. INSTALL A NEW SET OF FILTERS ONE DAY PRIOR TO TURNOVER.

BALANCE AIR AND WATER QUANTITIES TO WITHIN +/- 10% OF THAT INDICATED ON THE DRAWINGS. ANY REQUIRED CHANGES IN SHEAVES, BELTS OR PULLEYS NEEDED TO ACHIEVE SPECIFIED FLOW RATES SHALL BE PERFORMED WITH NO ADDITIONAL COST TO THE OWNER. ALL CONTROL SEQUENCES SHALL BE TESTED (INTERLOCKED EQUIPMENT, SMOKE DETECTORS, SMOKE EVACUATION, ECONOMIZER, ETC.) AND OPERATING STATUS RECORDED IN THE REPORT.

### SEVEN (7) COPIES OF THE BALANCE REPORT SHALL BE SUBMITTED FOR APPROVAL.

PERFORM ALL APPLICABLE TESTING AND BALANCING FUNCTIONS REQUIRED FOR THE SYSTEM DESIGNED ON THESE DRAWINGS. ALL SYSTEMS UNABLE TO BE COMPLETELY BALANCED AT THE TIME OF ORIGINAL BALANCE MUST BE BALANCED IN FUTURE AT NO ADDITIONAL EXPENSE TO THE OWNER. RECHECK ANY ITEMS THAT OWNER DEEMS NECESSARY AT NO ADDITIONAL COST TO OWNER.

THE BALANCE REPORT SHALL BE ON THE AABC NATIONAL STANDARD REPORT FORMS OR THE NEBB CERTIFIED REPORT FORMS AS PUBLISHED IN THEIR MOST CURRENT EDITIONS.

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**MECHANICAL** 

**SPECIFICATIONS** 

# GENERAL PLUMBING NOTES

- ALL WORK SHALL BE IN CONFORMANCE WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.
- PROVIDE TO OWNER A COPY OF ALL REPORTS AND APPROVAL CERTIFICATES FROM LOCAL AND STATE INSPECTIONS AND ALL PLUMBING SYSTEMS EQUIPMENT MANUALS INCLUDING WARRANTIES.
- COORDINATE THE COMPLETE INSTALLATION OF SYSTEMS TO AVOID CONFLICT WITH OTHER TRADES.

PER FOOT FOR PIPING 3" OR SMALLER.

- COORDINATE ALL ABOVE SLAB AND UNDER SLAB SANITARY, AND WATER PIPING SYSTEMS TO AVOID CONFLICT WITH ALL OTHER TRADES SYSTEMS, AND COLUMN FOOTINGS. ALL SOIL AND WASTE PIPING SHALL BE GRADED
- COORDINATE ALL FLOOR DRAINS, CLEANOUTS, AND FLOOR MOUNTED FIXTURES WITH FINISHED FLOOR SLAB ELEVATION TO ENSURE THEY ARE INSTALLED PLUM AND FLUSH WITHOUT CRACKS, RISE IN THE SLAB, OR VOIDS AROUND GRATES OR TOPS. ALL CLEANOUTS SHALL BE INSTALLED ALONG MAINS AT 50'-0" DISTANCE MAXIMUM ALL FLOOR AND WALL CLEANOUTS SHALL BE ACCESSIBLE FOR MAINTENANCE AND NOT INSTALLED BENEATH EQUIPMENT. ANY DRAIN GRATES THAT ARE DAMAGED AS A RESULT OF OTHER CONSTRUCTION PRIOR TO RELEASE OF THE BUILDING TO THE OWNER SHALL BE REPLACED WITH LIKE GRATE AT NO EXPENSE OF THE

TO A UNIFORM SLOPE OF NOT LESS THAN 1/8" PER FOOT FOR PIPING 4" OR LARGER, AND NOT LESS THAN 1/4"

- ALL EXPOSED PIPES PENETRATING FINISHED WALLS SHALL BE EQUIPPED WITH WALL ESCUTCHEONS.
- PROVIDE TRAP AND SEAL PRIMERS ON ALL FLOOR DRAINS IF REQUIRED BY CODE OR OWNER.
- PLUMBING VENTS THROUGH THE ROOF ARE LOCATED AT A MINIMUM OF 5'-0" FROM BUILDING PARAPETS AND 10'-0" FROM FRESH AIR INTAKES AND AS REQUIRED TO MEET LOCAL CODES.
- ALL SHUT-OFF OR BALANCING VALVES TO PLUMBING ROUTED IN PIPE CHASES SHALL BE ACCESSIBLE FROM CEILING AREA OR ACCESS DOORS PROVIDED IN WALL.
- PROVIDE FINAL CONNECTIONS FOR ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. PROVIDE ALL REQUIRED SHUT-OFFS, BACKFLOW PREVENTERS, PRESSURE REGULATORS, AND CONDENSATE DRAINS AS REQUIRED BY LOCAL CODES FOR COMPLETE EQUIPMENT INSTALLATION. CONSULT EQUIPMENT SUPPLIER OR OWNER FOR ADDITIONAL FINAL CONNECTION REQUIREMENTS NOT SHOWN ON THESE DRAWINGS
- CONTRACTOR TO FULLY INVESTIGATE ALL EXISTING PIPING TO REMAIN TO INSURE EXISTING PIPING IS IN GOOD REPAIR. IF ANY EXISTING PIPING IS FOUND TO BE DAMAGED REPLACE WITH LIKE.
- ALL WATER SERVICE INSTALLATIONS INCLUDING BACKFLOW DEVICES ARE SUBJECT TO FIELD VERIFICATION AND APPROVAL BY THE WATER DEPARTMENT INSPECTOR.

PL	UMBING A	BBRE\	<b>VIATIONS</b>
AD	AREA DRAIN, ACCESS DOOR	ΙE	INVERT ELEVATION
AFC	ABOVE FINISH CEILING	LP	LIQUIFIED PETROLEUM
AFG	ABOVE FINISH GRADE	MBH	1000 BTU PER HOUR
AHU	AIR HANDLING UNIT	N/A	NOT APPLICABLE
BFP	BACKFLOW PREVENTER	ORD	OVERFLOW ROOF DRAIN
BOP	BOTTOM OF PIPE	OST	STORM OVERFLOW
BOS	BOTTOM OF STRUCTURE	PD	PUMP DISCHARGE
CD	CONDENSATE	PIV	POST INDICATOR VALVE
CO	CLEANOUT	PRV	PRESSURE REDUCING VALVE
CW	DOMESTIC COLD WATER	REV	REVISION
DD	DECK DRAIN	RPM	REVOLUTIONS PER MINUTE
DN	DOWN	RTU	ROOF TOP UNIT
ETR	EXISTING TO REMAIN	SAN	SANITARY
EWC	ELECTRIC WATER COOLER	SCW	SOFT DOMESTIC COLD WATER
FCO	FLOOR CLEANOUT	SHW	SOFT DOMESTIC HOT WATER
FFA	FROM FLOOR ABOVE	SDHWR	SOFT RECIRC. HOT WATER
FP	FIRE PROTECTION	ST	STORM
FS	FLOOR SINK	TFA	TO FLOOR ABOVE
G	GAS (NATURAL)	TFB	TO FLOOR BELOW
GCO	GRADE CLEANOUT	TW	TEMPERED WATER
GPM	GALLONS PER MINUTE	UH	UNIT HEATER
НВ	HOSE BIBB	V	VENT PIPE
HW	DOMESTIC HOT WATER	VTR	VENT THROUGH ROOF
HWR	HOT WATER RETURN	WCO	WALL CLEANOUT
HWS	HOT WATER SUPPLY	WH	WALL HYDRANT

	PLUMBIN	<b>G</b> SYM	IBOLS
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
<b>→</b>	GATE VALVE	₩	FLOOR DRAIN / AREA DRAIN
<b>→</b> ≻	CHECK VALVE		FLOOR SINK
<b>→</b>	PRESSURE		HOT WATER RECIRCULATION PUMP
<u>\$</u> <b>−</b> ₩−	SOLENOID VALVE	.1.	
<b>⊸</b> ↓	GLOBE VALVE (STRAIGHT PATTERN)	VTR	PLUMBING VEVT THRU ROOF
<u>-ф</u> -	BUTTERFLY VALVE		POINT OF CONNECTION (CONNECT NEW TO EXISTING)
<del>-</del>	BALL VALVE		, , , , , , , , , , , , , , , , , , , ,
<del>-</del> \$-	GAS COCK	306A	KITCHEN EQUIPMENT DESIGNATION
—⋈—	PLUG VALVE		PLUMBING EQUIPMENT DESIGNATION
☐ FCO	FLOOR CLEAN OUT		PEUMBINO EQUITMENT DESIGNATION
——∥ wco	WALL CLEAN OUT	$\left(\begin{array}{c} x \\ x \end{array}\right)$	PLUMBING RISER OR DETAIL DESIGNATION
co	CLEAN OUT	<u> </u>	SANITARY SEWER PIPING
<b>—</b>	HOSE BIBB	ST	STORM SEWER PIPING
<del>-  </del>	FREEZE PROOF WALL HYDRANT	V	VENT PIPING
<del></del>	ELBOW DOWN	CW	COLD WATER PIPING
<del></del>	ELBOW UP	— <del>-</del>	HOT WATER PIPING
	- TEE UP	LIMD	HOT WATER RECIRCULATING PIPING
<del>-10</del> +	- TEE DOWN	HWR FW	FILTERED WATER PIPING
+	STRAINER		GAS PIPING
	UNION	G CD	CONDENSATE PIPING
_		1 00	

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ENGINEERED BUILDING SOLUTIONS, LLC P.O. BOX 11101 OVERLAND PARK, KS 66207 913-735-5654 MO Certificate of Authority #E-2021006522
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HIVE DESIGN COLLABORATIVE, INC.

			PLU	MBII	NG FI	XTU	RE SCHED	ULE
TAG	MANUFACTURER	MODEL	DRAIN	VENT	COLD WATER	HOT WATER	ELECTRICAL REQUIREMENTS	DESCRIPTION
IMB	SIOUX CHIEF	696		( <del></del>	1/2"			ICE MAKER BOX WITH SHUTOFF AND MINI ARRESTOR.
SNK	ELKAY	ELGAD3322PD	2"	2"	1/2"	1/2"	110V, SINGLE	DOUBLE BOWL DROP-IN SINK WHITE. FAUCET: PEERLESS P188103LF-SD PROVIDE WITH ASSE 1070 THERMOSTATIC MIXING VALVE AND INSINKERATOR BADGER 1 GARBAGE DISPOSER.

- 1. MODELS IN SCHEDULE ARE A BASIS OF DESIGN CONFIRM FINAL FIXTURE MODELS WITH OWNER PRIOR TO PURCHASING.
- 2. ALL LAVATORIES/SINKS SHALL BE PROVIDED WITH ANTI-SCALD ASSE 1070 COMPLIANT VALVE.
- 3. PROVIDE LOOSE KEY STOPS AND FLEXIBLE RISERS.
- 4. ON LAVATORY INSULATE EXPOSED TAILPIECE, P-TRAP, AND WATER RISERS WITH TRU-BRO INSULATION KIT.
- 5. PROVIDE FLUSH VALVE HANDLE ON WIDE SIDE OF ROOM.

# PLUMBING FIXTURE MINIMUM CONNECTION SCHEDULE

	<u> </u>	<del></del>			
DESIGNATION	FIXTURE	C.W.	H.W.	DRAIN	VENT
WC	WATER CLOSET	1"	-	4"	2"
UR	URINAL	3/4"	-	2"	2"
LAV.	LAVATORY	1/2"	1/2"	2"	2"
EWC/DF	ELECTRIC WATER COOLER/DRINKING FOUNTAIN	1/2"	-	2"	2"
MB/SS	MOP BASIN/SERVICE SINK	1/2"	1/2"	3"	2"
SH/BT	SHOWER/BATHTUB	1/2"	1/2"	2"	2"
SK	SINK	1/2"	1/2"	2"	2"

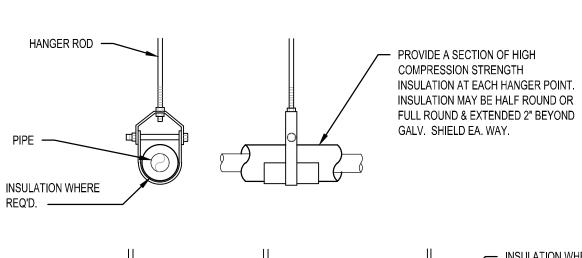
### GENERAL NOTES:

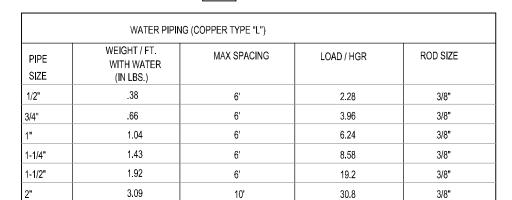
- PITCH ALL DRAINAGE PIPING 3" AND LARGER AT 1/8" PER FOOT MINIMUM UNLESS

- VERIFY/COORDINATE LOCATIONS OF ALL FIXTURES, DRAIN, ETC. WITH ARCHITECT

# OTHERWISE NOTED. PITCH ALL DRAINAGE PIPING 2-1/2" AND SMALLER AT 1/4" PER FOOT.

- ALL UNDERGROUND DRAINAGE PIPING SHALL BE A MINIMUM OF 2" IN SIZE.
- PROVIDE TRAP PRIMER UNITS FOR ALL FLOOR DRAINS.





PIPE

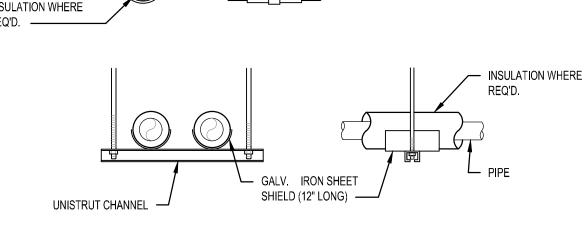
THREADED ROD PER

ADJUSTABLE CLEVIS HANGER

- FIBERGLASS INSULATION PER

SPECIFICATION

SPECIFICATION



- 1. ATTACH SUPPORTS FOR ALL PIPING SUSPENDED FROM THE STEEL STRUCTURE TO THE TOP CORD
- 2. PROVIDE COPPER OR PLASTIC COATED HANGERS FOR NON-INSULATED COPPER PIPE.



PLUMBING NOTES, SYMBOLS, & ABBREVIATIONS

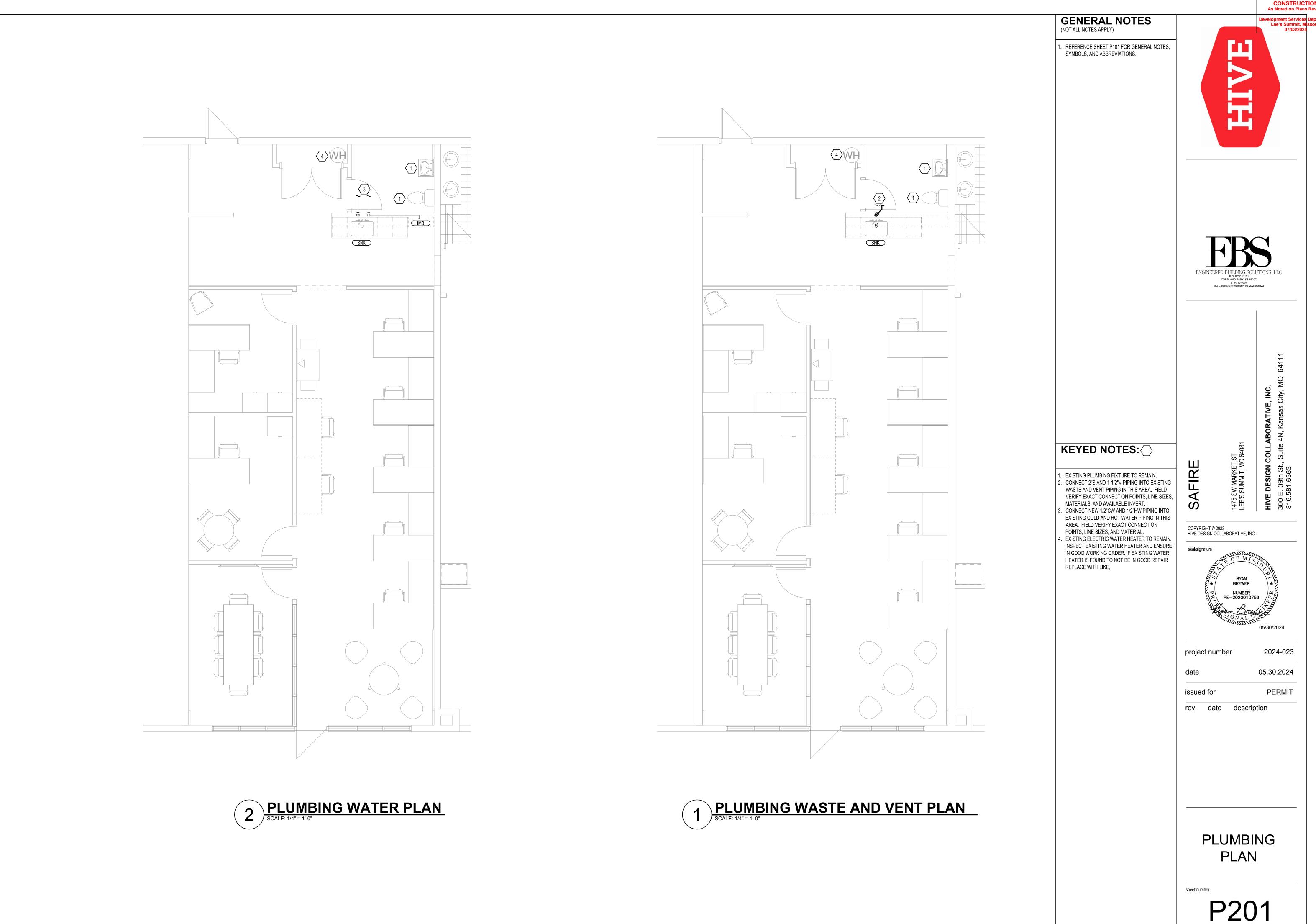
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#### QUALITY ASSURANCE

OBTAIN AND PAY FOR ALL PERMITS, INSPECTIONS AND CONNECTION FEES REQUIRED BY GOVERNING BODIES IN CONNECTION WITH THE WORK. DELIVER CERTIFICATES OF INSPECTION TO THE OWNER'S REPRESENTATIVE. ALL WORK SHALL COMPLY WITH GOVERNING CODES, ORDINANCES, AND REGULATIONS OF CITY, COUNTY AND STATE.

#### SUBMITTALS

SHOP DRAWINGS: SUBMIT MATERIALS, PRODUCTS, EQUIPMENT AND SYSTEMS AS SPECIFIED UNDER EACH PLUMBING SECTION IN THIS DIVISION IN ACCORDANCE WITH THE GENERAL CONDITIONS. SHOW PIPE SIZES, LOCATION, SLOPES OF HORIZONTAL RUNS, FITTINGS, VALVES, METERS, GAGES AND CONNECTIONS.

PRODUCT DATA: SUBMIT ON MATERIALS, FIXTURES, AND EQUIPMENT UNLESS OTHERWISE SPECIFIED OR ACKNOWLEDGED IN WRITING.

SAMPLES: SUBMIT WHEN SPECIFIED OR REQUESTED.

#### RECORD DOCUMENTS

REFER TO GENERAL CONDITIONS FOR REQUIREMENTS CONCERNING RECORD DOCUMENTS. ADDITIONAL REQUIREMENTS MAY BE SPECIFIED IN DIVISION 1. UNLESS SEPIAS OF THE DRAWINGS ARE TO BE FURNISHED BY THE ARCHITECT-ENGINEER FOR PREPARATION OF RECORD DRAWINGS, FURNISH OWNER'S REPRESENTATIVE WITH TWO SETS OF ACCURATELY MARKED COPIES OF THE DRAWINGS, INSTEAD OF ONE SET AS REQUIRED BY THE GENERAL CONDITIONS, INDICATING ALL CHANGES FROM ORIGINAL DRAWINGS AS

#### PRODUCT HANDLING

PIPE, FIXTURES AND ACCESSORIES SHALL BE PROTECTED FROM DAMAGE IN SHIPMENT, HANDLING, STORAGE AND INSTALLATION: FROM MOISTURE, DIRT AND DEBRIS. PIPE, CLEANOUT AND FLOOR DRAIN OPENINGS SHALL BE TEMPORARILY PLUGGED WITH TEST PLUGS UNTIL FINAL CONNECTIONS ARE MADE.

#### GUARANTEE AND SERVICE

REFER TO GENERAL CONDITIONS FOR GUARANTEE. WHERE EXTENDED GUARANTEES ARE CALLED FOR, FURNISH THREE COPIES TO BE INSERTED INTO OPERATION AND MAINTENANCE MANUALS.

PLUMBING SYSTEMS SHALL BE PROVIDED COMPLETE. SHOULD A SYSTEM, OR ANY PART THEREOF FAIL TO MEET PERFORMANCE REQUIREMENTS, NECESSARY REPLACEMENTS, ALTERATIONS OR REPAIRS, AS REQUIRED BY THE OWNER'S REPRESENTATIVE, SHALL BE MADE TO BRING PERFORMANCE UP TO SPECIFIED REQUIREMENTS AND ALL BUILDING CONSTRUCTION AND FINISHES DAMAGED OR MARRED BY SUCH REPLACEMENTS, ALTERATIONS OR REPAIRS SHALL BE RESTORED TO PRIOR CONDITION, AT NO ADDITIONAL COST TO THE OWNER.

WHERE MULTIPLE ITEMS OF EQUIPMENT OR MATERIALS ARE REQUIRED THEY SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER.

INSERTS, PIPE SLEEVES, HANGERS, SUPPORTS, FIXTURES, TRIM DRAINS AND ANCHORAGE OF PLUMBING SHALL BE PROVIDED AS SPECIFIED HEREIN. WHERE SUCH ITEMS ARE TO BE SET OR EMBEDDED IN CONCRETE, MASONRY OR SIMILAR WORK, THE ITEMS SHALL BE FURNISHED AND LAYOUT MADE AT THE PROPER TIME 13. SHEET COPPER: ASTM B 152. FOR THE SETTING OR EMBEDMENT THEREOF SO AS TO CAUSE NO DELAY IN THE 14. NO-HUB STAINLESS STEEL COUPLING AND GASKETS: CISPI STD. S-301.

### MANUFACTURER'S NAMES AND CATALOG NUMBERS

SPECIFIED REFERENCES HAVE BEEN MADE TO ONE OR MORE MANUFACTURER'S NAMES AND MODEL OR CATALOG NUMBERS. THIS DOES NOT NECESSARILY INDICATE THAT THE MATERIAL AND EQUIPMENT SPECIFIED IS AN "OFF THE SHELF" ITEM, REQUIREMENTS FOR SPECIFIC FINISHES, MATERIAL OR OTHER MODIFICATIONS MAY INTRODUCE VARIANCES FROM MANUFACTURERS' STANDARDS, MODIFICATIONS SHALL BE FULLY CONSIDERED.

### CHARTS AND TAGS

IN AREAS HAVING VALVES, PROVIDE SINGLE LINE DIAGRAMS FRAMED UNDER GLASS AND MOUNTED ON EQUIPMENT ROOM WALL. THE DIAGRAMS SHALL GIVE NAME, NUMBER DESIGNATION AND LOCATION OF VALVE.

VALVES SHALL BE IDENTIFIED WITH 1/16 INCH THICK WHITE LAMINATED PLASTIC NAMEPLATES WITH 3/16 INCH HIGH BLACK LAMINATED LETTERS, THE NAMEPLATE 5. SOLDERED JOINTS: 95-5 TIN-ANTIMONY SOLDER. SLIP JOINTS: USE FOR IDENTIFICATION SHALL COINCIDE WITH ITEMS APPEARING ON DIAGRAMS. ATTACH NAMEPLATES TO VALVES WITH NON-CORROSIVE CHAIN OR WIRE.

### ACCESS DOORS

PROVIDE ACCESS DOORS AS INDICATED AND SPECIFIED IN DRAWINGS

# INSTALLATION AND WORKMANSHIP

THE WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ANY MATERIAL, APPARATUS OR EQUIPMENT WHICH, IN THE 9. ASSEMBLY FOR HUBLESS PIPING: AS RECOMMENDED BY THE OPINION OF THE OWNER'S REPRESENTATIVE, IS IMPROPERLY INSTALLED SHALL BE REMOVED AND REINSTALLED IN AN APPROVED MANNER AT NO ADDITIONAL COST TO THE OWNER.

THE LOCATION OF PLUMBING PIPING SHALL BE COORDINATED TO ENSURE THAT IT INSTALLATION CLEARS OPENINGS AND STRUCTURAL MEMBERS; THAT PIPING INDICATED AS CONCEALED CAN BE PROPERLY CONCEALED IN WALLS OR PARTITIONS AND THAT IT DOES NOT INTERFERE WITH LIGHTS, DUCTWORK OR EQUIPMENT HAVING FIXED LOCATIONS. MAKE NECESSARY HORIZONTAL OR VERTICAL OFFSETS WITH PIPE FITTINGS TO INSTALL THE SYSTEM IN THE AVAILABLE SPACE. CONCEAL OR INSTALL TIGHT TO STRUCTURE (IF EXPOSED) UNLESS OTHERWISE NOTED.

PIPING SHALL BE EXPOSED IN FINISHED AREAS ONLY WHERE INDICATED OR WITH THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

WHERE DRAIN OR WATER CONNECTIONS NECESSARY TO THE OPERATION OF FIXTURES OR EQUIPMENT ARE NOT SPECIFICALLY SHOWN ON DIAGRAMS, EXTEND NECESSARY BRANCHES TO THE CLOSEST INDICATED BRANCH OR MAIN, AT NO ADDITIONAL COST TO THE OWNER.

EACH FIXTURE, EQUIPMENT DRAIN OR FLOOR DRAIN SHALL BE SEPARATELY TRAPPED UNLESS OTHERWISE INDICATED OR SPECIFIED.

PLUMBING PIPING AND EQUIPMENT SHALL NOT BE FIELD PAINTED, OR PRIMED BEYOND THE DEGREE OF APPLICATION FROM THE FACTORY SOURCE, OR EXCEPT AS REQUIRED BY APPLICABLE CODES AND AUTHORITIES HAVING JURISDICATION.

WATERPROOFING DO NOT CUT OR PENETRATE WATERPROOFED SURFACES OR WATERPROOFING MEMBRANES WITHOUT FIRST MAKING ARRANGEMENTS FOR REPAIR BY A METHOD APPROVED BY THE OWNER'S REPRESENTATIVE.

INSTALL AS REQUIRED FOR MAINTENANCE, ADJUSTMENT, REMOVAL AND REPAIR OF VALVES, EQUIPMENT AND LIKE ITEMS, DOORS SHALL BE CONVENIENTLY LOCATED AND OF SUFFICIENT SIZE.

PIPING PROVISIONS FOR FIXTURES AND EQUIPMENT SPECIFIED IN OTHER SECTIONS OR FURNISHED BY THE OWNER ROUGH IN LOCATIONS SHALL BE DETERMINED FOR SERVICES. PROVIDE ALL NECESSARY PLUMBING SERVICES, ACCESSIBLE VALVES ON PLUMBING BRANCHES AND MAKE ALL FINAL CONNECTIONS.

#### PLUMBING OPERATION AND MAINTENANCE MANUALS

FURNISH TWO COPIES OF COMPLETE OPERATION AND MAINTENANCE MANUALS TO THE OWNER'S REPRESENTATIVE, FOR APPROVAL AND FOR THE OWNER, ON PLUMBING EQUIPMENT AND SPECIALTIES. THE MANUAL SHALL BE BOUND IN HARD-BACK, THREE-RING LOOSE-LEAF BINDERS.

#### MANUAL CONTENTS

TITLE SHEET WITH JOB NAME, AND THE NAMES, ADDRESSES AND PHONE NUMBERS OF THE CONTRACTOR, SUBCONTRACTOR, CONTROL SUBCONTRACTOR, RELATED CONTRACTOR AND MATERIAL AND EQUIPMENT SUPPLIERS.

#### INDEX OF CONTENTS

TYPEWRITTEN OPERATING INSTRUCTIONS FOR THE OWNER'S PERSONNEL DESCRIBING HOW TO OPERATE EACH PIECE OF EQUIPMENT, AND CAUTION AND WARNING NOTICES.

APPROVED SHOP DRAWINGS, PRODUCT DATA AND PARTS AND MAINTENANCE BOOKLET FOR EACH ITEM OF PLUMBING, EQUIPMENT SPECIFIED IN DIVISION 15.

COPIES OF CERTIFICATES OF INSPECTION. WHERE INSPECTION IS REQUIRED. GUARANTEES, INCLUDING EXTENDED GUARANTEES.

DELIVER THE MANUALS TO THE OWNER'S REPRESENTATIVE PRIOR TO SUBMITTING APPLICATION FOR FINAL PAYMENT.

FURNISH AND INSTALL PLUMBING PIPING WHERE SHOWN ON DRAWINGS AND AS SPECIFIED.

### PIPING MATERIALS

CAST IRON HUBLESS SANITARY PIPE AND FITTINGS: CISPI STD. 301. CAST IRON SOIL PIPE AND FITTINGS, SERVICE WEIGHT: ASTM A 74.

- CAST IRON SOIL PIPE AND FITTINGS, EXTRA HEAVY WEIGHT: ASTM A 74. 4. STEEL PIPE: ASTM A 53.
- MALLEABLE IRON FITTINGS, 150 LB.: ASTM A 197.
- PIPE THREADS: ANSI B2.1 NIPPLES, PIPE (THREADED): FED SPEC. WW-N-351.
- COPPER WATER TUBE: ASTM B 88.
- 10. WROUGHT COPPER AND WROUGHT COPPER ALLOY SOLDER-JOINT DRAINAGE FITTINGS: ANSI BL6,29,
- 11. CAULKING LEAD: FED. SPEC. QQ-C-40 (2).
- SHEET LEAD: FED. SPEC. QQ-L-201.
- 15. WHERE ACCEPTABLE BY LOCAL AUTHORITY HAVING JURISDICTION SOLID WALL ABS PIPING MAY BE USED FOR WASTE PIPING.
- 15.A. PVC/ABS PIPING CANNOT BE USED IN RETURN AIR PLENUM APPLICATION.

### JOINTS AND CONNECTIONS

- OPTIONS CAST IRON, HUB AND SPIGOT: PACKED WITH OAKUM AND FINISHED WITH LEAD NOT LESS THAN 1 INCH DEEP; WELL CAULKED. 2. CAST IRON, NO-HUB: NEOPRENE GASKET AND CORRUGATED 304 STAINLESS
- AND SMALLER, 6 CLAMPS FOR 5" AND LARGER. BETWEEN LEAD AND BRASS: FERRULES OR SOLDERING NIPPLES WITH WIPED JOINTS 3/8" THICK AND 3/4" EACH SIDE OF JOINTS.
- 4. SCREWED JOINTS: AMERICAN NATIONAL STANDARD WITH PIPE FREE FROM CUTTING AND BURRS. THREE THREADS EXPOSED MAXIMUM.
- PLUMBING TRAP SEALS ON INLET SIDE ONLY. 6. BETWEEN COPPER AND FERROUS MATERIALS: INSULATING DIELECTRIC
- 7. FLANGED JOINTS: FURNISH WITH COMPANION FLANGE AND CLOTH
- INSERTED RUBBER GASKET. 8. FLANGED BOLTS: ASTM A 354, MINIMUM GRADE BD, ALLOY STEEL WITH HEX NUTS IN COMPLIANCE WITH ANSI B18.22 AND STANDARD ROLLED STEEL
- MANUFACTURER. 10. CHANGES IN PIPE SIZE SHALL BE MADE WITH REDUCERS, INCREASERS OR REDUCING FITTINGS, BUSHINGS WILL NOT BE PERMITTED.

### BEFORE INSTALLING PIPE IN ANY PART OF THE SYSTEM, THE PIPE SHALL BE

CLEANED INSIDE AND MADE FREE OF OIL, DIRT, AND FOREIGN MATTER. PROPERLY ALIGN AND INSTALL IN NEAT ARRANGEMENT, TRUE TO THE LINES OF THE BUILDING. PITCH LINE AT A CONSTANT SLOPE FOR PROPER DRAINAGE.

EXCEPT AS NOTED OTHERWISE ON DRAWINGS, PIPING SHALL BE HELD AS HIGH AS POSSIBLE, BETWEEN STRUCTURES AND THROUGH JOIST WEBBING, WITH DUE REGARD TO CONFLICTS WITH OTHER SYSTEMS AND THEIR REQUIREMENTS FOR SPACE.

PIPING, INCLUDING NO-HUB PIPING, SHALL BE INSTALLED STRAIGHT AND TRUE TO VERTICAL AND HORIZONTAL LINES. DEFLECTION SHALL NOT EXCEED ONE DEGREE. WHEN NECESSARY TO ACHIEVE THIS ALIGNMENT PROVIDE ADDITIONAL HANGERS OR BRACING.

### APPLY LUBRICANT TO SCREW JOINT MALE THREADS.

METAL TO BE SOLDERED SHALL BE CLEANED AND FLUXED AS SUITABLE FOR THE

NOTCHING OF COPPER TUBING OR PLASTIC PIPING FOR CONNECTIONS WILL NOT BE PERMITTED.

### PLUMBING SPECIALITES

SCHEDULE 40 BLACK STEEL, GALVANIZED 26 GAGE STEEL, PROVIDE FOR ALL PIPES THROUGH WALLS AND FLOORS.

### **ESCUTCHEONS**

PROVIDE FOR ALL PIPING THROUGH WALLS, FLOORS AND CEILING WERE PIPING IS EXPOSED TO VIEW IN FINISHED AREA. ESCUTCHEONS SHALL BE CHROMIUM PLATED, TWO PIECE, HINGED WITH SET SCREW.

# PROVIDE GROUND JOINT BRASS UNIONS OR FLANGES ON EACH PIPING

CONNECTION TO EQUIPMENT.

#### PROVIDE DIELECTRIC UNIONS BETWEEN COPPER AND STEEL PIPING CONNECTION TO EQUIPMENT.

#### VACUUM BREAKERS

SHALL CONFORM TO THE REQUIREMENTS OF THE REFERENCED PLUMBING CODE AND SHALL BE PROVIDED FOR HOSE BIBBS, FLUSHOMETERS AND ANY FIXTURE OR EQUIPMENT WATER SUPPLY HAVING A THREADED OUTLET.

# VENT FLASHING SHALL COMPLY WITH ROOFING MANUFACTURER'S WRITTEN

# **SPECIFICATIONS**

#### CLEANOUTS ON NO-HUB PIPE SHALL BE STANDARD NO-HUB FITTINGS CLEANOUTS ON CAST IRON HUB AND SPIGOT PIPING, SHALL BE CADMIUM PLATED. APPROVED MANUFACTURERS: ZURN, JOSAM OR JONESPEC.

PROVIDE WHERE INDICATED ON DRAWINGS. PRECISION PRODUCTS WITH

### PIPE SLEEVES

TRAP PRIMERS

EXTEND SLEEVE 1/4 INCH BEYOND FINISHED SURFACE.

DISTRIBUTION UNIT OR APPROVED EQUAL.

- 2. SET SLEEVE BEFORE POURING CONCRETE. PROVIDE CLEARANCE BETWEEN SLEEVE AND PIPE OR BETWEEN SLEEVE AND INSULATION TO ALLOW FOR PIPE MOVEMENT DUE TO EXPANSION AND
- CONTRACTION. INSULATION SHALL PASS CONTINUOUS THROUGH THE SLEEVE CAULK BETWEEN SLEEVE AND PIPE OR SLEEVE AND INSULATION. PREFABRICATED, PRE-INSULATED, "PIPE SHIELDS" WILL BE ACCEPTABLE
- FOR PIPES PASSING THROUGH FLOORS, EXTERIOR WALLS, FIRE WALLS AND FIRE RESISTIVE WALLS AND PARTITONS. 6. ESCUTCHEONS: FIT AROUND INSULATION WHERE PRESENT. PROVIDE DEEP
- ESCUTCHEON PLATES WHERE PIPE SLEEVES EXTEND ABOVE FLOORS. WATER HAMMER ARRESTERS: INSTALL WHERE SHOWN ON DRAWINGS. CLEANOUTS: INSTALL WHERE SHOWN ON DRAWINGS AND AT BASE OF ALL RISERS. PROVIDE ADDITIONAL CLEANOUTS WHERE REQUIRED BY LOCAL
- CODES AND FOR CONVENIENCE OF TESTING AND ERECTION AT CONTRACTOR'S OPTION. 9. FRAMES AND COVERS SHALL BE FLUSH WITH ADJOINING ARCHITECTURAL

#### PLUMBING VALVES

FINISH.

INSTALL IN ACCESSIBLE LOCATION. WROUGHT COPPER AND BRONZE SOLDER-JOINT PRESSURE FITTINGS: ANSI VALVES SHALL NOT BE INSTALLED WITH THE STEMS BELOW THE HORIZONTAL

### VALVES, GATE, 125# UNION BONNET. RISING STEM

- 3 INCH AND SMALLER: SCREWED: ITT GRINNELL #3080 OR APPROVED EQUAL.
- 2. SOLDER JOINT: ITT GRINNELL #3080 SJ OR APPROVED EQUAL.

VALVES, BALL (MAY BE USED IN LIEU OF GATE VALVES UP TO 2"): 2" AND SMALLER NIBCO #T580; TWO PIECE BRONZE BODY, WITH SCREEWED ENDS, CHROME PLATED BRONZE BALL WITH CONVENTIONAL PORT, 400 PSI, BLOW OUT PROOF STEM.

### VALVES, GLOBE 150# TEFLON DISC. UNION BONNET

- 3 INCH OR SMALLER: SCREWED: ITT GRINELL #3240 OR APPROVED EQUAL.
- 2. SOLDER JOINT: ITT GRINELL #3240 SJ OR APPROVED EQUAL. STEEL SHIELD IN CONJUNCTION WITH 4 STAINLESS STEEL CLAMPS FOR 4" VALVES, CHECK 125# REMOVABLE REGRINDABLE DISC A. 3 INCH AND SMALLER,
  - HORIZONTAL: SCREWED: ITT GRINELL #3300 OR APPROVED EQUAL.
  - SOLDER JOINT: ITT GRINELL #3300 SJ OR APPROVED EQUAL.

### 3 INCH AND SMALLER, VERTICAL:

1. FOR SCREWED AND SOLDER JOINT INSTALLATION. SAME AS SECTION A OR APPROVED EQUAL. PROVIDE ADAPTERS FOR SOLDER JOINT CONNECTION. 2.05 HOSE BIBBS A. SEE FIXTURE SCHEDULE ON DRAWINGS. B. PLUG COCKS, 125# BRONZE COCKS. TWO (2) INCH AND SMALLER SHALL BE CRANE NO. 250 OR APPROVED EQUAL.

### INSTALLATION

INSTALL VALVES WHERE SHOWN ON DRAWINGS.

### PLUMBING HANGERS AND SUPPORTS

DESCRIPTION PROVIDE HANGERS FOR ALL PIPING NOT INDICATED BELOW GRADE. USE HANGERS CAPABLE OF ADJUSTMENT.

# HANGERS AND SUPPORTS

HANGERS FOR BLACK OR GALVANIZED STEEL PIPE SHALL BE GRINNELL, MODEL NO. 65 OR APPROVED EQUAL.

#### HANGERS FOR CAST IRON PIPE SHALL BE GRINNELL, MODEL NO. 260 OR APPROVED EQUAL.

HANGERS FOR COPPER TUBING SHALL BE GRINNELL, MODEL NO. 97 C OR

MAY BE USED WHERE PIPES ARE DESIGNED TO RUN PARALLEL AT THE SAME

APPROVED EQUAL. TRAPEZE HANGERS OF A TYPE APPROVED BY THE OWNER'S REPRESENTATIVE

ELEVATION. PROVIDE ISOLATION HANGER WITH PROTECTIVE SHIELD, GRINNELL, MODEL NO. 300 103 OR APPROVED EQUAL, FOR ALL INSULATED PIPING. AT HANGER POINTS, PROVIDE 6 INCH LONG SECTION OF 1/2 INCH THICK CALCIUM SILICATE SECTIONAL PIPE INSULATION WITH FACTORY LONGITUDINAL LAP. SEAL BUTT JOINTS WITH INSULATING CEMENT.

### STRAP HANGERS: NOT PERMITTED.

RISER CLAMPS: PROVIDE RISER CLAMPS FOR VERTICAL PIPING AT EACH LEVEL, **GRINNELL MODEL NO. 261** 

#### INSERTS: IN CONCRETE, GRINNELL MODEL NO. 285 OR APPROVED EQUAL, HAVING ADJUSTMENT FROM 3/4 INCH THROUGH 1-1/4 INCH. IN METAL DECKS READHEAD SD1 OR APPROVED EQUAL, POWDER PROPELLED PERMITTED IN NEW CONSTRUCTION WHERE TYPE AND LOCATION ARE APPROVED PRIOR TO

INSTALLATION. IN EXISTING CONSTRUCTION, START SLUGIN NO. 6800 SERIES OR APPROVED EQUAL. SIDE BEAM CLAMPS: PROVIDE WHEN SUPPORTING FROM STRUCTURAL STEEL

MEMBERS, GRINNELL, MODEL 225 OR APPROVED EQUAL. OTHER SUPPORTS: OBTAIN OWNER'S REPRENTATIVE APPROVAL FOR OTHER

#### SPACING OF HANGERS PROVIDE HANGER AT EACH CHANGE OF DIRECTION.

METHODS OF SUPPORT.

SPACE HANGERS AND SUPPORTS TO PREVENT SAGGING AND REDUCE STRAIN ON VALVES AND SPECIALTIES WITH SPACING NO GREATER AND ROD NO SMALLER THAN SHOWN ON THE FOLLOWING TABLE. HANGERS SHALL ALLOW FOR

#### EXPANSION AND CONTRACTION. FERROUS PIPING AND COPPER TUBING: DIAMETER OF PIPE MAXIMUM SPACING ROD SIZE 1/2" THROUGH 1-1/2" 6 FT. 3/8"

#### 6" AND LARGER 16 FT. 3/4" D. **CAST IRON PIPING:**

DIAMETER OF PIPE MAXIMUM SPACING ROD SIZE 2" AND 3" EACH JOINT 3/8" 4" AND 5" EACH JOINT 1/2" 6" AND 8" EACH JOINT 3/4"

2" THROUGH 3" 10 FT. 1/2"

4" THROUGH 5" 12 FT. 5/8"

10" THROUGH 15" EACH JOINT 3/4" (TWO HANGERS)

#### RISER CLAMPS INSTALL AT EACH LEVEL BELOW THE FLOOR. SUSPEND FROM TWO HANGER RODS AND INSERTS WHERE THE INSTALLATION OF ESCUTCHEON PLATES IS REQUIRED.

### TESTING OF PLUMBING PIPING

CONCEALED OR COVERED.

CONDUCT ALL TESTS AFTER PIPING IS INSTALLED AND BEFORE PIPING IS

PROVIDE ALL NECESSARY TEMPORARY PIPING CLOSURES.

PROVIDE ALL TESTING EQUIPMENT, MATERIALS AND SUPPLIES.

SYSTEMS SHALL REMAIN UNDER TEST FOR SUFFICIENT LENGTH OF TIME TO PROVE TIGHTNESS THEREOF AND FOR ADEQUATE OBSERVATION BY THE ARCHITECT-ENGINEER.

MATERIALS OTHER THAN THOSE SPECIFIED FOR JOINING WILL NOT BE PERMITTED IN THE PIPING SYSTEMS FOR THE PURPOSE OF STOPPING LEAKS.

ALL LEAKS DISCLOSED BY THE TESTING PROCEDURES SHALL BE REPAIRED AND

TESTING REPEATED UNTIL THE SYSTEM IS PROVEN TIGHT. TESTING REQUIREMENTS ARE MINIMUM AND ARE NOT INTENDED TO BE LIMITING WHERE ADDITIONAL TESTING METHODS ARE REQUIRED BY THE AUTHORITY

# HAVING JURISDICTION.

STERILIZATION: PROVIDE A DATED LETTER TO THE ARCHITECT-ENGINEER'S REPRESENTATIVE STATING THAT PIPING SYSTEM HAS BEEN STERILIZED AND FLUSHED AS SPECIFIED.

#### PIPING TEST DOMESTIC HOT AND COLD WATER PIPING SHALL BE FILLED. THEN TESTED TO A

OF ONE HOUR. SANITARY PIPING, PREVIOUS TO CONNECTION OF FIXTURES, SHALL BE FILLED WITH WATER TO THE TOP OF THE SYSTEM AND PROVEN TIGHT. WHEN TESTING

HYDROSTATIC PRESSURE OF 150 PSIG. MAINTAIN TEST PRESSURE FOR A MINIMUM

#### BE 10 FEET. EXAMINE ALL JOINTS FOR LEAKS. NEW FIRE STANDPIPE SYSTEM SHALL BE TESTED TO A HYDROSTATIC PRESSURE

OF 200 PSIG. MAINTAIN TEST PRESSURE FOR A MINIMUM OF TWO HOURS.

THE SYSTEM BY SECTIONS THE MINIMUM HEIGHT OF THE WATER COLUMN SHALL

#### GAS PIPING SHALL BE TESTED WITH NITROGEN TO 50 PSIG. PRESSURE SHALL BE MEASURED WITH A MANOMETER. MAINTAIN TEST PRESSURE FOR A MINIMUM OF 30 MINUTES.

#### STERILIZATION AFTER TESTS ARE COMPLETED ALL WATER SUPPLY SYSTEMS SHALL BE FILLED WITH A SOLUTION CONTAINING 100 PPM OF AVAILABLE CHLORINE AND ALLOWED TO STAND FOR A PERIOD TO TWO HOURS BEFORE BEING FLUSHED WITH CLEAN

### PLUMBING, FIXTURES, TRIM AND DRAINS

### MANUFACTURER

MANUFACTURER SHALL BE AS SCHEDULED OR BY APPROVED EQUAL.

#### PIPING TO SERVE FIXTURES AND EQUIPMENT AND EXPOSED TO VIEW IN FINISHED AREAS SHALL BE BRASS, CHROMIUM PLATED.

SUPPORTS PROVIDE ALL BRACKETS, PLATES, ANCHORS AND FASTENING DEVICES REQUIRED FOR ANCHORING THE FIXTURES RIGIDLY IN PLACE. RISERS TO SHOWER HEADS

#### SHALL BE ANCHORED TO THE WALL CONSTRUCTION TO PREVENT MOVEMENT. **FIXTURES** PROVIDE PLUMBING FIXTURES AS SCHEDULED ON DRAWINGS, AMERICAN

PLUMBING DRAINS FURNISH WITH SEEPAGE FLANGE WHERE INSTALLED WITH PANS OR FLASHING, FURNISH CLAMPING RING.

### ALL DRAINS SHALL BE OF THE SAME MANUFACTURER.

STANDARD, KOHLER, ELJER OR APPROVED EQUAL.

FURNISH FLOOR DRAINS WITH PRIMER CONNECTIONS WHERE INDICATED ON THE DRAWINGS, IN LIEU OF CAST-IN PRIMER CONNECTIONS ON THE DRAIN BODY, A TEE BETWEEN THE DRAIN BODY AND THE TRAP, TO RECEIVE THE PRIMER DISCHARGE WILL BE ACCEPTABLE.

# PROVIDE FLOOR DRAINS WITH 4 INCH DEEP SEAL TRAPS.

PROVIDE ALL DRAINS AS SCHEDULED ON DRAWINGS OR APPROVED EQUAL.

DRAIN SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS; ACCESSIBLE AND LOCATED TO SUIT EQUIPMENT APPROVED FOR INSTALLATION, WHERE FLUSH VALVES ARE SPECIFIED WITH FIXTURES, THE SUPPLY TO THE VALVE IN EACH ROOM SHALL BE AT THE SAME HEIGHT FOR THE TYPE OF FIXTURE AND THE VALVE SHALL BE SET IN PLACE SO THAT THE CENTER LINE OF THE VALVE DISCHARGE IS DIRECTLY ABOVE THE CENTER LINE OF FIXTURE STUD. BENDING OF NIPPLE BETWEEN THE VALVE AND THE STUD TO ACHIEVE CONNECTION WILL NOT BE PERMITTED.

CHROME PLATED PIPING REQUIRING THE USE OF WRENCH SHALL BE PROTECTED FROM DAMAGE.

#### BOLT WATER CLOSET CARRIER TO FLOOR.

SHALL COMPLY WITH THE REQUIREMENTS OF NFPA NO. 54 AND THE LOCAL GAS

PIPE SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH MALLEABLE FITTINGS

PIPING SHALL COMPLY WITH THE REQUIREMENTS OF NFPA NO. 54 AND THE LOCAL GAS COMPANY.

INSTALL GAS SHUT-OFF AND GAS MANIFOLDS AS INDICATED OR REQUIRED.

### DOMESTIC HOT AND COLD WATER

### DESCRIPTION

THE WORK INCLUDES FURNISHING AND INSTALLING HOT AND COLD WATER PIPING AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.

### HOT AND COLD WATER PIPING SHALL BE COPPER WATER TUBE HARD TEMPER,

GATE VALVES

TYPE "K" WITH WROUGHT SOLDER FITTINGS BELOW GRADE.

### SPECIFIED IN SECTION, PLUMBING VALVES

EXISTS, INSTALL VACUUM BREAKERS.

NOTCHING OF PIPE FOR CONNECTION NOT PERMITTED. WHERE POSSIBILITY OF BACKFLOW FROM THE DRAIN TO THE SUPPLY FITTING

TYPE "L" WITH WROUGHT SOLDER FITTINGS ABOVE FLOOR AND SOFT TEMPER

NOT MORE THAN ONE LAVATORY, SINK, OR SIMILAR FIXTURE SHALL BE SUPPLIED BY A 1/2 INCH BRANCH. LINEAR DIMENSIONS NOT TO EXCEED 5 FEET.

OR SPECIFIED HEREIN. HOT WATER BRANCH CONNECTIONS TO DISTRIBUTION MAINS SHALL BE TOP

MAKE CONNECTION TO EQUIPMENT AND FIXTURES INDICATED ON THE DRAWINGS

TAKE-OFF, SWING JOINT TYPE. ALL PIPING INSTALLED BELOW GROUND SHALL RECEIVE TWO COATS OF KOPPERS

# <u>PLUMBIN</u>G INSULATION

NO. 50 OR APPROVED EQUAL.

INSULATION SHALL NOT BE INSTALLED UNTIL TESTING PROCEDURES HAVE BEEN COMPLIED WITH AND ALL SURFACES HAVE BEEN CLEANED AND FREE OF DIRT, GREASE AND COMPLETELY DRIED.

#### TEST PERFORMANCE, AND SMOKE DEVELOPED RATING. SUBMITTALS

INSULATION AND ADHESIVE AND PRODUCT DATA LISTING RECOMMENDATIONS

SAMPLES AND MANUFACTURER'S PRODUCT DATA: SUBMIT SAMPLES OF

MATERIALS SHALL COMPLY WITH UL 723, FLAME SPREAD RATING, HOT SURFACE

### FOR USE AND COMPLIANCE WITH NFPA 90.

APPROVED EQUAL.

INSULATION INSULATION FOR HOT AND COLD WATER PIPING, SHALL BE SECTIONAL GLASS FIBER AS MANUFACTURED BY OWENS CORNING FIBERGLASS TYPE ASJ/SSLII OR APPROVED EQUAL, WITH FACTORY APPLIED, ALL PURPOSE, FIRE RETARDANT

INSULATION FOR EXPOSED HOT AND COLD WATER PIPING SHALL BE SECTIONAL GLASS FIBER AS MANUFACTURED BY OWENS CORNING FIBERGLASS TYPE ASJ/SSLII OR APPROVED EQUAL, WITH FACTORY APPLIED, .016 EMBOSSED ALUMINUM JACKET.

ADHESIVE SHALL BE BENJAMIN FOSTER 30-36, OR APPROVED EQUAL, WHITE INSULATION LAGGING ADHESIVE.

VAPOR BARRIER MASTIC SHALL BE BENJAMIN FOSTER NO. 82-07, WHITE, OR

### HOT AND COLD WATER PIPING: SHALL BE INSULATED WITH 1/2 INCH THICK GLASS FIBER INSULATION HAVING A FACTORY APPLIED, ALL PURPOSE, FIRE RETARDANT JACKET WITH A MINIMUM R-4.0 PER INCH. CONCEALED AND EXPOSED PIPING

SHALL HAVE THE INSULATION APPLIED WITH SIDE AND END JOINTS BUTTED

TIGHTLY. SEAL JACKET LEGS AND BUTT JOINT STRIPS WITH ADHESIVE.

INSULATE FITTINGS FOR PIPING UP TO 3 INCHES IPS WITH MOLDED GLASS FIBER INSULATE FITTINGS FOR PIPING LARGER THAN 3 INCHES WITH MOLDED FITTINGS OR SEGMENTED SECTIONS, WIRED IN PLACE TO THE SAME THICKNESS AS ADJACENT INSULATION. EXPOSED INSULATED PIPING AND FITTINGS SHALL BE JACKETED WITH 6 OUNCE CANVAS PIPING INCLUDING THE FITTING CHANGE FROM HORIZONTAL TO VERTICAL. CONCEALED AND EXPOSED PIPING SHALL HAVE THE INSULATION APPLIED WITH SIDE AND END JOINTS BUTTED TIGHTLY. SEAL OFF

ENDS OF INSULATION WITH VAPOR BARRIER MASTIC AT EACH FITTING AND AT 21

FOOT INTERVALS ON CONTINUOUS RUNS.

INSTALL THE FACTORY APPLIED FIRE RETARDANT JACKET VAPOR BARRIER SO THAT IT WILL LAP SMOOTHLY AND SECURELY AT THE LONGITUDINAL LAP AND ADHERE IT WITH VAPOR BARRIER MASTIC. ADHERE 3 INCH WIDE BUTT STRIPS X SMOOTHLY OVER ALL END JOINTS WITH THE VAPOR BARRIER MASTIC TO ASSURE A CONTINUOUS VAPOR BARRIER - NO STAPLES ALLOWED, INSULATE DRAIN BODIES AND FITTINGS WITH METERED SEGMENTS OF PIPE INSULATION, OVERSIZED PIPE INSULATION OR MOLDED FITTINGS, COAT WITH TWO, 1/8 INCH COATS OF VAPOR BARRIER MASTIC REINFORCED WITH GLASS FABRIC EXTENDING 2 INCHES ONTO ADJACENT PIPES. EXPOSED INSULATED PIPING AND FITTINGS SHALL BE JACKETED WITH 8 OUNCE CANVAS. TERMINATE INSULATION NEATLY AT CLEANOUTS ON STORM AND COLD DRAIN PIPING. DO NOT COVER CLEANOUTS.

#### DOMESTIC WATER HEATING

#### PROVIDE DOMESTIC WATER HEATING EQUIPMENT WHERE SHOWN ON DRAWINGS AND SPECIFIED.

#### DISCHARGE PIPE RELIEF VALVE DISCHARGE SHALL BE COPPER WATER TUBE, TYPE M.

WATER HEATER SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS.

DISCHARGE PIPE SHALL HAVE TERMINATING END CUT AT 45 DEGREE ANGLE.

TERMINATE RELIEF VALVE DRAIN AS SHOWN ON THE DRAWINGS.



RELEASED FOR CONSTRUCTION As Noted on Plans Reviev

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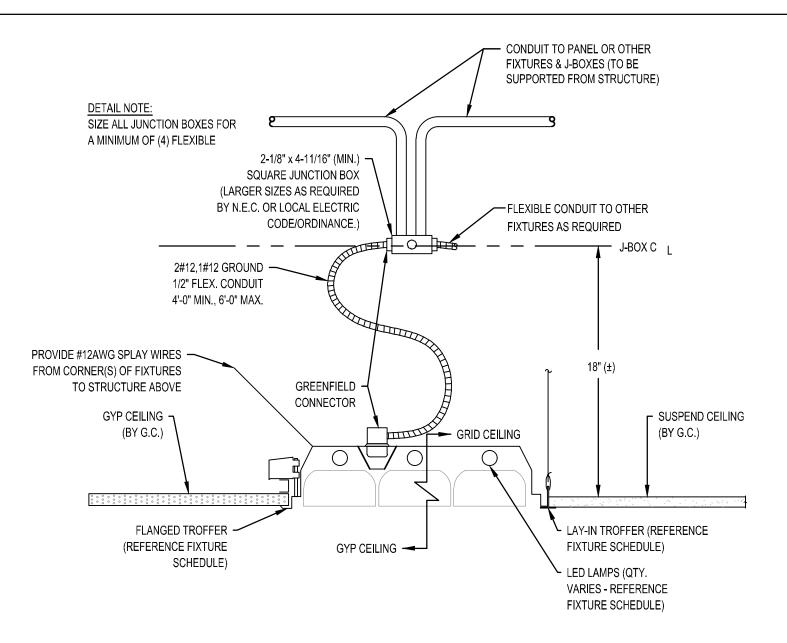
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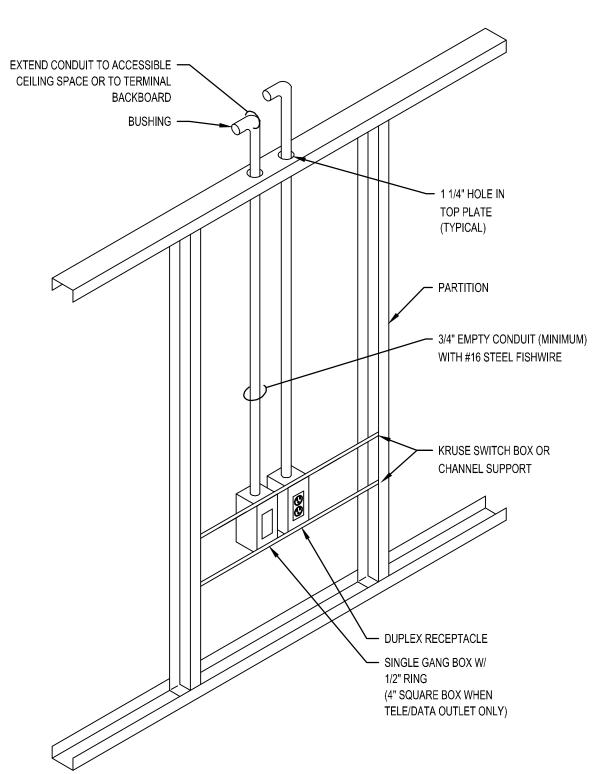
PLUMBING

**SPECIFICATIONS** 

issued for



# TYPICAL RECESSED FIXTURE DETAIL SCALE: NOT TO SCALE



OUTLET IN HOLLOW PARTITION

AC	ALTERNATING CURRENT
AHU	AIR HANDLING UNIT
A. OR AMPS.	AMPERES
AFC	ABOVE FINISH COUNTER
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AIC	AMPERES INTERRUPTING CAPACITY
ATS	AUTOMATIC TRANSFER SWITCH
BTC C	BRANCH TO CONNECTION POINT AND CONNECT EQUIPMENT
CF	CONDUIT ("E.C." IS EMPTY CONDUIT)  CEILING FAN
CM	COFFEE MAKER
CT	COOKTOP
D	DEDICATED CIRCUIT
DCO	DUPLEX CONVIENCE OUTLET
DP	DISPOSAL
DW	DISHWASHER
DY	DRYER
EMT	ELETRICAL METALLIC TUBING
EF	EXHAUST FAN
EWC	ELECTRIC WATER COOLER (WATER-COOLED DRINKING FOUNTAIN)
EX	EXISTING
FCU	FAN COIL UNIT
GFI/GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFIP	GROUND FAULT INTERRUPTER PROTECTED
GRD	GROUND
HD HD	HORIZONTAL MOUNT (RECEPTACLE)  VENTILATION HOOD
HP	HORSEPOWER
HT	HEAT TRACE POWER (PROVIDE W/ 20A/1P GFI BREAKER)
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
HZ	HERTZ
IG	ISOLATED GROUND (DUPLEX RECEPTS NEMA 5-20RIG)
KCM	THOUSAND CIRCULAR MILLS
KVA	KILOVOLT-AMPERES (1000 VOLT-AMPERES)
KW	KILOWATTS (1000 WATTS)
MLO	MAIN LUGS ONLY
MCB	MAIN CIRCUIT BREAKER
MW	MICROWAVE (COORD MTG HT W/ ARCHITECT)
NIC	NOT IN CONTRACT
NEC	NATIONAL ELECTRICAL CODE
NF OF OLD	NOT FUSED
OFCI PNL	OWNER FURNISHED CONTRACTOR INSTALLED
PH OR Ø	PANEL PHASE
P	POLE
PVC	POLYVINYL CHLORIDE
RF	REFRIGERATOR
RG	RANGE
SPD	SURGE PROTECTIVE DEVICE
T	TAMPERPROOF RECEPTACLE
TTB	TELEPHONE TERMINAL BOARD
TV	TELEVISION RECEPTACLE
UC	UNDERCOUNTER REFRIGERATOR (OR ICE MACHINE)
UL	UNDERWRITERS LABORATORIES
U.N.O.	UNLESS NOTED OTHERWISE
V	VOLTAMPERE
VA	VOLT-AMPERES
VED	VENDING MACHINE (24"AFF)
VFD W	VARIABLE FREQUENCY DRIVE
WA	WATTS WASHER
WD	WASHER WARMING DRAWER
WO	WALL OVEN
WP	WEATHERPROOF
WP/WR	WEATHER RESISTANT WEATHER RESISTANT
W/UNIT	DISCONNECT IS SUPPLIED WITH THE UNIT

# GENERAL ELECTRICAL NOTES

- . COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE,
- . DO NOT SCALE FROM THESE DRAWINGS. . REFER TO ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL
- LIGHTING FIXTURES AND ELECTRICAL DEVICES.

REQUIREMENTS OF THE AHJ AND ALL LOCAL & STATE CODES.

- . ALL EMPTY CONDUITS SHALL BE PROVIDED WITH PULL STRINGS AND BUSHINGS. ALL JUNCTION BOXES SHALL HAVE A COVER.
- . COORDINATE EACH LIGHT FIXTURE INSTALLATION(S) W/ ACTUAL CEILING TO BE FURNISHED. ALL BRANCH CIRCUITS WITHOUT A CONDUCTOR & CONDUIT INDICATED SHALL BE ROUTED TO A 20A-1P
- BREAKER W/ 2#12,1#12EG,3/4"C. ALL BRANCH CIRCUIT CONDUCTORS SHALL NOT BE SMALLER THAN #12 AWG AND ALL CONDUIT SHALL NOT
- BE SMALLER THAN 3/4"C. UNLESS SPECIFICALLY NOTED OTHERWISE. ALL CIRCUITS (LIGHTING AND POWER) SHALL BE PROVIDED WITH DEDICATED NEUTRALS UNLESS NOTED OTHERWISE. WHERE NEUTRALS ARE INDICATED TO BE SHARED, MULTIWIRE BRANCH CIRCUITS SHALL BE PROVIDED WITH 2P OR 3P BREAKERS AS REQUIRED PER NEC210.4.
- ALL CIRCUITS (LIGHTING AND POWER) SHALL BE PROVIDED WITH AN INSULATED EQUIPMENT GROUND CONDUCTOR SIZED IN ACCORDANCE WITH THE NEC. THE RACEWAY SHALL NOT BE USED AN EQUIPMENT
- . ALL FIXTURES SHALL BE SUPPORTED FROM EACH CORNER (INDEPENDENT OF THE SUSPENDED CEILING) WITH 12 GAUGE WIRE CONNECTED TO STRUCTURAL SYSTEM OF BUILDING. THE INSTALLATION SHALL MEET OR EXCEED THE SEISMIC REQUIREMENTS OF LOCAL AND NATIONAL CODES. 2. ELECTRICAL DEVICE MOUNTING HEIGHTS, UNO:

PANELBOARDS 78" AFF TO TOP OF PANEL SWITCHES 48" AFF TO TOP OF JUNCTION BOX RECEPTACLES 18" AFF TO CENTER OF RECEPTACLE

- TELE/DATA OUTLETS 18" AFF TO CENTER OF RECEPTACLE APARTMENT LOADCENTERS PER ANSI A117.1 REQUIREMENTS (VERIFY WITH LOCAL INSPECTOR) 13. ELECTRICAL EQUIPMENT (PANELBOARDS, TRANSFORMERS, DISTRIBUTION EQUIPMENT, ETC.) IS SHOWN TO
- SCALE ON THE FLOOR PLANS. 14. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING EQUIPMENT THAT WILL FIT WITHIN THE
- SPACES SHOWN ON THE PLANS AND COMPLYING WITH ALL CODE REQUIRED CLEARANCES. 15. ELECTRICAL CONTRACTOR TO LABEL ALL DEVICES (RECEPTACLES, SWITCHES, PANELBOARDS,
- DISCONNECTS, ETC.) WITH CIRCUIT NUMBER AND PANELBOARD DESIGNATION. RECEPTACLES, SWITCHES, AND SIMILAR DEVICES TO HAVE PRE-PRINTED, SELF ADHESIVE LABEL. PANELBOARDS, DISCONNECT SWITCHES, AND SIMILAR DEVICES TO HAVE ENGRAVED, SELF-ADHESIVE,
- LAMINATED ACRYLIC LABEL (BLACK W/ WHITE LETTERING). 7. PROVIDE TYPE-WRITTEN PANELBOARD SCHEDULES FOR ALL ELECTRICAL PANELBOARDS.

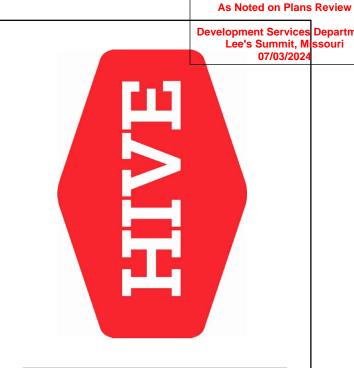
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REFER TO LIGHT FATURE SCHEDULE  224 LIGHT FATURE (JETTER RIDDIATES PATURE TYPE) 225 LIGHT FATURE SCHEDULE  226 LING  23003712  RUSDIANS NIGHTER AS AS SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHTER AS AS AS A SPOLE SWITCH WITH 1284 PUSES) 2300372  RUSDIANS NIGHT PUSES SWIETCH WITH 1284 PUSES 2300372  RUSDIANS NIGHT PUSES SWIETCH WITH 1284 PUSES) 2400372  RUSDIANS NIGHT PUSES SWIETCH WITH 1284 PUSES) 2500372  RUSDIANS NIGHT PUSES SWIETCH WITH 1284 PUSES 2500372  RUSDIANS NIGHT						A
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MARKSENDY BLOCKLEY  STATE OF THE PROPERTY LIGHT FATURE LIGHTER INDICATES FATURE  CELLING  THE PROPERTY CLIGHT FATURE SCHEDUL:  EMERSENCY EXT SIGN. PROVIDE ARROWS; AS INDICATED. SHOWN RIGHTER FATURE SCHEDUL:  EMERSENCY EXT SIGN. PROVIDE ARROWS; AS INDICATED. SHOWN RIGHT STATE SCHEDUL:  SHOWN RIGHT STATE SCHEDUL:  SOUND SHOWN RIGHT STATE SCHEDUL:  SOUND SHOWN RIGHT STATE SCHEDUL:  FOUR WAY SWITCH 20A (12027TV)  WALL -46" AFF  WALL -46" AFF  WALL 50" AFF  WALL -46" AFF			30/20/3	CEILING		A
TYPE; REFERE TO LIGHT PRIVILES SCHEDILLE  STATE OF SHADING INDICATES PACE LETTER NIDICATES PRIVILES TRITINE TYPE)  REFERENCY EXT SIGN PROVIDE ARROWS AS NOCATED.  SHADING INDICATES PACE LETTER NIDICATES PRIVILES TRITINE TYPE)  SHADING INDICATES PACE LETTER NIDICATES PRIVILES TRITINE TYPE)  SINGLE POLE SWITCH 20A (120277V)  WALL +87 AFF  WALL -87 AFF  WALL -88 AFF			30/NF/3L			
SHADING NOICATES FACE LETTER NOICATES FIXTURE TYPE)  CELING  SINGLE POLE SWITCH 20A (120/277V)  WALL 48° AFF  WAL		MOTOR RATED SWITCH	SM			<b>1</b>
S <sub>3</sub> THREE WAY SWITCH 20A (120277V) WALL -48" AFF		MOTOR	N		SHADING INDICATES FACE (LETTER INDICATES FIXTURE TYPE)	<b>₹</b> x1 <b>1€1</b>
S4 FOUR WAY SWITCH 20A (120/277V)  WALL - 48' AFF  WALL BOX DIMMER SWITCH  WALL - 48' AFF  WALL BOX DIMMER SWITCH  WALL - 48' AFF  WALL - 48'	WALL - 18" AFF	NEMA 5-20R SIMPLEX RECEPTACLE	Ю	WALL - 48" AFF	SINGLE POLE SWITCH 20A (120/277V)	S
WALL 48" AFF  WALL BOX DIMMER SWITCH  WALL 48" AFF  WALL 48" AFF  CEILING OR WALL MOUNTED OCCUPANCY SENSOR (LETTER INDICATES SENSOR TYPE) REFER TO LIGHTING CONTROL S SCHEDULE  CEILING  WALL 48" AFF  WALL 48" AFF  CEILING  WALL 48" AFF  WAL	WALL - 18" AFF	NEMA 5-20R DUPLEX RECEPTACLE	₩	WALL - 48" AFF	THREE WAY SWITCH 20A (120/277V)	$S_3$
CEILING OR WALL MOUNTED OCCUPANCY SENSOR (LETTER INDICATES SENSOR TYPE) REFER TO LIGHTING CONTROLS SCHEDULE  LOW-VOLTAGE CONTROL STATION (LETTER INDICATES SENSOR TYPE) REFER TO LIGHTING CONTROLS SCHEDULE  WALL -48" AFF REFER TO LIGHTING CONTROLS SCHEDULE  WALL -48" AFF REFER TO LIGHTING CONTROLS SCHEDULE  WALL -48" AFF REFER TO LIGHTING CONTROLS SCHEDULE  PHOTOCELL SENSOR (LETTER INDICATES SENSOR TYPE) REFER TO LIGHTING CONTROLS SCHEDULE  PPOWERPACK (LETTER INDICATES POWERPACK TYPE) REFER TO LIGHTING CONTROLS SCHEDULE  CEILING  COMMUNICATION/LOW-VOLTAGE DEVICES  SYMBOL  DESCRIPTION  MOUNTING  CARD READER (VERIFY EXACT REQUIREMENTS)  MALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELEIDATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELEIDATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL -18" AFF ROVIDE PULL	1	NEMA 5-20R DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER	<b>₩</b>	WALL - 48" AFF	FOUR WAY SWITCH 20A (120/277V)	S <sub>4</sub>
## CEILING	WALL - 18" AFF	NEMA 5-20R QUAD-PLEX RECEPTACLE	<b>₩</b>	WALL - 48" AFF	WALL BOX DIMMER SWITCH	Н
COMMUNICATION/LOW-VOLTAGE DEVICES   Wall - 48" AFF   Wall - 68" AND DATA CONNECTION SCHEDULE   Wall - 68" AND DATA CONNECTION WITH FURNITURE VENDOR   Wall - 68" AND DATA CONNECTION SCHEDULE   Wall -	WALL - 18" AFF		<b>\(\operatorname(\text{\tin}\text{\tetx{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\texi}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\texi}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\ti}\}\tittt{\text{\texi}\text{\text{\texi}\tittt{\text{\texi}\text{\text{\text{\texi}\text{\texi}\texittt{\text{\texit{\text{\tetit}\tittt{\texi}\tilint{\text{\texit{\texi}\texi{\texi{\t</b>		(LETTER INDICATES SENSOR TYPE)	$ \diamondsuit_{X}  \nabla_{\!$
REFER TO LIGHTING CONTROLS SCHEDULE   FIELD VERIFY   SIMILAR TO HUBBELL #USB20AC5W	WALL - 18" AFF OR CEILING		90	WALL - 48" AFF	(LETTER INDICATES CONTROL STATION TYPE)	НСX
COMMUNICATION/LOW-VOLTAGE DEVICES   SYMBOL   DESCRIPTION   MOUNTING	WALL - 18" AFF		₩USB	FIELD VERIFY	(LETTER INDICATES SENSOR TYPE)	<b>₽</b> C X
SYMBOL DESCRIPTION MOUNTING  CARD READER (VERIFY EXACT REQUIREMENTS)  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  PROVIDE PULLSTRING IN CONDUIT TO	CEILING - FLUSH	NEMA 5-20R DUPLEX RECEPTACLE MOUNTED ON CEILING	<del>©</del>		(LETTER INDICATES POWERPACK TYPE)	PP
CR CARD READER (VERIFY EXACT REQUIREMENTS)  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  PLOOR OR CEILING  PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  PROVIDE PULLSTRING IN CONDUIT TO ACCESSI	FLOOR - FLUSH	WITH (2) DUPLEX RECEPTACLES AND DATA/COMMUNICATION	FB1	DEVICES	UNICATION/LOW-VOLTAGE [	COMM
DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  FLOOR OR CEILING  PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  P	FLOOR - FLUSH	WITH (1) DUPLEX RECEPTACLE AND DATA/COMMUNICATION	FB2	MOUNTING	DESCRIPTION	
PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  WALL - 18" AFF  HUBBELL S1PT SERIES 4" POKE-THRU (OR EQUAL) WITH (2) DUPLEX RECEPTACLES AND DATA/COMMUNICATION CONNECTION CAPABILITY PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  DATA, TELEPHONE, OR COMBO TELE/DATA OUTLET PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  FLOOR OR CEILING  HUBBELL S1PT SERIES 4" POKE-THRU (OR EQUAL) FOR POWER AND DATA CONNECTIONS TO PRE-WIRED FURNITURE VERIFY EXACT CONNECTION WITH FURNITURE VENDOR	FLOOR - FLUSH	FOR POWER AND DATA CONNECTIONS TO PRE-WIRED FURNITURE	FB3			CR
PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING  CEILING  HUBBELL S1PTFF SERIES 4" POKE-THRU (OR EQUAL) FOR POWER AND DATA CONNECTIONS TO PRE-WIRED FURNITURE VERIFY EXACT CONNECTION WITH FURNITURE VENDOR	FLOOR - FLUSH	HUBBELL S1PT SERIES 4" POKE-THRU (OR EQUAL) WITH (2) DUPLEX RECEPTACLES AND DATA/COMMUNICATION	PK1	-	PROVIDE PULLSTRING IN CONDUIT TO ACCESSIBLE CEILING	
WALLOR I VENTION CONTROL VENTION WITH CHARACTER VENTION CONTROL VENTION CONTRO	FLOOR - FLUSH	HUBBELL S1PTFF SERIES 4" POKE-THRU (OR EQUAL) FOR POWER AND DATA CONNECTIONS TO PRE-WIRED FURNITURE	PK2	CEILING	· · · · · · · · · · · · · · · · · · ·	
CEILING  HUBBELL S1R6 SERIES 6" POKE-THRU (OR EQUAL) WITH (2) DUPLEX RECEPTACLES AND DATA/COMMUNICATION AND A/V CONNECTION CAPABILITY	FLOOR - FLUSH	HUBBELL S1R6 SERIES 6" POKE-THRU (OR EQUAL) WITH (2) DUPLEX RECEPTACLES AND DATA/COMMUNICATION AND	(PK3)		TELEVISION OUTLET	
SPEAKER OUTLET  FIELD VERIFY   CONDUIT IN OR UNDER FLOOR/GRADE				FIELD VERIFY	SPEAKER OUTLET	<b>Ø</b>
TELEPHONE TERMINAL BOARD  WALL  CONDUCTOR HOME RUN - (1) HOT, (1) NUETRAL, (1) EQUIPMENT GROUND, & (1) ISOLATED GROUND		CONDUCTOR HOME RUN - (1) HOT, (1) NUETRAL, (1) EQUIPMENT GROUND, & (1) ISOLATED GROUND		WALL	TELEPHONE TERMINAL BOARD	'TTB'
SECURITY CAMERA OUTLET  FIELD VERIFY  EQUIPMENT CONNECTION		•		FIELD VERIFY	SECURITY CAMERA OUTLET	

CONDUIT IN CEILING OR WALL

NOTE: NOT ALL SYMBOLS MAY BE USED.

PUSH BUTTON

 $\langle$  1  $\rangle$  IF MOUNTED ABOVE A COUNTER, DEVICE TO BE WALL MOUNTED 6" ABOVE FINISHED COUNTER OR 44" TO TOP OF JUNCTION BOX (WHICHEVER IS LOWER). IF NOT MOUNTED ABOVE A COUNTER, DEVICE TO BE WALL MOUNTED AT 48" AFF TO TOP OF JUNCTION BOX AS REQUIRED TO MEET ADA REQUIREMENTS. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS/ELEVATIONS.



CONSTRUCTION

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OVERLAND PARK, KS 68207
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MO Certificate of Authority #E-2021006522

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2024-023 project number 05.30.2024

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ELECT. NOTES, SYMBOLS & **ABBREVIATIONS** 

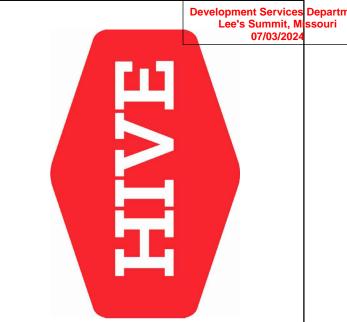


### **GENERAL NOTES**

(NOT ALL NOTES APPLY)

REFERENCE SHEET E101 FOR GENERAL NOTES,

- SYMBOLS, AND ABBREVIATIONS. 2. COORDINATE MOUNTING HEIGHTS AND LOCATIONS FOR ALL DEVICES WITH ARCHITECT AND/OR INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.
- . CIRCUIT NUMBERS ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS.
- WHERE POSSIBLE, RE-USE SPARE CIRCUITS RESULTING FROM DEMOLITION PRIOR TO PULLING NEW CIRCUITS FROM PANELBOARD.
- EXISTING CONDITIONS INDICATED IN THESE DOCUMENTS ARE BASED ON A CURSORY SITE REVIEW AND DO NOT REPRESENT A COMPLETE "AS-BUILT" SET OF DOCUMENTS. IT IS THE CONTRACTORS RESPONSIBILITY TO FULLY INVESTIGATE ALL EXISTING CONDITIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES TO THESE DOCUMENTS OR THE DESIGN INTENT.
- 6. DEVICES LABELED 'EX' ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE.



RELEASED FOR
CONSTRUCTION
As Noted on Plans Review



# FIELD VERIFY EXACT CONNECTION

REQUIREMENTS OF ALL BREAK ROOM APPLIANCES WITH OWNER PRIOR TO ROUGH-IN. 2. POWER AND DATA FOR OPEN OFFICE

KEYED NOTES:

- FURNITURE. FIELD VERIFY EXACT CONNECTION REQUIREMENTS WITH FURNITURE SUPPLIER PRIOR TO ROUGH-IN. . PROVIDE (1) 3/4" CONDUIT FOR POWER AND (1) 1-1/4" CONDUIT FOR DATA FROM POKE-THRU TO
- NEAREST WALL AND UP INTO ACCESSIBLE CEILING. PATCH AND REPAIR CONCRETE AS REQUIRED. I. POWER AND DATA FOR WALL MOUNTED TV.
- FIELD VERIFY EXACT LOCATION PRIOR TO ROUGH-IN.
- . EXISTING WATER HEATER TO REMAIN. 6. EXISTING HVAC EQUIPMENT TO REMAIN. . CONNECT EXHAUST FAN TO LIGHTING SWITCHLEG IN THIS AREA. DESIGN INTENT IS FOR FAN TO ENERGIZE 'ON'/'OFF' WITH THE LIGHT
- FIXTURES IN THIS AREA. 8. PROVIDE 4'X8'X3/4" SHEET OF FIRE RESISTANT PLYWOOD FOR TELE/DATA TERMINAL BOARD AND IT EQUIPMENT.

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ELECTRICAL POWER PLAN

E201

GENERAL NOTES

(NOT ALL NOTES APPLY)

REFERENCE SHEET E101 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS.

- COORDINATE MOUNTING HEIGHTS AND LOCATIONS FOR ALL DEVICES WITH ARCHITECT AND/OR INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.
- CIRCUIT NUMBERS ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS.
- 4. WHERE POSSIBLE, RE-USE SPARE CIRCUITS RESULTING FROM DEMOLITION PRIOR TO PULLING NEW CIRCUITS FROM PANELBOARD.
- 5. EXISTING CONDITIONS INDICATED IN THESE DOCUMENTS ARE BASED ON A CURSORY SITE REVIEW AND DO NOT REPRESENT A COMPLETE "AS-BUILT" SET OF DOCUMENTS. IT IS THE CONTRACTORS RESPONSIBILITY TO FULLY INVESTIGATE ALL EXISTING CONDITIONS AND NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES TO THESE DOCUMENTS OR THE DESIGN INTENT.
- 6. CIRCUIT ALL EXIT SIGNS TO NEAREST EMERGENCY LIGHTING CIRCUIT (OR NEAREST LIGHTING CIRCUIT (OR NEAREST LIGHTING CIRCUIT IF NO GENERATOR).

  7. VERIFY ALL EXISTING BRANCH CIRCUITING. CONTRACTOR SHALL WIRE FIXTURES IN ACCORDANCE WITH SWITCHING INDICATED. CONNECTED LOAD ON 277V-20A CIRCUITS SHALL NOT EXCEED 4000W, 120V-20A CIRCUITS SHALL NOT EXCEED 1800W.

KEYED NOTES:

SENSOR SWITCH.

SENSOR SWITCH.

CONTROL INTENT FOR THIS AREA IS FOR LIGHTS TO BE MANUAL 'ON', AUTO 'OFF' VIA OCCUPANCY

. CONTROL INTENT FOR THIS AREA IS FOR LIGHTS TO BE MANUAL 'ON', AUTO 'OFF' VIA OCCUPANCY SENSOR WITH MANUAL OVERRIDE AVAILABLE AT

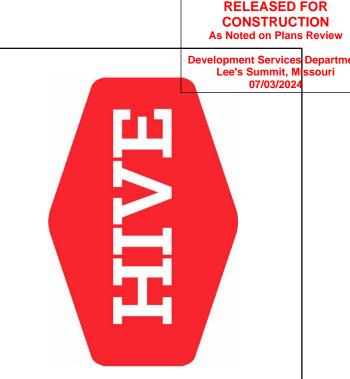
THE LOW-VOLTAGE CONTROL STATION.

B. CONTROL INTENT FOR THIS AREA IS FOR LIGHTS
TO BE AUTO 'ON', AUTO 'OFF' VIA OCCUPANCY

EXISTING SIGNAGE CIRCUIT AND CONTROLS TO REMAIN. FIELD VERIFY THE EXISTING SIGNAGE CIRCUIT HAS A NEMA 3R, LOCKABLE DISCONNECT SWITCH THAT CAN BE RE-USED FOR A NEW SIGN AS REQUIRED. IF NECESSARY, PROVIDE A LOCKABLE DISCONNECT SWITCH FOR ANY NEW SIGNAGE, FIELD VERIFY EXACT REQUIREMENTS

CONTROL INTENT FOR THIS AREA IS FOR LIGHTS TO BE AUTO 'ON', AUTO 'OFF' VIA OCCUPANCY SENSOR WITH MANUAL OVERRIDE AVAILABLE AT THE LOW-VOLTAGE CONTROL STATION.

WITH OWNER/SIGNAGE PROVIDER.



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39th St., Suite 4N, Kansas City, MO 64

FIRE

1475 SW MARKET LEE'S SUMMIT, M

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ELECTRICAL LIGHTING PLAN

sheet numbe

E301

											P/	NEL	LA (EX	ISTIN	G)											
	BUS AMP	E/PHASE: ; PERAGE: ; IN TYPE: I	200A	0V, 3PH, ₄	w						A	AFC VALUE: NC RATING: MOUNTING:		NEMA1)					SE		GR ED GROUI NTRANCE	ND BUS:		T250.122	?)	
												F	LL LOADS IN V	'A	1											
LTG	RCPT	MOTOR	HEAT	COOL	MISC	KITCHEN	ELEV	DESCRIPTION	AMP	Р		CKT#	PHASE	CKT#	WIRE		AMP	DESCRIPTION	LTG	RCPT	MOTOR	HEAT	COOL	MISC	KITCHEN	ELEV
	360							TELE/DATA BRD QUAD	20	1	12	1	Α	2	EX	1		WATER HEATER						1500		
					1500			COFFEE MAKER	20	1	12	3	В	4	12	1		INTERIOR LTG	973							
					1200			MICROWAVE	20	1	12	5	С	6	EX	1	20	SIGNA GE/TIMECLOCK	1200							
		1184						DISPOSAL	20	1	12	7	A	8				SPACEONLY								
					1000			REFRIGERATOR	20	1	12	9	В	10				SPACE ONLY								
					1000			DISHWASHER	20	1	12	11	С	12				SPACEONLY								
	540							BREAK AREA RCPTS	20	1	12	13	A	14				SPACEONLY								
	1260							OFFICE 102/103 RCPTS	20	1	12	15	В	16	EX	1	20	FURNACE (EXISTING)			1200					
	1080							CONF 101 WALL RCPTS	20	1	12	17	С	18				SPACEONLY								
	360							CONF 101 FLOORBOX	20	1	12	19	Α	20				SPACE ONLY								
	540							OP OFFICE CONV RCPTS	20	1	12	21	В	22				SPACE ONLY								
	540							OP OFFICE DESK RCPTS	20	1	12	23	С	24				SPACEONLY								
	360							OP OFFICE DESK RCPTS	20	1	12	25	А	26									2078			
	360							OP OFFICE DESK RCPTS	20	1	12	27	В	28	EX	3	40	CONDENSING UNIT (EXISTING)					2078			
					1800			COPY MACHINE	20	1	12	29	С	30	1			(EXISTING)					2078			
0	5400	1184	0	0	6500	0	0	TOTALS										TOTALS	2173	0	1200	0	6233	1500	0	0
				NE	CODER	EFERENCES				1									PHA	SELOAD	SUMMARY	,				
100% C	F 1ST 10 K	(VA, 50% C	F REMAIN	ING						†						TOTA	٩L	PHASE	LTG	RCPT	MOTOR	HEAT	COOL	MISC	кпанем	ELEV
125% (	F LARGES	T MOTOR +	- 100% SI	JM OF REN	A INING M	OTORS										638	12	A	0	1620	1184	0	2078	1500	0	0
ELEVA	TOR DEMA	ND FACTO	R BASED	ON NEC TO	320.14.											891	1	В	973	2160	1200	0	2078	2500	0	0
																889	18	c	1200	1620	0	0	2078	4000	0	0
				PA	NEL ABBR	EVIATIONS				1								· ·			SUMMAR		20.0			
- GRO	IND FALIL	T BREAKER				EM - PROV	IDE EMER	RGENCY LOCKING TAB		-						2419	90	CONNECTED VA	2173	5400	2384	0	6233	8000	0	0
	IT TRIP BRI					FA - FIRE	LARM, F	ROVIDE RED LOCKING TAB										DEMAND FACTORS	1.25	*	**	1.00	1.00	1.00	1.00	1.00
	FAULT BR							LOCKA BLE BREAKER								2473	33	DEMAND VA	2716	5400	2384	0	6233	8000	0	0
		C/GROUND	FALLET RE	REAKER				LINE DIA GRAM FOR WIRE SIZ	F							0		SHOW WINDOW DEMAND								-
		TED GROUN		LAKEN				ROLLED VIA RELAY PANEL	-							<del>-</del>		TRACK LTG DEMAND	†							
. 1104	DE NOLA				PANEL I			COLLEG VARIETIANEL		†						0%		SPARE	ł							
										+						2473		DEMAND VA + SPARE	1							
										1						68.		TOTAL DESIGN AMPS	ł							

IXTURE TAG	MANUFACTURER	MODEL #	SETTINGS	DESCRIPTION	NOTES
SC	ACUITY BRANDS: nLIGHT	nPP16 SERIES	REFER TO PLANS	ON/OFF ROOM SWITCH CONTROLLER	1,2,4
			FOR CONTROL INTENT	LINE VOLTAGE - SINGLE RELAY	
L3	ACUITY BRANDS: nLIGHT	nPODM	-	ON/OFF LOW VOLTAGE SWITCH	1,6
				WITH 1-CHANNEL CONTROL	
S1	SENSOR SWITCH	WSX SERIES	REFER TO PLANS	WALL MOUNT OCCUPANCY SENSOR	1
			FOR CONTROL INTENT	LINE VOLTAGE - SINGLE RELAY	
S3	ACUITY BRANDS: nLIGHT	nCM-9 SERIES	-	CEILING MOUNT OCCUPANCY SENSOR - SMALL MOTION	3
				LOW VOLTAGE	
S4	ACUITY BRANDS: nLIGHT	nCM-10 SERIES	-	CEILING MOUNT OCCUPANCY SENSOR - LARGE MOTION	3
				LOWVOLTAGE	
WIRE	-	-	-	CAT5, CAT5e, OR CAT 6. STANDARD OR SOLID.	
				TERMINATED AS RJ45 TIA/EIA-568B	

. COORDINATE ALL MODEL NUMBERS WITH MANUFACTURER PRIOR TO ORDERING. PROVIDE DEVICES TO MEET CONTROL INTENT INDICATED ON THE DRAWINGS. 2. PROMDE 6'-0" OF EXCESS CONTROL WIRING, COILED AND TIED, BETWEEN CEILING MOUNTED OCCUPANCY SENSOR AND CORRESPONDING LOAD CONTROLLER. 3. MODIFY LOCATIONS OF CEILING MOUNTED OCCUPANCY SENSORS AS REQUIRED SO THAT NO OCCUPACNY SENSORS IS WITHIN 4'-0" OF AN HVAC SUPPLY DIFFUSER. I. LOCATE DEVICE ABOVE CEILING OR AT STRUCTURE IN ACCESSIBLE LOCATION. LOCATIONS SHOWN ON DRAWINGS ARE SCHEMATIC. ADD ACCESS PANEL WITHIN CEILING IF NECESSARY. COORDINATE ACCESS PANEL LOCATION AND SPECIFICATION DIRECTLY WITH ARCHITECT.

5. LOCATION SHOWN ON PLAN FOR REFERENCE ONLY. CONTRACTOR MAY RELOCATE BRIDGE PORTS FOR A MORE ECONOMICAL LAYOUT IF DESIRED. 6. PROVIDE DEVICES WITH DEFAULT MANUFACTURE MARKINGS ON BUTTONS.

ROUTE RECEPTACLE CIRCUIT INDICATED ON PLAN AS "CONTROLLED RECEPTACLES" THROUGH PLUG LOAD CONTROLLER FOR AUTOMATIC ON/OFF CONTROL MA OCCUPACNY SENSOR. ONE CONTROLLED CIRCUIT PER PLUG CONTROLLER.

8. DEVICE TO BE INSTALLED IN SINGLE GANG BOX. COORDINATE TIME-OF-DAY SCHEDULES WITH OWNER FOR ZONES TO BE ON TIME-OF-DAY CONTROL.

9. PENDANT MOUNT DEVICE TO 1/2" KNOCKOUT ON JUNCTION BOX AS REQUIRED.

FIXT.			LAMPS	FIXT.	TOTAL		REMARKS/MOUNTING	
TYPE	DESCRIPTION & MANUFACTURER OPTIONS	NO.	TYPE	VOLT	WATTS	FINISH	REWARKS/WOUNTING	NOTES
	2' x 2' Field Selectable LED Troffer	1	LED	UNV	31W	Standard	Recessed (Lay-In)	
Α	M# LITHONIA #STAKS 2X2 AL03 SWW7							
В	Pendant Mounted 6' Linear LED Strip Fixture  M# BETA CALCO #BLFP1P-SL07-LPF080-CR80-CTA40-DD3-V1-DA01	1	LED	UNV	42W	Coord. w/ Architect	Mount Fixtures as Close to 10' AFF as Possible. Field Coordinate Exact Locations to Avoid	
							Obstructions.	
X2	Combination LED Exit Sign and Emergency Light Fixture, Universal Mount, Emergency Battery Pack. Provide Arrows as Indicated.  M# EVENLITE#TCXCOM-R-U-W	1	LED	UNV	2W		Wall/Ceiling/Pendant	1
	DUAL LITE#EVC-U-R-W  LED Emergency Light w/ (2) 2-Watt Adjustable LED Heads and	1 2	LED	UNV	5W	White	Surface (Wall/Ceiling)	1
Х3	Emergency Battery Backup  M# EVENLITE#TCL-4-W DUAL LITE#EV4D-02L	_		ONV	300	vvinte	Surface (vvaii/Celling)	'
X4	Combination LED Exit Sign and Emergency Light Fixture w/ Exterior Rated Remote Emergency Heads, Universal Mount, Emergency Battery Pack. Provide Arrows as Indicated.  M# EVENLITE#TCXCOM-R-U-W-PRWLED2MV DUAL LITE#EVC-U-R-W-D4 WITH EVO-D-X	1	LED	UNV	5VV		Wall/Ceiling/Pendant	1

### **GENERAL NOTES**

1. THIS RISER DIAGRAM REPRESENTS (AS ACCURATELY AS POSSIBLE) THE ELECTRICAL DISTRIBUTION SYSTEM. FIELD VERIFY ALL SIZES OF EQUIPMENT, CONDUCTORS, FUSES, ETC. ALL EQUIPMENT AND CONDUCTORS ARE EXISTING TO REMAIN UNLESS NOTED OTHERWISE. 200A, NEMA 3R -FUSED DISC. SWITCH (EXISTING)



# FEEDER SCHEDULE

BUILDING TENANT EXTERIOR SPACE

THHN/THWN COPPER CONDUCTORS W/ EG CONDUCTOR XHHW ALUMINUM CONDUCTORS W/ EG CONDUCTOR

CONDUCTORS & GROUND

CONDUCTORS & GROUND					
CODE	SETS	CONDUCTORS	RACEWAY	AMPS	
EX	ı	EXISTING CONDUCTORS TO REMAIN	EXISTING	ı	

- ALL CONDUCTORS AMPACITY BASED ON THE NEC TABLE 310-16 FOR CONDUCTORS W/ 75°C INSULATION.
- ALL RACEWAY SIZES (EMT/RMC/PVC 40) BASED ON THE NEC TABLE 4(CHAPTER 9), 40% FILL COLUMN.
- ELECTRICAL CONTRACTOR TO VERIFY ALL EQUIPMENT CONDUCTOR TERMINATION TEMPERATURE RATINGS (IE, 60°C OR 75°C). ADJUST CONDUCTOR AMPACITY AND CONDUIT SIZES ACCORDINGLY.
- VERIFY MAXIMUM NO. OF SETS OF SERVICE ENTRANCE CONDUCTORS ALLOWED W/ UTILITY CO.
- EQUIPMENT GROUNDING CONDUCTORS BASED ON T250.122. GROUND TO BE ADJUSTED PER T250.66 FOR SEPARATELY DERIVED SYSTEMS.
- ALUMINUM FEEDERS NOT TO BE USED ON TRANSFORMER SECONDARY CONDUCTORS.

# **VOLTAGE DROP CHART** BRANCH CIRCUIT VOLTAGE DROP WIRING

SCHEDULE FOR 1Ø CIRCUITS								
BRANCH CIRCUIT	WIRE SIZE	MAXIMUM LENGTH OF BRANCH CIRCUIT (FEET)						
RATING (AMPS)	(AWG)	120V	208V	240V	277V	480V		
	#12	50	90	110	125	200		
20A	#10	80	150	175	200	350		
20A	#8	140	230	280	320	550		
	#6	215	375	430	500	870		
	#10	50	100	110	130	225		
30A	#8	80	160	180	210	360		
30A	#6	135	250	280	325	560		
	#4	220	400	450	525	910		

PROVIDE BRANCH CIRCUIT CONDUCTORS AS INDICATED IN THE TABLE ABOVE FOR ALL LIGHTING AND RECEPTACLE BRANCH CIRCUITS. WHERE BRANCH CIRCUITS SERVE DEDICATED EQUIPMENT, THE CONTRACTOR MAY PERFORM VOLTAGE DROP CALCULATIONS BASED ON ACTUAL EQUIPMENT CONNECTED LOAD AND PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO A MAXIMUM OF 3%

CONDUCTOR SIZES ARE BASED ON SOLID COPPER CONDUCTORS FOR WIRES SMALLER THAN #6 AND STRANDED COPPER CONDUCTORS FOR WIRES #6 AND LARGER, IN A SINGLE METAL CONDUIT.

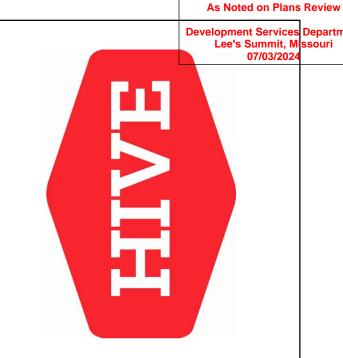
LIMITS FOR CONDUCTOR LENGTH SHOWN ARE BASED ON A MAXIMUM OF 3% VOLTAGE DROP TO COMPLY WITH THE NEC FOR CIRCUITS LOADED UP TO 80% OF THE BRANCH BREAKER RATING. FIELD VERIFY EXACT BRANCH CIRCUIT LENGTHS AND PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO 3%.

UNLESS NOTED OTHERWISE, WIRE SIZES CALLED OUT IN PANEL SCHEDULES DO NOT ACCOUNT FOR VOLTAGE DROP. CONTRACTOR SHALL INCREASE WIRE SIZES AS REQUIRED UTILIZING VOLTAGE DROP TABLE PROVIDED.

AFTER DEMOLITION, VERIFY THE QUANTITY OF AVAILABLE CIRCUITS IN THE EXISTING PANELBOARDS. IF THE QUANTITY OF AVAILABLE CIRCUITS IS NOT ENOUGH TO COMPLETE THE NEW SCOPE OF WORK, NOTIFY ENGINEER. WHERE NECESSARY, PROVIDE NEW BREAKERS AS REQUIRED.

#### **GENERAL NOTES** (NOT ALL NOTES APPLY)

- REFERENCE SHEET E101 FOR GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS. COORDINATE MOUNTING HEIGHTS AND
- LOCATIONS FOR ALL DEVICES WITH ARCHITECT AND/OR INTERIOR ELEVATIONS PRIOR TO ROUGH-IN.
- FIELD VERIFY ALL ELECTRICAL WORK WITH OWNER/ARCHITECT PRIOR TO START OF PROJECT.



RELEASED FOR CONSTRUCTION

### KEYED NOTES:

FIELD VERIFY EXISTING FEEDER IS (4)#3/0, (1)#6G IN 2" CONDUIT(MINIMUM), NOTIFY ENGINEER IF FEEDER DOES NOT MEET THIS MINIMUM REQUIREMENT.





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ELECT. RISER DIAGRAM & SCHEDULES

E401

DIVISION 16 OF THE SPECIFICATIONS COVERS ALL ELECTRICAL WORK FOR THE PROJECT. WORK SHALL INCLUDE LABOR, MATERIAL AND ACCESSORIES NECESSARY TO ACCOMPLISH THE WORK AS SPECIFIED AND SHOWN ON THE DRAWINGS, INCLUDING CONNECTION AND CHECKOUTS OF EQUIPMENT FURNISHED BY OTHERS (OTHER TRADES, THE OWNER AND OTHER CONTRACTORS), AND TO ALL EQUIPMENT ITEMS AND AS INDICATED ON DRAWINGS OR AS REQUIRED.

THE ARCHITECTURAL SPECIFICATIONS AND DRAWINGS INCLUDING THE GENERAL CONDITIONS, INCLUDING ALL SUPPLEMENTS ISSUED THERETO, INSTRUCTIONS TO BIDDERS, AND OTHERS PERTINENT DOCUMENTS ISSUED BY THE ARCHITECT ARE A PART OF THESE SPECIFICATIONS AND ELECTRICAL DRAWINGS. THIS TRADE SHALL CONSULT THEM FOR INSTRUCTIONS WHICH APPLY. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF THE ELECTRICAL LAYOUT AND WORK INCLUDED. ELECTRICIAN SHALL FOLLOW DRAWINGS IN LAYOUT THE ELECTRICAL WORK AND CONSULT THE DRAWINGS AND LAYOUTS OF OTHER TRADES TO VERIFY LOCATION AND SPACES IN WHICH WORK WILL BE INSTALLED.

CODES, PERMITS, INSPECTION AND COMMISSIONING

INSTALLATION SHALL COMPLY WITH ALL LAWS APPLYING TO ELECTRICAL WORK IN EFFECT, INCLUDING THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (N.E.C.), THE NATIONAL ELECTRICAL SAFETY CODE, ALL LOCAL GOVERNING CODES AND ORDINANCES, WITH THE REGULATIONS OF THE SERVING ELECTRICAL UTILITY COMPANY. PROVIDE ALL REQUIRED PERMITS AND INCLUDE THE COST OF SAME IN THE COST OF THE PROJECT. OBTAIN AND PAY FOR (WITHOUT ADDITIONAL EXPENSE TO THE OWNER) ALL REQUIRED INSPECTIONS AND REVIEWS. PROVIDE FOR AND PAY ALL EXPENSES (WITHOUT ADDITIONAL EXPENSE TO THE OWNER) ASSOCIATED WITH LIGHTING AND LIGHTING CONTROLS COMMISSIONING. ALL COMMISSIONING DOCUMENTATION SHALL BE CERTIFIED AND GIVEN TO OWNER AND DESIGN PROFESSIONAL.

THE FOLLOWING INDUSTRY STANDARDS AS APPLICABLE TO ELECTRICAL WORK SHALL APPLY TO THE WORK OF THIS DIVISION EXCEPT THAT, WHERE THE REQUIREMENTS OF THESE SPECIFICATIONS ARE MORE THAN THE LISTED STANDARD, THESE SPECIFICATIONS SHALL TAKE PRECEDENCE:

UL - UNDERWRITERS' LABORATORIES

NEMA - NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION NECA - NATIONAL ELECTRICAL CONTRACTOR'S ASSOCIATION ANSI - AMERICAN NATIONAL STANDARDS INSTITUTE ASTM - AMERICAN SOCIETY OF TESTING MATERIALS.

ALL MATERIALS SHALL BE NEW, UL LISTED AND LABELED WHERE LABELED MATERIALS ARE AVAILABLE, UNDAMAGED AND FREE OF DEFECTS AT TIME OF INSTALLATION. MATERIALS OR EQUIPMENT DAMAGED IN SHIPMENT OR OTHERWISE DAMAGED PRIOR TO OR DURING INSTALLATION SHALL NOT BE REPAIRED AT THE JOB SITE, BUT SHALL BE REPLACED WITH NEW MATERIALS. WHEN THE MANUFACTURER'S NAME APPEARS IN THESE SPECIFICATIONS AND DRAWINGS. IT SHALL BE CONSTRUED THAT THE MANUFACTURER HAS TO MEET THE FULL REQUIREMENTS OF THE SPECIFICATIONS AND DRAWINGS.

SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR EQUIPMENT TO THE ARCHITECT FOR ENGINEER'S REVIEW ELECTRONICALLY OR HARD COPIES. INCLUDE SUFFICIENT INFORMATION TO INDICATE COMPLETE COMPLIANCE WITH SPECIFICATIONS. PROVIDE SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW ONE WEEK FOR ENGINEER REVIEW TIME. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OF QUANTITIES; OR FOR OMITTING COMPONENTS OR FITTINGS; OR FOR NOT COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS AND/OR OTHER TRADES.

### OWNER RECORDS

ACCUMULATE DURING THE PROGRESS OF THE JOB, THE FOLLOWING DATA IN DUPLICATE, AND PREPARE IN A NEAT BROCHURE OR PACKET FOLDER TO BE TURNED OVER TO THE OWNER AT SUBSTANTIAL COMPLETION: RECORD DRAWINGS PER ABOVE

ALL WARRANTIES, GUARANTEES, AND MANUFACTURER'S DIRECTION ON EQUIPMENT & MATERIAL FURNISHED.

COMPLETE PLAIN ENGLISH STEP-BY-STEP OPERATING INSTRUCTIONS FOR THE ELECTRICAL SYSTEM. ONE COPY OF THESE INSTRUCTIONS SHALL BE FRAMED AND POSTED AS DIRECTED ON THE PREMISES.

CERTIFIED LIGHTING AND LIGHTING CONTROLS COMMISSIONING AS REQUIRED BY CURRENTLY ADOPTED ENERGY CODE REQUIREMENTS.

MANUFACTURERS' NAMES AND CATALOG NUMBERS

IN SOME INSTANCES, SPECIFIC REFERENCES HAVE BEEN MADE TO ONE OR MORE MANUFACTURER'S NAME AND MODEL OR CATALOG NUMBERS. USE OF NAMES AND CATALOG NUMBERS DOES NOT INDICATE THAT THE EQUIPMENT SPECIFIED IN NECESSARILY AN "OFF THE SHELF" ITEM. VARIANCES MAY BE DUE TO REQUIREMENT OF DESIRED FINISH, MATERIAL OR OTHER MODIFICATION.

IN THE CASE OF PANELBOARDS, SAFETY SWITCHES AND OTHER EQUIPMENT REQUIRING WIRE AND CABLE TERMINATIONS, ASCERTAIN THAT LUG SIZES AND WIRING GUTTERS OR WIRING SPACE ALLOWED IS PROPER FOR THE WIRES AND CABLES CONTAINED THEREIN.

WHEN APPROVAL IS GIVEN FOR THE USE OF EQUIPMENT DIFFERING FROM THAT SHOWN ON DRAWINGS IN REGARD TO FOUNDATIONS, SPACE FOR PIPING, DUCTWORK, WIRING, INSULATION, ETC. CHANGES REQUIRED TO ACCOMPLISH SUCH DIFFERENCES SHALL BE ACCOMPLISHED AT NO COST TO THE OWNER.

PROTECTION OF EQUIPMENT

ELECTRICAL EQUIPMENT SHALL BE PROTECTED FROM THE WEATHER, IN PARTICULAR, DRIPPING OR SPLASHING WATER, AT ALL TIMES DURING SHIPMENT, STORAGE AND CONSTRUCTION. MANUFACTURER'S RECOMMENDATIONS WITH REGARD TO STORAGE, PROTECTION, AND HANDLING SHALL BE FOLLOWED.

SHOULD ANY APPARATUS BE SUBJECTED TO POSSIBLE INJURY DUE TO WATER, IT SHALL BE THOROUGHLY DRIED AND PUT THROUGH A DIELECTRIC TEST, AT THE EXPENSE OF THE CONTRACTOR, TO ASCERTAIN THE SUITABILITY OF THE APPARATUS OR IT SHALL BE REPLACED WITHOUT ADDITIONAL COST TO THE OWNER.

DAMAGED OR DEFECTIVE EQUIPMENT: INSPECT ALL ELECTRICAL EQUIPMENT AND REQUIREMENTS. MATERIALS PRIOR TO INSTALLATION. INSTALLATION OR PLACEMENT INTO SERVICE OF DAMAGED MATERIALS WITHOUT THE PRIOR WRITTEN CONSENT OF THE OWNER IS PROHIBITED. REPLACE OR REPAIR TO NEW CONDITION, AS CERTIFIED BY THE MANUFACTURER, AND TEST DAMAGED EQUIPMENT IN COMPLIANCE WITH INDUSTRY STANDARDS AT NO ADDITIONAL COST TO THE OWNER. EQUIPMENT REQUIRED FOR THE TESTING SHALL BE PROVIDED BY THE CONTRACTOR.

THE SIZE OF ELECTRICAL EQUIPMENT SHOWN ON THE DRAWINGS IS BASED ON DIMENSIONS OF A PARTICULAR MANUFACTURER, (GENERALLY THE FIRST NAMED). WHILE OTHER MANUFACTURERS MAY BE ACCEPTABLE. IT IS THE RESPONSIBILITY OF THE TRADE TO DETERMINE IF THE EQUIPMENT PROPOSED WILL FIT IN THE ALLOCATED SPACE.

INSTALL ALL EQUIPMENT IN A MANNER TO PERMIT ACCESS TO ALL SURFACES. MAINTAIN PROPER CLEARANCE TO MEET ALL SAFETY AND OPERATING CODES. PARTICULARLY N.E.C. INCLUDE ALL REQUIREMENTS DICTATED BY OPERATION, CONTROL, ADJUSTMENT, MAINTENANCE AND POSSIBLE REPLACEMENT OF EQUIPMENT IN DETERMINING CLEARANCE.

SHOULD THERE BE APPARENT VIOLATIONS OF N.E.C. CLEARANCE, NOTIFY THE ARCHITECT-ENGINEER BEFORE PROCEEDING WITH CONNECTION OR PLACEMENT OF EQUIPMENT.

INSTALLATION STUDIES ARE REQUIRED TO COORDINATE THE ELECTRICAL WORK WITH THE WORK OF OTHER TRADES. PREPARE COORDINATION DRAWINGS AT ACCURATE SCALE WHERE SEVERAL ELEMENTS OF ELECTRICAL OR COMBINED MECHANICAL/STRUCTURAL/ELECTRICAL WORK MUST BE SEQUENCED AND POSITIONED WITH PRECISION IN ORDER TO FIT INTO THE AVAILABLE SPACE.

SHOW THE ACTUAL PHYSICAL DIMENSIONS REQUIRED FOR PROPER INTEGRATION OF EQUIPMENT WITH BUILDING SYSTEMS.

PROVIDE APPROVED SHOP DRAWINGS TO ALL REQUIRED DISCIPLINES AND VERIFY FINAL ELECTRICAL CHARACTERISTICS BEFORE ROUGHING POWER FEEDS TO ANY EQUIPMENT. WHEN ELECTRICAL DATA ON APPROVED SHOP DRAWINGS DIFFERS FROM CONTEMPLATED DESIGN, MAKE NECESSARY ADJUSTMENTS TO THE WIRING, DISCONNECTS, AND BRANCH-CIRCUIT PROTECTION FOR THE EQUIPMENT ACTUALLY INSTALLED AT NO ADDITIONAL COST TO THE OWNER.

DAMAGE FROM INTERFERENCE CAUSED BY INADEQUATE COORDINATION SHALL BE RECTIFIED AT NO ADDITIONAL COST TO THE OWNER.

ALL WORK SHALL BE EXECUTED IN A WORKMANLIKE MANNER AND SHALL PRESENT A NEAT MECHANICAL APPEARANCE WHEN COMPLETED.

ANY MATERIAL ITEMS OR WORK NOT SHOWN ON THE DRAWINGS, BUT MENTIONED IN THESE SPECIFICATIONS OR VISA-VERSA, OR ANY ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE IN ALL RESPECTS AND READY FOR OPERATION SHALL BE PROVIDED WITHOUT ADDITIONAL COST TO THE OWNER.

THIS TRADE SHALL DO OR HAVE DONE BY COMPETENT TRADESMEN ALL CUTTING AND PATCHING NECESSARY FOR THE INSTALLATION OF THIS WORK. NO CUTTING IN CONSTRUCTIVE PARTS OF THE BUILDING LIKELY TO IMPAIR ITS STRENGTH SHALL BE DONE WITHOUT THE ARCHITECT-ENGINEER'S WRITTEN APPROVAL.

#### EXCAVATION AND BACKFIL

EXCAVATION, TRENCHING AND BACKFILLING ARE SPECIFIED IN SECTION EXCAVATION TRENCHING AND BACKFILLING FOR UTILITIES. CONDUIT IS TO BE INSTALLED AS SPECIFIED FOR PIPELINES. CONDUIT INSTALLED BENEATH FLOOR SLAB SHALL BE A MINIMUM OF 6" BELOW SLAB. BACKFILL OVER CONDUIT SHALL BE COMPACTED AS FOR SLAB BEDDING MATERIAL. REFER TO STRUCTURAL DRAWINGS FOR DETAILS OF CONDUIT (PIPE) PENETRATION OF EXTERIOR FOOTINGS. COMPLETE INSTALLATION SHALL CONFORM TO N.E.C.

COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRE-STOPPING SPECIFIED IN ARCHITECTURAL SPECIFICATIONS.

ROOFS: COORDINATE ALL ROOF PENETRATIONS WITH ENGINEER, OWNER, AND AS APPLICABLE, THE ROOFING CONTRACTOR PROVIDING A ROOF WARRANTY KEEP ALL RACEWAY PENETRATIONS WITHIN MECHANICAL EQUIPMENT CURBS WHEREVER POSSIBLE. COORDINATE WITH DIVISION 15. FLASH AND COUNTERFLASH ALL OPENINGS THROUGH ROOF, AND/OR PROVIDE PRE-FABRICATED MOLDED SEALS COMPATIBLE WITH THE ROOF CONSTRUCTION INSTALLED, OR AS REQUIRED BY THE ENGINEER, OWNER, OR ROOFING CONTRACTOR. ALL ROOF PENETRATIONS SHALL BE LEAKTIGHT AT THE TERMINATINO OF THE WORK AND SHALL NOT VOID ANY NEW OR EXISTING ROOF WARRANTIES.

WALLS AND FLOORS - SLEEVES FOR RACEWAYS AND CABLES: STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL. PLAIN ENDS AND DRIP RINGS.

CAST IRON PIPE SLEEVES: CAST OR FABRICATED "WALL PIPE", EQUIVALIENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL SATERSTOP, UNLESS OTHERWISE INDICATED.

FIRESTOPPING: FIRE RESISTANT THROUGH PENETRAION SEALANTS - TWO PART. FOAMED-IN-PLACE, SILICONE SEALANT FORMULATED FOR USE IN THROUGH-PENETRAION FIRE-STOPPING AROUND CABLES, RACEWAYS, AND CABLE TRAY PENETRAIONS THROUGH FIRE-RATED WALLS AND FLOORS. SEALANTS AND ACCESSORIES SHALL HAVE FIRE-RESISTANCE RATINGS INDICATED, AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES IN ACCORDANCE WITH ASTM E 814, BY UNDERWRITER'S LABORATORIES, INC., OR OTHER NRTL ACCEPTABLE TO

ACCEPTABLE MANUFACTURERS - HILTI, INC., 3M CORP, RECTORSEAL, SPECIFY TECHNOLOGY INC., UNITED STATES GYPSUM COMPANY.

SERVICE SHALL BE AS SHOWN ON DRAWINGS.

PROVIDE SECONDARY SERVICE INTO THE BUILDING WITH CONDUIT AND WIRING AS SHOWN ON THE PLANS, INCLUDING, BUT NOT LIMITED TO, UNDERGROUND RACEWAYS AND CABLES AND SECONDARY CONNECTIONS TO UTILITY TRANSFORMERS AS REQUIRED BY SERVING ELECTRICAL UTILITY COMPANY. COORDINATE ALL REQUIREMENTS WITH UTILITY COMPANY PRIOR TO BID.

PROVIDE ALL REQUIRED GROUNDING FOR A COMPLETE SERVICE ENTRANCE GROUNDING SYSTEM. PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE (AT A MINIMUM) WITH N.E.C. OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. USE BARE OR INSULATED CONDUCTORS, AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.

PROVIDE ALL NECESSARY ENCLOSURES REQUIRED BY THE OWNER FOR THE UTILITY COMPANY METERING. REFER TO DRAWINGS FOR MINIMUM REQUIREMENTS. COORDINATE WITH UTILITY COMPANY PRIOR TO BID FOR ALL

### <u>PRODUCTS</u>

ALL EQUIPMENT OF A PARTICULAR KIND, SUCH AS WIRING DEVICES AND PANELBOARDS AND ALL LIGHTING FIXTURES OF THE SAME TYPE, SHALL BE THE PRODUCT OF THE SAME MANUFACTURER.

PROVIDE ACCESS PANELS FOR ALL EQUIPMENT AND DEVICES REQUIRING SUCH PANELS. SIZE AS REQUIRED FOR PROPER ACCESS AND MAINTENANCE, MINIMUM ACCEPTABLE IS 12 IN BY 12 IN CLEAR OPENING WHERE HAND ACCESS ONLY IS

PROVIDE LABELS FOR EACH MOTOR CONTROLLER, SAFETY SWITCH, RELAY, PANELBOARD, CONTACTOR, TIMER, CONTROL DEVICE, METER AND CIRCUIT BREAKER. LABELS SHALL BE LAMINATED, PHENOLIC STRIPS 1/16" THICK, AND ENGRAVED TO SHOW BLACK LETTERS ON A WHITE BACKGROUND NOT LESS THAN 1/4" HIGH. SIZE STRIPS TO PROPERLY FIT MANUFACTURER'S BRACKETS AND BE LEGIBLE. WHERE MANUFACTURER'S BRACKETS ARE NOT PROVIDED, MOUNT LABELS WITH PROPER SCREWS, OR AN APPROVED ADHESIVE.

CONDUIT, RIGID STEEL; GALVANIZED OR SHERADIZED AND MANUFACTURED IN ACCORDANCE WITH ANSI STANDARD C80.L. FITTINGS SHALL BE PIPE THREADED, MALLEABLE IRON. CONNECTORS SHALL BE INSULATED THROAT TYPE.

CONDUIT, PVC: POLYVINYLCHLORIDE SCHEDULE 40 PIPE SPECIFICALLY MANUFACTURED AND LABELED (UL STANDARD 651) FOR USE AS ELECTRICAL CONDUIT. FITTINGS SHALL BE EITHER SOCKET WELDED TYPE OR PIPE THREADED WITH INSULATED THROAT.

CONDUIT, FLEXIBLE METALLIC: GALVANIZED, INTERLOCKED SPIRALLY WOUND STEEL STRIP WITH GALVANIZED OR SHERADIZED FITTINGS. LISTED PER UL-L. FITTINGS SHALL BE OF THE SQUEEZE TYPE WITH INSULATED THROATS.

CONDUIT, LIQUIDTIGHT FLEXIBLE METALLIC: GALVANIZED, INTERLOCKED SPIRALLY WOUND STEEL STRIP WITH OVERALL JACKET OF LIQUID TIGHT PVC, UL LISTED. FITTINGS SHALL BE STEEL OR MALLEABLE IRON INSULATED THROAT, WATERTIGHT.

ELECTRIC METALLIC TUBING: GALVANIZED OR SHERADIZED AND MANUFACTURED IN ACCORDANCE WITH ANSI STANDARD C80.3. FITTINGS 1/2 INCH THROUGH 2 INCH TRADE SIZE SHALL BE COMPRESSION TYPE. MANUFACTURED FROM MALLEABLE IRON OR STEEL, AND RAIN AND/OR CONCRETE-TIGHT AS REQUIRED BY INSTALLATION. POT METAL OR DIE CAST TYPE FITTINGS ARE PROHIBITED. CONNECTORS SHALL BE INSULATED THROAT TYPE.

GENERAL: SERVICE LATERALS AND PANELBOARD FEEDERS SHALL BE OF ANNEALED (SOFT) COPPER COMPLYING WITH ICEA S-95-658/NEMA WC70; SOLID CONDUCTOR FOR NO. 10 AWG AND SMALLER; CONCENTRIC, COMPRESSED STRANDED FOR NO. 8 AWG AND LARGER. ALL FEEDER CONDUCTORS NO 8 AWG AND LARGER; STRANDED, TYPE THWN-2 OR XHHW-2 INSULATION.

ALL BRANCH CIRCUITS SHALL BE ANNEALED (SOFT) COPPER COMPLYING WITH ICEA S-95-658/NEMA WC70; SOLID CONDUCTOR FOR NO. 10AWG AND SMALLER; CONCENTRIC, COMPRESSED STRANDED FOR NO. 8 AWG AND LARGER. ALL BRANCH CIRCUIT CONDUCTORS NO 8 AWG AND LARGER; STRANDED, TYPE THWN-2 OR XHHW-2 INSULATION. ALL CONDUCTORS, NO 10 AWG AND SMALLER, USED FOR POWER AND LIGHTNG CIRCUITS; SOLID COPPER, TYPE THWN-2 INSULATION (WET OR DAMP LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB), TYPE THHN INSULATION (DRY LOCATIONS ONLY ABOVE GRADE), OR DUAL RATED TYPE THHN/THWN-2. ALL BRANCH CIRCUIT WIRING SHALL NOT BE SMALLER THAN NO 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE CONDUCTORS AND CONDUIT SIZED PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE RATING AND NUMBER OF POLES, WHERE NO CIRCUIT SIZE (CONDUCTORS AND OVERCURRENT PROTECTIVE DEVICE) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO 12 AWG CONDUCTORS IN 3/4" RACEWAY, AND A 20A SINGLE POLE CIRCUIT BREAKER.

CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED. TYPE THHN/THWN-2 OR XHHW-2 COMPLYING WITH ICEA S-95-658/NEMA WC70.

COLORS FOR 208/120V CONDUCTORS PHASE A: BLACK PHASE B: RED PHASE C: BLUE NEUTRAL: WHITE EQUIPMENT GROUND: GREEN

ISOLATED GROUND: GREEN WITH YELLOW STRIPE COLORS FOR 480/277V CONDUCTORS

PHASE A: BROWN PHASE B: ORANGE PHASE C: YELLOW NEUTRAL: WHITE

EQUIPMENT GROUND: GREEN UNLESS NOTED OTHERWISE, SPECIAL PURPOSE CONDUCTORS AND CABLES, SUCH AS LOW VOLTAGE CONTROL AND SHIELDED INSTRUMENT WIRING, SHALL BE

AS RECOMMENDED BY THE SYSTEM EQUIPMENT MANUFACTURER. CONTROL WIRING; STRANDED COPPER CONDUCTORS, 600V INSULATION, OF THE

PROPER TYPE, SIZE AND NUMBER AS REQUIRED TO ACCOMPLISH SPECIFIED

FUNCTION. MINIMUM SIZE; NO. 14 AWG UNLESS NOTED OTHERWISE.

MC TYPE CABLE CAN BE USED IF ACCEPTED BY LOCAL AUTHORITY AND GOVERNING CODES FOR WHIPS FROM JUNCTION BOX TO LIGHT FIXTURES ONLY. TYPE MC CABLE; 600V, UNJACKETED; ANSI E119 AND E814, UL STANDARDS 44 OR 83 (AS APPLICABLE), AND 1569, NFPA 70 ARTICLE 330; ALUMINUM OR GALVANIZED

PROVIDE A DEDICATED EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL BRANCH CIRCUITS AND FEEDERS, SIZED IN

STEEL INTERLOCKED ARMOR: THHN- OR XHHW-INSULATED CONDUCTORS; COLOR

ACCORDANCE WITH NFPA 70, UNLESS INDICATED AS LARGER ON THE DRAWINGS. PROVIDE A DEDICATED NEUTRAL (WHERE REQUIRED) AND DEDICATED

CODE; ICEA METHOD 1, WITH GREEN INSULATED GROUDING CONDUCTOR.

GROUNDING CONDUCTOR FOR EACH BRANCH CIRCUIT.

VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 2%.

GFCI CIRCUITS: DO NOT USE MULTI-CONDUCTOR CIRCUITS, WITH A SHARED NEUTRAL FOR ANY GFCI CIRCUIT BREAKER OR RECEPTACLE CIRCUIT. BRANCH CIRCUITS FED FROM GFCI CIRCUIT BREAKERS, LIMIT THE ONE-WAY CONDUCTOR LENGTH TO 100 FEET BETWEEN THE PANELBOARD AND THE MOST REMOTE RECEPTACLE OR LOAD ON THE GFCI CIRCUIT

OUTLET BOXES: GALVANIZED PRESSED STEEL WITH GALVANIZED STEEL EXTENSION RINGS OR PLASTER RINGS OR TILE RINGS TO PROVIDE EXPOSED SURFACE FLUSH WITH WALL OR CEILING FINISH, PROVIDE ALL CEILING OUTLET BOXES WITH "NO-BOLT" OR THROUGH AND LOCKNUTTED TYPE FIXTURE STUDS.

JUNCTION AND PULL BOXES: FABRICATE IN ACCORDANCE WITH NEMA AND N.E.C. STANDARDS AND REQUIREMENTS INSOFAR AS MATERIAL, GAUGES, DIMENSIONS, AND FABRICATION METHODS. BOXES SHALL BEAR THE UL LABEL. WHERE BOXES ARE NOT SIZED ON THE DRAWINGS, THEY SHALL BE SIZED IN ACCORDANCE WITH N.E.C. REQUIREMENTS. FINISH IN STANDARD GRAY ENAMEL, WITH SIDES AND BACK SPOT-WELDED IN POSITION AND THE REMOVABLE SCREW COVER MOUNTED WITH BRASS MACHINE SCREWS.

SWITCHES: HEAVY DUTY AC, RATED 20 AMPERES, 120/277 VOLTS, SINGLE-POLE, DOUBLE-POLE, THREE-POLE, OR FOUR-WAY AS NOTED ON DRAWINGS OR AS REQUIRED FOR THE SWITCHING ARRANGEMENTS IN EACH SPACE. HUBBELL #HBL122\*\* OR EQUAL. COORDINATE SWITCH COLORS WITH COVERPLATES AS DESCRIBED BELOW UNDER "PLATES".

SWITCHES, SPECIAL PURPOSE: KEY OPERATED, HEAVY-DUTY AC, RATED 20 AMPERES, 120/277 VOLTS, SINGLE OR MULTI-POLE AS NOTED OR AS REQUIRED. HUBBELL #HBL122\*\* OR EQUAL.

RECEPTACLES: THREE WIRE GROUNDING TYPE, 120 VOLT RATED. SPECIFICATION GRADE 20 AMPERES DUPLEX UNLESS NOTED OTHERWISE ON DRAWINGS. HUBBELL #5362 OR EQUAL. COORDINATE RECEPTACLE COLOR WITH COVERPLATE AS DESCRIBED BELOW UNDER "PLATES". SINGLE RECEPTACLE, 20 AMPERE, 120 VOLT, SPECIFICATION GRADE. HUBBELL #5361 OR EQUAL.

DUST AND MOISTURE RESISTANT, MELAMINE BODY, GRAY NYLON FACE BACKED BY FABRIC REINFORCED NEOPRENE GASKET SLIT TO PROVIDE WIPING ACTION ON CAP BLADES. PASS & SEYMOUR #6307 OR APPROVED EQUAL. GROUND FAULT CIRCUIT INTERRUPTER, NYLON FACE CLASS A, NEMA 5-20R, SPECIFICATION GRADE. HUBBELL #GF-5362\* OR EQUAL.

CORROSION RESISTANT, SIMILAR AND APPROVED EQUAL TO STANDARD RECEPTACLE. EXCEPT FABRICATED FROM YELLOW MELAMINE PLASTIC WITH YELLOW NYLON FACE AND EXPOSED METAL PARTS FINISHED TO RESIST CORROSION. (NEMA 5-15R = HUBBELL #52CM61).

ISOLATED GROUND, DUPLEX OR SIMPLEX THREE WIRE GROUNDING TYPE, SPECIFICATION GRADE, ORANGE FACE, GROUND CONTACT FULLY ISOLATED FROM CIRCUIT BREAKERS: CIRCUIT BREAKERS OF THE PROPER SIZE. RATING. AND STRAP AND EQUIPPED WITH SCREW TERMINAL. HUBBELL #IG-5362\* OR EQUAL.

RECEPTACLES, SPECIAL PURPOSE: SPECIAL PURPOSE OUTLETS SHALL BE AS SCHEDULED ON DRAWINGS.

PLATES: PROVIDE PLATES FOR ALL OUTLET BOXES, PLATES SHALL BE OF SUITABLE CONFIGURATION FOR THE NUMBER AND TYPE OF DEVICES SERVED, SHALL BE ONE PIECE, SHALL OVERLAP OUTLET BOX EDGE AND ROOM SURFACES, AND SHALL BE SMOOTH FINISH NYLON TYPE OF SAME MANUFACTURER AS THE WIRING DEVICES. VERIFY DESIRED MATERIALS AND COLORS WITH ARCHITECT PRIOR TO INSTALLATION.

STANDARD INTERIOR: IVORY FINISHED ON LIGHT COLORED WALLS - COORDINATE ALL COLORS WITH ARCHITECT

#### INTERIOR DAMP LOCATIONS: STAINLESS STEEL.

EXTERIOR LOCATIONS: FOR UNATTENDED WET LOCATIONS, PROVIDE IN-USE NEMA 3R, UL LABELED PLATES MOLDED FROM A CLEAR HIGH IMPACT ULTRAVIOLET STABILIZED POLYCARBONATE MATERIAL FOR EASY VERIFICATION THAT CORDS ARE PLUGGED IN AND THAT THE GFCI IS FUNCTIONING. COVER PLATES SHALL BE BY THE SAME MANUFACTURER AS THE WIRING DEVICES; COMPLYING WITH NFPA 70 406.8 (A) OR (B) REQUIREMENTS FOR ATTENDED OR UNATTENDED USE AS APPLICABLE.

ACCEPTABLE MANUFACTURERS: HUBBELL, PASS & SEYMOUR, LEVITON AND COOPER.

FURNISH AND INSTALL FLUSH CABINETS AND ENCLOSURES AS SHOWN ON THE PLANS AND AS HEREIN SPECIFIED. UNIT SHALL BE PROVIDED WITH DEAD FRONT SUB PANEL, RECESSED AS REQUIRED, TO HOUSE CONTROLS. DOOR SHALL BE PROVIDED WITH CONCEALED HINGES AND FLUSH KEY OPERATED LOCK. DOOR AND TRIM SHALL BE PRIME PAINTED FOR FIELD PAINTING TO MATCH WALL FINISHES. PROVIDE KNOCK-OUTS, LOUVERS AND IDENTIFICATION ENGRAVING AS REQUIRED TO MEET FIELD CONDITIONS. EXACT BACKBOX SIZE TO BE COORDINATED WITH EQUIPMENT SUPPLIER.

### CIRCUIT DISCONNECTS

SAFETY SWITCHES: SAFETY SWITCHES SHALL CONSIST OF A BOX, FRONT COVER, AND CIRCUIT PROTECTOR DEVICE ALL MANUFACTURED AND ASSEMBLED IN ACCORDANCE WITH NEMA STANDARDS

THE BOX SHALL BE FABRICATED FROM CODE GAUGE GALVANIZED SHEET STEEL IN ACCORDANCE WITH U.L. LISTING AND LABEL. THE CIRCUIT PROTECTOR DEVICE SHALL BE HEAVY DUTY, QUICK-MAKE, QUICK-BREAK FUSED OR UNFUSED SWITCH RATED FOR MOTOR CIRCUITS AND/OR SERVICE ENTRANCE DUTY, IF REQUIRED. UNITS SHALL BE FURNISHED FOR SURFACE OR FLUSH MOUNTING WITH EITHER GENERAL PURPOSE OR RAINTIGHT ENCLOSURES, AS REQUIRED. FUSED UNITS SHALL BE FURNISHED COMPLETE WITH PROPER FUSES.

SHALL CONSIST OF BOX, INTERIOR, FRONT, AND CIRCUIT PROTECTIVE DEVICES. THE ASSEMBLY SHALL BE U.L. LABELED AND BE LISTED FOR SERVICE. THE ASSEMBLY SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH NEMA STANDARD PB-1. THE LATEST UL STANDARD (UL-50) AND SHALL HAVE A TURNED EDGE AROUND THE FRONT FOR RIGIDITY AND FOR CLAMPING ON FRONT. PROVIDE STANDARD KNOCKOUTS ON REMOVABLE BOX ENDS. FABRICATE FROM SHEET STEEL AND FINISH WITH BAKED ON GRAY ENAMEL OVER RUST INHIBITOR. EACH FRONT SHALL HAVE A DOOR MOUNTED ON SEMI-CONCEALED HINGES WITH A CYLINDER LOCK, INDEX CARD CIRCUIT DIRECTORY MOUNTED BEHIND CLEAR PLASTIC AND HELD IN A METAL FRAME, AND CONCEALED TRIM CLAMPS FOR MOUNTING TO THE BOX. ALL LOCKS SHALL BE MASTER KEYED AND ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN.

ALL INTERIORS SHALL BE COMPLETELY FACTORY ASSEMBLED. THE DESIGN OF THE INTERIOR SHALL PERMIT REPLACEMENT OF INDIVIDUAL BRANCH BREAKERS WITHOUT DISTURBING ADJACENT UNITS AND WITHOUT MACHINE DRILLING OR TAPPING. BUS BARS FOR PANELS RATED 600 AMPERES OR MORE SHALL BE TIN PLATED 98% CONDUCTIVITY COPPER OR TIN FINISH ALUMINUM (57% CONDUCTIVITY) OF RECTANGULAR CROSS-SECTION. BUS BARS FOR PANELS RATED LESS THAN 600 AMPERES SHALL BE TIN PLATED 98% CONDUCTIVITY COPPER OF RECTANGULAR CROSS-SECTION. BUS BAR CONNECTIONS TO BRANCH CIRCUIT BREAKERS SHALL BE THE PHASE SEQUENCE TYPE AND ACCEPT BOLT-ON TYPE BREAKERS ONLY. PANELBOARD BUS STRUCTURE AND MAIN BREAKER OR MAIN LUGS SHALL BE RATED AS SCHEDULED ON DRAWING. SUCH RATINGS SHALL BE ESTABLISHED BASED ON HEAT RISE TESTS IN ACCORDANCE WITH UL STANDARDS. GROUP INCOMING CABLE LUGS AT ONE END FOR SEPARATION FROM LOAD SIDE CABLES. EQUIPMENT NEUTRAL BUSSING WITH A LUG FOR EACH BRANCH BREAKER POSITION. INTERIOR SHALL MOUNT TO BOX WITHOUT TOOLS.

BREAKERS SHALL BE QUICK-MAKE, QUICK-BREAK, BOLT-ON THERMAL-MAGNETIC MOLDED CASE CIRCUIT BREAKERS ONE, TWO OR THREE POLE WITH INTEGRAL CROSSBAR FOR MULTI-POLE UNITS, EQUIPPED WITH AN OVERCENTER, TRIP-FREE, TOGGLE-TYPE OPERATING ACTION AND POSITIVE HANDLE INDICATION OF BREAKER STATUS. CIRCUIT BREAKERS SHALL BE UL LISTED IN ACCORDANCE WITH UL STANDARDS.

EACH PANELBOARD, AS A COMPLETE UNIT, SHALL HAVE A SHORT CIRCUIT RATING EQUAL TO OR GREATER THAN THE INTEGRATED EQUIPMENT RATING SHOWN ON DRAWINGS. THE RATING SHALL BE ESTABLISHED BY TESTING WITH THE OVERCURRENT DEVICES MOUNTED IN THE PANELBOARD. THE SHORT CIRCUIT TESTS ON THE OVERCURRENT DEVICES ON THE STRUCTURE SHALL BE MADE SIMULTANEOUSLY BY CONNECTING THE FAULT TO EACH OVERCURRENT DEVICE

REFER TO PANELBOARD SCHEDULES FOR FULLY RATED OR SERIES-RATED REQUIREMENTS. SERIES-RATED SYSTEMS ARE NOT ALLOWED UNLESS SPECIFICALLY INDICATED ON PANELBOARD SCHEDULES. WHERE ALLOWED, SERIES-RATED SYSTEMS SHALL BE PROPERLY LABELLED BY NEC REQUIREMENTS.

METHOD OF TESTING SHALL BE PER UL STANDARDS. PANELBOARDS SHALL BE

MARKED WITH THEIR MAXIMUM SHORT CIRCUIT CURRENT RATING AT THE SUPPLY

APPROVED MANUFACTURERS: SQUARE-D CO. OR EQUAL BY GE, SIEMENS AND/OR

WITH THE PANELBOARD CONNECTED TO ITS RATED SUPPLY VOLTAGE.

VOLTAGE.

### OVERCURRENT PROTECTIVE DEVICES

FUSES OF THE PROPER SIZE, RATING AND ELECTRICAL CHARACTERISTICS SHALL BE PROVIDED IN EACH FUSIBLE DEVICE. FUSES OF 600 VOLTS AND BELOW SHALL BE UL CLASS RK-1, CURRENT-LIMITING, TIME-DELAY, DUAL-ELEMENT, 200,000 AMPERE RMS SYMMETRICAL INTERRUPTING CAPACITY ON NON-MOTOR CIRCUITS AND UL CLASS RK-5, TIME-DELAY, DUAL-ELEMENT, 200,000 AMPERES RMS SYMMETRICAL INTERRUPTING CAPACITY ON MOTOR CIRCUITS.

APPROVED MANUFACTURERS: BUSSMANN, LITTLEFUSE OR FERRAZ-SHAWMUT (ALL FUSES SHALL BE OF SAME MANUFACTURER TO ENSURE SELECTIVE COORDINATION).

ELECTRICAL CHARACTERISTICS SHALL BE PROVIDED WHERE CALLED FOR ON DRAWINGS. BREAKERS SHALL BE THERMAL MAGNETIC MOLDED-CASE WITH QUICK-MAKE, QUICK-BREAK, OVER CENTER TOGGLE TYPE MECHANISM AND TRIP-FREE HANDLE MECHANISM. THE BREAKER SHALL BE ENCLOSED IN A SUITABLE NEMA RATED ENCLOSURE. BREAKERS SHALL BE OF SAME MANUFACTURER AS THOSE IN THE PANELBOARDS.

ELECTRONIC TIME SWITCHES: ELECTRONIC, SOLID STATE PROGRAMMABLE UNITS WITH ALPHANUMERIC DISPLAY; COMPLYING WITH UL917. SPST, 30 AMPERE INDUCTIVE OR RESISTIVE, 240VAC, CONTACT RATING. 2 PROGRAMMABLE ON-OFF SET POINTS ON A 24-HOUR SCHEDULE, ALLOWING DIFFERENT SET POINTS FOR EACH DAY OF THE WEEK. ALLOW CONNECTION OF A PHOTOELECTRIC RELAY AS SUBSTITUE FOR ON-OFF FUNCTION OF A PROGRAM. ASTRONOMIC TIME ON ALL CHANNELS. BATTERY BACKUP FOR SCHEDULES AND TIME CLOCK.

#### OUTDOOR PHOTOELECTRIC SWITCHES

SOLID STATE, WITH SPST DRY CONTACT RATED FOR 1800-VA TUNGSTEN OR 1000-VA INDUCTIVE, TO OPERATE CONNECTED RELAY, CONTACTOR COILS OR MICROPROCESSOR INPUT, COMPLYING WITH UL 773A.

SPECIAL FINISHES.

FURNISH AND INSTALL A SYSTEM OF PROPERLY SIZED AND PROPERLY LOCATED OUTLETS WITH ASSOCIATED CONNECTING CONDUIT RUNS, EXTENDING TO PULL BOXES AND TELEPHONE BACKBOARD. FURNISH AND INSTALL RACEWAYS, FOR INCOMING SERVICE WHERE INDICATED. OUTLET BOXES: UNLESS OTHERWISE INDICATED, ALL TELEPHONE OUTLETS AND JUNCTION BOXES SHALL BE PROVIDED AS REQUIRED TO ACCOMMODATE INTERNAL TERMINAL STRIPS BY TELEPHONE CO.

OUTLET COVER PLATES: TELEPHONE OUTLET COVER PLATES SHALL MATCH THOSE SPECIFIED FOR ADJACENT WIRING DEVICES, INCLUDING THOSE WITH

RACEWAYS: MATERIALS FOR TELEPHONE RACEWAY SYSTEM WORK SHALL BE IN ACCORDANCE WITH CORRESPONDING RACEWAYS SPECIFIED HEREIN AND IN OTHER SECTIONS.

VERIFY LOCATION OF WALL OUTLETS BEFORE ROUGHING IN TO ENSURE COORDINATION WITH OWNER'S FINAL INTENDED FURNITURE LAYOUT. PLAN INDICATIONS SHALL NOT BE SCALED UNLESS DIRECTED. OUTLETS SHALL BE RELOCATED WITHIN ROOMS BEFORE ROUGH-IN WHERE DIRECTED BY ARCHITECT-ENGINEER WITHOUT ADDITIONAL COST TO OWNER.

TELEPHONE SERVICE CONDUIT LAYOUT SHALL HAVE THE JOB SITE APPROVAL OF AN AUTHORIZED REPRESENTATIVE OF THE TELEPHONE CO. COORDINATE WORK SO THAT BOTH TELEPHONE CO. AND OWNER'S REPRESENTATIVES ARE PRESENT AT THE SAME TIME FOR APPROVAL OR CHANGES IN AMPLE TIME FOR ANY REQUIRED CORRECTIONS BEFORE COMPLETION OF PROJECT.

FROM EACH TELEPHONE OUTLET, PROVIDE 3/4" EMT CONDUIT CONCEALED IN WALL TO 6" ABOVE ACCESSIBLE CEILING OR UP TO STRUCTURE WHERE NO CEILING EXISTS, UNLESS SHOWN OTHERWISE ON DRAWINGS.

TELEPHONE TERMINAL BOARD: PRIOR TO INSTALLATION OF TELEPHONE TERMINAL BOARD, THE EXACT LOCATION SHALL BE VERIFIED WITH THE TELEPHONE CO. THE TELEPHONE TERMINAL BOARD SHALL BE PROVIDED WITH A DOUBLE DUPLEX RECEPTACLE LOCATED WHERE INDICATED ON THE DRAWINGS. THE TERMINAL BOARD SHALL BE CONSTRUCTED OF 4' X 8' X 3/4" PLYWOOD WITH TWO (2) COATS OF FLAME RETARDANT PAINT UNLESS NOTED OTHERWISE ON DRAWINGS.

#### FIXTURES ARE SPECIFIED IN THE SCHEDULE BY MANUFACTURER'S NAME AND CATALOG NUMBER.

ALL RECESSED LIGHT FIXTURES SHALL BE PROVIDED WITH FACTORY INSTALLED THERMAL PROTECTION.

ALL LAMPS USED ON THIS PROJECT SHALL BE NEW, DELIVERED TO THE JOB SITE IN THE ORIGINAL PACKING CASES AND SLEEVES AND SHALL BE OF THE SAME MANUFACTURER.

PROVIDE FLUORESCENT FIXTURES WITH ELECTRONIC BALLASTS SUITABLE FOR OPERATION OF LAMPS SPECIFIED; TOTAL HARMONIC DISTORTION LESS THAN 20%; FREQUENCY OF OPERATION OF 20 KHZ OR GREATER WITH NO VISIBLE FLICKER; LINE TRANSIENT WITHSTAND RATINGS AS DEFINED IN ANSI/IEEE, CATEGORY A. APPROVED MANUFACTUERERS: ADVANCE OR EQUAL BY MAGNETEK, MOTOROLA OR OSRAM.

POTTED AND ENCASED TO MINIMIZE SOUND. APPROVED MANUFACTURERS: GE. SYLVANIA, OR OSRAM. LED LIGHT FIXTURES ARE TO BE PROVIDED WITH COMPATIBLE DRIVER AND MUST BE COORDINATED WITH CONTROL TYPE INDICATED. CONTRACTOR IS

RESPONSIBLE TO ENSURE CONTROLS ARE CAPABLE OF PROPERLY CONTROLLING

LIGHT FIXTURES AS INDICATED WITHIN THESE DRAWINGS.

HID BALLASTS SHALL BE AUTO TRANSFORMER REACTOR. HIGH POWER FACTOR

#### **CONTACTORS AND RELAYS**

ALL CONTACTORS AND RELAYS SHALL BE UL LISTED AND LABELED, GENERAL PURPOSE, ELECTRICALLY HELD TYPE, IN NEMA 1 ENCLOSURES. WHERE SPECIFICALLY NOTED ON DRAWINGS, UNITS SHALL BE ELECTRICALLY HELD OR MOMENTARY OPERATIONAL TYPE. UNITS SHALL BE FURNISHED WITH LINE OR LOW VOLTAGE CONTROL AS NOTED AND WITH THE CORRECT NUMBER OF POLES AND CURRENT CHARACTERISTICS. WHERE LOW VOLTAGE OPERATION IS INDICATED, PROVIDE PROPER STEPDOWN TRANSFORMERS AND RECTIFIERS. APPROVED MANUFACTURERS: ASCO, OR MANUFACTURER OF APPROVED PANELBOARDS FURNISHED.

#### TRANSFORMERS

GENERAL PURPOSE, UL-LISTED/LABELED 150 DEGREES C TEMPERATURE RISE ABOVE 40 DEGREES C AMBIENT. INSULATING MATERIALS: EXCEED NEMA ST-020 STANDARDS, RATED FOR 220 DEGREES C, UL-COMPONENT RECOGNIZED INSULATION SYSTEM. PHASES, VOLTAGES, AND SIZES: AS INDICATED ON THE DRAWINGS. SOUND LEVEL: NOT EXCEEDING NEMA STANDARDS FOR THE SIZES INDICATED. FULL-CAPACITY PRIMARY TAPS: BELOW 25 KVA - MINIMUM OF TWO 5% (2-); 25 KVA TO 300 KVA - MINIMUM OF SIX 2.5% (2+, 4-); ABOVE 300 KVA - FOUR 2.5% (2+, 2-). TRANSFORMER CORE AND COIL ASSEMBLIES: MOUNTED ON INTEGRAL VIBRATION-ABSORBING PADS. MAKE FINAL CONDUIT CONNECTIONS TO TRANSFORMERS WITH FLEXIBLE CONDUIT, WITH AT LEAST 6" OF SLACK IN ALL DIRECTIONS. TRANSFORMER ENCLOSURES: FULLY ENCLOSED (EXCEPT FOR VENTILATION OPENINGS), NEMA 2, DRIP-PROOF, FABRICATED OF HEAVY GAUGE SHEET STEEL CONSTRUCTION. MANUFACTURERS: SQUARE D, GENERAL ELECTRIC, ACME, SIEMENS.

RELEASED FOR CONSTRUCTION As Noted on Plans Reviev

Lee's Summit, Missouri

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**ELECTRICAL** 

**SPECIFICATIONS** 

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WIRING OF MECHANICAL EQUIPMENT

PROVIDE ALL RACEWAYS AND POWER WIRING FOR ALL DIVISION 15 EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS, INCLUDING, BUT NOT LIMITED TO, PUMPS, WATER HEATERS, AND HVAC EQUIPMENT, AND ALL LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 15. CONNECT PER MANUFACTURER'S WIRING DIAGRAMS. COORDINATE WITH DIVISION 15 FOR DISCONNECTS FURNISHED WITH EQUIPMENT, AND PROVIDE ALL DISCONNECT SWITCHES AS REQUIRED. AFTER INSTALLING WIRING, VERIFY THAT EACH MOTOR LOAD HAS THE CORRECT PHASE ROTATION.

VERIFY THE ACTUAL "MAXIMUM OVERCURRENT PROTECTION" DEVICE RATINGS AND "MINIMUM CIRCUIT AMPACITY" CONDUCTOR SIZING FOR MECHANICAL EQUIPMENT FROM THE EQUIPMENT NAMEPLATE. BASE ELECTRICAL INSTALLATIONS ON ACTUAL REQUIRED AMPERAGES, WHICH MAY VARY SOMEWHAT FROM THE CONDUCTOR AND EQUIPMENT SIZES SHOWN ON THE DRAWINGS; HOWEVER, IN NO CASE, REDUCE THE SIZE OF CONDUCTORS INDICATED ON THE DRAWINGS WITHOUT AUTHORIZATION FROM THE ENGINEER. PROVIDE PROPERLY SIZED ELECTRICAL WIRING AND EQUIPMENT WITHOUT EXTRA COST TO THE OWNER. NOTIFY THE ENGINEER OF ALL CHANGES REQUIRED IN THE ELECTRICAL INSTALLATION DUE TO EQUIPMENT VARIANCES SO THAT THE EFFECTS ON FEEDERS, BRANCH CIRCUITS, PANELBOARDS, FUSES AND CIRCUIT BREAKERS CAN BE CHECKED PRIOR TO PURCHASING AND INSTALLATION. BE RESPONSIBLE FOR COORDINATING WITH DIVISION 15 TO VERIFY THE ACTUAL AMPACITIES AND CORRECT SIZES OF ALL CONDUCTORS AND OVERCURRENT PROTECTIVE DEVICES FOR ALL EQUIPMENT, AND CORRECT OVERLOAD HEATERS FOR ALL MOTORS, WHEN STARTERS ARE PROVIDED UNDER DIVISION 16.

PROVIDE ALL RACEWAYS, POWER WIRING, AND LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 15, FOR ALL THERMOSTATS, TEMPERATURE CONTROL DEVICES, AND CONTROLS, INCLUDING, BUT NOT LIMITED TO, NIGHT-STATS, WATER HEATER INTERLOCKS, TIME SWITCHES AND OVERRIDE TIMERS. SEE MECHANICAL DRAWINGS FOR LOCATIONS AND TEMPERATURE CONTROL DIAGRAMS. LOW-VOLTAGE CONDUCTORS FOR THERMOSTATS AND TEMPERATURE CONTROL SYSTEMS MAY BE RUN EXPOSED ABOVE FINISHED ACCESSIBLE CEILINGS, IF APPROVED AND LISTED FOR THIS PURPOSE, BUT SHALL BE INSTALLED IN CONDUIT WITHIN WALLS AND WHERE EXPOSED IN THE WORK AREAS.

#### EXECUTION

#### METHOD OF PROCEDURE

ERECT EQUIPMENT PARTS AT SUCH TIME AND IN SUCH MANNER AS TO MINIMIZE INTERFERENCES AND DELAYS IN THE EXECUTION OF THE WORK CARE SHALL BE USED IN THE ERECTION AND INSTALLATION OF ALL EQUIPMENT AND MATERIALS TO AVOID MARRING SURFACES OF THE WORK. DAMAGES SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.

EQUIPMENT REQUIRING ELECTRICAL SERVICE SHALL NOT BE ENERGIZED OR PLACED IN SERVICE UNTIL ALL INTERESTED PARTIES HAVE BEEN DULY NOTIFIED AND ARE PRESENT OR HAVE WAIVED THEIR RIGHT TO BE PRESENT. WHERE EQUIPMENT TO BE PLACED IN SERVICE INVOLVES SERVICE OR CONNECTION FROM ANOTHER CONTRACTOR OR THE OWNER, NOTIFY THE OWNER IN WRITING WHEN THE EQUIPMENT WILL BE READY. THE OWNER SHALL BE NOTIFIED AS FAR IN ADVANCE AS POSSIBLE, OF THE DATE THE VARIOUS ITEMS OF EQUIPMENT WILL BE COMPLETE.

THE WORK OF THIS TRADE INCLUDES ROUGH-IN FOR AND FINAL CONNECTION AND REQUIRED TO ALL MISCELLANEOUS EQUIPMENT FURNISHED BY OTHERS, OR UNDER OTHER DIVISIONS OF THE WORK. THIS SHALL INCLUDE POWER AND CONTROL WIRING. WIRING DEVICES AND COVER-PLATES FOR BUILT-IN EQUIPMENT ARE INCLUDED IN THE WORK OF THIS DIVISION. SAFETY DISCONNECTS AND OTHER MISCELLANEOUS PROTECTIVE DEVICES REQUIRED BY N.E.C. ARE INCLUDED IN THE WORK OF THIS DIVISION. DO ALL ROUGHING-IN AND FINAL CONNECTIONS FROM APPROVED SHOP DRAWINGS ONLY.

COMPLIANCE WITH THE DRAWING AND ANY NOTES THEREON IS REQUIRED. PROVIDE OPENINGS THROUGH WALLS, PARTITIONS, FLOORS, AND ROOFS AS REQUIRED FOR ELECTRICAL WORK.

PROVIDE SLEEVES FOR ELECTRICAL WORK PASSING THROUGH WALLS, PARTITIONS, ROOFS, AND FLOORS. SLEEVES SHALL EXTEND THROUGH FLOORS, WALLS AND PARTITIONS AND SHALL BE CUT FLUSH WITH EACH SURFACE UNLESS OTHERWISE SPECIFIED. FIRE WALL AND/OR FLOOR INTEGRITY SHALL BE RESTORED AFTER PENETRATION. SLEEVES IN CONCRETE AND MASONRY WALLS, CONCRETE FLOORS AND ROOFS, SHALL BE FABRICATED FROM STANDARD GALVANIZED STEEL PIPE WITH ENDS FINISHED SMOOTH, BURR FREE, WITHOUT SHARP EDGES. SLEEVES IN WALLS, ROOFS, AND FLOORS OF OTHER CONSTRUCTION AND THROUGH SUSPENDED CEILINGS SHALL BE FABRICATED FROM 22 U.S. GAUGE GALVANIZED STEEL. FLOOR SLEEVES SHALL EXTEND THREE INCHES ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED. SPACE BETWEEN FLOOR SLEEVES AND PASSING CONDUIT SHALL BE FILLED WITH DUCT SEAL PACKING AND CAULKED WITH WATERPROOF COMPOUND AS APPROVED. WHERE CONDUITS PASS THROUGH WATERPROOFED FLOORS OR WALLS, SLEEVES SHALL BE FABRICATED SUCH THAT WATERPROOFING CAN BE FLASHED ONTO AND AROUND THE SLEEVE.

### RACEWAYS

ALL POWER AND LIGHTING CIRCUITS SHALL BE RUN IN METALLIC RACEWAYS EXCEPT WHERE SPECIFICALLY NOTED OTHERWISE. THESE RACEWAYS SHALL BE RUN CONCEALED IN ALL FINISHED AREAS, AND WHERE RUN EXPOSED SHALL BE SQUARE TO THE BUILDING AND HELD TIGHT TO THE BUILDING CONSTRUCTION. LOW VOLTAGE, TELEPHONE, INTERCOM, MUSIC, ALARM AND SECURITY WIRING RUN ABOVE ACCESSIBLE CEILINGS SHALL BE RUN USING INSULATED, PLENUM RATED CABLE. PROVIDE LOW VOLTAGE CABLE IN CONDUIT IF REQUIRED BY LOCAL AHJ. VERIFY ALL REQUIREMENTS PRIOR TO INSTALLATION. METALLIC CONDUIT FOR THESE SYSTEMS SHALL BE PROVIDED ONLY WHERE RUN INSIDE WALLS. THE DRAWINGS INDICATE THE REQUIRED SIZE OF ALL RACEWAYS (EXCEPT AS HEREINAFTER SPECIFIED), THE POINTS OF TERMINATION AND THE SUGGESTED ROUTING. HOWEVER, THE INSTALLER IS RESPONSIBLE FOR PROPER COORDINATION WITH BUILDING STRUCTURE AND THE WORK OF OTHER TRADES. FURNISH ALL REQUIRED BENDS, ELBOWS, FITTINGS, JUNCTION AND PULL BOXES, WHETHER OR NOT SPECIFICALLY SHOWN ON DRAWINGS, THAT MAY BE REQUIRED TO SATISFY CODES AND THE STANDARDS OF GOOD PRACTICE. WHERE CONDUITS FOR BOTH BRANCH AND FEEDER CIRCUITS ARE RUN CONCEALED, THEY MAY BE RUN OUT OF SQUARE TO THE BUILDING PROVIDING THE SHORTEST POSSIBLE RUN IS UTILIZED. RACEWAY SIZES ARE BASED ON THE USE OF COPPER CONDUCTORS AND N.E.C. FILL.

CONDUIT SHALL BE CONSTRUED AS ELECTRICAL RACEWAYS AND SHALL CONFORM TO THE FOLLOWING: CONCEALED IN SUSPENDED CEILINGS AND INTERIOR PARTITIONS - EMT WITH SET SCREW TYPE FITTINGS. UNDERGROUND OR BELOW INTERIOR SLABS - GRS. (NOTE: PVC CONDUIT IS PERMITTED OUTSIDE FOR PARKING AREA LIGHTING, SIGNS, ETC. ELBOWS SHALL BE GRS). EXPOSED ON BUILDING EXTERIOR - GRS.

CONDUIT BENDS SHALL BE MADE TO THE LARGEST POSSIBLE RADIUS FOR EASE IN PULLING CONDUCTORS AND TO PROVIDE A NEATLY INSTALLED APPEARANCE. EQUIPMENT AND CONDITIONS PERMITTING, POWER CONDUIT BENDS SHALL CONFORM TO THE FOLLOWING: 1-1/2 IN. - 18 IN. RADIUS; 2 IN. - 24 IN. RADIUS; 2-1/2 IN. - 24 IN. RADIUS; 3 IN. - 36 IN. RADIUS.

GRS CONDUIT SHALL BE CUT WITH POWER OR HACKSAW AND CLEANLY REAMED

TO REMOVE ALL "BURRS" AND ALL FIELD CUT THREADS SHALL BE PAINTED WITH WHITE LEAD BEFORE COUPLINGS ARE APPLIED.

EMPTY CONDUIT SYSTEMS INSTALLED FOR COMMUNICATION SYSTEMS, PUBLIC TELEPHONES, OWNER ITEMS AND OTHER SYSTEMS AS INDICATED ON DRAWINGS SHALL BE INSTALLED COMPLETE WITH NYLON PULL WIRES PROPERLY TAGGED AT BOTH ENDS FOR IDENTIFICATION.

WHERE BUILDING VENTILATION CONDITIONS ARE SUCH THAT AIR MAY FLOW CONTINUOUSLY IN CONDUITS, CAUSING CONDENSATION AND THE COLLECTION OF MOISTURE, THE CONDUITS SHALL BE SEALED AT EACH END WITH A PLIABLE X DUCT SEALING COMPOUND. ALSO SEAL ALL CONDUITS ENTERING AND LEAVING REFRIGERATED EQUIPMENT AND PROVIDE EXPANSION JOINTS PER N.E.C.

ALL CONNECTIONS TO MOTORS, SOLENOID VALVES, PRESSURE SWITCHES, LIMIT SWITCHES, AND SIMILAR APPARATUS SHALL BE FLEXIBLE CONDUIT WHERE PERMITTED. WHERE EQUIPMENT IS INSTALLED OUTDOORS OR EXPOSED TO MOISTURE, USE LIQUIDTIGHT FLEXIBLE CONDUIT WITH WATERTIGHT FITTINGS.

#### EQUIPMENT LEVELING, HANGERS AND SUPPORTS

SET EACH PIECE INSTALLED UNDER THIS DIVISION TRUE AND LEVEL.

ADEQUATELY SUPPORT ALL RACEWAYS FROM THE STRUCTURE USING SCREW
CLAMPS TO SECURE TO SAME. ARRANGE SUPPORTS TO PREVENT MOISTURE
COLLECTION AND ALLOW ENTRANCE TO BOXES WITHOUT BENDS. INSTALL
MULTIPLE CONDUITS USING CHANNEL TRAPEZE SUPPORTS TIGHT TO STRUCTURE
ABOVE. USE APPROVED SPACERS TO INSULATE FROM CONTACT WITH BUILDING.
SIZE CLAMPS, INSERTS, CHANNELS AND ALL OTHER MEMBERS TO SUPPORT A
LOAD EQUAL TO 200% OF THE COMBINED WEIGHT OF ALL SUPPORTED MATERIAL
PLUS THE WEIGHT OF A MAN.

WHERE SEVERAL RACEWAYS ARE SUPPORTED ON A COMMON TRAPEZE HANGER, SUPPORTS SHALL BE SPACED TO ACCOMMODATE THE SMALLEST SIZE RACEWAY INVOLVED. SPACE HANGERS AS FOLLOWS:
RIGID CONDUIT: 1/2 AND 3/4 IN. SIZE; 6'-0" ON CENTERS; 1 AND 1-1/4 IN. SIZE; 9'-0" ON CENTERS

ELECTRIC METALLIC TUBING: 1/2 AND 3/4 IN. SIZE; 5'-0" ON CENTERS; 1 AND 1-1/4 IN SIZE; 6'-0" ON CENTERS.

SECURELY ATTACH HANGERS AND SUPPORTS TO CONSTRUCTION BY METHODS RECOMMENDED IN THE "NECA STANDARDS OF INSTALLATION" MANUAL COORDINATION WITH MECHANICAL TRADES: THE INTENT OF THE ABOVE CEILING SUPPORTS IS TO COMBINE AS MANY PIPES, CONDUITS, ETC., AS IS POSSIBLE WITHIN SAFE STRUCTURAL LIMITS, ON EACH HORIZONTAL SECTION OF A TRAPEZE HANGER. PRIOR TO SELECTING THE HORIZONTAL MEMBER, ALL TRADES, MECHANICAL AND ELECTRICAL, SHALL COORDINATE ACTUAL NUMBER OF PIPES, CONDUITS, ETC., SUCH THAT FINAL SELECTION RESULTS IN A NEATLY GROUPED, DISCIPLINED AND ACCESSIBLE INSTALLATION.

#### WIRING INSTALLATION

EXCEPT FOR SUCH ITEMS AS ARE NORMALLY WIRED AT THEIR POINT OF MANUFACTURE AND SO DELIVERED - AND UNLESS SPECIFICALLY NOTED TO THE CONTRARY HEREIN - THE ELECTRICAL TRADE SHALL DO ALL ELECTRICAL WIRING OF EVERY CHARACTER. IT IS THE INTENT OF THESE SPECIFICATIONS AND DRAWINGS THAT ALL SYSTEMS AND EQUIPMENT SHALL BE PROVIDED WITH ALL NECESSARY UTILITY CONNECTIONS, COMPLETED TO ALLOW SAFE AND PROPER OPERATION OF SAID SYSTEMS. WHEN IT IS NECESSARY FOR TRADES PERFORMING WORK COVERED BY THIS DIVISION TO MAKE FINAL CONNECTIONS TO ITEMS OF EQUIPMENT BEING FURNISHED BY OTHERS, OR BY OTHER TRADES UNDER OTHER DIVISIONS, ALL SUCH WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THIS DIVISION AND ALL MATERIALS USED SHALL BE AS SPECIFIED HEREIN.

MINIMUM WIRE SIZE FOR BRANCH CIRCUITS SHALL BE #12 AWG, EXCEPT THAT HOMERUNS LONGER THAN 100 FT. LENGTH FROM THE PANEL TO THE CIRCUIT'S ELECTRICAL LOAD CENTER SHALL BE #10 AWG MINIMUM. WHERE RUNS EXCEED 150', CONTRACTOR MUST ENSURE WIRE SIZE BEING UTILIZED DOES NOT CREATE A VOLTAGE DROP GREATER THAN 3%. REQUEST PROPER WIRE SIZE PRIOR TO INSTALLATION IF A 3% VOLTAGE DROP MAY OCCUR FOR ANY BRANCH CIRCUIT. WHERE MORE THAN THREE CURRENT CARRYING CONDUCTORS ARE ENCLOSED IN THE SAME RACEWAY, CONDUCTORS ARE TO BE DERATED PER N.E.C. AND WIRE SIZE INCREASED AS REQUIRED. WHERE THE INCREASED CONDUCTOR SIZE REQUIRES, INCREASE THE RACEWAY SIZE AS WELL. FOR CONTROL WIRING, USE #14 AWG MINIMUM. FOR FIXTURE WIRING, AS PERMITTED BY N.E.C., USE #18 AWG MINIMUM. FOR SIGNAL AND COMMUNICATIONS SYSTEMS USE WIRE SIZE AS SPECIFICALLY REQUIRED BY THE SYSTEM SUPPLIER.

MAKE CONNECTIONS TO TERMINALS USING PRESSURE TYPE CONNECTORS. SOLDERED JOINTS ARE PROHIBITED. ALL JOINTS IN CONDUCTORS SHALL BE MADE AT AN ACCESSIBLE LOCATION WITHIN A BOX BY TWISTING THE BARE CONDUCTOR ENDS TOGETHER AND APPLYING A WIRE CONNECTOR IN ALL SIZES UP TO THE MAXIMUM CAPACITY OF THE CONNECTOR. JOINTS SHALL BE TAPED WITH AN APPROVED ELECTRICAL TAPE. SPLICES FOR CONDUCTORS LARGER THAN #10 AWG SHALL BE MADE WITH AN APPROVED COMPRESSION (SQUEEZE) CONNECTOR INSULATED WITH NOT LESS THAN TWO LAYERS OF ELECTRICAL FILL TAPE TO 1.5 TIMES THE THICKNESS OF INSULATION, FOLLOWED BY TWO (MINIMUM) LAYERS OF HALF-LAPPED ELECTRICAL TAPE FOR MECHANICAL PROTECTION. LOCATE ALL SPLICES IN BOXES OR FITTINGS OF PROPER SIZE PER N.E.C.

IDENTIFY ALL WIRES AND CABLES WITH BRADY ADHESIVE WIRE MARKERS AT EACH BOX, PANEL, AND OUTLET. IDENTIFICATION SHALL, AS A MINIMUM, INDICATE THE PANEL AND CIRCUIT SUPPLYING THE OUTLET. AT THE PANEL END, THE LOAD SERVED AND ITS LOCATION SHALL BE INDICATED. PROVIDE A MINIMUM OF 8 IN. SLACK WIRE AT EACH OUTLET FOR MAKING CONNECTION TO THE DEVICE OR TO PROVIDE FOR A FUTURE DEVICE IN THE BOX.

EACH BOX SHALL BE OF PROPER SIZE TO ACCOMMODATE THE DEVICE AND FUNCTION FOR WHICH IT IS SHOWN. BOXES FOR WALL DEVICES SHALL BE FURNISHED COMPLETE WITH PLASTER RING OR TILE RING ACCORDING TO WALL CONSTRUCTION WHERE REQUIRED. BOXES FOR INSTALLATION IN MASONRY WALLS SHALL BE SPECIAL SQUARE CORNER MASONRY TYPE. BOXES FOR MOUNTING OF LIGHTING FIXTURES SHALL BE FOUR INCH OCTAGON, EQUIPPED WITH 3/8 IN. "NO-BOLT" FIXTURE STUD. BOXES FOR FLOOR OUTLETS SHALL BE CONCRETE PROOF STEEL BOXES WITH ADJUSTABLE TOPS AND DEVICES AS HEREINAFTER NOTED OR SHOWN. ALL BOXES SHALL BE FURNISHED COMPLETE WITH PROPER COVER AND/OR DEVICE PLATE AND DEVICE. UNLESS OTHERWISE NOTED, PLACE OUTLET BOXES AT THE FOLLOWING HEIGHTS (BOX CENTER TO FINISH FLOOR): WALL SWITCHES 48" AND CONVENIENCE OUTLETS 18" UNLESS NOTED OTHERWISE ON DRAWINGS.

TELEPHONE, ALARM, AND SIGNAL SYSTEM OUTLET BOXES SHALL BE STANDARD OUTLET BOX TYPE WHERE ONLY ONE CONDUIT ENTERS SAME. UNLESS OTHERWISE SPECIFIED OR INDICATED ON DRAWINGS, WHERE TWO OR MORE CONDUITS ENTER, BOX SHALL BE 4-11/16 IN. SQUARE MINIMUM WITH SUITABLE ADAPTER RING.

LOCATE ALL OUTLETS AS INDICATED ON DRAWINGS, HOWEVER, AT INSTALLATION INSPECT ARCHITECTURAL DRAWINGS AND LOCATE LOCAL SWITCHES ON THE STRIKE SIDE OF THE DOOR.

SYSTEM GROUNDING

WHERE BUILDING VENTILATION CONDITIONS ARE SUCH THAT AIR MAY FLOW CONTINUOUSLY IN CONDUITS, CAUSING CONDENSATION AND THE COLLECTION OF

GREEN GROUNDING CONDUCTOR SIZE IN ACCORDANCE WITH N.E.C. AND CONNECTED BETWEEN THE DEVICE GROUNDING SCREW AND THE OUTLET BOX, CONNECTION TO THE BOX MAY BE A "G" CLIP OR BY A 10/24 SCREW THREADED INTO A HOLE IN THE BACK OF THE BOX AND USED FOR NO OTHER PURPOSE.

FEQUIPMENT CONNECTED TO THE ELECTRICAL SYSTEM SHALL BE GROUNDED WITHIN INSULATED GREEN GROUNDING CONDUCTOR SIZED IN ACCORDANCE WITH N.E.C. AND INSTALLED WITHIN THE RACEWAY. CONDUCTOR SHALL BE CONTINUOUS BETWEEN A GROUNDING SCREW IN THE EQUIPMENT JUNCTION BOX AND A GROUND ATTACHMENT IN THE NEAREST OUTLET BOX IN THE RIGID METALLIC CONDUIT SYSTEM. THIS REQUIREMENT INCLUDES ALL FLEXIBLE CONDUIT.

EQUIPMENT, RACEWAY SYSTEMS, WIRING SYSTEM NEUTRALS, RECEPTACLES AND POWER OUTLETS, MOTORS AND MOTORIZED EQUIPMENT, SHALL BE GROUNDED IN

GROUND RECEPTACLES AND POWER OUTLETS TO THE CONDUIT SYSTEM WITH A

GENERALLY FOR TELEPHONE AND SUPPLEMENTAL COMMUNICATION SYSTEMS NO 6 AWG CONDUCTOR TO EACH PROTECTOR CABINET, OTHER CABINET, OR DEVICE INSTALLATION SHALL BE CONSIDERED SUFFICIENT, FROM THE SERVICE GROUND (UNLESS INDICATED OTHERWISE).

### GROUNDING MATERIAL: GROUND-RODS - 1/2" DIA., 10' LONG, COPPERWELD

ACCORDANCE WITH N.E.C. ARTICLE 250.

GROUND CONDUCTOR - SIZE AS PER N.E.C. REQUIREMENTS, SOFT DRAWN OR SOFT ANNEALED, COPPER WIRE.
JOINTS AND CONNECTIONS - MOLDED FUSION WELDING PROCESS USING PROPER

MOLD AND THE NUMBER, SIZE AND TYPE CARTRIDGE FOR THE JOINT OR CONNECTION. WATERPIPE CONNECTION, SILICON BRONZE APPROVED MECHANICAL CONNECTOR DESIGNED FOR THE PIPE AND CABLE TO BE BONDED.

#### PANELBOARD INSTALLATION:

MOUNT PANELBOARDS WITH CENTERLINE AT 5 FT.-6IN. ABOVE FINISH FLOOR, EXCEPT THAT THE HIGHEST BREAKER HANDLE SHALL BE BELOW 6 FT.-5 IN. ABOVE FINISH FLOOR. ARRANGE BREAKERS SO THAT THE BREAKER RATING IS VISIBLE WITH THE PANEL FRONT IN PLACE.

PANEL DIRECTORIES, AS A MINIMUM, SHALL BE TYPEWRITTEN AND INDICATE BREAKER POSITION NUMBER AND EQUIPMENT SERVED. THE PANEL IDENTIFICATION SHALL BE LOCATED ON THE PANEL TRIM AND SHALL CONSIST OF A BLACK LAMINATED PHENOLIC LABEL, SCREW MOUNTED, WITH THE PANEL IDENTIFICATION MATCHING PANEL IDENTIFICATION ON DRAWINGS. LABEL ALL CONDUCTORS WITH ADHESIVE WRAP LABELS WITHIN 2 IN. OF THE CONDUCTOR TERMINATION PRIOR TO INSTALLATION OF TRIM.

#### LIGHTING FIXTURE INSTALLATION

PROVIDE A LIGHTING FIXTURE FOR EACH AND EVERY OUTLET IN ACCORDANCE WITH TYPE DESIGNATION AND FIXTURE SCHEDULE ON THE DRAWINGS. VERIFY THE ARCHITECTURAL FINISHES AND CEILING CONSTRUCTION AND - REGARDLESS OF THE CATALOG NUMBER PREFIXES AND SUFFIXES SHOWN - PROVIDE FIXTURES WITH THE PROPER TRIM, FRAMES, SUPPORTS, AND HANGER AND OTHER MISCELLANEOUS APPURTENANCES TO PROPERLY COORDINATE WITH SAID FINISHES. REINFORCE CEILING CONSTRUCTION AS REQUIRED TO PROPERLY SUPPORT THE WEIGHT OF FIXTURES INSTALLED THEREON.

IMMEDIATELY PRIOR TO FINAL INSPECTION: THOROUGHLY CLEAN ALL FIXTURES INSIDE AND OUT, INCLUDING PLASTICS AND GLASSWARE. ADJUST TRIM TO FIT ADJACENT SURFACES. REPLACE BROKEN OR DAMAGED PARTS. INSTALL NEW LAMPS. ELECTRICALLY AND MECHANICALLY TEST THE SYSTEM FOR PROPER OPERATION.

THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING APPROVAL FROM LOCAL CODE AUTHORITIES AND MAKING ANY REVISIONS DIRECTED BY THEM ON EMERGENCY AND EXIT LIGHTING.

### CLEANING

THOROUGHLY CLEAN ALL FIXTURES, SWITCHES, OTHER DEVICES, PANELBOARDS, AND EQUIPMENT PROVIDED OR CONNECTED IN THIS CONTRACT. ALL SURFACES SHALL BE PROPERLY POLISHED AND SHALL BE FREE OF PAINT AND ALL OTHER DIRT OR DEBRIS. TOUCHUP OR COMPLETELY REFINISH ALL EQUIPMENT FURNISHED WITH FACTORY FINISHES THAT IS DAMAGED DURING DELIVERY OR CONSTRUCTION. PROPERLY PROTECT THE FRONTS OF ALL PANELBOARDS, SWITCHBOARDS AND SIMILAR EQUIPMENT TO PREVENT MARRING AND OTHER DEFACING.

AT ALL TIMES, KEEP THE PREMISES FREE FROM ACCUMULATIONS OF WASTE MATERIALS OR RUBBISH CAUSED BY THE WORK OF THE TRADESMEN DOING ELECTRICAL WORK. AT COMPLETION OF THE WORK, REMOVE ALL RUBBISH, TOOLS, EQUIPMENT, AND SURPLUS MATERIALS. BROOM CLEAN ALL ASSIGNED SPACES PRIOR TO LEAVING THE PREMISES.

### TESTING AND LOAD BALANCING

TEST ALL CIRCUITS TO ASSURE THEM TO BE FREE OF GROUNDS AND SHORTS. LIGHT AND TEST EACH LAMP. PROVE AND TEST THE AVAILABLE VOLTAGE ON THE LOAD SIDE OF EACH DISCONNECT. VERIFY PROPER OPERATION OF THE DISCONNECT. VERIFY THE PHASE SEQUENCE, VOLTAGE, AND ROTATION AT EACH MOTOR IN THE PRESENCE OF THE INSTALLER. RUN EACH MOTOR WITH ITS CONTROL AS NEARLY AS POSSIBLE UNDER OPERATING CONDITIONS FOR A SUFFICIENT LENGTH OVER TIME TO DEMONSTRATE CORRECT ALIGNMENT, WIRING CAPACITY, SPEED, AND OVERALL SATISFACTORY OPERATION. CHECK THAT THE PROPER OVERLOAD HEATERS HAVE BEEN INSTALLED BY READING THE MOTOR NAMEPLATE. ADJUST THE SIZE OF THE OVERLOAD HEATER AS REQUIRED TO MATCH THE MOTOR NAMEPLATE. OPERATE ALL MAIN AND FEEDER SWITCHES AND BREAKERS.

THE VARIOUS BRANCH CIRCUITS SERVED FROM THE LIGHTING PANELBOARDS VARY IN LOADING. CAREFULLY BALANCE THE ACTUAL OPERATING LOAD ON EACH PANELBOARD WHEN ALL LOAD IS TURNED ON AND THE SYSTEM IS OPERATING AT 100% DEMAND, THE UNBALANCE SHALL NOT EXCEED 10%. DURING FINAL INSPECTION, FURNISH THE TEST INSTRUMENTS AND QUALIFIED PERSONNEL TO PERFORM COMPLETE TESTING. COSTS OF ALL TESTING, INCLUDING THE INCIDENT COSTS FOR RETESTING OCCASIONED BY DEFECTS AND FAILURES OF THE EQUIPMENT TO MEET THE SPECIFICATIONS, SHALL BE BORNE BY THE CONTRACTOR.

FURNISH AT THE COMPLETION OF THE PROJECT A FINAL INSPECTION CERTIFICATE FROM THE LOCAL INSPECTING AUTHORITY.

END OF SECTION 16000