

LIGHTING DEVICE SCHEDULE

Occ Sensor - Wall: Switched	а	REF
Lighting Switches: Switch	b	CON TO E
Lighting Switches: Switch	EMS	ENE SWI

Family and Type Switch Tag

ELECTRIC INVERTER SCHEDULE

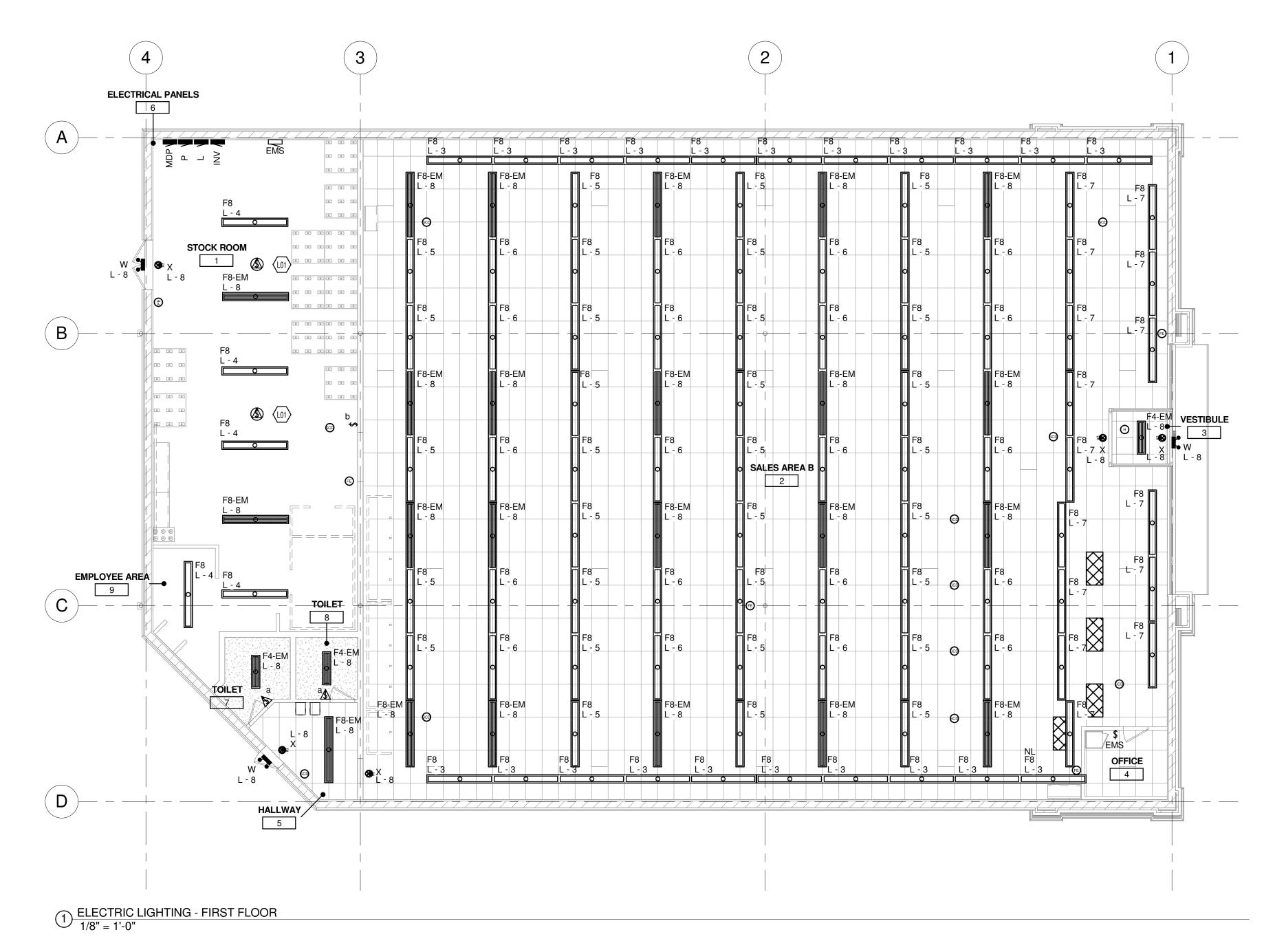
Provide UL924 listed inverters / battery backup for emergency egress as specified below and per specifications. See floor plans for individual luminaires to be connected to each inverter. Luminaires are labeled with "IN_". Coordinate final inverter sizes with final luminaire selection and maximum inverter loading requirements prior to purchase / rough in. Where a luminiare on an inverter is specified to be controlled / dimmed, provide UL924 control bypass devices to force luminaires to 100% on when power is lost. Mount inverters in an easily accessible location. Coordinate final inverter locations in field.

INVERTER ID	125% LOAD	PANEL	CIRCUIT NUMBER	VOLTAGE	INVERTER SIZE
INV	674 VA	L	8	120 V	720 VA

LIGHTING CONTROL PANEL (LCF NOTES:

1) PROVIDE A MINIMUM 10% SPARE RELAY OR DIMMER (OR BOTH IF LCP CON LIGHTING CONTROL PANEL WITH NO LESS THAN 1 SPARE RELAY AND/OR DI 2) THIS SCHEDULE IS INTENDED ONLY TO CONVEY MINIMUM QUANTITIES OF POLE SPACE WITHIN THOSE PANELS, PROVIDE ADDITIONAL PANELS AND/OR CHOSEN LIGHTING CONTROL SYSTEM MANUFACTURER FOR THE QUANTITY CIRCUITS/ZONES SHOWN IN THIS SCHEDULE. 3) PROVIDE NORMALLY-OPEN RELAYS UNLESS OTHERWISE NOTED.

LIGHTING	CONTROL ZONING	SCHEDULE:		
SUPPLY	CIRCUIT NUMBER	NUMBER OF POLES	CURRENT	LOAD
EMP				1
L	2	1	3 A	SHOW WINDOW RECEPTACL
L	4	1	2 A	LIGHTING
L	7	1	6 A	LIGHTING SALES AREA A 11
L	8	1	10 A	(L) INV
S/S	<u>u</u>			•
L	9	1	10 A	SIGNAGE
SALES				•
L	3	1	8 A	LIGHTING ROOM 10, 2, 11
L	5	1	12 A	LIGHTING SALES AREA C 10
L	6	1	7 A	LIGHTING SALES AREA C 10



SCHEDULE	
Comments	A.
ER TO DETAIL ON SHEET E301 FOR UPANCY SESNRO WIRING FIGURE LIGHTING IN THIS AREA BE MANUAL ON AND AUTO OFF RGY MANAGEMENT SYSTEM ICH	В.
P) SCHEDULE	
NTAINS BOTH) CAPACITY PER IMMER SPACE. LIGHTING CONTROL PANELS AND R POLE SPACE AS REQUIRED BY OF CONTROLLED	C.
	D.
LOAD NAME	E.
RECEPTACLE SALES AREA A 11	
AREA A 11	
	1.01

LIGHTING	GENERAL	NOTES

LIGHTING CIRCUIT HOMERUNS SHALL BE RUN IN A COMMON CONDUIT TO THE EMS PANEL. PROVIDE APPROPRIATELY SIZED CONDUIT AND JUNCTION BOXES. PROVIDE DEDICATED NEUTRAL FOR EACH LIGHTING CIRCUIT. PROVIDE HANDLE TIES IN ACCORDANCE WITH NEC 210.4B. ALL LIGHTING CIRCUITS SHALL BE ROUTED THROUGH THE LIGHTING CONTROL PANEL AS SHOWN.

EXIT FIXTURES SHALL BE INSTALLED AND CIRCUITED PER LOCAL AND LATEST NATIONAL ELECTRICAL CODES. ALL EMERGENCY AND EXIT FIXTURES SHALL BE DUAL-VOLTAGE (120/277 VOLT INPUT). CONNECT TO THE LINE SIDE OF LOCAL SWITCHING AND CONTACTOR OR CONNECT TO DESIGNATED NIGHT LIGHT CIRCUIT. IN STOCKROOM INSTALL WALL MOUNTED TYPE ON WALL CENTERED 1'0" ABOVE THE DOOR OPENING. IN SALES AREA, MOUNT ON CEILING 1'0" FROM THE WALL.

"EM" EMERGENCY LIGHTING: CONNECT BOTH SWITCHED AND UNSWITCHED CIRCUIT LEG FROM SAME CIRCUIT. SEE DETAIL. MODIFY FIXTURE WIRING HARNESS AS NEEDED TO CONNECT ONLY ONE LAMP TO INVERTER. "EM-BATT" EMERGENCY LIGHTING: FIXTURE EQUIPPED WITH 90 MINUTE

INTEGRAL BATTERY INVERTER. CONNECT TO BOTH SWITCHED AND UNSWITCHED HOT UNLESS INDICATED AS NL.

MAKE ALL FINAL CONNECTIONS AS REQUIRED FOR A FULLY COMPLET AND OPERABLE SYSTEM.

KEYED NOTES

SURFACE MOUNT LIGHTING IN THIS AREA FROM THE BOTTOM OF EXISTING STRUCTURE. PROVIDE ALL MATERIALS AS REQUIRED. FIXTURES SHALL BE SEISMICALLY RESTRAINED WHERE REQUIRED BY LOCAL CODE AUTHORITY.



PERMIT #:



E-101

GENERAL ELECTRIC NOTES

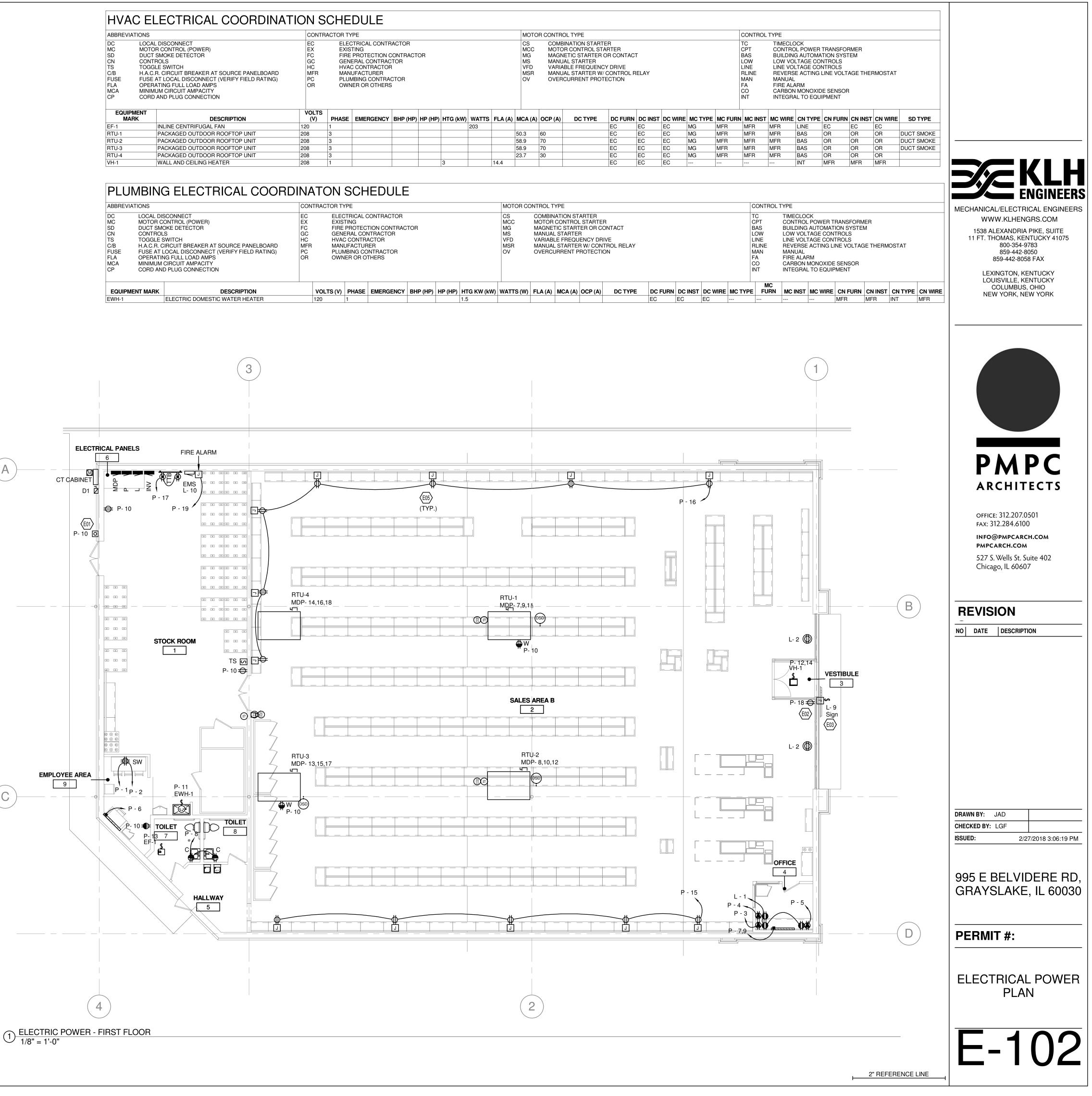
- BEFORE SUBMITTING THE BID PROPOSAL, THE CONTRACTOR SHALL VISIT THE JOB SITE AND FULLY ACQUAINT THEMSELVES WITH THE JOB CONDITIONS AND VERIFY SERVICE CONNECTIONS, INCLUDING ALL NECESSARY PULL BOXES, SIZE AND NUMBER OF CONDUITS AND CONDUCTORS, SWITCH GEAR, METERING, ANY ASSOCIATED FEES. ETC., WHETHER SHOWN ON DRAWINGS OR NOT BUT REQUIRED BY SERVICE UTILITY CO. TO MAKE A COMPLETE AND OPERATING ELECTRICAL SERVICE WITHOUT ADDITIONAL COST TO THE TENANT. VERIFY SERVICES AND CHARGES WITH POWER AND TELEPHONE COMPANIES.
- CONTRACTOR SHALL VERIFY ALL REQUIREMENTS OF MECHANICAL EQUIPMENT WITH MECHANICAL DRAWINGS AND SPECIFICATIONS AND SHALL FURNISH AND INSTALL ALL ITEMS, INCLUDING LOCAL DISCONNECTS AS DETAILED IN THE MECHANICAL ELECTRICAL COORDINATION SCHEDULE, REQUIRED BY THE CONTRACTOR FOR COMPLETE INSTALLATION.
- VERIFY LOCATION AND REQUIREMENTS OF MECHANICAL EQUIPMENT | C. WITH CONTRACTOR (DOOR HEATERS, UNIT HEATERS, ROOF TOP UNITS, TRANSFER FANS, ETC.)
- ELECTRICAL WORK AND MATERIALS SHALL COMPLY WITH LATEST NEC D. AND ALL LOCAL CODES AND ORDINANCES. IN CASES OF CONFLICT AMONG REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.
- ALL CONDUCTORS SHALL BE #12 AWG COPPER EXCEPT AS OTHERWISE NOTED OR AS REQUIRED FOR VOLTAGE DROP (SEE SPECS). ALL CONDUIT SHALL BE 1/2" MINIMUM EXCEPT AS OTHERWISE NOTED OR AS REQUIRED FOR CONDUCTORS.
- TENANT'S ELECTRICAL EQUIPMENT SHALL BE RELOCATED AS REQUIRED TO MINIMIZE LENGTH OF CONDUIT/CONDUCTOR BETWEEN SERVICE DISCONNECT SWITCH AND PANEL 'MDP'. OBTAIN APPROVAL FROM TENANT'S ARCHITECTURAL DEPARTMENT OR PROPOSED LOCATION PRIOR TO INSTALLATION, COST CLAIMS FOR CONDUIT/CONDUCTOR IN EXCESS OF BASE BID WILL NOT BE
- CONSIDERED IF PANEL RELOCATION IS NOT PROPOSED TO MINIMIZE THESE COSTS PRIOR TO INSTALLATION. TELEPHONE: FURNISH AND INSTALL ALL NECESSARY CONDUIT, DEVICE
- BOXES AND PLATES. PROVIDE NEW TELEPHONE SERVICE TO TENANT'S SPACE AND NEW TELEPHONE EQUIPMENT BOARD. COORDINATE WITH LANDLORD AND TELEPHONE CO. AS REQUIRED FOR INSTALLING THIS SERVICE.
- FURNISH AND INSTALL 3/4" CONDUIT FROM EACH TELEPHONE OUTLET 1'-0" INTO CEILING CAVITY, OR UP TO JOIST WHERE NO CEILING IS INSTALLED.
- FURNISH AND INSTALL TELEPHONE CABLE FROM EACH OUTLET BOX, BACK TO TENANT'S TELEPHONE SERVICE LOCATION. CABLE SHALL BE LISTED AS COMMUNICATIONS PLENUM CABLE WHEN INSTALLED IN AN AIR HANDLING PLENUM.
- ATTACH TELEPHONE CABLES TO PHONE JACKS AND TO TELEPHONE COMPANY SERVICE CONNECTION DEVICE. COORDINATE WITH TELEPHONE COMPANY, AS REQUIRED.TELEPHONE: FURNISH AND INSTALL ALL
- NECESSARY CONDUIT, DEVICE BOXES AND PLATES FIRE ALARM SYSTEM: IF THERE IS NO EXISTING FIRE ALARM SYSTEM AND THE NATIONAL, STATE OR LOCAL FIRE AUTHORITY HAVING JURISDICTION NOW REQUIRES A FIRE ALARM SYSTEM, FURNISH AND INSTALL DEVICES, COMPONENTS, ETC. AS DIRECTED BY ENFORCING AGENCY. INCLUDE COST FOR DEVICES AND INSTALLATION IN BASE BID. CONNECT ALARM CONTACT(S) OF SPRINKLER SYSTEM FLOW
- SWITCH AND SUPERVISED VALVE AND AIR DUCT DETECTORS TO FIRE ALARM SYSTEMS AS REQUIRED. IF REQUIRED, CONNECT FIRE ALARM DEVICES (AIR DUCT
- DETECTORS, ETC) AND ANY OTHER ASSOCIATED EQUIPMENT TO DEDICATED 120V CIRCUIT. PROVIDE LOCAL STATUS INDICATOR AND ALARM SYSTEM FOR
- ALARM DEVICES WHERE NOT CONNECTED TO FIRE ALARM SYSTEM. VERIFY ALL REQUIREMENTS AND INSTALL IN ACCORDANCE
- WITH NFPA, NATIONAL, STATE, LOCAL CODES, LOCAL FIRE AUTHORITY HAVING JURISDICTION AND LANDLORD REQUIREMENTS.
- IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO REVIEW ALL ARCHITECTURAL DRAWINGS, ELECTRICAL DRAWINGS AND NOTES TO ENSURE THAT ALL ELECTRICAL REQUIREMENTS ARE MET. ALL POWER AND ALARM WIRING FOR EXIT DOORS SHALL BE CONCEALED IN DOOR FRAME.
- DUCTWORK AND PIPING SHALL NOT BE ROUTED OVER ELECTRIC
- PANELS OR TRANSFORMERS ALL CONDUITS SHALL BE CONCEALED IN WALLS AND OUTLET BOXES SHALL BE FLUSH WITH FINISHED WALL UNLESS OTHERWISE NOTED.
- DISCONNECT AND DISCARD ALL EXISTING ELECTRICAL EQUIPMENT AND DEVICES, WIRING, CONDUIT, LIGHT FIXTURES, ETC. NOT BEING REUSED
- ANY PENETRATIONS THROUGH FIRE-RESISTANT/RATED WALLS, PARTITIONS, FLOORS, AND CEILINGS SHALL BE FIRESTOPPED USING APPROVED METHODS TO MAINTAIN THE FIRE RESISTANCE RATING.
- ELECTRICAL CONTRACTOR SHALL PROVIDE JUNCTION BOX AND 0. RACEWAY FOR THERMOSTATS AND HVAC LOW VOLTAGE CONTROLS AT 48" A.F.F. TO TOP OF DEVICE. THERMOSTATS AND HVAC LOW VOLTAGE CONTROLS INSTALLED AND WIRED BY MECHANICAL CONTRACTOR. COORDINATE EXACT LOCATIONS WITH MECHANICAL CONTRACTOR. TYPICAL OF ALL
- WHERE OPEN-AIR INSTALLATION METHODS (EITHER EXPOSED ABOVE THE CEILINGS, IN BRIDLE RINGS OR IN CABLE TRAYS) ARE PERMITTED, PROVIDE PLENUM-RATED CABLES WHEREVER PLENUM CEILINGS (IF ANY) EXIST AND INSTALL PER NEC.
- ACCESS TO LANDLORD'S JUNCTION BOXES MUST BE MAINTAINED. | Q. PROVIDED ACCESS PANELS AS REQUIRED.
- WIRING DEVICES: UNLESS OTHERWISE NOTED, MOUNT EACH OUTLET BOX SO THE BOTTOM IS LOCATED AS FOLLOWS: SWITCH +44" -RECEPTACLE: +16". ADJUST TO COORDINATE WITH MASONRY IF REQUIRED. REFER TO ARCHITECTURAL DRAWINGS BEFORE STARTING WORK
- PROVIDE LABELED CIRCUIT(S) FOR COOLER/FREEZER EQUIPMENT AS INDICATED. ALL ADDITIONAL DISCONNECTS AND REQUIRED EQUIPMENT TO BE PROVIDED BY INSTALLER.
- CASH REGISTER AND COMPUTER WIRING: DO NOT CONNECT "ISOLATED" GROUND WIRE TO RACEWAY OR BOX. CONDUIT AND BOX SHALL BE METAL AND METAL-TO-METAL CONNECTORS SHALL BE USED (NO FLEX CONDUIT) TO ESTABLISH GROUND PATH FOR BOX AND RACEWAY. DO NOT RUN ANY OTHER CIRCUIT IN SAME CONDUIT WITH CASH REGISTER OR COMPUTER (IG) CIRCUITS. CASH REGISTER DATA SYSTEM CABLE SHALL BE FURNISHED AND INSTALLED BY OTHERS.

KEYED NOTES

- SIGNAL SYSTEMS: REAR DOOR BELL AND PUSH-BUTTON: FURNISH AND F01 INSTALL AN EDWARDS #55-6G5, 24V AC "ADAPT-A-BELL" ABOVE CEILING AND A #852 WEATHERPROOF PUSH-BUTTON IN FLUSH (NEW CONST.) SWITCH BOX AT TENANT SPACE BACK DOOR. CONNECT SO THAT BELL SOUNDS WHEN PUSH-BUTTON IS PRESSED.
- GATEKEEPER CART RECEPTACLE. MOUNT 12" BELOW CEILING. E02 E03 PROVIDE ROUGH IN FOR TENANT STOREFRONT SIGN(S) WHERE APPLICABLE. FINAL CONNECTIONS WILL BE FURNISHED AND INSTALLED BY TENANT'S SIGN CONTRACTOR. FURNISH AND INSTALL DISCONNECT AND JUNCTION BOXES W/6' WHIP ON INTERIOR WALL ABOVE ACCESSIBLE CEILING. WHERE INSTALLED OUTDOORS PROVIDE WEATHERPROOF, INSULATED JUNCTION BOX AND WEATHERPROOF DISCONNECT. CONTRACTOR SHALL COORDINATE FINAL EXTERIOR JUNCTION BOX LOCATION WITH SIGN VENDOR. JUNCTION BOXES NEED TO BE WITHIN 5 FEET OF SIGN FOR SIGN VENDOR TO MAKE FINAL ELECTRICAL CONNECTION. IF STORE HAS ADDITIONAL SIDE OR REAR SIGNAGE THE CONTRACTOR SHALL COORDINATE WITH THE SIGN VENDOR FOR ANY ADDITIONAL EXTERIOR SIGNAGE AND THE ASSOCIATED ELECTRICAL REQUIREMENTS. AFTER THE ELECTRICAL DESIGN IS COMPLETE, IT MAY BE DETERMINED THAT CERTAIN SITES REQUIRE SIDE OR REAR SIGNAGE MOUNT ON FLOOR AND MAKE MC CONNECTION TO DUPLEX RECEPTACLE INSTALLED IN FIXTURE KICK PLATE. ASSEMBLE JUNCTION BOX AROUND INSTALLED FIXTURE.

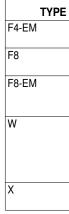
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GENERAL ELECTRICAL INSTALLATION NOTES

- EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED IN STRICT COMPLIANCE WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70), INCLUDING ARTICLE 250 AND TABLE 250.122. THESE CONDUCTORS MAY OR MAY NOT BE INDICATED ON SINGLE-LINE DIAGRAMS, BUT SHALL BE PROVIDED UNDER BASE BID NEVERTHELESS.
- LAYOUT AND INSTALL ALL ELECTRICAL WORK IN STRICT COMPLIANCE WITH CHAPTER ONE, PART B, SECTION 110.26(a) OF THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70). IF EXISTING CONDITIONS VIOLATE MANDATED CLEARANCES, CONTACT ELECTRICAL ENGINEER FOR INSTRUCTIONS BEFORE PROCEEDING. LOCATIONS AND ROUTING THAT MAY BE SHOWN ON PLANS ARE SCHEMATIC AND DIAGRAMMATIC IN NATURE. MAINTAIN CLEARANCES
- THROUGH ALL STAGES OF CONSTRUCTION. HOLD ALL NEW OVERHEAD ELECTRICAL WORK AS TIGHTLY AS POSSIBLE TO THE BOTTOM OF THE OVERHEAD STRUCTURE. DO NOT INSTALL ANY ELECTRICAL WORK WITHIN SIX INCHES OF ROOF
- DECKING. PROVIDE FLUSH MOUNTED EQUIPMENT FOR APPLICATIONS IN FINISHED AREAS AND COORDINATE THESE LOCATIONS AND INSTALLATIONS WITH ARCHITECT, OWNER AND AFFECTED TRADES. ELSEWHERE PROVIDE SURFACE MOUNTED EQUIPMENT UNLESS FLUSH MOUNTED EQUIPMENT IS NEEDED TO ACCOMMODATE UNUSUAL CONDITIONS.
- IF NOT EXISTING, PROVIDE LABELS ON ALL ELECTRICAL EQUIPMENT TO UNIQUELY IDENTIFY IT AS INDICATED ON PLANS. LABELS SHALL BE BLACK WITH 1" HIGH WHITE LETTERING.
- PROVIDE NEW BREAKERS IN EXISTING PANELS AS REQUIRED FOR NEW CONSTRUCTION. NEW BREAKERS SHALL MATCH THE MANUFACTURER, HIGHEST INTERRUPTING RATING, TYPE, ETC. OF EXISTING BREAKERS IN PANEL TO ENSURE COMPATIBILITY WITH EXISTING SYSTEM. IT IS ASSUMED THAT EXISTING BREAKERS MADE AVAILABLE BY DEMOLITION WILL BE UTILIZED FOR NEW CONSTRUCTION WHEREVER POSSIBLE, AND THAT ALL BIDS WILL REFLECT THEIR REUSE EVEN WHEN
- DRAWINGS DO NOT SPECIFICALLY INDICATE THEM AS SUCH. PRIOR TO PROJECT CLOSEOUT PROVIDE AN UPDATED, TYPED PANEL SCHEDULE AFFIXED TO INSIDE OF PANEL DOOR FOR ALL PANELS AFFECTED BY NEW CONSTRUCTION.
- BALANCE PHASE LOADS TO WITHIN 10% OF EACH OTHER PRIOR TO PROJECT CLOSEOUT. PROVIDE HACR RATED CIRCUIT BREAKERS FOR ALL MOTOR LOADS.
- POWER DISTRIBUTION EQUIPMENT SUPPLIER SHALL PROVIDE EQUIPMENT APPROPRIATELY RATED AND BRACED TO ACCOMMODATE THE AVAILABLE FAULT CURRENT AT THE UTILITY COMPANY TRANSFORMER SECONDARIES. THIS SUPPLIER SHALL ACCORDINGLY PROVIDE ANY RELATED CALCULATIONS SO THAT THEIR EQUIPMENT IS PROPERLY COORDINATED FOR THE AVAILABLE FAULT CURRENT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THIS SUPPLIER WITH COPIES OF THE ELECTRICAL DOCUMENTS AS REQUIRED SO THAT
- PROPERLY RATED/BRACED EQUIPMENT IS PROVIDED UNDER BASE BID. UNLESS INDICATED OTHERWISE, PROVIDE FULLY-RATED OR SERIES-RATED OVERCURRENT PROTECTION (OCP) AS REQUIRED TO COMPLY WITH ALL APPLICABLE REQUIREMENTS OF NFPA 70. IF FAULT CURRENT VALUES ARE NOT INDICATED AT NODES ON THE SINGLE-LINE DIAGRAM, ALSO PROVIDE FAULT CURRENT CALCULATIONS AND FURNISH RESULTS WITH EQUIPMENT SUBMITTALS. PROVIDE EQUIPMENT AND OCP RATED TO MEET OR EXCEED THE CALCULATED AVAILABLE SERIES-RATED FAULT CURRENT AT THE RESPECTIVE NODE IN THE POWER DISTRIBUTION SYSTEM. FURNISH ELECTRONIC COPIES OF THE ELECTRICAL DOCUMENTS TO THE MANUFACTURER'S REPRESENTATIVE AND/OR EQUIPMENT SUPPLIER SO THAT PROPERLY RATED AND BRACED EQUIPMENT IS PROVIDED UNDER BASE BID.



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SYMB	SYMBOL DESCRIPTION						
		IATIONS	ABBREV				
• ◆ ♀¤∀[•	ISOLATED GROUND	IG LR	e fixture, equipment or device Above finished floor / grade /				
WALL HO O	LONG - SHORT - INSTANTANEOUS LONG - SHORT - INSTANTANEOUS - GROUND FAULT	LSI LSIG	PAVEMENT ME OF FUSED SWITCH OR CIRCUIT BREAKER	F AMP FRA			
	MAIN CIRCUIT BREAKER MANUFACTURER MAIN LUGS ONLY MANUAL TRANSFER SWITCH MICROWAVE OVEN	MCB MFR MLO MTS MW	LT CIRCUIT INTERRUPTER IRCUIT AMPS INTRRUPTING RATING OF FUSED SWITCH OR CIRCUIT IC TRANSFER SWITCH	IC SHORT C T AMP TRIF BREAKEF			
a 🛄 \$	NOT IN CONTRACT (SHOWN FOR REFERENCE ONLY)	NIC	AUTOMATION SYSTEM	T.C. WORK UN			
٢	NOT TO SCALE OWNER-FURNISHED EQUIPMENT - INSTALLED AND WIRED BY E.C.	NTS OFE	R HEIGHT OR SPECIAL HEIGHT DEVICE	B CIRCUIT I			
	OPTIONAL STANDBY WORK UNDER DIVISION 22	OS P.C.	NCY IDER DIVISION 26	EMERGEI			
Φ Φ	WORK UNDER DIVISION 21 SURGE PROTECTIVE DEVICE SHUNT TRIP	S.C. SPD ST	MANAGEMENT SYSTEM NCY POWER OFF NT ROOM REDUCTION MAINTENANCE SWITCH	PO EMERGEI R EQUIPME RM ENERGY			
 	TO ABOVE ACCESSIBLE CEILING TAMPER RESISTANT TELEPHONE TERMINAL BOARD	TAAC TR TTB	TO REMAIN C WATER COOLER				
(ф) ≭	TYPICAL UNDER COUNTER REFRIGERATOR	TYP UCR	ED BY OTHERS - INSTALLED AND Y E.C. ED AND INSTALLED BY OTHERS -	WIRED B			
(*)	UNDERWRITER'S LABORATORY LISTED FOR SERVICE ENTRANCE UNLESS NOTED OR INDICATED OTHERWISE ON	UL U.L.S.E. UNO	CLE TO BE USED FOR A FLAT PANEL	DISPLAY.			
• •	DRAWINGS OR IN SPECIFICATIONS		ED WITH EQUIPMENT BY OTHERS - NSTALLED AND WIRED BY E.C.	I			
	VARIABLE FREQUENCY / SPEED DRIVE VERIFY IN FIELD VENDING MACHINE	VFD / VSD VIF VM	E DISPOSAL FAULT EQUIPMENT PROTECTION FAULT CIRCUIT INTERRUPTER DEVICE	iFEP GROUND iFI / GFCI GROUND			
ф ^н т ф ^{42"}	VANDAL PROOF WIRE GUARD WEATHER RESISTANT	VP WG WR	NDER DIVISION 23 DFF - AUTO" SWITCH				
φ ^{sw}			PLAN-VIEW AND GF				

(UNLESS OTHERWISE INDICATED)
WORK SHOWN BOLD-DASHED INDICATES SELECTIVE DEMOLITION WORK (UNLESS OTHERWISE INDICATED)

ELECTRIC LUMINAIRE SCHEDULE

PE	DESCRIPTION	MANUFACTURER / SERIES	Housing / Mounting	LAMP QTY	LAMP TYPE	LAMP BASE	COMMENTS	FIXTURE LOAD	VOLTAGE
	4' EM STRIP FIXTURE		SURFACE	(1) 18 W LED		FURNISHED W/ FIXTURE	EMERGENCY LIGHT LUMEN OUTPUT IS 1200. CONTROLLED BY EMS UNLESS NL.	22 VA	120 V
	8' STRIP FIXTURE		SURFACE	(2) 18 W LED		FURNISHED W/ FIXTURE	4-WIRE HARNESS. NOTES A,C,D,F&G.	44 VA	120 V
	8' EM STRIP FIXTURE		SURFACE	(2) 18 W LED		FURNISHED W/ FIXTURE	EMERGENCY LIGHT WIRED TO REMOTE BATTERY INVERTER AND CONTROLLED CIRCUIT. 4 WIRE GARNESS. NOTES. A,C,D,E,F&G	44 VA	120 V
	REMOTE EMERGENCY LIGHTS MOUNTED 10' AFF ABOVE EXIT DOORS; NORMALLY ON OPERATION		SURFACE	12 LED EACH HEAD		FURNISHED W/ FIXTURE	EXTERIOR EMERGENCY LIGHT WITH MOUNT AT 10'-0" ABOVE FINSIHED GRADE	30 VA	120 V
	LED EXIT SIGN		SURFACE	LED ARRAY		FURNISHED W/ FIXTURE	90 MINUTE EMERGENCY BATTERY BACKUP. NOTES: D	2 VA	120 V

LIGHT FIXTURE SCHEDULE GENERAL NOTES

DESIGNATED FIXTURE SHALL HAVE LED LAMPS 48" LED T8 LAMPS WITH 4 WIRE HARNESS AND DISCONNECT. CUT INSULATION (WHEN BATT TYPE IS USED) OR PROVIDE SHIELD AROUND FIXTURE (WHEN BLOWN-IN IS USED) TO KEEP INSULATION A

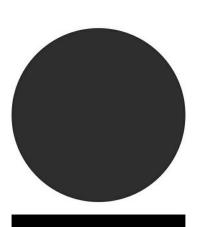
MINIMUM OF 3" AWAY FROM RECESSED FIXTURE. ATTACH FIXTURE TO T-BAR PER NEC 410.36 WHERE APPLICABLE. PROVIDE "CADDY" CLIP #CAD-IDS WHERE REQUIRED BY LOCAL AUTHORITY AND SEISMIC INSTALLATION REQUIREMENTS. FIXTURE PROVIDED WITH DUAL VOLTAGE 120/277V POWER SUPPLY. VERIFY VOLTAGE FOR EACH FIXTURE LOCATION.

CONNECTED TO REMOTE BATTERY INVERTER FOR FULL LUMEN OUTPUT DURATION OF 90 MINUTE MINIMUM. EMERGENCY (EM) LIGHT SHALL BE CONNECTED AHEAD OF SWITCHES, CONTACTORS, ETC. LIGHT FIXTURES DENOTED BY "NL" SHALL REMAIN ON DURING NON-BUSINESS WORKING HOURS.

WITH NO FINISHED CEILING, LIGHT FIXTURES IN THE SALES AREA SHALL BE SUSPENDED @ 12'-0" AFF AND LIGHT FIXTURES IN THE PRESALES AREA SHALL BE SUSPENDED @ 10'-0" AFF. EXTERIOR FIXTURES SHALL BE SUITABLE FOR WET/DAMP LOCATION AND COLD WEATHER OPERATION.

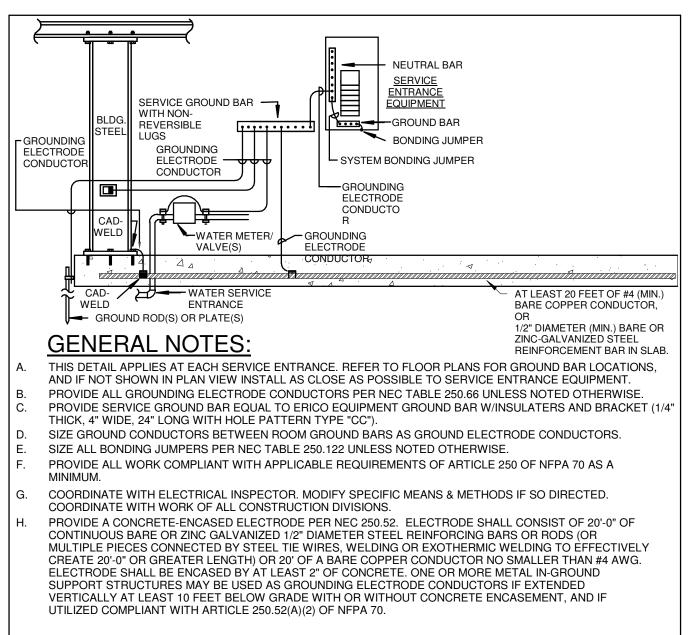
	ELECTRIC LEGEND	
SYMBOL	DESCRIPTION	ENGINEERS
	LIGHTING/LIGHTING CONTROLS	MECHANICAL/ELECTRICAL ENGINEERS WWW.KLHENGRS.COM
₽¤₽₀⊙©	LUMINAIRE (REFER TO THE LUMINAIRE SCHEDULE) NOTE THAT OTHER SHAPES MAY ALSO BE USED TO REPRESENT LUMINAIRES	1538 ALEXANDRIA PIKE, SUITE 11 FT. THOMAS, KENTUCKY 41075
	SHADED LUMINAIRES DENOTE THOSE CONNECTED TO EMERGENCY OR STANDBY POWER AS APPLICABLE (UNSWITCHED LUMINAIRES ARE EGRESS LIGHTS AND/OR NIGHT-LIGHTS THAT OPERATE 24/7)	800-354-9783 859-442-8050
	SINGLE / DOUBLE SIDED EXIT SIGN CONNECT AHEAD OF SWITCHING & CONFIGURE ARROWS TO INDICATE DIRECTION OF EGRESS TRAVEL	859-442-8058 FAX
••••• ** ? ••	EMERGENCY LIGHTING UNIT WITH 90-MINUTE BATTERY BACKUP AND ASSOCIATED REMOTE HEADS WHERE APPLICABLE. CONNECT TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHING	LEXINGTON, KENTUCKY LOUISVILLE, KENTUCKY COLUMBUS, OHIO
	A = LUMINAIRE TYPE (REFER TO THE LUMINAIRE SCHEDULE), NL = NIGHT-LIGHT (UNSWITCHED), a = SWITCHING DESIGNATION, EL = EGRESS LUMINAIRE (UNSWITCHED OR AUTO-ON DURING UTILITY OUTAGE)	NEW YORK, NEW YORK
\$	LIGHTING SWITCH (KEYS: 2 = 2-POLE, 3 = 3-WAY, 4 = 4-WAY, D=DIMMER, K=KEYED, LV = LOW VOLTAGE M = MOMENTARY-CONTACT 1PDT W/CENTER-REST, P = SWITCH W/PILOT LIGHT, T = TIMER SWITCH)	
(A) TYPE	CEILING-MOUNTED OCCUPANCY SENSOR. DUAL TECHNOLOGY UNLESS OTHERWISE NOTED BY TYPE. TYPE "IR" = INFRARED, TYPE "US" = ULTRASONIC	
TYPE#	WALL-MOUNTED OCCUPANCY SENSOR SWITCH. DUAL TECHNOLOGY UNLESS OTHERWISE NOTED BY TYPE. TYPE "IR"=INFRARED, TYPE "US"=ULTRASONIC, "V"=VACANCY SENSOR, "#" = CONTROLLED CIRCUITS.	
	RECEPTACLES/MISCELLANEOUS OUTLETS	
ΦΦΦ	SINGLE ("SIMPLEX"), DUPLEX, AND DOUBLE DUPLEX ("QUAD") RECEPTACLE RESPECTIVELY	
	GFI / GFCI RECEPTACLES	
\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	SURGE PROTECTIVE DEVICE RECEPTACLES	
<u>т</u> п п	ISOLATED GROUND RECEPTACLES	
	FULL SWITCHED RECEPTACLES	
	CEILING MOUNTED RECEPTACLES	PMPC
		ARCHITECTS
	RECEPTACLE ATTRIBUTES 42" = MOUNT RECEPTACLE AT THIS HEIGHT ABOVE GRADE / FINISHED FLOOR C = INSTALL ABOVE COUNTER AND BACKSPLASH	
Ψ 🕈	H = INSTALL RECEPTACLE HORIZONTALLY L = LIT (PROVIDE ILLUMINATED FACE OR INDICATOR LIGHT TO INDICATE THERE IS POWER TO RECEPTACLE) SW = SPLIT WIRED	OFFICE: 312.207.0501
$\Phi^{sw} \Phi^{L}$	T = TAMPER-RESISTANT W = WEATHER PROOF WHILE IN USE COVER AND WEATHER RESISTANT RECEPTACLE	fax: 312.284.6100 Info@pmpcarch.com
	DOOR OPERATORS/DEVICES	PMPCARCH.COM
□ ¢	DOOR BELL WITH TRANSFORMER & PUSHBUTTONS	527 S. Wells St. Suite 402 Chicago, IL 60607
0	FLUSH PUSHBUTTON FOR DOOR CHIME OR BELL	
	FIRE ALARM DEVICES	
DSD	FIRE ALARM SYSTEM DUCT SMOKE DETECTOR AND SAMPLING TUBE	REVISION
STS	FIRE ALARM SYSTEM KEYED TEST SWITCH AND ANNUNCIATOR	NO DATE DESCRIPTION
	MISCELLANEOUS	
	INDICATES DIRECT CONNECTION TO EQUIPMENT	
\$ \$ ^{MS} \$ ^{MSR}	MOTOR RATED TOGGLE SWITCH, MANUAL STARTER WITH PILOT LIGHT, AND MANUAL STARTER WITH PILOT LIGHT WITH EXTERNAL RELAY FOR CONTROL OR MONITORING RESPECTIVELY - ALL MAY BE KEYED "K"	
	HEAVY DUTY DISCONNECT SWITCH (NON-FUSED) (LEFT) HEAVY DUTY DISCONNECT SWITCH (FUSED) (RIGHT)	
	PLYWOOD EQUIPMENT BOARD	
_ _	ELECTRICAL PANELBOARD OR DISTRIBUTION BOARD (DIMENSIONS MAY VARY / FLUSH OR SURFACE MOUNTED AS INDICATED)	
	OIL FILLED TRANSFORMER	
	SINGLE LINE DIAGRAM	
	ELECTRIC UTILITY COMPANY METER AND ASSOCIATED CURRENT TRANSFORMERS	
س <u>کا</u> اب کا	CUSTOMER ELECTRIC METER AND ASSOCIATED CURRENT TRANSFORMERS HD = HIGH DENSITY METERING CABINET/BANK MOUNTED TO TIGHTLY GROUP ALL METERS TOGETHER	
	HEAVY DUTY DISCONNECT SWITCH (NON-FUSED)(LEFT) (FUSED)(RIGHT)	DRAWN BY: JAD
	SIZES MAY BE SHOWN ONLY IN SCHEDULE ELECTRICAL PANELBOARD OR DISTRIBUTION BOARD	CHECKED BY: LGF ISSUED: 2/27/2018 3:06:24 PM
	SURGE PROTECTIVE DEVICE	ISSUED: 2/27/2018 3:06:24 PM
	WIRE / CABLE / RACEWAY	
► LPA-1,3	BRANCH CIRCUIT HOME RUN WITH PANEL NAME AND CIRCUIT NUMBER(S)	995 E BELVIDERE RD,
	CABLING / RACEWAY INSTALLED CONCEALED IN WALLS OR ABOVE CEILING	GRAYSLAKE, IL 60030
	CABLING / RACEWAY INSTALLED BELOW FLOOR OR GRADE	
	CABLE TRAY	PERMIT #:
Ū	FLUSH MOUNTED JUNCTION BOX OR PULL BOX AS APPLICABLE FOR APPLICATION	
Р		SCHEDULES AND
	SINGLE-SERVICE SURFACE RACEWAY (ONE COMPARTMENT - POWER)	DETAILS
	MULTI-SERVICE SURFACE RACEWAY (TWO COMPARTMENT - POWER AND TECHNOLOGY)	
^{UP} O _{DN}	CONDUIT UP OR DOWN	
		E-201



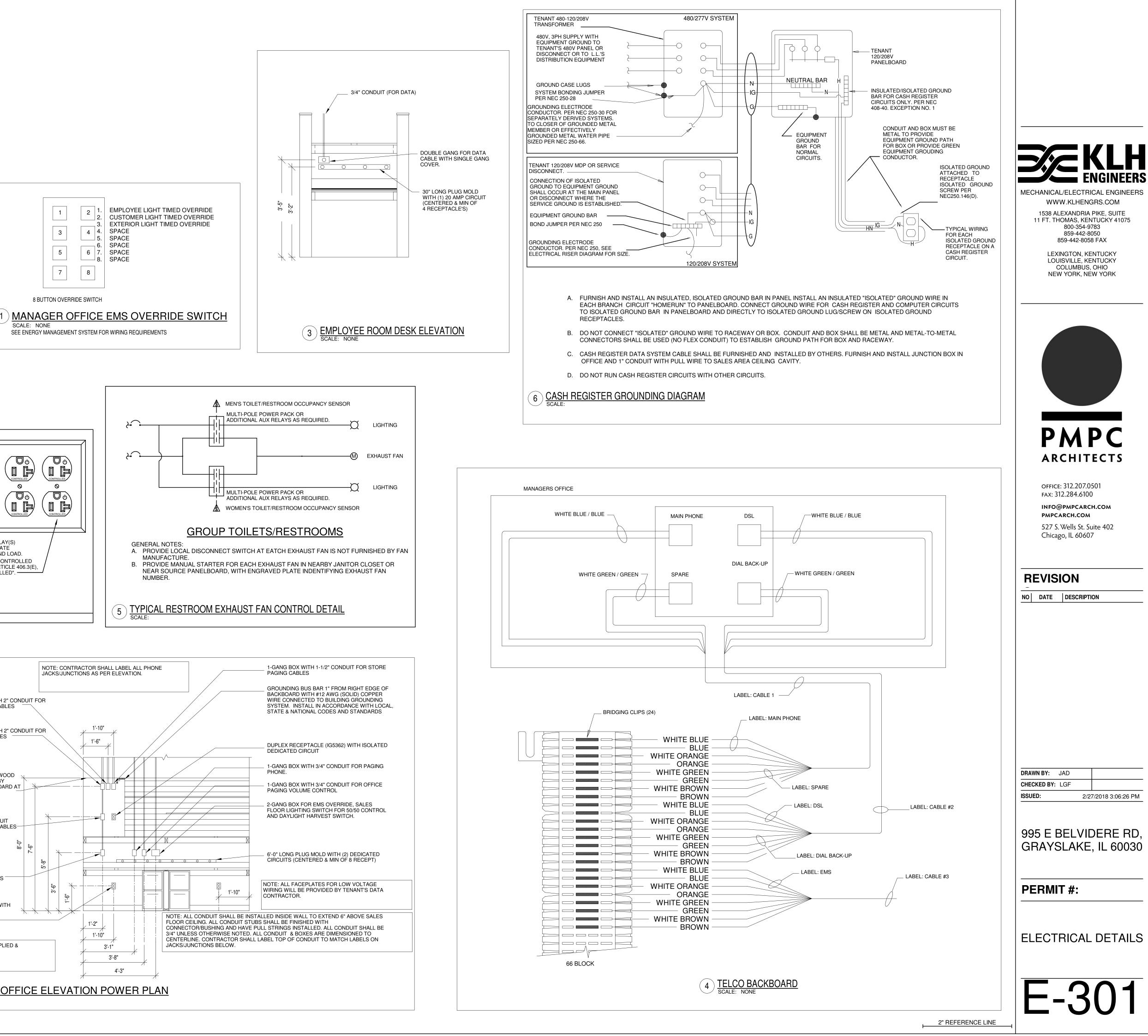




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NO DATE DES	SCRIPTION
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DRAWN BY: JAD CHECKED BY: LGF	
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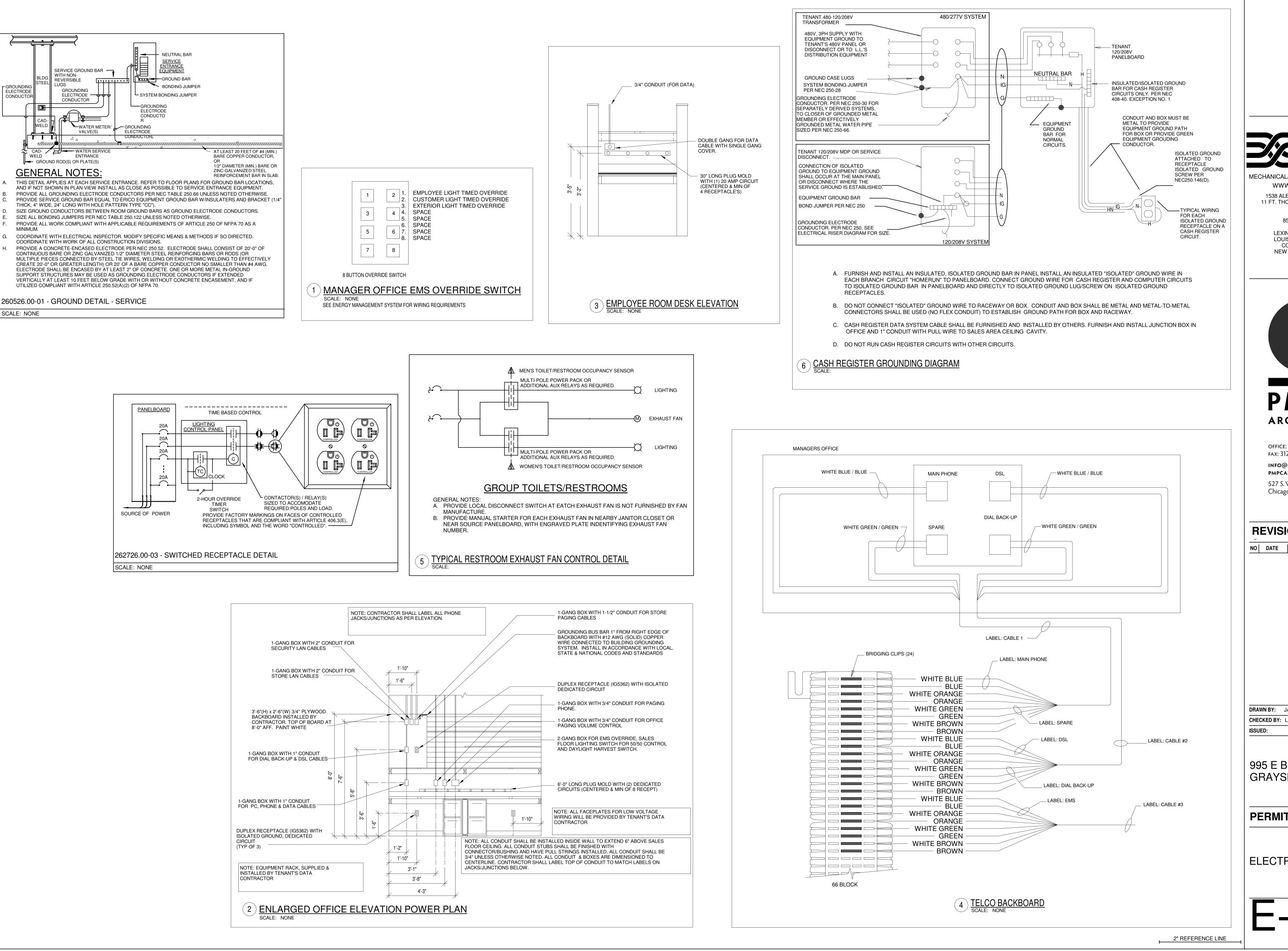


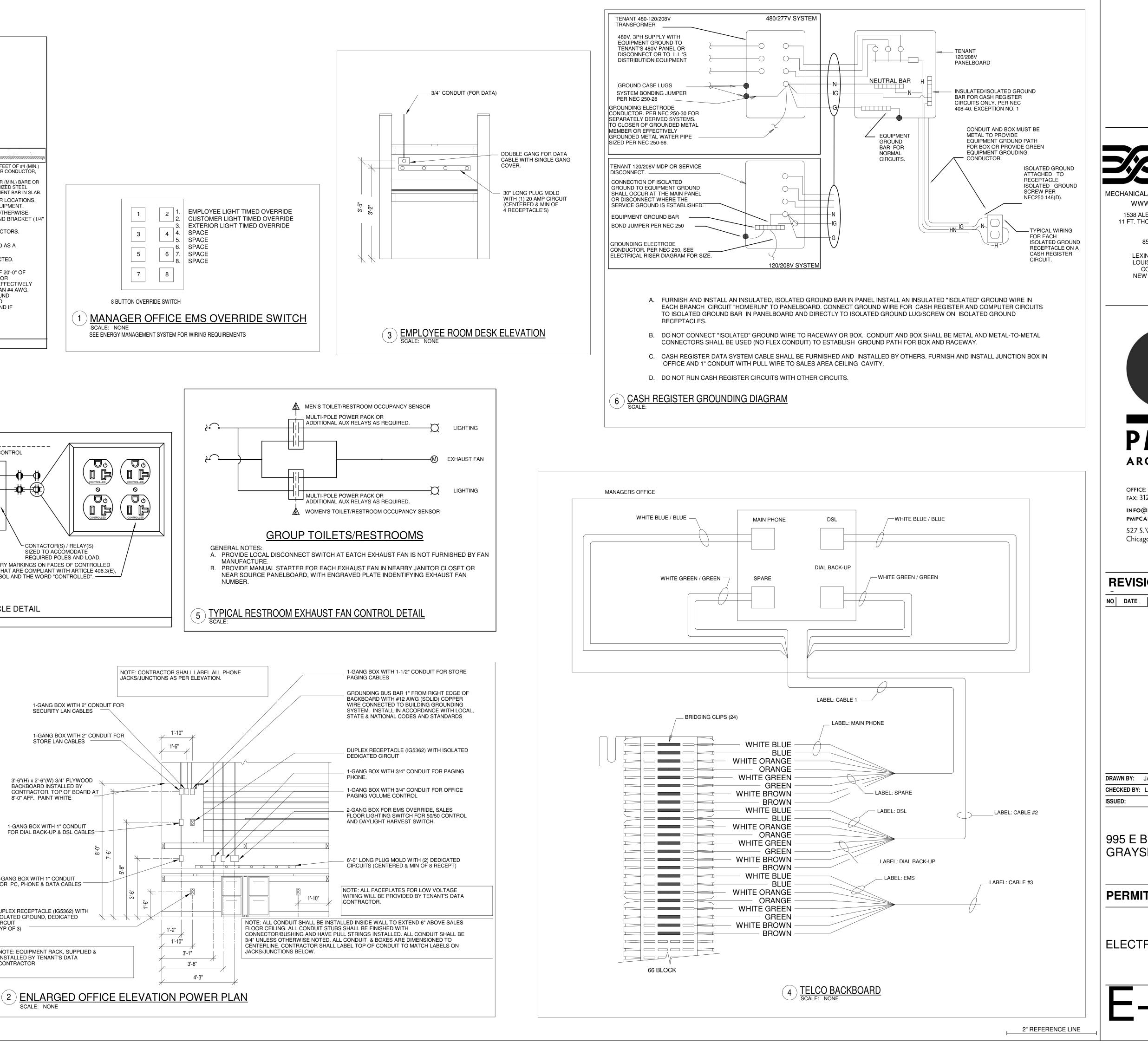
SCALE: NONE



IGINEERS

2/27/2018 3:06:26 PM





ELECTRICAL SPECIFICATIONS

The General Provisions of the contract apply to the work in this section. Before submitting a bid, examine documents of all other trades, visit the site and get acquainted with all conditions that may in any way affect the execution of this contract. Include all labor, material, equipment, tools and incidental costs to provide all work in contract documents. Apply for, secure and pay for all required permits.

All materials and methods shall be in accordance with applicable codes, regulations and/or ordinances and meet the approval of local inspection authority having jurisdiction. The latest edition of NFPA 70 (National Electrical Code, NEC) and NFPA 72 shall be the minimum requirement for all work.

All materials and equipment shall be new and shall bear a UL listing or similar testing agency listing. Material and equipment shall be suitable for installed environment, temperature range, strength, durability, voltage, etc. Install all equipment with code required and manufacturer recommended minimum clearances for operation and maintenance.

Perform work under this contract in close harmony with other contractors so completed work shall present a neat and workmanlike installation. Consult all other disciplines drawings and coordinate with contractors in field before performing work so that this work will not interfere with other disciplines work.

Exposed finished materials and equipment shall be carefully cleaned and wiped to remove grease, smudges, fingerprints, dust and other spots. During the progress of the work, the electrical sub-contractor shall carefully clean the job site and shall leave the premises and all portions of the building in which he is working free of debris and in a clean and safe condition.

Neatly provide all cutting and patching required for the admission of work. Patching shall match quality of surroundings to owner's satisfaction. Seal all new floor, ceiling, wall, slab, etc. penetrations to match or exceed existing assembly fire ratings.

Provide two clean sets of contract drawings reserved for showing a complete picture of the work as actually installed at completion of project. Provide two neatly bound and tabbed copies of all maintenance books, instruction books and parts list pertaining to all equipment furnished.

All work, materials, and equipment shall have a one year warranty after acceptance of the work by the Owner. Any defective items shall be removed and replaced at the electrical sub-contractor's expense and to the satisfaction of the engineer and owner's representative. Train the owner's representatives of each system to the satisfaction of the owner's representative.

Provide product data submittals for each of the following sections. Provide submittals as individual PDFs by section. Provide cover sheet for and naming of each submittal per http://www.klhengrs.com/the-firm/contractor-resources.html

- 26 05 19.00 Low-Voltage Electrical Power Conductors and Cables Hangers and Supports for Electrical Systems 26 05 29.00 Raceways and Boxes for Electrical Systems 26 05 33.00
- 26 09 23.00 Lighting Control Devices
- 26 24 16.00 Panelboards 26 27 13.00 Electricity Metering
- 26 27 26.00 Wiring Devices 26 51 00.00 LightinG

Provide temporary lighting, power and life safety measures in areas affected by construction.

Provide 600V rated conductors (#12 AWG minimum) wire with color coded insulation / jacket to identify phase per NEC. Insulation shall be THHN/THWN-2 unless installed underground or subject to moisture where it shall be XHHW-2. Provide copper conductors unless stated otherwise on drawings. Provide insulated equipment grounding conductor for each branch circuit. Do not share neutrals. Provide copper jumpers for final terminations of aluminum conductors where required by equipment.

Provide EMT for indoor feeders, Type MC cable for indoor branch circuits, and Schedule 40 PVC conduit for underground wiring. Conduit and cable shall be independently supported directly from structural members by approved straps, fasteners and hangers. Conduit and cables shall be neatly installed parallel and perpendicular to structural members. Noncompliant work shall be removed and replaced to satisfaction of owner. Do not support conduit or cables from roof deck or install within 4" of roof deck. Provide flexible conduit or fittings, and leave slack in cables, at all expansion joints. Provide separate raceways for normal and emergency branches of power compliant with NEC. Install raceways and cables concealed in new construction. Provide surface raceway for existing surfaces.

Recessed steel boxes shall not be less than 4" x 1-1/2" deep. No ganged boxes. Cut in box neatly. Verify all box/device mounting heights and locations in field with Owners representative.

Where technology devices shown on plan, provide 4" x 2-1/8" deep square box, with at least (1) 1" conduit (with plastic bushings or insulated throats at end fittings) to above accessible ceiling and pull string to facilitate future cable installation. Where no accessible ceiling route to technology room. Provide blank wall plates for boxes that are not immediately deviced.

Provide seismic restraint systems to meet total design lateral force requirements for support and restraint of electrical components where required by code and as directed by structural engineer. Seismic restraint designer shall coordinate all attachments with the structural engineer of record. Provide engineered stamped and signed drawings of seismic design. Seismic restraint designer shall provide visual inspection after installation and approve installation of seismic design components.

Provide engraved plastic laminate naming identification for all electrical equipment and circuit identification for junction boxes and conductors. Provide accurate typed panel schedules.

Provide all necessary electrically related work as required to render all fire protection, plumbing. mechanical, electrical, technology, architectural and Owner equipment fully operational and fully compliant with manufacturer instructions and codes. Review equipment submittal data and coordinate with installing contractors to ensure the correct size, rating and quantity of conductors and overcurrent protective devices (OCP's) are provided. Provide electrical disconnect ahead of all equipment. Locate electrical equipment to maintain clearances required by respective manufacturers and by NEC 110.26. Provide boxes and conduits to controlled equipment for control and monitor devices of other trades (thermostats, other environmental control devices, alarms, etc.).

Provide exterior photocells equal to Tork 210# series for surface mount and Tork 30## for flush applications.

Provide 7-day time clock equals to Tork #T930I-E and required contactors for a complete system. Program owners schedule.

Provide occupancy sensor switches equal to Wattstopper DW-100. Provide ceiling mounted occupancy sensors equal to Wattstopper DT-300. Provide enough sensors for 100% coverage without nuisance tripping. Provide power packs and other accessories for a complete svstem.

Provide electrical distribution panels equal to Square D "I-Line", branch panel boards equal to Square D " NF" or "NQ" with bolt-on branch breakers. All bussing shall be copper or aluminum. All equipment must be appropriately braced for available fault current. Install panels such that no overcurrent device exceeds 6'-7". Recessed panelboards shall have (3) empty 1-1/4" conduits terminated in 12" X 12" X 6" junction box above accessible ceiling. Fused and non-fused disconnect switches shall be heavy duty, quick-make, quick-break with handle configured for lock-out/tag-out for future maintenance.

Provide specification grade wiring devices. Provide WR type and NEMA 3R while-in-use covers for wiring devices installed outdoors and other areas exposed to water. All GFCI receptacles shall be accessible or protect the circuit with a GFCI circuit breaker. Device colors shall be ivory. Provide standard size stainless steelwall plates. Provide neutral in each switch box. Unless noted otherwise, install receptacles 18" to center and switches 46" to center. Ensure that lighting control devices are fully compatible with luminaires controlled.

Provide motor starters, manual or combination type, of sizes, ratings and control types as required per coordination schedules and per requirements of equipment that will actually be provided.

Provide luminaires and/or luminaire outlet boxes to properly support luminaire weight. All luminaires installed in suspended ceiling systems shall be independently supported directly to the building structural system. Connect all emergency lighting ahead of switching providing additional unswitched "hots" where required for operation.

MDP

MDP

New Construction Branch Panelboard

New Construction Branch Panelboard

New Construction Branch Panelboard

New Construction Load Center

New Construction Lighting Control Panel

	This note was created with the free version of the Centek Rich Text Editor. To remove this text, purchase he software at software.centekeng.com													
										EL	ECTRIC	SING	ÀLE LIN	NE E
REQUIRED TO ACCOM CONDITIONS, ETC.	IMODATE COND	/INIMUM SIZES. INCREA UCTOR PULLING EASE, LUMINUM CONDUCTOR	FIELD	AS 1	1 - PC SAFE 2 - DE 3 - FL	CAL EQUIPMENT NAM DWER DISTRIBUTION TY) ESCRIPTION (H - 480' OOR / LEVEL EQUENCE	SYSTEM (BL)	ANK - NC		- EMERGENCY, S -	STANDBY, L - LIF	E * - INDIC, 1 - GROU U = EC UTILITY P = PA X = EX	ID NOMENCLA ATES FEEDER JND TYPE (MA' QUIPMENT GRO ARITY-SIZED EO (ISTING FEEDE PSIZED GROUN	SIZED T Y BE BLA OUND C QUIPME ER TO RI
EQUIPMENT	PHASE	EQUIPMENT TYPE	SUPPLY FROM	SPA NUM	-	SPACE NAME	VOLTAGE	POLES	WIRES	DEMAND (kVA)	DEMAND (A)	MAINS RATING (A)	MAINS FRAME RATING (A)	Е МА
UTILITY	New Construction	Pad Mounted Transformer					208	3		82.0 kVA	228 A			
D1	New Construction	Fused Switch	UTILITY				208	3	4	82.0 kVA	228 A	600	600	FUSED

82.0 kVA

11.1 kVA

8.7 kVA

0.0 kVA

1.2 kVA

228 A

31 A

ELECTRICAL PANELS 208

ELECTRICAL PANELS 208

ELECTRICAL PANELS 208

STOCK ROOM

STOCK ROOM

PAN	EL SC	HEDULE LEGEND
(EX)	=	EXISTING CIRCUIT TO REMAIN
(#)	=	NEW CIRCUIT TO EXISTING CIRCUIT BREAKER
(G)	=	PROVIDE GROUND-FAULT CIRCUIT INTERRUPTER (GFCI) CIRCUIT BREAKER
(GE)	=	PROVIDE GROUND-FAULT EQUIPMENT PROTECTION (GFEP) CIRCUIT BREAKER
(ST)	=	PROVIDE SHUNT TRIP CIRCUIT BREAKER
(A)	=	PROVIDE ARC FAULT CIRCUIT INTERRUPTER (AFCI) CIRCUIT BREAKER
(L)	=	PROVIDE LOCK-ON DEVICE

PANEL NAME: P

I		 Г								
	SUPPLY FRO	DM: MDP		M	AINS R	ATING	(A): 15	0		
		DN: ELECTRICAL PANELS 6			MA	INS TY	PE:			
	DISTRIBUTION SYSTE						ID: 15	0-4C		
	FEEDI	ER: (4) #1/0 AWG CU, (1) #6 AV	NG CU	GND.	IN 2" C	ONDUI	T			_
СКТ	CIRCUIT	DESCRIPTION	VD%	AWG	GND	TRIP	POLE	A	۱ <u> </u>	
1	RECEPTACLE EMPLOYE	E AREA 9	0.268	#12	#12	20 A	1	0.18	0.18	
3	OFFICE 4		0.981	#12	#12	20 A	1			
5	OFFICE 4		1.025	#12	#12	20 A	1			
7	PLUGMOLD NON-CONT		0.666	#12	#12	20 A	2	0.18	0.36	
9		INUUUS OFFICE 4	0.000	#12	#12	20 A	2			
11	EWH-1		1.842	*#10	*#10	20 A	1			
13	EF-1		0.47	#12	#12	20 A	1	0.20	1.50	
15	RECEPTACLE ROOM 10,	2, 11	2.785	*#10	*#10	20 A	1			
17	RECEPTACLE STOCK RC	DOM 1	0.119	#12	#12	20 A	1			
19	(L) FIRE ALARM NON-CO	ONTINUOUS STOCK ROOM 1	0.127	#12	#12	20 A	1	0.36	0.00	
21	SPARE					20 A	1			
23	SPARE					20 A	1			
25	SPARE					20 A	1	0.00	0.00	
27	SPARE					20 A	1			
29	SPARE					20 A	1			
31	SPARE					20 A	1	0.00	0.00	
33	SPARE					20 A	1			
35	SPARE					20 A	1			
37	SPARE					20 A	1	0.00	0.00	
39	SPARE					20 A	1			
41	SPARE					20 A	1			
			Т	OTAL (CONNE	ECTED	LOAD:	3.0 ł	κVA	
LOAD	O CLASSIFICATION	CONNECTED LOAD			l	DEMAN	D FACT	OR		
	nuous	1500 VA					5.00%			
Heati	•	2995 VA					0.00%			
Motor		203 VA					5.00%			
	Continuous ptacle	1160 VA 4860 VA					0.00%			
		4000 VA		_		10	0.00/0			
										_

DANEL NAME. I

	SUPPLY FROM: MDP LOCATION: ELECTRICAL PANELS 6 DISTRIBUTION SYSTEM: 208/120V 3PH 4W FEEDER: (4) #1/0 AWG CU, (1) #6 AV	VG CU		MA F	NINS TY	R ID: 150						AULT C T CIRCU ENCLO	JIT RAT LUGS 1	ING 4 TYPE:	2000	1	SURGE SUPRESSION: ULSE: 200% NEUTRAL: ISOLATED GROUND:	
KT	CIRCUIT DESCRIPTION	VD%	AWG	GND	TRIP	POLE	A		I	В		C	POLE	TRIP	GND	AWG	VD% CIRCUIT DESCRIPTION	СКТ
1	RECEPTACLE OFFICE 4	1.828	*#10	*#10	20 A	1	0.54	0.36					1	20 A	#12	#12	1.726 SHOW WINDOW RECEPTACLE SALES AREA A 11	2
3	LIGHTING ROOM 10, 2, 11	2.005	*#8	*#8	20 A	1			0.92	0.22			1	20 A	#12	#12	0.458 LIGHTING	4
I	LIGHTING SALES AREA C 10	2.57	*#8	*#8	20 A	1					1.41	0.88	1	20 A	*#10	*#10	2.597 LIGHTING SALES AREA C 10	6
	LIGHTING SALES AREA A 11	2.158	*#10	*#10	20 A	1	0.66	1.18					1	20 A	SL	SL	SL (L) INV	8
:	SIGNAGE	2.133	*#8	*#8	20 A	1			1.20	0.00			1	20 A	SL	SL	SL (L) EMS	10
1	SPARE				20 A	1					0.00	0.00	1	20 A			SPARE	12
3	SPARE				20 A	1	0.00	0.00					1	20 A			SPARE	14
5	SPARE				20 A	1			0.00	0.00			1	20 A			SPARE	16
7	SPARE				20 A	1					0.00	0.00	1	20 A			SPARE	18
9	SPARE				20 A	1	0.00	0.00					1	20 A			SPARE	20
1	SPARE				20 A	1			0.00	0.00			1	20 A		-	SPARE	22
3	SPARE				20 A	1					0.00	0.00	1	20 A		-	SPARE	24
5	SPARE				20 A	1	0.00	0.00					1	20 A			SPARE	26
7	SPARE				20 A	1			0.00	0.00			1	20 A			SPARE	28
Э;	SPARE				20 A	1					0.00	0.00	1	20 A			SPARE	30
1	SPARE				20 A	1	0.00	0.00					1	20 A			SPARE	32
3	SPARE				20 A	1			0.00	0.00			1	20 A			SPARE	34
5	SPARE				20 A	1					0.00	0.00	1	20 A			SPARE	36
7	SPARE				20 A	1	0.00	0.00					1	20 A			SPARE	38
9	SPARE				20 A	1			0.00	0.00			1	20 A			SPARE	40
1	SPARE				20 A	1					0.00	0.00	1	20 A			SPARE	42
		т	TAL (CONNI	CTED	LOAD:	2.7	άVΑ	2.3	kVA	2.3	kVA					· · · · ·	1
AD	CLASSIFICATION CONNECTED LOAD				DEMAN	ID FACT	OR			ESTIM	ATED [EMAND)	NOTE	S:		BREAKER QUANTITIES (NEW ONL	_Y)
htin	-					5.00%					6588 V						(40) 20A / 1P	
	ontinuous 1200 VA					0.00%					1200 V			_			(2) 20A / 1P (L)	
сер	tacle 900 VA		_		10	0.00%					900 V/	١		_				
			_											_				
														-				
	1							F	PANEL	TOTALS	6							
						TOTAL	CONNE			7.4 kVA								
						AND CA												
										8.7 kVA	4							
							TAL DE				-							

20-2C

(2) #12 AWG CU, (1) #12 AWG CU GND. IN 3/4" CONDUIT

MDF

i ĝ

WIRE LENGTH.

В

0.18 0.18

0.18 0.98

0.90 1.26

0.00 0.00

0.00 0.00

0.00 0.00

0.00 0.00

PANEL TOTALS

3.7 kVA 4.1 kVA

ESTIMATED DEMAND

1875 VA

2995 VA

254 VA

1160 VA

4860 VA

(LT)

(->)

**

SL

С

| 1.50 | 1.50 |

=

FAULT CURRENT (A): 28191

LUGS TYPE:

ENCLOSURE TYPE: NEMA 1

1 20 A

NOTES:

0.00 0.00 1 20 A

POLE TRIP GND AWG VD%

1 20 A #12 #12 0.972 OFFICE 4

2 20 A *#10 *#10 2.665 VH-1

0.18 0.36 1 20 A #12 #12 0.688 PLUGMOLD | NON-CONTINUOUS

1 20 A #12 #12 0.854 RECEPTACLE ROOM 7, 8

1 20 A #12 #12 2.782 RECEPTACLE SALES AREA B 2

1 20 A *#10 *#10 2.271 RECEPTACLE ROOM 11, 2, 10

0.36 | 0.18 | 1 | 20 A | #12 | #12 | 0.829 | GATE KEEPER | RECEPTACLE SALES AREA A 11

SPARE

-- SPARE

SHORT CIRCUIT RATING... 42000

=

OF THE BRANCH CIRCUIT CONDUCTOR INSULATION. PROVIDE NEW BREAKER IF C. REQUIRED. WIRE SIZED TO COMPENSATE FOR VOLTAGE DROP =

PROVIDE LOCK-OUT/TAG-OUT DEVICE

1 20 A #12 #12 0.268 RECEPTACLE EMPLOYEE AREA 9

REFER TO DRAWINGS FOR SPECIFICATIONS SEE THE SINGLE LINE DIAGRAM / SCHEDULE FOR WIRE SIZE AND VOLTAGE DROP

ULSE:

18

32

34

38

40

42

BREAKER QUANTITIES (NEW ONLY)

(37) 20A / 1P

(2) 20A / 2P

(1) 20A / 1P (L)

CONNECT BRANCH CIRCUIT, WHICH WAS DISCONNECTED FROM ANOTHER

SURGE SUPRESSION:

ISOLATED GROUND:

200% NEUTRAL:

CIRCUIT DESCRIPTION

SOURCE AS PART OF SELECTIVE DEMOLITION, TO POLE SPACE(S) INDICATED,

DETERMINE EXACT POLE ASSIGNMENT(S) BASED ON EXISTING COLOR-CODING

PROVIDE HACR RATED BREAKERS ON ALL MOTOR LOADS. PROVIDE LOCKING TYPE BREAKER FOR ALL LIFE SAFETY AND NIGHT LIGHTING BRANCH CIRCUITS. ALL VOLTAGE DROP CALCULATIONS AND COMPENSATED WIRE SIZES ARE BASED ON RIGHT ANGLE

PANEL NAME: MDP SUPPLY FROM: D1 MAINS RATING (A): **LOCATION:** ELECTRICAL PANELS 6 MAINS TYPE: DISTRIBUTION SYSTEM: 208/120V 3PH 4W FEEDER ID: FEEDER: (2) SETS OF (4) #350 KCMIL CU, (1) #1 AWG CU GND, IN 3 **CIRCUIT DESCRIPTION** CKT CKT VD% AWG GND TRIP POL 2 4 3 P SL | SL | SL | 150 A | 3 6 5 8 7 10 9 RTU-1 1.171 #4 #10 60 A 12 11 14 13 16 |1.231| #4 | #8 | 70 A | 3 15 RTU-3 17 19 SPARE 20 A 1 20 -- --21 SPARE 20 A 22 -- -- --23 SPARE 20 A 1 24 -- --25 SPARE 20 A 1 26 -- - -27 SPARE -- -- --20 A 1 28 29 SPARE 20 A 30 -- -- --31 SPARE 20 A 1 33 SPARE 20 A 1 -- -- --35 SPARE 20 A 1 36 37 SPARE 20 A -- -- --39 SPARE 20 A 1 41 SPARE -- - 20 A TOTAL CONNECTED LOAD LOAD CLASSIFICATION CONNECTED LOAD DEMAND FA 125.00% 1500 VA Continuous 100.00% 65182 VA Heating 5270 VA 125.00% Lighting 203 VA 125.00% Non-Continuous 2360 VA 100.00% 5760 VA 100.00% Receptacle тот DEMAND

DEMAND CALCULATION NOTES: TOTAL DEMAND: 11.1 kVA

TOTAL CONNECTED LOAD: 10.7 kVA

TOTAL DEMAND AMPS: 31 A

RISER DIAGRAM GENERAL NOTES

- SERVICE ENTRANCE: INFORMATION ON THE ELECTRICAL SERVICE ENTRANCE IS BASED ON THE INFORMATION RECEIVED AT THE TIME OF DESIGN FOR THIS PROJECT. EXACT INFORMATION WAS NOT AVAILABLE. CONTRACTOR SHALL VERIFY ELECTRICAL SERVICE AND ALL EQUIPMENT AGAINST THE DESIGN AND REPORT ANY DISCREPANCIES THAT CAN NOT BE RESOLVED IN THE FIELD TO THE ENGINEER FOR FURTHER INSTRUCTION AND/OR POSSIBLE REDESIGN OF AFFECTED ITEMS.
- PANEL BOARDS: LOCATE PANEL BOARDS IN EXCLUSIVELY DEDICATED SPACES IN ACCORDANCE WITH NEC 110.26 PLUG UNUSED OPENINGS. DO NOT USE RISER DIAGRAM TO LOCATE EQUIPMENT. REFER TO POWER PLAN FOR LOCATIONS. PLUG UNUSED OPENINGS IN PANEL BOARDS.
- NATIONAL ACCOUNT VENDOR: FOR INTERIOR PANELS CONTRACTOR SHALL CONTACT NATIONAL ACCOUNT VENDOR C. FOR EQUIPMENT TO BE FURNISHED BY TENANT FOR THE PROJECT. CONTRACTOR SHALL PROVIDE ALL OTHER EQUIPMENT INCLUDING EXTERIOR CABINETS, DISCONNECTS, METERS, WIREWAYS, CONDUIT AND WIRE NEEDED FOR COMPLETE SYSTEM. PROVIDED BY CONTRACTOR: ALL CONDUIT, WIRE, MISCELLANEOUS ITEMS AND HARDWARE, ETC..., FOR A
- COMPLETE AND OPERATIONAL SYSTEM. EMS UPDATES: CONTRACTOR IS TO COORDINATE ANY EMS UPDATES AND CHANGES FOR LIGHTING CONTROL AND
- HVAC SYSTEMS INCLUDING ANY CONTRACTOR LABOR AND MATERIALS NEEDED TO COMPLETE SYSTEM REVISIONS. DESIGN DRAWINGS ARE SCHEMATIC. THIS CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING OR AWARD OF
- CONTRACT TO INSPECT EXISTING FIELD CONDITIONS. THIS CONTRACT SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY FOR FIELD MODIFICATIONS DUE TO EXISTING CONDITIONS. THE CONTRACTOR SHALL CONTACT THE ARCHITECT, ENGINEER OR OWNER PRIOR TO BIDDING FOR G. INTERPRETATIONS AND CLARIFICATIONS OF THE DESIGN AND INCLUDE IN HIS BID ALL COSTS TO MEET THE DESIGN
- INTENT. CLARIFICATIONS MADE BY THE ARCHITECT, ENGINEER OR OWNER AFTER BIDDING WILL BE FINAL AND SHALL BE IMPLEMENTED AT CONTRACTORS COST. BIDDING CONTRACTORS SHALL HAVE A WORKING KNOWLEDGE OF LOCAL CODES AND ORDINANCES AND SHALL
- THE PLANS AND SPECIFICATIONS NOT WITHSTANDING. THE CONTRACTOR SHALL ALERT ARCHITECT. ENGINEER OR OWNER OF ANY APPARENT DISCREPANCIES BETWEEN GOVERNING CODES AND DESIGN INTENT. REFER TO LANDLORD DRAWINGS FOR AIC RATINGS FOR ALL ELECTRICAL EQUIPMENT.

FAULT CURRENT

14596

NEMA

22000

FAULT CURRENT CALCULATIONS ARE BASED ON A 300 KVA TRANSFORMER AT 2.5% IMPEDANCE. VERIFY THE AVAILABLE FAULT CURRENT AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

EQUIPMENT SCHEDULE O COMPENSATE FOR VOLTAGE DROP - CONDUCTOR AMPACITY 3 - TOTAL NUMBER OF PHASE AND GROUNDED ("NEUTRAL") CONDUCTORS ONDUCTOR REMOVED FOR SERVICE ENTRANCE FROM - CONDUCTOR MATERIAL: C = COPPER, A = ALUMINUM 5 - SPECIAL (MAY BE BLANK) I = ISOLATED GROUND (PROVIDE CONTINUOUS INSULATED ISOLATED EQUIPMENT GROUNDING CONDUCTOR(S) FROM INSULATED ENT GROUND CONDUCTOR EMAIN UNLESS OTHERWISE NOTED ISOLATED GROUND BAR(S) TO RESPECTIVE UPSTREAM SERVICE ENTRANCE OR DERIVED SYSTEM GROUNDING ÉLECTRODE DUCTORS FOR TRANSFORMER SECONDARY CONDUCTOR AS APPLICABLE. FAULT SHORT ENCLOSURE 200% CURRENT CIRCUIT AINS TYPE FEEDER ID FEEDER LUGS TYPE TYPE NEUTRAL K-RATING (A) RATING (A) NOTES VD % ULSE NEMA 3F 33333 (2) SETS OF (4) #350 KCMIL CU IN 3" CONDUIT EACH Yes NEMA 3R 30785 42000 (2) SETS OF (4) #350 KCMIL CU, (1) #1 AWG CU GND. IN 3" CONDUIT EACH 0.122 29893 42000 600-4C NFMA 150-4C (4) #1/0 AWG CU, (1) #6 AWG CU GND. IN 2" CONDUIT NEMA 1 28191 42000 0.129 (4) #1/0 AWG CU, (1) #6 AWG CU GND. IN 2" CONDUIT NEMA 1 26673 42000 150-4C 0.133 (2) #12 AWG CU, (1) #12 AWG CU GND. IN 3/4" CONDUIT NEMA 1 10000 0.133 20-2C

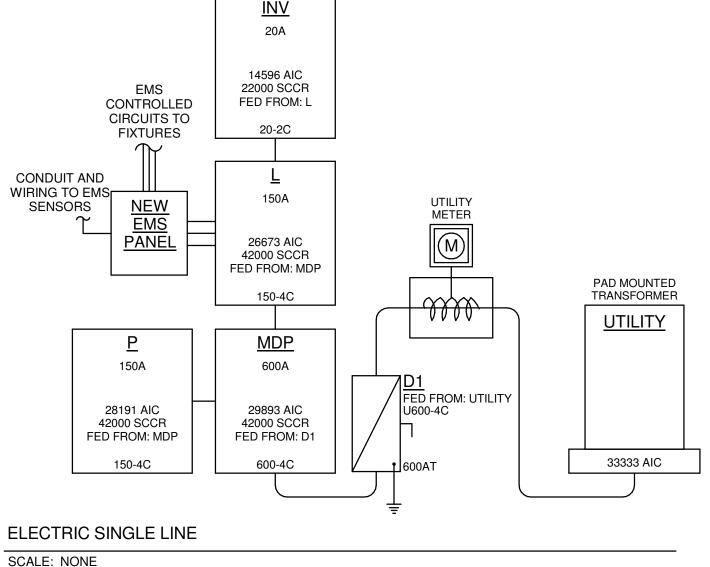
CIRCUIT LENGTHS TO THE LAST DEVICE. ACTUAL VOLTAGE DROP VARIES BASED ON INSTALLED

))-4C ONDUI [*]	ΤΕΔΩΗ	4			AULT C T CIRCL ENCLO	JIT RAT LUGS 1	ING 4 YPE:	42000	1		20	E SUPRESSION: ULSE: 00% NEUTRAL: NTED GROUND:	
	A			3		C	POLE	TRIP	1	AWG				СКТ
	2.96	2.74		-			FULE	INF	GND	AWG	VD70			2
2	2.00	2.17	3.68	2.34			3	150 A	SL	SL	SL	L		4
' ŀ			0.00	2.04	4.08	2.29		100 / 1	0L		0L	-		6
-	5.44	6.37			4.00	2.20								8
2	0.11	0.07	5.44	6.37			3	70 A	#8	#4	1 816	RTU-2		10
'			0.77	0.07	5.44	6.37	J	IUA	π0	<i>n</i> -	1.010	1110 2		12
-	6.37	2.56			0.11	0.07								14
۰ I	0.07	2.00	6.37	2.56			3	30 A	#10	#10	1 215	RTU-4		16
ĺ			0.07	2.00	6.37	2.56	Ŭ	0071			1.210			18
1	0.00	0.00			0.07	2.00								20
	0.00	0.00	0.00	0.00			3	20 A				PHASE MONITOR		22
			0.00	0.00	0.00	0.00	Ŭ	2070						24
	0.00	0.00			0.00	0.00	1	20 A				SPARE		26
	0.00	0.00	0.00	0.00			1	20 A				SPARE		28
			0.00	0.00	0.00	0.00	1	20 A				SPARE		30
	0.00	0.00					1	20 A				SPARE		32
			0.00	0.00			1	20 A				SPARE		34
					0.00	0.00	1	20 A				SPARE		36
	0.00	0.00					1	20 A				SPARE		38
			0.00	0.00			1	20 A				SPARE		40
					0.00	0.00	1	20 A				SPARE		42
D:	26.4	kVA	26.8	kVA	27.1	kVA								
АСТ	OR			ESTIM		EMAND)	NOT	ES:				BREAKER QUANTITIES (NEW ONL	.Y)
%					1875 V	A							(2) 150A / 3P	_
%					65182 \								(21) 20A / 1P (1) 20A / 3P	
%					6588 V			_					(1) 30A / 3P	
)%)%					254 VA			_					(1) 60A / 3P	
1% 1%					2360 V			_					(2) 70A / 3P	
			PANEL										<u> </u>	
TAL	CONNE		LOAD:											
) CA	LCULA		OTES:											

TOTAL DEMAND: 82.0 kVA

TOTAL DEMAND AMPS: 228 A

INCLUDE IN THEIR BIDS THE COSTS FOR ALL WORK INSTALLED IN STRICT ACCORDANCE WITH GOVERNING CODES.



2" REFERENCE LINE



ELECTRICAL SINGLE LINE AND SCHEDULES

E-302

	_	

FUNCTIONAL TESTING NOTE

Lighting control devices and systems shall be tested to ensure the hardware and software is calibrated, programmed, and in proper working order. Installing contractor shall be responsible for any/all required installation certificates and shall provide manuals for lighting control devices to owner prior to project close-out. Installing contractor shall be responsible for contracting with appropriate parties to arrange for testing/ commissioning of the lighting control systems and shall be responsible for ensuring any/all required functional testing forms are completed and submitted to the owner and local AHJ prior to project close-out.

> Project Title: DOLLAR TREE STORES Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\20151.cck



COMcheck Software Version 4.0.7.0 Inspection Checklist

Energy Code: 2015 IECC Requirements: 100.0% were addressed directly in the COMcheck software Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comme
C103.2 [PR4] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C406 [PR9] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.

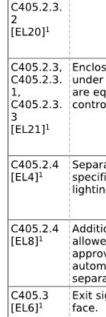
Additional Comments/Assumptions:

Project Title: DOLLAR TREE STORES Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\20151.cck

uments prepared by the Consultant as instruments of statutory and other reserved rights, including, without instr Iaw, and uments a **OWNERSHIP OF INSTRUMENTS OF SERVICE** All reports, plans, specifications, computer files, field data, notes and other doc service shall remain the property of the Consultant. The Consultant shall retain limitation, the copyright thereto.

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions	Section # & Req.ID	Rou
C303.3, C408.2.5. 2 [FI17] ³	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.	C405.2.1 [EL15] ¹	Lightin reduce 50%.
C405.4.1 [FI18] ¹	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	□Complies □Does Not □Not Observable □Not Applicable	See the Interior Lighting fixture schedule for values.	C405.2.1 [EL18] ¹ C405.2.1, C405.2.2.	Occupa require
C408.2.5. 1 [FI16] ³	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	Complies Does Not Not Observable Not Applicable	Requirement will be met.	[EL23] ²	per ap manua visible Autom
C408.3 [FI33] ¹	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	Complies	Requirement will be met.	1 [EL22] ²	buildin buildin
		□Not Applicable		C405.2.3	Daylig

Additional Comments/Assumptions:



Additional Comments/Assumptions:

	1 High Impact (Tier 1) 2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)	
Project Title:	DOLLAR TREE STORES	Report date: 02/26/18	Project Title:
Data filename:	G:\20000-20999\20100-20199\20151\Project Data\Energy\20151.cck	Page 5 of 6	Data filename:

B C D E

Lamps/ # of Fixture (C X D)

44

44

44

Report date: 02/26/18

Page 2 of 6

Total Proposed Watts = 4708

4 44

1408

1056

176

528

Fixture Fixtures Watt.

32

12

24

Comments/Assumptions

Report date: 02/26/18

Page 6 of 6

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been

Nam



Project Information Energy Code: Project Title: Project Type:

Construction Site: 995 E BELVIDERE RD GRAYSLAKE, IL 60030 Additional Efficiency Package

Allowed Interi

1-EMPLOYEE ARE 2-TOILET 8 (Comr 3-OFFICE 4 (Comr 4-SALES AREA B 5-VESTIBULE 3 (C 6-HALLWAY 5 (Cor 7-TOILET 7 (Comr 8-ELECTRICAL PA 9-STOCK ROOM 1 10-SALES AREA (11-SALES AREA A

Proposed Inte

Fixtu

1-EMPLOYEE A 2-TOILET 8 (Cor 3-OFFICE 4 (Cor 4-SALES AREA F8: F8: 8' STRIF F8-EM: F8-EM: 5-VESTIBULE 3 7-TOILET 7 (Common Space Types:Restrooms)

Report date: 02/26/18

Page 3 of 6

Project Title: DOLLAR TREE STORES Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\20151.cck

F8-EM: F8-EM: 8' EM STRIP FIXTURE: Other: terior Lighting PASSES: Design 61% better than code

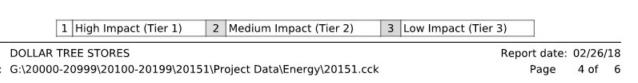
designed to meet the 2015 IECC requirements in COMcheck Version 4.0.7.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

ame - Title	Signature	Date

Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast 9-STOCK ROOM 1 (Common Space Types:Storage >=1000 sq.ft.) 10-SALES AREA C 10 (Retail:Sales Area) F8: F8: 8' STRIP FIXTURE: Other: F8-EM: F8-EM: 8' EM STRIP FIXTURE: Other: 11-SALES AREA A 11 (Retail:Sales Area) F8: F8: 8' STRIP FIXTURE: Other:

Α

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.1 [EL15] ¹	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.1 [EL18] ¹	Occupancy sensors installed in required spaces.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.1, C405.2.2. 3 [EL23] ²	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	Does Not	Requirement will be met.
C405.2.2. 1 [EL22] ²	Automatic controls to shut off all building lighting installed in all buildings.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.3 [EL16] ²	Daylight zones provided with individual controls that control the lights independent of general area lighting.	Complies Does Not Not Observable Not Applicable	Requirement will be met.
C405.2.3, C405.2.3. 1, C405.2.3. 2 [EL20] ¹	Primary sidelighted areas are equipped with required lighting controls.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.3, C405.2.3. 1, C405.2.3. 3 [EL21] ¹	under skylights and rooftop monitors are equipped with required lighting	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.4 [EL4] ¹	Separate lighting control devices for specific uses installed per approved lighting plans.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.2.4 [EL8] ¹	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
C405.3 [EL6] ¹	Exit signs do not exceed 5 watts per face.	Complies Does Not Not Observable Not Applicable	Requirement will be met.



COMcheck Software Version 4.0.7.0 Interior Lighting Compliance Certificate

2015 IECC DOLLAR TREE STORES New Construction

Owner/Agent:

Designer/Contractor: KLH Engineers 1538 Alexandria Pike Fort Thomas, KY 41075

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

or Lighting Power	or	Lighting	Power
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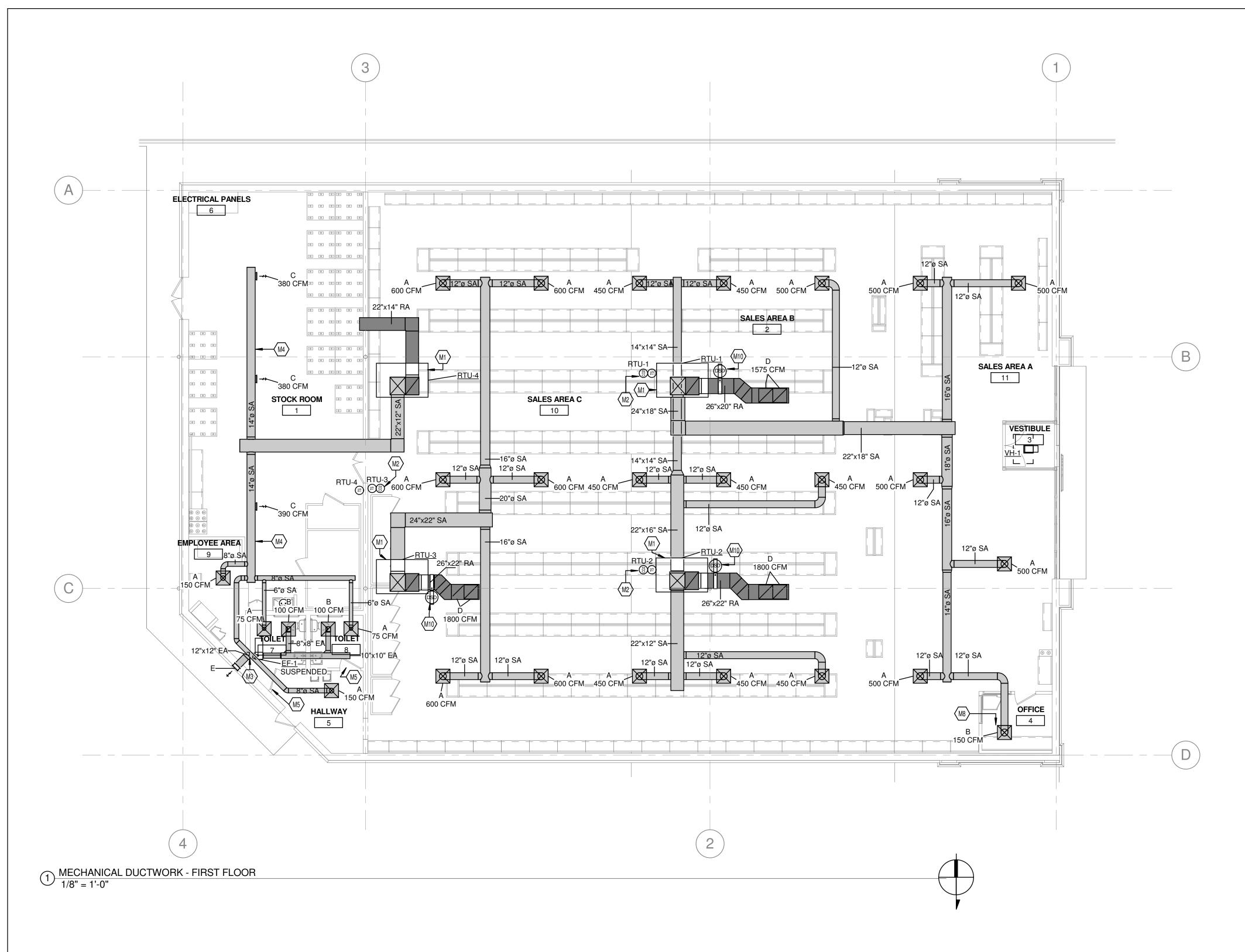
rior Lighting Power				
A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2		D wed Watts (B X C)
REA 9 (Common Space Types:Storage >=50 - <=1000 sq.ft.)	113	0.57		64
nmon Space Types:Restrooms)	56	0.88		49
nmon Space Types:Office - Enclosed)	80	1.00		80
B 2 (Retail:Sales Area)	3000	1.43		4290
(Common Space Types:Corridor/Transition >=8 ft wide)	49	0.59		29
Common Space Types:Corridor/Transition >=8 ft wide)	113	0.59		67
nmon Space Types:Restrooms)	71	0.88		62
PANELS 6 (Common Space Types:Storage <50 sq.ft.)	21	1.12		24
1 (Common Space Types:Storage >=1000 sq.ft.)	1372	0.57		782
C 10 (Retail:Sales Area)	3003	1.43		4294
A 11 (Retail:Sales Area)	1683	1.43		2407
	То	tal Allowed W	/atts =	12148
erior Lighting Power		•		-
A ture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
AREA 9 (Common Space Types:Storage >=50 - <=1000 sq.ft.)				
ommon Space Types:Restrooms)				
ommon Space Types:Office - Enclosed)				
A <u>B 2 (Retail:Sales Area)</u> NP FIXTURE: Other:	2	31	44	1364
1: 8' EM STRIP FIXTURE: Other:	2	4	44	176
3 (Common Space Types:Corridor/Transition >=8 ft wide)				
(Common Space Types:Corridor/Transition >=8 ft wide)				

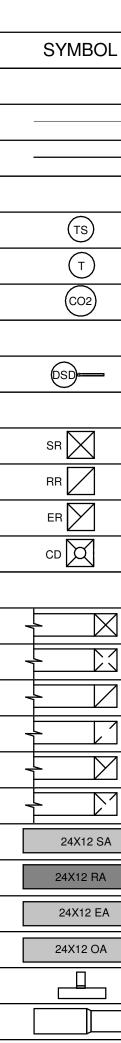
6-HALLWAY 5 (Common Space Types:Corridor/Transition >=8 ft wide)

8-ELECTRICAL PANELS 6 (Common Space Types:Storage < 50 sq.ft.)

Project Title: DOLLAR TREE STORES Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\20151.cck Report date: 02/26/18 Page 1 of 6

<section-header><text><text><text><text></text></text></text></text></section-header>
EXAMPLE ARCHITECTS
OFFICE: 312.207.0501 FAX: 312.284.6100 INFO@PMPCARCH.COM PMPCARCH.COM 527 S. Wells St. Suite 402 Chicago, IL 60607
Image: Provide the system of the system o
DRAWN BY: JAD CHECKED BY: LGF ISSUED: 2/27/2018 3:06:30 PM
995 E BELVIDERE RD, GRAYSLAKE, IL 60030
PERMIT #:
LIGHTING COMPLIANCE
EN101





	KEYED NOTES	
	 M1 CONTRACTOR SHALL INSTALL NEW HVAC UNIT AND CONTRACTOR PROVIDED ROOF CURB AS INDICATED ON PLANS, SCHEDULE AND NOTES. PROVIDE NEW OPENING AND STRUCTURAL SUPPORT AS SHOWN ON STRUCTURAL DRAWINGS, PROVIDE FULL SIZE DUCT DROPS TO BOTTOM CHORD OF STRUCTURE. CONTRACTOR MAY CONTACT TENANT VENDOR FOR PRICING ON UNITS. M2 CONTRACTOR SHALL PROVIDE CO2 SENSOR 7'-0" A.F.F. THESE SENSOR SHALL CONTROL RTU-1,2,3. M3 EXTEND EXHAUST DUCT THRU WALL AND TERMINATE WITH WALL CAP 10'-0" MIN. ABOVE WALKWAY. PAINT WALL CAP TO MATCH ADJACENT SURFACES. M4 CONTRACTOR SHALL LOCATE BOTTOM OF STOCK ROOM DUCTWORK ABOVE LIGHTING, ANY DEVIATION TO THIS DIMENSION DUE TO INTERFERENCE WITH ANY BUILDING OBSTRUCTIONS SUCH AS STRUCTURE, OVERHEAD DOORS, ETC. SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO FABRICATING THE DUCTWORK. M5 PROVIDE 1" AIRSPACE BETWEEN BOTTOM OF DOOR AND FINISHED FLOOR FOR AIRFLOW. M4 ADJUST DIFFUSER FOR FULL VERTICAL DISCHARGE INTO OFFICE BELOW. M10 FURNISH AND INSTALL SMOKE DUCT DETECTOR (SYSTEM SENSOR #D4120) IN RETURN AIR DROP FROM UNIT. WIRE SMOKE DUCT DETECTOR TO BUILDING FIRE ALARM CONTROL PANEL OR FURNISH AND INSTALL A REMOTE AUDIBLE/VISUAL ALARM DEVICE WITH A REMOTE TEST SWITCH (SYSTEM SENSOR #RTS2-AOS) LOCATED IN AN APPROVED LOCATION. FIELD VERIFY EXACT REQUIREMENTS. CONTRACTOR SHALL TEST SYSTEM TO INSURE PROPER FUNCTION PRIOR TO TENANT OCCUPYING SPACE. 	THE ANDRIA PIKE, SUITE 11 FT. THOMAS, KENTUCKY 41075 800-354-9783
	 BARNER STREAM OF THE PROPERTION OF THE PROVIDE AND ANY PENETRATION THROUGH THE ROOF SHALL BE COORDINATED BY LOCAL CODE. ANY PENETRATION THROUGH THE ROOF SHALL BE COORDINATED WITH THE LANDLORD'S FIELD REPRESENTATIVE AND SHALL BE DONE BY A LANDLORD APPROVED ROOFING CONTRACTOR IN ORDER TO MAINTAIN THE ROOFING WARRANTEE. ALL VENTS SHALL EXTEND A MINIMUM OF 12 INCHES ABOVE ROOF AND SHALL BE A MINIMUM OF 10 FEET FROM ANY OUTSIDE AIR INTAKE. ALL DUCT SIZES SHOWN ARE CLEAR INSIDE AIR FLOW DIMENSIONS. DONOT PROVIDE AIR EXTRACTORS OR SPLITTER DAMPERS WHICH PROTRIDE INTO RECTANGULAR TRUNK DUCTS (WHERE USED). PROVIDE ROUND SPIN-IN FITTINGS FOR ROUND BRANCH DUCTS. ROUND BRANCH DUCTS WHERE INDICATED ARE SAME SIZE AS ATTACHED DIFFUSER NECK SIZE. DO NOT SUSPEND ANY ITEMS FROM DECK OR SLAB ABOVE. ALL ITEMS SHALL SUSPEND FROM STRUCTURE UNLESS OTHERWISE NOTED. PROVIDE MISCELLANEOUS STEEL AS REQUIRED. WHERE CEILING SPACE IS NOT SUFFICIENT TO PERMIT TOP CONNECTION TO CEILING DIFFUSER WITH PROPER BEND RADIUS FOR FLEXIBLE DUCT. CONTRACTOR SHALL FADS REALL FADS CONNECTION OF FILE SUPPORT FOR SHALL COORDINATE AND SCHEDULE ALL WORK WITH LANDLORD'S FOR DIFFUSER TO PERMIT SIDE CONNECTION OF FLEXIBLE DUCT. PROVIDE SUPPORT FOR PIPING ON ROOF PER LANDLORD'S ROOFING CONTRACTOR SHELD SUPPORT FOR PIPING ON ROOF PER LANDLORD'S ROOFING CONTRACTOR SHELD SUPPORT FOR PIPING ON ROOF PER LANDLORD'S ROOFING CONTRACTORS RECOMMENDATIONS. ALL CONCELAD SUPPING AN ROOF PER LANDLORD'S ROOFING CONTRACTORS RECOMMENDATIONS. ALL CONCELAD SUPPING AN ROOF PER LANDLORD'S ROOFING CONTRACTORS RECOMMENDATIONS. ALL CONCELAD SUPPING AN ROOF PER LANDLORD'S ROOFING CONTRACTORS RECOMMENDATIONS. ALL CONCELAD SUPPING AN ROOF PER LANDLORD'S SHALL BE INSULATED TO CODE MINIMUM VALUE. 	859-442-8050 859-442-8058 FAX LEXINGTON, KENTUCKY LOUISVILLE, KENTUCKY COLUMBUS, OHIO NEW YORK, NEW YORK
	MECHANICAL LEGEND DESCRIPTION PLAN-VIEW LINE TYPES WORK SHOWN FADED INDICATES EXISTING WORK TO REMAIN OR NEW WORK BY	OFFICE: 312.207.0501 FAX: 312.284.6100 INFO@PMPCARCH.COM PMPCARCH.COM 527 S. Wells St. Suite 402 Chicago, IL 60607
_	WORK SHOWN BOLD-CONTINUOUS INDICATES NEW WORK	
	MECHANICAL STATS & SENSORS	REVISION
	LOW VOLTAGE THERMOSTAT	NO DATE DESCRIPTION
	CARBON DIOXIDE SENSOR	
	MECHANICAL DUCTWORK ACCESSORIES	
	DUCT MOUNTED SMOKE DETECTOR (HARD WIRE INTERLOCK TO FAN MOTOR BY E.C.) FURNISHED BY E.C., INSTALLED BY M.C.	
	MECHANICAL AIR DEVICES	
	SUPPLY REGISTER	
	EXHAUST REGISTER CEILING DIFFUSER	
	MECHANICAL DUCTWORK	
UP	SUPPLY DUCT WITH ELBOW TURNED UP	DRAWN BY: MEB
DN	SUPPLY DUCT WITH ELBOW TURNED DOWN	CHECKED BY: JRK
UP	RETURN DUCT WITH ELBOW TURNED UP	ISSUED: 2/27/2018 4:18:54 PM
DN	RETURN DUCT WITH ELBOW TURNED DOWN	
UP	EXHAUST DUCT WITH ELBOW TURNED UP	995 E BELVIDERE RD, GRAYSLAKE, IL 60030
DN	EXHAUST DUCT WITH ELBOW TURNED DOWN	
	SUPPLY DUCT	
	RETURN DUCT	PERMIT #:
	OUTSIDE AIR DUCT	MECHANICAL DUCTWORK - FIRST
	BRANCH TAKEOFF REDUCER, CONCENTRIC	FLOOR
		M - 100

OWNERSHIP OF INSTRUMENTS OF SERVICE
All reports, plans, specifications, computer files, field data, notes and other documents and instruments prepared by t
service shall remain the property of the Consultant. The Consultant shall retain all common law, statutory and other r
limitation the convrisht therate

' the Consultant as instruments of reserved rights, including, without ls d

											HVAC	ROOFTC		S SCHE	DULE										
EQUIPMENT MARK	DESCRIPTION	LOCATION	STATUS	WEIGHT (lbs)	MANUFACTURE	MODEL	MIN EER	PHASE	CFM (cfm)	ESP (in WC)	FAN RPM (rpm)	OACFM (cfm)	CLG MBH (mbh)) CLG SENS (mb	h) HTG MBH (mbh)	LAT HTG (Deg F)	GAS HTG IN (mbh)	GAS HTG OUT (mbh)	MIN GAS PRESSURE (in WC)	MAX GAS PRESSURE (in WC)	HTG KW (kW)	FLA (amps)	MCA (amps)	OCP (amps)	ACCESSORIES
RTU-1	PACKAGED OUTDOOR ROOFTOP UNIT	ROOF	NEW	1300	YORK	ZJ102	12	3	3150	0.5	0	567	96	76	111	92	180	144	4	14			50.3	60	2,3,4,5,7,10,20,22
RTU-2	PACKAGED OUTDOOR ROOFTOP UNIT	ROOF	NEW	1300	YORK	ZJ120	12.2	3	3600	0.5	0	864	121	91	121	86	240	182	4	14			58.9	70	2,3,4,5,7,10,20,22
RTU-3	PACKAGED OUTDOOR ROOFTOP UNIT	ROOF	NEW	1300	YORK	ZJ120	12.2	3	3600	0.5	0	864	121	91	121	86	240	182	4	14			58.9	70	2,3,4,5,7,10,20,22
RTU-4	PACKAGED OUTDOOR ROOFTOP UNIT	ROOF	NEW	1100	YORK	ZJ049	12.2	3	1600	0.5	0	256	46	38	64	99	120	97	4	14			23.7	30	2,3,4,5,7,10,20,22

EQUIPMENT MARK	DESCRIPTION	LOCATION	STATUS	WEIGHT (lbs)		RE	VOLTS	PHASE	HTG MBH (mbh)	HW EWT (Deg F)	HW LWT (Deg F) HTG GPM (gpm)	MIN HTG AFUE	GAS HTG IN (mbh)	GAS HTG OUT (mbh)	HTG KW (kW)	MIN GAS PRESSURE (in WC)	MAX GAS PRESSURE (in WC)	FLA (amps)	MCA (amps)	OCP (amps)
VH-1	WALL AND CEILING HEATER	VESTIBULE	NEW		MARKEL	3480	208	1	0	0	0 0		0	0	3			14.4		

BBREVIATIONS		CON	TRACTOR TYPE						мотс	R CONTRO	L TYPE						CONTRO	L TYPE					
C MOTO D DUCT N CONT S TOGO /B H.A.C JSE FUSE LA OPEF CA MINIM	AL DISCONNECT OR CONTROL (POWER) T SMOKE DETECTOR TROLS GLE SWITCH C.R. CIRCUIT BREAKER AT SOURCE PANE E AT LOCAL DISCONNECT (VERIFY FIELD RATING FULL LOAD AMPS MUM CIRCUIT AMPACITY D AND PLUG CONNECTION		EXISTIN FIRE PR GENERA HVAC C MANUFA PLUMBII	ICAL CONTI IG OTECTION AL CONTRAC ONTRACTO ACTURER NG CONTRA OR OTHER	CONTRACT CTOR PR ACTOR	FOR			CS MCC MG MS VFD MSR OV	MOTOF MAGNE MANUA VARIAE MANUA	NATION START CONTROL STA TIC STARTER L STARTER BLE FREQUENC L STARTER W/ CURRENT PROT	ARTER OR CONTAG Y DRIVE CONTROL	-				TC CPT BAS LOW LINE RLINE MAN FA CO INT	BUILDING LOW VO LINE VOI REVERS MANUAL FIRE ALA CARBON	DL POWEF G AUTOM LTAGE CO LTAGE CO E ACTING	R TRANSFO MATION SYS ONTROLS ONTROLS G LINE VOLT IDE SENSOF UIPMENT	TEM FAGE THEF	RMOSTAT	
EQUIPMENT MARK	DESCRIPTION			MERCENCY							DC TYPE												SD TYPE
-1	INLINE CENTRIFUGAL FAN	120) NP (NP)	20				DCTIFE	EC	EC	EC	MG	MFR	MFR			EC	EC	EC	SUTTE
 TU-1	PACKAGED OUTDOOR ROOFTOP UNIT	208	3				20	0	50.3	60		EC	EC	EC	MG	MFR	MFR		BAS	OR			DUCT SMOKE
TU-2	PACKAGED OUTDOOR ROOFTOP UNIT	208	3						58.9	70		EC	EC	EC	MG	MFR	MFR		BAS	OR	-	-	DUCT SMOKE
TU-3	PACKAGED OUTDOOR ROOFTOP UNIT	208	3						58.9	70		EC	EC	EC	MG	MFR	MFR	MFR	BAS	OR	-	-	DUCT SMOKE
	PACKAGED OUTDOOR ROOFTOP UNIT	208	3						23.7	30		EC	EC	EC	MG	MFR	MFR	MFR	BAS	OR	-	OR	20010110
•		1200																		0	0	0	
	WALL AND CEILING HEATER		1				3	14.4				EC	EC	EC					INT	MFR	MFR	MFR	
ŀ	HVAC LOAD SCHE	DULE JLATIONS ARE BASED O EAKDOWN SENSIBLE HEAT GAI	N FROM ROOF	· · · · · · · · · · · · · · · · · · ·		PERATURE	C	E/COOLING L	OAD FACTO	TAL SENSIB	LE HEAT GAIN	EC DNS AND EX			HEATIN HROOF	ARE PER A	REAKDOV HEAT L	VN OSS FROM F	ROOF		MFR	MFR	
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HVAC ACCESSORIES

ACCESSORIES:

- 1. MOTOR DAMPER 2. ECONOMIZER
- 3. ROOF CURB 4. HAIL GUARDS

5. INTAKE HOOD 6. VIBRATION ISOLATION 7. FLAT FILTER 8. FILTER/MIXING BOX

9. ACCESS DOOR 10. FLEX CONNECTIONS 11. MOUNTING COLLAR 12. HOT GAS BYPASS

HVAC UNIT HEATERS SCHEDULE

NUMBER	NAME	AREA	LEVEL	CEILING HEIGHT	AIR CHGS	OA CHGS	PEOPLE RED	OA PER PERSON	OA PER SQ FT.	REQ SUP	ACT SUP	REQ OA	ACT OA	ACT RET	ACT EXH	CRIT OA	PRESSURE	PCT OPERABLE	NATURAL VENTILATION
	STOCK ROOM	1372 SF	FIRST FLOOR	8' - 0"	0	0	4		0.12	1131	1150	181	184	1150	0	0.1791	E	0	
	SALES AREA B	3000 SF	FIRST FLOOR	12' - 0"	0	0	43	7.5	0.12	3550	3600	852	864	3600	0	0.2366	E	0	
	VESTIBULE	49 SF	FIRST FLOOR	10' - 3 15/32"	0	0	0		0.06	0	0	0	0	0	0	0	E	0	
	OFFICE	80 SF	FIRST FLOOR	12' - 0"	0	0	0	5	0.06	144	150	26	27	150	0	0.04	E	0	
	HALLWAY	113 SF	FIRST FLOOR	8' - 0"	0	0	0		0.06	150	150	24	24	150	0	0.06	E	0	
	ELECTRICAL PANELS	21 SF	FIRST FLOOR	8' - 0"	0	0	0			0	0	0	0	0	0	0	E	0	
	TOILET	71 SF	FIRST FLOOR	8' - 0 1/8"	0	0	0			75	75	12	12	0	80	0	N	0	
	TOILET	56 SF	FIRST FLOOR	8' - 0"	0	0	0			75	75	12	12	0	80	0	N	0	
	EMPLOYEE AREA	113 SF	FIRST FLOOR	8' - 0 1/16"	0	0	3	5	0.06	150	150	24	24	150	0	0.1866	E	0	
0	SALES AREA C	3003 SF	FIRST FLOOR	12' - 0"	0	0	41	7.5	0.12	3479	3600	835	864	3600	0	0.2319	E	0	
1	SALES AREA A	1683 SF	FIRST FLOOR	12' - 0"	0	0	31	7.5	0.12	2939	3000	529	540	3000	0	0.1806	E	0	
		9562 SF												·	·				

								HVAC F	ANS SCHEDULE								
EQUIPMENT MARK	DESCRIPTION	LOCATION	STATUS	WEIGHT (lbs)	MANUFACTURE R	MODEL	VOLTS	PHASE	WATTS (Watts)	CFM (cfm)	ESP (in WC)	FAN RPM (rpm)	BHP (hp)	HP (hp)	FLA (amps)	MCA (amps)	OCP (amps)
EF-1	INLINE CENTRIFUGAL FAN	RESTROOM	NEW	50	СООК	GN184	120	1	203	200	0.25	0					

HVAC DIFFUSERS AND REGISTERS SCHEDULE

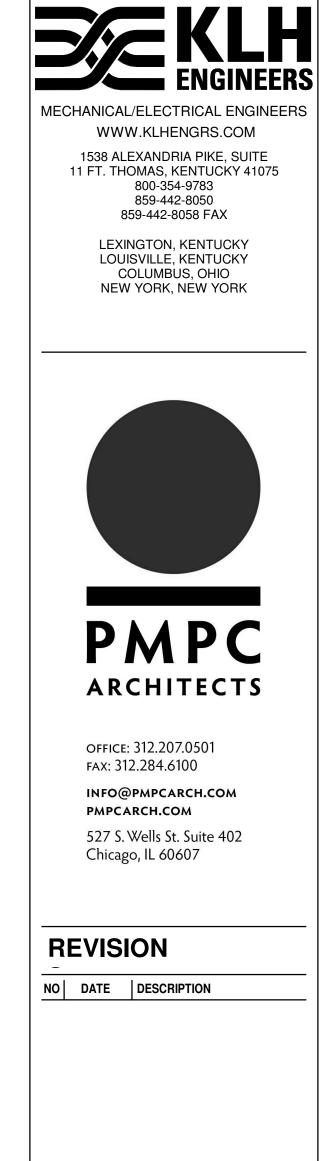
TAG	MANUFACTURER	MODEL	FACE	MOUNTING	MATERIAL	FINISH	DAMPER TYPE	BORDER STYLE
A	TITUS	TMS	24"x24"	CEILING	STEEL	STANDARD WHITE	BUTTTERFLY	LAY IN MOUNTING
В	TITUS	TMSA	24"x24"	CEILING	STEEL	STANDARD WHITE	BUTTTERFLY	LAY-IN PANEL, PROVIDE FRAME FOR CEILING MOUNTING
С	TITUS	S300FL	14"x6"	DUCT	STEEL	STANDARD WHITE	OPPOSED BLADE	SURFACE MOUNT
D	TITUS	50F	24"x24"	CEILING	STEEL	STANDARD WHITE	PARALLEL BLADE	LAY IN MOUNTING
E	TITUS	350RL	24"x24"	CEILING	STEEL	STANDARD WHITE	OPPOSED BLADE	SURFACE MOUNT

HVAC VENTILATION SCHEDULE

13. FACE/BYPASS DAMPER 14. CONDENSATE PUMP 15. MOTOR GUARD 16. GREASE TRAP

17. DUCT FLANGES 18. BASE RAIL 19. HUMIDIFIER 20. CO2 SENSORS

21. ECON POWERED EXHAUST 22. ECON BAROMETRIC RELIEF 23. HOT GAS REHEAT COIL 24. SHAFT GROUNDING BRUSHES



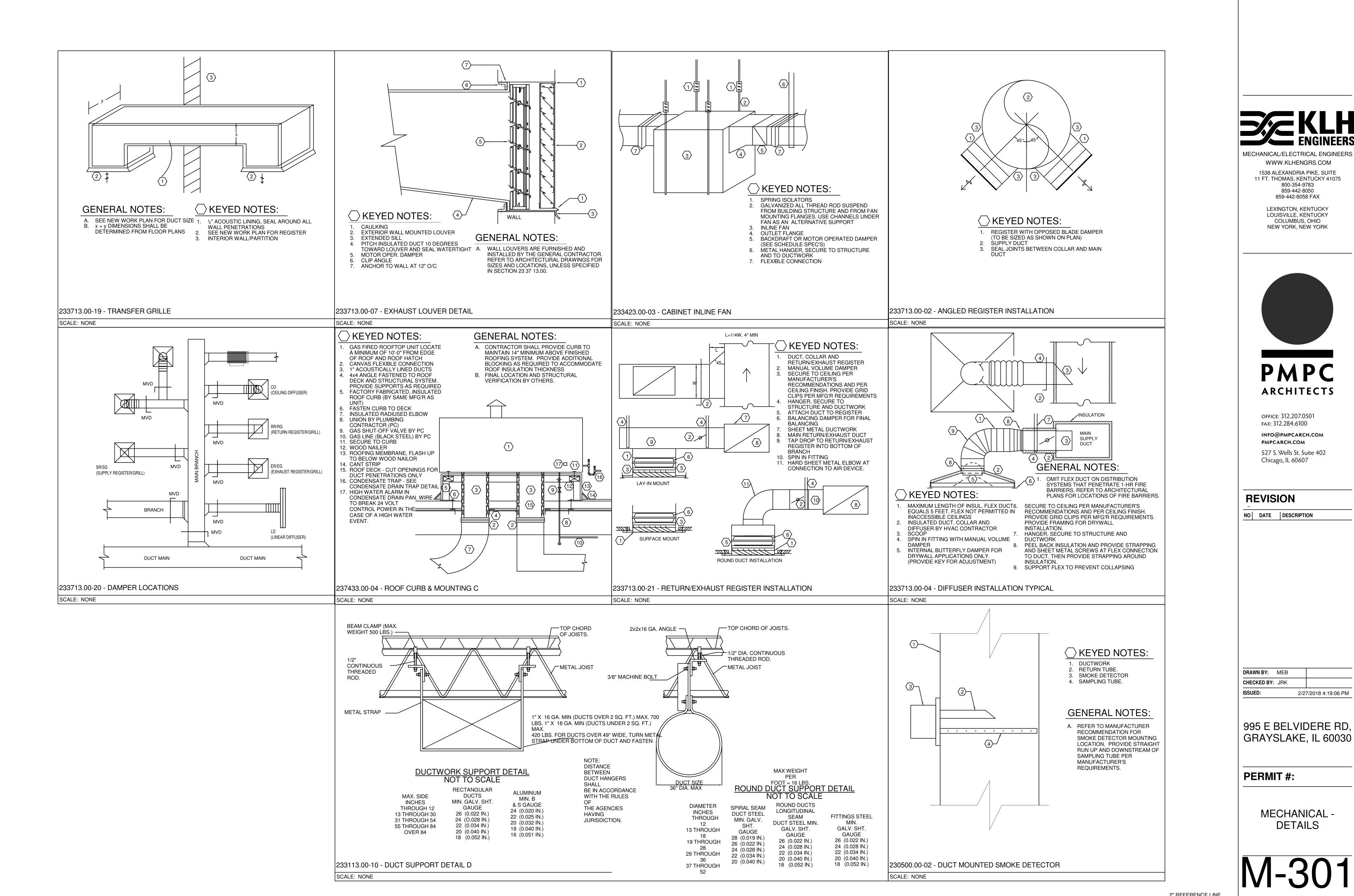
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995 E BELVIDERE RD, GRAYSLAKE, IL 60030

PERMIT #:

MECHANICAL -SCHEDULES





of

Division 23 - HVAC SPECIFICATIONS

23 05 01.00 - Common Requirements for HVAC General

General Provisions of the Contract including General and Supplementary Conditions and General Requirements apply to work of this section.

The base bid includes furnishing all materials, labor, tools, and equipment and the performance of all work required to install a complete heating and air conditioning system as outlined herein.

Guarantee

The contractor shall provide a guarantee in written form stating that all work under this section shall be free of defective work, materials, or parts for a period of one year from the date of owner's final acceptance and shall repair, revise or replace at no cost to the owner any such defects occurring within the guarantee period. Contractor shall also state in written form that any items or occurrences arising during the guarantee period will be attended to in a timely manner and will in no case exceed four (4) working days from date of notification by owner. Quality Assurance

Provide a complete installation in conformance with the following standards.

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers NFPA: National Fire Protection Association

SMACNA: Sheet Metal and Air Conditioning Contractors National Association.

Statewide Building Code

IMC: International Mechanical Code Permits, Fees, Inspections, Laws and Regulations

Permits and fees of every nature required in connection with this work shall be obtained and paid for by this contractor who shall also pay for all the installation fees and similar charges. Laws and regulations, which bear upon or affect the various branches of this work shall be complied with by this contractor and are hereby made a part of this contract. All work, which such laws require to be inspected, shall be submitted to the proper public official for inspection and a certificate of final approval must be furnished

Work in Existing Spaces

General: Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed Ceilings: Where work is being performed above ceilings, and the architectural drawings do not indicate ceiling

modifications by the general contractor, it shall be the responsibility of this contractor to remove and replace existing ceilings where work is being performed. In those instances, all repair and installation of new grid, ceiling panels, etc shall be the responsibility of this contractor. Match existing finishes.

Walls & Floors: It shall be the responsibility of this contractor to patch existing walls and floors and match existing finishes where work is being removed or installed and patching is being performed, unless noted otherwise on the architectural drawings

Tests and Adjustments

No ducts, fixtures or equipment shall be concealed or covered until they have been inspected and approved by the Architect and the inspector who shall be notified by the contractor when the work is ready for inspection. Work shall be completely installed, tested and leak tight before inspection is required. All tests shall be repeated to the satisfaction of those making the inspection.

Architectural coordination items

Cutting and Patching: Cut and drill all openings in walls and floors required for the installation. Secure approval of Engineer before cutting and drilling. Neatly patch all openings cut.

Fire Caulking: Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch. Access Panels and Pathways: Furnish all access panels required for proper servicing of equipment. Provide access

panels for all concealed valves, vents, controls, cleanout doors, and sprinkler devices required by NFPA. Provide access panels for all fire and/or fire & smoke dampers. Provide frame as required for finish. Furnish panels to General Contractor. Exact locations to be approved by the Architect. Minimum size to be 12" x 12", units to be 16 gauge steel, locking device shall be screwdriver cam locks.

proiect conditions

Where new HVAC systems are required to be connected to existing HVAC systems, it is the contractor's responsibility to verify the location, size, pressure, condition, and they shall verify that the existing HVAC system is indeed the correct and appropriate HVAC system before any work is done. Provide all necessary camera scoping and dye testing as necessary. If there is any need for concern, if it is determined that the existing HVAC system is not a correct or appropriate HVAC system or not connected to a correct or appropriate HVAC system, if the condition of the existing HVAC system is not viable for re-use, or any other condition that would not allow the proper functioning of the new HVAC system, the contractor shall notify the engineer in writing immediately via RFI and wait for direction before proceeding.

23 05 03.00 – submittals for HVAC General

Where submittals are required by the Contract Documents, they shall be prepared and supplied in accordance with the Contract Documents. In addition to Division 01, the Contractor is advised to review and comply with the requirements articulated within each Division and within each section of that Division.

Some Divisions may include a division-specific "Submittal Requirements for" section. Where this section exists, it articulates additional requirements for submittals that apply to the work of that Divisior The following requirements help to identify, track and keep the project organized for all parties involved. They are necessary to ensure a timely turnaround and an appropriate technical review. Submittals that do not conform to the administrative requirements are rejected and returned, without technical review. Requirements

Supply submittals for each section: Submittals shall be supplied on a section-by-section and type-by-type basis. For example, independent product data submittals shall be furnished for each section that requires product data submittals Independent shop drawing submittals shall be furnished for each section that requires shop drawings. Refer to the specifications for identification of which submittals are required for the project. Separate PDF file packages shall be supplied for each section, for each submittal type, where electronic submittals are required. Each PDF shall represent a single standalone submittal

Separately bound and identified submittals shall be provided where hardcopies are required. Include a transmittal: Transmittals shall enumerate each submittal for each section of each type and iteration.

Include cover sheet / title page: The cover sheet shall include the information identified in the contract documents. It shall be included as the first page of each electronic and/or hardcopy document-based submittal. An editable and printable PDF form created with editable fields and specification compliant appearance is available from KLH upon request. It is also downloadable from the KLH website at www.klhengrs.com. Include an index: The index shall enumerate the contents of the submittal.

Include checklists: Where checklists are included with the specifications, complete and include them within the appropriate submittal. Supply complete submittals: Complete submittals of each type are required. Partial submittals will be rejected. Where a section requires a product data submittal, all product data for that section shall be supplied together, at one time, as one complete submittal. Do not send half the product data as one submittal and the other half as a separate one. When resubmittal is required (e.g. Revise and Resubmit) the revised submittal shall be more complete, more accurate and more contract-compliant than its rejected predecessor. The submittal number (for each section and type) shall increment for each subsequent submittal (00 – Original submission, 01 – First Resubmission, 02 – Second Resubmission, etc...). Resubmittals shall include a copy of the reviewers comments supplied with the prior submittal rejection and shall be amended with a description of the specific action taken to comply with the reviewer's comments. The absence of this on resubmittal is cause for rejection.

Name electronic files to match the submittal ID and cover sheet: The electronic file name of submittals shall match the submittal ID included on the submittals cover page. For example: The original/first product data submittal for Section 234116 would be labeled as "234116.00-PD-00"; the first resubmittal of same shall be labeled "234116.00-PD-01". The original/first shop drawings submittal file for the same section would be labeled "234116.00-SD-00"; the first resubmittal of same shall be labeled "234116.00-SD-01". Use of Electronic Drawings from the Owner's Design Team

Plan drawings for the Project were created with AutoCAD and Revit.

If expressly permitted by the Owner and the terms of the Contract, editable electronic versions of standard-scale

AutoCAD-based plan drawings may be made available for the creation of shop and as-built drawings. Revit files are not available. If expressly permitted by the Owner and the terms of the Contract, editable electronic versions of published two-dimensional plan drawings may be made available for the creation of shop and as-built drawings for a nominal surcharge by sheet series for projects that were designed in Revit and must be converted to an AutoCĂD or Navisworks format.

Due to the proprietary nature of internal design systems, editable native-software versions of some drawings, including but not limited to system diagrams and details will not be made available in an editable form. In these cases, electronic versions of the drawings may be made available only in PDF, JPG or similar non-editable electronic form, at the sole discretion of the Design Professional.

The Request Drawings form can be accessed, filled out and submitted at the following internet address (scroll down to bottom of home page): http://www.klhengrs.com 23 05 29.00 - Hangers and Supports for HVAC Piping and Equipment

Support all ductwork and equipment by hangers or brackets properly from the building structure. Support from decking above is prohibited. Furnish structural steel members where required to support piping and equipment. No portion of piping or valves shall be supported by equipment. Ductwork - Support by means of hangers as follows:

Duct Width Hanger Size and Type Max. Spacing

30 or less (#16 gage)

A pair of hangers shall be located at every transverse joint and elsewhere according to the table. 23 05 93.00 - Testing, Adjusting and Balancing for HVAC

General Test, adjust, and balance the following mechanical systems:

Supply air systems, all pressure ranges

Return air systems. Exhaust air systems

Verify temperature control system operation

Test systems for proper sound and vibration levels. Quality Assurance

Codes and Standards

AABC: "National Standards for Total System Balance". ASHRAE: ASHRAE Handbook, 2011 Applications, Chapter 38, Testing, Adjusting, and Balancing.

Submittals Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance

with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

Final Report: Upon verification and approval prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final report to the landlord. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced.

Qualifications The contractor shall procure the services of an independent Balance and Testing Agency, approved by the Engineer, and a member of Associated Air Balance Council (AABC) or NEBB, which specializes in the balancing and testing of heating. ventilating and air conditioning systems, to balance, adjust and test all air and water systems and equipment as herein specified. All work by this agency shall be done under direct supervision of a qualified heating and ventilating Engineer employed by this agency. All instruments used by this agency shall be accurately calibrated and maintained in good working order.

Sequencing and Scheduling

Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg F wet bulb temperature of maximum summer design condition, and within 10 deg F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation

Check all filters for cleanliness, provide new as required. Check dampers (volume and fire) for correct and locked position and temperature control for completeness of installation before starting fans. Place outlet dampers in full open position. Lubricate all motors and bearings. Check fan belt tension. Check fan rotation Air balance and testing shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating and air conditioning systems and equipment into full operation and shall continue the

operation of same during each working day of testing and balancing. The contractor shall submit within 30 days after receipt of contract, 8 copies of submittal data for the testing and balancing of the air conditioning, heating, and ventilating systems. The Air Balance and Testing Agency shall provide proof of having successfully completed at least five projects of similar size and scope. The air balancing contractor shall include the additional cost to change every fan factory installed sheave, pulley and/or belt

of in order to obtain the design air flows. Performing Testing, Adjusting and Balancing

Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Patch insulation, ductwork, and housings, using materials identical to those removed.

Seal ducts and piping, and test for and repair leaks.

Seal insulation to re-establish integrity of the vapor barrier. Mark equipment settings, including damper control positions; valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

23 07 13.00 - Duct Insulation All liners, insulation and adhesives shall have a flame spread index not more than 25 and a smoke developed index of not more than 50. Insulation shall have a minimum installed thermal resistance value of R6 or code minimum, whichever

Rigid Fiberglass Ductwork Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with vapor barrier all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinvl film.

Flexible Fiberglass Ductwork Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with vapor barrier all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinvl film

Vapor Barrier Material for Ductwork: Paper-backed aluminum-foil, except as otherwise indicated; strength and permeability rating equivalent to factory-applied vapor barriers on adjoining ductwork insulation, where available; with following additional construction characteristics:

High Puncture Resistance: Low vapor transmission (for ducts in exposed areas: Mech. Rooms, etc.) Moderate Puncture Resistance: Medium vapor transmission (for ducts in concealed areas). All ductwork shall be insulated except:

Double wall ductwork Fabric ductwork Metal ducts with duct liner of sufficient thickness to comply with energy code. Factory insulated flexible ductwork

Factory insulated plenums and casings

Flexible connectors Vibration control devices

Factory insulated access panels and doors

Supply ductwork exposed in conditioned spaces excluding mechanical rooms, server rooms and electric equipment rooms Toilet exhaust, general exhaust and return ductwork in an insulated joist or attic space. 23 07 19.00 - HVAC Piping Insulation

Provide 1" fiberalass insulation on concealed condensate drain piping. Insulation shall have a minimum thickness as required by Code. All insulation and adhesives shall have a flame spread index not more than 25 and a smoke developed index of not more than 50.

23 09 93.00 - Sequence of Operations for HVAC Controls Packaged Rooftop Unit

Startup During startup, the fan shall run with the dampers in the full recirculation position. Provide occupied changeover sequence with optimum start function. When the return air temperature reaches occupied setpoint (adjustable), the minimum outside

air damper shall open to the controlled minimum outdoor air position. Supply Fan Control The supply fan speed shall be constant, run continuously during occupied mode and set to the required CFM. RTU-4 The supply fan shall be two staged and modulate up and down based on a call for heating or cooling. RTU-1,2,3

. Space Temperature Control Provide 7-day programmable thermostat with digital display of space temperature and setpoint (+/- deg. F. adjustable), with

override feature and remote space temperature sensor. . Minimum Outside Air Control

During occupied mode the minimum outside air damper shall be open. Provide motorized outdoor air damper. Provide carbon dioxide sensors in the space to measure carbon dioxide levels. Outside air damper shall modulate to maintain maximum carbon dioxide level setpoint at all times during occupied mode. CO2 levels shall be held below 1000 ppm (adjustable). When CO2 levels are below setpoint, outside air damper shall be at a minimum position, which equates to the sum of the "OA SQFT" multiplied by the room areas of each room in the "HVAC Ventilation Schedule" during occupied Furnish all access panels required for proper servicing of equipment. Provide access panels for all concealed valves, mode

. Economizer Control

Provide dual enthalpy economizer control. Economizer control shall be enabled whenever the outside air enthalpy is lower than the return air enthalpy. Enthalpy shall be calculated from sensors which are tied to the same controller for accuracy. During economizer mode, the outside air damper shall modulate to 100% open. The economizer damper shall modulate open on a call for cooling and modulate closed on a call for heating. The return damper shall modulate inversely with the economizer damper. Economizer shall have powered relief.

5. Cooling Control Cooling shall be controlled to maintain space temperature setpoint. On a call for cooling, the heating shall be off and supply fan speed shall be low. On a further call for cooling, the economizer shall be enabled. On a further call for cooling, disable the economizer and energize first stage cooling on. On a further call for cooling, the supply fan speed shall be high and energized second stage of cooling. Heating Control

Wheel: Backward or forward inclined as scheduled, non-overloading, statically and dynamically balanced. Heating shall be controlled to maintain space temperature setpoint. On a call for heating, the mechanical cooling shall be off. On a further call for heating, the economizer mode shall be disabled. On a further call for heating the gas heating coil Accessories: Provide the following accessories as indicated. shall be staged on. Volume Control Damper: Provide manual controlled volume damper in fan outlet with guadrant and lock.

8. Smoke Detector When the smoke detector is alarmed, the system shall be alarmed and the air handler shall fail safe with manual reset. Unoccupied Mode

During the unoccupied mode of operation, the RTU shall go into night setback mode. 10. Night Setback/Shutdown At night setback/shutdown the RTU shall go to fail safe position. Fail safe position is defined by the following: The supply fan is off, the outdoor air intake damper is closed, the heating is off and the mechanical cooling is off. The supply fan shall

cycle in conjunction with either the heating or cooling system to maintain a minimum/maximum space temperature depending on the season Toilet Exhaust Fans

Exhaust fans shall be controlled by local manual switch furnished, installed and wired by electrical contractor. When activated, exhaust fan motor damper shall open and fan shall start. (Indicated by EC on HECS schedule) Controls

Electrical contractor will provide power wiring. HVAC contractor shall provide all the low voltage wiring of HVAC units and controls, thermostats and controllers. Thermostat shall be by the manufacturer of the HVAC unit (heat/cool/auto/off) with night setback. Provide plastic protective cover for all thermostats. Replace controls on existing unit, adjust and calibrate

Low Voltage Thermostats Low voltage thermostats shall be furnished, installed and wired by the HVAC contractor. The electrical contractor shall provide 4" square x 1- 1/2" deep wall outlet boxes (with single-gang rings) for all thermostats/sensors. The electrical contractor shall provide one 3/4" empty conduit from each thermostat/sensor location, turned out above accessible ceilings (in joist space or against overhead slab/deck). The HVAC/Temperature Control Contractor shall provide all other necessary conduit, raceway and wiring related work. Conduit shall be identified in ceiling cavity and shall be provided with sweep bends, bushings and dragline.

The HVAC/Temperature Control Contractor shall coordinate with the General Contractor to ensure thermal envelope is maintained at these locations. carbon dioxide sensors

Carbon dioxide sensors shall be non-dispersive infrared (NIDR) type with a measurement range of 0-2000 ppm, repeatability of +/- 20 ppm and a measurement accuracy of +/- 75 ppm. Field Quality Control Testing: After installation of ventilators has been completed, test each ventilator to demonstrate proper operation of units The recommended calibration interval shall be a minimum of 5 years. Space mounted applications shall utilize diffusion through an attractive, satin finish, high impact housing. at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate General Control Wiring Requirements and Installation Methods compliance. Replace units, which cannot be satisfactorily corrected. Except where specifically indicated otherwise above, the HVAC/Temperature Control Contractor shall provide all electrical Adjusting and Cleaning work as required for all temperature control related wiring (i.e. conduit, raceway, outlet boxes, junction boxes, wiring, etc.) Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint. in accordance with Electrical Specifications requirements. All conduit shall be 3/4" minimum. Spare Parts Coordinate all thermostat/sensor locations in field (case by case) with Architect, Owner and Electrical Contractor to ensure General: Furnish to Owner, with receipt, one spare set of belts for each belt drive power ventilator. that they are placed in locations that will not interfere with furniture, equipment, artwork, wall-hung specialties, room 23 37 13.00 - Diffusers, Registers and Louvers finishes, etc. All thermostat/sensor wall locations indicated on HVAC drawings are schematic only and must be verified Ceiling Air Diffusers case-by-case prior to rough-in. Diffuser Faces:

All electrical work as described in this specification shall be per the latest edition of the National Electrical Code (NEC) and per applicable state and local codes.

Where "free-air" installation methods (either exposed above the ceilings, in bridle rings or in cable trays) are permitted Surface Mount: Diffuser shall have rolled edge below finished ceiling for surface mounting or diffuser shall be furnished under Electrical Specifications above ceilings, provide plenum-rated cables wherever plenum ceilings (if any) exist and with accessory plaster frame. install as defined under Electrical Specifications. Install low voltage circuits, located in concrete slabs and masonry walls, in Lay-In: Diffuser housing sized to fit between ceiling exposed suspension tee bars and rest on top surface of tee bar. inaccessible locations, or exposed in occupied areas, in electrical conduit regardless of what wiring methods are permitted Diffuser Dampers: Opposed Blade Dampers: Multiple opposed blade dampers connected to linkage adjustable from face of diffuser with key. under Electrical Specifications. Fire Damper: Combination adjustable opposed blade damper and fusible link fire damper with UL approved link and Where cable trays or bridle rings are provided by the electrical contractor for low voltage cables, these raceways may be

assembly designed to meet requirements of NFPA 90A. utilized for control wiring by this contractor (provide special color coded jackets, label cable jackets per Electrical Specifications and group control wiring cables together). Provide conduit drops from cable tray/bridle ring paths to wall Diffuser Acoustic Performance: NC less than or equal to 30 putlet boxes and equipment unless directed otherwise under Electrical Specifications. Diffuser Accessories: Plaster Ring: Perimeter ring designed to act as plaster stop and diffuser anchor. Regardless of permitted methods in Electrical Specifications, all cables/wiring installed concealed by gypsum board, Titus TRM frame kit masonry or other inaccessible materials in walls or above ceilings shall be installed in conduit, 3/4" minimum. Diffuser Finishes: White Enamel: Semi-gloss white enamel prime finish.

All conduit, bridle rings, raceway, outlet boxes, etc. necessary for complete operational installation of control wiring shall be Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following: Anemostat Products Div., Dynamics Corp. of America. provided (furnished and installed) by the temperature control contractor in strict compliance with Electrical Specifications documents. Coordinate all work with all other applicable trades including the electrical contractor. Metal-Aire Titus Products Div., Philips Industries, Inc. Provide all required conduit work to and between equipment in a manner compliant with that described above (i.e. between VAV boxes, to boilers, starters, condensing units, etc. as applicable). Tuttle and Bailey. Install control wiring without splices between terminal points, color-coded. Install in neat workmanlike manner, securely astened. Install in accordance with National Electrical Code and per Electrical Specifications. 23 74 33.00 - Packaged Outdoor Rooftop Units Install circuits over 25 volt with color-coded No. 12 wire in electrical metallic tubing, per Electrical Specifications. Install Warranty circuits under 25 volt with color-coded No. 18 wire with 0.031" high temperature (105 degs. F) plastic insulation on each

conductor and plastic sheath over all. Install electronic circuits with color-coded No. 22 wire with 0.023" polyethylene nsulation on each conductor with plastic-jacketed copper shield over all. Smoke Detector All duct smoke detectors will be furnished by electrical contractor, installed by the HVAC contractor, and wired by the

electrical contractor per local codes. HVAC contractor will interlock fan with smoke detector. Motor Operated Dampers All fresh air intakes and exhaust louvers shall have motor operated dampers. Dampers shall be low leak with blade and edge seals. All motor operated dampers shall be provided and wired by the mechanical contractor unless otherwise noted. Provide all necessary transformers, contactors, controls and wiring for interlocking equipment to motor operated dampers.

23 31 13.00 - Metal Ducts Ductwork Materials

Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other mperfections, including those which would impair painting. Exposed ductwork which is to be painted shall have paint grip applied. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel, lock forming quality; with G 90

zinc coating and mill phosphatized for exposed locations. Minimum gauge shall be 24. Miscellaneous Ductwork Materials Volume Dampers: Provide volume dampers in all branch ducts or as required for balancing to required air flows.

Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15 deg. change of direction per section. Unless specifically detailed otherwise, use 45 deg. laterals and 45 deg. elbows for branch takeoff connections. Where 90 deg. branches are indicated, provide conical type tees.

Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Duct Cement: Non-hardening migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.

Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork. Fabrication

Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. All ductwork shall be Pittsburgh Construction with a minimum of thickness of 24 gauge. In addition, ductwork used in systems over 3" W.G. shall have cold sealant applied. Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards". Lined Duct

Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners. Duct liner to be 3-lb density for acoustic requirements 1" thick or as noted. Size of ductwork shown on the drawings is free net area, outside dimension of ducts will need to be increased if lined duct is used. Size of ductwork shown on the drawings is free net area, outside dimension of ducts will need to be increased if lined duct

is used Duct Liner: Fibrous glass of thickness indicated. 3-lb density. All liners, insulation and adhesives shall have a flame spread ndex not more than 25 and a smoke developed index of not more than 50.

Duct Liner Adhesive Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards.

nstallation of Metal Ductwork General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 178" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at

Sealing: Seal all longitudinal seams, S's and drives and all joints with mastic or cement. Install according to SMACNA standards

Balancing Dampers: The sheet metal contractor shall be fully responsible for installing balancing dampers in the ductwork, (whether shown on the drawing or not) in order to arrive at the intended air flow. The balancing sub-contractor shall provide direction and assistance in determining locations where dampers are required. Additional dampers, if required shall be installed at no additional cost to the owner.

Wall Penetrations: Seal and pack around all ducts and piping sleeves which pass through walls that extend to bottom side of structure and rated walls Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate

installation requirements. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.

Coordinate layout with suspended ceiling and lighting layouts and similar finished work. Electrical Equipment Spaces: Do not route ductwork through transformer vaults and their electrical equipment spaces and enclosures.

Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2". Fasten to duct and substrate. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and

other associated work of ductwork system. Installation of Duct Line General: Install duct liner in accordance with SMACNA HVAC Duct Construction Standards. Size of ductwork shown on

the drawings is free net area, outside dimension of ducts will need to be increased if lined duct is used. Store internally lined ductwork up off of the floor. Protect internally lined ductwork from water and dust. "Butter the leading edge of all internal duct lining with the manufacturer's recommended adhesive. Inspect and repair all damaged lining prior to installation of ductwork.

Access Panels vents, controls and cleanout doors, and sprinkler devices required by NFPA. Provide frame as required for finish. Furnish panels to General Contractor. Exact locations to be approved by the Architect. Minimum size to be 12" x 12", units to be 16 gauge steel, locking device shall be screwdriver cam locks. 23 34 23.00 - HVAC Power Ventilators

Inline Centrifugal Fans General: Provide inline centrifugal fans of sizes and arrangement as indicated, and of capacities and having accessories as scheduled

Housing: Aluminum or galvanized steel housing inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceilina mountina

Direct-Drive Units: Provide ball bearing motor encased in housing so as to be out of air stream. Provide factory wiring to disconnect switch located on outside of fan housing. Provide NEMA 1 disconnect factory mounted. For single-phase fractional HP fans use a toggle type disconnect switch. On hree-phase integral HP fans use a NEMA 1 safety switch.

Outlet Damper: Provide manual or motorized outlet damper as scheduled. Dampers utilized for pressure relief applications shall be tight seal, motorized, with blade and edge seals.

Companion Flanges: Provide matching flanges on inlet and outlet to connect ductwork to fan. Motor and Fan Guards: Provide guards on inlets and outlets not connected to ductwork, constructed of expanded metal in

emovable frame. Duct Lining: Provide 1" thick, 3-lb density duct liner a minimum of 10' (ten feet) up and down stream of fan. Speed Control: For direct drive fans, provide variable speed switch with off-on control, and speed control for 100% to 50%

of fan air delivery. Manufacturer: Subject to compliance with requirements, provide inline centrifugal fans of one of the following: Acme

Cook (Loren) Co. Greenheck

Twin City Fan & Blower

nspection

General: Examine areas and conditions under which power and gravity ventilators are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected. Installation

The power ventilator(s) shall be installed a minimum of 10'-0" from any roof edge regardless of location indicated on plans, unless a screen wall or railing is installed per the local building code. See the architectural plans for coordination. Coordinate ventilator work with work of roofing, walls, and ceilings, as necessary for proper interfacing. Installation of Unit Heaters Provide access door in duct below ventilator to service damper.

Solder bottom joints and up 2" of side joints of duct under roof ventilator to retain any moisture entering ventilator. Access: Provide access and service space around and over fans as indicated, but in no case less than that recommended by manufacturer.

Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Ensure that rotation is in direction indicated and intended for proper performance. Do not proceed with centrifugal fan start-up until wiring installation is acceptable to fan Installer.

Square: Square housing, core of square concentric louvers, square or round duct connection. Diffuser Mounting:

Warranty on Compressor and Heat Exchanger: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, compressors and heat exchangers with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation. Warranty Period: 5 years from date of owner acceptance. STAGED VOLUME

General: Rooftop unit shall be factory-assembled and tested, designed for roof or slab installation and, consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers. Capacities and electrical characteristics are scheduled. Casing manufacturer's standard casing construction, having corrosion protection coating, and exterior finish. Casings shall have removable panels or access doors for inspection and access to internal parts, a minimum of 1" thick thermal insulation, knockouts for electrical and piping connections, and an exterior condensate drain connection, and lifting lugs. Unit casing shall have double wall construction with foam injected panels.

Roof Curbs: Manufacturer's standard construction, insulated and having corrosive protective coating, complete with factory-installed wood nailer and drain nipple. Construction shall be in accordance with NRCA Standards. Evaporator Fans: Forward-curved, centrifugal, belt-driven fans with adjustable sheaves; and permanently lubricated motor

Condenser fans: Propeller-type, direct-driven fans with permanently lubricated bearings. Coils: Aluminum plate fin and seamless copper tube type. Fins shall have collars drawn, belled and firmly bonded to the completely insulated

Safety Controls:

low pressure cutout, manual reset; high pressure cutout, manual reset; anti-recycling timing device; adjustable low-ambient lockout:

oil pressure switch. Controls: high limit cutout:

> Enthalpy Controlled Economizer Control: Provide dual enthalpy economizer control. Provide return and outside air dampers, outside air filter, fully modulating electric control system with dry control, and adjustable mixed-air thermostat. System shall be capable of driving 100% closed for unoccupied mode, minimum outside air position and modulation to 100 percent open outside air capability. Provide

automatic changeover through adjustable control device. Heating Types: natural gas Temperature Control:

system and fan switches. Other control features include:

Provide air filters to fit in filter box, with a Maximum filter face velocity of 500 fpm, of the following type: Disposable Type: Provide 30% efficient disposable type air filters 2" thick, consisting of viscous coated fibers with filtering media encased in fiberboard cell sides having perforated metal grids on each side to provide media support. Filters: Provide 65%, efficient filters. Provide filters with clean resistance not exceeding 0.10" w.g. at face velocity of 300 fpm, and ASHRAE weight arrestance efficiency of 70-82%, based on final operating resistance of 0.5" w.g.

Options Carrier Air Conditioning, Div of Carrier Corp.

penetrations and flashing.

23 82 39.00 - Unit Heaters

Wall Heaters

Accessories:

Disconnect switch.

Qmark

Markel

Trane Co.

Inspection

Installation

Grounding

Field Quality Control

Electrical Wiring

Adjusting and Cleaning

software.centekeng.com

inside of cabinets.

unless otherwise indicated

Install piping as indicated.

Demonstration

Start-Up Services:

Examination Examine areas and conditions under which rooftop units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer Installatio

tubes by means of mechanical expansion of the tubes. No soldering or tinning shall be used in the bonding process. Coils shall have a galvanized steel casing. Coils shall be mounted in the coil casing with same end connections accessible for service. Coils shall be removable from the unit through the roof or through the piping enclosure. Coil section shall be

Refrigerant cooling coils: have an equalizing type vertical distributor to ensure each coil circuit receives the same amount of refrigerant. Coils shall be proof (450 psig) and leak (300 psig) tested with air pressure under water, then cleaned, dehydrated, and sealed with a holding charge of nitrogen Condensate Pan: Provide IAQ steel, double sloping drain pain. Provide high condensate in primary condensate pan to de-energize unit upon detection of high condensate levels. Compressors: Serviceable, semi-hermetic, or hermetic compressors with integral vibration isolators, and crankcase heaters, which de-energize during compressor operation. Units shall also have: Hot-gas bypass valve and piping on the lead circuit

compressor motor overload protection, manual reset;

Temperature control: factory-installed, demand-oriented solid-state control system above 5 tons shall have minimum of 2 cooling steps and 2 heating steps. Controls shall include solid-state thermostats with dead-band, and sub-base with

Manufacturers: Subject to compliance with requirements, provide rooftop units of one of the following:

General: Install rooftop units in accordance with manufacturer's installation instructions. Install units plumb and level. firmly anchored in locations indicated, and maintain manufacturer's recommended clearances. The rooftop unit(s) shall be installed a minimum of 10'-0" from any roof edge regardless of location indicated on plans unless a screen wall or railing is installed per the local building code. See the architectural plans for coordination. Support: Install and secure roof curb to roof structure, in accordance with National Roofing Contractor's Association (NRCA) installation recommendations and shop drawings. Install and secure rooftop units on curbs and coordinate roof

Condensate Piping: Provide Type L copper condensate piping with trap. Electrical Connections: Refer to Electrical Specifications - Electrical Connections for Equipment for final connections to equipment and installation of loose shipped electrical components.

Provide the services of a factory-authorized service representative to start-up rooftop units, in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment. Training of Owner's Personnel

Provide services of manufacturer's service representative to instruct Owner's personnel in operation and maintenance of rooftop units. Training shall include start-up and shut-down, servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance. Review operating and maintenance data contained in the Operating and Maintenance Manuals specified in Division One. Schedule training with Owner, provide at least 7-day prior notice to the Architect/Engineer.

General: Provide unit heaters in locations as indicated, and of capacities, style, and having accessories as scheduled. Provide temperature control valves for modulation during a call for heat and closed during cooling.

General: Provide a heavy duty fan forced wall heater. Heating grid shall be made up of rugged steel fins, copper brazed to non glowing, steel sheathed elements. Unit to have built in, tamper proof thermostat or remote thermostat, built in disconnect switch.

Front cover shall be decorative 16 gauge welded bar grille. Fan delay and thermal cutout are standard. Provide all required control transformers.

time delay relay, voltage as scheduled. 1" semi recessed mounting sleeve.

Double Line Disconnect Switch Provide wall heaters with the following devices:

Thermally activated fan switch to keep fan motor operating until residual heat is dissipated

Automatic reset, high limit cut-out switch located in discharge air stream. Manual "Summer-OFF-Winter" switch.

Control Power Transformer Magnetic Contactor (Relay Kit)

Manufacturers: Subject to compliance with requirements, provide wall heaters of one of the following

Examine areas and conditions under which heaters to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

General: Install unit heaters as indicated, and in accordance with manufacturer's installation instructions. Uncrate units and inspect for damage. Verify that nameplate data corresponds with unit designation. Hang units from building substrate, not from piping. Mount as high as possible to maintain greatest headroom possible

Support units with rod-type hangers anchored to building substrate.

Protect units with protective covers during balance of construction.

Install electric heating terminal units including components as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices; complying with applicable installation requirements of NEC and NECA's "Standard of Installation

Coordinate with other electrical work, including wiring/cabling, as necessary to properly interface installation of heating terminal units with other work.

Clean dust and debris from each heating terminal as it is installed to ensure cleanliness. Comb out damaged fins where bent or crushed before covering elements with enclosures.

Touch-up scratched or marred heating terminal enclosure surfaces to match original finishes.

Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A.

Provide equipment grounding connections for electric heating terminals as indicated. Tighten connections to comply with tightening torque values specified in UL Std 486A to assure permanent and effective grounding.

Upon completion of installation of electric heating terminals, and after building circuitry has been energized, test heating terminals to demonstrate capability and compliance with requirements. Where possible, field correct malfunctioning units, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting. Replace electric heating terminals and accessories which are damaged and remove damaged items from construction site.

General: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of the electrical specifications. Do not proceed with equipment start-up until wiring installation is acceptable to equipment

General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

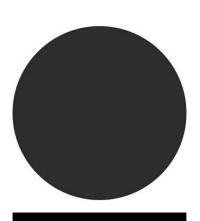
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REVISION

DRAWN BY: MEB CHECKED BY: JRK ISSUED: 2/27/2018 4:19:11 PM

995 E BELVIDERE RD GRAYSLAKE, IL 60030

PERMIT #:

MECHANICAL **SPECIFICATIONS**



COMcheck Software Version 4.0.7.2 Review **Mechanical Compliance Certificate**

Project Information Energy Code: Project Title: Location: Climate Zone: Project Type:

90.1 (2013) Standard 20151.00 - Dollar Tree - Freestanding, Grayslake, IL - Landlord Work Grayslake, Illinois New Construction

Designer/Contractor:

Construction Site: 995 E Belvidere Rd. Grayslake, IL 60030

- Mechanical Systems List Quantity System Type & Description
- 1 RTU-1 (Single Zone):
- Heating: 1 each Unit Heater, Electric, Capacity = 96 kBtu/h No minimum efficiency requirement applies Cooling: 1 each Single Package DX Unit, Capacity = 111 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.00 EER, Required Efficiency: 11.20 EER + 12.9 IEER Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Passes

Owner/Agent:

- FAN 1 Supply, Constant Volume, 3150 CFM, 2.0 motor nameplate hp, 0.5 fan efficiency grade 1 RTU-2 (Single Zone): Heating: 1 each - Unit Heater, Electric, Capacity = 121 kBtu/h
- No minimum efficiency requirement applies Cooling: 1 each Single Package DX Unit, Capacity = 121 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.20 EER, Required Efficiency: 11.20 EER + 12.9 IEER Fan System: FAN SYSTEM 2 -- Compliance (Motor nameplate HP method) : Passes
- FAN 2 Supply, Constant Volume, 3600 CFM, 2.0 motor nameplate hp, 0.5 fan efficiency grade 1 RTU-3 (Single Zone): Heating: 1 each - Unit Heater, Electric, Capacity = 121 kBtu/h No minimum efficiency requirement applies No minimum efficiency requirement applies Cooling: 1 each - Single Package DX Unit, Capacity = 121 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 12.20 EER, Required Efficiency: 11.20 EER + 12.9 IEER Fan System: FAN SYSTEM 3 -- Compliance (Motor nameplate HP method) : Passes
- FAN 3 Supply, Constant Volume, 3600 CFM, 2.0 motor nameplate hp, 0.5 fan efficiency grade 1 RTU-4 (Single Zone):
- Heating: 1 each Unit Heater, Electric, Capacity = 46 kBtu/h No minimum efficiency requirement applies Cooling: 1 each Single Package DX Unit, Capacity = 64 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 14.00 SEER, Required Efficiency: 13.00 SEER Fan System: FAN SYSTEM 4 -- Compliance (Motor nameplate HP method) : Passes
- FAN 4 Supply, Constant Volume, 1600 CFM, 2.0 motor nameplate hp, 0.5 fan efficiency grade

Project Title: 20151.00 - Dollar Tree - Freestanding, Gravslake, IL - Landlord Work Report date: 02/23/18 Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\Compliance\Mechanical Report\DT Page 1 of 12 Grayslake Comcheck.cck

Project Title Data filena	e: 20151.00 - Dollar Tree - Frees me: G:\20000-20999\20100-2019 Grayslake Comcheck.cck	J. , ,			Report date: 02/23/1 rt\DT Page 2 of 1
Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumpt
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be me
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be me
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be me
			-	D a	

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2013) Standard requirements in COMcheck Version 4.0.7.2 Review and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

- Signature

2/23/2018

Date

Mechanical Compliance Statement

Joseph Kohrs, P.E.

Name - Title

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value			Comments/Assumptions
6.4.4.1.4 [ME41] ³	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.4.2.1 [ME10] ²	Ducts and plenums sealed based on static pressure and location.			Complies Does Not Not Observable	Requirement will be met.
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.4.2.2 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.2.3 [ME19] ³	Dehumidification controls provided to prevent reheating, recooling, mixing of hot and cold airstreams or concurrent heating and cooling of the same airstream.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.2.4.1 [ME68] ³	Humidifiers with airstream mounted preheating jackets have preheat auto-shutoff value set to activate when humidification is not required.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.2.4.2 [ME69] ³	Humidification system dispersion tube hot surfaces in the airstreams of ducts or air- handling units insulated >= R- 0.5.			□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
6.5.2.5 [ME70] ³	Preheat coils controlled to stop heat output whenever mechanical cooling, including economizer operation, is active.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.3.5 [ME72] ²	Motors for fans $>= 1/12$ hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be met.

& Req.ID	mopeetion	varue	- Value		
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.3.5 [ME72] ²	Motors for fans >= 1/12 hp and < 1 hp are electronically- commutated motors or have a minimum motor efficiency of 70%. These motors are also speed adjustable for either balancing or remote control.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.3.3 [ME42] ³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply. See the Mechanical Systems lis for values.
6.5.3.3 [ME42] ³	Multiple zone VAV systems with DDC of individual zone boxes			Complies Does Not	Exception: Requirement does not apply.
	have static pressure setpoint reset controls.			□Not Observable □Not Applicable	See the Mechanical Systems lis for values.
6.5.3.3 [ME42] ³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint			Complies Does Not Not Observable	Exception: Requirement does not apply.
	reset controls.		-	Not Applicable	See the Mechanical Systems lis for values.
6.5.3.3 [ME42] ³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint			Complies Does Not Not Observable	Exception: Requirement does not apply.
	reset controls.			□Not Applicable	See the Mechanical Systems lis for values.
6.5.4.2 [ME25] ³	HVAC pumping systems >10 hp designed for variable fluid flow.			Complies Does Not	Requirement will be met.
				□Not Observable □Not Applicable	
6.5.6.1 [ME56] ¹	Exhaust air energy recovery on systems meeting Tables 6.5.6.1- 1, and 6.5.6.1-2.			Complies Does Not	Requirement will be met.
				□Not Observable □Not Applicable	
6.5.7.1.1 [ME32] ²	Kitchen hoods >5,000 cfm have make up air >=50% of exhaust air volume.			Complies Does Not	Exception: Requirement does not apply.
				□Not Observable □Not Applicable	
6.5.7.1.2 [ME46] ³	Conditioned supply air to space with a kitchen hood shall not exceed the greater of a) supply flow required to meet space heating or cooling, or b) hood exhaust flow minus the available air transfer from available spaces.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3) Project Title: 20151.00 - Dollar Tree - Freestanding, Grayslake, IL - Landlord Work Report date: 02/23/18 Data filename: G:\20000-20999\20100-20199\20151\Project Data\Energy\Compliance\Mechanical Report\DT Page 6 of 12 Grayslake Comcheck.cck

Final Inspection Complies? **Comments/Assumptions** & Req.ID Complies 6.4.3.1.2 Thermostatic controls have a 5 °F Requirement will be met. deadband Does Not □Not Observable Not Applicable 6.4.3.2 [Fl20]³ Temperature controls have setpoint Complies overlap restrictions. Requirement will be met. □Not Observable Not Applicable 6.4.3.3.1 HVAC systems equipped with at least [Fl21]³ one automatic shutdown control. Requirement will be met. □Not Observable Not Applicable 6.4.3.3.2 Setback controls allow automatic restart and temporary operation as required for maintenance. Requirement will be met. □Not Observable □Not Applicable 6.4.3.6 [FI6]³ When humidification and dehumidification are provided to a zone, simultaneous operation is prohibited. Humidity control prohibits the use of fossil fuel or electricity to produce RH > 30% in the warmest zone humidified and RH < 60% in the coldest zone downidified
 Zone huminined and Kn < 0070 m the coldest zone dehumidified.

 7.2.1
 Furnished HVAC as-built drawings submitted within 90 days of system accentance.
 Complies Does Not

 acceptance.
 Dot Observable

 Not Observable
 Not Applicable

 6.7.2.2 [FI8]³
 Furnished 0&M manuals for HVAC systems within 90 days of system acceptance.
 Complies Does Not acceptance.
 Requirement will be met.
 acceptance. acceptance. ■Not Observable □Not Applicable

 6.7.2.3
 An air and/or hydronic system
 Complicable

 [FI9]¹
 balancing report is provided for HVAC systems serving zones >5,000 ft2 of conditioned area.
 Complicable

 Image: Not Applicable
 Image: Not Applicable

 conditioned area.
 Interpretation

 6.7.2.4
 HVAC control systems have been

 [FI10]¹
 tested to ensure proper operation, calibration and adjustment of controls.

 Interpretation
 Interpretation

 10.4.3 [FI24]
 Elevators are designed with the proper lighting, ventilation power, and standby mode.
 Complicable

 Exception: Requirement does not apply.
 □Not Observable □Not Applicable

 1
 High Impact (Tier 1)
 2
 Medium Impact (Tier 2)
 3
 Low Impact (Tier 3)

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Additional Comments/Assumptions:



▲ COM*check* Software Version 4.0.7.2 Review Inspection Checklist Energy Code: 90.1 (2013) Standard

Requirements: 100.0% were addressed directly in the COMcheck software Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2, 6.4.4.2.1, 6.7.2 [PR2] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	Complies Does Not Not Observable Not Applicable	Requirement will be met.
4.2.2, 8.4.1.1, 8.4.1.2, 8.7 [PR6] ²	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the electrical systems and equipment and document where exceptions are claimed. Feeder connectors sized in accordance with approved plans and branch circuits sized for maximum drop of 3%.	Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.7.2.4 [PR5] ¹	Detailed instructions for HVAC systems commissioning included on the plans or specifications for projects >=50,000 ft2.	□Complies □Does Not □Not Observable □Not Applicable	Exception: Requirement does not apply.

Section # Footing / Foundation Inspection Complies? **Comments/Assumptions** 6.4.3.7 [FO9]³ Freeze protection and snow/ice Complies melting system sensors for future Does Not connection to controls. Exception: Requirement does not apply □Not Observable Not Applicable Additional Comments/Assumptions:

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						_		
Section # & Req.ID	Mechanical Rough-In	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions		Section # & Req.ID	Rough-In E
6.5.10 [ME73] ³	Doors separating conditioned space from the outdoors have controls that disable/reset heating and cooling system when open.			Complies Does Not Not Observable Not Applicable	Requirement will be met.		[EL10] ²	At least 50% of 20-Amp recept an automatic c
Addition	al Comments/Assumptions:							Electric motors where applicab

Section # & Reg.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.7.1.2 [ME46] ³	Conditioned supply air to space with a kitchen hood shall not exceed the greater of a) supply flow required to meet space heating or cooling, or b) hood exhaust flow minus the available air transfer from available spaces.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.5.7.1.2 [ME46] ³	Conditioned supply air to space with a kitchen hood shall not exceed the greater of a) supply flow required to meet space heating or cooling, or b) hood exhaust flow minus the available air transfer from available spaces.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.5.7.1.2 [ME46] ³	Conditioned supply air to space with a kitchen hood shall not exceed the greater of a) supply flow required to meet space heating or cooling, or b) hood exhaust flow minus the available air transfer from available spaces.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.5.7.1.5 [ME49] ³	Approved field test used to evaluate design air flow rates and demonstrate proper capture and containment of kitchen exhaust systems.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.5.8.1 [ME34] ²	Unenclosed spaces that are heated use only radiant heat.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 15% >240 kBtu/h - 10%			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 15% >240 kBtu/h - 10%			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 15% >240 kBtu/h - 10%			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.9 [ME35] ¹	Hot gas bypass limited to: <=240 kBtu/h - 15% >240 kBtu/h - 10%			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.3.9 [ME63] ²	Heating for vestibules and air curtains include automatic controls that shut off the heating system when outdoor air temperatures > 45F. Vestibule heating systems controlled by a thermostat in the vestibule with setpoint <= 60F.			Complies Does Not Not Observable Not Applicable	Requirement will be met.

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Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.1.4, 6.4.1.5 [ME1] ²	HVAC equipment efficiency verified. Non-NAECA HVAC equipment labeled as meeting 90.1.	Efficiency:	Efficiency:	Complies Does Not Not Observable	See the Mechanical Systems list for values.
6.4.3.4.1 [ME3] ³	Stair and elevator shaft vents have motorized dampers that automatically close.			Not Applicable Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.4.3.4.2, 6.4.3.4.3 [ME4] ³	Outdoor air and exhaust systems have motorized dampers that automatically shut when not in use and meet maximum leakage rates. Check gravity dampers where allowed.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.3.4.5 [ME39] ³	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.			Complies Does Not Not Observable Not Applicable	Exception: Requirement does not apply.
6.4.3.4.4 [ME5] ³	Ventilation fans >0.75 hp have automatic controls to shut off fan when not required.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.3.8 [ME6] ¹	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.5.3.2.1 [ME40] ²	DX cooling systems >= 75 kBtu/h (>= 65 kBtu/h effective 1/2016) and chilled-water and evaporative cooling fan motor hp >= ¼ designed to vary indoor fan airflow as a function of load and comply with operational requirements.			Complies Does Not Not Observable Not Applicable	Requirement will be met. See the Mechanical Systems list for values.
6.4.4.1.1 [ME7] ³	Insulation exposed to weather protected from damage. Insulation outside of the conditioned space and associated with cooling systems is vapor retardant.			Complies Does Not Not Observable Not Applicable	Requirement will be met.
6.4.4.1.2 [ME8] ²	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	R	R	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.
6.4.4.1.3 [ME9] ²	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	in.	in.	□Complies □Does Not □Not Observable □Not Applicable	Requirement will be met.

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Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10] ²		□Complies □Does Not	Requirement will be met.
	an automatic control device.	□Not Observable □Not Applicable	
10.4.1 [EL9] ²	Electric motors meet requirements where applicable.	□Complies □Does Not	Requirement will be met.
		□Not Observable □Not Applicable	

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

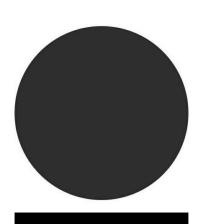
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MECHANICAL/ELECTRICAL ENGINEERS WWW.KLHENGRS.COM 1538 ALEXANDRIA PIKE, SUITE 11 FT. THOMAS, KENTUCKY 41075 800-354-9783 859-442-8050 859-442-8058 FAX

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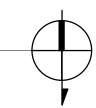
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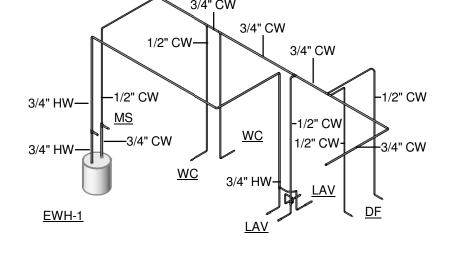
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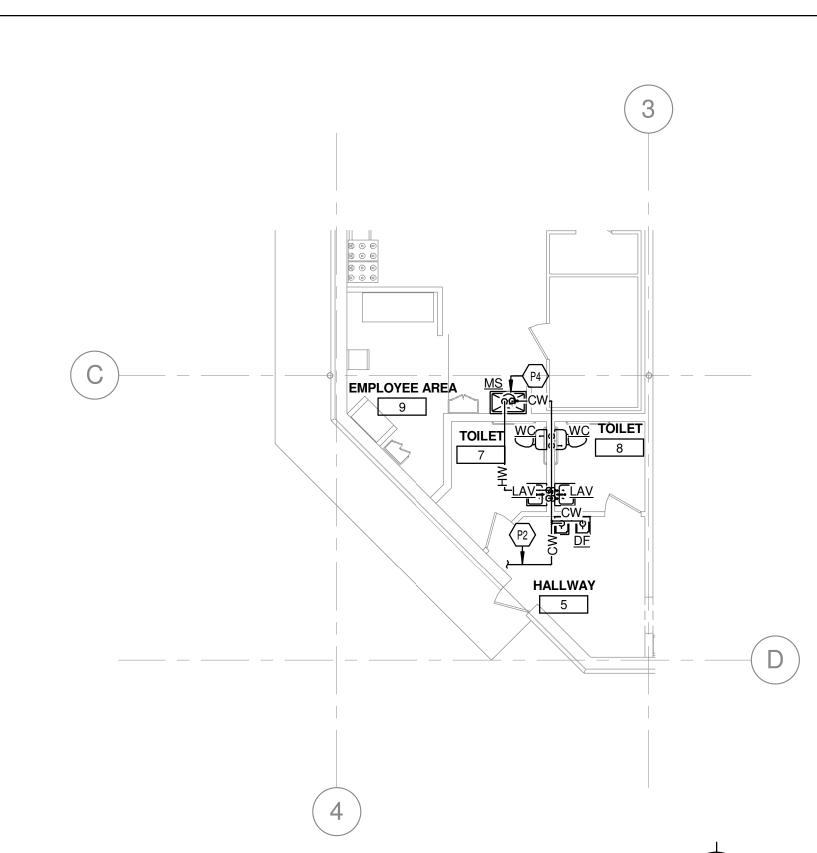




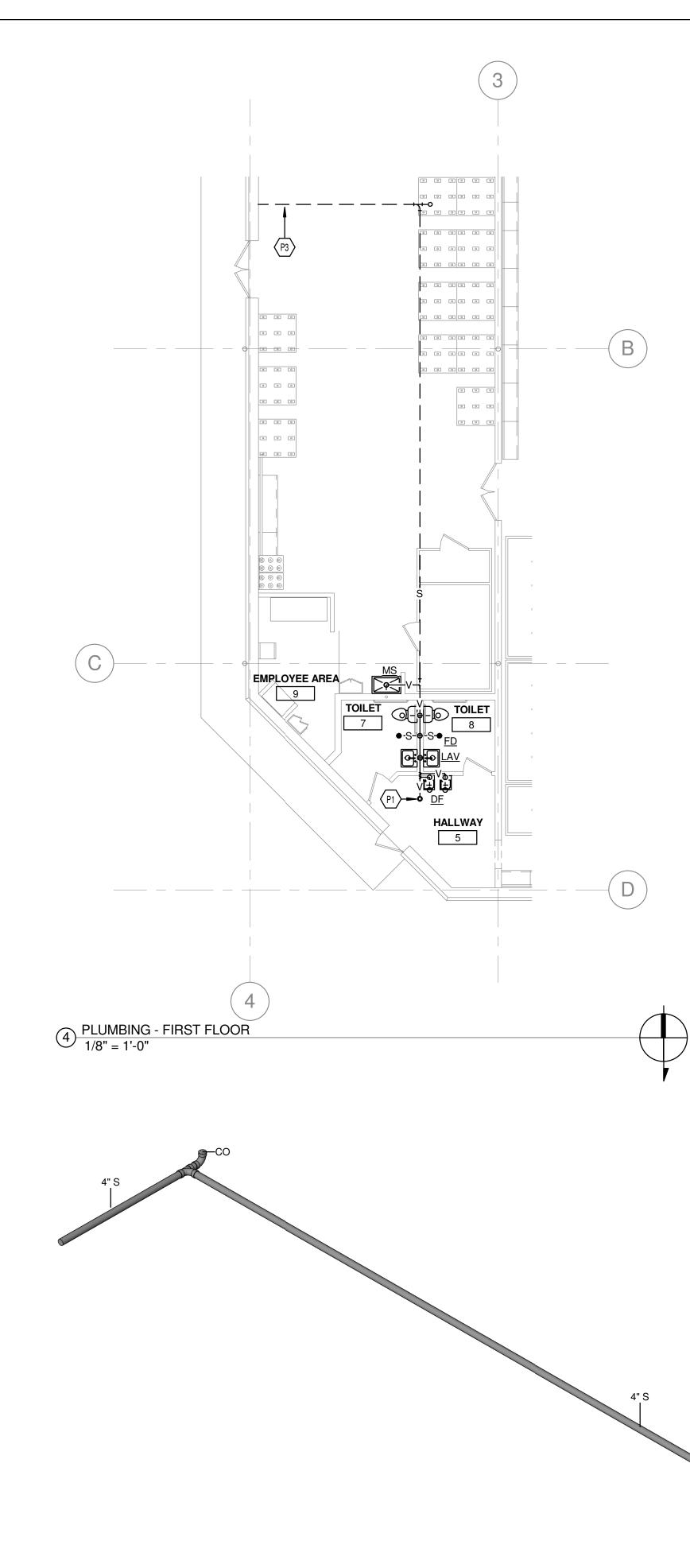










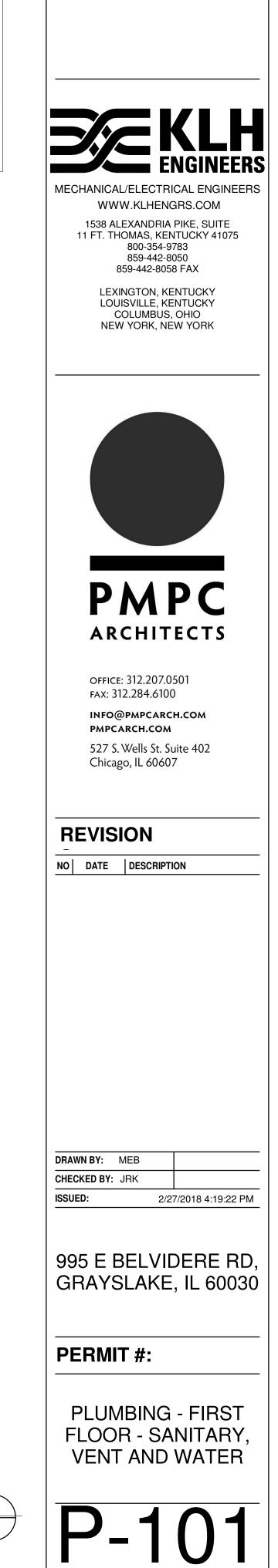


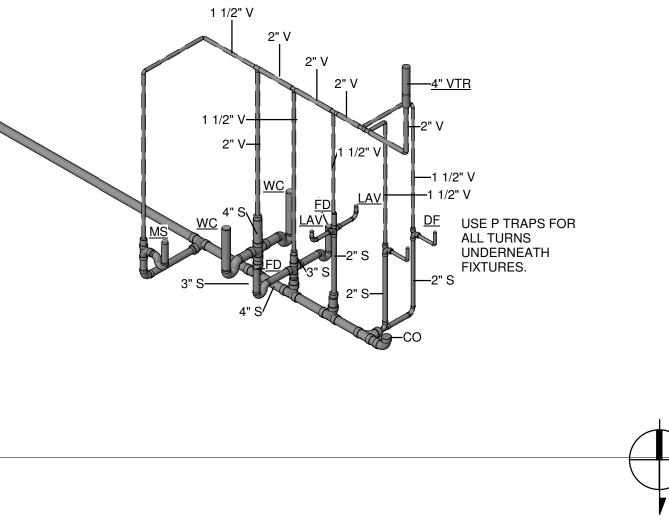
KEYED NOTES

- P1 PROVIDE NEW 4" VENT THRU ROOF. COORDINATE ROOF PENETRATION REQUIREMENTS WITH LANDLORD'S ROOFING CONTRACTOR.
 P2 EXTEND DOMESTIC WATER TO EXISTING MIN. WATER. PROVIDE SHUT-OFF, BACKFLOW PREVENTER, PRESSURE REGULATING VALVE, METER, AND REMOTE READER IF REQUIRED. INSULATE ENTIRE LINE WITHIN BUILDING. FIELD VERIFY EXACT LOCATION OF EXISTING DOMESTIC WATER PRIOR TO INSTALLING ANY PIPING. REPORT DIFFERENCES TO ENGINEER. FAILURE TO DO SO MAY RESULT IN CONTRACTOR REPLACING PIPING AT NO ADDITIONAL COST TO TENANT
- P3 CONNECT NEW SANITARY PIPING TO NEAREST EXISTING PIPING. FIELD VERIFY EXACT LOCATION, INVERT, DIRECTION OF FLOW, AND SYSTEM TYPE PRIOR TO STARTING WORK. CONTACT ENGINEER WITH ANY DIFFERENCES OTHER THAN WHAT IS SHOWN ON PLAN. PROVIDE CAMERA SCOPING TO INSURE PIPING SIZES AND LOCATION. FAILURE TO DO SO MAY RESULT IN CONTRACTOR REPLACING PIPING AT NO ADDITIONAL COST TO TENANT.
- P4 PROVIDE ELECTRIC HOT WATER HEATER ABOVE MOP SINK WITH 6'8" CLEAR TO BOTTOM OF WATER HEATER SUPPORT PLATFORM. PROVIDE EXPANSION TANK: AMTROL ST-5.

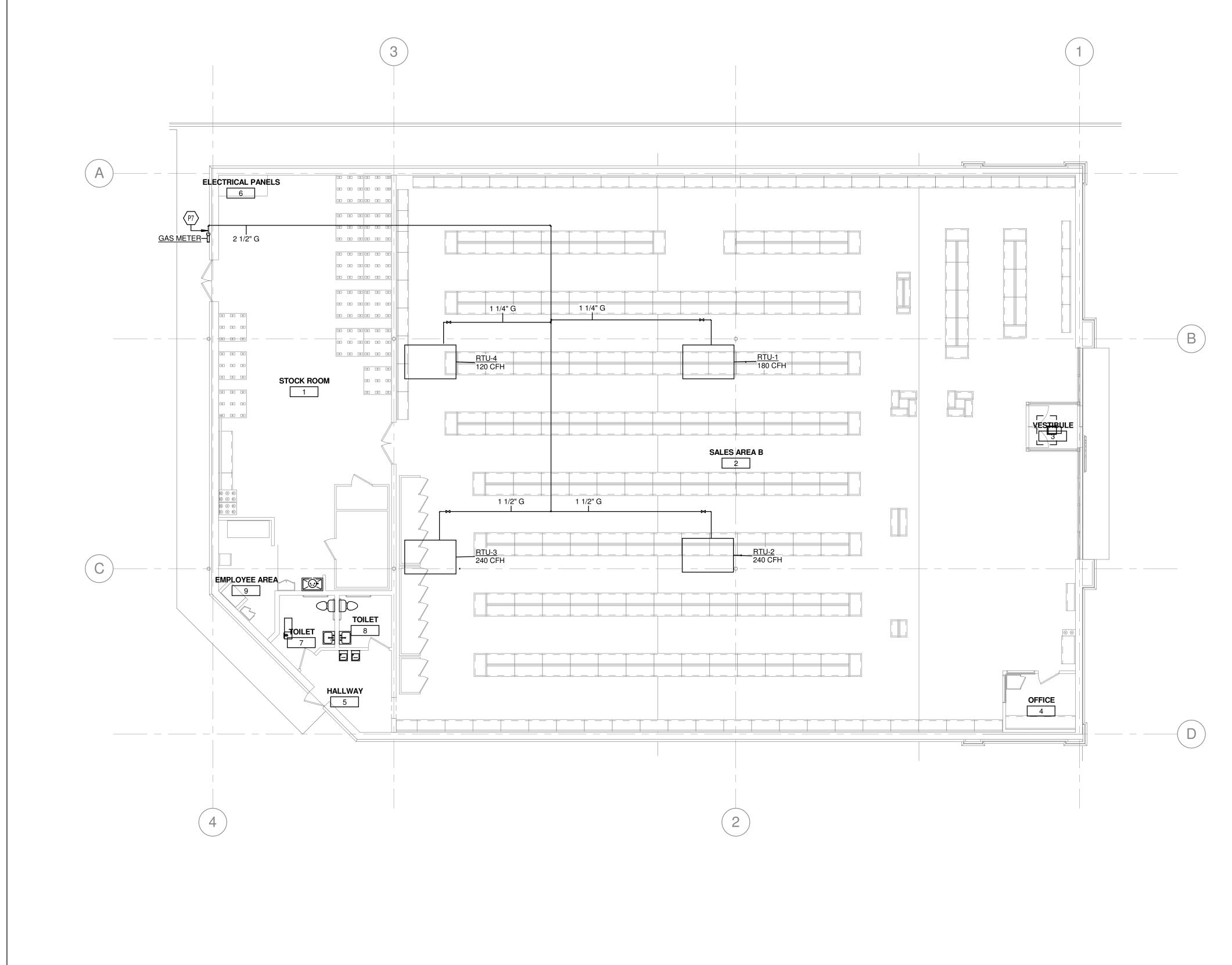
INCOMING WATER PRESSURE

WATER PRESSURE WAS ASSUMED TO BE 60 PSI FOR STATIC AND 55 PSI RESIDUAL. CONTRACTOR TO VERIFY PRESSURE AT ENTRANCE OF BUILDING PRIOR TO BID AND CONTACT ENGINEER OF RECORD IF PRESSURE DIFFERS FROM THE ASSUMED PRESSURES.









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KEYED NOTES

P7

CONTRACTOR TO COORDINATE WITH NATURAL GAS COMPANY FOR GAS METER INSTALLATION.

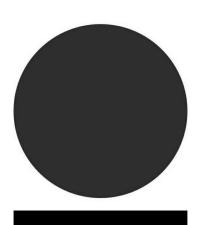
NATURAL GAS NOTES

NATURAL GAS PIPING IS SIZED BASED ON A 780 CFH CONNECTED LOAD, 120 LINEAR FEET OF PIPE, LESS THAN 7" W.C. OF PRESSURE, A PRESSURE DROP OF 0.3 INCH WATER COLUMN AND A SPECIFIC GRAVITY OF 0.6. PLUMBING CONTRACTOR SHALL FIELD VERIFY AND COORDINATE EXACT CONDITIONS WITH LOCAL NATURAL GAS COMPANY PRIOR TO BID. IMMEDIATELY NOTIFY ENGINEER OF RECORD IF FIELD CONDITIONS DIFFER.



-1. THOMAS, KENTUCKY 4107 800-354-9783 859-442-8050 859-442-8058 FAX LEXINGTON, KENTUCKY

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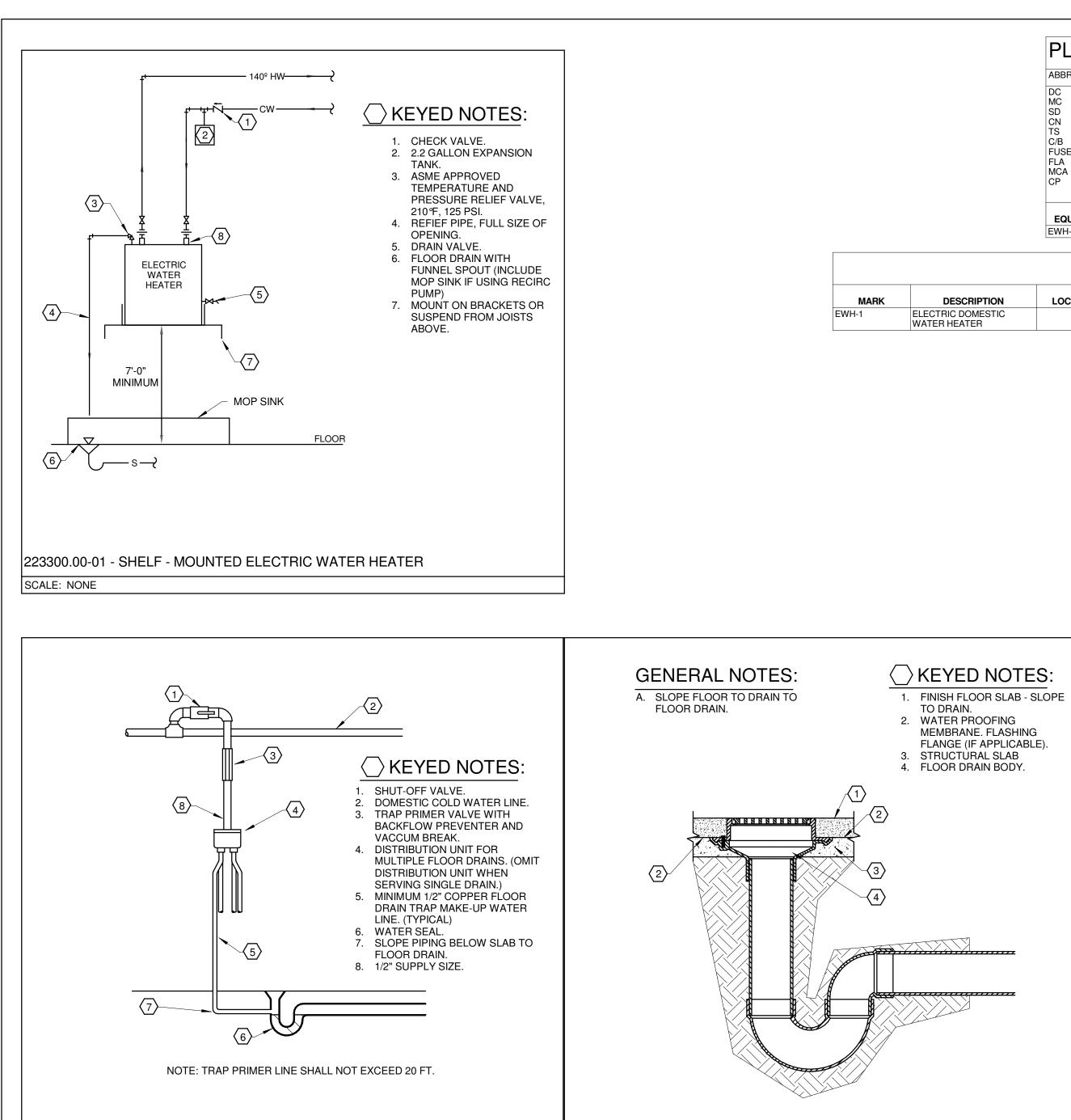
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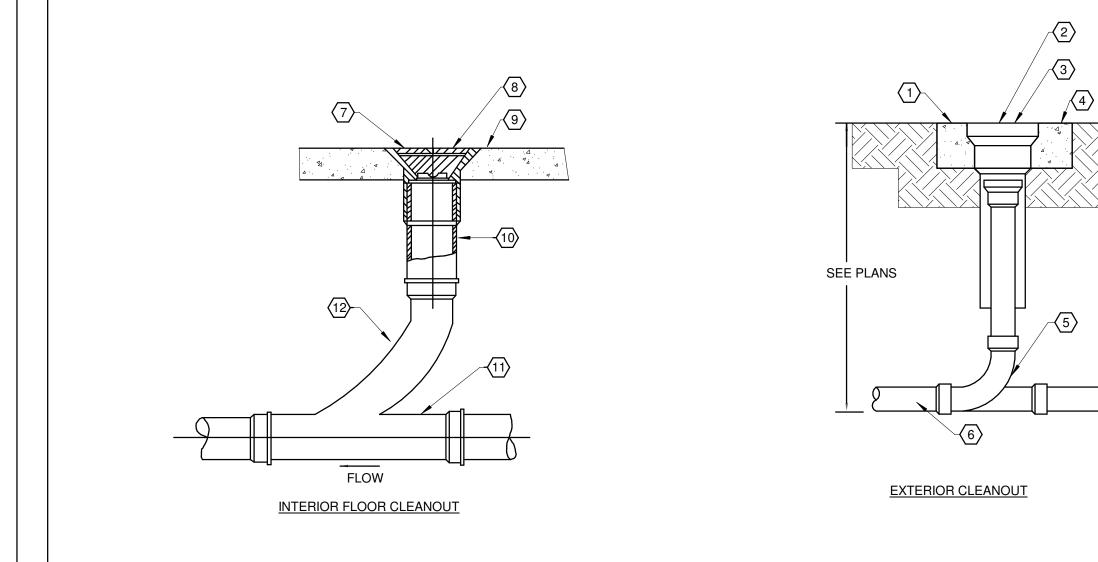
PLUMBING - FIRST FLOOR - GAS

P-102



221119.00-34 - TRAP PRIMER DETAIL SCALE: NONE

221316.00-01 - FLOOR DRAIN DETAIL SCALE: NONE



221313.00-01 - FLOOR CLEANOUTS

SCALE: NONE

t as instruments of s, including, without

ABBREV	ATIONS	CONTR/	ACTOR TYPE	MOTOR	CONTROL TYPE
DC MC SD CN TS C/B FUSE FLA MCA CP	LOCAL DISCONNECT MOTOR CONTROL (POWER) DUCT SMOKE DETECTOR CONTROLS TOGGLE SWITCH H.A.C.R. CIRCUIT BREAKER AT SOURCE PANELBOARD FUSE AT LOCAL DISCONNECT (VERIFY FIELD RATING) OPERATING FULL LOAD AMPS MINIMUM CIRCUIT AMPACITY CORD AND PLUG CONNECTION	EC EX FC GC HC MFR PC OR	ELECTRICAL CONTRACTOR EXISTING FIRE PROTECTION CONTRACTOR GENERAL CONTRACTOR HVAC CONTRACTOR MANUFACTURER PLUMBING CONTRACTOR OWNER OR OTHERS	CS MCC MG MS VFD MSR OV	COMBINATION STARTE MOTOR CONTROL STA MAGNETIC STARTER C MANUAL STARTER VARIABLE FREQUENC ^Y MANUAL STARTER W/ OVERCURRENT PROTE

EQUIPMENT MARK DESCRIPTION ELECTRIC DOMESTIC WATER HEATER FWH-1

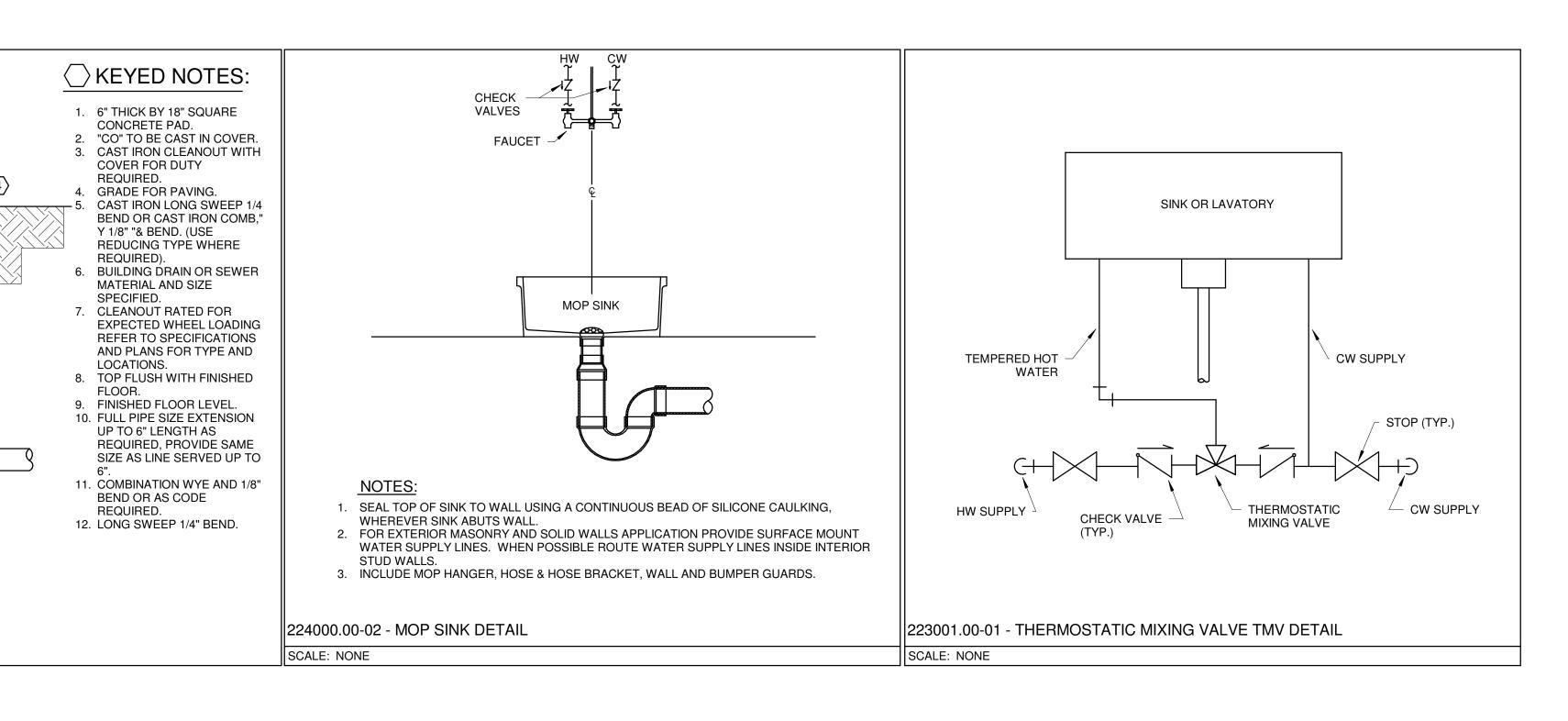
				PL	UMBING		RIC DOM	IESTIC V	NATER I	HEATER	SCH
DESCRIPTION	LOCATION	STATUS	MANUFACTURER	MODEL	VOLTS	PHASE	EFFICIENCY	EWT (Deg F)	LWT (Deg F)	GAS HTG IN (mbh)	STORAG
ELECTRIC DOMESTIC			BRADFORD WHITE	RE110	120	1	98	40	140	0	10

PLUMBING FIXTURE

MARK	DESCRIPTION	MANUFACTURER	MODEL	VALVE/FAUCET MFGR	VALVE/FAUCET MODEL	CW SIZE (in)	HW SIZE (in)	SAN SIZ
DF	DRINKING FOUNTAIN	OASIS	PACSL			1/2		2
LAV	SINK	ZURN	Z5344	ZURN	Z86500-XL	1/2	1/2	1-1/2
MS	MOP SINK	ZURN	Z2600	ZURN	Z843MI	3/4	3/4	3
WC	TANK WATER CLOSET	ZURN	Z5560	-	-	1/2		4

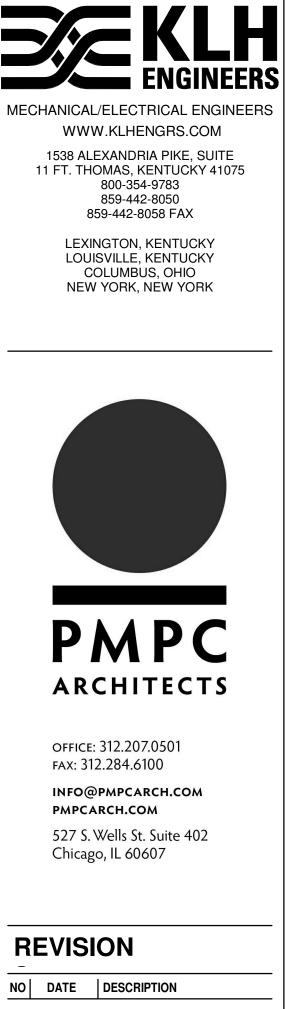
MARK	DESCRIPTION	MANUFA
FD	FLOOR DRAIN	ZURN

	Total Equivalent Length of Pipe(Feet):		XXX Pressure Drop (inches W.C): X.		.X Delive		ery Pressure After Meter & PRV (inches W.C.):		хх	Gas Type	[NATRUAL GAS]	
Equipment Mark	nent Mark HVACTYPE		Description			IS	GAS HTG IN (CFH) MIN G		AS PRES	SURE (in W.C.)	MAX GAS PRESSURE (in W.C	
RTU-1	23 74 33.00	PACKAGED C	OUTDOOR ROOFT	OP UNIT	NEW		360		4		14	
RTU-2	23 74 33.00	PACKAGED OUTDOOR ROOFTOP UNIT		OP UNIT	NEW		480	480			14	
RTU-3	23 74 33.00	00 PACKAGED OUTDOOR ROOFTOP UNIT		OP UNIT	NEW		480		4		14	
RTU-4	23 74 33.00	PACKAGED C	OUTDOOR ROOFT	OP UNIT	NEW		240		4		14	
				TOTAL	GAS LOAD	:	1560					



TRACTOF	RTYPE					MOTOR CONTROL TYPE									YPE					
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PLUMBING GAS LOAD SCHEDULE



DRAWN BY: MEB
CHECKED BY: JRK ISSUED: 2/27/2018 4:19:37 PM
995 E BELVIDERE RD, GRAYSLAKE, IL 60030
PERMIT #:
PLUMBING - DETAILS AND SCHEDULES
P-201

Division 22 - PLUMBING SPECIFICATION SECTION 22 05 00.00 - COMMON WORK RESULTS FOR PLUMBING

GENERAL The general conditions, supplementary conditions and instructions to bidders shall apply to and be part of this specification.

Contractor shall comply with all applicable codes, rules and regulations. Contractor shall obtain and pay for all permits, certificates of inspection and approvals required The base bid shall include furnishing all materials, labor, tools, equipment and installation of all

work required to provide complete plumbing systems as outlined in Division-22. Examine the drawings, specifications, and visit the site prior to submitting a bid. APPLICABLE STANDARDS The applicable provisions of the following standards shall govern:

American Society for Test Materials (ASTM);

American Standards Association (ASA); Underwriters Laboratories (UL);

National Fire Protection Association (NFPA):

PI ANS

Illinois Building Code. Illinois Plumbing Code

The installation of all plumbing work shall conform to the applicable local plumbing codes and

Plans are diagrammatic indicating required size, points of termination of piping and suggested routes. However, it is not intended that drawings indicate all necessary offsets. Install piping in such manner as to conform to the structure, avoid obstructions and preserve headroom. All piping shall be run as straight as possible and symmetrical with architectural items. Piping shall be concealed in pipe shafts, pipe spaces, and furring wherever possible. Piping fabricated before coordination with the other trades will be done at contractors' own risk. In the event of inconsistencies or conflict within or between the Contract Documents, provide the better quality, more costly or greater quantity of work and comply with the more stringent requirements. Seek the direction of the Engineer of Record for clarification of conflicts as soon as a conflict is identified. (Prior to installation) CUTTING, PATCHING AND DEMOLITION

Contractor shall include all necessary cutting and patching required to perform their work. Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed. Provide non-destructive concrete structural scanning or concrete x-ray prior to drilling, cutting or

Saw cut all slab penetrations. Seal around all wall, floor and ceiling pipe penetrations with NFPA approved sealant material to maintain the fire resistant and watertight integrity of the assembly. Disconnect, demolish, and remove from site all plumbing systems, equipment, and components indicated to be removed and as necessary to perform the described scope of work. No unused plumbing systems, equipment, and components shall be abandoned.

No means of demolition shall be used that would result in damage to structures, materials, equipment or components indicated to remain or endanger the health, safety and welfare of the deneral public

EXCAVATION AND BACKFILL Perform all excavation and backfilling required for this work. Contractor shall consult with utility

company prior to beginning excavation. At a minimum, all piping shall be laid on a bed of sand, 6" deep, well tamped into place and properly graded to permit the pipe to have an even bearing throughout its entire length. Sand shall be installed around the piping and to a point 6" above the piping. PIPE JOINTS AND CONNECTIONS

Any minor adjustment in location of alignment of new work or connection to existing utilities shall be performed as directed by the engineer without additional cost to the owner. The contractor shall be responsible for damages to the grounds, walks, road, building, piping systems, electrical systems, and their equipment and contents, caused by leaks in the piping systems being installed or having been installed by him. The contractor shall repair at his expense all damaged so caused. All repair work shall be done as directed by and in such manner as satisfactory to the architect.

Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the contractor's guarantee bond nor relieving the contractor of his responsibilities during the bonding period.

project conditions Where new plumbing systems are required to be connected to existing plumbing systems, it is the contractor's responsibility to verify the location, size, invert elevation, pressure, condition, and they shall verify that the existing plumbing system is indeed the correct and appropriate plumbing system before any work is done. Provide all necessary camera scoping and dye testing as necessary. If there is any need for concern, if it is determined that the existing plumbing system is not a correct or appropriate plumbing system or not connected to a correct or appropriate plumbing system, if the condition of the existing plumbing system is not viable for re-use, or any other condition that would not allow the proper functioning of the new plumbing system, the contractor shall notify the engineer in writing immediately via RFI and wait for direction before proceeding. WARRANTY

This contractor shall warrant that all work under this section shall be free of defective work, materials and parts for a period of one year after acceptance of the work and shall repair, revise, and replace, at no cost to the owner, any such defects occurring within the warranty period. 22 05 03.00 - SUBMITTALS FOR PLUMBING General

Where submittals are required by the Contract Documents, they shall be prepared and supplied in accordance with the Contract Documents. In addition to Division 01, the Contractor is advised to review and comply with the requirements articulated within each Division and within each section of that Division.

Some Divisions may include a division-specific "Submittal Requirements for" section. Where this section exists, it articulates additional requirements for submittals that apply to the work of that Division

he following requirements help to identify, track and keep the project organized for all parties involved. They are necessary to ensure a timely turnaround and an appropriate technical review. Submittals that do not conform to the administrative requirements are rejected and returned, without technical review. Requirements

Supply submittals for each section: Submittals shall be supplied on a section-by-section and type-by-type basis. For example, independent product data submittals shall be furnished for each section that requires product data submittals. Independent shop drawing submittals shall be furnished for each section that requires shop drawings. Refer to the specifications for identification of which submittals are required for the project. Separate PDF file packages shall be supplied for each section, for each submittal type, where electronic submittals are required. Each PDF shall represent a single standalone submittal. Separately bound and identified submittals shall be provided where hardcopies are required.

Include a transmittal: Transmittals shall enumerate each submittal for each section of each type and iteration.

Include cover sheet / title page: The cover sheet shall include the information identified in the contract documents. It shall be included as the first page of each electronic and/or hardcopy document-based submittal. An editable and printable PDF form created with editable fields and specification compliant appearance is available from KLH upon request. It is also downloadable from the KLH website at www.klhengrs.com.

Include an index: The index shall enumerate the contents of the submittal. Include checklists: Where checklists are included with the specifications, complete and include them within the appropriate submittal. Supply complete submittals: Complete submittals of each type are required. Partial submittals will be rejected. Where a section requires a product data submittal, all product data for that section shall be supplied together, at one time, as one complete submittal. Do not send half the product data as one submittal and the other half as a separate one. When resubmittal is required (e.g. Revise and Resubmit) the revised submittal shall be more complete, more accurate and more contract-compliant than its rejected predecessor. The submittal number (for each section and type) shall increment for each subsequent submittal (00 - Original submission, 01 – First Resubmission, 02 – Second Resubmission, etc...). Resubmittals shall include a copy of the reviewers comments supplied with the prior submittal rejection and shall be amended with a description of the specific action taken to comply with the reviewer's comments.

The absence of this on resubmittal is cause for rejection. Name electronic files to match the submittal ID and cover sheet: The electronic file name of submittals shall match the submittal ID included on the submittals cover page. For example: The original/first product data submittal for Section 220523 would be labeled as "220523.00-PD-00"; the first resubmittal of same shall be labeled "220523.00-PD-01". The original/first shop drawings submittal file for the same section would be labeled "220523.00-SD-00"; the first resubmittal of same shall be labeled "220523.00-SD-01". Use of Electronic Drawings from the Owner's Design Team

Plan drawings for the Project were created with Revit. Revit electronic files are not available. If expressly permitted by the Owner and the terms of the Contract, editable electronic versions of published two-dimensional plan drawings may be made available for the creation of shop and as-built drawings for a nominal surcharge by sheet series for projects that were designed in Revit and must be converted to an AutoCAD or Navisworks format.

Due to the proprietary nature of internal design systems, editable native-software versions of some drawings, including but not limited to system diagrams and details will not be made available in an editable form. In these cases, electronic versions of the drawings may be made available only in PDF, JPG or similar non-editable electronic form, at the sole discretion of the Design Professional. The Request Drawings form can be accessed, filled out and submitted at the following internet address (scroll down to bottom of home page): http://www.klhengrs.com. 22 05 23.00 - GENERAL DUTY VALVES

Provide stops or isolation valves on domestic water supplies to isolate hot and cold water to each fixture, including all equipment and equipment provided by others. Fixtures, item or units furnished by the manufacturer with integral stops or stops specified with the fixture are considered to be properly valved at the fixtures.

Access shall be provided to all valves. Valves on domestic water piping shall be ball valves.

Ball valves - 2 inch and smaller: Lead-Free, 2-piece body, 600 psi CWP, 100 psi at 300°F, cast bronze body, full port, Teflon seats, blowout-proof stem, adjustable packing gland, chrome plated bronze ball, and vinyl-covered steel handle. Provide solder ends. Provide extended valve stems for valves used on insulated lines. Provide equal to Nibco series 585-80-LF Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following:

American Valve, Inc.

Conbraco Industries, Inc.; Apollo Valves. Crane Co.; Crane Valve Group; Crane Valves.

Hammond Valve. Milwaukee Valve Company.

General

NIBCO INC. Red-White Valve Corporation.

Watts Regulator Co.; a division of Watts Water Technologies, Inc CHECK VALVES

Spring check valves - class 125, cast bronze body and cap, horizontal swing, y-pattern, with a bronze disc, and having threaded or solder ends. Provide solder ends for domestic hot and cold water service. Provide equal to Nibco T-480-Y-LF.

22 05 29.00 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT GENERAL Support all piping and equipment by hangers or brackets. Provide structural steel members where

required to support piping and equipment. No portion of piping or valves shall be supported by equipment.

DELEGATED DESIGN For equipment supports, this contractor shall retain a qualified professional engineer to provide support calculations of static and dynamic loading due to operating equipment weight, seismic and

wind forces. The signed and sealed calculations and details shall be submitted by the retained professional engineer. PIPING

Provide hangers, supports, clamps and attachments to support piping properly from building structure. Support from the decking above is prohibited. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or provide intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

Individual pipe hangers to be Anvil International Clevis Hanger Fig. 260, Elcen, or approved equal. Rod sizes to conform to the following: 3/8" rods for 3/4" to 2" pipe; 1/2" rods for 2-1/2" to 3" pipe; 5/8" rods for 4" to 5" pipe; 3/4" rods for 6" pipe. Hangers shall be sized to allow insulation to pass through unobstructed, provide saddle support for

insulation at all hangers. Hanger spacing for steel piping unless otherwise noted is to be as follows: 1-1/4" or smaller to be 8' on center; 1-1/2" to 2" to be 10" on center; 2-1/2" and larger to be 12' on center and at each change

of direction Hanger spacing for copper pipe to be as follows: 1" or smaller 6' on center; 1-1/4" or larger 8' on center

Hanger spacing for cast iron piping shall be 5'-0" on center. Piping shall also be supported at each change in direction, valves and equipment. 22 05 53.00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

Provide self-adhesive pipe labels with white background and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction. EQUIPMENT

Provide self-adhesive plastic equipment labels with white background and black lettering, contact type with permanent adhesive backing, 160 degree F temperature. Include equipment's drawing designation and specification section number where equipment is specified. 22 07 19.00 - PLUMBING SYSTEM INSULATION

GENERAL Insulation shall be listed and labeled per ASTM E 84 for plenum installations employing slip on techniques.

Provide insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application PIPING SYSTEMS REQUIRING INSULATION

Insulate domestic cold water piping, associated fittings and valves with flexible elastomeric 1/2" wall

thickness insulation. Insulate domestic hot water piping, associated fittings and valves with 1" thick flexible elastomeric, 1-1/2" thick fiberglass insulation or per local energy code, whichever greater. Insulate domestic hot water return piping, associated fittings and valves with 1" wall thickness insulation or per local energy code, whichever greater.

Insulate waste piping above ceilings that receive condensate with 1/2" wall thickness insulation. Insulate exposed sanitary drains, domestic water, domestic hot water, and stops for plumbing fixtures for people with disabilities. FLEXIBLE ELASTOMERIC INSULATION

Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated. Manufacturers: Subject to compliance with requirements, available products that may be

incorporated into the work include, and are limited to, the following: Aeroflex USA, Inc.; Aerocel. Armacell LLC; AP Armaflex.

K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

FIBERGLASS INSULATION Fiberglass piping insulation: ASTM C 547. Class 1

Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers. Vapor Barrier Material: Paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for

applications indicated.

Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following: Armstrong World Industries, Inc.

Owens-Corning Fiberglass Corp. Keene Corp.

CertainTeed. Johns Manville

ADHESIVES

Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated. Insulation for handicap accessible fixtures All handicap lavatory p-trap and angle stop assemblies shall be insulated with trap wrap protective kit manufactured by Proflo model PF202WH or equal. Abrasion resistant, anti-microbial vinyl

exterior cover shall be smooth. For traps, the insulation shall have a cleanout nut cap to allow service to the trap without disassembly. For stops, the insulation shall have a lock lid that prevents tampering but allows access without removal of the insulation. Fasteners shall remain substantially out of sight. Manufacturers: subject to compliance with requirements:

Proflo

Truebro **Plumbere**>

22 11 16.00 - DOMESTIC WATER PIPING GENERAL

Install piping concealed from view unless noted otherwise, free of sags and bends. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction. Clean and disinfect potable domestic water piping using approved procedures by authorities having jurisdiction

Install at right angles; diagonal runs are prohibited unless otherwise shown. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Coordinate all piping with all other trades. Provide water pressure regulators where necessary to limit the incoming water pressure to 80 psi

inside the building. DOMESTIC WATER PIPING ABOVE GROUND:

Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints. Solder Filler Metals: ASTM B 32, lead-free alloys.

Flux: ASTM B 813, water flushable. Type "L"; copper pressure-seal joint; and pressure-seal joint systems. CATHODIC PROTECTION

Provide dielectric insulation at points where copper or brass pipe comes in contact with ferrous piping, reinforcing steel or other dissimilar metal in structure. 22 16 13.00 - NATURAL GAS PIPING SYSTEMS

GENERAL Plumbing contractor shall be responsible for installing gas piping run-outs to all gas-fired equipment, including equipment supplied by the HVAC and electric contractors. Piping shall be installed full-size (as indicated on the drawings) to each units' gas inlet connection, burner, regulator, etc. Plumbing subcontractor shall provide gas cock and make final connections. Connections to each gas-fired equipment item shall include a drip leg and shutoff gas cock. Comply with equipment manufacturer's instruction. For connections to gas-fired rooftop equipment, plumbing contractor shall be responsible for the roof penetration and shall install the gas piping through the roof in a location that has been coordinated with the HVAC contractor.

BUILDING DISTRIBUTION PIPING: All piping from meter/regulator to gas fired equipment connections shall be black steel. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B. Pipe size 2" and smaller: Malleable-Iron Threaded Fittings Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern. GENERAL DUTY VALVES:

Metallic valves 2 inches and smaller shall comply with ASME B16.33, cold working pressure of 125 Metallic valves larger than 2 inches shall comply with ASME B16.38, cold working pressure of 125

Provide one-piece ball valves with bronze body, chrome-plated brass ball, blowout proof stem and seat, and bronze trim complying with MSS SP-110.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and limited to, the following: BrassCraft Manufacturing Company; a Masco company. Conbraco Industries, Inc.; Apollo Div.

Lyall, R. W. & Company, Inc. McDonald, A. Y. Mfg. Co.

Perfection Corporation; a subsidiary of American Meter Company.

PRESSURE REGULATORS: Provide pressure regulators to conform with ANSI Z21.80, cast iron or die-cast aluminum body, interchangeable zinc-plated steel springs and diaphragm plate, single port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.

Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff. Overpressure Protection Device: Factory mounted on pressure regulator.

Regulator shall include vent limiting device, instead of vent connection and piping, if approved by authorities having jurisdiction NATURAL GAS METERS:

Service meters shall comply with the requirements of the utility supplying gas to the facility. 22 13 16.00 - SANITARY, WASTE AND VENT PIPING SYSTEM GENERAL

Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified hereir Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks,

a minimum of 1/4" per foot for drainage piping 2" and smaller and as indicated on the drawings. Protection shall be given all footings, other structural elements during underground work adjacent to such items. Refer to architectural and/or structural drawings for locations. Vent all fixtures, connect branch vents to main vent risers at least six inches above flood rim of fixtures. Pitch vent lines back to soil or waste pipe, free of drops and sags. Cleanouts shall be full size of pipe up to 4", and 4" for larger sizes. For underground and concealed lines, provide cleanouts in accessible positions at each right angle turn and at intervals not to exceed fifty feet. In floors, install flush with finish floor with extension pipe from cleanout 22 30 01.00 - POINT OF USE THERMOSTATIC MIXING VALVES GENERAL Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set outlet temperature of thermostatic mixing valve to 105 degrees F Point-of use thermostatic mixing valves shall be equal to Powers LFG480. Route tempered water to hot water side of sink and lavatories Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following: Symmons Lawler Leonard Powers Bradley 22 33 00.00 - COMMERCIAL ELECTRIC, DOMESTIC WATER HEATERS TANK TYPE Provide commercial electric tank type water heater as scheduled. Comply with UL 1453 Standard. Provide corrosion resistant metal drain pan with raised edge sized not less than the base of the water heater and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads. Provide field fabricated piping heat trap arrangement according to ASHRAE/IESNA 90.1. Provide combination temperature and pressure relief valve, ASME rated and stamped with relieving capacity at least as great as heat input and pressure setting less than water heater's rated operating Provide water heater stands or mounting brackets with manufacturer's factory fabricated steel capable of supporting water heater and water. Provide steel pressure-rated expansion tank constructed with welded joints and factory-installed butyl rubber diaphragm, pre-charged to minimum system operating pressure at tank. Provide field-fabricated piping-type heat traps in accordance with ASHRAE/IESNA 90.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following: AO Smith Bock Water Heaters Bradford White Corporation. Lochinvar Corporation. State Industries. 22 40 00.00 - PLUMBING FIXTURES GENERAL Refer to plumbing fixture schedule. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following: American Standard America. Crane Plumbing, LLC. Kohler Co. Toto USA, Inc. Zurn Industries, LLC; Commercial Brass and Fixtures. Sterling; a Kohler Company. Eljer Inc. This note was created with the free version of the Centek Rich Text Editor. To remove this text, purchase the software at software.centekeng.com

horizontal branches, traps, and connections to fixtures and drains. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to existing sanitary sewer.

INTERIOR PIPING Cast iron soil piping and fittings no hub ASTM A-74 with ASTM C-564 gasketed joints. Waste and vent piping 2-1/2" and under - Type "M" copper ASTM B88.62.

Soil, waste and vent piping 3" and over in size and all underground cast iron soil piping and fittings, ASTM A-74. No-hub cast iron pipe and fittings may be used above floor for soil, waste, and vent piping. Piping alignment shall be as indicated on the drawings using approved wye branches or eight

bands for direction changes and shall be surely supported or secured to maintain such alignment. Piping alignment shall be as indicated on the drawings using approved wye branches or eighth bends for direction changes and shall be surely supported or secured to maintain such alignment. Pitch of sanitary piping shall be uniform at a minimum of 1/8" per foot for building drains, drainage piping greater than 2" and as indicated on the drawings. Pitch of sanitary piping shall be uniform at

