

MARYLAND BUILDING NOTES:

- ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF THE 2021 INTERNATIONAL BUILDING CODE AND ALL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.
- THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
 - TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH 2021 IBC REQUIREMENTS AS OUTLINED IN SECTION [IBC 1704].
 - THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.
 - THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
 - A. STANDARDS OF HEATING - 2021 IMC - 309.1
 - B. DUCT CONSTRUCTION AND INSTALLATION - 2021 IMC - 603
 - C. AIR INTAKES, EXHAUSTS AND RELIEF - 2021 IMC - 401.5
 - D. AIR FILTERS - 2021 IMC - 605
 - E. MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS - 2021 IMC - 606
 - F. GAS FIRED EQUIPMENT - 2021 FUEL GAS CODE.
 - VENTILATION FOR ALL AREA SHALL COMPLY WITH 2021 IMC - 401
 - MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
 - A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY 2021 IMC - 403.3.
 - REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION.
 - THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.
 - SMOKE DETECTOR SHALL MEET UL268A.
 - ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
 - A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY 2021 IMC - 403.3. HVAC SYSTEM SHALL BE BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS AS REQUIRED.
 - HVAC AND SERVICE WATER HEATING CONTROLS SHALL BE TESTED TO DOCUMENT THAT CONTROL DEVICES, COMPONENT, EQUIPMENT AND SYSTEM ARE CALIBRATED AND OPERATE IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATION.
 - AIR BALANCING REPORT SHOULD BE PROVIDED IN ACCORDANCE WITH 2021 IMC 403.3.1.5.
 - MECHANICAL SYSTEM COMMISSIONING SHALL BE DONE AS PER SECTION C408.2. IF THE TOTAL MECHANICAL EQUIPMENT CONNECTED LOAD SERVING THE ALTERATION SPACE IS MORE THAN 480,000 BTU/H COOLING CAPACITY AND 600,000 BTU/H COMBINED SERVICE WATER HEATING AND SPACE HEATING.
 - DUCT AND PLENUM INSULATION SCHEDULE.

CONCEALED, RECTANGULAR, ROUND AND FLAT OVAL, SUPPLY-RETURN, OUTDOOR AND EXHAUST AIR DUCT AND AIR PLENUM INSULATION:	
FLEXIBLE FIBER BOARD OR POLYOLEFIN WITH MINIMUM THERMAL RESISTANCE AS FOLLOWS:	
UNCONDITIONED SPACES WITHIN BUILDING :	R-6
WITHIN BUILDING ENVELOPE ASSEMBLY :	R-8
OUTSIDE OR BUILDING :	R-8

THERMOSTATIC CONTROL NOTES:

- C403.2.4.1 THERMOSTATIC CONTROLS**
THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE. WHERE HUMIDIFICATION OR DEHUMIDIFICATION OR BOTH IS PROVIDED, AT LEAST ONE HUMIDITY CONTROL DEVICE SHALL BE PROVIDED FOR EACH HUMIDITY CONTROL SYSTEM.
- C403.2.4.1.2 DEADBAND**
WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM..
- C403.2.4.1.3 SETPOINT OVERLAP RESTRICTION**
WHERE A ZONE HAS A SEPARATE HEATING AND A SEPARATE COOLING THERMOSTATIC CONTROL LOCATED WITHIN THE ZONE A LIMIT SWITCH, MECHANICAL STOP OR DIRECT DIGITAL CONTROL SYSTEM WITH SOFTWARE PROGRAMMING SHALL BE PROVIDED WITH THE CAPABILITY TO PREVENT THE HEATING SETPOINT FROM EXCEEDING THE COOLING SETPOINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.2.4.1.2.
- C403.2.4.2.1 THERMOSTATIC SETBACK CAPABILITIES**
THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURES DOWN TO 55°F (13°C) OR UP TO 85°F (29°C).
- C403.2.4.2.2 AUTOMATIC SETBACK AND SHUTDOWN**
AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROLS SHALL BE CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK AND RETAINING THEIR PROGRAMMING AND TIME SETTING DURING A LOSS OF POWER FOR AT LEAST 10 HOURS. ADDITIONALLY, THE CONTROLS SHALL HAVE A MANUAL OVERRIDE THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO 2 HOURS; A MANUALLY OPERATED TIMER CAPABLE OF BEING ADJUSTED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.
- C403.2.4.2.3 AUTOMATIC START CAPABILITIES**
AUTOMATIC START CONTROL SHALL BE PROVIDED FOR EACH HVAC SYSTEM, PROVIDED WITH SETBACK CONTROLS AND DIRECT DIGITAL CONTROL (DDC) SYSTEM. THE CONTROLS SHALL BE CAPABLE OF AUTOMATICALLY ADJUSTING THE DAILY START TIME OF THE HVAC SYSTEM IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.

TESTING, ADJUSTING AND BALANCING FOR HVAC:

- SUMMARY**
 - TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:
 - AIR SYSTEMS: CONSTANT-VOLUME
- QUALITY ASSURANCE**
 - THE CONTRACTOR SHALL PROCURE THE SERVICES OF A TESTING, ADJUSTING AND BALANCING (TAB) SPECIALIST WHO SPECIALIZES IN HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS. THE TAB AGENT SHALL HAVE THE FOLLOWING QUALIFICATIONS: AABC, NEBB OR TABB CERTIFIED.
- EXECUTION**
 - THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL EXISTING AIR AND HYDRONIC SYSTEMS THAT ARE TO REMAIN OR TO BE INCORPORATED INTO NEW WORK PRIOR TO THE STARTING OF WORK IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.
 - THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL NEW AIR AND HYDRONIC SYSTEMS AS LISTED ABOVE IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.
 - THE REPORT SHALL INDICATE A SCHEMATIC DIAGRAM INDICATING LOCATIONS OF ALL EQUIPMENT TESTED AND MEASUREMENT LOCATIONS.
 - PRIOR TO FINAL INSPECTION OF THE WORK, THE TAB SPECIALIST SHALL BALANCE ALL SYSTEMS AS INDICATED ABOVE TO THE REQUIREMENTS OF THE DESIGN.
 - THE CONTRACTOR SHALL HAVE FURNISH AND INSTALL ALL ADDITIONAL BALANCING EQUIPMENT, PRESSURE TAPS, GAUGES AND OTHER EQUIPMENT AS REQUIRED FOR A PROPERLY BALANCED SYSTEM AT NO ADDITIONAL COST TO THE OWNER. SUCH ADDITIONAL EQUIPMENT SHALL ADHERE IN STRICT ACCORDANCE WITH THE RESPECTIVE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.

MECHANICAL LEGEND

	SUPPLY DUCT UP		PIPING DOWN
	SUPPLY DUCT DOWN		PIPING UP
	RETURN DUCT UP		TURNING VANES
	RETURN DUCT DOWN		VOLUME DAMPER
	FIRE DAMPER		CONDENSATE DRAIN
	COMB. FIRE/SMOKE DAMPER		MOTORIZED DAMPER
	BACKDRAFT DAMPER		BACKDRAFT DAMPER
	SMOKE DETECTOR		REMOTE ANNUNCIATOR
	SPIN-IN WITH VOLUME DAMPER		REMOTE TEMP. SENSOR
	45° RETURN DUCT TAP WITH VOL. DAMPER		THERMOSTAT
	DIFFUSER		FLEX DUCT
	DIFFUSER WITH FLEX CONNECTION		LINEAR DIFFUSER WITH FLEX CONNECTION
	GRILLE/REGISTER		ROUND DUCT UP
	SIDEWALL GRILLE/ REGISTER/ DIFFUSER		ROUND DUCT DOWN
	CONNECT TO EXISTING		REDUCER
	PULL DOWN STATION		EXTENT OF DEMOLITION

GENERAL NOTES:

- ALL WORK TO BE PERFORMED TO MEET ALL STATE, CITY & LOCAL CODE REQUIREMENTS.
- ALL DUCTWORK TO BE CONSTRUCTED OF GALVANIZED METAL ACCORDING TO SMACMNA STANDARDS.
- ALL WALL PATCHING TO BE BY THE GENERAL CONTRACTOR.
- HVAC CONTRACTOR IS TO COORDINATE WITH OTHER TRADES BEFORE INSTALLING DUCTWORK. IF THE HVAC CONTRACTOR FAILS TO COORDINATE WITH OTHER TRADES AND THE WORK MUST BE ALTERED THE HVAC CONTRACTOR WILL CHANGE IT AT HIS OWN EXPENSE.**
- ONCE THE SYSTEM IS COMPLETE AND ALL CEILING TILES ARE INSTALLED THE SYSTEM FILTER SHALL BE CHANGED AND THE AIR SIDE SHALL BE BALANCED. SUBMIT ELECTRONIC COPY OF BALANCE REPORT TO ENGINEER FOR REVIEW.
- COORDINATE THE EXACT LOCATION OF ALL GRILLES, REGISTERS & DIFFUSER WITH ARCHITECTURAL REFLECTED CEILING PLAN. ALSO COORDINATE MOUNTING HEIGHTS OF FIXTURES.
- HVAC CONTRACTOR IS TO VISIT THE SITE PRIOR TO SUBMITTING A BID & INCLUDE IN THE BID ANY ITEMS NECESSARY FOR A COMPLETE & OPERATIONAL SYSTEM.
- PROVIDE TURNING VANES AT ALL 90° CHANGE IN DIRECTION.
- DRAWINGS ARE SCHEMATIC IN NATURE & HVAC CONTRACTOR IS TO INCLUDE ANY ITEMS REQUIRED FOR A COMPLETE & OPERATIONAL SYSTEM WHETHER SHOWN OR NOT SHOWN ON THE DRAWINGS.
- HVAC CONTRACTOR TO FURNISH ALL PERMITS REQUIRED FOR HIS PORTION OF THE WORK.
- HVAC CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR CONCERNING ELECTRICAL REQUIREMENTS BEFORE ORDERING ANY EQUIPMENT.
- FLEXIBLE DUCTS SHALL BE WIREMOLD TYPE WGC, 1-1/2" INSULATION & RATED AT 10" W.C WITH A MAXIMUM LENGTH OF 5'-0".

ABBREVIATIONS

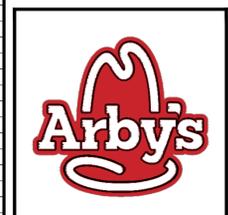
(N)	NEW	EXH	EXHAUST
(D)	DEMOLITION	FPI	FINS PER INCH
(E)	EXISTING	GTC	GENERAL TRADES CONTRACTOR
(F)	FUTURE	ID	INNER DIAMETER
(R)	(RELOCATE)	LAT	LEAVING AIR TEMPERATURE
AAV	AUTOMATIC AIR VENT	LWT	LEAVING WATER TEMPERATURE
AFF	ABOVE FINISHED FLOOR	MFR	MANUFACTURER
AMB	AMBIENT	N/A	NOT APPLICABLE
APD	AIR PRESSURE DROP	NC	NORMALLY CLOSED
BAS	BUILDING AUTOMATIC SYSTEM	NO	NORMALLY OPEN
BDD	BACKDRAFT DAMPER	NTS	NOT TO SCALE
BBFG	BACKFLOW PREVENTER	OA	OUTSIDE AIR
	BUILDING	OD	OUTSIDE DIAMETER
BOB	BOTTOM OF BEAM	PD	PRESSURE DROP
BOD	BOTTOM OF DUCT	PRV	PRESSURE REDUCING VALVE
BOP	BOTTOM OF PIPE	RA	RETURN AIR
BOS	BOTTOM OF STRUCTURE	REL	RELIEF AIR
CL	CENTER LINE	SA	SUPPLY AIR
CO	CLEAN OUT	SCC	SENSIBLE COOLING CAPACITY
DB	DRY BULB	SP	STATIC PRESSURE
DIA	DIAMETER	TCP	TEMPERATURE CONTROL PANEL
DN	DOWN	TSP	TOTAL STATIC PRESSURE
EA	EXHAUST AIR	TYP	TYPICAL
EAT	ENTERING AIR TEMPERATURE	UNO	UNLESS NOTED OTHERWISE
EFF	EFFICIENCY	VFD	VARIABLE FREQUENCY DRIVE
EG	ETHYLENE GLYCOL	WB	WET BULB
ESP	EXTERNAL STATIC PRESSURE	WG	WATER GAUGE
EWT	ENTERING WATER TEMPERATURE	WPD	WATER PRESSURE DROP

SEQUENCE OF OPERATION

- PROVIDE STAND ALONE OR APPLICATION SPECIFIC CONTROLLERS AS REQUIRED TO PERFORM THE FOLLOWING SEQUENCES OF OPERATIONS.
- PACKAGED ROOFTOP UNITS**
 - UNIT SHALL CONSIST OF SUPPLY AIR FAN, FILTERS, DX COOLING COIL, GAS-FIRED HEAT SECTION, AND A 7-DAY PROGRAMMABLE THERMOSTAT.
 - PROVIDE AN OVERRIDE SWITCH TO OPERATE THE UNIT DURING UNOCCUPIED HOURS. THIS SWITCH SHALL BE PART OF THE PROGRAMMABLE THERMOSTAT. OVERRIDE SWITCH ALLOWS THE UNIT TO OPERATE FOR TWO HOURS (ADJUSTABLE).
 - OCCUPIED MODE: BASED ON THE ROOFTOP UNITS HOURS OF OCCUPANCY, START THE UNIT AT THE BEGINNING OF OCCUPANCY AND SHUT DOWN THE UNIT AT THE END OF OCCUPANCY INDOOR. OUTSIDE AIR DAMPER WITHIN THE RTU SHALL OPEN AND THEN THE RTU SHALL START. THE UNIT SHALL START EARLIER AS DETERMINED BY THE PROGRAM FOR EARLY WARM-UP OR COOL DOWN. ON A SYSTEM STARTUP, THE RTU FAN SHALL START AND RUN CONTINUOUSLY AND THE INTERNAL FACTORY CONTROLS SHALL BE ENABLED. BASED ON THE SPACE TEMPERATURE SENSOR, THE UNIT SHALL CYCLE THE HEATING/COOLING TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.
 - ECONOMIZER MODE: WHEN ENTHALPY OF OA IS BELOW 28 BTU/LB. ECONOMIZER MODE SHALL BE ENABLED. ECONOMIZER MODE SHALL LINEARLY MODULATE OUTDOOR AIR CFM FROM MINIMUM OA CFM TO 100% BASED ON ENTHALPY READINGS.
 - UNOCCUPIED MODE: THE RTU INTERNAL OA DAMPERS SHALL REMAINED CLOSED WHEN THE BUILDING IS NOT OCCUPIED. THE RTU SHALL STOP HEATING/COOLING AND THE FAN SHALL STOP. IF THE SPACE TEMPERATURE FALLS BELOW 60 DEGREE F (ADJUSTABLE), THE UNIT SHALL START AND HEAT UNTIL THE SPACE TEMPERATURE IS 64 DEGREE F (ADJUSTABLE) AND THEN SHUTDOWN. IF THE SPACE TEMPERATURE RISES ABOVE 85 DEGREE F (ADJUSTABLE), THE UNIT SHALL START AND COOL UNTIL THE SPACE TEMPERATURE IS 80 DEGREE F (ADJUSTABLE) AND THEN SHUTDOWN.
 - UPON DETECTION OF SMOKE BY UNIT SMOKE DETECTOR THE RTU SHALL SHUT DOWN AND AN ALARM SHALL BE SENT TO THE RESPECTIVE LOCAL REMOTE ANNUNCIATORS.
- KITCHEN HOOD EXHAUST FAN (EF-1)**
 - THE KITCHEN HOOD EXHAUST FAN SHALL BE ENABLED WHEN ANY COOKING APPLIANCE LOCATED UNDER THE HOOD IS IN USE.
- EF-2**
 - EXHAUST FAN SHALL RUN WHEN THE BUILDING IS OCCUPIED. EC TO WIRE THROUGH KITCHEN LIGHT SWITCH.
- ANSUL SYSTEM ACTIVATION**
 - UPON ACTIVATION OF ANSUL SYSTEM, SHUT DOWN RTU-1 AND RTU-2. PROVIDE RELAYS CONTACTS, INTERLOCKS, TRANSFORMERS AND ALL ASSOCIATED WIRING TO ACCOMPLISH SEQUENCE. MECHANICAL CONTRACTOR SHALL INTERLOCK RTU-1 AND RTU-2 TO ALSO SHUT DOWN.

DRAWING INDEX

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ISSUE		
NO.	DATE	DESCRIPTION

DWG DATE: 09-18-2024
 DRAWN BY: NYE
 REVIEWED BY:
 PROJECT No.:
 DWG TITLE:

MECHANICAL GENERAL INFORMATION

SHEET No.
M-0

UNIT ID	MANUFACTURER	EFFICIENCY	MODEL	AREA SERVED	NOMINAL TONS	SUPPLY FAN			GAS HEAT		COOLING				ELECTRICAL		EER	IEER	THERMAL EFFICIENCY	OPERATING WEIGHT (LBS)	NOTES	
						TOTAL CFM	OUTSIDE AIR CFM	EXTERNAL STATIC PRESSURE (IN. W.G.)	INPUT MBH	OUTPUT MBH	TOTAL MBH	SENSIBLE S.A.E.	AMBIENT DB (°F)	ENTERING DB / WB (°F)	STAGES	VOLTS						PHASE
RTU-1 (E)	S.A.E.	STANDARD	48FCM07A2A5 (V.I.F)	SEE PLAN	6	2400	415	S.A.E.	S.A.E.	S.A.E.	S.A.E.	95	80/67	S.A.E.	208 (V.I.F)	3 (V.I.F)	28 (V.I.F)	45 (V.I.F)	S.A.E.	S.A.E.	S.A.E.	1-8
RTU-2 (E)	S.A.E.	STANDARD	48TCM07A2A5 (V.I.F)	SEE PLAN	6	2400	415	S.A.E.	S.A.E.	S.A.E.	S.A.E.	95	80/67	S.A.E.	208 (V.I.F)	3 (V.I.F)	37 (V.I.F)	50 (V.I.F)	S.A.E.	S.A.E.	S.A.E.	1-8
RTU-3 (E)	S.A.E.	STANDARD	48TCED12A2A5 (V.I.F)	SEE PLAN	10	4000	700	S.A.E.	S.A.E.	S.A.E.	S.A.E.	95	80/67	S.A.E.	208 (V.I.F)	3 (V.I.F)	53 (V.I.F)	60 (V.I.F)	S.A.E.	S.A.E.	S.A.E.	1-8

NOTES / ACCESSORIES -

- EXISTING RTUs WITH ALL ACCESSORIES TO REMAIN SAME AND TO BE REUSED.
- S.A.E. : SAME AS EXISTING , V.I.F. : VERIFY IN FIELD
- CONTRACTOR TO FIELD VERIFY ALL RTUs ARE WORKING AT THEIR 100% RATED CAPACITY, INFORM TO DESIGN ENGINEER IF ANY DISCREPANCIES ARE FOUND IN PERFORMANCE PRIOR TO CONSTRUCTION.
- CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF UNIT ON SITE.
- IF REQUIRED, PROVIDE NEW THERMOSTAT AND TEMPERATURE SENSOR COMPATIBLE WITH EXISTING RTU. CO-ORDINATE FINAL LOCATION OF T-SENSOR WITH ARCHITECT/OWNER.
- CONTRACTOR TO BALANCE OUTSIDE AIR & RETURN AIR DAMPER ON EXISTING RTU TO MATCH VALUES MENTIONED IN ABOVE TABLES.
- REPLACE FILTERS, IF REQUIRED.
- CONTRACTOR SHALL VERIFY EXACT ELECTRICAL CONNECTIONS, WIRE SIZES, BREAKER, DISCONNECT ETC. PRIOR TO ORDERING AND BID.

GRILLES, REGISTERS, AND DIFFUSERS SCHEDULE								
BASED ON METAL-AIRE/GRAINGER U.N.O.								
TAG	FUNCTION	MODEL	FACE SIZE	FRAME TYPE	MATERIAL	FINISH	BALANCE DAMPER	MAX N.C.
A	SUPPLY	EP5700/STR-C	24" x 24"	LAY-IN	POLYMER	WHITE	-	25
B	SUPPLY	EP5700/STR-C	12" x 12"	LAY-IN	POLYMER	WHITE	-	25
C	RETURN	EPRHF/SSTR-ERFG-W-FR	24" x 24"	LAY-IN	POLYMER	BEIGE	-	25
D	SUPPLY	EP5750/STR-PERF	24" x 24"	LAY-IN	POLYMER	WHITE	-	25

ROUND NECK SIZES SCHEDULE:		SQUARE NECK SIZE SCHEDULE:	
Up To 100 Cfm - 6" DIA	6"X6"	0 - 115 CFM	
101 To 225 Cfm - 8" DIA	8"X8"	116 - 220 CFM	
226 To 350 Cfm - 10" DIA	10"X10"	221 - 350 CFM	
351 To 600 Cfm - 12" DIA	12"X12"	351 - 520 CFM	
601 To 900 Cfm - 14" DIA	14"X14"	521 - 730 CFM	
	16"X16"	731 - 840 CFM	
	18"X18"	840 - 1035 CFM	
	20"X20"	1036 - 1285 CFM	
	22"X22"	1286 - 1570 CFM	

KITCHEN HOOD SCHEDULE											
BASED ON CAPTIVEAIRE U.N.O.											
UNIT DATA											
TAG	MODEL	HOOD LENGTH	MAX. COOKING TEMP.	TOTAL EXHAUST CFM	RISER (DIA)	S.P. (IN" W.G.)	QTY.	TYPE	FIRE SUPP. SYSTEM	HANGING WEIGHT (LBS.)	COMMENTS
KH-1	3044-BD-2	5'-0"	450°F	1200	12"	-0.45	1	INCAND.	YES	280	

FAN SCHEDULE																
UNIT ID	MANUFACTURER	AREA SERVED	MODEL	CFM	TYPE	DRIVE	FAN RPM	MOTOR				SERVICE	INTERLOCKED WITH	WEIGHT (LBS)	NOTES / ACCESSORIES	
								E.S.P. (IN. W.G.)	FLA (A)	HP	VOLTS					PHASE
EF-1 (N)	CAPTIVE-AIRE	KH-1 HOOD EXHAUST	DUS0HFA	1200	ROOF MOUNTED UP BLAST	DIRECT	1320	0.75	8.4	1/4	115	1	FRYER	KH-1	100	1,2
EF-2 (N)	GREENHECK	RESTROOM	G-095-D	210	ROOF MOUNTED DOWN BLAST	DIRECT	1550	0.7	-	1/8	115	1	TOILET	RTU-3 (E)	70	1,2

NOTES:

- FACTORY PROVIDED DISCONNECT SWITCH
- REUSE THE EXISTING ROOF CURB AND MODIFY IT IF REQUIRED.

VENTILATION CALCULATION														
ROOM NAME	AREA (SQ.FT.)	NUMBER OF PEOPLE/1000sq.ft AS PER IMC 2021	NUMBER OF PEOPLE AS PER IMC 2021	NUMBER OF CHAIR	FINAL PEOPLE NO.	MIN OUTSIDE AIR AS PER IMC 2021		REQ. OA (CFM)	Provided OA After Effectiveness 0.8	Provided OA (CFM)	EXHAUST AIRFLOW RATE (CFM/SQ.FT OR /FIXT.)	NO OF FIXTURES	TOTAL EXHAUST CFM	PROVIDED EXHAUST (CFM)
						CFM/PEOPLE	CFM/SQ.FT							
RTU-1 (E)														
DINING	680	70	48	26	26	7.5	0.18	317	320	415	0	0	0	0
VESTIBULE 01	41	0	0	0	0	0	0.06	0	5	415	0	0	0	0
ROOM 01	20	5	1	0	0	5	0.06	1	5	415	0	0	0	0
	741			26	26			321	330	415			0	0
RTU-2 (E)														
DINING	680	70	48	26	26	7.5	0.18	317	320	415	0	0	0	0
VESTIBULE 02	101	0	0	0	0	0	0.06	6	10	415	0	0	0	0
	781			26	26			323	330	415			0	0
RTU-3 (E)														
SERVICE AREA	113	20	3	3	3	7.5	0.12	36	40	700	0	0	0	0
HALLWAY	36	0	0	0	0	0	0.06	2	5	700	0	0	0	0
KITCHEN	689	20	14	14	14	7.5	0.12	188	190	700	0.7	0	482.3	1200
SUPPLIES/EQUIP	248	0	0	0	0	0	0.12	30	30	700	0.7	0	0	0
MANAGERS AREA	60	5	1	1	1	5	0.06	9	10	700	0	0	0	0
WOMENS	122	0	0	0	0	0	0	0	0	700	70	2	140	140
MENS	86	0	0	0	0	0	0	0	0	700	70	1	70	70
	1146			18	18			264.26	275	700			482.3	1410

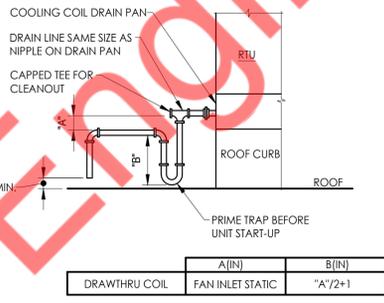
AIR BALANCE					
UNIT	AREA SERVED	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	RETURN AIR (CFM)	EXHAUST AIR (CFM)
RTU-1 (E)	SEE PLAN	2400	415	1985	0
RTU-2 (E)	SEE PLAN	2400	415	1985	0
RTU-3 (E)	SEE PLAN	4000	700	3300	0
EF-1 (N)	SEE PLAN	0	0	0	1200
EF-2 (N)	SEE PLAN	0	0	0	210
TOTAL:		8800	1530	7270	1410

BUILDING PRESSURE: 120 POSITIVE

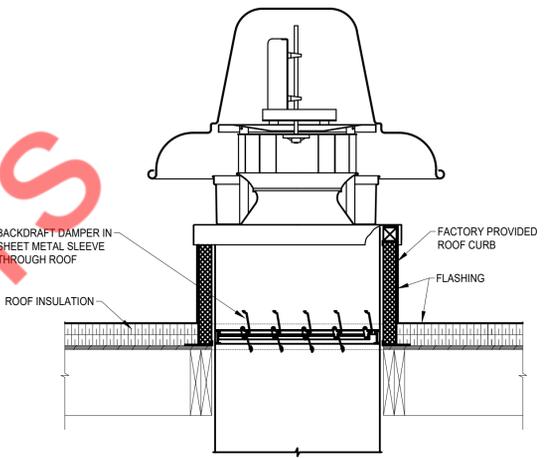
AIR CURTAIN SCHEDULE								
MANUFACTURER	UNIT ID	MODEL	LENGTH (IN.)	CFM	QUANTITY	ELECTRIC HEAT (KW)	V/PH/Hz	AMPS (A)
MARS	ACH-1	LPV248-1UA-OB	48	1200	1	-	115/1/60	2.4

NOTES / ACCESSORIES:

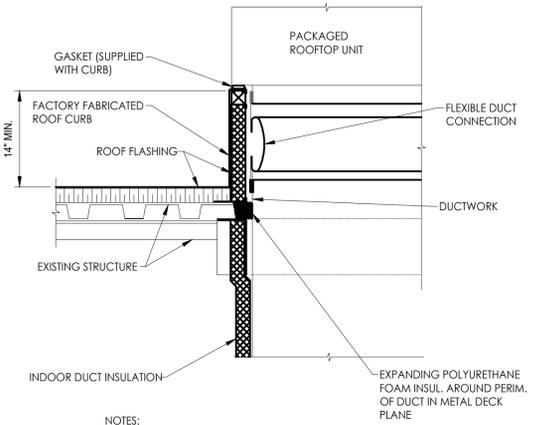
- COORDINATE WITH ARCHITECT/OWNER FOR FINAL REQUIREMENT.
- PROVIDE MANUFACTURER RECOMMENDED ACCESSORIES.
- COORDINATE WITH ELECTRICAL CONTRACTOR FOR POWER REQUIREMENT.



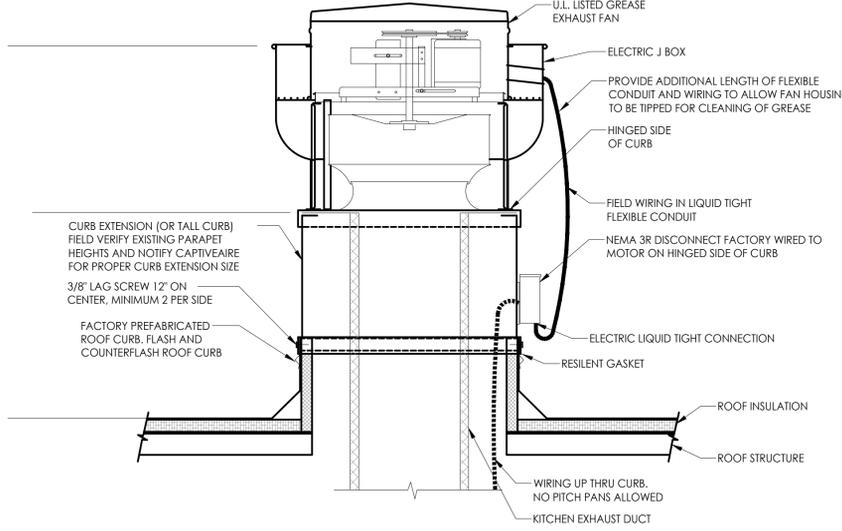
1 RTU CONDENSATE DRAIN DETAIL
N.T.S.



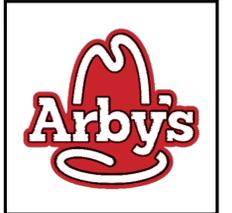
2 GENERAL EXHAUST FAN DETAIL
N.T.S.



3 PACKAGED ROOFTOP UNIT DETAIL
N.T.S.



4 GREASE EXHAUST FAN DETAIL
N.T.S.



ISSUE		
NO.	DATE	DESCRIPTION

DWG DATE: 09-18-2024
 DRAWN BY: NVE
 REVIEWED BY:
 PROJECT NO.:
 DWG TITLE:

MECHANICAL SCHEDULE

HOOD INFORMATION - Job#2788398

HOOD NO.	TAG	MODEL	LENGTH	MAX COOKING TEMP.	TOTAL EXH. CFM	EXHAUST PLENUM RISER(S)				HOOD CONSTRUCTION	HOOD CONFIG		
						WIDTH	LENG.	HEIGHT	DIA.		CFM	S.P.	END TO END
1		3044 BD-2	5' 0.00'	450 Deg.	1200		4'	12'	1200	-0.452'	430 SS Where Exposed	ALONE	ALONE

HOOD INFORMATION

HOOD NO.	TAG	TYPE	FILTER(S)				LIGHT(S)				UTILITY CABINET(S)				FIRE SYSTEM PIPING	HOOD HANGING WGT
			QTY.	HEIGHT	LENGTH	EFFICIENCY @ 9 MICRONS	QTY.	TYPE	WIRE GUARD	LOCATION	SIZE	TYPE	SIZE	MODEL #		
1		SS Baffle with Handles	3	16"	16"	30%	2	Screw In Compact	NO	Left	12"x30"x24"	Ansul R102	3.0		YES	280 LBS

HOOD OPTIONS

HOOD NO.	TAG	OPTION
1		FIELD WRAPPER 31.00' High Front, Left, Right
		BACKSPLASH 6.3.00' High X 72.00' Long 430 SS Vertical
		BACKSPLASH 114.00' High X 18.00' Long 430 SS Vertical
		BACKSPLASH 114.00' High X 18.00' Long 430 SS Vertical
		RIGHT QUARTER END PANEL 20' Top Width, 0' Bottom Width, 20' High 430 SS
		LEFT QUARTER END PANEL 20' Top Width, 0' Bottom Width, 20' High 430 SS

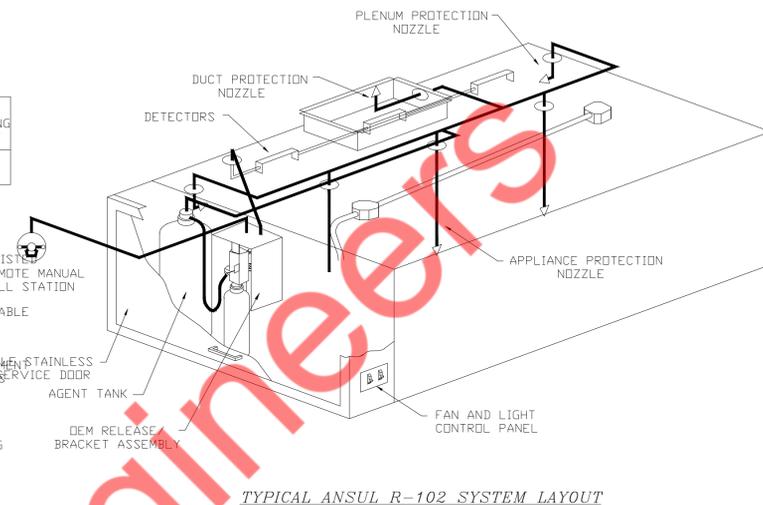
SPECIFICATIONS

THE RESTAURANT FIRE SUPPRESSION SYSTEM SHALL BE THE PRE-ENGINEERED TYPE WITH A FIXED NOZZLE AGENT DISTRIBUTION NETWORK. IT SHALL BE LISTED WITH UNDERWRITERS LABORATORIES, INC. (UL) REMOTE MANUAL PULL STATION

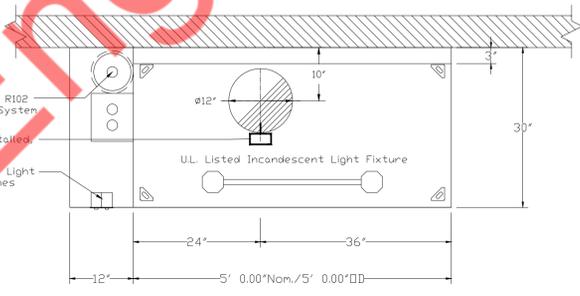
THE SYSTEM SHALL BE CAPABLE OF AUTOMATIC DETECTION AND ACTUATION WITH LOCAL OR REMOTE MANUAL ACTUATION. ACCESSORIES SHALL BE AVAILABLE FOR MECHANICAL OR ELECTRICAL GAS LINE SHUT-OFF APPLICATIONS.

THE EXTINGUISHING AGENT SHALL BE A POTASSIUM CARBONATE, POTASSIUM ACETATE-BASED FORMULATION DESIGNED FOR FLAME KNOCKDOWN AND REMOVAL OF GREASE RELATED FIRES. IT SHALL BE AVAILABLE IN PLASTIC CONTAINERS WITH INSTRUCTIONS FOR LIQUID AGENT HANDLING AND USAGE.

THE REGULATED RELEASE MECHANISM SHALL BE COMPATIBLE WITH A FUSIBLE LINK DETECTION SYSTEM. THE FUSIBLE LINK SHALL BE SELECTED AND INSTALLED ACCORDING TO THE OPERATING TEMPERATURE IN THE VENTILATING SYSTEM. THE FUSIBLE LINK SHALL BE SUPPORTED BY A DETECTOR BRACKET/LINKAGE ASSEMBLY.



TYPICAL ANSUL R-102 SYSTEM LAYOUT



PLAN VIEW - Hood #1 (H-1)
5' 0.00" LONG 3044BD-2

CAPTIVE-AIRE HOODS ARE BUILT IN COMPLIANCE WITH



NFPA #96
UL 710 & ULC710 STANDARDS
E.T.L. LISTED 3054804-001

UNLESS SPECIFICALLY NOTED:

THE MODEL BD-2 HOOD IS LISTED WITH A MINIMUM SIDE OVERHANG TO THE COOKING EQUIPMENT SURFACE OF 0", AND A MINIMUM FRONT OVERHANG OF -3". FOR 450°F APPLICATIONS, THE MINIMUM EXHAUST RATE IS 150 CFM/FT.

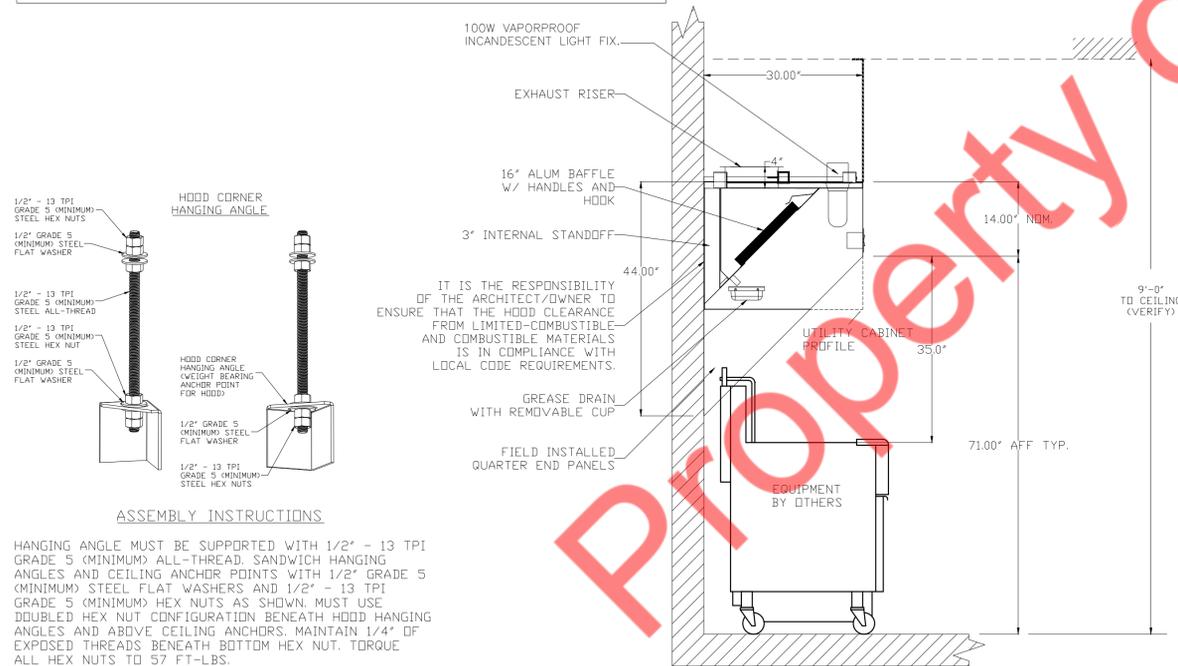
HVAC DISTRIBUTION NOTE

IT IS RECOMMENDED NOT TO INSTALL HIGH VELOCITY DIFFUSERS OR HVAC RETURNS WITHIN TEN (10) FEET OF THE EXHAUST HOOD. PERFORATED DIFFUSERS ARE RECOMMENDED.

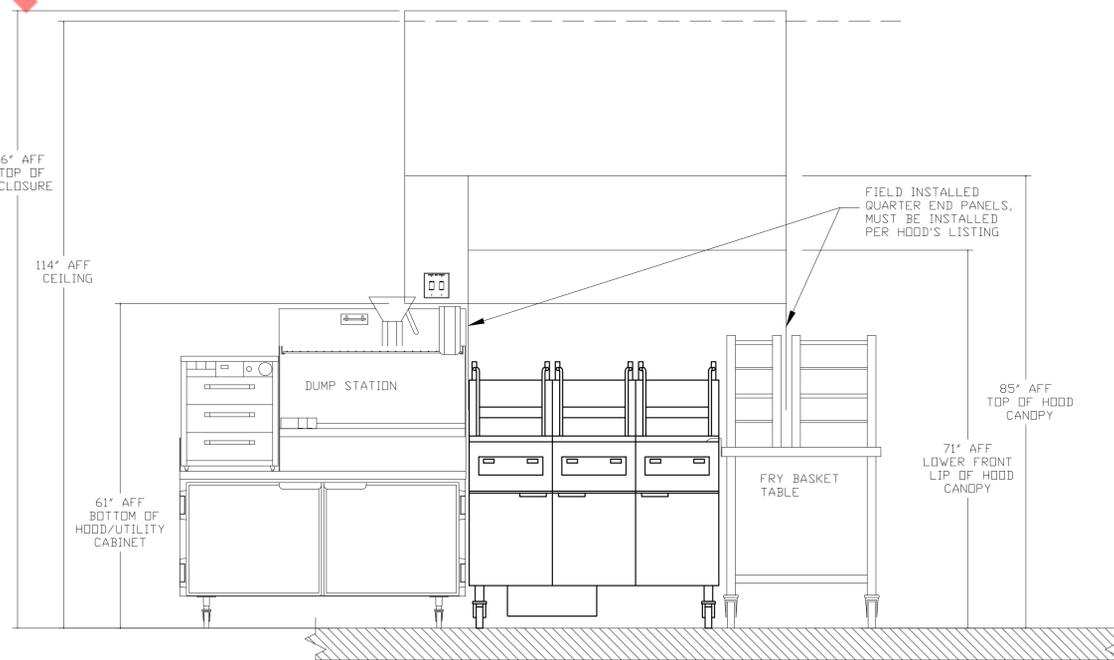
CAPTIVEAIRE SYSTEMS RECOMMENDS THE USE OF LISTED, PRE-FABRICATED ROUND GREASE EXHAUST DUCT TO REDUCE STATIC PRESSURE IN THE SYSTEM, MINIMIZE INSTALLATION AND INSPECTION TIMES, AND ENSURE DUCT IS LIQUID TIGHT

VERIFY CEILING HEIGHT

HEIGHT REQUIRED TO VERIFY THAT HOOD FITS SPACE AND TO SIZE THE ENCLOSURE PANELS



SECTION VIEW - MODEL 3044BD-2 w/ PSP



ELEVATION VIEW - MODEL 3044BD-2

REVISIONS

NO.	DATE	DESCRIPTION

Arby's

CAPTIVEAIRE

Atlanta Office
1395 S. Marietta Pkwy, Bldg 100, Ste 105, Marietta, GA, 30067
PHONE: (800) 862-6628 FAX: (919) 227-5964 EMAIL: reg50@captivaire.com

DATE: 9/28/2016
DWG.#: 2788398
DRAWN BY: WAH-50
SCALE: 3/4" = 1'-0"
MASTER DRAWING
SHEET NO. 1



ISSUE		
NO.	DATE	DESCRIPTION

DWG DATE: 09-18-2024
DRAWN BY: NYE
REVIEWED BY:
PROJECT No.:
DWG TITLE:

HOOD DETAILS & INFORMATION

SHEET No.
M-4

LIGHT FIXTURE SCHEDULE

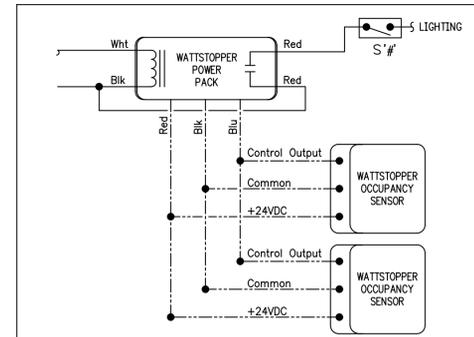
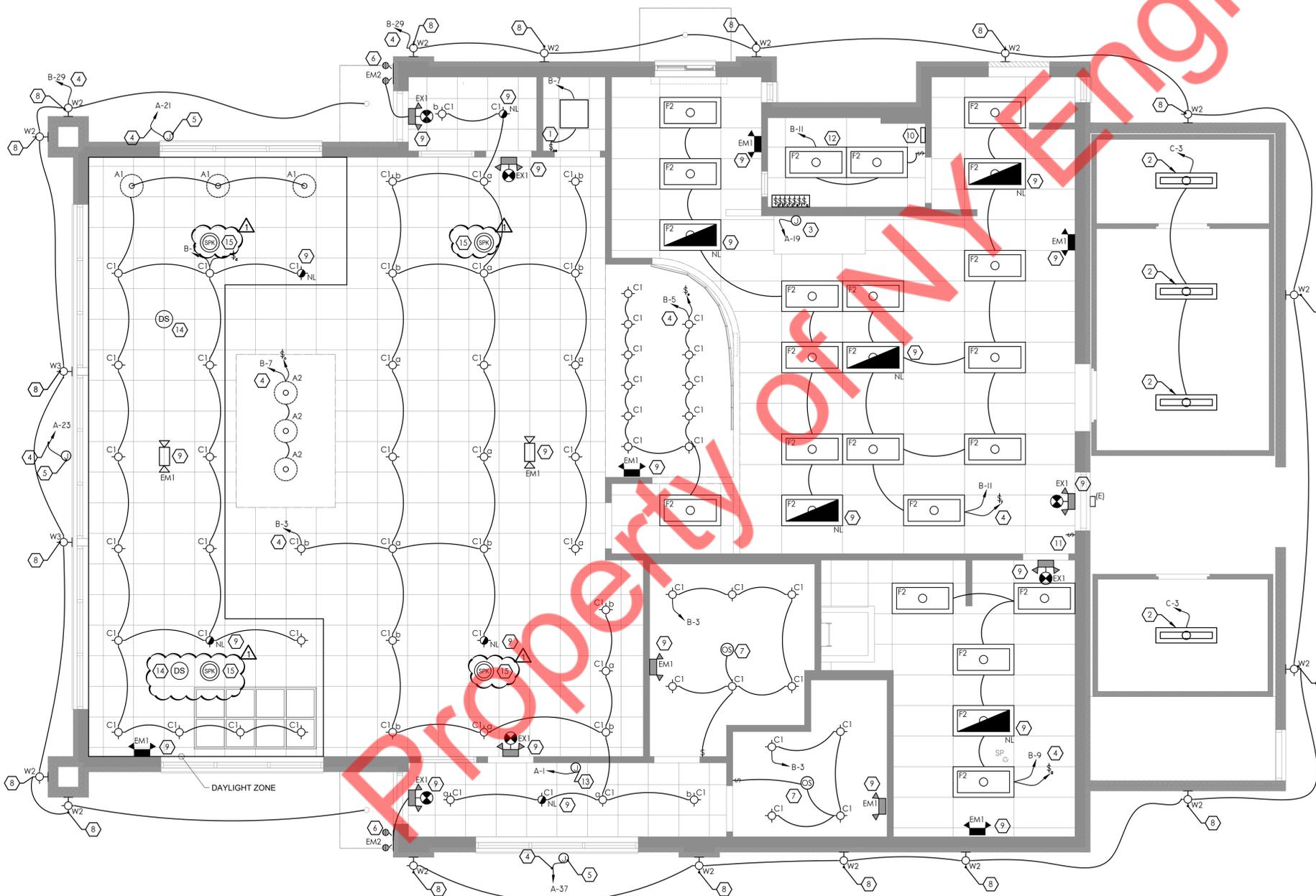
TYPE	EQUIPMENT DESCRIPTION	MANUFACTURER	MODULE	MOUNTING	LAMP	DRIVER	COMMENTS	VOLTS	WATTS	QUANTITY
A1	PENDANT	KICHLER	EVERLY42046-OZ-1 (OLD BRONZE)	SUSPENDED	SATCO \$9578	N/A	SEE NOTE 1	120	4.5	3
A2	PENDANT	KICHLER	MISSOULA 78200-LT-1 (BRONZE)	SUSPENDED	SATCO \$9578	N/A	SEE NOTE 1	120	4.5	3
C1	LED DOWNLIGHT	CREE	CR6T-825-27K-12-E25/RC6-GU24 E26 ADAPTER	RECESSED	LED ENGINE	LED DRIVER	WHITE TRIM RING	120	11	70
F2	2X4 LED TROFFER	CREE	C-TR-B-FP24-50L-40K-WH-2	RECESSED	LED ENGINE	LED DRIVER	-	120	50	24
W2	EXTERIOR UP/DOWN SCNCE	SATCO	NUVO62/1143R1	WALL	3000K CCT LED	LED DRIVER	-	120	20	16
W3	EXTERIOR WALL SCNCE	WESTGATE	LWA-12-CS-WH	W ALL	LED ENGINE	LED DRIVER	-	120	12	2
EX1	COMBINATION EMERGENCY EXIT SIGN	EXITRONIX	VLEDC-51-WH	UNIVERSAL	WITH UNIT WITH UNIT	N/A	PENDANT MOUNTED AT 10'-0" AFF	120	14	6
EM1	EMERGENCY BATTERY PACK WITH DUAL HEADS	EXITRONIX	LED-90	WALL	W/UNIT	N/A	-	120	14	7

GENERAL NOTES:

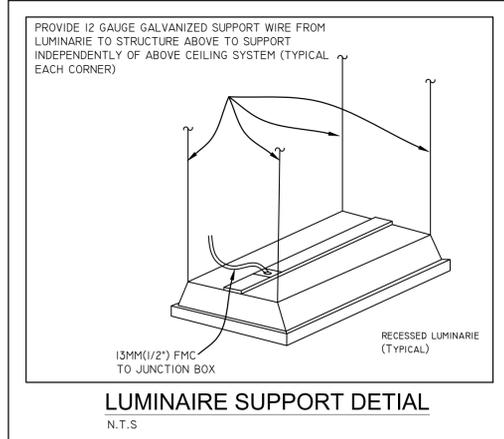
- A. REFER TO REFLECTED CEILING PLAN FOR COORDINATION OF CEILING GRID, DIFFUSERS AND LIGHTING.
- B. ALL NIGHT LIGHTING, EXIT AND EGRESS EMERGENCY LIGHTING SHALL BE CONNECTED TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCH LEG.
- C. CONTRACTOR PROVIDE ALL MATERIALS TO PROVIDE A COMPLETE INSTALLATION IN ACCORDANCE WITH THE CURRENT EDITION OF THE NEC AND ALL STATE AND LOCAL CODES.
- D. REFER TO DECOR PLANS FOR COORDINATION OF ALL DECORATIVE PENDANT AND SCONCE LIGHTING, INCLUDING MOUNTING HEIGHTS AND SUSPENSION HEIGHTS & SPECIFICATIONS.
- E. MOUNT EXIT LIGHTS IN DINING ROOM ON BULKHEAD ABOVE DOOR.

LIGHTING PLAN KEYED NOTES (B)

1. WALL MOUNTED OCCUPANCY SENSOR EQUAL TO WATTSTOPPER WS-250. SET OFF TIME TO 20 MINUTES FOR RESTROOM & OFFICE APPLICATIONS, SET DIP SWITCH TO AUTOMATIC ON.
2. THE EXISTING FREEZER/COOLER LIGHTING FIXTURE, LIGHTING CONTROL & ITS ELECTRICAL CONNECTION SHALL REMAIN. E.C. SHALL VERIFY THE OPERABLE CONDITION OF EXISTING LIGHT FIXTURE, LIGHTING CONTROL & E.C. TO RECONNECT EXISTING CIRCUIT TO NEW BREAKER AS SHOWN REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
3. VAPOR PROOF LIGHT FIXTURES FURNISHED BY EXHAUST HOOD MANUFACTURER. EC SHALL INSTALL LIGHT FIXTURES PER MANUFACTURER'S RECOMMENDATION AND WIRE THRU EXHAUST HOOD CONTROLLER. SEE POWER PLAN. MAKE FINAL CONNECTION.
4. THRU RELAY PANEL. SEE DETAIL AND SCHEDULE SHEET E-5.
5. EXTERIOR SIGN: PROVIDE WP JB AT 19'-0". DO NOT COMBINE OR SHARE NEUTRALS WITH OTHER CIRCUITS. IF SIGN IS NOT EQUIPPED WITH INTEGRAL DISCONNECT, PROVIDE WP DISC SW. COORDINATE WITH SIGN VENDOR. MOUNT JB INSIDE BUILDING IN TRUSS SPACE.
6. MOUNT AT 9'-2" AFF TO CENTERLINE OF FIXTURE.
7. LOW VOLTAGE OCCUPANCY SENSOR EQUAL TO WATTSTOPPER DT-305. PROVIDE LOW VOLTAGE OCCUPANCY SENSOR EQUAL TO WATTSTOPPER DT-305. PROVIDE WATTSTOPPER BZ POWER PACK(S) AS REQUIRED. INTERCONNECT OCCUPANCY SENSORS SO THAT ANY SENSOR WILL TRIGGER ALL LIGHTS. SET OFF TIME FOR 20 MINUTES.
8. MOUNT AT 7'-6" A.F.F. TO CENTER OF FIXTURE.
9. WIRE ALL EMERGENCY, NIGHT LIGHT AND EXIT LIGHT TO THE NEAREST CIRCUIT AHEAD OF ALL CONTROLS & SWITCHING FOR CONTINUOUS OPERATION.
10. RELAY PANEL : ACUITY ARP-INTENC16-NLT-16FCR-MVOLT-1VB-SC-SM-DTC.
11. DIGITAL SWITCH : ACUITY "CHELSEA" CHI-BWH-PWH. SWITCH TO HAVE 4 LIGHT CONTROL OVERRIDES.
12. LIGHTING NEAR ELECTRICAL PANELS SHALL NOT BE CONTROLLED BY ANY AUTOMATIC MEANS AND SHALL BE COMPILED AS PER NEC 110.26(D).
13. ARBY'S 'A' SIGN : VERIFY EXACT LOCATION AND MOUNTING HEIGHT WITH ARBY'S CM PRIOR TO ROUGH-IN. EC SHALL WIRE 'A' SIGN INTO LOCAL LIGHTING CIRCUIT FOR POWER. PROVIDE POWER THROUGH DIMMER SWITCH AT THE TOP OF THE 'A'. COORDINATE EXACT LOCATION OF DIMMER SWITCH WITH CM.
14. LIGHTING IN THIS AREA SHALL BE CONTROLLED VIA DAY LIGHT SENSOR.
15. E.C. TO COORDINATE LV EQUIPMENT POWER REQUIREMENT & CONTROL WITH LV VENDOR IN COORDINATION WITH ARCHITECT/OWNER IN FIELD.



OCCUPANCY SENSOR DETAIL
N.T.S.



LUMINAIRE SUPPORT DETAIL
N.T.S.

TYPICAL OCCUPANCY SENSOR WIRING DIAGRAM
N.T.S.



ISSUE		
NO.	DATE	DESCRIPTION
1	10/31/2024	PERMIT COMMENTS

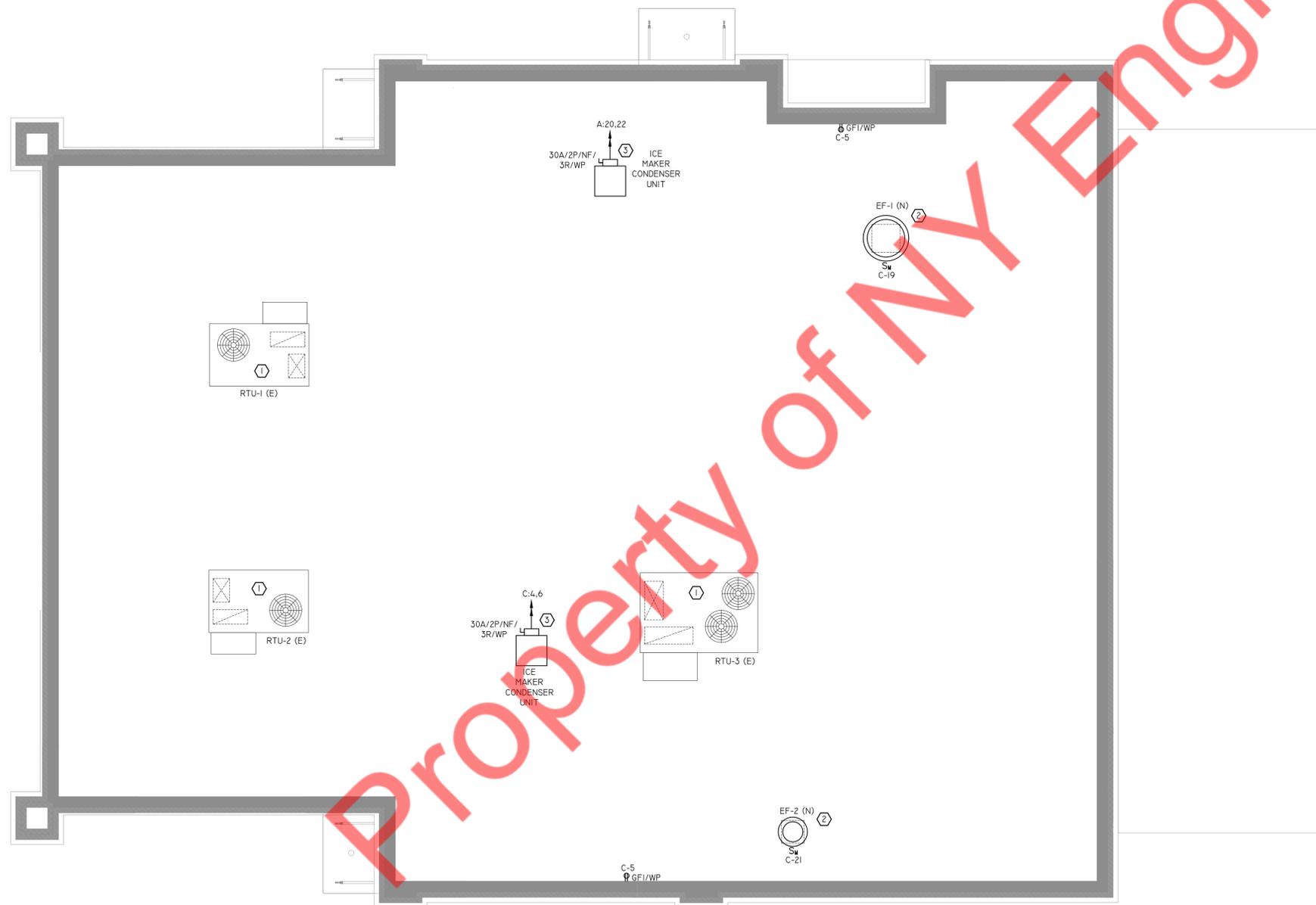
DWG DATE: 09-18-2024
DRAWN BY: NYE
REVIEWED BY:
PROJECT NO.:
DWG TITLE:

POWER PLAN ROOF - GENERAL NOTES

- COORDINATE EXACT LOCATION OF HVAC EQUIPMENTS ON ROOF WITH MECHANICAL CONTRACTOR.
- ELECTRICAL CONTRACTOR SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR MECHANICAL UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER FOR FINAL SELECTION PRIOR TO ROUGH-IN. E.C. COORDINATE LOCATION OF DISCONNECT SWITCH WITH MANUFACTURER AND MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES.

POWER PLAN ROOF - KEYED WORK NOTES

- EXISTING CIRCUIT AND DISCONNECTING MEANS FOR EXISTING ALL RTU'S SHALL REMAIN. E.C. SHALL VERIFY OPERABLE CONDITION OF EXISTING DISCONNECT INCLUDING WIRE/CONDUIT/BREAKER IN FIELD. REPLACE WITH NEW IF FOUND INOPERABLE. INFORM ENGINEER ON RECORD FOR ANY DISCREPANCY PRIOR TO BID. BASE BID ACCORDINGLY.
- THE EXHAUST FAN EF-1 (N) AND EF-2 (N) SHALL BE INTERLOCKED WITH THE KH-1 HOOD EXHAUST AND RESTROOM LIGHTS RESPECTIVELY. E.C. TO COORDINATE WITH MECHANICAL DRAWINGS AND PROVIDE NECESSARY WIRING AND CONTROL AS REQUIRED ON FIELD.
- DRIVE-THRU BEVERAGE STATION ICE MAKER CONDENSING UNIT: 2.4 KW, 208V-1PH, PROVIDE (2) #12, #12G IN 3/4" CONDUIT FROM 20A/2P BREAKER THROUGH 30A/2P NON-FUSED NEMA 3R DISC SWITCH TO UNIT. MAKE FINAL CONNECTION.



Property of NY Engineers



A1 ROOF POWER PLAN

SCALE: 1/4" = 1'-0"

ISSUE		
NO.	DATE	DESCRIPTION

DWG DATE: 09-18-2024
 DRAWN BY: NYE
 REVIEWED BY:
 PROJECT No.:
 DWG TITLE:

ROOF POWER PLAN

SHEET No.
E-4

PANEL: MDP (EXISTING)										MOUNTING: RECESSED				
120/208	VOLTS,	3	PHASE,	4	WIRE	PANEL LOCATION: OFFICE					FED FROM: EX. ELE. SERVICE			
MAIN CB: NA		MLO: 800A		BUS: EXISTNG		MIN.								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
						A	B	C						
1	3P-175	EX. PANEL B	O	10.04	EXISTNG	16.41			EXISTNG	6.36	H	EX. RTU-3	3P-60	1
2	3P-400	EX. PANEL C	O	13.22	EXISTNG	13.22			EXISTNG	6.36	H			2
3	3P-200	PRODUCTION COUNTER(BY OTHERS)	E	19.21	4#3/0, #6G, 2"C.	23.66			EXISTNG	4.44	H	EX. RTU-2	3P-50	3
4	3P-175	EX. PANEL A	O	9.22	EXISTNG	12.59			EXISTNG	3.36	H	EX. RTU-1	3P-45	4
TOTAL CONNECTED LOAD (KVA)						65.88	65.88	65.88						

PANEL: A (EXISTING)										MOUNTING: RECESSED				
120/208	VOLTS,	3	PHASE,	4	WIRE	PANEL LOCATION: OFFICE					FED FROM: EX. MDP			
MAIN CB: NA		MLO: 225A		BUS: 225A		MIN.								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
						A	B	C						
1	20	ARBYS SIGN	L	1.00	2#12, #12G, 3/4"C	1.36			2#12, #12G, 3/4"C	0.36	O	RESTROOM AUTO SENSORS	20	2
2	20	8-HEAD DRINK DISPENSER	E	1.10	2#12, #12G, 3/4"C		2.18		2#12, #12G, 3/4"C	1.08	R	39-DRIVE THRU ORDER SYSTEM	20	4
3	20	27-WATER HEATER CONTROLS	O	0.50	2#12, #12G, 3/4"C			2.30	2#12, #12G, 3/4"C	1.80	E	92-ICE MAKER	20	6
4	20	16-COOK AND HOLD CABINET	E	0.80	2#12, #12G, 3/4"C	0.90			2#12, #12G, 3/4"C	0.10	E	75-DRIVE THRU WINDOW OPENER	20	6
5	20	13-LEMONADE MACHINE	E	0.48	2#12, #12G, 3/4"C		1.28		2#12, #12G, 3/4"C	0.80	E	16-COOK AND HOLD CABINET	20	10
6	20	80-UPRIGHT FREEZER	E	0.70	2#12, #12G, 3/4"C			2.40	2#12, #12G, 3/4"C	1.70	E	49-COFFEE MAKER	20	12
7	20	16-COOK AND HOLD CABINET	E	0.80	2#12, #12G, 3/4"C	1.16			2#12, #12G, 3/4"C	0.36	R	MENUBOARD	20	14
8	20	16-COOK AND HOLD CABINET	E	0.80	2#12, #12G, 3/4"C	0.98			2#12, #12G, 3/4"C	0.18	E	126-CO2 MONITORING SYSTEM	20	16
9	20	HOOD CONTROLS/GAS SOLENOID	E	1.20	2#12, #12G, 3/4"C		2.40		2#12, #12G, 3/4"C	1.20	E	43-THREE BANK FRYER	20	18
10	20	HOOD LIGHTING	L	0.20	2#12, #12G, 3/4"C	1.86			2#12, #12G, 3/4"C	1.66	H		20	20
11	20	EXTERIOR SIGN	L	1.20	2#12, #12G, 3/4"C		2.86		2#12, #12G, 3/4"C	1.66	H	92A-ICE MACHINE CONDENSER UNIT	2P-20	22
12	20	EXTERIOR SIGN	L	1.20	2#12, #12G, 3/4"C			1.70	2#12, #12G, 3/4"C	0.50	O	HEAT TRACE	20	24
13	20	IRRIGATION	O	0.36	2#12, #12G, 3/4"C	0.96			2#12, #12G, 3/4"C	0.60	O	LOOP DETECTORS	20	26
14	20	DRIVE THRU TIMER SYSTEM	R	0.18	2#12, #12G, 3/4"C	0.98			2#12, #12G, 3/4"C	0.80	O	DRIVE THRU MENUBOARD	20	28
15	20	63-MUSIC SYSTEM	E	0.18	2#12, #12G, 3/4"C		0.48		2#12, #12G, 3/4"C	0.30	O	DRIVE THRU SPRAKER CANOPY	20	30
16	20	EQ-SATELLITE RECEIVER	E	0.18	2#12, #12G, 3/4"C	0.98			2#12, #12G, 3/4"C	0.80	E	84-BAG IN BOX	20	32
17	20	DINING-TV	R	0.36	2#12, #12G, 3/4"C	1.56			2#12, #12G, 3/4"C	1.20	E	96-GREASE STORAGE	20	34
18	20	EQ-POS/MONITOR(FRY DUMP)	R	1.08	2#12, #12G, 3/4"C	1.48			2#12, #12G, 3/4"C	0.40	E	44-CABONATOR	20	36
19	20	EXTERIOR SIGN	L	1.20	2#12, #12G, 3/4"C	1.70			2#12, #12G, 3/4"C	0.50	H	EX. WALK IN COOLER EAVPORATOR	20	38
20	20	SPARE				1.00			2#10, #10G, 3/4"C	1.00	H	EX. WALK IN FREEZER EAVPORATOR	2P-30	40
21	20	SPARE				1.00				1.00	H			42
TOTAL CONNECTED LOAD (KVA)						8.92	10.84	11.76						

PANEL: B (EXISTING)										MOUNTING: RECESSED				
120/208	VOLTS,	3	PHASE,	4	WIRE	PANEL LOCATION: OFFICE					FED FROM: EX. MDP			
MAIN CB: NA		MLO: 225A		BUS: 225A		MIN.								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
						A	B	C						
1	20	POS/MONITOR(DRIVE THRU)	R	1.08	2#12, #12G, 3/4"C	1.26			2#12, #12G, 3/4"C	0.18	O	MICROPHONE SPEAKER	20	2
2	20	LTG-DINING, VESTIBULE & RESTROOM	L	0.53	2#12, #12G, 3/4"C		1.43		2#12, #12G, 3/4"C	0.90	R	RECEPTACLE-MANAGER'S DESK	20	4
3	20	LTG-SERVICE AREA	L	0.20	2#12, #12G, 3/4"C			1.28	2#12, #12G, 3/4"C	1.08	R	EQ-POS-FRONT COUNTER	20	6
4	20	LTG-DAYLIGHT ZONE & DINING AREA	L	0.30	2#12, #12G, 3/4"C	0.30								8
5	20	LTG-SUPPLIES ROOM	L	0.35	2#12, #12G, 3/4"C	0.35								10
6	20	LTG-KITCHEN AREA AND OFFICE	L	1.30	2#12, #12G, 3/4"C		1.30							12
7	3P-25	SPARE				0.00								14
8	3P-25	SPARE				0.00								16
9	3P-25	SPARE				0.18			2#12, #12G, 3/4"C	0.18	E	15-SAFE	20	20
10	3P-25	SPARE				0.36			2#12, #12G, 3/4"C	0.36	R	TELEPHONE TERMINAL BOARD	20	22
11	2P-30	12-SHAKE MACHINE	E	2.18	2#10, #10G, 3/4"C	2.36			2#12, #12G, 3/4"C	0.18	R	RECEPTACLE-WIFI	20	26
12	20	LTG-EXTERIOR	L	1.30	2#12, #12G, 3/4"C		2.90		2#12, #12G, 3/4"C	1.60	R	SHOW WINDOW RECEPTACLE	20	30
13	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	2.62			2#12, #12G, 3/4"C	0.70	E	44-CABONATOR	20	32
14	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	3.52			2#12, #12G, 3/4"C	1.60	R	SHOW WINDOW RECEPTACLE	20	34
15	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	3.72			2#12, #12G, 3/4"C	1.80	R	SHOW WINDOW RECEPTACLE	20	36
16	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	1.92								38
17	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	1.92								40
18	3P-20	EX. WALK IN FREEZER	H	1.92	EXISTING	1.92								42
TOTAL CONNECTED LOAD (KVA)						8.65	10.85	11.48						

PANEL SCHEDULE GENERAL NOTES

- ALL CIRCUITING SHOWN IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY CIRCUITING OF THE EXISTING DEVICES IN FIELD AND INFORM ENGINEER FOR ANY DISCREPANCIES.
- ELECTRICAL CONTRACTOR TO VERIFY THE EXACT PANEL SIZES AND INCOMING FEEDER SIZE.
- ELECTRICAL CONTRACTOR SHALL VERIFY EXACT CIRCUIT NUMBER & BREAKER SIZE OF EXISTING DEVICES IN FIELD.
- E.C. SHALL PROVIDE NEW CIRCUIT BREAKERS IN PLACE OF EXISTING CIRCUIT BREAKERS WHEREVER NECESSARY TO BE IN LINE WITH THE PANEL SCHEDULE. BASE BID ACCORDINGLY.
- E.C. SHALL VERIFY THE EXISTING EQUIPMENT LOAD & RATINGS IN FIELD AND ACCORDINGLY CONSIDER THE ELECTRICAL LOAD IN PANEL BOARD SCHEDULE.
- E.C. TO UPDATE THE PANEL BOARD SCHEDULE AS PER EXISTING SITE CONDITION & NEW EQUIPMENT REQUIREMENTS.
- EXISTING EQUIPMENTS AND ITS EXISTING ELECTRICAL CONNECTION SHALL REMAIN. E.C. SHALL VERIFY THE CIRCUIT NUMBER, BREAKER SIZE AND OPERABLE CONDITION OF EXISTING ELECTRICAL CONNECTION IN FIELD. REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
- ALL EXISTING HVAC EQUIPMENTS AND ITS ELECTRICAL CONNECTION SHALL REMAIN. E.C. SHALL VERIFY THE CIRCUIT NUMBER & OPERABLE CONDITION OF EXISTING ELECTRICAL CONNECTION IN FIELD. REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
- E.C. TO ENSURE THAT DEMAND LOAD AMPERES ON PANEL A SHALL NOT BE MORE THAN 225A.
- E.C. TO ENSURE THAT DEMAND LOAD AMPERES ON PANEL E SHALL NOT BE MORE THAN 100A.
- ALL EXISTING ELECTRICAL EQUIPMENT & ITS ELECTRICAL CONNECTION SHALL REMAIN. E.C. SHALL VERIFY THE OPERABLE CONDITION OF ALL EXISTING ELECTRICAL EQUIPMENT & ITS ELECTRICAL CONNECTIONS AND ITS CIRCUIT BREAKER IN FIELD. EXTEND THE EXISTING FEEDER AS REQUIRED. REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.

ELECTRICAL PANEL SCHEDULE ABBREVIATIONS	
L	= LIGHTING
R	= RECEPTACLE
H	= HVAC
M	= MOTOR
E	= EQUIPMENT
O	= OTHER

A1 PANEL SCHEDULE

KITCHEN EQUIPMENT SCHEDULE									
ITEM	QUANTITY	EQUIPMENT DESCRIPTION	VOLTAGE	PHASE	AMPS	KW	POWER CONNECTION		
1	4	RESTROOM REGISTER	120	1	10	1.2	NEMA 5-15R		
2	1	12 HEAD DRINK DISPENSER	120	1	5.2	0.624	NEMA 5-15R		
3	1	8-HEAD DRINK DISPENSER	120	1	9.1	1.1	NEMA 6-20P		
4	1	SHAKE MACHINE	208	1	21	4.4	NEMA 6-20P		
5	1	LEMONADE MACHINE	120	1	4.00	0.4	NEMA 5-15R		
6	1	SAFE	120	1	1.00	0.1	NEMA 5-15R		
7	4	COOK AND HOLD	120	1	6.50	0.8	NEMA 5-15R		
8	2	DIGITAL COUNTERTOP ELECTRIC CONVECTION OVEN	208	1	14.00	3.3	NEMA 6-15P		
9	1	WAREWASHER	208	1	30	6.24	DIRECT		
10	1	WALK-IN FREEZER CONDENSER UNIT	208	1	30.00	5.4	DIRECT		
11	1	WALK-IN COOLER CONDENSER UNIT	208	1	20.00	2.7	DIRECT		
12	1	DRIVE-THRU ORDER SYSTEM	120	1	3.30	0.4	DIRECT		
13	1	FRY DUMP	208	1	14.75	3.1	NEMA 6-20P		
14	1	GAS FRYER	120	1	10.00	1.2	NEMA 5-15R		
15	1	CARBONATOR	120	1	6.00	0.7	DIRECT		
16	1	MENU BOARD	120	1	-	-	NEMA 5-20R		
17	1	PRODUCTION COUNTER	208	3	160	45	DIRECT		
18	1	COFFEE MAKER	120	1	14.00	1.7	NEMA 5-20R		
19	1	MUSIC SYSTEM (MNGR'S DESK)	120	1	5.00	0.6	NEMA 5-15R		
20	1	AUTOMATIC DRIVE THRU WINDOW	120	1	0.80	0.1	NEMA 5-15R		
21	1	REACH-IN FREEZER	120	1	0.60	0.7	NEMA 5-15R		
22	2	ICE MAKER	208	1	10.70	2.2	NEMA 5-15R		
23	2	REMOTE CONDENSER	208	1	11.60	2.4	DIRECT		
24	1	GREASE STORAGE TANK	120	1	1.10	0.1	DIRECT		
25	1	CO2 MONITORING SYSTEM	120	1	1.00	0.1	NEMA 5-15R		

J8 EQUIPMENT SCHEDULE

PANEL: C (EXISTING)										MOUNTING: RECESSED				
120/208	VOLTS,	3	PHASE,	4	WIRE	PANEL LOCATION: OFFICE					FED FROM: EX. MDP			
MAIN CB: NA		MLO: 400A		BUS: 400A		MIN.								
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
						A	B	C						
1	20	92-ICE MAKER	E	1.80	2#12, #12G, 3/4"C	2.08			2#12, #12G, 3/4"C	0.28	H	ACH-1	20	2
2	20	EX. WALK IN COOLER/FREEZER LIGHTING	L	0.20	2#12, #12G, 3/4"C		1.86		2#12, #12G, 3/4"C	1.66	H	92A-ICE MACHINE CONDENSER UNIT	2P-20	4
3	20	ROOF TOP RECEPTACLE	R	0.36	2#12, #12G, 3/4"C			2.02		1.66	H			6
4	3P-30	SPARE				0.00						SPARE	3P-60	8
5	3P-30	SPARE				0.00		0.00				SPARE	3P-60	10
6	3P-30	SPARE				0.00		0.00				SPARE	3P-50	12
7	3P-30	SPARE				0.00		0.00				SPARE	3P-50	14
8	3P-30	SPARE				0.00								

SPECIFICATIONS -ELECTRICAL

SECTION 26 05 33 - RACEWAYS FOR ELECTRICAL SYSTEMS (CONTINUED)

PART 2 - PRODUCTS

2.1 ELECTRICAL METALLIC TUBING (EMT)

- A. PROVIDE GALVANIZED OR ZINC COATED STEEL EMT COMPLIANT WITH FS WW-C-563, ANSI C80.3 AND UL 797.
- B. PROVIDE EMT FOR ABOVE-GRADE CONDUIT, EXCEPT WHERE INDICATED OTHERWISE HEREIN, UNDER OTHER DIVISION 26 SECTIONS, OR ON DRAWINGS.

2.2 STEEL RIGID METAL CONDUIT (RMC)

- A. PROVIDE RIGID STEEL, HEAVY WALL, FULL WEIGHT, ZINC-COATED, THREADED TYPE (GALVANIZED AFTER CUTTING/THREADING) CONDUIT CONFORMING TO ANSI C80.1 AND UL 6. PROVIDE ZINC COATING FUSED TO INSIDE AND OUTSIDE WALLS OF CONDUIT.
- B. PROVIDE GALVANIZED OR ZINC COATED STEEL THREADED FITTINGS.
- C. PROVIDE FOR THE FOLLOWING APPLICATIONS.
 - 1. CONDUIT INSTALLED EMBEDDED IN CONCRETE, OR MASONRY.
 - 2. CONDUITS (GROUNDED) THAT TURN UP FROM BELOW GRADE OR BELOW SLAB, EXCLUDING THE 90 DEGREE FITTINGS THAT CONNECT TO HORIZONTAL CONDUITS BELOW GRADE OR SLAB.
 - 3. OTHER APPLICATIONS AS INDICATED IN PROJECT MANUAL OR ON DRAWINGS, AS REQUIRED BY NEC, OR AS OTHERWISE REQUIRED FOR SPECIAL PHYSICAL PROTECTION (I.E. NEARBY VEHICULAR/EQUIPMENT TRAFFIC, SITE MAINTENANCE EQUIPMENT, ETC.).

2.3 PVC COATED STEEL RIGID METAL CONDUIT (PVC/RMC)

- A. PROVIDE RIGID STEEL, HEAVY WALL, FULL WEIGHT, THREADED TYPE (GALVANIZED AFTER CUTTING/THREADING INSIDE AND OUT) PVC COATED CONDUIT CONFORMING TO UL 6 STANDARD FOR SAFETY, RIGID METAL CONDUIT, AND UL514B STANDARD FOR SAFETY, FITTINGS FOR CONDUIT AND OUTLET BOXES
- B. THE PVC COATED GALVANIZED RIGID CONDUIT MUST BE ETL VERIFIED TO THE INTERTEK ETL SEMKO HIGH TEMPERATURE H2O PVC COATING ADHESION TEST PROCEDURE FOR 200 HOURS. THE PVC COATED GALVANIZED RIGID CONDUIT MUST BEAR THE ETL VERIFIED PVC-001 LABEL TO SIGNIFY COMPLIANCE TO THE ADHESION PERFORMANCE STANDARD.
- C. PROVIDE FOR APPLICATIONS SPECIFICALLY DESIGNATED ON DRAWINGS.

2.4 FLEXIBLE METAL CONDUIT

- A. PROVIDE FLEXIBLE METAL CONDUIT COMPLIANT WITH FS WW-C-566 AND UL I, AND FORMED FROM CONTINUOUS LENGTH OF SPIRALLY WOUND, INTERLOCKED ZINC-COATED OR GALVANIZED (INSIDE & OUTSIDE) STRIP STEEL. PROVIDE CONDUIT FITTINGS FOR USE WITH FLEXIBLE STEEL CONDUIT OF THREADED HINGED CLAMP TYPE, WITH INSULATED THROATS. PROVIDE STRAIGHT TERMINAL CONNECTORS CONSISTING OF ONE PIECE BODY, FEMALE END WITH CLAMP AND DEEP SLOTTED MACHINE SCREW FOR SECURING CONDUIT, AND MALE THREADED END WITH LOCKNUT. DO NOT USE 45 DEGREE OR 90 DEGREE TERMINAL ANGLE CONNECTORS FOR FLEXIBLE OR WATER-TIGHT FLEXIBLE METAL CONDUIT IN LOCATIONS THAT WILL NOT BE FULLY ACCESSIBLE AFTER COMPLETION OF CONSTRUCTION. PROVIDE FULL SIZE GREEN INSULATED GROUND WIRE FOR ALL APPLICATIONS, REGARDLESS OF LENGTH. PROVIDE FLEXIBLE METAL CONDUIT FOR THE FOLLOWING CONDITIONS AS APPLICABLE.
 - 1. PROVIDE FOR FINAL 72 INCHES FROM OUTLET/JUNCTION BOXES TO RECESSED LUMINAIRES THAT ARE LOCATED IN ACCESSIBLE CEILING SYSTEMS. OPTIONALLY, TYPE AC/MC CABLE MAY BE USED FOR "FIXTURE WHIPS" (REFER TO SECTION 26 05 19).
 - 2. PROVIDE FOR FINAL 24-72 INCHES OF CONNECTION TO INDOOR EQUIPMENT THAT IS SUBJECT TO MOVEMENT OR VIBRATION. LEAVE SUFFICIENT SLACK IN FLEXIBLE CONDUIT TO PERMIT MOVEMENT FROM VIBRATION WITHOUT ADVERSELY AFFECTING CONDUITS AND CONNECTIONS.

PART 3 - EXECUTION

A. GENERAL

- 1. PROVIDE CONDUIT, TUBING AND FITTINGS OF TYPES, GRADES, SIZES AND WEIGHTS (WALL THICKNESSES) FOR APPLICATIONS AS NEEDED TO RENDER ELECTRICAL WORK FULLY OPERATIONAL.
- 2. PROPERLY SUPPORT AND ANCHOR RACEWAYS FOR THEIR ENTIRE LENGTH USING STRUCTURAL MATERIALS. DO NOT SPAN ANY SPACE UNSUPPORTED.

END OF SECTION

SECTION 26 05 34 - BOXES AND FITTINGS FOR ELECTRICAL SYSTEMS

PART 1 - PRODUCTS

1.1 INDOOR BOXES

- A. PROVIDE MINIMUM SIZE OF 4 INCHES SQUARE BY 1-1/2 INCHES DEEP FOR OUTLET BOXES AND JUNCTION BOXES. PROVIDE OUTLET BOX ACCESSORIES AS REQUIRED FOR EACH INSTALLATION, INCLUDING BOX SUPPORTS, MOUNTING EARS AND BRACKETS, WALLBOARD HANGERS, BOX EXTENSION RINGS, FIXTURE STUDS, CABLE CLAMPS, AND METAL STRAPS FOR SUPPORTING OUTLET BOXES, WHICH ARE COMPATIBLE WITH OUTLET BOXES BEING USED TO FULFILL INSTALLATION REQUIREMENTS FOR INDIVIDUAL WIRING SITUATIONS. PROVIDE WITH STAINLESS STEEL NUTS, BOLTS, SCREWS AND WASHERS.

1.2 DAMP AND WET LOCATION OUTLET BOXES AND COVERS

- A. PROVIDE CORROSION-RESISTANT WEATHERTIGHT/RAINTIGHT OUTLET WIRING BOXES, OF TYPES, SHAPES AND SIZES, INCLUDING DEPTH OF BOXES, WITH THREADED CONDUIT HOLES FOR FASTENING ELECTRICAL CONDUIT, SUITABLY CONFIGURED FOR EACH APPLICATION, INCLUDING FACE PLATE GASKETS AND CORROSION-RESISTANT PLUGS AND FASTENERS. PROVIDE WEATHERTIGHT OUTLETS FOR INTERIOR AND EXTERIOR LOCATIONS EXPOSED TO WEATHER OR MOISTURE, I.E. IN DAMP OR WET LOCATIONS.
- B. PROVIDE MINIMAL PROFILE ASSEMBLIES THAT ARE RATED NEMA 3R WHILE IN USE AND THAT EMPLOY RECESSED BOX AND COVER DESIGN, EQUAL TO THOMAS & BETTS " RED DOT " SERIES. PROVIDE TRIM COLOR(S) AS DIRECTED BY ARCHITECT.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. INSTALL ELECTRICAL BOXES IN THOSE LOCATIONS THAT ENSURE ACCESSIBILITY TO ENCLOSED ELECTRICAL WIRING.
- B. DO NOT INSTALL ALUMINUM PRODUCTS IN CONCRETE.
- C. CONSIDER THE OUTLET, JUNCTION, AND PULL BOX LOCATIONS INDICATED ON DRAWINGS APPROXIMATE. STUDY THE GENERAL CONSTRUCTION WITH RELATION TO SPACES AND EQUIPMENT SURROUNDING EACH OUTLET, AND NEATLY INSTALL OUTLETS ACCORDINGLY.

END OF SECTION

SECTION 26 05 80 - MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED WORK

- A. PROVIDE ALL NECESSARY ELECTRICALLY RELATED WORK AS REQUIRED TO RENDER ALL MECHANICAL EQUIPMENT (INCLUDING PLUMBING, HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT) FULLY OPERATIONAL AND FULLY COMPLIANT WITH NEC. THIS INCLUDES, PRIOR TO ORDERING MATERIALS OR COMMENCING WITH ROUGH-IN, REVIEWING EQUIPMENT SUBMITTAL DATA AND COORDINATING WITH INSTALLING CONTRACTORS TO ENSURE THE CORRECT SIZE, RATING AND QUANTITY OF CONDUCTORS ARE PROVIDED.

PART 2 - EXECUTION

2.1 INSTALLATION

A. GENERAL

- 1. PROVIDE DISCONNECT SWITCH AHEAD OF ALL EQUIPMENT, INCLUDING CONTROLS, UNLESS THE MECHANICAL EQUIPMENT COMES WITH INTEGRAL NEC-COMPLIANT DISCONNECT(S). PROVIDE NEMA 3R ENCLOSURES WHERE INSTALLED OUTDOORS AND WHERE INSTALLED INDOORS IN AREAS SUBJECT TO MOISTURE. GROUND METAL FRAMES OF EQUIPMENT BY CONNECTING FRAMES TO THE GROUNDED METAL RACEWAY OR TO A FULL SIZE GREEN GROUND CONDUCTOR OR BOTH. PROVIDE THE NECESSARY ELECTRICAL CONNECTIONS BETWEEN THE SPECIFIED EQUIPMENT AND THE JUNCTION BOX NEAR EQUIPMENT WITH FLEXIBLE METALLIC CONDUIT (LIQUID-TIGHT OUTDOORS) AND MATCHED CONNECTORS (SEE SECTION 26 05 33). WHERE MECHANICAL EQUIPMENT LUGS CANNOT ACCOMMODATE CONDUCTOR SIZES SHOWN ON DRAWINGS, PROVIDE ILSCO CLEARAPT INSULATED MULTI-TAP CONNECTORS.

- 2. SIZES, ELECTRICAL RATINGS, ETC. OF EQUIPMENT AND WIRING SHOWN ON DRAWINGS ARE BASED ON THE RESPECTIVE EQUIPMENT DESIGN BASE MANUFACTURERS. IF DIFFERENT MANUFACTURERS (S) OR MODEL(S) ARE ACTUALLY SUPPLIED, PROVIDE NECESSARY COORDINATION IN FIELD (PRIOR TO ORDERING MATERIALS AND PRIOR TO ROUGH-IN) AND PROVIDE THE NECESSARY SIZE OF RELATED ELECTRICAL EQUIPMENT, WIRING, CONDUIT, ETC.
- 3. PRIOR TO FURNISHING SUBMITTALS AND PRIOR TO ROUGH-IN, DETERMINE EXACT ELECTRICALLY RELATED CHARACTERISTICS, LOADS, VOLTAGES, DISCONNECT AND STARTER REQUIREMENTS, LOCATIONS, MOUNTING HEIGHTS, CONNECTION POINTS, ETC. OF MECHANICAL EQUIPMENT.

B. HACR BREAKERS

- 1. COORDINATE IN FIELD WITH THE RESPECTIVE TRADES AND DETERMINE CASE BY CASE, WHICH EQUIPMENT IS FACTORY LISTED FOR USE WITH HEATING AND AIR CONDITIONING RATED (HACR) BREAKERS. IN AN EFFORT TO MINIMIZE REQUIREMENTS FOR STOCKING OF FUSES BY THE OWNER, UTILIZE HACR BREAKERS AT THE SOURCE PANELBOARDS AS THE NEC REQUIRED OVERCURRENT PROTECTION WHEREVER POSSIBLE (IN LIEU OF FUSING LOCAL DISCONNECT SWITCHES).

C. DISCONNECT SWITCH AND STARTER LOCATIONS

- 1. LOCATIONS OF DISCONNECTS AND STARTERS SHOWN ON DRAWINGS ARE INDICATED FOR SCHEMATIC PURPOSES ONLY. DETERMINE EXACT LOCATIONS IN FIELD SO THAT THEY ARE COMPLIANT WITH NEC ARTICLE 110 REQUIREMENTS FOR PANELBOARDS.
- 2. COMMERCIAL KITCHEN EXHAUST HOODS AND RELATED FAN EQUIPMENT
- 3. SEE DETAILS ON DRAWINGS.
 - a. REFER TO FOOD SERVICE DRAWINGS, FOOD SERVICE SPECIFICATIONS AND MANUFACTURER'S SUBMITTALS FOR SPECIFIC INFORMATION. FIELD COORDINATE WORK WITH AFFECTED ENTITIES.
 - b. PROVIDE INTERLOCK WIRING AND CONNECTIONS TO AND FROM THE VARIOUS EQUIPMENT AND CONTROLS.
 - c. PROVIDE CONTROL WIRING FROM THE FAN UNITS TO RESPECTIVE REMOTE DUCT STATS.
 - d. PROVIDE AUXILIARY CONTROL CIRCUIT WIRING FROM THE FACTORY MICRO-SWITCH IN THE HOOD FIRE SUPPRESSION SYSTEMS TO RESPECTIVE DEDICATED FIRE ALARM SYSTEM MONITOR MODULES TO INITIATE ALARM SIGNAL WHEN RESPECTIVE HOOD FIRE PROTECTION SYSTEM IS ACTIVATED.
 - e. PROVIDE AUXILIARY CONTROL CIRCUIT WIRING FROM THE FACTORY MICRO-SWITCH IN THE HOOD FIRE SUPPRESSION SYSTEM TO CONTACTOR CONTROL COIL(S).
 - f. PROVIDE EMPTY OCTAGON BOX FOR MECHANICAL MANUAL PULL STATION (AND INSTALL PULL STATION) FOR EACH HOOD FIRE PROTECTION SYSTEM (MOUNTED AT 48" ABOVE FINISHED FLOOR TO TOP OF OUTLET BOX) WITH (1) 1/2" EMPTY CONDUIT ROUTED UP AND OVER TO HOOD AS DIRECTED BY HOOD INSTALLER IN FIELD (W/SWEEP 90'S). FIELD VERIFY LOCATION.
 - g. PROVIDE INTERLOCK CONTROL WIRING BETWEEN GAS SOLENOID SHUT OFF VALVES AND RESPECTIVE KITCHEN HOOD FIRE SUPPRESSION SYSTEM. COORDINATE WITH AFFECTED INSTALLERS.

END OF SECTION

SECTION 26 05 90 - MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 RELATED WORK

- A. TIME BASED CONTROL - MULTI-PURPOSE TIME CLOCK (365 DAY)
 - 1. PROVIDE INTERMATIC #ET9045CR SERIES MULTI-PURPOSE TIME CLOCK (OR EQUAL BY TORK), WHICH IS PROGRAMMABLE 365-DAY/24-HOUR WITH OVERRIDE CONTROLS. PROVIDE FOUR-CHANNEL UNIT. PROVIDE REQUIRED EXTERNAL CONTACTORS, RELAYS, ETC. TO RENDER THE CONTROL SYSTEMS FULLY OPERATIONAL. VERIFY ZONE CONTROL REQUIREMENTS IN FIELD PRIOR TO ROUGH-IN. PROVIDE 100-HOUR CARRYOVER.
 - 2. REFER TO SECTION 26 27 40 FOR DEFINITION OF LIGHTING CONTACTORS. NOTE THAT ANY GIVEN LIGHTING CONTACTOR DESIGNATION MAY ACTUALLY INCLUDE MULTIPLE CONTACTORS DEPENDING ON HOW MANY CIRCUITS ARE CONTROLLED BY THE RESPECTIVE CONTACTOR DESIGNATION.

END OF SECTION

SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED WORK

- A. PROVIDE LABOR, MATERIALS, TOOLS, APPLIANCES, CONTROL HARDWARE, SENSOR, WIRE, JUNCTION BOXES AND EQUIPMENT NECESSARY FOR AND INCIDENTAL TO THE DELIVERY, INSTALLATION AND FURNISHING OF COMPLETELY OPERATIONAL OCCUPANCY SENSOR LIGHTING CONTROLS, AS DESCRIBED HEREIN.
- B. PROVIDE PRODUCTS SUPPLIED FROM A SINGLE MANUFACTURER THAT HAS BEEN CONTINUOUSLY INVOLVED IN MANUFACTURING OF OCCUPANCY SENSORS FOR A MINIMUM OF FIVE (5) YEARS.
- C. PROVIDE OCCUPANCY SENSORS FOR ENTIRE PROJECT THAT ARE ALL MADE BY THE SAME MANUFACTURER, REGARDLESS OF WHERE THE MATERIALS ARE SPECIFIED IN DIVISION 26 DOCUMENTS. PROVIDE COMPONENTS THAT ARE ALL MADE BY THE SAME MANUFACTURER IN CASES WHERE OCCUPANCY SENSOR COMPONENTS ARE ALSO CONNECTED TO A BUILDING LIGHTING CONTROL SYSTEM, REGARDLESS OF WHERE THE MATERIALS ARE SPECIFIED IN DIVISION 26 DOCUMENTS.
- D. PROVIDE COMPONENTS THAT ARE U.L. LISTED, OFFER A FIVE (5) YEAR WARRANTY AND MEET STATE AND LOCAL APPLICABLE CODE REQUIREMENTS.
- E. PROVIDE PRODUCTS MANUFACTURED BY AN ISO 9002 CERTIFIED MANUFACTURING FACILITY WITH A DEFECT RATE OF LESS THAN ONE-THIRD OF ONE PERCENT.

PART 2 - SPECIFIC REQUIREMENTS

2.1 ACCEPTABLE MANUFACTURERS

- A. BASIS OF DESIGN MANUFACTURER IS WATTSTOPPER. OTHER ACCEPTABLE MANUFACTURERS ARE HUBBELL, SENSOR SWITCH, LEVITON, LUTRON, LC&D AND COOPER GREENGATE CA IN AS MUCH THE SYSTEMS MEET THE INTENT AND FUNCTIONALITY AND SUSTAINABILITY OF THE DESIGN.

2.2 PRODUCTS

- A. CEILING SENSORS
 - 1. PROVIDE STANDARD OF QUALITY EQUAL TO WATTSTOPPER: WT-605, WT-600, WT-1105, WT-1100, WT-2205, WT-2200, WT-2250, WT-2255, WP-605, WP-1105, WP-2255, WP-2205, W-500A, W-1000A, W-2000A, W-2000H, UT-300, UT-305, UT-355, WP1R, HB-100, HB-150, DT-200, DT-205, DT-300, DT-305, DT-355, CX-100, CX-105, CI-200, CI-205, CI-300, CI-305, CI-355, CI-12 OR CI-24 SERIES.
- B. POWER AND AUXILIARY PACKS
 - 1. PROVIDE STANDARD OF QUALITY EQUAL TO WATTSTOPPER: B120E-P, B277E-P, BZ-100, LC-100, C120E-P, C277E-P, S120/277-P, AT-120 OR AT-277 SERIES.
- C. DUAL TECHNOLOGY SENSORS
 - 1. PROVIDE SENSORS THAT ARE EITHER WALL MOUNTED, CORNER MOUNTED OR CEILING MOUNTED IN SUCH A WAY AS TO MINIMIZE COVERAGE IN UNWANTED AREAS. PROVIDE PASSIVE INFRARED AND ULTRASONIC TECHNOLOGIES FOR OCCUPANCY DETECTION.

D. GENERAL STANDARDS

- 1. PROVIDE SENSORS CAPABLE OF OPERATING NORMALLY WITH ELECTRONIC BALLASTS, PL LAMP SYSTEMS AND RATED MOTOR LOADS.
- 2. PROVIDE SENSORS WITH COVERAGE THAT REMAINS CONSTANT AFTER SENSITIVITY CONTROL HAS BEEN SET. AUTOMATIC REDUCTION IN COVERAGE DUE TO THE CYCLING OF AIR CONDITIONER OR HEATING FANS IS NOT PERMITTED.
- 3. PROVIDE SENSORS WITH READILY ACCESSIBLE, USER ADJUSTABLE SETTINGS FOR TIME DELAY AND SENSITIVITY. LOCATE SETTINGS ON THE SENSOR (NOT THE CONTROL UNIT) AND RECESS TO LIMIT TAMPERING.
- 4. PROVIDE BYPASS MANUAL OVERRIDE ON EACH SENSOR TO ACCOMMODATE FAILURES. CONFIGURE SO THAT WHEN BYPASS IS UTILIZED, LIGHTING REMAINS ON CONSTANTLY OR CONTROL DIVERTS TO A WALL SWITCH UNTIL SENSOR IS REPLACED. RECESS THIS CONTROL TO PREVENT TAMPERING.
- 5. PROVIDE SENSORS WITH AN LED AS A VISUAL MEANS OF INDICATION AT ALL TIMES TO VERIFY THAT MOTION IS BEING DETECTED DURING BOTH TESTING AND NORMAL OPERATION.
- 6. WHERE SPECIFIED, PROVIDE SENSOR WITH INTERNAL ADDITIONAL ISOLATED RELAY WITH NORMALLY OPEN, NORMALLY CLOSED AND COMMON OUTPUTS FOR USE WITH HVAC CONTROL, DATA LOGGING AND OTHER CONTROL OPTIONS. DO NOT USE SENSORS THAT UTILIZE SEPARATE COMPONENTS OR SPECIALLY MODIFIED UNITS TO ACHIEVE THIS FUNCTION.
- 7. PROVIDE SENSORS WITH UL RATED, 94V-0 PLASTIC ENCLOSURES.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED WORK

- A. TYPES OF PANELBOARDS AND ENCLOSURES REQUIRED FOR THE PROJECT INCLUDE THE FOLLOWING.
 - 1. POWER-DISTRIBUTION PANELBOARDS.
 - 2. GENERAL USE PANELBOARDS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PANELBOARD PRODUCTS OF ONE OF THE FOLLOWING (FOR EACH TYPE AND RATING OF PANELBOARD AND ENCLOSURE).
 - 1. SQUARE D COMPANY.
 - 2. GENERAL ELECTRIC COMPANY.
 - 3. SIEMENS/ITE.
 - 4. EATON.

2.2 GENERAL REQUIREMENTS

- A. EXCEPT AS OTHERWISE INDICATED, PROVIDE PANELBOARDS, ENCLOSURES AND ANCILLARY COMPONENTS, OF TYPES, SIZES, AND RATINGS INDICATED, WHICH COMPLY WITH MANUFACTURER'S STANDARD MATERIALS, WITH THE DESIGN AND CONSTRUCTION IN ACCORDANCE WITH PUBLISHED PRODUCT INFORMATION.
- B. PROVIDE PANELBOARDS WITH PROPER NUMBER OF UNIT PANELBOARD DEVICES AS REQUIRED FOR COMPLETE INSTALLATION, WHERE TYPES, SIZES, OR RATINGS ARE NOT INDICATED, COMPLY WITH NEC, UL AND ESTABLISHED INDUSTRY STANDARDS FOR THOSE APPLICATIONS INDICATED.
- C. PROVIDE PANELBOARDS THAT ARE NEW AND MANUFACTURER'S LATEST STANDARD CATALOG DESIGN.
- D. PROVIDE PANELBOARDS THAT BEAR UL LABELS FOR THEIR SPECIFIC APPLICATIONS.
- E. PROVIDE PANELBOARDS SUITABLE FOR SERVICE VOLTAGE WITH NUMBER OF BRANCH CIRCUITS OF CAPACITY SCHEDULED.
- F. PROVIDE PANELBOARDS, AND SECTIONS THEREOF IF APPLICABLE, WITH MAIN-LUGS-ONLY OF CAPACITY EQUAL TO, OR GREATER THAN, THE RATING OR SETTING OF THE OVERCURRENT PROTECTIVE DEVICE NEXT BACK ON THE LINE.
- G. PROVIDE PANELBOARD BRANCHES AS SCHEDULED ON THE DRAWINGS.

2.3 CIRCUIT BREAKER PANELBOARDS

- H. PROVIDE CIRCUIT BREAKER PANELBOARD BUS ASSEMBLIES WITH DISTRIBUTED (SEQUENCE) TYPE BUSSING THROUGHOUT, SO THAT ANY TWO ADJACENT SINGLE-POLE BREAKERS, OR SPACES, ARE REPLACEABLE BY A TWO-POLE INTERNAL COMMON TRIP BREAKER, AND SO THAT ANY THREE ADJACENT SINGLE-POLE BREAKERS, OR SPACES, ARE REPLACEABLE BY A THREE-POLE INTERNAL COMMON TRIP BREAKER. THIS APPLIES FOR BRANCH BREAKERS SIZED 15 AMP THROUGH 70 AMP INCLUSIVE, WITHOUT DISTURBING ANY OTHER BREAKER.

2.4 BUSSESS

- J. PROVIDE DEAD-FRONT SAFETY TYPE PANELBOARDS AS INDICATED, WITH PANELBOARD SWITCHING AND PROTECTIVE DEVICES IN QUANTITIES, RATINGS, TYPES, AND WITH ARRANGEMENT SHOWN. PROVIDE WITH ANTI-TURN SOLDERLESS PRESSURE TYPE MAIN LUG CONNECTORS APPROVED FOR USE WITH COPPER OR ALUMINUM CONDUCTORS.
- K. PROVIDE FULL-SIZED (100 PERCENT) NEUTRAL BUS. PROVIDE SUITABLE LUGS ON NEUTRAL BUS FOR OUTGOING FEEDERS REQUIRING NEUTRAL CONNECTIONS.
- L. PROVIDE PANELBOARDS WITH BARE UNINSULATED GROUNDING BARS SUITABLE FOR BOLTING TO ENCLOSURES.

2.5 GENERAL USE CIRCUIT BREAKER PANELBOARDS

- A. PROVIDE 208Y/120V THREE-PHASE GENERAL USE PANELBOARDS EQUAL TO SQUARE D NQ0D WITH BOLT-ON BRANCH BREAKERS.

2.6 MOLDED CASE CIRCUIT BREAKERS

- A. PROVIDE COPPER BUSSING.
- A. PROVIDE GALVANIZED SHEET STEEL CABINET TYPE ENCLOSURES, IN SIZES AND NEMA TYPES AS INDICATED, CODE-GAGE, MINIMUM 16-GAGE THICKNESS.
- B. PROVIDE BOXES WITH CODE-COMPLIANT SIDE AND END GUTTERS (MINIMUM 4 INCHES), AND OF CODE GAUGE GALVANIZED STEEL. PROVIDE BOXES THAT ARE 20 INCHES WIDE MINIMUM, AND 5-3/4 INCHES DEEP MINIMUM. PROVIDE BOXES WITH MULTIPLE KNOCKOUTS AND WIRING GUTTERS.
- C. PROVIDE PANELBOARD TRIMS THAT ARE FLUSH OR SURFACE AS REQUIRED FOR RESPECTIVE APPLICATION, THAT ARE CONSTRUCTED OF CODE GAUGE STEEL, THAT ARE FINISHED WITH RUST INHIBITING PRIME COAT AND THEN FACTORY APPLIED HOT SPRAY LACQUER OR BAKED-ON ENAMEL, AND THAT ARE FACTORY PAINTED MANUFACTURER'S STANDARD LIGHT GRAY. PROVIDE TRIMS COMPLETE WITH CONCEALED HINGES AND CONCEALED TRIM CLAMPS. PROVIDE DOORS WITH FLUSH CHROMIUM PLATED COMBINATION CYLINDER LOCK AND CATCH, AND WITH DIRECTORY SUITABLE FOR CLEAR PLASTIC. PROVIDE LOCKS THAT ARE KEYPED ALIKE.
- D. PROVIDE ENCLOSURES THAT ARE FABRICATED BY SAME MANUFACTURER AS PANELBOARDS, WHICH MATE AND MATCH PROPERLY WITH PANELBOARDS TO BE ENCLOSED.
- A. PROVIDE FACTORY-ASSEMBLED, MOLDED-CASE CIRCUIT BREAKERS OF FRAME SIZES, CHARACTERISTICS, AND RATINGS INCLUDING RMS SYMMETRICAL INTERRUPTING RATINGS REQUIRED FOR EACH APPLICATION. PROVIDE BREAKERS WITH PERMANENT THERMAL AND INSTANTANEOUS MAGNETIC TRIP, WITH FAULT-CURRENT LIMITING PROTECTION, AND WITH AMPERE RATINGS AS INDICATED.
- B. PROVIDE COORDINATED SERIES-RATED CIRCUIT BREAKERS AS APPLICABLE THROUGHOUT, ACCOMMODATING RESPECTIVE AVAILABLE FAULT CURRENT.
- C. PROVIDE BREAKERS THAT ARE DESIGNED TO BE MOUNTED AND OPERATED IN ANY PHYSICAL POSITION, AND TO BE OPERATED IN A MINIMUM AMBIENT TEMPERATURE OF 40 DEGREES C. PROVIDE BREAKERS WITH MECHANICAL SCREW TYPE REMOVABLE CONNECTOR LUGS, AL/CU RATED.
- D. PROVIDE BRANCH CIRCUIT BREAKERS THAT ARE FULL AMBIENT COMPENSATED THERMAL MAGNETIC MOLDED CASE TYPE, WITH QUICK-MAKE AND QUICK-BREAK ACTION, AND WITH POSITIVE HANDLE TRIP INDICATION (ON BOTH MANUAL AND AUTOMATIC OPERATION). PROVIDE BREAKERS OF THE OVER-THE-CENTER TOGGLE OPERATING TYPE WITH THE HANDLE GOING TO A POSITION BETWEEN "ON" AND "OFF" TO INDICATE AUTOMATIC TRIPPING.

- E. PROVIDE BOLT-ON BRANCH BREAKERS. PROVIDE FULL SIZE CIRCUIT BREAKERS. DO NOT PROVIDE "TANDEM" OR "SPLIT" BREAKERS

2.7 FAULT CURRENT RATINGS

- A. PROVIDE ELECTRICAL DISTRIBUTION RELATED EQUIPMENT WITH APPROPRIATELY BRACED BUSSING AND PROPERLY RATED BREAKERS, FUSES, ETC. FOR THE AVAILABLE FAULT CURRENTS.

2.8 SERIES COORDINATION

- A. PROVIDE FACTORY SERIES COORDINATION FOR ALL CIRCUIT BREAKERS (INCLUDING BRANCH BREAKERS), RELATIVE TO UPSTREAM BREAKERS, SO THAT ONLY THE BREAKER CLOSEST IN THE CIRCUIT TO THE LOAD TRIPS UPON AN OVERLOAD OR FAULT CONDITION.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. PROVIDE ENCLOSURES FASTENED FIRMLY TO WALLS AND STRUCTURAL SURFACES, ENSURING THAT THEY ARE PERMANENTLY AND MECHANICALLY ANCHORED.
- B. PROVIDE NEATLY TYPED CIRCUIT DIRECTORY CARD FOR EACH PANELBOARD UPON COMPLETION OF INSTALLATION WORK. INCLUDE THE ACTUAL ROOM NAMES/NUMBERS THAT ARE SELECTED FOR INTERIOR SIGNAGE/DESIGNATION.
- C. SCHEDULING SHOWN ON DRAWINGS IS SHOWN TO INDICATE FEEDER AND BRANCH CIRCUITING REQUIREMENTS. DETERMINE EXACT NUMBERING SEQUENCE OF CIRCUITS IN FIELD AFTER PERFORMING FINAL BALANCING

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. PROVIDE WIRING DEVICES, IN TYPES, CHARACTERISTICS, GRADES, COLORS, AND ELECTRICAL RATINGS FOR APPLICATIONS INDICATED WHICH ARE UL LISTED AND WHICH COMPLY WITH NEMA WD 1 AND OTHER APPLICABLE UL AND NEMA STANDARDS. VERIFY COLOR SELECTIONS WITH OWNER'S REPRESENTATIVE.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING.

- SWITCHES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER
- DIMMERS: LUTRON
- RECEPTACLES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER
- WALL PLATES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER

2.2 WIRING DEVICE COLORS

- A. UNLESS SPECIFICALLY INDICATED OTHERWISE, OR DIRECTED OTHERWISE IN FIELD, PROVIDE WHITE COLOR FOR NORMAL UTILITY WIRING DEVICES.

2.3 SPECIFICATION GRADE RECEPTACLES

- A. STANDARD SPECIFICATION GRADE DUPLEX/SINGLE RECEPTACLES
 - 1. PROVIDE DUPLEX RECEPTACLES EQUAL TO LEVITON #5362 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS. PROVIDE RECEPTACLES EQUAL TO LEVITON #5361 SERIES FOR SIMPLEX (SINGLE) APPLICATIONS.
- B. GROUND-FAULT INTERRUPTER SPECIFICATION GRADE RECEPTACLES
 - 1. PROVIDE GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLES EQUAL TO LEVITON #8989 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS.
 - 2. RECEPTACLES INDICATED AS GFI MAY BE GFI-PROTECTED BY AN UPSTREAM GFI RECEPTACLE ON THE SAME CIRCUIT ONLY IF LOCATED IN THE SAME ROOM. OTHERWISE PROVIDE A SEPARATE GFI RECEPTACLE FOR EACH ONE SHOWN.

2.4 WIRING DEVICE ACCESSORIES

- C. ISOLATED GROUND SPECIFICATION GRADE RECEPTACLES
 - 1. PROVIDE DUPLEX ISOLATED GROUND RECEPTACLES EQUAL TO LEVITON #5362-IG. PROVIDE SIMPLEX (SINGLE) ISOLATED GROUND RECEPTACLES EQUAL TO LEVITON #5361-IG. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS. PROVIDE DEDICATED INSULATED ISOLATED GROUND CONDUCTORS (GREEN WITH YELLOW TRACER) FOR EACH APPLICATION.
- D. WEATHER RESISTANT GFCI RECEPTACLES
 - 1. PROVIDE DUPLEX WEATHER RESISTANT RECEPTACLES EQUAL TO LEVITON # W7899 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS.

2.5 WIRING DEVICE ACCESSORIES

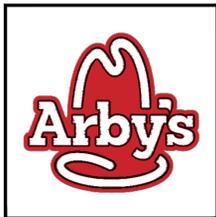
- A. WALL PLATES
 - 1. PROVIDE SINGLE AND COMBINATION, OF TYPES, SIZES, AND WITH GANGING AND CUTOUPS AS REQUIRED TO ACCOMMODATE EACH APPLICATION. PROVIDE PLATES WHICH MATE AND MATCH WITH WIRING DEVICES TO WHICH ATTACHED. PROVIDE METAL SCREWS FOR SECURING PLATES TO DEVICES WITH SCREW HEADS COLORED TO MATCH FINISH OF PLATES. PROVIDE WALL PLATE COLOR TO MATCH WIRING DEVICES UNLESS SPECIFICALLY INDICATED OTHERWISE.
 - 2. PROVIDE STANDARD SIZE WALL PLATES. DO NOT PROVIDE "MIDWAY", "OVERSIZED" ("JUMBO") OR "EXTRA DEEP" WALL PLATES.
 - 3. PROVIDE GALVANIZED STEEL WALL PLATES IN UNFINISHED EXPOSED-CONDUIT AREAS.
 - 4. PROVIDE COMMERCIAL GRADE, SATIN FINISH STAINLESS STEEL WALL PLATES IN FINISHED AREAS, WITH BEVELED EDGES, EQUAL TO LEVITON TYPE 302 SERIES.
 - 5. PROVIDE COMMERCIAL SPECIFICATION GRADE THERMOPLASTIC WALL PLATES IN FINISHED AREAS.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. PROVIDE GROUNDED (" NEUTRAL ") CONDUCTOR IN ALL LIGHTING CONTROL DEVICE (SWITCH, DIMMER, OCCUPANCY SENSOR, ETC.) WALL OUTLET BOXES, EVEN IF NOT IMMEDIATELY USED.
- B. INSTALL RECEPTACLES SO THAT THE GROUND PIN IS ORIENTED IN A CONSISTENT MANNER THROUGHOUT THE FACILITY, SO THAT THE ORIENTATION IS COMPLIANT WITH ALL PREVAILING CODES AND REGULATIONS, AND SO THAT THE ORIENTATION IS ACCEPTABLE TO THE ELECTRICAL INSPECTOR.

END OF SECTION



ISSUE		
NO.	DATE	DESCRIPTION

SPECIFICATIONS -ELECTRICAL

SECTION 26 05 33 - RACEWAYS FOR ELECTRICAL SYSTEMS (CONTINUED)

PART 2 - PRODUCTS

2.1 ELECTRICAL METALLIC TUBING (EMT)

- A. PROVIDE GALVANIZED OR ZINC COATED STEEL EMT COMPLIANT WITH FS WW-C-563, ANSI C80.3 AND UL 797.
- B. PROVIDE EMT FOR ABOVE-GRADE CONDUIT, EXCEPT WHERE INDICATED OTHERWISE HEREIN, UNDER OTHER DIVISION 26 SECTIONS, OR ON DRAWINGS.

2.2 STEEL RIGID METAL CONDUIT (RMC)

- A. PROVIDE RIGID STEEL, HEAVY WALL, FULL WEIGHT, ZINC-COATED, THREADED TYPE (GALVANIZED AFTER CUTTING/THREADING) CONDUIT CONFORMING TO ANSI C80.1 AND UL 6. PROVIDE ZINC COATING FUSED TO INSIDE AND OUTSIDE WALLS OF CONDUIT.
- B. PROVIDE GALVANIZED OR ZINC COATED STEEL THREADED FITTINGS.
- C. PROVIDE FOR THE FOLLOWING APPLICATIONS.
 1. CONDUIT INSTALLED EMBEDDED IN CONCRETE, OR MASONRY.
 2. CONDUITS (GROUNDED) THAT TURN UP FROM BELOW GRADE OR BELOW SLAB, EXCLUDING THE 90 DEGREE FITTINGS THAT CONNECT TO HORIZONTAL CONDUITS BELOW GRADE OR SLAB.
 3. OTHER APPLICATIONS AS INDICATED IN PROJECT MANUAL OR ON DRAWINGS, AS REQUIRED BY NEC, OR AS OTHERWISE REQUIRED FOR SPECIAL PHYSICAL PROTECTION (I.E. NEARBY VEHICULAR/EQUIPMENT TRAFFIC, SITE MAINTENANCE EQUIPMENT, ETC.).

2.3 PVC COATED STEEL RIGID METAL CONDUIT (PVC/RMC)

- A. PROVIDE RIGID STEEL, HEAVY WALL, FULL WEIGHT, THREADED TYPE (GALVANIZED AFTER CUTTING/THREADING INSIDE AND OUT) PVC COATED CONDUIT CONFORMING TO UL 6 STANDARD FOR SAFETY, RIGID METAL CONDUIT, AND UL514B STANDARD FOR SAFETY, FITTINGS FOR CONDUIT AND OUTLET BOXES
- B. THE PVC COATED GALVANIZED RIGID CONDUIT MUST BE ETL VERIFIED TO THE INTERTEK ETL SENKO HIGH TEMPERATURE H2O PVC COATING ADHESION TEST PROCEDURE FOR 200 HOURS. THE PVC COATED GALVANIZED RIGID CONDUIT MUST BEAR THE ETL VERIFIED PVC-001 LABEL TO SIGNIFY COMPLIANCE TO THE ADHESION PERFORMANCE STANDARD.
- C. PROVIDE FOR APPLICATIONS SPECIFICALLY DESIGNATED ON DRAWINGS.

2.4 FLEXIBLE METAL CONDUIT

- A. PROVIDE FLEXIBLE METAL CONDUIT COMPLIANT WITH FS WW-C-566 AND UL 1, AND FORMED FROM CONTINUOUS LENGTH OF SPIRALLY WOUND, INTERLOCKED ZINC-COATED OR GALVANIZED (INSIDE & OUTSIDE) STEEL CONDUIT FITTINGS FOR USE WITH FLEXIBLE METAL CONDUIT. PROVIDE CONDUIT OF THREADLESS HINGED CLAMP TYPE, WITH INSULATED THROATS, PROVIDE STRAIGHT TERMINAL CONNECTORS CONSISTING OF ONE PIECE BODY, FEMALE END WITH CLAMP AND DEEP SLOTTED MACHINE SCREW FOR SECURING CONDUIT, AND MALE THREADED END WITH LOCKNUT. DO NOT USE 45 DEGREE OR 90 DEGREE TERMINAL ANGLE CONNECTORS FOR FLEXIBLE OR WATER-TIGHT FLEXIBLE METAL CONDUIT IN LOCATIONS THAT WILL NOT BE FULLY ACCESSIBLE AFTER COMPLETION OF CONSTRUCTION. PROVIDE FULL SIZE GREEN INSULATED GROUND WIRE FOR ALL APPLICATIONS, REGARDLESS OF LENGTH. PROVIDE FLEXIBLE METAL CONDUIT FOR THE FOLLOWING CONDITIONS AS APPLICABLE.
 1. PROVIDE FOR FINAL 72 INCHES FROM OUTLET/JUNCTION BOXES TO RECESSED LUMINAIRES THAT ARE LOCATED IN ACCESSIBLE CEILING SYSTEMS. OPTIONALLY, TYPE AC/MC CABLE MAY BE USED FOR "FIXTURE WHIPS" (REFER TO SECTION 26 05 19).
 2. PROVIDE FOR FINAL 24-72 INCHES OF CONNECTION TO INDOOR EQUIPMENT THAT IS SUBJECT TO MOVEMENT OR VIBRATION. LEAVE SUFFICIENT SLACK IN FLEXIBLE CONDUIT TO PERMIT MOVEMENT FROM VIBRATION WITHOUT ADVERSELY AFFECTING CONDUITS AND CONNECTIONS.

PART 3 - EXECUTION

- A. GENERAL
 1. PROVIDE CONDUIT, TUBING AND FITTINGS OF TYPES, GRADES, SIZES AND WEIGHTS (WALL THICKNESSES) FOR APPLICATIONS AS NEEDED TO RENDER ELECTRICAL WORK FULLY OPERATIONAL.
 2. PROPERLY SUPPORT AND ANCHOR RACEWAYS FOR THEIR ENTIRE LENGTH USING STRUCTURAL MATERIALS. DO NOT SPAN ANY SPACE UNSUPPORTED.

END OF SECTION

SECTION 26 05 34 - BOXES AND FITTINGS FOR ELECTRICAL SYSTEMS

PART 1 - PRODUCTS

1.1 INDOOR BOXES

- A. PROVIDE MINIMUM SIZE OF 4 INCHES SQUARE BY 1-1/2 INCHES DEEP FOR OUTLET BOXES AND JUNCTION BOXES. PROVIDE OUTLET BOX ACCESSORIES AS REQUIRED FOR EACH INSTALLATION, INCLUDING BOX SUPPORTS, MOUNTING EARS AND BRACKETS, WALLBOARD HANGERS, BOX EXTENSION RINGS, FIXTURE STUDS, CABLE CLAMPS, AND METAL STRAPS FOR SUPPORTING OUTLET BOXES, WHICH ARE COMPATIBLE WITH OUTLET BOXES BEING USED TO FULFILL INSTALLATION REQUIREMENTS FOR INDIVIDUAL WIRING SITUATIONS. PROVIDE WITH STAINLESS STEEL NUTS, BOLTS, SCREWS AND WASHERS.

1.2 DAMP AND WET LOCATION OUTLET BOXES AND COVERS

- A. PROVIDE CORROSION-RESISTANT WEATHERTIGHT/RAINTIGHT OUTLET WIRING BOXES, OF TYPES, SHAPES AND SIZES, INCLUDING DEPTH OF BOXES, WITH THREADED CONDUIT HOLES FOR FASTENING ELECTRICAL CONDUIT, SUITABLY CONFIGURED FOR EACH APPLICATION, INCLUDING FACE PLATE GASKETS AND CORROSION-RESISTANT PLUGS AND FASTENERS. PROVIDE WEATHERTIGHT OUTLETS FOR INTERIOR AND EXTERIOR LOCATIONS EXPOSED TO WEATHER OR MOISTURE, I.E. IN DAMP OR WET LOCATIONS.
- B. PROVIDE MINIMAL PROFILE ASSEMBLIES THAT ARE RATED NEMA 3R WHILE IN USE AND THAT EMPLOY RECESSED BOX AND COVER DESIGN, EQUAL TO THOMAS & BETTS " RED DOT " SERIES. PROVIDE TRIM COLOR(S) AS DIRECTED BY ARCHITECT.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. INSTALL ELECTRICAL BOXES IN THOSE LOCATIONS THAT ENSURE ACCESSIBILITY TO ENCLOSED ELECTRICAL WIRING.
- B. DO NOT INSTALL ALUMINUM PRODUCTS IN CONCRETE.
- C. CONSIDER THE OUTLET, JUNCTION, AND PULL BOX LOCATIONS INDICATED ON DRAWINGS APPROXIMATE. STUDY THE GENERAL CONSTRUCTION WITH RELATION TO SPACES AND EQUIPMENT SURROUNDING EACH OUTLET, AND NEATLY INSTALL OUTLETS ACCORDINGLY.

END OF SECTION

SECTION 26 05 80 - MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED WORK

- A. PROVIDE ALL NECESSARY ELECTRICALLY RELATED WORK AS REQUIRED TO RENDER ALL MECHANICAL EQUIPMENT (INCLUDING PUMPING, HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT) FULLY OPERATIONAL AND FULLY COMPLIANT WITH NEC. THIS INCLUDES, PRIOR TO ORDERING MATERIALS OR COMMENCING WITH ROUGH-IN, REVIEWING EQUIPMENT SUBMITTAL DATA AND COORDINATING WITH INSTALLING CONTRACTORS TO ENSURE THE CORRECT SIZE, RATING AND QUANTITY OF CONDUCTORS ARE PROVIDED.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. GENERAL
 1. PROVIDE DISCONNECT SWITCH AHEAD OF ALL EQUIPMENT, INCLUDING CONTROLS, UNLESS THE MECHANICAL EQUIPMENT COMES WITH INTEGRAL NEC-COMPLIANT DISCONNECT(S). PROVIDE

NEMA 3R ENCLOSURES WHERE INSTALLED OUTDOORS AND WHERE INSTALLED INDOORS IN AREAS SUBJECT TO MOISTURE. GROUND METAL FRAMES OF EQUIPMENT BY CONNECTING FRAMES TO THE GROUND METAL RACEWAY OR TO A FULL SIZE GREEN GROUND CONDUCTOR OR BOTH. PROVIDE THE NECESSARY ELECTRICAL CONNECTIONS BETWEEN THE SPECIFIED EQUIPMENT AND THE JUNCTION BOX NEAR EQUIPMENT WITH FLEXIBLE METALLIC CONDUIT (LIQUID-TIGHT OUTDOORS) AND MATCHED CONNECTORS (SEE SECTION 26 05 33). WHERE MECHANICAL EQUIPMENT LUGS CANNOT ACCOMMODATE CONDUCTOR SIZES SHOWN ON DRAWINGS, PROVIDE ILSCO CLEAR-TAP INSULATED MULTI-TAP CONNECTORS.

2. SIZES, ELECTRICAL RATINGS, ETC. OF EQUIPMENT AND WIRING SHOWN ON DRAWINGS ARE BASED ON THE RESPECTIVE EQUIPMENT DESIGN BASE MANUFACTURERS. IF DIFFERENT MANUFACTURER(S) OR MODEL(S) ARE ACTUALLY SUPPLIED, PROVIDE NECESSARY COORDINATION IN FIELD PRIOR TO ORDERING MATERIALS AND PRIOR TO ROUGH-IN AND PROVIDE THE NECESSARY SIZE OF RELATED ELECTRICAL EQUIPMENT, WIRING, CONDUIT, ETC.

3. PRIOR TO FURNISHING SUBMITTALS AND PRIOR TO ROUGH-IN, DETERMINE EXACT ELECTRICALLY RELATED CHARACTERISTICS, LOADS, VOLTAGES, DISCONNECT AND STARTER REQUIREMENTS, LOCATIONS, MOUNTING HEIGHTS, CONNECTION POINTS, ETC. OF MECHANICAL EQUIPMENT.

B. HACR BREAKERS

1. COORDINATE IN FIELD WITH THE RESPECTIVE TRADES AND DETERMINE CASE BY CASE, WHICH EQUIPMENT IS FACTORY LISTED FOR USE WITH HEATING AND AIR CONDITIONING RATED (HACR) BREAKERS. IN AN EFFORT TO MINIMIZE REQUIREMENTS FOR STOCKING OF FUSES BY THE OWNER, UTILIZE HACR BREAKERS AT THE SOURCE PANELBOARDS AS THE NEC REQUIRED OVERCURRENT PROTECTION WHEREVER POSSIBLE (IN LIEU OF FUSING LOCAL DISCONNECT SWITCHES).

C. DISCONNECT SWITCH AND STARTER LOCATIONS

1. LOCATIONS OF DISCONNECTS AND STARTERS SHOWN ON DRAWINGS ARE INDICATED FOR SCHEMATIC PURPOSES ONLY. DETERMINE EXACT LOCATIONS IN FIELD SO THAT THEY ARE COMPLIANT WITH NEC ARTICLE 110 REQUIREMENTS FOR PANELBOARDS.

2. COMMERCIAL KITCHEN EXHAUST HOODS AND RELATED FAN EQUIPMENT

3. SEE DETAILS ON DRAWINGS.

A. REFER TO FOOD SERVICE DRAWINGS, FOOD SERVICE SPECIFICATIONS AND MANUFACTURER'S SUBMITTALS FOR SPECIFIC INFORMATION. FIELD COORDINATE WORK WITH AFFECTED ENTITIES.

B. PROVIDE INTERLOCK WIRING AND CONNECTIONS TO AND FROM THE VARIOUS EQUIPMENT AND CONTROLS.

C. PROVIDE CONTROL WIRING FROM THE FAN UNITS TO RESPECTIVE REMOTE DUCT STATS.

D. PROVIDE AUXILIARY CONTROL CIRCUIT WIRING FROM THE FACTORY MICRO-SWITCH IN THE HOOD FIRE SUPPRESSION SYSTEMS TO RESPECTIVE DEDICATED FIRE ALARM SYSTEM MONITOR MODULES TO INITIATE ALARM SIGNAL WHEN RESPECTIVE HOOD FIRE PROTECTION SYSTEM IS ACTIVATED.

E. PROVIDE AUXILIARY CONTROL CIRCUIT WIRING FROM THE FACTORY MICRO-SWITCH IN THE HOOD FIRE SUPPRESSION SYSTEM TO CONTACTOR CONTROL COIL(S).

F. PROVIDE EMPTY OCTAGON BOX FOR MECHANICAL MANUAL PULL STATION (AND INSTALL PULL STATION) FOR EACH HOOD FIRE PROTECTION SYSTEM (MOUNTED AT 48" ABOVE FINISHED FLOOR TO TOP OF OUTLET BOX) WITH (1) 1/2" EMPTY CONDUIT ROUTED UP AND OVER TO HOOD AS DIRECTED BY HOOD INSTALLER IN FIELD (W/SHEEP 90'S). FIELD VERIFY LOCATION.

G. PROVIDE INTERLOCK CONTROL WIRING BETWEEN GAS SOLENOID SHUT OFF VALVES AND RESPECTIVE KITCHEN HOOD FIRE SUPPRESSION SYSTEM. COORDINATE WITH AFFECTED INSTALLERS.

END OF SECTION

SECTION 26 05 90 - MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 RELATED WORK

A. TIME BASED CONTROL - MULTI-PURPOSE TIME CLOCK (365 DAY)

1. PROVIDE INTERMATIC #ET90415CR SERIES MULTI-PURPOSE TIME CLOCK (OR EQUAL BY TORK), WHICH IS PROGRAMMABLE 365-DAY/24-HOUR WITH OVERRIDE CONTROLS. PROVIDE FOUR-CHANNEL UNIT. PROVIDE REQUIRED EXTERNAL CONTACTORS, RELAYS, ETC. TO RENDER THE CONTROL SYSTEMS FULLY OPERATIONAL. VERIFY ZONE CONTROL REQUIREMENTS IN FIELD PRIOR TO ROUGH-IN. PROVIDE 100-HOUR CARRYOVER.

2. REFER TO SECTION 26 27 40 FOR DEFINITION OF LIGHTING CONTACTORS. NOTE THAT ANY GIVEN LIGHTING CONTACTOR DESIGNATION MAY ACTUALLY INCLUDE MULTIPLE CONTACTORS DEPENDING ON HOW MANY CIRCUITS ARE CONTROLLED BY THE RESPECTIVE CONTACTOR DESIGNATION.

END OF SECTION

SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED WORK

A. PROVIDE LABOR, MATERIALS, TOOLS, APPLIANCES, CONTROL HARDWARE, SENSOR, WIRE, JUNCTION BOXES AND EQUIPMENT NECESSARY FOR AND INCIDENTAL TO THE DELIVERY, INSTALLATION AND FURNISHING OF COMPLETELY OPERATIONAL OCCUPANCY SENSOR LIGHTING CONTROLS, AS DESCRIBED HEREIN.

B. PROVIDE PRODUCTS SUPPLIED FROM A SINGLE MANUFACTURER THAT HAS BEEN CONTINUOUSLY INVOLVED IN MANUFACTURING OF OCCUPANCY SENSORS FOR A MINIMUM OF FIVE (5) YEARS.

C. PROVIDE OCCUPANCY SENSORS FOR ENTIRE PROJECT THAT ARE ALL MADE BY THE SAME MANUFACTURER, REGARDLESS OF WHERE THE MATERIALS ARE SPECIFIED IN DIVISION 26 DOCUMENTS. PROVIDE COMPONENTS THAT ARE ALL MADE BY THE SAME MANUFACTURER IN CASES WHERE OCCUPANCY SENSOR COMPONENTS ARE ALSO CONNECTED TO A BUILDING LIGHTING CONTROL SYSTEM, REGARDLESS OF WHERE THE MATERIALS ARE SPECIFIED IN DIVISION 26 DOCUMENTS.

D. PROVIDE COMPONENTS THAT ARE UL LISTED, OFFER A FIVE (5) YEAR WARRANTY AND MEET STATE AND LOCAL APPLICABLE CODE REQUIREMENTS.

E. PROVIDE PRODUCTS MANUFACTURED BY AN ISO 9002 CERTIFIED MANUFACTURING FACILITY WITH A DEFECT RATE OF LESS THAN ONE-THIRD OF ONE PERCENT.

PART 2 - SPECIFIC REQUIREMENTS

2.1 ACCEPTABLE MANUFACTURERS

A. BASIS OF DESIGN MANUFACTURER IS WATTSSTOPPER. OTHER ACCEPTABLE MANUFACTURERS ARE HUBBELL, SENSOR SWITCH, LEVITON, LUTRON, LC80 AND COOPER GREENGATE CA IN AS MUCH THE SYSTEMS MEET THE INTENT AND FUNCTIONALITY AND SUSTAINABILITY OF THE DESIGN.

2.2 PRODUCTS

A. CEILING SENSORS

1. PROVIDE STANDARD OF QUALITY EQUAL TO WATTSSTOPPER: WT-605, WT-600, WT-105, WT-1100, WT-2205, WT-2200, WT-2250, WT-2255, WP-605, WP-1105, WP-2255, WP-2205, W-500A, W-1000A, W-2000A, W-2000H, UT-300, UT-305, UT-355, WPIR, HB-100, HB-150, DT-200, DT-205, DT-300, DT-305, DT-355, CX-100, CX-105, CI-200, CI-205, CI-300, CI-305, CI-355, CI-12 OR CI-24 SERIES.

B. POWER AND AUXILIARY PACKS

1. PROVIDE STANDARD OF QUALITY EQUAL TO WATTSSTOPPER: B120E-P, B277E-P, BZ-100, LC-100, CI20E-P, C277E-P, S120/277-P, AT-120 OR AT-277 SERIES.

C. DUAL TECHNOLOGY SENSORS

1. PROVIDE SENSORS THAT ARE EITHER WALL MOUNTED, CORNER MOUNTED OR CEILING MOUNTED IN SUCH A WAY AS TO MINIMIZE COVERAGE IN UNWANTED AREAS. PROVIDE PASSIVE INFRARED AND ULTRASONIC TECHNOLOGIES FOR OCCUPANCY DETECTION.

D. GENERAL STANDARDS

1. PROVIDE SENSORS CAPABLE OF OPERATING NORMALLY WITH ELECTRONIC BALLASTS, PL LAMP SYSTEMS AND RATED MOTOR LOADS.
2. PROVIDE SENSORS WITH COVERAGE THAT REMAINS CONSTANT AFTER SENSITIVITY CONTROL HAS BEEN SET. AUTOMATIC REDUCTION IN COVERAGE DUE TO THE CYCLING OF AIR

CONDITIONER OR HEATING FANS IS NOT PERMITTED.

3. PROVIDE SENSORS WITH READILY ACCESSIBLE, USER ADJUSTABLE SETTINGS FOR TIME DELAY AND SENSITIVITY. LOCATE SETTINGS ON THE SENSOR (NOT THE CONTROL UNIT) AND RECESS TO LIMIT TAMPERING.

4. PROVIDE BYPASS MANUAL OVERRIDE ON EACH SENSOR TO ACCOMMODATE FAILURES. CONFIGURE SO THAT WHEN BYPASS IS UTILIZED, LIGHTING REMAINS ON CONSTANTLY OR CONTROL DIVERTS TO A WALL SWITCH UNTIL SENSOR IS REPLACED. RECESS THIS CONTROL TO PREVENT TAMPERING.

5. PROVIDE SENSORS WITH AN LED AS A VISUAL MEANS OF INDICATION AT ALL TIMES TO VERIFY THAT MOTION IS BEING DETECTED DURING BOTH TESTING AND NORMAL OPERATION.

6. WHERE SPECIFIED, PROVIDE SENSOR WITH INTERNAL ADDITIONAL ISOLATED RELAY WITH NORMALLY OPEN, NORMALLY CLOSED AND COMMON OUTPUTS FOR USE WITH HVAC CONTROL, DATA LOGGING AND OTHER CONTROL OPTIONS. DO NOT USE SENSORS THAT UTILIZE SEPARATE COMPONENTS OR SPECIALLY MODIFIED UNITS TO ACHIEVE THIS FUNCTION.

7. PROVIDE SENSORS WITH UL RATED, 94V-0 PLASTIC ENCLOSURES.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED WORK

A. TYPES OF PANELBOARDS AND ENCLOSURES REQUIRED FOR THE PROJECT INCLUDE THE FOLLOWING.

1. POWER-DISTRIBUTION PANELBOARDS.
2. GENERAL USE PANELBOARDS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PANELBOARD PRODUCTS OF ONE OF THE FOLLOWING (FOR EACH TYPE AND RATING OF PANELBOARD AND ENCLOSURE):

1. SQUARE D COMPANY.
2. GENERAL ELECTRIC COMPANY.
3. SIEMENS/ITE.
4. EATON.

2.2 GENERAL REQUIREMENTS

A. EXCEPT AS OTHERWISE INDICATED, PROVIDE PANELBOARDS, ENCLOSURES AND ANCILLARY COMPONENTS, OF TYPES, SIZES, AND RATINGS INDICATED, WHICH COMPLY WITH MANUFACTURER'S STANDARD MATERIALS; WITH THE DESIGN AND CONSTRUCTION IN ACCORDANCE WITH PUBLISHED PRODUCT INFORMATION.

B. PROVIDE PANELBOARDS WITH PROPER NUMBER OF UNIT PANELBOARD DEVICES AS REQUIRED FOR COMPLETE INSTALLATION. WHERE TYPES, SIZES, OR RATINGS ARE NOT INDICATED, COMPLY WITH NEC, UL AND ESTABLISHED INDUSTRY STANDARDS FOR THOSE APPLICATIONS INDICATED.

C. PROVIDE PANELBOARDS THAT ARE NEW AND MANUFACTURER'S LATEST STANDARD CATALOG DESIGN.

D. PROVIDE PANELBOARDS THAT BEAR UL LABELS FOR THEIR SPECIFIC APPLICATIONS.

E. PROVIDE PANELBOARDS SUITABLE FOR SERVICE VOLTAGE WITH NUMBER OF BRANCH CIRCUITS OF CAPACITY SCHEDULED.

F. PROVIDE PANELBOARDS, AND SECTIONS THEREOF IF APPLICABLE, WITH MAIN-LUGS-ONLY OF CAPACITY EQUAL TO, OR GREATER THAN, THE RATING OR SETTING OF THE OVERCURRENT PROTECTIVE DEVICE NEXT BACK ON THE LINE.

G. PROVIDE PANELBOARD BRANCHES AS SCHEDULED ON THE DRAWINGS.

H. PROVIDE CIRCUIT BREAKER PANELBOARD BUS ASSEMBLIES WITH DISTRIBUTED (SEQUENCE) TYPE BUSSING THROUGHOUT, SO THAT ANY TWO ADJACENT SINGLE-POLE BREAKERS, OR SPACES, ARE REPLACEABLE BY A TWO-POLE INTERNAL COMMON TRIP BREAKER, AND SO THAT ANY THREE ADJACENT SINGLE-POLE BREAKERS, OR SPACES, ARE REPLACEABLE BY A THREE-POLE INTERNAL COMMON TRIP BREAKER. THIS APPLIES FOR BRANCH BREAKERS SIZED 15 AMP THROUGH 70 AMP INCLUSIVE, WITHOUT DISTURBING ANY OTHER BREAKER.

J. PROVIDE DEAD-FRONT SAFETY TYPE PANELBOARDS AS INDICATED, WITH PANELBOARD SWITCHING AND PROTECTIVE DEVICES IN QUANTITIES, RATINGS, TYPES, AND WITH ARRANGEMENT SHOWN. PROVIDE WITH ANTI-TURN SOLDERLESS PRESSURE TYPE MAIN LUG CONNECTORS APPROVED FOR USE WITH COPPER OR ALUMINUM CONDUCTORS.

K. PROVIDE FULL-SIZED (100 PERCENT) NEUTRAL BUS. PROVIDE SUITABLE LUGS ON NEUTRAL BUS FOR OUTGOING FEEDERS REQUIRING NEUTRAL CONNECTIONS.

2.3 GENERAL USE CIRCUIT BREAKER PANELBOARDS

A. PROVIDE 208Y/120V THREE-PHASE GENERAL USE PANELBOARDS EQUAL TO SQUARE D NQOD WITH BOLT-ON BRANCH BREAKERS.

B. PROVIDE COPPER BUSSING.

C. CIRCUIT BREAKER PANELBOARD ENCLOSURES

- A. PROVIDE GALVANIZED SHEET STEEL CABINET TYPE ENCLOSURES, IN SIZES AND NEMA TYPES AS INDICATED, CODE-GAGE, MINIMUM 16-GAGE THICKNESS.
- B. PROVIDE BOXES WITH CODE-COMPLIANT SIDE AND END GUTTERS (MINIMUM 4 INCHES), AND OF CODE GAUGE GALVANIZED STEEL. PROVIDE BOXES THAT ARE 20 INCHES WIDE MINIMUM, AND 5-3/4 INCHES DEEP MINIMUM. PROVIDE BOXES WITH MULTIPLE KNOCKOUTS AND WIRING GUTTERS.
- C. PROVIDE PANELBOARD TRIMS THAT ARE FLUSH OR SURFACE AS REQUIRED FOR RESPECTIVE APPLICATION. THAT ARE CONSTRUCTED OF CODE GAUGE STEEL, THAT ARE FINISHED WITH RUST INHIBITING PRIME COAT AND THEN FACTORY APPLIED HOT SPRAY LACQUER OR BAKED-ON ENAMEL, AND THAT ARE FACTORY PAINTED MANUFACTURER'S STANDARD LIGHT GRAY. PROVIDE TRIMS COMPLETE WITH CONCEALED HINGES AND CONCEALED TRIM CLAMPS. PROVIDE DOORS WITH FLUSH CHROMIUM PLATED COMBINATION CYLINDER LOCK AND CATCH, AND WITH DIRECTORY SUITABLE FOR CLEAR PLASTIC. PROVIDE LOCKS THAT ARE KEYED ALIKE.
- D. PROVIDE ENCLOSURES THAT ARE FABRICATED BY SAME MANUFACTURER AS PANELBOARDS, WHICH MATE AND MATCH PROPERLY WITH PANELBOARDS TO BE ENCLOSED.

2.4 BUSSING

A. PROVIDE COPPER BUSSING.

B. CIRCUIT BREAKER PANELBOARD ENCLOSURES

- A. PROVIDE GALVANIZED SHEET STEEL CABINET TYPE ENCLOSURES, IN SIZES AND NEMA TYPES AS INDICATED, CODE-GAGE, MINIMUM 16-GAGE THICKNESS.
- B. PROVIDE BOXES WITH CODE-COMPLIANT SIDE AND END GUTTERS (MINIMUM 4 INCHES), AND OF CODE GAUGE GALVANIZED STEEL. PROVIDE BOXES THAT ARE 20 INCHES WIDE MINIMUM, AND 5-3/4 INCHES DEEP MINIMUM. PROVIDE BOXES WITH MULTIPLE KNOCKOUTS AND WIRING GUTTERS.
- C. PROVIDE PANELBOARD TRIMS THAT ARE FLUSH OR SURFACE AS REQUIRED FOR RESPECTIVE APPLICATION. THAT ARE CONSTRUCTED OF CODE GAUGE STEEL, THAT ARE FINISHED WITH RUST INHIBITING PRIME COAT AND THEN FACTORY APPLIED HOT SPRAY LACQUER OR BAKED-ON ENAMEL, AND THAT ARE FACTORY PAINTED MANUFACTURER'S STANDARD LIGHT GRAY. PROVIDE TRIMS COMPLETE WITH CONCEALED HINGES AND CONCEALED TRIM CLAMPS. PROVIDE DOORS WITH FLUSH CHROMIUM PLATED COMBINATION CYLINDER LOCK AND CATCH, AND WITH DIRECTORY SUITABLE FOR CLEAR PLASTIC. PROVIDE LOCKS THAT ARE KEYED ALIKE.
- D. PROVIDE ENCLOSURES THAT ARE FABRICATED BY SAME MANUFACTURER AS PANELBOARDS, WHICH MATE AND MATCH PROPERLY WITH PANELBOARDS TO BE ENCLOSED.

2.5 CIRCUIT BREAKER PANELBOARD ENCLOSURES

A. PROVIDE GALVANIZED SHEET STEEL CABINET TYPE ENCLOSURES, IN SIZES AND NEMA TYPES AS INDICATED, CODE-GAGE, MINIMUM 16-GAGE THICKNESS.

B. PROVIDE BOXES WITH CODE-COMPLIANT SIDE AND END GUTTERS (MINIMUM 4 INCHES), AND OF CODE GAUGE GALVANIZED STEEL. PROVIDE BOXES THAT ARE 20 INCHES WIDE MINIMUM, AND 5-3/4 INCHES DEEP MINIMUM. PROVIDE BOXES WITH MULTIPLE KNOCKOUTS AND WIRING GUTTERS.

C. PROVIDE PANELBOARD TRIMS THAT ARE FLUSH OR SURFACE AS REQUIRED FOR RESPECTIVE APPLICATION. THAT ARE CONSTRUCTED OF CODE GAUGE STEEL, THAT ARE FINISHED WITH RUST INHIBITING PRIME COAT AND THEN FACTORY APPLIED HOT SPRAY LACQUER OR BAKED-ON ENAMEL, AND THAT ARE FACTORY PAINTED MANUFACTURER'S STANDARD LIGHT GRAY. PROVIDE TRIMS COMPLETE WITH CONCEALED HINGES AND CONCEALED TRIM CLAMPS. PROVIDE DOORS WITH FLUSH CHROMIUM PLATED COMBINATION CYLINDER LOCK AND CATCH, AND WITH DIRECTORY SUITABLE FOR CLEAR PLASTIC. PROVIDE LOCKS THAT ARE KEYED ALIKE.

D. PROVIDE ENCLOSURES THAT ARE FABRICATED BY SAME MANUFACTURER AS PANELBOARDS, WHICH MATE AND MATCH PROPERLY WITH PANELBOARDS TO BE ENCLOSED.

2.6 MOLDED CASE CIRCUIT BREAKERS

A. PROVIDE FACTORY-ASSEMBLED, MOLDED-CASE CIRCUIT BREAKERS OF FRAME SIZES, CHARACTERISTICS, AND RATINGS INCLUDING RMS SYMMETRICAL INTERRUPTING RATINGS REQUIRED FOR EACH APPLICATION. PROVIDE BREAKERS WITH PERMANENT THERMAL AND INSTANTANEOUS MAGNETIC TRIP, WITH FAULT-CURRENT LIMITING PROTECTION, AND WITH AMPERE RATINGS AS INDICATED.

B. PROVIDE COORDINATED SERIES-RATED CIRCUIT BREAKERS AS APPLICABLE THROUGHOUT, ACCOMMODATING RESPECTIVE AVAILABLE FAULT CURRENT.

C. PROVIDE BREAKERS THAT ARE DESIGNED TO BE MOUNTED AND OPERATED IN ANY PHYSICAL POSITION, AND TO BE OPERATED IN A MINIMUM AMBIENT TEMPERATURE OF 40 DEGREES C. PROVIDE BREAKERS WITH MECHANICAL SCREW TYPE REMOVABLE CONNECTOR LUGS, AL/CU RATED.

D. PROVIDE BRANCH CIRCUIT BREAKERS THAT ARE FULL AMBIENT COMPENSATED THERMAL MAGNETIC MOLDED CASE TYPE, WITH QUICK-MAKE AND QUICK-BREAK ACTION, AND WITH POSITIVE HANDLE TRIP INDICATION (ON BOTH MANUAL AND AUTOMATIC OPERATION). PROVIDE BREAKERS OF THE OVER-THE-CENTER TOGGLE OPERATING TYPE WITH THE HANDLE GOING TO A POSITION BETWEEN "ON" AND "OFF" TO INDICATE AUTOMATIC TRIPPING.

E. PROVIDE BOLT-ON BRANCH BREAKERS. PROVIDE FULL SIZE CIRCUIT BREAKERS. DO NOT PROVIDE "TANDEM" OR "SPLIT" BREAKERS

2.7 FAULT CURRENT RATINGS

A. PROVIDE ELECTRICAL DISTRIBUTION RELATED EQUIPMENT WITH APPROPRIATELY BRACED BUSSING

AND PROPERLY RATED BREAKERS, FUSES, ETC. FOR THE AVAILABLE FAULT CURRENTS.

2.8 SERIES COORDINATION

A. PROVIDE FACTORY SERIES COORDINATION FOR ALL CIRCUIT BREAKERS (INCLUDING BRANCH BREAKERS), RELATIVE TO UPSTREAM BREAKERS, SO THAT ONLY THE BREAKER CLOSEST IN THE CIRCUIT TO THE LOAD TRIPS UPON AN OVERLOAD OR FAULT CONDITION.

PART 3 - EXECUTION

3.1 INSTALLATION

A. PROVIDE ENCLOSURES FASTENED FIRMLY TO WALLS AND STRUCTURAL SURFACES, ENSURING THAT THEY ARE PERMANENTLY AND MECHANICALLY ANCHORED.

B. PROVIDE NEATLY TYPED CIRCUIT DIRECTORY CARD FOR EACH PANELBOARD UPON COMPLETION OF INSTALLATION WORK. INCLUDE THE ACTUAL ROOM NAMES/NUMBERS THAT ARE SELECTED FOR INTERIOR SIGNAGE/DESIGNATION.

C. SCHEDULING SHOWN ON DRAWINGS IS SHOWN TO INDICATE FEEDER AND BRANCH CIRCUITING REQUIREMENTS. DETERMINE EXACT NUMBERING SEQUENCE OF CIRCUITS IN FIELD AFTER PERFORMING FINAL BALANCING

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. PROVIDE WIRING DEVICES, IN TYPES, CHARACTERISTICS, GRADES, COLORS, AND ELECTRICAL RATINGS FOR APPLICATIONS INDICATED WHICH ARE UL LISTED AND WHICH COMPLY WITH NEMA WD 1 AND OTHER APPLICABLE UL AND NEMA STANDARDS. VERIFY COLOR SELECTIONS WITH OWNER'S REPRESENTATIVE.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING.

SWITCHES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER
DIMMERS: LUTRON
RECEPTACLES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER
WALL PLATES: LEVITON, HUBBELL, BRYANT, PASS & SEYMOUR, COOPER

2.2 WIRING DEVICE COLORS

A. UNLESS SPECIFICALLY INDICATED OTHERWISE, OR DIRECTED OTHERWISE IN FIELD, PROVIDE WHITE COLOR FOR NORMAL UTILITY WIRING DEVICES.

2.3 SPECIFICATION GRADE RECEPTACLES

A. STANDARD SPECIFICATION GRADE DUPLEX/SINGLE RECEPTACLES

1. PROVIDE DUPLEX RECEPTACLES EQUAL TO LEVITON #5362 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS. PROVIDE RECEPTACLES EQUAL TO LEVITON #5361 SERIES FOR SIMPLEX (SINGLE) APPLICATIONS.

B. GROUND-FAULT INTERRUPTER SPECIFICATION GRADE RECEPTACLES

1. PROVIDE GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLES EQUAL TO LEVITON #8989 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS.
2. RECEPTACLES INDICATED AS GFI MAY BE GFI-PROTECTED BY AN UPSTREAM GFI RECEPTACLE ON THE SAME CIRCUIT ONLY IF LOCATED IN THE SAME ROOM. OTHERWISE PROVIDE A SEPARATE GFI RECEPTACLE FOR EACH ONE SHOWN.

C. ISOLATED GROUND SPECIFICATION GRADE RECEPTACLES

1. PROVIDE DUPLEX ISOLATED GROUND RECEPTACLES EQUAL TO LEVITON #5362-IG. PROVIDE SIMPLEX (SINGLE) ISOLATED GROUND RECEPTACLES EQUAL TO LEVITON #5361-IG. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS. PROVIDE DEDICATED INSULATED ISOLATED GROUND CONDUCTORS (GREEN WITH YELLOW TRACER) FOR EACH APPLICATION.

D. WEATHER RESISTANT GFI RECEPTACLES

1. PROVIDE DUPLEX WEATHER RESISTANT RECEPTACLES EQUAL TO LEVITON # W7899 SERIES. FOR RECEPTACLE CIRCUITS PROTECTED WITH 15A BREAKERS, PROVIDE NEMA 5-15R EQUIVALENTS.

2.4 WIRING DEVICE ACCESSORIES

A. WALL PLATES

1. PROVIDE SINGLE AND COMBINATION, OF TYPES, SIZES, AND WITH GANGING AND CUTOUPS AS REQUIRED TO ACCOMMODATE EACH APPLICATION. PROVIDE PLATES WHICH MATE AND MATCH WITH WIRING DEVICES TO WHICH ATTACHED. PROVIDE METAL SCREWS FOR SECURING PLATES TO DEVICES WITH SCREW HEADS COLORED TO MATCH FINISH OF PLATES. PROVIDE WALL PLATE COLOR TO MATCH WIRING DEVICES UNLESS SPECIFICALLY INDICATED OTHERWISE.
2. PROVIDE STANDARD SIZE WALL PLATES. DO NOT PROVIDE "MIDWAY", "OVERSIZED" ("JUMBO") OR "EXTRA DEEP" WALL PLATES.
3. PROVIDE GALVANIZED STEEL WALL PLATES IN UNFINISHED EXPOSED-CONDUIT AREAS.
4. PROVIDE COMMERCIAL GRADE, SATIN FINISH STAINLESS STEEL WALL PLATES IN FINISHED AREAS, WITH BEVELED EDGES, EQUAL TO LEVITON TYPE 302 SERIES.
5. PROVIDE COMMERCIAL SPECIFICATION GRADE THERMOPLASTIC WALL PLATES IN FINISHED AREAS.

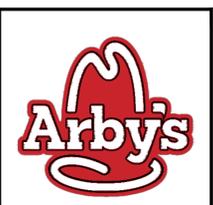
PART 3 - EXECUTION

3.1 INSTALLATION

A. PROVIDE GROUND (" NEUTRAL ") CONDUCTOR IN ALL LIGHTING CONTROL DEVICE (SWITCH, DIMMER, OCCUPANCY SENSOR, ETC.) WALL OUTLET BOXES, EVEN IF NOT IMMEDIATELY USED.

B. INSTALL RECEPTACLES SO THAT THE GROUND PIN IS ORIENTED IN A CONSISTENT MANNER THROUGHOUT THE FACILITY, SO THAT THE ORIENTATION IS COMPLIANT WITH ALL PREVAILING CODES AND REGULATIONS, AND SO THAT THE ORIENTATION IS ACCEPTABLE TO THE ELECTRICAL INSPECTOR.

END OF SECTION



SPECIFICATIONS - DIVISION 22 - PLUMBING

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUIPMENT:

1. STRUCTURAL PERFORMANCE: HANGERS AND SUPPORTS SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7.
 - a. DESIGN SUPPORTS FOR MULTIPLE PIPES CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, AND SYSTEM CONTENTS.
 - b. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND COMPONENTS.
 - c. DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.

2.2 SLEEVES AND SLEEVE SEALS

- A. GALVANIZED-STEEL-PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, ZINC COATED, WITH PLAIN ENDS.
- B. PVC-PIPE SLEEVES: ASTM D 1785, SCHEDULE 40.
- C. GALVANIZED-STEEL-SHEET SLEEVES: 0.0239-INCH MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT.

2.3 GROUT

- A. STANDARD: ASTM C 1107/C 1107M, GRADE B, POST-HARDENING AND VOLUME-ADJUSTING, DRY, HYDRAULIC-CEMENT GROUT.
 1. CHARACTERISTICS: NONSHRINK; RECOMMENDED FOR INTERIOR AND EXTERIOR APPLICATIONS.
 2. DESIGN MIX: 5000-PSI, 28-DAY COMPRESSIVE STRENGTH.
 3. PACKAGING: PREMIXED AND FACTORY PACKAGED.

2.4 ESCUTCHEONS AND FLOOR PLATES

- A. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.
- B. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.
- C. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE WITH HOLES FOR FASTENERS.

2.5 PRESSURE GAGES AND TEST PLUGS

- A. DIRECT-MOUNTED, METAL-CASE, DIAL-TYPE PRESSURE GAGES:
 1. STANDARD: ASME B40.100.
 2. CASE: SEALED OPEN-FRONT, PRESSURE RELIEF TYPE(S); CAST ALUMINUM OR DRAWN STEEL 4-1/2-INCH NOMINAL DIAMETER.
 3. MOVEMENT: MECHANICAL, WITH LINK TO PRESSURE ELEMENT AND CONNECTION TO POINTER.
 4. DIAL: NONREFLECTIVE ALUMINUM WITH PERMANENTLY ETCHED SCALE MARKINGS GRADUATED IN PSI.
 5. POINTER: DARK-COLORED METAL.
 6. WINDOW: PLASTIC.
 7. RING: METAL.
 8. ACCURACY: GRADE A, PLUS OR MINUS 1 PERCENT OF MIDDLE HALF OF SCALE RANGE.
- B. TEST PLUG: CORROSION-RESISTANT BRASS OR STAINLESS-STEEL BODY WITH TWO SELF-SEALING RUBBER CORE INSERTS AND GASKETED AND THREADED CAP, WITH EXTENDED STEM FOR UNITS TO BE INSTALLED IN INSULATED PIPING, MINIMUM PRESSURE AND TEMPERATURE RATING 500 PSIG AT 200 DEG F.

2.6 HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUIPMENT

- A. CARBON-STEEL PIPE HANGERS AND SUPPORTS:
 1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, FACTORY-FABRICATED COMPONENTS.
 2. GALVANIZED METALLIC COATINGS: PREGALVANIZED OR HOT DIPPED.
 3. NONMETALLIC COATINGS: PLASTIC COATING, JACKET, OR LINER.
 4. PADDED HANGERS: HANGER WITH FIBERGLASS OR OTHER PIPE INSULATION PAD OR CUSHION TO SUPPORT BEARING SURFACE OF PIPING.
 5. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF CARBON STEEL.
- B. COPPER PIPE HANGERS:
 1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, COPPER-COATED-STEEL, FACTORY-FABRICATED COMPONENTS.
 2. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF COPPER-COATED STEEL.
- C. FASTENER SYSTEMS:
 1. MECHANICAL-EXPANSION ANCHORS: INSERT-WEDGE-TYPE, ZINC-COATED STEEL ANCHORS, FOR USE IN HARDENED PORTLAND CEMENT CONCRETE; WITH PULL-OUT, TENSION, AND SHEAR CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS WHERE USED.

D. MISCELLANEOUS MATERIALS:

1. STRUCTURAL STEEL: ASTM A 36/A 36M, CARBON-STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.
2. GROUT: ASTM C 1107, FACTORY-MIXED AND -PACKAGED, DRY, HYDRAULIC-CEMENT, NONSHRINK AND NONMETALLIC GROUT; SUITABLE FOR INTERIOR AND EXTERIOR APPLICATIONS.
 - a. PROPERTIES: NONSTAINING, NONCORROSIVE, AND NONGASEOUS.
 - b. DESIGN MIX: 5000-PSI, 28-DAY COMPRESSIVE STRENGTH.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. INSTALL PIPING FREE OF SAGS AND BENDS.
- B. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
- C. SLEEVES:
 1. INSTALL SLEEVES FOR PIPING PASSING THROUGH PENETRATIONS IN FLOORS, PARTITIONS, ROOFS, AND WALLS.
 2. INSTALL SLEEVES IN CONCRETE FLOORS, CONCRETE ROOF SLABS, AND CONCRETE WALLS AS NEW SLABS AND WALLS ARE CONSTRUCTED.
 - a. USE GROUT AND SEAL THE SPACE OUTSIDE OF SLEEVES IN SLABS AND WALLS WITHOUT SLEEVE-SEAL SYSTEM.
 3. INSTALL SLEEVES FOR PIPES PASSING THROUGH INTERIOR PARTITIONS.
 4. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. COMPLY WITH REQUIREMENTS FOR FIRESTOPPING SPECIFIED IN SECTION 078446 "PENETRATION FIRESTOPPING."
- D. ESCUTCHEONS AND FLOOR PLATES:
 4. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.
 5. INSTALL ESCUTCHEONS WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.
 6. INSTALL FLOOR PLATES FOR PIPING PENETRATIONS OF EQUIPMENT-ROOM FLOORS.
 7. INSTALL FLOOR PLATES WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.
- F. METERS AND GAGES:

1. INSTALL DIRECT-MOUNTED PRESSURE GAGES IN PIPING TEES WITH PRESSURE GAGE LOCATED ON PIPE AT THE MOST READABLE POSITION.
2. INSTALL METERS AND GAGES ADJACENT TO MACHINES AND EQUIPMENT TO ALLOW SERVICE AND MAINTENANCE OF METERS, GAGES, MACHINES, AND EQUIPMENT.
3. ADJUST FACES OF METERS AND GAGES TO PROPER ANGLE FOR BEST VISIBILITY.

G. INSTALL UNIONS AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.

- H. INSTALL DIELECTRIC UNIONS AND FLANGES TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS IN GAS PIPING.

- I. INSTALL DIELECTRIC COUPLING AND NIPPLE FITTINGS TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS IN WATER PIPING.

3.2 HANGERS AND SUPPORTS

- A. COMPLY WITH MSS SP-69 AND MSS SP-89. INSTALL BUILDING ATTACHMENTS WITHIN CONCRETE OR TO STRUCTURAL STEEL.
- B. INSTALL HANGERS AND SUPPORTS TO ALLOW CONTROLLED THERMAL AND SEISMIC MOVEMENT OF PIPING SYSTEMS.
- C. INSTALL POWDER-ACTUATED FASTENERS AND MECHANICAL-EXPANSION ANCHORS IN CONCRETE AFTER CONCRETE IS CURED. DO NOT USE IN LIGHTWEIGHT CONCRETE OR IN SLABS LESS THAN 4 INCHES THICK.
- D. LOAD DISTRIBUTION: INSTALL HANGERS AND SUPPORTS SO PIPING LIVE AND DEAD LOADING AND STRESSES FROM MOVEMENT WILL NOT BE TRANSMITTED TO CONNECTED EQUIPMENT.

- E. HORIZONTAL-PIPING HANGERS AND SUPPORTS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SPECIFICATION SECTIONS, INSTALL THE FOLLOWING TYPES:
 1. ADJUSTABLE STEEL CLEVIS HANGERS (MSS TYPE 1): FOR SUSPENSION OF NONINSULATED OR INSULATED STATIONARY PIPES, NPS 1/2 TO NPS 30.
 2. PIPE HANGERS (MSS TYPE 5): FOR SUSPENSION OF PIPES, NPS 1/2 TO NPS 4, TO ALLOW OFF-CENTER CLOSURE FOR HANGER INSTALLATION BEFORE PIPE ERECTION.
 3. ADJUSTABLE STEEL BAND HANGERS (MSS TYPE 7): FOR SUSPENSION OF NONINSULATED STATIONARY PIPES, NPS 1/2 TO NPS 8.
 4. ADJUSTABLE BAND HANGERS (MSS TYPE 9): FOR SUSPENSION OF NONINSULATED STATIONARY PIPES, NPS 1/2 TO NPS 8.
 5. ADJUSTABLE SWIVEL-RING BAND HANGERS (MSS TYPE 10): FOR SUSPENSION OF NONINSULATED STATIONARY PIPES, NPS 1/2 TO NPS 2.

- F. VERTICAL-PIPING CLAMPS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SPECIFICATION SECTIONS, INSTALL THE FOLLOWING TYPES:
 1. EXTENSION PIPE OR RISER CLAMPS (MSS TYPE 8): FOR SUPPORT OF PIPE RISERS, NPS 3/4 TO NPS 20.
 2. CARBON- OR ALLOY-STEEL RISER CLAMPS (MSS TYPE 42): FOR SUPPORT OF PIPE RISERS, NPS 3/4 TO NPS 20, IF LONGER ENDS ARE REQUIRED FOR RISER CLAMPS.

- 3.3 GENERAL EQUIPMENT INSTALLATIONS

- A. INSTALL EQUIPMENT TO ALLOW MAXIMUM POSSIBLE HEADROOM UNLESS SPECIFIC MOUNTING HEIGHTS ARE NOT INDICATED.
- B. INSTALL EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO OTHER BUILDING SYSTEMS AND COMPONENTS, UNLESS OTHERWISE INDICATED.
- C. INSTALL MECHANICAL EQUIPMENT TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT OF COMPONENTS. CONNECT EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM INTERFERENCE TO OTHER INSTALLATIONS. EXTEND GREASE FITTINGS TO ACCESSIBLE LOCATIONS.

- D. INSTALL EQUIPMENT TO ALLOW RIGHT OF WAY FOR PIPING INSTALLED AT REQUIRED SLOPE.

END OF SECTION

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. SUBMITTALS:
 1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. ASME COMPLIANCE: ASME B16.10 AND ASME B16.34 FOR FERROUS VALVE DIMENSIONS AND DESIGN CRITERIA.
- B. NSF COMPLIANCE: NSF 61 FOR VALVE MATERIALS FOR POTABLE-WATER SERVICE.

2.2 GENERAL-DUTY VALVES

- A. VALVE SIZES: SAME AS UPSTREAM PIPING UNLESS OTHERWISE INDICATED.
- B. VALVES IN INSULATED PIPING: WITH 2-INCH STEM EXTENSIONS.
- C. END CONNECTIONS: THREADS SHALL COMPLY WITH ANSI B1.20.1. FLANGES SHALL COMPLY WITH ANSI B16.24 FOR BRONZE VALVES. SOLDER-JOINT CONNECTIONS SHALL COMPLY WITH ANSI B16.18.
- D. ONE-PIECE, COPPER-ALLOY BALL VALVES: LEAD FREE BRONZE BODY WITH CHROME-PLATED BRASS BALL, MTFE SEATS, AND 600-PSIG MINIMUM CWP RATING.
- E. TWO-PIECE, COPPER-ALLOY BALL VALVES: LEAD FREE BRONZE BODY WITH FULL-POR, CHROME-PLATED BRASS BALL; RPIFE SEATS; AND 600-PSIG MINIMUM CWP RATING AND BLOW-OUT-PROOF STEM.
- F. LEAD FREE BRONZE, SWING CHECK VALVES: CLASS 125, BRONZE BODY WITH BRONZE DISC AND SEAT.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. USE BALL VALVES FOR SHUTOFF DUTY AND FOR THROTTLING DUTY.
- B. LOCATE VALVES FOR EASY ACCESS AND PROVIDE SEPARATE SUPPORT WHERE NECESSARY.
- C. INSTALL VALVES FOR EACH FIXTURE AND ITEM OF EQUIPMENT.
- D. INSTALL VALVES IN HORIZONTAL PIPING WITH STEM AT OR ABOVE CENTER OF PIPE.
- E. INSTALL VALVES IN A POSITION TO ALLOW FULL STEM MOVEMENT.
- F. INSTALL CHECK VALVES FOR PROPER DIRECTION OF FLOW IN HORIZONTAL POSITION WITH HINGE PIN LEVEL.

END OF SECTION

SECTION 220700 - PLUMBING INSULATION

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. INSULATION INSTALLED INDOORS: FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS ACCORDING TO ASTM E 84.

2.2 INSULATION MATERIALS

- A. MINERAL-FIBER, PREFORMED PIPE INSULATION: COMPLY WITH ASTM C 547, TYPE I, GRADE A, WITH FACTORY-APPLIED ASJ.
 1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - a. JOHNS MANVILLE; MICRO-LOK.
 - b. KNAUF INSULATION; 1000-DEGREE PIPE INSULATION.
 - c. OWENS CORNING; FIBERGLAS PIPE INSULATION.
 2. TYPE I, 850 DEG F MATERIALS: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN, COMPLY WITH ASTM C 547, TYPE I, GRADE A, WITH FACTORY-APPLIED JACKET

REQUIREMENTS ARE SPECIFIED IN "FACTORY-APPLIED JACKETS" ARTICLE.

B. PROTECTIVE SHIELDING PIPE COVERS:

1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
 - a. MCGUIRE MANUFACTURING.
 - b. PLUMBEREX.
 - c. TRUEBRO; A BRAND OF IPS CORPORATION.
 - d. ZURN INDUSTRIES, LLC; TUBULAR BRASS PLUMBING PRODUCTS OPERATION.
2. DESCRIPTION: MANUFACTURED PLASTIC WRAPS FOR COVERING PLUMBING FIXTURE HOT- AND COLD-WATER SUPPLIES AND TRAP AND DRAIN PIPING. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.

2.3 ADHESIVES

- A. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.
 1. FOR INDOOR APPLICATIONS, ADHESIVE SHALL HAVE A VOC CONTENT OF 80 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
 2. ADHESIVE SHALL COMPLY WITH THE TESTING AND PRODUCT REQUIREMENTS OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES' STANDARD PRACTICE FOR THE TESTING OF VOLATILE ORGANIC EMISSIONS FROM VARIOUS SOURCES USING SMALL-SCALE ENVIRONMENTAL CHAMBERS."

2.4 MASTICS

- A. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR USE ON BELOW AMBIENT SERVICES.
 1. FOR INDOOR APPLICATIONS, USE MASTICS THAT HAVE A VOC CONTENT OF 50 G/L OR LESS.
 2. WATER-VAPOR PERMEANCE: ASTM E 96/E 96M, PROCEDURE B, 0.013 PERM AT 43-MIL DRY FILM THICKNESS.
 3. SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180 DEG F.
 4. SOLIDS CONTENT: ASTM D 1644, 58 PERCENT BY VOLUME AND 70 PERCENT BY WEIGHT.
 5. COLOR: WHITE.
- B. BREATHER MASTIC: WATER BASED; SUITABLE FOR INDOOR AND OUTDOOR USE ON ABOVE AMBIENT SERVICES.
 1. WATER-VAPOR PERMEANCE: ASTM F 1249, 1.8 PERMS AT 0.0625-INCH DRY FILM THICKNESS.
 2. SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180 DEG F.
 3. SOLIDS CONTENT: 60 PERCENT BY VOLUME AND 66 PERCENT BY WEIGHT.
 4. COLOR: WHITE.

2.5 SEALANTS

- A. JOINT SEALANTS:
 1. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
 2. PERMANENTLY FLEXIBLE, ELASTOMERIC SEALANT.
 3. SERVICE TEMPERATURE RANGE: MINUS 100 TO PLUS 300 DEG F.
 4. COLOR: WHITE OR GRAY.
 5. FOR INDOOR APPLICATIONS, SEALANTS SHALL HAVE A VOC CONTENT OF 420 G/L OR LESS.
- B. ASJ FLASHING SEALANTS:
 1. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
 2. FIRE- AND WATER-RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT.
 3. SERVICE TEMPERATURE RANGE: MINUS 100 TO PLUS 250 DEG F.
 4. COLOR: WHITE.
 5. FOR INDOOR APPLICATIONS, SEALANTS SHALL HAVE A VOC CONTENT OF 420 G/L OR LESS.

2.6 FACTORY-APPLIED JACKETS

- A. INSULATION SYSTEM SCHEDULES INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS. WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:
 1. ASJ: WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C 1136, TYPE I.

2.7 TAPES

- A. ASJ TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE, COMPLYING WITH ASTM C 1136.
 1. WIDTH: 3 INCHES.
 2. THICKNESS: 11.5 MILS.
 3. ADHESION: 90 OUNCES FORCE/INCH IN WIDTH.
 4. ELONGATION: 2 PERCENT.
 5. TENSILE STRENGTH: 40 LBF/INCH IN WIDTH.
 6. ASJ TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES OF ASJ TAPE.

PART 3 - EXECUTION

3.1 PIPE INSULATION INSTALLATION

- A. COMPLY WITH REQUIREMENTS OF THE MIDWEST INSULATION CONTRACTORS ASSOCIATION'S "NATIONAL COMMERCIAL & INDUSTRIAL INSULATION STANDARDS" FOR INSULATION INSTALLATION ON PIPES AND EQUIPMENT.
- B. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.
- C. INSULATION INSTALLATION AT FIRE-RATED WALL, PARTITION, AND FLOOR PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH PENETRATIONS. SEAL PENETRATIONS. COMPLY WITH REQUIREMENTS IN SECTION 078400.
- D. MINERAL-FIBER INSULATION INSTALLATION:
 1. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES: WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
 2. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE AMBIENT SURFACES, SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6 INCHES O.C.
 3. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS BUT SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.

E. INTERIOR PIPING SYSTEM APPLICATIONS: INSULATE THE FOLLOWING PIPING SYSTEMS:

1. DOMESTIC HOT WATER.
2. RECIRCULATED DOMESTIC HOT WATER.
3. EXPOSED WATER SUPPLIES AND SANITARY DRAINS OF FIXTURES FOR PEOPLE WITH DISABILITIES.

F. DO NOT APPLY INSULATION TO THE FOLLOWING SYSTEMS, MATERIALS, AND EQUIPMENT:

1. FLEXIBLE CONNECTORS.
2. SANITARY DRAINAGE AND VENT PIPING.
3. DRAINAGE PIPING LOCATED IN CRAWLSPACES UNLESS OTHERWISE INDICATED.
4. CHROME-PLATED PIPES AND FITTINGS, EXCEPT FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES.
5. PIPING SPECIALTIES, INCLUDING AIR CHAMBERS, UNIONS, STRAINERS, CHECK VALVES, PLUG VALVES, AND FLOW REGULATORS.

3.2 INDOOR PIPING INSULATION SCHEDULE

A. DOMESTIC COLD WATER:

1. NPS 1 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:
 - a. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1/2 INCH THICK.
2. NPS 1-1/4 AND LARGER: INSULATION SHALL BE THE FOLLOWING:
 - a. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH THICK.

B. DOMESTIC HOT AND RECIRCULATED HOT WATER:

1. NPS 2 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:
 - a. MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH THICK.

C. EXPOSED SANITARY DRAINS, DOMESTIC WATER, DOMESTIC HOT WATER, AND STOPS FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES:

1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
 - a. PROTECTIVE SHIELDING PIPING COVERS.
 - b. MANUFACTURED PLASTIC WRAPS FOR COVERING PLUMBING FIXTURE HOT- AND COLD-WATER SUPPLIES AND TRAP AND DRAIN PIPING. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.

END OF SECTION

SECTION 221116 - DOMESTIC WATER PIPING

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. POTABLE-WATER PIPING AND COMPONENTS SHALL COMPLY WITH NSF 14 AND NSF 61.

2.2 PIPE AND FITTINGS

- A. CPVC PIPING: ASTM F 441/F 441M, SCHEDULE 40 PIPE WITH ASTM F 438, CPVC SCHEDULE 40 SOCKET-TYPE FITTINGS.
 - B. UPONOR PEX TUBE AND FITTINGS: ASTM F 877, SDR 9 PEX TUBING AND ASTM F 1807, METAL INSERT-TYPE FITTINGS WITH COPPER OR STAINLESS-STEEL CRIMP RINGS.
 1. MANIFOLD: ASTM F 877 PLASTIC OR CORROSION-RESISTANT-METAL ASSEMBLY, WITH A PLASTIC OR CORROSION-RESISTANT-METAL VALVE FOR EACH OUTLET.

C. SPECIAL-DUTY VALVES:

1. COMPLY WITH REQUIREMENTS IN SECTION 220523 "GENERAL-DUTY VALVES FOR PLUMBING PIPING" FOR GENERAL-DUTY METAL VALVES.
2. COMPLY WITH REQUIREMENTS IN SECTION 221119 "DOMESTIC WATER PIPING SPECIALTIES" FOR BALANCING VALVES, DRAIN VALVES, BACKFLOW PREVENTERS, AND VACUUM BREAKERS.

- D. TRANSITION FITTINGS: MANUFACTURED PIPING COUPLING OR SPECIFIED PIPING SYSTEM FITTING, SAME SIZE AS PIPES TO BE JOINED AND PRESSURE RATING AT LEAST EQUAL TO PIPES TO BE JOINED.

- E. FLEXIBLE CONNECTORS: STAINLESS-STEEL, CORRUGATED-METAL TUBING WITH WIRE-BRAID COVERING, WORKING-PRESSURE RATING A MINIMUM OF 200 PSIG.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR BASIC PIPING INSTALLATION REQUIREMENTS.
- B. INSTALL WALL PENETRATION SYSTEM AT EACH SERVICE PIPE PENETRATION THROUGH FOUNDATION WALL. MAKE INSTALLATION WATER-TIGHT. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR WALL PENETRATION SYSTEMS.

- C. INSTALL SHUTOFF VALVE, HOSE-END DRAIN VALVE, STRAINER, PRESSURE GAGE, AND TEST TEE WITH VALVE, INSIDE THE BUILDING AT EACH DOMESTIC WATER SERVICE ENTRANCE. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR PRESSURE GAGES AND SECTION 221119 "DOMESTIC WATER PIPING SPECIALTIES" FOR DRAIN VALVES AND STRAINERS.

- D. INSTALL DOMESTIC WATER PIPING WITHOUT PITCH FOR HORIZONTAL PIPING AND PLUMB FOR VERTICAL PIPING.

- E. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR BASIC PIPING JOINT CONSTRUCTION.
 1. SOLDERED JOINTS: COMPLY WITH PROCEDURES IN ASTM B 828 UNLESS OTHERWISE INDICATED.

- F. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR PIPE HANGER AND SUPPORT DEVICES.
 1. INSTALL VINYL-COATED HANGERS FOR CPVC PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
 - a. NPS 1 AND SMALLER: 36 INCHES WITH 3/8-INCH ROD.
 - b. NPS 1-1/4 TO NPS 2: 48 INCHES WITH 3/8-INCH ROD.
 - c. NPS 2-1/2 TO NPS 3-1/2: 48 INCHES WITH 1/2-INCH ROD.
 - d. INSTALL SUPPORTS FOR VERTICAL CPVC PIPING EVERY 60 INCHES FOR NPS 1 AND SMALLER, AND EVERY 72 INCHES FOR NPS 1-1/4 AND LARGER.
 2. INSTALL VINYL-COATED HANGERS FOR PEX PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
 - a. NPS 1 AND SMALLER: 32 INCHES WITH 3/8-INCH ROD.
 - b. INSTALL HANGERS FOR VERTICAL PEX PIPING EVERY 48 INCHES.

3.2 INSPECTING AND CLEANING

- A. INSPECT AND TEST PIPING SYSTEMS AS FOLLOWS:
 1. FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
 2. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED.
- B. CLEAN AND DISINFECT POTABLE DOMESTIC WATER PIPING BY FILLING SYSTEM WITH WATER/CHLORINE SOLUTION WITH AT LEAST 50 PPM OF CHLORINE. ISOLATE WITH VALVES AND ALLOW TO STAND FOR 24 H

SPECIFICATIONS - DIVISION 22 - PLUMBING (CONTINUED)

- 3.4 VALVE SCHEDULE
- A. DRAWINGS INDICATE VALVE TYPES TO BE USED. WHERE SPECIFIC VALVE TYPES ARE NOT INDICATED, THE FOLLOWING REQUIREMENTS APPLY:
1. SHUTOFF DUTY: USE BRONZE BALL VALVES FOR PIPING NPS 2 AND SMALLER.
 2. THROTTLING DUTY: USE BRONZE BALL VALVES FOR PIPING NPS 2 AND SMALLER.
 3. HOT-WATER-PIPING, BALANCING DUTY: MEMORY-STOP BALANCING VALVES.
 4. DRAIN DUTY: HOSE-END DRAIN VALVES.
- B. INSTALL BALL VALVES CLOSE TO MAIN ON EACH BRANCH AND RISER SERVING TWO OR MORE PLUMBING FIXTURES OR EQUIPMENT CONNECTIONS AND WHERE INDICATED.
- C. INSTALL BALL VALVES ON INLET TO EACH PLUMBING EQUIPMENT ITEM, ON EACH SUPPLY TO EACH PLUMBING FIXTURE NOT HAVING STOPS ON SUPPLIES, AND ELSEWHERE AS INDICATED.
- D. INSTALL DRAIN VALVE AT BASE OF EACH RISER, AT LOW POINTS OF HORIZONTAL RUNS, AND WHERE REQUIRED TO DRAIN WATER DISTRIBUTION PIPING SYSTEM.
- E. INSTALL SWING CHECK VALVE ON DISCHARGE SIDE OF EACH PUMP AND ELSEWHERE AS INDICATED.
- F. INSTALL BALL VALVES IN EACH HOT-WATER CIRCULATING LOOP AND DISCHARGE SIDE OF EACH PUMP.

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 2 - PRODUCTS

- 2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES
- A. POTABLE-WATER PIPING AND COMPONENTS SHALL COMPLY WITH NSF 61 AND NSF 14.

- 2.2 PERFORMANCE REQUIREMENTS
- A. MINIMUM WORKING PRESSURE FOR DOMESTIC WATER PIPING SPECIALTIES: 125 PSIG UNLESS OTHERWISE INDICATED.

- 2.3 MANUFACTURED UNITS
- A. PIPE-APPLIED, ATMOSPHERIC-TYPE VACUUM BREAKERS:

1. STANDARD: ASSE 1001.
2. SIZE: NPS 1/4 TO NPS 3, AS REQUIRED TO MATCH CONNECTED PIPING.
3. BODY: BRONZE.
4. INLET AND OUTLET CONNECTIONS: THREADED.
5. FINISH: CHROME PLATED.

- B. HOSE-CONNECTION VACUUM BREAKERS:
1. STANDARD: ASSE 1011.
 2. BODY: BRONZE, NONREMOVABLE, WITH MANUAL DRAIN.
 3. OUTLET CONNECTION: GARDEN-HOSE THREADED COMPLYING WITH ASME B1.20.7.
 4. FINISH: CHROME OR NICKEL PLATED BRONZE.

- C. REDUCED-PRESSURE-PRINCIPLE BACKFLOW PREVENTERS:
1. STANDARD: ASSE 1013.
 2. OPERATION: CONTINUOUS-PRESSURE APPLICATIONS.
 3. PRESSURE LOSS: 12 PSIG MAXIMUM, THROUGH MIDDLE THIRD OF FLOW RANGE.
 4. BODY: LEAD FREE BRONZE OR STAINLESS STEEL FOR NPS 2 AND SMALLER.
 5. END CONNECTIONS: THREADED FOR NPS 2 AND SMALLER.
 6. CONFIGURATION: DESIGNED FOR HORIZONTAL, STRAIGHT-THROUGH FLOW.
 7. ACCESSORIES:
 - a. VALVES NPS 2 AND SMALLER: BALL TYPE WITH THREADED ENDS ON INLET AND OUTLET.
 - b. AIR-GAP FITTING: ASME A112.1.2, MATCHING BACKFLOW-PREVENTER CONNECTION.

- D. WATER REGULATORS:
1. STANDARD: ASSE 1003.
 2. PRESSURE RATING: INITIAL WORKING PRESSURE OF 150 PSIG.
 3. DESIGN OUTLET PRESSURE SETTING: 60 PSIG.
 4. BODY: LEAD FREE BRONZE WITH CHROME-PLATED FINISH FOR NPS 2 AND SMALLER.
 5. END CONNECTIONS: THREADED FOR NPS 2 AND SMALLER.

- E. MEMORY-STOP BALANCING VALVES:
1. STANDARD: MSS SP-110 FOR TWO-PIECE, COPPER-ALLOY BALL VALVES.
 2. PRESSURE RATING: 400-PSIG MINIMUM CWP.
 3. SIZE: NPS 2 OR SMALLER.
 4. BODY: LEAD FREE COPPER ALLOY.
 5. PORT: FULL PORT.
 6. BALL: CHROME-PLATED BRASS.
 7. SEATS AND SEALS: REPLACEABLE.
 8. END CONNECTIONS: SOLDER JOINT OR THREADED.
 9. HANDLE: VINYL-COVERED STEEL WITH MEMORY-SETTING DEVICE.

- F. THERMOSTATIC, WATER MIXING VALVES:
1. STANDARD: ASSE 1017.
 2. PRESSURE RATING: 125 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
 3. TYPE: EXPOSED-MOUNTED, THERMOSTATICALLY CONTROLLED, WATER MIXING VALVE.
 4. MATERIAL: LEAD FREE BRONZE BODY WITH CORROSION-RESISTANT INTERIOR COMPONENTS.
 5. CONNECTIONS: THREADED OR UNION INLETS AND OUTLET.
 6. ACCESSORIES: MANUAL TEMPERATURE CONTROL, CHECK STOPS ON HOT- AND COLD-WATER SUPPLIES, AND ADJUSTABLE, TEMPERATURE-CONTROL HANDLE.
 7. TEMPERED-WATER SETTING: AS SPECIFIED ON DRAWINGS.
 8. PRESSURE DROP AT DESIGN FLOW RATE: NOT EXCEED 15 PSIG.
 9. VALVE FINISH: CHROME PLATED.
 10. PIPING FINISH: CHROME PLATED.

- G. Y-PATTERN STRAINERS:
1. STANDARD: ASSE 1017.
 2. PRESSURE RATING: 125 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
 3. TYPE: EXPOSED-MOUNTED, THERMOSTATICALLY CONTROLLED, WATER MIXING VALVE.
 4. MATERIAL: LEAD FREE BRONZE BODY WITH CORROSION-RESISTANT INTERIOR COMPONENTS.
 5. CONNECTIONS: THREADED OR UNION INLETS AND OUTLET.
 6. ACCESSORIES: MANUAL TEMPERATURE CONTROL, CHECK STOPS ON HOT- AND COLD-WATER SUPPLIES, AND ADJUSTABLE, TEMPERATURE-CONTROL HANDLE.
 7. TEMPERED-WATER SETTING: AS SPECIFIED ON DRAWINGS.
 8. PRESSURE DROP AT DESIGN FLOW RATE: NOT EXCEED 15 PSIG.
 9. VALVE FINISH: CHROME PLATED.
 10. PIPING FINISH: CHROME PLATED.

- H. HOSE BIBBS:
1. STANDARD: ASME A112.18.1 FOR SEDIMENT FAUCETS.

2. BODY MATERIAL: BRONZE.
3. SEAT: BRONZE, REPLACEABLE.
4. SUPPLY CONNECTIONS: NPS 3/4 THREADED OR SOLDER-JOINT INLET.
5. OUTLET CONNECTION: GARDEN-HOSE THREAD COMPLYING WITH ASME B1.20.7.
6. PRESSURE RATING: 125 PSIG.
7. VACUUM BREAKER: INTEGRAL, NONREMOVABLE, DRAINABLE, HOSE-CONNECTION VACUUM BREAKER COMPLYING WITH ASSE 1011.
8. FINISH FOR EQUIPMENT ROOMS: ROUGH BRONZE, OR CHROME OR NICKEL PLATED.
9. FINISH FOR SERVICE AREAS: CHROME OR NICKEL PLATED.
10. FINISH FOR FINISHED ROOMS: CHROME OR NICKEL PLATED.
11. OPERATION FOR EQUIPMENT ROOMS: WHEEL HANDLE OR OPERATING KEY.
12. OPERATION FOR SERVICE AREAS: OPERATING KEY.
13. OPERATION FOR FINISHED ROOMS: OPERATING KEY.
14. INCLUDE OPERATING KEY WITH EACH OPERATING-KEY HOSE BIBB.
15. INCLUDE INTEGRAL WALL FLANGE WITH EACH CHROME- OR NICKEL-PLATED HOSE BIBB.

SECTION 221123 - DOMESTIC WATER PUMPS

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

- 2.2 DOMESTIC WATER PUMPS
- A. HOT WATER CIRCULATOR PUMP, RP-1:

1. BASIS-OF-DESIGN PRODUCT: GRUNDFOS ALPHA 15-55SF, AS INDICATED ON DRAWINGS.

2. CASING: STAINLESS STEEL WITH COMPANION-FLANGE CONNECTIONS.
 3. MOTOR: AUTOMATIC ADJUSTABLE, WET-ROTOR, PERMANENT MAGNET.
- 2.3 MOTORS
- A. COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS FOR MOTORS.
- B. MOTOR SIZE: MINIMUM SIZE AS INDICATED. IF NOT INDICATED, LARGE ENOUGH SO DRIVEN LOAD WILL NOT REQUIRE MOTOR TO OPERATE IN SERVICE FACTOR RANGE ABOVE 1.0.

- 2.4 CONTROLS
- A. TIMERS: ELECTRIC, FOR CONTROL OF HOT-WATER CIRCULATION PUMP.
1. TYPE: PROGRAMMABLE, SEVEN-DAY CLOCK WITH MANUAL OVERRIDE ON-OFF SWITCH.
 2. PROGRAMMABLE SEQUENCE OF OPERATION: UP TO TWO ON-OFF CYCLES EACH DAY FOR SEVEN DAYS.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- A. INSTALL PUMPS WITH ACCESS FOR PERIODIC MAINTENANCE, INCLUDING REMOVAL OF MOTORS, IMPELLERS, COUPLINGS, AND ACCESSORIES.
- B. SUPPORT PUMPS AND PIPING SO WEIGHT OF PIPING IS NOT SUPPORTED BY PUMP VOLUTE.
- C. INSTALL ELECTRICAL CONNECTIONS FOR POWER, CONTROLS, AND DEVICES.
- D. SUSPEND IN-LINE PUMPS INDEPENDENT FROM PIPING. USE CONTINUOUS-THREAD HANGER RODS AND VIBRATION ISOLATION HANGERS. FABRICATE BRACKETS OR SUPPORTS AS REQUIRED FOR PUMPS.
- E. CONNECT PIPING WITH VALVES THAT ARE AT LEAST THE SAME SIZE AS PIPING CONNECTING TO PUMPS.
- F. INSTALL SUCTION AND DISCHARGE PIPE SIZES EQUAL TO OR GREATER THAN DIAMETER OF PUMP NOZZLES.
- G. INSTALL SHUTOFF VALVE AND STRAINER ON SUCTION SIDE OF PUMPS.
- H. INSTALL NONSLAM CHECK VALVE AND THROTTLING VALVE ON DISCHARGE SIDE OF PUMPS.
- I. INSTALL THERMOSTATS IN HOT-WATER RETURN PIPING.
- J. INSTALL TEST PLUGS ON SUCTION AND DISCHARGE OF EACH PUMP. INSTALL AT INTEGRAL PRESSURE GAGE TAPPINGS WHERE PROVIDED.

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- A. COMPONENTS AND INSTALLATION SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING MINIMUM WORKING PRESSURE UNLESS OTHERWISE INDICATED:
1. SOIL, WASTE, AND VENT PIPING: 10-FOOT HEAD OF WATER.
- B. PIPING MATERIALS SHALL BEAR LABEL, STAMP, OR OTHER MARKINGS OF SPECIFIED TESTING AGENCY.
- C. COMPLY WITH NSF/ANSI 14, "PLASTICS PIPING SYSTEMS COMPONENTS AND RELATED MATERIALS," FOR PLASTIC PIPING COMPONENTS.

2.2 PIPES AND FITTINGS

- A. PVC PLASTIC, DWV PIPE AND FITTINGS: ASTM D 2665, SCHEDULE 40, PLAIN ENDS WITH PVC SOCKET-TYPE, DWV PIPE FITTINGS.
1. ADHESIVE PRIMER: ASTM F 656.
 - a. ADHESIVE PRIMER SHALL HAVE A VOC CONTENT OF 550 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
 2. SOLVENT CEMENT: ASTM D 2564.
 - a. PVC SOLVENT CEMENT SHALL HAVE A VOC CONTENT OF 510 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

PART 3 - EXECUTION

- 3.1 PIPING INSTALLATION
- A. INSTALL WALL PENETRATION SYSTEM AT EACH PIPE PENETRATION THROUGH FOUNDATION WALL. MAKE INSTALLATION WATERTIGHT. COMPLY WITH REQUIREMENTS IN SECTION 220513 "COMMON WORK RESULTS FOR PLUMBING" FOR WALL PENETRATION SYSTEMS.

- B. MAKE CHANGES IN DIRECTION FOR SOIL AND WASTE DRAINAGE AND VENT PIPING USING APPROPRIATE BRANCHES, BENDS, AND LONG-SWEEP BENDS. SANITARY TEES AND SHORT-SWEEP 1/4 BENDS MAY BE USED ON VERTICAL STACKS IF CHANGE IN DIRECTION OF FLOW IS FROM HORIZONTAL TO VERTICAL. USE LONG-TURN, DOUBLE Y-BRANCH AND 1/8-BEND FITTINGS IF TWO FIXTURES ARE INSTALLED BACK TO BACK OR SIDE BY SIDE WITH COMMON DRAIN PIPE. STRAIGHT TEES, ELBOWS, AND CROSSES MAY BE USED ON VENT LINES. DO NOT CHANGE DIRECTION OF FLOW MORE THAN 90 DEGREES. USE PROPER SIZE OF STANDARD INCREASERS AND REDUCERS IF PIPES OF DIFFERENT SIZES ARE CONNECTED. REDUCING SIZE OF DRAINAGE PIPING IN DIRECTION OF FLOW IS PROHIBITED.
- C. LAY BURIED BUILDING DRAINAGE PIPING BEGINNING AT LOW POINT OF EACH SYSTEM. INSTALL TRUE TO GRADES AND ALIGNMENT INDICATED, WITH UNBROKEN CONTINUITY OF INVERT. PLACE HUB ENDS OF PIPING UPSTREAM. INSTALL REQUIRED GASKETS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR USE OF LUBRICANTS, CEMENTS, AND OTHER INSTALLATION REQUIREMENTS. MAINTAIN SWAB IN PIPING AND PULL PAST EACH JOINT AS COMPLETED.
- D. INSTALL SOIL AND WASTE DRAINAGE AND VENT PIPING AT THE FOLLOWING MINIMUM SLOPES, UNLESS OTHERWISE INDICATED:
1. HORIZONTAL SANITARY DRAINAGE PIPING: 2 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 2-1/2 AND SMALLER; 1 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 3 AND LARGER.
 2. VENT PIPING: ALL VENT AND BRANCH VENT PIPING SHALL BE GRADED AND CONNECTED TO DRAIN BACK TOWARD VERTICAL FIXTURE VENT OR TOWARD VENT STACK.
- G. INSTALL PVC SOIL AND WASTE DRAINAGE AND VENT PIPING ACCORDING TO ASTM D 2665.
- H. INSTALL UNDERGROUND PVC SOIL AND WASTE DRAINAGE PIPING ACCORDING TO ASTM D 2321.
- I. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT IS INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION.
- J. COMPLY WITH REQUIREMENTS IN SECTION 220513 "COMMON WORK RESULTS FOR PLUMBING" FOR BASIC PIPING JOINT CONSTRUCTION.
- K. COMPLY WITH REQUIREMENTS IN SECTION 220513 "COMMON WORK RESULTS FOR PLUMBING" FOR PIPE HANGER AND SUPPORT DEVICES.

3.2 PIPE SCHEDULE

- A. ABOVEGROUND APPLICATIONS: PVC PLASTIC, DWV PIPE AND FITTINGS WITH SOLVENT-CEMENTED JOINTS, COPPER DRAINAGE TUBE AND FITTINGS WITH SOLDERED JOINTS. PVC PLASTIC PIPE AND FITTINGS SHALL NOT BE PERMITTED FOR INSTALLATION IN RETURN AIR PLENUMS OR LOCATIONS EXPOSED TO RETURN AIR PLENUMS.
- B. BELOWGROUND APPLICATIONS: PVC PLASTIC, DWV PIPE AND DRAINAGE-PATTERN FITTINGS WITH CEMENTED JOINTS.

END OF SECTION

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

- 1.1 SECTION REQUIREMENTS
- A. SUBMITTALS:

1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
 - a. INCLUDE RATED CAPACITIES, OPERATING CHARACTERISTICS, AND ACCESSORIES FOR GREASE INTERCEPTORS.

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- A. DRAINAGE PIPING SPECIALTIES SHALL BEAR LABEL, STAMP, OR OTHER MARKINGS OF SPECIFIED TESTING AGENCY.
- 2.2 MANUFACTURED UNITS - AS INDICATED ON DRAWINGS
- A. FLOOR CLEANOUTS: PER STANDARD ASME A112.36.2M-2002.
- B. WALL CLEANOUTS:
- C. FLOOR DRAINS: PER STANDARD ASME A112.6.3-2001.
- D. CAST IRON FLOOR SINKS: PER STANDARD ASME A112.6.7-2001.
- E. PVC PLASTIC FLOOR SINKS: PER STANDARD ASME A112.6.7-2001.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- A. INSTALL CLEANOUTS AT GRADE AND EXTEND TO WHERE BUILDING SANITARY DRAINS CONNECT TO BUILDING SANITARY SEWERS.
- B. INSTALL FLOOR DRAINS AT LOW POINTS OF SURFACE AREAS TO BE DRAINED. SET GRATES OF DRAINS FLUSH WITH FINISHED FLOOR UNLESS OTHERWISE INDICATED.

1. INSTALL FLOOR-DRAIN FLASHING COLLAR OR FLANGE SO NO LEAKAGE OCCURS BETWEEN DRAIN AND ADJOINING FLOORING. MAINTAIN INTEGRITY OF WATERPROOF MEMBRANES WHERE PENETRATED.
 2. INSTALL INDIVIDUAL TRAPS FOR FLOOR DRAINS CONNECTED TO SANITARY BUILDING DRAIN, UNLESS OTHERWISE INDICATED.
- C. PROVIDE A 2" MINIMUM AIR-GAP OR 2 TIMES THE PIPE DIAMETER (WHICHEVER IS GREATER) ON INDIRECT-WASTE PIPING DISCHARGE INTO SANITARY DRAINAGE SYSTEM.

END OF SECTION

SECTION 2234 00 - FUEL-FIRED, DOMESTIC WATER HEATERS

PART 1 - GENERAL

- 1.1 SUMMARY
- A. SECTION INCLUDES:

1. COMMERCIAL, GAS-FIRED, TANKLESS, DOMESTIC-WATER HEATERS.
2. DOMESTIC-WATER HEATER ACCESSORIES.

1.2 QUALITY ASSURANCE

- A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
- B. NSF COMPLIANCE: FABRICATE AND LABEL EQUIPMENT COMPONENTS THAT WILL BE IN CONTACT WITH POTABLE WATER TO COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS."

1.3 WARRANTY

- A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF FUEL-FIRED, DOMESTIC-WATER HEATERS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1. FAILURES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - a. STRUCTURAL FAILURES INCLUDING STORAGE TANK AND SUPPORTS.
 - b. FAULTY OPERATION OF CONTROLS.
 - c. DETERIORATION OF METALS, METAL FINISHES, AND OTHER MATERIALS BEYOND NORMAL USE.

2. WARRANTY PERIODS: FROM DATE OF SUBSTANTIAL COMPLETION.
 - a. GAS-FIRED, TANKLESS, DOMESTIC-WATER HEATERS:
 - 1) HEAT EXCHANGER: TEN YEARS.
 - 2) CONTROLS AND OTHER COMPONENTS: FIVE YEARS.
 - 3) THERMAL EXPANSION TANK: FIVE YEARS.

PART 2 - PRODUCTS

- A. DOMESTIC WATER COMPRESSION TANKS:

1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING; RETAIN OPTION IN FIRST SUBPARAGRAPH BELOW IF MANUFACTURER'S NAME AND MODEL NUMBER ARE INDICATED IN SCHEDULES OR PLANS ON DRAWINGS; DELETE OPTION AND INSERT MANUFACTURER'S NAME AND MODEL NUMBER IF NOT INCLUDED ON DRAWINGS.
 - a. AMTROL INC.
 - b. RHEEM-RUIUD.
 - c. WAITS WATER TECHNOLOGIES, CO.
 - d. WESSELS TANK CO.

2. DESCRIPTION: STEEL, PRESSURE-RATED TANK CONSTRUCTED WITH WELDED JOINTS AND FACTORY-INSTALLED BUTYL-RUBBER DIAPHRAGM. INCLUDE AIR PRECHARGE TO MINIMUM SYSTEM-OPERATING PRESSURE AT TANK.

3. CONSTRUCTION:
 - a. TAPPINGS: FACTORY-FABRICATED STEEL, WELDED TO TANK BEFORE TESTING AND LABELING. INCLUDE ASME B1.20.1 PIPE THREAD.
 - b. INTERIOR FINISH: COMPLY WITH NSF 61 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING FINISH INTO AND THROUGH TANK FITTINGS AND OUTLETS.
 - c. AIR-CHARGING VALVE: FACTORY INSTALLED.

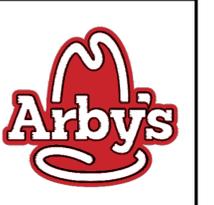
- C. GAS SHUTOFF VALVES: ANSI Z21.15/CSA 9.1-M, MANUALLY OPERATED. FURNISH FOR INSTALLATION IN PIPING.

- D. GAS PRESSURE REGULATORS: ANSI Z21.18/CSA 6.3, APPLIANCE TYPE. INCLUDE 1/2-PSIG PRESSURE RATING AS REQUIRED TO MATCH GAS SUPPLY.

- E. AUTOMATIC GAS VALVES: ANSI Z21.21/CSA 6.5, APPLIANCE, ELECTRICALLY OPERATED, ON-OFF AUTOMATIC VALVE.

- F. SOURCE QUALITY CONTROL

1. HYDROSTATICALLY TEST COMMERCIAL DOMESTIC-WATER HEATERS TO MINIMUM OF ONE AND ONE-HALF TIMES PRESSURE RATING BEFORE SHIPMENT.
2. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
3. PREPARE TEST AND INSPECTION REPORTS.



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PLUMBING SPECIFICATIONS

SPECIFICATIONS - DIVISION 22 - PLUMBING (CONTINUED)

PART 3 - EXECUTION 3.1 DOMESTIC WATER HEATER INSTALLATION

- A. INSTALL PRESSURE RELIEF VALVES IN WATER PIPING FOR DOMESTIC WATER HEATERS WITHOUT STORAGE. EXTEND COMMERCIAL-WATER-HEATER RELIEF-VALVE OUTLET, WITH DRAIN PIPING SAME AS DOMESTIC-WATER PIPING IN CONTINUOUS DOWNWARD PITCH, AND DISCHARGE BY POSITIVE AIR GAP ONTO CLOSEST FLOOR DRAIN.
- B. INSTALL WATER-HEATER DRAIN PIPING AS INDIRECT WASTE TO SPILL BY POSITIVE AIR GAP INTO OPEN DRAINS OR OVER FLOOR DRAINS. INSTALL HOSE-END DRAIN VALVES AT LOW POINTS IN WATER PIPING FOR DOMESTIC-WATER HEATERS THAT DO NOT HAVE TANK DRAINS.
- C. INSTALL THERMOMETER ON OUTLET PIPING OF DOMESTIC-WATER HEATERS. COMPLY WITH REQUIREMENTS FOR THERMOMETERS SPECIFIED IN SECTION 220500 - "COMMON WORK RESULTS FOR PLUMBING".

3.2 FIELD QUALITY CONTROL

- A. PERFORM TESTS AND INSPECTIONS.
 - 1. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN TESTING.
 - 2. LEAK TEST: AFTER INSTALLATION, CHARGE SYSTEM AND TEST FOR LEAKS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.
 - 3. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER OPERATION.
 - 4. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.
- B. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
- C. PREPARE TEST AND INSPECTION REPORTS.

3.3 DEMONSTRATION

- A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS.

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. SUBMITTALS:
 - 1. PRODUCT DATA FOR EACH TYPE OF PLUMBING FIXTURE, INCLUDING TRIM, FITTINGS, ACCESSORIES, APPLIANCES, APPURTENANCES, EQUIPMENT, AND SUPPORTS.
 - 2. DOCUMENTATION INDICATING FLOW AND WATER CONSUMPTION REQUIREMENTS.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN ICC A117.1, "ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES"; PUBLIC LAW 90-480, "ARCHITECTURAL BARRIERS ACT"; AND PUBLIC LAW 101-336, "AMERICANS WITH DISABILITIES ACT" FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES.
- B. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN PUBLIC LAW 102-486, "ENERGY POLICY ACT," ABOUT WATER FLOW AND CONSUMPTION RATES FOR PLUMBING FIXTURES.
- C. NSF STANDARD: COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS," FOR FIXTURE MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER.
- D. FIXTURES SHALL BE PROVIDED AS SCHEDULED ON THE DRAWINGS.

PART 3 - EXECUTION

3.1 INSTALLATIONS

- A. INSTALL FITTING INSULATION KITS ON FIXTURES FOR PEOPLE WITH DISABILITIES.
- B. INSTALL FIXTURES WITH FLANGES AND GASKET SEALS.
- C. INSTALL TANKS FOR ACCESSIBLE, TANK-TYPE WATER CLOSETS WITH LEVER HANDLE MOUNTED ON WIDE SIDE OF COMPARTMENT.
- D. FASTEN WALL-HANGING PLUMBING FIXTURES SECURELY TO SUPPORTS ATTACHED TO BUILDING SUBSTRATE WHEN SUPPORTS ARE SPECIFIED, AND TO BUILDING WALL CONSTRUCTION WHERE NO SUPPORT IS INDICATED.
- E. FASTEN FLOOR-MOUNTED FIXTURES TO SUBSTRATE. FASTEN FIXTURES HAVING HOLES FOR SECURING FIXTURE TO WALL CONSTRUCTION, TO REINFORCEMENT BUILT INTO WALLS.
- F. FASTEN WALL-MOUNTED FITTINGS TO REINFORCEMENT BUILT INTO WALLS.
- G. FASTEN COUNTER-MOUNTING PLUMBING FIXTURES TO CASEWORK.
- H. SECURE SUPPLIES TO SUPPORTS OR SUBSTRATE WITHIN PIPE SPACE BEHIND FIXTURE.
- I. SET MOP BASINS IN LEVELING BED OF CEMENT GROUT.
- J. INSTALL INDIVIDUAL SUPPLY INLETS, SUPPLY STOPS, SUPPLY RISERS, AND TUBULAR BRASS TRAPS WITH CLEANOUTS AT FIXTURE.
- K. INSTALL WATER-SUPPLY STOP VALVES IN ACCESSIBLE LOCATIONS.
- L. INSTALL TRAPS ON FIXTURE OUTLETS. OMIT TRAPS ON FIXTURES HAVING INTEGRAL TRAPS. OMIT TRAPS ON INDIRECT WASTES UNLESS OTHERWISE INDICATED.
- M. INSTALL ESCUTCHEONS AT WALL, FLOOR, AND CEILING PENETRATIONS IN EXPOSED, FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK. USE DEEP-PATTERN ESCUTCHEONS WHERE REQUIRED TO CONCEAL PROTRUDING PIPE FITTINGS.
- N. SEAL JOINTS BETWEEN FIXTURES AND WALLS, FLOORS, AND COUNTERS USING SANITARY-TYPE, ONE-PART, MILDEW-RESISTANT, SILICONE SEALANT. MATCH SEALANT COLOR TO FIXTURE COLOR.
- O. INSTALL PIPING CONNECTIONS BETWEEN PLUMBING FIXTURES AND PIPING SYSTEMS AND PLUMBING EQUIPMENT. INSTALL INSULATION ON SUPPLIES AND DRAINS OF FIXTURES FOR PEOPLE WITH DISABILITIES.

SECTION 221623 - FACILITY NATURAL-GAS PIPING

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. MINIMUM OPERATING-PRESSURE RATINGS:
 - 1. PIPING AND VALVES: 100 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
- B. NATURAL-GAS SYSTEM PRESSURE WITHIN BUILDING: ONE DISTRIBUTION PRESSURE, 14" W.C., BUT NOT MORE THAN 2.0 PSIG.
- 2.2 PIPES, TUBES, AND FITTINGS
 - A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL, SCHEDULE 40, TYPE E OR S, GRADE B.
 - 1. MALLEABLE-IRON THREADED FITTINGS: ASME B16.3, CLASS 150, STANDARD PATTERN.
 - 2. WROUGHT-STEEL WELDING FITTINGS: ASTM A 234/A 234M FOR BUTT WELDING AND SOCKET WELDING.
 - 3. UNIONS: ASME B16.39, CLASS 150, MALLEABLE IRON WITH BRASS-TO-IRON SEAT, GROUND JOINT, AND THREADED ENDS.
 - 4. PROTECTIVE COATING FOR UNDERGROUND PIPING: FACTORY-APPLIED, THREE-LAYER COATING OF EPOXY, ADHESIVE, AND PE.
 - B. CORRUGATED, STAINLESS-STEEL TUBING: COMPLY WITH ANSI/AS LC 1; INCLUDE FLAME-RETARDANT PE COATING, COPPER-ALLOY THREADED ENDS, AND STRIKER PLATES.
- 2.3 SPECIALTIES

A. APPLIANCE FLEXIBLE CONNECTORS:

- 1. INDOOR, FIXED-APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z21.24.
- 2. INDOOR, MOVABLE-APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z21.69.
- 3. OUTDOOR, APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z21.75.
- 4. CORRUGATED STAINLESS-STEEL TUBING WITH POLYMER COATING.

- B. STRAINERS: ASTM A 126, CLASS B, CAST-IRON BODY, Y-PATTERN, FULL SIZE OF CONNECTING PIPING, CWP RATING OF 125 PSIG. INCLUDE 40-MESH STARTUP STRAINER, AND PERFORATED STAINLESS-STEEL BASKET.

- C. WEATHERPROOF VENT CAP: CAST- OR MALLEABLE-IRON INCREASER FITTING WITH CORROSION-RESISTANT WIRE SCREEN, WITH FREE AREA AT LEAST EQUAL TO CROSS-SECTIONAL AREA OF CONNECTING PIPE AND THREADED-END CONNECTION.

2.4 VALVES

- A. GENERAL REQUIREMENTS FOR METALLIC MANUAL GAS SHUTOFF VALVES: COMPLY WITH ASME B16.33.
 - 1. CWP RATING: 125 PSIG.
- B. ONE-PIECE, BRONZE BALL VALVE WITH BRONZE TRIM: MSS SP-110.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. BALL: CHROME-PLATED BRASS.
 - 3. STEM: BRONZE; BLOWOUT PROOF.
 - 4. SEATS: REINFORCED TFE; BLOWOUT PROOF.
 - 5. PACKING: SEPARATE PACKNUT WITH ADJUSTABLE STEM PACKING THREADED ENDS.
 - 6. CWP RATING: 600 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - 8. SERVICE: SUITABLE FOR NATURAL-GAS SERVICE WITH "WOG" INDICATED ON VALVE BODY.
- C. TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM: MSS SP-110.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. BALL: CHROME-PLATED BRONZE.
 - 3. STEM: BRONZE; BLOWOUT PROOF.
 - 4. SEATS: REINFORCED TFE; BLOWOUT PROOF.
 - 5. PACKING: THREADED BODY PACKNUT DESIGN WITH ADJUSTABLE STEM PACKING.
 - 6. CWP RATING: 600 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - 8. SERVICE: SUITABLE FOR NATURAL-GAS SERVICE WITH "WOG" INDICATED ON VALVE BODY.
- D. BRONZE PLUG VALVES: MSS SP-78.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. PLUG: BRONZE.
 - 3. OPERATOR: SQUARE HEAD OR LUG TYPE WITH TAMPERPROOF FEATURE WHERE INDICATED.
 - 4. PRESSURE CLASS: 125 PSIG.
 - 5. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - 6. SERVICE: SUITABLE FOR NATURAL-GAS SERVICE WITH "WOG" INDICATED ON VALVE BODY.
- E. CAST-IRON, NONLUBRICATED PLUG VALVES: MSS SP-78.
 - 1. BODY: CAST IRON, COMPLYING WITH ASTM A 126, CLASS B.
 - 2. PLUG: BRONZE OR NICKEL-PLATED CAST IRON.
 - 3. SEAT: COATED WITH THERMOPLASTIC.
 - 4. STEM SEAL: COMPATIBLE WITH NATURAL GAS.
 - 5. OPERATOR: SQUARE HEAD OR LUG TYPE WITH TAMPERPROOF FEATURE WHERE INDICATED.
 - 6. PRESSURE CLASS: 125 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - 8. SERVICE: SUITABLE FOR NATURAL-GAS SERVICE WITH "WOG" INDICATED ON VALVE BODY.

- F. ELECTRICALLY OPERATED, AUTOMATIC GAS VALVES: COMPLY WITH UL 429.
 - 2.5 PRESSURE REGULATORS
 - A. GENERAL REQUIREMENTS: SINGLE STAGE, STEEL JACKETED, AND CORROSION RESISTANT. INCLUDE ELEVATION COMPENSATOR.
 - B. LINE PRESSURE REGULATORS: ANSI Z21.80; 2-PSIG MAXIMUM INLET PRESSURE. FACTORY- OR FIELD-INSTALLED, STAINLESS-STEEL SCREEN IN VENT OPENING IF NOT CONNECTED TO VENT PIPING.
 - C. APPLIANCE PRESSURE REGULATORS: ANSI Z21.18; 2-PSIG MAXIMUM INLET PRESSURE. REGULATOR MAY INCLUDE VENT LIMITING DEVICE, INSTEAD OF VENT CONNECTION, IF APPROVED BY AUTHORITIES HAVING JURISDICTION.

PART 3 - EXECUTION

3.1 INDOOR PIPING INSTALLATION

- A. COMPLY WITH REQUIREMENTS IN SECTION 220500 "COMMON WORK RESULTS FOR PLUMBING" FOR BASIC PIPING INSTALLATION REQUIREMENTS.
- B. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
- C. INSTALL ESCUTCHEONS AT PENETRATIONS OF INTERIOR WALLS, CEILINGS, AND FLOORS.
- D. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED PIPE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. COMPLY WITH REQUIREMENTS IN SECTION 078413 "PENETRATION FIRESTOPPING."
- E. INSTALL GAS STOPS FOR SHUTOFF TO APPLIANCES WITH LOW-PRESSURE GAS SUPPLY.
- F. INSTALL NATURAL-GAS PIPING AT UNIFORM GRADE OF 2 PERCENT DOWN TOWARD DRIP AND SEDIMENT TRAPS.
- G. USE ECCENTRIC REDUCER FITTINGS TO MAKE REDUCTIONS IN PIPE SIZES. INSTALL FITTINGS WITH LEVEL SIDE DOWN.
- H. CONNECT BRANCH PIPING FROM TOP OR SIDE OF HORIZONTAL PIPING.
- I. INSTALL UNIONS IN PIPES NPS 2 AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. UNIONS ARE NOT REQUIRED AT FLANGED CONNECTIONS.
- J. INSTALL STRAINER ON INLET OF EACH LINE PRESSURE REGULATOR AND AUTOMATIC OR ELECTRICALLY OPERATED VALVE.
- K. INSTALL PRESSURE GAGE PLUG UPSTREAM AND DOWNSTREAM FROM EACH LINE REGULATOR.
- L. CONNECT GAS PIPING TO EQUIPMENT AND APPLIANCES WITH SHUTOFF VALVES AND UNIONS. INSTALL GAS VALVE UPSTREAM FROM AND WITHIN 72 INCHES OF EACH APPLIANCE USING GAS. INSTALL UNION OR FLANGED CONNECTIONS DOWNSTREAM FROM VALVES.
- M. EXTEND RELIEF VENT CONNECTIONS FOR SERVICE REGULATORS, LINE REGULATORS, AND OVERPRESSURE PROTECTION DEVICES TO THE OUTDOORS AND TERMINATE WITH WEATHERPROOF VENT CAP.
- N. DO NOT USE NATURAL-GAS PIPING AS GROUNDING ELECTRODE.
- 3.2 PIPING JOINT CONSTRUCTION
 - A. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS COMPLYING WITH ASME B1.20.1.
 - B. WELDED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS D10.12M/D10.12, USING QUALIFIED PROCESSES AND WELDING OPERATORS.
 - C. JOINTS IN STEEL PIPING WITH PROTECTIVE COATING: APPLY JOINT COVER KITS TO PIPE AFTER JOINING TO COVER, SEAL, AND PROTECT JOINTS.
- D. FLANGED JOINTS: INSTALL GASKET MATERIAL, SIZE, TYPE, AND THICKNESS APPROPRIATE FOR NATURAL-GAS SERVICE. INSTALL GASKET CONCENTRICALLY POSITIONED.

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PLUMBING SPECIFICATIONS

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