EXISTING ROOF TOP UNIT SCHEDULE [RTU-1]	
TAG	RTU-1
MANUFACTURER	LENNOX (V.I.F)
MODEL	KGA240H4 (20-TON) (V.I.F)
LOCATION, CURB DIMENSIONS	S.A.E
TYPE OF HEAT	S.A.E
TOTAL COOLING CAPACITY, MBTU/HR	S.A.E
SENSIBLE COOLING CAPACITY, MBTU/HR	S.A.E
ENTERING AIR CONDITIONS, DB'F/WB'F	S.A.E
AMBIENT AIR DB TEMPERATURE, °F	S.A.E
SUPPLY AIR, CFM	8000 (V.I.F)
OUTSIDE AIR, CFM	SEE SCHEDULE
EXTERNAL STATIC PRESSURE, "WG	S.A.E
BHP - MEDIUM STATIC MOTOR	S.A.E
E.E.R	12.0 (V.I.F)
GAS INPUT MBTU/HR	360 (V.I.F)
GAS OUTPUT MBTU/HR	288 (V.I.F)
UNIT WEIGHT, LBS.	S.A.E
ELECTRICAL REQUIREMENT, V/PHASE/HZ	208-230/3/60 (V.I.F)
MINIMUM CIRCUIT AMPERAGE	104 (V.I.F)
MAXIMUM OVER CURRENT PROTECTION	125 (V.I.F)

NOTES:
1. S.A.E :- SAME AS EXISTING. V.I.F:- VERIFY IN FIELD.
2. EXISTING RTUs WITH ALL ACCESSORIES TO REMAIN SAME AND TO BE REUSED.
3. CONTRACTOR TO CONFIRM IF EXISTING RTUs ARE WORKING AT 100% RATED CAPACITY.
4. CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF RTUs ON SITE.
5. IF REQUIRED, PROVIDE NEW THERMOSTATS AND TEMPERATURE SENSORS COMPATIBLE WITH EXISTING RTUs. COORDINATE FINAL LOCATION WITH ARCHITECT/OWNER.
6. CONTRACTOR TO RE-BALANCE OUTSIDE AIR & RETURN AIR DAMPERS ON EXISTING RTUs TO MATCH VALUES MENTIONED IN ABOVE TABLE.
7. REPLACE ALL THE FILTERS, IF REQUIRED. PROVIDE MINIMUM MERV-8 FILTERS.

PACKAGE ROOFTOP UNIT SCHEDULE [RTU-2]	
	RTU-2
MANUFACTURER	LENNOX
MODEL	LGM180U4M (15-TON)
LOCATION, CURB DIMENSIONS	ROOF, 86-1/8" X 98-1/2"
TYPE OF HEAT	NATURAL GAS
TOTAL COOLING CAPACITY, MBTU/HR	172
SENSIBLE COOLING CAPACITY, MBTU/HR	159
ENTERING AIR CONDITIONS, DB'F/WB'F	80/67
AMBIENT AIR DB TEMPERATURE, °F	95
SUPPLY AIR, CFM	5250
OUTSIDE AIR, CFM	SEE SCHEDULE
EXTERNAL STATIC PRESSURE, "WG	1.0
HP - MEDIUM STATIC MOTOR	5.0
E.E.R.	12.0
GAS INPUT MBTU/HR	260
GAS OUTPUT MBTU/HR	208
UNIT WEIGHT, LBS.	2650
ELECTRICAL REQUIREMENT, V/PHASE/HZ	208-230/3/60
MINIMUM CIRCUIT AMPERAGE	80
MAXIMUM OVER CURRENT PROTECTION	90

ACCESSORIES:
1. 100% ECONOMISER WITH BAROMETRIC RELIEF
2. REUSE EXISTING ROOF CURB ,REPLACE IF DAMAGED.
3. ONE YEAR COMPLETE PARTS AND LABOR WARRANTY
4. ADDITIONAL FOUR YEAR PARTS WARRANTY COVERING COMPRESSORS
5. SMOKE DETECTOR (SEE HVAC ROOF PLAN, SHEET M-2.1)
6. AQUAGUARD AG-3180E MOISTURE SENSOR FOR PRIMARY PAN
7. RTU-2 ONLY HUMIDIMISER HOT GAS RE-HEAT COIL WITH HUMIDISTAT SET TO 55% R.H.

NOTE: COORDINATE RTU PLACEMENT ON SITE PRIOR TO SETTING EQUIPMENT. IF ADJUSTMENT IS NECESSARY MAINTAIN FRESH AIR INTAKE CLEARANCES.

FAN SCHEDULE				
UNIT NUMBER	EF-1	EF-2	EF-3	EF-4
AREA SERVED	KICHEN/OVEN	TOASTER/OVENS	RESTROOM	RESTROOM
MANUFACTURER	HALTON	HALTON	CAPTIVE AIRE	CAPTIVE AIRE
MODEL	TXD1025SC	TXD8SC	CFA-HE-110CA	CFA-HE-110CA
CFM	600	300	100	100
STATIC PRESSURE, "WG	0.5	0.5	0.25	0.25
FAN HORSEPOWER	0.25	0.25	0.03	0.03
DRIVE	DIRECT	DIRECT	DIRECT	DIRECT
RPM	1320	1225	940	940
ELECTRICAL V/ø/HZ	120/1/60	120/1/60	120/1/60	120/1/60
NCA CURB LXWXH	22x27.25x16.5	22x24x16.5	---	---
ACCESSORIES	A,B,D,E,H,J,K,L,M	A,B,D,E,H,J,K,L,M	B,C,D,E,G,L,M	B,C,D,E,G,L,M

NOTES/ACCESSORIES

A. ALUMINIZED BIRDSCREEN
B. SAFETY DISCONNECT SWITCH
C. GRAVITY BACKDRAFT DAMPER
D. AMCA SEAL & U.L. CERTIFIED
E. SPEED CONTROL
G. INTERLOCK WITH SALES FLOOR LIGHTS
H. PREFABRICATED ROOF CURB
J. CONTROLS BY ELECTRICAL - VIF WITH GENERAL CONTRACTOR
K. REFER TO KITCHEN BALANCE SCHEDULE
L. ENSURE 10' - 0" MINIMUM CLEARANCE FROM AIR INTAKES
M. COORDINATE WITH MANUFACTURER FOR FINAL SELECTION

AIR BALANCE SCHEDULE						
TAG	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR	BLDG. PRESSURE	% OUTSIDE AIR
RTU-1(E)	8000 CFM	740 CFM	7260 CFM	---	+ 740 CFM	9.25
RTU-2(N)	5250 CFM	400 CFM	4850 CFM	---	+ 400 CFM	7.60
EF-1	---	---	---	300 CFM	- 300 CFM	---
EF-2	---	---	---	600 CFM	- 600 CFM	---
EF-3	---	---	---	100 CFM	- 100 CFM	---
EF-4	---	---	---	100 CFM	- 100 CFM	---
TOTAL	13250 CFM	1140 CFM	12110 CFM	1100 CFM	+ 40 CFM	8.60

AIR DEVICE SCHEDULE								
SYM.	SIZE	TYPE	DUCT SIZE	MODEL#	FINISH	BOOT SIZE	OPENING SIZE	QTY.
A*	24X24	SUPPLY 4 WAY	12"ø, 14"ø	NCA12	WHITE	12"ø, 14"ø	T-BAR	20
B**	24X24	SUPPLY PERF.	12"ø	APDF3-1424	WHITE	12"ø	T-BAR	4
C***	12X12	SUPPLY 1 WAY W/OBD	6"ø	630	GREY	12X12	-	0
D***	12X12	SUPPLY 1 WAY W/OBD	6"ø	630	WHITE	12X12	SIZE + 1/4"	2
F	24X24	RETURN	18"ø	630TB	WHITE	22X22	T-BAR	7

ALL DIFFUSERS SHALL BE MANUFACTURED BY METALAIRE OR EQUIVALENT AND 100% ALUMINUM CONSTRUCTION
* PROVIDE WITH PVCR9 SLIDING-BLADE DAMPER
** PROVIDE WITH ONE 14"ø-TO-12"ø REDUCERS FOR TOPS OF DIFFUSERS
*** PROVIDE WITH DUAL DEFLECTION BLADES AND OPPOSED-BLADE DAMPER

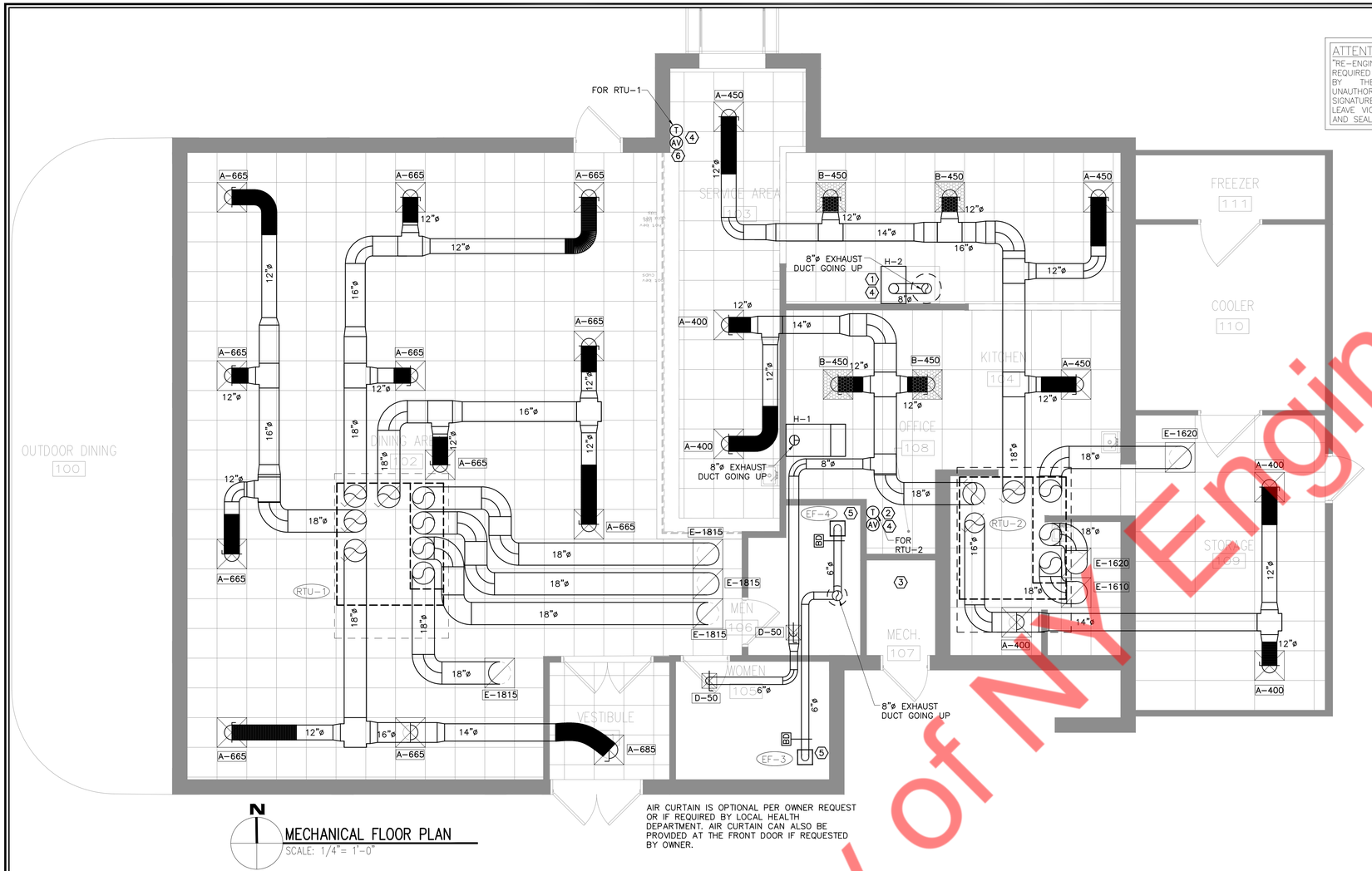
VENTILATION CALCULATION

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 (CFM)	EXHAUST AIRFLOW RATE (CFM/SQ.FT OR /FIXT.)	TOTAL EXHAUST (CFM)	PROVIDED EXHAUST (CFM)
						CFM/PEOPLE	CFM/SQ.FT					
WOMEN RESTROOM	82	0	0	0	0	0	0.06	0	0	70	70	100
VESTIBULE	64	10	1	0	0	5	0.06	4	20	-	-	-
MEN RESTROOM	70	0	0	0	0	0	0.06	0	0	70	70	100
DINING	1256	70	88	50	50	7.5	0.18	601	720	-	-	-
KITCHEN	618	20	13	0	6	7.5	0.12	119	200	0.7	433	900
STORAGE	253	0	0	0	0	0	0.12	30	30	-	-	-
OFFICE	23	5	1	0	2	5	0.06	11	20	-	-	-
SERVICES	339	30	11	0	10	7.5	0.12	116	150	-	-	-
TOTAL	**2705**	-	-	-	**68**	-	-	-	**1140**	-	-	**1100**

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

MECHANICAL SCHEDULES

M1.0



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MECHANICAL FLOOR PLAN

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

AIR CURTAIN IS OPTIONAL PER OWNER REQUEST OR IF REQUIRED BY LOCAL HEALTH DEPARTMENT. AIR CURTAIN CAN ALSO BE PROVIDED AT THE FRONT DOOR IF REQUESTED BY OWNER.

ATTENTION GENERAL CONTRACTOR:
"RE-ENGINEERING" DEVIATIONS FROM THE SHOWN DESIGN AND REQUIRED HVAC EQUIPMENT MUST BE APPROVED IN ADVANCE BY THE ARCHITECT AND PROFESSIONAL ENGINEER. UNAUTHORIZED SUBSTITUTIONS OR ALTERATIONS WILL VOID THE SIGNATURE AND SEAL OF THE PROFESSIONAL ENGINEER AND LEAVE VIOLATORS RESPONSIBLE FOR RESUBMISSION OF SIGNED AND SEALED DRAWINGS.

CONTRACTORS NOTES

HVAC CONTRACTOR

1. THE HVAC CONTRACTOR IS TO FURNISH AND INSTALL THE (OWNER PROVIDED) HOODS, (OWNER PROVIDED) EXHAUST FANS, ROOF-TOP UNITS, DUCTWORK, INSULATION WRAP, DIFFUSERS, SMOKE DETECTORS, AND TEMPERATURE CONTROLS.

2. THE HVAC CONTRACTOR IS TO VERIFY LOCATIONS FOR EF-1, EF-2, AND THE HOODS ON SITE FROM MOST-RECENT KITCHEN EQUIPMENT PLANS. ALL FANS ARE TO BE UL LISTED.

3. ALL HVAC EQUIPMENT CURBS ARE TO BE SUPPLIED BY THE HVAC CONTRACTOR.

4. ALL RTU CURBS ARE TO BE FABRICATED FROM 18 GA. GALVANIZED METAL WITH FULLY WELDED SEAMS, WATER TIGHT AND INTERNALLY INSULATED. FACTORY CURB CONVERSION SHALL NOT BE ACCEPTED.

5. SHIMS ARE TO BE PROVIDED BY HVAC CONTRACTOR BETWEEN THE ROOF DECK AND THE CURBS TO COMPENSATE FOR ROOF PITCH.

6. ALL FLEX DUCT IS TO BE U.L. LISTED, R-6, FOIL-BACKED, CLASSIFIED AS A CLASS 1 AIR DUCT. MAXIMUM LENGTH PER LOCAL CODE.

7. ALL METAL DUCT AND AIR DISTRIBUTION DEVICES ARE TO BE INSULATED WITH R-6, 2" X .75 DENSITY FOIL-BACKED INSULATION, WITH FIRE AND SMOKE RATING [25]-[50].

8. ALL DUCTWORK IS TO BE INDEPENDENTLY HUNG FROM STRUCTURAL MEMBERS.

9. ALL DUCTWORK IS TO BE FABRICATED, INSTALLED, SEALED, AND EXTERNALLY INSULATED PER SMACNA LOW-VELOCITY DUCT MANUAL (LATEST ISSUE). INTERNALLY LINED DUCTWORK IS NOT ALLOWED.

10. UNLESS OTHERWISE NOTED, ALL SUPPLY TAKEOFFS ARE TO HAVE A MANUAL VOLUME CONTROL DAMPER.

11. THE HVAC CONTRACTOR IS TO COORDINATE DIFFUSER LOCATIONS ON SITE WITH THE MOST RECENT REFLECTED CEILING PLAN.

12. THE HVAC CONTRACTOR IS TO FURNISH A WRITTEN GUARANTEE COVERING A ONE-YEAR PERIOD FOR ALL HVAC EQUIPMENT AND PROVIDE AN ADDITIONAL FOUR-YEAR PERIOD FOR THE COMPRESSORS IN THE RTUS. ALL FANS TO BE U.L. LISTED.

13. UPON COMPLETION OF PROJECT THE HVAC CONTRACTOR IS TO HIRE AN A.A.B.C. OR N.E.B.B. CERTIFIED, INDEPENDENT TEST AND BALANCE COMPANY TO CONDUCT A COMPLETE, CERTIFIED TEST AND BALANCE OF ALL HVAC EQUIPMENT. PROVIDE A WRITTEN REPORT TO NCA CONSULTANTS. ALL CAPACITIES MUST BE SET TO AMOUNTS INDICATED ON THE FLOOR PLANS AND SCHEDULES.

14. THE HVAC CONTRACTOR IS TO MAKE ALL LOW-VOLTAGE WIRING FINAL CONNECTIONS FOR ALL HVAC EQUIPMENT INCLUDING TEMPERATURE CONTROLS, RTUS, AND SMOKE DETECTORS.

GENERAL CONTRACTOR

1. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO RECEIVE, OFFLOAD, AND STORE ALL HVAC MATERIALS WHICH ARRIVE AT THE JOB SITE. ALL MATERIAL MUST BE STORED INSIDE THE BUILDING. HOODS MUST BE STORED IN THE KITCHEN.

2. IT IS VERY IMPORTANT THAT ACCURATE MEASUREMENTS ARE USED WHEN LOCATING EXHAUST FAN ROOF OPENING. COORDINATE ROOF OPENINGS WITH THE KITCHEN EQUIPMENT PLAN AND EXHAUST HOOD PLANS. OBTAIN THE CORRECT PLANS FROM THE KITCHEN EQUIPMENT SUPPLIER.

3. RTU ROOF OPENING SIZES AND ROOF CURBS ARE BASED ON EQUIPMENT SHOWN. IF OTHER EQUIPMENT IS USED, VERIFY ROOF OPENING REQUIREMENTS. MAKE PENETRATION AS NEEDED FOR INSTALLATION OF NEW CURB AND RTU. COORDINATE ON SITE WITH HVAC CONTRACTOR. ENSURE THAT ROOFING MATERIAL DOES NOT COVER THE TOP OF ANY HVAC EQUIPMENT CURB.

4. ALL ROOF, CEILING, WALL, AND STRUCTURAL FRAMING REQUIRED FOR UNIT, FAN, DUCT, DIFFUSER, AND ALL OTHER HVAC WORK IS TO BE BY THE G.C. COORDINATE ON SITE WITH HVAC CONTRACTOR. GENERAL CONTRACTOR IS TO PROVIDE ANY SCREENING, GUARD RAILS, ETC. FOR ROOF-MOUNTED HVAC EQUIPMENT PER IBC AND LOCAL CODES. ANY REQUIRED PAINTING OF HVAC WORK IS TO BE BY THE GENERAL CONTRACTOR.

5. IF NECESSARY THE GENERAL CONTRACTOR IS TO REMOVE, REPLACE, AND/OR REPAIR CEILING GRID AND TILES IN ORDER FOR THE HVAC WORK TO BE PERFORMED.

ELECTRICAL CONTRACTOR

1. THE ELECTRICAL CONTRACTOR IS TO FURNISH AND INSTALL PITCH POCKETS FOR POWER AND CONTROL WIRING, AND IS TO MAINTAIN 12" MINIMUM CLEARANCE FROM BACK PANEL OF AIR CONDITIONING UNITS. DO NOT PENETRATE BOTTOM OF RTU CURB.

2. THE ELECTRICAL CONTRACTOR IS TO INSTALL LOW-VOLTAGE CONTROL WIRING FOR ALL AIR CONDITIONING CONTROLS.

3. THE ELECTRICAL CONTRACTOR IS TO FURNISH AND INSTALL DISCONNECTS FOR RTUS, WIRE THE RESTROOM EXHAUST FAN TO RUN CONTINUOUSLY WHILE THE DINING ROOM LIGHTS ARE ON, AND WIRE KITCHEN / HOOD EXHAUST FANS THROUGH THE OCCUPIED / UNOCCUPIED PANEL. NOTE: IF THE PANEL IS NOT UTILIZED, AND IF THE HOOD FANS ARE NOT CONTROLLED BY TEMPERATURE PROBES IN THE HOOD DISCHARGE COLLARS (SEE HOOD DETAILS, THIS SET) THEN THE ELECTRICAL CONTRACTOR IS TO WIRE THE KITCHEN / HOOD FANS TO BE ENERGIZED DURING STORE OPERATIONAL HOURS.

4. THE ELECTRICAL CONTRACTOR IS TO USE A MINIMUM OF 4'-6" SEALTITE FLEXIBLE CONDUIT WHEN WIRING KITCHEN HOOD EXHAUST FANS ON ROOF SO THAT FANS MAY BE REMOVED FROM CURBS AND PLACED ON ROOF FOR CLEANING EXHAUST DUCTWORK.

5. FOR EACH UNIT, THE ELECTRICAL CONTRACTOR IS TO PROVIDE ONE SINGLE-GANG RECEPTACLE TEST STATION FOR THE REMOTE SENSOR AND/OR T-STAT, AND ONE DOUBLE-GANG RECEPTACLE TEST STATION FOR THE ANNUNCIATOR, WITH GREEN AND RED LIGHT INDICATORS. THE FIRE AND MECHANICAL INSPECTORS WILL DETERMINE SUITABLE LOCATION FOR TEST STATIONS. ANNUNCIATORS AND TEST STATION WILL BE LOOPED IN THE CIRCUITRY OF THE SMOKE DETECTION DEVICES. WIRING WILL BE INSTALLED BY ELECTRICAL CONTRACTOR. PROVIDE ADDITIONAL RECEPTACLE FOR RTU-1 HUMIDISTAT.

PLUMBING CONTRACTOR

1. THE PLUMBING CONTRACTOR IS TO PROVIDE AND INSTALL CONDENSATE DRAINS/GAS PIPING FOR ALL HVAC EQUIPMENT, AND PITCH POCKETS FOR RTU CONNECTIONS. DO NOT PENETRATE BOTTOM OF RTU CURB.

2. THE PLUMBING CONTRACTOR IS TO COORDINATE PLUMBING VENT STACKS AND WATER HEATER FLUES WITH OUTSIDE AIR INTAKES OF A/C UNITS. 10'-0" MINIMUM CLEARANCE REQUIRED OR PER LOCAL CODE.

3. THE PLUMBING CONTRACTOR IS TO PROVIDE AND INSTALL FLUE GAS EXHAUST VENT FOR WATER HEATER. MAINTAIN 10'-0" MINIMUM CLEARANCE TO AIR INTAKES, OR PER LOCAL CODE. COORDINATE ON SITE WITH G.C. AND HVAC CONTRACTOR.

KEYED NOTES

1. PROVIDE EXHAUST GRILLE WITH 10"ø SHEETMETAL DUCT FROM CONNECTION ON GRILLE TO EXHAUST FAN ON ROOF. OFFSET AND TRANSITION AT CONNECTIONS AS NEEDED. VERIFY DIMENSIONS PRIOR TO FABRICATION OR INSTALLATION. USE FACTORY-MANUFACTURED PIPE AND FITTINGS ONLY. CONFIRM LOCATION ON SITE WITH MOST RECENT KITCHEN PLANS.
2. PROVIDE THERMOSTAT 66" A.F.F. IN A WALL NEAR LOCATION SHOWN. SEAL WALL OPENINGS WITH CAULK. CONFIRM FINAL LOCATION WITH ARCHITECT/OWNER.
3. EXISTING WATER HEATER TO REMAIN AND REUSED.
4. AUDIO-VISUAL ANNUNCIATOR TIED INTO SMOKE DETECTOR. COORDINATE LOCATION ON SITE WITH G.C. AND EQUIPMENT. AVOID SOURCES OF HEAT. INSULATE BACKS OF THERMOSTATS
5. PROVIDE CEILING MOUNTED EXHAUST FANS IN RESTROOM.
6. RELOCATE AND REUSE EXISTING THERMOSTAT, IF EXISTING THERMOSTAT IS NOT IN CONDITION TO REUSE THEN INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.

HVAC EQUIPMENT PACKAGE

PLAN AND SPECIFICATIONS AS PER P.E. SEAL

TIM HORTONS HAS A NATIONAL ACCOUNT AGREEMENT WITH THE NCA GROUP. NCA SHALL VISIT THE SITE, AS AUTHORIZED, TO VERIFY ALL MATERIALS, EQUIPMENT, AND INSTALLATION ARE PER THE PROFESSIONAL ENGINEER SEAL.

HEATING COOLING EQUIPMENT PACKAGE INCLUDES ALL ROOFTOP (OR SPLIT SYSTEM) AIR CONDITIONING EQUIPMENT WITH ALL ACCESSORIES AS SPECIFIED ON THESE PLANS.

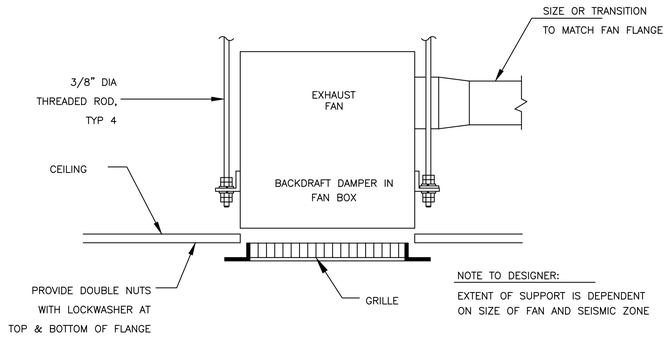
FAN PACKAGE INCLUDES ALL FANS WITH ALL ACCESSORIES AS SPECIFIED ON THESE PLANS.

AIR DEVICE PACKAGE INCLUDES ALL GRILLES, REGISTERS AND DIFFUSERS PER PLANS. SQUARE TO ROUND TRANSITIONS PROVIDED WHERE REQUIRED.

EXHAUST HOOD PACKAGE INCLUDES EXHAUST FANS, HOODS, SHROUDS AND ANSUL SYSTEM, AS CODE REQUIRES.

CONTROLS PACKAGE INCLUDES PRESET DIGITAL THERMOSTATS, THERMOSTAT WIRE, LOCKING COVERS, AND AS CODE REQUIRES SMOKE DETECTORS AND AUDIBLE-VISUAL DEVICES; OCCUPIED/UNOCCUPIED PANEL, AND INTERLOCK PANEL, IF REQUIRED.

NOTE: "RE-ENGINEERING" DEVIATIONS FROM THE SHOWN DESIGN AND REQUIRED HVAC EQUIPMENT MUST BE APPROVED IN ADVANCE BY THE ARCHITECT AND PROFESSIONAL ENGINEER. UNAUTHORIZED SUBSTITUTIONS OR ALTERATIONS WILL VOID THE SIGNATURE AND SEAL OF THE PROFESSIONAL ENGINEER AND LEAVE VIOLATORS RESPONSIBLE FOR RESUBMISSION OF SIGNED AND SEALED DRAWINGS



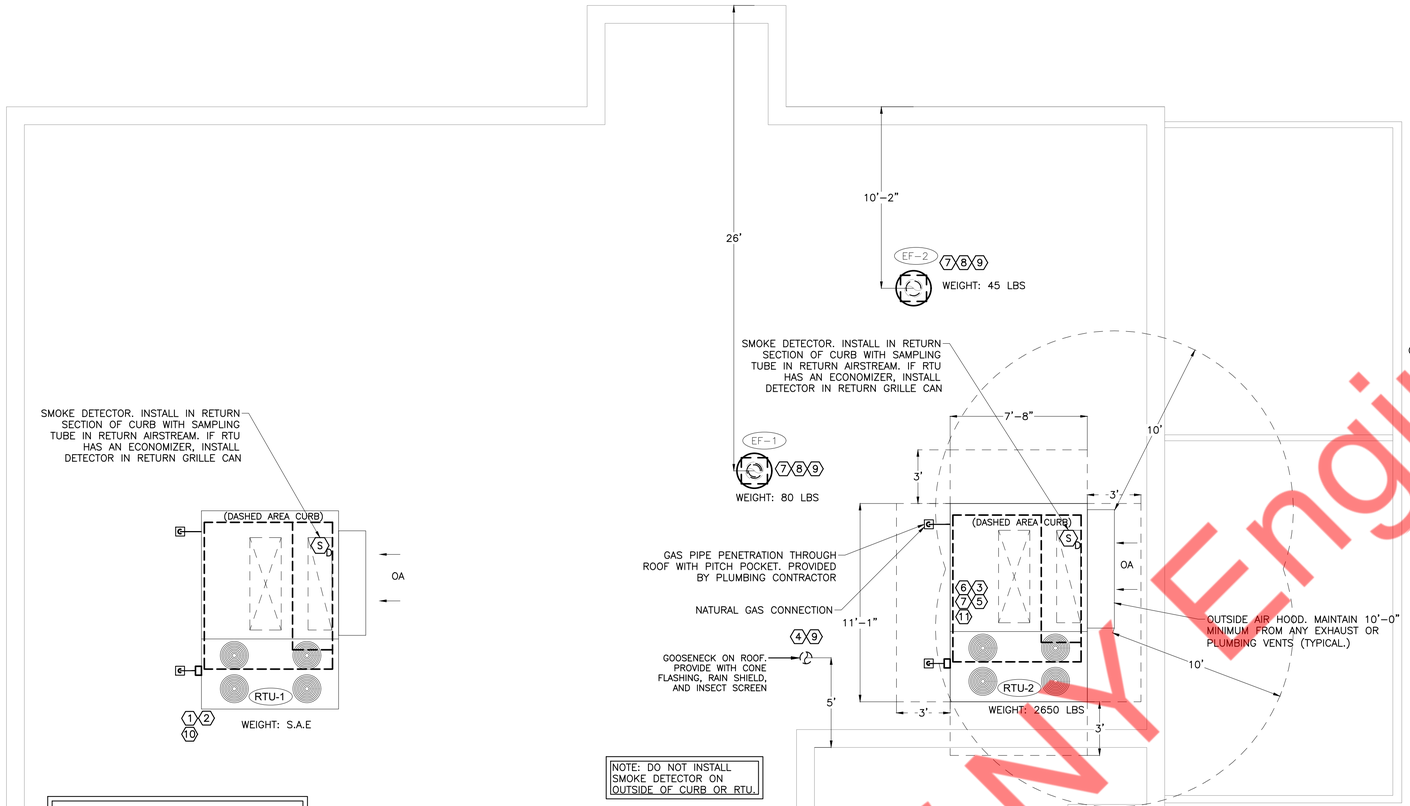
CEILING EXHAUST FAN

NOT TO SCALE

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

MECHANICAL FLOOR PLAN & DETAILS

M1.1



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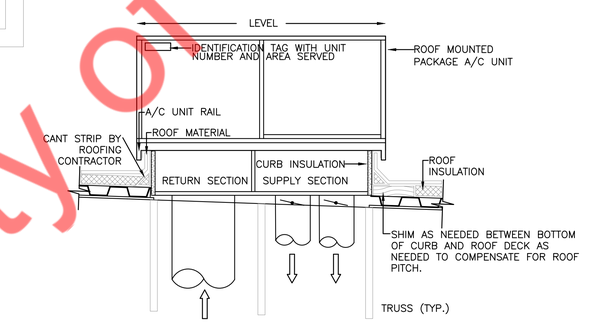
MECHANICAL ROOF PLAN

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

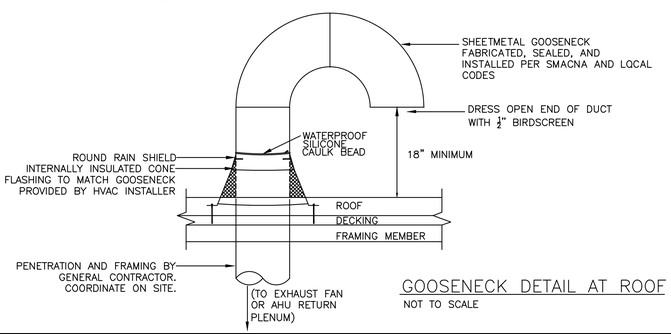
MECHANICAL ROOF PLAN KEY NOTES:

1. CONDENSATE DRAIN TO REMAIN AS IT IS FOR ALL EXITING RTU. CONTRACTOR TO FLUSH THE EXISTING DRAIN.
2. EXISTING RTU TO REMAIN SAME AND TO BE REUSED WITH ALL ITS EXISTING ACCESSORIES. CONTRACTOR TO FIELD VERIFY LOCATION OF THE EQUIPMENT ON SITE & INFORM TO ARCHITECT IF ANY ACCESSORIES NOT WORKING OR NOT IN GOOD CONDITION.
3. NEW ROOFTOP UNIT IS PROVIDED. PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES. MECHANICAL CONTRACTOR SHALL SCRIBE INTO UNIT POSITION OF OUTSIDE AIR DAMPER AND LABEL OUTSIDE AIR VOLUME AND PERCENT OF OUTSIDE AIR. TRANSITION AND CONNECT SUPPLY AND RETURN DUCTWORK FROM BELOW. COORDINATE ROUTING THROUGH STRUCTURAL TRUSSES AND OFFSET AS REQUIRED IN CURB SPACE.
4. TERMINATE TOILET EXHAUST WITH GOOSENECK. PROVIDE WITH CONE FLASHING, RAIN SHIELD AND INSECT SCREEN.
5. PROVIDE CURB ADAPTOR AS/IF REQUIRED.
6. PROVIDE HORIZONTAL SLOPE TO DRAIN PIPING IN THE DIRECTION OF DISCHARGE OF NOT LESS THAN 1/8 UNIT VERTICAL IN 12 UNITS HORIZONTAL (1% SLOPE).
7. COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL DRAWINGS.
8. COORDINATE INSTALLATION OF ROOF MOUNTED EXHAUST FAN WITH LANDLORD AND EXISTING CONDITIONS TO ENSURE THAT EXHAUST OUTLETS SHALL BE LOCATED NOT LESS THAN 10 FT. HORIZONTALLY FROM AIR INTAKE SOURCE.
9. EXHAUST TERMINATION TO BE 10 FT. AWAY FROM ANY OUTSIDE AIR INTAKE OPENING/SOURCE.
10. REUSE EXISTING SMOKE DETECTOR. IF EXISTING SMOKE DETECTOR IS NOT IN CONDITION TO REUSE, THEN INSTALL NEW ONE.
11. SMOKE DETECTOR SHALL BE FURNISHED/INSTALLED BY MECHANICAL CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING RTU UNDER ALARM CONDITIONS. ALL WIRING SHALL BE IN CONDUIT PER N E C SMOKE DETECTOR SHALL BE SYSTEM SENSOR MODEL DH100ACDCLP OR EQUAL.



DUCT RISER/LEVELING DETAIL

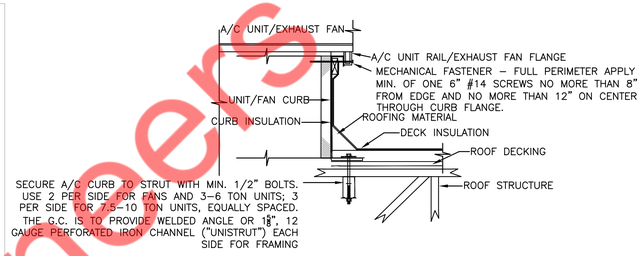
NOT TO SCALE



GOOSENECK DETAIL AT ROOF

NOT TO SCALE

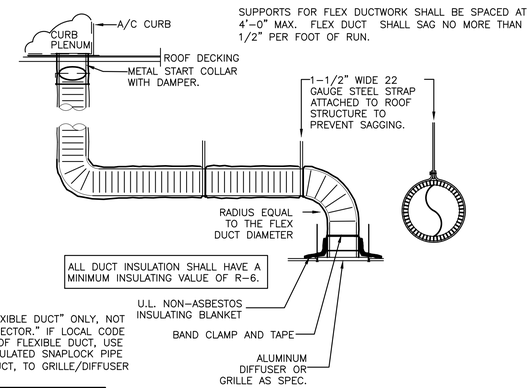
ATTENTION GENERAL CONTRACTOR: "RE-ENGINEERING"
DEVIATIONS FROM THE SHOWN DESIGN AND REQUIRED HVAC EQUIPMENT MUST BE APPROVED IN ADVANCE BY THE ARCHITECT AND PROFESSIONAL ENGINEER. UNAUTHORIZED SUBSTITUTIONS OR ALTERATIONS WILL VOID THE SIGNATURE AND SEAL OF THE PROFESSIONAL ENGINEER AND LEAVE VIOLATORS RESPONSIBLE FOR RESUBMISSION OF SIGNED AND SEALED DRAWINGS.



ACCEPTABLE FOR 140 MPH ZONE
VERIFY ON SITE WITH GENERAL CONTRACTOR

ROOF EQUIP. CURB MOUNTING DETAIL

NOT TO SCALE



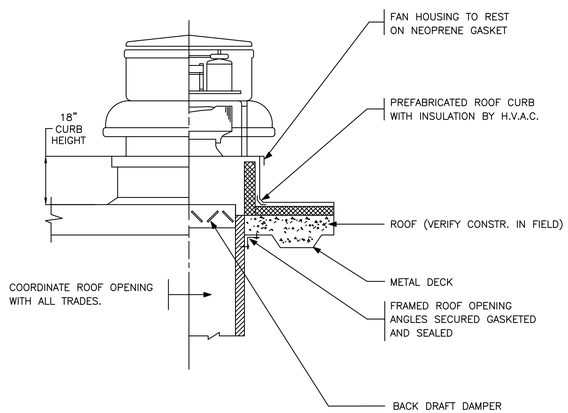
NOTE: USE "FLEXIBLE DUCT" ONLY, NOT "FLEXIBLE CONNECTOR." IF LOCAL CODE LIMITS LENGTH OF FLEXIBLE DUCT, USE EXTERNALLY INSULATED SNAPLOCK PIPE TO FLEXIBLE DUCT, TO GRILLE/DIFFUSER

DUCT SCHEDULE	
SIZE	GAUGE
6"ø – 8"ø	28
10"ø – 12"ø	26
14"ø – 16"ø	24
18"ø – 20"ø	22

DUCT SUPPORT
SUPPORT DUCTWORK WITH 1-1/2" WIDE 22 GAUGE STEEL STRAPS FIRMLY ATTACHED TO THE BUILDING STRUCTURE. SPACING SHALL BE MAXIMUM 10-0" FOR RIGID DUCTWORK, AND MINIMUM 4'-0" FOR FLEXIBLE DUCTWORK. 12 GAUGE WIRE MAY BE SUBSTITUTED FOR STRAPS IF 1-1/2" WIDE 22 GAUGE STEEL SADDLES ARE USED TO FULLY ENCIRCLE DUCT. REFER TO THE HVAC DUCT CONSTRUCTION STANDARDS PUBLISHED BY SMACNA FOR ADDITIONAL DETAILS. FULLY COMPLY WITH MECHANICAL CODES.

RIGID/FLEXDUCT CONNECTION/INSTALL DETAIL

NOT TO SCALE



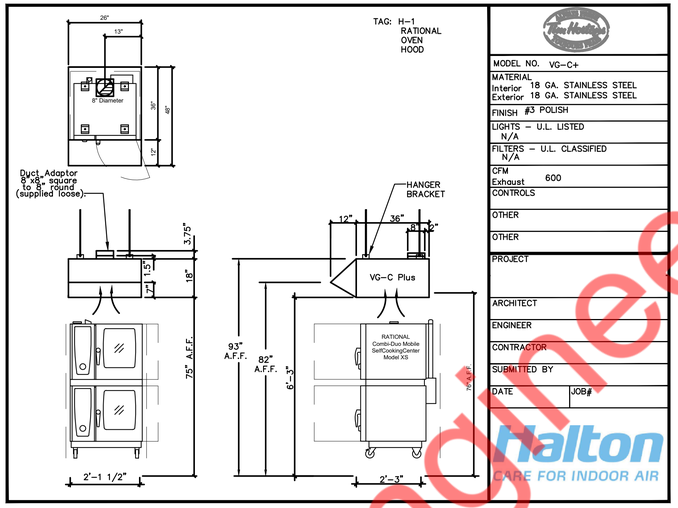
TYPICAL ROOF MOUNTED FAN DETAIL

NOT TO SCALE

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

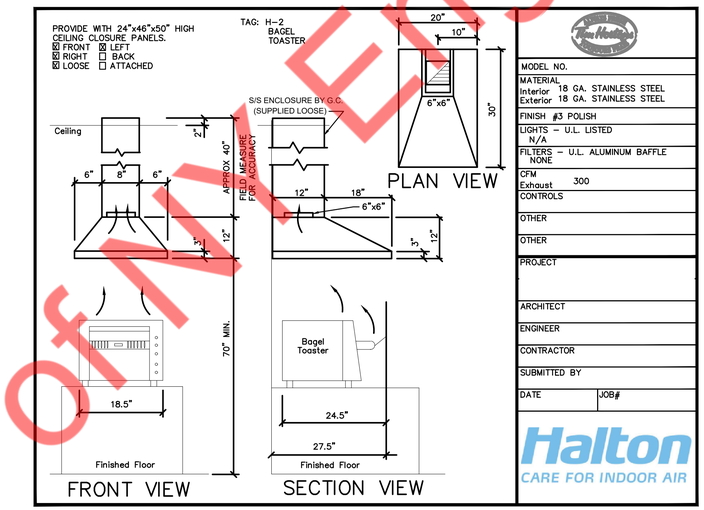
MECHANICAL ROOF PLAN AND DETAILS

M2.1



MODEL NO.	VG-C+
MATERIAL Interior	18 GA. STAINLESS STEEL
Exterior	18 GA. STAINLESS STEEL
FINISH	#3 POLISH
LIGHTS - U.L. LISTED	N/A
FILTERS - U.L. CLASSIFIED	N/A
CFM Exhaust	600
CONTROLS	
OTHER	
OTHER	
PROJECT	
ARCHITECT	
ENGINEER	
CONTRACTOR	
SUBMITTED BY	
DATE	JOB#

Halton
CARE FOR INDOOR AIR



MODEL NO.	
MATERIAL Interior	18 GA. STAINLESS STEEL
Exterior	18 GA. STAINLESS STEEL
FINISH	#3 POLISH
LIGHTS - U.L. LISTED	N/A
FILTERS - U.L. ALUMINUM BAFFLE	NONE
CFM Exhaust	300
CONTROLS	
OTHER	
OTHER	
PROJECT	
ARCHITECT	
ENGINEER	
CONTRACTOR	
SUBMITTED BY	
DATE	JOB#

Halton
CARE FOR INDOOR AIR

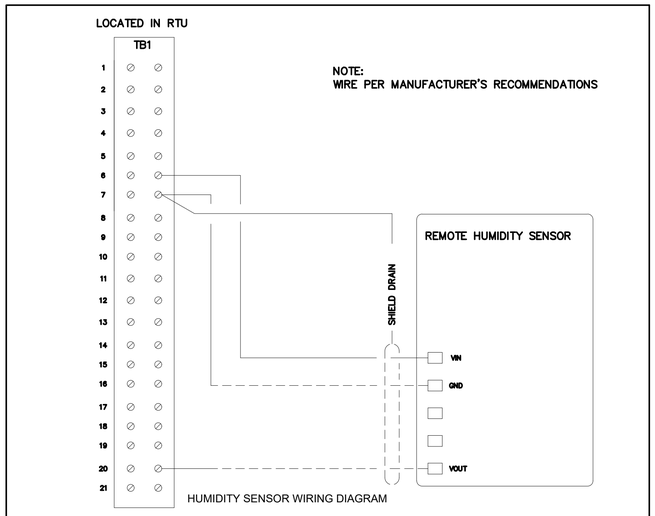
HOOD & FAN PACKAGE NOTES

1. PROVIDE ALL WORK TO INSTALL KITCHEN HOODS AND EXHAUST FANS AS SHOWN ON THE DRAWNGS.
2. HEATING AND COOLING UNITS AS INDICATED ON THE DRAWNGS TO BE INSTALLED BY THIS CONTRACTOR AND PURCHASED BY THIS CONTRACTOR FROM OWNER VENDOR. HEATING AND COOLING UNITS INDICATED ON THE DRAWINGS AND HEREINAFTER SPECIFIED ARE DESIGNED TO MEET ASHRAE 90.1 BASED ON NORFOLK,VERGINIA DESIGN CONDITIONS OF 90'F SUMMER AND 0'F WINTER.
3. ALL EXHAUST FANS MUST BE INSTALLED LEVEL AND PLUMB.
4. EXHAUST AIR VOLUMES ARE RECOMMENDED FOR THE PROPER FUNCTION OF THE COOKING EQUIPMENT SPECIFIED.
5. VERIFY ALL DIMENSIONS WITH EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN.
6. PROVIDE HOOD WITH BALANCING DAMPER AT DUCT COLLAR. DAMPER SHALL BE LISTED FOR USE AS PART OF TYPE II EXHAUST SYSTEM.

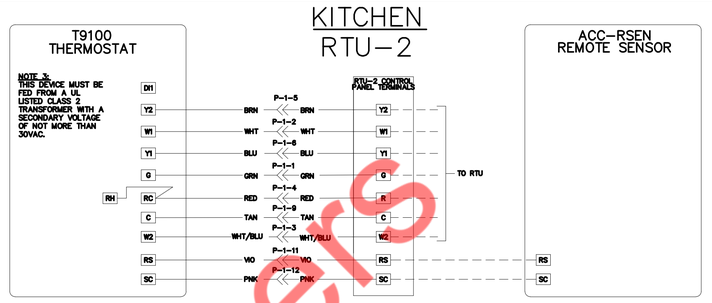
Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

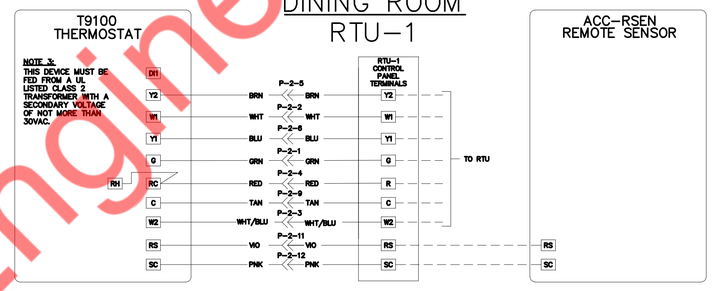
EXHAUST HOOD SHOP DRAWINGS

M3.1



HUMIDITY SENSOR WIRING DIAGRAM





TEMPERATURE CONTROL DIAGRAM

NOTE:
INSTALLATION OF WIRE AND FINAL TERMINATIONS FOR HVAC CONTROLS ARE TO BE MADE BY THE HVAC CONTRACTOR.

INSTALLATION OF WIRE AND FINAL TERMINATIONS FOR LIGHTING CONTROLS ARE TO BE MADE BY THE ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL ADJUST THE PHOTOCELL IN THE EVENING, AT AN APPROPRIATE TIME RELATIVE TO SUNSET

LEGEND

- P-#-# = CONNECTOR TAB NUMBER
- = MOLEX CONNECTOR
- = ENCLOSURE TERMINALS HVAC
- = ENCLOSURE TERMINALS – CONTROL
- = WIRE NUT
- = NYLON CRIMP SPLICE AT PANEL
- = MARKED TERMINAL
- = FIELD WIRING
- = FACTORY WIRING
- = FIELD MTD. DEVICE

REFERENCE NOTE:
THIS SHEET PROVIDED FOR REFERENCE ONLY. INSTALLATION AND OPERATION OF CONTROLS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. VERIFY REQUIRED WORK WITH HVAC EQUIPMENT MANUFACTURER PRIOR TO BID AND INCLUDE ALL COST OF THIS WORK (MATERIALS AND LABOR) IN BID.

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

TEMPERATURE & LIGHTING CONTROL SCHEMATIC

M5.1

DIVISION 23 – MECHANICAL SPECIFICATIONS

BASIC MECHANICAL MATERIALS AND METHODS SECTION 23 05 00

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. GENERAL REQUIREMENTS.

B. MOTORS.

C. VIBRATION ISOLATION.

D. STEM–TYPE THERMOMETERS.

E. MECHANICAL IDENTIFICATION.

1.2 QUALITY ASSURANCE

A. GUARANTEE: EACH CONTRACTOR SHALL GUARANTEE EACH COMPLETE SYSTEM FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE OF THE WORK BY THE OWNER TO BE FREE OF DEFECTS OF MATERIAL AND WORKMANSHIP AND THAT ANY FAULTY MATERIAL OR WORKMANSHIP WILL BE REPAIRED OR REPLACED WITHOUT ADDITIONAL COST TO THE OWNER.

B. MATERIAL AND EQUIPMENT: ALL MATERIAL AND EQUIPMENT SHALL BE NEW AND OF THE BEST QUALITY USED FOR THE PURPOSE IN GOOD COMMERCIAL PRACTICE AND SHALL BE THE STANDARD PRODUCT OF REPUTABLE MANUFACTURERS. THE MATERIAL AND EQUIPMENT MUST MEET APPROVAL OF STATE AND LOCAL CODES IN THE AREA IT IS BEING USED.

C. WARRANTIES: EQUIPMENT AND DEVICES SHALL BE PROVIDED WITH THE WARRANTY AS SPECIFIED HEREIN. AT FINAL ACCEPTANCE, DELIVER TO THE OWNER ALL WARRANTIES WITH TERMS EXTENDING BEYOND THE ONE YEAR GUARANTEE PERIOD. EACH WARRANTY INSTRUMENT SHALL BE ADDRESSED TO THE OWNER AND STATING COMMENCEMENT DATE AND TERM.

D. NOISE CRITERIA: MAINTAIN ASHRAE CRITERIA FOR AVERAGE NOISE CRITERIA CURVES FOR ALL EQUIPMENT AT FULL LOAD CONDITION. EQUIPMENT NOISE SHALL MEET OWNER'S SATISFACTION AT FINAL ACCEPTANCE.

1.3 MECHANICAL GENERAL REQUIREMENTS

A. THIS SECTION APPLIES TO ALL MECHANICAL WORK. THE CONTRACTORS INVOLVED SHALL CHECK ALL SECTIONS OF THE SPECIFICATIONS IN ADDITION TO THE PARTICULAR SECTION COVERING THEIR SPECIFIC TRADE. EACH DISTINCT SECTION OF THE SPECIFICATIONS AIMED FOR ONE TRADE MAY HAVE DETAILED INFORMATION WITH REGARDS TO OTHER TRADES. THEREFORE, IT IS IMPERATIVE THAT ALL OTHER TRADES COORDINATE FUNCTIONS AND WORK REQUIRED.

B. THE OWNER DRAWINGS, WHICH CONSTITUTE AN INTEGRAL PART OF THIS CONTRACT, SHALL SERVE AS THE WORKING PLANS. THEY INDICATE THE GENERAL LAYOUT OF THE COMPLETE MECHANICAL SYSTEMS.

1. FIELD VERIFICATION OF SCALED DIMENSIONS ON PLANS IS DIRECTED SINCE ACTUAL LOCATIONS, DISTANCES, AND LEVELS WILL BE GOVERNED BY ACTUAL FIELD CONDITIONS. ALL MEASUREMENTS SHALL BE VERIFIED AT THE SITE.
2. THE MECHANICAL CONTRACTORS SHALL CHECK ARCHITECTURAL, STRUCTURAL, PLUMBING, HEATING, VENTILATION, AIR CONDITIONING, AND ELECTRICAL PLANS TO AVERT POSSIBLE INSTALLATION CONFLICTS. SHOULD DRASTIC CHANGES FROM THE ORIGINAL PLANS BE NECESSARY TO RESOLVE SUCH CONFLICT, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND SECURE WRITTEN APPROVAL AND AGREEMENT ON NECESSARY ADJUSTMENT BEFORE THE INSTALLATION IS STARTED.
3. DISCREPANCIES SHOWN BETWEEN PLANS, OR BETWEEN PLANS AND ACTUAL FIELD CONDITIONS, OR BETWEEN PLANS AND SPECIFICATIONS SHALL PROMPTLY BE BROUGHT TO THE ATTENTION OF THE ARCHITECT OR ENGINEER FOR A DECISION.
4. DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER THE COMPLETED INSTALLATION OF SYSTEMS TO FUNCTION AS DESCRIBED. THE OMISSION OF THE EXPRESSED REFERENCE TO ANY ITEM OF LABOR AND MATERIAL NECESSARY TO COMPLY TO PRACTICE CODES, ORDINANCES, ETC. SHALL NOT RELIEVE THE CONTRACTOR FROM PROVIDING SUCH ADDITIONAL LABOR AND MATERIAL.
5. THE CONTRACT DRAWINGS SERVE AS WORKING DRAWINGS FOR THE GENERAL LAYOUT OF THE VARIOUS SERVICES. HOWEVER, LAYOUT OF EQUIPMENT ACCESSORIES, SPECIALTIES, PIPING SYSTEMS, AND CONDUIT RUNS ARE DIAGRAMMATIC UNLESS SPECIFICALLY DIMENSIONED AND DO NOTE NECESSARILY INDICATE EVERY REQUIRED VALVE, FITTING, TRANSITION, TURNING VANE, ETC. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE FIELD VERIFICATION OF ALL SERVICES, SYSTEMS, ETC. AS PART OF THE TOTAL WORK REQUIRED AND THE COST TO BE INCLUDED IN THIS BASE BID.

C. ACCESSIBILITY: DO NOT LOCATE TRAPS, CONTROLS, UNIONS, ETC IN ANY SYSTEM AT A LOCATION THAT WILL BE INACCESSIBLE AFTER CONSTRUCTION IS COMPLETED. MAINTAIN ACCESSIBILITY FOR ALL COMPONENTS IN MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS.

D. CUTTING AND PATCHING: ALL CUTTING REQUIRED SHALL BE DONE BY THE CONTRACTOR WHOSE WORK IS INVOLVED WITHOUT EXTRA COST TO THE OWNER. ALL PATCHING AND RESTORATION INCLUDING THE FINISHING AND INSTALLATION OF ACCESS PANELS IN THE CEILING, WALLS, ETC. WITHIN THE BUILDING LINES SHALL BE DONE BY THE RESPECTIVE, RESPONSIBLE CONTRACTOR. NO CUTTING OF STRUCTURAL STEEL, CONCRETE, OR WOOD SHALL BE DONE WITHOUT PRIOR APPROVAL AND EXPLICIT DIRECTIONS OF THE ARCHITECT AND THE OWNER. ALL DUCT OPENINGS IN WALLS, FLOORS, CEILINGS, AND ROOF SHALL BE CUT AND PATCHED BY THE RESPECTIVE, RESPONSIBLE CONTRACTOR.

E. RELOCATION OF EXISTING CONDUITS, DUCTWORK, PIPES, AND UTILITIES: THE CONTRACTOR, UNDER WHOSE JURISDICTION THE WORK MAY FALL, SHALL PROVIDE LABOR, MATERIALS, AND TOOLS REQUIRED TO CUT, REPAIR, PROTECT, CAP, OR RELOCATE EXISTING PIPES, CONDUITS, OR UTILITIES INTERFERING WITH OR UNCOVERED DURING WORK PER REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.

F. DAMAGE TO OTHER WORK: EACH CONTRACTOR SHALL BE HELD RIGIDLY RESPONSIBLE FOR ALL DAMAGES TO THEIR OWN OR ANY OTHER TRADE'S WORK RESULTING FROM THE EXECUTION OF THE INVOLVED CONTRACTOR'S WORK.

G. ROUGH–IN FOR CONNECTION OF EQUIPMENT: IT SHALL BE THE RESPONSIBILITY OF EACH CONTRACTOR TO STUDY THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL, AND MECHANICAL DRAWINGS, CONFERRING WITH THE VARIOUS TRADES INVOLVED AND CHECKING WITH THE SUPPLIER OF EQUIPMENT IN ORDER TO PROPERLY ROUGH–IN FOR ALL EQUIPMENT.

H. PERFORMANCE OF WORK: ALL WORK OUTLINED IN THE VARIOUS MECHANICAL AND ELECTRICAL SECTIONS SHALL BE DONE BY THE CONTRACTOR UNDER WHOSE JURISDICTION THE WORK MAY FALL. SEE DRAWINGS AND SPECIFICATIONS.

I. ELECTRICAL WIRING: SEE ELECTRICAL SPECIFICATIONS, DIVISION 26.

J. TESTING: ALL TESTING RESULTS SHALL BE IN THE FORM OF WRITTEN REPORTS.

1.4 SUPPLEMENTARY CONDITIONS

A. REFER TO OTHER REQUIREMENTS OF MECHANICAL AND ELECTRICAL WORK IN DIVISION 26 WITHOUT EXCEPTION.

B. PERMITS, INSPECTIONS, AND TESTS: ALL WORK IS TO BE EXECUTED IN COMPLIANCE WITH, AND EACH CONTRACTOR IS TO OBSERVE AND ABIDE BY, ALL APPLICABLE LAWS, REGULATIONS, ORDINANCES, AND RULES OF THE NATIONAL, STATE, COUNTY, AND LOCAL GOVERNING AGENCIES OR ANY DULY CONSTITUTED PUBLIC AUTHORITY. EACH CONTRACTOR WILL, AT ALL TIMES, MAINTAIN PROPER FACILITIES AND PROVIDE SAFE ACCESS FOR INSPECTION OF ALL PARTS OF THE WORK AND TO THE SHOPS WHEREIN THE WORK IS IN PREPARATION. NO WORK WILL BE ENCLOSED OR COVERED UNTIL APPROVED BY THE ARCHITECT AND SHOULD ANY WORK BE ENCLOSED OR COVERED BEFORE ALL NECESSARY INSPECTIONS ARE COMPLETED, SAME WILL BE OPENED FOR EXAMINATION AT THE CONTRACTOR'S EXPENSE. ALL FEES, LICENSES, TEST COSTS, ETC. ARE THE CONTRACTOR'S RESPONSIBILITY.

C. RULES, REGULATIONS, AND CODES:

1. ALL MATERIAL AND EQUIPMENT SHALL CONFORM TO THE STANDARDS, WHERE AVAILABLE, OF THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA), NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), NATIONAL ELECTRICAL CODE (NEC), UNDERWRITERS LABORATORIES (UL), AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR–CONDITIONING ENGINEERS (ASHRAE), SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION (SMACNA), AND AMERICAN WATER WORKS ASSOCIATION (AWWA).
2. ALL WORK SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND UTILITY COMPANIES' REGULATIONS.

D. WORKMANSHIP AND INSTALLATION: THE OWNER SHALL DECIDE WHETHER OR NOT THE FINISHED WORK IS SATISFACTORY IN THEIR JUDGMENT. IF ANY MATERIAL AND/OR EQUIPMENT HAS NOT BEEN PROPERLY INSTALLED OR FINISHED, THIS CONTRACTOR IS OBLIGATED TO REPLACE THE MATERIAL AND/OR EQUIPMENT WHENEVER REQUIRED AND TO REINSTALL THE MATERIAL AND EQUIPMENT IN A MANNER ENTIRELY SATISFACTORY WITHOUT ADDITIONAL COST TO THE OWNER.

E. COOPERATION: THERE SHALL BE COMPLETE COOPERATION WITH ALL TRADES IN THE MATTER OF PLANNING AND EXECUTION OF THE WORK. EVERY REASONABLE EFFORT SHALL BE MADE TO PREVENT CONFLICT AS TO SPACE REQUIREMENTS, DIMENSIONS, LOCATIONS, LEAVING OF OPENINGS, OR OTHER MATTERS THAT OBSTRUCT OR DELAY WORK.

PART 2 – PRODUCTS – REFER TO DRAWINGS

2.1 MOTORS

A. ELECTRIC SERVICE: REFER TO DIVISION 26.

B. MOTORS: NEMA MG1, CONTINUOUS RATED, OPEN, BALL–BEARING, SQUIRREL CAGE, INDUCTION WITH CLASS B INSULATION, HIGH OR PREMIUM EFFICIENCY UNLESS OTHERWISE NOTED.

C. SINGLE PHASE MOTORS, LESS THAN 1/3 HORSEPOWER: SPLIT PHASE.

D. SINGLE PHASE MOTORS, 1/3 HORSEPOWER OR LARGER: CAPACITOR START.

E. NOMINAL NAMEPLATE HORSEPOWER: NOT LESS THAN 115% OF EQUIPMENT HORSEPOWER REQUIRED FOR SPECIFIC PERFORMANCE.

2.2 VIBRATION ISOLATION

A. VIBRATION ISOLATORS:

1. HANGERS: OPEN SPRING MOUNT WITH STIFF SPRINGS, HEAVY MOUNTING FRAME, AND LIMIT STOP.
2. PADS: NEOPRENE WAFFLE PADS, 30 DUROMETER, 1/2" THICK MINIMUM, MAXIMUM LOADING OF 40 PSI.

2.3 STEM–TYPE THERMOMETERS

A. ASTM E1, RED APPEARING MERCURY, LENS FRONT TUBE, CAST ALUMINUM CASE WITH ENAMEL FINISH, 9 INCH SCALE, LEXAN WINDOW, BRASS STEM, 2 PERCENT ACCURACY, SCALE IN DEGREES FAHRENHEIT.

2.4 MECHANICAL IDENTIFICATION

A. PLASTIC TAGS: LAMINATED PLASTIC WITH ENGRAVED LETTERS ON CONTRASTING BACKGROUND COLOR. TAG SIZE MINIMUM OF 1–1/2" SQUARE.

B. STENCILED TAGS: SEMI–GLOSS ENAMEL PAINTED, MINIMUM 2" HIGH LETTERS.

C. PLASTIC TAPE PIPE MARKERS: FLEXIBLE, VINYL FILM TAPE WITH PRESSURE SENSITIVE ADHESIVE BACKING AND PRINTED MARKINGS.

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. PROVIDE VIBRATION ISOLATION ON MOTOR DRIVEN EQUIPMENT AND CONNECTED PIPING AND/OR DUCTWORK.

C. PROVIDE SPRING ISOLATORS ON PIPING CONNECTED TO ISOLATED EQUIPMENT AS FOLLOWS:

1. UP TO 4" DIAMETER: ISOLATORS ON FIRST 3 POINTS OF SUPPORT.
2. 5" TO 8" DIAMETER: ISOLATORS ON FIRST 4 POINTS OF SUPPORT.
3. 10" DIAMETER AND LARGER: ISOLATORS ON FIRST 6 POINTS OF SUPPORT.
4. STATIC DEFLECTION OF THE FIRST POINT OF SUPPORT SHALL BE TWICE THE DEFLECTION OF THE ISOLATED EQUIPMENT.

D. INSTALL THERMOMETERS IN PIPING SYSTEMS IN SHORT COUPLINGS. ENLARGE PIPES SMALLER THAN 2–1/2" FOR INSTALLATION OF THERMOMETER SOCKETS. ENSURE SOCKETS ALLOW CLEARANCE FROM INSULATION.

E. INSTALL GAUGES AND THERMOMETERS IN LOCATIONS WHERE THEY ARE EASILY READ FROM OPERATING LEVEL. INSTALLATION SHALL BE BETWEEN 0 AND 45 DEGREES FROM VERTICAL.

F. IDENTIFY ROOFTOP UNITS WITH STENCILED TAGS.

G. IDENTIFY AIR HANDLING UNITS, PUMPS, HEAT TRANSFER EQUIPMENT, TANKS, AND WATER TREATMENT DEVICES WITH PLASTIC TAGS.

H. SMALLER DEVICES, SUCH AS IN–LINE PUMPS, MAY BE IDENTIFIED WITH PLASTIC TAPE MARKERS.

I. IDENTIFY CONTROL PANELS AND MAJOR CONTROL COMPONENTS OUTSIDE PANELS WITH PLASTIC TAGS.

END OF SECTION

SUPPORTS AND ANCHORS SECTION 23 05 29

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. PIPE, EQUIPMENT HANGERS, AND SUPPORTS.

B. SLEEVES AND SEALS.

C. FLASHING AND SEALING EQUIPMENT AND PIPE STACKS.

D. EQUIPMENT CURBS.

PART 2 – PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. MANUFACTURERS:

1. B–LINE.
2. GRINNELL.

B. PLUMBING PIPING:

1. CONFORM TO ASME B31.9.
2. HANGERS FOR PIPE SIZES 1/2" TO 1–1/2": MALLEABLE IRON, ADJUSTABLE SWIVEL, SPLIT RING.
3. HANGERS FOR PIPE SIZES 2" AND LARGER: CARBON STEEL, ADJUSTABLE, CLEVIS.
4. MULTIPLE OR TRAPEZE HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
5. WALL SUPPORT FOR PIPE SIZES 3" AND SMALLER: CAST IRON HOOK.
6. WALL SUPPORT FOR PIPE SIZES 4" AND LARGER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
7. VERTICAL SUPPORT: STEEL RISER CLAMP, ANGLE RING.
8. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
9. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

C. DUCTWORK: IN ACCORDANCE WITH SMACNA STANDARDS.

2.2 ACCESSORIES

A. HANGER RODS: MILD STEEL THREADED BOTH ENDS, THREADED ONE END, OR CONTINUOUS THREADED.

2.3 FLASHING

A. METAL FLASHING: 26 GAUGE GALVANIZED STEEL.

B. METAL COUNTER FLASHING: 22 GAUGE GALVANIZED STEEL.

C. LEAD FLASHING:

1. WATERPROOFING: 5 LB./FT.2 SHEET LEAD.
2. SOUNDPROOFING: 1 LB./FT.2 SHEET LEAD.

D. FLEXIBLE FLASHING: 47 MIL THICK SHEET BUTYL, COMPATIBLE WITH ROOFING.

E. CAPS: STEEL, 22 GAUGE MINIMUM, 16 GAUGE AT FIRE RESISTANT ELEMENTS.

F. ARCHITECTURAL SPECIFICATIONS SUPERCEDE THESE FLASHING REQUIREMENTS.

2.4 SLEEVES

A. SLEEVES FOR PIPES THROUGH NON–FIRE RATED FLOORS: 18 GAUGE GALVANIZED STEEL.

B. SLEEVES FOR PIPES THROUGH FIRE RATED AND FIRE RESISTIVE FLOORS AND WALLS AND FIRE PROOFING: PREFABRICATED FIRE RATED SLEEVES INCLUDING SEALS, UL LISTED.

C. SLEEVES FOR ROUND DUCTWORK: GALVANIZED STEEL.

D. SLEEVES FOR RECTANGULAR DUCTWORK: GALVANIZED STEEL OR WOOD.

E. STUFFING INSULATION: GLASS FIBER TYPE, NON–COMBUSTIBLE.

F. SEALANT: ACRYLIC.

2.5 EQUIPMENT CURBS

A. CURBS SUPPLIED BY EQUIPMENT MANUFACTURER WHERE INDICATED.

B. FABRICATION: WELDED 18 GAUGE GALVANIZED STEEL SHELL AND BASE, MITERED 3" CANT, SLOPED TO MATCH ROOF, 1–1/2" THICK INSULATION, FACTORY INSTALLED WOOD NAILER.

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. SUPPORT HORIZONTAL PIPING AS SCHEDULED.

C. PLACE HANGERS WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW.

D. USE HANGERS WITH 1–1/2 INCH MINIMUM VERTICAL ADJUSTMENT.

E. SUPPORT HORIZONTAL CAST IRON PIPE ADJACENT TO EACH HUB WITH 5 FEET MAXIMUM SPACING BETWEEN HANGERS.

F. WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT SAME ELEVATION, PROVIDE MULTIPLE OR TRAPEZE HANGERS.

G. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.

H. PROVIDE COPPER PLATED HANGER AND SUPPORTS FOR COPPER PIPING.

I. DESIGN HANGER FOR PIPE MOVEMENT WITHOUT DISENGAGEMENT OF SUPPORTED PIPE.

J. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS.

K. PROVIDE FLEXIBLE FLASHING AND METAL COUNTER FLASHING WHERE PIPING AND DUCTWORK PENETRATE WEATHER OR WATERPROOFED WALLS, FLOORS, AND ROOFS.

L. FLASH VENT AND SOIL PIPES PROJECTING 3 INCHES MINIMUM ABOVE FINISHED ROOF SURFACE WITH LEAD WORKED 1 INCH MINIMUM INTO HUB, 8 INCHES MINIMUM CLEAR ON SIDES WITH 24" X 24" SHEET SIZE. FOR PIPES THROUGH OUTSIDE WALLS, TURN FLANGES BACK INTO WALL THEN CAULK, METAL COUNTER FLASH, AND SEAL.

M. SEAL FLOOR AND MOP SINK DRAINS WATERTIGHT TO ADJACENT MATERIALS.

N. PROVIDE CURBS FOR MECHANICAL ROOF INSTALLATIONS 14 INCHES MINIMUM ABOVE ROOFING SURFACE. FLASH AND COUNTERFLASH WITH SHEET METAL AND SEAL WATERTIGHT. ATTACH COUNTERFLASHING TO MECHANICAL EQUIPMENT AND LAP BASE FLASHING ON ROOF CURBS. FLATTEN AND SOLDER JOINTS.

O. ADJUST STORM COLLARS TIGHT TO PIPE WITH BOLTS AND CAULK AROUND TOP EDGE. USE STORM COLLARS ABOVE ROOF JACKS. SCREW VERTICAL FLANGE SECTION TO FACE OF CURB.

P. SET SLEEVES IN POSITION IN FORMWORK. PROVIDE REINFORCING AROUND SLEEVES.

Q. SIZE SLEEVES LARGE ENOUGH TO ALLOW FOR MOVEMENT DUE TO EXPANSION AND CONTRACTION. PROVIDE FOR CONTINUOUS INSULATION WRAPPING.

R. WHERE PIPING OR DUCTWORK PENETRATES FLOOR, CEILING, OR WALL, CLOSE OFF SPACE BETWEEN PIPE OR DUCT AND ADJACENT WORK WITH FIRE STOPPING INSULATION AND CAULK. PROVIDE CLOSE FITTING METAL COLLAR OR ESCUTCHEON COVERS AT BOTH SIDES OF PENETRATION.

S. INSTALL CHROME PLATED STEEL ESCUTCHEONS AT FINISHED SURFACES.

3.2 SCHEDULES

A. HANGER SPACING AND HANGER ROD SIZES:

PIPE SIZE (INCHES)	MAX. HANGER SPACING (FEET)	HANGER ROD DIAMETER (INCHES)
1/2 TO 1–1/2	6–1/2	3/8
1–1/2 TO 2	10	3/8
2–1/3 TO 3	10	1/2
4 TO 6	10	5/8
PVC	6	3/8
BELL & SPIGOT (OR NO–HUB) AND AT JOINTS	5	1/2

END OF SECTION

TESTING ADJUSTING AND BALANCING SECTION 23 05 93

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. PRE–START, TESTING, ADJUSTING AND BALANCING OF AIR SYSTEMS.

1.2 SUBMITTALS FOR REVIEW

A. GENERAL CONTRACTOR TO SUBMIT COPIES OF PRE–START REPORT FOR REVIEW PRIOR TO COMMENCEMENT OF TEST AND BALANCE AND FINAL ACCEPTANCE OF PROJECT. THE PROJECT'S TEST AND BALANCE CONTRACTOR TO PROVIDE FINAL COPIES OF CERTIFIED TEST AND BALANCE REPORT TO ARCHITECT/ENGINEER, AND FOR INCLUSION IN OPERATING AND MAINTENANCE MANUALS.

1.3 QUALIFICATIONS: MECHANICAL CONTRACTOR RESPONSIBLE FOR PRE–START OF MECHANICAL SYSTEMS, EQUIPMENT AND TESTING AND BALANCING SHALL BE PERFORMED BY THE AIR BALANCE CONTRACTOR.

PART 2 – EXECUTION

2.1 PRE–START REQUIREMENTS (BY MECHANICAL CONTRACTOR)

B. VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE PRIOR TO COMMENCEMENT OF TEST AND BALANCE. ENSURE THE FOLLOWING CONDITIONS:

1. SYSTEMS ARE STARTED AND OPERATING IN SAFE AND NORMAL CONDITION. HEATING AND A/C EQUIPMENT PROPERLY CHARGED AND HEATING SECTION FIRING CORRECTLY.
2. RTU POWER EXHAUST, SMOKE DETECTORS, AND ECONOMIZER SET–UP COMPLETED PER MANUFACTURERS RECOMMENDATIONS.
3. PROPER THERMAL OVERLOAD PROTECTION IS IN PLACE FOR ELECTRICAL EQUIPMENT.
4. FINAL FILTERS ARE CLEAN AND IN PLACE. IF REQUIRED, INSTALL TEMPORARY MEDIA IN ADDITION TO FINAL FILTERS.
5. DUCT SYSTEMS ARE CLEAN OF DEBRIS.
6. FANS ARE ROTATING CORRECTLY.
7. FIRE AND VOLUME DAMPERS ARE IN PLACE AND OPEN.
8. AIR COIL FINS ARE CLEANED AND COMBED.
9. ACCESS DOORS ARE CLOSED AND DUCT ENDS ARE IN PLACE.
10. AIR OUTLETS ARE INSTALLED AND CONNECTED.
11. DUCT SYSTEM LEAKAGE IS MINIMIZED.
12. SUBMIT FIELD REPORTS. REPORT DEFECTS AND DEFICIENCIES NOTED DURING PERFORMANCE OF SERVICES WHICH PREVENT SYSTEM BALANCE.

2.2 PREPARATION

A. TEST AND ADJUST ALL MECHANICAL SYSTEMS AND EQUIPMENT TO ASSURE PROPER BALANCE AND OPERATION. PERFORM TESTS IN ACCORDANCE WITH THE MOST CURRENT NEBB OR AABC, AND ASHRAE STANDARDS. ELIMINATE OBJECTIONABLE NOISE AND VIBRATION, AND ASSURE PROPER FUNCTION OF CONTROLS. BALANCING CONTRACTOR SHALL BE AN INDEPENDENT CERTIFIED TEST AND BALANCE CONTRACTOR, WITH NEBB OR AABC CERTIFICATION. SUBMIT COMPLETED AND CERTIFIED TEST AND BALANCE REPORT TO OWNER'S REPRESENTATIVE.

B. PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS. ALL INSTRUMENTS SHALL BE RECENTLY TESTED AND CALIBRATED.

C. PROVIDE ADDITIONAL BALANCING DEVICES AS REQUIRED.

2.3 INSTALLATION TOLERANCES

A. AIR HANDLING SYSTEMS: ADJUST TO WITHIN ±5 PERCENT OF DESIGN FOR SUPPLY SYSTEMS AND WITHIN ±10 PERCENT OF DESIGN FOR RETURN AND EXHAUST SYSTEMS.

B. AIR OUTLETS AND INLETS: ADJUST TOTAL TO WITHIN PLUS 10 PERCENT AND MINUS 5 PERCENT OF DESIGN TO SPACE.

2.4 AIR SYSTEM PROCEDURE

A. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES.

B. MAKE AIR QUANTITY MEASUREMENTS IN DUCTS BY PITOT TUBE TRAVERSE OF ENTIRE CROSS SECTIONAL AREA OF DUCT.

C. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.

D. ADJUST DISTRIBUTION SYSTEM TO OBTAIN UNIFORM SPACE TEMPERATURES FREE FROM OBJECTIONABLE DRAFTS AND NOISE.

E. USE VOLUME CONTROL DEVICES TO REGULATE AIR QUANTITIES ONLY TO THE EXTENT THAT ADJUSTMENTS DO NOT CREATE OBJECTIONABLE AIR MOTION OR SOUND LEVELS.

F. VARY TOTAL SYSTEM AIR QUANTITIES BY ADJUSTMENT OF FAN SPEEDS. PROVIDE DRIVE CHANGES IF REQUIRED. VARY MAIN TRUNK DUCT AIR QUANTITIES BY DAMPER REGULATION.

G. ADJUST AUTOMATIC DAMPERS, OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS FOR DESIGN CONDITIONS. SETTINGS OF FRESH AIR INTAKES SHALL MEET APPROPRIATE CODES.

H. MEASURE TEMPERATURE CONDITIONS ACROSS OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS TO CHECK LEAKAGE.

END OF SECTION

MECHANICAL PIPING AND DUCT INSULATION SECTION 23 07 19

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. PIPING INSULATION.

B. DUCT INSULATION.

C. JACKETS AND ACCESSORIES

PART 2 – PRODUCTS

2.1 PIPE INSULATION

A. CELLULAR FOAM

1. MANUFACTURER/MODEL:
   a. ARMSTRONG ARMAFLEX 22.
   b. OWENS CORNING O–C.
   c. CERTAINTEED CORP.
2. ASTM C534, FLEXIBLE, CELLULAR ELASTOMERIC MOLDED SHEET.
3. JOINTS: SEALED WITH WATERPROOF ADHESIVE.
4. ADHESIVES MANUFACTURER/MODEL:
   a. ARMSTRONG 520.
   b. OWENS CORNING 500.

B. GLASS FIBER

1. INSULATION: ASTM C547, RIGID MOLDED, NON–COMBUSTIBLE.
   a. 'K' VALUE: ASTM C177, 0.24 AT 75° F.
   b. MAXIMUM SERVICE TEMPERATURE: 850° F.
   c. MAXIMUM MOISTURE ABSORPTION: 0.2 PERCENT BY VOLUME.
2. VAPOR BARRIER JACKET:
   a. ASTM C921, WHITE KRAFT PAPER WITH GLASS FIBER YARN, BONDED TO ALUMINIZED FILM.
   b. MOISTURE BARRIER TRANSMISSION: ASTM E96, 0.02 PERM–INCHES.
3. TIE WIRE: 0.048 INCH STAINLESS STEEL WITH TWISTED ENDS ON MAXIMUM 12 INCH CENTERS.
4. VAPOR BARRIER LAP ADHESIVE: COMPATIBLE WITH INSULATION.
5. INSULATING CEMENT/MASTIC: ASTM C195, HYDRAULIC SETTING ON MINERAL WOOL.
6. FIBROUS GLASS FABRIC:
   a. CLOTH: UNTREATED, 9 OZ/YD^2 WEIGHT.
   b. BLANKET: 1.0 LB./FT.^3 DENSITY.
   c. WEAVE: 5X5.

2.2 DUCTWORK INSULATION

A. GLASS FIBER, FLEXIBLE:

1. MANUFACTURER/MODEL: OWENS CORNING/SOFTR DUCT WRAP.
2. OTHER MANUFACTURERS OFFERING EQUIVALENT PRODUCTS:
   a. KNAUF.
   b. JOHNS MANVILLE.
3. INSULATION: ASTM C553, FLEXIBLE, NON–COMBUSTIBLE BLANKET.
   a. INSTALLED 'K' VALUE: ASTM C518, 0.25 AT 75° F.
   b. MAXIMUM SERVICE TEMPERATURE: 250° F.
   c. MAXIMUM MOISTURE ABSORPTION: 0.2 PERCENT BY VOLUME.
4. VAPOR BARRIER JACKET:
   a. ASTM C921, WHITE KRAFT PAPER WITH GLASS FIBER YARN, BONDED TO ALUMINIZED FILM.
   b. MOISTURE BARRIER TRANSMISSION: ASTM E96, 0.02 PERM–INCHES.
   c. SECURE WITH PRESSURE SENSITIVE TAPE.
5. VAPOR BARRIER TAPE:
   a. KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM WITH PRESSURE SENSITIVE RUBBER BASED ADHESIVE.

B. JACKETS:

1. CANVAS JACKET: UL LISTED.
   a. FABRIC: ASTM C921, 6 OZ/YD^2, PLAIN WEAVE COTTON TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE.

2.3 INSULATION RATINGS

A. FLAME SPREAD SHALL BE 25 OR LESS IN ACCORDANCE WITH ASTM E84.

B. SMOKE DEVELOPED SHALL BE 50 OR LESS IN ACCORDANCE WITH ASTM E84.

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

B. ALL PIPE FITTINGS TO BE INSULATED WITH MITER CUT PIECES OF CELLULAR FOAM INSULATION ASSEMBLED ON SITE USING SPECIFIED ADHESIVE.

C. FIBER DUCTWORK IS NOT ACCEPTABLE.

D. DO NOT INSTALL INSULATION AND COVERINGS UNTIL DUCTWORK OR PIPING HAVE BEEN TESTED OR APPROVED.

E. ENSURE SURFACES ARE CLEAN AND DRY PRIOR TO INSULATING.

F. LOCATE INSULATION SEAMS IN LEAST VISIBLE LOCATION.

G. FINISH INSULATION NEATLY AT HANGERS, SUPPORTS, AND OTHER PROTRUSIONS.

H. ENSURE INSULATION IS CONTINUOUS INSIDE WALLS.

3.2 SCHEDULES

A. PIPING INSULATION THICKNESS

1. CELLULAR FOAM
   a. DOMESTIC HOT WATER, COLD WATER, AND HOT WATER RECIRCULATION 1/2"
   b. CONDENSATE DRAINS 1/2"
2. PRE–FORMED GLASS FIBER
   a. DOMESTIC HOT WATER, COLD WATER, AND HOT WATER RECIRCULATION 1"
   b. CONDENSATE DRAINS 1"

B. DUCTWORK INSULATION THICKNESS

1. FLEXIBLE FIBERGLASS
   a. RECTANGULAR AND ROUNDSUPPLY DUCT ABOVE CEILINGS 2"
   b. ROUND RETURN DUCT ABOVE CEILINGS 2"

END OF SECTION

COMMISSIONING OF HVAC SECTION 23 08 00

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES COMMISSIONING PROCESS REQUIREMENTS FOR HVAC &R SYSTEMS, ASSEMBLIES, AND EQUIPMENT.

1.2 DEFINITIONS

A. COMMISSIONING PLAN: A DOCUMENT THAT OUTLINES THE ORGANIZATION, SCHEDULE, ALLOCATION OF RESOURCES, AND DOCUMENTATION REQUIREMENTS OF THE COMMISSIONING PROCESS.

B. CXA: COMMISSIONING AUTHORITY.

C. HVAC&R: HEATING, VENTILATING, AIR CONDITIONING, AND REFRIGERATION.

D. SYSTEMS, SUBSYSTEMS, EQUIPMENT, AND COMPONENTS: WHERE THESE TERMS ARE USED TOGETHER OR SEPARATELY, THEY SHALL MEAN "AS–BUILT" SYSTEMS, SUBSYSTEMS, EQUIPMENT, AND COMPONENTS.

1.3 INFORMATIONAL SUBMITTALS

A. CERTIFICATES OF READINESS.

B. CERTIFICATES OF COMPLETION OF INSTALLATION, PRESTART, AND STARTUP ACTIVITIES.

1.4 ALLOWANCES

A. LABOR, INSTRUMENTATION, TOOLS, AND EQUIPMENT COSTS FOR TECHNICIANS FOR THE PERFORMANCE OF COMMISSIONING TESTING ARE COVERED BY THE "SCHEDULE OF ALLOWANCES" ARTICLE IN SECTION 012100 "ALLOWANCES."

1.5 UNIT PRICES

A. COMMISSIONING TESTING ALLOWANCE MAY BE ADJUSTED UP OR DOWN BY THE "LIST OF UNIT PRICES" ARTICLE IN SECTION 012200 "UNIT PRICES" WHEN ACTUAL MAN–HOURS ARE COMPUTED AT THE END OF COMMISSIONING TESTING.

1.6 CONTRACTOR'S RESPONSIBILITIES

A. PERFORM COMMISSIONING TESTS AT THE DIRECTION OF THE CXA.

B. ATTEND CONSTRUCTION PHASE CONTROLS COORDINATION MEETING.

C. ATTEND TESTING, ADJUSTING, AND BALANCING REVIEW AND COORDINATION MEETING.

D. PARTICIPATE IN HVAC&R SYSTEMS, ASSEMBLIES, EQUIPMENT, AND COMPONENT MAINTENANCE ORIENTATION AND INSPECTION AS DIRECTED BY THE CXA.

E. PROVIDE INFORMATION REQUESTED BY THE CXA FOR FINAL COMMISSIONING DOCUMENTATION.

F. PROVIDE MEASURING INSTRUMENTS AND LOGGING DEVICES TO RECORD TEST DATA, AND PROVIDE DATA ACQUISITION EQUIPMENT TO RECORD DATA FOR THE COMPLETE RANGE OF TESTING FOR THE REQUIRED TEST PERIOD.

1.7 CXA'S RESPONSIBILITIES

A. PROVIDE PROJECT–SPECIFIC CONSTRUCTION CHECKLISTS AND COMMISSIONING PROCESS TEST PROCEDURES FOR ACTUAL HVAC&R SYSTEMS, ASSEMBLIES, EQUIPMENT, AND COMPONENTS TO BE FURNISHED AND INSTALLED AS PART OF THE CONSTRUCTION CONTRACT.

B. DIRECT COMMISSIONING TESTING.

C. VERIFY TESTING, ADJUSTING, AND BALANCING OF WORK ARE COMPLETE.

D. PROVIDE TEST DATA, INSPECTION REPORTS, AND CERTIFICATES IN SYSTEMS MANUAL.

1.8 COMMISSIONING DOCUMENTATION

A. PROVIDE THE FOLLOWING INFORMATION TO THE CXA FOR INCLUSION IN THE COMMISSIONING PLAN:

1. PLAN FOR DELIVERY AND REVIEW OF SUBMITTALS, SYSTEMS MANUALS, AND OTHER DOCUMENTS AND REPORTS.
2. IDENTIFICATION OF INSTALLED SYSTEMS, ASSEMBLIES, EQUIPMENT, AND COMPONENTS INCLUDING DESIGN CHANGES THAT OCCURRED DURING THE CONSTRUCTION PHASE.
3. PROCESS AND SCHEDULE FOR COMPLETING CONSTRUCTION CHECKLISTS AND MANUFACTURER'S PRESTART AND STARTUP CHECKLISTS FOR HVAC&R SYSTEMS, ASSEMBLIES, EQUIPMENT, AND COMPONENTS TO BE VERIFIED AND TESTED.
4. CERTIFICATE OF READINESS, SIGNED BY THE CONTRACTOR, CERTIFYING THAT HVAC&R SYSTEMS, ASSEMBLIES, EQUIPMENT, COMPONENTS, AND ASSOCIATED CONTROLS ARE READY FOR TESTING.
5. CERTIFICATE OF COMPLETION CERTIFYING THAT INSTALLATION, PRESTART CHECKS, AND STARTUP PROCEDURES HAVE BEEN COMPLETED.
6. CERTIFICATE OF READINESS CERTIFYING THAT HVAC&R SYSTEMS, SUBSYSTEMS, EQUIPMENT, AND ASSOCIATED CONTROLS ARE READY FOR TESTING.
7. TEST AND INSPECTION REPORTS AND CERTIFICATES.
8. CORRECTIVE ACTION DOCUMENTS.
9. VERIFICATION OF TESTING, ADJUSTING, AND BALANCING REPORTS.

PART 2 – EXECUTION

2.1 TESTING PREPARATION

A. CERTIFY THAT HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT HAVE BEEN INSTALLED, CALIBRATED, AND STARTED AND ARE OPERATING ACCORDING TO THE CONTRACT DOCUMENTS.

B. CERTIFY THAT HVAC&R INSTRUMENTATION AND CONTROL SYSTEMS HAVE BEEN COMPLETED AND CALIBRATED, THAT THEY ARE OPERATING ACCORDING TO THE CONTRACT DOCUMENTS, AND THAT PRETEST SET POINTS HAVE BEEN RECORDED.

C. CERTIFY THAT TESTING, ADJUSTING, AND BALANCING PROCEDURES HAVE BEEN COMPLETED AND THAT TESTING, ADJUSTING, AND BALANCING REPORTS HAVE BEEN SUBMITTED, DISCREPANCIES CORRECTED, AND CORRECTIVE WORK APPROVED.

D. SET SYSTEMS, SUBSYSTEMS, AND EQUIPMENT INTO OPERATING MODE TO BE TESTED (E.G., NORMAL SHUTDOWN, NORMAL AUTO POSITION, NORMAL MANUAL POSITION, UNOCCUPIED CYCLE, EMERGENCY POWER, AND ALARM CONDITIONS).

E. INSPECT AND VERIFY THE POSITION OF EACH DEVICE AND INTERLOCK IDENTIFIED ON CHECKLISTS.

F. CHECK SAFETY CUTOUTS, ALARMS, AND INTERLOCKS WITH SMOKE CONTROL AND LIFE–SAFETY SYSTEMS DURING EACH MODE OF OPERATION.

G. TESTING INSTRUMENTATION: INSTALL MEASURING INSTRUMENTS AND LOGGING DEVICES TO RECORD TEST DATA AS DIRECTED BY THE CXA.

2.2 TESTING AND BALANCING VERIFICATION

A. PRIOR TO PERFORMANCE OF TESTING AND BALANCING WORK, PROVIDE COPIES OF REPORTS, SAMPLE FORMS, CHECKLISTS, AND CERTIFICATES TO THE CXA.

B. NOTIFY THE CXA AT LEAST 10 DAYS IN ADVANCE OF TESTING AND BALANCING WORK, AND PROVIDE ACCESS FOR THE CXA TO WITNESS TESTING AND BALANCING WORK.

C. PROVIDE TECHNICIANS, INSTRUMENTATION, AND TOOLS TO VERIFY TESTING AND BALANCING OF HVAC&R SYSTEMS AT THE DIRECTION OF THE CXA.

1. THE CXA WILL NOTIFY TESTING AND BALANCING CONTRACTOR10 DAYS IN ADVANCE OF THE DATE OF FIELD VERIFICATION. NOTICE WILL NOT INCLUDE DATA POINTS TO BE VERIFIED.
2. THE TESTING AND BALANCING CONTRACTOR SHALL USE THE SAME INSTRUMENTS (BY MODEL AND SERIAL NUMBER) THAT WERE USED WHEN ORIGINAL DATA WERE COLLECTED.
3. FAILURE OF AN ITEM INCLUDES, OTHER THAN SOUND, A DEVIATION OF MORE THAN 10 PERCENT. FAILURE OF MORE THAN 10 PERCENT OF SELECTED ITEMS SHALL RESULT IN REJECTION OF FINAL TESTING, ADJUSTING, AND BALANCING REPORT. FOR SOUND PRESSURE READINGS, A DEVIATION OF 3 DB SHALL RESULT IN REJECTION OF FINAL TESTING. VARIATIONS IN BACKGROUND NOISE MUST BE CONSIDERED.
4. REMEDY THE DEFICIENCY AND NOTIFY THE CXA SO VERIFICATION OF FAILED PORTIONS CAN BE PERFORMED.

2.3 GENERAL TESTING REQUIREMENTS

A. PROVIDE TECHNICIANS, INSTRUMENTATION, AND TOOLS TO PERFORM COMMISSIONING TEST AT THE DIRECTION OF THE CXA.

B. SCOPE OF HVAC&R TESTING SHALL INCLUDE ENTIRE HVAC&R INSTALLATION, FROM CENTRAL EQUIPMENT FOR HEAT GENERATION AND REFRIGERATION THROUGH DISTRIBUTION SYSTEMS TO EACH CONDITIONED SPACE. TESTING SHALL INCLUDE MEASURING CAPACITIES AND EFFECTIVENESS OF OPERATIONAL AND CONTROL FUNCTIONS.

C. TEST ALL OPERATING MODES, INTERLOCKS, CONTROL RESPONSES, AND RESPONSES TO ABNORMAL OR EMERGENCY CONDITIONS, AND VERIFY PROPER RESPONSE OF BUILDING AUTOMATION SYSTEM CONTROLLERS AND SENSORS.

D. THE CXA ALONG WITH THE HVAC&R CONTRACTOR, TESTING AND BALANCING CONTRACTOR, AND HVAC&R INSTRUMENTATION AND CONTROL CONTRACTOR SHALL PREPARE DETAILED TESTING PLANS, PROCEDURES, AND CHECKLISTS FOR HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT.

E. TESTS WILL BE PERFORMED USING DESIGN CONDITIONS WHENEVER POSSIBLE.

F. SIMULATED CONDITIONS MAY NEED TO BE IMPOSED USING AN ARTIFICIAL LOAD WHEN IT IS NOT PRACTICAL TO TEST UNDER DESIGN CONDITIONS. BEFORE SIMULATING CONDITIONS, CALIBRATE TESTING INSTRUMENTS. PROVIDE EQUIPMENT TO SIMULATE LOADS. SET SIMULATED CONDITIONS AS DIRECTED BY THE CXA AND DOCUMENT SIMULATED CONDITIONS AND METHODS OF SIMULATION. AFTER TESTS, RETURN SETTINGS TO NORMAL OPERATING CONDITIONS.

G. THE CXA MAY DIRECT THAT SET POINTS BE ALTERED WHEN SIMULATING CONDITIONS IS NOT PRACTICAL.

H. THE CXA MAY DIRECT THAT SENSOR VALUES BE ALTERED WITH A SIGNAL GENERATOR WHEN DESIGN OR SIMULATING CONDITIONS AND ALTERING SET POINTS ARE NOT PRACTICAL.

I. IF TESTS CANNOT BE COMPLETED BECAUSE OF A DEFICIENCY OUTSIDE THE SCOPE OF THE HVAC&R SYSTEM, DOCUMENT THE DEFICIENCY AND REPORT IT TO THE OWNER. AFTER DEFICIENCIES ARE RESOLVED, RESCHEDULE TESTS.

J. IF THE TESTING PLAN INDICATES SPECIFIC SEASONAL TESTING, COMPLETE APPROPRIATE INITIAL PERFORMANCE TESTS AND DOCUMENTATION AND SCHEDULE SEASONAL TESTS.

2.4 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. BOILER TESTING AND ACCEPTANCE PROCEDURES: TESTING REQUIREMENTS ARE SPECIFIED IN HVAC BOILER SECTIONS. PROVIDE SUBMITTALS, TEST DATA, INSPECTOR RECORD, AND BOILER CERTIFICATION TO THE CXA.

B. HVAC&R INSTRUMENTATION AND CONTROL SYSTEM TESTING: FIELD TESTING PLANS AND TESTING REQUIREMENTS ARE SPECIFIED IN SECTION 230923 "DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC" AND SECTION 230993.11 "SEQUENCE OF OPERATIONS FOR HVAC DDC." ASSIST THE CXA WITH PREPARATION OF TESTING PLANS.

C. PIPE SYSTEM CLEANING, FLUSHING, HYDROSTATIC TESTS, AND CHEMICAL TREATMENT REQUIREMENTS ARE SPECIFIED IN HVAC PIPING SECTIONS. HVAC&R CONTRACTOR SHALL PREPARE A PIPE SYSTEM CLEANING, FLUSHING, AND HYDROSTATIC TESTING PLAN. PROVIDE CLEANING, FLUSHING, TESTING, AND TREATING PLAN AND FINAL REPORTS TO THE CXA. PLAN SHALL INCLUDE THE FOLLOWING:

1. SEQUENCE OF TESTING AND TESTING PROCEDURES FOR EACH SECTION OF PIPE TO BE TESTED, IDENTIFIED BY PIPE ZONE OR SECTOR IDENTIFICATION MARKER. MARKERS SHALL BE KEYED TO DRAWINGS FOR EACH PIPE SECTOR, SHOWING THE PHYSICAL LOCATION OF EACH DESIGNATED PIPE TEST SECTION. DRAWINGS KEYED TO PIPE ZONES OR SECTORS SHALL BE FORMATTED TO ALLOW EACH SECTION OF PIPING TO BE PHYSICALLY LOCATED AND IDENTIFIED WHEN REFERRED TO IN PIPE SYSTEM CLEANING, FLUSHING, HYDROSTATIC TESTING, AND CHEMICAL TREATMENT PLAN.
2. DESCRIPTION OF EQUIPMENT FOR FLUSHING OPERATIONS.
3. MINIMUM FLUSHING WATER VELOCITY.
4. TRACKING CHECKLIST FOR MANAGING AND ENSURING THAT ALL PIPE SECTIONS HAVE BEEN CLEANED, FLUSHED, HYDROSTATICALLY TESTED, AND CHEMICALLY TREATED.

D. ENERGY SUPPLY SYSTEM TESTING: PROVIDE TECHNICIANS, INSTRUMENTATION, TOOLS, AND EQUIPMENT TO TEST PERFORMANCE OF GAS SYSTEMS AND EQUIPMENT AT THE DIRECTION OF THE CXA. THE CXA SHALL DETERMINE THE SEQUENCE OF TESTING AND TESTING PROCEDURES FOR EACH EQUIPMENT ITEM AND PIPE SECTION TO BE TESTED.

E. REFRIGERATION SYSTEM TESTING: PROVIDE TECHNICIANS, INSTRUMENTATION, TOOLS, AND EQUIPMENT TO TEST PERFORMANCE OF CHILLERS, COOLING TOWERS, REFRIGERANT COMPRESSORS AND CONDENSERS, HEAT PUMPS, AND OTHER REFRIGERATION SYSTEMS. THE CXA SHALL DETERMINE THE SEQUENCE OF TESTING AND TESTING PROCEDURES FOR EACH EQUIPMENT ITEM AND PIPE SECTION TO BE TESTED.

F. HVAC&R DISTRIBUTION SYSTEM TESTING: PROVIDE TECHNICIANS, INSTRUMENTATION, TOOLS, AND EQUIPMENT TO TEST PERFORMANCE OF AIR, STEAM, AND HYDRONIC DISTRIBUTION SYSTEMS; SPECIAL EXHAUST; AND OTHER DISTRIBUTION SYSTEMS, INCLUDING HVAC&R TERMINAL EQUIPMENT AND UNITARY EQUIPMENT.

G. VIBRATION AND SOUND TESTS: PROVIDE TECHNICIANS, INSTRUMENTATION, TOOLS, AND EQUIPMENT TO TEST PERFORMANCE OF VIBRATION ISOLATION AND SEISMIC CONTROLS.

END OF SECTION

Scale: N.T.S
Designed by: NYE
Drawn by: NYE
Checked by: NYE

Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

MECHANICAL SPECIFICATIONS

MS7.1

DIVISION 23 – MECHANICAL SPECIFICATIONS

METAL DUCT AIR DISTRIBUTION
SECTION 23 31 13

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. SHEET METAL DUCTWORK.

B. FLEXIBLE DUCTWORK.

C. DUCT SEALANT.

D. DUCT LINER.

E. DUCT ACCESSORIES.

F. GRILLES, REGISTERS, AND DIFFUSERS.

G. DUCT CLEANING.

1.2 QUALITY ASSURANCE

A. PERFORM WORK IN ACCORDANCE WITH SMACNA – HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

B. TEST DUCT LEAKAGE IN ACCORDANCE WITH SMACNA – HVAC AIR DUCT LEAKAGE TEST MANUAL, SEAL CLASS "A".

1.3 REGULATORY REQUIREMENTS

A. CONSTRUCT DUCTWORK TO NFPA 90A STANDARDS.

PART 2 – PRODUCTS

2.1 DUCTWORK

A. MATERIALS:

1. GALVANIZED STEEL DUCTS: ASTM A653/A653M GALVANIZED STEEL SHEET, LOCK-FORMING QUALITY, HAVING G60 ZINC COATING OR GREATER IN CONFORMANCE WITH ASTM A90.

2. FLEXIBLE DUCTS: UL 181, CLASS 1, TWO PLY ALUMINIZED FOIL FILM SUPPORTED BY HELICALLY WOUND SPRING STEEL WIRE, FIBERGLASS INSULATION, VAPOR BARRIER FILM. PRESSURE RATING: 10 INCHES W.C. POSITIVE AND 0.75 INCHES W.C. NEGATIVE. RATED FOR PLENUM SERVICE WITH FLAME SPREAD BELOW 25 AND SMOKE PRODUCTION BELOW 50. MINIMUM INSULATION VALUE R-6.0.

3. PVC COATED STEEL DUCTS: G90 GALVANIZED STEEL DUCT COATED WITH POLYVINYL CHLORIDE PLASTIC, 4 MIL THICK ON OUTSIDE. MANUFACTURED BY FOREMOST MANUFACTURING CO., SOUTHFIELD MI, MODEL PCD.

B. METAL DUCTWORK:

1. FABRICATE AND SUPPORT IN ACCORDANCE WITH ASHRAE AND SMACNA – HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

2. SHEETMETAL DUCTWORK SHALL BE FABRICATED AND INSTALLED FOR 1" W.G. PRESSURE CLASS, SEAL CLASS "A".

3. CONSTRUCT T'S, BENDS, AND ELBOWS WITH RADIUS 1-1/2 TIMES THE WIDTH OF DUCT ON CENTER LINE OR PROVIDE TURNING VANES MANUFACTURED BY TITUS OR BARBER-COLEMAN.

4. INCREASE DUCT SIZES GRADUALLY, NOT EXCEEDING 30 DEGREES DIVERGENCE AND 45 DEGREES CONVERGENCE.

5. WEIGHT OF RECTANGULAR SHEET METAL DUCT (IN UNITED STATES STANDARD GAUGE):

a. UP TO 12 INCHES: 26 GAUGE.

b. 13 TO 30 INCHES: 24 GAUGE.

c. 31 TO 54 INCHES: 22 GAUGE.

5. WEIGHT OF ROUND SHEET METAL DUCT (IN UNITED STATES STANDARD GAUGE):

a. UP TO 8 INCHES: 28 GAUGE.

b. 9 TO 14 INCHES: 26 GAUGE.

c. 5 TO 26 INCHES: 24 GAUGE.

d. 27 TO 36 INCHES: 22 GAUGE.

e. 37 TO 50 INCHES: 20 GAUGE.

6. HORIZONTAL AND VERTICAL SURFACES OF DUCTWORK SHALL HAVE STIFFENER ANGLES OF SIZE, WEIGHT, AND SPACING AS FOLLOWS:

a. UP TO 24 INCHES: TRANSVERSE JOINT CONNECTIONS OF S DRIVE SOCKET OR BAR SLIPS ON 7 FOOT 10 INCH CENTERS.

b. 25 TO 40 INCHES: TRANSVERSE JOINT CONNECTIONS OF 1 INCH POCKET OR BAR SLIPS ON 7 FOOT 10 INCH CENTERS WITH 1 X 1 X 1/8 ANGLE BRACING 4 FEET FROM JOINTS.

c. 41 TO 60 INCHES: TRANSVERSE JOINT CONNECTIONS OF 1-1/2 INCH POCKET OR BAR SLIPS WITH 1-3/8 X 1/8 INCH BAR REINFORCING ON 7 FOOT 10 INCH CENTERS WITH 1-1/2 X 1-1/2 X 1/2 ANGLE BRACING 4 FEET FROM JOINTS.

d. RIVETING OF SHEETS TO STIFFENER ANGLES SHALL NOT EXCEED 6 INCHES ON CENTER.

e. THE SPACING OF STIFFENERS ON ELBOWS AND CURVES SHALL NOT EXCEED 30 INCHES.

2.2 FLEXIBLE DUCTS

A. INSULATION: COMPLY WITH UL 181, CLASS 1. FACTORY FABRICATED, INSULATED ROUND DUCT WITH AN OUTER JACKET ENCLOSING R-6 GLASS FIBER INSULATION AROUND A CONTINUOUS INNER LINER.

a. REINFORCEMENT: STEEL WIRE HELIX ENCAPSULATED IN INNER LINER.

b. OUTER JACKET: BI-DIRECTIONAL FIBERGLASS SCRIM REINFORCED ALUMINUM FOIL.

c. INNER LINER: ACOUSTICALLY RATED BLACK CPE CORE PERMANENTLY BONDED TO COATED STEEL WIRE HELIX.

d. PRESSURE RATING: 6 INCH W.C. POSITIVE, 1/2 INCH W.C. NEGATIVE.

2.3 DUCT SEALANT

A. DUCT SEALANT: PROVIDE WATER BASED SYNTHETIC LATEX EMULSION PERMANENTLY FLEXIBLE HIGH VELOCITY DUCT SEALANT, DUCTMATE INDUSTRIES, INC. PRO SEAL OR EQUAL. SEALANT TO BE LOW VOC LEED COMPLIANT CAPABLE OF 15" W.G., NFPA 90A AND 90B APPROVED, UL 181B-M LISTED AND UL 723 CLASSIFIED. INSTALL PER MANUFACTURER INSTRUCTIONS. SEALANT SHALL BE APPROVED FOR PLENUM INSTALLATIONS AND MEET FLAME SPREAD AND SMOKE DEVELOPED RATINGS FOR PLENUM APPLICATIONS.

2.4 DUCT LINER

A. DUCT LINER (PROVIDE ON ALL RECTANGULAR RETURN DUCT): PROVIDE MINIMUM 2" THICK, 3 PCF DENSITY, LONG TEXTILE FIBER TYPE DUCT LINER, WITH COATING ON THE AIR STREAM SIDE CONFORMING TO NFPA 90A. DUCT LINER SHALL BE SECURED TO DUCT WITH BOTH ADHESIVE AND MECHANICAL FASTENERS. ADHESIVE SHALL BE LEED COMPLIANT LOW VOC AS RECOMMENDED BY DUCT LINER MANUFACTURER, AND SHALL COMPLY WITH ASTM C-916. DUCT LINER FASTENERS SHALL COMPLY WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION. THERMAL CONDUCTIVITY SHALL BE EQUAL TO OR LESS THAN 0.23 AT 75°F.

2.5 DUCT ACCESSORIES

A. VOLUME CONTROL DAMPERS:

a. FABRICATION: SMACNA – HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

b. SPLITTER DAMPERS: SAME GAUGE AS DUCT TO 24 INCHES SIZE AND TWO GAUGES HEAVIER FOR LARGER SIZES.

c. SINGLE BLADE DAMPERS: FABRICATE FOR DUCT SIZES TO 12 X 30 INCHES.

d. END BEARINGS: PROVIDE EXCEPT IN ROUND DUCTWORK 12 INCHES AND SMALLER.

B. BACKDRAFT DAMPERS: FABRICATE MULTI-BLADE, PARALLEL ACTION GRAVITY BALANCED BACKDRAFT DAMPERS OF GALVANIZED STEEL OR EXTRUDED ALUMINUM WITH CENTER PIVOTED BLADES LINKED TOGETHER.

C. FLEXIBLE DUCT CONNECTIONS: UL LISTED FIRE-RETARDANT NEOPRENE COATED WOVEN GLASS FIBER FABRIC TO NFPA 90A, APPROXIMATELY 3 INCHES WIDE, CRIMPED INTO METAL EDGING STRIP.

2.6 GRILLES, REGISTERS, AND DIFFUSERS

A. REFER TO SCHEDULE ON DRAWINGS.

2.7 FIRE DAMPERS

A. MANUFACTURERS: NAILOR, PREFCO, RUSKIN, SAFEAIR.

B. FABRICATE IN ACCORDANCE WITH NFPA 90A AND UL 555 AND AS INDICATED.

C. CEILING DAMPERS: GALVANIZED STEEL 22 GAUGE FRAME AND 16 GAUGE FLAP, TWO LAYERS OF 1/8 INCH CERAMIC FIBER ON TOP SIDE AND ONE LAYER ON BOTTOM SIDE FOR ROUND FLAPS WITH LOCKING CLIP.

D. HORIZONTAL DAMPERS: GALVANIZED STEEL 22 GAUGE FRAME, STAINLESS STEEL CLOSURE SPRING, AND LIGHTWEIGHT HEAT RETARDANT NON-ASBESTOS FABRIC BLANKET.

E. CURTAIN TYPE DAMPERS: GALVANIZED STEEL WITH INTERLOCKING BLADES. PROVIDE STAINLESS STEEL CLOSURE SPRINGS AND LATCHES FOR HORIZONTAL INSTALLATIONS. CONFIGURE WITH BLADES OUT OF AIR STREAM EXCEPT FOR 1.0 INCH PRESSURE CLASS DUCTS UP TO 12 INCHES IN HEIGHT.

F. MULTIPLE BLADE DAMPERS: 16 GAUGE GALVANIZED STEEL FRAME AND BLADES, OIL IMPREGNATED BRONZE OR STAINLESS STEEL SLEEVE BEARINGS AND PLATED STEEL AXLES, 1/8 X ½ INCH PLATED STEEL CONCEALED LINKAGE, STAINLESS STEEL CLOSURE SPRING, BLADE STOPS, AND LOCK.

G. FUSIBLE LINKS: UL 33, SEPARATE TO 160° F WITH ADJUSTABLE LINK STRAPS FOR COMBINATION FIRE/BALANCING DAMPERS.

PART 3 – EXECUTION

3.1 INSTALLATION

A. ALL DUCTWORK SHALL BE ERECTED IN A FIRST CLASS WORKMANLIKE MANNER.

B. USE OF FIBER DUCTWORK IS NOT ACCEPTABLE.

C. OFFSET AS REQUIRED FOR COORDINATION WITH STRUCTURE AND OTHER TRADES. ANGLE OF OFFSETS SHALL BE AS SMALL AS POSSIBLE.

D. DUCT SIZES INDICATED ON DRAWINGS ARE INSIDE "FREE AND CLEAR" DIMENSIONS.

E. EQUIVALENT DUCT SIZES MAY BE USED FOR ECONOMY OR TO AVOID STRUCTURAL INTERFERENCES.

F. THE ENTIRE DUCTWORK SYSTEM THROUGHOUT THE BUILDING SHALL BE RIGIDLY SUPPORTED AND SO CONSTRUCTED TO ELIMINATE VIBRATION AND OBJECTIONABLE NOISE.

G. LOCATE DUCTS WITH SUFFICIENT SPACE AROUND EQUIPMENT TO ALLOW NORMAL OPERATING AND MAINTENANCE ACTIVITIES.

H. TAPE JOINTS OF PVC COATED METAL DUCTWORK WITH PVC TAPE.

I. SEAL AROUND DUCTS THAT PASS THROUGH WALLS OR PARTITIONS WITH NON-COMBUSTIBLE MATERIAL.

J. ACCESS PANELS: PROVIDE TIGHT SHEET METAL ACCESS DOORS WITH GASKETS, HINGES, AND LOCKS WHERE ACCESS TO PLENUM SPACES OR DUCTS IS NECESSARY. ACCESS DOORS SHALL BE OF ADEQUATE SIZE AND INSTALLED PER LOCAL CODES.

K. VOLUME CONTROLS FOR BALANCING: AMPLE PROVISION SHALL BE MADE FOR CONTROL AND FOR BALANCING THE VENTILATION SYSTEMS BY INSTALLATION OF DAMPERS, REGULATORS, AND CONTROLS.

L. PAINTING: PAINT ALL DUCTWORK VISIBLE THROUGH GRILLES, REGISTERS, AND DIFFUSERS WITH A FLAT BLACK TOP COAT. PAINT ALL GRILLES, REGISTERS, AND DIFFUSERS (SUPPLY AND RETURN) INSTALLED IN GYPSUM BOARD WALLS AND/OR CEILINGS TO MATCH SURROUNDINGS UNLESS OTHERWISE NOTED. REFER TO ARCHITECTURAL SPECIFICATIONS FOR PAINTING.

M. PROVIDE DUCT ACCESS DOORS FOR INSPECTION AND CLEANING BEFORE AND AFTER FILTERS, COILS, AND FANS, AS WELL AS AT AUTOMATIC DAMPERS, FIRE DAMPERS, COMBINATION FIRE/SMOKE DAMPERS, AND ELSEWHERE AS INDICATED.

N. PROVIDE DUCT TEST HOLES WHERE INDICATED AND REQUIRED FOR TESTING AND BALANCING PURPOSES.

O. PROVIDE FIRE DAMPERS AT LOCATIONS INDICATED, WHERE DUCTS PASS THROUGH FIRE RATED COMPONENTS, AND WHERE REQUIRED BY AUTHORITIES HAVING JURISDICTION. INSTALL WITH REQUIRED PERIMETER MOUNTING ANGLES, SLEEVES, BREAKAWAY DUCT CONNECTIONS, CORROSION RESISTANT SPRINGS, BEARINGS, BUSHINGS, AND HINGES.

P. INSTALL FIRE DAMPERS IN ACCORDANCE WITH NFPA 92A.

Q. DEMONSTRATE RESETTING OF FIRE DAMPERS TO OWNER'S REPRESENTATIVE.

3.2 DUCTWORK CLEANING

A. ALL DUCTWORK SHALL BE THOROUGHLY CLEANED OUT MANUALLY BY THE CONTRACTOR.

B. AFTER MANUAL CLEANING IS COMPLETED, BLOW OUT THE ENTIRE SYSTEM WITH BUILT-UP VELOCITY SO AS TO PROPERLY CLEAN OUT THE INTERIOR OF ALL DUCTWORK, LEAVING IT FREE FROM ALL FOREIGN MATTER.

C. THE ABOVE WORK SHALL BE DONE BEFORE ANY PAINTING IS DONE OR ACOUSTIC CEILING INSTALLED.

END OF SECTION

CENTRIFUGAL FANS
SECTION 23 34 16

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. BACKWARD INCLINED CENTRIFUGAL FANS.

B. FORWARD CURVED CENTRIFUGAL FANS.

C. INLINE CENTRIFUGAL FANS.

D. MOTORS AND DRIVES.

E. FAN ACCESSORIES.

1.2 DELIVERY, STORAGE, AND PROTECTION

A. PROTECT MOTORS, SHAFTS, AND BEARINGS FROM WEATHER AND CONSTRUCTION DUST.

1.3 ENVIRONMENTAL REQUIREMENTS

A. DO NOT OPERATE FANS FOR ANY PURPOSE UNTIL DUCTWORK IS CLEAN, FILTERS IN PLACE, BEARINGS LUBRICATED, AND FAN HAS BEEN TEST RUN UNDER OBSERVATION.

PART 2 – PRODUCTS

2.1 MANUFACTURERS / MODELS

A. REFER TO SCHEDULE ON DRAWINGS.

2.2 PERFORMANCE

A. PERFORMANCE RATINGS: CONFORM TO AMCA 210 AND BEAR THE AMCA CERTIFIED RATING SEAL.

B. SOUND RATINGS: AMCA 301, TESTED TO AMCA 300 AND BEAR AMCA CERTIFIED SOUND RATING SEAL.

C. FABRICATION: CONFORM TO AMCA 99.

D. TEMPERATURE LIMIT: MAXIMUM 300° F.

E. STATIC AND DYNAMIC BALANCE: ELIMINATE VIBRATION OR NOISE TRANSMISSION TO OCCUPIED AREA.

2.3 WHEEL AND INLET

A. BACKWARD INCLINED: STEEL OR ALUMINUM CONSTRUCTION WITH SMOOTH CURVED INLET FLANGE; HEAVY BACK PLATE, BACKWARDLY CURVED BLADES WELDED OR RIVETED TO FLANGE AND BACK PLATE; CAST IRON OR STEEL HUB RIVETED TO BACK PLATE AND KEYED TO SHAFT WITH SET SCREWS.

B. FORWARD CURVED: BLACK ENAMELED STEEL CONSTRUCTION WITH INLET FLANGE, BACK PLATE, SHALLOW BLADES WITH INLET AND TIP CURVED FORWARD IN DIRECTION OF AIRFLOW; MECHANICALLY SECURED TO FLANGE AND BACK PLATE; STEEL HUB SWAGED TO BACK PLATE AND KEYED TO SHAFT WITH SET SCREWS.

C. AIRFOIL WHEEL: STEEL CONSTRUCTION WITH SMOOTH CURVED INLET FLANGE, HEAVY BACK PLATE, DIE FORMED HOLLOW AIRFOIL SHAPED BLADES CONTINUOUSLY WELDED AT TIP FLANGE AND BACK PLATE, CAST IRON OR STEEL HUB WELDED TO BACK PLATE AND KEYED TO SHAFT WITH SET SCREWS.

2.4 HOUSING

A. HEAVY GAGE STEEL, SPOT WELDED, ADEQUATELY BRACED, DESIGNED TO MINIMIZE TURBULENCE WITH SPUN INLET BELL AND SHAPED CUT-OFF.

B. FACTORY FINISH BEFORE ASSEMBLY TO MANUFACTURER'S STANDARD FOR FANS HANDLING AIR DOWNSTREAM OF HUMIDIFIERS.

C. PROVIDE BOLTED CONSTRUCTION WITH HORIZONTAL FLANGED SPLIT HOUSING WHERE INDICATED.

D. FABRICATE PLUG FANS WITHOUT VOLUTE HOUSING, IN LINED STEEL CABINET.

2.5 BEARINGS AND DRIVES

A. BEARINGS: HEAVY DUTY PILLOW BLOCK TYPE, SELF-ALIGNING, GREASE LUBRICATED BALL BEARINGS, WITH ABMA L-10 LIFE OF AT LEAST 50,000 HOURS.

B. SHAFTS: HOT ROLLED STEEL, GROUND AND POLISHED, WITH KEYWAY, PROTECTIVE COATING OF LUBRICATING OIL, AND SHAFT GUARD.

C. DRIVES: V-BELT, CAST IRON OR STEEL SHEAVES, DYNAMICALLY BALANCED, KEYED. VARIABLE AND ADJUSTABLE PITCH SHEAVES ON MOTORS 15 HP AND UNDER AND SELECTED SO REQUIRED RPM IS OBTAINED WITH SHEAVES SET AT MID-POSITION. FIXED PITCH SHEAVES ON MOTORS LARGER THAN 15 HP. DIRECT DRIVE AS INDICATED ON DRAWINGS.

D. BELT GUARD: FABRICATE TO SMACNA STANDARD; 0.106 INCH THICK, 3/4 INCH DIAMOND MESH WIRE SCREEN WELDED TO STEEL ANGLE FRAME OR EQUIVALENT; PRIME COATED. SECURE TO FAN OR FAN SUPPORTS WITHOUT SHORT CIRCUITING VIBRATION ISOLATION WITH PROVISION FOR ADJUSTMENT OF BELT TENSION, LUBRICATION, AND USE OF TACHOMETER WITH GUARD IN PLACE.

2.6 ACCESSORIES

A. REFER TO SCHEDULE ON DRAWINGS.

B. INLET / OUTLET SCREENS: GALVANIZED STEEL WELDED GRID.

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL FANS WITH RESILIENT MOUNTINGS AND FLEXIBLE ELECTRICAL LEADS.

B. INSTALL FLEXIBLE CONNECTIONS BETWEEN FAN INLET AND DISCHARGE DUCTWORK. ENSURE METAL BANDS OF CONNECTORS ARE PARALLEL WITH MINIMUM ONE INCH FLEX BETWEEN DUCTWORK AND FAN WHILE RUNNING.

C. INSTALL FAN RESTRAINING SNUBBERS. ADJUST SNUBBERS TO PREVENT TENSION IN FLEXIBLE CONNECTORS WHEN FAN IS OPERATING.

D. PROVIDE SHEAVES REQUIRED FOR FINAL AIR BALANCE.

E. PROVIDE SAFETY SCREEN WHERE INLET OR OUTLET IS EXPOSED.

F. PIPE SCROLL DRAINS TO NEAREST FLOOR DRAIN.

G. PROVIDE BACKDRAFT DAMPERS ON DISCHARGE OF EXHAUST FANS AS INDICATED.

H. DO NOT OPERATE FANS IN NORMAL OPERATION UNTIL DUCTWORK IS CLEAN, FILTERS ARE IN PLACE, BEARINGS ARE LUBRICATED, AND FAN HAS BEEN RUN UNDER OBSERVATION.

END OF SECTION

DIFFUSERS, REGISTERS, AND GRILLES
SECTION 23 37 13

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. ROUND CEILING DIFFUSERS.

2. RECTANGULAR AND SQUARE CEILING DIFFUSERS.

3. FIXED FACE GRILLES.

B. RELATED SECTIONS:

1. SECTION 089116 "OPERABLE WALL LOUVERS" AND SECTION 089119 "FIXED LOUVERS" FOR FIXED AND ADJUSTABLE LOUVERS AND WALL VENTS, WHETHER OR NOT THEY ARE CONNECTED TO DUCTS.

2. SECTION 233300 "AIR DUCT ACCESSORIES" FOR FIRE AND SMOKE DAMPERS AND VOLUME-CONTROL DAMPERS NOT INTEGRAL TO DIFFUSERS, REGISTERS, AND GRILLES.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED, INCLUDE THE FOLLOWING:

1. DATA SHEET: INDICATE MATERIALS OF CONSTRUCTION, FINISH, AND MOUNTING DETAILS; AND PERFORMANCE DATA INCLUDING THROW AND DROP, STATIC-PRESSURE DROP, AND NOISE RATINGS.

2. DIFFUSER, REGISTER, AND GRILLE SCHEDULE: INDICATE DRAWING DESIGNATION, ROOM LOCATION, QUANTITY, MODEL NUMBER, SIZE, AND ACCESSORIES FURNISHED.

B. SAMPLES: FOR EACH EXPOSED PRODUCT AND FOR EACH COLOR AND TEXTURE SPECIFIED.

PART 2 – PRODUCTS

2.1 CEILING DIFFUSERS

A. ROUND CEILING DIFFUSER

1. DEVICES SHALL BE SPECIFICALLY DESIGNED FOR VARIABLE-AIR-VOLUME FLOWS.

2. MATERIAL: STEEL/ALUMINUM.

3. FINISH: BAKED ENAMEL, COLOR SELECTED BY ARCHITECT/ANODIZED ALUMINUM

4. FACE STYLE: CONE.

5. MOUNTING: DUCT CONNECTION.

6. PATTERN: FULLY ADJUSTABLE.

7. DAMPERS: RADIAL OPPOSED BLADE/BUTTERFLY.

8. ACCESSORIES:

a. EQUALIZING GRID.

b. PLASTER RING.

c. SAFETY CHAIN.

d. WIRE GUARD.

e. SECTORIZING BAFFLES.

f. OPERATING ROD EXTENSION.

B. RECTANGULAR AND SQUARE CEILING DIFFUSERS

1. DEVICES SHALL BE SPECIFICALLY DESIGNED FOR VARIABLE-AIR-VOLUME FLOWS.

2. MATERIAL: STEEL/ALUMINUM.

3. FINISH: BAKED ENAMEL, COLOR SELECTED BY ARCHITECT

4. FACE SIZE: 24 BY 24 INCHES 20 BY 20 INCHES 12 BY 12 INCHES

5. FACE STYLE: [THREE CONE] [FOUR CONE] [PLAQUE].

6. MOUNTING: T-BAR.

7. PATTERN: ADJUSTABLE.

8. DAMPERS: RADIAL OPPOSED BLADE/BUTTERFLY.

9. ACCESSORIES:

a. EQUALIZING GRID.

b. PLASTER RING.

c. SAFETY CHAIN.

d. WIRE GUARD.

e. SECTORIZING BAFFLES.

f. OPERATING ROD EXTENSION.

2.2 REGISTERS AND GRILLES

A. FIXED FACE GRILLE :

1. MATERIAL: STEEL/ALUMINUM.

2. FINISH: BAKED ENAMEL, COLOR SELECTED BY ARCHITECT.

3. FACE ARRANGEMENT: 1/2-1/2-1/2-INCH.

4. CORE CONSTRUCTION: REMOVABLE.

5. FRAME: 1 INCH WIDE.

6. MOUNTING: LAY IN.

7. ACCESSORY: FILTER.

2.3 SOURCE QUALITY CONTROL

A. VERIFICATION OF PERFORMANCE: RATE DIFFUSERS, REGISTERS AND GRILLES ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS."

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL DIFFUSERS, REGISTERS, AND GRILLES LEVEL AND PLUMB.

B. CEILING-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL. FOR UNITS INSTALLED IN LAY-IN CEILING PANELS, LOCATE UNITS IN THE CENTER OF PANEL. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ARCHITECT FOR A DETERMINATION OF FINAL LOCATION.

C. INSTALL DIFFUSERS, REGISTERS, AND GRILLES WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.

3.2 ADJUSTING

A. AFTER INSTALLATION, ADJUST DIFFUSERS, REGISTERS, AND GRILLES TO AIR PATTERNS INDICATED, OR AS DIRECTED, BEFORE STARTING AIR BALANCING.

END OF SECTION

KITCHEN HOODS
SECTION 23 38 13

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES TYPE II COMMERCIAL KITCHEN HOODS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR THE FOLLOWING:

1. FILTERS/BAFFLES.

2. LIGHTING FIXTURES.

B. SHOP DRAWINGS: SIGNED AND SEALED BY A QUALIFIED PROFESSIONAL ENGINEER.

1. SHOW PLAN VIEW, ELEVATION VIEW, SECTIONS, ROUGHING-IN DIMENSIONS, SERVICE REQUIREMENTS, DUCT CONNECTION SIZES, AND ATTACHMENTS TO OTHER WORK.

2. SHOW COOKING EQUIPMENT PLAN AND ELEVATION TO CONFIRM MINIMUM CODE-REQUIRED OVERHANG.

3. INDICATE PERFORMANCE, EXHAUST AND MAKEUP AIR AIRFLOW, AND PRESSURE LOSS AT ACTUAL PROJECT-SITE ELEVATION.

4. DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

5. DESIGN CALCULATIONS:CALCULATE REQUIREMENTS FOR SELECTING SEISMIC RESTRAINTS.

6. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.

1.3 INFORMATIONAL SUBMITTALS

A. WELDING CERTIFICATES.

B. MANUFACTURER SEISMIC QUALIFICATION CERTIFICATION: SUBMIT CERTIFICATION THAT COMMERCIAL KITCHEN HOODS, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN SECTION 230548 "VIBRATION AND SEISMIC CONTROLS FOR HVAC."

C. FIELD QUALITY-CONTROL TEST REPORTS.

1.4 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

PART 2 – PRODUCTS

2.1 HOOD MATERIALS

A. STAINLESS-STEEL SHEET: ASTM A 666, TYPE 304.

1. MINIMUM THICKNESS: 0.037 INCH- 0.050 INCH

2. FINISH: COMPLY WITH SSINA'S "FINISHES FOR STAINLESS STEEL" FOR RECOMMENDATIONS FOR APPLYING AND DESIGNATING FINISHES.

a. FINISH SHALL BE FREE FROM TOOL AND DIE MARKS AND STRETCH LINES AND SHALL HAVE UNIFORM, DIRECTIONALLY TEXTURED, POLISHED FINISH INDICATED, FREE OF CROSS SCRATCHES. GRAIN SHALL RUN WITH LONG DIMENSION OF EACH PIECE.

3. CONCEALED STAINLESS-STEEL SURFACES: ASTM A 480/A 480M, NO. 2B FINISH (BRIGHT, COLD-ROLLED, UNPOLISHED FINISH).

4. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 2B FINISH (BRIGHT, COLD-ROLLED, UNPOLISHED).

5. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 3 FINISH (INTERMEDIATE POLISHED SURFACE).

6. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 4 FINISH (DIRECTIONAL SATIN).

7. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 6 FINISH (DULL SATIN).

8. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 7 FINISH (REFLECTIVE, DIRECTIONAL POLISH).

9. EXPOSED SURFACES: ASTM A 480/A 480M, NO. 8 FINISH (MIRRORLIKE REFLECTIVE, NONDIRECTIONAL POLISH).

10. WHEN POLISHING IS COMPLETED, PASSIVATE AND RINSE SURFACES. REMOVE EMBEDDED FOREIGN MATTER AND LEAVE SURFACES CHEMICALLY CLEAN.

B. ZINC-COATED STEEL SHAPES: ASTM A 36/A 36M, ZINC COATED ACCORDING TO ASTM A 123/A 123M REQUIREMENTS.

C. SEALANT: ASTM C 920; TYPE S, GRADE NS, CLASS 25, USE NT. ELASTOMERIC SEALANT SHALL BE NSF CERTIFIED FOR COMMERCIAL KITCHEN HOOD APPLICATION. SEALANTS, WHEN CURED AND WASHED, SHALL COMPLY WITH REQUIREMENTS IN 21 CFR, SECTION 177.2600, FOR USE IN AREAS THAT COME IN CONTACT WITH FOOD.

1. COLOR: AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE.

2. BACKER ROD: CLOSED-CELL POLYETHYLENE, IN DIAMETER LARGER THAN JOINT WIDTH.

D. SOUND DAMPENING: NSF-CERTIFIED, NONABSORBENT, HARD-DRYING, SOUND-DEADENING COMPOUND FOR PERMANENT ADHESION TO METAL IN MINIMUM 1/8-INCH THICKNESS THAT DOES NOT CHIP, FLAKE, OR BLISTER.

E. GASKETS: NSF CERTIFIED FOR END-USE APPLICATION INDICATED; OF RESILIENT RUBBER, NEOPRENE, OR PVC THAT IS NONTOXIC, STABLE, ODORLESS, NONABSORBENT, AND UNAFFECTED BY EXPOSURE TO FOODS AND CLEANING COMPOUNDS, AND THAT PASSES TESTING ACCORDING TO UL 710.

2.2 GENERAL HOOD FABRICATION REQUIREMENTS

A. WELDING: USE WELDING ROD OF SAME COMPOSITION AS METAL BEING WELDED. USE METHODS THAT MINIMIZE DISTORTION AND DEVELOP STRENGTH AND CORROSION RESISTANCE OF BASE METAL. MAKE DUCTILE WELDS FREE OF MECHANICAL IMPERFECTIONS SUCH AS GAS HOLES, PITS, OR CRACKS.

1. WELDED BUTT JOINTS: FULL-PENETRATION WELDS FOR FULL-JOINT LENGTH. MAKE JOINTS FLAT, CONTINUOUS, AND HOMOGENOUS WITH SHEET METAL WITHOUT RELYING ON STRAPS UNDER SEAMS, FILLING IN WITH SOLDER, OR SPOT WELDING.

2. GRIND EXPOSED WELDED JOINTS FLUSH WITH ADJOINING MATERIAL AND POLISH TO MATCH ADJOINING SURFACES.

3. WHERE FASTENERS ARE WELDED TO UNDERSIDE OF EQUIPMENT, FINISH REVERSE SIDE OF WELD SMOOTH AND FLUSH.

4. COAT CONCEALED STAINLESS-STEEL WELDED JOINTS WITH METALLIC-BASED PAINT TO PREVENT CORROSION.

B. FOR METAL BUTT JOINTS, COMPLY WITH SMACNA'S "KITCHEN VENTILATION SYSTEMS & FOOD SERVICE EQUIPMENT GUIDELINES."

C. FORM METAL WITH BREAK BENDS THAT ARE NOT FLAKY, SCALY, OR CRACKED IN APPEARANCE; WHERE BREAKS MAR UNIFORM SURFACE APPEARANCE OF MATERIAL, REMOVE MARKS BY GRINDING, POLISHING, AND FINISHING.

D. SHEARED METAL EDGES: FINISH FREE OF BURRS, FINS, AND IRREGULAR PROJECTIONS.

E. IN FOOD ZONES, AS DEFINED IN NSF, FABRICATE SURFACES FREE FROM EXPOSED FASTENERS.

F. CAP EXPOSED FASTENER THREADS, INCLUDING THOSE INSIDE CABINETS, WITH STAINLESS-STEEL LOCK WASHERS AND STAINLESS-STEEL CAP (ACORN) NUTS.

G. FABRICATE PIPE SLOTS ON EQUIPMENT WITH TURNED-UP EDGES SIZED TO ACCOMMODATE SERVICE AND UTILITY LINES AND MECHANICAL CONNECTIONS.

H. FABRICATE ENCLOSURES, INCLUDING PANELS, HOUSINGS, AND SKIRTS, TO CONCEAL SERVICE LINES, OPERATING COMPONENTS, AND MECHANICAL AND ELECTRICAL DEVICES INCLUDING THOSE INSIDE CABINETS, UNLESS OTHERWISE INDICATED.

I. FABRICATE SEISMIC RESTRAINTS ACCORDING TO SMACNA'S "KITCHEN VENTILATION SYSTEMS & FOOD SERVICE EQUIPMENT GUIDELINES," APPENDIX A, "SEISMIC RESTRAINT DETAILS."

J. FABRICATE EQUIPMENT EDGES AND BACKSPLASHES ACCORDING TO SMACNA'S "KITCHEN VENTILATION SYSTEMS & FOOD SERVICE EQUIPMENT GUIDELINES."

K. FABRICATE ENCLOSURE PANELS TO CEILING AND WALL AS FOLLOWS:

1. FABRICATE PANELS WITH SAME MATERIAL AS HOOD, AND EXTEND FROM CEILING TO TOP OF HOOD CANOPY AND FROM CANOPY TO WALL.

2. WALL OFFSET SPACER: MINIMUM OF 3 INCHES.

3. WALL SHELVES AND OVERSHELVES: FABRICATE ACCORDING TO SMACNA'S "KITCHEN VENTILATION SYSTEMS & FOOD SERVICE EQUIPMENT GUIDELINES," WITH MINIMUM 0.0625-INCH- THICK, STAINLESS-STEEL SHELF TOPS.

2.3 TYPE II EXHAUST HOOD FABRICATION

A. FABRICATE HOODS ACCORDING TO NSF 2, "FOOD EQUIPMENT."

B. FABRICATE HOODS TO COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS: METAL AND FLEXIBLE."

C. HOOD CONFIGURATION: EXHAUST ONLY.

D. HOOD TYPE: [HEAT AND VAPOR] [CONDENSATE] REMOVAL.

E. HOOD STYLE: [WALL-MOUNTED CANOPY] [SINGLE-ISLAND CANOPY] [DOUBLE-ISLAND CANOPY] [BACK SHELF] [EYEBROW] [PASS OVER].

F. CONDENSATE HOOD BAFFLES: REMOVABLE, STAINLESS-STEEL BAFFLES TO DRAIN INTO A HOOD DRAIN TROUGH, AND STAINLESS-STEEL DRAIN PIPING.

PART 3 – EXECUTION

3.1 INSTALLATION

A. COMPLETE FIELD ASSEMBLY OF HOODS WHERE REQUIRED.

1. MAKE CLOSED BUTT AND CONTACT JOINTS THAT DO NOT REQUIRE FILLER.

2. GRIND FIELD WELDS ON STAINLESS-STEEL EQUIPMENT SMOOTH, AND POLISH TO MATCH ADJACENT FINISH. COMPLY WITH WELDING REQUIREMENTS IN PART 2 "GENERAL HOOD FABRICATION REQUIREMENTS" ARTICLE.

B. INSTALL HOODS AND ASSOCIATED SERVICES WITH CLEARANCES AND ACCESS FOR MAINTAINING, CLEANING, AND SERVICING HOODS, FILTERS/BAFFLES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.

C. MAKE CUTOUTS IN HOODS WHERE REQUIRED TO RUN SERVICE LINES AND TO MAKE FINAL CONNECTIONS, AND SEAL OPENINGS ACCORDING TO UL 1978.

D. SECURELY ANCHOR AND ATTACH ITEMS AND ACCESSORIES TO WALLS, FLOORS, OR BASES WITH STAINLESS-STEEL FASTENERS, UNLESS OTHERWISE INDICATED.

E. INSTALL HOODS TO OPERATE FREE FROM VIBRATION.

F. INSTALL SEISMIC RESTRAINTS ACCORDING TO SMACNA'S "KITCHEN VENTILATION SYSTEMS & FOOD SERVICE EQUIPMENT GUIDELINES," APPENDIX A, "SEISMIC RESTRAINT DETAILS."

G. INSTALL TRIM STRIPS AND SIMILAR ITEMS REQUIRING FASTENERS IN A BED OF SEALANT. FASTEN WITH STAINLESS-STEEL FASTENERS AT 48 INCHES O.C. MAXIMUM.

H. INSTALL SEALANT IN JOINTS BETWEEN EQUIPMENT AND ABUTTING SURFACES WITH CONTINUOUS JOINT BACKING, UNLESS OTHERWISE INDICATED. PROVIDE AIRTIGHT, WATERTIGHT, VERMIN-PROOF, SANITARY JOINTS.

I. SET INITIAL TEMPERATURES, AND CALIBRATE SENSORS.

J. SET FIELD-ADJUSTABLE SWITCHES.

K. CONNECT DUCTS ACCORDING TO REQUIREMENTS IN SECTION 233300 "AIR DUCT ACCESSORIES." INSTALL FLEXIBLE CONNECTORS ON MAKEUP AIR SUPPLY DUCT. WELD EXHAUST-DUCT CONNECTIONS WITH CONTINUOUS LIQUID TIGHT JOINT.

3.2 FIELD QUALITY CONTROL

A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT, TEST, AND ADJUST COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS. REPORT RESULTS IN WRITING.

B. 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.

C. TESTS AND INSPECTIONS:

1. TEST EACH EQUIPMENT ITEM FOR PROPER OPERATION. REPAIR OR REPLACE EQUIPMENT THAT IS DEFECTIVE, INCLUDING UNITS THAT OPERATE BELOW REQUIRED CAPACITY OR THAT OPERATE WITH EXCESSIVE NOISE OR VIBRATION.

2. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.

3. PERFORM HOOD PERFORMANCE TESTS REQUIRED BY AUTHORITIES HAVING JURISDICTION.

4. PREPARE TEST AND INSPECTION REPORTS.

END OF SECTION

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MECHANICAL SPECIFICATIONS

MS7.2

DIVISION 23 – MECHANICAL SPECIFICATIONS

PACKAGED AIR CONDITIONING UNITS
SECTION 23 74 23

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. PACKAGED AIR CONDITIONING UNITS.

B. MAINTENANCE SERVICE.

1.2 REGULATORY REQUIREMENTS

A. PRODUCTS REQUIRING ELECTRICAL CONNECTION: LISTED AND CLASSIFIED BY UNDERWRITERS LABORATORIES INC. AS SUITABLE FOR THE PURPOSE SPECIFIED AND INDICATED.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. PROTECT UNITS FROM PHYSICAL DAMAGE BY STORING OFF SITE UNTIL ROOF MOUNTING CURBS ARE IN PLACE AND READY FOR IMMEDIATE INSTALLATION OF UNITS.

1.4 WARRANTY

A. PROVIDE FIVE–YEAR MANUFACTURER WARRANTY FOR ENTIRE UNIT.

1.5 MAINTENANCE SERVICE

A. FURNISH SERVICE AND MAINTENANCE OF PACKAGED AIR CONDITIONING UNITS FOR ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 – PRODUCTS

2.1 MANUFACTURERS / MODELS

A. REFER TO SCHEDULE ON DRAWINGS.

2.2 AIR CONDITIONING UNITS

A. GENERAL: ROOF MOUNTED UNITS HAVING GAS BURNER AND ELECTRIC REFRIGERATION.

B. DESCRIPTION: SELF–CONTAINED, PACKAGE, FACTORY ASSEMBLED AND PRE–WIRED, CONSISTING OF CABINET AND FRAME, SUPPLY FAN, HEAT EXCHANGER AND BURNER, CONTROLS, AIR FILTERS, REFRIGERANT COOLING COIL AND COMPRESSOR, CONDENSER COIL AND CONDENSER FAN.

C. ELECTRICAL CHARACTERISTICS AND ACCESSORIES: REFER TO DRAWINGS.

2.3 FABRICATION

A. CABINET: STEEL WITH BAKED ENAMEL FINISH, ACCESS DOORS OR REMOVABLE ACCESS PANELS WITH QUICK FASTENERS – SCREWDRIVER OPERATED FLUSH CAM TYPE. STRUCTURAL MEMBERS SHALL BE 18 GAGE WITH ACCESS DOORS OR REMOVABLE PANELS OF MINIMUM 20 GAGE.

B. INSULATION: THICK NEOPRENE COATED GLASS FIBER WITH EDGES PROTECTED FROM EROSION.

C. HEAT EXCHANGERS: STAINLESS STEEL, WELDED CONSTRUCTION.

D. SUPPLY FAN: FORWARD CURVED CENTRIFUGAL TYPE, RESILIENTLY MOUNTED WITH V–BELT DRIVE, ADJUSTABLE VARIABLE PITCH MOTOR PULLEY, AND RUBBER ISOLATED HINGE MOUNTED HIGH EFFICIENCY MOTOR, DIRECT DRIVE AS INDICATED.

E. AIR FILTERS: REFER TO DRAWINGS.

2.4 BURNER

A. GAS BURNER: INDUCED DRAFT TYPE BURNER WITH ADJUSTABLE COMBUSTION AIR SUPPLY, PRESSURE REGULATOR, GAS VALVES, MANUAL SHUT–OFF, INTERMITTENT SPARK OR GLOW COIL IGNITION, FLAME SENSING DEVICE, AND AUTOMATIC 100 PERCENT SHUT–OFF PILOT.

B. GAS BURNER SAFETY CONTROLS: ENERGIZE IGNITION, LIMIT TIME FOR ESTABLISHMENT OF FLAME, PREVENT OPENING OF GAS VALVE UNTIL PILOT FLAME IS PROVEN, STOP GAS FLOW ON IGNITION FAILURE, ENERGIZE BLOWER MOTOR, AND AFTER AIR FLOW PROVEN AND SLIGHT DELAY, ALLOW GAS VALVE TO OPEN.

C. HIGH LIMIT CONTROL: TEMPERATURE SENSOR WITH FIXED STOP AT MAXIMUM PERMISSIBLE SETTING, DE–ENERGIZE BURNER ON EXCESSIVE BONNET TEMPERATURE AND ENERGIZE BURNER WHEN TEMPERATURE DROPS TO LOWER SAFE VALUE.

D. SUPPLY FAN CONTROL: TEMPERATURE SENSOR SENSING BONNET TEMPERATURES AND INDEPENDENT OF BURNER CONTROLS, WITH PROVISIONS FOR CONTINUOUS FAN OPERATION.

2.5 EVAPORATOR COIL

A. PROVIDE COPPER TUBE ALUMINUM FIN COIL ASSEMBLY WITH GALVANIZED STEEL DRAIN PAN AND CONNECTION.

B. PROVIDE CAPILLARY TUBES OR THERMOSTATIC EXPANSION VALVES FOR UNITS 6 TONS COOLING CAPACITY OR LESS, AND THERMOSTATIC EXPANSION VALVES AND ALTERNATE ROW CIRCUITING FOR UNITS 7.5 TONS COOLING CAPACITY AND GREATER.

2.6 COMPRESSOR

A. PROVIDE HERMETIC COMPRESSORS, 3600 RPM MAXIMUM, RESILIENTLY MOUNTED WITH POSITIVE LUBRICATION, CRANKCASE HEATER, HIGH AND LOW PRESSURE SAFETY CONTROLS, MOTOR OVERLOAD PROTECTION, SUCTION AND DISCHARGE SERVICE VALVES AND GAGE PORTS, AND FILTER DRIER.

B. FIVE MINUTE TIMED OFF CIRCUIT TO DELAY COMPRESSOR START.

2.7 CONDENSER

A. PROVIDE COPPER TUBE ALUMINUM FIN COIL ASSEMBLY WITH SUB COOLING ROWS AND COIL GUARD.

B. PROVIDE DIRECT DRIVE CONDENSER FANS, RESILIENTLY MOUNTED WITH FAN GUARD, MOTOR OVERLOAD PROTECTION, AND WIRED TO OPERATE WITH COMPRESSOR.

C. PROVIDE REFRIGERANT PRESSURE SWITCHES TO CYCLE CONDENSER FANS.

2.8 MIXED AIR CASING

A. DAMPERS: REFER TO DRAWINGS.

B. GASKETS: PROVIDE TIGHT FITTING DAMPERS WITH EDGE GASKETS (MAXIMUM LEAKAGE RATE 5 PERCENT AT 2 INCHES W.C. [500 PA] PRESSURE DIFFERENTIAL).

2.9 PERFORMANCE

A. REFER TO DRAWINGS.

B. SCHEDULED PERFORMANCE:

1. COOLING CAPACITY: ARI 210 TEST CONDITIONS.
2. SOUND RATING NUMBERS: ARI 270.

PART 3 – EXECUTION

3.1 EXAMINATION

A. VERIFY THAT ROOF IS READY TO RECEIVE WORK AND OPENING DIMENSIONS ARE AS ILLUSTRATED BY THE MANUFACTURER.

B. VERIFY THAT PROPER POWER SUPPLY IS AVAILABLE.

3.2 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, NFPA 90A, AND NFPA 90B.

END OF SECTION

THERMOSTATIC NOTES

C403.4.1 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, NOT FEWER THAN ONE HUMIDITY CONTROL DEVICE SHALL BE PROVIDED FOR EACH HUMIDITY CONTROL SYSTEM.

EXCEPTION: INDEPENDENT PERIMETER SYSTEMS THAT ARE DESIGNED TO OFFSET ONLY BUILDING ENVELOPE HEAT LOSSES, GAINS OR BOTH SERVING ONE OR MORE PERIMETER ZONES ALSO SERVED BY AN INTERIOR SYSTEM PROVIDED THAT BOTH OF THE FOLLOWING CONDITIONS ARE MET:
1. THE PERIMETER SYSTEM INCLUDES NOT FEWER THAN ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE HAVING EXTERIOR WALLS FACING ONLY ONE ORIENTATION (WITHIN ± 45 DEGREES) (0.8 RAD) FOR MORE THAN 50 CONTIGUOUS FEET (15 240 MM).
2. THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY THERMOSTATS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM.

C403.4.1.2 DEADBAND

WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CONFIGURED TO PROVIDE A TEMPERATURE RANGE OR DEADBAND OF NOT LESS THAN 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS SHUT OFF OR REDUCED TO A MINIMUM.

EXCEPTIONS:
1. THERMOSTATS REQUIRING MANUAL CHANGEOVER BETWEEN HEATING AND COOLING MODES.
2. OCCUPANCIES OR APPLICATIONS REQUIRING PRECISION IN INDOOR TEMPERATURE CONTROL AS APPROVED BY THE CODE OFFICIAL.

C403.4.1.3 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 CONFIGURED TO PREVENT THE HEATING SETPOINT FROM EXCEEDING THE COOLING SETPOINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.4.1.2.

C403.4.2 OFF–HOUR CONTROLS

EACH ZONE SHALL BE PROVIDED WITH THERMOSTATIC SETBACK CONTROLS THAT ARE CONTROLLED BY EITHER AN AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL SYSTEM.

EXCEPTIONS:
1. ZONES THAT WILL BE OPERATED CONTINUOUSLY.
2. ZONES WITH A FULL HVAC LOAD DEMAND NOT EXCEEDING 6,800 BTU/H (2 KW) AND HAVING A MANUAL SHUTOFF SWITCH LOCATED WITH READY ACCESS.

C403.4.2.1 THERMOSTATIC SETBACK

THERMOSTATIC SETBACK CONTROLS SHALL BE CONFIGURED 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).

C403.4.2.2 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 NOT FEWER THAN 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 CONFIGURED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

C403.4.2.3 AUTOMATIC START AND STOP

AUTOMATIC START AND STOP CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM. THE AUTOMATIC START CONTROLS SHALL BE CONFIGURED TO AUTOMATICALLY ADJUST THE DAILY START TIME OF THE HVAC SYSTEM IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY. AUTOMATIC STOP CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM WITH DIRECT DIGITAL CONTROL OF INDIVIDUAL ZONES. THE AUTOMATIC STOP CONTROLS SHALL BE CONFIGURED TO REDUCE THE HVAC SYSTEM'S HEATING TEMPERATURE SETPOINT AND INCREASE THE COOLING TEMPERATURE SETPOINT BY NOT LESS THAN 2°F (–16.6°C) BEFORE SCHEDULED UNOCCUPIED PERIODS BASED ON THE THERMAL LAG AND ACCEPTABLE DRIFT IN SPACE TEMPERATURE THAT IS WITHIN COMFORT LIMITS.

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MECHANICAL SPECIFICATIONS

MS7.3

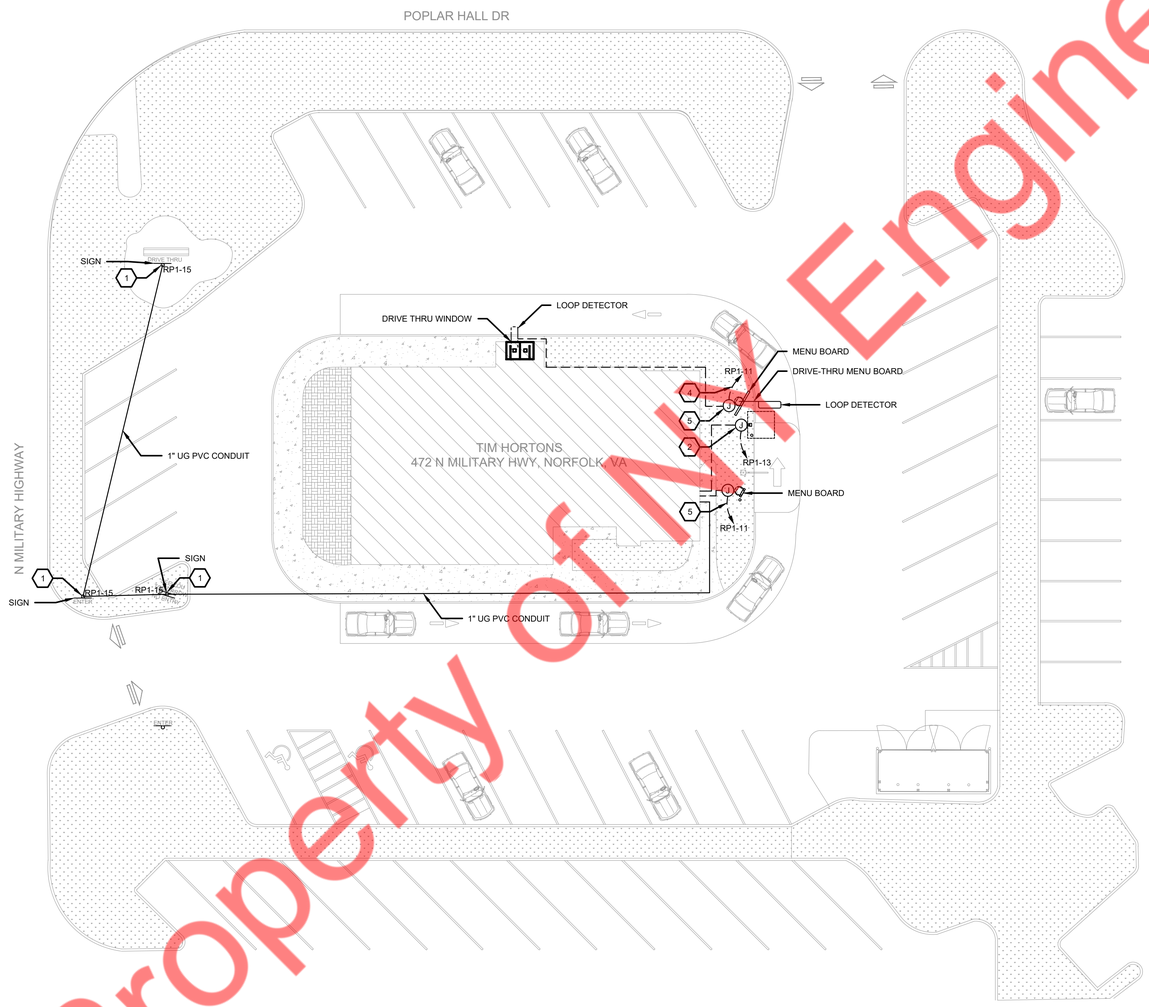
GENERAL NOTES

A. FOR TELEPHONE SERVICE, GAS, WATER AND SANITARY SEWER LOCATIONS, SEE CIVIL SITE PLAN.

B. SEE SHEET E3.1 FOR WORK ASSOCIATED WITH ELECTRICAL SERVICE.

CODED NOTES:

1. STREET SIGN. VERIFY EXACT LOCATION. PROVIDE 3-#8 AWG COPPER XHHW CONDUCTORS IN 3/4" CONDUIT WITH 120V, 20A, 1-POLE CONCEALED WEATHERPROOF DISCONNECT FOR STREET SIGN.
2. SPEAKER POST/PAYMENT KIOSK - CONNECT TO SAME CIRCUIT AS PREVIEW MENU BOARD. VERIFY EXACT LOCATION PRIOR TO ROUGH-IN. REFER TO DETAILS 3 AND 4 ON SHEET E4.1 FOR MORE INFORMATION.
3. NOT USED.
4. ROUTE HOMERUNS (QUANTITY AS SHOWN) IN 1" CONDUIT BACK TO ELECTRICAL PANEL. PROVIDE SEPARATE NEUTRAL FOR EACH CIRCUIT. DO NOT SHARE NEUTRALS. ROUTE CIRCUIT(S) THROUGH LIGHTING CONTROLS. REFER TO SHEET E3.1 FOR MORE INFORMATION. VERIFY EXACT LOCATION OF MENU BOARDS WITH TDL REPRESENTATIVE. SEE DETAILS 4 AND 5 ON SHEET E4.1 FOR ADDITIONAL INFORMATION.
5. PROVIDE DEDICATED 20 AMP CIRCUIT WITH (2) #12 & (1) #12 GROUND IN 1" CONDUIT WITH 20A1P TOGGLE DISCONNECT FOR EACH DRIVE THROUGH MENU/PREVIEW BOARD. EACH BOARD HAS INTEGRAL GFCI RECEPTACLE AND CONFIRMATION ORDER SCREEN. SEE DETAILS 4 AND 5 ON SHEET E4.1 FOR ADDITIONAL INFORMATION. COORDINATE WITH MENU BOARD PROVIDER FOR ALL FINAL CONNECTIONS.



ELECTRICAL SITE PLAN (1)
1/16" = 1'-0"

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ELECTRICAL SITE PLAN

E0.1

ELECTRICAL SYMBOLS

NOTE: ALL MOUNTING HEIGHTS SHALL BE AS INDICATED, UNLESS NOTED OTHERWISE. ALL MOUNTING HEIGHTS FOR KITCHEN EQUIPMENT SHALL BE AS INDICATED ON THE KITCHEN EQUIPMENT WIRING SCHEDULE, SHEET E4.1.

- T — THERMOSTAT @ 48"
- WALL MOUNTED PUSH BUTTON @ 48"
- WALL MOUNTED OCCUPANCY SENSOR @ 48"
- CEILING MOUNTED OCCUPANCY SENSOR.
- CEILING MOUNTED PHOTO/IONIZATION DETECTOR WITH CARBON MONOXIDE DETECTOR
- DUCT MOUNTED PHOTO/IONIZATION DETECTOR
- CEILING MOUNTED HORN/STROBE
- CEILING MOUNTED STROBE ONLY DEVICE
- FACP — FIRE ALARM CONTROL PANEL
- FAAP — FIRE ALARM ANNUNCIATOR PANEL (REMOTE)
- A — REMOTE ANNUNCIATOR/TEST STATION @ 60"
- SINGLE PHASE MOTOR
- THREE PHASE MOTOR
- 120 VOLT SIMPLEX RECEPTACLE @ 16"
- 120 VOLT DUPLEX RECEPTACLE @ 16"
  WP = WEATHERPROOF
  GFI = GROUND FAULT INTERRUPTER
  IG = ISOLATED GROUND
- 120 VOLT DOUBLE DUPLEX (QUAD) RECEPTACLE @ 16"
- 120 VOLT SIMPLEX CEILING MOUNTED RECEPTACLE
- 120 VOLT DUPLEX RECEPTACLE WITH 2-USB PORTS
- DATA/TELEPHONE OUTLET BOX @ 16"
- DATA OUTLET BOX @ 16"
- TELEPHONE OUTLET BOX @ 16"
- 208V OR 120/208V RECEPTACLE @16"
- J — JUNCTION OR PULL BOX
- EQUIPMENT DISCONNECT SWITCH @ 60"
- LIGHTING/POWER PANELBOARD, TOP BREAKER @72"
- PC — PHOTOCELL MOUNTED ON ROOF FACING NORTH
- TC — TIMECLOCK
- MUSIC SYSTEM RADIO, AMPLIFIER EQUIPMENT
- S — CEILING MOUNTED AUDIO SYSTEM SPEAKER

- CEILING MOUNTED SURFACE/RECESSED LIGHTING FIXTURE 1'X4'.
- CEILING MOUNTED EMERGENCY EXIT SIGN SHADED QUADRANT INDICATES ILLUMINATED FACE ARROW INDICATES "DIRECTIONAL ARROW" POSITION(S).
- WALL MOUNTED EMERGENCY EXIT SIGN SHADED QUADRANT INDICATES ILLUMINATED FACE ARROW INDICATES "DIRECTIONAL ARROW" POSITION(S).
- WALL/CEILING MOUNTED COMBINATION EMERGENCY LIGHTING / EXIT SIGN FIXTURE-BATTERY TYPE. SHADED QUADRANT INDICATES ILLUMINATED FACE, ARROW INDICATES "DIRECTIONAL ARROW" POSITION(S).
- WALL/CEILING MOUNTED EMERGENCY LIGHTING FIXTURE-BATTERY TYPE.
- REMOTE MOUNTED EMERGENCY LIGHTING FIXTURE.
- CEILING/WALL MOUNTED SURFACE TRACK LIGHTING FIXTURE ASSEMBLY.
- CEILING MOUNTED SURFACE/RECESSED LIGHTING FIXTURE-EMERGENCY/NIGHT TYPE AS INDICATED.
- CEILING MOUNTED SURFACE/RECESSED LIGHTING FIXTURE, TYPE AS INDICATED. NIGHT LIGHT.
- CEILING MOUNTED SURFACE/RECESSED LIGHTING FIXTURE, TYPE AS INDICATED. NIGHT LIGHT.
- CEILING MOUNTED SURFACE/RECESSED LIGHTING FIXTURE, TYPE AS INDICATED. NIGHT LIGHT.
- POLE MOUNTED LIGHTING FIXTURE
- WALL SWITCH, NUMBER INDICATES 2, 3, OR 4 POLE, LETTER INDICATES FIXTURE(S) TO BE CONTROLLED BY SWITCH @ 48" (2, a)
- CIRCUIT RUN TO PANELBOARD
- PP1-1,3,5 — CIRCUIT RUN TO PANELBOARD DESIGNATION.
- INDICATES CIRCUIT NUMBERS. INDICATES PANEL DESIGNATION.
- CONDUIT RUNS ABOVE GRADE.
- CONDUIT RUN BELOW GRADE OR IN CONCRETE SLAB.
- LOW-VOLTAGE CONDUIT RUN
- N.T.S. — NOT TO SCALE
- A.F.F. — ABOVE FINISHED FLOOR
- NL — NIGHT LIGHT
- EM — EMERGENCY

NOTE: ALL ELECTRICAL COVERPLATES SHALL MATCH ADJACENT WALL COLOR. REFER TO ARCHITECTURAL SHEET A10 FOR WALL COLORS.

GENERAL NOTES

A. UNLESS OTHERWISE NOTED, ALL CONDUITS SHALL BE 1-1/2" STEEL FLEX OR PLASTIC STUBBED OUT ABOVE THE WALL LINE AND TERMINATED INTO A STANDARD JUNCTION BOX FLUSH WITH WALL AND CAPABLE OF ACCEPTING A FACEPLATE COVER.

B. ALL JUNCTION BOXES SHALL BE INSTALLED IN SUCH A WAY SO THAT THEY ARE NOT BLOCKED BY OTHER EQUIPMENT OR STRUCTURAL COMPONENTS.

C. ALL CABLE ACCESS OPENINGS THROUGH STAINLESS STEEL SHALL HAVE RUBBER OR PLASTIC GROMMETS INSTALLED.

D. INSTALL ALL COMMUNICATION AND DATA CONDUITS INCLUDING PULL WIRE BETWEEN CONNECTION POINTS.

E. VERIFY WITH REGISTER SYSTEM SUPPLIER AND MENUBOARD SUPPLIER THE LOCATIONS AND SIZES OF ALL CONDUITS RELATING TO THAT SYSTEM.

F. SEE SHEET AS2.1 FOR MENU BOARD, PREVIEW BOARD, AND SPEAKER MOUNTING DETAILS AND CONDUIT REQUIREMENTS.

G. ACTUAL SITE CONDITIONS MAY CAUSE AN ADJUSTMENT OF LAYOUT. LAYOUT SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

H. VERIFY SIGN LOCATION AND LAYOUT WITH OWNER.

I. RECEPTACLE LOCATIONS MAY BE ADJUSTED AS NECESSARY TO AVOID CONFLICTS WITH STUDS AND PLUMBING PIPING.

J. PROVIDE A COMPLETE ELECTRICAL SYSTEM AS INDICATED ON THE DRAWINGS AND DESCRIBED HEREIN.

K. ELECTRIC WORK SHALL COMPLY WITH THE LATEST LOCALLY ADOPTED NATIONAL ELECTRIC CODE AS WELL AS STATE AND LOCAL CODES.

L. PAY FOR ALL PERMITS AND INSPECTIONS AND PROVIDE CERTIFICATE OF INSPECTION.

M. PROVIDE REQUIRED SERVICE AND EQUIPMENT GROUNDING SYSTEMS. CONDUIT SYSTEM SHALL BE ELECTRICALLY CONTINUOUS AND SHALL BE SAFELY GROUNDED AT THE DISTRIBUTION PANEL. ALL DEVICES SHALL BE BONDED TO THE CONDUIT SYSTEM. PROVIDE A SEPARATE GROUNDING CONDUCTOR IN EACH CONDUIT, #12 MINIMUM OR AS SHOWN ON DRAWINGS.

N. MATERIALS SHALL BE NEW WITH MANUFACTURER'S NAME PRINTED THEREON AND UNDERWRITER'S LABORATORY LISTED. THE SELECTION OF MATERIALS AND EQUIPMENT TO BE PROVIDED UNDER THIS CONTRACT SHALL BE IN STRICT ACCORDANCE WITH THE SPECIFICATIONS AND DRAWINGS. THIS CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL 4 COPIES OF EQUIPMENT AS FOLLOWS: MAIN DISTRIBUTION PANEL, PANELBOARDS, DISCONNECT SWITCHES AND LIGHTING FIXTURES.

O. IDENTIFY DISCONNECT SWITCHES WITH LAMINATED PHENOLIC NAMEPLATES WITH 1/4" MINIMUM HEIGHT LETTERS.

P. PROVIDE POWER WIRING AND HOOKUP FOR EACH MECHANICAL AND KITCHEN EQUIPMENT ITEM. THIS CONTRACTOR SHALL MOUNT, PROVIDE WIRING, AND MAKE FINAL CONNECTIONS TO EQUIPMENT CONTROL PANELS (WHICH INCLUDE PREWIRED STARTERS, RELAYS, ETC.) PROVIDE ALL STARTERS WHICH ARE NOT FURNISHED AS PART OF MECHANICAL EQUIPMENT.

Q. DISCONNECT SWITCHES SHALL BE HEAVY DUTY TYPE IN NEMA 1 ENCLOSURE OR EQUAL BY SQUARE D OR EATON. SWITCHES SHALL BE QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERATED AND INTERLOCKED.

R. SWITCHES SHALL BE 20 AMP HUBBELL 1221-1 SINGLE POLE OR 1223-1 THREE WAY. DUPLEX RECEPTACLES SHALL BE 20 AMP HUBBELL 5362-1. PASS AND SEYMOUR, AND ARROW-HART SHALL BE CONSIDERED AS EQUAL. GROUND FAULT INTERRUPTING SHALL BE LEVITON. GFTR2-T. COVER PLATES SHALL BE SIERRA (PASS AND SEYMOUR). SWITCH PLATES TO BE SERIES #S-IN. DUPLEX PLATES TO BE SERIES #S-IN. DUPLEX PLATES IN DINING ROOM TO BE #P-8 ETC. ALL COVER PLATES SHALL HAVE SATIN FINISH #302 STAINLESS STEEL (EXCEPT DINING ROOM PLATES).

S. TEST ELECTRICAL SYSTEM FOR SHORT CIRCUITS AND MEGGER TEST FEEDERS AND BRANCH CIRCUIT WIRING. ENSURE LOW IMPEDANCE GROUND SYSTEM.

T. VERIFY ELECTRICAL SERVICE TO SITE PRIOR TO BIDDING. PROVIDE CONDUIT, CABLE, CONCRETE, CONNECTIONS AND OTHER EQUIPMENT REQUIRED FOR AN UNDERGROUND ELECTRICAL SYSTEM FROM POWER COMPANY EQUIPMENT TO DISTRIBUTION SWITCHBOARD "DB1". COORDINATE ELECTRICAL SERVICE ENTRANCE WORK AND REQUIREMENTS WITH POWER COMPANY. SECURE CONTRACTS WITH POWER COMPANY FOR INSTALLATION OF PRIMARY ENTRANCE. INCLUDE CHARGES BY POWER COMPANY IN BID. PERFORM WORK REQUIRED BY POWER COMPANY IN ACCORDANCE WITH POWER COMPANY RULES AND REGULATIONS TO ENSURE A COMPLETE ELECTRICAL SERVICE.

U. FOR SERVICE AND PANEL FEEDER WIRING, USE TYPE THHN/THWN CABLE. USE THWN CABLE FOR INTERIOR BRANCH CIRCUIT WIRING EXCEPT AS NOTED. DESIGN IS BASED ON COPPER CONDUCTORS AND ALL WIRING SHALL BE COPPER, MINIMUM #12 AWG. WIRING SHALL BE IN CONDUIT. SPLICE WIRES #6 AWG. AND LARGER WITH APPROVED SOLDERLESS CONNECTORS SUCH AS ILSCO PROPERLY TAPED AND INSULATED. SPLICE SMALLER WIRES WITH MECHANICAL CONNECTORS SUCH AS 3M "SCOTCHLOCK" TYPE R.

V. PROVIDE RIGID GALVANIZED STEEL HEAVY WALL CONDUIT/OR SCHEDULE 80 PLASTIC CONDUIT FOR SERVICE AND PANEL FEEDER CONDUITS. FITTINGS SHALL BE STEEL, THREADED, SET-SCREW TYPE WITH INSULATED THROATS. FURNISH EMT CONDUIT FOR INTERIOR WIRING WHERE PHYSICAL DAMAGE IS NOT A CONSIDERATION. MINIMUM CONDUIT SIZE IS 3/4" EXCEPT FOR FLEXIBLE RUNOUTS TO FIXTURES, MOTORS, ETC. WHICH MAY BE 1/2".

W. CONDUIT SHALL BE CONCEALED WHEREVER POSSIBLE AND SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING WALLS AND CEILINGS.

X. CONDUIT INSTALLED IN OR BELOW SLAB SHALL BE GALVANIZED RIGID CONDUIT OR PLASTIC CONDUIT. NO CONDUIT LARGER THAN 1 1/2" DIA. WILL BE INSTALLED IN SLAB.

Y. PROVIDE STRUCTURAL STEEL FRAMEWORK AND HANGING RODS WITH BRACES AND ACCESSORIES WHERE REQUIRED TO HOLD EQUIPMENT IN FINAL POSITION. PROVIDE STEEL SHAPES AND FRAMES TO SUPPORT WALL MOUNTED EQUIPMENT WHERE NORMAL WALL STRENGTH MAY BE INADEQUATE.

Z. ELECTRICAL DEVICES, MOTOR STARTERS, DISCONNECT SWITCHES, ETC. SHALL BE SUPPORTED INDEPENDENT OF AND ISOLATED FROM EQUIPMENT VIBRATION.

AA. COORDINATE WITH KITCHEN EQUIPMENT SUPPLIER ALL INTERIOR WIRING CONNECTIONS NEEDED DURING ASSEMBLY OF KITCHEN EQUIPMENT.

AB. PROVIDE FIXTURES AS LISTED ON LIGHTING FIXTURE SCHEDULE. PROVIDE NECESSARY MOUNTING HARDWARE FOR A COMPLETE INSTALLATION. PROVIDE LAMPS, BALLASTS AND SPECIAL CONTROLS.

AC. PROVIDE EMPTY CONDUIT, OUTLETS AND BACKBOARD TO ACCOMMODATE TELEPHONE COMPANY WIRING AND EQUIPMENT AS SHOWN ON DRAWINGS. WORK SHALL BE INSTALLED IN STRICT ACCORDANCE WITH TELEPHONE COMPANY REQUIREMENTS.

AD. GUARANTEE WORK INSTALLED UNDER THE CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP AND MATERIALS, USUAL WEAR EXPECTED, AND SHOULD ANY SUCH DEFECTS OCCUR WITHIN A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE BUILDING BY THE OWNER, THIS CONTRACTOR SHALL REPAIR AND/OR REPLACE DEFECTIVE ITEMS AND DAMAGE RESULTING FROM FAILURE OF THESE ITEMS, AT NO EXPENSE WHATSOEVER TO THE OWNER.

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ELECTRICAL SYMBOLS AND NOTES

E1.0

GENERAL NOTES

A. "EM" UNITS SHALL OPERATE ON 120 VOLT SINGLE PHASE WITH NUMBER OF HEADS AS INDICATED ON PLAN. UNITS SHALL BE PLUG-IN TYPE WITH SEALED PURE LEAD BATTERIES. CHARGER SHALL BE COMPLETELY AUTOMATIC. SOLID STATE TYPE CAPABLE OF FULLY RECHARGING DISCHARGED BATTERY IN 24 HOURS. TRANSFER DEVICE SHALL AUTOMATICALLY SWITCH LOAD ON AT POWER FAILURE AND OFF ON RETURN OF NORMAL POWER. UNITS SHALL HAVE LOW VOLTAGE DISCONNECT FEATURE. CONNECT TO LOCAL LIGHTING CIRCUIT AHEAD OF ALL SWITCHING.

B. CONNECT EXIT SIGNS, EMERGENCY AND NIGHT LIGHTS TO UNSWITCHED LIGHTING CIRCUIT, NOT CONTROLLED BY OCCUPANCY SENSORS, SWITCHES OR CONTACTORS.

C. ALL CIRCUITS SHALL HAVE AN INDIVIDUAL NEUTRAL CONDUCTOR. NO SHARED NEUTRALS ARE PERMITTED.

D. UPON COMPLETION OF ALL WORK (INCLUDING WORK BY TDL FORCES OR OTHER SYSTEM PROVIDERS), PROVIDE ALL STAINLESS STEEL COVER PLATES, INCLUDING BLANKS AND THOSE REQUIRED FOR DATA CABLES.

E. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND DETAILS FOR LOCATION OF LIGHTING FIXTURES AND OTHER EQUIPMENT INSTALLED IN CEILING SYSTEM. VERIFY MOUNTING HEIGHTS AND FINISHES WITH ARCHITECT PRIOR TO ROUGH-IN.

F. PROVIDE (2) ADDITIONAL #12 CONDUCTORS FOR ALL 0-10V DIMMING CIRCUITS.

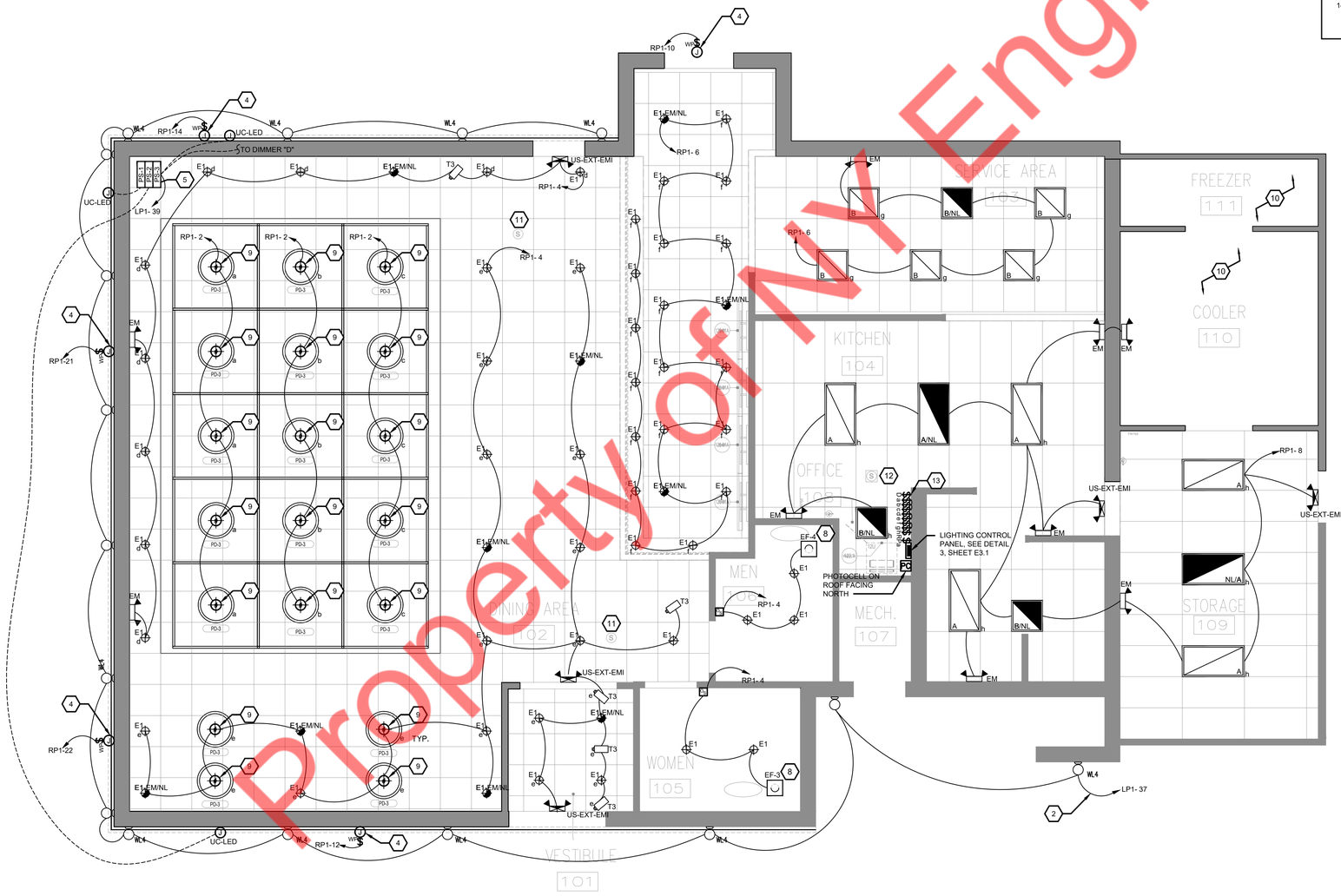
LIGHTING FIXTURE SCHEDULE

ALL LIGHTING FIXTURES TO BE PURCHASED FROM VISO, UNLESS NOTED OTHERWISE.

FIXTURE DESIGNATION	QUANTITY	MANUFACTURER	GENERAL DESCRIPTION	VISO CATALOG NUMBER	INPUT WATTAGE	REMARKS
A	7	VISO	2'X4' RECESSED LED TROFFER FOR T-BAR CEILING (TAA24-40W-FP-3500K) 120 DEGREE, 125 LM/W, 80 CRI,0.5A, 120V, 22 LBS	NA.TDL-VIS-A	40W	KITCHEN & STORAGE
B	8	VISO	2'X2' RECESSED LED TROFFER FOR T-BAR CEILING (TAA22-30W-FP-3500K) 120 DEGREE, 125 LM/W, 80 CRI, 0.4A, 120V, 12 LBS	NA.TDL-VIS-B	30W	SERVICE AREA & DINING AREA
E1	58	VISO	3" ADJUST. LED DOWNLIGHT (VSC06-3T-10-36-30-10) WHITE FINISH, 3.1" DIA, 36 DEGREE BEAM, 1000LM, 3000K, 120/277V, NON-DIMMING, 5.2 LBS	NA.TDL-VIS-E1	10W	PROVIDE WITH EMERGENCY BATTERY BACKUP WHERE NOTED ON PLANS WITH 'EM'. SEE "-EM" NOTE BELOW.
PD3	19	VISO	LARGE ROUND LED PENDANT, BLACK/RED FINISH, 28" DIA (SITE ADJUST. HT. IN 12" INCREMENTS, 2700K, 1200LM, FROSTED WHITE ACRYLIC, 120V, 22 LBS	NA.TDL-VIS-PD3	20W	DINING AREA
T3	5	VISO	MONOPOINT TRACK HEAD, 68MM (DIA), 1000LM, 36 DEGREE BEAM, CRI>90, 3000K, NON-DIMMABLE, 6.1 LBS	NA.TDL-VIS-T3	10W	
WL4	16	VISO	EXTERIOR LED WALL MOUNT UP/DOWN LIGHT, RED FINISH, 3.3"DIA X 11.8"H X 5.5"D, 3000K, 1800LM, 80 CRI, 120/277V, IP54 RATED, 16 LBS	NA.TDL-VIS-WL4	20W	COORDINATE MOUNTING HEIGHT WITH ARCHITECTURAL ELEVATIONS.
UC	122'-0"	VISO	SURFACE MOUNTED FLEXIBLE LED STRIP, 24V, 3000K, 96 CRI	NA.TDL-VIS-UC	2.9W/FT	PROVIDE WITH OPTIC ENCLOSURE U1 ALONG WITH ALL REQUIRED ACCESSORIES, DRIVERS, AND MOUNTING HARDWARE FOR A COMPLETE INSTALLATION. COORDINATE EXACT REQUIREMENTS WITH FIXTURE MANUFACTURER.
US-EXT-EMI	5	VISO	EXIT/EMERGENCY LIGHT, WHITE FINISH, 120V, 120 MIN EMERGENCY DURATION, SUITABLE FOR SINGLE OR DOUBLE SIDED APPLICATIONS, 4.8 LBS	NA.TDL-VIS-US-EXT-EMI	6W	SEE GENERAL NOTE A.
-EM	9		WHERE LIGHT FIXTURE IS FOLLOWED BY "-EM" PROVIDE WITH EMERGENCY LIGHTING BATTERY PACK (90 MIN ILLUMINATION) FRONT OF HOUSE ONLY	NA.TDL-VIS-EBP	--	SEE GENERAL NOTE A.

CODED NOTES:

1. NOT USED
2. CIRCUIT TO BE CONTROLLED BY LIGHTING CONTROL PANEL. REFER TO DETAIL 2 ON SHEET E3.1.
3. NOT USED.
4. PROVIDE WEATHERPROOF JUNCTION BOX WITH CONCEALED 20A/1P DISCONNECT FOR BUILDING SIGN. USE VHM DRILL BIT (SPECIALLY DESIGNED FOR PLASTICS, THERMOPLASTICS AND PLEXIGLASS) WHILE DRILLING FOR ELECTRICAL FEED LINES. JUNCTION BOX SHALL BE LOCATED UNDER ROOF DECK WITHIN 6' OF SIGN. COORDINATE EXACT LOCATION WITH SIGN SHOP DRAWINGS PRIOR TO ROUGH-IN.
5. REMOTE POWER SUPPLIES (MEAN WELL HLG-185H-SPEC TYPE B OR EQUAL) WITH 0-10V DIMMING FOR EXTERIOR LED STRIP LIGHTING AT PERIMETER OVERHANG (ABOVE AND BELOW). MOUNT IN ACCESSIBLE LOCATION AS HIGH AS POSSIBLE ON WALL ABOVE SUSPENDED CEILING FEATURE CONCEALED FROM PUBLIC VIEW BELOW. POWER SUPPLY MUST BE LOCATED WITHIN 64' OF END OF STRIP IT IS SUPPLYING. COORDINATE EXACT LOCATION WITH OWNER'S CONSTRUCTION MANAGER PRIOR TO ROUGH-IN. SEE SHEET A5 SERIES FOR EXACT LOCATION OF LED STRIP LIGHTING. REFER TO DETAIL 3 ON SHEET E4.2.
6. NOT USED.
7. NOT USED.
8. PROVIDE FINAL CONNECTION FOR CEILING MOUNTED EXHAUST FAN. FAN SHALL BE CONTROLLED BY ROOM LIGHT CONTROL. REFER TO DETAIL 2 ON SHEET E4.2.
9. PROVIDE JUNCTION BOX FOR LIGHT FIXTURE AT SUSPENDED CEILING BULKHEAD.
10. VERIFY OPERABLE CONDITION OF THE EXISTING LIGHTING FIXTURE AND CIRCUIT IN THE FIELD. REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
11. CEILING MOUNTED MUSIC SYSTEM SPEAKER. COORDINATE SPEAKER INSTALLATION WITH CEILING TYPE. PROVIDE BACKBOX IF NEEDED AND 1/2" EMPTY CONDUIT WITH PULLSTRING ROUTED BACK TO MUSIC SYSTEM IN OFFICE AREA FOR SPEAKER CABLING
12. MUSIC SYSTEM MOUNTED IN OFFICE AREA. REFER TO DETAIL 4 ON SHEET E4.2.
13. REMOTE DIMMER SWITCH FOR EXTERIOR LED STRIP LIGHTING AND TIMECLOCK OVERRIDE SWITCH. REFER TO DETAIL 1 ON SHEET E3.1.
14. NOT USED.



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LIGHTING PLAN

E1.1

GENERAL NOTES

A. COORDINATE POWER REQUIREMENTS WITH ALL TRADES AND INCLUDE WORK REQUIRED TO POWER ALL KITCHEN EQUIPMENT, HVAC EQUIPMENT, COOLER/FREEZER, PLUMBING EQUIPMENT, SIGNAGE, LIGHTING, AND ALL OTHER EQUIPMENT/DEVICE REQUIRING POWER IN THE CONTRACT DOCUMENTS.

B. VERIFY ALL ROUGH-IN DIMENSIONS AND POWER REQUIREMENTS WITH KITCHEN EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.

C. VERIFY FAULT CURRENT FROM PRIMARY SERVICE AND ENSURE COMPATIBILITY OF DISTRIBUTION PANEL.

D. ENSURE ADEQUATE CONDUIT SIZE FOR ELECTRICAL AND PHONE WIRING ON SITE AND INTO BUILDING.

E. HEIGHTS INDICATED FOR RECEPTACLES AND JUNCTION BOXES ARE MEASURED FROM FINISHED FLOOR TO CENTER OF BOX.

F. PROVIDE ALL DATA LINES. DATA LINES SHALL BE CATEGORY 6.

G. ALL CIRCUITS MAY BE MODIFIED TO THE LEAST AMOUNT OF CONDUIT RUN UNLESS NOTED OTHERWISE.

H. SEE SHEET E5.1 FOR REGISTER SYSTEM CONDUITS AND SHEET E4.1/2 FOR DETAILS.

I. SEE KITCHEN EQUIPMENT WIRING SCHEDULE ON SHEET E3.2 FOR WIRING REQUIREMENTS AND MOUNTING HEIGHTS.

J. ALL 120 VOLT, 15 AND 20 AMP RECEPTACLES IN THE KITCHEN SHALL BE GFCI PROTECTED PER CODE USING GFCI TYPE PERSONNEL PROTECTION BREAKERS.

K. ALL CIRCUITS SHALL HAVE AN INDIVIDUAL NEUTRAL CONDUCTOR. NO SHARED NEUTRALS ARE PERMITTED.

L. COLOR OF ALL PUBLIC AREA RECEPTACLES AND COVER PLATES SHALL MATCH ADJACENT WALL COLOR. REFER TO ARCHITECTURAL PLANS FOR WALL COLORS.

M. ALL WIRING UNDER SLAB, IN WALLS, ABOVE INACCESSIBLE CEILINGS, OR AS REQUIRED BY CODE SHALL BE IN CONDUIT. WHERE LINE VOLTAGE WIRING IS NOT REQUIRED TO BE IN CONDUIT, PROVIDE JUNCTION BOX AND TRANSITION TO MC CABLE. WHERE LOW VOLTAGE WIRING IS NOT REQUIRED TO BE IN CONDUIT, PROVIDE BUSHING ON OPEN END OF CONDUIT.

N. UPON COMPLETION OF ALL WORK (INCLUDES WORK BY TDL FORCES - SYSTEMS PROVIDER) PROVIDE ALL STAINLESS STEEL COVER PLATES, INCLUDING BLANKS AND THOSE REQUIRED FOR DATA CABLES.

O. IF ALLOWED BY THE AUTHORITY HAVING JURISDICTION, MC CABLE MAY BE USED FOR BRANCH CIRCUIT RUNS, EXCEPT FIRST SEGMENT FROM ELECTRICAL PANEL TO NEAREST JUNCTION BOX. THIS SEGMENT SHALL USE HARD CONDUIT.

P. DEFINITIONS: FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION. INSTALL MEANS TO PLAN IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE. PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.

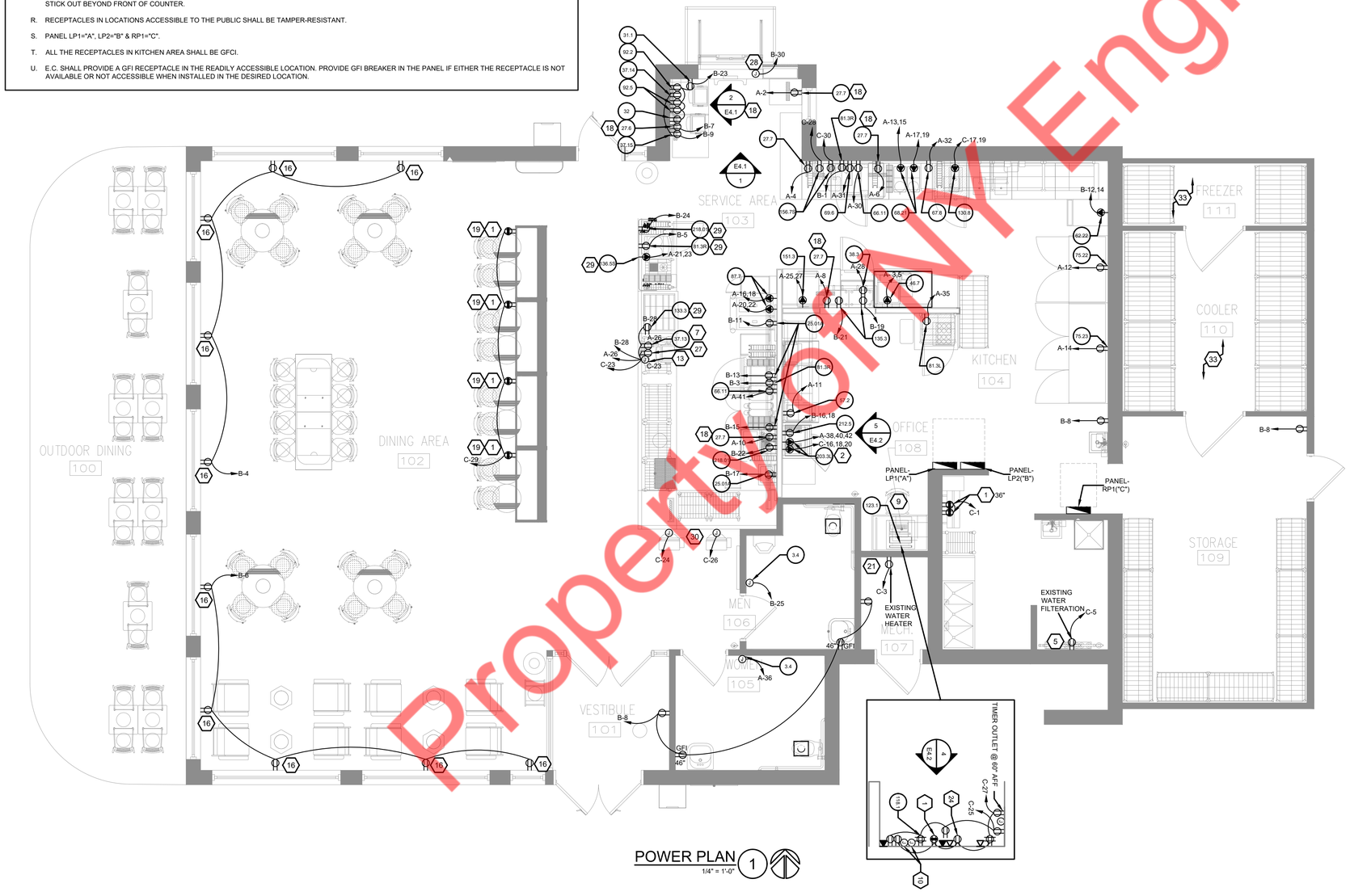
Q. ELECTRICAL RECEPTACLES MOUNTED BELOW COUNTER BEHIND FULL COUNTER-DEPTH KITCHEN EQUIPMENT (I.E. UNDERCOUNTER REFRIGERATORS, SANDWICH UNITS, ICE MACHINES, ETC) SHALL BE COUNTERSUNK INTO WALL TO ALLOW FRONT OF EQUIPMENT TO BE FLUSH WITH MILLWORK AND NOT STICK OUT BEYOND FRONT OF COUNTER.

R. RECEPTACLES IN LOCATIONS ACCESSIBLE TO THE PUBLIC SHALL BE TAMPER-RESISTANT.

S. PANEL LP1="A", LP2="B" & RP1="C".

T. ALL THE RECEPTACLES IN KITCHEN AREA SHALL BE GFCI.

U. E.C. SHALL PROVIDE A GFI RECEPTACLE IN THE READILY ACCESSIBLE LOCATION. PROVIDE GFI BREAKER IN THE PANEL IF EITHER THE RECEPTACLE IS NOT AVAILABLE OR NOT ACCESSIBLE WHEN INSTALLED IN THE DESIRED LOCATION.



POWER PLAN 1
1/4" = 1'-0"

CODED NOTES:

1. PROVIDE COMBINATION USB CHARGER, TAMPER-RESISTANT RECEPTACLES BY PASS & SEYMOUR MODEL #TR5361USBLA OR APPROVED EQUAL. MOUNT VERTICALLY. COORDINATE EXACT LOCATION WITH OWNER'S CONSTRUCTION MANAGER PRIOR TO ROUGH-IN.
2. REFER TO DETAIL 5 ON SHEET E4.2 FOR MORE INFORMATION ON EQUIPMENT RECEPTACLE INSTALLATION.
3. NOT USED.
4. NOT USED.
5. REUSE EXISTING OR PROVIDE RECEPTACLE FOR FILTRATION SYSTEM. COORDINATE REQUIREMENTS AND LOCATION WITH PLUMBING CONTRACTOR.
6. NOT USED.
7. RECEPTACLE FOR EQUIPMENT SHALL BE SURFACE-MOUNTED AND CONCEALED WITHIN MILLWORK. ROUTE CONDUIT CONCEALED WITHIN MILLWORK BACK TO NEAREST FULL-HEIGHT WALL AND BACK TO ELECTRICAL PANEL. COORDINATE RECEPTACLE LOCATIONS AND ROUTING OF CONDUIT WITH MILLWORK CONTRACTOR AND TIM HORTONS CONSTRUCTION MANAGER PRIOR TO COMMENCING WORK.
8. NOT USED.
9. PROVIDE 20A RECEPTACLE AND SEPARATE JUNCTION BOX FOR MEDIA CABINET. VERIFY EXACT LOCATION IN FIELD. MOUNT APPROXIMATELY 9" BELOW CEILING. REFER TO DETAIL 6, SHEET E4.2.
10. 4"x4"x4" JUNCTION BOX. REFER TO DETAIL 4, SHEET E4.2 FOR MORE INFORMATION.
11. NOT USED.
12. NOT USED.
13. NOT USED.
14. NOT USED.
15. NOT USED.
16. RECEPTACLE SHALL BE WALL MOUNTED CENTERED 12" ABOVE WINDOW.
17. NOT USED
18. PROVIDE DUPLEX RECEPTACLE, SINGLE GANG J-BOX FOR DATA AND SINGLE GANG OUTLET BOX FOR MONITOR. REFER TO "KITCHEN EQUIPMENT WIRING SCHEDULE" ON SHEET E3.2 FOR MOUNTING HEIGHT.
19. MOUNT RECEPTACLE ON FRONT FACE OF FIXED BOOTH SEATING AT +9" AFF. COORDINATE EXACT LOCATION WITH OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN.
20. NOT USED.
21. REUSE EXISTING OR PROVIDE (2) 20A, 120V CIRCUITS WITH 20A/1P TOGGLE DISCONNECTS FOR GAS WATER HEATER AND RECIRCULATION PUMP. COORDINATE EXACT LOCATION WITH PLUMBING CONTRACTOR PRIOR TO ROUGH-IN.
22. NOT USED.
23. NOT USED.
24. OFFICE PRINTER SHALL BE SOURCED, PROCURED AND INSTALLED BY THE OWNER. MOUNT RECEPTACLE FOR PRINTER AT +36" AFF.
25. NOT USED.
26. NOT USED.
27. PROVIDE RECEPTACLE LOCATED INSIDE MILLWORK FOR IPAD CHARGING STATION. POWER FOR RECEPTACLE SHALL BE ROUTED THROUGH SAME J-BOX AS POS STATIONS. COORDINATE RECEPTACLE LOCATION WITH MILLWORK INSTALLER AND OWNER PRIOR TO ROUGH-IN.
28. PROVIDE 20A, 120V J-BOX WITH 20A/1P TOGGLE DISCONNECT MOUNTED AT +36" AFF FOR DRIVE-THRU WINDOW POWER.
29. COUNTERSINK RECEPTACLE INTO CABINET/MILLWORK TO ALLOW KITCHEN EQUIPMENT (AFTER PLUGGED IN) TO BE INSTALLED IN LOCATION SHOWN UNDER COUNTER. EQUIPMENT SHALL NOT STICK OUT BEYOND COUNTER.
30. PROVIDE 20A, 120V 1PH. 1Ø FUTURE ORDER KIOSK. ROUTE 2#-12 AND #12 GROUND IN 1/2" CONDUIT TO FLOOR MOUNTED J-BOX WITH COVER PLATE. CAP AND LABEL CONDUCTORS ACCORDINGLY. FIELD VERIFY LOCATION PRIOR TO ROUGH-IN.
31. NOT USED.
32. NOT USED.
33. EXISTING FREEZER & COOLER EVAPORATOR & CONDENSER TO REMAIN. VERIFY THE LOCATION, RATING, AND OPERABLE CONDITION OF ALL ELECTRICAL CONNECTION IN FIELD. REPLACE IF FOUND INOPERABLE.

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POWER PLAN

E2.1

GENERAL NOTES

A. COORDINATE POWER REQUIREMENTS WITH ALL TRADES AND INCLUDE WORK REQUIRED TO POWER ALL KITCHEN EQUIPMENT, HVAC EQUIPMENT, COOLER/FREEZER, PLUMBING EQUIPMENT, SIGNAGE, LIGHTING, AND ALL OTHER EQUIPMENT/DEVICE REQUIRING POWER IN THE CONTRACT DOCUMENTS.

B. VERIFY ALL ROUGH-IN DIMENSIONS AND POWER REQUIREMENTS WITH KITCHEN EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.

C. VERIFY FAULT CURRENT FROM PRIMARY SERVICE AND ENSURE COMPATIBILITY OF DISTRIBUTION PANEL.

D. ENSURE ADEQUATE CONDUIT SIZE FOR ELECTRICAL AND PHONE WIRING ON SITE AND INTO BUILDING.

E. HEIGHTS INDICATED FOR RECEPTACLES AND JUNCTION BOXES ARE MEASURED FROM FINISHED FLOOR TO CENTER OF BOX.

F. PROVIDE ALL TELEPHONE LINES. TELEPHONE LINES SHALL BE CATEGORY 6.

G. ALL CIRCUITS MAY BE MODIFIED TO THE LEAST AMOUNT OF CONDUIT RUN UNLESS NOTED OTHERWISE.

H. SEE SHEET E5.1 FOR REGISTER SYSTEM CONDUITS AND SHEET E4.1/2 FOR DETAILS.

I. SEE KITCHEN EQUIPMENT WIRING SCHEDULE ON SHEET E3.2 FOR WIRING REQUIREMENTS AND MOUNTING HEIGHTS.

J. ALL 120 VOLT, 15 AND 20 AMP RECEPTACLES IN THE KITCHEN SHALL BE GFCI PROTECTED PER CODE USING GFCI TYPE PERSONNEL PROTECTION BREAKERS.

K. ALL CIRCUITS SHALL HAVE AN INDIVIDUAL NEUTRAL CONDUCTOR. NO SHARED NEUTRALS ARE PERMITTED.

L. COLOR OF ALL PUBLIC AREA RECEPTACLES AND COVER PLATES SHALL MATCH ADJACENT WALL COLOR. REFER TO ARCHITECTURAL PLANS FOR WALL COLORS.

M. ALL WIRING UNDER SLAB, IN WALLS, ABOVE INACCESSIBLE CEILINGS, OR AS REQUIRED BY CODE SHALL BE IN CONDUIT. WHERE LINE VOLTAGE WIRING IS NOT REQUIRED TO BE IN CONDUIT, PROVIDE JUNCTION BOX AND TRANSITION TO MC CABLE. WHERE LOW VOLTAGE WIRING IS NOT REQUIRED TO BE IN CONDUIT, PROVIDE BUSHING ON OPEN END OF CONDUIT.

N. UPON COMPLETION OF ALL WORK (INCLUDES WORK BY TDL FORCES - SYSTEMS PROVIDER) PROVIDE ALL STAINLESS STEEL COVER PLATES, INCLUDING BLANKS AND THOSE REQUIRED FOR DATA CABLES.

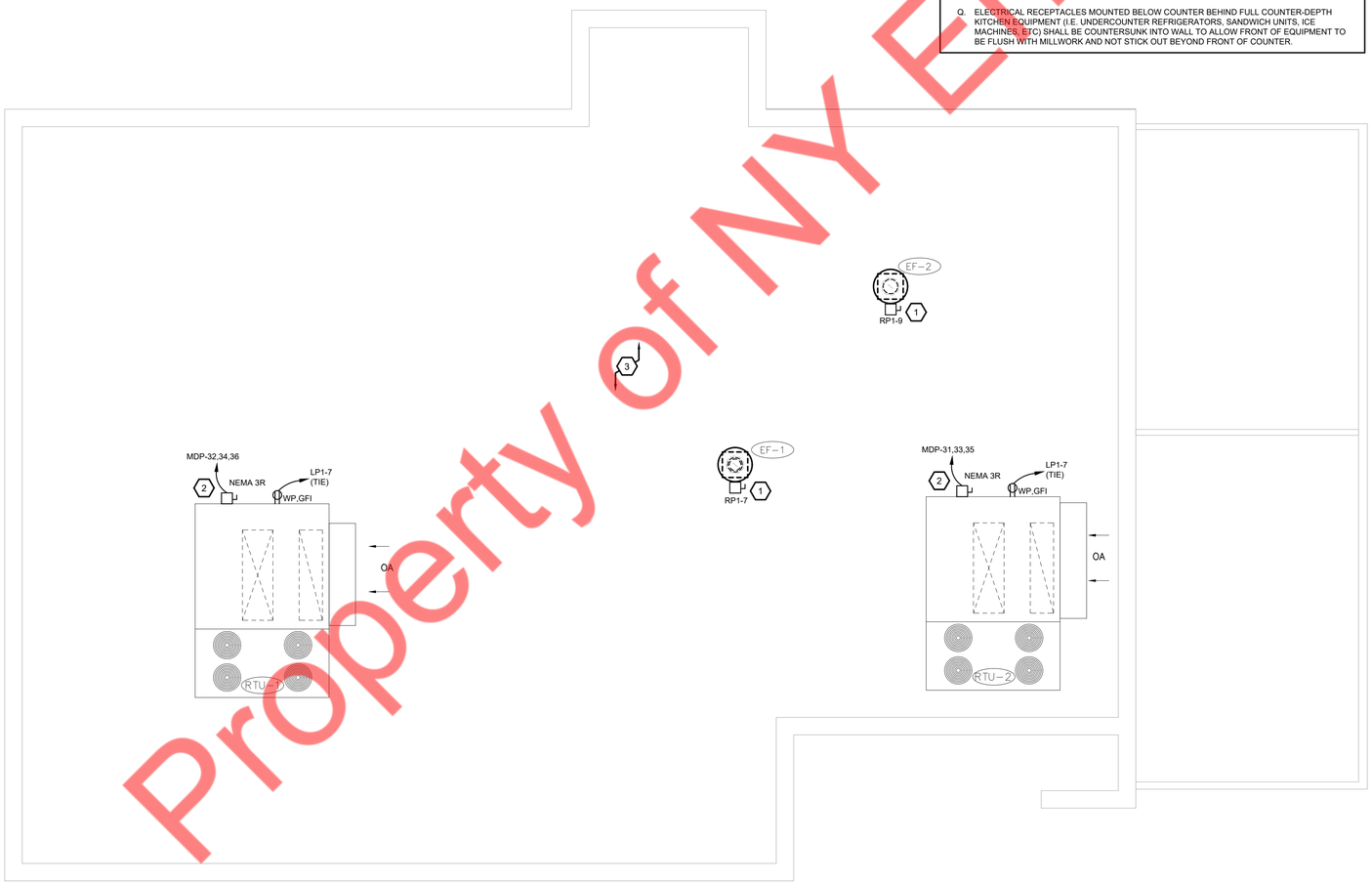
O. IF ALLOWED BY THE AUTHORITY HAVING JURISDICTION, MC CABLE MAY BE USED FOR BRANCH CIRCUIT RUNS, EXCEPT FIRST SEGMENT FROM ELECTRICAL PANEL TO NEAREST JUNCTION BOX. THIS SEGMENT SHALL USE HARD CONDUIT.

P. DEFINITIONS: FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION. INSTALL MEANS TO PLAN IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE. PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.

Q. ELECTRICAL RECEPTACLES MOUNTED BELOW COUNTER BEHIND FULL COUNTER-DEPTH KITCHEN EQUIPMENT (I.E. UNDERCOUNTER REFRIGERATORS, SANDWICH UNITS, ICE MACHINES, ETC) SHALL BE COUNTERSUNK INTO WALL TO ALLOW FRONT OF EQUIPMENT TO BE FLUSH WITH MILLWORK AND NOT STICK OUT BEYOND FRONT OF COUNTER.

CODED NOTES:

1. EXHAUST FAN #1: 120V 1PH. RUN 2 #12, 1 #12 GROUND IN 3/4" CONDUIT THROUGH DISCONNECT SWITCH LOCATED AT UNIT (BY MANUFACTURER) TO 20A-1P CIRCUIT BREAKER IN PANEL. FAN SHALL BE CONTROLLED BY 20A/1P WALL SWITCH. SWITCH SHALL BE LABELED "EXHAUST HOODS".
2. ROOFTOP UNIT #1/#2: 208V 3PH. DISCONNECT SWITCH LOCATED AT UNIT (BY MANUFACTURER) TO CIRCUIT BREAKER IN PANEL. RTU SERVICE RECEPTACLE FURNISHED WITH UNIT TO BE WIRED BY ELECTRICAL.
3. VERIFY THE LOCATION, RATING, AND OPERABLE CONDITION OF ALL ELECTRICAL CONNECTION IN FIELD. REPLACE IF FOUND INOPERABLE.



ROOF POWER PLAN 1
1/4" = 1'-0"

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ROOF POWER PLAN

E2.2

PANEL:	LP1	(EXISTING)													MOUNTING:	RECESSED
208Y/120	VOLTS		PHASE	3		-		-				DEMAND LOAD	30.77		PANEL LOCATION:	STORAGE WALL
150A	MLO		WIRE	4		-		-				DEMAND CURRENT	85.52		FED FROM:	MDP
NOTE:																

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	NOTES	PER PHASE (KVA) A	B	C	NOTES	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	27.6- MONITOR - 17"	O	0.12	2#12, #12G, 3/4"C	G	0.24			G	2#12, #12G, 3/4"C	0.12	O	27.7-MONITOR - 23"	20	2
3	30/2P	46.7- TOASTER	E	2.50	2#10, #10G, 3/4"C	G		2.62		G	2#12, #12G, 3/4"C	0.12	O	27.7-MONITOR - 23"	20	4
5			E	2.50					2.62	G	2#12, #12G, 3/4"C	0.12	O	27.7-MONITOR - 23"	20	6
7	20	ROOF SERVICE RECPTCL	R	0.36	2#12, #12G, 3/4"C	G	0.48			G	2#12, #12G, 3/4"C	0.12	O	27.7-MONITOR - 23"	20	8
9	20	SPARE						0.12		G	2#12, #12G, 3/4"C	0.12	O	27.7-MONITOR - 23"	20	10
11	20	57.2-FONDANT WARMER	E	0.80	2#12, #12G, 3/4"C	G			1.95	G	2#12, #12G, 3/4"C	1.15	E	75.22- FREEZER 2DOOR	20	12
13	30/2P	68.21- COFFE BREWER	E	2.00	2#10, #10G, 3/4"C	G	3.69			G	2#12, #12G, 3/4"C	1.69	E	75.23- FREEZER 3DOOR	20	14
15			E	2.00				3.77			2#10, #10G, 3/4"C	1.77	E	87.7- ICED CAPP	30/2P	16
17	30/2P	68.21- COFFE BREWER	E	2.00	2#10, #10G, 3/4"C	G			3.77			1.77	E			18
19			E	2.00			3.35				2#12, #12G, 3/4"C	1.35	E	87.7- ICED CAPP	20/2P	20
21	30/2P	136.5S- ESPRESSO MACHINE	E	2.50	2#10, #10G, 3/4"C	G		3.85				1.35	E			22
23			E	2.50					2.62	G	2#12, #12G, 3/4"C	0.12	O	32- BATTERY CHARGER	20	24
25	40/2P	151.3- MERRYCHEF	E	3.12	2#8, #10G, 3/4"C	G	3.24			G	2#12, #12G, 3/4"C	0.12	O	37.13-POS CASH STATION	20	26
27			E	3.12				3.54		G	2#12, #12G, 3/4"C	0.42	E	38.3-SANDWICH UNIT 27"	20	28
29	20	31.1-WIRELESS BASE STATION	O	0.10	2#12, #12G, 3/4"C	G			0.28	G	2#12, #12G, 3/4"C	0.18	E	66.11-NEXT GEN DAIRY DIS	20	30
31	20	69.6-SUGAR DISPENSER	E	0.12	2#12, #12G, 3/4"C	G	1.92			G	2#12, #12G, 3/4"C	1.80	E	67.8-DRINK MACHINE	20	32
33	20	SPARE						0.00						SPARE	20	34
35	20	81.3L-U/C REFRIGERATOR	E	0.35	2#12, #12G, 3/4"C	G			1.35	G	2#12, #12G, 3/4"C	1.00	E	WOMEN-HAND DRYER	20	36
37	20	EXTERNAL LIGHTING	L	0.32	2#12, #12G, 3/4"C		2.22					1.90	E			38
39	20	EXTERNAL LED STRIP	L	0.35	2#12, #12G, 3/4"C			2.25		G	3#10, #10G, 3/4"C	1.90	E	203.3L- RATIONAL OVEN	30/3P	40
41	20	66.11-NEXT GEN DAIRY DIS.	E	0.18	2#12, #12G, 3/4"C	G			2.08			1.90	E			42
							15.14	16.15	14.67							

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	0.67	125%	0.84			
TOTAL RECEPTACLE	R	0.36	100%	0.36	TOTAL CONNECTED LOAD	45.96	KVA
TOTAL HVAC	H	0.00	100%	0.00	TOTAL DEMAND LOAD	30.77	KVA
TOTAL MOTOR	M	0.00	100%	0.00	TOTAL CONNECTED CURRENT	127.72	AMP
TOTAL EQUIPMENTS	E	43.87	65%	28.52	TOTAL DEMAND CURRENT	85.52	AMP
TOTAL OTHER	O	1.06	100%	1.06			

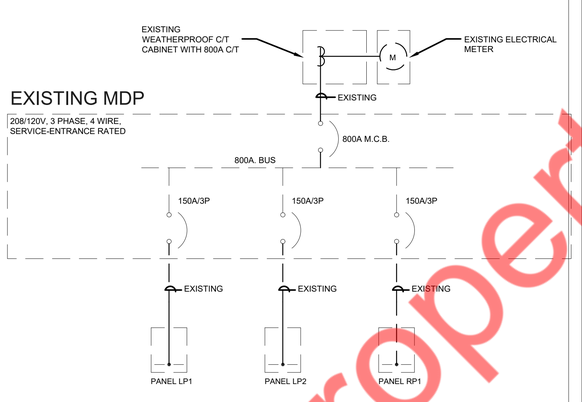
PANEL:	LP2	(EXISTING)													MOUNTING:	RECESSED
208Y/120	VOLTS		PHASE	3		-		-				DEMAND LOAD	15.97		PANEL LOCATION:	STORAGE WALL
150A	MLO		WIRE	4		-		-				DEMAND CURRENT	44.39		FED FROM:	MDP
NOTE:																

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	NOTES	PER PHASE (KVA) A	B	C	NOTES	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	81.3R-U/C REFRIGERATOR	E	0.35	2#12, #12G, 3/4"C	G	0.40			G	2#12, #12G, 3/4"C	0.05	O	92.2-LANE TIMER-HME	20	2
3	20	81.3R-U/C REFRIGERATOR	E	0.35	2#12, #12G, 3/4"C	G		1.25		G	2#12, #12G, 3/4"C	0.90	R	WINDOW RCPTCL	20*	4
5	20	81.3R-U/C REFRIGERATOR	E	0.35	2#12, #12G, 3/4"C	G			1.25	G	2#12, #12G, 3/4"C	0.90	R	WINDOW RCPTCL	20*	6
7	20	D.T. MONITERS	O	0.50	2#12, #12G, 3/4"C	G	1.22			G	2#12, #12G, 3/4"C	0.72	R	GENERAL RCPTCL	20*	8
9	20	D.T. CASH REGISTERS	O	1.00	2#12, #12G, 3/4"C	G		1.00						SPARE	20*	10
11	20	125.01A- 50" SAMSUNG	O	0.22	2#12, #12G, 3/4"C	G			1.45	G	3#12, #12G, 3/4"C	1.23	E	62.22- ICE MACHINE	20/2P	12
13	20	125.01A- 50" SAMSUNG	O	0.22	2#12, #12G, 3/4"C	G	1.45					1.23	E			14
15	20	125.01A- 50" SAMSUNG	O	0.22	2#12, #12G, 3/4"C	G		1.94		G	2#12, #12G, 3/4"C	1.72	E	212.5-RATIONAL OVEN	20/2P	16
17	20	125.01A- 50" SAMSUNG	O	0.22	2#12, #12G, 3/4"C	G			1.94			1.72	E			18
19	20	135.3-PHU - 2Hx2W	O	0.84	2#12, #12G, 3/4"C	G	1.20			G	2#12, #12G, 3/4"C	0.36	O	118.1-OFFICE COMPUTER	20	20
21	20	135.3-PHU - 2Hx2W	O	0.84	2#12, #12G, 3/4"C	G		0.87		G	2#12, #12G, 3/4"C	0.03	O	218.01-RECEIPT PRINTER	20	22
23	20	DRIVE THROUGH RECEPTACLE	R	1.08	2#12, #12G, 3/4"C	G			1.11	G	2#12, #12G, 3/4"C	0.03	O	218.01-RECEIPT PRINTER	20	24
25	20	MEN HAND DRYER	E	1.00	2#12, #12G, 3/4"C	G	1.03			G	2#12, #12G, 3/4"C	0.03	O	218.01-RECEIPT PRINTER	20	26
27	20/2P	223-EGG COOKER	E	1.50	2#12, #12G, 3/4"C	G		1.80		G	2#12, #12G, 3/4"C	0.30	E	133.3-DONUT CASE	20	28
29			E	1.50					2.00	G	2#12, #12G, 3/4"C	0.50	O	DRIVE THROUGH WINDOW	20	30
							5.30	6.86	7.75							

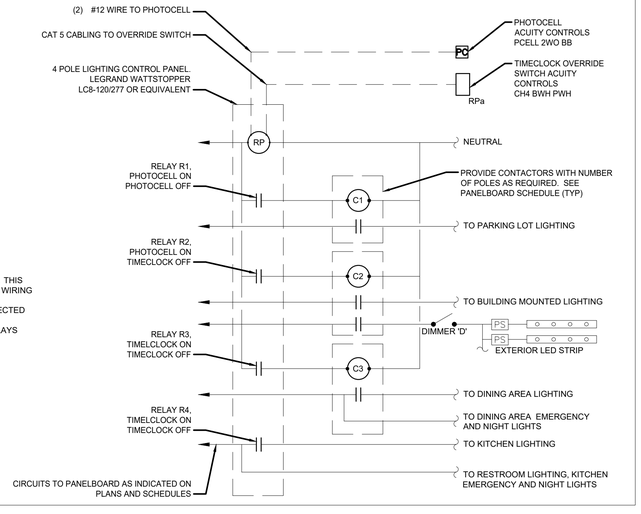
LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)	PANEL TOTAL LOAD		
TOTAL LIGHTING	L	0.00	125%	0.00			
TOTAL RECEPTACLE	R	3.60	100%	3.60	TOTAL CONNECTED LOAD	19.91	KVA
TOTAL HVAC	H	0.00	100%	0.00	TOTAL DEMAND LOAD	15.97	KVA
TOTAL MOTOR	M	0.00	100%	0.00	TOTAL CONNECTED CURRENT	55.33	AMP
TOTAL EQUIPMENTS	E	11.25	65%	7.31	TOTAL DEMAND CURRENT	44.39	AMP
TOTAL OTHER	O	5.06	100%	5.06			

GENERAL NOTES:

1. E.C. SHALL VERIFY/COORDINATE THE FOLLOWING INFORMATION IN THE FIELD WITH THE UTILITY/LANDLORD/OWNER AND INFORM THE ENGINEER OF RECORD OF ANY DISCREPANCY.
2. THE EXACT POWER DISTRIBUTION AND SCOPE OF WORK WITH THE LANDLORD/OWNER BEFORE BID.
3. THE ELECTRICAL WORK SHALL BE PERFORMED IN COMPLIANCE WITH THE NEC, LOCAL CODES AND AHJ.
4. COORDINATE THE EXACT LOCATION OF ALL THE NEW ELECTRICAL DEVICES SHOWN ON THE RISER AND ENSURE THE CLEAR WORKING AND DEDICATED SPACE HAS BEEN PROVIDED AS PER NEC 110.26.
5. COORDINATE AVAILABLE FAULT CURRENT (AIC RATING) WITH UTILITY/LANDLORD/OWNER. CALCULATE THE EXACT AIC RATING OF EACH EQUIPMENT IN THE FIELD. AIC RATING SHALL BE WRITTEN ON EACH EQUIPMENT AS PER STANDARD.
6. ENSURE THE COMBINED VOLTAGE DROP OF THE FEEDER AND BRANCH CIRCUIT SHALL NOT EXCEED 5% PER CODE.
7. PROVIDE GEC AND EGC AS PER 250.66 & 250.122 RESPECTIVELY, AS NEEDED. PROVIDE SEPARATE GROUND CONDUCTORS IN ALL CONDUITS.
8. THE PART OF RISER MARKED AS EXISTING IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY THE RISER IN THE FIELD. INFORM THE ENGINEER OF RECORD OF ANY DISCREPANCY FOUND.
9. SPARE AMPS AVAILABLE IN THE EXISTING ELECTRICAL SERVICE SHALL BE MORE THAN THE NEWLY ADDED DEMAND AMPS.
10. VERIFY THE LOCATION, RATING, AND OPERABLE CONDITION OF ALL THE EXISTING DEVICES BEING REUSED. REPLACE IF FOUND INOPERABLE (WITHIN THE SCOPE OF WORK). BASE BID ACCORDINGLY.
11. ADDITION OR ALTERATION TO THE EXISTING SYSTEM SHALL NOT BE DONE WITHOUT THE WRITTEN CONSENT OF THE OWNER.



ELECTRIC ONE-LINE DIAGRAM 3
N.T.S.



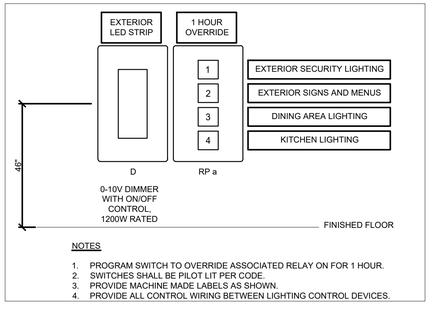
NOTES

1. NOT ALL LOADS AND CONTROLS ARE SHOWN. THIS DIAGRAM IS INTENDED TO PROVIDE GENERAL WIRING AND CONTROL INTENT ONLY.
2. PROGRAM LIGHTING CONTROL PANEL AS DIRECTED BY OWNER.
3. MINIMUM INTERRUPTING RATING FOR ALL RELAYS AND CONTACTORS SHALL BE 10,000 A.I.C.

LIGHTING CONTROL DIAGRAM 2
N.T.S.

PANEL SCHEDULE NOTES

General Notes:	
	CONTRACTOR TO FURNISH TWO "HANDLE PADLOCK ATTACHMENTS" FOR CIRCUIT BREAKERS. ATTACHMENT PIECES TO BE PROVIDED TO THE OWNER OR TO BE INSTALLED IN THE PANELBOARD FOR EASY ACCESS BY AN ELECTRICAL CONTRACTOR PERFORMING MAINTENANCE ON ELECTRICAL EQUIPMENT REQUIRING A DISCONNECTING MEANS, CAPABLE OF BEING PADLOCKED.
	BALANCE PANELS WITHIN 10% PHASE TO PHASE.
Circuit Key Notes:	
L	HANDLE LOCK "OFF/ON" CLAMP DEVICE
C# / R#	ROUTE CIRCUIT THROUGH CONTACTOR / RELAY INDICATED
CL	ROUTE CIRCUIT THROUGH CURRENT LIMITER PANEL FOR ENERGY CODE COMPLIANCE
HACR	HEATING, AIR CONDITION AND REFRIGERATION RATED BREAKER
FV	FIELD VERIFY ELECTRICAL REQUIREMENTS OF KITCHEN EQUIPMENT ITEM
NOTE	INSTALL BREAKER ACCORDING TO MANUFACTURER'S INSTRUCTIONS. GFCI BREAKER WILL HAVE NEUTRAL PIGTAIL. KITCHEN EQUIPMENT VOLTAGE IS 208V/3PH SO EQUIPMENT FEEDER DOES NOT HAVE A LOAD NEUTRAL. FOR PROPER WIRING OF GFCI BREAKER UNDER 208V/3PH CONDITIONS, BREAKER'S NEUTRAL PIGTAIL SHOULD BE CONNECTED TO PANEL'S NEUTRAL BAR PER MANUFACTURER'S INSTRUCTIONS.
G	GROUND FAULT CIRCUIT INTERRUPTING BREAKER
*	INDICATES MODIFIED BREAKERS



NOTES

1. PROGRAM SWITCH TO OVERRIDE ASSOCIATED RELAY ON FOR 1 HOUR.
2. SWITCHES SHALL BE PILOT LIT PER CODE.
3. PROVIDE MACHINE MADE LABELS AS SHOWN.
4. PROVIDE ALL CONTROL WIRING BETWEEN LIGHTING CONTROL DEVICES.

DIMMER AND SWITCH DETAIL 1
N.T.S.

Scale:
Designed by: NYE
Drawn by: NYE
Checked by: NYE
Issue: Date:
Design Development 06/18/2024
Progress Set 07/03/2024
Permit Set 07/19/2024
REV Permit Set 1 08/14/2024

PANEL SCHEDULES AND RISER DIAGRAMS

E3.1

KITCHEN EQUIPMENT POWER SCHEDULE

1. PROVIDE SO CORD DROP WITH STRAIN RELIEF. REFER TO ELECTRICAL POWER PLAN.
2. FURNISHED WITH CONTROL BOX. CONNECT ALL COMPONENTS.
3. PROVIDE WP DISCONNECT SWITCH. VERIFY RATING WITH ACTUAL EQUIPMENT.

TAG	EQUIPMENT DESCRIPTION	QTY	VOLT	PHASE	AMP (A)	LOAD (VA)	CONNECTION	REMARKS
3.4	HAND DRYER	2	120	1	8.33	1000	DIRECT	
27.6	MONITOR - 17" - CRASHPOINT	1	120	1	3	360	NEMA 5-20P	
27.7	MONITOR - 23" - SERVICE AREA	5	120	1	2	250	NEMA 5-20P	
31.1	WIRELESS BASE STATION - HME	1	100-240	1	1.5	180	NEMA 5-15R	
32	BATTERY CHARGER	1	120	1	1.5	180	NEMA 5-20P	
37.13	POS CASH STATION - FRONT COUNTER (STANDARD)	1	120	1	1.5	180	NEMA 5-20P	
37.14/.15	CASH REGISTER	1	120	1	4.16	500	NEMA 5-20P	
38.3	SANDWICH UNIT 27" TAYLOR - DOOR	1	115	1	3.5	403	NEMA 5-15R	
46.7	TOASTER - HI-SPEED - Wx6225	1	208	1	24	4992	NEMA 6-30P	250V 6' POWER PLUG
57.2	FONDANT WARMER - STANDARD	1	120	1	6.7	800	NEMA 5-15P	
62.22	ICE MACHINE - STANDALONE	1	208-230	1	11.8	2455	NEMA 5-20P	3 WIRES INCLUDING GROUND
66.11	NEXT GEN DAIRY DISPENSER	2	120	1	1.5	180	NEMA 5-20P	
67.8	HOT POWDERED DRINK MACHINE	1	120	1	15	1800	NEMA 5-20P	
68.21	COFFE BREWER	2	120/208	1	19.2	4000	NEMA 5-20P	PLUG SHOULD BE PURCHASE SEPERATELY
69.6	SUGAR DISPENSER	1	120	1	1	120	NEMA 5-20P	
75.22	REACH-IN FREEZER 2 DOOR	1	115	1	10	1150	NEMA 5-15P	
75.23	REACH-IN FREEZER 3 DOOR	1	115	1	14.7	1690	NEMA 5-20P	
81.3L	U/C REFRIGERATOR - LEFT HINGE	1	120	1	2.9	348	NEMA 5-15R	
81.3R	U/C REFRIGERATOR - RIGHT HINGE	3	120	1	2.9	348	NEMA 5-15R	
87.7	ICED CAPP	1	208-230	1	17 &13	6240	NEMA 6-20P	TWO DEDICATED CONNECTIONS REQUIRED,3 WIRE
92.2	LANE TIMER - HME (UPGRADE)	1	120	1	0.3	36	NEMA 5-15R	
92.5	LANE TIMER - MONITOR	2	120	1	0.2	24	NEMA 5-15R	
118.1	OFFICE COMPUTER	1	120	1	3	360	NEMA 5-20P	
123.1	MEDIA CABINET	1	120	1			NEMA 5-20P	
125.01A	50" SAMSUNG - WALL MOUNTED	4	120	1	1.8	216	NEMA 5-20P	
130.8	ICE COFFE BREWER	1	208	1		2025	NEMA 6-50R	
133.3	DONUT CASE	1	120	1	2.5	300	NEMA 5-15R	
135.3	PHU - 2Hx2W	2	120	1	7	840	NEMA 5-15P	
136.5S	ESPRESSO MACHINE - SCHAERER COFFEE ART PLUS	1	208	1	24	4992	NEMA L6-30R	
151.3	MERRYCHEF - CONNEX 16	1	208-240	1	30	6000	NEMA 6-50R	
156.7S	ICB INFUSION STAND	2	120	1		138	NEMA 5-20P	
203.3L	RATIONAL OVEN	2	208	3	16	5700	NEMA 6-50R	
212.5	RATIONAL OVEN COMPONENT - ULTRAVENT XS	1	208	3	16.5	3432	NEMA 15-30P	
218.01	RECEIPT PRINTER	3	120	1	0.2	24		
223	TABLE TOP EGG COOKER	1	200-240	1	12.5	3000	NEMA L6-20P	

NOTE: - **CONTACTOR TO COORDINATE WITH MANUFACTURER FOR EXACT POWER REQUIREMENTS AND CONNECTION TYPE OF THE EQUIPMENT AND**

PANEL: RP1 (EXISTING) — **MOUNTING:** RECESSED

208Y/120 VOLTS — PHASE **3** — DEMAND LOAD 25.05 — **PANEL LOCATION:** STORAGE WALL
150A **MLO** WIRE **4** — DEMAND CURRENT 69.61 — **FED FROM:** MDP
NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	NOTES	PER PHASE (KVA) A	B	C	NOTES	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	STORAGE RCPTL	R	0.36	2#12, #12G, 3/4"C	G	0.66			C3/CL	2#12, #12G, 3/4"C	0.30	L	LIGHTING-DINING AREA	20	2
3	20*	EXISTING WATER HEATE	E	0.60	2#12, #12G, 3/4"C			1.12		C3/CL	2#12, #12G, 3/4"C	0.52	L	LIGHTING-DINING AREA	20	4
5	20*	WATER FILTERATION	E	1.50	2#12, #12G, 3/4"C	G			1.90	C3/CL	2#12, #12G, 3/4"C	0.40	L	LIGHTING-SERVICE AREA	20	6
7	20*	EF-1	H	0.15	2#12, #12G, 3/4"C		0.52			C3/CL	2#12, #12G, 3/4"C	0.37	L	LIGHTING-KITCHEN & STORA	20	8
9	20*	EF-2	H	0.15	2#12, #12G, 3/4"C			1.35		C2	2#12, #12G, 3/4"C	1.20	L	STORE FRONT SIGN	20	10
11	20*	DT DIGITAL MENUBOARI	O	1.20	2#12, #12G, 3/4"C				2.40	C2	2#12, #12G, 3/4"C	1.20	L	STORE FRONT SIGN	20	12
13	20*	ODMB CANOPY & SPEAK	O	1.20	2#12, #12G, 3/4"C		2.40			C2	2#12, #12G, 3/4"C	1.20	L	STORE FRONT SIGN	20	14
15	20*	SIGNAGE	O	1.20	2#12, #12G, 3/4"C			3.10				1.90	E			16
17	30/2P	130.8-ICE COFFE BREWE	E	2.03	2#10, #10G, 3/4"C	G			3.93	G	3#10, #10G, 3/4"C	1.90	E	203.3L- RATIONAL OVEN	30/3P*	18
19			E	2.03			3.93					1.90	E			20
21	20	STORE FRONT SIGN	L	1.20	2#12, #12G, 3/4"C	C2		2.40		C2	2#12, #12G, 3/4"C	1.20	L	STORE FRONT SIGN	20	22
23	20	CHARGING STATION	E	0.18	2#12, #12G, 3/4"C	G			0.30	C2	2#12, #12G, 3/4"C	0.12	O	ORDER KIOSK	20*	24
25	20	OFFICE RECEPTACLES	O	1.08	2#12, #12G, 3/4"C	G	1.20			C2	2#12, #12G, 3/4"C	0.12	O	ORDER KIOSK	20*	26
27	20	OFFICE RECEPTACLES	O	0.90	2#12, #12G, 3/4"C	G		1.04			2#12, #12G, 3/4"C	0.14	E	156.7S- ICB INFUSION STAND	20*	28
29	20	PUBLIC AREA RCPTL	R	1.08	2#12, #12G, 3/4"C	G			1.22		2#12, #12G, 3/4"C	0.14	E	156.7S- ICB INFUSION STAND	20*	30
							8.71	**9.01**	**9.75**							

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
TOTAL LIGHTING	L	7.59	125%	9.49
TOTAL RECEPTACLE	R	1.44	100%	1.44
TOTAL HVAC	H	0.30	100%	0.30
TOTAL MOTOR	M	0.00	100%	0.00
TOTAL EQUIPMENTS	E	12.31	65%	8.00
TOTAL OTHER	O	5.82	100%	5.82

PANEL TOTAL LOAD		
TOTAL CONNECTED LOAD	27.46	KVA
TOTAL DEMAND LOAD	25.05	KVA
TOTAL CONNECTED CURRENT	76.31	AMP
TOTAL DEMAND CURRENT	69.61	AMP

PANEL: MDP (EXISTING) — **MOUNTING:** SURFACE

208Y/120 VOLTS — PHASE **3** — DEMAND LOAD 195.44 — **PANEL LOCATION:** MECH. ROOM
800A **MCB** WIRE **4** — DEMAND CURRENT 543.12 — **FED FROM:** METER
NOTE:

CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA) A	B	C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1						1.92				1.92	O			2
3	EXISTING	SPARE	0	0.00			1.92		EXISTING	1.92	O	CONDENSER COOLER	EXISTING	4
5			0	0.00				1.92		1.92	O			6
7						1.92				1.92	O			8
9	EXISTING	SPARE	0	0.00			1.92		EXISTING	1.92	O	CONDENSER FREEZER	EXISTING	10
11			0	0.00				1.92		1.92	O			12
13						0.00								14
15	EXISTING	SPARE	0	0.00			0.00			0.00	0	SPARE	EXISTING	16
17			0	0.00				0.00		0.00	0			18
19						0.00								20
21	EXISTING	SPARE	0	0.00			0.00			0.00	0	SPARE	EXISTING	22
23			0	0.00				0.00		0.00	0			24
25						0.00								26
27	EXISTING	SPARE	0	0.00			0.00			0.00	0	SPARE	EXISTING	28
29			0	0.00				0.00		0.00	0			30
31			H	9.61		22.11				12.50	H			32
33	90/3P	RTU-2	H	9.61	3#3, #8G, 1"C		22.11		EXISTING	12.50	H	RTU-1	125/3P	34
35			H	9.61				22.11		12.50	H			36
37			O	21.09		29.44				8.35	O			38
39	150/3P	PANEL- LP1	O	21.09	EXISTING		29.44		EXISTING	8.35	O	PANEL- RP1	150/3P	40
41			O	21.09				29.44		8.35	O			42
43			O	9.76		9.76								44
45	150/3P	PANEL- LP2	O	9.76	EXISTING		9.76			0.00	0	SPARE	EXISTING	46
47			O	9.76				9.76		0.00	0			48
						65.15	**65.15**	**65.15**						

LOAD CLASSIFICATION		CONNECTED LOAD (KVA)	DEMAND FACTOR	DEMAND LOAD (KVA)
TOTAL LIGHTING	L	0.00	125%	0.00
TOTAL RECEPTACLE	R	0.00	100%	0.00
TOTAL HVAC	H	66.33	100%	66.33
TOTAL MOTOR	M	0.00	100%	0.00
TOTAL EQUIPMENTS	E	0.00	65%	0.00
TOTAL OTHER	O	129.11	100%	129.11

PANEL TOTAL LOAD		
TOTAL CONNECTED LOAD	195.44	KVA
TOTAL DEMAND LOAD	195.44	KVA
TOTAL CONNECTED CURRENT	543.12	AMP
TOTAL DEMAND CURRENT	543.12	AMP

Scale:
Designed by: NYE
Drawn by: NYE
Checked by: NYE
Issue: Date:
Design Development 06/18/2024
Progress Set 07/03/2024
Permit Set 07/19/2024
REV Permit Set 1 08/14/2024

KITCHEN EQUIPMENT AND PANEL SCHEDULE

E3.2

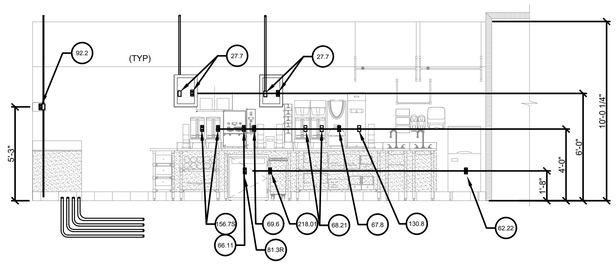
GENERAL NOTES

A. ALL DETAILS ARE DIAGRAMMATIC ONLY. CONTRACTOR TO REVIEW SITE SPECIFIC MILLWORK SHOP DRAWINGS PRIOR TO ROUGH IN AND COORDINATE ROUGH IN LOCATIONS WITH MILLWORK ACCESS.

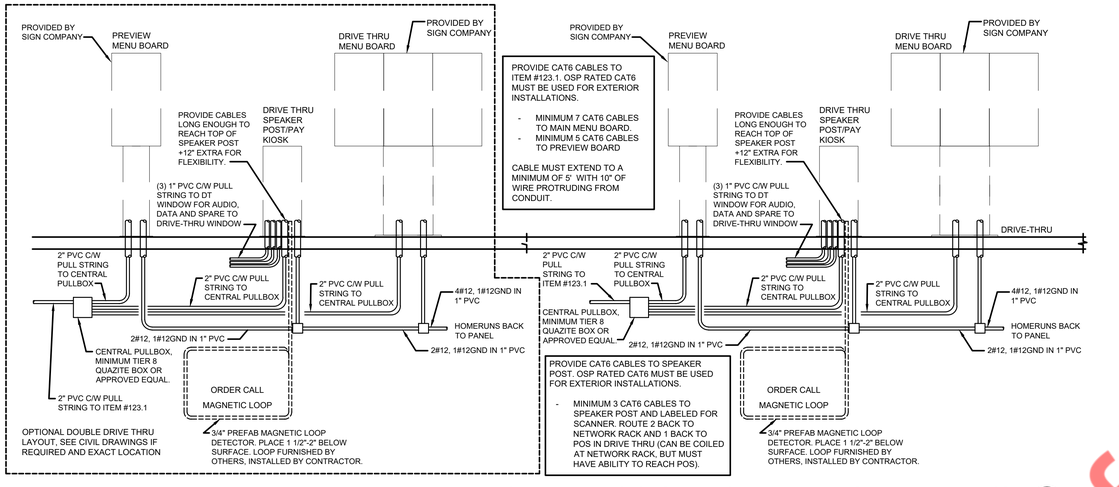
B. MILLWORK AND DEVICES SHOWN FOR REFERENCE ONLY. MOUNT DEVICES IN EXTERIOR WALL ONLY WHERE ACCESSIBLE THROUGH MILLWORK. FIELD VERIFY WITH MILLWORK SUPPLIER FOR EXACT SIZES, LOCATIONS AND REQUIREMENTS.

DETAILS CODED NOTES:

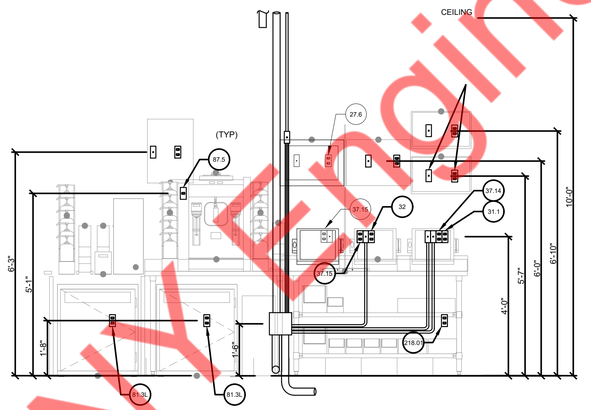
1. NO BOXES TO BE MOUNTED IN THIS AREA OF THE COMPARTMENT, AS IT CONFLICTS WITH CASH DRAWER.
2. WALL MOUNT MONITOR BRACKET PROVIDED BY TDL. ENSURE ADEQUATE PLYWOOD BACKING IN WALL FOR SUPPORT.
3. (1) 1" CONDUIT TO TIMER LOOP AND (3) 1" TO EXTERIOR D/T SPEAKER POST/MENU BOARD (PER DRIVE THRU LANE) STUBBED OUT OF FLOOR IN KICK SPACE OF CABINET.
4. 3/4" CONDUIT FROM CEILING TO JUNCTION BOX, CONTINUING TO KICK SPACE IN CABINET.
5. 3" CONDUIT FROM 8" X 8" JUNCTION BOX TO KICK SPACE IN CABINET.
6. 3" CONDUIT FROM 8" X 8" JUNCTION BOX, UNDER SLAB TO FRONT COUNTER CASHES.
7. 3" CONDUIT FROM CEILING TERMINATING IN 8" X 8" JUNCTION BOX WITH COVER PLATE.
8. 8" X 8" JUNCTION BOX MUST BE MOUNTED IN 1ST COMPARTMENT, SINCE 2ND IS NOT ACCESSIBLE.
9. ALL DATA/TELEPHONE OUTLETS SHALL BE STANDARD J-BOX TO ACCOMMODATE FACE PLATES.
10. DETAIL IS DIAGRAMMATIC ONLY. REFER TO ARCHITECTURAL DRAWINGS AND SITE SPECIFIC MILLWORK SHOP DRAWINGS PRIOR TO ROUGH IN AND ADJUST TO SUIT.
11. ALL CONDUIT ABOVE GROUND SHALL BE EMT.
12. 1" CONDUIT FROM CEILING TERMINATING IN SINGLE GANG JUNCTION BOX WITH COVER PLATE.
13. 1" CONDUIT FROM CEILING TO 2" X 4" JUNCTION BOX RECESSED IN WALL FOR WIRELESS TRANSMITTER, CONTINUING TO (2) 1/2" CONDUITS ROUTED TO JUNCTION BOX.



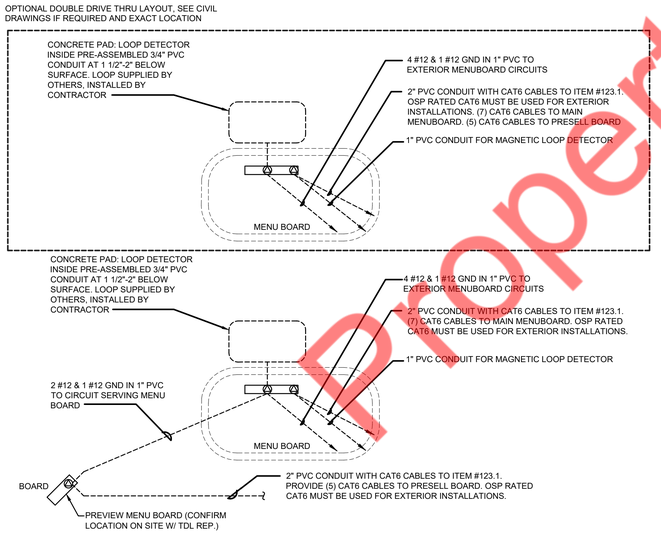
DRIVE-THRU WINDOW DETAIL 1
N.T.S.



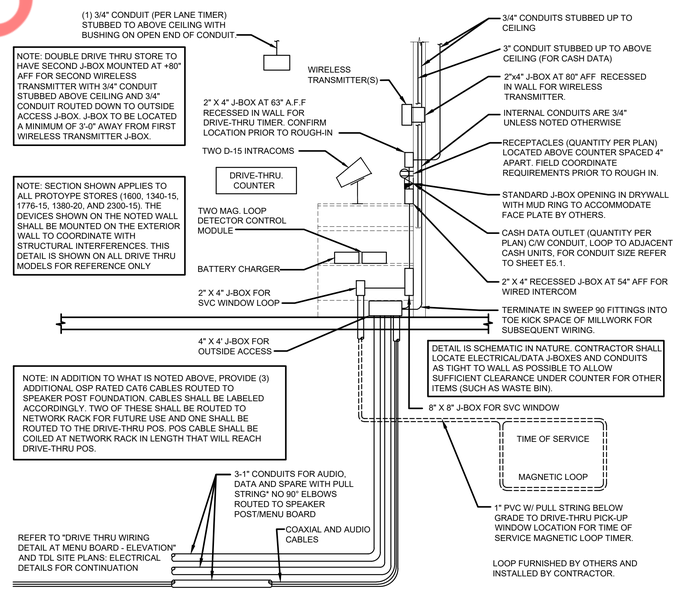
DRIVE-THRU WIRING DETAIL AT MENU BOARD - ELEVATION 4
N.T.S.



DRIVE-THRU WINDOW DETAIL - CASH COUNTER 2
N.T.S.



DRIVE-THRU WIRING DETAIL AT MENU BOARD- PLAN 5
N.T.S.

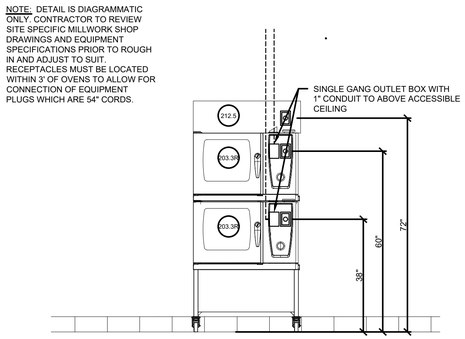


DRIVE-THRU WIRING DETAIL AT D.T. COUNTER 3
N.T.S.

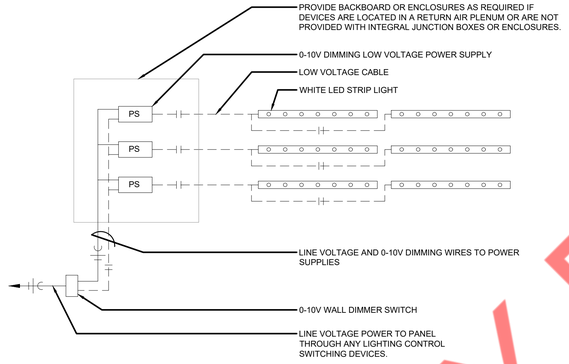
Scale:
Designed by: NYE
Drawn by: NYE
Checked by: NYE
Issue: Date:
Design Development 06/18/2024
Progress Set 07/03/2024
Permit Set 07/19/2024
REV Permit Set 1 08/14/2024

ELECTRICAL DETAILS AND WIRING SCHEDULE

E4.1

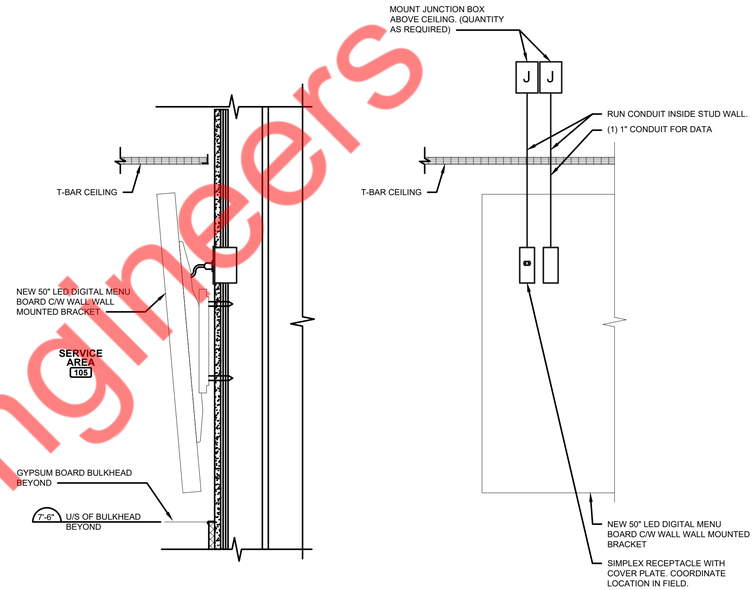


RATIONAL OVEN DETAIL 5
N.T.S.

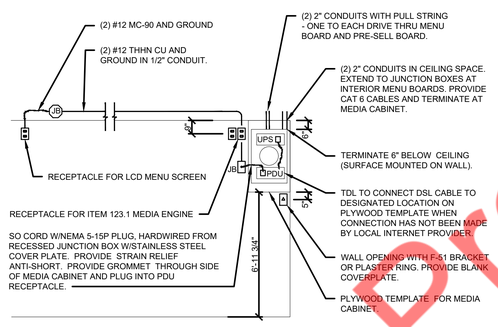


NOTES:
1. THIS DETAIL IS GENERIC AND DOES NOT SHOW ALL PARTS AND PIECES NECESSARY FOR A COMPLETE AND WORKING INSTALLATION.
2. REFER TO MANUFACTURERS INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS BEFORE ROUGH IN.
3. PROVIDE ALL LOW VOLTAGE AND LINE VOLTAGE CABLING AS REQUIRED.
4. PLAN ROUTING AND QUANTITY OF LOW VOLTAGE CABLE RUNS TO COMPLY WITH MANUFACTURER LIMITATIONS ON WATTS PER POWER SUPPLY, DRIVER, INDIVIDUAL FIXTURE RUN AND VOLTAGE DROP.
5. SIZE LOW VOLTAGE CABLE AS REQUIRED TO COMPLY WITH MANUFACTURER VOLTAGE DROP LIMITATIONS.
6. IT IS RECOMMENDED TO CONTACT MANUFACTURER REPRESENTATIVE OR TECHNICAL SUPPORT FOR ASSISTANCE WITH SYSTEM LAYOUT.

LED STRIP LIGHT WIRING DIAGRAM 3
N.T.S.

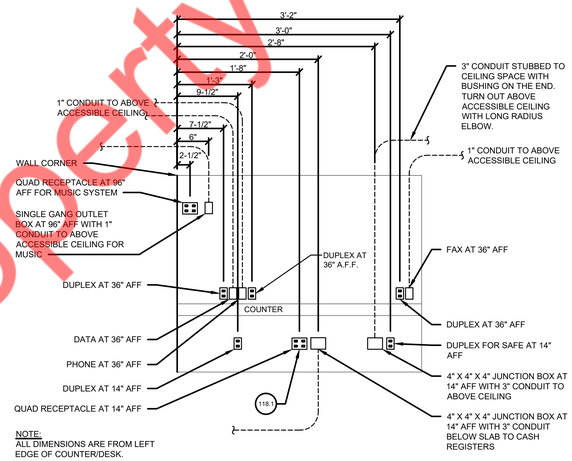


INTERIOR MENU BOARD DETAIL 1
N.T.S.



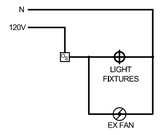
NOTES:
1. MAXIMUM MOUNTING HEIGHT OF 7'-5" TO UNDERSIDE OF PLYWOOD TEMPLATE.
2. ALL EQUIPMENT WITHIN THE MEDIA CABINET IS SUPPLIED BY TDL, SYSTEM PROVIDER.
3. G.C. TO VERIFY THAT THIS ITEM IS TO BE INCLUDED FOR EACH STORE LOCATION.

MEDIA CABINET (ITEM 123.1) DETAIL 6
N.T.S.



NOTE:
ALL DIMENSIONS ARE FROM LEFT EDGE OF COUNTER/DESK.

OFFICE AREA ELEVATION 4
N.T.S.



OCCUPANCY SENSOR WIRING DETAIL 2
N.T.S.

Scale:
Designed by: NYE
Drawn by: NYE
Checked by: NYE
Issue: Date:
Design Development 06/18/2024
Progress Set 07/03/2024
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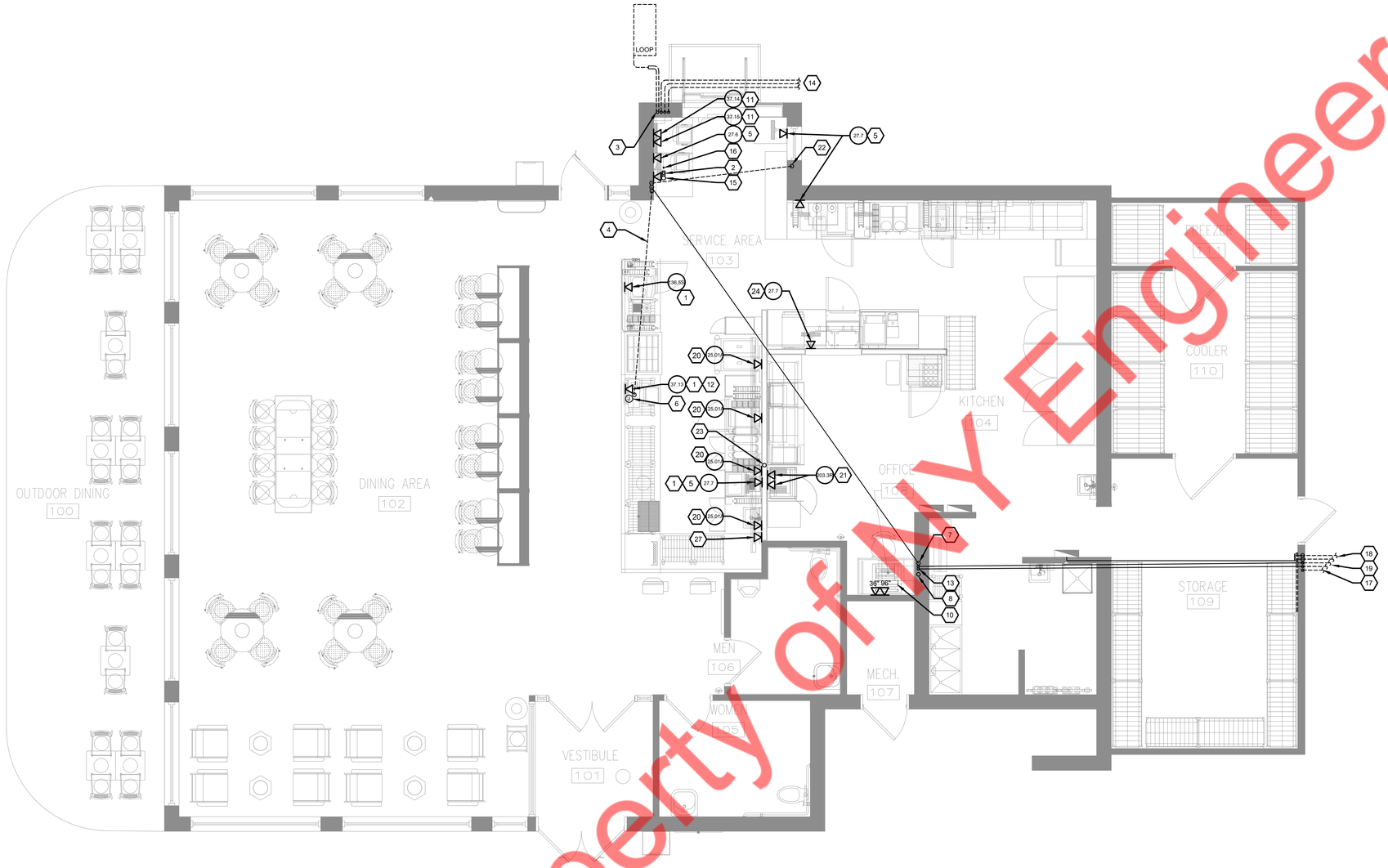
REV Permit Set 1 08/14/2024

ELECTRICAL DETAILS

E4.2

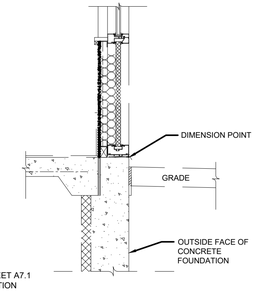


TELEPHONE AND REGISTER SYSTEMS PLAN 2
1/4" = 1'-0"

CODED NOTES:

1. DEVICE MOUNTED ON INSIDE OF MILLWORK. COORDINATE EXACT LOCATION WITH ARCHITECTURAL ELEVATIONS AND MILLWORK SHOP DRAWINGS. WIRING TO DEVICE TO BE ROUTED CONCEALED WITHIN CASEWORK THROUGH JUNCTION BOX (SEE NOTE 6).
2. 1" CONDUIT WITH SINGLE GANG MINIMUM SIZE JUNCTION BOX FOR HEADSET AT 60" A.F.F. TO ABOVE CEILING.
3. 1" CONDUIT WITH SINGLE GANG MINIMUM SIZE JUNCTION BOX AT 2" A.F.F. UNDER COUNTER TO DRIVE-THRU WINDOW.
4. 3" CONDUIT UNDER FLOOR CASH TO CASH.
5. EXTEND (1) 1" EMPTY CONDUIT WITH PULLSTRING FROM MONITOR JUNCTION BOX UP THROUGH CEILING FOR DATA CABLES TO KITCHEN ORDER PROCESSOR. REFER TO KITCHEN EQUIPMENT SCHEDULE ON E3.1 FOR DATA OUTLET MOUNTING HEIGHT. COORDINATE EXACT LOCATION OF PROCESSOR WITH OWNER PRIOR TO ROUGH-IN.
6. PROVIDE JUNCTION BOX IN MILL WORK FOR DATA/COMMUNICATION CONNECTION TO POS STATIONS. MOUNT BELOW COUNTER.
7. ROUTE 3" CONDUIT WITH PULL STRING OVERHEAD FOR SECURITY WITH 4" X 4" X 4" MINIMUM SIZE JUNCTION BOX AT 14" A.F.F TO DRIVE-THRU COUNTER. REFER TO DETAIL 4 ON SHEET E4.2.
8. 3" CONDUIT WITH 4" X 4" X 4" MINIMUM SIZE JUNCTION BOX AT 14" A.F.F. TO ABOVE ACCESSIBLE LAY-IN CEILING. INSTALL BUSHING ON CONDUIT END. REFER TO DETAIL 4 ON SHEET E4.2.
9. NOT USED.
10. INSTALL DATA EQUIPMENT IN MEDIA CABINET ENGINE.
11. DATA JACK FOR CREDIT CARD MACHINE INSTALLED AT 1'-0" A.F.F. DATA LINES SHALL BE CATEGORY 6.
12. DATA JACK FOR CREDIT CARD MACHINE INSTALLED AT 2'-5/8" A.F.F. DATA LINES SHALL BE CATEGORY 6.
13. 2" CONDUIT FROM MEDIA CABINET TO MENU BOARD, SPEAKER POST AND PRE-SELL BOARD. USE LONG RADIUS ELLS FOR ALL BENDS. SEE DETAIL 4/E4.2 FOR FURTHER INFORMATION.
14. PROVIDE (3) 1" CONDUITS FROM DRIVE-THRU WINDOW TO MENU BOARD/SPEAKER POST - ONE FOR COAX/AUDIO, ONE FOR DATA AND ONE FOR SPARE. CONDUITS TO TERMINATE AT KICK PLATE OF MILLWORK IN ORDER TO NOT INTERFERE WITH MILLWORK COUNTER. MILLWORK COMPANY TO PROVIDE ACCESS PANEL. REFER TO SHEETS E4.1 AND AS2.1 FOR DETAILS. CONTRACTOR TO COORDINATE ROUTING OF CONDUITS TO OUTDOOR MENUBOARDS IN FIELD BASED ON ACTUAL SITE CONDITIONS.
15. 3/4" CONDUIT FROM ABOVE CEILING TO JUNCTION BOX AT 72" A.F.F. FOR TIMER. THEN DOWN TO BELOW COUNTER AT NOTE 3.
16. READER, 3/4" CONDUIT TO ABOVE CEILING.
17. ONE 1" CONDUIT TO MENU BOARDS FOR POWER. EXTEND POWER CONDUIT TO PANEL. REFER TO SHEET AS2.1 AND E4.1 FOR DETAILS.
18. ONE 3" CONDUIT FOR BROADBAND DATA SERVICE. SEE SITE PLAN FOR CONTINUATION.
19. 2" CONDUIT TO MENU BOARD, SPEAKER POST AND PRE-SELL BOARD. VERIFY LOCATION WITH CIVIL PLANS BEFORE ROUGH-IN.
20. DATA OUTLET FOR MENU BOARD SHALL BE INSTALLED ABOVE WALL MOUNTING BRACKET. COORDINATE MOUNTING HEIGHT WITH ARCHITECTURAL PLANS. REFER TO DETAIL 1 ON SHEET E4.2.
21. INSTALL DATA OUTLET WITH 1" CONDUIT TO ABOVE ACCESSIBLE CEILING RATIONAL OVEN. REFER TO DETAIL 5 ON SHEET E4.2.
22. 3/4" CONDUIT WITH 4" X 4" X 4" MINIMUM SIZE JUNCTION BOX AT 14" A.F.F. TO ABOVE ACCESSIBLE LAY-IN CEILING. INSTALL 90° BEND AND BUSHING ON CONDUIT END.
23. 1" CONDUIT WITH 4" X 4" X 4" MINIMUM SIZE JUNCTION BOX AT 14" A.F.F. TO ABOVE ACCESSIBLE LAY-IN CEILING. INSTALL BUSHING ON CONDUIT END.
24. EXTEND (1) 1" EMPTY CONDUIT WITH PULLSTRING FROM MONITOR JUNCTION BOX UP THROUGH CEILING FOR DATA CABLES TO KITCHEN ORDER PROCESSOR. EXTEND (1) ADDITIONAL 1" EMPTY CONDUIT WITH PULLSTRING FROM MONITOR JUNCTION BOX TO SANDWICH COUNTER JUNCTION BOX MOUNTED AT 48" A.F.F. REFER TO KITCHEN EQUIPMENT SCHEDULE ON E3.1 FOR DATA OUTLET MOUNTING HEIGHT. COORDINATE EXACT LOCATION OF PROCESSOR WITH OWNER PRIOR TO ROUGH-IN.
25. PROVIDE JUNCTION BOX IN FLOOR FOR DATA CONNECTION TO FUTURE ORDER KIOSK.
26. 1" CONDUIT UNDER FLOOR TO FUTURE ORDER KIOSKS.
27. INSTALL DATA OUTLET WITH 1" CONDUIT TO ABOVE ACCESSIBLE CEILING FOR FUTURE MOBILE ORDER DISPLAY. MOUNT AT 72" A.F.F. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.
28. INSTALL DATA OUTLET WITH 1" CONDUIT TO ABOVE ACCESSIBLE CEILING FOR FUTURE MOBILE ORDER DISPLAY. MOUNT AT 48" A.F.F. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.

NOTE: ALL DIMENSIONS ARE FROM OUTSIDE FACE OF CONCRETE FOUNDATION. SEE DETAIL ON THIS SHEET.



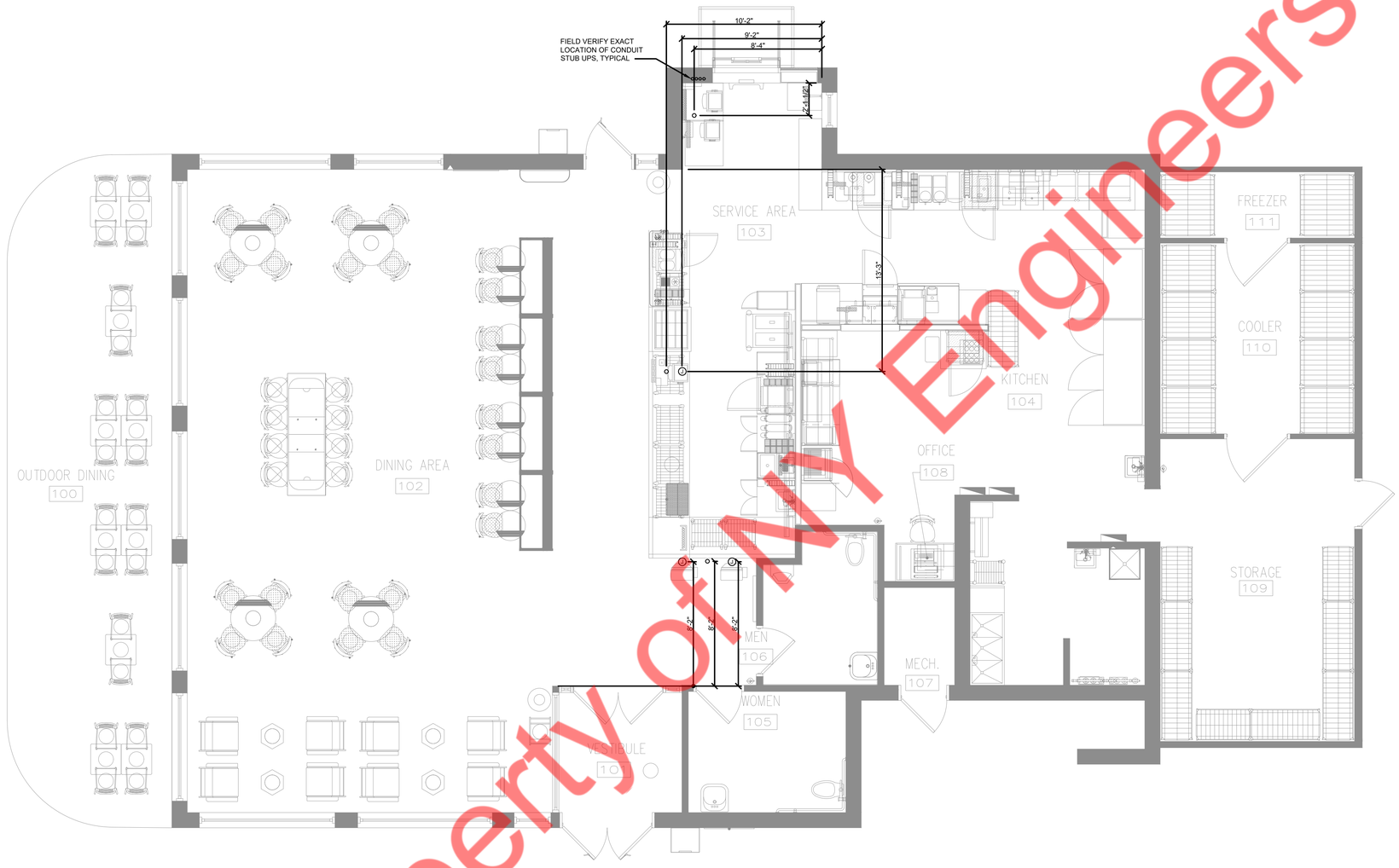
SEE DETAIL 1 ON SHEET A7.1 FOR MORE INFORMATION

DIMENSION POINT DETAIL 1
N.T.S.

Scale:	
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

TELEPHONE/REGISTER PLAN

E5.1



UNDERGROUND DIMENSIONS PLAN 1
1/4" = 1'-0"

Scale:	
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

UNDERGROUND DIMENSIONS PLAN

E5.2

DIVISION 26 - ELECTRICAL SPECIFICATIONS

BASIC ELECTRICAL MATERIALS AND METHODS SECTION 26 05 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. ELECTRICAL EQUIPMENT COORDINATION AND INSTALLATION.
2. COMMON ELECTRICAL INSTALLATION REQUIREMENTS.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

1.4 COORDINATION

A. COORDINATE ARRANGEMENT, MOUNTING, AND SUPPORT OF ELECTRICAL EQUIPMENT:

1. TO ALLOW MAXIMUM POSSIBLE HEADROOM UNLESS SPECIFIC MOUNTING HEIGHTS THAT REDUCE HEADROOM ARE INDICATED.
2. TO PROVIDE FOR EASE OF DISCONNECTING THE EQUIPMENT WITH MINIMUM INTERFERENCE TO OTHER INSTALLATIONS.
3. TO ALLOW RIGHT OF WAY FOR PIPING AND CONDUIT INSTALLED AT REQUIRED SLOPE.
4. SO CONNECTING RACEWAYS, CABLES, WIREWAYS, CABLE TRAYS, AND BUSWAYS WILL BE CLEAR OF OBSTRUCTIONS AND OF THE WORKING AND ACCESS SPACE OF OTHER EQUIPMENT.

B. COORDINATE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SET SLEEVES IN CAST-IN-PLACE CONCRETE, MASONRY WALLS, AND OTHER STRUCTURAL COMPONENTS AS THEY ARE CONSTRUCTED.

C. COORDINATE LOCATION OF ACCESS PANELS AND DOORS FOR ELECTRICAL ITEMS THAT ARE BEHIND FINISHED SURFACES OR OTHERWISE CONCEALED. ACCESS DOORS AND PANELS ARE SPECIFIED IN DIVISION 8 SECTION "ACCESS DOORS AND FRAMES."

D. COORDINATE ELECTRICAL TESTING OF ELECTRICAL, MECHANICAL, AND ARCHITECTURAL ITEMS, SO EQUIPMENT AND SYSTEMS THAT ARE FUNCTIONALLY INTERDEPENDENT ARE TESTED TO DEMONSTRATE SUCCESSFUL INTEROPERABILITY.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. IN OTHER PART 2 ARTICLES WHERE TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:

1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, MANUFACTURERS SPECIFIED.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS.

B. COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRESTOPPING .

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. COMPLY WITH NECA 1.

B. MEASURE INDICATED MOUNTING HEIGHTS TO BOTTOM OF UNIT FOR SUSPENDED ITEMS AND TO CENTER OF UNIT FOR WALL-MOUNTING ITEMS.

C. HEADROOM MAINTENANCE: IF MOUNTING HEIGHTS OR OTHER LOCATION CRITERIA ARE NOT INDICATED, ARRANGE AND INSTALL COMPONENTS AND EQUIPMENT TO PROVIDE MAXIMUM POSSIBLE HEADROOM CONSISTENT WITH THESE REQUIREMENTS.

D. EQUIPMENT: INSTALL TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT OF COMPONENTS OF BOTH ELECTRICAL EQUIPMENT AND OTHER NEARBY INSTALLATIONS. CONNECT IN SUCH A WAY AS TO FACILITATE FUTURE DISCONNECTING WITH MINIMUM INTERFERENCE WITH OTHER ITEMS IN THE VICINITY.

E. RIGHT OF WAY: GIVE TO RACEWAYS AND PIPING SYSTEMS INSTALLED AT A REQUIRED SLOPE.

3.2 FIRESTOPPING

A. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.

3.3 FIELD QUALITY CONTROL

A. INSPECT INSTALLED SLEEVE AND SLEEVE-SEAL INSTALLATIONS AND ASSOCIATED FIRESTOPPING FOR DAMAGE AND FAULTY WORK.

END OF SECTION 26 05 00

CONDUCTORS AND CABLES SECTION 26 05 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. BUILDING WIRES AND CABLES RATED 600 V AND LESS.
2. CONNECTORS, SPLICES, AND TERMINATIONS RATED 600 V AND LESS.
3. SLEEVES AND SLEEVE SEALS FOR CABLES.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

1.4 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

B. COMPLY WITH NFPA 70.

1.5 COORDINATION

A. SET SLEEVES IN CAST-IN-PLACE CONCRETE, MASONRY WALLS, AND OTHER STRUCTURAL COMPONENTS AS THEY ARE CONSTRUCTED.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. ALCAN PRODUCTS CORPORATION; ALCAN CABLE DIVISION.
2. AMERICAN INSULATED WIRE CORP.; A LEVITON COMPANY.
3. GENERAL CABLE CORPORATION.
4. SENATOR WIRE & CABLE COMPANY.
5. SOUTHWIRE COMPANY.

B. ALUMINUM AND COPPER CONDUCTORS: COMPLY WITH NEMA WC 70. (ALUMINUM APPROVED FOR SERVICE ENTRANCE ONLY).

C. CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR TYPES THHN-THWN, XHHW AND SO.

2.2 CONNECTORS AND SPLICES

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. AFC CABLE SYSTEMS, INC.
2. HUBBELL POWER SYSTEMS, INC.
3. O-Z/GEDNEY; EGS ELECTRICAL GROUP LLC.
4. 3M; ELECTRICAL PRODUCTS DIVISION.
5. TYCO ELECTRONICS CORP.

B. DESCRIPTION: FACTORY-FABRICATED CONNECTORS AND SPLICES OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS FOR APPLICATION AND SERVICE INDICATED.

2.3 SLEEVES FOR CABLES

A. STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS.

B. COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRESTOPPING.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. FEEDERS: COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.

B. BRANCH CIRCUITS: COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.

C. SERVICE ENTRANCE: ALUMINUM. SEE ELECTRICAL RISER DIAGRAM FOR SIZING.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE
APPLICATIONS AND WIRING METHODS

A. SERVICE ENTRANCE: TYPE XHHW, SINGLE CONDUCTORS IN RACEWAY.

B. EXPOSED FEEDERS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

C. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

D. FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

E. EXPOSED BRANCH CIRCUITS, INCLUDING IN CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

F. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

G. BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

H. CORD DROPS AND PORTABLE APPLIANCE CONNECTIONS: TYPE SO, HARD SERVICE CORD WITH STAINLESS-STEEL, WIRE-MESH, STRAIN RELIEF DEVICE AT TERMINATIONS TO SUIT APPLICATION.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. CONCEAL CABLES IN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.

B. USE MANUFACTURER-APPROVED PULLING COMPOUND OR LUBRICANT WHERE NECESSARY; COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.

C. USE PULLING MEANS, INCLUDING FISH TAPE, CABLE, ROPE, AND BASKET-WEAVE WIRE/CABLE GRIPS, THAT WILL NOT DAMAGE CABLES OR RACEWAY.

D. INSTALL EXPOSED CABLES PARALLEL AND PERPENDICULAR TO SURFACES OF EXPOSED STRUCTURAL MEMBERS, AND FOLLOW SURFACE CONTOURS WHERE POSSIBLE.

E. IDENTIFY AND COLOR-CODE CONDUCTORS ACCORDING TO LOCAL CUSTOM.

3.4 CONNECTIONS

A. TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.

B. MAKE SPLICES AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN UNSPLICED CONDUCTORS.

1. USE OXIDE INHIBITOR IN EACH SPLICE, TERMINATION, AND TAP FOR ALUMINUM CONDUCTORS.

C. WIRING AT OUTLETS: INSTALL CONDUCTORS AT EACH OUTLET, WITH AT LEAST 6 INCHES OF SLACK.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRESTOPPING.

B. FIRE-RATED-ASSEMBLY PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT CABLE PENETRATIONS.

3.6 FIRESTOPPING

A. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.

END OF SECTION 26 05 19

GROUNDING AND BONDING SECTION 26 05 26

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES METHODS AND MATERIALS FOR GROUNDING SYSTEMS AND EQUIPMENT.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. OTHER INFORMATIONAL SUBMITTALS: PLANS SHOWING DIMENSIONED AS-BUILT LOCATIONS OF GROUNDING FEATURES SPECIFIED IN PART 3 "FIELD QUALITY CONTROL" ARTICLE, INCLUDING THE FOLLOWING:

1. TEST WELLS.
2. GROUND RODS.
3. GROUND RINGS.
4. GROUNDING ARRANGEMENTS AND CONNECTIONS FOR SEPARATELY DERIVED SYSTEMS.

1.4 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

B. COMPLY WITH UL 467 FOR GROUNDING AND BONDING MATERIALS AND EQUIPMENT.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. INSULATED CONDUCTORS: COPPER WIRE OR CABLE INSULATED FOR 600 V UNLESS OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.

B. BARE COPPER CONDUCTORS:

1. SOLID CONDUCTORS: ASTM B 3.
2. STRANDED CONDUCTORS: ASTM B 8.

2.2 CONNECTORS

A. LISTED AND LABELED BY A NATIONALLY RECOGNIZED TESTING LABORATORY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR APPLICATIONS IN WHICH USED, AND FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS CONNECTED.

B. BOLTED CONNECTORS FOR CONDUCTORS AND PIPES: COPPER OR COPPER ALLOY, BOLTED PRESSURE-TYPE, WITH AT LEAST TWO BOLTS.

1. PIPE CONNECTORS: CLAMP TYPE, SIZED FOR PIPE.

C. WELDED CONNECTORS: EXOTHERMIC-WELDING KITS OF TYPES RECOMMENDED BY KIT MANUFACTURER FOR MATERIALS BEING JOINED AND INSTALLATION CONDITIONS.

2.3 GROUNDING ELECTRODES

A. GROUND RODS: COPPER-CLAD 10'-0" IN LENGTH BY 3/4" IN DIAMETER.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. CONDUCTORS: INSTALL SOLID CONDUCTOR FOR NO. 10 AND SMALLER, AND STRANDED CONDUCTORS FOR NO. 8 AWG AND LARGER, UNLESS OTHERWISE INDICATED.

B. UNDERGROUND GROUNDING CONDUCTORS: INSTALL BARE COPPER CONDUCTOR, NO. 3/0 AWG MINIMUM.

1. BURY AT LEAST 24 INCHES BELOW GRADE.

C. GROUNDING BUS: INSTALL IN ELECTRICAL AND TELEPHONE EQUIPMENT ROOMS, IN ROOMS HOUSING SERVICE EQUIPMENT, AND ELSEWHERE AS INDICATED.

1. INSTALL BUS ON INSULATED SPACERS 1 INCH, MINIMUM, FROM WALL 6 INCHES ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED.

D. CONDUCTOR TERMINATIONS AND CONNECTIONS:

1. PIPE AND EQUIPMENT GROUNDING CONDUCTOR TERMINATIONS: BOLTED CONNECTORS.
2. UNDERGROUND CONNECTIONS: WELDED CONNECTORS, EXCEPT AT TEST WELLS AND AS OTHERWISE INDICATED.
3. CONNECTIONS TO GROUND RODS AT TEST WELLS: BOLTED CONNECTORS.
4. CONNECTIONS TO STRUCTURAL STEEL: WELDED CONNECTORS.

3.2 GROUNDING AT THE SERVICE

A. EQUIPMENT GROUNDING CONDUCTORS AND GROUNDING ELECTRODE CONDUCTORS SHALL BE CONNECTED TO THE GROUND BUS. INSTALL A MAIN BONDING JUMPER BETWEEN THE NEUTRAL AND GROUND BUS.

3.3 EQUIPMENT GROUNDING

A. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH ALL FEEDERS AND BRANCH CIRCUITS.

B. INSTALL EQUIPMENT GROUNDING CONDUCTORS WITH THE FOLLOWING ITEMS, IN ADDITION TO THOSE REQUIRED BY NFPA 70:

1. LIGHTING AND RECEPTACLE CIRCUITS.
2. ALL MOTOR AND APPLIANCE BRANCH CIRCUITS.
3. ARMORED AND METAL-CLAD CABLE RUNS.

C. AIR-DUCT EQUIPMENT CIRCUITS: INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTOR TO DUCT-MOUNTED ELECTRICAL DEVICES OPERATING AT 120V AND MORE, INCLUDING HEATERS, DAMPERS, HUMIDIFIERS, AND OTHER DUCT ELECTRICAL EQUIPMENT. BOND CONDUCTOR TO EACH UNIT AND TO AIR DUCT AND CONNECT METALLIC PIPING.

D. WATER HEATER AND HEAT-TRACING: INSTALL A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR TO EACH ELECTRIC WATER HEATER AND HEAT-TRACING CABLE. BOND CONDUCTOR TO HEATER UNITS, PIPING, CONNECTED EQUIPMENT, AND COMPONENTS.

E. POLES SUPPORTING OUTDOOR LIGHTING FIXTURES: INSTALL GROUNDING ELECTRODE AND A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ADDITION TO GROUNDING CONDUCTOR INSTALLED WITH BRANCH-CIRCUIT CONDUCTORS.

F. SIGNAL AND COMMUNICATION EQUIPMENT: FOR TELEPHONE, ALARM, VOICE AND DATA, AND OTHER COMMUNICATION EQUIPMENT, PROVIDE NO. 6 AWG MINIMUM INSULATED GROUNDING CONDUCTOR IN RACEWAY FROM GROUNDING ELECTRODE SYSTEM TO EACH SERVICE LOCATION, TERMINAL CABINET, WIRING CLOSET, AND CENTRAL EQUIPMENT LOCATION.

1. SERVICE AND CENTRAL EQUIPMENT LOCATIONS AND WIRING CLOSETS: TERMINATE GROUNDING CONDUCTOR ON A 1/4-BY-2-BY-12-INCH GROUNDING BUS.

3.4 INSTALLATION

A. GROUNDING CONDUCTORS: ROUTE ALONG SHORTEST AND STRAIGHTEST PATHS POSSIBLE, UNLESS OTHERWISE INDICATED OR REQUIRED BY CODE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.

B. GROUND RODS: DRIVE RODS UNTIL TOPS ARE 2 INCHES BELOW FINISHED FLOOR OR FINAL GRADE, UNLESS OTHERWISE INDICATED.

1. INTERCONNECT GROUND RODS WITH GROUNDING ELECTRODE CONDUCTOR BELOW GRADE AND AS OTHERWISE INDICATED. MAKE CONNECTIONS WITHOUT EXPOSING STEEL OR DAMAGING COATING, IF ANY.

C. TEST WELLS: GROUND ROD DRIVEN THROUGH DRILLED HOLE IN BOTTOM OF HANDHOLE. HANDHOLES ARE SPECIFIED IN DIVISION 2 SECTION "UNDERGROUND DUCTS AND UTILITY STRUCTURES," AND SHALL BE AT LEAST 12 INCHES DEEP, WITH COVER.

1. TEST WELLS: INSTALL AT LEAST ONE TEST WELL FOR EACH SERVICE, UNLESS OTHERWISE INDICATED. INSTALL AT THE GROUND ROD ELECTRICALLY CLOSEST TO SERVICE ENTRANCE. SET TOP OF TEST WELL FLUSH WITH FINISHED GRADE OR FLOOR.

D. BONDING STRAPS AND JUMPERS: INSTALL IN LOCATIONS ACCESSIBLE FOR INSPECTION AND MAINTENANCE, EXCEPT WHERE ROUTED THROUGH SHORT LENGTHS OF CONDUIT.

1. BONDING TO STRUCTURE: BOND STRAPS DIRECTLY TO BASIC STRUCTURE, TAKING CARE NOT TO PENETRATE ANY ADJACENT PARTS.

2. BONDING TO EQUIPMENT MOUNTED ON VIBRATION ISOLATION HANGERS AND SUPPORTS: INSTALL SO VIBRATION IS NOT TRANSMITTED TO RIGIDLY MOUNTED EQUIPMENT.

3. USE EXOTHERMIC-WELDED CONNECTORS FOR OUTDOOR LOCATIONS, BUT IF A DISCONNECT-TYPE CONNECTION IS REQUIRED, USE A BOLTED CLAMP.

E. GROUNDING AND BONDING FOR PIPING:

1. METAL WATER SERVICE PIPE: INSTALL INSULATED COPPER GROUNDING CONDUCTORS, IN CONDUIT, FROM BUILDING'S MAIN SERVICE EQUIPMENT, OR GROUNDING BUS, TO MAIN METAL WATER SERVICE ENTRANCES TO BUILDING. CONNECT GROUNDING CONDUCTORS TO MAIN METAL WATER SERVICE PIPES, USING A BOLTED CLAMP CONNECTOR OR BY BOLTING A LUG-TYPE CONNECTOR TO A PIPE FLANGE, USING ONE OF THE LUG BOLTS OF THE FLANGE. WHERE A DIELECTRIC MAIN WATER FITTING IS INSTALLED, CONNECT GROUNDING CONDUCTOR ON STREET SIDE OF FITTING. BOND METAL GROUNDING CONDUCTOR CONDUIT OR SLEEVE TO CONDUCTOR AT EACH END.

F. CONCRETE-ENCASED GROUNDING ELECTRODE (UFER GROUND): FABRICATE ACCORDING TO NFPA 70, USING A MINIMUM OF 20 FEET OF BARE COPPER CONDUCTOR NOT SMALLER THAN NO. 4 AWG.

1. BOND GROUNDING CONDUCTOR TO REINFORCING STEEL IN AT LEAST FOUR LOCATIONS. EXTEND GROUNDING CONDUCTOR BELOW GRADE AND CONNECT TO BUILDING GROUNDING GRID OR TO GROUNDING ELECTRODE EXTERNAL TO CONCRETE.

3.5 FIELD QUALITY CONTROL

A. PERFORM THE FOLLOWING TESTS AND INSPECTIONS AND PREPARE TEST REPORTS:

1. AFTER INSTALLING GROUNDING SYSTEM BUT BEFORE PERMANENT ELECTRICAL CIRCUITS HAVE BEEN ENERGIZED, TEST FOR COMPLIANCE WITH REQUIREMENTS.

2. TEST COMPLETED GROUNDING SYSTEM AT SERVICE DISCONNECT ENCLOSURE GROUNDING TERMINAL.

a. MEASURE GROUND RESISTANCE NOT LESS THAN TWO FULL DAYS AFTER LAST TRACE OF PRECIPITATION AND WITHOUT SOIL BEING MOISTENED BY ANY MEANS OTHER THAN NATURAL DRAINAGE OR SEEPAGE AND WITHOUT CHEMICAL TREATMENT OR OTHER ARTIFICIAL MEANS OF REDUCING NATURAL GROUND RESISTANCE.

b. PERFORM TESTS BY FALL-OF-POTENTIAL METHOD ACCORDING TO IEEE 81.

3. PREPARE DIMENSIONED DRAWINGS LOCATING EACH TEST WELL, GROUND ROD AND GROUND ROD ASSEMBLY, AND OTHER GROUNDING ELECTRODES. IDENTIFY EACH BY LETTER IN ALPHABETICAL ORDER, AND KEY TO THE RECORD OF TESTS AND OBSERVATIONS. INCLUDE THE NUMBER OF RODS DRIVEN AND THEIR DEPTH AT EACH LOCATION, AND INCLUDE OBSERVATIONS OF WEATHER AND OTHER PHENOMENA THAT MAY AFFECT TEST RESULTS. DESCRIBE MEASURES TAKEN TO IMPROVE TEST RESULTS.

B. REPORT MEASURED GROUND RESISTANCES THAT EXCEED THE FOLLOWING VALUES:

1. 10 OHMS.

C. EXCESSIVE GROUND RESISTANCE: IF RESISTANCE TO GROUND EXCEEDS SPECIFIED VALUES, NOTIFY ARCHITECT PROMPTLY AND INCLUDE RECOMMENDATIONS TO REDUCE GROUND RESISTANCE.

END OF SECTION 26 05 26

RACEWAY AND BOXES SECTION 26 05 33

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES RACEWAYS, FITTINGS, BOXES, ENCLOSURES, AND CABINETS FOR ELECTRICAL WIRING.

1.3 DEFINITIONS

A. EMT: ELECTRICAL METALLIC TUBING.
B. FMC: FLEXIBLE METAL CONDUIT.
C. IMC: INTERMEDIATE METAL CONDUIT.
D. LFMC: LIQUIDTIGHT FLEXIBLE METAL CONDUIT.
E. RNC: RIGID NONMETALLIC CONDUIT.

1.4 SUBMITTALS

A. PRODUCT DATA: FOR SURFACE RACEWAYS, WIREWAYS AND FITTINGS, FLOOR BOXES, HINGED-COVER ENCLOSURES, AND CABINETS.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. AFC CABLE SYSTEMS, INC.
2. ALFLEX INC.
3. ALLIED TUBE & CONDUIT; A TYCO INTERNATIONAL LTD. CO.
4. ANAMET ELECTRICAL, INC.; ANACONDA METAL HOSE.
5. ELECTRI-FLEX CO.
6. MANHATTAN/CDT/COLE-FLEX.
7. MAVERICK TUBE CORPORATION.
8. O-Z GEDNEY; A UNIT OF GENERAL SIGNAL.
9. WHEATLAND TUBE COMPANY.

B. RIGID STEEL CONDUIT: ANSI C80.1.

C. ALUMINUM RIGID CONDUIT: ANSI C80.5. AND UL6

D. IMC: ANSI C80.6. AND UL 1242

E. EMT: ANSI C80.3. AND UL 797

F. FMC: ZINC-COATED STEEL.

G. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.

H. FITTINGS FOR CONDUIT (INCLUDING ALL TYPES AND FLEXIBLE AND LIQUIDTIGHT), EMT, AND CABLE: NEMA FB 1; LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.

1. FITTINGS FOR EMT: STEEL SET-SCREW OR COMPRESSION TYPE.

I. JOINT COMPOUND FOR RIGID STEEL CONDUIT OR IMC: LISTED FOR USE IN CABLE CONNECTOR ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED RACEWAY JOINTS FROM CORROSION AND ENHANCE THEIR CONDUCTIVITY.

2.2 NONMETALLIC CONDUIT AND TUBING

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. AFC CABLE SYSTEMS, INC.
2. ANAMET ELECTRICAL, INC.; ANACONDA METAL HOSE.
3. ARNCO CORPORATION.
4. CANTEX INC.
5. CERTAINTEED CORP.; PIPE & PLASTICS GROUP.
6. CONDUX INTERNATIONAL, INC.
7. ELECSYS, INC.
8. ELECTRI-FLEX CO.
9. LAMSON & SESSIONS; CARLON ELECTRICAL PRODUCTS.
10. MANHATTAN/CDT/COLE-FLEX.
11. RACO; A HUBBELL COMPANY.
12. THOMAS & BETTS CORPORATION.

B. RNC: NEMA TC 2, TYPE EPC-40-PVC, UNLESS OTHERWISE INDICATED.

C. FITTINGS FOR RNC: NEMA TC 3; MATCH TO CONDUIT OR TUBING TYPE AND MATERIAL.

2.4
METAL WIREWAYS

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

B. FOLLOWING:

1. COOPER B-LINE, INC.
2. HOFFMAN.
3. SQUARE D; SCHNEIDER ELECTRIC.

C. DESCRIPTION: SHEET METAL SIZED AND SHAPED AS INDICATED, NEMA 250, TYPE 1, UNLESS OTHERWISE INDICATED.

D. FITTINGS AND ACCESSORIES: INCLUDE COUPLINGS, OFFSETS, ELBOWS, EXPANSION JOINTS, ADAPTERS, HOLD-DOWN STRAPS, END CAPS, AND OTHER FITTINGS TO MATCH AND MATE WITH WIREWAYS AS REQUIRED FOR COMPLETE SYSTEM.

E. WIREWAY COVERS: SCREW-COVER TYPE.

F. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

1. COOPER CROUSE-HINDS; DIV. OF COOPER INDUSTRIES, INC.
2. EGS/APPLETON ELECTRIC.
3. ERICKSON ELECTRICAL EQUIPMENT COMPANY.
4. HOFFMAN.
5. HUBBELL INCORPORATED; KILLARK ELECTRIC MANUFACTURING CO. DIVISION.
6. O-Z/GEDNEY; A UNIT OF GENERAL SIGNAL.
7. RACO; A HUBBELL COMPANY.
8. ROBROY INDUSTRIES, INC.; ENCLOSURE DIVISION.
9. SCOTT FETZER CO.; ADALET DIVISION.
10. SPRING CITY ELECTRICAL MANUFACTURING COMPANY.
11. THOMAS & BETTS CORPORATION.
12. WALKER SYSTEMS, INC.; WIREMOLD COMPANY (THE).
13. WOODHEAD, DANIEL COMPANY; WOODHEAD INDUSTRIES, INC. SUBSIDIARY.

B. SHEET METAL OUTLET AND DEVICE BOXES: NEMA OS 1.

C. CAST-METAL OUTLET AND DEVICE BOXES: NEMA FB 1, FERROUS ALLOY, TYPE FD, WITH GASKETED COVER.

D. FLOOR BOXES: AS SPECIFIED ON DRAWINGS.

E. SMALL SHEET METAL PULL AND JUNCTION BOXES: NEMA OS 1.

F. HINGED-COVER ENCLOSURES: NEMA 250, TYPE 1, WITH CONTINUOUS-HINGE COVER WITH FLUSH LATCH, UNLESS OTHERWISE INDICATED.

1. METAL ENCLOSURES: STEEL, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.

G. CABINETS:

1. NEMA 250, TYPE 1, GALVANIZED-STEEL BOX WITH REMOVABLE INTERIOR PANEL AND REMOVABLE FRONT, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
2. HINGED DOOR IN FRONT COVER WITH FLUSH LATCH AND CONCEALED HINGE.
3. KEY LATCH TO MATCH PANELBOARDS.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED:

1. EXPOSED CONDUIT: RIGID STEEL CONDUIT.
2. CONCEALED CONDUIT, ABOVEGROUND: EMT.
3. UNDERGROUND CONDUIT: RNC, TYPE EPC-40-PVC, DIRECT BURIED.
4. BOXES AND ENCLOSURES, ABOVEGROUND: NEMA 250, TYPE 3R.

B. COMPLY WITH THE FOLLOWING INDOOR APPLICATIONS, UNLESS OTHERWISE INDICATED:

1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
2. EXPOSED AND SUBJECT TO PHYSICAL DAMAGE: RIGID STEEL CONDUIT.
3. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT
4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
5. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 3R] IN OUTDOOR LOCATIONS.

C. MINIMUM RACEWAY SIZE: 1/2-INCH TRADE SIZE.

D. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.

1. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED.
2. PVC EXTERNALLY COATED, RIGID STEEL CONDUITS: USE ONLY FITTINGS LISTED FOR USE WITH THAT MATERIAL. PATCH AND SEAL ALL JOINTS, NICKS, AND SCRAPES IN PVC COATING AFTER INSTALLING CONDUITS AND FITTINGS. USE SEALANT RECOMMENDED BY FITTING MANUFACTURER.

E. DO NOT INSTALL ALUMINUM CONDUITS IN CONTACT WITH CONCRETE.

3.2 INSTALLATION

A. COMPLY WITH NECA 1 FOR INSTALLATION REQUIREMENTS APPLICABLE TO PRODUCTS SPECIFIED IN PART 2 EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER.

B. KEEP RACEWAYS AT LEAST 6 INCHES AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.

C. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUCTOR INSTALLATION.

D. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE THE FINISHED SLAB.

E. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED.

F. CONCEAL CONDUIT AND EMT WITHIN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.

G. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIVE, OR OUTDOOR CONDITIONS: APPLY LISTED COMPOUND TO THREADS OF RACEWAY AND FITTINGS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.

H. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS, INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG.

I. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES OF SLACK AT EACH END OF PULL WIRE.

J. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES OF SLACK AT EACH END OF PULL WIRE.

K. INSTALL RACEWAY SEALING FITTINGS AT SUITABLE, APPROVED, AND ACCESSIBLE LOCATIONS AND FILL THEM WITH LISTED SEALING COMPOUND. FOR CONCEALED RACEWAYS, INSTALL EACH FITTING IN A FLUSH STEEL BOX WITH A BLANK COVER PLATE HAVING A FINISH SIMILAR TO THAT OF ADJACENT PLATES OR SURFACES. INSTALL RACEWAY SEALING FITTINGS AT THE FOLLOWING POINTS:

1. WHERE CONDUITS PASS FROM WARM TO COLD LOCATIONS, SUCH AS BOUNDARIES OF REFRIGERATED SPACES.
2. WHERE OTHERWISE REQUIRED BY NFPA 70.

L. FLEXIBLE CONDUIT CONNECTIONS: USE MAXIMUM OF 72 INCHES OF FLEXIBLE CONDUIT FOR RECESSED AND SEMIRECESSED LIGHTING FIXTURES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS.

1. USE LFMC IN DAMP OR WET LOCATIONS SUBJECT TO SEVERE PHYSICAL DAMAGE.

M. RECESSED BOXES IN MASONRY WALLS: SAW-CUT OPENING FOR BOX IN CELL OF MASONRY BLOCK, AND INSTALL BOX FLUSH WITH SURFACE OF WALL.

N. SET FLOOR BOXES LEVEL AND FLUSH WITH FINISHED FLOOR SURFACE.

3.3 FIRESTOPPING

A. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.

3.4 PROTECTION

A. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS THAT ENSURE COATINGS, FINISHES, AND CABINETS ARE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.

1. REPAIR DAMAGE TO GALVANIZED FINISHES WITH ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER.
2. REPAIR DAMAGE TO PVC OR PAINT FINISHES WITH MATCHING TOUCH-UP COATING RECOMMENDED BY MANUFACTURER.

END OF SECTION 26 05 33

Scale:	
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

ELECTRICAL SPECIFICATIONS

ES8.1

DIVISION 26 - ELECTRICAL SPECIFICATIONS

ELECTRICAL IDENTIFICATION SECTION 26 05 53

PART 1 - GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES ELECTRICAL IDENTIFICATION MATERIALS AND DEVICES REQUIRED TO COMPLY WITH ANSI C2, NFPA 70, OSHA STANDARDS, AND AUTHORITIES HAVING JURISDICTION.

B. RELATED DOCUMENTS:

1. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR EACH ELECTRICAL IDENTIFICATION PRODUCT INDICATED.

1.3 QUALITY ASSURANCE

A. COMPLY WITH NFPA 70.

B. COMPLY WITH ANSI A13.1 AND NFPA 70 FOR COLOR-CODING.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

A. COMPLY WITH ANSI A13.1, TABLE 3, FOR MINIMUM SIZE OF LETTERS FOR LEGEND AND FOR MINIMUM LENGTH OF COLOR FIELD FOR EACH RACEWAY AND CABLE SIZE.

1. COLOR: BLACK LETTERS ON ORANGE FIELD.
2. LEGEND: INDICATES VOLTAGE AND SERVICE.

B. VINYL LABELS: PRE-PRINTED, FLEXIBLE, SELF-ADHESIVE VINYL WITH LEGEND OVER-LAMINATED WITH A CLEAR, WEATHER- AND CHEMICAL-RESISTANT COATING WITH MATCHING WRAPAROUND CLEAR ADHESIVE TAPE FOR SECURING BOTH ENDS OF LEG LABEL.

C. PRE-TENSIONED, WRAPAROUND PLASTIC SLEEVES: FLEXIBLE, PREPRINTED, COLOR-CODED, ACRYLIC BAND SIZED TO SUIT THE DIAMETER OF THE LINE IT IDENTIFIES AND ARRANGED TO STAY IN PLACE BY PRE-TENSIONED GRIPPING ACTION WHEN PLACED IN POSITION.

D. COLORED ADHESIVE TAPE: SELF-ADHESIVE VINYL TAPE NOT LESS THAN 3 MILS THICK BY 1 TO 2 INCHES WIDE (0.08 MM THICK BY 25 TO 51 MM WIDE).

E. TAPE MARKERS: VINYL OR VINYL-CLOTH, SELF-ADHESIVE, WRAPAROUND TYPE WITH PRE-PRINTED NUMBERS AND LETTERS.

F. PLASTICIZED CARD-STOCK TAGS: VINYL CLOTH WITH PRE-PRINTED AND FIELD-PRINTED LEGENDS. ORANGE BACKGROUND, UNLESS OTHERWISE INDICATED, WITH EYELET FOR FASTENER.

2.2 NAMEPLATES AND SIGNS

A. SAFETY SIGNS: COMPLY WITH 29 CFR, CHAPTER XVII, PART 1910.145.

B. ENGRAVED PLASTIC NAMEPLATES AND SIGNS: ENGRAVING STOCK, MELAMINE PLASTIC LAMINATE, MINIMUM 1/16 INCH (1.6 MM) THICK FOR SIGNS UP TO 20 SQ. IN. (129 SQ. CM) AND 1/8 INCH (3.2 MM) THICK FOR LARGER SIZES.

1. ENGRAVED LEGEND WITH BLACK LETTERS ON WHITE FACE.
2. PUNCHED OR DRILLED FOR MECHANICAL FASTENERS.

C. FASTENERS FOR NAMEPLATES AND SIGNS: SELF-TAPPING, STAINLESS-STEEL SCREWS OR NO. 10/32, STAINLESS-STEEL MACHINE SCREWS WITH NUTS AND FLAT AND LOCK WASHERS.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. CABLE TIES: FUNGUS-INERT, SELF-EXTINGUISHING, ONE-PIECE, SELF-LOCKING, TYPE 6/6 NYLON.

1. MINIMUM WIDTH: 3/16 INCH (5 MM).
2. TENSILE STRENGTH: 50 LB (22.3 KG) MINIMUM.
3. TEMPERATURE RANGE: MINUS 40 TO PLUS 185 DEG F (MINUS 40 TO PLUS 85 DEG C).
4. COLOR: ACCORDING TO COLOR-CODING.

B. PAINT: FORMULATED FOR THE TYPE OF SURFACE AND INTENDED USE.

1. PRIMER FOR GALVANIZED METAL: SINGLE-COMPONENT ACRYLIC VEHICLE FORMULATED FOR GALVANIZED SURFACES.
2. PRIMER FOR CONCRETE MASONRY UNITS: HEAVY-DUTY-RESIN BLOCK FILLER.
3. PRIMER FOR CONCRETE: CLEAR, ALKALI-RESISTANT, BINDER-TYPE SEALER.
4. ENAMEL: SILICONE-ALKYD OR ALKYD URETHANE AS RECOMMENDED BY PRIMER MANUFACTURER.

PART 3 - EXECUTION

3.1 INSTALLATION

A. IDENTIFICATION MATERIALS AND DEVICES: INSTALL AT LOCATIONS FOR MOST CONVENIENT VIEWING WITHOUT INTERFERENCE WITH OPERATION AND MAINTENANCE OF EQUIPMENT.

B. LETTERING, COLORS, AND GRAPHICS: COORDINATE NAMES, ABBREVIATIONS, COLORS, AND OTHER DESIGNATIONS WITH CORRESPONDING DESIGNATIONS IN THE CONTRACT DOCUMENTS OR WITH THOSE REQUIRED BY CODES AND STANDARDS. USE CONSISTENT DESIGNATIONS THROUGHOUT PROJECT.

C. SEQUENCE OF WORK: IF IDENTIFICATION IS APPLIED TO SURFACES THAT REQUIRE FINISH, INSTALL IDENTIFICATION AFTER COMPLETING FINISH WORK.

D. SELF-ADHESIVE IDENTIFICATION PRODUCTS: CLEAN SURFACES BEFORE APPLYING.

E. INSTALL PAINTED IDENTIFICATION ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND AS FOLLOWS:

1. CLEAN SURFACES OF DUST, LOOSE MATERIAL, AND OILY FILMS BEFORE PAINTING.
2. PRIME SURFACES USING TYPE OF PRIMER SPECIFIED FOR SURFACE.
3. APPLY ONE INTERMEDIATE AND ONE FINISH COAT OF ENAMEL.

F. COLOR BANDING RACEWAYS AND EXPOSED CABLES: BAND EXPOSED AND ACCESSIBLE RACEWAYS OF THE SYSTEMS LISTED BELOW:

1. BANDS: PRE-TENSIONED, WRAPAROUND PLASTIC SLEEVES; COLORED ADHESIVE TAPE; OR A COMBINATION OF BOTH. MAKE EACH COLOR BAND 2 INCHES (51 MM) WIDE, COMPLETELY ENCIRCLING CONDUIT, AND PLACE ADJACENT BANDS OF TWO-COLOR MARKINGS IN CONTACT, SIDE BY SIDE.
2. BAND LOCATIONS: AT CHANGES IN DIRECTION, AT PENETRATIONS OF WALLS AND FLOORS, AT 50-FOOT (15-M) MAXIMUM INTERVALS IN STRAIGHT RUNS, AND AT 25-FOOT (7.6-M) MAXIMUM INTERVALS IN CONGESTED AREAS.
3. APPLY THE FOLLOWING COLORS TO THE SYSTEMS LISTED BELOW:

    a. FIRE ALARM SYSTEM: RED.
    b. FIRE-SUPPRESSION SUPERVISORY AND CONTROL SYSTEM: RED AND YELLOW.
    c. COMBINED FIRE ALARM AND SECURITY SYSTEM: RED AND BLUE.
    d. SECURITY SYSTEM: BLUE AND YELLOW.
    e. MECHANICAL AND ELECTRICAL SUPERVISORY SYSTEM: GREEN AND BLUE.
    f. TELECOMMUNICATION SYSTEM: GREEN AND YELLOW.

G. CAUTION LABELS FOR INDOOR BOXES AND ENCLOSURES FOR POWER AND LIGHTING: INSTALL PRESSURE-SENSITIVE, SELF-ADHESIVE LABELS IDENTIFYING SYSTEM VOLTAGE WITH BLACK LETTERS ON ORANGE BACKGROUND. INSTALL ON EXTERIOR OF DOOR OR COVER.

H. COLOR-CODING OF SECONDARY PHASE CONDUCTORS: USE THE FOLLOWING COLORS FOR SERVICE, FEEDER AND BRANCH-CIRCUIT PHASE CONDUCTORS:

1. 208/120-V CONDUCTORS:

    a. PHASE A: BLACK
    b. PHASE B: RED
    c. PHASE C: BLUE

2. FACTORY APPLY COLOR THE ENTIRE LENGTH OF CONDUCTORS, EXCEPT THE FOLLOWING FIELD-APPLIED, COLOR-CODING METHODS MAY BE USED INSTEAD OF FACTORY-CODED WIRE FOR SIZES LARGER THAN NO. 10 AWG:

    a. COLORED, PRESSURE-SENSITIVE PLASTIC TAPE IN HALF-LAPPED TURNS FOR A DISTANCE OF 6 INCHES (150 MM) FROM TERMINAL POINTS AND IN BOXES WHERE SPLICES OR TAPS ARE MADE. APPLY LAST TWO TURNS OF TAPE WITH NO TENSION TO PREVENT POSSIBLE UNWINDING. USE 1-INCH (25-MM) WIDE TAPE IN COLORS SPECIFIED. ADJUST TAPE BANDS TO AVOID OBSCURING CABLE IDENTIFICATION MARKINGS.

I. APPLY IDENTIFICATION TO CONDUCTORS AS FOLLOWS:

1. MULTIPLE POWER OR LIGHTING CIRCUITS IN THE SAME ENCLOSURE: IDENTIFY EACH CONDUCTOR WITH SOURCE, VOLTAGE, CIRCUIT NUMBER, AND PHASE. USE COLOR-CODING TO IDENTIFY CIRCUITS' VOLTAGE AND PHASE.
2. MULTIPLE CONTROL AND COMMUNICATION CIRCUITS IN THE SAME ENCLOSURE: IDENTIFY EACH CONDUCTOR BY ITS SYSTEM AND CIRCUIT DESIGNATION. USE A CONSISTENT SYSTEM OF TAGS, COLOR-CODING, OR CABLE MARKING TAPE.

J. APPLY WARNING, CAUTION, AND INSTRUCTION SIGNS AS FOLLOWS:

1. WARNINGS, CAUTIONS, AND INSTRUCTIONS: INSTALL TO ENSURE SAFE OPERATION AND MAINTENANCE OF ELECTRICAL SYSTEMS AND OF ITEMS TO WHICH THEY CONNECT. INSTALL ENGRAVED PLASTIC-LAMINATED INSTRUCTION SIGNS WITH APPROVED LEGEND WHERE INSTRUCTIONS ARE NEEDED FOR SYSTEM OR EQUIPMENT OPERATION. INSTALL METAL-BACKED BUTYRATE SIGNS FOR OUTDOOR ITEMS.
2. EMERGENCY OPERATION: INSTALL ENGRAVED LAMINATED SIGNS WITH WHITE LEGEND ON RED BACKGROUND WITH MINIMUM 3/8-INCH- (9-MM-) HIGH LETTERING FOR EMERGENCY INSTRUCTIONS ON POWER TRANSFER AND OTHER EMERGENCY OPERATIONS.

K. EQUIPMENT IDENTIFICATION LABELS: ENGRAVED PLASTIC LAMINATE. INSTALL ON EACH UNIT OF EQUIPMENT, INCLUDING CENTRAL OR MASTER UNIT OF EACH SYSTEM. THIS INCLUDES POWER, LIGHTING, COMMUNICATION, SIGNAL, AND ALARM SYSTEMS, UNLESS UNITS ARE SPECIFIED WITH THEIR OWN SELF-EXPLANATORY IDENTIFICATION. UNLESS OTHERWISE INDICATED, PROVIDE A SINGLE LINE OF TEXT WITH 1/2-INCH- (13-MM-) HIGH LETTERING ON 1-1/2-INCH- (38-MM-) HIGH LABEL; WHERE TWO LINES OF TEXT ARE REQUIRED, USE LABELS 2 INCHES (50 MM) HIGH. USE WHITE LETTERING ON BLACK FIELD. APPLY LABELS FOR EACH UNIT OF THE FOLLOWING CATEGORIES OF EQUIPMENT USING MECHANICAL FASTENERS:

1. PANELBOARDS, ELECTRICAL CABINETS, AND ENCLOSURES.
2. EMERGENCY SYSTEM BOXES AND ENCLOSURES.
3. DISCONNECT SWITCHES.
4. ENCLOSED CIRCUIT BREAKERS.
5. MOTOR STARTERS.
6. CONTACTORS.
7. CONTROL DEVICES.
8. TRANSFORMERS.
9. CLOCK/PROGRAM MASTER EQUIPMENT.
10. FIRE ALARM MASTER STATION OR CONTROL PANEL.
11. SECURITY-MONITORING MASTER STATION OR CONTROL PANEL.

END OF SECTION 26 05 53

LIGHTING CONTROL DEVICES SECTION 26 09 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING LIGHTING CONTROL DEVICES:

1. TIME SWITCHES.
2. OUTDOOR PHOTOELECTRIC SWITCHES.
3. MULTI-POLE CONTACTORS.

B. RELATED SECTIONS INCLUDE THE FOLLOWING:

1. DIVISION 26 SECTION "WIRING DEVICES" FOR OCCUPANCY SENSORS AND MANUAL LIGHT SWITCHES.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. FIELD QUALITY-CONTROL TEST REPORTS.

C. OPERATION AND MAINTENANCE DATA: FOR EACH TYPE OF PRODUCT TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS.

1.4 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

1.5 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF CEILING-MOUNTED DEVICES WITH OTHER CONSTRUCTION THAT PENETRATES CEILINGS OR IS SUPPORTED BY THEM, INCLUDING LIGHT FIXTURES, HVAC EQUIPMENT, FIRE-SUPPRESSION SYSTEM, AND PARTITION ASSEMBLIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. MANUFACTURER/MODEL # SHALL BE AS SPECIFIED ON DRAWINGS OR EQUAL. REFER TO CONSTRUCTION DRAWINGS FOR EQUIPMENT CLARIFICATIONS.

PART 3 - EXECUTION

3.1 WIRING INSTALLATION

A. WIRING METHOD: COMPLY WITH DIVISION 26 SECTION "CONDUCTORS AND CABLES." MINIMUM CONDUIT SIZE SHALL BE 1/2 INCH (13 MM).

B. WIRING WITHIN ENCLOSURES: BUNDLE, LACE, AND TRAIN CONDUCTORS TO TERMINAL POINTS. SEPARATE POWER-LIMITED AND NON-POWER-LIMITED CONDUCTORS ACCORDING TO CONDUCTOR MANUFACTURER'S WRITTEN INSTRUCTIONS.

C. SIZE CONDUCTORS ACCORDING TO LIGHTING CONTROL DEVICE MANUFACTURER'S WRITTEN INSTRUCTIONS, UNLESS OTHERWISE INDICATED.

D. SPLICES, TAPS, AND TERMINATIONS: MAKE CONNECTIONS ONLY ON NUMBERED TERMINAL STRIPS IN JUNCTION, PULL, AND OUTLET BOXES; TERMINAL CABINETS; AND EQUIPMENT ENCLOSURES.

E. TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A.

3.2 IDENTIFICATION

A. IDENTIFY COMPONENTS AND POWER AND CONTROL WIRING ACCORDING TO DIVISION 26 SECTION "ELECTRICAL IDENTIFICATION."

B. LABEL TIME SWITCHES AND CONTACTORS WITH A UNIQUE DESIGNATION.

3.3 FIELD QUALITY CONTROL

A. PERFORM THE FOLLOWING FIELD TESTS AND INSPECTIONS AND PREPARE TEST REPORTS:

1. AFTER INSTALLING TIME SWITCHES AND SENSORS, AND AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, ADJUST AND TEST FOR COMPLIANCE WITH REQUIREMENTS.
2. OPERATIONAL TEST: VERIFY ACTUATION OF EACH SENSOR AND ADJUST TIME DELAYS.

B. REMOVE AND REPLACE LIGHTING CONTROL DEVICES WHERE TEST RESULTS INDICATE THAT THEY DO NOT COMPLY WITH SPECIFIED REQUIREMENTS.

C. ADDITIONAL TESTING AND INSPECTING, AT CONTRACTOR'S EXPENSE, WILL BE PERFORMED TO DETERMINE COMPLIANCE OF REPLACED OR ADDITIONAL WORK WITH SPECIFIED REQUIREMENTS.

END OF SECTION 26 09 23

PANELBOARDS SECTION 26 24 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. DISTRIBUTION PANELBOARDS.
2. LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS.
3. TRANSIENT VOLTAGE SUPPRESSION PANELBOARDS.

1.3 DEFINITIONS

A. EMI: ELECTROMAGNETIC INTERFERENCE.

B. GFCI: GROUND-FAULT CIRCUIT INTERRUPTER.

C. RFI: RADIO-FREQUENCY INTERFERENCE.

D. RMS: ROOT MEAN SQUARE.

E. SPDT: SINGLE POLE, DOUBLE THROW.

1.4 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PANELBOARD, OVERCURRENT PROTECTIVE DEVICE, TRANSIENT VOLTAGE SUPPRESSION DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.

B. SHOP DRAWINGS: FOR EACH PANELBOARD AND RELATED EQUIPMENT.

1. DIMENSIONED PLANS, ELEVATIONS, SECTIONS, AND DETAILS. SHOW TABULATIONS OF INSTALLED DEVICES, EQUIPMENT FEATURES, AND RATINGS. INCLUDE THE FOLLOWING:

    a. ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.
    b. BUS CONFIGURATION, CURRENT, AND VOLTAGE RATINGS.
    c. SHORT-CIRCUIT CURRENT RATING OF PANELBOARDS AND OVERCURRENT PROTECTIVE DEVICES.
    d. FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.

C. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS. SUBMIT FINAL VERSIONS AFTER LOAD BALANCING.

D. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 1 SECTION " OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:

1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.
2. TIME-CURRENT CURVES, INCLUDING SELECTABLE RANGES FOR EACH TYPE OF OVERCURRENT PROTECTIVE DEVICE.

1.5 QUALITY ASSURANCE

A. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.

B. PRODUCT OPTIONS: DRAWINGS INDICATE SIZE, PROFILES, AND DIMENSIONAL REQUIREMENTS OF PANELBOARDS AND ARE BASED ON THE SPECIFIC SYSTEM INDICATED. REFER TO DIVISION 1 SECTION "PRODUCT REQUIREMENTS."

C. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

D. COMPLY WITH NEMA PB 1.

E. COMPLY WITH NFPA 70.

1.6 PROJECT CONDITIONS

A. ENVIRONMENTAL LIMITATIONS: RATE EQUIPMENT FOR CONTINUOUS OPERATION UNDER THE FOLLOWING CONDITIONS, UNLESS OTHERWISE INDICATED:

1. AMBIENT TEMPERATURE: NOT EXCEEDING 104 DEG F.
2. ALTITUDE: NOT EXCEEDING 6600 FEET.

1.7 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, AND ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS.

1.8 EXTRA MATERIALS

A. FURNISH EXTRA MATERIALS DESCRIBED BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.

1. KEYS: SIX SPARES FOR EACH TYPE OF PANELBOARD CABINET LOCK.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. MANUFACTURER/MODEL # SHALL BE AS SPECIFIED ON THE DRAWINGS EQUAL TO SQUARE D, EATON, SIEMENS OR GE. REFER TO CONSTRUCTION DRAWINGS FOR EQUIPMENT CLARIFICATIONS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL PANELBOARDS AND ACCESSORIES ACCORDING TO NEMA PB 1.1.

B. MOUNT TOP OF TRIM 74 INCHES ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED.

C. MOUNT PLUMB AND RIGID WITHOUT DISTORTION OF BOX. MOUNT RECESSED PANELBOARDS WITH FRONTS UNIFORMLY FLUSH WITH WALL FINISH.

D. INSTALL OVERCURRENT PROTECTIVE DEVICES AND CONTROLLERS.

1. SET FIELD-ADJUSTABLE SWITCHES AND CIRCUIT-BREAKER TRIP RANGES.

E. INSTALL FILLER PLATES IN UNUSED SPACES.

F. ARRANGE CONDUCTORS IN GUTTERS INTO GROUPS AND BUNDLE AND WRAP WITH WIRE TIES AFTER COMPLETING LOAD BALANCING.

3.2 IDENTIFICATION

A. IDENTIFY FIELD-INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS.

B. CREATE A DIRECTORY TO INDICATE INSTALLED CIRCUIT LOADS AFTER BALANCING PANELBOARD LOADS. OBTAIN APPROVAL BEFORE INSTALLING. USE A COMPUTER OR TYPEWRITER TO CREATE DIRECTORY; HANDWRITTEN DIRECTORIES ARE NOT ACCEPTABLE.

C. PANELBOARD NAMEPLATES: LABEL EACH PANELBOARD WITH ENGRAVED METAL OR LAMINATED-PLASTIC NAMEPLATE MOUNTED WITH CORROSION-RESISTANT SCREWS.

3.3 CONNECTIONS

A. GROUND EQUIPMENT ACCORDING TO DIVISION 26 SECTION "GROUNDING AND BONDING."

B. CONNECT WIRING ACCORDING TO DIVISION 26 SECTION "CONDUCTORS AND CABLES."

3.4 FIELD QUALITY CONTROL

A. LOAD BALANCING: AFTER SUBSTANTIAL COMPLETION, BUT NOT MORE THAN 60 DAYS AFTER FINAL ACCEPTANCE, MEASURE LOAD BALANCING AND MAKE CIRCUIT CHANGES.

1. MEASURE AS DIRECTED DURING PERIOD OF NORMAL SYSTEM LOADING.
2. PERFORM LOAD-BALANCING CIRCUIT CHANGES OUTSIDE NORMAL OCCUPANCY/WORKING SCHEDULE OF THE FACILITY AND AT TIME DIRECTED. AVOID DISRUPTING CRITICAL 24-HOUR SERVICES SUCH AS FAX MACHINES AND ON-LINE DATA PROCESSING, COMPUTING, TRANSMITTING, AND RECEIVING EQUIPMENT.
3. AFTER CIRCUIT CHANGES, RECHECK LOADS DURING NORMAL LOAD PERIOD. RECORD ALL LOAD READINGS BEFORE AND AFTER CHANGES AND SUBMIT TEST RECORDS.
4. TOLERANCE: DIFFERENCE EXCEEDING 20 PERCENT BETWEEN PHASE LOADS, WITHIN A PANELBOARD, IS NOT ACCEPTABLE. REBALANCE AND RECHECK AS NECESSARY TO MEET THIS MINIMUM REQUIREMENT.

3.5 CLEANING

A. ON COMPLETION OF INSTALLATION, INSPECT INTERIOR AND EXTERIOR OF PANELBOARDS. REMOVE PAINT SPLATTERS AND OTHER SPOTS. VACUUM DIRT AND DEBRIS; DO NOT USE COMPRESSED AIR TO ASSIST IN CLEANING. REPAIR EXPOSED SURFACES TO MATCH ORIGINAL FINISH.

END OF SECTION 26 24 16

WIRING DEVICES SECTION 26 27 26

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. RECEPTACLES, RECEPTACLES WITH INTEGRAL GFCI, AND ASSOCIATED DEVICE PLATES.
2. TWIST-LOCKING RECEPTACLES.
3. WALL-BOX MOTION SENSORS.
4. SNAP SWITCHES AND WALL-BOX DIMMERS.
5. PENDANT CORD-CONNECTOR DEVICES.
6. CORD AND PLUG SETS.
7. FLOOR SERVICE OUTLETS, SERVICE POLES, AND MULTIOUTLET ASSEMBLIES.

1.3 DEFINITIONS

A. GFCI: GROUND-FAULT CIRCUIT INTERRUPTER.

B. PIGTAIL: SHORT LEAD USED TO CONNECT A DEVICE TO A BRANCH-CIRCUIT CONDUCTOR.

1.4 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. SHOP DRAWINGS: LIST OF LEGENDS AND DESCRIPTION OF MATERIALS AND PROCESS USED FOR PREMARKING WALL PLATES.

C. OPERATION AND MAINTENANCE DATA: FOR WIRING DEVICES TO INCLUDE IN ALL MANUFACTURERS' PACKING LABEL WARNINGS AND INSTRUCTION MANUALS THAT INCLUDE LABELING CONDITIONS.

1.5 QUALITY ASSURANCE

A. SOURCE LIMITATIONS: OBTAIN EACH TYPE OF WIRING DEVICE AND ASSOCIATED WALL PLATE THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER. INSOFAR AS THEY ARE AVAILABLE, OBTAIN ALL WIRING DEVICES AND ASSOCIATED WALL PLATES FROM A SINGLE MANUFACTURER AND ONE SOURCE.

B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

C. COMPLY WITH NFPA 70.

1.6 COORDINATION

A. RECEPTACLES FOR OWNER-FURNISHED EQUIPMENT: MATCH PLUG CONFIGURATIONS.

1. CORD AND PLUG SETS: MATCH EQUIPMENT REQUIREMENTS.

1.7 EXTRA MATERIALS

A. FURNISH EXTRA MATERIALS DESCRIBED IN SUBPARAGRAPHS BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.

1. SERVICE/POWER POLES: ONE FOR EVERY 10 , BUT NO FEWER THAN ONE .
2. FLOOR SERVICE OUTLET ASSEMBLIES: ONE FOR EVERY 5, BUT NO FEWER THAN ONE.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. MANUFACTURERS' NAMES: SHORTENED VERSIONS (SHOWN IN PARENTHESES) OF THE FOLLOWING MANUFACTURERS' NAMES ARE USED IN OTHER PART 2 ARTICLES:

1. COOPER WIRING DEVICES; A DIVISION OF COOPER INDUSTRIES, INC. (COOPER).
2. HUBBELL INCORPORATED; WIRING DEVICE-KELLEMS (HUBBELL).
3. LEVITON MFG. COMPANY INC. (LEVITON).
4. PASS & SEYMOUR/LEGRAND; WIRING DEVICES & ACCESSORIES (PASS & SEYMOUR).

2.2 STRAIGHT BLADE RECEPTACLES

A. CONVENIENCE RECEPTACLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, AND UL 498.

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. COOPER; 5351 (SINGLE), 5352 (DUPLEX).
    b. HUBBELL; HBL5351 (SINGLE), CR5352 (DUPLEX).
    c. LEVITON; 5891 (SINGLE), 5352 (DUPLEX).
    d. PASS & SEYMOUR; 5381 (SINGLE), 5352 (DUPLEX).

2.3 GFCI RECEPTACLES

A. GENERAL DESCRIPTION: STRAIGHT BLADE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED.

B. DUPLEX GFCI CONVENIENCE RECEPTACLES, 125 V, 20 A:

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. COOPER; GF20.
    b. PASS & SEYMOUR; 2084.

2.4 TWIST-LOCKING RECEPTACLES

A. SINGLE CONVENIENCE RECEPTACLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION L5-20R, AND UL 498.

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. COOPER; L520R.
    b. HUBBELL; HBL2310.
    c. LEVITON; 2310.
    d. PASS & SEYMOUR; L520-R.

2.5 PENDANT CORD-CONNECTOR DEVICES

A. DESCRIPTION: MATCHING, LOCKING-TYPE PLUG AND RECEPTACLE BODY CONNECTOR; NEMA WD 6 CONFIGURATIONS L5-20P AND L5-20R, HEAVY-DUTY GRADE.

1. BODY: NYLON WITH SCREW-OPEN CABLE-GRIPPING JAWS AND PROVISION FOR ATTACHING EXTERNAL CABLE GRIP.
2. EXTERNAL CABLE GRIP: WOVEN WIRE-MESH TYPE MADE OF HIGH-STRENGTH GALVANIZED-STEEL WIRE STRAND, MATCHED TO CABLE DIAMETER, AND WITH ATTACHMENT PROVISION DESIGNED FOR CORRESPONDING CONNECTOR.

2.6 CORD AND PLUG SETS

A. DESCRIPTION: MATCH VOLTAGE AND CURRENT RATINGS AND NUMBER OF CONDUCTORS TO REQUIREMENTS OF EQUIPMENT BEING CONNECTED.

1. CORD: RUBBER-INSULATED, STRANDED-COPPER CONDUCTORS, WITH TYPE SOW-A JACKET; WITH GREEN-INSULATED GROUNDING CONDUCTOR AND EQUIPMENT-RATING AMPACITY PLUS A MINIMUM OF 30 PERCENT.
2. PLUG: NYLON BODY AND INTEGRAL CABLE-CLAMPING JAWS. MATCH CORD AND RECEPTACLE TYPE FOR CONNECTION.

2.7 SNAP SWITCHES

A. COMPLY WITH NEMA WD 1 AND UL 20.

B. SWITCHES, 120/277 V, 20 A:

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. COOPER; 2221 (SINGLE POLE), 2222 (TWO POLE), 2223 (THREE WAY), 2224 (FOUR WAY).
    b. HUBBELL; CS1221 (SINGLE POLE), CS1222 (TWO POLE), CS1223 (THREE WAY), CS1224 (FOUR WAY).
    c. LEVITON; 1221-2 (SINGLE POLE), 1222-2 (TWO POLE), 1223-2 (THREE WAY), 1224-2 (FOUR WAY).
    d. PASS & SEYMOUR; 20AC1 (SINGLE POLE), 20AC2 (TWO POLE), 20AC3 (THREE WAY), 20AC4 (FOUR WAY).

C. KEY-OPERATED SWITCHES, 120/277 V, 20 A:

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. COOPER; 2221L.
    b. HUBBELL; HBL1221L.
    c. LEVITON; 1221-2L.
    d. PASS & SEYMOUR; PS20AC1-L.

2. DESCRIPTION: SINGLE POLE, WITH FACTORY-SUPPLIED KEY IN LIEU OF SWITCH HANDLE.

2.8 OCCUPANCY SENSORS

A. CEILING MOUNT SENSORS: DUAL TECHNOLOGY, WITH BOTH PASSIVE-INFRARED- AND MICRO PHONE ACOUSTIC DETECTION, 120/277 V, ADJUSTABLE TIME DELAY UP TO 30 MINUTES, 360-DEGREE FIELD OF VIEW, AND A MINIMUM COVERAGE AREA OF 450 SQ. FT. SENSORS SHALL BE SELF-CONTAINED AND ACCEPT CLASS 1 WIRING DIRECTLY WITHOUT THE USE OF A POWER PACK.

1. AVAILABLE PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

    a. SENSOR SWITCH; CMR-PDT.

2.9 WALL PLATES

A. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES.

1. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
2. MATERIAL FOR FINISHED SPACES: 0.035-INCH-THICK, NYLON OR POLYCARBONATE.
3. MATERIAL FOR UNFINISHED SPACES: GALVANIZED STEEL.
4. WET-LOCATION, WEATHERPROOF WHILE IN USE COVER PLATES: NEMA 250, COMPLYING WITH TYPE 3R

2.10 FINISHES

A. COLOR: WIRING DEVICE CATALOG NUMBERS IN SECTION TEXT DO NOT DESIGNATE DEVICE COLOR. COLOR SHALL BE AS SELECTED AS SCHEDULED ON DRAWINGS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. COMPLY WITH NECA 1, INCLUDING THE MOUNTING HEIGHTS LISTED IN THAT STANDARD, UNLESS OTHERWISE NOTED.

B. COORDINATION WITH OTHER TRADES:

1. TAKE STEPS TO INSURE THAT DEVICES AND THEIR BOXES ARE PROTECTED. DO NOT PLACE WALL FINISH MATERIALS OVER DEVICE BOXES AND DO NOT CUT HOLES FOR BOXES WITH ROUTERS THAT ARE GUIDED BY RIDING AGAINST OUTSIDE OF THE BOXES.
2. KEEP OUTLET BOXES FREE OF PLASTER, DRYWALL JOINT COMPOUND, MORTAR, CEMENT, CONCRETE, DUST, PAINT, AND OTHER MATERIAL THAT MAY CONTAMINATE THE RACEWAY SYSTEM, CONDUCTORS, AND CABLES.
3. INSTALL DEVICE BOXES IN BRICK OR BLOCK WALLS SO THAT THE COVER PLATE DOES NOT CROSS A JOINT UNLESS THE JOINT IS TROWELED FLUSH WITH THE FACE OF THE WALL.
4. INSTALL WIRING DEVICES AFTER ALL WALL PREPARATION, INCLUDING PAINTING, IS COMPLETE.

C. CONDUCTORS:

1. DO NOT STRIP INSULATION FROM CONDUCTORS UNTIL JUST BEFORE THEY ARE SPLICED OR TERMINATED ON DEVICES.
2. STRIP INSULATION EVENLY AROUND THE CONDUCTOR USING TOOLS DESIGNED FOR THE PURPOSE. AVOID SCORING OR NICKING OF SOLID WIRE OR CUTTING STRANDS FROM STRANDED WIRE.
3. THE LENGTH OF FREE CONDUCTORS AT OUTLETS FOR DEVICES SHALL MEET PROVISIONS OF NFPA 70, ARTICLE 300, WITHOUT PIGTAILS.

D. DEVICE INSTALLATION:

1. REPLACE ALL DEVICES THAT HAVE BEEN IN TEMPORARY USE DURING CONSTRUCTION OR THAT SHOW SIGNS THAT THEY WERE INSTALLED BEFORE BUILDING FINISHING OPERATIONS WERE COMPLETE.
2. KEEP EACH WIRING DEVICE IN ITS PACKAGE OR OTHERWISE PROTECTED UNTIL IT IS TIME TO CONNECT CONDUCTORS.
3. DO NOT REMOVE SURFACE PROTECTION, SUCH AS PLASTIC FILM AND SMUDGE COVERS, UNTIL THE LAST POSSIBLE MOMENT.
4. CONNECT DEVICES TO BRANCH CIRCUITS USING PIGTAILS THAT ARE NOT LESS THAN 6 INCHES IN LENGTH.
5. WHEN THERE IS A CHOICE, USE SIDE WIRING WITH BINDING-HEAD SCREW TERMINALS. WRAP SOLID CONDUCTOR TIGHTLY CLOCKWISE, 2/3 TO 3/4 OF THE WAY AROUND TERMINAL SCREW.
6. USE A TORQUE SCREWDRIVER WHEN A TORQUE IS RECOMMENDED OR REQUIRED BY THE MANUFACTURER.
7. WHEN CONDUCTORS LARGER THAN NO. 12 AWG ARE INSTALLED ON 15- OR 20-A CIRCUITS, SPLICE NO. 12 AWG PIGTAILS FOR DEVICE CONNECTIONS.
8. TIGHTEN UNUSED TERMINAL SCREWS ON THE DEVICE.
9. WHEN MOUNTING INTO METAL BOXES, REMOVE THE FIBER OR PLASTIC WASHERS USED TO HOLD DEVICE MOUNTING SCREWS IN YOKES, ALLOWING METAL-TO-METAL CONTACT.

E. RECEPTACLE ORIENTATION:

1. INSTALL GROUND PIN OF VERTICALLY MOUNTED RECEPTACLES UP, AND ON HORIZONTALLY MOUNTED RECEPTACLES TO THE LEFT.

F. DEVICE PLATES: DO NOT USE OVERSIZED OR EXTRA-DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING.

G. ARRANGEMENT OF DEVICES: UNLESS OTHERWISE INDICATED, MOUNT FLUSH, WITH LONG DIMENSION VERTICAL AND WITH GROUNDING TERMINAL OF RECEPTACLES ON TOP. GROUP ADJACENT SWITCHES UNDER SINGLE, MULTIGANG WALL PLATES.

3.2 IDENTIFICATION

A. COMPLY WITH DIVISION 26 SECTION "ELECTRICAL IDENTIFICATION."

1. RECEPTACLES: IDENTIFY PANELBOARD AND CIRCUIT NUMBER FROM WHICH SERVED. USE DURABLE WIRE MARKERS OR TAGS INSIDE OUTLET BOXES.

3.3 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

1. TEST INSTRUMENT FOR CONVENIENCE RECEPTACLES: DIGITAL WIRING ANALYZER WITH DIGITAL READOUT OR ILLUMINATED LED INDICATORS OF MEASUREMENT.

B. TESTS FOR CONVENIENCE RECEPTACLES:

1. LINE VOLTAGE: ACCEPTABLE RANGE IS 105 TO 132 V.
2. PERCENT VOLTAGE DROP UNDER 15-A LOAD: A VALUE OF 6 PERCENT OR HIGHER IS NOT ACCEPTABLE.
3. GROUND IMPEDANCE: VALUES OF UP TO 2 OHMS ARE ACCEPTABLE.
4. GFCI TRIP: TEST FOR TRIPPING VALUES SPECIFIED IN UL 1436 AND UL 943.
5. USING THE TEST PLUG, VERIFY THAT THE DEVICE AND ITS OUTLET BOX ARE SECURELY MOUNTED.
6. THE TESTS SHALL BE DIAGNOSTIC, INDICATING DAMAGED CONDUCTORS, HIGH RESISTANCE AT THE CIRCUIT BREAKER, POOR CONNECTIONS, INADEQUATE FAULT CURRENT PATH, DEFECTIVE DEVICES, OR SIMILAR PROBLEMS. CORRECT CIRCUIT CONDITIONS, REMOVE MALFUNCTIONING UNITS AND REPLACE WITH NEW ONES, AND RETEST AS SPECIFIED ABOVE.

END OF SECTION 26 27 26

Scale:
Designed by: NYE
Drawn by: NYE
Checked by: NYE

Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

ELECTRICAL SPECIFICATIONS

ES8.2

DIVISION 26 - ELECTRICAL SPECIFICATIONS

ENCLOSED SWITCHES AND CIRCUIT BREAKERS SECTION 26 28 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY

- A. THIS SECTION INCLUDES THE FOLLOWING INDIVIDUALLY MOUNTED, ENCLOSED SWITCHES AND CIRCUIT BREAKERS:
  1. FUSIBLE SWITCHES.
  2. NONFUSIBLE SWITCHES.
  3. MOLDED-CASE CIRCUIT BREAKERS.
  4. MOLDED-CASE SWITCHES.
  5. ENCLOSURES.

1.3 DEFINITIONS

- A. GD: GENERAL DUTY.
- B. GFCI: GROUND-FAULT CIRCUIT INTERRUPTER.
- C. HD: HEAVY DUTY.
- D. RMS: ROOT MEAN SQUARE.
- E. SPDT: SINGLE POLE, DOUBLE THROW.

1.4 SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF ENCLOSED SWITCH, CIRCUIT BREAKER, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONED ELEVATIONS, SECTIONS, WEIGHTS, AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.
  1. ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.
  2. CURRENT AND VOLTAGE RATINGS.
  3. SHORT-CIRCUIT CURRENT RATING.
  4. FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.

1.5 QUALITY ASSURANCE

- A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
- B. COMPLY WITH NFPA 70.

1.6 PROJECT CONDITIONS

- A. ENVIRONMENTAL LIMITATIONS: RATE EQUIPMENT FOR CONTINUOUS OPERATION UNDER THE FOLLOWING CONDITIONS, UNLESS OTHERWISE INDICATED:
  1. AMBIENT TEMPERATURE: NOT LESS THAN MINUS 22 DEG F AND NOT EXCEEDING 104 DEG F.
  2. ALTITUDE: NOT EXCEEDING 6600 FEET.

1.7 COORDINATION

- A. COORDINATE LAYOUT AND INSTALLATION OF SWITCHES, CIRCUIT BREAKERS, AND COMPONENTS WITH OTHER CONSTRUCTION, INCLUDING CONDUIT, PIPING, EQUIPMENT, AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.

1.8 EXTRA MATERIALS

- B. FURNISH EXTRA MATERIALS DESCRIBED BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
  1. SPARES: FOR THE FOLLOWING:
     - a. FUSES FOR FUSIBLE SWITCHES: (3) FOR EACH AMPERAGE USED.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. IN OTHER PART 2 ARTICLES WHERE TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:
  1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK ARE LIMITED TO, MANUFACTURERS SPECIFIED.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. MANUFACTURERS:
  1. EATON CORPORATION; CUTLER-HAMMER PRODUCTS.
  2. SQUARE D/GROUP SCHNEIDER.
- B. FUSIBLE SWITCH, 1200 A AND SMALLER: NEMA KS 1, TYPE HD, WITH CLIPS OR BOLT PADS TO ACCOMMODATE SPECIFIED FUSES, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
- C. NONFUSIBLE SWITCH, A AND SMALLER: NEMA KS 1, TYPE HD, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
- D. ACCESSORIES:
  1. EQUIPMENT GROUND KIT: INTERNALLY MOUNTED AND LABELED FOR COPPER AND ALUMINUM GROUND CONDUCTORS.
  2. NEUTRAL KIT: INTERNALLY MOUNTED; INSULATED, CAPABLE OF BEING GROUNDED, AND BONDED; AND LABELED FOR COPPER AND ALUMINUM NEUTRAL CONDUCTORS.

2.3 ENCLOSURES

- A. NEMA AB 1 AND NEMA KS 1 TO MEET ENVIRONMENTAL CONDITIONS OF INSTALLED LOCATION.
  1. OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.
  2. KITCHEN AREAS: NEMA 250, TYPE 4X, STAINLESS STEEL.
  3. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE ELEMENTS AND SURFACES TO RECEIVE ENCLOSED SWITCHES FOR COMPLIANCE WITH INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE.
- B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

- A. COMPLY WITH APPLICABLE ORTIONS OF NECA 1, NEMA PB 1.1, AND NEMA PB 2.1 FOR INSTALLATION OF ENCLOSED SWITCHES AND CIRCUIT BREAKERS.
- B. MOUNT INDIVIDUAL WALL-MOUNTING SWITCHES AND CIRCUIT BREAKERS WITH TOPS AT UNIFORM HEIGHT, UNLESS OTHERWISE INDICATED.

3.3 INDENTIFICATION

- A. ENCLOSURE NAMEPLATES: LABEL EACH ENCLOSURE WITH ENGRAVED METAL OR LAMINATED-PLASTIC NAMEPLATE.

3.4 CLEANING

- A. UPON COMPLETION OF INSTALLION, VACUUM DIRT AND DEBRIS FROM INTERIORS; DO NOT USE COMPRESSED AIR TO ASSIST IN CLEANING.
- B. INSPECT EXPOSED SURFACES AND REPAIR DAMAGED FINISHES.

END OF SECTION 26 28 16

INTERIOR LIGHTING SECTION 26 51 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

- A. THIS SECTION INCLUDES THE FOLLOWING:
  1. INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS.
  2. EMERGENCY LIGHTING UNITS.
  3. EXIT SIGNS.
  4. LIGHTING FIXTURE SUPPORTS.

1.3 DEFINITIONS

- A. BF: BALLAST FACTOR.
- B. CRI: COLOR-RENDERING INDEX.
- C. CU: COEFFICIENT OF UTILIZATION.
- D. HID: HIGH-INTENSITY DISCHARGE.
- E. LER: LUMINAIRE EFFICACY RATING.
- F. LUMINAIRE: COMPLETE LIGHTING FIXTURE, INCLUDING BALLAST HOUSING IF PROVIDED.
- G. RCR: ROOM CAVITY RATIO.

1.4 SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF LIGHTING FIXTURE, ARRANGED IN ORDER OF FIXTURE DESIGNATION. INCLUDE DATA ON FEATURES, ACCESSORIES, FINISHES, AND THE FOLLOWING:
  1. PHYSICAL DESCRIPTION OF LIGHTING FIXTURE INCLUDING DIMENSIONS.
  2. EMERGENCY LIGHTING UNITS INCLUDING BATTERY AND CHARGER.
  3. BALLAST.
  4. ENERGY-EFFICIENCY DATA.
  5. LIFE, OUTPUT, AND ENERGY-EFFICIENCY DATA FOR LAMPS.
  6. PHOTOMETRIC DATA, IN IESNA FORMAT, BASED ON LABORATORY TESTS OF EACH LIGHTING FIXTURE TYPE, OUTFITTED WITH LAMPS, BALLASTS, AND ACCESSORIES IDENTICAL TO THOSE INDICATED FOR THE LIGHTING FIXTURE AS APPLIED IN THIS PROJECT.
     - a. PHOTOMETRIC DATA SHALL BE CERTIFIED BY A MANUFACTURER'S LABORATORY WITH A CURRENT ACCREDITATION UNDER THE NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) FOR ENERGY EFFICIENT LIGHTING PRODUCTS.
- B. SHOP DRAWINGS: SHOW DETAILS OF NONSTANDARD OR CUSTOM LIGHTING FIXTURES. INDICATE DIMENSIONS, WEIGHTS, METHODS OF FIELD ASSEMBLY, COMPONENTS, FEATURES, AND ACCESSORIES.
- C. QUALIFICATION DATA: FOR AGENCIES PROVIDING PHOTOMETRIC DATA FOR LIGHTING FIXTURES.
- D. FIELD QUALITY-CONTROL TEST REPORTS.
- E. OPERATION AND MAINTENANCE DATA: FOR LIGHTING EQUIPMENT AND FIXTURES TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS.
- F. WARRANTIES: SPECIAL WARRANTIES SPECIFIED IN THIS SECTION.

1.5 QUALITY ASSURANCE

- A. LUMINAIRE PHOTOMETRIC DATA TESTING LABORATORY QUALIFICATIONS: PROVIDED BY MANUFACTURERS' LABORATORIES THAT ARE ACCREDITED UNDER THE NATIONAL VOLUNTEER LABORATORY ACCREDITATION PROGRAM FOR ENERGY EFFICIENT LIGHTING PRODUCTS.
- B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
- C. COMPLY WITH NFPA 70.

1.6 COORDINATION

- A. COORDINATE LAYOUT AND INSTALLATION OF LIGHTING FIXTURES AND SUSPENSION SYSTEM WITH OTHER CONSTRUCTION THAT PENETRATES CEILINGS OR IS SUPPORTED BY THEM, INCLUDING HVAC EQUIPMENT, FIRE-SUPPRESSION SYSTEM, AND PARTITION ASSEMBLIES.

1.7 WARRANTY

- A. SPECIAL WARRANTY FOR EMERGENCY LIGHTING BATTERIES: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER OF BATTERY-POWERED EMERGENCY LIGHTING UNIT AGREES TO REPAIR OR REPLACE COMPONENTS OF RECHARGEABLE BATTERIES THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
  1. WARRANTY PERIOD FOR EMERGENCY LIGHTING UNIT BATTERIES: 10 YEARS FROM DATE OF SUBSTANTIAL COMPLETION. FULL WARRANTY SHALL APPLY FOR FIRST YEAR, AND PRORATED WARRANTY FOR THE REMAINING NINE YEARS.
  2. WARRANTY PERIOD FOR EMERGENCY SELF-POWERED EXIT SIGN BATTERIES: SEVEN YEARS FROM DATE OF SUBSTANTIAL COMPLETION. FULL WARRANTY SHALL APPLY FOR FIRST YEAR, AND PRORATED WARRANTY FOR THE REMAINING SIX YEARS.
- B. SPECIAL WARRANTY FOR BALLASTS: MANUFACTURER'S STANDARD FORM IN WHICH BALLAST MANUFACTURER AGREES TO REPAIR OR REPLACE BALLASTS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
  1. WARRANTY PERIOD FOR ELECTRONIC BALLASTS: FIVE YEARS FROM DATE OF SUBSTANTIAL COMPLETION.
  2. WARRANTY PERIOD FOR ELECTROMAGNETIC BALLASTS: THREE YEARS FROM DATE OF SUBSTANTIAL COMPLETION.
- C. SPECIAL WARRANTY FOR T5 AND T8 FLUORESCENT LAMPS: MANUFACTURER'S STANDARD FORM, MADE OUT TO OWNER AND SIGNED BY LAMP MANUFACTURER AGREEING TO REPLACE LAMPS THAT FAIL IN MATERIALS OR WORKMANSHIP, F.O.B. THE NEAREST SHIPPING POINT TO PROJECT SITE, WITHIN SPECIFIED WARRANTY PERIOD INDICATED BELOW.
  1. WARRANTY PERIOD: TWO YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

1.8 EXTRA MATERIALS

- A. FURNISH EXTRA MATERIALS DESCRIBED BELOW THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
  1. LAMPS: 10 FOR EVERY 100 OF EACH TYPE AND RATING INSTALLED. FURNISH AT LEAST ONE OF EACH TYPE.
  2. PLASTIC DIFFUSERS AND LENSES: 1 FOR EVERY 100 OF EACH TYPE AND RATING INSTALLED. FURNISH AT LEAST ONE OF EACH TYPE.
  3. BALLASTS: 1 FOR EVERY 100 OF EACH TYPE AND RATING INSTALLED. FURNISH AT LEAST ONE OF EACH TYPE.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MANUFACTURER/MODEL # SHALL BE FURNISHED BY OWNER THROUGH NATIONAL ACCOUNT VENDOR. REFER TO CONSTRUCTION DRAWINGS FOR EQUIPMENT CLARIFICATIONS.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. LIGHTING FIXTURES: SET LEVEL, PLUMB, AND SQUARE WITH CEILINGS AND WALLS. INSTALL LAMPS IN EACH FIXTURE.
- B. SUPPORT FOR LIGHTING FIXTURES IN OR ON GRID-TYPE SUSPENDED CEILINGS: USE GRID AS A SUPPORT ELEMENT.
  1. INSTALL A MINIMUM OF FOUR CEILING SUPPORT SYSTEM RODS OR WIRES FOR EACH FIXTURE. LOCATE NOT MORE THAN 6 INCHES FROM LIGHTING FIXTURE CORNERS.
  2. SUPPORT CLIPS: FASTEN TO LIGHTING FIXTURES AND TO CEILING GRID MEMBERS AT OR NEAR EACH FIXTURE CORNER WITH CLIPS THAT ARE UL LISTED FOR THE APPLICATION.
  3. FIXTURES OF SIZES LESS THAN CEILING GRID: INSTALL AS INDICATED ON REFLECTED CEILING PLANS OR CENTER IN ACOUSTICAL PANEL, AND SUPPORT FIXTURES INDEPENDENTLY WITH AT LEAST TWO 3/4-INCH METAL CHANNELS SPANNING AND SECURED TO CEILING TEES.
- C. SUSPENDED LIGHTING FIXTURE SUPPORT:
  1. STEM-MOUNTED, SINGLE-UNIT FIXTURES: SUSPEND WITH TWIN-STEM HANGERS.
  2. CONTINUOUS ROWS: USE TUBING OR STEM FOR WIRING AT ONE POINT AND TUBING OR ROD FOR SUSPENSION FOR EACH UNIT LENGTH OF FIXTURE CHASSIS, INCLUDING ONE AT EACH END.
- D. ADJUST AIMABLE LIGHTING FIXTURES TO PROVIDE REQUIRED LIGHT INTENSITIES.
- E. CONNECT WIRING ACCORDING TO DIVISION 26 SECTION "CONDUCTORS AND CABLES."

3.2 FIELD QUALITY CONTROL

- A. TEST FOR EMERGENCY LIGHTING: INTERRUPT POWER SUPPLY TO DEMONSTRATE PROPER OPERATION. VERIFY TRANSFER FROM NORMAL POWER TO BATTERY AND RETRANSFER TO NORMAL.
- B. PREPARE A WRITTEN REPORT OF TESTS, INSPECTIONS, OBSERVATIONS, AND VERIFICATIONS INDICATING AND INTERPRETING RESULTS. IF ADJUSTMENTS ARE MADE TO LIGHTING SYSTEM, RETEST TO DEMONSTRATE COMPLIANCE WITH STANDARDS.

END OF SECTION 26 51 00

COMMUNICATIONS HORIZONTAL CABLING SECTION 27 15 00

PART 1 - GENERAL

1.1 SUMMARY

- A. SECTION INCLUDES:
  1. PATHWAYS.
  2. UTP CABLING.
  3. MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLIES.
  4. CABLE CONNECTING HARDWARE, PATCH PANELS, AND CROSS-CONNECTS.
  5. TELECOMMUNICATIONS OUTLET/CONNECTORS.
  6. CABLING IDENTIFICATION PRODUCTS.
  7. CABLE MANAGEMENT SYSTEM.

1.2 DEFINITIONS

- A. BASKET CABLE TRAY: A FABRICATED STRUCTURE CONSISTING OF WIRE MESH BOTTOM AND SIDE RAILS.
- B. BICSI: BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL.
- C. CHANNEL CABLE TRAY: A FABRICATED STRUCTURE CONSISTING OF A ONE-PIECE, VENTILATED-BOTTOM OR SOLID-BOTTOM CHANNEL.
- D. CONSOLIDATION POINT: A LOCATION FOR INTERCONNECTION BETWEEN HORIZONTAL CABLES EXTENDING FROM BUILDING PATHWAYS AND HORIZONTAL CABLES EXTENDING INTO FURNITURE PATHWAYS.
- E. CROSS-CONNECT: A FACILITY ENABLING THE TERMINATION OF CABLE ELEMENTS AND THEIR INTERCONNECTION OR CROSS-CONNECTION.
- F. EMI: ELECTROMAGNETIC INTERFERENCE.
- G. IDC: INSULATION DISPLACEMENT CONNECTOR.
- H. LADDER CABLE TRAY: A FABRICATED STRUCTURE CONSISTING OF TWO LONGITUDINAL SIDE RAILS CONNECTED BY INDIVIDUAL TRANSVERSE MEMBERS (RUNGS).
- I. LAN: LOCAL AREA NETWORK.
- J. MUTOA: MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY, A GROUPING IN ONE LOCATION OF SEVERAL TELECOMMUNICATIONS OUTLET/CONNECTORS.
- K. OUTLET/CONNECTORS: A CONNECTING DEVICE IN THE WORK AREA ON WHICH HORIZONTAL CABLE OR OUTLET CABLE TERMINATES.
- L. RCDD: REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER.
- M. SOLID-BOTTOM OR NONVENTILATED CABLE TRAY: A FABRICATED STRUCTURE CONSISTING OF LONGITUDINAL SIDE RAILS AND A BOTTOM WITHOUT VENTILATION OPENINGS.
- N. TROUGH OR VENTILATED CABLE TRAY: A FABRICATED STRUCTURE CONSISTING OF LONGITUDINAL SIDE RAILS AND A BOTTOM HAVING OPENINGS FOR THE PASSAGE OF AIR.
- O. UTP: UNSHIELDED TWISTED PAIR.

1.3 HORIZONTAL CABLING DESCRIPTION

- A. HORIZONTAL CABLE AND ITS CONNECTING HARDWARE PROVIDE THE MEANS OF TRANSPORTING SIGNALS BETWEEN THE TELECOMMUNICATIONS OUTLET/CONNECTOR AND THE HORIZONTAL CROSS-CONNECT LOCATED IN THE COMMUNICATIONS EQUIPMENT ROOM. THIS CABLING AND ITS CONNECTING HARDWARE ARE CALLED "PERMANENT LINK," A TERM THAT IS USED IN THE TESTING PROTOCOLS.
  1. TIA/EIA-568-B.1 REQUIRES THAT A MINIMUM OF TWO TELECOMMUNICATIONS OUTLET/CONNECTORS BE INSTALLED FOR EACH WORK AREA.
  2. HORIZONTAL CABLING SHALL CONTAIN NO MORE THAT ONE TRANSITION POINT OR CONSOLIDATION POINT BETWEEN THE HORIZONTAL CROSS-CONNECT AND THE TELECOMMUNICATIONS OUTLET/CONNECTOR.
  3. BRIDGED TAPS AND SPLICES SHALL NOT BE INSTALLED IN THE HORIZONTAL CABLING.
  4. SPLITTERS SHALL NOT BE INSTALLED AS PART OF THE OPTICAL FIBER CABLING.
- B. THE MAXIMUM ALLOWABLE HORIZONTAL CABLE LENGTH IS 295 FEET (90 M). THIS MAXIMUM ALLOWABLE LENGTH DOES NOT INCLUDE AN ALLOWANCE FOR THE LENGTH OF 16 FEET (4.9 M) TO THE WORKSTATION EQUIPMENT. THE MAXIMUM ALLOWABLE LENGTH DOES NOT INCLUDE AN ALLOWANCE FOR THE LENGTH OF 16 FEET (4.9 M) IN THE HORIZONTAL CROSS-CONNECT.

1.4 PERFORMANCE REQUIREMENTS

- A. GENERAL PERFORMANCE: HORIZONTAL CABLING SYSTEM SHALL COMPLY WITH TRANSMISSION STANDARDS IN TIA/EIA-568-B.1, WHEN TESTED ACCORDING TO TEST PROCEDURES OF THIS STANDARD.

1.5 SUBMITTALS

- A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
- B. SHOP DRAWINGS:
  1. SYSTEM LABELING SCHEDULES: ELECTRONIC COPY OF LABELING SCHEDULES, IN SOFTWARE AND FORMAT SELECTED BY OWNER.
  2. CABLING ADMINISTRATION DRAWINGS AND PRINTOUTS.
- C. QUALIFICATION DATA: FOR QUALIFIED LAYOUT TECHNICIAN, INSTALLATION SUPERVISOR, AND FIELD INSPECTOR.
- D. SOURCE QUALITY-CONTROL REPORTS.
- E. FIELD QUALITY-CONTROL REPORTS.
- F. MAINTENANCE DATA: FOR SPLICES AND CONNECTORS TO INCLUDE IN MAINTENANCE MANUALS.
- G. SOFTWARE AND FIRMWARE OPERATIONAL DOCUMENTATION:
  1. SOFTWARE OPERATING AND UPGRADE MANUALS.
  2. PROGRAM SOFTWARE BACKUP: ON MAGNETIC MEDIA OR COMPACT DISK, COMPLETE WITH DATA FILES.
  3. DEVICE ADDRESS LIST.
  4. PRINTOUT OF SOFTWARE APPLICATION AND GRAPHIC SCREENS.

1.6 QUALITY ASSURANCE

- A. INSTALLER QUALIFICATIONS: CABLING INSTALLER MUST HAVE PERSONNEL CERTIFIED BY BICSI ON STAFF.
  1. LAYOUT RESPONSIBILITY: PREPARATION OF SHOP DRAWINGS, CABLING ADMINISTRATION DRAWINGS, AND FIELD TESTING PROGRAM DEVELOPMENT BY AN RCDD.
  2. INSTALLATION SUPERVISION: INSTALLATION SHALL BE UNDER THE DIRECT SUPERVISION OF LEVEL 2 INSTALLER, WHO SHALL BE PRESENT AT ALL TIMES WHEN WORK OF THIS SECTION IS PERFORMED AT PROJECT SITE.
  3. TESTING SUPERVISOR: CURRENTLY CERTIFIED BY BICSI AS AN RCDD TO SUPERVISE ON-SITE TESTING.
- B. SURFACE-BURNING CHARACTERISTICS: AS DETERMINED BY TESTING IDENTICAL PRODUCTS ACCORDING TO ASTM E 84 BY A QUALIFIED TESTING AGENCY. IDENTIFY PRODUCTS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
  1. FLAME-SPREAD INDEX: 25 OR LESS.
  2. SMOKE-DEVELOPED INDEX: 50 OR LESS.
- C. 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.
- D. TELECOMMUNICATIONS PATHWAYS AND SPACES: COMPLY WITH TIA/EIA-569-A.
- E. GROUNDING: COMPLY WITH ANSI-J-STD-607-A.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. TEST CABLES UPON RECEIPT AT PROJECT SITE.
  1. TEST OPTICAL FIBER CABLES TO DETERMINE THE CONTINUITY OF THE STRAND END TO END. USE OPTICAL FIBER FLASHLIGHT OR OPTICAL LOSS TEST SET.
  2. TEST OPTICAL FIBER CABLES WHILE ON REELS. USE AN OPTICAL TIME DOMAIN REFLECTOMETER TO VERIFY THE CABLE LENGTH AND LOCATE CABLE DEFECTS, SPLICES, AND CONNECTOR; INCLUDING THE LOSS VALUE OF EACH. RETAIN TEST DATA AND INCLUDE THE RECORD IN MAINTENANCE DATA.
  3. TEST EACH PAIR OF UTP CABLE FOR OPEN AND SHORT CIRCUITS.

1.8 PROJECT CONDITIONS

- A. ENVIRONMENTAL LIMITATIONS: DO NOT DELIVER OR INSTALL CABLES AND CONNECTING MATERIALS UNTIL WET WORK IN SPACES IS COMPLETE AND DRY, AND TEMPORARY HVAC SYSTEM IS OPERATING AND MAINTAINING AMBIENT TEMPERATURE AND HUMIDITY CONDITIONS AT OCCUPANCY LEVELS DURING THE REMAINDER OF THE CONSTRUCTION PERIOD.

1.9 COORDINATION

- A. COORDINATE LAYOUT AND INSTALLATION OF TELECOMMUNICATIONS PATHWAYS AND CABLING WITH OWNER'S TELECOMMUNICATIONS AND LAN EQUIPMENT AND SERVICE SUPPLIERS.
- B. COORDINATE TELECOMMUNICATIONS OUTLET/CONNECTOR LOCATIONS WITH LOCATION OF POWER RECEPTACLES AT EACH WORK AREA.

1.10 EXTRA MATERIALS

- A. FURNISH EXTRA MATERIALS THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
  1. CONNECTING BLOCKS: ONE OF EACH TYPE.
  2. DEVICE PLATES: TEN OF EACH TYPE.
  3. MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLIES: SIX OF EACH TYPE.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. CABLE SUPPORT: NRTL LABELED FOR SUPPORT OF CATEGORY 6 (CAT6) CABLING, DESIGNED TO PREVENT DEGRADATION OF CABLE PERFORMANCE AND PINCH POINTS THAT COULD DAMAGE CABLE.
  1. SUPPORT BRACKETS WITH CABLE TIE SLOTS FOR FASTENING CABLE TIES TO BRACKETS.
  2. LACING BARS, SPOOLS, J-HOOKS, AND D-RINGS.
  3. STRAPS AND OTHER DEVICES.
- B. CONDUIT AND BOXES: COMPLY WITH REQUIREMENTS IN DIVISION 26 SECTION "RACEWAYS AND BOXES." FLEXIBLE METAL CONDUIT SHALL NOT BE USED.
  1. OUTLET BOXES SHALL BE NO SMALLER THAN 2 INCHES WIDE, 3 INCHES HIGH, AND 2-1/2 INCHES DEEP.

2.2 UTP CABLE

- A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
  1. BELDEN CDT INC.; ELECTRONICS DIVISION.
  2. BERK-TEK; A NEXANS COMPANY.
  3. COMMSCOPE, INC.
  4. GENESIS CABLE PRODUCTS; HONEYWELL INTERNATIONAL, INC.
  5. KRONE INCORPORATED.
  6. MOHAWK; A DIVISION OF BELDEN CDT.
  7. NORDEX/CDT; A SUBSIDIARY OF CABLE DESIGN TECHNOLOGIES.
  8. SUPERIOR ESSEX INC.
  9. SYSTIMAX SOLUTIONS; A COMMSCOPE, INC. BRAND.
  10. 3M.
  11. TYCO ELECTRONICS/AMP NETCONNECT; TYCO INTERNATIONAL LTD.
- B. DESCRIPTION: 100-OHM, 4-PAIR UTP, COVERED WITH A BLUE THERMOPLASTIC JACKET.
  1. COMPLY WITH ICEA S-90-661 FOR MECHANICAL PROPERTIES.
  2. COMPLY WITH TIA/EIA-568-B.1 FOR PERFORMANCE SPECIFICATIONS.
  3. COMPLY WITH TIA/EIA-568-B.2, CATEGORY 6 (CAT6).
  4. LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION AS COMPLYING WITH UL 444 AND NFPA 70 FOR THE FOLLOWING TYPES:
- C. COMMUNICATIONS, PLENUM RATED: TYPE CMP, COMPLYING WITH NFPA 262.

2.3 UTP CABLE HARDWARE

- A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
  1. AMERICAN TECHNOLOGY SYSTEMS INDUSTRIES, INC.
  2. DYNACOM CORPORATION.
  3. HUBBELL PREMISE WIRING.
  4. KRONE INCORPORATED.
  5. LEVITON VOICE & DATA DIVISION.
  6. NORDEX/CDT; A SUBSIDIARY OF CABLE DESIGN TECHNOLOGIES.
  7. PANDUIT CORP.
  8. SIEMON CO. (THE).
  9. TYCO ELECTRONICS/AMP NETCONNECT; TYCO INTERNATIONAL LTD.
- B. GENERAL REQUIREMENTS FOR CABLE CONNECTING HARDWARE: COMPLY WITH TIA/EIA-568-B.2, IDC TYPE, WITH MODULES DESIGNED FOR PUNCH-DOWN CAPS OR TOOLS. CABLES SHALL BE TERMINATED WITH CONNECTING HARDWARE OF SAME CATEGORY OR HIGHER.
- C. CONNECTING BLOCKS: 110-STYLE IDC FOR CATEGORY 6 (CAT6). PROVIDE BLOCKS FOR THE NUMBER OF CABLES TERMINATED ON THE BLOCK, PLUS 25 PERCENT SPARE. INTEGRAL WITH CONNECTOR BODIES, INCLUDING PLUGS AND JACKS WHERE INDICATED.
- D. CROSS-CONNECT: MODULAR ARRAY OF CONNECTING BLOCKS ARRANGED TO TERMINATE BUILDING CABLES AND PERMIT INTERCONNECTION BETWEEN CABLES.
  1. NUMBER OF TERMINALS PER FIELD: ONE FOR EACH CONDUCTOR IN ASSIGNED CABLES.
- E. PATCH PANEL: MODULAR PANELS HOUSING 24 NUMBERED JACK UNITS WITH IDC-TYPE CONNECTORS AT EACH JACK FOR PERMANENT TERMINATION OF PAIR GROUPS OF INSTALLED CABLES.
- F. JACKS AND JACK ASSEMBLIES: MODULAR, COLOR-CODED, EIGHT-POSITION MODULAR RECEPTACLE UNITS WITH INTEGRAL IDC-TYPE TERMINALS.
- G. PATCH CORDS: FACTORY-MADE, FOUR-PAIR CABLES IN 36-INCH LENGTHS; TERMINATED WITH EIGHT-POSITION MODULAR PLUG AT EACH END.
  1. PATCH CORDS SHALL HAVE BEND-RELIEF-COMPLIANT BOOTS AND COLOR-CODED ICONS TO ENSURE CATEGORY 6 (CAT6) PERFORMANCE. PATCH CORDS SHALL HAVE LATCH GUARDS TO PROTECT AGAINST SNAGGING.

2.4 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. JACKS: 100-OHM, BALANCED, TWISTED-PAIR CONNECTOR; FOUR-PAIR, EIGHT-POSITION MODULAR. COMPLY WITH TIA/EIA-568-B.1.
- B. WORKSTATION OUTLETS: TWO-PORT-CONNECTOR ASSEMBLIES MOUNTED IN SINGLE FACEPLATE.
  1. METAL FACEPLATE: STAINLESS STEEL, COMPLYING WITH REQUIREMENTS IN DIVISION 26 SECTION "WIRING DEVICES."
  2. FOR USE WITH SNAP-IN JACKS ACCOMMODATING ANY COMBINATION OF UTP WORK AREA CORDS.
  3. LEGEND: MACHINE PRINTED, IN THE FIELD, USING ADHESIVE-TAPE LABEL.

2.5 GROUNDING

- A. COMPLY WITH REQUIREMENTS IN DIVISION 26 SECTION "GROUNDING AND BONDING" FOR GROUNDING CONDUCTORS AND CONNECTORS.
- B. COMPLY WITH ANSI-J-STD-607-A.

2.6 IDENTIFICATION PRODUCTS

- A. COMPLY WITH TIA/EIA-606-A AND UL 969 FOR A SYSTEM OF LABELING MATERIALS, INCLUDING LABEL STOCKS, LAMINATING ADHESIVES, AND INKS USED BY LABEL PRINTERS.

2.7 SOURCE QUALITY CONTROL

- A. CABLE WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
- B. PREPARE TEST AND INSPECTION REPORTS.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. WIRING METHOD: INSTALL CABLES IN RACEWAYS EXCEPT WITHIN CONSOLES, CABINETS, DESKS, AND COUNTERS AND EXCEPT IN ACCESSIBLE CEILING SPACES, IN ATTICS, AND IN GYPSUM BOARD PARTITIONS WHERE UNENCLOSED WIRING METHOD MAY BE USED. CONCEAL RACEWAY AND CABLES EXCEPT IN UNFINISHED SPACES.
  1. COMPLY WITH REQUIREMENTS FOR RACEWAYS AND BOXES SPECIFIED IN DIVISION 26 SECTION "RACEWAYS AND BOXES."
- B. WIRING METHOD: CONCEAL CONDUCTORS AND CABLES IN ACCESSIBLE CEILINGS, WALLS, AND FLOORS WHERE POSSIBLE.
- C. WIRING WITHIN ENCLOSURES: BUNDLE, LACE, AND TRAIN CABLES TO TERMINAL POINTS WITH NO EXCESS AND WITHOUT EXCEEDING MANUFACTURER'S LIMITATIONS ON BENDING RADII. PROVIDE AND USE LACING BARS AND DISTRIBUTION SPOOLS.

3.2 INSTALLATION OF PATHWAYS

- A. COMPLY WITH TIA/EIA-569-A FOR PULL-BOX SIZING AND LENGTH OF CONDUIT AND NUMBER OF BENDS BETWEEN PULL POINTS.
- B. COMPLY WITH REQUIREMENTS IN DIVISION 26 SECTION "RACEWAYS AND BOXES" FOR INSTALLATION OF CONDUITS AND WIREWAYS.
  1. PATHWAY INSTALLATION IN COMMUNICATIONS EQUIPMENT ROOMS:
     - a. POSITION CONDUIT ENDS ADJACENT TO A CORNER ON BACKBOARD WHERE A SINGLE PIECE OF PLYWOOD IS INSTALLED.
     - b. SECURE CONDUITS TO BACKBOARD WHEN ENTERING ROOM FROM OVERHEAD.
     - c. EXTEND CONDUITS 3 INCHES ABOVE FINISHED FLOOR.

3.3 INSTALLATION OF CABLES

- A. COMPLY WITH NECA 1.
- B. GENERAL REQUIREMENTS FOR CABLING:
  1. COMPLY WITH TIA/EIA-568-B.1.
  2. COMPLY WITH BICSI ITSIM, CH. 6, "CABLE TERMINATION PRACTICES."
  3. TERMINATE CONDUCTORS; NO CABLE SHALL CONTAIN UNTERMINATED ELEMENTS. MAKE TERMINATIONS ONLY AT INDICATED OUTLETS, TERMINALS, AND PATCH PANELS.
  4. CABLES MAY NOT BE SPLICED. SECURE AND SUPPORT CABLES AT INTERVALS NOT EXCEEDING 30 INCHES AND NOT MORE THAN 6 INCHES FROM CABINETS, BOXES, FITTINGS, OUTLETS, RACKS, FRAMES, AND TERMINALS.
  5. INSTALL LACING BARS TO RESTRAIN CABLES, TO PREVENT STRAINING CONNECTIONS, AND TO PREVENT BENDING CABLES TO SMALLER RADII THAN MINIMUMS RECOMMENDED BY MANUFACTURER.
  6. BUNDLE, LACE, AND TRAIN CONDUCTORS TO TERMINAL POINTS WITHOUT EXCEEDING MANUFACTURER'S LIMITATIONS ON BENDING RADII, BUT NOT LESS THAN RADII SPECIFIED IN BICSI ITSIM, "CABLING TERMINATION PRACTICES" CHAPTER. INSTALL LACING BARS AND DISTRIBUTION SPOOLS.
  7. DO NOT INSTALL BRUISED, KINKED, SCORED, DEFORMED, OR ABRADED CABLE. DO NOT SPLICE CABLE BETWEEN TERMINATION, TAP, OR JUNCTION POINTS. REMOVE AND DISCARD CABLE IF DAMAGED DURING INSTALLATION AND REPLACE IT WITH NEW CABLE.
  8. COLD-WEATHER INSTALLATION: BRING CABLE TO ROOM TEMPERATURE BEFORE DEREELING. HEAT LAMPS SHALL NOT BE USED FOR HEATING.
  9. IN THE COMMUNICATIONS EQUIPMENT ROOM, INSTALL A 10-FOOT- LONG SERVICE LOOP ON EACH END OF CABLE.
  10. PULLING CABLE: COMPLY WITH BICSI ITSIM, CH. 4, "PULLING CABLE." MONITOR CABLE PULL TENSIONS.
- C. UTP CABLE INSTALLATION:
  1. COMPLY WITH TIA/EIA-568-B.2.
  2. DO NOT UNTWIST UTP CABLES MORE THAN 1/2 INCH FROM THE POINT OF TERMINATION TO MAINTAIN CABLE GEOMETRY.
- D. OPEN-CABLE INSTALLATION:
  1. INSTALL CABLING WITH HORIZONTAL AND VERTICAL CABLE GUIDES IN TELECOMMUNICATIONS SPACES WITH TERMINATING HARDWARE AND INTERCONNECTION EQUIPMENT.
  2. SUSPEND UTP CABLE NOT IN A WIREWAY OR PATHWAY A MINIMUM OF 8 INCHES ABOVE CEILINGS BY CABLE SUPPORTS NOT MORE THAN 60 INCHES APART.
  3. CABLE SHALL NOT BE RUN THROUGH STRUCTURAL MEMBERS OR IN CONTACT WITH PIPES, DUCTS, OR OTHER POTENTIALLY DAMAGING ITEMS.
- E. SEPARATION FROM EMI SOURCES:
  1. COMPLY WITH BICSI TDMM AND TIA/EIA-569-A FOR SEPARATING UNSHIELDED COPPER VOICE AND DATA COMMUNICATION CABLE FROM POTENTIAL EMI SOURCES, INCLUDING ELECTRICAL POWER LINES AND EQUIPMENT.
  2. SEPARATION BETWEEN OPEN COMMUNICATIONS CABLES OR CABLES IN NONMETALLIC RACEWAYS AND UNSHIELDED POWER CONDUCTORS AND ELECTRICAL EQUIPMENT SHALL BE AS FOLLOWS:
     - a. ELECTRICAL EQUIPMENT RATING LESS THAN 2 KVA: A MINIMUM OF 5 INCHES.
     - b. ELECTRICAL EQUIPMENT RATING BETWEEN 2 AND 5 KVA: A MINIMUM OF 12 INCHES.
     - c. ELECTRICAL EQUIPMENT RATING MORE THAN 5 KVA: A MINIMUM OF 24 INCHES.
  3. SEPARATION BETWEEN COMMUNICATIONS CABLES IN GROUNDED METALLIC RACEWAYS AND UNSHIELDED POWER LINES OR ELECTRICAL EQUIPMENT SHALL BE AS FOLLOWS:
     - a. ELECTRICAL EQUIPMENT RATING LESS THAN 2 KVA: A MINIMUM OF 2-1/2 INCHES.
     - b. ELECTRICAL EQUIPMENT RATING BETWEEN 2 AND 5 KVA: A MINIMUM OF 6 INCHES.
     - c. ELECTRICAL EQUIPMENT RATING MORE THAN 5 KVA: A MINIMUM OF 12 INCHES.
  4. SEPARATION BETWEEN COMMUNICATIONS CABLES IN GROUNDED METALLIC RACEWAYS AND POWER LINES AND ELECTRICAL EQUIPMENT LOCATED IN GROUNDED METALLIC CONDUITS OR ENCLOSURES SHALL BE AS FOLLOWS:
     - a. ELECTRICAL EQUIPMENT RATING LESS THAN 2 KVA: NO REQUIREMENT.
     - b. ELECTRICAL EQUIPMENT RATING BETWEEN 2 AND 5 KVA: A MINIMUM OF 3 INCHES.
     - c. ELECTRICAL EQUIPMENT RATING MORE THAN 5 KVA: A MINIMUM OF 6 INCHES.
  5. SEPARATION BETWEEN COMMUNICATIONS CABLES AND ELECTRICAL MOTORS AND TRANSFORMERS, 5 KVA OR HP AND LARGER: A MINIMUM OF 48 INCHES.
  6. SEPARATION BETWEEN COMMUNICATIONS CABLES AND FLUORESCENT FIXTURES: A MINIMUM OF 5 INCHES.

3.4 FIRESTOPPING

- A. COMPLY WITH TIA/EIA-569-A, ANNEX A, "FIRESTOPPING."
- B. COMPLY WITH BICSI TDMM, "FIRESTOPPING SYSTEMS" ARTICLE.

3.5 GROUNDING

- A. INSTALL GROUNDING ACCORDING TO BICSI TDMM, "GROUNDING, BONDING, AND ELECTRICAL PROTECTION" CHAPTER.
- B. COMPLY WITH ANSI-J-STD-607-A.
- C. LOCATE GROUNDING BUS BAR TO MINIMIZE THE LENGTH OF BONDING CONDUCTORS. FASTEN TO WALL ALLOWING AT LEAST 2-INCH CLEARANCE BEHIND THE GROUNDING BUS BAR. CONNECT GROUNDING BUS BAR WITH A MINIMUM NO. 4 AWG GROUNDING ELECTRODE CONDUCTOR FROM GROUNDING BUS BAR TO SUITABLE ELECTRICAL BUILDING GROUND.
- D. BOND METALLIC EQUIPMENT TO THE GROUNDING BUS BAR, USING NOT SMALLER THAN NO. 6 AWG EQUIPMENT GROUNDING CONDUCTOR.

3.6 IDENTIFICATION

- A. IDENTIFY SYSTEM COMPONENTS, WIRING, AND CABLING COMPLYING WITH TIA/EIA-606-A.
- B. COMPLY WITH REQUIREMENTS IN DIVISION 9 SECTION "PAINTING" FOR PAINTING BACKBOARDS. FOR FIRE-RESISTANT PLYWOOD, DO NOT PAINT OVER MANUFACTURER'S LABEL.

3.7 FIELD QUALITY CONTROL

- A. TESTS AND INSPECTIONS:
  1. VISUALLY INSPECT UTP CABLE JACKET MATERIALS FOR NRTL CERTIFICATION MARKINGS. INSPECT CABLING TERMINATIONS IN COMMUNICATIONS EQUIPMENT ROOMS FOR COMPLIANCE WITH COLOR-CODING FOR PIN ASSIGNMENTS, AND INSPECT CABLING CONNECTIONS FOR COMPLIANCE WITH TIA/EIA-568-B.1.
  2. VISUALLY CONFIRM CATEGORY 6 (CAT6), MARKING OF OUTLETS, COVER PLATES, OUTLET/CONNECTORS, AND PATCH PANELS.
  3. VISUALLY INSPECT CABLE PLACEMENT, CABLE TERMINATION, GROUNDING AND BONDING, EQUIPMENT AND PATCH CORDS, AND LABELING OF ALL COMPONENTS.
  4. UTP PERFORMANCE TESTS:
     - a. TEST FOR EACH OUTLET. PERFORM THE FOLLOWING TESTS ACCORDING TO TIA/EIA-568-B.1 AND TIA/EIA-568-B.2:
       1) WIRE MAP.
       2) LENGTH (PHYSICAL VS. ELECTRICAL, AND LENGTH REQUIREMENTS).
       3) INSERTION LOSS.
       4) NEAR-END CROSSTALK (NEXT) LOSS.
       5) POWER SUM NEAR-END CROSSTALK (PSNEXT) LOSS.
       6) EQUAL-LEVEL FAR-END CROSSTALK (ELFEXT).
       7) POWER SUM EQUAL-LEVEL FAR-END CROSSTALK (PSELFEXT).
       8) RETURN LOSS.
       9) PROPAGATION DELAY.
       10) DELAY SKEW.
- B. DOCUMENT DATA FOR EACH MEASUREMENT. DATA FOR SUBMITTALS SHALL BE PRINTED IN A SUMMARY REPORT THAT IS FORMATTED SIMILAR TO TABLE 10.1 IN BICSI TDMM, OR TRANSFERRED FROM THE INSTRUMENT TO THE COMPUTER, SAVED AS TEXT FILES, AND PRINTED AND SUBMITTED.
- C. PREPARE TEST AND INSPECTION REPORTS.

END OF SECTION 27 15 00

Scale:	
Designed by:	NYE
Drawn by:	NYE
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ELECTRICAL SPECIFICATIONS

ES8.3

DIVISION 26 - ELECTRICAL SPECIFICATIONS

VOICE AND DATA COMMUNICATION CABLING SECTION 27 51 23

PART 1 - GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES WIRE, CABLE, CONNECTING DEVICES, INSTALLATION, AND TESTING FOR WIRING SYSTEMS TO BE USED AS SIGNAL PATHWAYS FOR VOICE AND HIGH-SPEED DATA TRANSMISSION.

1.2 DEFINITIONS

A. EMI: ELECTROMAGNETIC INTERFERENCE.

B. IDC: INSULATION DISPLACEMENT CONNECTOR.

C. LAN: LOCAL AREA NETWORK.

D. PVC: POLYVINYL CHLORIDE.

E. STP: SHIELDED TWISTED PAIR.

F. UTP: UNSHIELDED TWISTED PAIR.

1.3 SUBMITTALS

A. PRODUCT DATA: INCLUDE DATA ON FEATURES, RATINGS, AND PERFORMANCE FOR EACH COMPONENT SPECIFIED.

B. SHOP DRAWINGS: INCLUDE DIMENSIONED PLAN AND ELEVATION VIEWS OF EACH INDIVIDUAL COMPONENT. SHOW EQUIPMENT ASSEMBLIES, METHOD OF FIELD ASSEMBLY, WORKSPACE REQUIREMENTS, AND ACCESS FOR CABLE CONNECTIONS.

1.4 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS: SYSTEM INSTALLER MUST HAVE ON STAFF A REGISTERED COMMUNICATION DISTRIBUTION DESIGNER CERTIFIED BY BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL.

B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

C. COMPLY WITH NFPA 70.

1.5 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF VOICE AND DATA COMMUNICATION CABLING WITH OWNER'S TELECOMMUNICATIONS AND LAN EQUIPMENT SUPPLIERS.

1. MEET JOINTLY WITH TELECOMMUNICATIONS AND LAN EQUIPMENT SUPPLIERS, AND OWNER TO EXCHANGE INFORMATION AND AGREE ON DETAILS OF EQUIPMENT ARRANGEMENTS AND INSTALLATION INTERFACES.

2. RECORD AGREEMENTS REACHED IN MEETINGS AND DISTRIBUTE TO OTHER PARTICIPANTS.

3. ADJUST ARRANGEMENTS AND LOCATIONS OF DISTRIBUTION FRAMES AND CROSS-CONNECT AND PATCH PANELS IN EQUIPMENT ROOMS AND WIRING CLOSETS TO ACCOMMODATE AND OPTIMIZE ARRANGEMENT AND SPACE REQUIREMENTS OF TELEPHONE SWITCH AND LAN EQUIPMENT.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. CABLE:
   a. BELDEN INC.; ELECTRONICS DIVISION.
   b. BERK-TEK; AN ALCATEL COMPANY.
   c. BRAND-REX CO.; UNIT OF BICC CABLES CORP.
   d. GENERAL CABLE CORPORATION.
   e. LUCENT TECHNOLOGIES; GLOBAL SERVICE PROVIDER.
   f. MOHAWK/CDT; A DIVISION OF CABLE DESIGN TECHNOLOGIES.
   g. MONTROSE/CDT; A DIVISION OF CABLE DESIGN TECHNOLOGIES.
   h. OPTICAL CABLE CORPORATION.
   i. PANDUIT CORP.
   j. PRESTOLITE WIRE CORP.
   k. REMEE PRODUCTS CORP.
   l. SIECOR.
   m. SUPERIOR ESSEX; SUPERIOR TELECOMMUNICATIONS INC.

2. TERMINAL AND CONNECTOR COMPONENTS AND DISTRIBUTION RACKS:
   a. AMP INCORPORATED; A TYCO INTERNATIONAL LTD. COMPANY.
   b. HUBBELL PREMISE WIRING.
   c. LEVITON TELECOM.
   d. LUCENT TECHNOLOGIES; GLOBAL SERVICE PROVIDER.
   e. PANDUIT CORP.
   f. THOMAS & BETTS CORPORATION.
   g. CHATSWORTH PRODUCTS.

2.2 SYSTEM REQUIREMENTS

A. GENERAL: COORDINATE THE FEATURES OF MATERIALS AND EQUIPMENT SO THEY FORM AN INTEGRATED SYSTEM. MATCH COMPONENTS AND INTERCONNECTIONS FOR OPTIMUM FUTURE PERFORMANCE.

B. EXPANSION CAPABILITY: UNLESS OTHERWISE INDICATED, PROVIDE SPARE CONDUCTOR PAIRS IN CABLES, POSITIONS IN CROSS-CONNECT AND PATCH PANELS, AND TERMINAL STRIPS TO ACCOMMODATE 20 PERCENT FUTURE INCREASE IN ACTIVE WORKSTATIONS.

2.3 MOUNTING ELEMENTS

A. RACEWAYS AND BOXES: COMPLY WITH DIVISION 26 SECTION "RACEWAYS AND BOXES."

B. BACKBOARDS: 3/4-INCH, INTERIOR-GRADE, FIRE-RETARDANT-TREATED PLYWOOD.

C. DISTRIBUTION RACKS: WALL-MOUNTED, MODULAR-STEEL UNITS DESIGNED FOR TELECOMMUNICATIONS TERMINAL SUPPORT AND COORDINATED WITH DIMENSIONS OF UNITS TO BE SUPPORTED.

1. APPROXIMATE MODULE DIMENSIONS: 36 INCHES HIGH BY 22 INCHES WIDE.
2. FINISH: BAKED-POLYESTER POWDER COAT.

2.4 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

A. CABLES: LISTED AS COMPLYING WITH CATEGORY 6 (CAT6) OF TIA/EIA-568-A. CATEGORY 6 (CAT6) FOR VOICE (RJ-11 JACKS) AND FOR DATA.

B. CONDUCTORS: SOLID COPPER.

C. UTP CABLE: COMPLY WITH TIA/EIA-568-A. FOUR, THERMOPLASTIC-INSULATED, INDIVIDUALLY TWISTED PAIRS OF CONDUCTORS; NO. 24 AWG, COLOR-CODED; ENCLOSED IN PVC JACKET.

D. UTP PLENUM CABLE: LISTED FOR USE IN AIR-HANDLING SPACES. FEATURES ARE AS SPECIFIED FOR CABLES, CONDUCTORS, AND UTP CABLE, EXCEPT MATERIALS ARE MODIFIED AS REQUIRED FOR LISTING.

E. UTP CABLE CONNECTING HARDWARE: COMPLY WITH TIA/EIA-568-A. IDC TYPE, USING MODULES DESIGNED FOR PUNCH-DOWN CAPS OR TOOLS.

1. IDC TERMINAL BLOCK MODULES: INTEGRAL WITH CONNECTOR BODIES, INCLUDING PLUGS AND JACKS WHERE INDICATED.
2. IDC CONNECTING HARDWARE: CONSISTENT THROUGHOUT PROJECT.

F. PATCH PANEL: MODULAR PANELS HOUSING MULTIPLE-NUMBERED JACK UNITS WITH IDC-TYPE CONNECTORS AT EACH JACK FOR PERMANENT TERMINATION OF PAIR GROUPS OF INSTALLED CABLES.

1. NUMBER OF JACKS PER FIELD: ONE FOR EACH FOUR-PAIR UTP CABLE INDICATED.
2. MOUNTING: RACK.

G. JACKS AND JACK ASSEMBLIES FOR UTP CABLE: MODULAR, COLOR-CODED, RJ-45 RECEPTACLE UNITS WITH INTEGRAL IDC-TYPE TERMINALS. USE KEYED JACKS FOR DATA SERVICE.

H. UTP PATCH CORDS: FOUR-PAIR CABLES IN 48-INCH LENGTHS, TERMINATED WITH RJ-45 PLUG AT EACH END. USE KEYED PLUGS FOR DATA SERVICE.

I. WORKSTATION OUTLETS: DUAL JACK-CONNECTOR ASSEMBLIES, AS INDICATED IN SCHEDULE, MOUNTED IN SINGLE-GANG FACEPLATE.

1. FACEPLATE: BRUSHED STAINLESS STEEL 302.
2. MOUNTING: FLUSH, UNLESS OTHERWISE INDICATED.
3. LEGEND: FIELD-LABELED, PER SCHEDULE ON DRAWINGS.

2.5 IDENTIFICATION PRODUCTS

A. COMPLY WITH DIVISION 26 SECTION "BASIC ELECTRICAL MATERIALS AND METHODS" AND THE FOLLOWING:

1. CABLE LABELS: SELF-ADHESIVE VINYL OR VINYL-CLOTH WRAPAROUND TAPE MARKERS, MACHINE PRINTED WITH ALPHANUMERIC CABLE DESIGNATIONS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. EXAMINE PATHWAY ELEMENTS INTENDED FOR CABLES. CHECK RACEWAYS, AND OTHER ELEMENTS FOR COMPLIANCE WITH SPACE ALLOCATIONS, INSTALLATION TOLERANCES, HAZARDS TO CABLE INSTALLATION, AND OTHER CONDITIONS AFFECTING INSTALLATION. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 APPLICATION OF MEDIA

A. HORIZONTAL CABLE FOR DATA SERVICE: USE UTP CATEGORY 6 (CAT6) CABLE FOR RUNS BETWEEN COMMUNICATION SERVICE ENTRANCE AND WORKSTATION OUTLETS.

B. HORIZONTAL CABLE FOR VOICE SERVICE: USE UTP CATEGORY 6 (CAT6) CABLE FOR RUNS BETWEEN COMMUNICATION SERVICE ENTRANCE AND WORKSTATION OUTLETS, EXCEPT DEDICATED VOICE OUTLETS (RJ-11 JACKS) MAY BE CATEGORY

3.3 INSTALLATION

A. WIRING METHOD: INSTALL WIRING IN RACEWAY EXCEPT WITHIN CONSOLES, CABINETS, DESKS, AND COUNTERS AND EXCEPT IN ACCESSIBLE CEILING SPACES WHERE UNENCLOSED WIRING, SUPPORTED ON J-HOOKS MAY BE USED. USE UL-LISTED PLENUM CABLE FOR ALL RUNS. CONCEAL RACEWAY AND CABLES EXCEPT IN UNFINISHED SPACES.

B. INSTALL CABLES USING TECHNIQUES, PRACTICES, AND METHODS THAT ARE CONSISTENT WITH CATEGORY RATING OF COMPONENTS AND THAT ENSURE APPROPRIATE CATEGORY 6 (CAT6) PERFORMANCE OF COMPLETED AND LINKED SIGNAL PATHS, END TO END.

C. INSTALL CABLES WITHOUT DAMAGING CONDUCTORS, SHIELD, OR JACKET.

D. DO NOT BEND CABLES, IN HANDLING OR IN INSTALLING, TO SMALLER RADII THAN MINIMUMS RECOMMENDED BY MANUFACTURER.

E. PULL CABLES WITHOUT EXCEEDING CABLE MANUFACTURER'S RECOMMENDED PULLING TENSIONS.

1. PULL CABLES SIMULTANEOUSLY IF MORE THAN ONE IS BEING INSTALLED IN SAME RACEWAY.
2. USE PULLING COMPOUND OR LUBRICANT IF NECESSARY. USE COMPOUNDS THAT WILL NOT DAMAGE CONDUCTOR OR INSULATION.
3. USE PULLING MEANS, INCLUDING FISH TAPE, CABLE, ROPE, AND BASKET-WEAVE WIRE OR CABLE GRIPS, THAT WILL NOT DAMAGE MEDIA OR RACEWAY.

F. INSTALL EXPOSED CABLES PARALLEL AND PERPENDICULAR TO SURFACES OR EXPOSED STRUCTURAL MEMBERS AND FOLLOW SURFACE CONTOURS WHERE POSSIBLE.

G. SECURE AND SUPPORT CABLES AT INTERVALS NOT EXCEEDING 30 INCHES AND NOT MORE THAN 6 INCHES FROM CABINETS, BOXES, FITTINGS, OUTLETS, RACKS, FRAMES, AND TERMINALS.

H. WIRING WITHIN WIRING CLOSETS AND ENCLOSURES: PROVIDE CONDUCTORS OF ADEQUATE LENGTH. TRAIN CONDUCTORS TO TERMINAL POINTS WITH NO EXCESS. USE LACING BARS TO RESTRAIN CABLES, TO PREVENT STRAINING CONNECTIONS, AND TO PREVENT BENDING CABLES TO SMALLER RADII THAN MINIMUMS RECOMMENDED BY MANUFACTURER.

I. SEPARATION OF WIRES: COMPLY WITH TIA/EIA-569-A RULES FOR SEPARATING UNSHIELDED COPPER VOICE AND DATA COMMUNICATION CABLING FROM POTENTIAL EMI SOURCES, INCLUDING ELECTRICAL POWER LINES AND EQUIPMENT.

J. MAKE SPLICES, TAPS, AND TERMINATIONS ONLY AT INDICATED OUTLETS, TERMINALS, AND CROSS-CONNECT AND PATCH PANELS.

K. USE SPLICE AND TAP CONNECTORS COMPATIBLE WITH MEDIA TYPES.

3.4 GROUNDING

A. COMPLY WITH DIVISION 26 SECTION "GROUNDING AND BONDING".

B. GROUND CABLE SHIELDS, DRAIN CONDUCTORS, AND EQUIPMENT TO ELIMINATE SHOCK HAZARD AND TO MINIMIZE GROUND LOOPS, COMMON-MODE RETURNS, NOISE PICKUP, CROSS TALK, AND OTHER IMPAIRMENTS.

C. BOND SHIELDS AND DRAIN CONDUCTORS TO GROUND AT ONLY ONE POINT IN EACH CIRCUIT.

D. SIGNAL GROUND TERMINAL: LOCATE IN EACH EQUIPMENT ROOM AND WIRING CLOSET; ISOLATE FROM POWER SYSTEM AND EQUIPMENT GROUNDING.

E. SIGNAL GROUND BUS: MOUNT ON WALL OF MAIN EQUIPMENT ROOM WITH STANDOFF INSULATORS.

3.5 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

A. INSTALL PLYWOOD BACKBOARDS ON WALLS OF EQUIPMENT ROOMS AND WIRING CLOSETS FROM FLOOR TO CEILING.

B. MOUNT PATCH PANELS, ETC. IN RACKS.

C. GROUP CONNECTING HARDWARE FOR CABLES INTO SEPARATE LOGICAL FIELDS.

D. USE PATCH PANELS TO TERMINATE CABLES ENTERING THE SPACE, UNLESS OTHERWISE INDICATED.

3.6 INSTALLATION STANDARDS

A. COMPLY WITH REQUIREMENTS IN TIA/EIA-568-A AND TIA/EIA-569-A.

3.7 IDENTIFICATION

A. IN ADDITION TO REQUIREMENTS IN THIS ARTICLE, COMPLY WITH APPLICABLE REQUIREMENTS IN DIVISION 26 SECTION "BASIC ELECTRICAL MATERIALS AND METHODS" AND TIA/EIA-606.

B. SYSTEM: USE A UNIQUE, THREE-GROUP, ALPHANUMERIC DESIGNATION FOR EACH CABLE, AND LABEL CABLE AND JACKS, CONNECTORS, AND TERMINALS TO WHICH IT CONNECTS WITH SAME DESIGNATION. USE LOGICAL AND SYSTEMATIC DESIGNATIONS FOR FACILITY'S ARCHITECTURAL ARRANGEMENT.

C. WORKSTATION: LABEL CABLES WITHIN OUTLET BOXES.

D. DISTRIBUTION RACKS AND FRAMES: LABEL EACH UNIT AND FIELD WITHIN THAT UNIT.

E. WITHIN CONNECTOR FIELDS IN EQUIPMENT ROOMS AND WIRING CLOSETS: LABEL EACH CONNECTOR AND EACH DISCRETE UNIT OF CABLE-TERMINATING AND CONNECTING HARDWARE.

F. CABLES, GENERAL: LABEL EACH CABLE WITHIN 4 INCHES OF EACH TERMINATION AND TAP, WHERE IT IS ACCESSIBLE IN A CABINET OR JUNCTION OR OUTLET BOX, AND ELSEWHERE AS INDICATED.

G. EXPOSED CABLES AND CABLES IN WIRE TROUGHS: LABEL EACH CABLE AT INTERVALS NOT EXCEEDING 15 FEET.

H. CABLE SCHEDULE: POST IN PROMINENT LOCATION IN EACH EQUIPMENT ROOM AND WIRING CLOSET. LIST INCOMING AND OUTGOING CABLES AND THEIR DESIGNATIONS, ORIGINS, AND DESTINATIONS. PROTECT WITH RIGID FRAME AND CLEAR PLASTIC COVER. FURNISH AN ELECTRONIC COPY OF FINAL COMPREHENSIVE SCHEDULES FOR PROJECT, IN SOFTWARE AND FORMAT SELECTED BY OWNER.

I. SEPARATION OF WIRES: COMPLY WITH TIA/EIA-569-A RULES FOR SEPARATING UNSHIELDED COPPER VOICE AND DATA COMMUNICATION CABLING FROM POTENTIAL EMI SOURCES, INCLUDING ELECTRICAL POWER LINES AND EQUIPMENT.

J. MAKE SPLICES, TAPS, AND TERMINATIONS ONLY AT INDICATED OUTLETS, TERMINALS, AND CROSS-CONNECT AND PATCH PANELS.

K. USE SPLICE AND TAP CONNECTORS COMPATIBLE WITH MEDIA TYPES.

END OF SECTION 27 51 23

Scale:	
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Issue:	Date:
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Progress Set	07/03/2024
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REV Permit Set 1	08/14/2024

ELECTRICAL SPECIFICATIONS

ES8.4

PLUMBING SYMBOLS LEGEND

ABBREVIATIONS:

AFF/AFG	ABOVE FINISHED FLOOR/GRADE
AHJ	AUTHORITY HAVING JURISDICTION
BFP	BACKFLOW PREVENTER
BV	BALL VALVE
WCO/CO	WALL CLEANOUT/ CLEANOUT
FCO	FLOOR CLEANOUT
RI	ROUGH-IN
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VTR	VENT THRU ROOF
IW	INDIRECT WASTE

LINETYPES:

——— – ———	COLD WATER (CW)
——— FW ———	FILTERED WATER SUPPLY (FW)
——— – – ———	HOT WATER (HW) 140°, 120°
——— – – – ———	HOT WATER RETURN (HWR) 140°, 120°
——— G ———	GAS LINE (G)
——— ——— ———	PLUMBING VENT (V)
– – – – – –	PLUMBING VENT (V) - BELOW SLAB/GRADE
——— ———	SANITARY WASTE (SAN) - BELOW SLAB/GRADE
——— GW ———	GREASE WASTE (GW) - BELOW SLAB/GRADE

PIPE SYMBOLS:

	PIPE TURNING UP/DOWN
	TEE TURNING UP/DOWN
	SHUTOFF VALVE (BALL TYPE)
	CHECK VALVE
	BALANCING VALVE
	END CAP

WATER HEATER SIZING

ITEMS SERVED	COUNT	MAX GPM	PEAK HOURLY HOT PER (GPH)	TOTAL HOURLY HOT (GPH)	TEMP REQUIRED	TEMP RISE	BTU	KW
MOP SINK	1	5	10	10	120	65	7219.33	1.586899
3-COMP SINK	1	3.5	65	65	140	85	61364.33	13.488643
HAND SINK	6	1	5	30	105	50	16660.00	3.662075
LAVATORY	2	0.5	5	10	105	50	5553.33	1.220692

MAX GPH	GROUND TEMP		TOTAL BTU	TOTAL KW
115	55		90797.000000	19.958309

NOTES:
WHERE: DEMAND (GPH) * TEMP_RISE*8.33/.75 OPERATING EFFICIENCY = XXXX BTU
WHERE: DEMAND (GPH) * TEMP_RISE*8.33/3412 (BTU/KWH) = XXXX KW
ASSUMING A MAX DEMAND FROM WARE WASH OF 1.02 GALLONS PER RACK AND A MAXIMUM USAGE OF 24 RACKS PER HOUR.

GAS FIRED WATER HEATER SCHEDULE

SYMBOL	MANUF.	MODEL	GAL	BTU/HR	GAS PRESSURE	RECOVERY (GPH/100°F)	SET POINT (°F)	NOTES (#)
EX.WH	STATE INDUSTRIES, INC	SBD10019 9NET	100	199000	4.50	192.96	140	(1)

NOTES:
1. EXISTING WATER HEATER TO REMAIN.

BACKFLOW PREVENTER SCHEDULE

LOCATION	TAG	MODEL	ASSE
ESPRESSO MACHINE	DCV-1	WATTS SD-3	1022
COFFEE BREWERS	DCV-2	WATTS SD-2	1022
OTHER EQUIPMENT	DCV-3	WATTS SERIES 7	1024

NOTE:
VERIFY BACKFLOW VALVE REQUIREMENTS AND APPROVAL FOR ALL EQUIPMENT WITH AUTHORITIES HAVING JURISDICTION PRIOR TO INSTALLATION.

GENERAL NOTES

A. PROVIDE ALL LABOR, EQUIPMENT, AND MATERIALS NECESSARY TO EXECUTE THE PLUMBING WORK INDICATED ON THE DRAWINGS, AND AS REQUIRED BY LOCAL CODES AND ORDINANCES.

B. PAY ALL FEES AND ARRANGE FOR EXECUTION OF ALL TAPS, METERS WITH REQUIRED ENCLOSURES (IF ANY), ETC. INHERENT TO THE INSTALLATION OF NEW PLUMBING SERVICE.

C. PLUMBING WORK INCLUDES ALL PIPING FOR DOMESTIC HOT AND COLD WATER LINES, VENT AND SANITARY LINES, HOOK-UP OF ALL FIXTURES SCHEDULED ON THE DRAWINGS, AND INSULATION OF DESIGNATED PIPING RUNS. WORK SHALL ALSO INCLUDE ALL GAS PIPING AND EQUIPMENT CONNECTIONS WHERE REQUIRED.

D. ALL ITEMS SUCH AS FITTINGS, ETC. NOT MENTIONED BUT UNDERSTOOD TO BE NECESSARY TO COMPLETE THE PLUMBING SYSTEM SHALL BE INCLUDED.

E. SOIL, WASTE, AND VENT PIPING SHALL BE OF MATERIAL APPROVED BY LOCAL CODES. PVC, DWV PIPING AND FITTINGS SHALL BE SCHEDULE 40 AS A MINIMUM.

F. PROVIDE CLEANOUTS FOR SOIL AND WASTE LINES AS SHOWN ON DRAWINGS, AND OF TYPE APPROVED BY LOCAL CODES.

G. ALL WATER SUPPLY PIPING BELOW GROUND SHALL BE PEX PIPING UNLESS PROHIBITED BY LOCAL CODES IN WHICH CASE COPPER TUBING SHALL BE USED. (AVOID FITTINGS BELOW SLAB WHENEVER POSSIBLE). ALL WATER SUPPLY PIPING ABOVE GROUND SHALL BE TYPE L HARD COPPER TUBING UNLESS NOTED OTHERWISE. PEX PIPING PASSING THROUGH CONCRETE SLABS SHALL BE SLEEVED WITH PVC BEND SUPPORT BY MANUFACTURER. PROVIDE UPONOR/WIRSBO SERIES: A5500500 FOR 1/2" PEX A5500750 FOR 3/4" PEX A5501000 FOR 1" PEX. PROVIDE CORRUGATED PVC TUBING (1) PIPE DIAMETER LARGER THAN THE PEX TUBING FOR SIZES LARGER THAN 1" PEX.

H. PROVIDE FOR DRAINING WATER SYSTEM, AND CAP ALL STUBS UNTIL FINISH WORK IS INSTALLED. INSTALL DRAIN VALVE AT WATER METER WITH 3/4" HOSE THREAD AND VACUUM BREAKER.

I. PROVIDE STOPS ON WATER SUPPLIES TO EACH FIXTURE & EQUIPMENT.

J. GAS PIPING FOR HEATING SYSTEMS WITH GAS-FIRED EQUIPMENT SHALL BE INCLUDED IN THIS CONTRACT. GAS PIPING SHALL BE STANDARD WEIGHT, BLACK STEEL PIPE, SCHEDULE 40. PIPING EXPOSED TO ATMOSPHERE OR RUN BELOW GRADE SHALL HAVE POLYETHYLENE PLASTIC COATING. ALL GAS PIPING, FITTINGS AND INSTALLATION SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF UTILITY COMPANY AND ALL GOVERNING BODIES.

K. INSULATE ALL COLD AND HOT WATER PIPING PER SPECIFICATIONS. WATER LINES SHOULD NOT BE INSTALLED IN EXTERIOR WALLS TO PREVENT FREEZING. INSULATION SHALL MEET FLAME SPREAD AND SMOKE DEVELOPED RATINGS REQUIRED BY LOCAL CODES.

L. PLUMBING FIXTURES SHALL BE PROVIDED WHERE SHOWN ON THE DRAWINGS. ALL FIXTURE FITTINGS AND EXPOSED FIXTURE PIPING SHALL BE BRASS CHROMIUM PLATED. ALL TRAPS SHALL BE CAST BRASS. ALL FIXTURES SHALL BE EQUAL IN ALL RESPECTS TO FIXTURES SPECIFIED.

M. ROUGH-IN AND FINAL CONNECTIONS OF REQUIRED WASTE, VENT, AND WATER SUPPLY PIPING BY THIS CONTRACTOR. ALL SUPPLY PIPING SHALL BE VALVED.

N. COORDINATE ALL WORK WITH OTHER CONTRACTORS.

O. THIS CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED UNDER THE CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP AND MATERIALS, (USUAL WEAR IS EXPECTED), AND SHOULD ANY SUCH DEFECTS DEVELOP WITHIN A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE BUILDING BY THE OWNER, THIS CONTRACTOR SHALL REPAIR AND/OR REPLACE ANY DEFECTIVE ITEMS AND ALL DAMAGE RESULTING FROM FAILURE OF THESE ITEMS, AT NO EXPENSE WHATSOEVER TO THE OWNER.

P. SEE PLUMBING SHEETS FOR KITCHEN EQUIPMENT SCHEDULE, FIXTURE SCHEDULE, DETAILS AND SANITARY ISOMETRIC.

Q. THE DIRECTION OF THE SANITARY MAIN AND THE LOCATION OF THE GREASE INTERCEPTOR SHALL BE COORDINATED WITH CIVIL DRAWINGS PRIOR TO ROUGH-IN.

R. ALL COLD, HOT, AND FILTERED WATER LINES SHALL BE INSTALLED UNDER SLAB UNLESS NOTED OTHERWISE. COORDINATE WITH OTHER TRADES PRIOR TO ROUGH-IN OF PIPING TO PREVENT CONFLICT.

S. COORDINATE LOCATION AND ROUGH-IN HEIGHT OF KITCHEN EQUIPMENT WITH OWNER AND MILLWORK PRIOR TO ROUGH-IN.

T. MAKE ALL CONNECTIONS TO KITCHEN AND MECHANICAL EQUIPMENT UNLESS OTHERWISE NOTED. USE MILL HARDWOOD 30B35 BRAIDED FLEXIBLE HOSES FOR ALL COUNTERTOP EQUIPMENT.

U. PROVIDE WATER HAMMER ARRESTORS AT THE END RUN OF ALL WATER PIPING. SIZE AS RECOMMENDED BY PLUMBING AND DRAINAGE INSTITUTE, AND AS RECOMMENDED BY THE MANUFACTURER.

V. ALL PIPING (GAS AND WATER) SHALL BE CONCEALED IN WALL SPACE WHEN POSSIBLE.

W. ALL SHUT-OFF VALVES SHALL BE 1/4 TURN VALVES.

X. THIS CONTRACTOR TO INSTALL PEX MANIFOLDS UNDER COUNTER SPACE AND SHALL BE MOUNTED AT 12" A.F.F. UNLESS NOTED OTHERWISE. COORDINATE LOCATION WITH OWNER.

Y. DAMAGE TO EXISTING WALLS, FLOORS, FINISHES ETC. BY THIS CONTRACTOR SHALL BE REPAIRED AT THIS CONTRACTOR'S EXPENSE.

Z. PROVIDE CUT TO LENGTH PEX PIPING SIZED PER EQUIPMENT CONNECTION SCHEDULE. EXTEND FILTERED WATER PEX FROM SHUTOFF VALVE ABOVE CEILING TO EQUIPMENT'S CONNECTION. INSTALL CONNECTION ENDS ON PEX SIZE AND TYPE TO COORDINATE WITH EQUIPMENT CONNECTION. SEE PEX RISERS AND KITCHEN CONNECTION SCHEDULE FOR MORE INFORMATION FOR INSTALLATION DETAILS. COORDINATE WITH OWNER'S REPRESENTATIVE & MILLWORK. SUPPORT PEX AT PROPER INTERVALS TO PREVENT SAGGING.

AA. ALL DRAINAGE PIPING SHALL BE UNIFORMLY PITCHED AT 1/4" PER FOOT FOR PIPE SIZES 2 1/2" AND SMALLER, 1/8" PER FOOT FOR PIPE SIZES 3"-6", AND 1/16" PER FOOT FOR PIPE SIZES 8" OR LARGER UNLESS OTHERWISE REQUIRED BY EXISTING CONDITIONS, OR INDICATED ON DRAWINGS. GREASE LADEN WASTE LINES AND SAND/OIL WASTE LINES SHALL BE INSTALLED AT NO LESS THAN AT 1/4" PER FOOT FALL.

PLUMBING FIXTURE SCHEDULE

SYMBOL	FIXTURE TYPE	MANUFACTURER	MODEL	DESCRIPTION	ACCESSORIES/OPTIONS
WC	WATER CLOSET (ACCESSIBLE)	AMERICAN STANDARD	3461.001.020	FLOOR MOUNT, WHITE VITREOUS CHINA, PROVIDE WITH TOTO TET1LAR#CP 1.28 GPF FLUSH VALVE. LOCATE FLUSH HARDWARE IN ACCORDANCE TO ADA ACCESSIBILITY REQUIREMENTS. MOUNT WATER AT 12"+/- AFF.	PROVIDE WITH QUARTER TURN BRASS ANGLE COMPRESSION STOP WITH LOOSE KEY HANDLE, STAINLESS BRAIDED SUPPLY AND CHROME SUPPLY ESCUTCHEON.
LAV	LAVATORY (ACCESSIBLE)	AMERICAN STANDARD	#0955.001EC MURRO	WALL HUNG, 20½"x18½", WHITE VITREOUS CHINA, TOTO #TEL105-D10E POLISHED CHROME, SINGLE HOLE, ECOPOWER DECK MOUNTED FAUCET WITH 0.09GPC DISCHARGE (10 SECOND CYCLE). MOUNT WASTE INLET AT 18" AFF.	PROVIDE WITH QUARTER TURN BRASS ANGLE COMPRESSION STOPS WITH LOOSE KEY HANDLES, STAINLESS BRAIDED SUPPLIES, CHROME SUPPLY AND DRAIN ESCUTCHEONS, CHROME GRID STRAINER DRAIN WITH TAILPIECE, CHROME PLATED CAST BODY P-TRAP WITH CLEANOUT, AND ZURN #Z-1231-81 LAVATORY CARRIER. INSULATE WASTE AND WATER PIPING WITH AMERICAN STANDRD #0063.000EC ACRYLIC SHROUD.
TP	TRAP PRIMER	PPP	P1-500	AUTOMATIC OPERATION, 1/2" INLET AND OUTLET. SERVICE UP TO FOUR FLOOR DRAINS WITH DISTRIBUTION UNIT.	INSTALL IN ACCESSIBLE LOCATION WITH PRIMER LOCATED MINIMUM OF 6" ABOVE FLOOD LEVEL OF FLOOR DRAIN RIM. PROVIDE ACCESS PANEL AS REQUIRED.
MS	MOP SINK	EXISTING	EXISTING	EXISTING	EXISTING TO REMAIN
MV	MIXING VALVE	ZURN	ZW3870XLT / ZW1070XL	THERMOSTATIC CONTROLLER WITH INTEGRAL CHECKS, ALL BRASS BODY WITH DUAL STAINLESS STEEL STRAINER, VANDAL RESISTANT TEMPERATURE ADJUSTMENT HANDLE. ASSE 1070 COMPLIANT.	SET TO 105°F. MOUNT IN ACCESSIBLE LOCATION.
FD-1	FLOOR DRAIN	ZURN	#ZN415-3NH-5M-P-VP	CAST IRON BODY, 7" DIAMETER BRONZE SERIES C STRAINER, COMBINATION MEMBRANE CLAMP, AND ADJUSTABLE COLLAR.	PROVIDE WITH ASSE 1072 APPROVED TRAP SEAL DEVICE. TRAP SEAL DEVICE SHALL BE TRAP PROSET TRAPGUARD OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE DRAINS IN CUSTOMER AREAS WITH VANDAL RESISTANT SCREWS.
FS-1	FLOOR SINK	ZURN	#FD2370-PV3	12" SQUARE TOP FLOOR SINK W/8" DEEP PVC/CAST IRON BODY & 3" BOTTOM OUTLET (CAST IRON OPTIONAL)	
FS-2	FLOOR SINK	ZURN	#FD2375-NH4 W/ZN1900-2	12" SQUARE TOP FLOOR SINK WITH 6" DEEP ACID RESISTANT ENAMEL CAST IRON BODY AND 3"OUTLET WITH ½" NICKEL BRONZE GRATE.	SET FLOOR SINK LEVEL WITH FINISH FLOOR.
FCO	FLOOR CLEAN OUT	ZURN	#CO2455-PV4	ADJUSTABLE PVC BODY WITH INTEGRAL THREADED PLUG AND SCREW DOWN COVER.	
WCO	WALL CLEAN OUT	ZURN	#CO2412-PVC	PVC BODY WITH PVC PLUG AND THREADED BRASS INSERT FOR CO2530 ROUND ACCESS COVER.	

KITCHEN EQUIPMENT CONNECTION SCHEDULE

ITEM	DESCRIPTION	FW	CW	HW (110°)	HW (140°)	WASTE	VENT	REMARKS
EX.	3-COMP. SINK	--	E	--	E	E	E	EXISTING TO REMAIN
62.22	ICE MACHINE	½"	--	--	--	INDIRECT	--	(2), (4), (5)
67.8	HOT POWDERED DRINK MACHINE	½"	--	--	--	--	--	(2), (5)
68.21	COFFEE BREWER	½"	--	--	--	--	--	(2), (5)
73.7	HAND/DUMP SINK	--	½"	½"		2"	1½"	(2), (6)
130.8	ICED COFFEE BREWER	½"	--	--	--	--	--	(2), (5)
136.5S	ESPRESSO	½"	--	--	--	INDIRECT	--	(2), (4), (5)
155.2	EYE WASH STATION	--	½"	½"	--	--	--	(2)
203.3L	STACKED OVENS	--	¾"	--	--	INDIRECT	--	(1), (3), (4), (5), (7), (8)
208.3	RINSER - IN COUNTER WITH DRAIN PAN	½"	--	--	--	INDIRECT	--	(4), (5)
208.6	RINSER - RESUSABLE CUP RINSER	½"	--	--	--	INDIRECT	--	(4,),(5)

REMARKS:	
1	INSTALL ASSE BACKFLOW PREVENTER PER LOCAL CODES AND SPECIFICATIONS.
2	PROVIDE CUT TO LENGTH PEX PIPING FROM MANIFOLD SHUTOFF TO EQUIPMENT CONNECTION. INSTALL ENDS ON PEX SIZED PER EQUIPMENT CONNECTION.
3	STACKED OVENS COME WITH STAINLESS STEEL DRAIN KIT. KIT IS TO BE INSTALLED WITH AN INDIRECT DRAIN WITH TRAP FROM SINGLE POINT CONNECTION AND EXTEND TO DRAIN.
4	INDIRECT WASTE TO DRAIN W/AIR GAP PER CODE.
5	PROVIDE BACKFLOW PROTECTION PER BACKFLOW PREVENTOR SCHEDULE. COORDINATE BACKFLOW INSTALLATION WITH KITCHEN EQUIPMENT PROVIDER.
6	MOUNT WASTE INLET AT 18" AFF.
7	CHEMICAL FEED UNITS AND INSTALLATION KITS FURNISHED BY OWNER'S REPRESENTATIVE AND INSTALLED BY CONTRACTOR. FEED STATIONS ARE LOCATED BELOW OVEN RACK. CONNECT ONE CHEMICAL UNIT TO EACH OVEN AND LABEL WHICH CHEMICAL UNIT SERVES WHICH OVEN. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
8	PROVIDE SHUT-OFF VALVE WITH 1/2" HOSE TO EACH OVEN, AND LABEL VALVE 'TREATED WATER'. EXTEND AN ADDITIONAL 3/4" COLD WATER LINE FROM PEX MAIN TO 36" AFF AND PROVIDE SHUT-OFF VALVE WITH 1/2" FLEXIBLE HOSE TO EACH OVEN PER MANUFACTURER'S RECOMMENDATIONS, AND LABEL VALVE 'UNTREATED WATER'. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. MAKE ALL FINAL CONNECTIONS. INSTALL TUBING KITS AND WATER FILTRATION SYSTEM AS FURNISHED BY OWNER'S REPRESENTATIVE. COORDINATE EXACT LOCATION WITH OWNER'S REPRESENTATIVE & MILLWORK PRIOR TO ROUGH-IN. PROVIDE PEX FOR COLD WATER AND FILTERED WATER LINES AS REQUIRED.
9	SINK: POLAR WARE 173-4-2, 20 GA. STAINLESS STEEL 2 HOLE LEDGE BACK SINK ONLY, 17"x13"x6" FAUCET: ZURN AQUASPEC Z812A1-XL CENTERSET GOOSNECK FAUCET, 4" CENTERS.
10	SINK: ENCORE FS17D141005XZ STAINLESS STEEL WALL MOUNTED HAND SINK WITH SIDE SPLASH. FAUCET: ZURN AQUASPEC Z812A1-XL-TWM WALL MOUNTED CENTERSET GOOSNECK FAUCET, 4" CENTERS.

GRAVITY GREASE INTERCEPTOR SIZING

CALCULATIONS PROVIDED PER VIRGINIA PLUMBING CODE 2021

FIXTURE	QTY.	DFU	TOTAL
MOP BASIN	1	5	5
3" FLOOR SINK	2	5	10
3" FLOOR DRAIN (EMERGENCY)	3	5	15
DFU VALUES GIVEN AS PER VIRGINIA PLUMBING CODE 2021, TABLE 709.2		DFU TOTAL	30.0

AS PER VIRGINIA PLUMBING CODE 2021 CHAPTER 7 SECTION 709.3 CONVERSION OF GPM VALUE FOR 30 DFU IS 15 GPM.

AS PER VIRGINIA PLUMBING CODE 2021 CHAPTER 10 SECTION 1003.3.7 THE CAPACITY OF GREASE INTERCEPTOR IS PEAK DRAIN FLOW MULTIPLIED BY 30 MINUTES RETENTION TIME.

15(GPM) X 30 (MIN.) = 450 GALLONS.

Scale:	N.T.S
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PLUMBING SCHEDULES AND NOTES

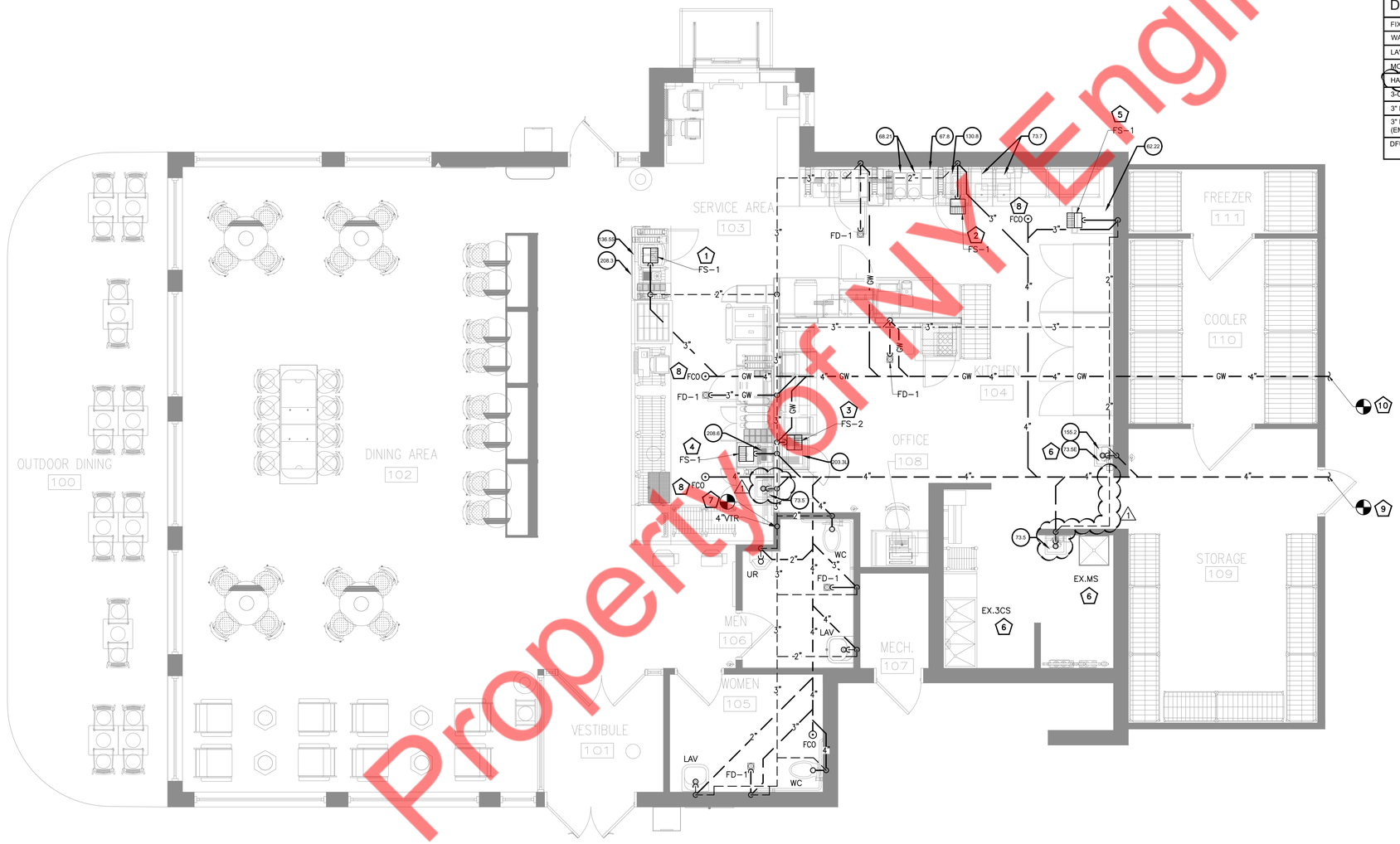
P1.0

SANITARY AND VENT KEYED NOTES:

1. ROUTE INDIRECT WASTE FROM ESPRESSO AND RINSER TO NEW FLOOR SINK WITH APPROVED AIR GAP. MOUNT PVC TO BE OUT OF SIGHT AND ALLOW ACCESS TO ALL EQUIPMENT UNDER COUNTER. VERIFY ROUTING WITH CONSTRUCTION MANAGER.
2. ROUTE INDIRECT WASTE FROM DUMP SINK, ICED COFFEE BREWER, HOT POWERED DRINK MACHINE AND COFFEE BREWER TO NEW FLOOR SINK WITH APPROVED AIR GAP.
3. ROUTE INDIRECT WASTE FROM STACKED OVENS TO NEW FLOOR SINK WITH APPROVED AIR GAP. SANITARY DRAIN PIPING WITHIN 6'-0" SHALL BE OF CAST IRON CONSTRUCTION. LOCATE CENTER OF DRAIN 12" FROM BACK WALL.
4. ROUTE INDIRECT WASTE FROM REUSABLE CUP RINSER TO NEW FLOOR SINK WITH APPROVED AIR GAP.
5. ROUTE INDIRECT WASTE FROM ICE MACHINE TO NEW FLOOR SINK WITH APPROVED AIR GAP.
6. EXISTING PLUMBING FIXTURE WITH ASSOCIATE ACCESSORIES AND FITTINGS TO REMAIN. CONTRACTOR TO FIELD VERIFY CONDITION OF EXISTING PIPING, REPLACE IF REQUIRED.
7. 4" VENT THROUGH ROOF. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION AND SIZE. LOCATE VENT MINIMUM OF 10'-0" FROM AIR INTAKES ON ROOF. VTR SHALL BE EXTENDED HIGHER THAN AIR INTAKES. LOCATE PER ROOF PLAN.
8. FLOOR CLEANOUTS SHALL BE LEVEL AND FLUSH WITH SURROUNDING FLOOR. DO NOT SLOPE FLOOR TO CLEAN OUT.
9. CONNECT NEW 4" SANITARY LINE TO EXISTING SANITARY LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE, LOCATION AND INVERT OF EXISTING SANITARY LINE AND UPGRADE IF REQUIRED.
10. CONNECT NEW 4" GREASE SANITARY LINE TO EXISTING GREASE SANITARY LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE, LOCATION AND INVERT OF EXISTING GREASE SANITARY LINE.

DFU CALCULATIONS

FIXTURE	QTY.	DFU	TOTAL
WATER CLOSET (FLUSH)	2	4	8
LAVATORY	2	1	2
MOP BASIN	1	2	2
HAND SINK	6	1	4
3-COMP SINK	1	INDIRECT DRAIN	INDIRECT DRAIN
3" FLOOR SINK	6	5	30
3" FLOOR DRAIN (EMERGENCY)	0	-	-
DFU VALUES GIVEN AS PER VIRGINIA PLUMBING CODE 2021, TABLE 709.1		DFU TOTAL	46.0



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PLUMBING SANITARY AND VENT FLOOR PLANS
SCALE: 1/4" = 1'-0"

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
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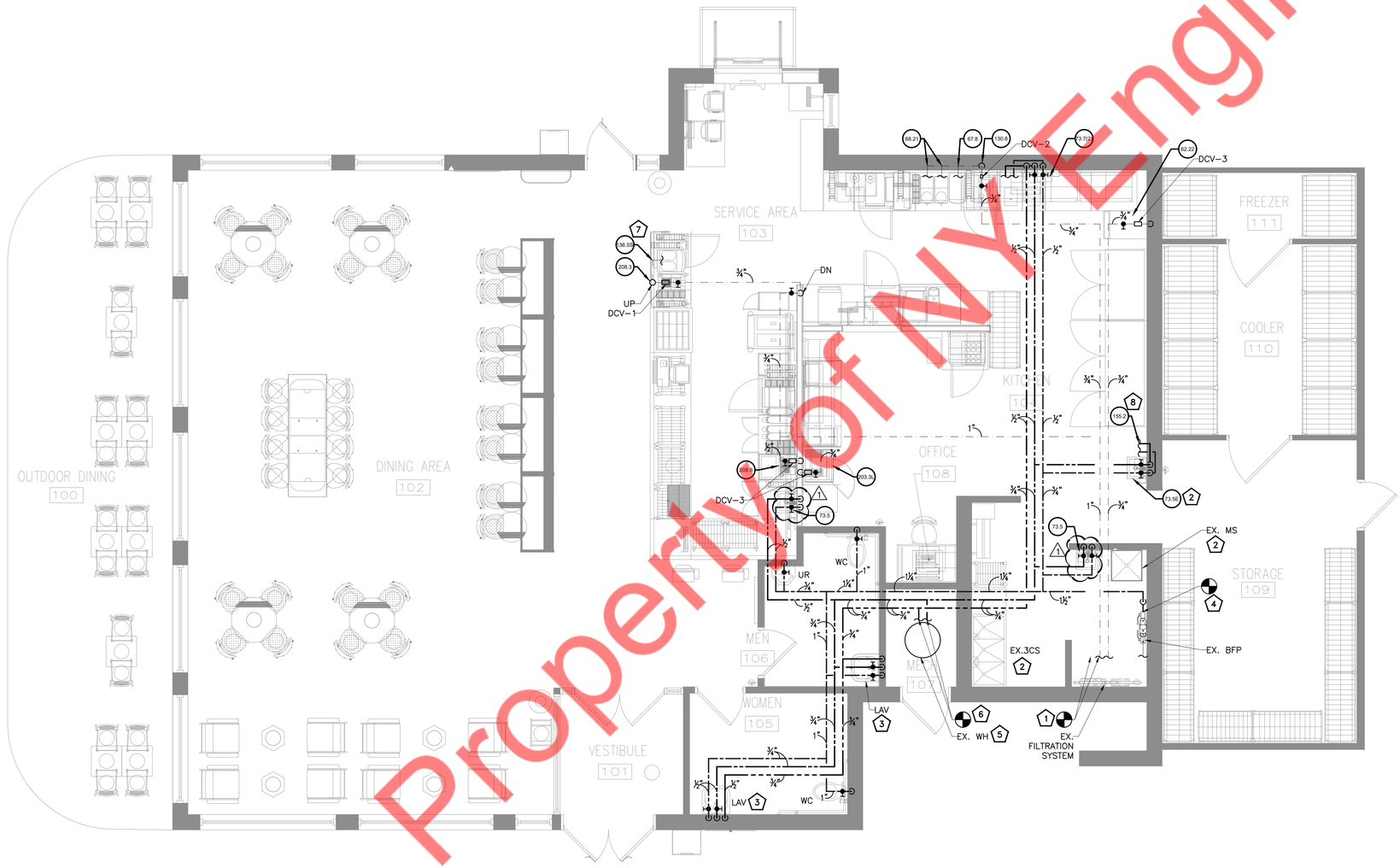
PLUMBING PLAN - SANITARY AND VENT

P1.1



N

PLUMBING WATER FLOOR PLAN

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

DOMESTIC WATER AND GAS KEYED NOTES:

1. CONNECT NEW 3/4" ICE MAKER LINE AND 1" FILTERED WATER LINE TO EXISTING FILTRATION SYSTEM. CONTRACTOR TO PROVIDE ALL CHECK VALVES AND SHUT-OFF VALVES AND TERMINATE BELOW CEILING FOR CONNECTION. VENDOR TO HOOK UP AND COMMISSION WATER FILTRATION SYSTEM PER MANUFACTURER'S RECOMMENDATIONS.
2. EXISTING PLUMBING FIXTURE WITH ASSOCIATE ACCESSORIES AND FITTINGS TO REMAIN. CONTRACTOR TO FIELD VERIFY CONDITION OF EXISTING PIPING AND FIXTURE, REPLACE IF REQUIRED.
3. PROVIDE A THERMOSTATIC MIXING VALVE AT ALL LAVATORIES. SET AT 110°F MAX.
4. CONNECT NEW 1-1/2" CW LINE WITH SHUT OFF VALVE TO EXISTING CW LINE WITH EXISTING BFP IN SPACE. CONTRACTOR TO FIELD VERIFY THE EXACT SIZE, LOCATION OF EXISTING BFP, UPGRADE IF REQUIRED.
5. EXISTING WATER HEATER WITH EXISTING WATER PIPING, ASSOCIATE ACCESSORIES AND FITTINGS TO REMAIN. CONTRACTOR TO FIELD VERIFY CONDITION OF WATER HEATER AND EXISTING PIPING PRIOR TO BID. REPLACE IF REQUIRED.
6. CONNECT NEW 3/4" HW AND 3/4" HWR LINE TO EXISTING HW AND HWR LINE. CONTRACTOR TO FIELD VERIFY THE EXACT SIZE, LOCATION OF EXISTING HW AND HWR LINE.
7. ROUTE PEX PIPING UNDER COUNTER AND UP THROUGH MILLWORK TO EQUIPMENT CONNECTION.
8. PROVIDE 1/2" COLD WATER AND 1/2" HOT WATER TO EYE WASH. EYE WASH TO BE PROVIDED WITH ANSI Z358.1 COMPLAINT MIXING VALVE.

WSFU CALCULATIONS

FIXTURE	QTY.	WSFU	TOTAL
WATER CLOSET (FLUSH)	2	10	20
LAVATORY	2	2	4
MOP BASIN	1	3	3
HAND SINK	6	2	12
3-COMP SINK	1	4	4
BEVERAGE STATION	2	1	2
ICE MAKER	1	1	1
STACKED OVEN	2	1	2
KITCHEN EQUIPMENT (BREWER OR DISPENSER)	7	1.0	7.0
HOSE BIBB	0	3	0.0
WFSU VALUES GIVEN AS PER VIRGINIA PLUMBING CODE 2021, TABLE E103.3(2)	WSFU TOTAL		55.00

WATER CALCULATION

CRITICAL ELEVATIONS AND DISTANCES:	FEET
ELEVATION OF CONTROLLING FIXTURE (WATER CLOSET)	4.0
ELEVATION OF FINISHED FLOOR	0.0
ELEVATION OF WATER MAIN	-4.0
ELEVATION OF WATER ENTRY	-4.0
VERTICAL DIST. FROM WATER MAIN TO CONTROLLING FIXTURE	8.00000
SYSTEM PRESSURE REQUIREMENTS:	PSI
ELEVATION (VERTICAL DISTANCE) X 0.434 PSI/FT	3.5
PRESSURE NEEDED AT CONTROLLING FIXTURE	25
BACKFLOW PREVENTER: 1-1/2"	8.0
WATER METER: 1-1/2"	10.0
FILTRATION SYSTEM	10.0
TOTAL	56.5
PIPE RUNS:	FEET
EXTERIOR, MAIN TO BUILDING ENTRY	100.0
EXTERIOR, VERTICAL RISE	10
INTERIOR, ENTRY TO CONTROLLING FIXTURE	40.0
INTERIOR, VERTICAL RISE	8.0
ALLOWANCE FOR FITTINGS, ETC. (LENGTH X 0.25)	39.5
TOTAL	197.5
SYSTEM PRESSURE DATA:	PSI
STREET PRESSURE	60.0
SYSTEM PRESSURE REQUIRED	56.5
PRESSURE AVAILABLE FOR (PIPING) FRICTION LOSS	3.5
PIPE SIZING:	PSI/100'
PRESSURE AVAILABLE X 100 / (TOTAL PIPE RUN)	1.8
* NOTE: ALL PIPING IS SIZED FOR 5 PSI/100' PRESSURE LOSS	

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

PLUMBING PLAN - DOMESTIC WATER

P1.2

(#) GAS KEYED NOTES:

1. EXTEND AND CONNECT NEW GAS LINE TO EXISTING GAS LINE OF EXISTING WATER HEATER AND EXISTING RTU-1.
2. CONNECT NEW 2" GAS LINE TO EXISTING GAS METER. CONTRACTOR TO FIELD VERIFY EXISTING GAS METER CAPACITY IS EQUAL TO OR GREATER THAN 819 MBH UPGRADE EXISTING GAS METER IF REQUIRED. COORDINATE ALL WORK WITH UTILITY COMPANY AND LANDLORD.

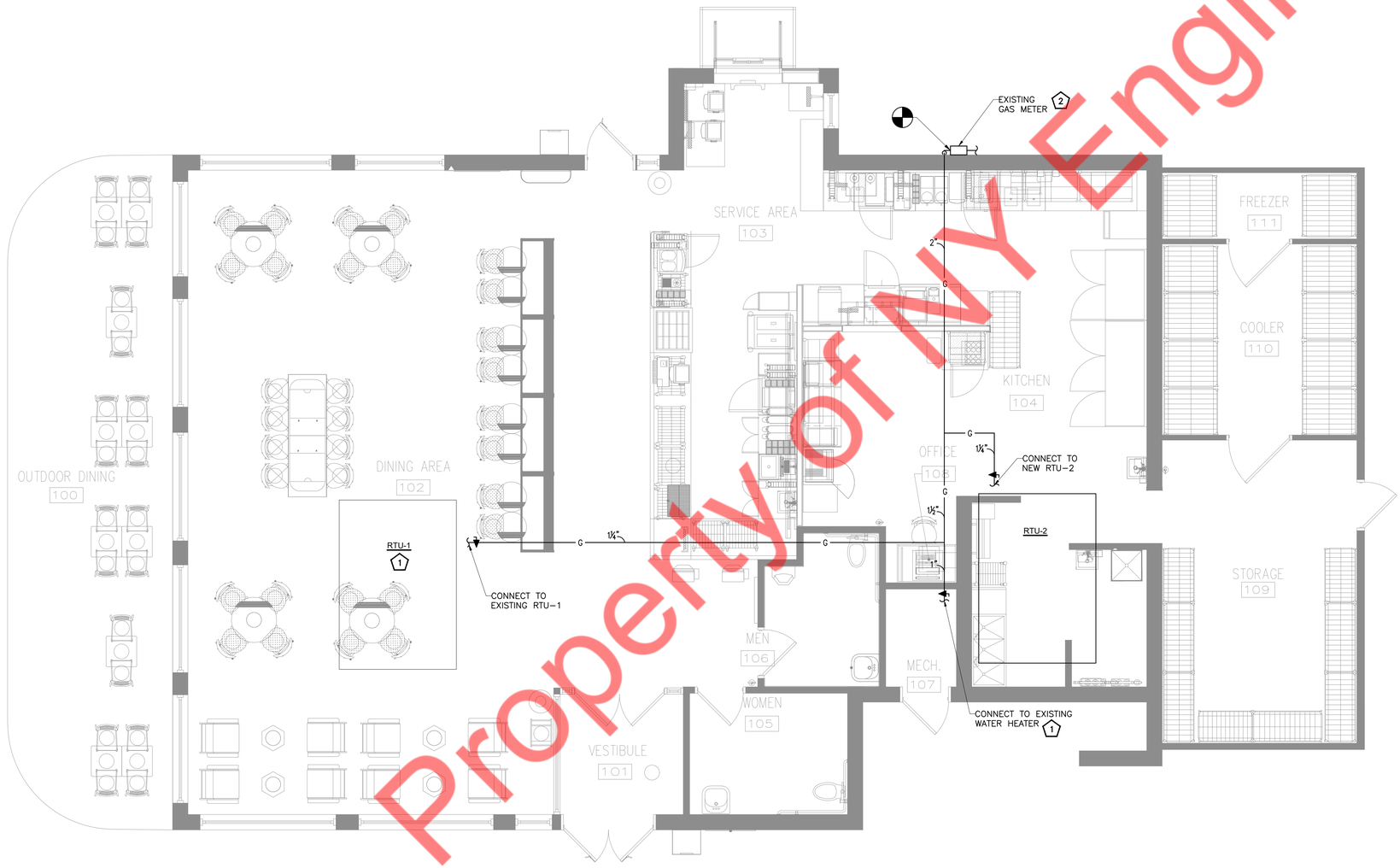
NATURAL GAS CALCULATIONS

EQUIPMENT	MBH
RTU-1	360
RTU-2	260
WH-1	199
TOTAL GAS LOAD (MBH)	819.00000

NOTE:

2" GAS LINE REQUIRED BASED ON 70'-0" TOTAL LENGTH OF PIPE AT LESS THAN 2 PSI

GAS LOAD BASED ON VIRGINIA FUEL GAS CODE 2021, SECTION 402 (IFGS) PIPE SIZING, 402.2 MAXIMUM GAS DEMAND, TABLE 402.4(2) SCHEDULE 40 METALLIC PIPE.



N

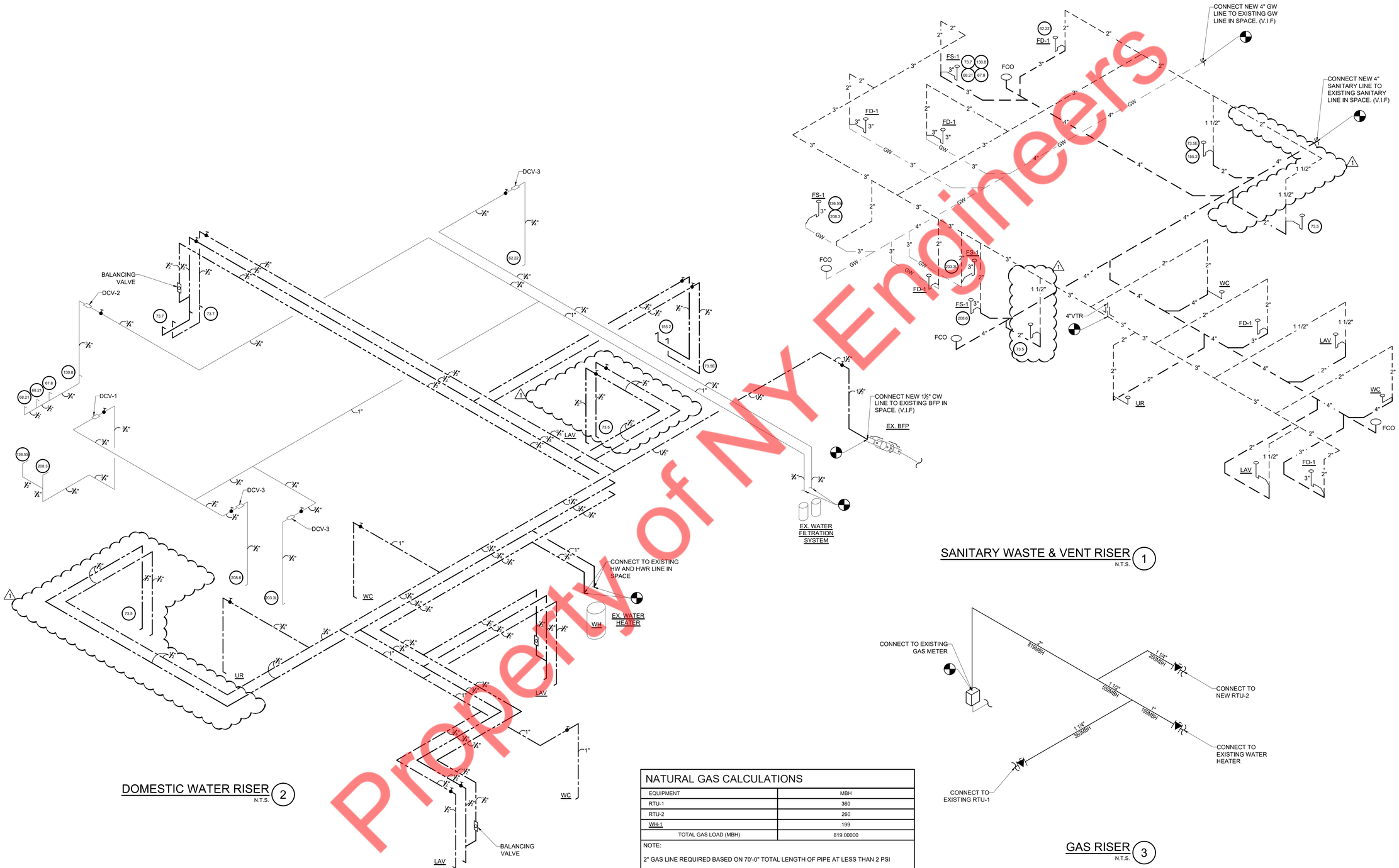
PLUMBING GAS FLOOR PLAN

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

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

PLUMBING PLAN - NATURAL GAS

P1.3



DOMESTIC WATER RISER (2)
N.T.S.

SANITARY WASTE & VENT RISER (1)
N.T.S.

GAS RISER (3)
N.T.S.

NATURAL GAS CALCULATIONS

EQUIPMENT	MBH
RTU-1	360
RTU-2	260
WH-1	199
TOTAL GAS LOAD (MBH)	819.00000

NOTE:

2" GAS LINE REQUIRED BASED ON 70'-0" TOTAL LENGTH OF PIPE AT LESS THAN 2 PSI

GAS LOAD BASED ON VIRGINIA FUEL GAS CODE 2021, SECTION 402 (IFGS) PIPE SIZING, 402.2 MAXIMUM GAS DEMAND, TABLE 402.4(2) SCHEDULE 40 METALLIC PIPE.

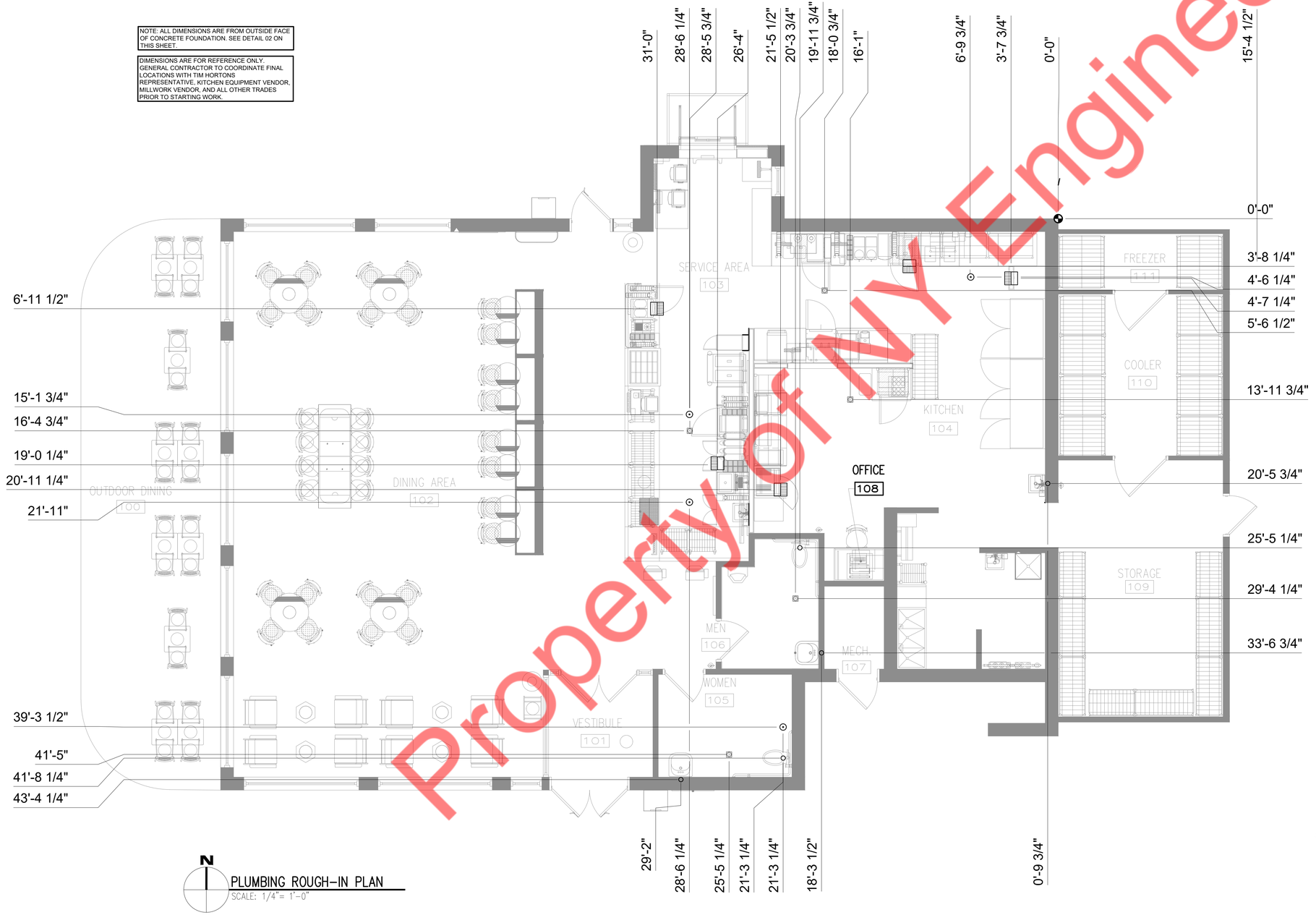
Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

PLUMBING RISER

P2.1

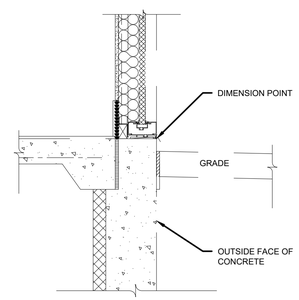
NOTE: ALL DIMENSIONS ARE FROM OUTSIDE FACE OF CONCRETE FOUNDATION. SEE DETAIL 02 ON THIS SHEET.

DIMENSIONS ARE FOR REFERENCE ONLY. GENERAL CONTRACTOR TO COORDINATE FINAL LOCATIONS WITH TIM HORTONS REPRESENTATIVE, KITCHEN EQUIPMENT VENDOR, MILLWORK VENDOR, AND ALL OTHER TRADES PRIOR TO STARTING WORK.



N

PLUMBING ROUGH-IN PLAN
SCALE: 1/4"= 1'-0"



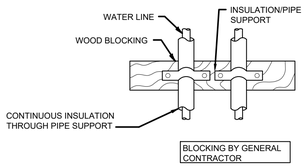
SEE DETAIL ON SHEET A7 FOR MORE DETAILS

DIMENSION POINT DETAIL 02
NOT TO SCALE

Scale:	1/4 = 1'-0"
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

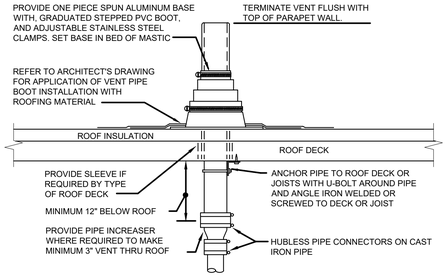
PLUMBING PLAN - ROUGH - IN

P3.1



PIPE SUPPORT (IN-WALL) 07

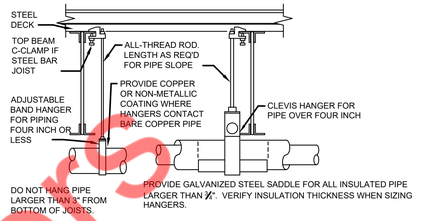
NOT TO SCALE



REFER TO PLANS FOR VTR PIPE SIZES AND LOCATIONS. LOCATE VTR A MINIMUM OF 10 FEET HORIZONTAL (UNLESS APPROVED BY ENGINEER PRIOR TO INSTALLATION) OR THREE FEET VERTICAL ABOVE ANY BUILDING OPENING OR FRESH AIR INTAKE, AND ONE FOOT FROM ANY VERTICAL SURFACE. PROVIDE 1" FIBERGLASS INSULATION WITH ALL-SERVICE JACKET ON VENT PIPE INSIDE BUILDING WITHIN SIX FEET OF VENT THRU ROOF LOCATION. VERIFY FLASHING AND COUNTERFLASHING WITH ROOFING CONTRACTOR.

VENT THROUGH ROOF DETAIL 04

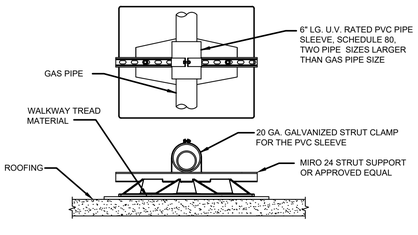
NOT TO SCALE



PROVIDE UPPER ATTACHMENT AS REQUIRED FOR CASES NOT SHOWN HERE. DO NOT INSTALL HANGER INSIDE INSULATION OR OTHERWISE PENETRATE VAPOR BARRIER. DO NOT HANG ONE PIPE FROM ANOTHER EXCEPT IN CHASES. TRAPEZE HANGERS MAY BE USED FOR MULTIPLE PARALLEL PIPES. HANGER SPACING FOR PIPE SIZE: COPPER: 4"=12'-0"; 3"=11'-0"; 2½"=10'-0"; 2"=9'-0"; 1½"=8'-0"; 1¼"=7'-0"; 1" & ¾"=6'-0"; ½"=5'-0". CAST IRON: 10'-0" AND ONE NEAR ALL JOINTS. STEEL: 4"=14'-0"; 3"=12'-0"; 2½"=11'-0"; 2"=10'-0"; 1½"=9'-0"; 1"=7'-0"; ¾"=6'-0"; ½"=5'-0". LOCATE HANGERS AS CLOSE AS POSSIBLE TO TURNS AND TEES OF PIPE. PROVIDE SUPPLEMENTARY STEEL STRUTS BETWEEN JOISTS IF REQUIRED. LOCATE HANGERS TO TAKE LOAD OFF OF EQUIPMENT CONNECTIONS. ANCHOR WATER PIPE AGAINST SWAYING DUE TO CHANGES IN WATER VELOCITY. PROVIDE SEISMIC BRACING IF/AS REQUIRED BY LOCAL AUTHORITIES. CHAINS OR PERFORATED STRAP IRON OR STEEL IS NOT ACCEPTABLE. REFER TO CODES FOR FURTHER INFORMATION.

PIPE HANGERS 01

NOT TO SCALE

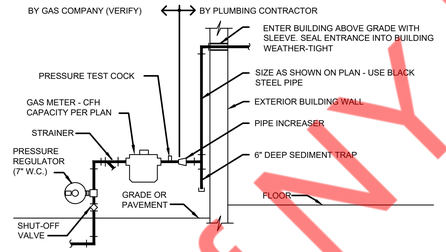


NOTES:

1. SUPPORT REQUIRED 10'-0" O.C. AND AT ALL CHANGES IN DIRECTION.
2. INCREASE IN HEIGHT AS REQUIRED FOR ROUTING ABOVE ROOF MOUNTED ACCESSORIES SUCH AS EXPANSION JOINTS AND TO ACCOMMODATE SLOPE.

ROOF GAS PIPE SUPPORT 08

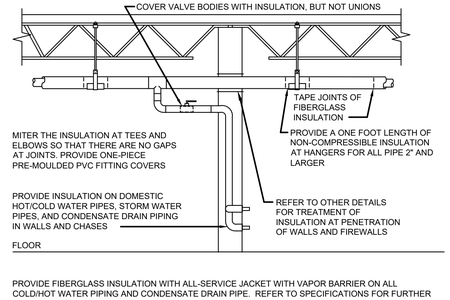
NOT TO SCALE



VERIFY REQUIREMENTS FOR METERING AND PIPING WITH GAS COMPANY. GAS COMPANY SHALL EXCAVATE, BACKFILL, AND REPAIR PAVING AND SOD FOR GAS SERVICE LINE INSTALLATION FROM MAIN TO BUILDING. PLUMBING CONTRACTOR TO PAY ALL GAS COMPANY FEES FOR THIS INSTALLATION. USE WELDED OR SCREWED PIPE AND FITTINGS PER SPECIFICATIONS. PAINT EXPOSED METAL GAS PIPE, FITTINGS AND ITEMS TO MATCH BUILDING.

GAS SERVICE 05

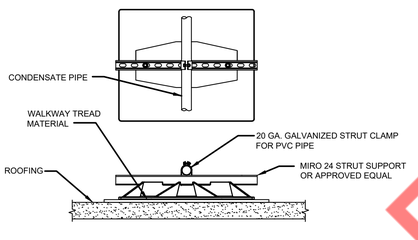
NOT TO SCALE



PROVIDE FIBERGLASS INSULATION WITH ALL-SERVICE JACKET WITH VAPOR BARRIER ON ALL COLD/HOT WATER PIPING AND CONDENSATE DRAIN PIPE. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION REGARDING INSULATION. INSTALL ALL ITEMS PER SPECIFICATIONS AND MANUFACTURERS INSTRUCTIONS. MAINTAIN VAPOR BARRIER ON COLD PIPING BY MEANS OF SEALANT AND TAPE. FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES SHALL NOT EXCEED 25/50. SEAL EXPOSED ENDS OF FIBERGLASS INSULATION WITH ADHESIVE MASTIC.

PIPE INSULATION 02

NOT TO SCALE

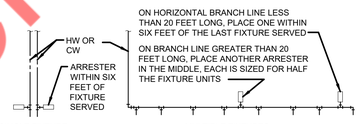


NOTES:

1. SUPPORT REQUIRED 10'-0" O.C. AND AT ALL CHANGES IN DIRECTION.
2. INCREASE IN HEIGHT AS REQUIRED FOR ROUTING ABOVE ROOF MOUNTED ACCESSORIES SUCH AS EXPANSION JOINTS AND TO ACCOMMODATE SLOPE.

ROOF CONDENSATE PIPE SUPPORT 09

NOT TO SCALE



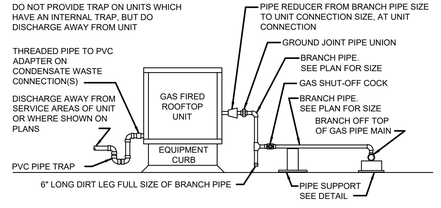
PDI SIZE	FIXTURE UNIT LOAD
AA	1-3
A	4-11
B	12-32
C	33-60
D	61-113

FIXTURE UNIT TABULATION		
FIXTURE	COLD	HOT
WATER CLOSET (VALVE)	10	-
LAVATORY	1.5	1.5
KITCHEN SINKS	3	3
MOP SINK	2.25	2.25
HAND SINKS	1.5	1.5
WALL HYDRANT/HOSE BIB	2	2

PC TO PROVIDE WATER HAMMER ARRESTERS BY SIOUX CHIEF, PRECISION PLUMBING PRODUCTS, WATTS OR APPROVED EQUIVALENT WITH PISTON AND 0-RING CONSTRUCTION, HAVING PDI #WH-201, ASSE #1010 OR ANSI #A112.26.1M CERTIFICATION. SIZE AND INSTALL PER PDI #WH-201 STANDARD OR MANUFACTURER'S INSTRUCTION. THE TABLES ABOVE ARE BASED ON THE SIOUX CHIEF PRODUCT LINE. IF PRESSURE IS IN EXCESS OF 65 PSIG THEN UPSIZE THE ARRESTER BY ONE (EXAMPLE: AN 'A' ARRESTER WOULD BECOME A 'B' ARRESTER.)

WATER HAMMER ARRESTOR 06

NOT TO SCALE



PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST AS REQUIRED.

ROOFTOP UNIT CONNECTIONS 03

NOT TO SCALE

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
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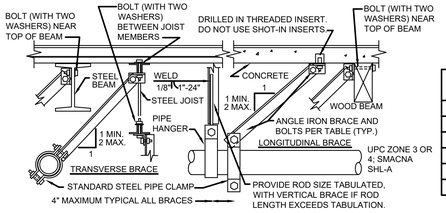
PLUMBING DETAILS

P4.1



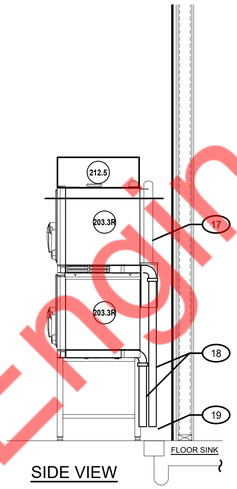
PIPE SIZE	SPACING TR.	SPACING LO.	TRANSVERSE BRACE	LONGITUDINAL BRACE	BOLT SIZE	ROD SIZE	MAX ROD LENGTH	VERTICAL BRACE
1"-2"	20'	20'	2"X2"X18GA	2"X2"X18GA	⅜"	⅜"	20"	2"X2"X18GA
2½"-3"	40'	40'	2½"X2½"X16GA	2½"X2½"X16GA	⅜"	⅜"	25"	2"X2"X16GA
4"-5"	40'	40'	2½"X2½"X16GA	2½"X2½"X16GA	½"	½"	31"	2"X2"X16GA
6"	40'	40'	2½"X2½"X12GA	2½"X2½"X12GA	½"	½"	37"	2½"X2½"X16GA
8"	40'	40'	2½"X2½"X12GA	2½"X2½"X12GA	⅝"	⅝"	43"	2½"X2½"X12GA
10"	20'	20'	2½"X2½"X12GA	2½"X2½"X12GA	⅝"	⅝"	43"	2½"X2½"X12GA

DO NOT BRACE ANY PIPES WHERE TOP OF PIPE TO BOTTOM OF UPPER ATTACHMENT IS LESS THAN 12". BRACE GAS, OIL AND AIR PIPES 1" AND LARGER. BRACE ALL PIPES IN EQUIPMENT ROOMS 1-1/4" AND LARGER. BRACE ALL OTHER PIPE 2-1/2" AND LARGER. BRACE HUBLESS CAST IRON PIPE ON EACH SIDE OF ANY CHANGE IN DIRECTION OF 90 DEGREES OR MORE. MAXIMUM HANGER ROD LENGTH IS 6 FEET. WHERE LENGTH OF RUN EXCEEDS LONGITUDINAL BRACE SPACING, PROVIDE 2 FEET OFFSET IN PIPE AND LOCATE BRACE AT MID RUNS. REFER TO CURRENT EDITION OF SMACNA "SEISMIC RESTRAINT MANUAL" FOR ALTERNATIVE ATTACHMENTS AND ADDITIONAL INFORMATION AND REQUIREMENTS. (THIS DETAIL APPLIES IN THE ABSENCE OF OTHER LOCAL CODE REQUIREMENTS.)

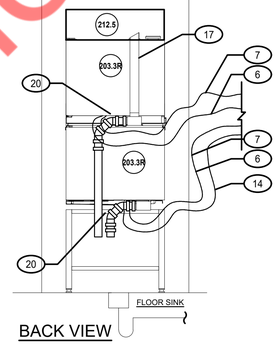
SEISMIC BRACING FOR PIPE 04
NOT TO SCALE

NOTES:

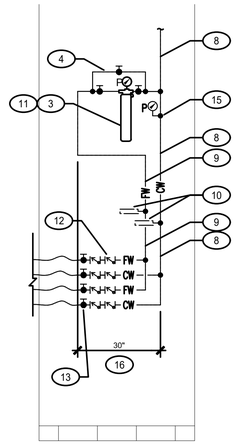
1. DETAIL IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL REVIEW SITE SPECIFIC DRAWINGS PRIOR TO ROUGHING IN AND ADJUST TO SUIT.
2. GENERAL CONTRACTOR SHALL PERFORM A PRESSURE TEST ON INCOMING WATER LINE AND DOWNSTREAM OF WATER TREATMENT SYSTEM FOR OVEN(S) AND SUBMIT THE RESULTS BACK TO THE ENGINEER AND TIM HORTON'S PROJECT MANAGER FOR REVIEW.
3. WATER TREATMENT SYSTEM (3M) FURNISHED WITH OVEN AND INSTALLED BY GENERAL CONTRACTOR.
4. 3/4" BY-PASS LINE CW BY-PASS VALVES ON WATER TREATMENT SYSTEM PROVIDED BY GENERAL CONTRACTOR.
5. ALL PIPING SHOWN SHALL BE 1/2" UNLESS OTHERWISE NOTED.
6. CW: COLD WATER LINE.
7. FW: FILTERED WATER LINE.
8. 3/4" COLD WATER LINE PROVIDED BY GENERAL CONTRACTOR.
9. 3/4" FILTERED WATER LINE PROVIDED BY GENERAL CONTRACTOR.
10. WATER HAMMER ARRESTOR WATTS MODEL LF15M2 SIZE: 3/4". PROVIDED BY GENERAL CONTRACTOR
11. MAINTAIN MINIMUM 3" CLEARANCE BELOW FILTER CARTRIDGES UPON COMPLETION OF ALL WORK FOR REMOVAL/INSTALLATION OF FILTERS.
12. DUAL CHECK VALVE "APOLLO 4N-300 SERIES" OR "WATTS 7 SERIES". (TYP. FOR 4)
13. TERMINATE CW & FW PIPING DOWNSTREAM OF D.U.C. CW SHUT-OFF VALVE AND 3/4" M.P.T. CONNECTION. THIS CONTRACTOR SHALL PROVIDE FINAL CONNECTION OF PRE-INSTALLED WATER PIPING FURNISHED WITH RATIONAL OVENS DOWNSTREAM OF SHUT-OFF VALVES. GENERAL CONTRACTOR SHALL FIELD VERIFY DISTANCE FROM OVEN TO LOCATION OF WATER TREATMENT SYSTEM AND PROVIDE ADDITIONAL LENGTH OF 1/2" PEX CW 3/4" N.P.T. FITTINGS WHERE REQUIRED TO SUIT. (TYP. FOR 4)
14. 1/2" WATER LINE PROVIDED WITH OVEN, TERMINATED WITH 3/4" F.P.T. CONNECTION. PIPING PRE-INSTALLED ON OVEN. (TYP. FOR 4)
15. PRESSURE GAUGE BOSHART INDUSTRIES MODEL PGS-100-G (MAXIMUM 100 P.S.I.) PROVIDED BY GENERAL CONTRACTOR.
16. ENSURE ALL PLUMBING FITTINGS, GAUGES, BACK FLOW PREVENTERS AND PIPING TO BE INSTALLED WITHIN THE WALL SPACE AS NOTED ON THE DETAIL.
17. PRE-INSTALLED STAINLESS STEEL VENT PIPE FOR THE BOTTOM OVEN. GENERAL CONTRACTOR TO PROVIDE PRE-MOULDED GLASS-FIBER INSULATION WITH ZESTON 2000 PVC JACKETING.
18. 2" COPPER DWV CW PRE-MOULDED GLASS-FIBER INSULATION WITH ZESTON 2000 PVC JACKETING. INSTALL HORIZONTAL SECTIONS OF DRAIN LINE WITH MINIMUM 5% / 3" SLOPE. SUPPLIED AND INSTALLED BY GENERAL CONTRACTOR
19. MAINTAIN MINIMUM 1" AIR GAP AT FD-3.
20. THREE (3) 45° ELBOWS ARE REQUIRED. REFER TO MANUFACTURER'S INSTALLATION MANUAL FOR DETAILS.



SIDE VIEW

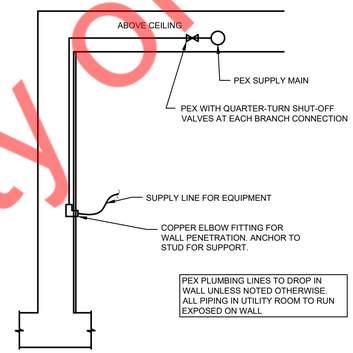


BACK VIEW

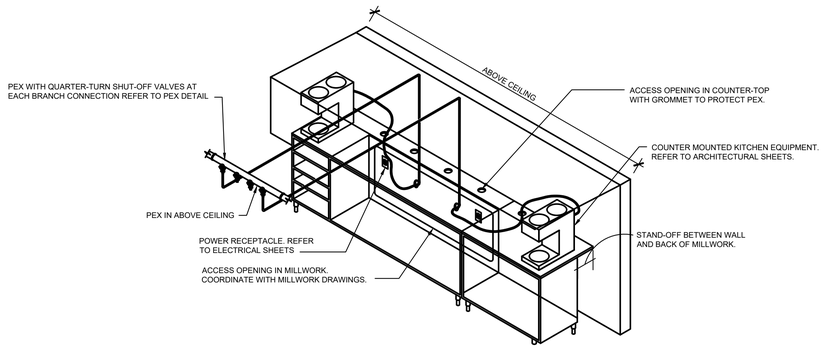


ELEVATION VIEW

STACKED OVEN INSTALLATION DETAIL 01
NOT TO SCALE



PEX WALL INSTALLATION 03
NOT TO SCALE



PEX CABINET INSTALLATION 02
NOT TO SCALE

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
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PLUMBING DETAILS

P4.2

DIVISION 22 - PLUMBING SPECIFICATIONS

BASIC MECHANICAL MATERIALS AND METHODS SECTION 22 00 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. PIPING MATERIALS AND INSTALLATION INSTRUCTIONS COMMON TO MOST PIPING SYSTEMS.
2. TRANSITION FITTINGS.
3. DIELECTRIC FITTINGS.
4. MECHANICAL SLEEVE SEALS.
5. SLEEVES.
6. ESCUTCHEONS.
7. GROUT.
8. PLUMBING DEMOLITION.
9. EQUIPMENT INSTALLATION REQUIREMENTS COMMON TO EQUIPMENT SECTIONS.
10. PAINTING AND FINISHING.
11. CONCRETE BASES.
12. SUPPORTS AND ANCHORAGES.

1.3 DEFINITIONS

A. FINISHED SPACES: SPACES OTHER THAN MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS, FURRED SPACES, PIPE CHASES, UNHEATED SPACES IMMEDIATELY BELOW ROOF, SPACES ABOVE CEILINGS, UNEXCAVATED SPACES, CRAWLSPACES, AND TUNNELS.

B. EXPOSED, INTERIOR INSTALLATIONS: EXPOSED TO VIEW INDOORS. EXAMPLES INCLUDE FINISHED OCCUPIED SPACES AND MECHANICAL EQUIPMENT ROOMS.

C. EXPOSED, EXTERIOR INSTALLATIONS: EXPOSED TO VIEW OUTDOORS OR SUBJECT TO OUTDOOR AMBIENT TEMPERATURES AND WEATHER CONDITIONS. EXAMPLES INCLUDE ROOFTOP LOCATIONS.

D. CONCEALED, INTERIOR INSTALLATIONS: CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS. EXAMPLES INCLUDE ABOVE CEILINGS AND IN CHASES.

E. CONCEALED, EXTERIOR INSTALLATIONS: CONCEALED FROM VIEW AND PROTECTED FROM WEATHER CONDITIONS AND PHYSICAL CONTACT BY BUILDING OCCUPANTS BUT SUBJECT TO OUTDOOR AMBIENT TEMPERATURES. EXAMPLES INCLUDE INSTALLATIONS WITHIN UNHEATED SHELTERS.

F. THE FOLLOWING ARE INDUSTRY ABBREVIATIONS FOR PLASTIC MATERIALS:

1. ABS: ACRYLONITRILE-BUTADIENE-STYRENE PLASTIC.
2. CPVC: CHLORINATED POLYVINYL CHLORIDE PLASTIC.
3. PE: POLYETHYLENE PLASTIC.
4. PVC: POLYVINYL CHLORIDE PLASTIC.

G. THE FOLLOWING ARE INDUSTRY ABBREVIATIONS FOR RUBBER MATERIALS:

1. EPDM: ETHYLENE-PROPYLENE-DIENE TERPOLYMER RUBBER.
2. NBR: ACRYLONITRILE-BUTADIENE RUBBER.

1.4 SUBMITTALS

A. PRODUCT DATA: FOR THE FOLLOWING:

1. TRANSITION FITTINGS.
2. DIELECTRIC FITTINGS.
3. MECHANICAL SLEEVE SEALS.
4. ESCUTCHEONS.

B. WELDING CERTIFICATES.

1.5 QUALITY ASSURANCE

A. STEEL SUPPORT WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO AWS D1.1, "STRUCTURAL WELDING CODE--STEEL."

B. STEEL PIPE WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE: SECTION IX, "WELDING AND BRAZING QUALIFICATIONS."

1. COMPLY WITH PROVISIONS IN ASME B31 SERIES, "CODE FOR PRESSURE PIPING."
2. CERTIFY THAT EACH WELDER HAS PASSED AWS QUALIFICATION TESTS FOR WELDING PROCESSES INVOLVED AND THAT CERTIFICATION IS CURRENT.

C. ELECTRICAL CHARACTERISTICS FOR PLUMBING EQUIPMENT: EQUIPMENT OF HIGHER ELECTRICAL CHARACTERISTICS MAY BE FURNISHED PROVIDED SUCH PROPOSED EQUIPMENT IS APPROVED IN WRITING AND CONNECTING ELECTRICAL SERVICES, CIRCUIT BREAKERS, AND CONDUIT SIZES ARE APPROPRIATELY MODIFIED. IF MINIMUM ENERGY RATINGS OR EFFICIENCIES ARE SPECIFIED, EQUIPMENT SHALL COMPLY WITH REQUIREMENTS.

1.6 DELIVERY, STORAGE, AND HANDLING

A. DELIVER PIPES AND TUBES WITH FACTORY-APPLIED END CAPS. MAINTAIN END CAPS THROUGH SHIPPING, STORAGE, AND HANDLING TO PREVENT PIPE END DAMAGE AND TO PREVENT ENTRANCE OF DIRT, DEBRIS, AND MOISTURE.

B. STORE PLASTIC PIPES PROTECTED FROM DIRECT SUNLIGHT. SUPPORT TO PREVENT SAGGING AND BENDING.

1.7 COORDINATION

A. ARRANGE FOR PIPE SPACES, CHASES, SLOTS, AND OPENINGS IN BUILDING STRUCTURE DURING PROGRESS OF CONSTRUCTION, TO ALLOW FOR PLUMBING INSTALLATIONS.

B. COORDINATE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SET SLEEVES IN POURED-IN-PLACE CONCRETE AND OTHER STRUCTURAL COMPONENTS AS THEY ARE CONSTRUCTED.

C. COORDINATE REQUIREMENTS FOR ACCESS PANELS AND DOORS FOR PLUMBING ITEMS REQUIRING ACCESS THAT ARE CONCEALED BEHIND FINISHED SURFACES. ACCESS PANELS AND DOORS ARE SPECIFIED IN DIVISION 08 SECTION "ACCESS DOORS AND FRAMES."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. IN OTHER PART 2 ARTICLES WHERE SUBPARAGRAPH TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY FOR PRODUCT SELECTION:

1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE MANUFACTURERS SPECIFIED.
2. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE MANUFACTURERS SPECIFIED.

2.2 PIPE, TUBE, AND FITTINGS

A. PIPE THREADS: ASME B1.20.1 FOR FACTORY-THREADED PIPE AND PIPE FITTINGS.

2.3 JOINING MATERIALS

A. PIPE-FLANGE GASKET MATERIALS: SUITABLE FOR CHEMICAL AND THERMAL CONDITIONS OF PIPING SYSTEM CONTENTS.

1. ASME B16.21, NONMETALLIC, FLAT, ASBESTOS-FREE, 1/8-INCH MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.
a. FULL-FACE TYPE: FOR FLAT-FACE, CLASS 125, CAST-IRON AND CAST-BRONZE FLANGES.
b. NARROW-FACE TYPE: FOR RAISED-FACE, CLASS 250, CAST-IRON AND STEEL FLANGES.
2. AWWA C110, RUBBER, FLAT FACE, 1/8 INCH THICK, UNLESS OTHERWISE INDICATED; AND FULL-FACE OR RING TYPE, UNLESS OTHERWISE INDICATED.

B. FLANGE BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL, UNLESS OTHERWISE INDICATED.

C. PLASTIC, PIPE-FLANGE GASKET, BOLTS, AND NUTS: TYPE AND MATERIAL RECOMMENDED BY PIPING SYSTEM MANUFACTURER, UNLESS OTHERWISE INDICATED.

D. SOLDER FILLER METALS: ASTM B 32, LEAD-FREE ALLOYS. INCLUDE WATER-FLUSHABLE FLUX ACCORDING TO ASTM B 813.

E. BRAZING FILLER METALS: AWS A5.8, BCUP SERIES, COPPER-PHOSPHORUS ALLOYS FOR GENERAL-DUTY BRAZING, UNLESS OTHERWISE INDICATED; AND AWS A5.8, BAG1, SILVER ALLOY FOR REFRIGERANT PIPING, UNLESS OTHERWISE INDICATED.

F. WELDING FILLER METALS: COMPLY WITH AWS D10.12 FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND CHEMICAL ANALYSIS OF STEEL PIPE BEING WELDED.

G. SOLVENT CEMENTS FOR JOINING PLASTIC PIPING:

1. ABS PIPING: ASTM D 2235.
2. CPVC PIPING: ASTM F 493.
3. PVC PIPING: ASTM D 2564. INCLUDE PRIMER ACCORDING TO ASTM F 656.
4. PVC TO ABS PIPING TRANSITION: ASTM D 3138.

H. FIBERGLASS PIPE ADHESIVE: AS FURNISHED OR RECOMMENDED BY PIPE MANUFACTURER.

2.4 TRANSITION FITTINGS

A. AWWA TRANSITION COUPLINGS: SAME SIZE AS, AND WITH PRESSURE RATING AT LEAST EQUAL TO AND WITH ENDS COMPATIBLE WITH, PIPING TO BE JOINED.

1. MANUFACTURERS:
a. CASCADE WATERWORKS MFG. CO.
b. DRESSER INDUSTRIES, INC.; DMD DIV.
c. FORD METER BOX COMPANY, INCORPORATED (THE); PIPE PRODUCTS DIV.
d. JCM INDUSTRIES.
e. SMITH-BLAIR, INC.
f. VIKING JOHNSON.
2. UNDERGROUND PIPING NPS 1-1/2 AND SMALLER: MANUFACTURED FITTING OR COUPLING.
3. UNDERGROUND PIPING NPS 2 AND LARGER: AWWA C219, METAL SLEEVE-TYPE COUPLING.
4. ABOVEGROUND PRESSURE PIPING: PIPE FITTING.

B. PLASTIC-TO-METAL TRANSITION FITTINGS: CPVC AND PVC ONE-PIECE FITTING WITH MANUFACTURER'S SCHEDULE 80 EQUIVALENT DIMENSIONS; ONE END WITH THREADED BRASS INSERT, AND ONE SOLVENT-CEMENT-JOINT END.

1. MANUFACTURERS:
a. ESLON THERMOPLASTICS.

C. PLASTIC-TO-METAL TRANSITION ADAPTORS: ONE-PIECE FITTING WITH MANUFACTURER'S SDR 11 EQUIVALENT DIMENSIONS; ONE END WITH THREADED BRASS INSERT, AND ONE SOLVENT-CEMENT-JOINT END.

1. MANUFACTURERS:
a. THOMPSON PLASTICS, INC.

D. PLASTIC-TO-METAL TRANSITION UNIONS: MSS SP-107, CPVC AND PVC FOUR-PART UNION. INCLUDE BRASS END, SOLVENT-CEMENT-JOINT END, RUBBER O-RING, AND UNION NUT.

1. MANUFACTURERS:
a. NIBCO INC.
b. NIBCO, INC.; CHEMTROL DIV.

E. FLEXIBLE TRANSITION COUPLINGS FOR UNDERGROUND COMPRESSOR DRAINAGE PIPING: ASTM C 1173 WITH ELASTOMERIC SLEEVE, ENDS SAME SIZE AS PIPING TO BE JOINED, AND CORROSION-RESISTANT METAL BAND ON EACH END.

1. MANUFACTURERS:
a. CASCADE WATERWORKS MFG. CO.
b. FERNCO, INC.
c. MISSION RUBBER COMPANY.
d. PLASTIC ODDITIES, INC.

2.5 DIELECTRIC FITTINGS

A. DESCRIPTION: COMBINATION FITTING OF COPPER ALLOY AND FERROUS MATERIALS WITH THREADED, SOLDER-JOINT, PLAIN, OR WELD-NECK END CONNECTIONS THAT MATCH PIPING SYSTEM MATERIALS.

B. INSULATING MATERIAL: SUITABLE FOR SYSTEM FLUID, PRESSURE, AND TEMPERATURE.

C. DIELECTRIC UNIONS: FACTORY-FABRICATED, UNION ASSEMBLY, FOR 250-PSIG MINIMUM WORKING PRESSURE AT 180 DEG F.

1. MANUFACTURERS:
a. CAPITOL MANUFACTURING CO.
b. CENTRAL PLASTICS COMPANY.
c. ECLIPSE, INC.
d. EPCO SALES, INC.
e. HART INDUSTRIES, INTERNATIONAL, INC.
f. WATTS INDUSTRIES, INC.; WATER PRODUCTS DIV.
g. ZURN INDUSTRIES, INC.; WILKINS DIV.

D. DIELECTRIC FLANGES: FACTORY-FABRICATED, COMPANION-FLANGE ASSEMBLY, FOR 150- OR 300-PSIG MINIMUM WORKING PRESSURE AS REQUIRED TO SUIT SYSTEM PRESSURES.

1. MANUFACTURERS:
a. CAPITOL MANUFACTURING CO.
b. CENTRAL PLASTICS COMPANY.
c. EPCO SALES, INC.
d. WATTS INDUSTRIES, INC.; WATER PRODUCTS DIV.

E. DIELECTRIC-FLANGE KITS: COMPANION-FLANGE ASSEMBLY FOR FIELD ASSEMBLY. INCLUDE FLANGES, FULL-FACE- OR RING-TYPE NEOPRENE OR PHENOLIC GASKET, PHENOLIC OR POLYETHYLENE BOLT SLEEVES, PHENOLIC WASHERS, AND STEEL BACKING WASHERS.

1. MANUFACTURERS:
a. ADVANCE PRODUCTS & SYSTEMS, INC.
b. CALPICO, INC.
c. CENTRAL PLASTICS COMPANY.
d. PIPELINE SEAL AND INSULATOR, INC.
2. SEPARATE COMPANION FLANGES AND STEEL BOLTS AND NUTS SHALL HAVE 150- OR 300-PSIG MINIMUM WORKING PRESSURE WHERE REQUIRED TO SUIT SYSTEM PRESSURES.

F. DIELECTRIC COUPLINGS: GALVANIZED-STEEL COUPLING WITH INERT AND NON CORROSIVE, THERMOPLASTIC LINING; THREADED ENDS; AND 300-PSIG MINIMUM WORKING PRESSURE AT 225 DEG F.

1. MANUFACTURERS:
a. CALPICO, INC.
b. LOCHINVAR CORP.

G. DIELECTRIC NIPPLES: ELECTROPLATED STEEL NIPPLE WITH INERT AND NON CORROSIVE, THERMOPLASTIC LINING; PLAIN, THREADED, OR GROOVED ENDS; AND 300-PSIG MINIMUM WORKING PRESSURE AT 225 DEG F.

1. MANUFACTURERS:
a. PERFECTION CORP.
b. PRECISION PLUMBING PRODUCTS, INC.
c. SIOUX CHIEF MANUFACTURING CO., INC.
d. VICTAULIC CO. OF AMERICA.

2.6 MECHANICAL SLEEVE SEALS

A. DESCRIPTION: MODULAR SEALING ELEMENT UNIT, DESIGNED FOR FIELD ASSEMBLY, TO FILL ANNULAR SPACE BETWEEN PIPE AND SLEEVE.

1. MANUFACTURERS:
a. ADVANCE PRODUCTS & SYSTEMS, INC.
b. CALPICO, INC.
c. METRAFLEX CO.
d. PIPELINE SEAL AND INSULATOR, INC.
2. SEALING ELEMENTS: EPDM INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE. INCLUDE TYPE AND NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE.
3. PRESSURE PLATES: CARBON STEEL. INCLUDE TWO FOR EACH SEALING ELEMENT.
4. CONNECTING BOLTS AND NUTS: CARBON STEEL WITH CORROSION-RESISTANT COATING OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE FOR EACH SEALING ELEMENT.

2.7 SLEEVES

A. GALVANIZED-STEEL SHEET: 0.0239-INCH MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT.

B. STEEL PIPE: ASTM A 53, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED, PLAIN ENDS.

C. CAST IRON: CAST OR FABRICATED "WALL PIPE" EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATER STOP, UNLESS OTHERWISE INDICATED.

D. STACK SLEEVE FITTINGS: MANUFACTURED, CAST-IRON SLEEVE WITH INTEGRAL CLAMPING FLANGE. INCLUDE CLAMPING RING AND BOLTS AND NUTS FOR MEMBRANE FLASHING.

1. UNDER DECK CLAMP: CLAMPING RING WITH SET SCREWS.

E. MOLDED PVC: PERMANENT, WITH NAILING FLANGE FOR ATTACHING TO WOODEN FORMS.

F. PVC PIPE: ASTM D 1785, SCHEDULE 40.

G. MOLDED PE: REUSABLE, PE, TAPERED-CUP SHAPED, AND SMOOTH-OUTER SURFACE WITH NAILING FLANGE FOR ATTACHING TO WOODEN FORMS.

2.8 ESCUTCHEONS

A. DESCRIPTION: MANUFACTURED WALL AND CEILING ESCUTCHEONS AND FLOOR PLATES, WITH AN ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF INSULATED PIPING AND AN OD THAT COMPLETELY COVERS OPENING.

B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH POLISHED CHROME-PLATED FINISH.

C. ONE-PIECE, CAST-BRASS TYPE: WITH SET SCREW.

1. FINISH: POLISHED CHROME-PLATED.

D. SPLIT-CASTING, CAST-BRASS TYPE: WITH CONCEALED HINGE AND SET SCREW.

1. FINISH: POLISHED CHROME-PLATED.

E. ONE-PIECE, STAMPED-STEEL TYPE: WITH SET SCREW OR SPRING CLIPS AND CHROME-PLATED FINISH.

F. SPLIT-PLATE, STAMPED-STEEL TYPE: WITH CONCEALED HINGE, SET SCREW OR SPRING CLIPS, AND CHROME-PLATED FINISH.

G. ONE-PIECE, FLOOR-PLATE TYPE: CAST-IRON FLOOR PLATE.

H. SPLIT-CASTING, FLOOR-PLATE TYPE: CAST BRASS WITH CONCEALED HINGE AND SET SCREW.

2.9 GROUT

A. DESCRIPTION: ASTM C 1107, GRADE B, NON SHRINK AND NONMETALLIC, DRY HYDRAULIC-CEMENT GROUT.

1. CHARACTERISTICS: POST-HARDENING, VOLUME-ADJUSTING, NON STAINING, NON CORROSIVE, NONGASEOUS, AND RECOMMENDED FOR INTERIOR AND EXTERIOR APPLICATIONS.
2. DESIGN MIX: 5000-PSI, 28-DAY COMPRESSIVE STRENGTH.
3. PACKAGING: PREMIXED AND FACTORY PACKAGED.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

A. REFER TO DIVISION 01 SECTION "CUTTING AND PATCHING" AND DIVISION 02 SECTION "SELECTIVE STRUCTURE DEMOLITION" FOR GENERAL DEMOLITION REQUIREMENTS AND PROCEDURES.

B. DISCONNECT, DEMOLISH, AND REMOVE PLUMBING SYSTEMS, EQUIPMENT, AND COMPONENTS INDICATED TO BE REMOVED.

1. PIPING TO BE REMOVED: REMOVE PORTION OF PIPING INDICATED TO BE REMOVED AND CAP OR PLUG REMAINING PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL.
2. PIPING TO BE ABANDONED IN PLACE: DRAIN PIPING AND CAP OR PLUG PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL.
3. EQUIPMENT TO BE REMOVED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT.
4. EQUIPMENT TO BE REMOVED AND REINSTALLED: DISCONNECT AND CAP SERVICES AND REMOVE, CLEAN, AND STORE EQUIPMENT; WHEN APPROPRIATE, REINSTALL, RECONNECT, AND MAKE EQUIPMENT OPERATIONAL.
5. EQUIPMENT TO BE REMOVED AND SALVAGED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT AND DELIVER TO OWNER.

C. IF PIPE, INSULATION, OR EQUIPMENT TO REMAIN IS DAMAGED IN APPEARANCE OR IS UNSERVICEABLE, REMOVE DAMAGED OR UNSERVICEABLE PORTIONS AND REPLACE WITH NEW PRODUCTS OF EQUAL CAPACITY AND QUALITY.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. INSTALL PIPING ACCORDING TO THE FOLLOWING REQUIREMENTS AND DIVISION 22 SECTIONS SPECIFYING PIPING SYSTEMS.

B. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

C. INSTALL PIPING IN CONCEALED LOCATIONS, UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

D. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

E. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

F. INSTALL PIPING TO PERMIT VALVE SERVICING.

G. INSTALL PIPING AT INDICATED SLOPES.

H. INSTALL PIPING FREE OF SAGS AND BENDS.

I. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

J. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.

K. SELECT SYSTEM COMPONENTS WITH PRESSURE RATING EQUAL TO OR GREATER THAN SYSTEM OPERATING PRESSURE.

L. INSTALL ESCUTCHEONS FOR PENETRATIONS OF WALLS, CEILINGS, AND FLOORS ACCORDING TO THE FOLLOWING:

1. NEW PIPING:
a. PIPING WITH FITTING OR SLEEVE PROTRUDING FROM WALL: ONE-PIECE, DEEP-PATTERN TYPE.
b. CHROME-PLATED PIPING: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED CHROME-PLATED FINISH.
c. INSULATED PIPING: ONE-PIECE, STAMPED-STEEL TYPE WITH SPRING CLIPS.
d. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED CHROME-PLATED FINISH.
e. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: ONE-PIECE, STAMPED-STEEL TYPE.
f. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES:ONE-PIECE OR SPLIT-CASTING, CAST-BRASS TYPE WITH POLISHED CHROME-PLATED FINISH.
g. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: ONE-PIECE, STAMPED-STEEL TYPE OR SPLIT-PLATE, STAMPED-STEEL TYPE WITH CONCEALED HINGE AND SET SCREW.
h. BARE PIPING IN UNFINISHED SERVICE SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED CHROME-PLATED FINISH.
i. BARE PIPING IN UNFINISHED SERVICE SPACES: ONE-PIECE, STAMPED-STEEL TYPE WITH CONCEALED OR EXPOSED-RIVET HINGE AND SET SCREW OR SPRING CLIPS.
j. BARE PIPING IN EQUIPMENT ROOMS: ONE-PIECE, CAST-BRASS TYPE.
k. BARE PIPING IN EQUIPMENT ROOMS: ONE-PIECE, STAMPED-STEEL TYPE WITH SET SCREW OR SPRING CLIPS.
l. BARE PIPING AT FLOOR PENETRATIONS IN EQUIPMENT ROOMS: ONE-PIECE, FLOOR-PLATE TYPE.
2. EXISTING PIPING: USE THE FOLLOWING:
a. CHROME-PLATED PIPING: SPLIT-CASTING, CAST-BRASS TYPE WITH CHROME-PLATED FINISH.
b. INSULATED PIPING: SPLIT-PLATE, STAMPED-STEEL TYPE WITH CONCEALED OR EXPOSED-RIVET HINGE AND SPRING CLIPS.
c. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: SPLIT-CASTING, CAST-BRASS TYPE WITH CHROME-PLATED FINISH.
d. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: SPLIT-PLATE, STAMPED-STEEL TYPE WITH CONCEALED HINGE AND SPRING CLIPS.
e. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: SPLIT-CASTING, CAST-BRASS TYPE WITH CHROME-PLATED FINISH.
f. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: SPLIT-PLATE, STAMPED-STEEL TYPE WITH CONCEALED HINGE AND SET SCREW.
g. BARE PIPING IN UNFINISHED SERVICE SPACES: SPLIT-CASTING, CAST-BRASS TYPE WITH POLISHED CHROME-PLATED FINISH.
h. BARE PIPING IN UNFINISHED SERVICE SPACES: SPLIT-PLATE, STAMPED-STEEL TYPE WITH CONCEALED OR EXPOSED-RIVET HINGE AND SET SCREW OR SPRING CLIPS.
i. BARE PIPING IN EQUIPMENT ROOMS: SPLIT-CASTING, CAST-BRASS TYPE.
j. BARE PIPING IN EQUIPMENT ROOMS: SPLIT-PLATE, STAMPED-STEEL TYPE WITH SET SCREW OR SPRING CLIPS.
k. BARE PIPING AT FLOOR PENETRATIONS IN EQUIPMENT ROOMS: SPLIT-CASTING, FLOOR-PLATE TYPE.

M. SLEEVES ARE NOT REQUIRED FOR CORE-DRILLED HOLES.

N. PERMANENT SLEEVES ARE NOT REQUIRED FOR HOLES FORMED BY REMOVABLE SLEEVES.

O. INSTALL SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS AND CONCRETE FLOOR AND ROOF SLABS.

P. INSTALL SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS, GYPSUM-BOARD PARTITIONS, AND CONCRETE FLOOR AND ROOF SLABS.

1. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES.
a. EXCEPTION: EXTEND SLEEVES INSTALLED IN FLOORS OF MECHANICAL EQUIPMENT AREAS OR OTHER WET AREAS 2 INCHES ABOVE FINISHED FLOOR LEVEL. EXTEND CAST-IRON SLEEVE FITTINGS BELOW FLOOR SLAB AS REQUIRED TO SECURE CLAMPING RING IF RING IS SPECIFIED.
2. INSTALL SLEEVES IN NEW WALLS AND SLABS AS NEW WALLS AND SLABS ARE CONSTRUCTED.
3. INSTALL SLEEVES THAT ARE LARGE ENOUGH TO PROVIDE 1/4-INCH ANNULAR CLEAR SPACE BETWEEN SLEEVE AND PIPE OR PIPE INSULATION. USE THE FOLLOWING SLEEVE MATERIALS:
a. STEEL PIPE SLEEVES: FOR PIPES SMALLER THAN NPS 6.
b. STEEL SHEET SLEEVES: FOR PIPES NPS 6 AND LARGER, PENETRATING GYPSUM-BOARD PARTITIONS.
c. STACK SLEEVE FITTINGS: FOR PIPES PENETRATING FLOORS WITH MEMBRANE WATERPROOFING. SECURE FLASHING BETWEEN CLAMPING FLANGES. INSTALL SECTION OF CAST-IRON SOIL PIPE TO EXTEND SLEEVE TO 2 INCHES ABOVE FINISHED FLOOR LEVEL. REFER TO DIVISION 07 SECTION "SHEET METAL FLASHING AND TRIM" FOR FLASHING.
d. SEAL SPACE OUTSIDE OF SLEEVE FITTINGS WITH GROUT.
4. EXCEPT FOR UNDERGROUND WALL PENETRATIONS, SEAL ANNULAR SPACE BETWEEN SLEEVE AND PIPE OR PIPE INSULATION, USING JOINT SEALANTS APPROPRIATE FOR SIZE, DEPTH, AND LOCATION OF JOINT. REFER TO SECTION "JOINT SEALANTS" FOR MATERIALS AND INSTALLATION.

Q. ABOVE GROUND, EXTERIOR-WALL PIPE PENETRATIONS: SEAL PENETRATIONS USING SLEEVES AND MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.

1. INSTALL STEEL PIPE FOR SLEEVES SMALLER THAN 6 INCHES IN DIAMETER.
2. INSTALL CAST-IRON "WALL PIPES" FOR SLEEVES 6 INCHES AND LARGER IN DIAMETER.
3. MECHANICAL SLEEVE SEAL INSTALLATION: SELECT TYPE AND NUMBER OF SEALING ELEMENTS REQUIRED FOR PIPE MATERIAL AND SIZE. POSITION PIPE IN CENTER OF SLEEVE. ASSEMBLE MECHANICAL SLEEVE SEALS AND INSTALL IN ANNULAR SPACE BETWEEN PIPE AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE WATERTIGHT SEAL.

R. UNDERGROUND, EXTERIOR-WALL PIPE PENETRATIONS: INSTALL CAST-IRON "WALL PIPES" FOR SLEEVES. SEAL PIPE PENETRATIONS USING MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.

1. MECHANICAL SLEEVE SEAL INSTALLATION: SELECT TYPE AND NUMBER OF SEALING ELEMENTS REQUIRED FOR PIPE MATERIAL AND SIZE. POSITION PIPE IN CENTER OF SLEEVE. ASSEMBLE MECHANICAL SLEEVE SEALS AND INSTALL IN ANNULAR SPACE BETWEEN PIPE AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE WATERTIGHT SEAL.

S. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRE STOP MATERIALS. REFER TO DIVISION 07 SECTION "PENETRATION FIRE STOPPING" FOR MATERIALS.

T. VERIFY FINAL EQUIPMENT LOCATIONS FOR ROUGHING-IN.

U. REFER TO EQUIPMENT SPECIFICATIONS IN OTHER SECTIONS OF THESE SPECIFICATIONS FOR ROUGHING-IN REQUIREMENTS.

3.3 PIPING JOINT CONSTRUCTION

A. JOIN PIPE AND FITTINGS ACCORDING TO THE FOLLOWING REQUIREMENTS AND DIVISION 22 SECTIONS SPECIFYING PIPING SYSTEMS.

B. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.

C. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPE AND FITTINGS BEFORE ASSEMBLY.

D. SOLDERED JOINTS: APPLY ASTM B 813, WATER-FLUSHABLE FLUX, UNLESS OTHERWISE INDICATED, TO TUBE END. CONSTRUCT JOINTS ACCORDING TO ASTM B 828 OR CDA'S "COPPER TUBE HANDBOOK," USING LEAD-FREE SOLDER ALLOY COMPLYING WITH ASTM B 32.

E. BRAZED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS'S "BRAZING HANDBOOK," "PIPE AND TUBE" CHAPTER, USING COPPER-PHOSPHORUS BRAZING FILLER METAL COMPLYING WITH AWS A5.8.

F. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. CUT THREADS FULL AND CLEAN USING SHARP DIES. REAM THREADED PIPE ENDS TO REMOVE BURRS AND RESTORE FULL ID. JOIN PIPE FITTINGS AND VALVES AS FOLLOWS:

1. APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS UNLESS DRY SEAL THREADING IS SPECIFIED.
2. DAMAGED THREADS: DO NOT USE PIPE OR PIPE FITTINGS WITH THREADS THAT ARE CORRODED OR DAMAGED. DO NOT USE PIPE SECTIONS THAT HAVE CRACKED OR OPEN WELDS.

G. WELDED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS D10.12, USING QUALIFIED PROCESSES AND WELDING OPERATORS ACCORDING TO PART 1 "QUALITY ASSURANCE" ARTICLE.

H. FLANGED JOINTS: SELECT APPROPRIATE GASKET MATERIAL, SIZE, TYPE, AND THICKNESS FOR SERVICE APPLICATION. INSTALL GASKET CONCENTRICALLY POSITIONED. USE SUITABLE LUBRICANTS ON BOLT THREADS.

I. PLASTIC PIPING SOLVENT-CEMENT JOINTS: CLEAN AND DRY JOINING SURFACES. JOIN PIPE AND FITTINGS ACCORDING TO THE FOLLOWING:

1. COMPLY WITH ASTM F 402 FOR SAFE-HANDLING PRACTICE OF CLEANERS, PRIMERS, AND SOLVENT CEMENTS.
2. ABS PIPING: JOIN ACCORDING TO ASTM D 2235 AND ASTM D 2661 APPENDIXES.
3. CPVC PIPING: JOIN ACCORDING TO ASTM D 2846/D 2846M APPENDIX.
4. PVC PRESSURE PIPING: JOIN SCHEDULE NUMBER ASTM D 1785, PVC PIPE AND PVC SOCKET FITTINGS ACCORDING TO ASTM D 2672. JOIN OTHER-THAN-SCHEDULE-NUMBER PVC PIPE AND SOCKET FITTINGS ACCORDING TO ASTM D 2855.
5. PVC NON PRESSURE PIPING: JOIN ACCORDING TO ASTM D 2855.
6. PVC TO ABS NON PRESSURE TRANSITION FITTINGS: JOIN ACCORDING TO ASTM D 3138 APPENDIX.

J. PLASTIC PRESSURE PIPING GASKETED JOINTS: JOIN ACCORDING TO ASTM D 3139.

K. PLASTIC NON PRESSURE PIPING GASKETED JOINTS: JOIN ACCORDING TO ASTM D 3212.

L. PE PIPING HEAT-FUSION JOINTS: CLEAN AND DRY JOINING SURFACES BY WIPING WITH CLEAN CLOTH OR PAPER TOWELS. JOIN ACCORDING TO ASTM D 2657.

1. PLAIN-END PIPE AND FITTINGS: USE BUTT FUSION.
2. PLAIN-END PIPE AND SOCKET FITTINGS: USE SOCKET FUSION.

M. FIBERGLASS BONDED JOINTS: PREPARE PIPE ENDS AND FITTINGS, APPLY ADHESIVE, AND JOIN ACCORDING TO PIPE MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.4 PIPING CONNECTIONS

A. MAKE CONNECTIONS ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:

1. INSTALL UNIONS, IN PIPING NPS 2 AND SMALLER, ADJACENT TO EACH VALVE AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.
2. INSTALL FLANGES, IN PIPING NPS 2-1/2 AND LARGER, ADJACENT TO FLANGED VALVES AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.
3. DRY PIPING SYSTEMS: INSTALL DIELECTRIC UNIONS AND FLANGES TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS.
4. WET PIPING SYSTEMS: INSTALL DIELECTRIC COUPLING AND NIPPLE FITTINGS TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

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 IN EXPOSED INTERIOR SPACES, UNLESS OTHERWISE INDICATED.

C. INSTALL PLUMBING 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.

3.6 PAINTING

A. PAINTING OF PLUMBING SYSTEMS, EQUIPMENT, AND COMPONENTS IS SPECIFIED IN ARCHITECTURAL SPECIFICATION SECTIONS "INTERIOR PAINTING" AND "EXTERIOR PAINTING."

B. DAMAGE AND TOUCHUP: REPAIR MARRED AND DAMAGED FACTORY-PAINTED FINISHES WITH MATERIALS AND PROCEDURES TO MATCH ORIGINAL FACTORY FINISH.

3.7 CONCRETE BASES

A. CONCRETE BASES: ANCHOR EQUIPMENT TO CONCRETE BASE ACCORDING TO EQUIPMENT MANUFACTURER'S WRITTEN INSTRUCTIONS AND ACCORDING TO SEISMIC CODES AT PROJECT.

1. CONSTRUCT CONCRETE BASES OF DIMENSIONS INDICATED, BUT NOT LESS THAN 4 INCHES LARGER IN BOTH DIRECTIONS THAN SUPPORTED UNIT.
2. INSTALL DOWEL RODS TO CONNECT CONCRETE BASE TO CONCRETE FLOOR. UNLESS OTHERWISE INDICATED, INSTALL DOWEL RODS ON 18-INCH CENTERS AROUND THE FULL PERIMETER OF THE BASE.
3. INSTALL EPOXY-COATED ANCHOR BOLTS FOR SUPPORTED EQUIPMENT THAT EXTEND THROUGH CONCRETE BASE, AND ANCHOR INTO STRUCTURAL CONCRETE FLOOR.
4. PLACE AND SECURE ANCHORAGE DEVICES. USE SUPPORTED EQUIPMENT MANUFACTURER'S SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED.
5. INSTALL ANCHOR BOLTS TO ELEVATIONS REQUIRED FOR PROPER ATTACHMENT TO SUPPORTED EQUIPMENT.
6. INSTALL ANCHOR BOLTS ACCORDING TO ANCHOR-BOLT MANUFACTURER'S WRITTEN INSTRUCTIONS.
7. USE 3000-PSI, 28-DAY COMPRESSIVE-STRENGTH CONCRETE AND REINFORCEMENT AS SPECIFIED IN DIVISION 03 SECTION "MISCELLANEOUS CAST-IN-PLACE CONCRETE."

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. REFER TO DIVISION 05 SECTION "METAL FABRICATIONS" FOR STRUCTURAL STEEL.

B. CUT, FIT, AND PLACE MISCELLANEOUS METAL SUPPORTS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION TO SUPPORT AND ANCHOR PLUMBING MATERIALS AND EQUIPMENT.

C. FIELD WELDING: COMPLY WITH AWS D1.1.

3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. CUT, FIT, AND PLACE WOOD GROUNDS, NAILERS, BLOCKING, AND ANCHORAGES TO SUPPORT, AND ANCHOR PLUMBING MATERIALS AND EQUIPMENT.

B. SELECT FASTENER SIZES THAT WILL NOT PENETRATE MEMBERS IF OPPOSITE SIDE WILL BE EXPOSED TO VIEW OR WILL RECEIVE FINISH MATERIALS. TIGHTEN CONNECTIONS BETWEEN MEMBERS. INSTALL FASTENERS WITHOUT SPLITTING WOOD MEMBERS.

C. ATTACH TO SUBSTRATES AS REQUIRED TO SUPPORT APPLIED LOADS.

3.10 GROUTING

A. MIX AND INSTALL GROUT FOR PLUMBING EQUIPMENT BASE BEARING SURFACES, PUMP AND OTHER EQUIPMENT BASE PLATES, AND ANCHORS.

B. CLEAN SURFACES THAT WILL COME INTO CONTACT WITH GROUT.

C. PROVIDE FORMS AS REQUIRED FOR PLACEMENT OF GROUT.

D. AVOID AIR ENTRAPMENT DURING PLACEMENT OF GROUT.

E. PLACE GROUT, COMPLETELY FILLING EQUIPMENT BASES.

F. PLACE GROUT ON CONCRETE BASES AND PROVIDE SMOOTH BEARING SURFACE FOR EQUIPMENT.

G. PLACE GROUT AROUND ANCHORS.

H. CURE PLACED GROUT.

END OF SECTION

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

PLUMBING SPECIFICATIONS

PS5.1

HANGERS AND SUPPORTS SECTION 22 05 29

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PIPE, EQUIPMENT HANGERS, AND SUPPORTS.

B. SLEEVES AND SEALS.

C. FLASHING AND SEALING EQUIPMENT AND PIPE STACKS.

D. EQUIPMENT CURBS.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. MANUFACTURERS:

1. B-LINE.
2. GRINNELL.

B. PLUMBING PIPING:

1. CONFORM TO ASME B31.9.
2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2": MALLEABLE IRON, ADJUSTABLE SWIVEL, SPLIT RING.
3. HANGERS FOR PIPE SIZES 2" AND LARGER: CARBON STEEL, ADJUSTABLE, CLEVIS.
4. MULTIPLE OR TRAPEZE HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
5. WALL SUPPORT FOR PIPE SIZES 3" AND SMALLER: CAST IRON HOOK.
6. WALL SUPPORT FOR PIPE SIZES 4" AND LARGER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
7. VERTICAL SUPPORT: STEEL RISER CLAMP, ANGLE RING.
8. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
9. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

2.2 ACCESSORIES

A. HANGER RODS: MILD STEEL THREADED BOTH ENDS, THREADED ONE END, OR CONTINUOUS THREADED.

2.3 FLASHING

A. METAL FLASHING: 26 GAUGE GALVANIZED STEEL.

B. METAL COUNTER FLASHING: 22 GAUGE GALVANIZED STEEL.

C. LEAD FLASHING:

1. WATERPROOFING: 5 LB./FT.2 SHEET LEAD.
2. SOUNDPROOFING: 1 LB./FT.2 SHEET LEAD.

D. FLEXIBLE FLASHING: 47 MIL THICK SHEET BUTYL, COMPATIBLE WITH ROOFING.

E. CAPS: STEEL, 22 GAUGE MINIMUM, 16 GAUGE AT FIRE RESISTANT ELEMENTS.

F. ARCHITECTURAL SPECIFICATIONS SUPERCEDE THESE FLASHING REQUIREMENTS.

2.4 SLEEVES

A. SLEEVES FOR PIPES THROUGH NON-FIRE RATED FLOORS:
18 GAUGE GALVANIZED STEEL.

B. SLEEVES FOR PIPES THROUGH FIRE RATED AND FIRE RESISTIVE FLOORS AND WALLS AND FIRE PROOFING: PREFABRICATED FIRE RATED SLEEVES INCLUDING SEALS, UL LISTED.

C. STUFFING INSULATION: GLASS FIBER TYPE, NON-COMBUSTIBLE.

D. SEALANT: ACRYLIC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. SUPPORT HORIZONTAL PIPING AS SCHEDULED.

C. PLACE HANGERS WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW.

D. USE HANGERS WITH 1-1/2 INCH MINIMUM VERTICAL ADJUSTMENT.

E. SUPPORT HORIZONTAL CAST IRON PIPE ADJACENT TO EACH HUB WITH 5 FEET MAXIMUM SPACING BETWEEN HANGERS.

F. WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT SAME ELEVATION, PROVIDE MULTIPLE OR TRAPEZE HANGERS.

G. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.

H. PROVIDE COPPER PLATED HANGER AND SUPPORTS FOR COPPER PIPING.

I. DESIGN HANGER FOR PIPE MOVEMENT WITHOUT DISENGAGEMENT OF SUPPORTED PIPE.

J. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS.

K. PROVIDE FLEXIBLE FLASHING AND METAL COUNTER FLASHING WHERE PIPING AND DUCTWORK PENETRATE WEATHER OR WATERPROOFED WALLS, FLOORS, AND ROOFS.

L. FLASH VENT AND SOIL PIPES PROJECTING 3 INCHES MINIMUM ABOVE FINISHED ROOF SURFACE WITH LEAD WORKED 1 INCH MINIMUM INTO HUB, 8 INCHES MINIMUM CLEAR ON SIDES WITH 24" X 24" SHEET SIZE. FOR PIPES THROUGH OUTSIDE WALLS, TURN FLANGES BACK INTO WALL THEN CAULK, METAL COUNTER FLASH, AND SEAL.

M. SEAL FLOOR AND MOP SINK DRAINS WATERTIGHT TO ADJACENT MATERIALS.

N. ADJUST STORM COLLARS TIGHT TO PIPE WITH BOLTS AND CAULK AROUND TOP EDGE. USE STORM COLLARS ABOVE ROOF JACKS. SCREW VERTICAL FLANGE SECTION TO FACE OF CURB.

O. SET SLEEVES IN POSITION IN FORM WORK. PROVIDE REINFORCING AROUND SLEEVES.

P. SIZE SLEEVES LARGE ENOUGH TO ALLOW FOR MOVEMENT DUE TO EXPANSION AND CONTRACTION. PROVIDE FOR CONTINUOUS INSULATION WRAPPING.

Q. WHERE PIPING OR DUCTWORK PENETRATES FLOOR, CEILING, OR WALL, CLOSE OFF SPACE BETWEEN PIPE OR DUCT AND ADJACENT WORK WITH FIRE STOPPING INSULATION AND CAULK. PROVIDE CLOSE FITTING METAL COLLAR OR ESCUTCHEON COVERS AT BOTH SIDES OF PENETRATION.

R. INSTALL CHROME PLATED STEEL ESCUTCHEONS AT FINISHED SURFACES.

3.2 SCHEDULES

A. HANGER SPACING AND HANGER ROD SIZES:

PIPE SIZE (IN)	MAX. HANGER SPACING (FT)	HANGER ROD DIAMETER (IN)
1/2 TO 1-1/2	6-1/2	3/8
1-1/2 TO 2	10	3/8
2-1/3 TO 3	10	1/2
4 TO 6	10	5/8
PVC	6	3/8
CI NO-HUB	5	1/2

END OF SECTION

PLUMBING PIPE INSULATION SECTION 22 07 19

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PIPING INSULATION.
B. JACKETS AND ACCESSORIES

PART 2 - PRODUCTS

2.1 PIPE INSULATION

A. CELLULAR FOAM

1. MANUFACTURER/MODEL:
   a. ARMSTRONG ARMAFLEX 22.
   b. OWENS CORNING O-C.
   c. CERTAINTEED CORP.
2. ASTM C534, FLEXIBLE, CELLULAR ELASTOMERIC MOLDED SHEET.
3. JOINTS: SEALED WITH WATERPROOF ADHESIVE.
4. ADHESIVES MANUFACTURER/MODEL:
   a. ARMSTRONG 520.
   b. OWENS CORNING 500.

B. GLASS FIBER

1. INSULATION: ASTM C547, RIGID MOLDED, NON-COMBUSTIBLE.
   a. 'K' VALUE: ASTM C177, 0.24 AT 75° F.
   b. MAXIMUM SERVICE TEMPERATURE: 850° F.
   c. MAXIMUM MOISTURE ABSORPTION: 0.2 PERCENT BY VOLUME.
2. VAPOR BARRIER JACKET:
   a. ASTM C921, WHITE KRAFT PAPER WITH GLASS FIBER YARN, BONDED TO ALUMINIZED FILM.
   b. MOISTURE BARRIER TRANSMISSION: ASTM E96, 0.02 PERM-INCHES.
3. TIE WIRE: 0.048 INCH STAINLESS STEEL WITH TWISTED ENDS ON MAXIMUM 12 INCH CENTERS.
4. VAPOR BARRIER LAP ADHESIVE: COMPATIBLE WITH INSULATION.
5. INSULATING CEMENT/MASTIC: ASTM C195, HYDRAULIC SETTING ON MINERAL WOOL.
6. FIBROUS GLASS FABRIC:
   a. CLOTH: UNTREATED, 9 OZ/YD^2 WEIGHT.
   b. BLANKET: 1.0 LB./FT.^3 DENSITY.
   c. WEAVE: 5X5.

2.3 INSULATION RATINGS

A. FLAME SPREAD SHALL BE 25 OR LESS IN ACCORDANCE WITH ASTM E84.

B. SMOKE DEVELOPED SHALL BE 50 OR LESS IN ACCORDANCE WITH ASTM E84.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

B. ALL PIPE FITTINGS TO BE INSULATED WITH MITER CUT PIECES OF CELLULAR FOAM INSULATION ASSEMBLED ON SITE USING SPECIFIED ADHESIVE.

C. FIBER DUCTWORK IS NOT ACCEPTABLE.

D. DO NOT INSTALL INSULATION AND COVERINGS UNTIL DUCTWORK OR PIPING HAVE BEEN TESTED OR APPROVED.

E. ENSURE SURFACES ARE CLEAN AND DRY PRIOR TO INSULATING.

F. LOCATE INSULATION SEAMS IN LEAST VISIBLE LOCATION.

G. FINISH INSULATION NEATLY AT HANGERS, SUPPORTS, AND OTHER PROTRUSIONS.

H. ENSURE INSULATION IS CONTINUOUS INSIDE WALLS.

3.2 SCHEDULES

A. PIPING INSULATION THICKNESS

1. CELLULAR FOAM
   a. DOMESTIC HOT WATER, COLD WATER, AND HOT WATER RECIRCULATION 1/2"
   b. CONDENSATE DRAINS 1/2"
2. PRE-FORMED GLASS FIBER
   a. DOMESTIC HOT WATER, COLD WATER, AND HOT WATER RECIRCULATION 1"
   b. CONDENSATE DRAINS 1"

END OF SECTION

PLUMBING PIPING SECTION 22 11 16

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PIPE, PIPE FITTINGS, VALVES, AND CONNECTIONS FOR PIPING SYSTEMS
1. SANITARY WASTE AND VENT
2. DOMESTIC WATER
3. STORM WATER
4. NATURAL GAS
5. CONDENSATE DRAINS

PART 2 - PRODUCTS

2.1 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING BELOW FLOOR

A. CAST IRON PIPE: ASTM A74 SERVICE WEIGHT.

1. FITTINGS: CAST IRON.
2. JOINTS: HUB-AND-SPIGOT, CISPI HSN COMPRESSION TYPE WITH ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.

B. ABS PIPE: ASTM D2661.

1. FITTINGS: ASTM D2661, ABS.
2. JOINTS: ASTM D2235, SOLVENT WELD.

C. PVC PIPE: ASTM D2665.

1. FITTINGS: ASTM D2665, PVC.
2. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.

2.2 SANITARY WASTE PIPING, ABOVE GRADE, ANY SIZE

A. CAST IRON PIPE: ASTM A74 SERVICE WEIGHT.

1. FITTINGS: CAST IRON.
2. JOINTS: ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.

B. ABS PIPE: ASTM D2661 - AS ALLOWED BY LOCAL CODE.

1. FITTINGS: ASTM D2661, ABS.
2. JOINTS: ASTM D2235, SOLVENT WELD.

C. PVC PIPE: ASTM D2665 - AS ALLOWED BY LOCAL CODE.

1. FITTINGS: ASTM D2665, PVC.
2. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.

D. COPPER PIPE: ASTM B42, ASTM B88, TYPE DWV.

1. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22 WROUGHT COPPER AND BRONZE.
2. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.3 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. CAST IRON PIPE: ASTM A74 SERVICE WEIGHT.

1. FITTINGS: CAST IRON.
2. JOINTS: ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.

B. ABS PIPE: ASTM D2661.

1. FITTINGS: ASTM D2661, ABS.
2. JOINTS: ASTM D2235, SOLVENT WELD.

C. PVC PIPE: ASTM D2665.

1. FITTINGS: ASTM D2665, PVC.
2. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.

2.4 STORM WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. CAST IRON PIPE: ASTM A74 SERVICE WEIGHT.

1. FITTINGS: CAST IRON.
2. JOINTS: ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.

B. COPPER TUBE: ASTM B306 DWV.

1. FITTINGS: ASME B16.23, CAST BRONZE OR ASME B16.29, WROUGHT COPPER.
2. JOINTS: ASTM B32, SOLDER, GRADE 50B.

C. VITRIFIED CLAY PIPE: ASTM C700 STANDARD STRENGTH.

1. FITTINGS: CLAY.
2. JOINTS: ASTM C425, BELL-AND-SPIGOT WITH LEAD AND OAKUM, NEOPRENE GASKETS, OR NEOPRENE GASKET AND CLAMP SYSTEM.

D. PVC PIPE: ASTM D2665 OR ASTM D3034.

1. FITTINGS: PVC, ASTM D2665 OR ASTM D3034.
2. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.

2.5 STORM WATER PIPING, ABOVE GRADE

A. CAST IRON PIPE: ASTM A74 SERVICE WEIGHT.

1. FITTINGS: CAST IRON.
2. JOINTS: HUB-AND-SPIGOT, CISPI HSN COMPRESSION TYPE WITH ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.

B. ABS PIPE: ASTM D2661.

1. FITTINGS: ASTM D2661, ABS.
2. JOINTS: ASTM D2235, SOLVENT WELD.

C. PVC PIPE: ASTM D2665.

1. FITTINGS: ASTM D2665, PVC.
2. JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.

D. COPPER PIPE: ASTM B88, TYPE L, HARD DRAWN.

1. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.
2. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.6 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. PIPE 1-1/2 INCHES AND SMALLER: ASTM F876, CROSSLINKED POLYETHYLENE TUBING (PEX). JOINTS SHALL NOT BE MADE BELOW SLAB.

B. PIPE 2 INCHES AND LARGER: COPPER PIPE, ASTM B88, TYPE K, HARD DRAWN.

1. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.

2. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.7 WATER PIPING, ABOVE GRADE

A. COPPER PIPE: ASTM B88, TYPE L, HARD DRAWN.

1. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.
2. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

2.8 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. STEEL PIPE: ASTM A53, SCHEDULE 40 BLACK.

1. FITTINGS: ASTM A234/A234M, FORGED STEEL WELDING TYPE.
2. JOINTS: ANSI B31.1, WELDED.
3. JACKET: AWWA C105 FACTORY APPLIED POLYETHYLENE JACKET AND DOUBLE LAYER, HALF-LAPPED 10 MIL POLYETHYLENE TAPE ON FITTINGS ONLY, OR IN ACCORDANCE WITH AUTHORITY HAVING JURISDICTION.

B. POLYETHYLENE PIPE: ASTM D2513, SDR 11.5.

1. FITTINGS: ASTM D2683 OR ASTM D2513 SOCKET TYPE.
2. JOINTS: FUSION WELDED.

2.9 NATURAL GAS PIPING, ABOVE GRADE

A. STEEL PIPE: ASTM A53, SCHEDULE 40 BLACK.

1. FITTINGS: ASME B16.3, MALLEABLE IRON OR ASTM A234/A234M, FORGED STEEL WELDING TYPE.
2. JOINTS: NFPA 54, THREADED OR WELDED TO ANSI B31.1.

B. CORRUGATED STAINLESS STEEL TUBING: ASTM A240.

1. JACKETING: TENITE YELLOW POLYETHYLENE MEETING REQUIREMENTS OF ASTM E84 FOR FLAME SPREAD AND SMOKE DENSITY.
2. FITTINGS: SAE CA360 BRASS DOUBLE WALL FLARE FOR SEALING AND JACKET CAPTURING.

2.10 CONDENSATE DRAIN PIPING: INSIDE THE BUILDING TO BE COPPER, OUTSIDE THE BUILDING TO BE CPVC AND PAINTED WITH TWO COATS OF WHITE LATEX PAINT.

A. COPPER PIPE: ASTM B88, TYPE L, HARD DRAWN.

1. FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE.
2. JOINTS: ASTM B32, SOLDER, GRADE 95TA.

B. CPVC ASTM D-1784, SCHEDULE 40.

1. FITTINGS: ASME D-2466.
2. JOINTS: ASTM F-493, SOLVENT WELD.

2.11 FLANGES, UNIONS, AND COUPLINGS

A. PIPE SIZE 3 INCHES AND OVER:

1. FERROUS PIPE: CLASS 150 MALLEABLE IRON THREADED UNIONS.
2. COPPER TUBE AND PIPE: CLASS 150 BRONZE UNIONS WITH SOLDERED JOINTS.

B. PIPE SIZE OVER 1 INCH

1. FERROUS PIPE: CLASS 150 MALLEABLE IRON THREADED OR FORGED STEEL SLIP-ON FLANGES, PREFORMED NEOPRENE GASKETS.
2. COPPER TUBE AND PIPE: CLASS 150 SLIP-ON FLANGES; PREFORMED NEOPRENE GASKETS.

C. GROOVED AND SHOULDERED PIPE END COUPLINGS:

1. HOUSING: MALLEABLE IRON CLAMPS TO ENGAGE AND LOCK, DESIGNED TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION, AND EXPANSION; STEEL BOLTS, NUTS, AND WASHERS; GALVANIZED FOR GALVANIZED PIPE.
2. SEALING GASKET: "C" SHAPE COMPOSITION SEALING GASKET.

D. DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER.

2.12 BALL VALVES

A. MANUFACTURER: WATTS MODEL WBVS.

B. OTHER ACCEPTABLE MANUFACTURERS OFFERING EQUIVALENT PRODUCTS:

1. APOLLO.
2. CRANE.
3. ITT GRINNELL.
4. HAMMOND.
5. STOCKHAM.

C. CONSTRUCTION, 4 INCHES AND SMALLER: CLASS 150, 400 PSI CWP, BRONZE, TWO-PIECE BODY, CHROME PLATED BRASS BALL, REGULAR FULL PORT, TEFLON SEATS AND STUFFING BOX RING, BLOW-OUT PROOF STEM, LEVER HANDLE, SOLDER OR THREADED ENDS WITH UNION.

PART 3 - EXECUTION

3.1 PREPARATION

A. REAM PIPE AND TUBE ENDS. REMOVE BURRS.

B. REMOVE SCALE AND DIRT ON INSIDE AND OUTSIDE BEFORE ASSEMBLY.

C. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS.

3.2 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. PROVIDE NON-CONDUCTING DIELECTRIC CONNECTIONS WHEREVER JOINTING DISSIMILAR METALS.

C. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN GRADIENT. ROUTE PARALLEL AND PERPENDICULAR TO WALLS.

D. INSTALL PIPING AS HIGH AS POSSIBLE TO MAINTAIN HEADROOM, CONSERVE SPACE, AND NOT INTERFERE WITH USE OF SPACE.

E. GROUP PIPING WHEREVER PRACTICAL AT COMMON ELEVATIONS.

F. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT.

G. PROVIDE CLEARANCE IN HANGERS AND FROM STRUCTURE OR EQUIPMENT FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.

H. PROVIDE ACCESS WHERE VALVES AND FITTINGS ARE NOT EXPOSED.

I. INSTALL VENT PIPING PENETRATING ROOFED AREAS TO MAINTAIN INTEGRITY OF ROOF ASSEMBLY.

J. PROVIDE SUPPORT FOR UTILITY METERS IN ACCORDANCE WITH REQUIREMENTS OF UTILITY COMPANIES.

K. GAS PIPING SYSTEMS WITHIN A BUILDING SHALL BE ELECTRICALLY CONTINUOUS AND BONDED TO A GROUNDED ELECTRODE AS DEFINED BY NFPA 70.

L. PREPARE EXPOSED, UNFINISHED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES FOR FINISH PAINTING.

M. INSTALL BELL AND SPIGOT PIPE WITH BELL END UPSTREAM.

N. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.

O. SLEEVE PIPES PASSING THROUGH PARTITIONS, WALLS, AND FLOORS. WHERE EXPOSED PIPING PASSES THROUGH FINISHED WORK, PROVIDE CHROME PLATED ESCUTCHEONS OR OTHER FINISH ACCEPTABLE TO ARCHITECT. WHERE FINISH IS NOT CRITICAL, SUITABLE PLATES SHALL BE PROVIDED TO ASSURE EFFECTIVENESS OF CONSTRUCTION AS A FIRE STOP.

P. ALL PIPING SHALL BE FREE OF RUST INSIDE AND OUT.

Q. ALL CORRUGATED STAINLESS STEEL TUBING SHALL BE INSTALLED BY TRAINED PERSONNEL WITH STRIKE PROTECTION AS REQUIRED.

R. THE TOTAL SYSTEM SHALL MEET OWNER'S APPROVAL.

END OF SECTION

PLUMBING SPECIALTIES SECTION 22 11 19

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. ROOF AND FLOOR DRAINS.

B. TRAP PRIMERS.

C. CLEANOUTS.

D. HOSE BIBS.

E. HYDRANTS.

F. BACKFLOW PREVENTERS.

G. WATER HAMMER ARRESTORS.

H. WATER PRESSURE REDUCING VALVES.

1.2 DELIVERY, STORAGE, AND PROTECTION

I. ACCEPT SPECIALTIES ON SITE IN ORIGINAL FACTORY PACKAGING. INSPECT FOR DAMAGE.

PART 2 - PRODUCTS

2.1 ROOF DRAINS

A. ASME A112.21.2M; COATED CAST IRON BODY, DOME, MEMBRANE FLASHING CLAMP, EXTENSION, UNDER DECK CLAMP, AND ROOF SUMP RECEIVER.

2.2 FLOOR DRAINS

A. ASME A112.6.3; PVC BODY WITH DOUBLE DRAINAGE FLANGE, WEEP HOLES, AND ROUND, ADJUSTABLE NICKEL-BRONZE STRAINER.

B. PROVIDE TRAP PRIMERS IF REQUIRED BY AUTHORITY HAVING JURISDICTION.

2.3 TRAP PRIMERS

A. ASSE 1018; BRONZE BODY WITH INTEGRAL VACUUM BREAKER, NON-LIMING INTERNAL OPERATING ASSEMBLY, GASKETED BRONZE COVER.

2.4 CLEANOUTS

A. MANUFACTURER/MODEL: REFER TO SCHEDULE ON DRAWINGS.

2.5 HOSE BIBS

A. INTERIOR:

1. BRONZE OR BRASS, WALL MOUNTED, REPLACEABLE HEXAGONAL DISC, HOSE THREAD SPOUT, CHROME PLATED WHERE EXPOSED, LOCK SHIELD, REMOVABLE KEY, AND INTEGRAL VACUUM BREAKER IN CONFORMANCE WITH ASSE 1011.

B. INTERIOR MIXING:

1. BRONZE OR BRASS, WALL MOUNTED, DOUBLE SERVICE FAUCET, HOSE THREAD SPOUT, CHROME PLATED WHERE EXPOSED, INTEGRAL STOPS, LOCK SHIELD, REMOVABLE KEY, AND INTEGRAL VACUUM BREAKER IN CONFORMANCE WITH ASSE 1011.

2.6 HYDRANTS

A. WALL HYDRANT:

1. ASSE 1019; NON-FREEZE, SELF-DRAINING TYPE WITH CHROME PLATED, LOCKABLE RECESSED BOX, HOSE THREAD SPOUT.

2.7 BACKFLOW PREVENTERS

A. REDUCED PRESSURE BACKFLOW PREVENTERS:

1. MANUFACTURER/MODEL: REFER TO SCHEDULE ON DRAWINGS.
2. ASSE 1013, BRONZE BODY WITH BRONZE INTERNAL PARTS, STAINLESS STEEL SPRINGS, TWO INDEPENDENTLY OPERATING SPRING LOADED CHECK VALVES, DIAPHRAGM TYPE DIFFERENTIAL PRESSURE RELIEF VALVE LOCATED BETWEEN CHECK VALVES, THIRD CHECK VALVE THAT OPENS UNDER BACK PRESSURE IN CASE OF DIAPHRAGM FAILURE, NON-THREADED VENT OUTLET, ASSEMBLED WITH TWO GATE VALVES, STRAINER, AND FOUR TEST COCKS.

B. DOUBLE CHECK VALVE BACKFLOW PREVENTERS:

1. MANUFACTURER/MODEL: REFER TO SCHEDULE ON DRAWINGS.
2. ASSE 1012; BRONZE BODY, CORROSION RESISTANT INTERNAL PARTS, STAINLESS STEEL SPRINGS, TWO INDEPENDENTLY OPERATING CHECK VALVES WITH INTERMEDIATE ATMOSPHERIC VENT.

C. SPECIAL PURPOSE PREVENTERS:

1. HOSE CONNECTIONS.
   1.1. PREVENTER CONFORMING AND APPROVED TO ASSE 1052.

2.8 WATER HAMMER ARRESTERS

A. ASSE1010; STAINLESS STEEL CONSTRUCTION, BELLOWS TYPE SIZED IN ACCORDANCE WITH PDI WH201, PRE-CHARGED SUITABLE FOR OPERATION IN TEMPERATURE RANGE -100° F TO 300° F AND MAXIMUM 150 PSI WORKING PRESSURE.

2.9 WATER PRESSURE REDUCING VALVES

A. ASSE 1003; BALANCED PISTON DESIGN, CAST BRONZE BODY WITH ACCESS COVERS, STAINLESS STEEL SCREEN, AND ADJUSTABLE DOWNSTREAM PRESSURE.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. EXTEND CLEANOUTS TO FINISHED FLOOR OR WALL SURFACE. LUBRICATE THREADED CLEANOUT PLUGS WITH MIXTURE OF GRAPHITE AND LINSEED OIL. ENSURE CLEARANCE AT CLEANOUT FOR RODDING OF DRAINAGE SYSTEM.

C. ENCASE EXTERIOR CLEANOUTS IN CONCRETE FLUSH WITH GRADE.

D. INSTALL FLOOR CLEANOUTS AT ELEVATION TO ACCOMMODATE FINISHED FLOOR. INSTALL WITH DOUBLE EIGHTH BENDS IN SEWER LINE.

E. INSTALL APPROVED POTABLE WATER PROTECTION DEVICES ON PLUMBING LINES WHERE CONTAMINATION OF DOMESTIC WATER MAY OCCUR.

F. PIPE RELIEF FROM BACKFLOW PREVENTER TO NEAREST DRAIN.

G. INSTALL WATER HAMMER ARRESTORS COMPLETE WITH ACCESSIBLE ISOLATION VALVE ON HOT AND COLD WATER SUPPLY PIPING.

H. PROVIDE AUTOMATIC TRAP PRIMERS WHERE REQUIRED BY THE AUTHORITY HAVING JURISDICTION.

END OF SECTION

PLUMBING FIXTURES SECTION 22 42 13

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. WATER CLOSETS.

B. URINALS.

C. LAVATORIES.

D. SINKS.

E. SERVICE SINKS.

F. ELECTRIC WATER COOLERS.

1.2 REGULATORY REQUIREMENTS

A. INSTALL FIXTURES IN ACCORDANCE WITH AMERICANS WITH DISABILITIES ACT WHERE INDICATED.

B. PRODUCTS REQUIRING ELECTRICAL CONNECTIONS: LISTED AND CLASSIFIED BY UNDERWRITER LABORATORIES INC. AS SUITABLE FOR THE PURPOSE SPECIFIED AND INDICATED.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. TRANSPORT, HANDLE, STORE, AND PROTECT PRODUCTS.

B. ACCEPT FIXTURES ON SITE IN FACTORY PACKAGING. INSPECT FOR DAMAGE.

C. PROTECT INSTALLED FIXTURES FROM DAMAGE BY SECURING AREA AND BY LEAVING FACTORY PACKAGING IN PLACE TO PREVENT USE.

1.4 WARRANTY

A. PROVIDE FIVE-YEAR MANUFACTURER WARRANTY FOR ELECTRIC WATER COOLER.

PART 2 - PRODUCTS - REFER TO DRAWINGS

PART 3 EXECUTION

3.1 EXAMINATION

A. VERIFY THAT WALLS AND FLOOR FINISHES ARE PREPARED AND READY FOR INSTALLATION OF FIXTURES.

B. VERIFY THAT ELECTRIC POWER IS AVAILABLE WITH THE CORRECT CHARACTERISTICS.

C. CONFIRM THAT MILLWORK IS CONSTRUCTED WITH ADEQUATE PROVISION FOR THE INSTALLATION OF COUNTER TOP LAVATORIES AND SINKS.

3.2 INSTALLATION

A. INSTALL EACH FIXTURE WITH TRAP, EASILY REMOVABLE FOR SERVICING AND CLEANING.

B. PROVIDE CHROME PLATED RIGID OR FLEXIBLE SUPPLIES TO FIXTURES WITH WHEEL STOPS, REDUCERS, ESCUTCHEONS.

C. INSTALL COMPONENTS LEVEL AND PLUMB.

D. INSTALL AND SECURE FIXTURES IN PLACE WITH WALL SUPPORTS AND BOLTS.

E. SEAL FIXTURES TO WALL AND FLOOR SURFACES WITH SEALANT, COLOR TO MATCH FIXTURE.

F. SOLIDLY ATTACH WATER CLOSETS TO FLOOR WITH LAG SCREWS. LEAD FLASHING IS NOT INTENDED TO HOLD FIXTURE IN PLACE.

3.3 INTERFACE WITH OTHER PRODUCTS

A. REVIEW MILLWORK AND OWNER PROVIDED FIXTURE SHOP DRAWINGS. CONFIRM LOCATION AND SIZE OF FIXTURES AND OPENINGS BEFORE ROUGH-IN AND INSTALLATION.

3.4 CLEANING

A. CLEAN PLUMBING FIXTURES AND EQUIPMENT.

END OF SECTION

PLUMBING WATER HEATERS SECTION 22 33 00

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. WATER HEATERS.

1.2 QUALITY ASSURANCE

A. ENSURE PRODUCTS AND INSTALLATION OF SPECIFIED PRODUCTS ARE IN ACCORDANCE WITH RECOMMENDATIONS AND REQUIREMENTS OF THE FOLLOWING ORGANIZATIONS:

1. NATIONAL SANITATION FOUNDATION (NSF).
2. NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA).
3. UNDERWRITERS LABORATORIES INC. (UL).

1.3 DELIVERY, STORAGE, AND PROTECTION

A. TRANSPORT, HANDLE, STORE, AND PROTECT PRODUCTS.

B. PROVIDE TEMPORARY INLET AND OUTLET CAPS. MAINTAIN CAPS IN PLACE UNTIL INSPECTION.

C. ACCEPT FIXTURES ON SITE IN FACTORY PACKAGING. INSPECT FOR DAMAGE.

1.4 WARRANTY

A. PROVIDE FIVE-YEAR MANUFACTURER WARRANTY FOR WATER HEATERS.

PART 2 - PRODUCTS

2.1 ELECTRIC WATER HEATERS

A. TYPE: FACTORY ASSEMBLED AND WIRED AUTOMATIC, ELECTRIC HEATER WITH VERTICAL GLASS LINED AND INSULATED STORAGE TANK AND MAGNESIUM ANODES FOR CORROSION PROTECTION.

B. REFER TO DRAWINGS FOR ELECTRICAL CHARACTERISTICS, CAPACITY, HEATING ELEMENT SIZE, AND ACCESSORIES.

C. HEATER SHALL BE SUITABLE FOR A MAXIMUM WORKING PRESSURE OF 150 PSIG. HEATER SHALL BE UL LISTED AND LABELED, MEET THE EFFICIENCY REQUIREMENTS OF ASHRAE 90.1, AND BE CERTIFIED BY THE CALIFORNIA ENERGY COMMISSION.

D. RELIEF VALVE: ASME AND/OR AGA RATED PRESSURE AND TEMPERATURE SAFETY RELIEF VALVE, PIPED FULL SIZE TO APPROVED RECEPTOR.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL WATER HEATERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND TO UL REQUIREMENTS.

B. PROVIDE ALL REQUIRED PIPING AND VALVES.

C. DOMESTIC HOT WATER DISCHARGE TEMPERATURE SHALL BE SET AT 110° F.

END OF SECTION 22 33 00

Scale:	N.T.S
Designed by:	NYE
Drawn by:	NYE
Checked by:	NYE
Issue:	Date:
Design Development	06/18/2024
Progress Set	07/03/2024
Permit Set	07/19/2024
REV Permit Set 1	08/14/2024

PLUMBING SPECIFICATIONS

PS5.2