

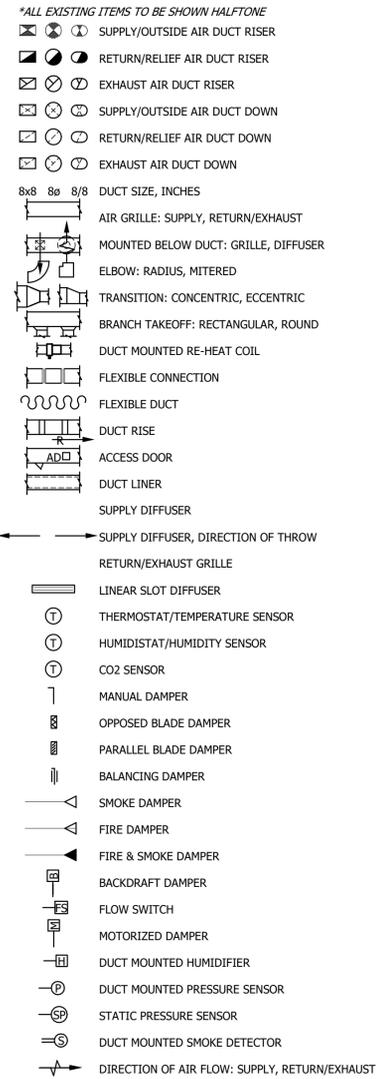
ABBREVIATIONS

A	ABOVE FINISHED FLOOR
AFF	AIR HANDLING UNIT
AHU	AMBIENT
AMB	APPROXIMATE(LY)
APPROX	ARCHITECT(URAL)
ARCH	AUTOMATIC TEMPERATURE CONTROL
ATC	
B	
B.O.D.	BOTTOM OF DUCT
B.O.P.	BOTTOM OF PIPE
BDD	BACKDRAFT DAMPER
BFP	BACKFLOW PREVENTER
BLDG	BUILDING
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	
CA	COMPRESSED AIR
CB	CATCH BASIN
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CIRC	CIRCULATION
CLG	CEILING
CO	CLEANOUT
CO2	CARBON DIOXIDE
COL	COLUMN
CONC	CONCRETE
CONN	CONNECT (ION)
CONT	CONTINUATION
CONTR	CONTRACTOR
CU	CONDENSING UNIT
CW	CITY WATER
CL	CENTERLINE
D	
DB	DRAIN
DIA	DRY BULB TEMPERATURE, °F
DIA	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
DN	DOWN
DOM	DOMESTIC
DS	DUCT SILENCER OR DOWNSPOUT
DWGS	DRAWINGS
DWV	DRAINAGE, WASTE & VENT
DX	DIRECT EXPANSION
E	
EA	EACH
EAT	ENTERING AIR TEMPERATURE, °F
ELEC	ELECTRIC(AL)
ELEV	ELEVATION OR ELEVATOR
ENT	ENTERING
EQUIP	EQUIPMENT
ES/EW	EMERGENCY SHOWER/EYEWASH
ESP	EXTERNAL STATIC PRESSURE
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE, °F
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
F	
FC	FAN COIL UNIT
FCO	FLOOR CLEANOUT
FD	FIRE DAMPER OR FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FIN	FINISH(ED)
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FLGD	FLANGED
FLR	FLOOR
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FBM	FEET PER MINUTE
FS	FLOW SWITCH
FT	FOOT OR FEET
FTG	FOOTING OR FITTING
FURN	FURNISH
°F	DEGREES FAHRENHEIT
G	
G	GAS
GAL	GALLON
GCO	GRADE CLEANOUT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GWR	GLYCOL/WATER RETURN
GWS	GLYCOL/WATER SUPPLY
H	
H/C	HANDICAP
HB	HOSE BIBB
HD	HUB DRAIN
HOR	HORIZONTAL
HP	HORSEPOWER OR HEAT PUMP
HR	HOUR
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
HW	HOT WATER

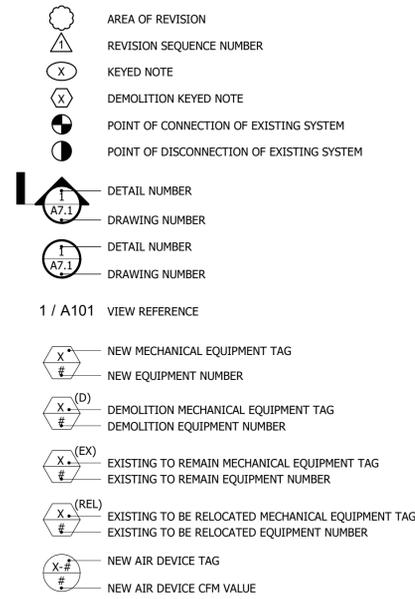
ABBREVIATIONS

HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HZ	FREQUENCY
I	
ID	INSIDE DIAMETER
IN	INCH(ES)
INSUL	INSULATE OR INSULATION
INV	INVERT
J	
JAN	JANITOR
K	
KW	KILOWATT(S)
L	
LAT	LEAVING AIR TEMPERATURE, °F
LAV	LAVATORY
LB	POUNDS
LBS/HR	POUNDS PER HOUR
LRA	LOCKED ROTOR AMPS
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE, °F
M	
M	MOTOR
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MOC	MAXIMUM OVERCURRENT PROTECTION
N	
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
N/A	NOT APPLICABLE
NFHB	NON-FREEZE HOSE BIBB
NFWH	NON-FREEZE WALL HYDRANT
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
O	
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE, °F
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OPNG	OPENING
P	
PB	POLYBUTYLENE
PC	PUMPED CONDENSATE
PD	PRESSURE DROP
PE	POLYETHYLENE
PLBG	PLUMBING
PRSS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PVC	POLYVINYL CHLORIDE
Q	
QTY	QUANTITY
R	
RA	RETURN AIR
RD	ROOF DRAIN
REQ'D	REQUIRED
RET	RETURN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RL	RAIN LEADER
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT

HVAC LEGEND:



TYPICAL ANNOTATION:



SHEET LIST	
Sheet Number	Sheet Name
M0.00	SYMBOLS, LEGENDS, AND ABBREVIATIONS - HVAC
M0.01	SPECIFICATIONS - MECHANICAL
M0.02	SPECIFICATIONS - MECHANICAL
M0.03	SPECIFICATIONS - MECHANICAL
M3.01	CONSTRUCTION PLAN - MECHANICAL
M3.02	ROOF PLAN - MECHANICAL
M3.03	ENLARGED PLANS - MECHANICAL
M8.00	DETAILS - MECHANICAL
M8.01	CALCULATIONS - MECHANICAL
M8.02	COMPLIANCE FORMS - MECHANICAL
M9.00	SCHEDULES - MECHANICAL

GENERAL NOTES:

- THESE GENERAL NOTES APPLY TO ALL M SERIES DRAWINGS.
- NOT ALL SYMBOLS, ABBREVIATIONS AND NOTES MAY APPLY TO THIS PROJECT.
- THE CONTRACTOR SHALL PAY FOR AND OBTAIN ALL NECESSARY FEES, PERMITS AND INSPECTIONS FOR APPLICABLE PORTIONS OF THE WORK.
- COORDINATE ALL DEMOLITION WORK WITH THE NEW INSTALLATION TO MINIMIZE SYSTEM DOWNTIME FOR AREAS TO REMAIN IN OPERATION.
- ALL CONSTRUCTION DEBRIS SHALL BE DISPOSED OF BY THE CONTRACTOR UNLESS NOTED OTHERWISE.
- THERE SHALL BE NOTHING ABANDONED IN PLACE UNLESS SPECIFICALLY INDICATED AS SUCH.
- SIZES INDICATED FOR EXISTING DUCTWORK AND PIPING ARE PER THE ORIGINAL DOCUMENTS. FIELD VERIFY EXACT SIZES AND PROVIDE TRANSITIONS ACCORDINGLY.
- PROVIDE OFFSETS AND TRANSITIONS IN DUCTWORK AND PIPING AS REQUIRED TO AVOID INTERFERENCE AT NO ADDITIONAL COST TO THE PROJECT.
- VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. PROVIDE TRANSITIONS TO MAKE FINAL CONNECTION TO EQUIPMENT, UNLESS OTHERWISE INDICATED. FIELD VERIFY ALL DIMENSIONS BEFORE FABRICATION OF WORK.
- PROVIDE ACCESS TO ALL CONCEALED EQUIPMENT. COORDINATE LOCATION OF ACCESS PANELS WITH ARCHITECT.
- WHERE CONNECTION IS MADE TO EXISTING SYSTEMS, FIELD VERIFY EXACT LOCATION, SIZE AND CONNECTION REQUIREMENTS AND PROVIDE TRANSITIONS AS REQUIRED. PATCH INSULATION AND OVERLAP VAPOR BARRIER AS APPLICABLE.
- EXACT LOCATION OF DIFFUSERS, GRILLES AND REGISTERS SHALL BE COORDINATED WITH THE REFLECTED CEILING PLANS AND ALL OTHER TRADES BEFORE INSTALLATION. PROVIDE SYMMETRY WITH THE ROOM LIGHTING SYSTEMS.
- VERIFY DIFFUSER, GRILLE AND REGISTER MOUNTING FRAME TYPES WITH THE CEILING TYPES. MATCH FRAME TYPE WITH CEILING CONFIGURATION.
- ALL ITEMS INDICATED WITH (E) ARE EXISTING TO REMAIN AND ALL ITEMS INDICATED WITH (R) ARE EXISTING TO BE RELOCATED. ALL EXISTING AND/OR RELOCATED ITEMS SHALL BE CLEANED AND REPAIRED IN ORDER TO PROVIDE A COMPLETE AND WORKING SYSTEM.
- COORDINATE ALL BUILDING SHUT DOWN REQUIREMENTS WITH THE BUILDING PROJECT COORDINATOR AND/OR BUILDING ENGINEER.
- SIZES INDICATED FOR ALL DUCTWORK ARE FREE AREA DIMENSIONS.
- DUCTWORK SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO UNDERSIDE OF BEAMS AND JOISTS, FLAT ON TOP WITH BOTTOM ECCENTRIC TRANSITIONS.
- FLEXIBLE DUCTWORK SHALL NOT EXCEED FIVE (5) FEET IN LENGTH. FLEXIBLE DUCT SHALL NOT REST ON LIGHTING FIXTURES. WHERE FLEXIBLE DUCTS REQUIRE SUPPORT, SUSPEND FROM STRUCTURE OVERHEAD WITH NYLON BANDS.
- DUCT FITTINGS ARE INDICATED SYMBOLICALLY. REFER TO DETAILS CONFIGURATION OF FITTING, TAPS AND CONNECTIONS. DUCT CONSTRUCTION SHALL COMPLY WITH SMACNA CONSTRUCTION STANDARDS. ALL 90 DEG. ELBOWS SHALL BE LONG RADIUS TYPE UNLESS SPACE IS LIMITED. ALL SQUARE ELBOWS AND SHORT RADIUS ELBOWS IN SUPPLY DUCT SHALL HAVE TURNING VANES.
- PROVIDE FLEXIBLE CONNECTIONS BETWEEN DUCTWORK AND FANS/AIR HANDLING EQUIPMENT.
- PAINT FLAT BLACK THE INSIDE OF ALL DUCTWORK VISIBLE THROUGH DIFFUSERS, GRILLES AND REGISTERS.
- PROVIDE CONCRETE HOUSEKEEPING PADS TO SUIT FLOOR MOUNTED MECHANICAL EQUIPMENT, SIZE PADS AND COORDINATE WITH OTHER TRADES FOR EXACT LOCATION.
- CONCENTRATE LOADS AT JOIST/BEAM LOCATIONS. PROVIDE ANGLE BRACES WHERE CONCENTRATED LOADS OCCUR AT OTHER LOCATIONS.
- COORDINATE ALL DOOR UNDER CUTS INDICATED AND REQUIRED FOR PROPER AIR MOVEMENT.
- PROVIDE DUCTWORK TO TERMINAL AIR DEVICES AT SCHEDULED INLET SIZE UNLESS OTHERWISE INDICATED.
- WHERE ROOMS ARE ENCLOSED BY FULL HEIGHT WALLS, ENSURE PLENUM RETURNS ARE DUCTED THROUGH WALLS.
- MAINTAIN BUILDING FIRE INTEGRITY WITH PIPING PENETRATIONS BY PROVIDING METAL SLEEVES AND UL APPROVED FIRE SAFING.
- PROVIDE RUNOUT PIPING AS SCHEDULED OR AS OTHERWISE INDICATED.
- INSTALL ALL EQUIPMENT LEVEL AND PLUMB. PROVIDE BLOCKING HARDWARE AS REQUIRED.
- PROVIDE THERMAL INSULATION WITH VAPOR BARRIER JACKET ON EXISTING AND NEW DUCTWORK UNLESS OTHERWISE NOTED. ALL EXISTING DUCT DAMAGED OR MISSING INSULATION SHALL BE RESTORED/REPAIRED OR REPLACED WITH NEW.
- MOUNT ROOM THERMOSTATS AT 48 INCHES AFF, MOUNT OCCUPANCY SENSORS AT 84 INCHES AFF UNLESS OTHERWISE INDICATED.
- INSTALL ALL EQUIPMENT REQUIRING PERIODIC SERVICE NOT LESS THAN 10 FEET FROM ROOF EDGE OR OPENING WITHOUT PROTECTIVE RAILING OR PARAPET OF 42 INCHES.
- PROVIDE NEW THERMOSTATS, WHERE SHOWN, TO MATCH BUILDING STANDARDS. THERMOSTATS SHALL BE CAPABLE OF COMMUNICATING WITH THE EXISTING BUILDING MANAGEMENT SYSTEM TO CONTROL INDICATED EQUIPMENT. TEMPERATURE CONTROL SYSTEMS AND SEQUENCE OF OPERATIONS SHALL BE APPROVED BY THE BUILDING ENGINEER PRIOR TO PURCHASE AND/OR INSTALLATION.
- UPON COMPLETION OF INSTALLATION OF HVAC WORK, CALIBRATE ALL THERMOSTATS AND BALANCE AIR FLOW AT ALL FANS, AIR TERMINAL, AND AIR DEVICES AFFECTED BY THIS PROJECT TO SPECIFIED VALUES.
- PROVIDE VOLUME DAMPERS AT ALL BRANCH DUCT TAKEOFFS, AT EACH AIR TERMINAL DEVICE, AND WHERE INDICATED.
- ALL AFFECTED HVAC SYSTEMS SHALL BE BALANCED TO THE INDICATED VALUES BY AN INDEPENDENT TEST AND BALANCE COMPANY PER AABC OR NEBB STANDARDS AND CONSTRUCTION DOCUMENTS. THREE (3) CERTIFIED COPIES OF TEST AND BALANCE REPORT SHALL BE PROVIDED TO THE ENGINEER PRIOR TO JOB CLOSE OUT.

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PANATTONI
DEVELOPMENT

SOUTH SOUND COMMERCE CENTER

BUILDING A
TUMWATER, WASHINGTON

Description: BUILDING PERMIT No: 04/22/2022 Date:



04/21/2022

CITY STAMP:

SHEET NAME:
SYMBOLS, LEGENDS, AND ABBREVIATIONS - HVAC

Proj. No21.0003934.080 Reviewed By:TB SHEET No:

M0.00

CLIENT:



PANATTONI[®]

PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:

SPECIFICATIONS -
MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M0.03

C. DRIVES: FACTORY-MOUNTED V-BELT DRIVE, WITH ADJUSTABLE ALIGNMENT AND BELT TENSIONING, AND WITH 1.5 SERVICE FACTOR BASED ON FAN MOTOR.

D. MOTORS:

1. COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, AND EFFICIENCY REQUIREMENTS FOR MOTORS SPECIFIED IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT."
2. MOTOR SIZES: MAXIMUM SIZES AS INDICATED. IF NOT INDICATED, LARGE ENOUGH SO DRIVEN LOAD WILL NOT REQUIRE MOTOR TO OPERATE IN SERVICE FACTOR RANGE ABOVE 1.0.

2.6 AIR FILTRATION

A. PANEL FILTERS:

1. DESCRIPTION: PLEATED FACTORY-FABRICATED, SELF-SUPPORTED, DISPOSABLE AIR FILTERS WITH HOLDING FRAMES.
2. FILTER UNIT CLASS: UL 900.
3. MEDIA: INTERLACED GLASS, SYNTHETIC OR COTTON FIBERS COATED WITH NONFLAMMABLE ADHESIVE AND ANTIMICROBIAL COATING.

B. CLEANABLE FILTERS:

1. CLEANABLE METAL MESH.

C. ADHESIVE, SUSTAINABILITY PROJECTS: AS RECOMMENDED BY AIR-FILTER MANUFACTURER AND WITH A VOC CONTENT OF 80 G/L OR LESS.

2.7 DAMPERS

A. OUTDOOR- AND RETURN-AIR DAMPERS: LOW-LEAKAGE, DOUBLE-SKIN, AIRFOIL-BLADE, GALVANIZED-STEEL DAMPERS WITH COMPRESSIBLE JAMB SEALS AND EXTRUDED-VINYL BLADE EDGE SEALS IN OPPOSED-BLADE ARRANGEMENT WITH ZINC-PLATED STEEL OPERATING RODS ROTATING IN SINTERED BRONZE OR NYLON BEARINGS MOUNTED IN A SINGLE GALVANIZED-STEEL FRAME, AND WITH OPERATING RODS CONNECTED WITH A COMMON LINKAGE. LEAKAGE RATE SHALL NOT EXCEED 4 CFM/SQ. FT. (20 L/S PER SQ. M) AT 1-INCH WG (250 PA) AND 8 CFM/SQ. FT. (40 L/S PER SQ. M) AT 4-INCH WG (1.0 MPA) RATED IN ACCORDANCE WITH AMCA 500D.

2.8 DIRECT-FIRED GAS BURNER

- A. DESCRIPTION: FACTORY ASSEMBLED, PIPED, AND WIRED; AND COMPLYING WITH ANSI Z21.47 AND WITH NFPA 54.
- B. CSA APPROVAL: DESIGNED AND CERTIFIED BY AND BEARING LABEL OF CSA.
- C. BURNERS: STAINLESS STEEL.
 1. FUEL: NATURAL GAS.
 2. IGNITION: ELECTRONICALLY CONTROLLED ELECTRIC SPARK WITH FLAME SENSOR.

2.9 UNIT CONTROL PANEL

- A. FACTORY-WIRED, FUSE-PROTECTED CONTROL TRANSFORMER, CONNECTION FOR POWER SUPPLY AND FIELD-WIRED UNIT TO REMOTE CONTROL PANEL.
- B. CONTROL PANEL: SURFACE-MOUNTED REMOTE PANEL, WITH ENGRAVED PLASTIC COVER AND THE FOLLOWING LIGHTS AND SWITCHES:
 1. ON-OFF-AUTO FAN SWITCH.
 2. HEAT-VENT-OFF SWITCH.
 3. SUPPLY-FAN OPERATION INDICATING LIGHT.
 4. HEATING OPERATION INDICATING LIGHT.
 5. THERMOSTAT.
 6. DAMPER POSITION POTENTIOMETER.
 7. DIRTY-FILTER INDICATING LIGHT OPERATED BY UNIT-MOUNTED DIFFERENTIAL PRESSURE SWITCH.
 8. SAFETY-LOCKOUT INDICATING LIGHT.

2.10 CONTROLS

- A. CONTROL DEVICES:
 1. REMOTE THERMOSTAT: ADJUSTABLE ROOM THERMOSTAT WITH TEMPERATURE READOUT.
 2. REMOTE SETBACK THERMOSTAT: ADJUSTABLE ROOM THERMOSTAT WITHOUT TEMPERATURE READOUT.
 3. STATIC-PRESSURE TRANSMITTER: NONDIRECTIONAL SENSOR WITH SUITABLE RANGE FOR EXPECTED INPUT, AND TEMPERATURE COMPENSATED.
 4. FIRE-PROTECTION THERMOSTATS: FIXED OR ADJUSTABLE SETTINGS TO OPERATE AT NOT LESS THAN 75 DEG F ABOVE NORMAL MAXIMUM OPERATING TEMPERATURE.
- B. OUTDOOR-AIR DAMPER CONTROL, 100 PERCENT OUTDOOR-AIR UNITS: OUTDOOR-AIR DAMPER SHALL OPEN WHEN SUPPLY FAN STARTS, AND CLOSE WHEN FAN STOPS.
- C. TEMPERATURE CONTROL:
 1. OPERATES GAS VALVE TO MAINTAIN DISCHARGE-AIR TEMPERATURE WITH FACTORY-MOUNTED SENSOR IN BLOWER OUTLET.
 2. OPERATES GAS VALVE TO MAINTAIN SPACE TEMPERATURE WITH WALL-MOUNTING, FIELD-WIRED SENSOR WITH TEMPERATURE ADJUSTMENT.
 3. TIMER SHALL SELECT REMOTE SETBACK THERMOSTAT TO MAINTAIN SPACE TEMPERATURE AT 50 DEG F.
 4. BURNER CONTROL, STEPPED: TWO OR FOUR STEPS OF CONTROL USING ONE OR TWO BURNER SECTIONS IN SERIES.
 5. BURNER CONTROL, MODULATING: 20 TO 100 PERCENT MODULATION OF THE FIRING RATE. 10 TO 100 PERCENT WITH DUAL BURNER UNITS.

2.11 ACCESSORIES

- A. ELECTRIC HEATER WITH INTEGRAL THERMOSTAT MAINTAINS MINIMUM 50 DEG F TEMPERATURE IN GAS BURNER COMPARTMENT.
- B. DUPLEX, 115-V, GROUND-FAULT-INTERRUPTER OUTLET WITH 15-A OVERCURRENT PROTECTION. INCLUDE TRANSFORMER IF REQUIRED.
- C. LOW-AMBIENT KIT USING VARIABLE-SPEED CONDENSER FANS FOR OPERATION DOWN TO 35 DEG F.
- D. FILTER DIFFERENTIAL PRESSURE SWITCH WITH SENSOR TUBING ON EITHER SIDE OF FILTER. SET FOR FINAL FILTER PRESSURE LOSS.
- E. COIL GUARDS OF PAINTED, GALVANIZED-STEEL WIRE.
- F. HALL GUARDS OF GALVANIZED STEEL, PAINTED TO MATCH CASING.

2.12 MATERIALS

- A. STEEL:
 1. ASTM A36/A36M FOR CARBON STRUCTURAL STEEL.
 2. ASTM A568/A568M FOR STEEL SHEET.
- B. STAINLESS STEEL:
 1. MANUFACTURER'S STANDARD GRADE FOR CASING.
 2. MANUFACTURER'S STANDARD TYPE, ASTM A240/A240M FOR BARE STEEL EXPOSED TO AIRSTREAM OR MOISTURE.
- C. GALVANIZED STEEL: ASTM A653/A653M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE AREAS AND CONDITIONS, WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.
- B. EXAMINE ROUGHING-IN FOR PIPING, DUCTS, AND ELECTRICAL SYSTEMS TO VERIFY ACTUAL LOCATIONS OF PIPING AND ELECTRICAL CONNECTIONS BEFORE EQUIPMENT INSTALLATION.
- C. VERIFY CLEANLINESS OF AIRFLOW PATH TO INCLUDE INNER-CASING SURFACES, FILTERS, COILS, TURNING VANES, FAN WHEELS, AND OTHER COMPONENTS.
- D. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

- A. ROOF CURB: INSTALL ON ROOF STRUCTURE OR CONCRETE BASE, LEVEL AND SECURE, ACCORDING TO AHRI GUIDELINE B. INSTALL UNITS ON CURBS AND COORDINATE ROOF PENETRATIONS AND FLASHING WITH ROOF CONSTRUCTION SPECIFIED IN SECTION 072200 "ROOF ACCESSORIES." SECURE UNITS TO UPPER CURB RAIL, AND SECURE CURB BASE TO ROOF FRAMING OR CONCRETE BASE WITH ANCHOR BOLTS. COORDINATE SIZES AND LOCATIONS OF ROOF CURBS WITH ACTUAL EQUIPMENT.
- B. INSTALL GAS-FIRED UNITS ACCORDING TO NFPA 54, "NATIONAL FUEL GAS CODE."
- C. INSTALL CONTROLS AND EQUIPMENT SHIPPED BY MANUFACTURER FOR FIELD INSTALLATION WITH DIRECT-FIRED HEATING AND VENTILATING UNITS.

3.3 PIPING CONNECTIONS

- A. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.
 1. GAS PIPING: COMPLY WITH REQUIREMENTS IN SECTION 231123 "FACILITY NATURAL-GAS PIPING." CONNECT GAS PIPING WITH SHUTOFF VALVE AND UNION, AND WITH SUFFICIENT CLEARANCE FOR BURNER REMOVAL AND SERVICE. MAKE FINAL CONNECTIONS OF GAS PIPING TO UNIT WITH CORRUGATED, STAINLESS-STEEL TUBING FLEXIBLE CONNECTORS COMPLYING WITH ANSI LC 1/CSA 6.26 EQUIPMENT CONNECTIONS.
- B. DRAIN: COMPLY WITH REQUIREMENTS IN SECTION 221316 "SANITARY WASTE AND VENT PIPING" FOR TRAPS AND ACCESSORIES ON PIPING CONNECTIONS TO CONDENSATE DRAIN PANS UNDER CONDENSING HEAT EXCHANGERS.
- C. WHERE INSTALLING PIPING ADJACENT TO HEATING AND VENTILATING UNITS, ALLOW SPACE FOR SERVICE AND MAINTENANCE.

3.4 DUCT CONNECTIONS

- A. DUCT CONNECTIONS: CONNECT SUPPLY DUCTS TO DIRECT-FIRED HEATING AND VENTILATING UNITS WITH FLEXIBLE DUCT CONNECTORS. COMPLY WITH REQUIREMENTS IN SECTION 233300 "AIR DUCT ACCESSORIES" FOR FLEXIBLE DUCT CONNECTORS.

3.5 ELECTRICAL CONNECTIONS

- A. CONNECT WIRING ACCORDING TO SECTION 260519 "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."
- B. GROUND EQUIPMENT ACCORDING TO SECTION 260526 "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."
- C. INSTALL ELECTRICAL DEVICES FURNISHED BY MANUFACTURER, BUT NOT FACTORY MOUNTED, ACCORDING TO NFPA 70 AND NECA 1.
- D. INSTALL NAMEPLATE FOR EACH ELECTRICAL CONNECTION, INDICATING ELECTRICAL EQUIPMENT DESIGNATION AND CIRCUIT NUMBER FEEDING CONNECTION.

3.6 CONTROL CONNECTIONS

- A. INSTALL CONTROL AND ELECTRICAL POWER WIRING TO FIELD-MOUNTED CONTROL DEVICES.
- B. CONNECT WIRING ACCORDING TO SECTION 260519 "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."

3.7 STARTUP SERVICE

- A. PERFORM STARTUP SERVICE.
- B. COMPLETE INSTALLATION AND STARTUP CHECKS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND PERFORM THE FOLLOWING:
 1. INSPECT FOR VISIBLE DAMAGE TO BURNER COMBUSTION CHAMBER.
 2. INSPECT CASING INSULATION FOR INTEGRITY, MOISTURE CONTENT, AND ADHESION.
 3. VERIFY THAT CLEARANCES HAVE BEEN PROVIDED FOR SERVICING.
 4. VERIFY THAT CONTROLS ARE CONNECTED AND OPERABLE.
 5. VERIFY THAT FILTERS ARE INSTALLED.
 6. PURGE GAS LINE.
 7. INSPECT AND ADJUST VIBRATION ISOLATORS.
 8. VERIFY BEARING LUBRICATION.
 9. INSPECT FAN-WHEEL ROTATION FOR MOVEMENT IN CORRECT DIRECTION WITHOUT VIBRATION AND BINDING.
 10. ADJUST FAN BELTS TO PROPER ALIGNMENT AND TENSION.
- C. START UNIT ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
 1. COMPLETE STARTUP SHEETS AND ATTACH COPY WITH CONTRACTOR'S STARTUP REPORT.
 2. INSPECT AND RECORD PERFORMANCE OF INTERLOCKS AND PROTECTIVE DEVICES; VERIFY SEQUENCES.
 3. OPERATE UNIT FOR RUN-IN PERIOD RECOMMENDED BY MANUFACTURER.
 4. PERFORM THE FOLLOWING OPERATIONS FOR BOTH MINIMUM AND MAXIMUM FIRING, AND ADJUST BURNER FOR PEAK EFFICIENCY:
 - a. MEASURE GAS PRESSURE AT MANIFOLD.
 - b. MEASURE COMBUSTION-AIR TEMPERATURE AT INLET TO COMBUSTION CHAMBER.
 - c. MEASURE SUPPLY-AIR TEMPERATURE AND VOLUME WHEN BURNER IS AT MAXIMUM FIRING RATE AND WHEN BURNER IS OFF. CALCULATE USEFUL HEAT TO SUPPLY AIR.
 5. CALIBRATE THERMOSTATS.
 6. ADJUST AND INSPECT HIGH-TEMPERATURE LIMITS.

7. INSPECT DAMPERS, IF ANY, FOR PROPER STROKE AND INTERLOCK WITH RETURN-AIR DAMPERS.
8. INSPECT CONTROLS FOR CORRECT SEQUENCING OF HEATING, MIXING DAMPERS, REFRIGERATION, AND NORMAL AND EMERGENCY SHUTDOWN.
9. MEASURE AND RECORD AIRFLOW. PLOT FAN VOLUMES ON FAN CURVE.
10. VERIFY OPERATION OF REMOTE PANEL, INCLUDING PILOT-OPERATION AND FAILURE MODES. INSPECT THE FOLLOWING:
 - a. HIGH-LIMIT HEAT.
 - b. ALARMS.
11. AFTER STARTUP AND PERFORMANCE TESTING, CHANGE FILTERS, VERIFY BEARING LUBRICATION, AND ADJUST BELT TENSION.
12. VERIFY DRAIN-PAN PERFORMANCE.
13. VERIFY OUTDOOR-AIR DAMPER OPERATION.

3.8 ADJUSTING

- A. ADJUST INITIAL TEMPERATURE SET POINTS.
- B. SET FIELD-ADJUSTABLE SWITCHES AND CIRCUIT-BREAKER TRIP RANGES AS INDICATED.
- C. OCCUPANCY ADJUSTMENTS: WHEN REQUESTED WITHIN 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, PROVIDE ON-SITE ASSISTANCE IN ADJUSTING SYSTEM TO SUIT ACTUAL OCCUPIED CONDITIONS. PROVIDE UP TO TWO VISITS TO PROJECT DURING OTHER-THAN-NORMAL OCCUPANCY HOURS FOR THIS PURPOSE.

3.9 CLEANING

- A. AFTER COMPLETING SYSTEM INSTALLATION AND TESTING, ADJUSTING, AND BALANCING MAKEUP AIR UNIT AND AIR-DISTRIBUTION SYSTEMS AND AFTER COMPLETING STARTUP SERVICE, CLEAN AIR-HANDLING UNITS INTERNALLY TO REMOVE FOREIGN MATERIAL AND CONSTRUCTION DIRT AND DUST. CLEAN FAN WHEELS, CABINETS, DAMPERS, COILS, AND FILTER HOUSINGS, AND INSTALL NEW, CLEAN FILTERS.

3.10 FIELD QUALITY CONTROL

- A. TESTING AGENCY: ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM TESTS AND INSPECTIONS
- B. PERFORM TESTS AND INSPECTIONS WITH THE ASSISTANCE OF A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE.
- C. UNITS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
- D. PREPARE TEST AND INSPECTION REPORTS.

SECTION 238239.19 - WALL AND CEILING UNIT HEATERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
 1. INCLUDE RATED CAPACITIES, OPERATING CHARACTERISTICS, FURNISHED SPECIALTIES, AND ACCESSORIES.

PART 2 - PRODUCTS

2.1 DESCRIPTION

- A. ASSEMBLY INCLUDING CHASSIS, ELECTRIC HEATING COIL, FAN, MOTOR, AND CONTROLS. COMPLY WITH UL 2021.
- B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

2.2 CABINET

- A. FRONT PANEL: STAMPED-STEEL LOUVER, WITH REMOVABLE PANELS FASTENED WITH TAMPERPROOF FASTENERS.
- B. FINISH: BAKED ENAMEL OVER BAKED-ON PRIMER WITH MANUFACTURER'S STANDARD COLOR SELECTED BY ARCHITECT, APPLIED TO FACTORY-ASSEMBLED AND -TESTED WALL AND CEILING HEATERS BEFORE SHIPPING.
- C. SURFACE-MOUNTED CABINET ENCLOSURE: STEEL WITH FINISH TO MATCH CABINET.

2.3 COIL

- A. ELECTRIC-RESISTANCE HEATING COIL: NICKEL-CHROMIUM HEATING WIRE, FREE FROM EXPANSION NOISE AND 60-HZ HUM, EMBEDDED IN MAGNESIUM OXIDE REFRACTORY AND SEALED IN CORROSION-RESISTANT METALLIC SHEATH. TERMINATE ELEMENTS IN STAINLESS-STEEL, MACHINE-STAKED TERMINALS SECURED WITH STAINLESS-STEEL HARDWARE, AND LIMIT CONTROLS FOR HIGH-TEMPERATURE PROTECTION. PROVIDE INTEGRAL CIRCUIT BREAKER FOR OVERCURRENT PROTECTION.

2.4 FAN AND MOTOR

- A. FAN: ALUMINUM PROPELLER DIRECTLY CONNECTED TO MOTOR.
- B. MOTOR: PERMANENTLY LUBRICATED, MULTISPEED. COMPLY WITH REQUIREMENTS IN SECTION 230513 "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT."

2.5 CONTROLS

- A. CONTROLS: UNIT-MOUNTED THERMOSTAT, LOW-VOLTAGE RELAY WITH TRANSFORMER KIT.
- B. ELECTRICAL CONNECTION: FACTORY WIRE MOTORS AND CONTROLS FOR A SINGLE FIELD CONNECTION WITH DISCONNECT SWITCH.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. EXAMINE AREAS TO RECEIVE WALL AND CEILING UNIT HEATERS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.
- B. EXAMINE ROUGHING-IN FOR ELECTRICAL CONNECTIONS TO VERIFY ACTUAL LOCATIONS BEFORE UNIT-HEATER INSTALLATION.
- C. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

- A. INSTALL WALL AND CEILING UNIT HEATERS TO COMPLY WITH NFPA 90A.
- B. INSTALL WALL AND CEILING UNIT HEATERS LEVEL AND PLUMB.
- C. INSTALL WALL-MOUNTED THERMOSTATS AND SWITCH CONTROLS IN ELECTRICAL OUTLET BOXES AT HEIGHTS TO MATCH LIGHTING CONTROLS.
- D. VERIFY LOCATION OF THERMOSTATS AND OTHER EXPOSED CONTROL SENSORS WITH DRAWINGS AND ROOM DETAILS BEFORE INSTALLATION.
- E. GROUND EQUIPMENT ACCORDING TO SECTION 260526 "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."
- F. CONNECT WIRING ACCORDING TO SECTION 260519 "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."

CLIENT:



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DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

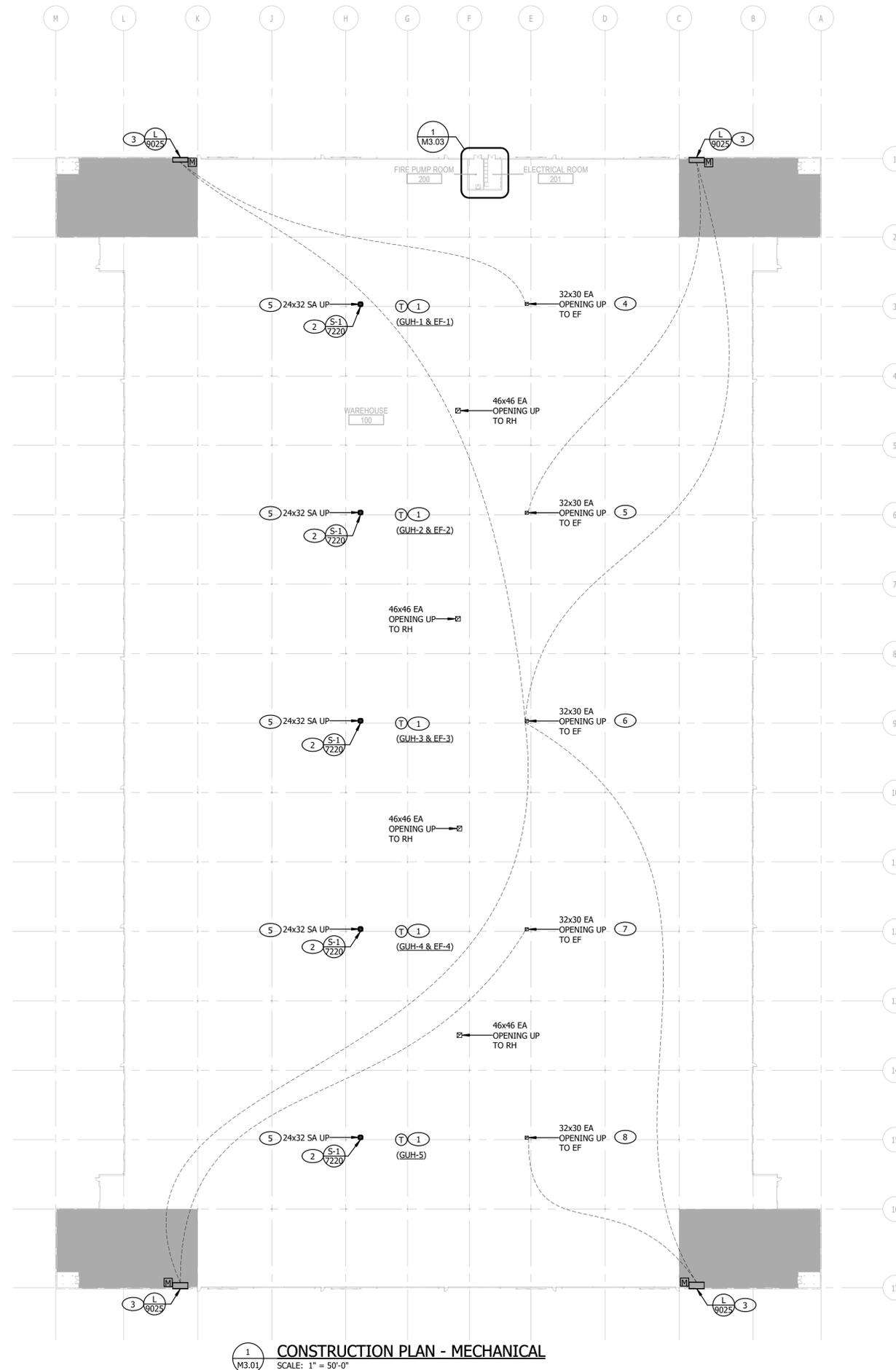
CITY STAMP:

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CONSTRUCTION PLAN -
MECHANICAL

Proj. No: 21.0003934.080 Reviewed By: TB
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M3.01



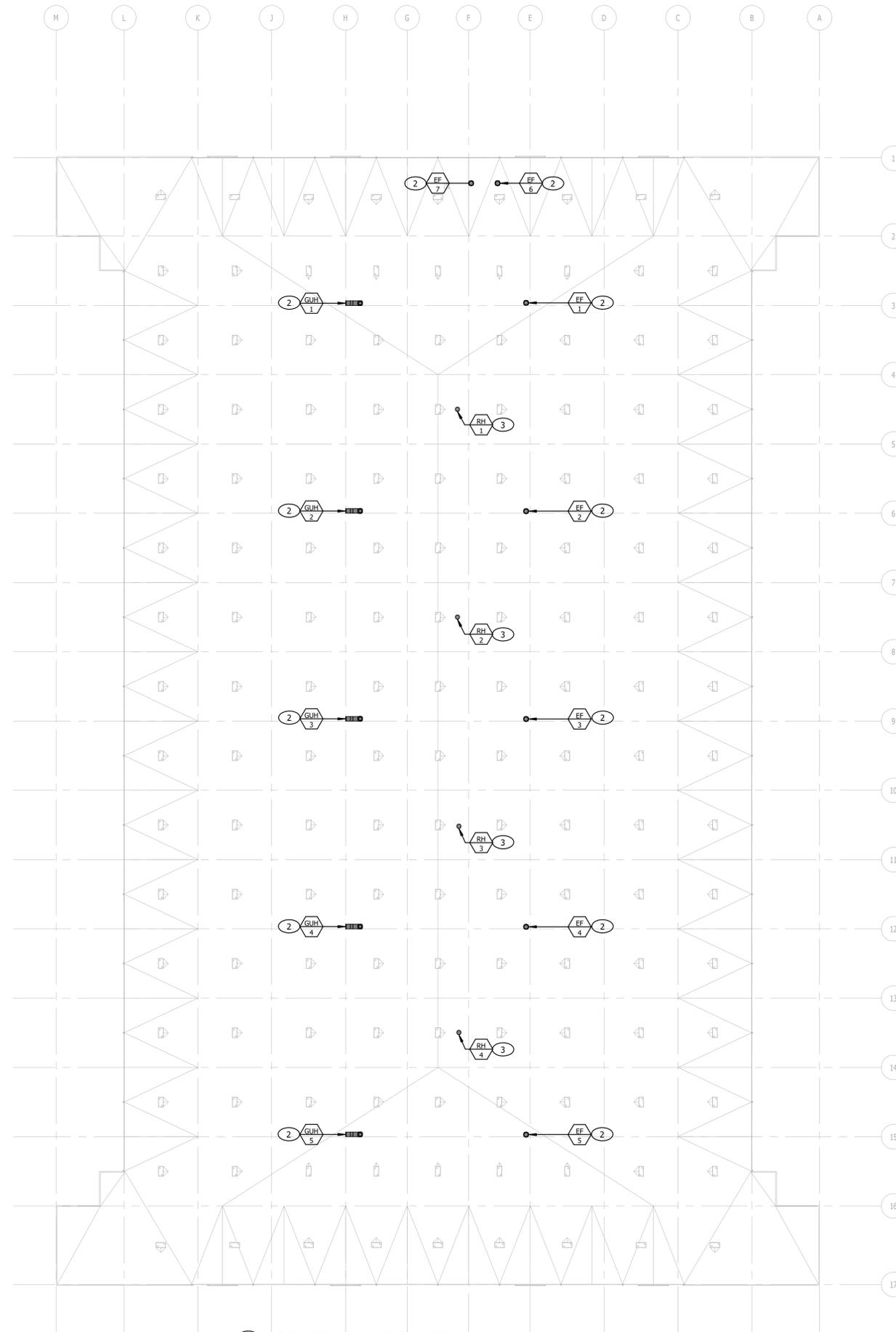
GENERAL NOTES:

1. PROVIDE THE NECESSARY LOW VOLTAGE WIRING, POWER SUPPLIES TO CONTROLS AND TRANSFORMERS TO SUPPLY POWER TO THE REMOTE SENSORS AS REQUIRED BY MANUFACTURER.
2. LOCATE WAREHOUSE AREA SENSORS AND THERMOSTATS SUCH THAT THEY ARE ACCESSIBLE, PROTECTED AND IN AN AREA OF UNOBSTRUCTED AIR CIRCULATION.
3. IT IS THE RESPONSIBILITY OF THE GENERAL AND MECHANICAL CONTRACTORS TO FULLY INSPECT THE SITE PRIOR TO COMMENCEMENT. VERIFY ALL SITE CONDITIONS INCLUDING LOCATIONS OF STRUCTURAL ELEMENTS, BAR JOISTS, COLUMNS ETC. AND COORDINATE DUCT LOCATIONS ACCORDINGLY.
4. MAINTAIN A MINIMUM 36'-0" CLEAR HEIGHT FOR ALL CEILING/STRUCTURE MOUNTED EQUIPMENT IN THE WAREHOUSE.

KEYNOTES

1. INSTALL AND MOUNT THERMOSTAT AT 4 FT AFF.
2. INSTALL AND MOUNT DROP DIFFUSER PER MANUFACTURER'S RECOMMENDATIONS. MOUNT DROP DIFFUSER SO THAT THE TOP OF THE DIFFUSER IS BELOW BOTTOM OF STRUCTURAL JOIST. COORDINATE EXACT LOCATION IN FIELD WITH OTHER TRADES. MAINTAIN ANY/ALL MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES. REFER TO AIR DEVICE SCHEDULE ON SHEET M9.00 AND DETAIL ON SHEET M-8.00 FOR MORE INFORMATION.
3. INSTALL AND MOUNT LOUVER IN ARCHITECTURAL KNOCKOUT. COORDINATE FINAL HEIGHT OF LOUVER WITH ARCHITECT AND ARCHITECTURAL ELEVATIONS. EC TO PROVIDE 120V/1 TO MOTORIZED DAMPER. REFER TO ELECTRICAL DRAWINGS FOR MORE INFORMATION. LOUVER TO INTERLOCK WITH EXHAUST FAN & UNIT HEATER ON ROOF.
4. EXHAUST FAN TO INTERLOCK WITH GUH-1.
5. EXHAUST FAN TO INTERLOCK WITH GUH-2.
6. EXHAUST FAN TO INTERLOCK WITH GUH-3.
7. EXHAUST FAN TO INTERLOCK WITH GUH-4.
8. EXHAUST FAN TO INTERLOCK WITH GUH-5.

1
M3.01
CONSTRUCTION PLAN - MECHANICAL
SCALE: 1" = 50'-0"



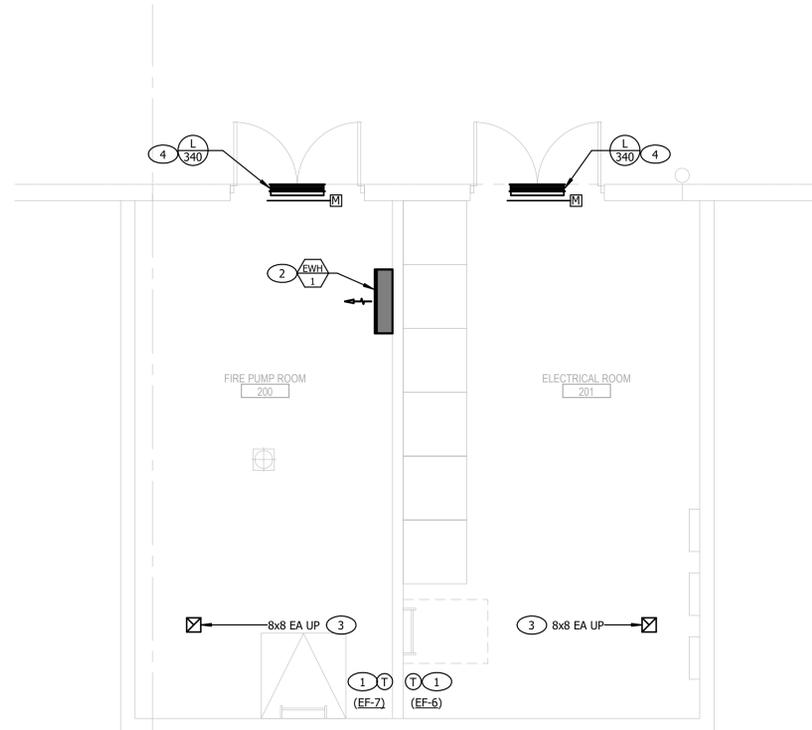
GENERAL NOTES:

- IT IS THE RESPONSIBILITY OF THE GENERAL AND MECHANICAL CONTRACTORS TO FULLY INSPECT THE SITE PRIOR TO COMMENCEMENT. VERIFY ALL SITE CONDITIONS INCLUDING LOCATIONS OF STRUCTURAL ELEMENTS, BAR JOISTS, COLUMNS ETC. AND COORDINATE DUCT LOCATIONS ACCORDINGLY.
- PROVIDE MINIMUM OF 10 FT CLEARANCE BETWEEN ANY ROUTINELY SERVICEABLE EQUIPMENT AND EDGE OF ROOF/FACE OF PARAPET.
- REFER TO MECHANICAL SCHEDULES ON SHEET M7.00 FOR EQUIPMENT INFORMATION.

KEYNOTES

- INSTALL AND MOUNT EXHAUST FAN (EF) ON ROOF PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE EXACT LOCATION IN FIELD WITH OTHER TRADES. VERIFY UNIT OPENING WITH MANUFACTURER. OPENING SHALL BE COVERED WITH 1/2" X 1/2" HARDWARE MESH. PROVIDE MOTORIZED DAMPER WITH FAN.
- INSTALL AND MOUNT GAS UNIT HEATER (GUH) ON ROOF PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE EXACT LOCATION IN FIELD WITH OTHER TRADES AND MAINTAIN MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES. CONFIRM THAT THE MAU'S OUTSIDE AIR INTAKE IS AT LEAST 10' AWAY FROM ALL EXHAUST ALL AND VENT PIPES. SUPPLY DUCT PENETRATION THROUGH ROOF SHALL BE FULL SIZE OF ROOF CURB OPENING. TRANSITION DUCTWORK BELOW ROOF PENETRATION TO DUCT SIZES SHOWN ON PLAN, IN ACCORDANCE WITH SMACNA STANDARDS. VERIFY UNIT OPENINGS AND CONFIGURATION WITH MANUFACTURER.
- INSTALL AND MOUNT ROOF HOOD (RH) PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE EXACT LOCATION IN FIELD WITH OTHER TRADES AND MAINTAIN MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES. CONFIRM THAT IS IT AT LEAST 10 FT AWAY FROM ANY UNIT'S FRESH AIR INTAKES. VERIFY UNIT OPENING WITH MANUFACTURER. OPENING SHALL BE COVERED WITH 1/2" X 1/2" HARDWARE MESH. PROVIDE BAROMETRIC RELIEF DAMPER WITH HOOD.

1
M3.02
ROOF PLAN - MECHANICAL
SCALE: 1" = 50'-0"



GENERAL NOTES:

1. PROVIDE THE NECESSARY LOW VOLTAGE WIRING, POWER SUPPLIES TO CONTROLS AND TRANSFORMERS TO SUPPLY POWER TO THE REMOTE SENSORS AS REQUIRED BY MANUFACTURER.
2. LOCATE WAREHOUSE AREA SENSORS AND THERMOSTATS SUCH THAT THEY ARE ACCESSIBLE, PROTECTED AND IN AN AREA OF UNOBSTRUCTED AIR CIRCULATION.
3. IT IS THE RESPONSIBILITY OF THE GENERAL AND MECHANICAL CONTRACTORS TO FULLY INSPECT THE SITE PRIOR TO COMMENCEMENT. VERIFY ALL SITE CONDITIONS INCLUDING LOCATIONS OF STRUCTURAL ELEMENTS, BAR JOISTS, COLUMNS ETC. AND COORDINATE DUCT LOCATIONS ACCORDINGLY.

KEYNOTES

1. INSTALL AND MOUNT THERMOSTAT AT 4 FT AFF. EC TO HARD WIRE 120V TO THERMOSTAT. THERMOSTAT TO INTERLOCK WITH EXHAUST FAN ON ROOF.
2. INSTALL AND MOUNT ELECTRIC WALL HEATER (EWH) SO THAT BOTTOM OF HEATER IS AT LEAST 9" AFF AND RECESSED IN THE WALL (WHERE NOT LOCATED ON A RATED WALL). PROVIDE HEATER WITH INTEGRAL THERMOSTAT. COORDINATE FINAL LOCATION ON WALL WITH OTHER TRADES BEFORE INSTALLATION.
3. EXHAUST AIR DUCTWORK FROM EXHAUST FAN DROP BELOW ROOM CEILING. COVER DUCT OPENING WITH 1/2"x1/2" HARDWARE MESH.
4. INSTALL AND MOUNT LOUVER IN ARCHITECTURAL KNOCKOUT. COORDINATE FINAL HEIGHT OF LOUVER WITH ARCHITECT AND ARCHITECTURAL ELEVATIONS. EC TO PROVIDE 120V/1 TO MOTORIZED DAMPER. REFER TO ELECTRICAL DRAWINGS FOR MORE INFORMATION. LOUVER TO INTERLOCK WITH EXHAUST FAN & UNIT HEATER ON ROOF.

CLIENT:



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DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: BUILDING PERMIT No: 04/22/2022 Date:

SEAL:



04/21/2022

CITY STAMP:

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ENLARGED PLANS -
MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M3.03

CLIENT:



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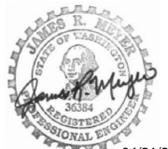
SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

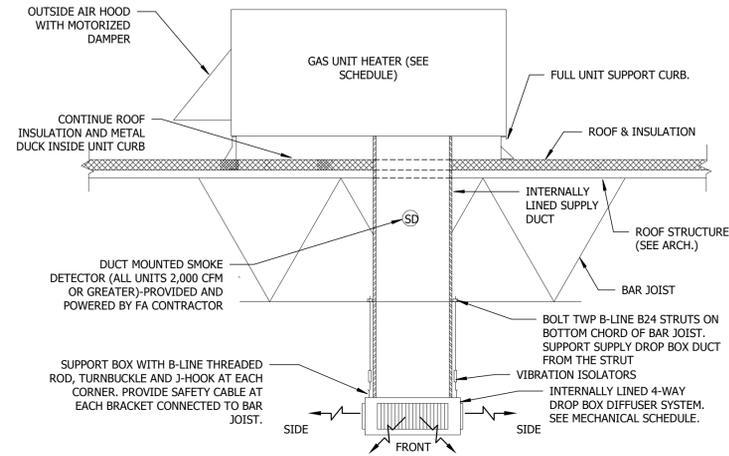
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DETAILS - MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M8.00

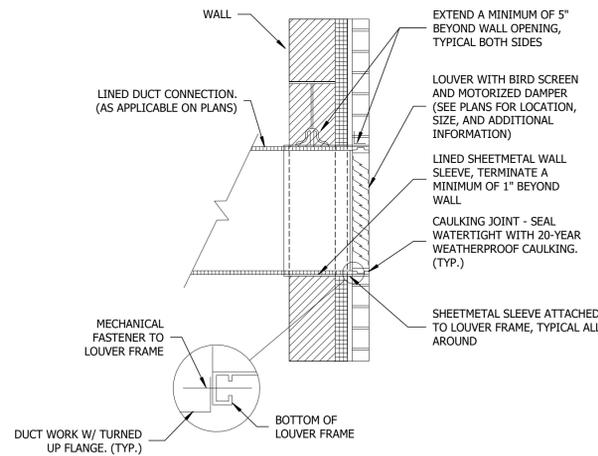


GENERAL NOTES:

- MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND SIZE OF ROOF OPENING REQUIRED BY ACTUAL EQUIPMENT INSTALLED WITH THE GENERAL CONTRACTOR IN THE FIELD.
- PREFABRICATED ROOF CURB SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ROOFING CONTRACTOR.
- CONNECTION OF THE ROOF CURB TO THE BUILDING STRUCTURE SHALL BE AS DETAILED BY THE STRUCTURAL ENGINEER AND/OR ARCHITECT TO RESIST WIND LOADING IN ACCORDANCE TO THE INTERNATIONAL BUILDING CODE. THE ATTACHMENT OF THE ROOFTOP UNIT TO THE ROOF CURB SHALL BE IN ACCORDANCE TO THE MANUFACTURER'S RECOMMENDATIONS TO RESIST WIND LOADING IN ACCORDANCE TO THE INTERNATIONAL BUILDING CODE.
- TRANSITION FROM FULL SIZE OF UNIT OPENINGS TO FULL SIZE OF DROP BOX INTAKE. INSTALL SUCH THAT BOX IS CENTERED BETWEEN THE BAR JOIST AT SPRINKLER LINES.

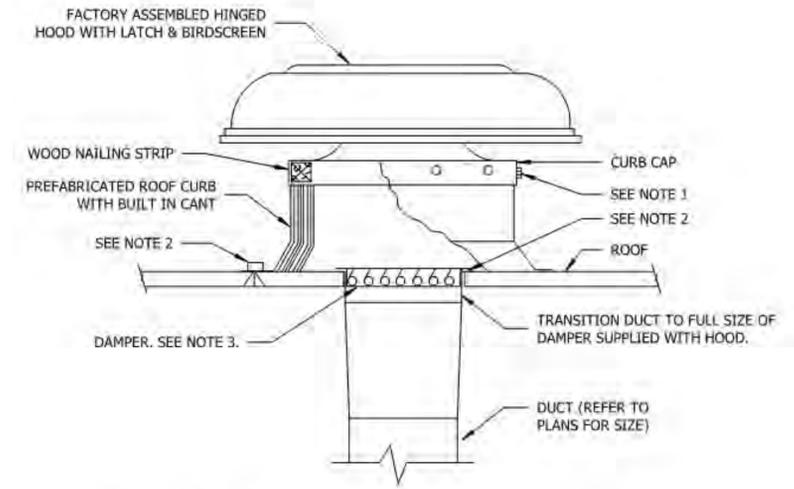
1 ROOF MOUNTED GAS UNIT HEATER WITH DROP BOX DIFFUSER DETAIL

M8.00 NO SCALE



3 LOUVER INSTALLATION DETAIL

M8.00 NO SCALE

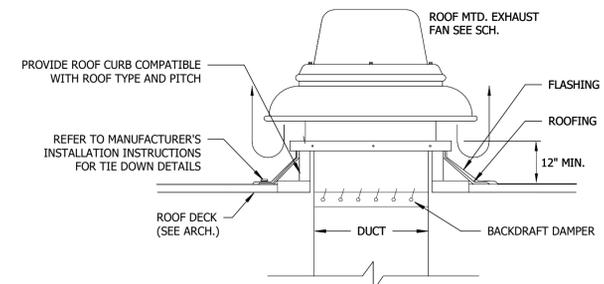


GENERAL NOTES:

- SECURE HOOD TO WOOD NAILING STRIP WITH 3/8" (10 MM) CADMIUM PLATED LAG BOLTS NOT OVER 12" (300 MM) ON CENTER.
- SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (METAL DECK & BAR JOIST ROOF)
- PROVIDE BAROMETRIC RELIEF DAMPER FOR RELIEF; GRAVITY BACKDRAFT DAMPER FOR EXHAUST; MOTORIZED DAMPER FOR INTAKE.

2 RELIEF TYPE ROOF HOOD DETAIL

M8.00 NO SCALE



4 ROOF MOUNTED EXHAUST FAN DETAIL

M8.00 NO SCALE



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COA#: 21004417

CLIENT:



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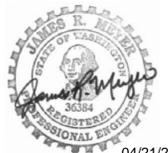
SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

CITY STAMP:

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CALCULATIONS - MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M8.01

Air System Information

Air System Name **RTU-WAREHOUSE**
Equipment Class **PKG ROOF**
Air System Type **SZCAV**

Number of zones **1**
Floor Area **481315.0** ft²
Location **Olympia, Washington**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone CFM Sizing **Peak zone sensible load**
Space CFM Sizing **Individual peak space loads**

Central Heating Coil Sizing Data

Max coil load **2178.1** MBH
Coil CFM at Des Htg **36099** CFM
Max coil CFM **36099** CFM
Water flow @ 20.0 °F drop **N/A**

Load occurs at **Des Htg**
BTU/(hr ft²) **4.5**
Ent. DB / Lvg DB **18.0 / 74.3** °F

Supply Fan Sizing Data

Actual max CFM at Des Htg **36099** CFM
Standard CFM **35838** CFM
Actual max CFM/ft² **0.08** CFM/ft²

Fan motor BHP **0.00** BHP
Fan motor kW **0.00** kW
Fan static **0.00** in wg

Outdoor Ventilation Air Data

Design airflow CFM **36099** CFM
CFM/ft² **0.08** CFM/ft²

CFM/person **0.00** CFM/person

ZONE LOADS	DESIGN COOLING			DESIGN HEATING		
	NO COOLING DATA			HEATING DATA AT DES HTG		
	NO COOLING OA DB / WB			HEATING OA DB / WB 18.0 °F / 14.8 °F		
	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	14104 ft ²	-	-	14104 ft ²	-	-
Wall Transmission	112362 ft ²	-	-	112362 ft ²	196676	-
Roof Transmission	476707 ft ²	-	-	476707 ft ²	383167	-
Window Transmission	9496 ft ²	-	-	9496 ft ²	115476	-
Skylight Transmission	4608 ft ²	-	-	4608 ft ²	73728	-
Door Loads	9582 ft ²	-	-	9582 ft ²	126682	-
Floor Transmission	481315 ft ²	-	-	481315 ft ²	60750	-
Partitions	0 ft ²	-	-	0 ft ²	0	-
Ceiling	0 ft ²	-	-	0 ft ²	0	-
Overhead Lighting	-	-	-	0	0	-
Task Lighting	-	-	-	0	0	-
Electric Equipment	-	-	-	0	0	-
People	-	-	-	0	0	0
Infiltration	-	-	-	-	0	0
Miscellaneous	-	-	-	-	0	0
Safety Factor	5% / 5%	-	-	5%	47824	0
>> Total Zone Loads	-	-	-	-	1004303	0
Zone Conditioning	-	-	-	-	970545	0
Plenum Wall Load	0%	-	-	0	0	-
Plenum Roof Load	0%	-	-	0	0	-
Plenum Lighting Load	0%	-	-	0	0	-
Return Fan Load	-	-	-	36099 CFM	0	-
Ventilation Load	-	-	-	36099 CFM	1207534	0
Supply Fan Load	-	-	-	36099 CFM	0	-
Space Fan Coil Fans	-	-	-	-	0	-
Duct Heat Gain / Loss	0%	-	-	0%	0	-
>> Total System Loads	-	-	-	-	2178079	0
Central Heating Coil	-	-	-	-	2178079	-
>> Total Conditioning	-	-	-	-	2178079	0
Key:	Positive values are cig loads Negative values are htg loads			Positive values are htg loads Negative values are cig loads		

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COA#: 21004417



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PROJECT:
SOUTH SOUND COMMERCE
CENTER
BUILDING A
TUMWATER, WASHINGTON
Description: No: Date:
BUILDING PERMIT 04/22/2022

MECHANICAL COMPLIANCE SUMMARY

2018 WSEC Compliance Forms for Commercial Buildings including Group R2, R3 & R4 over 3 stories and all R1 Administered by: ©2022 NEFA, All rights reserved.

Project & Applicant Information	Project Title	South Sound Commerce Center - Building A - 2018 WSEC	For Building Department Use:	Date: Apr 20, 2022
	Project Address	Tumwater, WA		
	Applicant Name			
	Applicant Phone			
	Applicant Email			

For questions about this report, contact WSEC Commercial Technical Support at 360-539-5300 or via email at com.techsupport@waenergycodes.com

General Occupancy		General Building Use Type	Warehouse, General Storage	Building Cond. Floor Area	481,315
General Project Types	Shell & Core	New Building or Addition Mechanical Scope	Single Zone Systems & Equipment	Project Cond. Floor Area	481,315
				Floors Above Grade	1
Mechanical Project Description	Shell and Core, new construction warehouse. HVAC scope of work include heating and ventilation only.				

Mechanical Compliance Scope and Method	Project Type	Mechanical Scope	Economizer Exception(s) Applied?	DOAS Ventilation Provided?	Higher Equipment Efficiency Option Applied?	Equipment Efficiency Compliance Verification
	Shell & Core	Single Zone Systems & Equipment	No	No	NA	COMPLIES
Additional Efficiency Credits Included (AEC)						
Does building include occupancy classifications requiring DOAS?	No		Does project include DOAS equipment?			No
Based on project scope do TSPR requirements apply?	No		Do all systems comply with Appendix D standard reference design or qualify for an exception to TSPR?			No

Scope & Space Conditioning	SHELL & CORE - SINGLE ZONE SYSTEMS & EQUIPMENT	Compliance Verification	COMPLIES
----------------------------	--	-------------------------	----------

Single Zone Air Systems Category- Unit heaters & duct heaters

System/Equip ID	Quantity of Items	Ventilation Standard	Ventilation CFM (Total if Multiple Items)	Ventilation Air Source	Paired with DOAS
GUH-1 THRU 5	5	ASHRAE Standard 62.1	36,100	Other System	

System /Equip ID	Heating System/Equip Type	Specific Type	Heating Capacity	HC Units	Proposed Heating Efficiency	HE Units	Efficiency Compliance Verification
GUH-1 THRU 5	Unit heater	Warm air, gas fired	440,700	Btu/h	92.0	Fc	COMPLIES

System/Equip ID	Area(s) Served	Location In Project Documents - Plan/Detail #
GUH-1 THRU 5	WAREHOUSE	M3.01; M3.02; M9.00
System/Equip ID for a single or multiple items?: Multiple items w/ identical heating & cooling capacity		
WSEC Equip Efficiency Reference Table - Heating: Table C403.3.2(4) Warm Air Furnaces		



04/21/2022

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COMPLIANCE FORMS - MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M8.02

SEQUENCE OF OPERATIONS

- THE EXHAUST FANS (EF-1 THRU 5) SHALL INTERLOCK WITH AN ASSOCIATED GAS UNIT HEATER AND WITH ASSOCIATED LOUVER(S). ASSOCIATIONS SHOWN ON PLAN. THE EXHAUST FANS SHALL OPERATE ACCORDINGLY: TURN ON, WHEN THE GAS UNIT HEATER IS OFF, AND TURN OFF WHEN THE GAS UNIT HEATER IS ON. ITS ASSOCIATED LOUVER(S) SHALL OPEN WHEN THE EXHAUST FAN IS TURNED ON AND RUNNING, AND SHALL CLOSE WHEN THE EXHAUST FAN IS TURNED OFF.
- EXHAUST FAN 6 SHALL BE CONTROLLED BY AN ASSOCIATED HARD-WIRED SPACE THERMOSTAT. SET THERMOSTAT TO 55°F (ADJ). WHEN THE SPACE RISES ABOVE THE ADJUSTABLE SETPOINT, THE EXHAUST FAN WILL TURN ON TO REMOVE AIR TO MAINTAIN THE TEMPERATURE SETPOINT WITHIN THE SPACE. ITS ASSOCIATED LOUVER SHALL INTERLOCK WITH THE FAN'S OPERATIONS AND SHALL OPEN WHEN THE FAN IS RUNNING, TO MAINTAIN POSITIVE BUILDING PRESSURE.
- ELECTRIC WALL HEATER 1 SHALL HEAT ITS SPACE BASED ON THE HEATER'S INTERNAL THERMOSTATIC SETPOINTS.
- GAS UNIT HEATERS (GUH-1 THRU 5) SHALL BE CONTROLLED BY AN ASSOCIATED SPACE THERMOSTAT. SET THERMOSTAT TO 55°F (ADJ) WITH 10° DEADBAND. WHEN THE SPACE FALLS BELOW THE ADJUSTABLE SETPOINT, THE GAS UNIT HEATER WILL TURN ON TO HEAT SPACE BACK TO THE TEMPERATURE SETPOINT.
- ROOF HOODS (RH-1 THRU 4) SHALL BE CONTROLLED BY A BAROMETRIC RELIEF DAMPER. THE HOOD WILL OPEN WHEN THE BUILDING PRESSURE IS OVERPOSITIVE TO RELIEVE EXCESS AIR.

GAS UNIT HEATER SCHEDULE																			
TAG	BASIS OF DESIGN					HEATING PERFORMANCE				FAN PERFORMANCE		MOTOR PERFORMANCE		ELECTRICAL PERFORMANCE				WEIGHT (LB)	REMARKS
	MANUFACTURER	MODEL	TYPE	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	TYPE	INPUT (MBH)	OUTPUT (MBH)	TEMPERATURE RISE (°F)	ESP (IN WG)	TYPE	SIZE (HP)	RPM	VOLTAGE (V)	PHASE	MCA (A)	MOCp (A)		
GUH-1	GREENHECK	DGX-P122-H22-MF	CONSTANT VOLUME 100% OA	7220	7220	DIRECT GAS-FIRED	440.7	405.5	52	0.5	DIRE DRIVE	5	1180	460	3	10.4	15	1139	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
GUH-2	GREENHECK	DGX-P122-H22-MF	CONSTANT VOLUME 100% OA	7220	7220	DIRECT GAS-FIRED	440.7	405.5	52	0.5	DIRE DRIVE	5	1180	460	3	10.4	15	1139	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
GUH-3	GREENHECK	DGX-P122-H22-MF	CONSTANT VOLUME 100% OA	7220	7220	DIRECT GAS-FIRED	440.7	405.5	52	0.5	DIRE DRIVE	5	1180	460	3	10.4	15	1139	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
GUH-4	GREENHECK	DGX-P122-H22-MF	CONSTANT VOLUME 100% OA	7220	7220	DIRECT GAS-FIRED	440.7	405.5	52	0.5	DIRE DRIVE	5	1180	460	3	10.4	15	1139	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
GUH-5	GREENHECK	DGX-P122-H22-MF	CONSTANT VOLUME 100% OA	7220	7220	DIRECT GAS-FIRED	440.7	405.5	52	0.5	DIRE DRIVE	5	1180	460	3	10.4	15	1139	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

REMARKS:

- SELECTIONS SCHEDULED ARE BASIS OF DESIGN. EQUAL PRODUCTS ARE BY TRANE, CAPTIVE AIRE AND CAMBRIDGE, PROVIDED THEY MEET OR EXCEED THE PERFORMANCE AND THE SPECIFICATIONS BELOW.
- PROVIDE UNIT WITH DOUBLE WALL CONSTRUCTION, HINGED ACCESS DOORS, SUPPLY FAN AND MOTOR VIBRATION ISOLATION
- PROVIDE UNIT WITH WEATHERHOOD.
- PROVIDE WITH FACTORY MOUNTED WIRE SERVICE LIGHTS AND SERVICE OUTLET.
- PROVIDE WITH FACTORY INSTALLED DISCONNECT.
- PROVIDE WITH HEATING INLET AIR SENSOR, INLET DAMPER END SWITCH AND FREEZE PROTECTION CONTROLS.
- PROVIDE WITH MATCHING ROOF CURB.
- UNIT SHALL BE HEATING ONLY, CONSTANT VOLUME WITH 100% OA. PROVIDE WITH MERV 8 FILTER AND MOTORIZED DAMPER ON OUTSIDE AIR INLET. PROVIDE WITH DIRTY FILTER SWITCH.
- UNIT SHALL BE CONTROLLED BY SPACE THERMOSTAT. SET TSTAT TO HEATING MODE AND 55°F (ADJ). THERMOSTATIC CONTROLS TO HAVE 10° DEADBAND.
- CONFIRM ALL UNIT DIMENSIONS WITH MANUFACTURER AND COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DESIGN.

EXHAUST FAN SCHEDULE																
TAG	BASIS OF DESIGN					FAN PERFORMANCE			MOTOR PERFORMANCE		ELECTRICAL PERFORMANCE				WEIGHT (LB)	REMARKS
	MANUFACTURER	MODEL	DESCRIPTION	AREA SERVED	CFM	ESP (IN WG)	TYPE	SIZE (HP)	RPM	VOLTAGE (V)	PHASE	MCA (A)	MOCp (A)			
EF-1	GREENHECK	G-300-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	WAREHOUSE	7220	0.5	DIRECT	5	840	460	3	9	15	286	1, 2, 3, 4, 5, 6	
EF-2	GREENHECK	G-300-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	WAREHOUSE	7220	0.5	DIRECT	5	840	460	3	9	15	286	1, 2, 3, 4, 5, 6	
EF-3	GREENHECK	G-300-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	WAREHOUSE	7220	0.5	DIRECT	5	840	460	3	9	15	286	1, 2, 3, 4, 5, 6	
EF-4	GREENHECK	G-300-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	WAREHOUSE	7220	0.5	DIRECT	5	840	460	3	9	15	286	1, 2, 3, 4, 5, 6	
EF-5	GREENHECK	G-300-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	WAREHOUSE	7220	0.5	DIRECT	5	840	460	3	9	15	286	1, 2, 3, 4, 5, 6	
EF-6	GREENHECK	G-097-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	ELECTRICAL ROOM	340	0.5	DIRECT	.25	--	208	1	--	--	40	2, 3, 4, 5, 6, 7	
EF-7	GREENHECK	G-097-VG	DIRECT DRIVE CENTRIFUGAL ROOF EXHAUST FAN	FIRE PUMP ROOM	340	0.5	DIRECT	.25	--	208	1	--	--	40	2, 3, 4, 5, 6, 7	

REMARKS:

- EXHAUST FAN IS CONSTANT VOLUME, SHALL INTERLOCK WITH LOUVER(S) AND GAS UNIT HEATER.
- PROVIDE MATCHING 12" HIGH ROOF CURB.
- PROVIDE INTERNAL BACKDRAFT DAMPER AND MOTORIZED DAMPER.
- PROVIDE WITH NONFUSED DISCONNECT SWITCH.
- APPROVED EQUALS: LOREN COOK, BROAN, JOHNSON CONTROLS, PENN.
- CONFIRM ALL UNIT DIMENSIONS WITH MANUFACTURER AND COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DESIGNS.
- EXHAUST FAN SHALL INTERLOCK WITH HARD WIRED THERMOSTAT AND ASSOCIATED LOUVER.

ELECTRIC WALL HEATER SCHEDULE									
TAG	BASIS OF DESIGN				HEATING PERFORMANCE		ELECTRICAL PERFORMANCE		REMARKS
	MANUFACTURER	MODEL	DESCRIPTION	AREA SERVED	COIL (KW)	AIRFLOW (CFM)	VOLTAGE/PHASE	AMPS	
EWH-1	QMARK	AWH4307F	HEAVY DUTY WALL HEATER	FIRE PUMP ROOM	3	100	277/1	10.8	1, 2, 3, 4, 5, 6, 7

REMARKS:

- EQUAL PRODUCTS ARE BY DAYTON, KING, CADET, BROAN PROVIDED THEY MEET OR EXCEED THE PERFORMANCE AND THE SPECIFICATIONS.
- PRODUCT SHALL BE DESIGNED TO MEET NATIONAL ELECTRIC CODE AND INSTALLED TO MEET ALL MANUFACTURER'S CLEARANCE RECOMMENDATIONS.
- PROVIDE BUILT-IN THERMOSTAT AND DISCONNECT SWITCH. COLOR SELECTED BY ARCHITECT.
- PROVIDE RECESS ENCLOSURE AND TRIM KIT.
- PROVIDE WITH AUTO-RESET THERMAL.

ROOF HOOD SCHEDULE							
TAG	BASIS OF DESIGN					WEIGHT (LB)	REMARKS
	MANUFACTURER	MODEL	DESCRIPTION	THROAT SIZE (W" X L")	CFM		
RH-1	GREENHECK	FGR	ROOF MOUNTED RELIEF HOOD	46" X 46"	9025	167	1, 2, 3, 4, 5
RH-2	GREENHECK	FGR	ROOF MOUNTED RELIEF HOOD	46" X 46"	9025	167	1, 2, 3, 4, 5
RH-3	GREENHECK	FGR	ROOF MOUNTED RELIEF HOOD	46" X 46"	9025	167	1, 2, 3, 4, 5
RH-4	GREENHECK	FGR	ROOF MOUNTED RELIEF HOOD	46" X 46"	9025	167	1, 2, 3, 4, 5

REMARKS:

- PROVIDE MATCHING 12" HIGH ROOF CURB.
- PROVIDE BAROMETRIC RELIEF DAMPER.
- PROVIDE BIRD AND INSECT SCREEN.
- APPROVED EQUALS: LOREN COOK, BROAN, JOHNSON CONTROLS, PENN.
- CONFIRM ALL UNIT DIMENSIONS WITH MANUFACTURER AND COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DESIGNS.

AIR DEVICE SCHEDULE										
MARK	BASIS OF DESIGN		TYPE	MOUNTING STYLE	FACE SIZE	MAXIMUM CFM	NECK SIZE	DUCT RUNNOUT	MATERIAL	NOTES
	MFR	MODEL								
S-1	KEES	DBD-44-DL	4-SIDED, 4-WAY DROP BOX DIFFUSER WITH DRUM LOUVERS	DUCT	46X46	7,220	30X30	30X30	ALUMINUM	1, 2, 3

NOTES:

- PROVIDE OPPOSED BLADE MANUAL VOLUME DAMPER FOR AIRFLOW ADJUSTMENT ACCESSIBLE THROUGH GRILLE FACE
- CONFIRM ALL FINISHES WITH ARCHITECT
- PROVIDE WITH INSULATED BACKPLATE



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PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: BUILDING PERMIT No: 04/22/2022 Date:

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:

SCHEDULES - MECHANICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

M9.00



ABBREVIATIONS

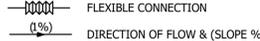
A	
AAV	AUTOMATIC AIR VENT
AC	AIR COMPRESSOR
AD	ACCESS DOOR
AF	AIR FILTER
AFB	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
AV	ACID VENT
AW	ACID WASTE
C	
CA	COMPRESSED AIR
CFM	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
CO2	CARBON DIOXIDE
CW	COLD WATER (DOMESTIC)
D	
DBCP	DOUBLE CHECK (ASSEMBLY) BACKFLOW PREVENTOR
DE	DEIONIZED (WATER)
DER	DEIONIZED (WATER) RETURN
DES	DEIONIZED (WATER) SUPPLY
DF	DRINKING FOUNTAIN
DI	DISTILLED (WATER)
DIA	DIAMETER
DP	DIFFERENTIAL PRESSURE
DR	DRAIN
DWH	DOMESTIC WATER HEATER
E	
(E)	EXISTING
(ETR)	EXISTING TO REMAIN
ET	EXPANSION TANK
EW	EYE WASH
EW/S	EYE WASH/SAFETY SHOWER (COMBINATION)
EW/C	ELECTRIC WATER COOLER
EW/H	ELECTRIC WATER HEATER
F	
FC	FLEXIBLE CONNECTOR
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FFE	FINISHED FLOOR ELEVATION
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FLOOR RECEPTOR
FS	FLOW SWITCH
FT	FEET
G	
GCO	GRADE CLEANOUT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GAS VENT
H	
HB	HOSE BIBB
HP	HORSEPOWER
HW	HOT WATER (SUPPLY)
HWR	HOT WATER RETURN
HX	HEAT EXCHANGER
HZ	HERTZ
I	
IDW	INDIRECT WASTE
IE	INVERT ELEVATION
IN	INCHES
K	
KW	KILOWATT(S)
L	
LA	LABORATORY (COMPRESSED) AIR
LAV	LAVATORY
LPG	LIQUIFIED PETROLEUM GAS (PROPANE)

ABBREVIATIONS

LV	LABORATORY VACUUM
M	
MA	MEDICAL (COMPRESSED) AIR
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	1000 BTU PER HOUR
MIN	MINIMUM
MR	MOP RECEPTOR
MV	MEDICAL VACUUM
N	
N2	NITROGEN
N2O	NITROUS OXIDE
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NG	NATURAL GAS
NTS	NOT TO SCALE
P	
P	PUMP
PD	PUMP DISCHARGE
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PS	PRESSURE SWITCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAUGE
R	
RD	ROOF DRAIN
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE (BACKFLOW PREVENTOR)
RWC	RAINWATER COMPRESSED AIR
RWR	REFRIGERATED (DOMESTIC) WATER RETURN
RWS	REFRIGERATED (DOMESTIC) WATER SUPPLY
S	
S	SANITARY (DRAIN/SEWER)
SF	SQUARE FOOT
SH	SHOWER
SRWC	SECONDARY RAIN WATER CONDUCTOR
SS	SERVICE SINK
SSD	SUB-SOIL DRAIN
SSH	SAFETY SHOWER
ST	STORM (DRAIN/SEWER)
STACK	STACK
T	
TEMP	TEMPERATURE
TOS	TOP OF STEEL
V	
V	VENT (SANITARY)
VAC	VACUUM
VC	VACUUM CLEANING
VIF	VERIFY IN FIELD
VTR	VENT THROUGH ROOF
W	
W	WASTE
WAGD	WASTE ANESTHESIA DISPOSAL
WC	WATER CLOSET
WCO	WALL CLEAN OUT
WH	WALL HYDRANT
WHA-X	WATER HAMMER ARRESTOR (SIZE)
X	
(X)	(REMOVE EXISTING)

PLUMBING LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

	DOMESTIC COLD WATER
	HOT WATER (110°F UNLESS NOTED OTHERWISE)
	HOT WATER RETURN (CIRCULATION)
	SOIL OR WASTE (ABOVE FLOOR OR GRADE)
	SOIL OR WASTE (BELOW FLOOR OR GRADE)
	VENT
	NATURAL GAS
	STORM DRAIN
	SECONDARY STORM DRAIN
	GREASE WASTE
	ACID WASTE
	ACID VENT
	INDIRECT WASTE
	PUMP DISCHARGE
	NITROGEN
	OXYGEN
	CARBON DIOXIDE
	WASTE ANESTHESIA GAS DISPOSAL
	COMPRESSED AIR
	LABORATORY COMPRESSED AIR
	MEDICAL COMPRESSED AIR
	NON-POTABLE WATER
	CONDENSATE DRAIN
	VACUUM
	MEDICAL VACUUM
	LABORATORY VACUUM
	LIQUIFIED PETROLEUM GAS (PROPANE)
	DOWNSPOUT
	BOILER FEED WATER
	WATER DEIONIZED
	WATER TEMPERED
	PIPING TO BE REMOVED (DEMOLISHED)
	FLOOR CLEANOUT OR GRADE CLEANOUT
	END OF LINE CLEANOUT
	TWO WAY CLEANOUT
	BLIND FLANGE OR END CAP
	TEE CONNECTION - STRAIGHT, DOWN, AND UP
	PIPE UP AND DOWN
	FLEXIBLE CONNECTION
	DIRECTION OF FLOW & (SLOPE %)
	GATE VALVE
	BUTTERFLY VALVE
	BALL VALVE
	GLOBE VALVE
	AUTOMATIC 2-WAY CONTROL VALVE
	AUTOMATIC 3-WAY CONTROL VALVE
	PLUG VALVE/BALANCING COCK
	SOLENOID VALVE
	MOTOR OPERATED VALVE
	TRIPLE DUTY VALVE
	CHECK VALVE
	PRESSURE REDUCING VALVE
	VALVE IN VERTICAL
	SHOCK ARRESTOR
	UNION
	P-TRAP
	FLOOR DRAIN W/ P-TRAP
	FLOOR DRAIN
	ROOF DRAIN
	AREA DRAIN
	FLOW SWITCH
	PUMP
	SAFETY VALVE OR PRESSURE RELIEF
	THERMOMETER
	STRAINER WITH BLOW-DOWN VALVE
	MANUAL AIR VENT
	AUTOMATIC AIR VENT
	PRESSURE GAUGE
	GAS COCK
	OS&Y VALVE
	HOSE BIBB/WALL HYDRANT
	WALL HYDRANT W/ LOCKED BOX
	STACK DESIGNATION
	BACKFLOW PREVENTER
	DOUBLE CHECK VALVE BACKFLOW PREVENTER

GENERAL NOTES:

- THE FOLLOWING NOTES ARE GENERAL IN NATURE AND PERTAIN TO THE ENTIRE PROJECT UNLESS OTHERWISE NOTED ON THE DRAWINGS WHERE THEY OCCUR.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS.
- PRIOR TO BID, THE CONTRACTOR SHALL EXAMINE ALL PROJECT DRAWINGS TO DEVELOP A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE. FAILURE TO REVIEW ALL CONTRACT DRAWINGS WILL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITIES TO PERFORM. ALL WORK REQUIRED, THE CONTRACTOR SHALL, UPON REVIEW OF THE DRAWINGS, ADVISE THE ENGINEER OF ANY DISCREPANCIES WHICH WILL AFFECT THE WORK REQUIRED.
- THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO ELIMINATE ANY CONFLICTS BETWEEN PIPING, DUCTWORK, AND ELECTRICAL WORK.
- DRAWINGS ARE DIAGRAMMATIC; THEREFORE, THE CONTRACTOR SHALL MAKE ADJUSTMENTS AS REQUIRED FOR A COMPLETE INSTALLATION. CONTRACTOR SHALL CLOSELY EXAMINE ALL PROJECT DRAWINGS TO UNDERSTAND WORK REQUIRED AND TO AVOID INTERFERENCE WITH EXISTING AND NEW WORK SUCH AS DUCTS, PIPING, LIGHTING FIXTURES, STRUCTURAL BEAMS, ETC.
- THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND FEES AND ARRANGE FOR INSPECTIONS BY LOCAL AUTHORITIES.
- PROTECT ALL EQUIPMENT AND FIXTURES STORED OR SET IN PLACE ON THE JOB.
- THE CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS FOR DIMENSIONS, ROOM FINISHES, AND COORDINATION WITH ARCHITECTURAL PLANS BEFORE COMMENCING WORK.
- ALL PIPING TO BE CONCEALED UNLESS OTHERWISE NOTED.
- ALL VENT LINES SHALL BE INSTALLED VERTICAL OR SLOPED UP TO VTR.
- EACH PLUMBING FIXTURE SHALL BE PROVIDED WITH AN ACCESSIBLE KEYLESS STOP ON SUPPLIES.
- EACH RISER SHALL BE VALVED IN AN ACCESSIBLE LOCATION.
- WORK INDICATED AS HAVING MINOR DETAILS OBVIOUSLY OMITTED FOR CLARITY SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- PAINTING OF EXISTING EXPOSED PIPING SHALL BE BY THE GENERAL CONTRACTOR. COLOR AS DIRECTED BY THE ARCHITECT. PAINTING OF NEW EXPOSED PIPING SHALL BE BY THIS CONTRACTOR.
- DRAINAGE, SEWAGE OR PLUMBING WORK SHALL NOT BE COVERED OR CONCEALED IN ANY MANNER UNTIL AFTER IT IS INSPECTED AND APPROVED BY THE PLUMBING INSPECTOR.
- THE APPROPRIATE SECTIONS OF THE FOLLOWING CODES APPLY TO THE WORK OF THIS CONTRACT:
 - THE INTERNATIONAL PLUMBING CODE: 2009 EDITION

TYPICAL ANNOTATION:

	AREA OF REVISION
	REVISION SEQUENCE NUMBER
	KEYED NOTE
	DEMOLITION KEYED NOTE
	POINT OF CONNECTION OF EXISTING SYSTEM
	POINT OF DISCONNECTION OF EXISTING SYSTEM
	DETAIL NUMBER
	DRAWING NUMBER
	DETAIL NUMBER
	DRAWING NUMBER
	1 / A101 VIEW REFERENCE
	NEW PLUMBING EQUIPMENT TAG
	NEW EQUIPMENT NUMBER
	DEMOLITION PLUMBING EQUIPMENT TAG
	DEMOLITION EQUIPMENT NUMBER
	EXISTING TO REMAIN PLUMBING EQUIPMENT TAG
	EXISTING TO REMAIN EQUIPMENT NUMBER
	EXISTING TO BE RELOCATED PLUMBING EQUIPMENT TAG
	EXISTING TO BE RELOCATED EQUIPMENT NUMBER

SHEET LIST

Sheet Number	Sheet Name
P0.00	SYMBOLS, LEGENDS, AND ABBREVIATIONS - PLUMBING
P0.01	SPECIFICATIONS - PLUMBING
P0.02	SPECIFICATIONS - PLUMBING
P2.00	CONSTRUCTION PLAN - PLUMBING
P4.00	ROOF PLAN - PLUMBING
P6.00	RISER DIAGRAMS - PLUMBING
P7.00	SCHEDULES - PLUMBING
P8.00	PLUMBING DETAILS



PIPE MATERIAL	MAX HORIZ SPACING (FT)	MAX CERT SPACING (FT)
CAST-IRON PIPE - ALL SIZES	5	15
COPPER TUBING - 1-1/4 INCH & SMALLER	6	10
COPPER TUBING - 1-1/2 INCH & LARGER	10	10

3.2 FIELD QUALITY CONTROL

- A. TEST DRAINAGE AND VENT SYSTEM IN ACCORDANCE WITH THE PROCEDURES OF THE AUTHORITY HAVING JURISDICTION.

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

- A. UNDERGROUND WATER SERVICE PIPING (2" AND LARGER) SHALL BE: CLASS 50 DUCTILE IRON PIPE, AWWA C151, WITH HUB AND SPIGOT, PUSH ON JOINTS, AWWA C11, AND CLASS 50 OR GREATER MECHANICAL JOINT DUCTILE IRON FITTINGS; AWWA C110, ALL CEMENT LINED PER AWWA C104.
- B. UNDERGROUND WATER SERVICE PIPING (2-1/2" AND SMALLER) FROM 5'-0" OUTSIDE OF BUILDING TO 1'-0" ABOVE FINISHED FLOOR SHALL BE: TYPE "K" SOFT COPPER TUBING, ASTM B88, WITH SOLDERED JOINTS AND WROUGHT COPPER, ANSI B16.22, OR CAST BRONZE, ANSI B16.18, SOCKET FITTINGS.
- C. ABOVE GROUND WATER PIPING SHALL BE: TYPE "L" HARD DRAWN COPPER TUBING, ASTM B88, WITH SOLDERED JOINTS AND WROUGHT COPPER, ANSI B16.22, OR CAST BRONZE, ANSI B16.18, SOCKET FITTINGS.
- D. UNDERGROUND WATER PIPING TO TRAP PRIMER LINES SHALL BE: TYPE "L" SOFT DRAWN COPPER TUBING, ASTM B88, WITH SOLDERED JOINTS AND SOCKET FITTINGS (NO FITTINGS BELOW FLOOR).

2.2 WATER HAMMER ARRESTORS

- A. WATER HAMMER ARRESTORS SHALL HAVE A STAINLESS STEEL CASING, FLEXIBLE MECHANICAL BELLOWS, PRESSURIZED INERT GAS CHAMBER, AND CERTIFICATION STAMP AS CONFORMING TO PDI WH-201.
- 2.3 BACKFLOW PREVENTERS**
- A. BACKFLOW PREVENTERS SHALL BE THE SAME SIZE AS THE PIPE ON WHICH IT IS INSTALLED UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- B. BACKFLOW PREVENTERS SHALL BE THE REDUCED PRESSURE ZONE TYPE WITH INTERMEDIATE ATMOSPHERIC VENT, CONSISTING OF SHUTOFF VALVES ON THE INLET AND OUTLET AND STRAINER ON THE INLET. ASSEMBLIES SHALL INCLUDE TEST COCKS AND SHALL COMPLY WITH THE REQUIREMENTS OF ASSE STANDARD 1013. BACKFLOW PREVENTERS 3" AND SMALLER SHALL HAVE BRONZE BODY WITH THREADED ENDS LEAD FREE REQUIREMENT.

2.4 TRAP PRIMERS

- A. MECHANICAL TRAP PRIMERS SHALL BE AUTOMATIC TYPE WITH CAST BRONZE BODY, REMOVABLE VALVE MECHANISM, INTEGRAL VACUUM BREAKER, AND 1/2" DIAMETER SOCKET TUBE ENDS.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. PROVIDE A UNION OR FLANGE AT ALL PIPING CONNECTIONS TO EQUIPMENT. PIPE CONNECTIONS TO EQUIPMENT SHALL BE MADE SO THAT NO STRAIN IS PLACED ON THE EQUIPMENT. PIPE SHALL BE SUPPORTED INDEPENDENT OF THE EQUIPMENT.
- B. CHANGES IN PIPE SIZE SHALL BE MADE WITH REDUCING FITTINGS. NO BUSHINGS WILL BE ALLOWED.
- C. INSTALL WATER HAMMER ARRESTORS WITHIN THE CHASE ON THE COLD-WATER BRANCH LINES AS INDICATED ON THE DRAWINGS. ALL WATER HAMMER ARRESTORS SHALL HAVE A WALL ACCESS PANEL ADJACENT TO THE SHOCK ABSORBER FOR REPAIR PURPOSES.
- D. THE ATMOSPHERIC RELIEF FROM BACKFLOW PREVENTERS SHALL BE PIPED THROUGH A FIXED AIR GAP TO A FLOOR DRAIN.
- E. UNDERGROUND PIPING FROM TRAP PRIMER TO FLOOR DRAINS SHALL BE INSTALLED WITHOUT FITTINGS.
- F. CONTRACTOR SHALL BE RESPONSIBLE FOR THE FITTING OF MATERIALS AND EQUIPMENT, SHALL PERFORM ALL DIMENSIONAL LAYOUT OF THE WORK AND SHALL ESTABLISH LINES AND GRADES. INSTALL PIPE LINES TO CONFORM TO CONDITIONS, OFF-SETTING TO CLEAR STRUCTURAL MEMBERS AND DUCTS. RUN PIPING PARALLEL TO OR AT RIGHT ANGLES TO BUILDING WALLS WITH EACH HORIZONTAL LINE AT MAXIMUM.
- G. PIPE FOUND TO BE DAMAGED BY HANDLING SHALL BE REMOVED FROM THE JOB SITE TO PREVENT MISTAKEN USE.

3.2 HANGERS AND SUPPORTS

- A. INSTALL HANGERS FOR HORIZONTAL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:

NOM. PIPE SIZE - IN	STEEL PIPE MAX. SPAN - FT.	COPPER TUBE MAX. SPAN - FT	MIN. ROD DIA. - IN
UP TO 3/4	7	5	3/8
1	7	6	3/8
1-1/4	7	7	3/8
1-1/2	9	8	3/8
2	10	8	3/8
2-1/2	11	9	1/2
3	12	10	1/2
4	14	12	5/8 (1/2 FOR COPPER)

3.3 INSTALLATION OF PIPING SPECIALTIES

- A. INSTALL BACKFLOW PREVENTERS AT EACH CONNECTION TO PLUMBING EQUIPMENT AND SYSTEMS IN COMPLIANCE WITH THE PLUMBING CODE AND AUTHORITY HAVING JURISDICTION. LOCATE IN SAME ROOM AS EQUIPMENT BEING CONNECTED. INSTALL AIR GAP FITTING AND PIPE RELIEF OUTLET DRAIN WITHOUT VALVES TO NEAREST FLOOR DRAIN.
- B. INSTALL PRESSURE-REGULATING VALVES WITH INLET AND OUTLET SHUTOFF VALVES AND BALANCE COCK BYPASS. INSTALL PRESSURE GAUGE ON VALVE OUTLET.

3.4 ADJUSTING

- A. ADJUST AND BALANCE ALL WATER SYSTEMS TO OBTAIN OPERATING FLOWS AT ALL FIXTURES AND WATER USING EQUIPMENT. ALSO ADJUST AND BALANCE THE HOT WATER CIRCULATION FROM ALL PORTIONS OF THE BUILDING.

3.5 FIELD QUALITY CONTROL

- A. INSPECTIONS: ARRANGE FOR INSPECTION BY THE PLUMBING OFFICIAL TO OBSERVE THE REQUIRED TESTS AND TO ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THE PLUMBING CODE. PREPARE INSPECTION REPORTS SIGNED BY THE PLUMBING OFFICIAL.
- B. FILL AND STERILIZE THE SYSTEM AS REQUIRED BY THE LOCAL WATER UTILITY AND THE LOCAL CODE AUTHORITIES.

SECTION 221316 - DRAINAGE AND VENT SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. THIS PROJECT SHALL COVER THE INSTALLATION OF DRAINAGE AND VENT SYSTEMS INCLUDING PIPING, DRAINAGE ACCESSORIES, TRAPS, AND FLOOR DRAINS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE DRAINAGE AND VENT SYSTEM PRODUCTS BY ONE OF THE MANUFACTURERS LISTED IN THIS SPECIFICATION OR ON THE DRAWING.

2.2 PIPE AND FITTINGS

- A. ABOVE GROUND SANITARY WASTE AND VENT PIPING (2" AND LARGER) SHALL BE SERVICE WEIGHT CAST IRON SOIL PIPE AND FITTINGS, ASTM A74, WITH NO-HUB NEOPRENE COUPLINGS CONFORMING TO CSEPI STANDARD 310.
- B. ALL WASTE PIPING 1 1/2" AND SMALLER SHALL BE TYPE "DWV" HARD DRAWN COPPER TUBING, ASTM B88, WITH SOLDERED JOINTS AND WROUGHT COPPER, ANSI B16.22, OR CAST BRONZE, ANSI B16.18, SOCKET FITTINGS.
- C. BELOW GROUND SANITARY WASTE AND VENT PIPING (ALL SIZES) SHALL BE ONE OF THE FOLLOWING:
- SERVICE WEIGHT, COATED, CAST IRON SOIL PIPE AND FITTINGS, ASTM A74, WITH GASKETED MODIFIED HUB AND SPIGOT JOINTS, ASTM C564.
 - SOLID WALL PVC PIPE, ASTM D 2665, WITH PVC SOCKET TYPE FITTINGS. USE PVC SOLVENT CEMENT THAT HAS A VOC CONTENT OF 510 G/L OR LESS AND ADHESIVE PRIMER THAT HAS A VOC CONTENT OF 510 G/L OR LESS.
- D. PVC PIPE AND FITTINGS MAY BE USED ABOVE GROUND IN BUILDINGS WITH NON-PLENUM RETURN IF APPROVED BY THE LOCAL AHJ.

2.3 TRAPS

- A. TRAPS OTHER THAN FURNISHED AS PART OF PLUMBING FIXTURE, SHALL BE OF THE SAME MATERIAL AND SIZE AS THE PIPE INTO WHICH THEY DISCHARGE, UNLESS SPECIFIED OTHERWISE HEREINAFTER. WHERE NOT UNDERGROUND, TRAPS SHALL BE PROVIDED WITH CLEANOUT PLUGS ON BOTTOM.

2.4 FLOOR DRAINS

- A. CAST IRON BODY WITH FLASHING FLANGE AND DEEP SEAL SIZED P-TRAP. DRAINS SHALL BE EQUIPPED WITH ADJUSTABLE STRAINER AS FOLLOWS; 6" ROUND ROUGH BRONZE IN MECHANICAL ROOMS; 6" SQUARE POLISHED BRONZE IN FINISHED FLOORS; 8" ROUND WITH FUNNEL TOP FOR CONDENSATE DRAINAGE.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. MAKE CHANGES IN DIRECTION FOR DRAINAGE AND VENT PIPING USING APPROPRIATE 45 DEGREE WYES, HALF-WYES, OR LONG SWEEP QUARTER, SIXTH, EIGHTH, OR SIXTEENTH BENDS. INSTALL UNDERGROUND BUILDING DRAINS TO CONFORM WITH THE PLUMBING CODE, AND IN ACCORDANCE WITH THE CAST IRON SOIL PIPE INSTITUTE ENGINEERING MANUAL.
- B. INSTALL CLEANOUT IN ABOVE AND BELOW GROUND PIPING AND BUILDING DRAIN PIPING AS INDICATED, AND AS REQUIRED BY PLUMBING CODE, AT EACH CHANGE IN DIRECTION OF PIPING GREATER THAN 45 DEGREES; AT MINIMUM INTERVALS OF 50' FOR PIPING 4" AND SMALLER AND 100' FOR LARGER PIPING; AT BASE OF EACH VERTICAL SOIL OR WASTE STACK. INSTALL FLOOR AND WALL CLEANOUT COVERS FOR CONCEALED PIPING, TYPES AS INDICATED.
- C. INSTALL HANGERS FOR ABOVE GROUND PIPE AT THE FOLLOWING INTERVALS:

- B. OMIT INSULATION ON CHROME-PLATED EXPOSED PIPING (EXCEPT FOR HANDICAPPED FIXTURES), AIR CHAMBERS, UNIONS, STRAINERS, CHECK VALVES, BALANCE COCKS, FLOW REGULATORS, DRAIN LINES FROM WATER COOLERS, DRAINAGE PIPING LOCATED IN CRAWL SPACES OR TUNNELS, BURIED PIPING, FIRE PROTECTION PIPING, PRE-INSULATED EQUIPMENT, HOT PIPING WITHIN RADIATION ENCLOSURES OR UNIT CABINETS, AND COLD PIPING WITHIN UNIT CABINETS PROVIDED PIPING IS LOCATED OVER DRAIN PAN.
- C. INSTALL INSULATION PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS, AND IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES.

SECTION 221000 - VALVES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. THIS SECTION INCLUDES GENERAL DUTY VALVES AND STRAINERS COMMON TO MOST PLUMBING PIPING SYSTEMS. SPECIAL PURPOSE VALVES AND STRAINERS ARE SPECIFIED IN INDIVIDUAL PIPING SYSTEM SPECIFICATIONS.

1.2 QUALITY ASSURANCE

- A. COMPLY WITH ASME B31.9 FOR BUILDING SERVICES PIPING AND ASME B31.1 FOR POWER PIPING. COMPLY WITH APPLICABLE SECTIONS OF MSS STANDARD PRACTICES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS FROM ONE OF THE MANUFACTURERS LISTED IN THIS SPECIFICATION FOR EACH VALVE TYPE OR STRAINER TYPE, OR APPROVED EQUIVALENT

2.2 VALVE FEATURES, GENERAL

- A. PRESSURE AND TEMPERATURE RATINGS: AS REQUIRED TO SUIT SYSTEM PRESSURES AND TEMPERATURES.
- B. SIZES: SAME SIZE AS UPSTREAM PIPE, UNLESS OTHERWISE INDICATED.
- C. EXTENDED STEMS: WHERE INSULATION IS INDICATED OR SPECIFIED, PROVIDE EXTENDED STEMS ARRANGED TO RECEIVE INSULATION.

2.3 GATE VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT MANUFACTURER FROM THE FOLLOWING: CRANE, GRINNELL, HAMMOND, NIBCO, OR STOCKHAM.
- B. GA-1 GATE VALVES, 2-INCH AND SMALLER: MSS SP-80; CLASS 150, BODY AND UNION BONNET OF ASTM B 62 CAST BRONZE; WITH THREADED ENDS, SOLID DISC, COPPER-SILICON ALLOY STEM, BRASS PACKING GLAND, "TEFLON" IMPREGNATED PACKING, AND MALLEABLE IRON HANDWHEEL.

2.4 BALL VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT MANUFACTURER FROM THE FOLLOWING: CRANE, GRINNELL, HAMMOND, NIBCO, OR STOCKHAM.
- B. BL-1 BALL VALVES, 1 INCH AND SMALLER: RATED FOR 150 PSI SATURATED STEAM PRESSURE, 400 PSI WOG PRESSURE; TWO-PIECE CONSTRUCTION; WITH BRONZE BODY CONFORMING TO ASTM B 62, STANDARD (OR REGULAR) PORT, CHROME-PLATED BRASS BALL, REPLACEABLE "TEFLON" OR "TFE" SEATS AND SEALS, BLOWOUT-PROOF STEM, AND VINYL-COVERED STEEL HANDLE. PROVIDE SOLDER OR THREADED ENDS FOR CONDENSER WATER, CHILLED WATER, AND DOMESTIC HOT AND COLD WATER SERVICE; THREADED ENDS FOR HEATING HOT WATER AND LOW-PRESSURE STEAM.
- C. BL-2 BALL VALVES, 1-1/4-INCH TO 2-INCH: RATED FOR 150 PSI SATURATED STEAM PRESSURE, 400 PSI WOG PRESSURE; WITH BRONZE BODY CONFORMING TO ASTM B 62, CONVENTIONAL PORT, CHROME-PLATED BRASS BALL, REPLACEABLE "TEFLON" OR "TFE" SEATS AND SEALS, BLOWOUT PROOF STEM, AND VINYL-COVERED STEEL HANDLE. PROVIDE SOLDER OR THREADED ENDS FOR CONDENSER WATER, CHILLED WATER, AND DOMESTIC HOT AND COLD WATER SERVICE; THREADED ENDS FOR HEATING HOT WATER AND LOW-PRESSURE STEAM.

2.5 GLOBE VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT MANUFACTURER FROM THE FOLLOWING: CRANE, GRINNELL, HAMMOND, NIBCO, OR STOCKHAM.
- B. GL-1 GLOBE VALVES, 2 INCHES AND SMALLER: RATED FOR 150# STEAM, 300# WOG. CONSTRUCTION SHALL BE PER MSS SP-80; BODY AND SCREWED BONNET OF ASTM B 62 CAST BRONZE; WITH THREADED OR SOLDER ENDS, BRASS OR REPLACEABLE COMPOSITION DISC, COPPER-SILICON ALLOY STEM, BRASS PACKING GLAND, "TEFLON" IMPREGNATED PACKING, AND MALLEABLE IRON HANDWHEEL.

2.6 BUTTERFLY VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT MANUFACTURER FROM THE FOLLOWING: CENTER LINE, CRANE, GRINNELL, KEYSTONE, NIBCO, OR WATTS. FOR GROOVED CONNECTIONS, USE VICTAULIC.
- B. BF-1 BUTTERFLY VALVES, 2-1/2-INCH AND LARGER: MSS SP-67; RATED AT 200 PSI; CAST-IRON BODY CONFORMING TO ASTM A 126, CLASS B. VALVES SHALL BE RATED FOR -40 TO 250 OF PROVIDE VALVES WITH FIELD REPLACEABLE EPDM SLEEVE, NICKEL-PLATED DUCTILE IRON DISC (EXCEPT ALUMINUM BRONZE DISC FOR VALVES INSTALLED IN CONDENSER WATER PIPING), STAINLESS STEEL STEM, AND EPDM O-RING STEM SEALS. PROVIDE LEVER OPERATORS WITH LOCKS FOR SIZES 2 THROUGH 6 INCHES AND GEAR OPERATORS WITH POSITION INDICATOR FOR SIZES 8 THROUGH 24 INCHES. PROVIDE LUG TYPE BODY, BUBBLE-TIGHT SHUT-OFF (WITHOUT NEED FOR DOWNSTREAM FLANGE), SUITABLE FOR DEAD END SERVICE. BODY AND STEM SHALL BE THROUGH STEM DESIGN. STEM SHALL EXTENDED A MINIMUM OF 2 INCHES BEYOND THE FLANGE OUTER DIAMETER TO ALLOW FOR INSULATION OF THE VALVE. FOR VALVES INSTALLED MORE THAN 12' AFF, PROVIDE CHAIN OR CABLE OPERATOR FOR ACTUATION AT FLOOR LEVEL.

2.7 CHECK VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT CHECK VALVE MANUFACTURER FROM THE FOLLOWING: CRANE, GRINNELL, HAMMOND, NIBCO, OR STOCKHAM. FOR GROOVED CONNECTIONS, USE VICTAULIC.
- B. CK-1 CHECK VALVES, THROUGH 2 INCH: RATED FOR 150# STEAM, 300# WOG. CONSTRUCTION SHALL BE CAST-BRONZE BODY AND CAP CONFORMING TO ASTM B 62; BRONZE DISC; AND HAVING THREADED OR SOLDER ENDS.

2.8 PLUG VALVES

- A. SUBJECT TO COMPLIANCE WITH THE TECHNICAL REQUIREMENTS, SELECT MANUFACTURER FROM THE FOLLOWING, OR APPROVED EQUIVALENT: LUNKENHEIMER, POWELL, DEZURICK, HOMESTEAD, MUELLER.
- B. PL-1 PLUG VALVES, 2 INCHES AND SMALLER: SCREWED END PLUG VALVE W/ RESILIENT SEATS AND BUBBLE-TIGHT SHUTOFF. VALVE, WHERE APPLICABLE, SHALL CARRY A UL LISTING FOR SHUTOFF SERVICE OF NATURAL GAS AND FUEL OILS. VALVE SHALL BE RATED FOR 175# WOG AT TEMPERATURES UP TO 180 °F. VALVE BODY SHALL BE CAST IRON ANSI OR MSS RATED, PLUG SHALL BE BRONZE, RESILIENT PLUG SEAL SHALL BE HYCAR OR PETROLEUM HYCAR AS REQUIRED FOR SERVICE.
- C. PL-2 PLUG VALVES, 2-1/2 INCHES AND LARGER: FLANGED END PLUG VALVE W/ RESILIENT SEATS AND BUBBLE-TIGHT SHUTOFF. VALVE, WHERE APPLICABLE, SHALL CARRY A UL LISTING FOR SHUTOFF SERVICE OF NATURAL GAS AND FUEL OILS. VALVE SHALL BE RATED FOR 175# WOG AT TEMPERATURES UP TO 180 °F. VALVE BODY SHALL BE CAST IRON ANSI OR MSS RATED, PLUG SHALL BE BRONZE, RESILIENT PLUG SEAL SHALL BE HYCAR OR PETROLEUM HYCAR AS REQUIRED FOR SERVICE.
- D. PL-3 PLUG VALVES, SCREWED END LUBRICATED PLUG COCK FOR 1/2" OR LESS NATURAL GAS; UL AND AGA APPROVED FOR THE SERVICE WITH 150# WOG BRASS BODY, BRASS PLUG WITH SQUARE HEAD AND SCREWED ENDS.

PART 3 - EXECUTION

3.1 VALVE ENDS SELECTION

- A. SELECT VALVES WITH THE FOLLOWING ENDS OR TYPES OF PIPE/TUBE CONNECTIONS:
- COPPER TUBE SIZE, 2-INCH AND SMALLER: SOLDER ENDS, OR PRESS-FIT ENDS, COMPATIBLE WITH PIPING SYSTEM SPECIFIED IN OTHER DIVISION 22 SECTIONS.
 - STEEL PIPE SIZES, 2-INCH AND SMALLER: THREADED ENDS.

3.2 VALVE APPLICATION SCHEDULE

- A. SELECT VALVES ACCORDING TO THE FOLLOWING SCHEDULE:
VALVES 2 INCHES AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK	PLUG
DOMESTIC HATE AND COLD WATER	GA-1	GL-1	BL-1	CK-1	--
CONDENSER, CHILLED WATER AND HEATING HOT WATER	GA-1	GL-1	BL-1	CK-1	PL-1

- B. VALVES 2-1/2 INCHES AND LARGER

SERVICE	GATE	GLOBE	B'FLY	CHECK	PLUG
DOMESTIC HATE AND COLD WATER	GA-2	GL-2	BF-1	CK-2	--
CONDENSER, CHILLED WATER AND HEATING HOT WATER	GA-2	--	BF-1	CK-2	PL-2

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. THIS PROJECT SHALL COVER THE INSTALLATION OF DOMESTIC WATER PIPING AND RELATED APPURTENANCES SUCH AS WATER HAMMER ARRESTORS, BACKFLOW PREVENTERS, UNIONS, TRAP PRIMERS, PIPE SLEEVES, AND SYSTEM COMMISSIONING.

1.2 QUALITY ASSURANCE

- A. STANDARDS: PRODUCTS AND INSTALLATION SHALL CONFORM TO APPLICABLE PORTIONS OF THE AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI), AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), FEDERAL SPECIFICATIONS (FED. SPEC.), PLUMBING AND DRAINAGE INSTITUTE (PDI), AND LOCAL CODES.

CLIENT:



PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:

CONSTRUCTION PLAN -
PLUMBING

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

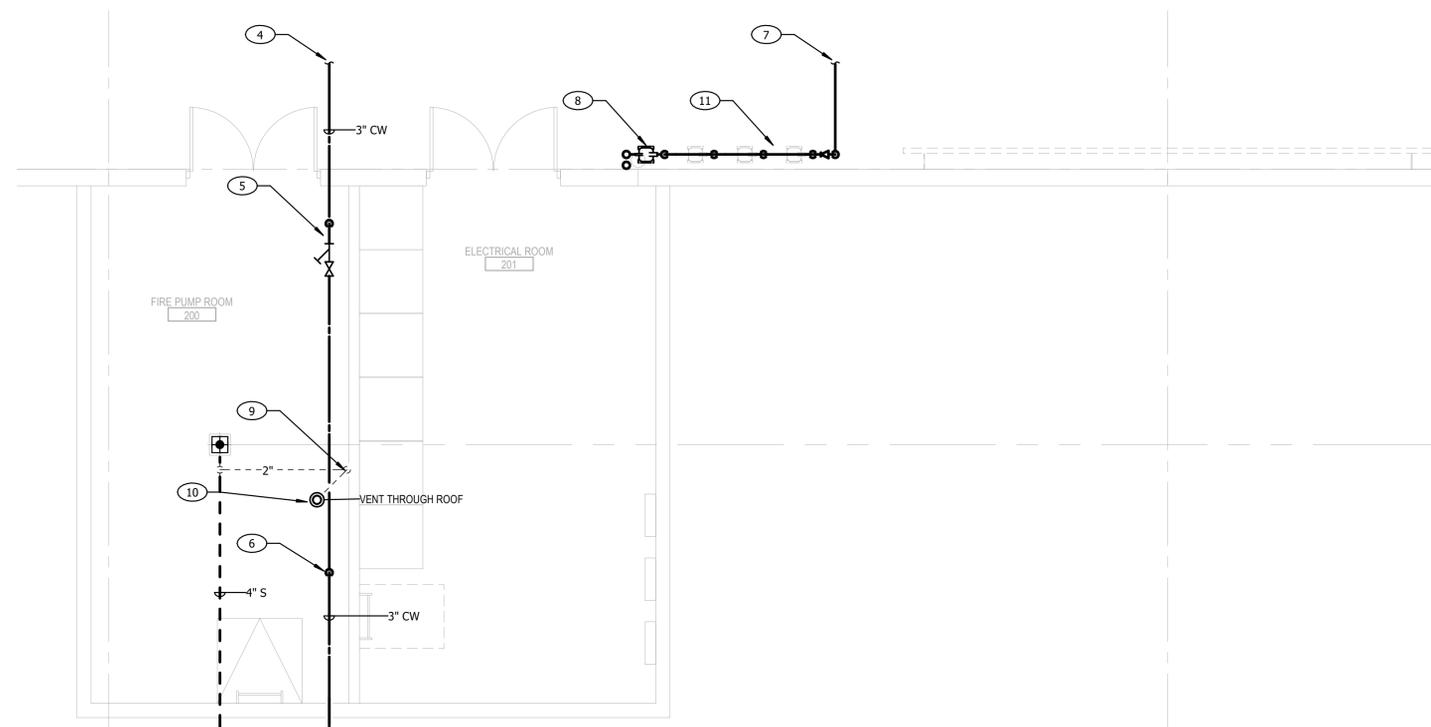
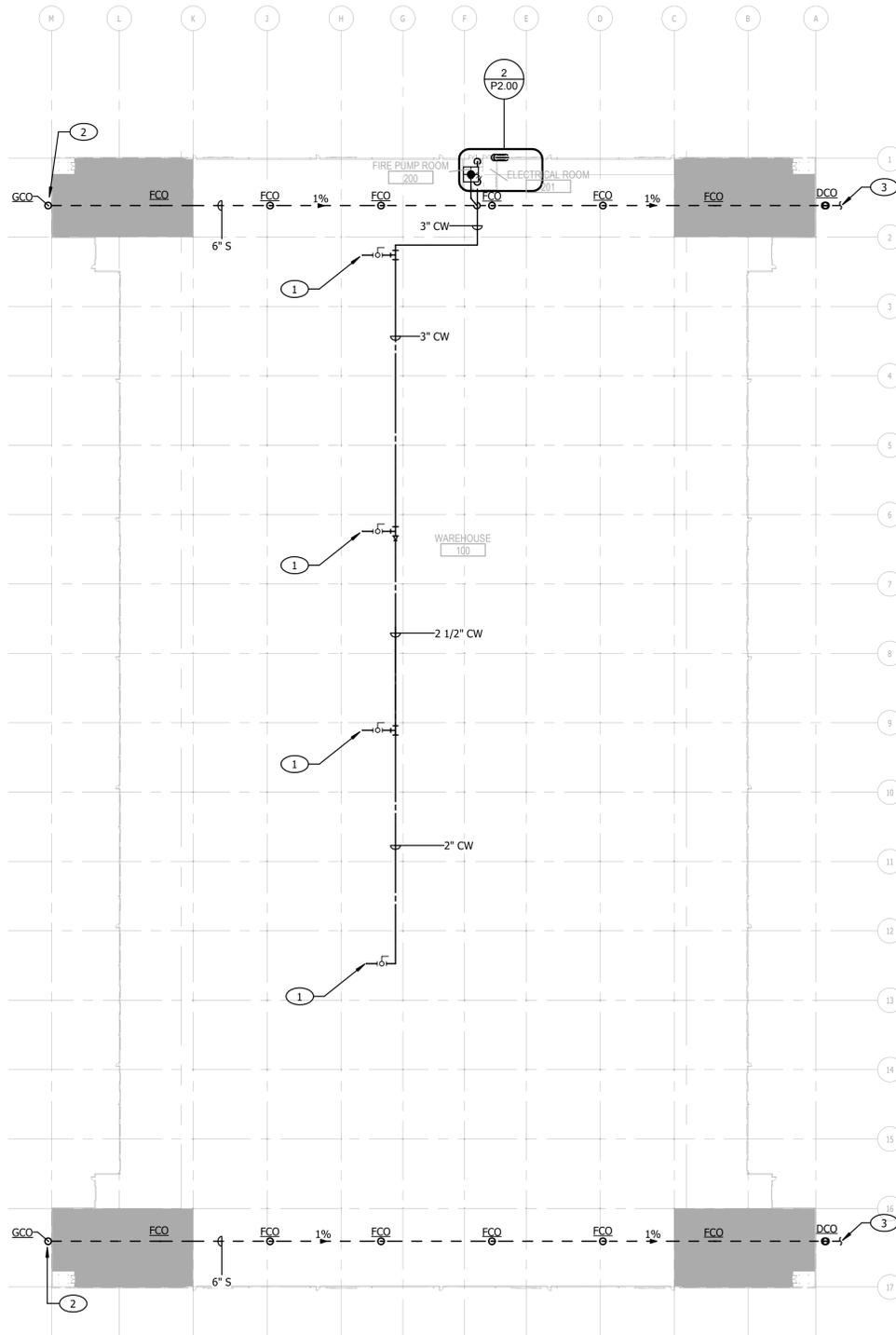
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GENERAL NOTES:

- FLOOR CLEANOUTS SHALL BE INSTALLED PER WASPC

KEYNOTES

- 2" COLD WATER STUB OVERHEAD WITH CHECK VALVE AND SHUTOFF VALVE CAPPED FOR FUTURE TENANT USE. SUB METER WILL BE PROVIDED DURING TENANT FIT OUT SCOPE.
- 4" FLOOR CLEANOUT LOCATED AT START OF SANITARY MAIN. STARTING INVERT ELEVATION = 2'-6" BELOW FINISHED FLOOR.
- 6" SANITARY BELOW GROUND, SEE CIVIL DRAWING FOR CONTINUATION. 1/8" / 1'-0".
- 3" DOMESTIC WATER SERVICE BELOW GROUND, SEE CIVIL DRAWING FOR CONTINUATION, BACKFLOW PREVENTOR, AND METER.
- DOMESTIC WATER SERVICE ENTRY RISER, SEE DETAIL.
- 3" COLD WATER SERVICE RISER WITH SHUT OFF VALVE IN VERTICAL.
- NATURAL GAS SERVICE BELOW GROUND, COORDINATE WITH UTILITY PROVIDER FOR EXACT ROUTING.
- 1-1/2" NATURAL GAS UP EXTERIOR WALL FROM HOUSE METER TO ROOF. CONTRACTOR SHALL PENETRATE WALL 6' BELOW ROOF LEVEL, TURN UP INSIDE SPACE, AND PENETRATE ROOF IN ORDER TO NOT ALLOW CLIMBING OF GAS PIPING.
- 2" VENT UP WALL.
- 2" VENT UP TO 3" VENT THROUGH ROOF.
- FUTURE GAS UTILITY METER. CONTRACTOR SHALL INSTALL METERBANK PER PSE REQUIREMENTS.



1 CONSTRUCTION PLAN - PLUMBING
SCALE: 1/64" = 1'-0"

CLIENT:



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PROJECT:

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TUMWATER, WASHINGTON

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SEAL:



04/21/2022

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SHEET NAME:

ROOF PLAN - PLUMBING

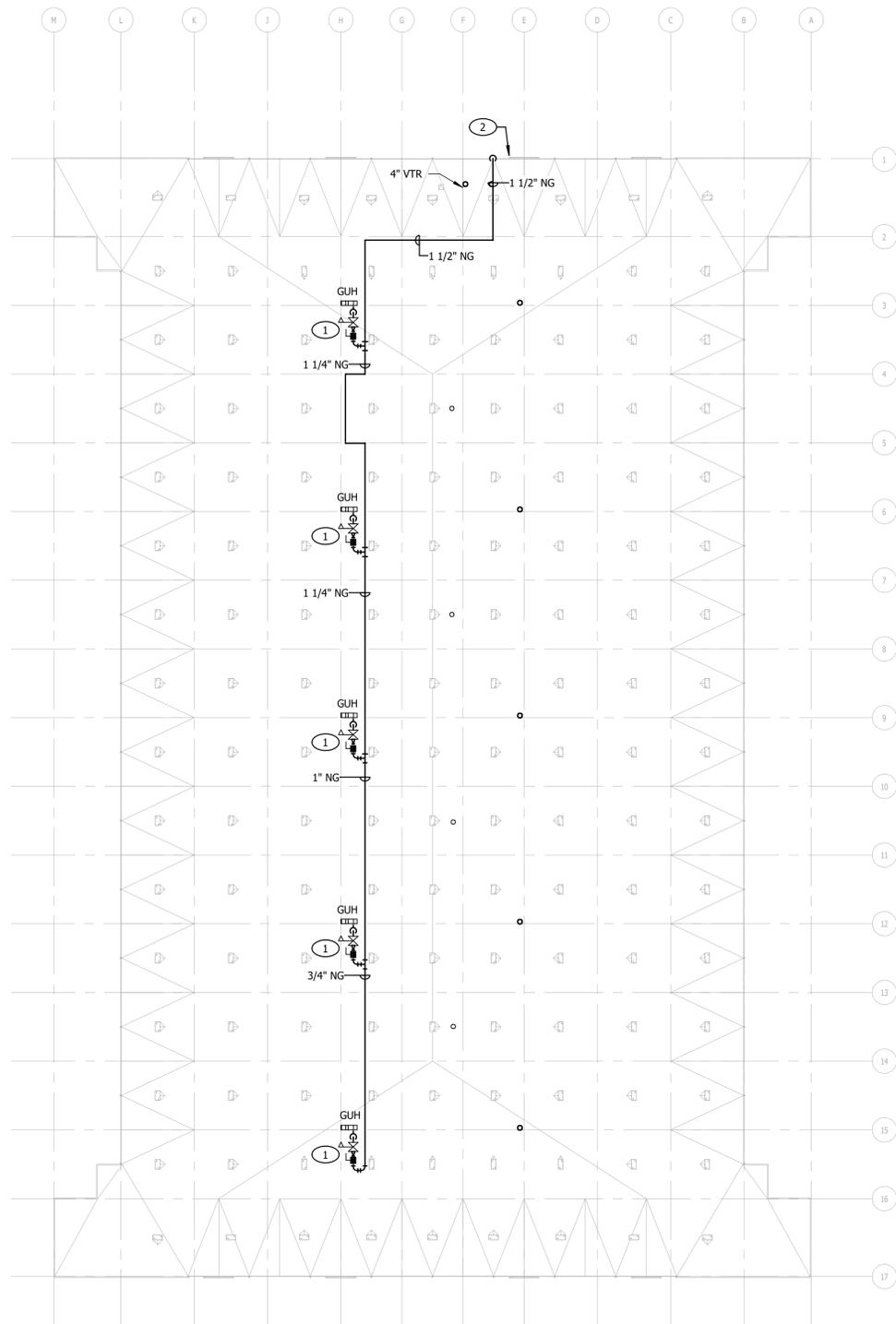
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KEYNOTES

1. NATURAL GAS CONNECTION TO UNIT HEATER WITH SHUTOFF VALVE, DIRT LEG, GAS PRESSURE REDUCING VALVE (10"WC), & UNION.
2. 1-1/2" NATURAL GAS DOWN WITHIN EXTERIOR WALL.



1 ROOF PLAN - PLUMBING
SCALE: 1/64" = 1'-0"

CLIENT:



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PROJECT:

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CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: BUILDING PERMIT No: 04/22/2022 Date:

SEAL:



04/21/2022

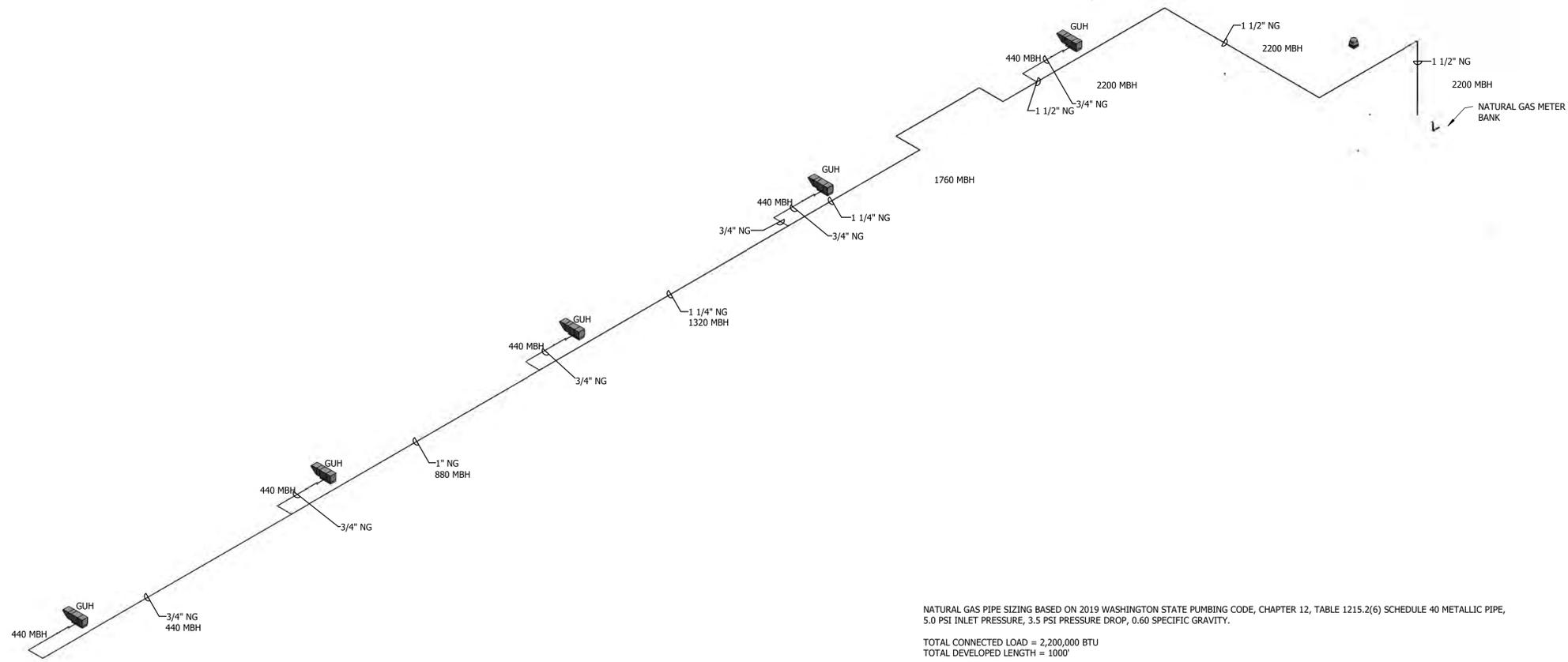
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RISER DIAGRAMS - PLUMBING

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COA#: 21004417

PLUMBING FIXTURE SCHEDULE							
TAG	FIXTURE TYPE	MODEL	W	V	CW	HW	REMARKS
		FD-1200-L					FLOOR DRAIN

NATURAL GAS PRESSURE REGULATOR SCHEDULE					
MANUFACTURER / MODEL	INLET PRESSURE		OUTLET PRESSURE		BTU MAX
	PSI	IN. WC.	IN. WC.	PIPE SIZE	
MAXITROL 325-3L48	5 PSI	7, 10 IN WC.	7, 10 IN WC.	1/2" X 1/2"	160,000
MAXITROL 325-5L48	5 PSI	7, 10 IN WC.	7, 10 IN WC.	1/2" X 1/2"	185,000
MAXITROL 325-5L48	5 PSI	7, 10 IN WC.	7, 10 IN WC.	3/4" X 3/4"	260,000
MAXITROL 325-5L600	5 PSI	7, 10 IN WC.	7, 10 IN WC.	3/4" X 3/4"	340,000
MAXITROL 325-5L600	5 PSI	7, 10 IN WC.	7, 10 IN WC.	1" X 1"	370,000
MAXITROL 325-7AL210D	5 PSI	7, 10 IN WC.	7, 10 IN WC.	1 1/4" X 1 1/4"	1,000,000
MAXITROL 325-7AL210D	5 PSI	7, 10 IN WC.	7, 10 IN WC.	1 1/2" X 1 1/2"	1,000,000

REMARKS
 LINE PRESSURE REGULATORS WITH OVERPRESSURE...
 CERTIFIED PER Z21.80/CSA 6.22
 MOUNT REGULATOR IN HORIZONTAL POSITION
 INDOOR REGULATORS SHALL BE PROVIDED WITH VENT LIMITING DEVICE
 EXTERIOR REGULATORS TO BE PROVIDED WITH VENT...
 AMBIENT TEMPERATURE RANGE -40 TO 205 DEG F.

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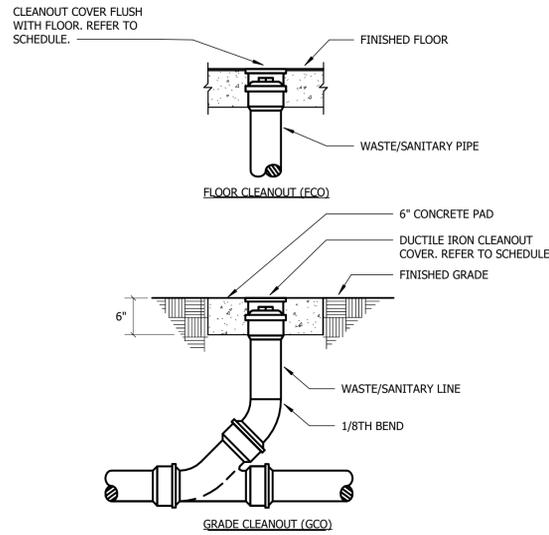
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SCHEDULES - PLUMBING

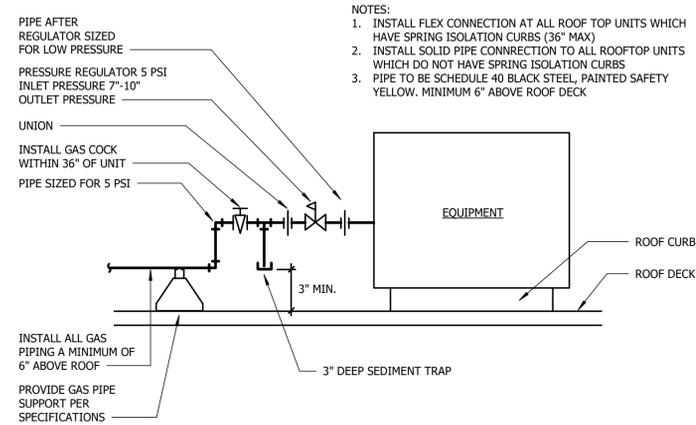
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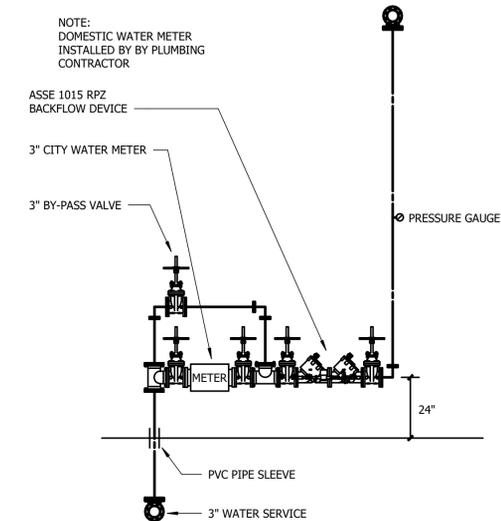
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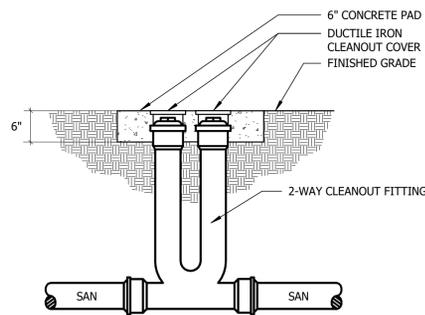
7 PLUMBING - FLOOR AND GRADE CLEANOUT DETAIL
P8.00 NO SCALE



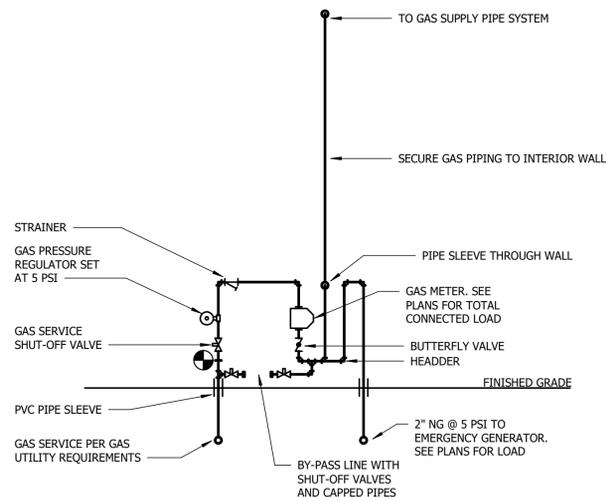
4 PLUMBING - GAS EQUIPMENT CONNECTION DETAIL
P8.00 NO SCALE



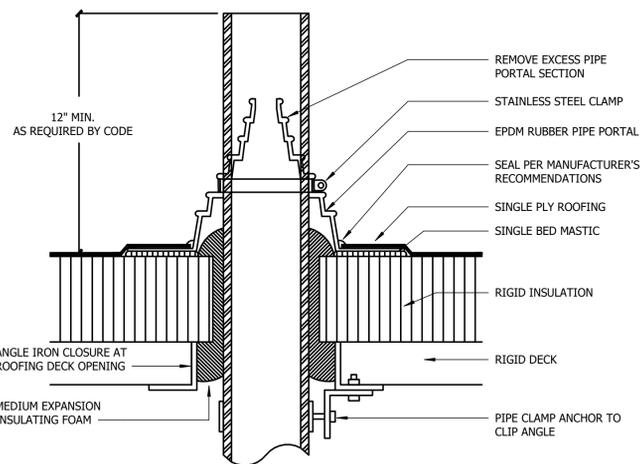
1 PLUMBING - WATER METER DETAIL
P8.00 NO SCALE



8 PLUMBING - 2-WAY CLEANOUT DETAIL
P8.00 NO SCALE



5 PLUMBING - GAS METER DETAIL
P8.00 NO SCALE



9 PLUMBING - VENT THRU ROOF DETAIL
P8.00 NO SCALE



04/21/2022

CITY STAMP:

SHEET NAME:

PLUMBING DETAILS



ABBREVIATIONS

A	AMPERES
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
B	BELOW FINISHED FLOOR
BFF	BELOW FINISHED GRADE
C	CONTROL POWER TRANSFORMER
CPT	CONDENSING UNIT
CU	CABINET UNIT HEATER
CUH	CABINET UNIT HEATER
CUV	CABINET UNIT VENTILATOR
D	DIAMETER
DPDT	DOUBLE POLE, DOUBLE THROW
E	ELECTRICAL CONTRACTOR
EC	ELECTRIC HAND DRYER
EF	EXHAUST FAN
EHD	ELECTRICAL METALLIC TUBING
EMT	EXISTING TO REMAIN
ETR	ELECTRIC WATER COOLER
EWC	
F	FAN
F	FAN COIL UNIT
FCU	FULL LOAD AMPERES
FLA	FINNED RADIATION
FR	
G	GROUND FAULT ALARM RELAY
GFR	GROUND FAULT INTERRUPTER
GFI	GROUND FAULT PROTECTION
GFP	
H	HAND-OFF-AUTOMATIC
H-O-A	HORSEPOWER
HP	HEIGHT
HT	HORIZONTAL UNIT HEATER
HUH	
I	INTERMEDIATE METALLIC CONDUIT
IMC	
K	KILO CIRCULAR MILS
KCMIL	KILOVOLT-AMPERES
KVA	KILOWATTS
KW	
L	LOCKED ROTOR AMPERES
LRA	LIGHTING
LTG	
M	MAXIMUM
MAX	MECHANICAL CONTRACTOR
MC	
N	NORMALLY CLOSED
N.C.	NORMALLY OPEN
N.O.	NATIONAL ELECTRICAL CODE
NEC	NUMBER
NO.	
O	ON CENTER
OC	
P	PUMP
P	PLUMBING CONTRACTOR
PC	POWER DISTRIBUTION UNIT
PDU	POWER QUALITY METER
PQM	POUNDS PER SQUARE INCH
PSI	POLYVINYL CHLORIDE
PVC	
Q	QUANTITY
Q	
R	RETURN AIR FAN
RAF	RADIANT CEILING PANEL
RCP	RIGID GALVANIZED STEEL
RGS	ROOF TOP UNIT
RTU	
S	SELF-CONTAINED UNIT
SCU	SINGLE POLE, DOUBLE THROW
SPDT	SINGLE POLE, SINGLE THROW
SPST	SPLIT SYSTEM
SS	SHEILDDED TWISTED PAIR
STP	STATIC TRANSFER SWITCH
STS	
T	TYPICAL
TYP	
V	VOLT, VOLTS
V	VOLT AMPERES
VA	VARIABLE AIR VOLUME
VAV	
W	WEATHERPROOF
WP	
X	TRANSFORMER
XFMR	EXPLOSION PROOF
XP	

LIGHTING FIXTURES LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

INTERIOR LIGHTING	
MOUNTING	
	RECESSED/SURFACE RECESSED LIGHT FIXTURE
	PENDANT PENDANT LIGHT FIXTURE
	WALL WALL LIGHT FIXTURE
	WALL WALL SCONCE
	AS NOTED DOWNLIGHT
	AS NOTED WALLWASH FIXTURE
	AS NOTED DOUBLE WALLWASH FIXTURE
	AS NOTED ADJUSTABLE DOWNLIGHT ACCENT
	AS NOTED TRACK LIGHTING
	12" BELOW CEILING MAX. 8'-0" AFF LIFE SAFETY REMOTE BATTERY UNIT
	12" BELOW CEILING MAX. 8'-0" AFF LIFE SAFETY BATTERY UNIT
	6" ABOVE DOOR JAMB EXIT SIGN; DIRECTION ARROWS AS INDICATED
	CEILING EXIT SIGN; DIRECTION ARROWS AS INDICATED
	AS NOTED LIGHT FIXTURE CONNECTED TO LIFE SAFETY CIRCUIT, TYPICAL

NOTE: FIXTURES MARKED AS LIFE SAFETY SHALL HAVE THE FOLLOWING OPERATIONS:
1. UNDER NON-EMERGENCY CONDITIONS LIFE SAFETY LIGHTING SHALL BE CONTROLLED WITH THE REST OF THE NORMAL FIXTURES AS SHOWN.
2. UNDER EMERGENCY CONDITIONS THE LIFE SAFETY LIGHTING SHALL COME ON 100%.

EXTERIOR LIGHTING

	1 OR 2 HEAD POLE LIGHT
	3 OR 4 HEAD POLE LIGHT
	SPOT LIGHT FIXTURE
	FLOOD LIGHT FIXTURE
	BOLLARD MOUNTED LIGHT FIXTURE

SWITCHES LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

MOUNTING	
	46" AFF SINGLE POLE TOGGLE SWITCH
	46" AFF THREE WAY TOGGLE SWITCH
	46" AFF FOUR WAY TOGGLE SWITCH
	46" AFF WALLBOX DIMMER
	46" AFF MULTI-WAY WALLBOX DIMMER
	46" AFF TOGGLE SWITCH WITH PILOT LIGHT
	46" AFF TOGGLE SWITCH MOMENTARY CONTACT
	46" AFF TOGGLE SWITCH MOMENTARY CONTACT; RAISE/LOWER
	46" AFF SINGLE POLE TOGGLE SWITCH; KEY OPERATED
	46" AFF THREE WAY TOGGLE SWITCH; KEY OPERATED
	46" AFF FOUR WAY TOGGLE SWITCH; KEY OPERATED
	46" AFF DOUBLE SWITCHING; REFER TO NOTES ON PLAN
	46" AFF ARCHITECTURAL LIGHTING KEYPAD
	46" AFF SINGLE POLE TOGGLE SWITCH; OCCUPANT SENSOR

NOTE: 'T' INDICATES SWITCH(ES) WITH INTEGRAL TIMER(S).

RECEPTACLES LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

MOUNTING	
	18" AFF SINGLE RECEPTACLE
	18" AFF DUPLEX RECEPTACLE
	AS NOTED DUPLEX RECEPTACLE; (ELEVATION)
	18" AFF DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER
	(WP) 24" AFF DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER AND WEATHERPROOF COVER
	18" AFF DUPLEX RECEPTACLE WITH TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)
	18" AFF DUPLEX RECEPTACLE WITH ISOLATED GROUND
	18" AFF QUADRUPLEX RECEPTACLE
	18" AFF QUADRUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER
	18" AFF QUADRUPLEX RECEPTACLE WITH TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)
	18" AFF QUADRUPLEX RECEPTACLE WITH ISOLATED GROUND
	18" AFF SPECIAL PURPOSE RECEPTACLE SINGLE PHASE
	18" AFF SPECIAL PURPOSE RECEPTACLE THREE PHASE
	AS NOTED SURFACE RACEWAY; RECEPTACLES AS INDICATED
	CEILING DUPLEX RECEPTACLE
	FLOOR DUPLEX RECEPTACLE
	FLOOR QUADRUPLEX RECEPTACLE
	FLOOR SPECIAL PURPOSE RECEPTACLE SINGLE PHASE
	FLOOR SPECIAL PURPOSE RECEPTACLE THREE PHASE
	2G FLOOR FURNITURE FEED COMBINATION POWER/TELECOM; GANG BOX SIZE AS INDICATED (TELECOM/AV CABLING PER PLANS)
	6G FLOOR COMBINATION QUADRUPLEX RECEPTACLE/TELECOM; GANG BOX SIZE AS INDICATED (TELECOM/AV CABLING PER PLANS)
	3" AFF DUPLEX RECEPTACLE WITH CAST OUTLET BOX ON STANDPIPE
	3" AFF QUADRUPLEX RECEPTACLE WITH CAST OUTLET BOX ON STANDPIPE
	3" AFF SPECIAL PURPOSE RECEPTACLE SINGLE PHASE WITH CAST OUTLET BOX ON STANDPIPE
	3" AFF SPECIAL PURPOSE RECEPTACLE THREE PHASE WITH CAST OUTLET BOX ON STANDPIPE
	FLOOR FURNITURE FEED POKE-THRU COMBINATION POWER/TELECOM; (TELECOM/AV CABLING PER PLANS)
	8" FLOOR COMBINATION POWER/TELECOM/AV; SIZE AS INDICATED (TELECOM/AV CABLING PER PLANS)
	# FLOOR POWER POLE; # OF DATA DROPS, IF APPLICABLE

EQUIPMENT LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

MOUNTING	
	18" AFF JUNCTION BOX; FLUSH
	3" AFF JUNCTION BOX WITH CAST OUTLET BOX ON STAND PIPE
	18" AFF BLANK OUTLET
	- BLANK OUTLET
	- BLANK OUTLET; FLUSH
	FLOOR JUNCTION BOX; FLUSH
	FLOOR BLANK OUTLET
	CEILING DROP CORD
	CEILING CORD REEL
	5'-0" AFF ENCLOSED CIRCUIT BREAKER
	- CONTACTOR
	46" AFF DRY TYPE TRANSFORMER; KVA RATING AS INDICATED
	5'-0" AFF SAFETY SWITCH; NON-FUSED (NEMA TYPE 1, UNLESS NOTED OTHERWISE)
	5'-0" AFF SAFETY SWITCH; FUSED (NEMA TYPE 1, UNLESS NOTED OTHERWISE)
	5'-0" AFF COMBINATION STARTER (NEMA TYPE 1, UNLESS NOTED OTHERWISE)
	5'-0" AFF MOTOR STARTER (NEMA TYPE 1, UNLESS NOTED OTHERWISE)
	- MOTOR
	- RELAY
	46" AFF PUSHBUTTON
	46" AFF PUSHBUTTON; EMERGENCY STOP
	46" AFF PUSHBUTTON WITH KEY RESET
	46" AFF PUSHBUTTON; START/STOP
	WALL OCCUPANT SENSOR ('R'=INFRARED, 'DT'=DUAL TECHNOLOGY, 'US'=ULTRASONIC)
	CEILING OCCUPANT SENSOR; 360 DEGREE DISPERSION ('R'=INFRARED, 'DT'=DUAL TECHNOLOGY, 'US'=ULTRASONIC)
	CEILING OCCUPANT SENSOR; 180 DEGREE DISPERSION ('R'=INFRARED, 'DT'=DUAL TECHNOLOGY, 'US'=ULTRASONIC)
	- BUILDING MOUNTED PHOTCELL. HEIGHT SHALL BE IN LINE WITH BUILDING MOUNTED LIGHT FIXTURES.

DISTRIBUTION LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

MOUNTING	
	TOP BREAKER 6'-0" AFF PANELBOARD; RECESSED
	TOP BREAKER 6'-0" AFF PANELBOARD; SURFACE MOUNTED
	AS NOTED PULL BOX OR WIREWAY
	BRANCH CIRCUITING; (2)#12 PER 1 POLE CIRCUIT WITH SEPARATE #12 GROUND WIRE MINIMUM
	HOMERUN TO PANELBOARD; PANEL AND CIRCUIT NUMBER AS INDICATED
	EQUIPMENT ON SAME CIRCUIT BUT SEPARATELY CONTROLLED
	CIRCUIT CONTINUATION
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
	EMERGENCY ONLY CIRCUIT
	NORMAL/EMERGENCY CIRCUIT
	LIFE SAFETY CIRCUIT
	PRIMARY ELECTRIC SERVICE
	SECONDARY ELECTRIC SERVICE
	TELEPHONE SERVICE
	TELEVISION SERVICE
	UNDERGROUND ELECTRIC SERVICE
	UNDERGROUND TELECOM SERVICE
	UNDERGROUND TELECOM SERVICE

TYPICAL ANNOTATION:

	AREA OF REVISION
	REVISION SEQUENCE NUMBER
	KEYED NOTE
	DEMOLITION KEYED NOTE
	POINT OF CONNECTION OF EXISTING SYSTEM
	POINT OF DISCONNECTION OF EXISTING SYSTEM
	DETAIL NUMBER
	DRAWING NUMBER
	DETAIL NUMBER
	DRAWING NUMBER
	1 / A101 VIEW REFERENCE

SYMBOL GENERAL NOTES:

- WHERE DEVICE HEIGHT OF 46" OCCURS AT POINT OF CHANGE OF FINISH, THE DEVICE SHALL BE LOWERED TO OCCUR IN ONE FINISH.
- WHERE DEVICES OCCUR IN BRICK, TILE, OR BLOCK WALLS, THEY SHALL BE MOUNTED AT A VERTICAL MASONRY JOINT AND IN EITHER TOP OR BOTTOM HORIZONTAL JOINT, MAXIMUM MOUNTING HEIGHT OF 46" AFF.
- UNLESS OTHERWISE NOTED, ALL MOUNTING HEIGHT DIMENSIONS LISTED ARE TO THE CENTER LINE OF THE WALL BOX OR DEVICE.
- EXISTING EQUIPMENT SHOWN DASHED.
- SOME LEGEND SYMBOLS MAY NOT BE USED. SEE FLOOR PLANS FOR APPLICABLE DEVICES.

GENERAL NOTES:

1. NON-PRIME CONTRACTS (TELECOM CONTRACT UNDER ELECTRICAL)

IN ADDITION TO SURFACE RACEWAY AND/OR FLOOR MOUNTED OUTLET BOXES AND POWER POLES INDICATED ON ELECTRICAL DRAWINGS, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CABLE TRAY AND FLUSH MOUNTED OUTLET BOXES/BACK BOXES AND ASSOCIATED CONDUIT FOR ALL TELECOMMUNICATIONS OUTLETS (INCLUDING PA/MASTER CLOCK/SOUND SYSTEMS, CATV/VIDEO SYSTEMS, AND SECURITY SYSTEMS) ON THIS PROJECT. THE CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS AND SECURITY DRAWINGS ('T' AND 'S' DRAWINGS) FOR CABLE TRAY AND OUTLET/DEVICE LOCATIONS, AND ALL INSTALLATION DETAILS SHOWN ON THE 'T' AND 'S' DRAWINGS. THE CONTRACTOR SHALL ALSO REFERENCE THE TELECOMMUNICATIONS DRAWINGS FOR EMBEDDED CONDUIT REQUIRED FOR IN-FLOOR BOXES THAT ARE SHOWN ON THE 'T' DRAWINGS, AND THE CONTRACTOR SHALL PROVIDE THE EMBEDDED CONDUITS AS SHOWN ON THE 'T' DRAWINGS.

THE ELECTRICAL CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS DRAWINGS FOR ANY UNDERGROUND SITE WORK AND SHALL PROVIDE ALL UNDERGROUND CONDUITS, DUCTBANKS, HANDHOLES, MANHOLES, AND UNDERGROUND PENETRATIONS AS SHOWN ON THE 'T' DRAWINGS. CONTRACTOR SHALL PROVIDE ALL EXCAVATION, BACKFILLING AND SURFACE RESTORATION REQUIRED FOR THE SITE WORK.

THE ELECTRICAL CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS AND SECURITY SPECIFICATIONS FOR SPECIFIC REQUIREMENTS FOR CABLE TRAYS, GROUNDING, PA/MASTER CLOCK/SOUND SYSTEMS, CATV/VIDEO SYSTEMS, AND SECURITY SYSTEMS.

2. PRIME CONTRACTS (TELECOM & ELECTRICAL CONTRACTS SEPARATE)

IN ADDITION TO SURFACE RACEWAY AND/OR FLOOR MOUNTED OUTLET BOXES AND POWER POLES INDICATED ON ELECTRICAL DRAWINGS, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CABLE TRAY AND FLUSH MOUNTED OUTLET BOXES/BACK BOXES AND ASSOCIATED CONDUIT FOR ALL TELECOMMUNICATIONS OUTLETS (INCLUDING PA/MASTER CLOCK/SOUND SYSTEMS, CATV/VIDEO SYSTEMS, AND SECURITY SYSTEMS) ON THIS PROJECT. THE CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS AND SECURITY DRAWINGS ('T' AND 'S' DRAWINGS) FOR CABLE TRAY AND OUTLET/DEVICE LOCATIONS, AND ALL INSTALLATION DETAILS SHOWN ON THE 'T' AND 'S' DRAWINGS. THE CONTRACTOR SHALL ALSO REFERENCE THE TELECOMMUNICATIONS DRAWINGS FOR EMBEDDED CONDUIT REQUIRED FOR IN-FLOOR BOXES THAT ARE SHOWN ON THE 'T' DRAWINGS, AND THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE EMBEDDED CONDUITS AS SHOWN ON THE 'T' DRAWINGS.

THE ELECTRICAL CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS DRAWINGS FOR ANY UNDERGROUND SITE WORK, AND THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL UNDERGROUND CONDUITS, DUCTBANKS, HANDHOLES, MANHOLES, AND UNDERGROUND PENETRATIONS AS SHOWN ON THE 'T' DRAWINGS. CONTRACTOR SHALL PROVIDE ALL EXCAVATION, BACKFILLING AND SURFACE RESTORATION REQUIRED FOR THE SITE WORK.

THE ELECTRICAL CONTRACTOR SHALL REFERENCE THE TELECOMMUNICATIONS SPECIFICATIONS FOR SPECIFIC REQUIREMENTS FOR CABLE TRAYS, GROUNDING, PA/MASTER CLOCK/SOUND SYSTEMS, CATV/VIDEO SYSTEMS, AND SECURITY SYSTEMS. TELECOMMUNICATIONS STRUCTURED CABLING SYSTEMS, TELECOMMUNICATIONS OUTLET DEVICES/FACEPLATES/JACKS, DATA NETWORK SYSTEMS PBX/TELEPHONE SYSTEMS, CONDUIT SLEEVES, PENETRATIONS FOR CONDUIT SLEEVES, FIRESTOPPING, CABLE RUNWAY (IN IDF'S AND MDF'S), AND PLYWOOD BACKBOARDS SHALL BE PROVIDED BY THE TELECOMMUNICATIONS CONTRACTOR.

REFERENCE NOTES:

- ER1. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE LOCATIONS OF THE FOLLOWING:
- ALL CEILING MOUNTED LIGHTING FIXTURES AND DEVICES
 - ALL FIRE RATED PARTITIONS AND BUILDING EXPANSION JOINTS
 - MOUNTING HEIGHTS OF EQUIPMENT AND DEVICES

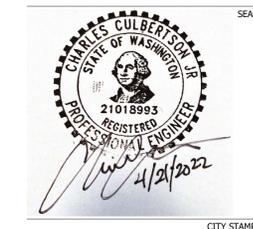
- ER2. REFER TO THE HVAC DRAWINGS FOR THE LOCATIONS OF THE FOLLOWING:
- MECHANICAL EQUIPMENT, CONTROL PANELS AND MOTORS
 - AUTOMATIC TEMPERATURE CONTROL SYSTEM PANELS AND DEVICES
 - DUCT MOUNTED SMOKE DETECTORS
 - MOTORIZED DAMPERS AND CONTROL VALVES
 - ELECTRIC HEAT TRACING OF MECHANICAL PIPING

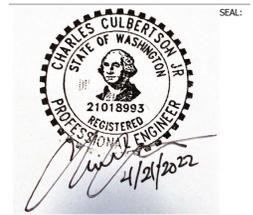
- ER3. REFER TO THE PLUMBING DRAWINGS FOR THE LOCATIONS OF THE FOLLOWING:
- ELECTRIC WATER HEATERS
 - ELECTRIC FLUSH VALVES
 - ELECTRIC HEAT TRACING OF PLUMBING AND DRAINAGE PIPING

- ER4. REFER TO THE FIRE PROTECTION/SPRINKLER DRAWINGS FOR THE LOCATIONS OF THE FOLLOWING:
- WATER FLOW AND TAMPER SWITCHES
 - PRE-ACTION AND/OR DELUGE SYSTEM CONTROL PANELS
 - ELECTRIC HEAT TRACING OF SPRINKLER PIPING

- ER5. REFER TO THE APPROPRIATE VENDORS APPROVED DIMENSIONED LAYOUT DRAWINGS FOR THE LOCATIONS OF THE FOLLOWING:
- CONDUIT CONNECTIONS TO FURNITURE AND PREFABRICATED MILLWORK
 - ELEVATOR AND ESCALATOR RELATED POWER, LIGHTING AND EMPTY CONDUIT PROVISIONS
 - POWER AND CONTROL WIRING FOR ELECTRICALLY OPERATED DOORS.

Sheet Number	Sheet Name
E0.00	SYMBOLS, LEGENDS, AND ABBREVIATIONS - ELECTRICAL
E0.01	SPECIFICATIONS - ELECTRICAL
E0.02	SPECIFICATIONS - ELECTRICAL
E0.03	SPECIFICATIONS - ELECTRICAL
E0.04	SPECIFICATIONS - ELECTRICAL
E1.00	SITE PLAN - ELECTRICAL
E2.00	CONSTRUCTION PLAN - LIGHTING
E2.01	CONSTRUCTION PLAN - ENLARGED LIGHTING
E2.02	CALCULATIONS - ELECTRICAL
E2.03	COMPLIANCE FORMS - ELECTRICAL
E3.01	CONSTRUCTION PLAN - POWER
E4.02	ROOF PLAN - MECHANICAL POWER
E7.00	RISER DIAGRAM AND SCHEDULES
E8.00	ELECTRICAL DETAILS
E9.00	PANEL SCHEDULES





PART 1 GENERAL INSTRUCTIONS

1-1 GENERAL REQUIREMENTS

- ALL REQUIREMENTS IN THE ARCHITECTURAL SPECIFICATIONS, ARCHITECTURAL GENERAL NOTES AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS SECTION AND DIVISION. WHERE THE REQUIREMENTS OF THIS SECTION AND DIVISION EXCEED THOSE OF THE ARCHITECTURAL SPECIFICATIONS AND ARCHITECTURAL GENERAL NOTES, THIS SECTION AND DIVISION TAKE PRECEDENCE. BECOME THOROUGHLY FAMILIAR WITH ALL REQUIREMENTS THAT AFFECT THIS DIVISION, SECTION OR BOTH. WORK REQUIRED UNDER THIS DIVISION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE ELECTRICAL SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, OR REASONABLY INFERRED TO BE NECESSARY TO FACILITATE EACH SYSTEM'S FUNCTIONALITY AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED.
- THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.
- DRAWINGS ARE GRAPHIC REPRESENTATIONS OF THE WORK UNDER WHICH THE CONTRACT IS BASED. THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER, INCLUDING SIZES, SHAPES, LOCATIONS, AND CONNECTIONS. THEY ALSO CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE EQUIPMENT, FIXTURES, OUTLETS AND CIRCUITS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. USE THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK AND TO VERIFY THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES AND WHICH, WHEN INSTALLED PER MANUFACTURERS' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY AND PROPERLY OPERATING SYSTEM.
- DRAWINGS ARE SCHEMATIC IN NATURE, SHOW THE VARIOUS COMPONENTS OF THE SYSTEMS APPROXIMATELY TO SCALE AND ATTEMPT TO INDICATE HOW THEY SHALL BE INTEGRATED WITH OTHER PARTS OF THE WORK. FIGURED DIMENSIONS TAKE PRECEDENCE TO SCALED DIMENSIONS. DETERMINE EXACT LOCATIONS BY JOB MEASUREMENTS, BY CHECKING THE REQUIREMENTS OF OTHER TRADES, AND BY REVIEWING ALL CONTRACT DOCUMENTS. CORRECT ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION, AT NO ADDITIONAL COST.
- SPECIFICATIONS DEFINE THE QUALITATIVE REQUIREMENTS FOR PRODUCTS, MATERIALS, AND WORKMANSHIP UPON WHICH THE CONTRACT IS BASED.

1-2 DEFINITIONS

- WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, THE FOLLOWING TERMS SHALL HAVE THE INDICATED MEANINGS:
- FURNISH: TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR OPERATIONS.
 - INSTALL: TO PERFORM ALL OPERATIONS AT THE PROJECT SITE, INCLUDING, BUT NOT LIMITED TO, AND AS REQUIRED: UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE.
 - PROVIDE: TO FURNISH AND INSTALL COMPLETE, AND READY FOR THE INTENDED USE.
 - FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION.
 - ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS. WHERE REFERENCED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT".
 - AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY, AUTHORITY HAVING JURISDICTION OVER THE WORK.
 - NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.
 - THE TERMS "EQUIVALENT", OR "EQUAL" ARE USED SYNONYMOSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED" OR "EQUAL" PRODUCTS SHALL BE LABELED, LISTED, CERTIFIED, OR ALL THREE, BY AN NRTL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

1-3 PRE-BID SITE VISIT

- PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED OF CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

1-4 MATERIAL AND WORKMANSHIP

- INSTALL MATERIAL AND EQUIPMENT NEW AND IN FIRST CLASS CONDITION. PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE BY EXPERIENCED MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE THE FOLLOWING QUALITY GRADE(S) FOR ALL MATERIALS AND EQUIPMENT (LIGHT DUTY AND RESIDENTIAL TYPE EQUIPMENT WILL NOT BE ACCEPTABLE):
- COMMERCIAL SPECIFICATION GRADE.
- PROVIDE ALL HOISTS, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY AND EQUIPMENT REQUIRED FOR THE INSTALLATION AND PERFORMANCE OF THE WORK. STORE AND MAINTAIN MATERIAL AND EQUIPMENT IN CLEAN CONDITION, AND PROTECTED FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.
- FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED, LABELED, CERTIFIED, OR ALL THREE, BY A NATIONALLY RECOGNIZED LABORATORY, WHENEVER ANY LISTING OR LABELING EXISTS FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED. AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1 (LATEST EDITION), "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION".

1-5 MANUFACTURERS

- IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.
- WHERE MANUFACTURERS ARE NOT LISTED, PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS THAN 5 YEARS.

1-6 COORDINATION

- COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. REFER TO ALL DRAWINGS, INCLUDING, BUT NOT LIMITED TO, CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PLUMBING, AND TO RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES. MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, BEAMS AND OTHER STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.

1-7 ORDINANCES, CODES, AND CLIENT STANDARDS

- COMPLY WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE, WORKMANSHIP, EQUIPMENT, AND MATERIALS. ADDITIONALLY, COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.
- WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT. WHEREVER REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, EXCEED THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, SHALL GOVERN. CODE COMPLIANCE, AT A MINIMUM, IS MANDATORY. CONSTRUCT NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THESE CODES.
- BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.
- PROVIDE AND MAINTAIN ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS DIVISION.

1-8 PROTECTION OF EQUIPMENT AND MATERIALS

- STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE. IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. FOR MATERIALS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNENESS, OR TEMPERATURE VARIATIONS, STORE INSIDE IN PROPERLY CONDITIONED SPACES. FOR MATERIALS AND EQUIPMENT NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.
- PLUG OR CAP OPEN ENDS OF CONDUITS WHILE STORED AND INSTALLED DURING CONSTRUCTION WHEN NOT IN USE, TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.
- RE-ESTABLISH SERVICE TO EXISTING EQUIPMENT THAT MAY HAVE BEEN INTERRUPTED DUE TO REMODELING.

1-9 SUBSTITUTIONS

- INCLUDE IN THE BASE BID THE PRODUCTS SPECIFICALLY NAMED IN THESE SPECIFICATIONS OR ON THE DRAWINGS. SUBMIT, IN THE FORM OF ALTERNATES, WITH THE BID, PRODUCTS OF ANY OTHER MANUFACTURERS FOR SIMILAR USE, PROVIDED THE DIFFERENCES IN COST, IF ANY, ARE INCLUDED FOR EACH PROPOSED ALTERNATE. PRIOR TO THE BID DATE, SUBSTITUTIONS WILL NOT BE CONSIDERED UNLESS SUBMITTED TO THE ARCHITECT, FOR ENGINEER'S REVIEW, AT LEAST TEN CALENDAR DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS. INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING CUTSHEETS, PHOTOMETRIC DATA, AND ALL OTHER INFORMATION NECESSARY FOR AN EVALUATION FOR EACH SUCH REQUEST. PROVIDE FACTORY GENERATED POINT-BY-POINT CALCULATIONS FOR ALL EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-BY-POINT CALCULATION FOR THE POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER. SUBMIT A \$100.00 REVIEW FEE TO THE ENGINEER WITH EACH SUCH POINT-BY-POINT CALCULATION FOR USE OF ELECTRONIC BASE FILES.
- THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE PRODUCT IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS HEREIN DESCRIBED ARE REJECTED, FURNISH THE SPECIFIED ITEM.

1-10 SUBMITTALS

- ASSESS AND SUBMIT TO THE ARCHITECT, FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR ALL MATERIAL AND ALL EQUIPMENT TO BE FURNISHED, INSTALLED, OR BOTH, UNDER THIS DIVISION, INCLUDING SHOP DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY THE ARCHITECTURAL SPECIFICATIONS; HOWEVER, AT A MINIMUM, SUBMIT SIX (6) SETS, OR SUBMIT ELECTRONIC PDF'S. BEFORE SUBMITTING, VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, FIT THE AVAILABLE SPACES, AND ALLOW AMPLE AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL INCLUDE THE FOLLOWING INFORMATION. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION:
 - THE PROJECT NAME AND LOCATION (STREET ADDRESS, FLOOR/SUITE NUMBER, CITY AND STATE).
 - THE APPLICABLE SPECIFICATION SECTION AND PARAGRAPH.
 - THE SUBMITTAL DATE.
 - THE CONTRACTOR'S STAMP, WHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, COMPLY WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.
 - BLANK PAGE FOR PLACEMENT OF ENGINEERS REVIEW STAMP.
 - TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW TWO WEEKS FOR ENGINEER REVIEW TIME, PLUS MAILING TIME, ALLOW AN ADDITIONAL TWO WEEKS FOR RE-SUBMITTALS, IF REQUIRED. TRANSMIT SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES; OR FOR OMITTING COMPONENTS OR FITTINGS; OR FOR NOT COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS.

1-11 ELECTRONIC DRAWING FILES

- IN PREPARATION OF SHOP DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD DWG OR DXF FORMAT FROM THE ENGINEER FOR A NON-REFUNDABLE SHIPPING AND HANDLING FEE OF \$200 FOR A DRAWING SET UP TO 12 SHEETS AND \$15 PER SHEET FOR A DRAWING SET OF MORE THAN 12 SHEETS. CONTRACTOR SHALL CONTACT THE ENGINEER FOR THE WRITTEN AUTHORIZATION. CONTRACTOR SHALL INDICATE ON THE FORM THE DESIRED SHIPPING METHOD AND DRAWING FORMAT CONTRACTOR SHALL INCLUDE PAYMENT WITH THE SIGNED AUTHORIZATION FORM. THE SIGNED AUTHORIZATION FORM AND PAYMENT MUST BE RECEIVED BY THE ENGINEER BEFORE ANY ELECTRONIC FILES WILL BE SENT.

1-12 TRAINING

- AT A TIME MUTUALLY AGREED UPON BETWEEN THE OWNER AND CONTRACTOR, TRAIN OWNER'S DESIGNATED PERSONNEL ON THE OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED FOR THIS PROJECT.
- PROVIDE TRAINING TO INCLUDE BUT NOT BE LIMITED TO AN OVERVIEW OF THE SYSTEM AND/OR EQUIPMENT AS IT RELATES TO THE FACILITY AS A WHOLE; OPERATION AND MAINTENANCE PROCEDURES AND SCHEDULES RELATED TO STARTUP/SHUTDOWN/TROUBLESHOOTING, SERVICING, PREVENTIVE MAINTENANCE AND APPROPRIATE OPERATOR INFORMATION; AND REVIEW OF DATA INCLUDED IN THE OPERATION AND MAINTENANCE INSTRUCTIONS.
- SCHEDULE TRAINING WITH OWNER WITH AT LEAST 30 DAYS IN ADVANCE NOTICE.

1-13 WARRANTIES

- WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, INSTALLATION, PRODUCT DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS AND DIVISION 1.
- ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:
 - ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.
 - ALL RACEWAY SEALS ARE EFFECTIVE.
 - THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.
- THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.
- PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.
- AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

1-14 MISCELLANEOUS REMODELING WORK

- PROVIDE ALL DEMOLITION OF EXISTING ELECTRICAL SYSTEMS AND NEW ELECTRICAL SYSTEM MODIFICATIONS REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS, OR NECESSARY FOR PROPER OPERATION AND NEW CONSTRUCTION. REMOVE ALL ABANDONED CABLES AND WIRING ABOVE ACCESSIBLE CEILINGS AND VENTILATION SHAFTS. EXERCISE EXTREME CAUTION IN THE INSTALLATION OF THIS WORK TO AVOID AN ELECTRICAL SHOCK ACCIDENT. THE FACILITY IS EXISTING AND MAY REMAIN IN OPERATION DURING THIS WORK. COORDINATE ALL WORK SCHEDULES WITH THE BUILDING MANAGEMENT PRIOR TO DE-ENERGIZING ANY ELECTRICAL CIRCUITS TO AVOID CONFLICTS WITH ANY OTHER TENANT'S OPERATION. ALLOW 3 DAYS PRIOR CONFIRMED NOTIFICATION.
- VERIFY THAT NEW AND EXISTING TO REMAIN INSTALLATIONS ARE CODE COMPLIANT, AND MAKE CORRECTIONS AS REQUIRED.
- DEVELOP AND MAINTAIN A SET OF "RED-LINE AS-BUILT" DRAWINGS. THESE DRAWINGS SHALL BE MAINTAINED AT THE PROJECT CONSTRUCTION SITE AND AVAILABLE TO THE ENGINEER UPON REQUEST. THEY SHALL BE CURRENT AND SHALL REFLECT ALL ACTUAL ASPECTS OF THE ELECTRICAL INSTALLATION WHICH DEVIATED FROM THE PRESENT ELECTRICAL DESIGN DRAWINGS. THESE DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER WITHIN 10 DAYS OF SUBSTANTIAL COMPLETION OF THE WORK AND MUST INCLUDE ALL PUNCH LIST ITEMS.
- VERIFY THE LOADING OF EACH CIRCUIT AFFECTED BY THE REMODELING. DO NOT LOAD CIRCUITS TO MORE THAN 80% OF ITS RATING.
- PROVIDE UPDATED, TYPED DIRECTORY FOR EACH PANELBOARD BEING USED OR MODIFIED UNDER THIS CONTRACT. DESIGNATE NEW CIRCUITS AND SUITE BEING SERVED.
- NO BX CABLE SHALL BE INSTALLED FOR THIS PROJECT.
- FLEXIBLE STEEL CONDUIT SHALL BE USED TO WIRE ALL LIGHT FIXTURES AND EQUIPMENT CONNECTIONS REQUIRED FOR VIBRATION OR EASE OF MAINTENANCE IN LENGTHS FROM 18 INCHES TO 72 INCHES ONLY.
- CONDUIT AND CABLE ABOVE CEILING SHALL BE SUPPORTED BY A UNISTRUT AND ALL-THREAD ROD TRAPEZE. EACH PIECE OF CONDUIT SHALL BE SECURED TO THE TRAPEZE WITH A CONDUIT STRAP. THE TRAPEZE SUPPORTS SHALL BE INSTALLED PER CODE PLUS A MINIMUM OF 12" ABOVE THE CEILING.
- PRIOR TO BID, THE EXISTING LIGHTING INSTALLATION SHALL BE INSPECTED TO VERIFY COMPATIBILITY WITH EXPANSION AND DUAL SWITCHING. NO CHANGE ORDER SHALL BE ISSUED DURING CONSTRUCTION FOR CHANGES DUE TO INCOMPATIBILITY.
- NO CHANGES SHALL BE MADE TO THE CIRCUITING SHOWN WITHOUT PRIOR WRITTEN APPROVAL OF THE ENGINEER OF RECORD. CIRCUIT NUMBERS SHALL BE INDICATED ON EACH JUNCTION BOX.
- ALL WORK FINISH PUNCH LIST, (3) ELECTRICIANS SHALL BE PRESENT TO ASSIST IN THE REMOVAL OF PANEL COVERS, JUNCTION BOX COVERS, RECEPTACLES, SWITCHES, AND OTHER ELECTRICAL DEVICES.

(END OF PART 1)

PART 2 ELECTRICAL WORK

2-1 BUILDING OPERATION

- COMPLY WITH THE SCHEDULE OF OPERATIONS AS OUTLINED IN THE ARCHITECTURAL PORTIONS OF THIS SPECIFICATION. BUILDING FACILITY SHALL BE MAINTAINED IN CONTINUOUS OPERATION. ACCOMPLISH WORK THAT REQUIRES INTERRUPTION OF BUILDING AND BUILDING TENANT OPERATIONS AT A TIME WHEN THE BUILDING IS NOT IN OPERATION, AND ONLY WITH WRITTEN APPROVAL OF BUILDING OWNER AND/OR AFFECTED TENANT(S). COORDINATE INTERRUPTION OF BUILDING OPERATION WITH THE OWNER AND/OR TENANT(S) A MINIMUM OF DAYS IN ADVANCE OF WORK.

2-2 COINCIDENTAL DAMAGE

- REPAIR ALL STREETS, SIDEWALKS, DRIVES, PAVING, WALLS, FLOORING, FINISHES, AND OTHER FACILITIES DAMAGED IN THE COURSE OF THIS WORK. REPAIR MATERIALS SHALL MATCH EXISTING CONSTRUCTION. ALL BACKFILLING AND REPAIRING SHALL MEET ALL REQUIREMENTS OF THE OWNER, CITY AND OTHERS HAVING JURISDICTION. REPAIR WORK SHALL BE FIRST CLASS UTILIZING THE BEST MATERIALS AND TRADESMEN TO PERFORM ALL NECESSARY REPAIR WORK. CONFORM TO ALL REQUIREMENTS OF DIVISION 2 OF THESE SPECIFICATIONS.

2-3 CUTTING AND PATCHING

- FOLLOWING THE REQUIREMENTS IN DIVISION 1, CUT WALLS, FLOORS, CEILINGS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED TO PERFORM WORK UNDER THIS DIVISION. OBTAIN PERMISSION OF THE ARCHITECT, OWNER, AND OWNER'S DESIGNATED STRUCTURAL ENGINEER BEFORE DOING ANY CUTTING. CUT ALL HOLES AS SMALL AS POSSIBLE. PATCH WALLS, FLOORS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED BY WORK UNDER THIS DIVISION. ALL PATCHING SHALL BE FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION, INCLUDING FIRE RATINGS IF APPLICABLE. DO NOT CUT OR PENETRATE MATERIAL AND CONSTRUCTION, INCLUDING FIRE RATINGS. DO NOT CUT OR PENETRATE STRUCTURAL ELEMENTS.
- BEFORE ANY NEW FLOOR CORES ARE MADE, PROVIDE A LETTER FROM THE BUILDING OWNER'S STRUCTURAL ENGINEER APPROVING THE LOCATION OF EACH NEW FLOOR CORE. THE LETTER SHALL ADDRESS CORES FOR: FOR CONDUIT AND POKE-THRU'S. WHERE A LETTER IS NOT SUPPLIED TO THE ENGINEER AND ARCHITECT OF RECORD BEFORE ANY FLOOR CORES ARE MADE, THE CONTRACTOR ASSUMES ALL LIABILITY FOR ANY AND ALL ISSUES THAT MAY OR COULD ARISE FROM CORING THE FLOOR.

2-4 ROUGH-IN

- COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH OTHER DIVISIONS. CONCEAL ALL RACEWAYS EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE INDICATED ON THE DRAWINGS.

2-5 SUPPORT SYSTEMS

- STEELE SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH; COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, POWER-STRUT, THOMAS & BETTS CORPORATION, UNISTRUT.
- FINISHES:
 - METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3
 - NONMETALLIC COATINGS: MANUFACTURER'S STANDARD PVC, POLYURETHANE, OR POLYESTER COATING APPLIED ACCORDING TO MFMA-3
 - PAINTED COATINGS: MANUFACTURER'S STANDARD PAINTED COATING APPLIED ACCORDING TO MFMA-3
 - STAINLESS STEEL: TYPE 304, PER ASTM A240.
 - ALUMINUM (EXTRUDED): TYPE 6063-T6, PER ASTM B221.
- FIELD FABRICATION:
 - WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.
 - FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANSER TO REMOVE OILS, RUST, SHARP EDGES AND SHARDS.
 - FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).

2-6 PENETRATIONS

- COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRE-STOPPING MATERIALS, IN ACCORDANCE WITH UL RATING OF WALL AND FLOOR TYPE.
- WALLS AND FLOORS:
 - SLEEVES FOR RACEWAYS AND CABLES:
 - STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS AND DRIP RINGS.
 - CAST-IRON PIPE SLEEVES: CAST OR FABRICATED "WALL PIPE," EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.
- SLEEVES FOR RECTANGULAR OPENINGS: GALVANIZED SHEET STEEL WITH MINIMUM 0.052-INCH THICKNESS AS INDICATED AND OF LENGTH TO SUIT APPLICATION.

2-7 FIRE STOPPING FLOOR AND WALL PENETRATIONS

- FIRE RESISTANT PENETRATION SEALANTS: TWO PART, FOAMED IN PLACE, SILICONE SEALANT FORMULATED FOR USE IN THROUGH PENETRATION FIRE STOPPING AROUND CABLES, RACEWAYS, AND CABLE TRAY PENETRATIONS THROUGH FIRE RATED WALLS AND FLOORS. SEALANTS AND ACCESSORIES SHALL HAVE FIRE RESISTANCE RATINGS INDICATED, AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES IN ACCORDANCE WITH ASTM E 814, BY UNDERWRITERS' LABORATORIES, INC., OR OTHER NRTL ACCEPTABLE TO AHJ.
- FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).
- "3M FIRE STOP FOAM #2001," 3M CORP.
- "METACAULK 835+," RECTORSEAL.
- "SPECSEAL PENSIL 200 SILICONE FOAM," SPECIFY TECHNOLOGY INC.
- "FIRE STOP SYSTEM," UNITED STATES GYPSUM COMPANY.

2-8 ACCESS DOORS

- PROVIDE ACCESS DOORS IN CEILINGS AND WALLS, WHERE INDICATED OR REQUIRED FOR ACCESS OR MAINTENANCE TO CONCEALED EQUIPMENT. INSTALL UNDER THIS SECTION. PROVIDE CONCEALED HINGES, SCREWDRIVER-TYPE LOCK, AND ANCHOR STRAPS. MANUFACTURED BY MILCOR, ZURN, TITUS, OR EQUAL. OBTAIN ARCHITECT'S APPROVAL OF TYPE, SIZE, LOCATION AND COLOR BEFORE ORDERING.

2-9 EQUIPMENT FURNISHED BY OTHERS

- PROVIDE NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS, IN LOCATIONS AS INDICATED ON THE DRAWINGS, SPECIFIED HEREIN, OR BOTH. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
 - CONDUIT TO COMPLY WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
 - "3M FIRE STOP FOAM #2001," 3M CORP.
 - "METACAULK 835+," RECTORSEAL.
 - "SPECSEAL PENSIL 200 SILICONE FOAM," SPECIFY TECHNOLOGY INC.
 - "FIRE STOP SYSTEM," UNITED STATES GYPSUM COMPANY.
- MAINTAIN ALL CORRECT ROUGH-IN DIMENSIONS, AND VERIFY THEM WITH ARCHITECT, OWNER'S REPRESENTATIVE, EQUIPMENT SUPPLIER, OR ALL THREE, PRIOR TO ROUGH-IN AND SERVICE INSTALLATIONS.

2-10 CLEANING

- IN ADDITION TO THE REQUIREMENTS SET FORTH IN THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS, REMOVE FROM THE PREMISES DIRT AND REFUSE RESULTING FROM THE PERFORMANCE OF THE ELECTRICAL WORK, AS REQUIRED, TO PREVENT ACCUMULATION. COOPERATE IN MAINTAINING REASONABLY CLEAN PREMISES AT ALL TIMES. IMMEDIATELY PRIOR TO FINAL INSPECTION, MAKE A FINAL CLEANUP OF DIRT AND REFUSE RESULTING FROM THE WORK. CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THIS DIVISION. REMOVE DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER FROM ALL SURFACES. TOUCH UP AND RESTORE ALL DAMAGED FINISHES TO THEIR ORIGINAL CONDITION.

2-11 ADJUSTING, ALIGNING AND TESTING

- ADJUST, ALIGN, AND TEST ALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION, FOR PROPER OPERATION.
- TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA ATS (LATEST EDITION) AND ALL ADDITIONAL REQUIREMENTS SPECIFIED IN FOLLOWING SECTIONS. PROVIDE COPIES OF ALL TEST REPORTS TO THE ENGINEER OF RECORD.
- MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMMETER, AND A MEGOHMMETER INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.

2-12 EQUIPMENT IDENTIFICATION

- PROVIDE EQUIPMENT IDENTIFICATION NAMEPLATES:
 - ON ALL PANELBOARDS, SWITCHES, STARTERS, AND DIMMERS, A/C UNITS, AND METERS.
 - WHERE INDICATED ON THE DRAWINGS.
 - RECEPTACLE FACEPLATES AND JUNCTION BOXES WITH CIRCUIT AND PANEL.
 - LIGHT SWITCH FACEPLATES BACKSIDE WITH CIRCUIT AND PANEL.
- NAMEPLATES:
 - ENGRAVED, CONTRASTING COLOR, THREE-LAYER, LAMINATED PLASTIC INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE DRAWINGS AND IN THE SPECIFICATIONS
 - SELF-ADHERING, WITH A PERMANENT, WEATHERPROOF ADHESIVE.
 - ATTACHMENT METHOD SHALL BE ACCEPTABLE TO THE MANUFACTURERS OF THE EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED.
 - COLOR: BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER. LETTER HEIGHT: 1/4-INCH MINIMUM.
 - LIGHT SWITCH FACEPLATES: PERMANENT BLACK MAGIC MARKER.

2-13 SYSTEM START UP

- PRIOR TO STARTING UP THE ELECTRICAL SYSTEMS:
 - CHECK ALL COMPONENTS AND DEVICES.
 - LUBRICATE ITEMS ACCORDINGLY.
 - TIGHTEN SCREWS AND BOLTS FOR 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.
 - ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE.
 - CHECK AND RECORD BUILDING'S SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE, AND PROPER PHASING.
 - BALANCE ALL SINGLE-PHASE LOADS AT EACH PANELBOARD, REDISTRIBUTING BRANCH CIRCUIT CONNECTIONS UNTIL BALANCE IS ACHIEVED. DO NOT TYPE UP FINAL PANELBOARD DIRECTORIES UNTIL ALL REBALANCING AND REDISTRIBUTION OF CIRCUITS ARE COMPLETE.
 - REPLACE ALL BURNED-OUT LAMPS, LAMPS NOT UNIFORM IN COLOR, AND LAMPS USED FOR TEMPORARY CONSTRUCTION LIGHTING IN PERMANENT LIGHT FIXTURES.
 - AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

(END OF PART 2)

PART 3 EXISTING EQUIPMENT REUSE AND REMOVAL

- REMOVE ALL EXISTING WIRING, LIGHT FIXTURES, EXPOSED CONDUITS AND OTHER ELECTRICAL INSTALLATIONS NOT REUSED PRIOR TO SUBSTANTIAL COMPLETION OF THE WORK.
- EXISTING RACEWAYS MAY BE REUSED IF THEIR POINTS OF TERMINATION ARE SUITABLE; IF THEY MEET OR EXCEED CURRENT APPLICABLE CODES; IF THEY ARE CLEAN INSIDE WITH NO EVIDENCE OF RUST OR BURRS; IF THEY ARE FREE FROM CRACKS, FLATTENED SECTIONS OR SHARP BENDS; AND, IF SUITABLY LOCATED TO AVOID CONFLICTS WITH OTHER TRADES OR INSTALLATIONS. CAREFULLY "FISH" ALL EXISTING CONDUITS REUSED UNDER THIS CONTRACT TO REMOVE ALL DEBRIS AND OBSTRUCTIONS, AND SWAB UNTIL ALL MOISTURE IS REMOVED.
- CUT, PATCH, AND REPAIR WHERE REQUIRED FOR NEW ELECTRICAL INSTALLATIONS, AND PATCH AND REPAIR ALL SURFACE DAMAGE RESULTING FROM THIS WORK. CUT FLUSH WITH THE FLOOR AND PLUG AT BOTH ENDS, RACEWAYS STUBBED ABOVE THE FLOOR AND NOT USED AT SUBSTANTIAL COMPLETION OF THE WORK.
- RELOCATE ALL EXISTING ELECTRICAL SYSTEMS REQUIRED TO BE IN OPERATION AT SUBSTANTIAL COMPLETION OF THE CONTRACT, IF REQUIRED, AS A RESULT OF WORK INCLUDED UNDER THIS CONTRACT, EVEN IF NOT SPECIFICALLY INDICATED IN THE DRAWINGS OR SPECIFICATIONS.

(END OF PART 3)

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CLIENT:



PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



CITY STAMP:

SHEET NAME:

SPECIFICATIONS - ELECTRICAL

TABLE 2 (4-1-10)

TYPE OF DEVICE	HUBBELL	PASS & SEYMOUR	LEVITON	COOPER
SIMPLEX RECEPTACLE	HBL-2161-I	26241-I	5891	5351
DUPLEX RECEPTACLE	HBL-2162-I	5362WSR	5352	5352
GFCl RECEPTACLE	GF5352	2091	6898/6598	XGF20
ISOLATED GROUND (IG) RECEPTACLE	IG5362	IG6300	8300-IG	IG5362
QUAD/4-PLEX	HBL-420	420	21254	N/A
CLOCK RECEPTACLE	HBL-5235	S3733-SS (15A ONLY)	5361-CH	93632 (15A ONLY)
SINGLE POLE SWITCH	CS1221	PS 20 AC1	1221-2	2221
THREE-WAY SWITCH	CS1223	PS 20 AC3	1223-2	2223
FOUR-WAY SWITCH	CS1224	PS 20 AC4	1224-2	2224
PILOT LIGHT SWITCH	HBL-1221PL	PS 20 AC1-RPL	1221-(7)PLR	2221PL
KEY SWITCH	HBL-1221L	PS 20 AC1-L	1221-2L	2221L
WALL-BOX DIMMER (1.5KW), SP3W, INCANDESCENT	AS153	9158	81500-3	N/A
MOMENTARY SPDT, CENTER-OFF SWITCH	HBL-1557	1251	1257	1995

4-1-11 SWITCH AND OUTLET COVER PLATES
SWITCH AND OUTLET PLATES: COLORED, SMOOTH NYLON; BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHERE EVE

4-2 ELECTRICAL SERVICE AND GROUNDING

4-2-1 CONNECTION TO SERVING UTILITIES

- PROVIDE RACEWAYS, TERMINATIONS, METERING PROVISIONS, AND MISCELLANEOUS EQUIPMENT, AS REQUIRED, FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE SERVING UTILITY, IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL APPLICABLE CODES AND OF THE SERVING UTILITY INVOLVED. VERIFY ALL SERVICE TERMINATIONS AND CONNECTION POINTS IN THE FIELD AND WORK IN CONJUNCTION WITH THE UTILITY INVOLVED IN THE INSTALLATION OF ALL SERVICES. PROVIDE ALL MATERIALS AND EQUIPMENT REQUIRED FOR COMPLETE UTILITY CONNECTION BUT NOT FURNISHED BY THE SERVING UTILITY. NOTIFY THE UTILITY COMPANIES INVOLVED WITHIN TWO WEEKS AFTER NOTICE TO PROCEED, OF ALL REQUIRED INFORMATION NECESSARY FOR THE UTILITY TO SUPPLY THE PROJECT WITHOUT DELAY. PAY ALL CHARGES OF THE SERVING UTILITY FOR THE ELECTRICAL SERVICE(S).

4-2-2 GROUNDING

- PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. USE BARE OR INSULATED CONDUCTORS, AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.

4-3 DISTRIBUTION AND CONTROL EQUIPMENT

4-3-1 LIGHTING AND APPLIANCE PANELBOARDS

- PANELBOARDS: SQUARE D TYPE NQDD (FOR 240/208V SERVICE) OR NF (FOR 480V SERVICE) OR APPROVED EQUAL BY SIEMENS, CUTLER HAMMER, OR GENERAL ELECTRIC, AS SCHEDULED ON THE DRAWINGS; COMPLETE WITH BOLT-ON THERMAL MAGNETIC, MOLDED CASE CIRCUIT BREAKERS ASSEMBLED IN A DEAD-FRONT FINISHED CABINET CONTAINING A TYPEDWRITTEN CARD DIRECTORY INDICATING EXACTLY WHAT EACH CIRCUIT BREAKER CONTROLS; FULLY-RATED OR SERIES-RATED AND WITH THE INTEGRATED SHORT CIRCUIT CURRENT RATINGS INDICATED ON THE DRAWINGS. PLUG-IN TYPE BREAKERS WILL NOT BE ACCEPTABLE. ALL TWO AND THREE POLE BREAKERS: COMMON TRIP TYPE. BREAKERS USED AS SWITCHES FOR 120V OR 277V LIGHTING CIRCUITS: APPROVED FOR THE PURPOSE AND MARKED "SWD". BREAKERS USED FOR THE PROTECTION OF HVAC AND REFRIGERATION EQUIPMENT: HACR TYPE. PANELBOARDS SHALL HAVE DOOR-IN-DOOR COVERS, TIN PLATED COPPER BUSES, AND FEED THRU LUGS.

4-3-2 CIRCUIT BREAKERS IN EXISTING PANELBOARDS

- PROVIDE NEW CIRCUIT BREAKERS, FOR INSTALLATION IN EXISTING PANELBOARDS OF THE SAME MANUFACTURER, TYPE AND SHORT CIRCUIT CURRENT INTERRUPTING RATINGS AS THE EXISTING PANELBOARD CIRCUIT BREAKERS.

4-3-3 SERIES RATINGS ON PANELBOARDS

- LABEL PANELBOARDS WITH A INTEGRATED SHORT CIRCUIT CURRENT RATING, WHEN SERIES RATINGS ARE APPLIED WITH INTEGRAL OR REMOTE UPSTREAM DEVICES, PROVIDE LABELS COMPLYING WITH NFPA 70 ARTICLES 240.86 AND 110.22. IN ADDITION TO THE WARNING LABEL, INCLUDE, AT A MINIMUM, THE FOLLOWING CONDITIONS OF THE UL 67 SERIES RATINGS:
 - SIZE AND TYPE OF UPSTREAM DEVICE.
 - BRANCH DEVICES THAT CAN BE USED.
 - UL SERIES SHORT CIRCUIT CURRENT RATING.
 - WHEN THERE IS NOT ENOUGH ROOM IN THE EQUIPMENT TO SHOW ALL THE LEGITIMATE SERIES RATED COMBINATIONS, REFERENCE A BULLETIN SUPPLIED WITH THE PANELBOARD, PER UL 67.
 - SERIES RATINGS SHALL COVER ALL TRIP RATINGS OF INSTALLED FRAMES.

4-3-4 DISCONNECT (SAFETY) SWITCHES

- DISCONNECT (SAFETY) SWITCHES: SQUARE D, SIEMENS, CUTLER HAMMER, OR GENERAL ELECTRIC FUSED OR NON-FUSED (AS INDICATED ON DRAWINGS OR REQUIRED) NEMA KS1, HEAVY DUTY, EXTERNALLY OPERATED, VISIBLE-BLADE SAFETY SWITCHES; NEMA ENCLOSURE TYPE INDICATED ON THE DRAWINGS OR SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED. BASED ON FUSIBLE SWITCH AND FUSE SIZES INDICATED, INCLUDE CLASS R, J, OR L FUSE PROVISIONS AS APPLICABLE.
- WHERE INDICATED, PROVIDE FUSIBLE SWITCHES PERMANENTLY LABELED AS SUITABLE FOR USE AS SERVICE ENTRANCE EQUIPMENT, WITH INTEGRAL AND SEPARATE NEUTRAL AND GROUND ASSEMBLIES, SUITABLE FOR THE SIZES OF CONDUCTORS INDICATED. DO NOT DOUBLE-LUG ANY TERMINATIONS NOT SPECIFICALLY LISTED AS SUITABLE FOR MORE THAN ONE CONDUCTOR.
- PROVIDE SWITCHES WHERE NOT FURNISHED WITH THE STARTING EQUIPMENT, AT ALL OTHER POINTS REQUIRED BY NFPA 70, AND WHERE INDICATED ON THE DRAWINGS.

4-3-5 FUSES

- PROVIDE EACH CIRCUIT AND SET OF FUSE CLIPS THROUGHOUT THE WORK WITH BUSSMANN, FERRAZ SHAWMUT, OR LITTLEFUSE FUSES, SIZES AND TYPES AS REQUIRED OR INDICATED. ALL FUSES LARGER THAN 600A: UL CLASS L, SIMILAR TO TYPE KR-C BUSSMANN LOW PEAK OR EQUAL. FUSES USED TO PROTECT MOTORS: UL CLASS RK5, BUSSMANN FUSETRON OR EQUAL. FUSES USED TO PROTECT ALL OTHER ELECTRICAL EQUIPMENT: UL CLASS RK1, DUAL ELEMENT, BUSSMAN LPS/LPN OR EQUAL. ALL FUSED DEVICES SHALL BE LABELED AS TO TYPE AND SIZE OF FUSE REQUIRED.

4-3-6 DRY-TYPE TRANSFORMERS

- TRANSFORMERS: GENERAL PURPOSE, UL-LISTED/LABELED 150 DEGREES C TEMPERATURE RISE ABOVE 40 DEGREES C AMBIENT. INSULATING MATERIALS: EXCEED NEMA ST-020 STANDARDS, RATED FOR 220 DEGREES C, UL-COMPONENT RECOGNIZED INSULATION SYSTEM. PHASES, VOLTAGES, AND SIZES: AS INDICATED ON THE DRAWINGS. SOUND LEVEL: NOT EXCEEDING NEMA STANDARDS FOR THE SIZES INDICATED. FULL-CAPACITY PRIMARY TAPS: BELOW 25 KVA - MINIMUM OF TWO 5 PERCENT (2-); 25 KVA TO 300 KVA - MINIMUM OF SIX 2.5 PERCENT (2+, 4-); ABOVE 300 KVA - FOUR 2.5 PERCENT (2+, 2-). TRANSFORMER CORE AND COIL ASSEMBLIES: MOUNTED ON INTEGRAL VIBRATION-ABSORBING PADS. MAKE FINAL CONDUIT CONNECTIONS TO TRANSFORMERS WITH FLEXIBLE CONDUIT, WITH AT LEAST 6 INCHES OF SLACK IN ALL DIRECTIONS. TRANSFORMER ENCLOSURES: FULLY ENCLOSED (EXCEPT FOR VENTILATION OPENINGS), NEMA 2, DRIP-PROOF, FABRICATED OF HEAVY GAUGE SHEET STEEL. CONSTRUCTION WINDING SHALL BE MADE OF COPPER.
- ENERGY-EFFICIENT TRANSFORMERS: COMPLYING WITH NEMA TP-1, WHEN TESTED IN ACCORDANCE WITH NEMA TP-2. PROVIDE ENERGY-EFFICIENT TRANSFORMERS WHEN REQUIRED BY LOCAL CODE.
- MANUFACTURERS: SQUARE D, GENERAL ELECTRIC, ACME, SIEMENS.

4-4 LIGHT FIXTURES, LAMPS AND BALLASTS

4-4-1 LIGHT FIXTURE LOCATIONS

- LIGHT FIXTURES SHOWN ON THE ELECTRICAL DRAWINGS REPRESENT GENERAL ARRANGEMENTS ONLY. REFER TO ARCHITECTURAL DRAWINGS FOR MORE EXACT LOCATIONS. COORDINATE LOCATION WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS. COORDINATE LIGHT FIXTURE LOCATIONS IN MECHANICAL ROOMS WITH FINAL INSTALLED PIPING AND DUCTWORK LAYOUTS.

- WHERE WIRING IS INDICATED AS INSTALLED, BUT THE CONNECTION IS INDICATED "FUTURE" OR "BY OTHER DIVISION, TRADES, OR CONTRACTS", LEAVE A MINIMUM 3-FOOT "PIGTAIL" AT THE BOX, TAPE THE ENDS OF THE CONDUCTORS, AND COVER THE BOX. THE NUMBER OF CONDUCTORS IN A SPECIFIC RACEWAY "HOME RUN" IS INDICATED WITH CROSS LINES (TICK MARKS) ON EACH "CIRCUIT RUN" ON THE DRAWINGS. IN GENERAL, THE DIRECTION OF BRANCH CIRCUIT "HOME RUN" ROUTING IS INDICATED ON THE DRAWINGS, COMPLETE WITH CIRCUIT NUMBERS AND PANELBOARD DESIGNATION. CONTINUE ALL SUCH "HOME RUN" WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH "CIRCUIT RUNS" WERE INDICATED IN THEIR ENTIRETY.
- WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS FOUR (CONDUCTOR COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS), THE FOLLOWING RESTRICTIONS APPLY, WHICH ARE IN ADDITION TO THOSE IN NFPA 70:
 - EMERGENCY LIGHTS: POINTS COVERED UNDER ARTICLES 700, 701 AND 702.
 - MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY. FOR UP TO EIGHT CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE: 3/4-INCH. FOR GREATER THAN EIGHT CONDUCTORS, MINIMUM RACEWAY SIZE: 1- INCH. DO NOT INSTALL ANY OTHER TYPE OF CIRCUIT IN THIS RACEWAY.
 - THE MINIMUM WIRE SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10 AWG.
 - ONLY 15A AND 20A BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.
 - GFCl CIRCUITS:
 - DO NOT USE MULTI-CONDUCTOR CIRCUITS, WITH A SHARED NEUTRAL, FOR ANY GFCl CIRCUIT BREAKER OR RECEPTACLE CIRCUIT.
- FOR BRANCH CIRCUITS FED FROM GFCl CIRCUIT BREAKERS, LIMIT THE ONE-WAY CONDUCTOR LENGTH TO 100 FEET BETWEEN THE PANELBOARD AND THE MOST REMOTE RECEPTACLE OR LOAD ON THE GFCl CIRCUIT.
- WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW. IN LARGER SIZES, WHERE PROPERLY COLORED INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUCTOR AT ALL TERMINATION POINTS, JUNCTION AND PULL BOXES. REFERENCE TABLE 1 FOR SYSTEM VOLTAGE

TABLE 1 (4-1-5-9)

SYSTEM VOLTAGE	CONDUCTOR TYPE	COLOR	
120/240	PHASE A	BLACK	
	PHASE B	RED	
	NEUTRAL	WHITE	
	EQUIPMENT GROUND	GREEN	
240A/120	PHASE A (HIGH LEG)	BLACK	
	PHASE B	ORANGE	
	PHASE C	RED	
	NEUTRAL	WHITE	
240A/120	EQUIPMENT GROUND	GREEN	
	ISOLATED GROUND	GN W/YELLOW STRIPE	
	208Y/120	PHASE A	BLACK
		PHASE B	RED
PHASE C		BLUE	
NEUTRAL		WHITE	
208Y/120	EQUIPMENT GROUND	GREEN	
	ISOLATED GROUND	GN W/YELLOW STRIPE	
	480Y/2770	PHASE A	BROWN
		PHASE B	ORANGE
PHASE C		YELLOW	
NEUTRAL		GRAY	
480Y/2770	EQUIPMENT GROUND	GREEN	

- PROPERLY IDENTIFY ALL TERMINAL BLOCKS AND WIRE TERMINALS FOR CONTROL WIRING WITH VINYL STICK-ON MARKERS OR EQUIVALENT. PROVIDE ENGINEER WITH A LIST OF PROPOSED IDENTIFYING NUMBERS FOR REVIEW PRIOR TO INSTALLING MARKERS.
- PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL BRANCH CIRCUITS AND FEEDERS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.
- VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 2 PERCENT.

4-1-6 JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS

- PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN LARGER THAN OR EQUAL TO THE CIRCUIT RUNS TO BE INSTALLED. INSTALL ENGRAVED NAMEPLATES ON ALL 3-BOXES, PULL BOXES, CABINETS AND WIREWAYS THAT PROVIDE NAME OF CIRCUITS EITHER TERMINATED, SPLICED, OR PASSING THRU AND THE NAME OF THE PANELBOARD THE CIRCUITS ORIGINATE.

4-1-7 OUTLET BOXES

- ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: NATIONAL ELECTRICAL, APPLETON, STEEL CITY, RACO, OR APPROVED EQUAL, GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES IN WALLS, COLUMNS, FLOORS, OR CEILINGS SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES, WITH HUBS AND WEATHERPROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WEAT, OR HARSH CONDITIONS.
- EACH OUTLET AND/OR FIXTURE SHALL BE PROVIDED WITH 4 INCH SQUARE DEEP OUTLET BOX WITH APPROPRIATE COVER AND WIRING TO SUIT FIELD CONDITIONS.
- ELECTRICAL MATERIALS USED ON THIS PROJECT SHALL BE UL LISTED AND LABEL.

4-1-8 OUTLET LOCATIONS

- COORDINATE LOCATIONS OF OUTLET BOXES. OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ARCHITECT.

4-1-9 MOUNTING HEIGHTS

- UNLESS OTHERWISE NOTED, INSTALL WIRING DEVICES AS INDICATED BELOW (NOTE: ALL DIMENSIONS ARE TO THE BOTTOM OF THE OUTLET BOX UNLESS OTHERWISE NOTED):
 - GENERAL:
 - VERTICALLY WITH THE GROUND SLOT MOUNTED AT THE TOP: 16 INCHES ABOVE FINISHED FLOOR
 - HORIZONTALLY, WITH NEUTRAL SLOT MOUNTED AT THE TOP: 16 INCHES ABOVE FINISHED FLOOR
 - ABOVE COUNTERS:
 - FOR 36-INCH HIGH COUNTER TOPS: 44 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
 - FOR 34-INCH HIGH COUNTER TOPS: 40 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
 - CONCRETE BLOCK WALLS: 40 INCHES ABOVE FINISHED FLOOR, OR CEILING, SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES, WITH HUBS AND WEATHERPROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WEAT, OR HARSH CONDITIONS.
 - WEATHERPROOF EXTERIOR RECEPTACLES: 24 INCHES ABOVE FINISHED GRADE OR ROOF, OR AS INDICATED ON DRAWINGS, VERTICALLY.
 - GFCl RECEPTACLES: SAME AS GENERAL RECEPTACLES.
 - ISOLATED GROUND RECEPTACLES: SAME AS GENERAL.
 - CONCRETE BLOCK WALLS: DIMENSIONS ABOVE MAY BE ADJUSTED SLIGHTLY, AS REQUIRED TO COMPENSATE FOR VARIABLE JOINT DIMENSIONS, SUCH THAT BOTTOM OR TOP OF BOXES, AS APPLICABLE, ARE AT BLOCK JOINTS.
 - GENERAL: 44 INCHES ABOVE FINISHED FLOOR.
 - ABOVE COUNTERS: SAME AS FOR RECEPTACLES.
 - CONCRETE BLOCK WALLS: 40 INCHES ABOVE FINISHED FLOOR (DIMENSION MAY BE ADJUSTED SLIGHTLY, AS REQUIRED TO COMPENSATE FOR VARIABLE.
 - JOINT DIMENSIONS, SUCH THAT BOTTOM OF BOXES ARE AT BLOCK JOINTS.
 - WALLS WITH WAINSCOTTING: 6 INCHES MINIMUM ABOVE WAINSCOTTING, BUT NOT EXCEEDING 48 INCHES ABOVE FINISHED FLOOR.
 - MULTI-OUTLET ASSEMBLIES:
 - 48 INCHES ABOVE FINISHED FLOOR, AS INDICATED ON THE DRAWINGS, OR 6 INCHES ABOVE COUNTER TOP.
 - TELEPHONE/DATA OUTLET BOXES:
 - GENERAL: MATCH MOUNTING HEIGHT OF ADJACENT WIRING DEVICE LISTED ABOVE.
 - FOR OTHER WIRING DEVICES, REFER TO PARAGRAPHS, ARTICLES, SECTIONS, DIVISIONS OR DRAWINGS TO OBTAIN MOUNTING HEIGHTS FOR SPECIFIC EQUIPMENT OR SYSTEMS.

4-1-10 WIRING DEVICES

PROVIDE THE FOLLOWING WIRING DEVICES WHERE SHOWN ON DRAWINGS OR REQUIRED. MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH STRUCTURAL AND BUILDING REQUIREMENTS AS DETERMINED IN THE COURSE OF CONSTRUCTION. PROVIDE ALL WIRING DEVICES OF THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT, TO THE MAXIMUM EXTENT POSSIBLE. PROVIDE COLOR OF TOGGLES AND RECEPTACLES AS REQUESTED BY THE ARCHITECT: REFER TO TABLE 2 SHOWING RECEPTACLES TABLE.

PART 4 BASIC ELECTRICAL MATERIALS AND METHODS

4-1 METHODS

4-1-1 RACEWAYS

- METALLIC CONDUIT AND TUBING:
 - ELECTRICAL METALLIC TUBING AND FITTINGS (EMT): ANSI C80.3, UL 797.
 - FLEXIBLE METAL CONDUIT (FMC): ZINC-COATED STEEL OR ALUMINUM, UL 1.
 - INTERMEDIATE METAL CONDUIT (IMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT: ANSI C80.6, UL 1242.
 - LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET: UL 360.
 - RIGID METAL CONDUIT (RMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS): ANSI C80.1, UL 6.
 - RIGID ALUMINUM CONDUIT (RACO): ANSI C80.5, UL 6A.
 - PLASTIC COATED IMC, RMC, AND FITTINGS: NEMA RN 1, UL LISTED.
 - IMC AND RMC FITTINGS: NEMA FB 1; COMPATIBLE WITH CONDUIT TYPE AND MATERIAL, UL LISTED
- NON-METALIC CONDUIT AND TUBING:
 - RIGID NONMETALLIC CONDUIT (RNC): SCHEDULE 40 PVC, 90 DEG C RATED, NEMA TC-2, UL 651; FITTINGS: NEMA TC 3, TC 6; UL 514, COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, UL LISTED.

4-1-2 RACEWAY INSTALLATION

- INSTALL ALL RACEWAYS A MINIMUM OF 12" ABOVE SUSPENDED CEILINGS, CONCEALED IN WALLS OR FLOORS EXCEPT WHERE OTHERWISE INDICATED. FOR AREAS WHERE CONDUITS MUST BE ROUTED CLOSER THAN 12", WRITTEN APPROVAL FROM THE ENGINEER OF RECORD MUST BE OBTAINED.
- PROVIDE RGSC FOR ALL CONDUITS RUN UNDERGROUND, EXPOSED TO WEATHER, OR EXPOSED TO OTHER HAZARDOUS CONDITIONS. PROVIDE RGSC INSTALLED BELOW GRADE WITH A CORROSION RESISTANT BONDED- PLASTIC OR APPROVED MASTIC COATING. THIS SHALL INCLUDE THE 90-DEGREE ELBOW BELOW GRADE AND THE ENTIRE VERTICAL TRANSITION TO ABOVE GRADE.
- ALL OTHER RACEWAY MAY BE EMT WHERE APPROVED BY LOCAL CODE. USE COMPRESSION TYPE FITTINGS FOR EMT, WITH ALL FITTINGS UL LISTED FOR THE ENVIRONMENT IN WHICH THEY ARE USED.
- AT CONTRACTOR'S OPTION, PVC CONDUIT MAY BE USED UNDERGROUND WHERE PERMITTED BY LOCAL CODE AND WHERE NOT SPECIFICALLY RESTRICTED BY THESE DOCUMENTS. WHEN USED, PROVIDE COATED GRs, AS SPECIFIED ABOVE, FOR ALL BENDS GREATER THAN 30 DEGREES, INCLUDING THE 90-DEGREE ELBOWS BELOW GRADE AND THE ENTIRE VERTICAL RISERS FOR TRANSITIONS FROM BELOW TO ABOVE GRADE OR ABOVE- SLAB.
- USE FMC FOR FINAL CONNECTION TO EACH MOTOR AND TRANSFORMER, AND TO ANY DEVICE THAT WOULD OTHERWISE TRANSMIT MOTION, VIBRATION, OR NOISE. WHERE EXPOSED TO LIQUIDS, VAPORS OR SUNLIGHT, USE LFMC. PROVIDE ALL FMC AND LFMC WITH AN INSULATED BONDING CONDUCTOR.
- USE ONLY METAL RACEWAYS FOR ALL POWER WIRING FROM THE OUTPUT OF VARIABLE FREQUENCY DRIVES TO THEIR RESPECTIVE MOTORS.
- INSTALL RACEWAYS PARALLEL AND PERPENDICULAR TO BUILDING LINES.
- INSTALL RACEWAYS TO REQUIREMENTS OF STRUCTURE AND TO REQUIREMENTS OF ALL OTHER WORK ON THE PROJECT. INSTALL RACEWAY TO CLEAR ALL OPENINGS, DEPRESSIONS, PIPES, DUCTS, REINFORCING STEEL, AND OTHER IMMOVABLE OBSTACLES. INSTALL RACEWAYS SET IN FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE. EXCEPT WHERE APPROVED IN WRITING BY THE ENGINEER, INSTALL NO RACEWAY IN A SLAB-ON-GRADE. LOCATE RACEWAY IN GRANULAR FILL BELOW SLABS-ON-GRADE.
- INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45-DEGREE AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH AND EVEN AND WITHOUT FLATTENING RACEWAY OR FLAKING GALVANIZING OR ENAMEL. RADIUS OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW. USE LONG RADIUS ELBOWS WHERE NECESSARY, INDICATED, OR BOTH.
- SECURELY FASTEN RACEWAYS IN PLACE WITH APPROVED STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. ATTACH RACEWAY SUPPORTS TO THE BUILDING STRUCTURE. SUPPORT RACEWAYS FOR FEEDERS WITH TRAPEZE SUPPORTS MADE OF ALL THREAD ROD AND UNISTRUT. SPACED NOT OVER 10 FEET APART. SECURELY CLAMP VERTICAL FEEDER RACEWAYS TO STRUCTURAL STEEL MEMBERS ATTACHED TO STRUCTURE. INSTALL CABLE CLAMPS FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. ADD RACEWAY SUPPORTS WITHIN 12 INCHES OF ALL BENDS, ON BOTH SIDES OF THE BENDS. DO NOT SUPPORT RACEWAYS FROM SUSPENDED CEILING DEVICES.
- SEAL RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLING CONDUCTORS WIRES. PROVIDE RACEWAYS OF AMPLE SIZE FOR PULLING OF WIRE AND NOT SMALLER THAN CODE REQUIREMENTS AND NOT LESS THAN 3/4-INCH IN SIZE, UNLESS OTHERWISE INDICATED ON DRAWINGS.
- EMT UP TO 2", IMC OR RIGID GALVANIZED STEEL GREATER THAN 2". ONLY STEEL COMPRESSION FITTINGS SHALL BE USED. SET SCREW FITTINGS ARE NOT ALLOWED UNDER ANY CIRCUMSTANCES. DO NOT RUN MORE THAN 6 CURRENT-CARRYING CONDUCTORS IN ANY ONE CONDUIT, UNLESS OTHERWISE NOTED. ALL CONDUITS SHALL CONTAIN A SEPARATE EQUIPMENT GROUND WIRE.
- PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGHING-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.
- ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL EQUIPMENT AND JUNCTION BOXES.
- INSTALL APPROVED EXPANSION/DEFLECTION FITTINGS WHERE RACEWAYS PASS THROUGH (IF EMBEDDED) OR ACROSS (IF EXPOSED) EXPANSION JOINTS.
- INSTALL A PULL WIRE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF CONDUCTORS OR CABLES UNDER OTHER DIVISIONS OR CONTRACTS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 24 INCHES OF SLACK AT EACH END OF PULL WIRE. INSTALL A PULL WIRE IN ALL RACEWAYS 1" OR GREATER IN SIZE THAT HAVE ROOM FOR ADDITIONAL WIRE TO BE ADDED.
- EFFECTIVELY SEAL RACEWAYS, BY INSTALLING A CONDUIT FITTING AT THE BOUNDARY OF THE TWO SPACES, AND FILLING IT WITH AN APPROVED PLUMBABLE MATERIAL, AFTER CONDUCTORS OR CABLES HAVE BEEN INSTALLED AND TESTED, WHERE:
 - RACEWAYS PASS FROM NON-COOL TO NON-COOL.
 - RACEWAYS TRANSITION FROM OUTSIDE A FACILITY OR ENCLOSURE TO INSIDE, WHETHER BURIED OR EXPOSED.

4-1-3 BUSHINGS AND LOCKNUTS

- RIGIDLY TERMINATE CONDUITS ENTERING SHEET METAL ENCLOSURES TO THE ENCLOSURE WITH A PLASTIC BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT OR AN APPROVED HUB ON THE OUTSIDE. CONDUIT SHALL ENTER THE ENCLOSURE SQUARELY.
- PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS.
- WHERE EMT ENTERS A BOX, PROVIDE APPROVED EMT COMPRESSION CONNECTORS. SET SCREW CONNECTORS ARE NOT ALLOWED UNDER ANY CIRCUMSTANCES.
- USE INSULATED, GROUNDING, OR COMBINATION, BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION OR MOISTURE, WHEN REQUIRED BY NFPA 70, OR BOTH.
- INSTALL PLASTIC BUSHINGS ON ALL EXISTING CONDUITS CONNECTORS.

4-1-4 CONDUCTORS AND CABLES

- CONDUCTOR MATERIAL:
 - ANNEALED (SOFT) COPPER COMPLYING WITH ICEA 5-95-658/NEMA WC70; SOLID CONDUCTOR FOR NO. 10 AWG AND SMALLER; CONCENTRIC, COMPRESSED STRANDED FOR NO. 8 AWG AND LARGER.
 - CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED, TYPE THHN/THWN-2 OR XHHW-2 COMPLYING WITH ICEA 5-95-658/NEMA WC70.
 - SIZES OF CONDUCTORS AND CABLES INDICATED OR SPECIFIED ARE IN AMERICAN WIRE GAUGE (AWG - BROWN AND SHARPE).
 - UNLESS INDICATED OTHERWISE, SPECIAL PURPOSE CONDUCTORS AND CABLES, SUCH AS LOW VOLTAGE CONTROL AND SHIELDED INSTRUMENT WIRING, SHALL BE AS RECOMMENDED BY THE SYSTEM EQUIPMENT MANUFACTURER.
- ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 12 AWG AND LARGER: STRANDED, TYPE THHN-2 OR XHHW-2 INSULATION.
- ALL BRANCH CIRCUIT WIRING: NOT SMALLER THAN NO. 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE CONDUCTORS AND CONDUIT SIZED PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE (OCPD) RATING AND NUMBER OF POLES. WHERE NO CIRCUIT SIZE (I.E., CONDUCTORS AND OCPD) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO. 12 AWG CONDUCTORS, IN 3/4-INCH RACEWAY, AND A 20A CIRCUIT BREAKER.
- CONDUCTORS FIELD-INSTALLED WITHIN FLOOR SUPPORTS, OR WIRE-MESH SAFETY GRIPS: TYPE THHN.
- CONTROL WIRING: STRANDED COPPER CONDUCTORS, 600V INSULATION, OF THE PROPER TYPE, SIZE AND NUMBER AS REQUIRED TO ACCOMPLISH SPECIFIED FUNCTION. MINIMUM SIZE: NO. 14 AWG, UNLESS NOTED OTHERWISE.
- 4-1-5 INSTALLATION OF CONDUCTORS AND CABLES**
 - INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES, EXCEPT WHERE SPECIFIED OR INDICATED.
 - MC CABLE MAY BE INSTALLED FOR THIS PROJECT AS LONG AS ALL OF THE FOLLOWING INSTALLATION METHODS ARE ADHERED TO:
 - ALL MC CABLE ROUTED ABOVE CEILINGS ARE INSTALLED A MINIMUM OF 12" ABOVE THE CEILING.
 - MC CABLE MUST BE SUPPORTED PER THE NEC WITH SUPPORTS INDEPENDENT OF THE CEILING GRID OR CEILING TILES.
 - MAXIMUM SAG OF THE MC CABLE BETWEEN SUPPORTS IS 6".
 - NO MC CABLE MAY BE DIRECTLY CONNECTED TO ANY PANELBOARDS.
 - EACH WIRE IN AN MC CABLE THAT IS SPLICED INTO ANOTHER WIRE IN A JUNCTION BOX MUST BE LABELED WITH WIRE NUMBER MARKER TAPE THAT INDICATES THE CIRCUIT THE WIRES ARE CONNECTED TO.
 - SUPPORT ALL CONDUCTORS AND CABLES IN VERTICAL INSTALLATIONS, AS REQUIRED BY NFPA 70, BY INSTALLING CABLE SUPPORTS OR PLIG-TYPE CONDUIT RISER SUPPORTS, OR WIRE-MESH SAFETY GRIPS.
 - INSTALL ALL CONDUCTORS AND CABLE IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTORS, OR CRIMP CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED. INSULATE ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.
 - ALL MATERIALS USED TO TERMINATE, SPLICE OR TAP CONDUCTORS: DESIGNED FOR, PROPERLY SIZED FOR, AND UL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

4-4-2 LIGHT FIXTURES

- LIGHT FIXTURES FURNISHED BY OWNER WHERE INDICATED ON SCHEDULE. COMPLY WITH ALL NOTES AND SPECIFICATION AS INDICATED IN SCHEDULE. INSTALL AND PROVIDE AS NEEDED ALL LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL AND LABOR TO SECURELY HANG, CLEAN, AND MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE AND STYLE OF LIGHT FIXTURES REQUIRED. PROVIDE ALL HANGERS, SUPPORTS, AND MISCELLANEOUS HARDWARE REQUIRED TO INSTALL LIGHT FIXTURES; PROPER TRIM TO FIT EACH CEILING CONDITION ACTUALLY ENCOUNTERED; ADDITIONAL TIE WIRES CONNECTED TO STRUCTURE TO CONFORM TO SEISMIC REQUIREMENTS AND WHERE REQUIRED BY THE APPLICABLE BUILDING CODE.
- ONLY THOSE FIXTURES LISTED IN THE LIGHT FIXTURE SCHEDULE, OR APPROVED IN ACCORDANCE WITH SUBSTITUTIONS OF THESE SPECIFICATIONS, WILL BE ACCEPTED UNLESS FIXTURE IS SUPPLIED BY OWNER. WHERE THE LIGHT FIXTURE SCHEDULE INDICATES AN ALLOWANCE FOR A SPECIAL LIGHT FIXTURE, THE PRICE IS A CONTRACTOR PRICE. INCLUDE ALL ADDITIONAL COSTS FOR FREIGHT, LAMPS, AND INSTALLATION OF LIGHT FIXTURE AND LAMPS.
- SURFACE-MOUNT ALL FLUORESCENT LIGHT FIXTURES LOCATED IN AREAS WITHOUT SUSPENDED CEILINGS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- INSTALL FLUORESCENT LIGHT FIXTURES HUNG IN CONTINUOUS ROWS ON CHANNEL STRUTS SPECIFICALLY DESIGNED FOR THIS PURPOSE.
- INSTALL ALL FLUORESCENT LIGHT FIXTURES LOCATED IN AREAS WITHOUT CEILINGS IMMEDIATELY BELOW THE ROOF-FRAMING MEMBERS, OR SUSPENDED FROM CHAIN HANGERS SUITABLE IN LENGTH TO PROVIDE THE INDICATED MOUNTING HEIGHT. HANGERS: "HYDEE" HANGER TYPE FOR OUTLET BOX MOUNTING, COMPLETE WITH GROUNDING RECEPTACLE, PLUG, 3-WIRE CORD AND NECESSARY CHAIN.
- THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILINGS, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. THE WHIP SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE LIGHT FIXTURE TO BE RELOCATED WITHIN A 6-FOOT RADIUS.

4-4-3 LAMPS

- PROVIDE LAMPS AS INDICATED ON THE DRAWINGS FOR ALL LIGHT FIXTURES UNLESS PROVIDED BY OWNER. OR, IF NOT INDICATED, PROVIDE LAMPS AS RECOMMENDED BY THE LIGHT FIXTURE MANUFACTURER. IN ALL CASES, LAMPS SHALL BE COMPATIBLE WITH THE SPECIFIED LIGHT FIXTURE. ACCEPTABLE LAMP MANUFACTURERS: GENERAL ELECTRIC, OSRAM/SYLVANIA, PHILIPS, OR VENTURE.
- ALL FLUORESCENT LAMPS SHALL BE MINIMUM OF 3500 DEGREES K, WITH A MINIMUM COLOR-RENDERING INDEX OF 70, UNLESS NOTED OR DIRECTED OTHERWISE. ALL FLUORESCENT LAMPS IN SALES AREAS SHALL BE 3000 DEGREES K WITH A COLOR-RENDERING INDEX OF 80. ALL METAL HALIDE LAMPS IN SALES AREAS SHALL BE COATED, 3000 DEGREES K WITH A COLOR-RENDERING INDEX OF 70.
- INCANDESCENT LAMPS: TYPE AND WATTAGE AS SHOWN ON THE DRAWINGS; RATED 130V UNLESS OTHERWISE SCHEDULED OR SPECIFIED.

4-5 MISCELLANEOUS ELECTRICAL

4-5-1 TELEPHONE SYSTEM PROVISIONS

- PROVIDE INCOMING TELEPHONE SERVICE RACEWAYS AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING TELEPHONE COMPANY. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE RETARDANT TREATED AND STAMPED FRP, SECURELY ANCHORED TO THE WALL, AT THE LOCATION AND OF THE SIZE AS INDICATED ON THE DRAWINGS. PROVIDE FLUSH MOUNTED TELEPHONE OUTLET BOXES WITH 1-INCH EMT STUB-UP CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS.

4-5-2 DATA SYSTEM PROVISIONS

- PROVIDE FLUSH MOUNTED DATA OUTLET BOXES WITH 1-INCH CONDUIT STUB-UP CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS. INSTALL A PULL STRING IN THE CONDUIT.

4-5-3 TIME SWITCHES

- TIME SWITCHES: MECHANICAL TYPE, WITH MANUAL BYPASS SWITCH, NEMA ENCLOSURE SUITABLE FOR THE ENVIRONMENT INSTALLED; NUMBER AND TYPES OF CONTACTS, SEQUENCE, AND VOLTAGE AS INDICATED ON THE DRAWINGS, OR AS REQUIRED, BASED ON THE TIME SWITCH FUNCTION AND THE NUMBER OF BRANCH CIRCUITS OR CONTRACTORS CONTROLLED. PROVIDE WIRING TO PHOTOCELLS, CONTRACTORS, RELAYS OR OTHER CONTROL POINTS AS REQUIRED. MANUFACTURERS: INTERMATIC, PARAGON OR TORK.

4-5-4 MISCELLANEOUS EQUIPMENT AND CONNECTIONS

- PROVIDE WIRING AND CONNECTIONS TO ILLUMINATED CASES.
- ALL WIRING AND CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS.
- ALL RACEWAYS, AND ALL WIRING AND CONNECTIONS OF DEVICES TO ENERGY MANAGEMENT SYSTEM THAT ARE NOT THE RESPONSIBILITY OF DIVISION 15.

4-5-5 SEISMIC PROTECTION

- SEISMIC PROTECTION OF LIGHT FIXTURES, AND RACEWAYS, PANELBOARDS AND SWITCHGEAR SHALL MEET REQUIREMENTS OF LOCAL CODE IN EFFECT.

4-5-6 FIRE ALARM AND DETECTION SYSTEM

- WORK INCLUDED IN THIS SECTION:
 - THIS IS A PERFORMANCE-BASED SPECIFICATION. QUANTITY & LOCATION OF DEVICES SHOWN ON THE DRAWINGS ARE MINIMUMS. PROVIDE ADDITIONAL DEVICES AS REQUIRED TO PROVIDE A COMPLETE WORKING SYSTEM PER MANUFACTURER'S RECOMMENDATIONS AND NFPA APPROVED METHODS.
 - PROVIDE THE FIRE ALARM AND DETECTION SYSTEMS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN. SYSTEM SHALL BE WIRED, CONNECTED, VERIFIED AND LEFT IN FIRST CLASS OPERATING CONDITION.
 - FIRE ALARM SYSTEM CONTROL WIRING AND CONDUIT FROM ALL FANS, AHUS DAMPERS AND OTHER MECHANICAL EQUIPMENT SHALL BE JURISDICTION OF THE CONTRACTOR. CONTRACTOR SHALL PROVIDE CORRECT QUANTITY OF DETECTORS IN THIS FIRE ALARM SYSTEM CONTROL WIRING SYSTEM SHALL BE COMPLETELY INDEPENDENT OF THE MECHANICAL CONTROL WIRING SYSTEM.
 - ALL NECESSARY FIRE ALARM SYSTEM WIRING DIAGRAMS AND CONTROL DIAGRAMS REQUIRED BY FIRE ALARM SUBCONTRACTOR SHALL BE SUPPLIED TO GENERAL CONTRACTOR FROM AUTOMATIC TEMPERATURE CONTROLS (ATC) SUBCONTRACTOR. FINAL FIRE ALARM SYSTEM CONTROL WIRING DIAGRAMS SHALL BE PROVIDED TO ATC SUBCONTRACTOR FROM FIRE ALARM SUBCONTRACTOR FOR ATC REVIEW AND COMMENT PRIOR TO INSTALLATION.
 - TWENTY-FOUR HOUR BATTERY BACK-UP SYSTEM WITH CHARGER. SYSTEM SHALL BE ABLE TO OPERATE FOR 24-HOURS IN NORMAL MODE AND 15 MINUTES IN ALARM MODE OR AS PER NFPA 72 REQUIREMENTS. SUBMIT BATTERY SIZE CALCULATIONS FOR ENGINEERS REVIEW AND APPROVAL. ALL COMPONENTS SHALL BE MOUNTED IN LOCKED CABINET SIMILAR IN APPEARANCE, CONSTRUCTION AND COLOR TO THE FIRE ALARM CONTROL PANEL (FACP).
 - ALL CONDUIT AND WIRE (CONTROL WIRE) FOR A COMPLETE AND OPERATIONAL SYSTEM SHALL BE PROVIDED AND SHALL INCLUDE BOTH "LINE (120 & 277V.) AND "LOW VOLTAGE WIRING. THESE CONDUITS AND ASSOCIATED J-BOXES SHALL BE PAINTED RED IN COLOR.
 - LABEL ALL INITIATING DEVICES WITH A ZONE NUMBER OR ADDRESS. LABEL EACH DEVICE THAT HAS AN END OF LINE RESISTOR AS FOLLOWS: "EOLR".
 - THE DESIGN SHALL CONFORM TO NFPA 72 AND LOCAL FIRE MARSHALL REQUIREMENTS.
 - ALL FIRE ALARM CABLES SHALL BE RED IN COLOR, PLENUM RATED, AND SUPPORTED BY THEIR OWN SUPPORT SYSTEM. ALL FIRE ALARM CABLES SHALL BE ROUTED HORIZONTALLY A MAXIMUM OF 6" BELOW THE STRUCTURE. FIRE ALARM CABLES MAY ONLY BE ROUTED VERTICAL AT 90° ANGLES.
 - WHERE FIRE ALARM CABLES ENTER A METAL BOX, THESE CABLES SHALL ENTER THE METAL BOX THRU EITHER A METALLIC CHASE NIPPLE WITH A PLASTIC BUSHING ON THE END OF THE CHASE NIPPLE INSIDE THE METAL BOX OR THRU A ROMEX CONNECTOR WITH A PLASTIC BUSHING ON THE END OF THE ROMEX CONNECTOR INSIDE THE METAL BOX.
 - ALL METAL BOXES THAT HOUSE ANY FIRE ALARM CABLE CONNECTORS SHALL BE PAINTED RED IN COLOR WITH AN ENGRAVED NAMEPLATE MOUNTED ON EITHER COVER OR THE SIDE OF THE BOX THAT STATES THE FOLLOWING: "FIRE J-BOX".
- SUBMITTALS
 - MANUFACTURER'S LITERATURE AND ILLUSTRATIONS INCLUDING CUT SHEETS OF ALL ALARM DETECTION DEVICES (I.E., IONIZATION DETECTORS, PULL STATIONS, FLOWSWITCHES, ETC) AND ALARM SIGNALING DEVICES (I.E., HORNS, LIGHTS, ETC).
 - A DESCRIPTION OF THE SYSTEM OPERATION WHICH INCLUDES THE METHOD OF OPERATION AND SUPERVISION OF EACH TYPE OF CIRCUIT (ALARM INITIATION, SIGNALING, CONTROL ANNUNCIATION, ETC.), OPERATION OF MANUAL CONTROLS, AND SEQUENCE OF AUTOMATIC AND MANUAL OPERATION. THE SYSTEM DESCRIPTION SHALL BE WRITTEN SPECIFICALLY FOR THIS PROJECT. THE MANUFACTURER'S STANDARD DESCRIPTIONS WHICH REFER ONLY TO GENERAL OPERATION ARE NOT ACCEPTABLE.
 - WIRING DIAGRAMS WHICH SHOW THE METHOD OF WIRING FOR EACH TYPE OF CIRCUIT FOR EACH FUNCTION PERFORMED. THESE SHALL INCLUDE THE FOLLOWING:
 - EACH TYPE OF ALARM INITIATION CIRCUIT.
 - EACH TYPE OF ALARM SIGNALING CIRCUIT.
 - ANNUNCIATION METHODS.
 - CONTROL METHODS (SEPARATE DIAGRAMS SHALL BE PROVIDED FOR EACH TYPE OF DEVICE CONTROLLED).EACH WIRING DIAGRAM SHALL INDICATE:
 - METHOD OF FUSING AND LOCATION OF FUSES ON THE CIRCUIT.
 - RECOMMENDED WIRING TYPE AND SIZE, METHOD OF GROUND OR SHIELDING IF USED, AND SIZE OF CONDUIT.
 - TERMINAL IDENTIFICATION AT CONTROL PANEL AND REMOTE DEVICES.
 - END OF LINE DEVICE, TYPE, RATING AND LOCATION.
 - THE FOLLOWING DATA SHALL BE SUPPLIED TO VERIFY COMPLIANCE WITH ALARM SYSTEM AMPLIFICATION AND SOUND LEVEL REQUIREMENTS.
 - LIST OF EACH HORN CIRCUIT, WITH AREA SERVED, NUMBER OF SPEAKER CONNECTED, SPEAKER TAP USED, ANTICIPATED SOUND LEVEL AT 10' AT TAP USED, AND AT NEXT AND AT NEXT HIGHER TAP.
 - LIST OF EACH AMPLIFIER WITH RATED OUTPUT (INTERMITTENT AND CONTINUOUS OUTPUT SHALL BE INDICATED IF THEY ARE DIFFERENT), LIST OF SPEAKER CIRCUITS CONNECTED TO EACH AMPLIFIER.
 - NUMBER OF STANDBY AMPLIFIERS PROVIDED.
 - PROVIDE TOTAL SYSTEM OPERATING AND SUPERVISORY POWER REQUIREMENTS INCLUDING BATTERY SIZE CALCULATIONS.
 - PROVIDE A FIRE ALARM ONE-LINE (RISER) DIAGRAM FOR BOTH THE FLOOR WHERE THE WORK IS OCCURRING AND THE ENTIRE BUILDING IN THE SUBMITTAL PACKAGE.
 - ALL SUBMITTALS SHALL BE RECEIVED BY THE ENGINEER OF RECORD BEFORE THEY ARE SUBMITTED TO THE FIRE MARSHALL.
 - ALL SUBMITTALS MUST CONFORM TO THESE SPECIFICATIONS AND LOCAL FIRE MARSHALL REQUIREMENTS FOR SUBMITTALS TO THE ENGINEER OF RECORD.
 - ALL PLANS, DRAWINGS, SKETCHES, OR OTHER DOCUMENTS THAT REQUIRE THE SIGNATURE OF A LICENSED FIRE PROTECTION ENGINEER SHALL BE SIGNED WHEN SUBMITTED TO THE ENGINEER OF RECORD. FAILURE TO SIGN THESE DOCUMENTS WILL CAUSE THE ENGINEER OF RECORD TO FILE A COMPLAINT WITH BOTH THE LOCAL AND STATE FIRE MARSHALLS.
 - PROVIDE (7) SETS OF SUBMITTALS IN A HARD COPY FORMAT. PROVIDE A SOFT COPY OF ALL DRAWINGS IN AN AUTOCAD 2005 FORMAT.

A. OPERATION AND MAINTENANCE MANUAL

- GENERAL:
 - PROVIDE THAT PORTION OF THE MANUAL AS REQUIRED TO FULLY DESCRIBE THE OPERATION AND MAINTENANCE OF THE FIRE ALARM AND DETECTION SYSTEMS.
 - THE MANUAL SHALL INCLUDE AT LEAST THE DATA AS GIVEN BY THE OUTLINE LISTED BELOW.
 - INSTALLATION INSTRUCTIONS:
 - INSTALLATION
 - ADJUSTMENT
 - CHECK-IN
 - OPERATION INSTRUCTIONS
 - START-UP
 - ROUTINE AND NORMAL INSTRUCTIONS
 - REGULATION AND CONTROL
- PRODUCTS:
 - ACCEPTABLE MANUFACTURERS SHALL MATCH BUILDING STANDARD
 - GENERAL:
 - THE COMPLETE INSTALLATION SHALL BE LISTED BY THE UNDERWRITERS LABORATORIES INC. AND BEAR THE U.L. LABEL. THE COMPLETE INSTALLATION SHALL CONFORM TO N.F.P.A. 72 AND 72E, THE LOCAL JURISDICTION HAVING AUTHORITY REQUIREMENTS FOR CENTRAL FIRE ALARM SYSTEMS, ADOPTED BUILDING CODE AND THE NATIONAL ELECTRICAL CODE.
 - THE EQUIPMENT FURNISHED UNDER THIS SECTION SHALL BE THE STANDARD PRODUCT OF ONE MANUFACTURER. EQUIPMENT DESCRIPTIONS ARE INTENDED TO INDICATE THE TYPE AND QUALITY OF DESIGN AND MATERIALS AS WELL AS THE OPERATING FEATURES DESIRED.
 - PROVIDE FIRE ALARM TERMINAL CABINETS (FATC) AS REQUIRED FOR TERMINATING CIRCUITS AND HOUSING END-OF-LINE RESISTORS.
 - IF A MULTIPLEX FIRE-ALARM SYSTEM IS PROVIDED, THEN INTERFACE UNITS SHALL BE LOCATED IN OR NEXT TO TERMINAL BOXES. RESPONSE TIME FOR MULTIPLEX CIRCUITS SHALL NOT EXCEED 6 SECONDS. FAILURE OF INTERFACE UNITS SHALL CAUSE A DEFAULT CONDITION WHICH WILL NOT INHIBIT FIRE ALARMS.
 - EXACT LOCATION OF ALL ALARM AND DETECTION DEVICES SHALL BE COORDINATED WITH THE ARCHITECT PRIOR TO INSTALLATION.
 - FIRE ALARM CONTROL PANEL (FACP):
 - f.1. EXPAND EXISTING PANEL AS REQUIRED TO ACCOMMODATE NEW DEVICES
 - MANUAL STATIONS
 - g.1. MANUAL STATIONS SHALL MATCH EXISTING AND BE 2-POLE DOUBLE ACTION DEVICES AND CONSTRUCTED OF RUGGED, DIE-CAST MATERIAL DESIGNED FOR SEMI-FLUSH MOUNTING. STATIONS SHALL NOT BE OF THE BREAK-GLASS DESIGN. STATIONS MUST BE RESET WITH A SPECIAL TOOL. IT SHALL NOT BE POSSIBLE TO CLOSE A STATION WITHOUT FIRST RESETTING IT. PROVIDE SIX SPECIAL MANUAL-STATION RESETTING TOOLS. MANUAL STATIONS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS AND AS INDICATED ON THE DRAWINGS:
 - EACH ENTRY/EXIT TO THE BUILDING.
 - DUCT SMOKE DETECTOR SHALL MATCH EXISTING AND BE MOUNTED IN A HOUSING WHICH WILL WORK IN CONJUNCTION WITH AIR SAMPLING TUBES SUPPLIED TO DETECT PRODUCTS OF COMBUSTION IN THE DUCTS OF AIR HANDLING SYSTEM. THE HOUSING SHALL BE SUITABLE FOR MOUNTING DIRECTLY ON THE DUCT OR REMOTELY, AS INDICATED ON THE DRAWINGS, WHERE DIRECT MOUNTING IS NOT POSSIBLE. THE UNIT WILL BE INSTALLED UNDER THE MECHANICAL SECTION OF THESE THESE SPECIFICATIONS, BUT SUPPLIED UNDER THIS ELECTRICAL SECTION. THE DETECTORS SHALL BE SUITABLE FOR OPERATION FROM THE POWER SUPPLIED FROM THE FIRE ALARM CONTROL PANEL (FACP). THE DETECTOR SHALL INCLUDE A REMOTE TEST STATION WITH "POWER ON" LIGHT, AN ALARM LIGHT, AND A TEST-RESET SWITCH. REMOTE TEST STATION SHALL BE LOCATED IN CLOSEST MECHANICAL ROOM OR BACK OF HOUSE SPACE TO DETECTOR. COORDINATE LOCATION OF STATION WITH ARCHITECT. LABEL TEST STATION AS "DUCT DETECTOR" (INSERT FAN DESCRIPTION IN BLANK). THE DETECTOR SHALL MEET NFPA 90A REQUIREMENTS. THE DETECTOR'S SAMPLING TUBES SHALL SPAN THE ENTIRE WIDTH OF THE DUCT. EACH DETECTOR WILL BE REQUIRED TO HAVE TWO AUXILIARY POSITIVE-ACTION CONTACTS: ONE FOR DEVICE IDENTIFICATION AND ONE FOR SHUTTING DOWN THE ASSOCIATED SUPPLY AIR FAN. DETECTORS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA. NOTE SPECIFICALLY FIGURES A-9-4.8 (B) AND (C) - 1990 EDITION.
 - IONIZATION DETECTORS
 - i.1. AUTOMATIC IONIZATION DETECTORS SHALL MATCH EXISTING AND BE IN ACCORDANCE WITH NFPA 72E, U.L. LISTED FOR 900 SQUARE FEET AND OPERATE ON THE IONIZATION PRINCIPAL UTILIZING THE DUAL CHAMBER DESIGN, SHALL BE SELECTED BASED ON APPROPRIATE AIR VELOCITY REQUIREMENTS FOR EACH APPLICATION, AND SHALL BE ACTIVATED BY THE PRESENCE OF PRODUCTS OF COMBUSTION. AN INTEGRAL INDICATOR ON THE DEVICE SHALL PROVIDE VISUAL INDICATION OF THE INITIATION OF AN ALARM. THE BASE SHALL HAVE TERMINALS FOR MAKING ALL CONNECTIONS AND PROVISIONS FOR A REMOTE RELAY OUTPUT. REMOTE RELAYS SHALL BE FURNISHED AS REQUIRED FOR LOCAL AIR HANDLING UNIT AND FAN SHUTDOWN. POWER FOR DETECTOR OPERATION AND AUXILIARY DEVICES SHALL BE VIA A SEPARATE SUPERVISED PAIR OF WIRES. DETECTORS LOCATED IN AIR HANDLING UNIT PLENUM SPACES SHALL BE MOUNTED ON A CONDUIT BOX LOCATED DIRECTLY IN THE PATH OF AIR TO THE UNIT. ALL IONIZATION DETECTOR COVERS IN FINISHED AREAS SHALL BE WHITE. IONIZATION DETECTORS SHALL BE PROVIDED AS FOLLOWS:
 - VISUAL ALARMS
 - j.1. VISUAL ALARM INDICATING UNITS SHALL MATCH EXISTING AND BE DESIGNED FOR SIDE VIEWING WITH A TWENTY-FOUR HOUR BATTERY BACK-UP SYSTEM WITH CHARGER. SYSTEM SHALL BE MOUNTED IN METAL BOX LISTED AND SHALL PRODUCE A MINIMUM OF 100 CANDELA AND MEET ALL ADA REQUIREMENTS. VISUAL ALARMS SHALL BE PROVIDED IN THE FOLLOWING LOCATIONS AND AS INDICATED ON THE DRAWINGS:
 - EACH ENTRY/EXIT TO THE BUILDING.
 - EACH RESTROOM.
 - PUBLIC CORRIDORS (MAXIMUM 50' SPACING).
 - AS REQUIRED BY LOCAL CODE.
 - WHERE VISUAL ALARMS AND AUDIBLE DEVICES ARE SHOWN ON THE CONTRACT DRAWINGS IN CLOSE PROXIMITY, THEN COMBINATION AUDIBLE/VISUAL DEVICES MAY BE PROVIDED AT DISCRETION OF ARCHITECT.
 - PROVIDE UNITS TO MATCH EXISTING.
 - FIRE ALARM HORNS
 - k.1. ALARM SIGNAL HORNS SHALL BE UL LISTED WALL MOUNTED FLUSH TYPE REENRANT TYPE HORNS HOUSED IN DIE CAST ALUMINUM FRAMES AND GRILLES WITH FINISH AS SELECTED BY THE ARCHITECT. THEY SHALL BE CONSTRUCTED FOR SAFE USE IN BOILER ROOMS, KITCHENS, AND EXTERIOR LOCATIONS WITHOUT IMPAIRING THE QUALITY OF TONE OR VOICE REPRODUCTION IN CLIMATES RANGING FROM -300F TO 1500F. THE HORN DIAPHRAGM SHALL BE CONSTRUCTED OF STAINLESS STEEL OR A POLYAMIDE PHENOLIC MATERIAL. THE HOUSING SHALL CONTAIN A RAPIDLY FLARED, FOLDED, REENRANT TYPE HORN AND SHALL PROTECT THE HORN MECHANISM FROM MALICIOUS ATTACK. HORNS SHALL BE PROVIDED SUCH THAT A MINIMUM SOUND LEVEL OF 15 DBA OR 5 DBA ABOVE AMBIENT SOUND LEVELS IS MAINTAINED IN ALL PUBLIC AND BACK OF HOUSE AREAS. LOCATIONS SHALL INCLUDE BUT NOT BE LIMITED TO:
 - AT EACH MANUAL PULL STATION.
 - EACH ENTRY/EXIT.
 - PUBLIC CORRIDORS (MAXIMUM 50' SPACING).
 - AS INDICATED ON THE DRAWINGS.
 - SYSTEM SHALL BE PROVIDED WITH ALL NECESSARY ELECTRONICS, HARD CARDS, PANELS, AMPLIFIERS, ETC., WITH WIRING AND TERMINAL STRIPS AT EACH FLOOR'S/BUILDING FIRE ALARM TERMINAL CABINET (FATC) READY FOR CONNECTION OF DEVICES TO SUPPLY ONE HORN FOR EVERY 1000 SF OF FUTURE SPACE.
 - HORNS SHALL BE UL LISTED AS AN APPROVED AUDIO APPLIANCE FOR FIRE ALARM SIGNALING.
 - PROVIDE UNITS TO MATCH EXISTING.

B. EXECUTION

- FIRE ALARM WIRING
 - a.1. FURNISH AND INSTALL ALL WIRING, CONDUIT AND OUTLET BOXES REQUIRED FOR THE ERECTION OF A COMPLETE AND PROPERLY OPERATING SYSTEM IN ACCORDANCE WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES, THE MANUFACTURER'S RECOMMENDATIONS, THE PLANS AND SPECIFICATIONS.
 - a.2. ALL WIRING SHALL BE IN A COMPLETELY SEPARATE CONDUIT SYSTEM. WIRING SHALL BE PROVIDED AS FOLLOWS:
 - AUDIBLE ALARM CIRCUITS: TWISTED JACKETED #16 PAIRS.
 - OTHER WIRING: THHN, SIZE AS REQUIRED.

6. AUDIBLE ALARM CIRCUITING AND SYSTEM AMPLIFICATION REQUIREMENTS

- A MAXIMUM OF 10 CIRCUITS SHALL BE CONNECTED TO ANY AMPLIFIER.
- NO LIMITATION OF COMPONENT POWER SUPPLY OR OTHER CONSIDERATION SHALL CAUSE THE SOUND OUTPUT LEVEL TO DETERIORATE FROM THOSE SPECIFIED IN ANY MODE OF SYSTEM OPERATION.
 - ONE STANDBY AMPLIFIER SHALL BE PROVIDED FOR EVERY TEN (10) SYSTEM AMPLIFIERS.
- SYSTEM TESTS
 - THE MANUFACTURER'S AUTHORIZED TECHNICAL REPRESENTATIVE, THE ENGINEER OF RECORD SHALL BE PRESENT DURING ALL TESTS AND INSPECTIONS CONDUCTED BY THE FIRE MARSHAL'S OFFICE REPRESENTATIVE. THE REPRESENTATIVE SHALL PROVIDE SUPERVISION OF FINAL CONNECTIONS TO THE SYSTEM PANEL, PERFORM A COMPLETE FUNCTIONAL TEST OF THE SYSTEM AND SUBMIT A WRITTEN REPORT TO THE ENGINEER ATTESTING TO THE PROPER OPERATION OF THE COMPLETED SYSTEM. THE REPORT SHALL LIST MEASURED SOUND PRESSURE LEVELS OF 10% OF THE HORNS. MEASUREMENTS SHALL BE TAKEN BY THE MANUFACTURER'S TECHNICAL REPRESENTATIVE. A SOUND PRESSURE LEVEL METER SHALL BE PROVIDED BY THE MANUFACTURER FOR THE USE OF THE FIRE MARSHAL DURING TESTING.
 - ANY REQUIRED RETESTS SHALL BE MADE BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER INCLUDING ENGINEERING FEES TO WITNESS SYSTEM RETESTS. THE CONTRACTOR SHALL PROVIDE AT LEAST TWO WEEKS WRITTEN NOTICE TO THE ARCHITECT, OWNER, ENGINEER OF RECORD, CITY BUILDING DEPARTMENT AND THE CITY FIRE DEPARTMENT PRIOR TO THE DATE OF TESTING.
 - UPON SATISFACTORY COMPLETION OF ALL SYSTEM TESTS, THE MANUFACTURER'S REPRESENTATIVE SHALL PRESENT FOR THE OWNER'S CONSIDERATION A PROPOSAL TO PROVIDE SEMI-ANNUAL INSPECTION AND TESTS OF THE SYSTEM. THIS PROPOSAL AND THE REQUIREMENTS SHALL CONFORM TO N.F.P.A. 72.
- OPERATING INSTRUCTIONS AND DRAWINGS
 - UPON COMPLETION OF INSTALLATION, PRINTED SYSTEM INSTRUCTIONS AND AS-BUILT WIRING DIAGRAMS ILLUSTRATING COMPLETE SYSTEM WIRING AND CENTRAL CONTROL STATION SCHEMATICS SHALL BE FURNISHED TO THE OWNER, AND THE ENGINEER OF RECORD.
 - THE MANUFACTURER SHALL PROVIDE AN AUTHORIZED REPRESENTATIVE TO INSTRUCT AND TRAIN FIRE DEPARTMENT PERSONNEL AND THE OWNER IN THE OPERATION OF THE SYSTEM.
- GUARANTEE AND SERVICE
 - ALL EQUIPMENT AND WIRING SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A ONE (1) YEAR PERIOD FROM THE START UP AND BENEFICIAL USE OF THE SYSTEM. WARRANTY SERVICE FOR THE EQUIPMENT SHALL BE PROVIDED BY THE MANUFACTURER'S FACTORY TRAINED SERVICE REPRESENTATIVE DURING NORMAL WORKING HOURS (MONDAY THROUGH FRIDAY, 8:00 A.M. TO 5:00 P.M. EXCLUDING HOLIDAYS). EMERGENCY SERVICE PROVIDED AT TIMES OTHER THAN AS STIPULATED ABOVE, SHALL BE AVAILABLE ON A 24 HOUR BASIS FROM THE SAME SOURCE AT ADDITIONAL SOURCE AT ADDITIONAL COST TO THE OWNER.

(END OF PART 4)

5-1 DEMOLITION

- GENERAL
 - GENERAL REQUIREMENTS
 - THE WORK REQUIRED UNDER THIS SECTION SHALL CONFORM TO THE REQUIREMENTS OF "DIVISION 1, GENERAL REQUIREMENTS", "CONDITIONS OF THE CONTRACT", AND "SUPPLEMENTARY CONDITIONS". SPECIFIC ATTENTION IS CALLED TO THE "DIVISION 16 GENERAL REQUIREMENTS" LOCATED IN SECTION 16011.
 - WORK INCLUDED
 - FURNISH ALL LABOR, EQUIPMENT AND MATERIALS REQUIRED TO DEMOLISH, CAP, PATCH, REPAIR AND DISPOSE OF THE DIVISION 16 SYSTEMS NO LONGER REQUIRED AS PART OF AN ACTIVE SYSTEM OF THE PROJECT AS SPECIFIED HEREIN AND AS INDICATED ON THE DRAWINGS.
 - SCOPE OF WORK
 - IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW THE ARCHITECTURAL DOCUMENTS IN ADDITION TO THE DIVISION 15 AND 16 DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.
- EXECUTION
 - GENERAL
 - UNDER THIS DIVISION, THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS TO BE USED IN CONNECTION WITH THE DEMOLITION OF THE DIVISION 16 SYSTEMS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN AND/OR AS REQUIRED BY THE LOCAL BUILDING CODE. THE WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
 - UNLESS NOTED OTHERWISE IN THE ARCHITECTURAL DOCUMENTS, ALL ELECTRICAL EQUIPMENT NO LONGER IN USE WITHIN THE AREA OF RENOVATION SHALL BE DEMOLISHED. THE CONTRACTOR SHALL REVIEW THE EXISTING CONDITIONS, IN ADDITION TO THE ARCHITECTURAL DOCUMENTS, AND THE DIVISION 15/16 DOCUMENTS, TO DETERMINE THE COMPLETE SCOPE OF WORK.
 - THE DEMOLITION WORK SHALL BE COORDINATED WITH THE ARCHITECTURAL SCOPE OF THE PROJECT TO ASSURE PROPER LIMITS OF DEMOLITION.
 - REMOVE ALL EXISTING ELECTRICAL EQUIPMENT, BUSWAYS, CONDUIT, RACEWAYS, LIGHT FIXTURES, WIRING AND ASSOCIATED EQUIPMENT WITHIN THE AREA TO BE DEMOLISHED, WHETHER SPECIFICALLY INDICATED OR NOT, THAT IS NO LONGER REQUIRED UNLESS OTHERWISE INDICATED.
 - OPENINGS REMAINING IN ENCLOSURES AS A RESULT OF DEMOLITION SHALL BE SEALED WITH SHEET METAL CAP OR OTHER APPROVED APPROPRIATE MEANS, UNLESS OTHERWISE INDICATED.
 - WHERE EXISTING EQUIPMENT IS TO BE RELOCATED, EXTREME CARE SHALL BE TAKEN TO PREVENT DAMAGE DURING THE REMOVAL AND REINSTALLATION. WHERE DAMAGE OCCURS, THE EQUIPMENT SHALL BE REPLACED OR REPAIRED TO THE SATISFACTION AND APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING, PATCHING AND RESTORATION OF EXISTING FINISHES.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL, DISPOSAL AND SALVAGE OF EQUIPMENT FROM JOB SITE.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING, TESTING AND REPAIR OF EXISTING EQUIPMENT TO BE REUSED.
 - REFER TO ARCHITECTURAL DOCUMENTS FOR AREA AND EXTENT OF DEMOLITION.
 - WHERE A SYSTEM TO BE DEMOLISHED MUST REMAIN OPERATIONAL THROUGHOUT THE CONSTRUCTION PROCESS UNTIL A NEW SYSTEM THAT WILL TAKE ITS PLACE IS FUNCTIONAL, THE CONTRACTOR SHALL PROVIDE ALL PRODUCTS, SERVICES, MATERIALS, LABOR AND SUPERVISION TO MAINTAIN THE OPERATIONAL STATUS OF THE AFFECTED SYSTEM.
 - EXISTING CONDITIONS
 - UNDER THE SCOPE OF WORK, THE CONTRACTOR SHALL PERFORM A COMPREHENSIVE FIELD INSPECTION OF THE EXISTING CONDITIONS TO THOROUGHLY FAMILIARIZE HIMSELF WITH THE PROJECT AND DETERMINE THE COMPLETE SCOPE OF NEW AND DEMOLITION WORK. THE CONTRACTOR SHALL VERIFY IN THE FIELD EXACT SIZES, CAPACITIES, AND LOCATIONS OF ALL EXISTING EQUIPMENT PRIOR TO INSTALLATION OF ANY PROPOSED WORK. PROPOSED WORK SHALL BE COORDINATED WITH EXISTING CONDITIONS TO ASSURE PROPER INSTALLATION. THIS FIELD SURVEY AND DETERMINATION OF THE COMPLETE SCOPE OF WORK SHALL BE PERFORMED PRIOR TO THE FINAL BID. SPECIFIC ATTENTION IS BROUGHT TO PHYSICALLY LARGER AND HEAVY PIECES OF EQUIPMENT THAT ARE NEW TO BE INSTALLED OR EXISTING TO BE REMOVED AND THE ROUTING OF SUCH EQUIPMENT WITH THE AVAILABLE MEANS AND SITE CONDITIONS.
 - CONFLICTS AND DEPARTURES
 - CONFLICTS
 - THE CONTRACTOR SHALL REMOVE ALL EXISTING ELECTRICAL EQUIPMENT AND ASSOCIATED ACCESSORIES WHETHER SPECIFICALLY INDICATED OR NOT, THAT ARE NO LONGER REQUIRED. ANY EQUIPMENT WHICH MUST REMAIN AS PART OF AN ACTIVE SYSTEM AND IS IN CONFLICT WITH THE PROPOSED WORK SHALL BE RELOCATED AT NO ADDITIONAL EXPENSE. THERE SHALL BE NO ADDITIONAL EXPENSE TO THE OWNER FOR THIS TYPE OF DEMOLITION WORK, UNLESS, IN THE ARCHITECT'S AND OWNER'S OPINION, IT IS BEYOND THE SCOPE AND INTENT OF THE CONTRACT DOCUMENTS.
 - DEPARTURES
 - THE CONTRACT DRAWINGS ARE DIAGRAMMATIC AND SCHEMATIC IN NATURE AND DO NOT INDICATE INFERRED DETAILS FROM THE DRAWINGS THAT ARE NECESSARY TO COMPLY WITH THE INTENT OF DOCUMENTS, REQUIREMENTS OF APPLICABLE BUILDING CODES OR THE AUTHORITY HAVING JURISDICTION SHALL BE DETAILED IN THE FORM OF SHOP DRAWING SUBMITTAL DATA AND SUBMITTED FOR REVIEW BY THE ARCHITECT AND ENGINEER. ALL DEMOLITION AND ANY SUCH REVISIONS FOR DEPARTURES SHALL BE MADE IN ACCORDANCE WITH THE REVIEWED SHOP DRAWINGS WITHOUT INCREASED EXPENSE TO THE OWNER. DEPARTURES SHALL NOT BE MADE WITHOUT PRIOR WRITTEN APPROVAL BY THE ARCHITECT.
 - COOPERATION
 - THE CONTRACTOR SHALL COMPLY WITH ALL THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND THE BUILDING OWNER.
 - THE CONTRACTOR SHALL GIVE ADVANCE NOTICE TO THE ARCHITECT WHEN WORK IS TO BE PERFORMED.
 - THE CONTRACTOR SHALL COOPERATE AND COORDINATE DEMOLITION OF DIVISION 16 SYSTEMS AS REQUIRED WITH ALL OF OTHER TRADES. THE CONTRACTOR SHALL SUPERVISE AND ASSIST IN THE REMOVING AND REPLACING OF EXISTING MATERIALS FOR INSTALLATION OF ELECTRICAL ITEMS AND ITEMS RELATED TO ALL OTHER TRADES.
 - OCCUPIED AREAS
 - NORMAL FUNCTIONS OF OCCUPIED AREAS MUST CONTINUE DURING THE CONSTRUCTION PHASES. EVERY EFFORT SHALL BE MADE TO INSURE SUCH FUNCTIONS ARE NOT DISTURBED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION AND REMOVAL OF TEMPORARY SYSTEMS AS REQUIRED TO MAINTAIN THE FUNCTIONS OF OCCUPIED AREAS. THE CONTRACTOR SHALL SCHEDULE ANY WORK WHICH MAY BE REQUIRED IN OCCUPIED AREAS DURING UNOCCUPIED HOURS.
 - BARRIERS
 - WHERE REQUIRED BY APPLICABLE HEALTH AND SAFETY REGULATIONS, THE CONTRACTOR SHALL FURNISH AND MAINTAIN SAFETY AND DUST BARRIERS. IF NECESSARY, THE CONTRACTOR SHALL FURNISH AND MAINTAIN TEMPORARY FENCING AND TRAFFIC BARRIERS IN ACCORDANCE WITH ALL APPLICABLE HEALTH AND SAFETY REGULATIONS AND AS DEEMED NECESSARY.

NELSON

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6100 Wilshire Boulevard Suite 430
Los Angeles, CA 90048

Attn: Thomas Bartczak, PM
Phone: (310) 975-2061
Email: Thomas.Bartczak@windwardec.com

WWW.WINDWARDDEC.COM

CLIENT:



PANATTONI®

PANATTONI DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



CITY STAMP:

SHEET NAME:

SPECIFICATIONS - ELECTRICAL

Proj. No21.0003934.080 Reviewed By:TB

SHEET No:

E0.03

1200 Fifth Ave., Suite 1300
Seattle, WA 98101
Phone: (206) 408-8500

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Los Angeles, CA 90048

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Phone: (310) 975-2061
Email: Thomas.Bartczak@windwarddec.com

WWW.WINDWARDEC.COM

- F. BARRIERS
 - a. WHERE REQUIRED BY APPLICABLE HEALTH AND SAFETY REGULATIONS, THE CONTRACTOR SHALL FURNISH AND MAINTAIN SAFETY AND DUST BARRIERS. IF NECESSARY, THE CONTRACTOR SHALL FURNISH AND MAINTAIN TEMPORARY FENCING AND TRAFFIC BARRIERS IN ACCORDANCE WITH ALL APPLICABLE HEALTH AND SAFETY REGULATIONS AND AS DEEMED NECESSARY.
- G. RESTORATION
 - a. DEMOLITION SHALL BE CARRIED OUT WITH CAUTION TO ASSURE THAT EXISTING CONDITIONS TO REMAIN WILL BE UNDAMAGED. EXISTING CONDITIONS TO REMAIN THAT ARE DAMAGED OR DEFACED BY WORK UNDER THIS CONTRACT SHALL BE RESTORED OR REPLACED EQUAL TO THE CONDITIONS AT THE TIME OF AWARD OF THE CONTRACT.
 - b. CUT, PATCH, AND RESTORE ALL EXISTING SURFACES NOT RECEIVING NEW FINISHES THAT HAVE BEEN DISTURBED DURING EXECUTION OF THIS CONTRACT. MATERIALS AND FINISHES USED SHALL BE SIMILAR, IN ALL RESPECT, TO ADJACENT SURFACES.
 - c. EXISTING CONDUIT AND WIRING WHICH ARE TO REMAIN AS PART OF AN EXISTING OR PROPOSED ACTIVE SYSTEM THAT THE CONTRACTOR DETERMINES TO BE DEFECTIVE SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT.
 - d. EXISTING EQUIPMENT TO BE REMOVED SHALL BE CLEANED, REPAIRED, AND REUSED AT THE DISCRETION OF THE ARCHITECT WHEREVER APPLICABLE.
- H. CONNECTIONS
 - a. CONNECTIONS TO EXISTING WORK SHALL BE SIMILAR, IN ALL RESPECTS, TO THE EXISTING SYSTEM AND CONDITIONS UNLESS OTHERWISE INDICATED. EXISTING WORK SHALL BE ALTERED AND/OR TEMPORARILY REMOVED AND REPLACED AS REQUIRED FOR COMPLETION OF REQUIREMENTS OF THE PROJECT.
- I. SALVAGE
 - a. THE OWNER ASSUMES NO RESPONSIBILITY FOR LOSS OR DAMAGE TO MATERIALS OR STRUCTURES ON SITE FOR THE SALVAGE VALUE OF EQUIPMENT WHICH THE CONTRACTOR MAY HAVE REFLECTED IN HIS BID.
 - b. ALL EXISTING ELECTRICAL EQUIPMENT, CONDUIT AND WIRING REMOVED DURING CONSTRUCTION NO LONGER REQUIRED AS PART OF AN ACTIVE SYSTEM AND NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR.
- J. CLEANING
 - a. THE CONTRACTOR SHALL CLEAR AWAY ALL DEBRIS AND DEMOLISHED MATERIAL AT FREQUENT INTERVALS. THE CONTRACTOR SHALL NOT ALLOW DEBRIS TO ACCUMULATE TO THE EXTENT THAT IT WILL INTERFERE WITH WORK, PASSAGE OF THE WORKMEN, AND THE OPERATION OF THE EXISTING OCCUPIED AREAS.
 - b. IT IS THE INTENT OF THIS SPECIFICATION THAT ALL WORK, INCLUDING THE INSIDE OF EQUIPMENT, BE LEFT IN A CLEAN CONDITION. ALL CONSTRUCTION DIRT SHALL BE REMOVED FROM MATERIAL AND EQUIPMENT.
- K. INVENTORY
 - a. CONTRACTOR SHALL PROVIDE A DETAILED INVENTORY OF ALL EXISTING ELECTRICAL EQUIPMENT INCLUDING SWITCHBOARDS, DISCONNECTS, PANELBOARDS, MOTOR STARTERS, ETC. TO BE STORED FOR LATER REUSE. INVENTORY SHALL INCLUDE TYPE, SIZE, CAPACITIES, AND QUANTITIES OF EACH ITEM OR PIECE OF EQUIPMENT.
- L. TESTING
 - a. EQUIPMENT
 - a.1. EXISTING EQUIPMENT, INSTRUMENTS, AND ACCESSORIES TO REMAIN SHALL BE TESTED FOR DEFECTS AND SHALL BE ADJUSTED, REPAIRED OR REPLACED WHERE REQUIRED. CONDITIONS, QUALIFICATIONS, AND PROCEDURES REGARDING ADJUSTMENTS, REPAIRATIONS, OR REPLACEMENT OF EXISTING EQUIPMENT AS DEEMED NECESSARY BY THE CONTRACTOR SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL. THE CONTRACTOR SHALL NOT PROCEED WITH EQUIPMENT REPLACEMENT WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT. THE ARCHITECT SHALL DETERMINE WHETHER REPLACEMENT IS REQUIRED AND SHALL SPECIFY THE REPLACEMENT EQUIPMENT TO BE USED.
- M. ADDITIONAL REQUIREMENTS
 - a. FOR BUSWAY, CONDUCTORS, PANELBOARDS, SWITCHBOARDS, ETC., REFER TO THE APPROPRIATE SPECIFICATION SECTION FOR TESTING REQUIREMENTS AND ADDITIONAL REQUIREMENTS OF EXISTING EQUIPMENT AND SYSTEMS TO BE A PART OF THE NEW ACTIVE SYSTEMS.
- N. QUALIFICATIONS
 - a. ONLY CONTRACTORS, SUBCONTRACTORS, AND WORKMEN EXPERIENCED AND REGULARLY ENGAGED IN THE DEMOLITION OF MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEMS SHALL BE PERMITTED TO PERFORM THE DEMOLITION OF EXISTING SYSTEMS.

(END OF PART 5)

CLIENT:



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PANATTONI
DEVELOPMENT

PROJECT:

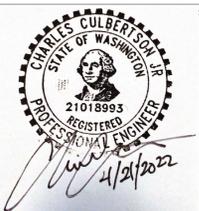
SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



CITY STAMP:

SHEET NAME:

SPECIFICATIONS - ELECTRICAL

Proj. No21.0003934.080 Reviewed By:TB

SHEET No:

E0.04

CLIENT:



PANATTONI
 DEVELOPMENT

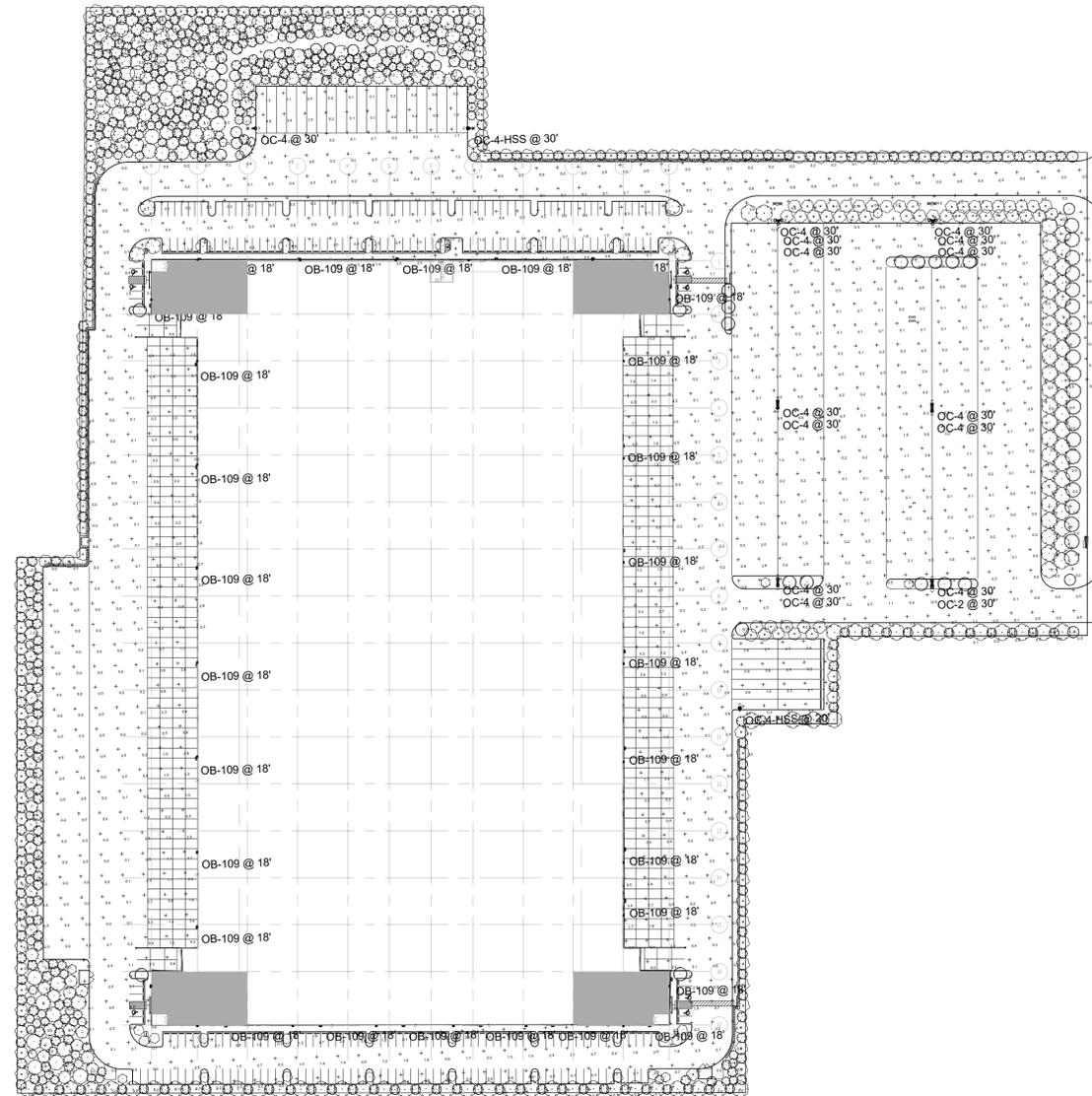
PROJECT:

SOUTH SOUND COMMERCE CENTER

BUILDING A

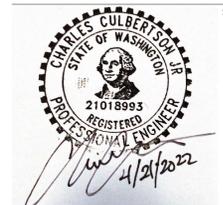
TUMWATER, WASHINGTON

Description: No: Date:



1 SITE PLAN - LIGHTING PHOTOMETRICS
 SCALE: 1" = 100'-0"

SEAL:



CITY STAMP:

SHEET NAME:

SITE PLAN - ELECTRICAL

CLIENT:



PANATTONI
DEVELOPMENT

PROJECT:

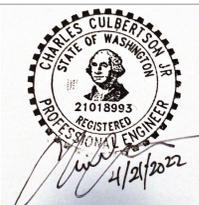
SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



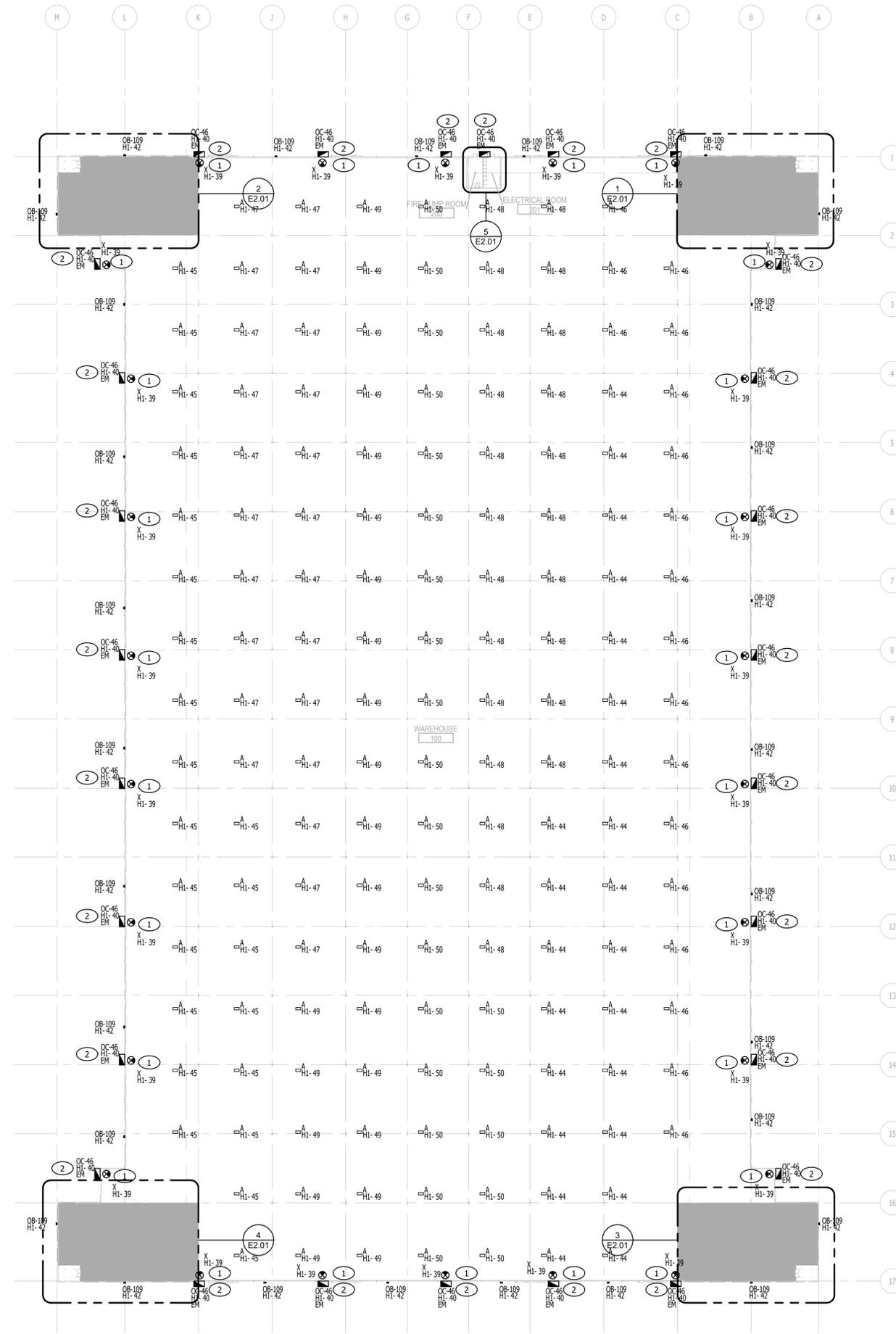
CITY STAMP:

SHEET NAME:

CONSTRUCTION PLAN -
LIGHTING

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

E2.00



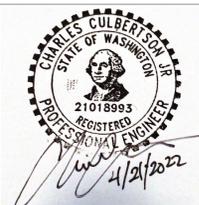
GENERAL NOTES:

- ACCESS TO AND CLEARANCES AROUND ELECTRICAL EQUIPMENT SHALL CONFORM TO NEC ARTICLES 110. CONSULT ENGINEER WHERE SPACE APPEARS INADEQUATE DUE TO ARCHITECTURAL CHANGES, EQUIPMENT LAYOUT CHANGES, OR FIELD CONDITIONS. DO NOT COVER, OBSCURE OR BLOCK ACCESS TO EQUIPMENT, DATA PLATES, ACCESS PANELS, OR MAINTENANCE AREAS WITH THE ELECTRICAL WORK.
- THIS DRAWING SHOWS EQUIPMENT LOCATIONS ONLY. COORDINATE CONDUIT ROUTE IN FIELD WITH OTHER TRADES, EQUIPMENT, AND OWNER. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS WITH OWNER & ARCHITECT PRIOR TO INSTALLATION.
- COORDINATE WITH MECHANICAL PLANS FOR FINAL LOCATION OF ALL DEVICES MOUNTED ON OR IN THE VICINITY OF THE MECHANICAL WORK.
- COORDINATE ELECTRICAL REQUIREMENTS OF ALL OWNER PROVIDED EQUIPMENT WITH ACTUAL EQUIPMENT PRIOR TO INSTALLATION.
- ALL LIGHTING CONTROLS SHALL BE PROVIDED BY A SINGLE MANUFACTURER AND ALL CONTROLS SHALL BE COMPATIBLE WITH THE LIGHTING FIXTURES PROVIDED.
- CONTRACTOR SHALL COORDINATE WITH LIGHTING CONTROL MANUFACTURER TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM. ALL REQUIRED, POWER PACKS, INTERCONNECTION WIRING, ETC. SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR SHALL COORDINATE DIMMING PROTOCOL (0-10V, DALI, PHASE DIMMING, ETC.) OF LIGHTING FIXTURES PROVIDED WITH LIGHTING CONTROLS VENDOR TO ENSURE COMPATIBILITY.
- CONTRACTOR'S MANUFACTURER WILL ENSURE THAT THEIR BEST SENSING PROTOCOL (ULTRASONIC, INFRARED, MICROWAVE, ETC.) AND EITHER SINGLE OR DUAL TECHNOLOGY DEVICES ARE PROVIDED FOR EACH SPACE TYPE.
- CONTRACTOR SHALL HAVE THEIR MANUFACTURER PROVIDE SHOP DRAWINGS WITH DETAILED INFORMATION SHOWING ALL REQUIRED LIGHTING CONTROL COMPONENTS AND INTERCONNECTIONS NECESSARY FOR THEIR SYSTEM TO FUNCTION AS DESCRIBED IN KEYNOTES BELOW. THESE DRAWINGS WILL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND ANY REQUIRED CHANGES WILL BE CORRECT AT NO ADDITIONAL COST TO THE OWNER.
- WALL SWITCH QUANTITY AND LOCATIONS HAVE BEEN NOTED ON THE LIGHTING PLANS. REFER TO LIGHTING CONTROLS SYMBOLS LEGEND FOR EACH TYPE OF SWITCH REQUIRED (DIMMING, KEYED, THREE-WAY, FOUR-WAY, OCCUPANCY SENSING, ETC.).
- ALL LIGHTING CIRCUITS SHALL HAVE ALL #10 AWG CONDUCTORS, UNLESS NOTED OTHERWISE.

KEYNOTES

- MOUNT EXIT SIGN SO THAT BOTTOM IS 6" ABOVE DOOR FRAME.
- EMERGENCY (EM) FIXTURE WITH 90 MINUTE BATTERY BACKUP.

1 CONSTRUCTION PLAN - LIGHTING
SCALE: 1" = 50'-0"

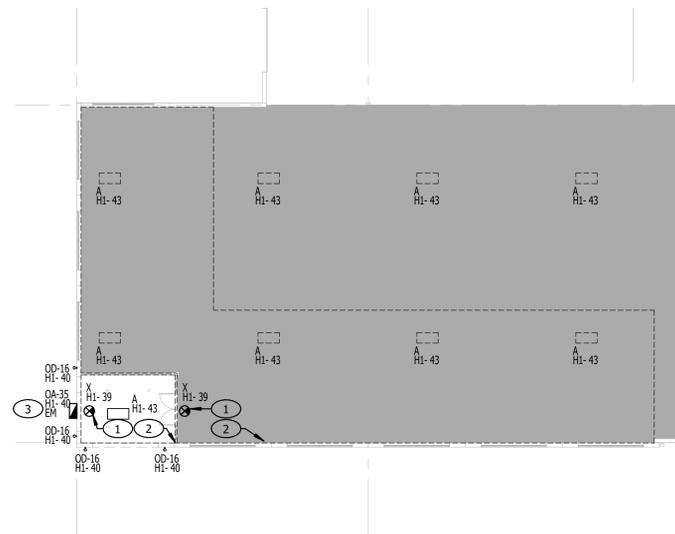


GENERAL NOTES:

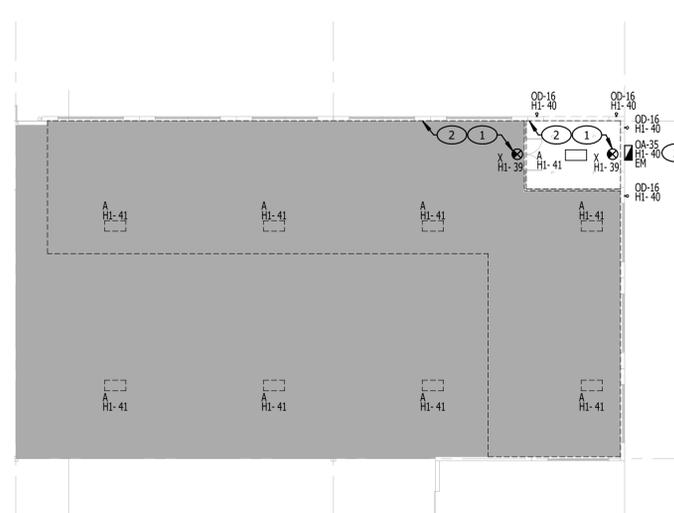
- ACCESS TO AND CLEARANCES AROUND ELECTRICAL EQUIPMENT SHALL CONFORM TO NEC ARTICLES 110. CONSULT ENGINEER WHERE SPACE APPEARS INADEQUATE DUE TO ARCHITECTURAL CHANGES, EQUIPMENT LAYOUT CHANGES, OR FIELD CONDITIONS. DO NOT COVER, OBSCURE OR BLOCK ACCESS TO EQUIPMENT, DATA PLATES, ACCESS PANELS, OR MAINTENANCE AREAS WITH THE ELECTRICAL WORK.
- THIS DRAWING SHOWS EQUIPMENT LOCATIONS ONLY. COORDINATE CONDUIT ROUTE IN FIELD WITH OTHER TRADES, EQUIPMENT, AND OWNER. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS WITH OWNER & ARCHITECT PRIOR TO INSTALLATION.
- COORDINATE WITH MECHANICAL PLANS FOR FINAL LOCATION OF ALL DEVICES MOUNTED ON OR IN THE VICINITY OF THE MECHANICAL WORK.
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- WALL SWITCH QUANTITY AND LOCATIONS HAVE BEEN NOTED ON THE LIGHTING PLANS. REFER TO LIGHTING CONTROLS SYMBOLS LEGEND FOR EACH TYPE OF SWITCH REQUIRED (DIMMING, KEYED, THREE-WAY, FOUR-WAY, OCCUPANCY SENSING, ETC.).
- ALL LIGHTING CIRCUITS SHALL HAVE ALL #10 AWG CONDUCTORS, UNLESS NOTED OTHERWISE.

KEYNOTES

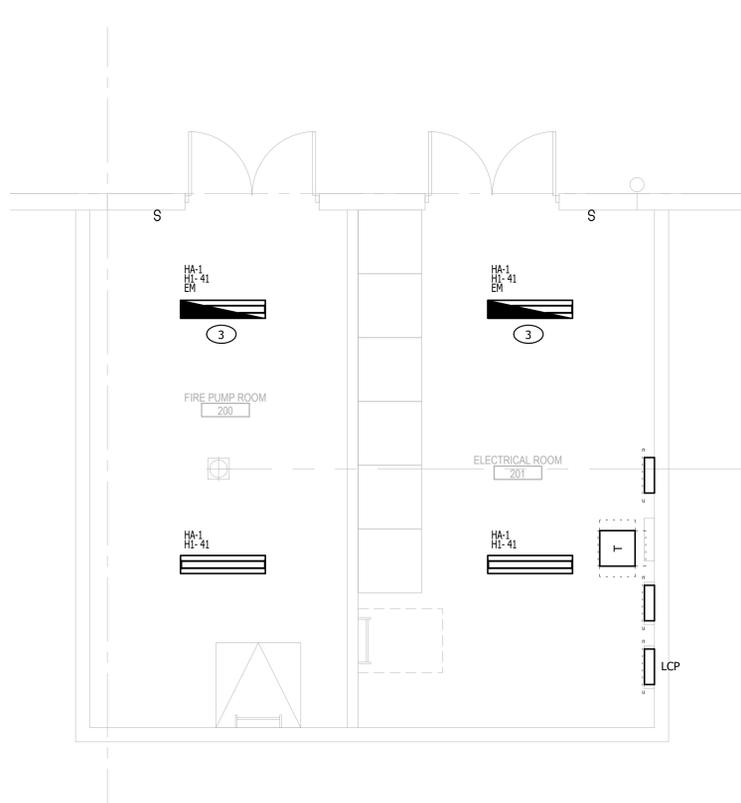
- MOUNT EXIT SIGN SO THAT BOTTOM IS 6" ABOVE DOOR FRAME.
- DASHED LINE INDICATES BOUNDARY OF DAYLIGHT ZONE. PROVIDE DAYLIGHT HARVESTING FOR ALL LUMINAIRES WITHIN BOUNDARY. CONTROL OF THESE FIXTURES ARE TO BE INDEPENDENT FROM THAT OF THE GENERAL LIGHTING AREA.
- EMERGENCY (EM) FIXTURE WITH 90 MINUTE BATTERY BACKUP.



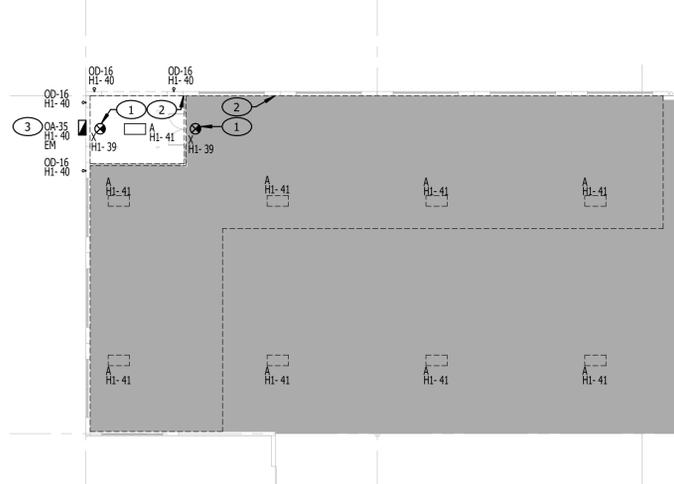
4 ENLARGED LIGHTING PLAN - SOUTHWEST ENTRANCE
SCALE: 1/16" = 1'-0"



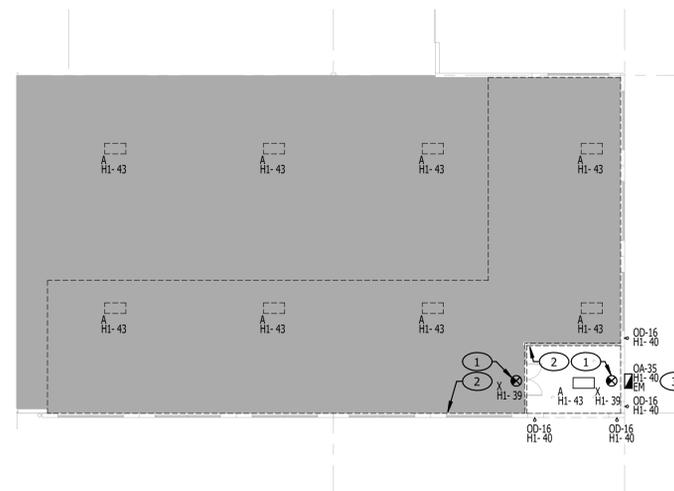
1 ENLARGED LIGHTING PLAN - NORTHEAST ENTRANCE
SCALE: 1/16" = 1'-0"



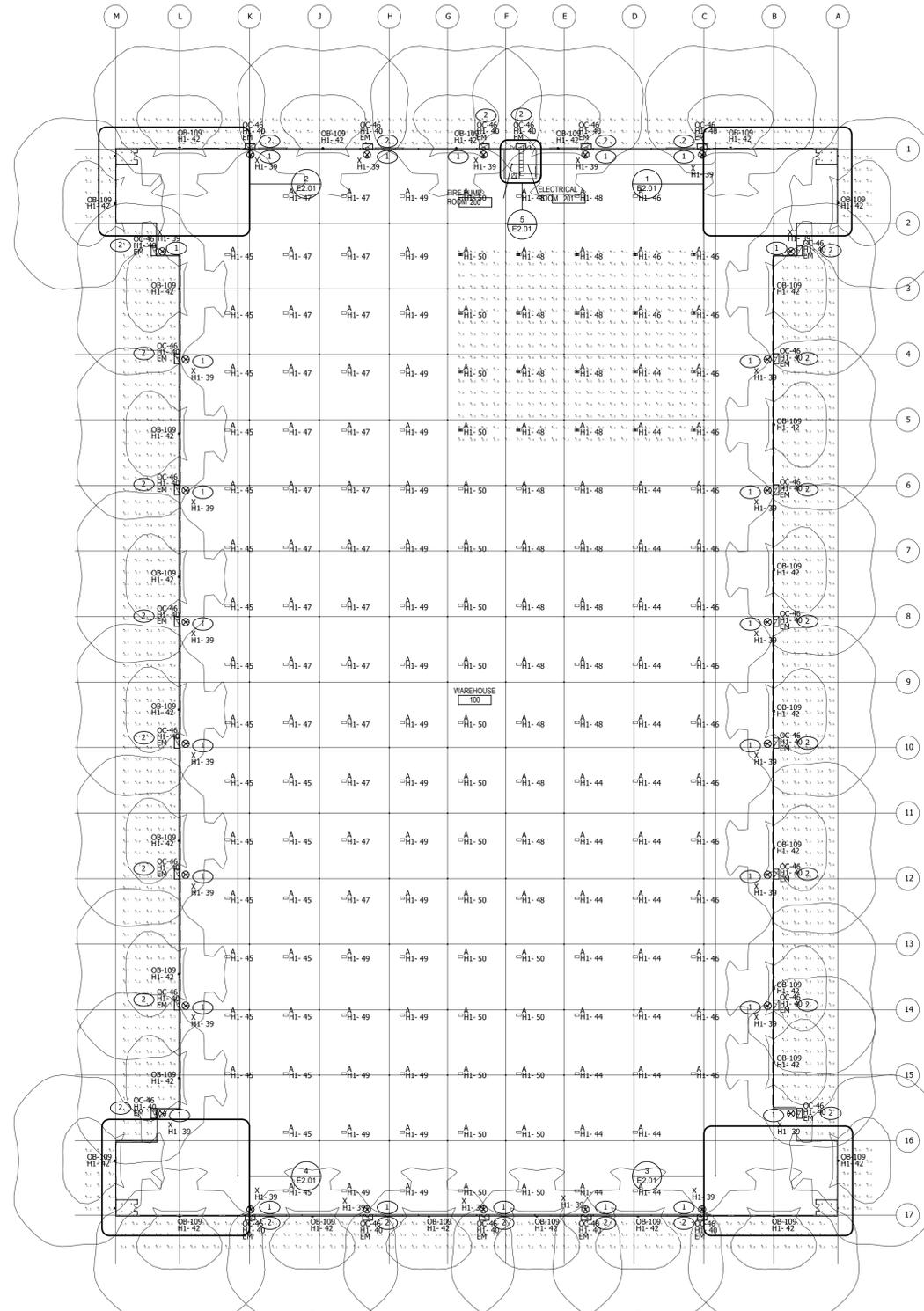
5 ENLARGED LIGHTING PLAN - ELECTRICAL AND FIRE PUMP ROOM
SCALE: 1/4" = 1'-0"



2 ENLARGED LIGHTING PLAN - NORTHWEST ENTRANCE
SCALE: 1/16" = 1'-0"



3 ENLARGED LIGHTING PLAN - SOUTHEAST ENTRANCE
SCALE: 1/16" = 1'-0"



CLIENT:



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DEVELOPMENT

PROJECT:

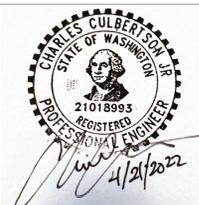
SOUTH SOUND COMMERCE CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



CITY STAMP:

SHEET NAME:

CALCULATIONS - ELECTRICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

E2.02

CLIENT:



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PROJECT:

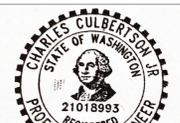
SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:

SEAL:



Charles Culbert
4/21/2022

CITY STAMP:

SHEET NAME:

COMPLIANCE FORMS -
ELECTRICAL

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

E2.03

LIGHTING COMPLIANCE SUMMARY

2018 WSEC Compliance Form for Commercial Buildings, including Group R2, R3 & R4 over 3 stories and all R1. Administered by: 03822 S.F.A. All Rights Reserved.

Project Title:	Panattoni Tumwater Building A - 2018 WSEC	For Building Department Use:	Date: Apr 22, 2022
Project Address:	SOUTH SOUND COMMERCE CENTER BUILDING A TUMWATER, WA		
Applicant Name:	James Mayer		
Applicant Phone:	(972) 916-6611		
Applicant Email:	james.mayer@panattoni.com		

For questions about this report, contact WSEC Commercial Technical Support at 360-576-2700 or via email at commercial@wsec.energycode.com

General Occupancy:	All Commercial	General Building Use Type:	Workshop, General Storage	Building Cond. Floor Area:	461,715
General Project Types:	New Building or Addition	Interior Lighting or Exterior Lighting:	Alteration	Project Cond. Floor Area:	461,715
Lighting Project Description:	Shell & Core	Lighting Scope:	Interior Lighting	Compliance Method:	Commission Method - Updated

Lighting Compliance Scope and Method:	Project Type: Interior - Exterior (includes both interior & parking)	Lighting Compliance Scope:	Interior Lighting	Compliance Method:	Building area	LPA Calculation Adjustment:	No Calculations Adjustments selected	Compliance Verification:	COMPLIES
Additional Efficiency Options Included:	Shell & Core	Lighting Scope:	Exterior Lighting	Compliance Method:	Building area	LPA Calculation Adjustment:	No applicable to entrance	Compliance Verification:	COMPLIES

Project Title:	Panattoni Tumwater Building A - 2018 WSEC	Date:	Apr 22, 2022
Lighting Power Calculation:	SHELL & CORE - INTERIOR LIGHTING	Compliance Verification:	COMPLIES
Compliance Method:	Building area	LPA Calculation Adjustment:	none

Building Areas:	Gross Interior Area (SF)	LPA (Watts/SF)	Total Watts Allowed (SF x LPA x 1.1)	Total Proposed Watts by Building Area	Compliance Status by Building Area
Warehouse	461,715	0.40	205,539	11,980	COMPLIES

Proposed Lighting Power Details								
Fixture Type/Application:	Fixture ID:	Building Area:	New or Existing-to-Remain:	Quantity of Fixtures, CLDs or Luminaires (Qty):	Watts per Fixture, CLD or Luminaire (WpF):	Total Linear Foot (LF):	Watts per Linear Foot (WpLF):	Total Watts Proposed (WpF x Qty) or (LF x WpLF):
Individual Fixtures:	Suspended	A	Warehouse	1	112			112
	Suspended	HA-1	Warehouse	1	28			28

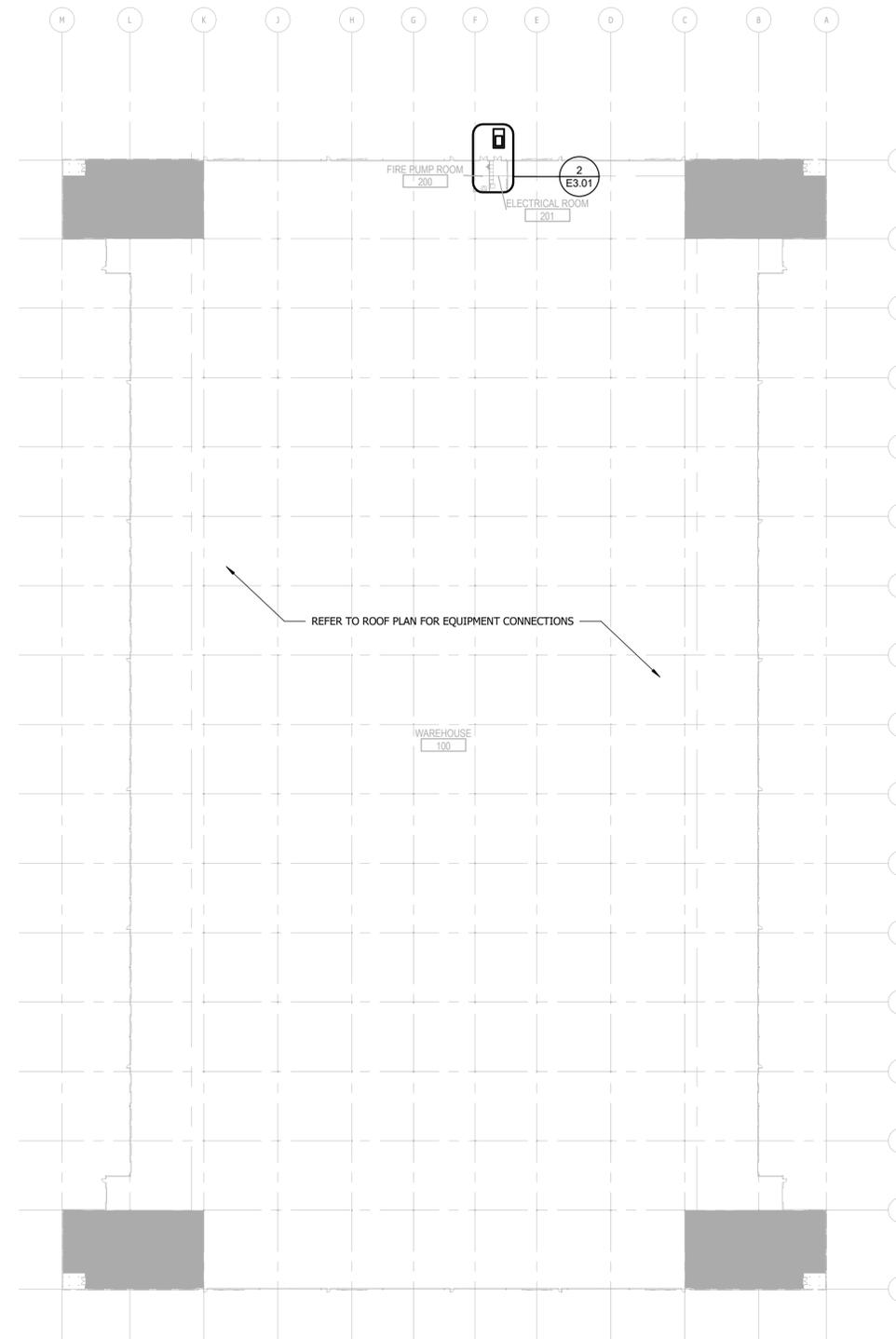
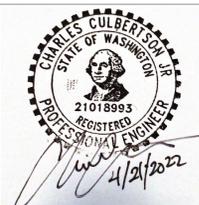
Project Title:	Panattoni Tumwater Building A - 2018 WSEC	Date:	Apr 22, 2022		
Proposed Fixture Details:	SHELL & CORE - INTERIOR LIGHTING				
Fixture Type/Application:	Fixture ID:	Location in Dimensions:	Lamp Type:	Building Area:	New or Existing-to-Remain:
Individual Fixtures:	Suspended	A	E2.00, E2.01, E2.02	Warehouse	New
Fixture Description:	LED LINKER HIGH BAY PENDANT			Are these fixtures located within a display case? Yes, specify provided	

Daylight (are locations):	Shade (daylight source primary and/or secondary)	Dimming method:	Commission, dimming
Do these fixtures require specific application lighting controls? (None required)	None required		
Surfaces:	HA-1	E2.01	LED
Fixture Description:	INDIVIDUAL LED HIGH BAY PENDANT		
Do these fixtures require specific application lighting controls? (None required)	Are these fixtures located within a display case? No		

Project Title:	Panattoni Tumwater Building A - 2018 WSEC	Date:	Apr 22, 2022
Lighting Power Calculation:	SHELL & CORE - EXTERIOR LIGHTING	Compliance Verification:	COMPLIES
Exterior Lighting Zone:	ZONE 4	Base Size Allowance:	none

Exterior Tradable Lighting Power Allowance						
Tradable Surface:	Tradable Surface Sub-Type:	Surface Area (SF):	LPA (Watts/SF):	Linear Feet (LF):	LPA (Watts/LF):	Total Watts Allowed (LPA x SF) or (LPA x LF):
Building grounds	Walkways 10 feet and wider	128,262	0.16			17,562
				Base Size Allowance:	none	
Totals:						17,562

Proposed Tradable Lighting Power Details							
Fixture Type:	Fixture ID:	Tradable Surface Type:	Quantity of Fixtures (Qty):	Watts or Watts per Linear Foot (WpLF):	Total Linear Foot (LF):	Watts per Linear Foot (WpLF):	Total Watts Proposed (Qty x WpLF) or (LF x WpLF):
Individual Fixtures:	Wall-mounted	HA-12	Building grounds - Walkways 10 feet and wider	4	46		184
	Wall-mounted	HA-46	Building grounds - Walkways 10 feet and wider	25	46		1,150
	Wall-mounted	HA-100	Building grounds - Walkways 10 feet and wider	29	100		2,900
Tradable Proposed Total:							4,934



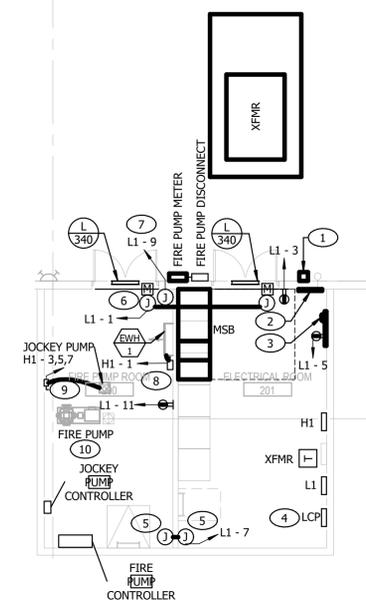
1
E3.01 **CONSTRUCTION PLAN - POWER**
SCALE: 1/64" = 1'-0"

GENERAL NOTES:

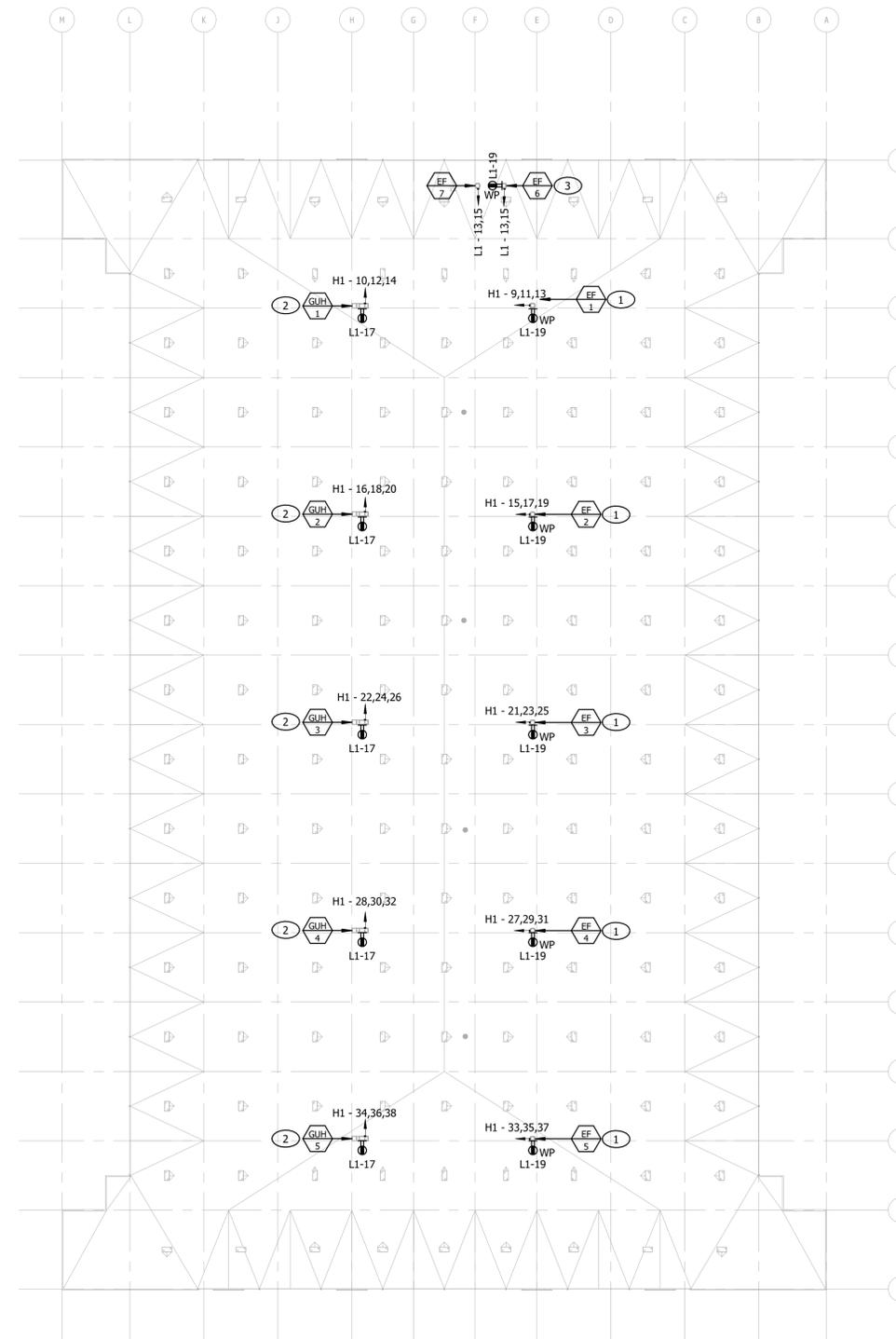
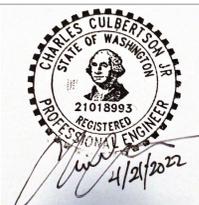
1. REFER TO DETAIL SHEETS FOR CONDUIT PENETRATION DETAILS.
2. ALL CONDUIT PENETRATIONS THROUGH WALL MUST BE SEALED, SLEEVED, AND PROPERLY SUPPORTED ON EACH SIDE OF THE WALL.
3. ALL OUTLET LOCATIONS SHOWN IN PLAN ARE APPROXIMATE. FINAL LOCATIONS TO BE DETERMINED IN FIELD WITH OWNER.
4. ELECTRICAL PANELBOARDS AND TRANSFORMER LOCATIONS HAVE BEEN SET. ADJUSTMENTS TO THEIR LOCATIONS MUST BE COORDINATED WITH OWNER'S PROJECT MANAGER.

KEYNOTES

1. PROVIDE 6"x8" NEMA 3R BOX FOR "PSE AMR". REFER TO PSE AMR DETAIL FOR ADDITIONAL INFORMATION.
2. PROVIDE 2" FIREPROOF PLYWOOD AT LOCATION SHOWN.
3. PROVIDE (2) 4" CONDUIT FOR TELECOM. COORDINATE FINAL ROUTING PRIOR TO ROUGH-IN.
4. PROVIDE LIGHTING CONTROL PANEL AT LOCATION SHOWN. REFER TO 3/E7.00 FOR ADDITIONAL INFORMATION.
5. PROVIDE 120V/1P CONNECTION FOR T-STATS. COORDINATE WITH MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
6. PROVIDE 120V/1P CONNECTION FOR MECHANICAL DAMPERS. COORDINATE WITH MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
7. PROVIDE 120V/1P CONNECTION FOR FACP PANEL. COORDINATE WITH FIRE PROTECTION DRAWINGS FOR ADDITIONAL INFORMATION.
8. PROVIDE 1P/30AS/20AF DISCONNECT AND COMPLETE ELECTRICAL 277V/1P CONNECTION FOR ELECTRIC WALL HEATER (EWH). COORDINATE WITH MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
9. PROVIDE 3P/30AS/20AF DISCONNECT AND COMPLETE ELECTRICAL 480V/3P CONNECTION FOR JOCKEY PUMP. COORDINATE WITH FIRE PROTECTION DRAWINGS FOR ADDITIONAL INFORMATION.
10. ELECTRIC FIRE PUMP. REFER TO ONE LINE DIAGRAM ON 1/E7.00 FOR ADDITIONAL INFORMATION.



2
E3.01 **ENLARGED ELECTRICAL & FIRE PROTECTION ROOM**
SCALE: 1/8" = 1'-0"



1 CONSTRUCTION PLAN - POWER
E4.02 SCALE: 1/64" = 1'-0"

GENERAL NOTES:

1. ALL CONDUIT PENETRATIONS AND JUNCTION BOX SUPPORTS SHALL FOLLOW DETAILS PROVIDED ON DETAIL SHEETS.
2. ALL CONDUIT PENETRATIONS THROUGH WALL MUST BE SEALED, SLEEVED, AND PROPERLY SUPPORTED ON EACH SIDE OF THE WALL.
3. PROVIDE WEATHERPROOF, NEMA-3R ENCLOSURES AND DEVICES FOR ALL EQUIPMENT MOUNTED ON ROOF.
4. MOUNT ALL DISCONNECT SWITCHES FOR MECHANICAL AND PLUMBING EQUIPMENT AT SAME ELEVATION AS EQUIPMENT BEING SERVICED, UON. MOUNT SO THAT ALL NEC REQUIRED CLEARANCES ARE MET.
5. ALL MECHANICAL EQUIPMENT TO BE WITHIN 25'-0" OF SERVICE RECEPTACLE PER NEC 210.63.
6. REFER TO FIRE ALARM DRAWINGS FOR FIRE ALARM REQUIREMENTS RELATED TO MECHANICAL EQUIPMENT. FIELD COORDINATE WITH OTHER TRADES FOR ALL REQUIRED INTERCONNECTIONS.

KEYNOTES

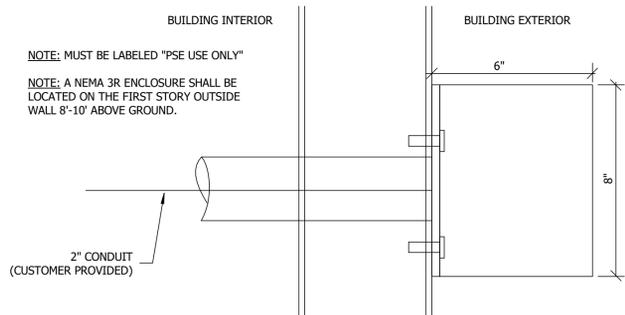
1. **EXHAUST FAN:** PROVIDE COMPLETE ELECTRICAL CONNECTION (480V/3P) TO EXHAUST FAN (EF). THE NON-FUSED DISCONNECT SWITCH IS PROVIDED BY DIVISION 23. FIELD COORDINATE INSTALLATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. INTERLOCK FAN WITH THE CONTROLS PROVIDED IN THE SPACE BEING SERVED. REFER TO MECHANICAL SCHEDULES FOR ADDITIONAL INFORMATION.
2. **GAS UNIT HEATER (GUH):** PROVIDE COMPLETE ELECTRICAL CONNECTION (480V/3P) TO GAS UNIT HEATER. THE NON-FUSED DISCONNECT SWITCH IS PROVIDED BY DIVISION 23. SERVICE OUTLET PROVIDED BY EQUIPMENT MANUFACTURER. FIELD COORDINATE INSTALLATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. EXTEND 3/4" CONDUIT WITH PULLSTRING DOWN TO THERMOSTAT. REFER TO MECHANICAL FOR EXACT LOCATION. CONTROL WIRING FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR.
3. **EXHAUST FAN:** PROVIDE COMPLETE ELECTRICAL CONNECTION (208V/1P) TO EXHAUST FAN (EF). THE NON-FUSED DISCONNECT SWITCH IS PROVIDED BY DIVISION 23. FIELD COORDINATE INSTALLATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. INTERLOCK FAN WITH THE CONTROLS IN THE SPACE BEING SERVED. REFER TO MECHANICAL SCHEDULES FOR ADDITIONAL INFORMATION.

ONE-LINE POWER RISER DIAGRAM GENERAL NOTES:

- ALUMINUM CONDUCTORS MAY BE SUBSTITUTED FOR COPPER CONDUCTORS FOR FEEDERS 125 AMPS & LARGER. ALUMINUM CONDUCTORS SHALL NOT BE USED WHERE EXPRESSLY FORBIDDEN BY LOCAL ELECTRICAL INSPECTIONS DEPARTMENT. UTILITY COMPANY OR THE PLAN REVIEW BOARD OF JURISDICTION. ELECTRICAL CONTRACTOR TO COORDINATE ALL CHANGES IN SIZE & QUANTITY OF PARALLEL CONDUITS FOR ANY/ALL ALUMINUM FEEDER CHANGES.
- REFER TO DETAILS FOR SERVICE GROUNDING & BONDING.
- ALL FLOOR-MOUNTED EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE HOUSEKEEPING PAD, UNLESS OTHERWISE NOTED.
- MAXIMUM DISTANCE THE SECONDARY CONDUCTORS CAN BE RUN PRIOR TO OVERCURRENT PROTECTION IS 10 FEET.
- ALL CIRCUIT BREAKERS GREATER THAN 250A SHALL BE PROVIDED WITH ADJUSTABLE TRIP SETTINGS.
- PROVIDE A SHORT CIRCUIT-STUDY, SELECTIVE COORDINATION STUDY AND ARC FLASH ANALYSIS FOR EACH ELECTRICAL SERVICE AND INFRASTRUCTURE. ADJUST TRIP SETTINGS ON CIRCUIT BREAKERS & MODIFY SHORT CIRCUIT RATINGS OF ELECTRICAL EQUIPMENT PER THE RESULTS. OVERCURRENT PROTECTIVE DEVICES SHALL BE SELECTIVELY COORDINATED FOR DISTRIBUTION SYSTEMS SERVING EMERGENCY AND STANDBY LOADS, AS WELL AS THOSE SERVING MULTIPLE ELEVATORS. FOR FAULTS WITH DURATIONS AT 0.01 SECONDS. ALL OTHER LOADS SHALL BE COORDINATED TO 0.1 SECONDS.
- COORDINATE REQUIREMENTS OF NEC ARTICLE 240.87 WITH OVER CURRENT DEVICES INSTALLED IN CIRCUIT BREAKERS RATED OR ADJUSTABLE AT 1200A AND HIGHER.
- COORDINATE REQUIREMENTS OF NEC ARTICLE 230.95. GROUND FAULT PROTECTION OF EQUIPMENT SHALL BE PROVIDED FOR SOLIDLY GROUNDED WYE ELECTRIC SERVICES OF MORE THAN 150 VOLTS TO GROUND BUT NOT EXCEEDING 1000 VOLTS PHASE-TO-PHASE FOR EACH SERVICE DISCONNECT RATED 1000 AMPERES OR MORE.
- REFER TO PANEL SCHEDULES ON SHEETS E9.00 FOR ADDITIONAL INFORMATION.

ONE-LINE POWER RISER DIAGRAM KEY NOTES:

- NEW PAD MOUNT UTILITY COMPANY TRANSFORMER (BY UTILITY COMPANY).
- PROVIDE METERING (PER UTILITY COMPANY REQUIREMENTS).
- FURNISH & INSTALL CONCRETE HOUSE KEEPING PAD FOR ELECTRICAL EQUIPMENT. SEE POWER PLAN DRAWING E3.01 FOR LOCATION AND ADDITIONAL REQUIREMENTS.

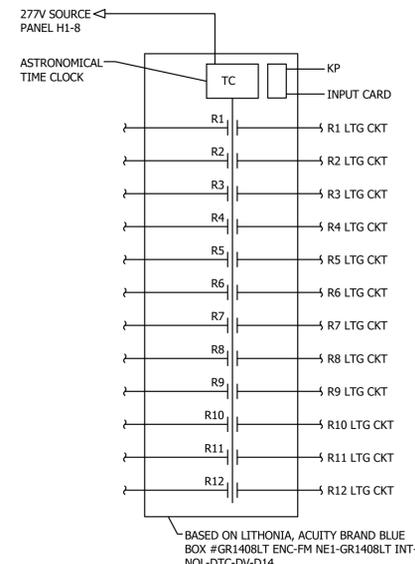


4 PSE AMR DETAIL DETAIL
NO SCALE

TAG	MANUFACTURER	MODEL	DESCRIPTION	LAMP	MOUNTING	VOLTAGE	WATTAGE	REMARKS
A	METALUX	LHB-24-UNV-L840-CD-U	LED LINEAR HIGH BAY FIXTURE.	LED, 4000K, 24,000LM	PENDANT	277	172 WATTS	COORDINATE WITH ARCHITECT FOR MOUNTING LOCATION.
HA-1	ACUTY	UFTT-L48-4000LM-HEF-MVOLT-G210-40K-80CRI-NLAI2R2-E57-WH	LED INDUSTRIAL LOW BAY PENDANT.	LED, 4000K, 4,000LM	PENDANT	277	29 WATTS	MOUNT FIXTURES AT 9' AFF. CONTRACTOR TO ORDER MOUNTING ACCESSORIES AS REQUIRED.
OA-35	LUMINAIRE LED	AEL-48IN-MIN10-35W-40K-277-DP-BKH-PC	LED BUILDING MOUNTED LUMINAIRE, FULL CUTOFF, WITH INTEGRAL PHOTOCELL SENSOR.	LED, 4000K, 3,9000M	BUILDING	277	46 WATTS	MOUNT FIXTURE ON MULLION CENTERED OVER DOOR. ARCHITECT TO SELECT FIXTURE FINISH.
OB-109	ACUTY	DSXW2-LED-30C-1000-40K-TFTM-MVOLT-XX-NLTAIR2-PI-RH-XX	LED BUILDING MOUNTED LUMINAIRE, FULL CUTOFF, TYPE FORWARD THROW DISTRIBUTION WITH INTEGRAL PIR SENSOR.	LED, 4000K, 11,121LM	BUILDING	277	109 WATTS	MOUNT FIXTURES AT 38" AFG. ARCHITECT TO SELECT FIXTURE FINISH.
OC-46	ACUTY	DSXW1-10C-700-40K-TFTM-MVOLT-NLAI2-PIR-XX	LED BUILDING MOUNTED LUMINAIRE, FULL CUTOFF, TYPE FORWARD THROW DISTRIBUTION WITH INTEGRAL PIR SENSOR.	LED, 4000K, 5,554LM	BUILDING	277	46 WATTS	MOUNT FIXTURES AT 12'-6" AFG, CENTERED OVER DOORS. ARCHITECT TO SELECT FIXTURE FINISH. PROVIDE WITH BATTERY BACK UP.
OD-16	MODERN FORMS	WS-W81637-3500K-AL	4' NOMINAL HEIGHT LED DECORATIVE OUTDOOR FIXTURE	LED, 35000K, 2,700LM	BUILDING	277	16 WATTS	COORDINATE WITH ARCHITECT FOR MOUNTING LOCATION.
X	EATON SURE-LITE	APCH SERIES OR EQUAL	UNIVERSAL EXIT LIGHT, DIE-CAST ALUMINUM HOUSING, BRUSHED ALUMINUM FINISH, RED LED, TWO REMOTE LED HEADS, UNIVERSAL CHEVRONS WITH BATTERY BACK UP.	LED		277		

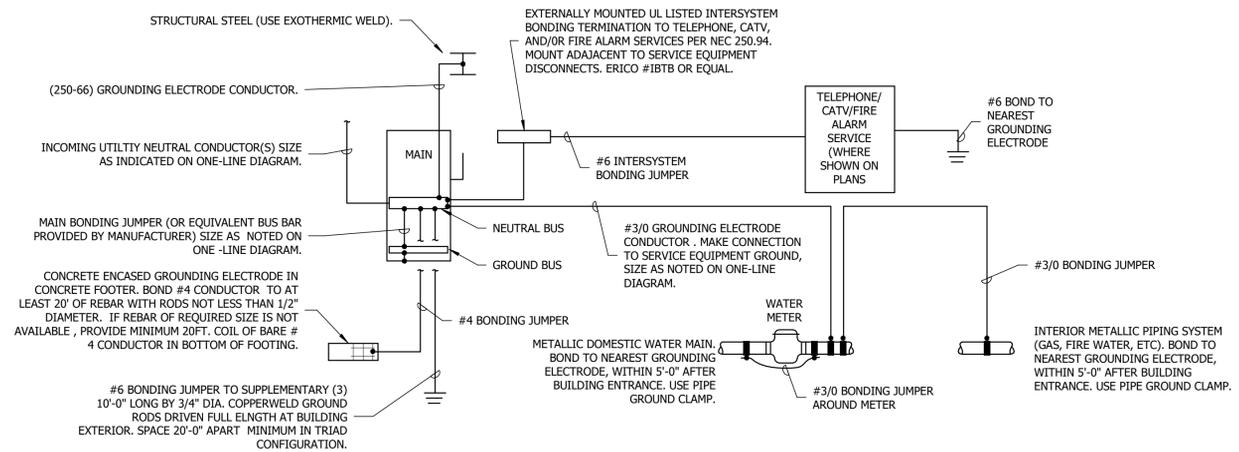
NOTES:

- COORDINATE FINAL PROGRAMMING REQUIREMENTS (INCLUDING TIME OF DAY SETTINGS) WITH OWNER AND OWNER'S CONSTRUCTION MANAGER.
- LIGHTING CONTROL SYSTEM MEETS ALL REQUIREMENTS OF ALL LOCAL AND STATE APPLICABLE CODES OR ORDINANCES.
- LCP1 CONTROL SITE LIGHTING, LCP1 CONTROL WAREHOUSE LIGHTING.

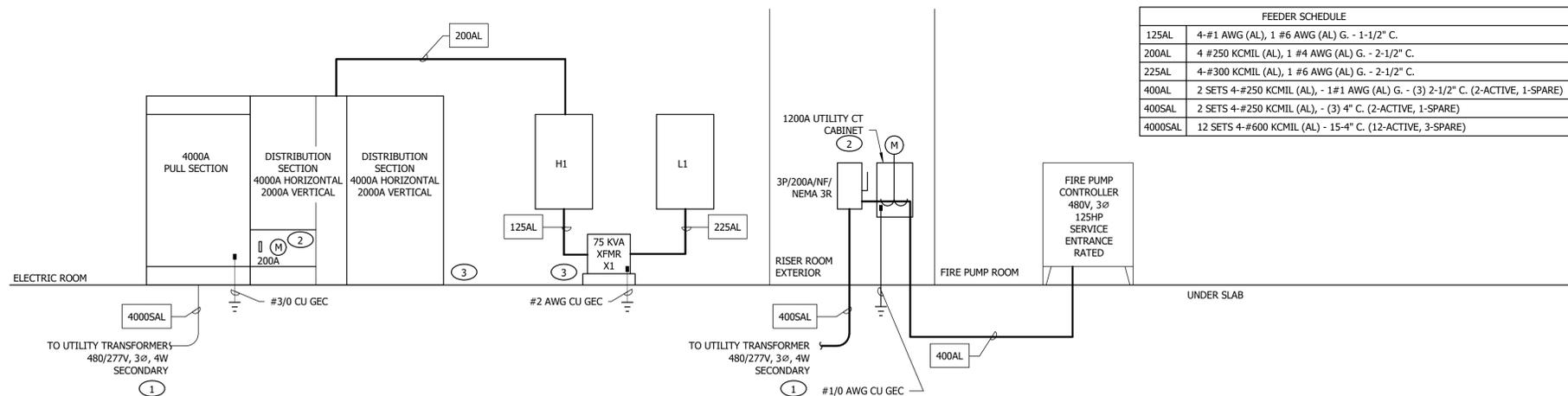


PANEL LCP

3 LIGHTING CONTROL PANEL LCP DETAIL
NO SCALE



2 ELECTRICAL GROUNDING AND BONDING DETAIL
NO SCALE



1 ONE-LINE RISER DIAGRAM
NTS

CLIENT:



PANATTONI

DEVELOPMENT

PROJECT:

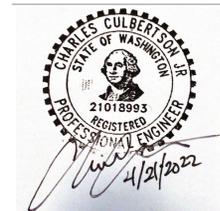
SOUTH SOUND COMMERCE CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



CITY STAMP:

SHEET NAME:

RISER DIAGRAM AND SCHEDULES

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

E7.00

1200 Fifth Ave., Suite 1300
Seattle, WA 98101
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6100 Wilshire Boulevard Suite 430
Los Angeles, CA 90048
Attn: Thomas Bartczak, PM
Phone: (310) 975-2061
Email: Thomas.Bartczak@windwardec.com
WWW.WINDWARDDEC.COM



PANATTONI
DEVELOPMENT

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022



SEAL:
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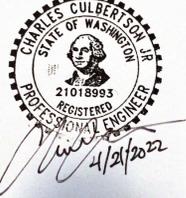
PANEL DESIGNATION		H1		BUS AMP		200 A		MIN. A.I.C.		35,000		MAIN BREAKER		MLO																																		
LOCATION		ELECTRICAL ROO...		PHASE		3		WIRE		4		VOLTAGE		480/277 Wye																																		
MOUNTING		SURFACE		NOTES:																																												
TOTAL POLES		60																																														
CKT	CIRCUIT DESCRIPTION	AMPS	POLES	WIRE NO.	WIRE SIZE	COND. SIZE	A	B	C	A	B	C	COND. SIZE	COND. SIZE	WIRE NO.	WIRE NO.	POLES	AMPS	CIRCUIT DESCRIPTION	CKT																												
1	EW-1	20	1	2	12	12	3/4"	3.0												2																												
3								0.8		2.3		1.3						3	125	XFMR	4																											
5	JOCKEY PUMP	20	3	3	12	12	3/4"		0.8		0.8		1.9							6																												
7											3.0		3/4"	12	12	2	1	20	LCP	8																												
9								2.5				2.9								10																												
11	EF-1	20	3	3	12	12	3/4"		2.5		2.5		2.9	3/4"	12	12	3	3	20	GUH-1	12																											
13									2.5			2.9								14																												
15									2.5		2.5		2.9							16																												
17	EF-2	20	3	3	12	12	3/4"		2.5		2.5		2.9	3/4"	12	12	3	3	20	GUH-2	18																											
19									2.5			2.9								20																												
21									2.5			2.9								22																												
23	EF-3	20	3	3	12	12	3/4"		2.5		2.5		2.9	3/4"	12	12	3	3	20	GUH-3	24																											
25									2.5			2.9								26																												
27									2.5			2.9								28																												
29	EF-4	20	3	3	12	12	3/4"		2.5		2.5		2.9	3/4"	12	12	3	3	20	GUH-4	30																											
31									2.5			2.9								32																												
33									2.5			2.9								34																												
35	EF-5	20	3	3	12	12	3/4"		2.5		2.5		2.9	3/4"	12	12	3	3	20	GUH-5	36																											
37									2.5			2.9								38																												
39	EXIT SIGNS/INTERIOR EGRESS LIGHTING	20	1	2	10	10	3/4"	0.3				1.6	3/4"	10	10	2	1	20	EXTERIOR EGRESS/DECORATIVE...	40																												
41	INTERIOR LIGHTING	20	1	2	10	10	3/4"		3.3			3.2	3/4"	10	10	2	1	20	SITE EGRESS LIGHTING	42																												
43	INTERIOR LIGHTING	20	1	2	10	10	3/4"	3.2			4.0		3/4"	10	10	2	1	20	INTERIOR LIGHTING	44																												
45	INTERIOR LIGHTING	20	1	2	10	10	3/4"	4.0			3.2		3/4"	10	10	2	1	20	INTERIOR LIGHTING	46																												
47	INTERIOR LIGHTING	20	1	2	10	10	3/4"		4.0		4.0		3/4"	10	10	2	1	20	INTERIOR LIGHTING	48																												
49	INTERIOR LIGHTING	20	1	2	10	10	3/4"	4.0			4.0		3/4"	10	10	2	1	20	INTERIOR LIGHTING	50																												
51	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	52																												
53	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	54																												
55	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	56																												
57	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	58																												
59	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	60																												
Total Load (kVA):								A: 50.9		B: 37.9		C: 43.7																																				
NEC LOAD SUMMARY PANEL H1																																																
NOTES: RECPS. - 100% FIRST 10 kVA, 50% REMAINING (NEC 220.44) KITCH. - BETWEEN 100% & 65% (NEC 220.56) NON-COINCIDENTAL - 0% (NEC 220.60)										<table border="1"> <thead> <tr> <th>LTS.</th> <th>RECPS.</th> <th>HVAC</th> <th>MISC.</th> <th>KITCH.</th> <th>NON-COIN</th> </tr> </thead> <tbody> <tr> <td>38.6</td> <td>3.3</td> <td></td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td>125%</td> <td>100%</td> <td></td> <td>100%</td> <td></td> <td>0%</td> </tr> <tr> <td>48.3</td> <td>3.3</td> <td></td> <td>1.0</td> <td></td> <td></td> </tr> </tbody> </table>					LTS.	RECPS.	HVAC	MISC.	KITCH.	NON-COIN	38.6	3.3		1.0			125%	100%		100%		0%	48.3	3.3		1.0			<table border="1"> <thead> <tr> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>132.5 kVA (CONNECTED)</td> </tr> <tr> <td>107% DEMAND FACTOR</td> </tr> <tr> <td>142.0 kVA (DEMAND)</td> </tr> <tr> <td>171 AMPS (DEMAND)</td> </tr> </tbody> </table>					TOTAL	132.5 kVA (CONNECTED)	107% DEMAND FACTOR	142.0 kVA (DEMAND)	171 AMPS (DEMAND)
LTS.	RECPS.	HVAC	MISC.	KITCH.	NON-COIN																																											
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PANEL DESIGNATION		L1		BUS AMP		225 A		MIN. A.I.C.		10,000		MAIN BREAKER		MCB																																		
LOCATION		ELECTRICAL ROO...		PHASE		3		WIRE		4		VOLTAGE		120/208 Wye																																		
MOUNTING		SURFACE		NOTES:																																												
TOTAL POLES		42																																														
CKT	CIRCUIT DESCRIPTION	AMPS	POLES	WIRE NO.	WIRE SIZE	COND. SIZE	A	B	C	A	B	C	COND. SIZE	COND. SIZE	WIRE NO.	WIRE NO.	POLES	AMPS	CIRCUIT DESCRIPTION	CKT																												
1	DAMPERS	20	1	2	12	12	3/4"	0.3											SPACE	2																												
3	DEDICATED RCPT - PSE	20	1	2	12	12	3/4"		0.3										SPACE	4																												
5	DEDICATED RCPT - PHONE BOARD	20	1	2	12	12	3/4"			0.5									SPACE	6																												
7	T-STAT	20	1	2	12	12	3/4"	0.3											SPACE	8																												
9	FIRE ALARM CONTROL PANEL	20	1	2	12	12	3/4"	0.4											SPACE	10																												
11	DEDICATED RCPT - IRRIGATION...	20	1	2	12	12	3/4"		0.5										SPACE	12																												
13																			SPACE	14																												
15	EF-6, EF-7	20	2	2	12	12	3/4"	0.6											SPACE	16																												
17	RCPTS - ROOFTOP	20	1	2	10	10	3/4"		0.9										SPACE	18																												
19	RCPTS - ROOFTOP	20	1	2	10	10	3/4"	1.1											SPACE	20																												
21	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	22																												
23	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	24																												
25	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	26																												
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29	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	30																												
31	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	32																												
33	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	34																												
35	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	36																												
37	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	38																												
39	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	40																												
41	SPACE	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	SPACE	42																												
Total Load (kVA):								A: 2.3		B: 1.3		C: 1.9																																				
NEC LOAD SUMMARY PANEL L1																																																
NOTES: RECPS. - 100% FIRST 10 kVA, 50% REMAINING (NEC 220.44) KITCH. - BETWEEN 100% & 65% (NEC 220.56) NON-COINCIDENTAL - 0% (NEC 220.60)										<table border="1"> <thead> <tr> <th>LTS.</th> <th>RECPS.</th> <th>HVAC</th> <th>MISC.</th> <th>KITCH.</th> <th>NON-COIN</th> </tr> </thead> <tbody> <tr> <td>3.3</td> <td></td> <td></td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td>100%</td> <td></td> <td></td> <td>100%</td> <td></td> <td>0%</td> </tr> <tr> <td>3.3</td> <td></td> <td></td> <td>1.0</td> <td></td> <td></td> </tr> </tbody> </table>					LTS.	RECPS.	HVAC	MISC.	KITCH.	NON-COIN	3.3			1.0			100%			100%		0%	3.3			1.0			<table border="1"> <thead> <tr> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>5.6 kVA (CONNECTED)</td> </tr> <tr> <td>100% DEMAND FACTOR</td> </tr> <tr> <td>5.6 kVA (DEMAND)</td> </tr> <tr> <td>15 AMPS (DEMAND)</td> </tr> </tbody> </table>					TOTAL	5.6 kVA (CONNECTED)	100% DEMAND FACTOR	5.6 kVA (DEMAND)	15 AMPS (DEMAND)
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SHEET NAME:
PANEL SCHEDULES

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

E9.00



SECTION 283100 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 STIPULATIONS

- A. GENERAL PROVISIONS OF THE CONTRACT DOCUMENTS INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATIONS SECTIONS APPLY TO ALL WORK IN THIS SECTION.

1.2 WORK INCLUDED

- A. THIS SECTION OF THE SPECIFICATION COVERS THE FURNISHING AND INSTALLING OF A NEW COMPLETE MULTIPLEX/ADDRESSABLE FIRE ALARM SYSTEM FOR THE SOUTH SOUND COMMERCE CENTER BUILDING A AS DESCRIBED HEREIN AND AS SHOWN ON THE DRAWINGS. THE WORK COVERED BY THIS SECTION OF THE SPECIFICATIONS INCLUDES THE FURNISHING OF ALL EQUIPMENT, LABOR, MATERIALS, AND PERFORMANCE OF ALL OPERATIONS, INCLUDING FIELD PROGRAMMING OF THE NEW SYSTEM ASSOCIATED WITH THE INSTALLATION.
- B. PHASING. CONTRACTOR WILL BE REQUIRED TO PHASE THE INSTALLATION OF THE NEW FIRE ALARM SYSTEM IN CONJUNCTION WITH THE OVERALL PROJECT. PROVIDE A COMPLETE AND FUNCTIONAL SYSTEM.
- C. PROVIDE FIRE ALARM CONTROL PANEL (FAP), ALARM INITIATING DEVICES, ALARM INDICATING APPLIANCES, AND ALL REQUIRED CONNECTIONS AS SHOWN ON THE DRAWINGS. THE FAP SHALL BE UL LISTED FOR USE AS PER CONTROL UNITS (UOJZ). THE DETECTION SYSTEM SHALL PROVIDE SMOKE AND HEAT DETECTORS, MANUAL PULL STATIONS AND DUCT DETECTORS IN AREAS INDICATED ON THE DRAWING. PROVIDE AUDIBLE/VISIBLE NOTIFICATION AS INDICATED ON THE PLANS.
- D. PROVIDE NECESSARY EQUIPMENT, MISCELLANEOUS CONNECTIONS, AND PROGRAMMING REQUIRED TO INTERFACE THE NEW SYSTEM WITH THE SUPERVISING STATION SELECTED BY THE OWNER AND AS ALLOWED BY THE FIRE MARSHAL.
- E. PROVIDE ALL INTERFACE MODULES NECESSARY TO INTERCONNECT THE BUILDING FAP WITH THE AUTOMATIC SUPPRESSION SYSTEMS, HVAC FAN AND DAMPER CONTROLS AND OTHER REQUIRED INITIATING OR CONTROL OUTPUT DEVICES AS APPLICABLE. COORDINATE ALL LOCATIONS OF REQUIRED INTERCONNECTIONS WITH THE RESPECTIVE TRADE CONTRACTORS.
- F. THE SYSTEM SHALL INCLUDE ALL WIRING, RACEWAYS, PULL BOXES, TERMINAL CABINETS, OUTLET AND MOUNTING BOXES, CONTROL EQUIPMENT, ALARM AND SUPERVISORY SIGNAL INITIATING DEVICES, ALARM NOTIFICATION APPLIANCES, AND ALL OTHER MANUFACTURER PROPRIETARY EQUIPMENT SUCH AS SIGNALING LINE CIRCUIT (SLC) MODULES, NOTIFICATION APPLIANCE CIRCUIT MODULES, AND OTHER ACCESSORIES AND MISCELLANEOUS ITEMS REQUIRED FOR A COMPLETE OPERATING SYSTEM IN THE BUILDING.
- G. THE LAYOUT ON THE DRAWINGS IS DIAGRAMMATIC. WHERE ADDITIONAL REMOTE FIRE ALARM CONTROL UNITS, NAC EXTENDER PANELS, OR SIMILAR FIRE ALARM RELATED EQUIPMENT ARE NEEDED, THEY SHALL BE PROVIDED AT A SUITABLE TERMINAL CABINET LOCATION. EACH REMOTE FIRE ALARM CONTROL UNIT SHALL BE POWERED FROM A WIRING RISER SPECIFICALLY FOR THAT USE OR FROM A LOCAL POWER PANEL. ALL FIRE ALARM POWER CIRCUITS SHALL BE DEDICATED. WHERE REMOTE FIRE CONTROL UNITS ARE PROVIDED, EQUIPMENT FOR NOTIFICATION APPLIANCES MAY BE LOCATED IN THE REMOTE FIRE ALARM CONTROL UNITS.

1.3 DEFINITIONS

- A. WHEREVER MENTIONED IN THIS SPECIFICATION OR ON THE DRAWINGS, THE NOMENCLATURE, EQUIPMENT, DEVICES, APPLIANCES, AND FUNCTIONS SHALL BE AS DEFINED BY NFPA 72 OR AS FOLLOWS:
- AUTHORITY HAVING JURISDICTION (AHJ) – FOR THE PURPOSE OF THESE DOCUMENTS THE TERM AHJ IS DEFINED AS ARE OTHER COMMONLY USED TERMS FOR PERSONNEL ASSOCIATED WITH REVIEW OR APPROVAL AS FOLLOWS:
 - AHJ – CITY OF TUMWATER, WA
 - FIRE MARSHAL – TUMWATER FIRE DEPARTMENT
 - OWNER – PANATTONI DEVELOPMENT
 - PROFESSIONAL – WINDWARD ENGINEERS & CONSULTANTS
 - CONSTRUCTION MANAGER (CM) – AGENT FOR THE OWNER THAT OVERSEES OR COORDINATES THE PROJECT DAILY.
 - INSURANCE CARRIER – AGENT FOR THE OWNER THAT PROVIDES INSURANCE COVERAGE FOR THE PROJECT.
 - TERMINAL CABINET – A STEEL CABINET WITH LOCKING, HINGE-MOUNTED DOOR IN WHICH TERMINAL STRIPS ARE SECURELY MOUNTED. MINIMUM SIZE IS 8-INCHES BY 8-INCHES (200 MM BY 200 MM).
 - FURNISH – TO SUPPLY THE STATED EQUIPMENT, MATERIALS, AND SERVICES.
 - INSTALL – TO SET IN POSITION AND CONNECT OR ADJUST FOR USE.
 - PROVIDE – TO FURNISH AND INSTALL THE STATED EQUIPMENT OR MATERIALS.
 - CONTRACTOR – SHALL REFER TO THE FIRE ALARM/ELECTRICAL CONTRACTOR.
 - FIRE PROTECTION/SPRINKLER CONTRACTOR – SHALL REFER TO THE PERSON OR GROUPS RESPONSIBLE FOR PROVIDING THE SPRINKLER SYSTEM.

1.4 APPROVALS

- A. THE CONTRACTOR MUST COMPLY WITH ALL LAWS, ORDINANCES, AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION (AHJ), INCLUDING BOROUGH, COUNTY, STATE, FEDERAL, PUBLIC UTILITY, AND THE OWNER'S INSURANCE CARRIER.
- B. BATTERY CALCULATIONS, PRODUCT DATA SHEETS, SHOP DRAWINGS AND ALL OTHER ASSOCIATED SUBMITTALS MUST BEAR THE STAMPS OF AND BE REVIEWED AND/OR APPROVED BY THE AHJ AND THE OWNER'S INSURANCE CARRIER. ANY AND ALL COMMENTS RECEIVED FROM THE AFOREMENTIONED REVIEWS, AND RESOLUTION THEREOF, SHALL BE SUBMITTED TO THE PROFESSIONAL FOR REVIEW AND APPROVAL.
- C. THE CONTRACTOR SHALL SUBMIT FULL AND COMPLETE SHOP DRAWINGS TO THE PROFESSIONAL FOR REVIEW AND OBTAIN A STAMP OF APPROVAL FROM THE PROFESSIONAL PRIOR TO INSTALLATION.

1.5 FIRE ALARM DESIGN

- A. SYSTEM SHALL BE A COMPLETE, SUPERVISED, NON-CODED, ADDRESSABLE FIRE ALARM SYSTEM CONFORMING TO NFPA 72. THE SYSTEM SHALL OPERATE IN ACCORDANCE WITH THE MATRIX OF OPERATIONS SHOWN ON THE CONTRACT DRAWINGS. THE SYSTEM SHALL REMAIN IN THE ALARM MODE UNTIL ALL INITIATING DEVICES ARE RESET AND THE FAP IS MANUALLY RESET AND RESTORED TO NORMAL STATUS. THE SYSTEM SHALL PROVIDE THE FOLLOWING FUNCTIONS AND OPERATING FEATURES:
- ALL FIRE ALARM SYSTEM CIRCUITS SHALL BE ELECTRICALLY SUPERVISED. PROVIDE CLASS B SIGNALING LINE CIRCUITS (SLC) AND CLASS B NOTIFICATION APPLIANCE CIRCUITS (NAC). PROVIDE SUPERVISION OF THE PRIMARY POWER SUPPLY, PRESENCE OF THE BATTERY, BATTERY VOLTAGE, AND PLACEMENT OF THE MODULES WITHIN THE PANEL.
 - AUTOMATIC RESPONSE FUNCTIONS SHALL BE ACCOMPLISHED BY THE FIRST DEVICE INITIATED. ALARM FUNCTIONS RESULTING FROM INITIATION BY THE FIRST DEVICES SHALL NOT BE ALTERED BY SUBSEQUENT ALARMS.
 - ALARM, SUPERVISORY AND TROUBLE SIGNALS SHALL BE AUTOMATICALLY TRANSMITTED TO THE APPROVED SUPERVISORY SERVICE VIA A STAND-ALONE COMMUNICATOR. THE COMMUNICATOR SHALL BE CAPABLE OF TRANSMITTING SIGNALS VIA CELLULAR SIGNAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL EQUIPMENT AND MAKING ALL NECESSARY CONNECTIONS FOR A COMPLETE OPERATING SYSTEM INCLUDING A 120V, 20-AMP CIRCUIT. THE OWNER SHALL BE RESPONSIBLE FOR ANY REQUIRED SERVICE AND CONNECTION FEES.
 - HISTORY LOG FUNCTION SHALL BE ENABLED AND SHALL INCLUDE ALL ALARMS, TROUBLE SIGNALS, AND RESET ACTIVITIES/EVENTS. THE HISTORY LOG SHALL NOT BE ERASED DURING COMPLETE LOSS OF POWER.
 - THE ENVIRONMENTAL COMPENSATION FUNCTION SHALL BE ENABLED.
 - ADJUSTABLE SENSITIVITY FOR DETECTORS.
 - BLOCK ALARM AND ACKNOWLEDGE SHALL BE PROVIDED.
 - THE TROUBLE SIGNALS SHALL BE NON-LATCHING.
 - ALARM VERIFICATION SHALL BE AVAILABLE.
 - DEVICE CONFIRMATION SHALL BE ENABLED.
 - UNION KEYS SHALL BE PROGRAMMED IN ACCORDANCE WITH THE AHJ AND OWNER'S SPECIFIC REQUIREMENTS.
 - PROVIDE PROGRAM CAPABILITY VIA SWITCHES IN A LOCKED PORTION OF THE FAP TO BYPASS THE AUTOMATIC NOTIFICATION APPLIANCE CIRCUITS, AIR HANDLER SHUTDOWN, SUPERVISING STATION AND OTHER OUTPUT FEATURES. OPERATION OF THIS PROGRAMMING SHALL INDICATE A TROUBLE CONDITION ON THE FAP AND PRINTER OUTPUT.
 - ALARM FUNCTIONS SHALL OVERRIDE TROUBLE OR SUPERVISORY FUNCTIONS. SUPERVISORY FUNCTIONS SHALL OVERRIDE TROUBLE FUNCTIONS.
 - THE SYSTEM SHALL BE CAPABLE OF BEING PROGRAMMED IN THE FIELD. ALL PROGRAMMED INFORMATION SHALL BE STORED IN NON-VOLATILE MEMORY.
 - THE SYSTEM SHALL BE CAPABLE OF OPERATING, SUPERVISING, AND/OR MONITORING BOTH ADDRESSABLE AND NON-ADDRESSABLE ALARM AND SUPERVISORY DEVICES.
 - THERE SHALL BE NO LIMIT, OTHER THAN MAXIMUM SYSTEM CAPACITY, AS TO THE NUMBER OF ADDRESSABLE DEVICES WHICH MAY BE IN ALARM SIMULTANEOUSLY.
 - THE SYSTEM SHALL BE CONFIGURED TO PERMIT A SINGLE PERSON WALK-TEST TO BE PERFORMED.
 - ALL AUTOMATIC SPRINKLER DEVICES, INCLUDING CONTROL VALVES AND WATER FLOW SWITCHES, AS INDICATED ON THE DRAWINGS, SHALL BE MONITORED IN ACCORDANCE WITH THE MATRIX OF OPERATIONS.
- B. DETECTION INITIATION
- ALARM VERIFICATION – FEATURE SHALL BE FIELD PROGRAMMABLE FOR ALL SMOKE DETECTORS IN ACCORDANCE WITH NFPA 72. CROSS-ZONING SHALL NOT BE PERMITTED AS A SUBSTITUTE FOR ALARM VERIFICATION.
 - DETECTOR SENSITIVITY CHECK/ADJUSTMENT – INDIVIDUAL SMOKE DETECTOR SENSITIVITY CHECKING AND ADJUSTING FOR ALARM CONDITION SHALL BE PROVIDED AT THE FAP. SAID SENSITIVITY CHECKING AND ADJUSTING SHALL MEET AND BE LISTED BY UL FOR THIS FUNCTION.
 - DETECTOR MAINTENANCE MONITORING – PROVIDE MONITORING OF SMOKE DETECTOR CHAMBERS FOR GRADUAL BUILDUP OF FOREIGN MATERIALS IN THE SENSING CHAMBER. WHEN THE SMOKE DETECTOR SENSES A HIGH LEVEL OF CONTAMINATION, THE CONTROL PANEL SHALL CAUSE A TROUBLE CONDITION AND INDICATE THE SPECIFIC DETECTOR LOCATION IN NEED OF MAINTENANCE.
 - AUTOMATIC DRIFT COMPENSATION – ALL SMOKE DETECTORS SHALL BE MONITORED FOR CHANGES IN SENSITIVITY RANGES AND AUTOMATICALLY ADJUST THE DETECTION RANGE UP OR DOWN TO COMPENSATE FOR ENVIRONMENTAL CHANGES OR DEGRADATION OF DETECTOR COMPONENTS.

1.6 OVERVOLTAGE AND SURGE PROTECTION

- A. SIGNALING LINE CIRCUIT SURGE PROTECTION. ALL COMMUNICATIONS EQUIPMENT SHALL BE PROTECTED AGAINST SURGES INDUCED ON ANY SLC. ALL CABLES AND CONDUCTORS, WHICH SERVE AS COMMUNICATIONS LINKS, SHALL HAVE SURGE PROTECTION CIRCUITS INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- B. POWER SUPPLY CIRCUIT PROTECTION. THE 120 VAC POWER SUPPLY FOR THE FAP SHALL BE PROTECTED AGAINST SURGES IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- C. FUSES SHALL NOT BE USED FOR SURGE PROTECTION.
- D. WIRING EXTENDING OUTSIDE THE BUILDING, EITHER UNDERGROUND OR OVERHEAD, SHALL MEET THE REQUIREMENTS OF THE NEC, NFPA 72, AND THE MANUFACTURER WITH RESPECT TO LIGHTNING AND OTHER INDUCED SURGES. PROVIDE LOW VOLTAGE LINE PROTECTION AT THE WIRE ENTRY POINT TO THE BUILDING.

1.7 QUALITY ASSURANCE

A. CONTRACTOR:

- "CONTRACTOR" IS DEFINED AS THE COMPANY AND AUTHORIZED REPRESENTATIVE THERETO THAT INSTALLS THE FIRE ALARM EQUIPMENT.
 - INSTALLATION SHALL BE ACCOMPLISHED BY A CONTRACTOR WITH A MINIMUM OF FIVE (5) YEARS EXPERIENCE IN THE INSTALLATION OF FIRE ALARM SYSTEMS. CONTRACTOR SHALL SHOW EVIDENCE OF CERTIFICATION OF AT LEAST 1 EMPLOYEE DIRECTLY RESPONSIBLE FOR THE WORK BY THE NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET) AT LEVEL II, III, OR IV IN THE FIRE ALARM SYSTEMS SUBFIELD OF FIRE PROTECTION ENGINEERING TECHNOLOGY; OR, A REGISTERED ENGINEER WITH SIMILAR EXPERIENCE IN FIRE ALARM SYSTEM INSTALLATION.
 - IF SUCH A CERTIFIED INDIVIDUAL IS NOT EMPLOYED, ADEQUATE DOCUMENTATION SHALL BE PROVIDED TO SHOW COMPARABLE TRAINING AND EXPERIENCE OF AN EXISTING EMPLOYEE. AT A MINIMUM, COMPARABLE TRAINING AND EXPERIENCE SHALL CONSIST OF 5 YEARS OF PROGRESSIVE EXPERIENCE IN THE INSTALLATION AND DESIGN OF FIRE ALARM SYSTEMS OF SIMILAR SIZE AND COMPLEXITY TO THAT SPECIFIED HEREIN. ANY PROPOSED INSTALLER WHO CANNOT SHOW EVIDENCE OF SUCH QUALIFICATIONS MAY BE REJECTED. THE SERVICES OF A TECHNICIAN CERTIFIED BY THE CONTROL EQUIPMENT MANUFACTURER SHALL BE PROVIDED TO SUPERVISE INSTALLATION ADJUSTMENTS AND TESTS OF THE SYSTEM.
- B. DISTRIBUTOR:
- "DISTRIBUTOR" IS DEFINED AS THE COMPANY AND AUTHORIZED REPRESENTATIVE OF THE MANUFACTURER THAT DISTRIBUTES AND DESIGNS THE FIRE ALARM SYSTEM AND ASSOCIATED EQUIPMENT PROVIDED BY THE MANUFACTURER AND INSTALLED BY THE CONTRACTOR.
 - THE DISTRIBUTOR SHALL SHOW EVIDENCE OF CERTIFICATION BY THE MANUFACTURER IN THE TECHNICAL SUPPORT OF THE SYSTEM INSTALLED UNDER THIS CONTRACT. DOCUMENTATION OF FACTORY MANUFACTURER TRAINING ON THE SYSTEM AND PRODUCTS BEING PROVIDED IS REQUIRED FOR AN INDIVIDUAL DIRECTLY ASSOCIATED WITH THE PROJECT.
 - THE DISTRIBUTOR SHALL SHOW EVIDENCE OF CERTIFICATION OF AT LEAST 1 EMPLOYEE BY THE NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET) AT LEVEL III OR IV IN THE FIRE ALARM SYSTEMS SUBFIELD OF FIRE PROTECTION ENGINEERING TECHNOLOGY; OR, A REGISTERED ENGINEER WITH SIMILAR EXPERIENCE IN FIRE ALARM SYSTEM DESIGN AND INSTALLATION.
 - IF SUCH A CERTIFIED INDIVIDUAL IS NOT EMPLOYED, ADEQUATE DOCUMENTATION SHALL BE PROVIDED TO SHOW COMPARABLE TRAINING AND EXPERIENCE OF AN EXISTING EMPLOYEE. AT A MINIMUM, COMPARABLE TRAINING AND EXPERIENCE SHALL CONSIST OF 5 YEARS OF PROGRESSIVE EXPERIENCE IN THE INSTALLATION AND DESIGN OF FIRE ALARM SYSTEMS OF SIMILAR SIZE AND COMPLEXITY TO THAT SPECIFIED HEREIN AND DEMONSTRATE EXPERIENCE WITH THE DESIGN AND INSTALLATION OF THE SYSTEM BEING PROVIDED. ADDITIONALLY, PROVIDE DOCUMENTATION FOR THE REGISTERED OR NICET LEVEL PERSON THAT WILL REVIEW AND CERTIFY THE DESIGN.

C. MANUFACTURER AND EQUIPMENT:

- "MANUFACTURER" IS DEFINED AS THE COMPANY AND AUTHORIZED REPRESENTATIVE THERETO THAT PRODUCES THE FIRE ALARM EQUIPMENT.
 - EACH ITEM OF THE FIRE ALARM SYSTEM SHALL BE LISTED AS A PRODUCT OF A SINGLE FIRE ALARM SYSTEM MANUFACTURER UNDER THE APPROPRIATE CATEGORY BY UNDERWRITERS LABORATORIES, INC. (UL), AND SHALL BEAR THE UL LABEL. EQUIPMENT IS TO BE LISTED UNDER UL CATEGORY UOJZ AS A SINGLE CONTROL UNIT. PARTIAL LISTING SHALL NOT BE ACCEPTABLE.
 - ALL DEVICES SHALL BE LISTED FOR USE WITH THE UOJZ LISTED CONTROL PANEL. ANY ASSOCIATED THIRD PARTY EQUIPMENT THAT IS NOT REQUIRED TO BE SPECIFICALLY LISTED FOR USE WITH THE CONTROL PANEL, SHALL BE CERTIFIED AS BEING ACCEPTABLE FOR USE WITH THE SPECIFIED SYSTEM BY THE MANUFACTURER.
 - TESTING SERVICES OR LABORATORIES:
 - PROVIDE FIRE ALARM AND DETECTION SYSTEM COMPONENTS THAT ARE UL LISTED AND FM APPROVED AND LABELED FOR THEIR INTENDED USE AND SERVICE. CONSTRUCT ALL FIRE ALARM AND FIRE DETECTION EQUIPMENT IN ACCORDANCE WITH THE PUBLICATIONS FROM UNDERWRITERS LABORATORIES (UL) AND FACTORY MUTUAL ENGINEERING CORPORATION (FM) SUCH AS:
 - UL 464 – AUDIBLE SIGNAL APPLIANCES
 - UL 864 – CONTROL UNITS FOR FIRE PROTECTIVE SIGNALING SYSTEMS
 - UL 1971 – SIGNALING DEVICES FOR THE HEARING IMPAIRED
- D. CODES AND STANDARDS:
- WASHINGTON BUILDING CODE, 2018 EDITION
 - ANY LOCAL CITY CODES, AMENDMENTS OR ORDINANCES.
 - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) (IBC/IFC REFERENCED EDITION IF SO DESIGNATED, OTHERWISE LATEST EDITION):
 - NFPA 70, NATIONAL ELECTRICAL CODE (NEC)
 - NFPA 72, NATIONAL FIRE ALARM CODE
 - NFPA 101, LIFE SAFETY CODE
 - AMERICANS WITH DISABILITIES ACT (ADA) AND THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG).
 - UNDERWRITERS LABORATORIES (UL), CURRENT EDITION OR VERIFIED SUPPLEMENTS.
 - FIRE PROTECTION EQUIPMENT DIRECTORY
 - ELECTRICAL CONSTRUCTION MATERIALS DIRECTORY
 - FACTORY MUTUAL (FM) APPROVAL GUIDE, CURRENT EDITION OR VERIFIED SUPPLEMENTS.
 - THE OWNER'S INSURANCE CARRIER.

1.8 SUBMITTALS

- A. REFER TO ANY FRONT END GENERAL PROJECT OR ELECTRICAL SPECIFICATIONS FOR BASIC INFORMATION RELATING TO SUBMITTAL REQUIREMENTS.
- B. THE FIRE ALARM/ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL FEES AND EFFORTS ASSOCIATED WITH THE REQUIRED APPROVALS.
- C. PRIOR TO INSTALLATION OF ANY MATERIALS AND/OR SYSTEM COMPONENTS, ALL FIRE ALARM SYSTEM SHOP DRAWINGS AND EQUIPMENT MUST BE APPROVED BY AND BEAR THE STAMP OF THE AHJ AND THE OWNER'S INSURANCE CARRIER AS APPLICABLE. FRONT END APPROVALS AS SPECIFIED IN IBC 907.1.1 TO THE AHJ AND ALL COMMENTS RECEIVED FROM THESE REVIEWS BE SUBMITTED TO THE PROFESSIONAL. AFTER APPROVAL BY THE AFOREMENTIONED AGENCIES AND REVIEW BY THE DESIGN PROFESSIONAL, SUBMIT 1 COMPLETE RECORD SET OF DOCUMENTS BEARING THE AFOREMENTIONED AGENCIES APPROVAL TO THE OWNER AND ANOTHER TO THE PROFESSIONAL.
- D. SUBMIT ALL SHOP DRAWINGS TO THE DESIGN PROFESSIONAL FOR REVIEW AND APPROVAL. SUBMITTALS ARE TO BE COMPLETE. PARTIAL SUBMITTALS SHALL NOT BE ACCEPTED EXCEPT AS FOLLOWS. INCLUDE IN THE FIRST SUBMITTAL A SCHEDULE INDICATING THE PACKAGING AND ESTIMATED DELIVERY DATE OF ALL REQUIRED SUBMITTALS. EXAMPLE: SUBMITTAL 1 (DATE) WILL INCLUDE: CONTRACTOR QUALIFICATIONS, PHASING PLAN, AND CATALOG DATA. SUBMITTAL 2 (DATE) WILL INCLUDE: APPROVALS, DRAWINGS AND CALCULATIONS. SUBMITTAL 3 (DATE) WILL INCLUDE: SYSTEM MESSAGES, TEST PLAN AND EXTENDED SERVICE AGREEMENT.
- E. THE SUBMITTAL SHALL BE MADE AS A COMPLETE PACKAGE CONSISTING OF FIRE ALARM EQUIPMENT ONLY. THE SUBMITTAL SHALL NOT INCLUDE OTHER ELECTRICAL EQUIPMENT OR COMPONENTS NOT DIRECTLY RELATED TO THE FIRE ALARM SYSTEM INSTALLATION (E.G., SECURITY, SOUND SYSTEMS, POWER, ETC.) FOR APPROVAL. WHERE OTHER EQUIPMENT OR COMPONENTS ARE AN INTEGRAL PART OF THE FIRE ALARM SYSTEM, THEY SHALL BE INDICATED AS SUCH BUT NOT INCLUDED WITH THE SUBMITTAL AND ONLY SHOW REQUIRED INTERFACE DETAILS. FAILURE TO SUBMIT ALL REQUIRED MATERIALS AS A COMPLETE, SEPARATE, SINGLE PACKAGE SHALL BE CAUSE FOR REJECTION OF ENTIRE PACKAGE. COPIES OF THE CONTRACT DOCUMENTS WITH CONTRACTOR'S NOTES THEREON WILL BE REJECTED. SIMPLY REDLINING THE CONTRACT DOCUMENTS IS NOT ACCEPTABLE. FOR ANY RESUBMITTALS TO THE PROFESSIONAL, PROVIDE A WRITTEN RESPONSE TO ANY PREVIOUS COMMENTS.
- F. THE FIRE ALARM EQUIPMENT DISTRIBUTOR SHALL SUBMIT DOCUMENTS AS SPECIFIED IN THE QUALIFICATIONS PORTION OF THIS SECTION. THE SUBMITTAL SHALL INCLUDE IDENTIFICATION OF THE FOLLOWING:
- NAME, TITLE, ADDRESS, AND PROOF OF QUALIFICATIONS FOR EACH "CONTRACTOR" AND AUTHORIZED REPRESENTATIVE, "DISTRIBUTOR" AND AUTHORIZED REPRESENTATIVE, AND "MANUFACTURER" AND AUTHORIZED REPRESENTATIVE.
 - WHEN THE DISTRIBUTOR INTENDS TO UTILIZE THE SERVICES OF A MANUFACTURED-AFFILIATED COMPANY IN THE SYSTEM DESIGN, THE DISTRIBUTOR SHALL SUBMIT A LETTER OF INTENT TO DO SO, ADDRESSED TO THE PROFESSIONAL, WHICH INCLUDES THE NAME OF THE MANUFACTURER-AFFILIATED COMPANY, THE NAMES AND QUALIFICATIONS OF THE NICET-CERTIFIED OR REGISTERED ENGINEER EMPLOYEES OF THE COMPANY, AND WHICH DESCRIBES THE DELEGATION OF FIRE ALARM SYSTEM DESIGN RESPONSIBILITIES.
- G. PROVIDE A NARRATIVE OF THE PHASING AND CALCULATIONS.
- PROVIDE UPDATES TO THE PROFESSIONAL ON A MONTHLY BASIS INCLUDING PROJECTED DATES.
- H. SYSTEM COMPONENT DATA, SHOP DRAWINGS, AND CALCULATIONS:
- DRAWINGS SHALL BE TO SCALE. SUBMIT 24X36 OR 30X42 INCH SHOP DRAWINGS AT A SCALE NOT SMALLER THAN 1/8 INCH = 1 FOOT. ALL DRAWINGS TO BE IN CAD. SYSTEM COMPONENT DATA AND CALCULATIONS SHALL NOT BE SMALLER THAN LETTER SIZE.
 - SYMBOLS SHALL BE CONSISTENT FOR THE ENTIRE SHOP DRAWING PACKAGE. THEREFORE, THE SYMBOLS USED ON THE FLOOR PLAN DRAWINGS SHALL BE THE SAME SYMBOLS USED ON THE RISER DIAGRAM AND TAPALS. SUBMITTING A RISER DIAGRAM WITH A COPY OF THE CONTRACT DRAWINGS USED AS THE FLOOR PLANS IS UNACCEPTABLE AND WILL RESULT IN REJECTION OF THE SHOP DRAWINGS.
 - AS A MINIMUM, THE FIRE ALARM AND FIRE DETECTION SHOP DRAWING SUBMITTAL SHALL INCLUDE THE FOLLOWING:
 - INCLUDE ANNOTATED CATALOG DATA SHOWING MANUFACTURER'S NAME, MODEL, VOLTAGE, AND CATALOG NUMBERS FOR ALL EQUIPMENT AND COMPONENTS. WHERE MULTIPLE CONFIGURATIONS OF EQUIPMENT OR OPTIONS ARE AVAILABLE, INDICATE SPECIFIC CONFIGURATION BEING SUBMITTED.
 - PROVIDE FLOOR PLANS SHOWING THE LOCATION OF ALL CONTROL UNITS, POWER EXTENDERS, DEVICES, EQUIPMENT, AND APPLIANCES AND THEIR ADDRESSES, INCLUDING IDENTIFICATION OF EQUIPMENT CONTROLLED OR MONITORED BY THE FIRE ALARM SYSTEM (E.G., FANS, DAMPERS, ETC.). SHOW CIRCUITING BETWEEN ALL DEVICES. SHOW LOCATIONS FOR ALL JUNCTION BOXES USED FOR T-TAPS. INDICATE CONDUIT FILL PERCENTAGES ON THE PLANS.
 - PROVIDE COMPLETE RISER DIAGRAMS INDICATING THE WIRING SEQUENCE OF ALL DEVICES, EQUIPMENT, AND APPLIANCES, THEIR ADDRESSES, AND THEIR CONNECTIONS TO THE CONTROL EQUIPMENT. PROVIDE A COLOR CODE SCHEDULE FOR THE WIRING.

- PROVIDE POINT-TO-POINT WIRING DIAGRAMS SHOWING THE POINTS OF CONNECTION AND TERMINALS USED FOR ALL ELECTRICAL FIELD CONNECTIONS IN THE SYSTEM, INCLUDING ALL INTERCONNECTIONS WITHIN FIRE ALARM CABINETS, AND BETWEEN THE EQUIPMENT OR SYSTEMS WHICH ARE SUPERVISED OR CONTROLLED BY THE FIRE ALARM SYSTEM. DIAGRAMS SHALL SHOW ALL CONNECTIONS FROM FIELD DEVICES (INTERFACE MODULES, ALL FIRE PROTECTION EQUIPMENT, DETECTORS, MANUAL PULL STATIONS, NOTIFICATION APPLIANCES, ETC.) TO THE FAP AND REMOTE FAA, INITIATING CIRCUITS, SWITCHES, RELAYS AND TERMINALS, AND OTHER ANCILLARY EQUIPMENT.
- PROVIDE WIRING DIAGRAMS AND DRAWINGS TO DEPICT THE LAYOUT OF THE POWER SUPPLIES AND CORRESPONDING AUDIBLE/VISIBLE CIRCUITS. PROVIDE CIRCUIT NUMBERS FOR EACH NAC AND SLC CIRCUIT.
- PROVIDE DRAWINGS AND A DESCRIPTION OF HOW THE FIRE ALARM SYSTEM MEETS THE REQUIREMENTS TO SYNCHRONIZE ALL THE NOTIFICATION APPLIANCES THROUGHOUT THE BUILDING.
- PROVIDE DATA ON EACH CIRCUIT TO INDICATE THAT THERE IS AT LEAST 20 PERCENT SPARE CAPACITY FOR NOTIFICATION APPLIANCES ON THE NAC, AND 20 PERCENT SPARE CAPACITY FOR INITIATING DEVICES ON THE SLC (E.G., NOT MORE THAN 80 PERCENT LOADED). THIS PORTION OF THE SUBMITTAL SHALL INCLUDE WIRE SIZING CALCULATIONS TO SHOW THAT THE WIRING LENGTHS AND WIRE GAUGE PROVIDE ADEQUATE VOLTAGE TO THE LAST DEVICE ON A CIRCUIT. EXAMPLE - AN 8 AMP POWER SUPPLY WOULD NOT BE LOADED TO MORE THAN 6.4 AMPS AND IF THE AUDIBLE/VISIBLE APPLIANCE IS RATED FOR 20 TO 24 VOLTS DC, THE WIRE SIZING CALCULATIONS WOULD SHOW THAT THE LAST DEVICE HAS A MINIMUM VOLTAGE OF 20.8 VOLTS. THE CALCULATION SHALL BE PROVIDED IN A TABULAR FORMAT. SIMPLY PROVIDING THE AMPERAGE AT THE END OF THE CIRCUIT ON THE RISER OR PLAN DRAWINGS IS NOT ACCEPTABLE.
- PROVIDE COMPLETE BATTERY CALCULATIONS FOR BOTH THE ALARM AND SUPERVISORY POWER REQUIREMENTS. THE CALCULATION SHALL INCLUDE: IDENTIFICATION, QUANTITY, AND AMPERE-HOUR REQUIREMENTS FOR EACH SYSTEM COMPONENT AND/OR DEVICE IN BOTH THE STANDBY AND ALARM CONDITIONS IN A TABULAR OR OTHER EASILY DISCERNIBLE FORMAT. IN ADDITION TO ANY MANUFACTURER'S RECOMMENDED DERATING FACTOR, PROVIDE AN OVERALL MINIMUM 20 PERCENT SAFETY FACTOR.
- PROVIDE A COMPLETE DESCRIPTION OF THE SYSTEM OPERATION. THIS SHALL BE A WRITTEN SUMMARY OR FURNISHED COMPLETE AND CONSIST OF FIRE ALARM EQUIPMENT AND DATA ONLY. EACH SHALL CONTAIN SUFFICIENT DETAILED INFORMATION TO ENABLE OWNER'S TECHNICIANS TO UNDERSTAND, OPERATE AND MAINTAIN THE SYSTEM EQUIPMENT AND TO IDENTIFY REPLACEABLE PARTS. THE MANUAL SHALL INCLUDE:
 - AN INDEX.
 - COPIES OF ALL APPROVED SHOP DRAWINGS AND SUBMITTAL MATERIALS UPDATED TO "AS-BUILT".
 - A COMPLETE PARTS LIST OF ALL COMPONENTS.
 - A COPY OF THE COMPLETED AND SIGNED TESTING AND INSPECTION FORM (FROM NFPA 72 OR EQUIVALENT).
 - OPERATING INSTRUCTIONS, MAINTENANCE AND REPAIR PROCEDURES, AND TROUBLESHOOTING GUIDELINES.
 - TESTING PROCEDURES AND MAINTENANCE FREQUENCIES.
 - A LIST OF RECOMMENDED SPARE PARTS. THE SPARE PARTS LIST SHALL INCLUDE, FOR EACH ITEM, THE MANUFACTURER'S NAME, SERIAL NUMBER OF THE PART, AN ORDERING NUMBER, IF APPROPRIATE, AND A PHYSICAL AND ELECTRICAL DESCRIPTION OF THE PART.
 - A PRINTOUT OF THE NEW SYSTEM PROGRAM, INCLUDING ALL INPUT AND OUTPUT ADDRESSES AND MESSAGES DISPLAYED AT THE FAP AND FAA. FAILURE TO INCLUDE THE SYSTEM PROGRAM WILL BE CAUSE FOR WITHHOLDING FINAL PAYMENT.
 - A WRITTEN COPY OF ALL PASSWORDS OR OTHER ACCESS CODES FOR THE FAP.
- PROVIDE A COMPLETE TEST PLAN FOR SYSTEM TESTING AT LEAST THREE WEEKS PRIOR TO THE FINAL ACCEPTANCE TEST.
- SUBMIT A COPY OF THE EXTENDED SERVICE AGREEMENT.
- UPON RECEIPT OF FINAL-APPROVED SHOP DRAWING REVIEW, THE CONTRACTOR SHALL ISSUE ONE SET TO THE LOCAL CODE OFFICIAL.

1.9 PROJECT RECORD DOCUMENTS

- PREPARE AND SUBMIT 5 SETS OF DETAILED CAD "AS-BUILT" DRAWINGS. THE DRAWINGS SHALL SHOW THE SYSTEM AS INSTALLED, INCLUDING ALL DEVIATIONS FROM BOTH THE PROJECT DRAWINGS AND THE APPROVED SHOP DRAWINGS. THE DRAWINGS SHALL BE PREPARED ON UNIFORM SIZED SHEETS THE SAME SIZE AS THE PROJECT DRAWINGS.
- THE DRAWINGS SHALL INCLUDE COMPLETE PLAN VIEW WIRING DIAGRAMS SHOWING CONNECTIONS BETWEEN ALL DEVICES AND EQUIPMENT, INCLUDING, BUT NOT LIMITED TO, FIRE ALARM PANELS, FIELD DEVICES AND SINGLE LINE CIRCUIT ROUTINGS BETWEEN DEVICES. INDICATE CONDUIT FILL PERCENTAGES ON THE PLANS. ALL EQUIPMENT IN PANELS SHALL BE SHOWN IN THE AS-BUILT ORIENTATION.
- INCLUDE DETAILED CONDUIT SCHEDULES WITHIN THE FAP.
- INCLUDE A RISER DIAGRAM AND DRAWINGS SHOWING THE AS-BUILT LOCATION AND ADDRESS OR CIRCUIT NUMBER OF ALL DEVICES AND EQUIPMENT.
- THESE DRAWINGS SHALL BE SUBMITTED WITH THE SPECIFIED OPERATIONS AND MAINTENANCE MANUALS.
- UPON COMPLETION OF THE PROJECT AND AFTER APPROVAL BY THE DESIGN PROFESSIONAL, SUBMIT ONE (1) COMPLETE, REPRODUCIBLE RECORD SET TO THE OWNER. A SINGLE CAD (ELECTRONIC) COPY OF THE "AS-BUILT" DRAWINGS SHALL ALSO BE PROVIDED.
- ALL DRAWINGS SUBMITTED SHALL BE SIGNED AND SEALED BY THE REGISTERED ENGINEER OR THE NICET EMPLOYEE OF THE DISTRIBUTOR.
- ENSURE ALL REQUIRED RECORD DOCUMENTS ARE PLACED IN THE DOCUMENT STORAGE BOX AT THE FIRE ALARM CONTROL PANEL IN ACCORDANCE WITH NFPA 72.

1.10 OPERATION AND MAINTENANCE DATA

- PROVIDE 5 BOUND COPIES OF AN OPERATION AND MAINTENANCE MANUAL. MAINTENANCE MANUALS SHALL BE FURNISHED COMPLETE AND CONSIST OF FIRE ALARM EQUIPMENT AND DATA ONLY. EACH SHALL CONTAIN SUFFICIENT DETAILED INFORMATION TO ENABLE OWNER'S TECHNICIANS TO UNDERSTAND, OPERATE AND MAINTAIN THE SYSTEM EQUIPMENT AND TO IDENTIFY REPLACEABLE PARTS. THE MANUAL SHALL INCLUDE:
 - AN INDEX.
 - COPIES OF ALL APPROVED SHOP DRAWINGS AND SUBMITTAL MATERIALS UPDATED TO "AS-BUILT".
 - A COMPLETE PARTS LIST OF ALL COMPONENTS.
 - A COPY OF THE COMPLETED AND SIGNED TESTING AND INSPECTION FORM (FROM NFPA 72 OR EQUIVALENT).
 - OPERATING INSTRUCTIONS, MAINTENANCE AND REPAIR PROCEDURES, AND TROUBLESHOOTING GUIDELINES.
 - TESTING PROCEDURES AND MAINTENANCE FREQUENCIES.
 - A LIST OF RECOMMENDED SPARE PARTS. THE SPARE PARTS LIST SHALL INCLUDE, FOR EACH ITEM, THE MANUFACTURER'S NAME, SERIAL NUMBER OF THE PART, AN ORDERING NUMBER, IF APPROPRIATE, AND A PHYSICAL AND ELECTRICAL DESCRIPTION OF THE PART.
 - A PRINTOUT OF THE NEW SYSTEM PROGRAM, INCLUDING ALL INPUT AND OUTPUT ADDRESSES AND MESSAGES DISPLAYED AT THE FAP AND FAA. FAILURE TO INCLUDE THE SYSTEM PROGRAM WILL BE CAUSE FOR WITHHOLDING FINAL PAYMENT.
 - A WRITTEN COPY OF ALL PASSWORDS OR OTHER ACCESS CODES FOR THE FAP.

1.11 SERVICE AGREEMENT

- INCLUDED IN THE BID PRICE SHALL BE A 1 YEAR SERVICE CONTRACT, EFFECTIVE UPON FINAL SYSTEM ACCEPTANCE, TO PROVIDE ALL SERVICE REQUIRED BEYOND THE WARRANTY AND THE CAPABILITY OF THE FACILITY PERSONNEL. CONTRACT SHALL INCLUDE ALL SERVICE AND REPAIRS REQUIRED UNDER THE WARRANTY AS WELL AS QUARTERLY, SEMI-ANNUAL, AND ANNUAL SYSTEM TESTING AND INSPECTION IN ACCORDANCE WITH NFPA 72.
- THE DISTRIBUTOR SHALL MAKE AVAILABLE TO THE OWNER A TESTING AND MAINTENANCE CONTRACT PROPOSAL TO MAINTAIN THE SYSTEM IN ACCORDANCE WITH NFPA 72 FOR YEARS 2 THROUGH 5. BREAKOUT PRICING ON A PER YEAR BASIS. OWNER IS UNDER NO OBLIGATION TO ACCEPT.

CLIENT:



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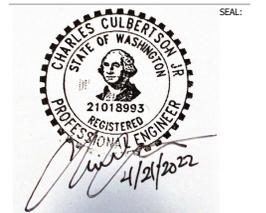
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SHEET NAME:

SPECIFICATIONS - FIRE ALARM

SECTION 283100 - FIRE DETECTION AND ALARM

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- NOTIFIER
- GAMWELL
- SIEMENS
- SIMPLEXGRINNELL
- APPROVED EQUAL

2.2 FIRE ALARM CONTROL PANEL (FAP)

- PROVIDE A COMPLETE CONTROL PANEL FULLY ENCLOSED IN A LOCKABLE STEEL ENCLOSURE AS SPECIFIED HEREIN. ALL OPERATIONS REQUIRED FOR TESTING OR FOR NORMAL CARE AND MAINTENANCE OF THE SYSTEMS SHALL BE PERFORMED FROM THE FRONT OF THE ENCLOSURE. IF MORE THAN A SINGLE UNIT IS REQUIRED AT A PUBLIC ACCESSIBLE LOCATION TO FORM A COMPLETE CONTROL PANEL, THE UNIT ENCLOSURES SHALL MATCH EXACTLY.
- EACH CONTROL UNIT SHALL PROVIDE POWER, SUPERVISION, CONTROL AND LOGIC FOR THE ENTIRE SYSTEM, UTILIZING SOLID STATE, MODULAR COMPONENTS, INTERNALLY MOUNTED AND ARRANGED FOR EASY ACCESS. EACH CONTROL UNIT SHALL BE SUITABLE FOR OPERATION ON A 120 VOLT, 60 HERTZ, BUILDING POWER SUPPLY. THE SYSTEM DEVICES SHALL OPERATE AT 24 VOLTS DC. PROVIDE EACH PANEL WITH SUPERVISORY FUNCTIONS FOR POWER FAILURE, INTERNAL COMPONENT PLACEMENT, AND OPERATION. VISUAL INDICATION OF ALARM, SUPERVISORY OR TROUBLE INITIATION ON THE FIRE ALARM CONTROL PANEL SHALL BE BY LIQUID CRYSTAL DISPLAY OR SIMILAR MEANS WITH A MINIMUM OF 80 CHARACTERS OF WHICH AT LEAST 32 ARE FIELD CHANGEABLE.
- THE FAP SHALL BE LISTED FOR REMOTE STATION SERVICE. PROVIDE AUDIBLE SIGNALS TO INDICATE ANY ALARM OR TROUBLE CONDITION. THE ALARM SIGNALS SHALL BE DIFFERENT FROM THE TROUBLE SIGNAL. CONNECT ALL CIRCUIT CONDUCTORS ENTERING OR LEAVING THE PANEL TO SCREW-TYPE TERMINALS WITH EACH TERMINAL MARKED FOR IDENTIFICATION. LOCATE DIODES AND RELAYS, IF ANY, ON SCREW TERMINALS IN THE FAP. CIRCUITS OPERATING AT 24 VDC SHALL NOT OPERATE AT LESS THAN 20.8 VOLTS. CIRCUITS OPERATING AT ANY OTHER VOLTAGE SHALL NOT HAVE A VOLTAGE DROP EXCEEDING 10 PERCENT OF NOMINAL VOLTAGE.
- OPERATION OF THE SYSTEM SHALL BE IN ACCORDANCE WITH THE DESCRIPTION UNDER "SYSTEM OPERATION" OF THIS SPECIFICATION SECTION AND AS INDICATED IN THE MATRIX OF OPERATIONS SHOWN ON THE CONTRACT DRAWINGS.
- THE CABINET ENCLOSURE SHALL BE IDENTIFIED BY PERMANENT MARKINGS ON THE CABINET OR BY AN ENGRAVED LAMINATED PHENOLIC RESIN NAMEPLATE. LETTERING ON THE NAMEPLATE SHALL IDENTIFY THE CABINET AND SHALL NOT BE LESS THAN 1-INCH HIGH. PROVIDE PROMINENT RIGID PLASTIC OR METAL IDENTIFICATION PLATES FOR ALL LAMPS, CIRCUITS, METERS, FUSES AND SWITCHES. THE CABINET SHALL BE PROVIDED IN A STURDY STEEL HOUSING, COMPLETE WITH BACKBOX, HANGERS AND FLOOR WITH CYLINDRICAL LOCK, AND SURFACE MOUNTING PROVISIONS.
- PROVIDE AN ALARM SILENCE SWITCH AT THE FAP THAT WILL SILENCE THE AUDIBLE SIGNAL BUT NOT AFFECT THE VISUAL ALARM INDICATOR. PROVIDE TROUBLE AND SUPERVISORY SILENCING SWITCH THAT WILL SILENCE THE AUDIBLE TROUBLE AND SUPERVISORY SIGNAL, BUT NOT EXTINGUISH THE VISUAL INDICATOR. THESE SWITCHES SHALL BE OVERRIDDEN UPON ACTIVATION OF A SUBSEQUENT ALARM.
- PROVIDE A DRILL TEST SWITCH WHICH WILL ACTIVATE THE ALARM INDICATING DEVICES, BUT WILL NOT PUT THE PANEL INTO THE ALARM MODE AND WHICH WILL NOT NOTIFY THE SUPERVISING STATION.
- DESIGN AND SUPERVISE EACH CIRCUIT SUCH THAT DATA ON PEAK OUTPUT AS DETERMINED IN AN ANECHOIC CHAMBER IS NOT SUITABLE. AUDIBLE APPLIANCES THROUGHOUT SHALL EMIT A SYNCHRONIZED, TEMPORAL SIGNAL.
- PROVIDE NOTIFICATION APPLIANCE MOUNTING PLATES CONSTRUCTED OF COLD ROLLED STEEL HAVING A MINIMUM THICKNESS OF 16 GAUGE AND EQUIPPED WITH MOUNTING HOLES AND OTHER OPENINGS AS NEEDED FOR A COMPLETE INSTALLATION. ALL FABRICATION MARKS AND HOLES SHALL BE GROUND AND FINISHED TO PROVIDE A SMOOTH AND NEAT APPEARANCE FOR EACH PLATE. EACH PLATE SHALL BE PRIMED AND PAINTED RED. PROVIDE TERMINAL BLOCKS FOR MAKING CONNECTIONS.
- VISIBLE APPLIANCES:
 - VISIBLE ALARM INDICATING APPLIANCES SHALL BE XENON STROBE LIGHTS MEETING THE REQUIREMENTS OF UL 1971. STROBES SHALL HAVE A FLASH RATE OF BETWEEN 1 AND 3 HZ. VISIBLE APPLIANCES THROUGHOUT EACH FLOOR SHALL BE SYNCHRONIZED.
 - THE STROBE LENS SHALL CONFORM TO THE AMERICANS WITH DISABILITIES ACT. STROBES SHALL BE DESIGNED AND LISTED AS REQUIRED FOR WALL OR CEILING MOUNTING AS APPLICABLE.
 - THE STROBE LENS HOUSING SHALL BE ENGRAVED OR STENCILED WITH THE WORD "FIRE".
 - CEILING MOUNTED DEVICES SHALL BE SPECIFICALLY APPROVED FOR CEILING MOUNTING. WALL MOUNTED DEVICES SHALL NOT BE USED FOR CEILING APPLICATIONS UNLESS APPROVED FOR SUCH USE.
- REMOTE ALARM LAMP AND TEST SWITCH
 - A REMOTE ALARM LAMP SHALL BE USED FOR IDENTIFICATION OF AN AUTOMATIC DEVICE WHERE ALARM DEVICES ARE MOUNTED SUCH THAT THEY ARE NOT VISIBLE.
 - THE ALARM LAMP SHALL HAVE AN INTEGRAL KEYPED TEST SWITCH TO PERMIT TESTING OF THE INITIATING DEVICE REMOTELY.
- RECORD DOCUMENT STORAGE BOX
 - PROVIDE A DOCUMENT STORAGE BOX TO HOLD FIRE ALARM SYSTEM RECORDS AND TESTING INFORMATION AS REQUIRED BY NFPA 72.
 - THE DOCUMENT STORAGE BOX SHALL BE CONSTRUCTED OF 18-GAUGE COLD ROLLED STEEL WITH A RED FACTORY-APPLIED POWDER COAT FINISH AND WHITE LETTERING READING "SYSTEM RECORD DOCUMENTS".
 - THE DOCUMENT STORAGE BOX SHALL HAVE INTEGRAL CAPABILITIES TO STORE ELECTRONIC MEDIA WITH A MINIMUM CAPACITY OF 8 GB.
 - ACCEPTABLE MANUFACTURERS:
 - SPACE AGE ELECTRONICS, INC.
 - APPROVED EQUAL.

2.9 SMOKE DETECTORS

- PROVIDE ADDRESSABLE PHOTOELECTRIC OR IONIZATION OPEN AREA AND PHOTOELECTRIC DUCT SMOKE DETECTORS AS FOLLOWS:
 - PROVIDE ANALOG SMOKE DETECTORS UTILIZING THE PHOTOELECTRIC LIGHT SCATTERING PRINCIPLE OR IONIZATION PRINCIPAL FOR OPERATION. SMOKE DETECTORS SHALL BE LISTED FOR USE WITH THE FIRE ALARM CONTROL PANEL.
 - PROVIDE SELF-RESTORING TYPE DETECTORS WHICH DO NOT REQUIRE ANY READJUSTMENT AFTER ACTUATION TO RESTORE IT TO NORMAL OPERATION. DETECTORS SHALL BE UL LISTED AS SMOKE - AUTOMATIC FIRE DETECTORS. INSTALL DETECTORS IN ACCORDANCE WITH THE REQUIREMENTS DESCRIBED IN THE LISTING.
 - DETECTORS SHALL HAVE ALARM VERIFICATION CAPABILITY AND AN ENVIRONMENTAL COMPENSATION FEATURE AND PROVIDED WITH AN INSECT SCREEN.
 - PROVIDE TWIST LOCK BASES FOR THE DETECTORS. THE DETECTORS SHALL MAINTAIN CONTACT WITH THEIR BASES WITHOUT THE USE OF SPRINGS. PROVIDE COMPANION MOUNTING BASE WITH FIXED WIRING TERMINALS. THE DETECTOR SHALL HAVE A VISUAL INDICATOR TO SHOW ACTUATION.
 - THE DETECTOR ADDRESS SHALL IDENTIFY THE PARTICULAR UNIT, ITS LOCATION WITHIN THE SYSTEM, AND ITS SENSITIVITY SETTING. DETECTOR SHALL BE OF THE LOW VOLTAGE TYPE RATED FOR USE ON A 24 VDC SYSTEM.
 - DETECTORS SHALL BE EQUIPPED WITH SCREW TERMINALS FOR EACH CONDUCTOR.
 - DUCT SMOKE DETECTORS SHALL BE FURNISHED BY THE FIRE ALARM CONTRACTOR AND INSTALLED BY THE HVAC CONTRACTOR. THE FIRE ALARM CONTRACTOR SHALL COORDINATE SAMPLING TUBE SIZES WITH THE HVAC CONTRACTOR. ALL DUCT SMOKE DETECTORS LOCATED 10-FEET OR HIGHER, LOCATED ABOVE FINISHED CEILINGS, OR OTHERWISE HIDDEN FROM VIEW, SHALL BE FURNISHED WITH REMOTE ALARM INDICATOR LAMPS AND TEST STATIONS LOCATED IN A READILY ACCESSIBLE LOCATION, ALONG WITH IDENTIFICATION NAMEPLATES CLEARLY INDICATING THE DEVICE AND ITS LOCATION.

2.10 NOTIFICATION APPLIANCES

- PROVIDE APPLIANCES IN AREAS AS INDICATED ON THE CONTRACT DRAWINGS. COMBINATION AUDIBLE/VISIBLE APPLIANCES IN A SINGLE WALL OR CEILING MOUNTED UNIT SHALL BE USED IN ALL LOCATIONS WHERE A COMBINATION UNIT CAN BE PROVIDED. SEPARATE AUDIBLE OR VISIBLE APPLIANCES MAY BE USED AS NECESSARY FOR COVERAGE OF ODD SHAPED AREAS TO FORM A COMPLETE AND FUNCTIONAL SYSTEM.
- ALL WALL MOUNTED DEVICES SHALL BE RED UNLESS OTHERWISE NOTED.
- AUDIBLE/VISIBLE DEVICES IN AREAS SUBJECT TO DAMAGE SHALL BE PROVIDED WITH A WIRE METAL PROTECTIVE COVER TO PROTECT THE DEVICE FROM DAMAGE. PLASTIC COVERS THAT REDUCE LIGHT AND SOUND TRANSMISSION ARE NOT ACCEPTABLE.
- AUDIBLE APPLIANCES:
 - ALL AUDIBLE APPLIANCES SHALL BE CAPABLE OF INSTALLATION ON STANDARD 4-INCH (100 MM) SQUARE ELECTRICAL BOXES. PROVIDE FIRE ALARM HORNS CONFORMING TO UL 464, HAVING SEPARATE TERMINATIONS FOR EACH "IN" AND "OUT" CONNECTION.
 - AUDIBLE APPLIANCES SHALL PROVIDE A MINIMUM OUTPUT SOUND OF 15 DBA ABOVE AMBIENT THROUGHOUT THE BUILDING IN ACCORDANCE WITH NFPA 72. THE APPLIANCE SHALL HAVE A MINIMUM RATING OF 90 DBA AT 10-FEET (3 M) AS NOTED ON REVERBERANT ROOM TEST; DATA ON PEAK OUTPUT AS DETERMINED IN AN ANECHOIC CHAMBER IS NOT SUITABLE. AUDIBLE APPLIANCES THROUGHOUT SHALL EMIT A SYNCHRONIZED, TEMPORAL SIGNAL.
 - PROVIDE NOTIFICATION APPLIANCE MOUNTING PLATES CONSTRUCTED OF COLD ROLLED STEEL HAVING A MINIMUM THICKNESS OF 16 GAUGE AND EQUIPPED WITH MOUNTING HOLES AND OTHER OPENINGS AS NEEDED FOR A COMPLETE INSTALLATION. ALL FABRICATION MARKS AND HOLES SHALL BE GROUND AND FINISHED TO PROVIDE A SMOOTH AND NEAT APPEARANCE FOR EACH PLATE. EACH PLATE SHALL BE PRIMED AND PAINTED RED. PROVIDE TERMINAL BLOCKS FOR MAKING CONNECTIONS.
- VISIBLE APPLIANCES:
 - VISIBLE ALARM INDICATING APPLIANCES SHALL BE XENON STROBE LIGHTS MEETING THE REQUIREMENTS OF UL 1971. STROBES SHALL HAVE A FLASH RATE OF BETWEEN 1 AND 3 HZ. VISIBLE APPLIANCES THROUGHOUT EACH FLOOR SHALL BE SYNCHRONIZED.
 - THE STROBE LENS SHALL CONFORM TO THE AMERICANS WITH DISABILITIES ACT. STROBES SHALL BE DESIGNED AND LISTED AS REQUIRED FOR WALL OR CEILING MOUNTING AS APPLICABLE.
 - THE STROBE LENS HOUSING SHALL BE ENGRAVED OR STENCILED WITH THE WORD "FIRE".
 - CEILING MOUNTED DEVICES SHALL BE SPECIFICALLY APPROVED FOR CEILING MOUNTING. WALL MOUNTED DEVICES SHALL NOT BE USED FOR CEILING APPLICATIONS UNLESS APPROVED FOR SUCH USE.

2.11 REMOTE ALARM LAMP AND TEST SWITCH

- A REMOTE ALARM LAMP SHALL BE USED FOR IDENTIFICATION OF AN AUTOMATIC DEVICE WHERE ALARM DEVICES ARE MOUNTED SUCH THAT THEY ARE NOT VISIBLE.
- THE ALARM LAMP SHALL HAVE AN INTEGRAL KEYPED TEST SWITCH TO PERMIT TESTING OF THE INITIATING DEVICE REMOTELY.

2.12 RECORD DOCUMENT STORAGE BOX

- PROVIDE A DOCUMENT STORAGE BOX TO HOLD FIRE ALARM SYSTEM RECORDS AND TESTING INFORMATION AS REQUIRED BY NFPA 72.
- THE DOCUMENT STORAGE BOX SHALL BE CONSTRUCTED OF 18-GAUGE COLD ROLLED STEEL WITH A RED FACTORY-APPLIED POWDER COAT FINISH AND WHITE LETTERING READING "SYSTEM RECORD DOCUMENTS".
- THE DOCUMENT STORAGE BOX SHALL HAVE INTEGRAL CAPABILITIES TO STORE ELECTRONIC MEDIA WITH A MINIMUM CAPACITY OF 8 GB.
- ACCEPTABLE MANUFACTURERS:
 - SPACE AGE ELECTRONICS, INC.
 - APPROVED EQUAL.

PART 3 - EXECUTION

3.1 GENERAL

- PROVIDE AND INSTALL THE SYSTEM IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS, ALL APPLICABLE CODES AND THE MANUFACTURER'S RECOMMENDATIONS. ALL WIRING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL THE PROVISIONS OF THE NEC. UPON COMPLETION, THE CONTRACTOR SHALL SO CERTIFY IN WRITING TO THE OWNER AND THE PROFESSIONAL.
- ALL ASSOCIATED CONDUIT AND WIRING FOR WALL-MOUNTED APPLIANCES SHALL BE HIDDEN FROM VIEW. UTILIZE RECESSED BACK BOXES TO MOUNT THE FIRE ALARM DEVICE. AS AN EXAMPLE, THIS WOULD INCLUDE MANUAL PULL STATIONS AND ALARM NOTIFICATION DEVICES ATTACHED TO GYPSUM OR CMU WALLS. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE OWNER, OR PROFESSIONAL PRIOR TO ROUTING ANY EXPOSED RACEWAY IN FINISHED AREAS OF THE BUILDING. THE CONTRACTOR SHALL COORDINATE THE ROUTING OF THE CONDUIT AND PLACEMENT OF BOXES TO MEET THIS REQUIREMENT.
- ALL JUNCTION BOXES SHALL BE SPRAYED RED AND LABELED "FIRE ALARM". WIRING COLOR CODE SHALL BE MAINTAINED THROUGHOUT THE INSTALLATION.
- THE CONTRACTOR SHALL CLEAN ALL DIRT AND DEBRIS FROM THE INSIDE AND THE OUTSIDE OF THE FIRE ALARM EQUIPMENT AFTER COMPLETION OF THE INSTALLATION. DETECTORS SHALL NOT BE INSTALLED DURING CONSTRUCTION. INSTALLING DETECTORS WITH A DUST COVER IS NOT ACCEPTABLE. INSTALL DETECTORS ONLY AFTER THE BUILDING IS CLEAN AND READY FOR TESTING AND OCCUPANCY.
- THE NICET APPROVED DISTRIBUTOR AND CONTRACTOR SUPERVISING EMPLOYEES SHALL ATTEND ALL MEETINGS REQUIRED BY THE PROFESSIONAL, OWNER OR CM. THIS SHALL INCLUDE AS A MINIMUM A PROJECT KICKOFF MEETING, MONTHLY JOB SITE VISITS TO SUPERVISE THE INSTALLATION, AND FINAL SYSTEM ACCEPTANCE.
- USE OF WIRE NUTS IS PROHIBITED. INSTALLING MULTIPLE WIRES ON A SINGLE TERMINAL IS PROHIBITED.
- PROVIDE A SMOKE DETECTOR OVER EACH FIRE ALARM CONTROL UNIT. FOR THE PURPOSE OF THIS PROJECT, THE TERM FIRE ALARM CONTROL UNIT SHALL APPLY TO THE FAP, DATA GATHERING PANELS, AND NOTIFICATION EXTENDER PANELS.

3.2 SYSTEM FIELD WIRING

- WIRE EACH SIGNAL LINE CIRCUIT AND FIRE ALARM INDICATING APPLIANCE CIRCUIT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. PROVIDE FIRE ALARM CIRCUIT CONDUCTORS WITH COLOR CODED INSULATION, OR USE COLOR CODED TAPE AT EACH CONDUCTOR TERMINATION AND IN EACH JUNCTION BOX AND INTERFACE PANEL.
- SIZE AND QUANTITY OF DATA, COMMUNICATION AND CONTROL WIRING ALONG WITH RELATED CONDUIT WHERE REQUIRED SHALL BE IN ACCORDANCE WITH THE GENERAL ELECTRICAL SPECIFICATIONS, EXCEPT AS MODIFIED HEREIN AND THE MANUFACTURER'S RECOMMENDATIONS AND THE REFERENCED CODES.
- SIGNALING LINE CIRCUITS, NOTIFICATION APPLIANCE CIRCUITS, AND INITIATING DEVICE CIRCUITS SHALL BE SUPERVISED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 72 AND THE SYSTEM OPERATION PORTION OF THIS SPECIFICATION. PROVIDE WIRING WITHIN CABINETS INSTALLED PARALLEL WITH OR AT RIGHT ANGLES TO THE SIDES AND BACK OF THE ENCLOSURE. ALL CONDUCTORS WHICH ARE TERMINATED, SPLICED, OR OTHERWISE INTERRUPTED IN ANY ENCLOSURE ASSOCIATED WITH THE FIRE ALARM SYSTEM SHALL BE CONNECTED WITH EITHER CRIMP-ON TYPE CONNECTIONS OR WITH CRIMP-ON SPADE TYPE CONNECTIONS TO TERMINAL BLOCKS. MARK EACH TERMINAL IN ACCORDANCE WITH THE WIRING DIAGRAMS OF THE SYSTEM.
- JUNCTION BOXES WITH CRIMP-ON TYPE CONNECTIONS MAY BE UTILIZED WHERE TWO (2) OR FEWER WIRING CONNECTIONS ARE MADE. PROVIDE A LABELED TERMINAL CABINET WHERE MORE THAN TWO WIRING CONNECTIONS ARE MADE.
- FOR ALARM AND SUPERVISORY INITIATING DEVICE CIRCUITS AND ALARM INDICATING CIRCUIT WIRING FOR THE LOW VOLTAGE PORTION OF THE FIRE ALARM SYSTEM, PROVIDE ALL WIRING AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER. PROVIDE WIRING OPERATING AT 120 VAC AS MINIMUM NO. 12 AWG SOLID COPPER HAVING SIMILAR INSULATION.
- CONDUIT:
 - CONDUCTORS SHALL BE RUN IN CONDUIT THROUGHOUT. THIS PORTION OF THE SYSTEM SHALL BE INSTALLED IN A MANNER APPROVED BY THE NATIONAL ELECTRIC CODE AND THE AHJ UTILIZING APPROVED RACEWAYS.
 - ALL CONDUIT SHALL BE RIGID OR EMT, SIZED AT 3/4 INCH MINIMUM. THE COLOR SHALL BE RED. ANY DEVICE WIRING THAT IS CONCEALED IN A WALL OR OTHER SIMILAR SPACE SHALL BE PROVIDED WITH FLEXIBLE METALLIC CONDUIT, CONDUIT OR OTHER SUITABLE RACEWAY.
 - THE USE OF TYPE MC FIRE ALARM CABLE IS PERMITTED IN LIEU OF CONDUIT TO THE EXTENT PERMITTED BY THE NEC, EXCEPT THAT CONDUCTORS SHALL BE IN CONDUIT OR SURFACE RACEWAY AS APPLICABLE IN PUBLIC OR OCCUPIED AREAS WITH EXPOSED CEILINGS. ALL TYPE MC FIRE ALARM CABLE SHALL BE RED STRIPED OR OTHERWISE IDENTIFIED. TYPE MC CABLE SHALL BE SIMILAR TO AFC CABLE SYSTEMS FIRE ALARM/CONTROL CABLE (PRODUCT INDICATED TO SHOW LEVEL OF QUALITY AND STYLING). INSTALL, SUPPORT AND TERMINATE AS REQUIRED BY THE NEC AND THE MANUFACTURER'S INSTRUCTIONS.

H. SURFACE RACEWAY:

- THE BUILDING SHALL USE EXPOSED SURFACE RACEWAYS AS DESCRIBED IN SECTION 3.1 ABOVE WHEN IT IS NECESSARY TO ROUTE EXPOSED CABLING IN PUBLIC ACCESSIBLE AREAS. THE EXTENT TO WHICH SURFACE RACEWAY IS PERMITTED IS BASED ON THE FEASIBILITY OF FIRST ROUTING CONCEALED CONDUIT OR FISHING TYPE MC FIRE ALARM CABLE TO THE DEVICE. WHERE THIS IS NOT PRACTICAL, SURFACE RACEWAY IS PERMITTED WITH THE APPROVAL OF THE OWNER, CM OR PROFESSIONAL.
- FOR ANY EXPOSED SURFACE RACEWAYS, METALLIC OR NON-METALLIC SURFACE RACEWAY IS PERMISSIBLE. NON-METALLIC SURFACE RACEWAY SHALL BE SIMILAR TO PANDUIT LDP MODELS (PRODUCT INDICATED TO SHOW LEVEL OF QUALITY). ALL SURFACE RACEWAY SHALL BE SIZED AS REQUIRED.
- PROVIDE NEW SURFACE MOUNTED BACK BOXES TO MOUNT THE FIRE ALARM DEVICE IN AREAS OF THE EXISTING BUILDING WHERE ARCHITECTURAL WORK WILL NOT PERMIT FLUSH MOUNTING AND CONCEALED CONDUIT. ROUTE NEW WIREMOLD FROM ABOVE THE CEILINGS, ALONG ARCHITECTURAL ELEMENTS AND DOWN TO DEVICES WHERE REQUIRED.
- MATCH OR COORDINATE THE SURFACE RACEWAY COLOR WITH THE ADJOINING SURFACE TO PROVIDE A UNIFORM APPEARANCE. PAINT AS REQUIRED AND SUBMIT COLOR SAMPLES TO THE PROFESSIONAL FOR APPROVAL.
- IN ACCORDANCE WITH NFPA 72, CONNECTIONS TO THE LIGHT AND POWER SERVICE SHALL BE ON DEDICATED BRANCH CIRCUITS. THE CIRCUITS AND CONNECTIONS SHALL BE MECHANICALLY PROTECTED VIA A HANDLE LOCKING OR SIMILAR DEVICE. CIRCUIT DISCONNECTING MEANS SHALL HAVE A RED MARKING, SHALL BE ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL, AND SHALL BE IDENTIFIED AS FIRE ALARM CIRCUIT CONTROL. THE LOCATION OF THE CIRCUIT DISCONNECTING MEANS SHALL BE PERMANENTLY IDENTIFIED AT EACH FIRE ALARM CONTROL UNIT. THIS SHALL APPLY TO ALL FIRE ALARM CONTROL, NAC, AMPLIFIER, AND SIMILAR PANELS.
- INDICATIVELY COLOR CODE ALL WIRING DIFFERENTLY FROM THE NORMAL BUILDING WIRING. AUDIBLE ALARM INDICATING APPLIANCES SHALL BE COLOR CODED DIFFERENTLY FROM ALARM INITIATING CIRCUITS. USE DIFFERENT COLORS FOR EACH TYPE OF ALL PANELS. ALL CEILING MOUNTED DEVICES SHALL BE IDENTIFIED AS FIRE ALARM CIRCUIT CONTROL.
- WIRING CONNECTIONS SHALL BE MADE BY THE INSTALLING CONTRACTOR AS SHOWN ON DRAWINGS FURNISHED BY THE REPRESENTATIVE OF THE DISTRIBUTOR. POWER SHALL NOT BE APPLIED TO THE SYSTEM UNTIL THE DISTRIBUTOR HAS APPROVED THE CONNECTIONS TO THE CONTROL EQUIPMENT.

3.3 INSTALLATION OF FIRE ALARM INITIATING AND NOTIFICATION EQUIPMENT

- ALL INITIATION AND NOTIFICATION EQUIPMENT SHALL BE INSTALLED ON BACK BOXES/JUNCTION BOXES. FIELD VERIFY EXACTLY THE LOCATION OF ALL PANELS. ALL CEILING MOUNTED DEVICES SHALL UTILIZE T-BAR HANGERS OR APPROVED EQUAL. PROVIDE A TYPED LABEL ON EACH MANUAL PULL STATION, DETECTOR, AND INTERFACE MODULE TO INDICATE THE LOOP AND ADDRESS NUMBER OF THE DEVICE.
- MANUAL PULL STATIONS: LOCATE MANUAL PULL STATIONS IN AREAS SHOWN ON THE DRAWINGS. PROVIDE RECESSED BACK BOXES IN WHICH THE STATION OPERATING MECHANISMS SHALL BE MOUNTED. MOUNT STATIONS WITH THE OPERATING HANDLES 42-INCHES ABOVE THE FINISHED FLOOR.
- SPOT TYPE SMOKE AND HEAT DETECTORS:
 - LOCATE SPOT TYPE SMOKE AND HEAT DETECTORS ON THE DRAWINGS. DETECTORS LOCATED ON THE CEILING SHALL BE INSTALLED NOT LESS THAN 4-INCHES FROM A SIDE WALL OR TO THE NEAR EDGE OF A CEILING TILE. THE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 72. INSTALL SMOKE DETECTORS NO CLOSER THAN 3 FEET FROM HVAC REGISTERS.
 - VERIFY THE QUANTITY AND LOCATION OF DUCT SMOKE DETECTORS REQUIRED WITH THE HVAC SCHEDULES AND DRAWINGS.
- AUDIBLE/VISIBLE ALARM NOTIFICATION APPLIANCES:
 - LOCATE APPLIANCES IN AREAS SHOWN ON THE DRAWINGS.
 - AS A MINIMUM, ZONE EACH FLOOR SEPARATELY AND SYNCHRONIZE ALL DEVICES THROUGHOUT THE BUILDING.
- VISIBLE ALARM INDICATING APPLIANCES:
 - LOCATE VISIBLE ALARM INDICATING APPLIANCES IN AREAS SHOWN ON THE DRAWINGS. FOR WALL MOUNTED STROBES, THE STROBE SHALL BE INSTALLED 80 INCHES ABOVE THE FINISHED FLOOR OR 6 INCHES BELOW THE CEILING, WHICHEVER IS LOWER. CEILING MOUNTED DEVICES SHALL BE INSTALLED WITH THE FACEPLATE FLUSH TO THE CEILING TILE.
 - PROVIDE SPARE CAPACITY IN CIRCUITS AS DESCRIBED ABOVE. STROBE LIGHTS SHALL BE WIRED FOR SYNCHRONIZED OPERATION THROUGHOUT.
 - ANY AREAS THAT REQUIRE ALTERNATE MOUNTING LOCATIONS, WALL MOUNTING HEIGHTS BETWEEN 80 AND 96 INCHES, OR CEILING MOUNTED DEVICES IN LIEU OF WALL MOUNTED TO PROPERLY COVER AN ENTIRE ROOM OR AREA BASED ON OBSTRUCTION MUST BE COORDINATED WITH THE FIRE ALARM DISTRIBUTOR PRIOR TO SUBMITTING TO THE PROFESSIONAL FOR APPROVAL. ADJUST CANDELA RATINGS AND CIRCUIT CALCULATIONS AS REQUIRED.
- FIRE ALARM CONTROL PANEL AND NAC PANELS:
 - LOCATE THE FAP WHERE INDICATED ON THE DRAWINGS. THE ENCLOSURE SHALL BE SURFACE-MOUNTED WITH TOP AND BOTTOM OPENING ABOVE AND BELOW THE FINISHED FLOOR.
 - ADDITIONAL PANELS, WHEN REQUIRED, MAY BE LOCATED IN STORAGE ROOMS, JANITOR'S CLOSETS, OR OTHER SIMILAR NOT NORMALLY OCCUPIED AREA. THE OWNER MUST APPROVE THESE LOCATIONS. THE ENCLOSURES SHALL BE SURFACE MOUNTED WITH THE TOP OF THE CABINET NOT MORE THAN 6 FEET ABOVE THE FINISHED FLOOR.
 - PROVIDE A SMOKE DETECTOR OVER THE CONTROL PANELS IN ACCORDANCE WITH NFPA 72.
 - PROVIDE TYPED QUALITY LABELS ON ALL PANEL IDENTIFICATION CARDS.
 - EXTEND POWER FROM A DEDICATED SPARE 20 AMP, 1-PHASE BREAKER IN ACCORDANCE WITH PART 1 OF THIS SPECIFICATION AND THE NEC. FIELD VERIFY EXACT LOCATIONS.
- MONITOR AND CONTROL MODULES:
 - MODULES SHALL BE MOUNTED WITHIN 3 FEET OF THE DEVICE BEING MONITORED OR CONTROLLED. IN PUBLIC ACCESSIBLE AREAS, LOCATE IN THE IMMEDIATE VICINITY OF ITS ASSOCIATED COMPONENT ABOVE THE CEILING.
 - MODULES SHALL BE LABELED WITH THEIR RESPECTIVE ADDRESSES.
 - THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING INSTALLATION WITH THE TRADE CONTRACTOR'S PROVIDING THE OTHER DEVICES.
 - SPRINKLER SYSTEM WATER FLOW AND PRESSURE SWITCHES SHALL BE FURNISHED AND INSTALLED BY THE SPRINKLER SYSTEM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL CONNECT THESE SWITCHES TO THE FIRE ALARM SYSTEM. THE CONTRACTORS SHALL WORK IN A COORDINATED BASIS TO TEST THE UNITS.
 - SPRINKLER SYSTEM SUPERVISORY SWITCHES SHALL BE FURNISHED AND INSTALLED BY THE SPRINKLER SYSTEM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL CONNECT THE SUPERVISORY SWITCHES TO THE FIRE ALARM SYSTEM. THE CONTRACTORS SHALL WORK IN A COORDINATED BASIS TO TEST THE UNITS.
 - THE WIRING BETWEEN MODULES AND THEIR INTENDED INTERFACE DEVICE, SUCH AS SPRINKLER SYSTEM DEVICE, IS SOLELY THE RESPONSIBILITY OF THE FIRE ALARM CONTRACTOR.
 - VERIFY THE QUANTITY AND LOCATION OF ELECTROMAGNETIC DOOR HOLDERS AND ASSOCIATED FIRE ALARM INTERFACE (SMOKE DETECTORS AND CONTROL MODULES/RELAYS) REQUIRED WITH THE ARCHITECTURAL DOOR SCHEDULES AND DRAWINGS. ELECTROMAGNETIC DOOR HOLDERS SHALL BE FAILSAFE (E.G., CLOSE ON A LOSS OF POWER TO THE DEVICE) AND BE POWERED BY THE BUILDING ELECTRICAL SYSTEM. THEY SHALL BE FURNISHED AND INSTALLED BY THE DOOR CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE POWER TO THE DOORS AND SHALL CONNECT THESE DEVICES TO THE FIRE ALARM SYSTEM WITH THE APPROPRIATE INTERFACE MODULES TO RELEASE THE DOORS ON ALARM. THE FIRE ALARM CONTRACTOR AND GENERAL CONTRACTORS SHALL WORK IN A COORDINATED BASIS TO TEST THE DEVICES.
 - VERIFY THE QUANTITY AND LOCATION OF HVAC UNITS REQUIRING UNIT SHUTDOWN AND ASSOCIATED FIRE ALARM INTERFACE (SMOKE DETECTORS AND CONTROL MODULES/RELAYS) REQUIRED WITH THE HVAC SCHEDULES AND DRAWINGS.
 - THE FA CONTRACTOR SHALL CONNECT TO THE TAMPER SWITCH ON THE PIV AND PROVIDE WIRE AND CONDUIT AS REQUIRED TO COMPLETE THE CONNECTION FROM 5 FEET OUTSIDE THE BUILDING. THE CONTRACTOR INSTALLING THE UNDERGROUND MAIN AND PIV IS TO PROVIDE CONDUIT WITH A PULL STRING FROM THE PIV TO WITHIN 5' OF THE BUILDING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION EFFORTS WITH OTHER CONSTRUCTION TRADES WORKING WITHIN THE SCOPE OF THIS PROJECT.

SECTION 283100 - FIRE DETECTION AND ALARM

PART 3 - EXECUTION (CONT.)

3.4 MINIMUM SYSTEM TESTS

- A. THE CONTRACTOR AND DISTRIBUTOR SHALL COMPLETE PRELIMINARY SYSTEM TESTING PRIOR TO THE FINAL TESTING TO ENSURE THAT ALL SYSTEMS ARE WORKING PROPERLY.
- B. THE CONTRACTOR AND DISTRIBUTOR SHALL DEVELOP A WRITTEN TESTING PLAN AND MATRIX TO COVER ALL ASPECTS OF SYSTEM TESTING. AS A MINIMUM, THIS MATRIX SHOULD INCLUDE AREAS FOR CHECKING ALL DEVICES AND OUTPUTS. OUTPUT CHECKING SHALL INCLUDE REPRESENTATIVE SAMPLES OF INPUT DEVICES FROM CIRCUITS OR MULTIPLE CIRCUITS THAT CONTRIBUTE TO MULTIPLE ALARM OUTPUTS.
- C. NOTIFY THE AHJ, FIRE MARSHAL, OWNER'S REPRESENTATIVE, CM, AND THE PROFESSIONAL IN WRITING A MINIMUM OF 3 WEEKS PRIOR TO THE FINAL ACCEPTANCE TEST.
- D. THE COMPLETED FIRE ALARM SYSTEM SHALL BE FULLY TESTED IN ACCORDANCE WITH THE PROVISIONS OF NFPA 72 BY THE CONTRACTOR IN THE PRESENCE OF THE PROFESSIONAL, AHJ, FIRE MARSHAL AND THE OWNER. THE CONTRACTOR AND DISTRIBUTOR SHALL PERFORM SAID TESTS AS REQUIRED BY THE FIRE MARSHAL INSPECTION PERSONNEL FOR THE FINAL TEST OF EQUIPMENT AND OPERATION OF THE SYSTEM. AN AUTHORIZED REPRESENTATIVE FROM EACH SUPPLIER OF EQUIPMENT SHALL BE IN ATTENDANCE AT THE TESTING TO MAKE NECESSARY ADJUSTMENTS. THE REQUIRED TESTS ARE AS FOLLOWS:
 1. VERIFY THE ABSENCE OF UNWANTED VOLTAGES BETWEEN CIRCUIT CONDUCTORS AND GROUND. THE TESTS SHALL BE ACCOMPLISHED AT THE PRELIMINARY TEST WITH RESULTS AVAILABLE AT THE FINAL SYSTEM TEST.
 2. VERIFY THAT THE CONTROL UNIT IS IN THE NORMAL CONDITION AS DETAILED IN THE MANUFACTURER'S OPERATING AND MAINTENANCE MANUAL.
 3. TEST AND RECORD EACH INITIATING DEVICE AND INDICATING APPLIANCE AND CIRCUIT FOR PROPER OPERATION AND RESPONSE AT THE CONTROL UNIT, INCLUDING THOSE ASSOCIATED WITH ALL SPECIFIED SYSTEM INTERFACES. TESTING OF ALL SYSTEM INTERFACES SHALL BE CONDUCTED IN COOPERATION WITH THE RESPECTIVE SYSTEM CONTRACTORS TO VERIFY THAT THE SYSTEMS FUNCTION AS SPECIFIED IN THE FIRE ALARM SYSTEM MATRIX OF OPERATIONS.
 4. TEST AND RECORD THE SYSTEM FOR ALL SPECIFIED FUNCTIONS IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS AND THE MANUFACTURER'S OPERATING AND MAINTENANCE MANUAL.
 5. TEST BOTH PRIMARY AND SECONDARY POWER. VERIFY, BY TEST, THE SECONDARY POWER SYSTEM IS CAPABLE OF OPERATING THE SYSTEM FOR THE TIME PERIOD AND IN THE MANNER SPECIFIED.
 6. DETERMINE THAT THE SYSTEM IS OPERABLE UNDER TROUBLE CONDITIONS AS SPECIFIED.
 7. VISUALLY INSPECT ALL WIRING.
 8. TEST THE BATTERY CHARGER AND BATTERIES. MARK THE DATE OF THE TEST CLEARLY AND LEGIBLY DIRECTLY ON THE BATTERIES THEMSELVES.
 9. VERIFY THAT ALL SOFTWARE CONTROL AND DATA FILES HAVE BEEN ENTERED OR PROGRAMMED INTO THE FAP. HARD COPY RECORDS OF THE SOFTWARE SHALL BE PROVIDED TO THE OWNER.
 10. VERIFY THAT AS-BUILT DRAWINGS ARE ACCURATE.
 11. MEASURE AND RECORD THE CURRENT IN CIRCUITS TO ASSURE THERE IS THE SPECIFIED SPARE CAPACITY FOR THE CIRCUITS.
 12. MEASURE AND RECORD THE VOLTAGE DROP AT THE MOST REMOTE APPLIANCE ON EACH NOTIFICATION APPLIANCE CIRCUIT TO ASSURE THAT THE VOLTAGE DROP IS NOT EXCESSIVE.
 13. SMOKE DETECTORS SHALL BE TESTED FOR SMOKE ENTRY (I.E., GO/NO-GO TESTS (MAGNETS) ARE NOT ACCEPTABLE). DISCONNECT THE VERIFICATION FEATURE FOR SMOKE DETECTORS DURING TESTS TO MINIMIZE THE AMOUNT OF SMOKE OR TEST GAS NEEDED TO ACTIVATE THE DETECTOR.
- E. AUDIBILITY TESTS SHALL BE PERFORMED TO VERIFY COMPLIANCE WITH THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG). IF THE SYSTEM DOES NOT MEET THE INTENDED PERFORMANCE OF THE ADAAG, THIS CONTRACTOR SHALL PROVIDE ADDITIONAL AUDIBLE APPLIANCES AND SYSTEM EXPANSION PARTS TO ACCOMMODATE THEM, AS REQUIRED TO MEET THE REQUIRED AUDIBILITY LEVELS.
- F. THE DISTRIBUTOR SHALL COMPLETE A 100 PERCENT SYSTEM INSPECTION AND TEST OF ALL CONTROLS, DEVICES, AUXILIARY OPERATIONS AND SUPERVISING STATION CONNECTIONS. THE DISTRIBUTOR SHALL COMPLETE "RECORD OF COMPLETION" FORMS FOR THE FACILITY AS DESCRIBED IN NFPA 72, LISTING ANY DEVIATIONS TO THE APPLICABLE CODES AND HAVING A REPRESENTATIVE OF THE FIRE MARSHAL SIGN THE DOCUMENT. COPIES OF THE COMPLETED RECORD OF COMPLETION SHALL BE MADE AVAILABLE TO ANY AND ALL INTERESTED PARTIES AND BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUAL PROVIDED TO THE OWNER.
- G. AFTER FINAL TESTING IS COMPLETE, PROVIDE A LETTER CERTIFYING THAT THE INSTALLATION IS COMPLETE AND FULLY OPERABLE TO THE PROFESSIONAL AND THE OWNER. THE LETTER SHALL INCLUDE THE NAMES AND TITLES OF THE WITNESSES TO THE PRELIMINARY TESTS AND FINAL ACCEPTANCE TESTS.
- H. UPON COMPLETION OF A SUCCESSFUL ACCEPTANCE TEST, THE CONTRACTOR SHALL SO CERTIFY IN WRITING TO THE AHJ.

3.5 TRAINING

- A. PROVIDE TRAINING SESSION, MINIMUM OF TWO (2) AT 1 HOUR EACH, FOR ALL PERSONNEL DESIGNATED BY THE OWNER. ALL TRAINING SESSIONS SHALL BE CONDUCTED PRIOR TO, OR IN CONJUNCTION WITH THE TESTING OF THE SYSTEM BY AN AUTHORIZED REPRESENTATIVE OF THE FIRE ALARM EQUIPMENT DISTRIBUTOR.
- B. TRAINING SESSIONS SHALL COVER ALL ASPECTS OF SYSTEM PERFORMANCE, INCLUDING SYSTEM ARCHITECTURE, SLC CONFIGURATIONS, SENSOR AND OTHER INITIATING DEVICE TYPES, LOCATIONS, DEVICE ADDRESSES, FIRE ALARM CONTROL PANEL FUNCTION KEY OPERATION, THE SYSTEM MATRIX OF OPERATION, AND OTHER FUNCTIONS AS DESIGNATED BY THE OWNER.
- C. THIS TRAINING SHALL INCLUDE TRAINING MANUALS, DEMONSTRATION EQUIPMENT AND ANY OTHER ITEMS REQUIRED TO ASSIST THE OWNER IN THE OPERATION AND MAINTENANCE OF THE SYSTEMS.
- D. COMPREHENSIVE SYSTEM TROUBLESHOOTING TRAINING SHALL BE PROVIDED FOR A SINGLE INDIVIDUAL DESIGNATED BY OWNER. THIS SESSION SHALL BE SEPARATE AND DISTINCT FROM THE ABOVE DESCRIBED SESSION AND BE A MINIMUM OF 2 HOURS.

3.6 SPARE PARTS AND TOOLS

- A. ALL SPARE PARTS FURNISHED SHALL BE DIRECTLY INTERCHANGEABLE WITH THE CORRESPONDING COMPONENTS OF THE INSTALLED SYSTEM. SPARE PARTS SHALL BE SUITABLY PACKAGED AND IDENTIFIED BY NAMEPLATE, TAGGING, OR STAMPING. SPARE PARTS SHALL BE DELIVERED TO THE SITE IN UNOPENED CARTONS FOR STORAGE IN THE BUILDING WHERE DIRECTED.
- B. PROVIDE THE FOLLOWING SPARE PARTS AND ACCESSORIES:
 1. SPOT TYPE SMOKE DETECTOR, 1 OF EACH TYPE INSTALLED.
 2. INTERFACE MODULE OR ADDRESSABLE RELAY, 1 OF EACH TYPE INSTALLED.
 3. MANUAL PULL STATIONS, 1 OF EACH TYPE INSTALLED.
 4. AUDIBLE/VISIBLE APPLIANCES, 1 OF EACH TYPE INSTALLED.
- C. FURNISH A LIST, IN DUPLICATE, OF ALL OTHER PARTS AND ACCESSORIES WHICH THE MANUFACTURER OF THE SYSTEM RECOMMENDS TO BE STOCKED FOR MAINTENANCE.

3.7 KEYS

- A. KEYS AND LOCKS FOR ALL EQUIPMENT SHALL BE IDENTICAL. PROVIDE NOT LESS THAN 6 KEYS OF EACH TYPE REQUIRED. IDENTIFY KEYS BY AN APPROPRIATE NUMBER STAMPED ON EACH KEY OR ON A METAL TAG ATTACHED THERETO. PROVIDE A KEY NUMBERING CHART IN EACH OPERATION AND MAINTENANCE MANUAL.

3.8 WARRANTY

- A. THE CONTRACTOR SHALL WARRANT THE FIRE ALARM EQUIPMENT AND WIRING TO BE FREE FROM INHERENT MECHANICAL AND ELECTRICAL DEFECTS FOR A PERIOD OF 1 YEAR FROM THE DATE OF FINAL INSTALLATION AND ACCEPTANCE OF THE SYSTEM BY THE OWNER'S REPRESENTATIVES.
- B. WITHIN THESE WARRANTIES, ALL PARTS AND THE ASSOCIATED LABOR REQUIRED FOR RESPONSE, TROUBLE SHOOTING, REPAIR AND/OR REPLACEMENT ARE TO BE INCLUDED.

3.9 SYSTEM SOFTWARE AND FIRMWARE

- A. THE CONTRACTOR SHALL MAINTAIN RECORD COPIES OF ALL VERSIONS OF SYSTEM SOFTWARE INSTALLED. CHANGES IN SOFTWARE SHALL BE AUTOMATICALLY IDENTIFIABLE WHEN DIFFERENT VERSIONS OF THE SYSTEM PROGRAM ARE COMPARED. DIFFERENCES BETWEEN THE DOCUMENTS SHALL BE DISTINCTLY HIGHLIGHTED TO MAKE IT DISTINCT FROM THE NORMAL PROGRAM TEXT.
- B. THE CONTRACTOR SHALL MAINTAIN A RECORD OF ALL SYSTEM FIRMWARE PROVIDED AS PART OF THE EQUIPMENT. IN ADDITION, RECORDS SHALL BE MAINTAINED OF ALL FIRMWARE MODIFICATIONS FROM INITIAL INSTALLATION UNTIL FINAL ACCEPTANCE.
- C. PROVIDE THE OWNER WITH A WRITTEN COPY OF ALL PASSWORDS OR OTHER ACCESS CODES FOR THE FAP.
- D. LACK OF DOCUMENTATION OF SOFTWARE OR FIRMWARE CHANGES SHALL RESULT IN COMPLETE SYSTEM RE-ACCEPTANCE TESTING.
- E. PROVIDE 2 PROGRAMMING CHANGES AS DIRECTED BY THE A/E, OWNER, OR OWNER'S REPRESENTATIVE. THIS DOES NOT INCLUDE PROGRAMMING CHANGES REQUIRED TO MAKE THE SYSTEM OPERATION MEET THE CONTRACT DOCUMENT REQUIREMENTS AND APPROVAL OF THE AHJ.
- F. UPON COMPLETION OF THIS PROJECT, THE CONTRACTOR SHALL TURN OVER TO THE OWNER THE MOST CURRENT, VIRUS-FREE COPY OF THE DOWNLOADABLE, AS-BUILT FIRE ALARM SOFTWARE. THIS INFORMATION SHALL BE IN THE FOLLOWING FORMATS: PRINTED REPRODUCIBLE HARD COPY AND VIRUS-FREE ELECTRONIC MEDIAL (USB DRIVE OR CD). IN ADDITION, ANY REVISIONS CREATED DURING THE WARRANTY PERIOD DUE TO WARRANTY RELATED WORK SHALL ALSO BE ISSUED TO THE OWNER IN THE FORMATS DESCRIBED AT NO ADDITIONAL COST.

-END OF SECTION-

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CLIENT:



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PROJECT:

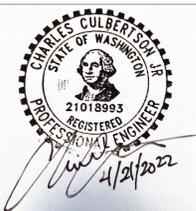
**SOUTH SOUND COMMERCE
CENTER**

BUILDING A

TUMWATER, WASHINGTON

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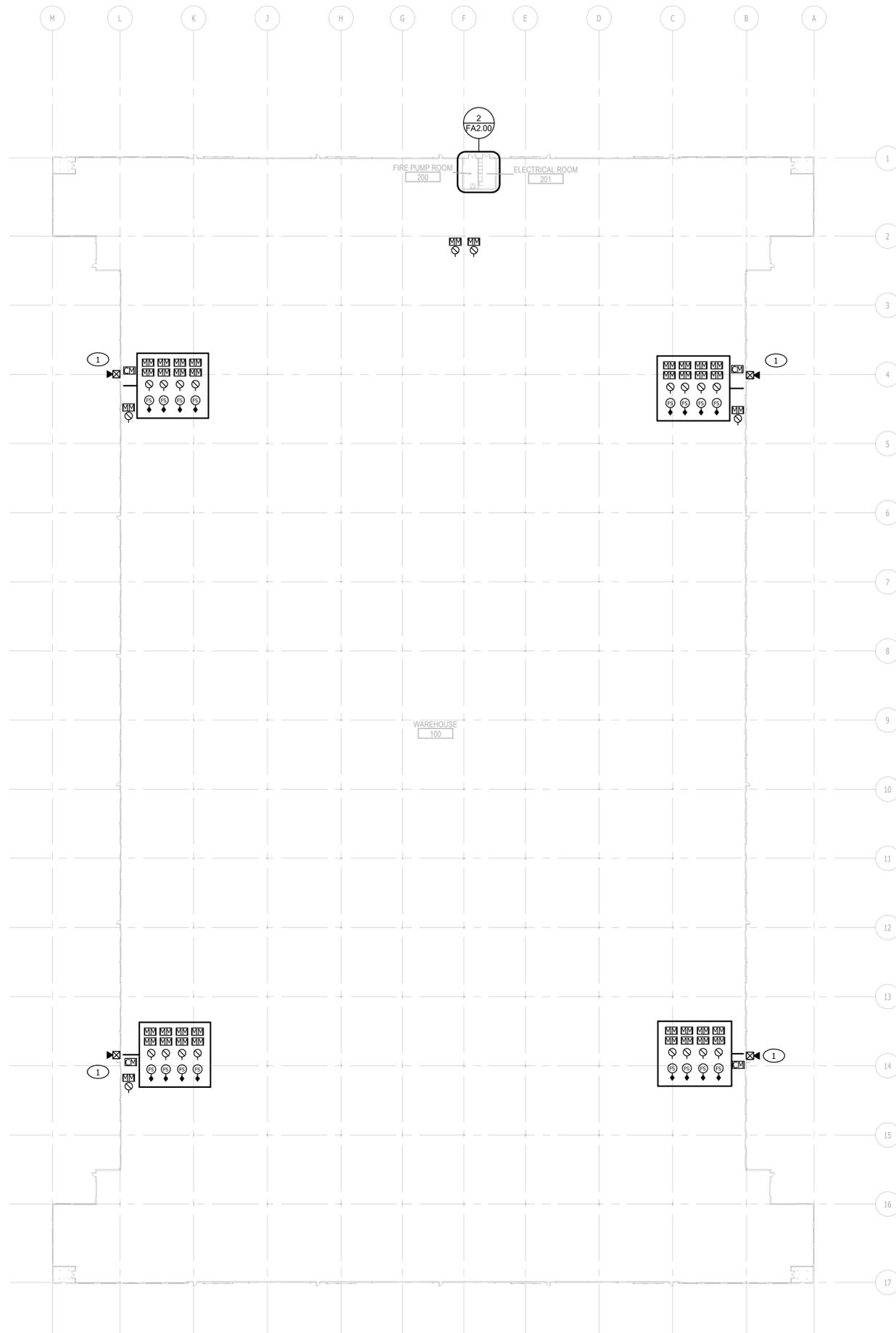
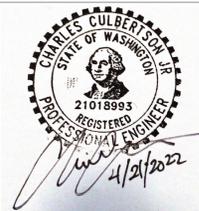
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SPECIFICATIONS - FIRE ALARM

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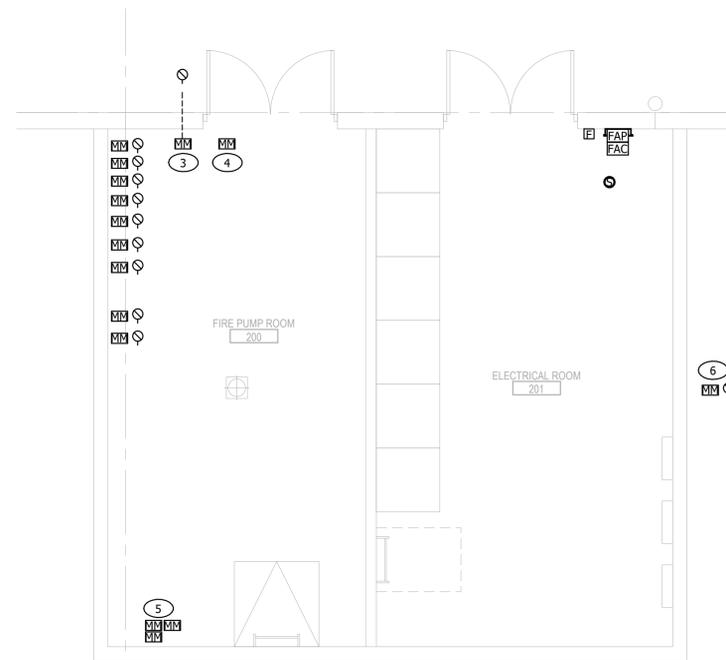
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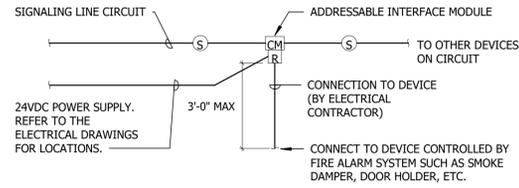
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CONSTRUCTION PLAN - FIRE ALARM
SCALE: 1" = 50'-0"

KEYNOTES

1. PROVIDE A CHIME/STROBE WITH A BLUE LENS TO SIGNAL WATER FLOW FROM THE SPRINKLER RISER. PROVIDE A CONTROL MODULE AND RELAY TO ACTIVATE THE DEVICE OFF THE SLC SO THAT EACH DEVICE CAN BE ACTIVATED INDIVIDUALLY.
2. EXTEND A BRANCH LINE DOWN FROM THE WAREHOUSE SYSTEM ABOVE TO PROVIDE COMPLETE SPRINKLER COVERAGE IN THE ELECTRICAL AND FIRE PUMP ROOMS. BOTH ROOMS SHALL BE DESIGNED AS ORDINARY HAZARD GROUP 1 SPACES. COORDINATE WITH THE ELECTRICAL CONTRACTOR TO AVOID INSTALLING ANY SPRINKLER PIPING OR EQUIPMENT DIRECTLY ABOVE ANY ELECTRICAL PANELS. PROVIDE A SUPERVISED CONTROL VALVE ON THE LINE SERVING THE MAIN ELECTRICAL ROOM.
3. PROVIDE A MONITOR MODULE TO INTERFACE THE TAMPER SWITCH ON THE POST INDICATING VALVE WITH THE FIRE ALARM SYSTEM.
4. PROVIDE A MONITOR MODULE TO INTERFACE THE TAMPER SWITCH ON THE KNOX BOX WITH THE FIRE ALARM SYSTEM. FIELD COORDINATE THE LOCATION OF THE DEVICE WITH THE FIRE MARSHAL APPROVED LOCATION OF THE KNOX BOX.
5. PROVIDE MONITOR MODULES TO INTERFACE THE FIRE PUMP CONTROLLER WITH THE FIRE ALARM SYSTEM.
6. PROVIDE A MONITOR MODULE TO INTERFACE THE TAMPER SWITCH ON THE VALVE SERVING THE ELECTRICAL ROOM. FIELD COORDINATE THE LOCATION OF THE DEVICE WITH THE SPRINKLER CONTRACTOR.

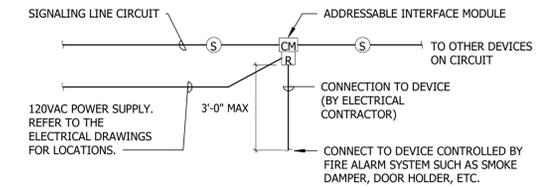


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ENLARGED FIRE PUMP & ELECTRICAL ROOM - FIRE ALARM
NTS



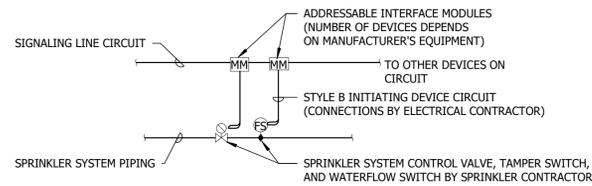
- NOTES:**
1. PROVIDE 24VDC POWER SUPPLY FROM FACP AS REQUIRED.
 2. PROVIDE RELAY AS REQUIRED.
 3. VERIFY POWER DRAW AND VOLTAGE OF DEVICE WITH THE RESPECTIVE CONTRACTOR.

4 FIRE ALARM CONTROL INTERFACE DETAIL
NO SCALE

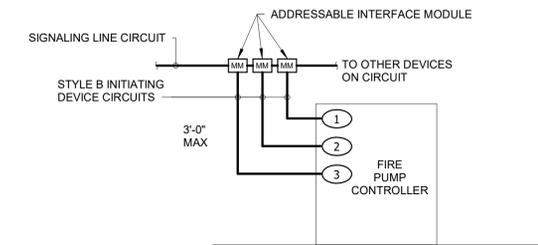


- NOTES:**
1. PROVIDE RELAY AS REQUIRED.
 2. VERIFY POWER DRAW AND VOLTAGE OF DEVICE WITH THE RESPECTIVE CONTRACTOR.

1 FIRE ALARM - 120V POWER CONTROL INTERFACE DETAIL
NO SCALE

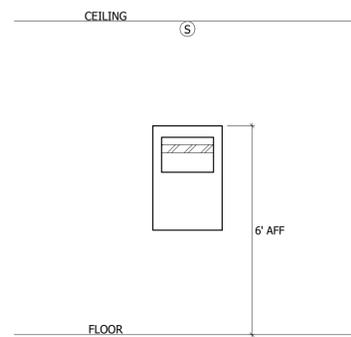


5 FIRE ALARM SPRINKLER SYSTEM INTERFACE DETAIL
NO SCALE



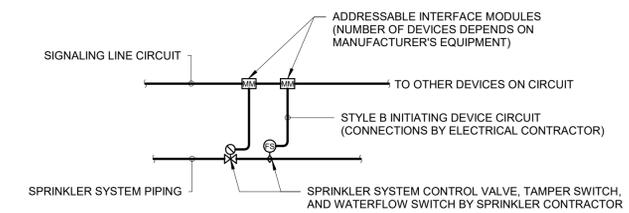
- DETAIL NOTES:**
- 1 PUMP RUNNING CONTACTS.
 - 2 POWER SUPPLY LOSS OF PHASE.
 - 3 POWER SUPPLY PHASE REVERSAL.

2 FIRE ALARM ELECTRIC FIRE PUMP INTERFACE DETAIL
NO SCALE



- NOTES:**
1. FOR BLOCK WALLS - COORDINATE MOUNTING HEIGHT WITH TOP OF COURSE OF BLOCK NEAREST 6 FEET AFF.

6 FIRE ALARM PANEL ANNUNCIATOR MOUNTING DETAIL
NO SCALE



3 FIRE ALARM - SPRINKLER SYSTEM INTERFACE DETAIL
NO SCALE

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PROJECT:

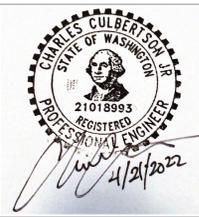
SOUTH SOUND COMMERCE CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: BUILDING PERMIT No: 04/22/2022 Date:

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CITY STAMP:

SHEET NAME:
DETAILS - FIRE ALARM

Proj. No21.0003934.080 Reviewed By:TB
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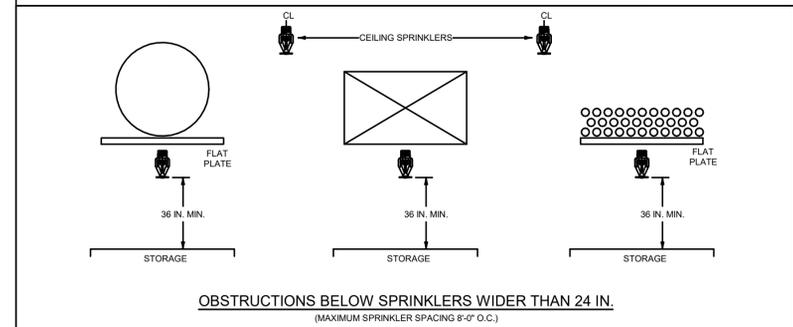
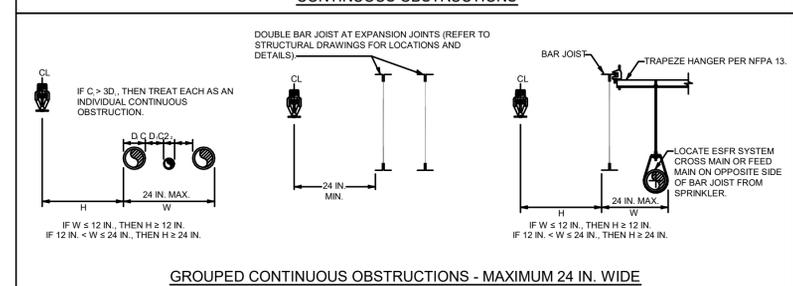
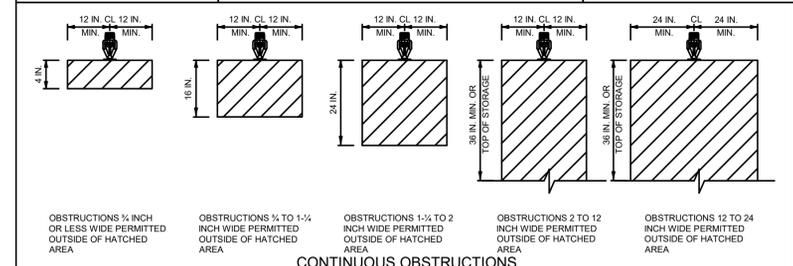
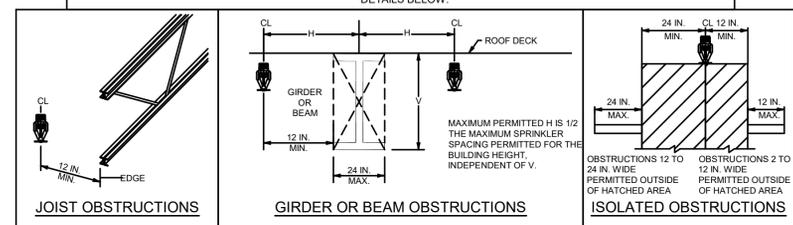
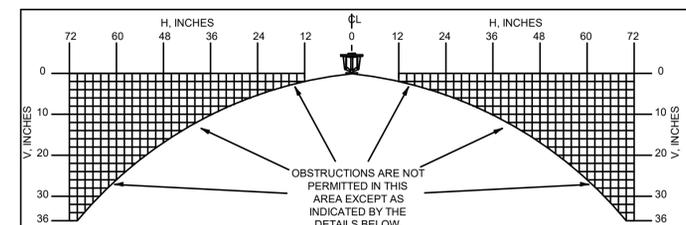
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SHEET LIST	
Sheet Number	Sheet Name
FAD.00	SYMBOLS, LEGENDS, AND ABBREVIATIONS - FIRE ALARM
FAD.01	SPECIFICATIONS - FIRE ALARM
FAD.02	SPECIFICATIONS - FIRE ALARM
FAD.03	SPECIFICATIONS - FIRE ALARM
FA2.00	CONSTRUCTION PLAN - FIRE ALARM
FAS.00	DETAILS - FIRE ALARM

DEFERRED SUBMISSION

THE FIRE PROTECTION DRAWINGS AND SPECIFICATIONS ARE PERFORMANCE BASED. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL AS A DEFERRED SUBMITAL TO THE LOCAL AHJ THREE (3) SETS OF SHOP DRAWINGS AND HYDRAULIC CALCULATIONS INDICATING THE SPRINKLER SYSTEM LAYOUT INCLUDING FINAL HEAD LOCATIONS. THE PROFESSIONAL SHALL REVIEW THE SHOP DRAWINGS AND HYDRAULIC CALCULATIONS PRIOR TO THE DEFERRED SUBMISSION TO THE AHJ AND PROVIDE NOTATION ON THE DRAWINGS INDICATING THEY WERE REVIEWED BY THE PROFESSIONAL. SUBMIT APPROVED DRAWINGS AND CALCULATIONS WITH THE REQUIRED APPLICATION FEE PRIOR TO INSTALLATION.



OBSTRUCTIONS BELOW SPRINKLERS WIDER THAN 24 IN.
(MAXIMUM SPRINKLER SPACING 8'-0" O.C.)

GENERAL NOTES:

- SOME LEGEND SYMBOLS MAY NOT BE USED. SEE FLOOR PLAN DRAWINGS FOR APPLICABLE DEVICES.
- THESE NOTES ARE GENERAL IN NATURE AND PERTAIN TO THE ENTIRE PROJECT UNLESS OTHERWISE NOTED AS SUCH ON AN INDIVIDUAL DRAWING.
- PRIOR TO BIDDING, THE CONTRACTOR SHALL EXAMINE ALL PROJECT DRAWINGS AND SPECIFICATIONS TO DEVELOP A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY EXISTING CONDITIONS BEFORE BIDDING. FAILURE TO DO THIS WILL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITIES TO PERFORM ALL REQUIRED WORK. THE CONTRACTOR SHALL ADVISE THE PROFESSIONAL OF ANY DISCREPANCIES WHICH WILL AFFECT THE WORK REQUIRED.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN ACCORDANCE WITH APPLICABLE CODES, MANUFACTURER'S WRITTEN INSTRUCTIONS, AND RECOGNIZED INDUSTRY PRACTICES. ALL EQUIPMENT, DEVICES, AND MATERIALS SHALL BE UL LISTED AND FM APPROVED.
- THE CONTRACTOR IS RESPONSIBLE FOR SUBMITTING ALL REQUIRED INFORMATION TO THE AUTHORITY HAVING JURISDICTION TO OBTAIN THE NECESSARY PERMITS AND APPROVALS. ALL FEES ASSOCIATED WITH THIS SUBMISSION ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED INSPECTIONS AND BE RESPONSIBLE FOR ALL FEES CHARGED BY THE AUTHORITY HAVING JURISDICTION FOR SUCH INSPECTIONS.
- REFER TO THE ARCHITECTURAL PLANS FOR DIMENSIONS, ROOM FINISHES, FIRE WALLS, AND LIKE ITEMS. REFER TO THE STRUCTURAL DRAWINGS FOR STRUCTURAL MEMBERS. REFER TO OTHER TRADES PLANS TO UNDERSTAND THE EXTENT OF THEIR WORK AS REQUIRED.
- DO NOT SCALE DRAWINGS. HOLD INDICATED DIMENSIONS WHERE SHOWN. RESOLVE ANY DISCREPANCIES WITH THE PROFESSIONAL PRIOR TO BEGINNING WORK.
- PROVIDE A NEW COMPLETE SPRINKLER SYSTEM AS DESCRIBED IN THE SPECIFICATIONS AND SHOWN ON THE DRAWINGS. THE WORK COVERED UNDER THIS CONTRACT INCLUDES THE FURNISHING OF ALL EQUIPMENT, LABOR, AND MATERIALS TO PROVIDE A COMPLETE SYSTEM IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND REFERENCED CODES.
- THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING A WATER FLOW TEST AND SUBMITTING THE INFORMATION TO THE PROFESSIONAL.
- THE LAYOUT ON THE DRAWINGS IS DIAGRAMMATIC. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO ELIMINATE CONFLICTS BETWEEN STRUCTURAL ELEMENTS AS WELL AS PIPING, DUCTWORK, ELECTRICAL, AND ARCHITECTURAL WORK. PROVIDE OFFSETS, TRANSITIONS IN PIPING, AND AUXILIARY LOW POINT DRAINS AS REQUIRED TO AVOID INTERFERENCES AT NO ADDITIONAL COST TO THE PROJECT.
- THE DRAWINGS DO NOT SHOW ALL OF THE HEADS REQUIRED. ANY HEADS SHOWN ON THE DRAWINGS ARE INTENDED TO SHOW THE INTENT OF THE LAYOUT WITH RESPECT TO ARCHITECTURAL AND OTHER TRADES WORK. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR THE FINAL PLACEMENT OF ALL SPRINKLER HEADS IN ACCORDANCE WITH NFPA 13.
- ALL PIPING SHALL BE CONCEALED IN AREAS WITH CEILINGS. PIPING SHALL BE EXPOSED IN AREAS WITHOUT CEILINGS. CONTRACTOR SHALL COORDINATE ROUTINGS WITHIN THESE EXPOSED AREAS TO PRODUCE A SYMMETRIC AND AESTHETIC PIPE AND HEAD LAYOUT.
- THE AUTOMATIC SPRINKLER SYSTEMS SHALL BE HYDRAULICALLY DESIGNED IN ACCORDANCE WITH THE AREA/DENSITY METHOD REQUIREMENTS OF NFPA 13. THE ROOM DESIGN METHOD SHALL NOT BE USED. THE FOLLOWING C-FACTORS SHALL BE UTILIZED IN THE CALCULATIONS: CEMENT LINED CAST OR DUCTILE IRON PIPE C = 140, BLACK STEEL IN WET PIPE SYSTEMS C = 120.
- ALL THREADED PIPE SHALL BE SCHEDULE 40. MINIMUM PIPE SIZE IS 1".
- PIPE HANGERS SHALL COMPLY WITH IBC AND NFPA REQUIREMENTS FOR SEISMIC BRACING.
- ALL EQUIPMENT SHALL BE COORDINATED WITH OTHER TRADES AND ARCHITECTURAL AND STRUCTURAL FEATURES.
- FIRE STOPPING FOR ALL PIPES PENETRATING FIRE RATED WALLS AND SEALING OF SMOKE BARRIERS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, THE UL LISTING, AND THE SPECIFICATIONS TO MAINTAIN THE RATING.
- CONTRACTOR SHALL REPAINT OR REFINISH ANY AREA IN KIND IF INSTALLATION DEFACES EXISTING WALLS, FLOORS, OR CEILINGS.
- AFTER ALL EQUIPMENT IS INSTALLED, IT SHALL BE TESTED IN ACCORDANCE WITH NFPA 13 AND THE SPECIFICATIONS. EQUIPMENT NOT OPERATING CORRECTLY SHALL BE FIELD CORRECTED OR REPLACED. THE OWNER'S REPRESENTATIVE, PROFESSIONAL, AND AUTHORITY HAVING JURISDICTION SHALL BE PRESENT FOR THE TEST.

FIRE PUMP SPECIFICATIONS

RATED FLOW:	1500 GPM
RATED PRESSURE:	90 PSI
DRIVE TYPE:	ELECTRIC
CONTROLLER:	480V, 3 phase

NOTE:
1. REFER TO SPECIFICATION 21 30 00 FOR MORE INFORMATION.

FIRE PROTECTION LEGEND:

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

- PENDENT SPRINKLER HEAD
- UPRIGHT SPRINKLER HEAD
- ▷ SIDEWALL SPRINKLER HEAD
- PIPE RISE
- PIPE DROP
- ⊕ TEE CONNECTION STRAIGHT
- ⊖ TEE CONNECTION DOWN
- TEE CONNECTION UP
- ∩ PIPE CONTINUATION
- ∩ PIPE CAP
- ⊕ WATER FLOW SWITCH
- ⊙ PRESSURE GAUGE
- ∧ GATE VALVE
- ⊗ GATE VALVE WITH TAMPER SWITCH
- ∩ BUTTERFLY VALVE
- ∩ CHECK VALVE
- ∩ MULTI-PURPOSE/ANGLE HOSE VALVE
- ∩ BACKFLOW PREVENTER ASSEMBLY
- ∩ DOUBLE CHECK VALVE BACKFLOW PREVENTER ASSEMBLY
- ∩ FREESTANDING FIRE DEPARTMENT CONNECTION
- ∩ FIRE PUMP TEST CONNECTION
- ∩ ALARM CHECK VALVE ASSEMBLY

PIPE LEGEND

*ALL EXISTING ITEMS TO BE SHOWN HALFTONE

- FPD — FIRE PROTECTION - DRY
- FPO — FIRE PROTECTION - OTHER
- FPW — FIRE PROTECTION - WET
- - - FPDL - - - FIRE PROTECTION DRAIN
- - - CLDI - - - CEMENT LINED DI
- - - - - PIPING TO BE REMOVED (DEMOLISHED)
- ⋯ HAZARD OUTLINE
- - - - - ZONE OUTLINE
- ▬ AREA OF WORK

HYDRAULIC DESIGN INFORMATION	
CEILING LEVEL SPRINKLER SYSTEM(S) FLOW	
SYSTEM TYPE:	ESFR
COMMODITY CLASSIFICATION:	CLASS I-IV & CARTONED, UNEXPANDED GROUP A PLASTICS
SYSTEM FLOW REQUIRED:	1725 GPM
SYSTEM PRESSURE REQUIRED:	139 PSI
HOSE STREAM ALLOWANCE:	250 GPM
K-FACTOR:	22.4
REQUIRED PRESSURE AT HEAD:	40 PSI
MAXIMUM CEILING HEIGHT:	45 FEET
MAXIMUM STORAGE HEIGHT:	40 FEET

NOTE:
1. SPRINKLER DESIGN FLOW/PRESSURE INFORMATION IS BASED ON PRELIMINARY HYDRAULIC CALCULATIONS PERFORMED DURING DESIGN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING AND SUBMITTING HYDRAULIC CALCULATIONS BASED ON THEIR PROPOSED SYSTEM LAYOUT.

FLOW TEST INFORMATION	
LOCATION:	7960 CENTER STREET
HYDRAULIC NODE POINT:	310-030
STATIC PRESSURE:	71.31 PSI
RESIDUAL PRESSURE:	62.61 PSI
FLOW:	2002.40 GPM
PERFORMED BY:	CITY OF TUMWATER

NOTE: THE FLOW DATA PROVIDED IS BASED ON A HYDRAULIC MODEL PERFORMED BY THE CITY OF TUMWATER. THE RESULTS SHALL BE USED FOR BIDDING PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING A FIRE HYDRANT FLOW TEST IN ACCORDANCE WITH NFPA 291 FOR USE IN THEIR DESIGN AND TO VALIDATE THE RESULTS OF THE HYDRAULIC MODEL.

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 STIPULATIONS

- A. GENERAL PROVISIONS OF THE CONTRACT DOCUMENTS INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATIONS SECTIONS APPLY TO ALL WORK IN THIS SECTION.

1.2 WORK INCLUDED

- A. THIS SPECIFICATION APPLIES TO THE INSTALLATION OF THE AUTOMATIC SPRINKLER SYSTEM AT SOUTH SOUND COMMERCE CENTER BUILDING A. THIS SPECIFICATION PROVIDES GENERAL ITEMS RELATED TO THE FIRE PROTECTION WORK.
- B. WITHIN THE SCOPE OF WORK FOR THIS PROJECT, THE CONTRACTOR SHALL:
 - 1. PROVIDE A COMPLETE AUTOMATIC SPRINKLER SYSTEM IN THE BUILDING. REFER TO SECTION 21 13 13 AND THE DRAWINGS.
 - 2. PROVIDE A FIRE PUMP, JOCKEY PUMP, AND ASSOCIATED CONTROLS. REFER TO SECTION 21 30 00 - FIRE PUMPS AND THE DRAWINGS.

1.3 DEFINITIONS

- A. THE AUTHORITY HAVING JURISDICTION (AHJ) AND OTHER PROJECT SUPERVISORS ARE DEFINED AS:
 - 1. AHJ: CITY OF TUMWATER
 - 2. FIRE MARSHAL: TUMWATER FIRE DEPARTMENT
 - 3. OWNER: PANATTONI DEVELOPMENT
 - 4. PROFESSIONAL: WINDWARD ENGINEERS & CONSULTANTS
 - 5. CONSTRUCTION MANAGER (CM): AGENT FOR THE OWNER WHO PROVIDES DAILY CONSTRUCTION OVERSIGHT AND COORDINATION OF THE PROJECT
 - 6. INSURANCE CARRIER: AGENT FOR THE OWNER THAT PROVIDES INSURANCE COVERAGE FOR THE PROJECT
- B. THE FOLLOWING WORDS ARE DEFINED AS:
 - 1. CONTRACTOR: IN THIS SECTION SHALL REFER TO THE FIRE PROTECTION CONTRACTOR.
 - 2. PROVIDE: INCLUDES THE FURNISHING AND INSTALLATION OF A DEVICE OR SYSTEM.

1.4 APPROVALS

- A. THE CONTRACTOR MUST COMPLY WITH ALL LAWS, ORDINANCES, AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION (AHJ), INCLUDING BOROUGH, COUNTY, STATE, FEDERAL, PUBLIC UTILITY, AND THE OWNER'S INSURANCE CARRIER.
- B. HYDRAULIC CALCULATIONS, PRODUCT DATA SHEETS, SHOP DRAWINGS AND ALL OTHER ASSOCIATED SUBMITTALS MUST BEAR THE STAMP OF APPROVAL OF THE AHJ. PROVIDE NFPA 13 WORKING PLANS TO THE AHJ. ANY AND ALL COMMENTS RECEIVED FROM THE AHJ AND RESOLUTION THEREOF SHALL BE SUBMITTED TO THE PROFESSIONAL FOR RECORD.
- C. THE CONTRACTOR IS RESPONSIBLE FOR ALL FEES ASSOCIATED WITH THE REQUIRED APPROVALS.

1.5 SUBMITTALS

- A. REFER TO ANY FRONT-END SPECIFICATIONS FOR ADDITIONAL DETAILED REQUIREMENTS REGARDING SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES ASSOCIATED WITH THE AHJ, INSURANCE CARRIER AND/OR PROFESSIONAL'S REVIEWS.
- C. THE SUBMITTAL SHALL BE MADE AS A COMPLETE PACKAGE CONSISTING OF FIRE PROTECTION EQUIPMENT ONLY. THE SUBMITTAL SHALL NOT INCLUDE OTHER PLUMBING EQUIPMENT OR COMPONENTS NOT DIRECTLY RELATED TO THE FIRE PROTECTION SYSTEM INSTALLATION FOR APPROVAL. WHERE OTHER EQUIPMENT OR COMPONENTS ARE AN INTEGRAL PART OF THE FIRE PROTECTION SYSTEM, THEY SHALL BE INDICATED AS SUCH, BUT NOT INCLUDED WITH THE SUBMITTAL AND ONLY SHOW REQUIRED INTERFACE DETAILS. FAILURE TO SUBMIT ALL REQUIRED MATERIALS AS A COMPLETE, SEPARATE SINGLE PACKAGE SHALL BE CAUSE FOR REJECTION OF ENTIRE PACKAGE. COPIES OF THE CONTRACT DOCUMENTS WITH CONTRACTOR'S NOTES THEREON WILL BE REJECTED. SIMPLY REDELINING THE CONTRACT DOCUMENTS IS NOT ACCEPTABLE.
- D. REFER TO THE INDIVIDUAL SECTIONS FOR ADDITIONAL SUBMITTAL REQUIREMENTS, INCLUDING IDENTIFIED EQUIPMENT AND MATERIALS FOR WHICH SUBMITTALS ARE REQUIRED.
- E. SUBMIT CONTRACTOR QUALIFICATIONS (FROM THE QUALITY ASSURANCE PORTION OF THIS SPECIFICATION)
 - 1. INSTALLATION EXPERIENCE
 - 2. DESIGNER CERTIFICATION
- F. THE CONTRACTOR SHALL SUBMIT, FOR REVIEW BY THE PROFESSIONAL, IDENTIFICATION AND DATA OF SPECIFIC MATERIALS AND EQUIPMENT TO BE INCORPORATED IN THE PROJECT. SHOP DRAWINGS, HYDRAULIC CALCULATIONS, CATALOG CUTS, AND ASSOCIATED MATERIALS SHALL BE SUBMITTED AS A COMPLETE, SINGLE PACKAGE. THIS PACKAGE SHALL INCLUDE:
 - 1. HYDRANT FLOW TEST RESULTS. THIS CONTRACTOR SHALL COORDINATE WATER FLOW TESTS REQUIRED BY THIS CONTRACT. THE PROFESSIONAL SHALL BE NOTIFIED AT LEAST 5 WORKING DAYS PRIOR TO SAID WATER FLOW TEST. THE RESULTS OF THE WATER FLOW TEST SHALL BE SUBMITTED WITHIN 10 WORKING DAYS FOLLOWING THE WATER FLOW TEST AND PRIOR TO OR IN CONJUNCTION WITH THE SUBMISSION OF SHOP DRAWINGS.
 - 2. PRODUCT DATA. IDENTIFICATION OF SPECIFIC PRODUCT DATA AND EQUIPMENT SHALL BE SUBMITTED PRIOR TO OR IN CONJUNCTION WITH THE SUBMISSION OF SHOP DRAWINGS. SHOULD MORE THAN ONE ITEM OR A SPECIFIC ITEM WITH MULTIPLE OPTIONS APPEAR ON A SINGLE CUT SHEET, THE ITEM OR ITEMS SHALL BE SPECIFICALLY INDICATED.
 - 3. COMPLETE SHOP DRAWINGS. FAILURE OF THE CONTRACTOR TO SUBMIT COMPLETE SHOP DRAWING PACKAGES MAY RESULT IN DELAY IN PROCESSING TIME OR REJECTION OF THE SUBMITTAL. ALL SUCH DELAYS TO THE JOB RESULTING FROM THE CONTRACTOR'S FAILURE TO SUBMIT COMPLETE SHOP DRAWINGS AT ONE TIME WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE SHOP DRAWING SUBMITTAL SHALL BE SUBDIVIDED AND CLEARLY IDENTIFY THE CONTRACT SPECIFICATION SECTION OR DRAWING REFERENCED, IDENTIFYING AND HIGHLIGHTING EACH ITEM TO BE REVIEWED.
 - 4. SUBMIT MATERIALS AND INFORMATION DESCRIBED IN NFPA 13, NFPA 20, NFPA 24, NFPA 25, NFPA 70 AND NFPA 72.
 - 5. THE BUILDING IS IN SEISMIC DESIGN CATEGORY (SHORT PERIOD) = D OR SEISMIC DESIGN CATEGORY (LONG PERIOD) = D. THEREFORE, FIRE PROTECTION EQUIPMENT AND SYSTEMS SHALL BE DESIGNED TO RESIST SEISMIC FORCES. INCLUDE VIBRATION AND SEISMIC CONTROLS AS DESCRIBED WITHIN IBC.
 - 6. HYDRAULIC CALCULATIONS AND PIPING DRAWINGS. ALL CALCULATIONS AND CAD DRAWINGS SHALL:
 - a. BE PREPARED UNDER THE DIRECT SUPERVISION OF AN INDIVIDUAL HAVING NICET LEVEL III OR IV CERTIFICATION OR AN INDIVIDUAL HAVING REGISTRATION AS A PROFESSIONAL ENGINEER. PREPARATION OF HYDRAULIC CALCULATIONS AND/OR PIPING DRAWINGS BY INDIVIDUALS WHO DO NOT HAVE SAID CERTIFICATION OR WHO ARE NOT DIRECTLY SUPERVISED BY AN INDIVIDUAL WITH SAID CERTIFICATION IS PROHIBITED.
 - b. BE PREPARED USING A COMMERCIALY AVAILABLE COMPUTER MODELS SUCH AS HASS, HYDRACALC, SPRINKLER-CALC, SIGMA OR "THE".
 - c. BE PREPARED USING THE SAME COMPUTER MODEL. HYDRAULIC CALCULATIONS AND THE MODEL USED SHALL BE CONSISTENT THROUGHOUT THE PROJECT. HYDRAULIC CALCULATIONS SHALL BE NEAT AND ORDERLY (E.G. COLUMNS AND ROWS LINE UP ACCORDINGLY ON PRINTOUTS).
 - d. HAVE HYDRAULIC REFERENCE POINTS, PROVIDED IN A SYSTEMATIC AND CONSISTENT MANNER, CLEARLY INDICATED ON BOTH THE SHOP DRAWINGS AND THE HYDRAULIC CALCULATIONS.
 - 7. WHERE SPRINKLER SYSTEMS ARE SUBMITTED SEPARATELY, A SCHEMATIC DRAWING INDICATING LOCATIONS OF ALL NODES USED IN THE HYDRAULIC CALCULATIONS SHALL BE INCLUDED WITH THE SUBMISSION. COMMON PIPING AND NODES SHALL USE THE SAME NOMENCLATURE.
 - 8. WHERE PHASING OF CONSTRUCTION REQUIRES SUBMISSION OF PORTIONS OF THE SYSTEM, ALL PIPING AND EQUIPMENT ASSOCIATED WITH ANY CALCULATIONS MUST BE PROVIDED WITH THE SUBMITTAL. ADDITIONALLY, THE PHASING PLAN AS IT RELATES TO THE FIRE PROTECTION SYSTEM INSTALLATION SHALL BE PROVIDED EITHER DIAGRAMMATICALLY OR BY NARRATIVE.
- G. WHERE THE CONTRACTOR MUST REVISE AND RESUBMIT, THE REVISED SUBMITTAL SHALL BE ACCOMPANIED BY THE WRITTEN RESPONSE TO ALL PREVIOUS SUBMITTAL COMMENTS. FAILURE TO PROVIDE WRITTEN RESPONSE TO PREVIOUS COMMENTS SHALL BE CAUSE FOR REJECTION OF THE SUBMITTAL.
- H. CAD LAYOUT DRAWINGS SHALL BE SUBMITTED FOR THE AUTOMATIC SPRINKLER SYSTEM. THE LAYOUT DRAWINGS SHALL BE PREPARED AT A SCALE OF NOT LESS THAN 1/8 INCH = 1 FOOT, AND DRAWINGS SHEET SIZE SHALL BE EITHER 24X36 OR 30X42 INCHES. THE LAYOUT DRAWINGS SHALL INCLUDE ALL INFORMATION IDENTIFIED IN NFPA 13 TO BE INDICATED AND:
 - 1. ALL ROOM NUMBERS SHALL BE PROVIDED ON THE DRAWINGS.
 - 2. PLAN AND ELEVATION VIEWS OF THE MECHANICAL ROOM SHOWING THE SPRINKLER RISER, PROPOSED PIPING, EQUIPMENT PADS, DIMENSIONS OF OPENINGS IN FLOORS, ROOFS, AND WALLS, AND EQUIPMENT TO ESTABLISH THAT ALL PROPOSED EQUIPMENT WILL FIT WITHIN THE ALLOTTED SPACES WITH CLEARANCES FOR INSTALLATION AND MAINTENANCE.
 - 3. PLAN VIEWS, WITH ELEVATION VIEWS WHERE NECESSARY FOR CLARITY, OF ALL PIPING AND DISTRIBUTION SYSTEMS INDICATING LOCATIONS OF PROPOSED PIPING, HANGERS, SPRINKLERS, WATER FLOW SWITCHES, HOSE OUTLETS, AND PENETRATIONS TO FIRE-RATED OR SMOKE ENCLOSURE WALLS.
 - 4. WHERE TRAPEZE HANGERS ARE TO BE USED, PROVIDE ALL PERTINENT INFORMATION FOR DETERMINING SIZE OF TRAPEZE MEMBER.
 - 5. THE DRAWINGS SHALL SHOW PROPOSED DETAILS FOR ATTACHMENT, ANCHORING, AND HANGING TO STRUCTURAL FRAMING OF THE BUILDING; VIBRATION ISOLATION UNITS; FOUNDATION AND SUPPORT; LOCATION AND SIZE OF SLEEVES AND PREPARED OPENINGS FOR PASSAGE OF PIPES. IF THE CONTRACTOR DEMS DEPARTURES FROM THE CONTRACT DRAWINGS NECESSARY, DETAILS OF SUCH DEPARTURES, INCLUDING CHANGES IN RELATED PORTIONS OF THE PROJECT AND THE REASONS THEREFORE, SHALL BE SUBMITTED WITH THE DRAWINGS FOR REVIEW BY THE PROFESSIONAL. ALLOWED DEPARTURES SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.
 - 6. THE AVAILABLE WATER SUPPLY DATA FOR THE SPRINKLER SYSTEM DESIGN SHALL BE PROVIDED ON THE DRAWING THAT INDICATES THE LOCATION OF THE FIRE PROTECTION WATER SERVICE ENTRANCE. THE DATA SHALL INCLUDE: DATE AND TIME OF TEST; LOCATION (RELATIVE TO BUILDING) OF STATIC PRESSURE READINGS AND LOCATION OF RESIDUAL PRESSURE READING, ALONG WITH THE PRESSURES AND FLOWS DURING THE TEST. FURTHER, THE DATA FOR ADJUSTMENTS TO THE WATER SUPPLY DATA, INCLUDING ELEVATION CHANGES AND FRICTION LOSS COMPONENTS, BETWEEN THE STREET AND THE BUILDING SHALL BE NOTED. PROVIDE A "SCHEMATIC" FOR CLARITY IF NECESSARY.
 - 7. ITEMS ON OR PROJECTING THROUGH THE CEILING SHALL BE COORDINATED WITH OTHER ITEMS AND SHALL BE SHOWN ON THE REFLECTED CEILING PLAN SHOP DRAWINGS SUBMITTED FOR THE PROFESSIONAL'S REVIEW. SUCH ITEMS SHALL FOLLOW THE INTENT AS SHOWN ON THE CONTRACT DOCUMENTS REFLECTED CEILING PLAN DRAWINGS AND SHALL NOT BE INSTALLED UNTIL REVIEWED BY THE PROFESSIONAL.
- I. THE CONTRACTOR SHALL FORWARD TO ALL AHJ'S, FOR THEIR REVIEW AND COMMENT, A MINIMUM OF 3 SETS OF THE SHOP DRAWINGS INDICATING THE FINAL SPRINKLER HEAD LAYOUT WITH ASSOCIATED HYDRAULIC CALCULATIONS.
- J. FIRE PROTECTION EQUIPMENT ELECTRICAL DATA SHALL BE SUBMITTED FOR REVIEW:
 - 1. PRIOR TO SUBMITTING DATA FOR EQUIPMENT REQUIRING ELECTRICAL SERVICE, THE CONTRACTOR SHALL VERIFY THAT ELECTRICAL CHARACTERISTICS OF EQUIPMENT SUBMITTALS COMPLY WITH ELECTRICAL SERVICE PROVIDED FOR THE SPECIFIED ITEMS OF EQUIPMENT.
 - 2. UPON RECEIPT OF REVIEWED SUBMITTALS FOR EQUIPMENT PROVIDED UNDER THIS DIVISION OF THIS SPECIFICATION, THE CONTRACTOR SHALL COORDINATE THE ELECTRICAL SERVICE REQUIREMENTS SUCH AS, MOTOR HORSEPOWER AND FULL LOAD AMPS; ELECTRICAL SERVICE CHARACTERISTICS SUCH AS VOLTAGE AND PHASE; AND NUMBER OF SERVICES FOR EACH ITEM OF EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS WITH THE ELECTRICAL DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL FURNISH TO THE PROFESSIONAL AND THE ELECTRICAL CONTRACTOR A COMPLETE TYPEWRITTEN LIST OF ELECTRICAL REQUIREMENTS FOR EACH ITEM OF EQUIPMENT TO BE INSTALLED.

- K. OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED AND INCLUDE SYSTEM COMPONENTS, WATER FLOW TEST INFORMATION, CAD AS-BUILT DRAWINGS, AS-BUILT HYDRAULIC CALCULATIONS, AND TEST CERTIFICATIONS AS A MINIMUM. SEE OPERATIONS AND MAINTENANCE SECTION OF THIS SPECIFICATION.
- L. THE CONTRACTOR SHALL SUBMIT A LETTER OF COORDINATION VERIFYING THOSE ASPECTS OF PAINTING PREPARATION BEING DONE UNDER THIS CONTRACT. THE PAINTING CONTRACTOR SHALL CONCUR UPON THIS COORDINATION LETTER PRIOR TO SUBMISSION. THE CONTRACTOR SHALL SUBMIT COLOR SAMPLES AND MANUFACTURERS INSTRUCTIONS FOR THOSE ASPECTS OF PAINTING BEING PROVIDED BY THE CONTRACTOR.
- M. ALL FIRESTOPPING MATERIAL AND INSTALLATION METHODS MUST BE APPROVED BY THE PROFESSIONAL.
- N. PROVIDE A VALVE CHART.
- O. PROVIDE DOCUMENTATION OF GROOVED COUPLING TRAINING.
- P. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL TO THE LOCAL AHJ, THREE (3) SETS OF SHOP DRAWINGS AND HYDRAULIC CALCULATIONS INDICATING THE SPRINKLER SYSTEM LAYOUT INCLUDING HEAD LOCATIONS. SUBMIT DRAWINGS WITH THE REQUIRED APPLICATION AND FEE.

1.6 QUALITY ASSURANCE

- A. THE FIRE PROTECTION EQUIPMENT AND INSTALLATION SHALL CONFORM TO THE FULL MEANING AND INTENT OF THE FOLLOWING CODES AND REGULATIONS:
 - 1. WASHINGTON BUILDING CODE, 2018 EDITION
 - 2. LOCAL WATER AUTHORITY RULES AND REGULATIONS
- B. THE FIRE PROTECTION AND INSTALLATION SHALL CONFORM TO THE FULL MEANING AND INTENT OF THE FOLLOWING NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES AND STANDARDS (IBC/JFC REFERENCED EDITION IF SO DESIGNATED, OTHERWISE THE LATEST EDITION):
 - 1. NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
 - 2. NFPA 20, STANDARD FOR THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS
 - 3. NFPA 24, STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES
 - 4. NFPA 25, INSPECTION, TESTING, AND MAINTENANCE OF WATER-BASED FIRE PROTECTION SYSTEM
 - 5. NFPA 70, NATIONAL ELECTRICAL CODE (NEC)
 - 6. NFPA 72, NATIONAL FIRE ALARM CODE
 - 7. NFPA 101, LIFE SAFETY CODE
 - 8. NFPA 291, RECOMMENDED PRACTICE FOR FIRE FLOW TESTING AND MARKING OF HYDRANTS
- C. THE FIRE PROTECTION EQUIPMENT AND INSTALLATION SHALL CONFORM TO THE FULL MEANING AND INTENT OF THE LATEST EDITION OF THE FOLLOWING AGENCY STANDARDS:
 - 1. UL FIRE PROTECTION EQUIPMENT DIRECTORY
 - 2. FACTORY MUTUAL APPROVAL GUIDE
 - 3. REQUIREMENTS OF THE OWNER'S INSURANCE COMPANY
- D. OBTAIN ALL PERMITS AND INSPECTIONS FOR THE INSTALLATION OF THIS WORK AND PAY ALL CHARGES INCIDENT THERETO. DELIVER TO THE OWNER ALL CERTIFICATES OF SAID INSPECTION ISSUED BY THE AHJ.
- E. WORKMANSHIP AND MATERIALS
 - 1. THE WORKMANSHIP AND MATERIALS COVERED BY THESE SPECIFICATIONS SHALL CONFORM TO ALL ORDINANCES AND REGULATIONS OF THE CITY, TOWNSHIP, COUNTY, AND/OR OTHER AHJ.
 - 2. ALL PRODUCTS AND MATERIALS UTILIZED IN THE FIRE PROTECTION SYSTEMS SHALL BE LISTED FOR FIRE PROTECTION SERVICE BY UNDERWRITER'S LABORATORIES (UL) AND/OR APPROVED FOR FIRE PROTECTION SERVICE BY FACTORY MUTUAL (FM).
- F. QUALIFICATION OF PERSONNEL
 - 1. THE CONTRACTOR FOR THE FIRE PROTECTION SYSTEM SHALL BE QUALIFIED FOR THE WORK SPECIFIED HEREIN AND BE REGULARLY ENGAGED IN THE INSTALLATION OF AUTOMATIC SPRINKLER SYSTEMS AND EQUIPMENT.
 - 2. THE CONTRACTOR SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE IN THE INSTALLATION OF SPRINKLER SYSTEMS. DOCUMENTATION SHALL BE SUBMITTED TO SHOW THAT THE CONTRACTOR HAS PROVIDED SIMILAR SYSTEMS TO THOSE SPECIFIED HEREIN. DOCUMENTATION ON AT LEAST 3 SIMILAR SYSTEMS SHALL BE PROVIDED INCLUDING THE SYSTEM SIZE AND THE NAME OF A CONTACT PERSON AT THE FACILITY.
 - 3. DOCUMENTATION SHALL BE SUBMITTED TO SHOW THAT ALL FIRE PROTECTION SYSTEMS ARE DESIGNED BY A REGULAR FULL-TIME EMPLOYEE WITH A LEVEL III OR LEVEL IV NICET (NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES) CERTIFICATION IN AUTOMATIC SPRINKLER SYSTEM LAYOUT OR A REGISTERED PROFESSIONAL ENGINEER. IF SUCH A CERTIFIED INDIVIDUAL IS NOT EMPLOYED, ADEQUATE DOCUMENTATION SHALL BE PROVIDED TO SHOW COMPARABLE TRAINING AND EXPERIENCE OF THE DESIGNER. ADDITIONALLY, PROVIDE DOCUMENTATION FOR THE REGISTERED PE OR NICET LEVEL PERSON THAT WILL REVIEW AND CERTIFY THE DESIGN.
 - 4. WELDING:
 - a. ALL WELDERS EMPLOYED FOR THE WORK SHALL BE QUALIFIED UNDER THE REQUIREMENTS OF ANSI B31.1.0 SECTION 127.5.
 - b. EVIDENCE OF WELDERS' QUALIFICATIONS SHALL BE SUBMITTED TO THE PROFESSIONAL BEFORE ANY WELDS ARE MADE.
 - c. ALL WELDING SHALL BE PERFORMED AT THE SHOP.
 - 5. THE PROPOSED CONTRACTOR SHALL SUBMIT EVIDENCE OF THE ABOVE QUALIFICATIONS ITEMS TO THE PROFESSIONAL PRIOR TO PROCEEDING WITH ANY WORK ON THIS PROJECT. CONTRACTORS NOT MEETING THESE REQUIREMENTS WILL NOT BE PERMITTED TO PERFORM WORK SPECIFIED UNDER THIS SECTION, UNLESS SPECIFICALLY AUTHORIZED IN WRITING BY THE OWNER.
- G. QUALIFICATIONS OF MANUFACTURER AND PRODUCTS
 - 1. FITTINGS, FITTING ACCESSORIES SHALL BE MANUFACTURED IN THE UNITED STATES.
 - 2. FIRMS WHOSE EQUIPMENT AND PRODUCT NAME APPEAR WITHIN THE UNDERWRITER LABORATORY'S "FIRE PROTECTION EQUIPMENT DIRECTORY" LIST OF SPECIALTIES AND/OR ACCESSORIES AND FACTORY MUTUAL'S "FIRE PROTECTION APPROVAL GUIDE".
 - 3. ALL PRODUCTS/PARTS INSTALLED OR FURNISHED UNDER THIS CONTRACT SHALL BE LISTED AND APPROVED FOR USE BY THE AUTHORITIES AND AGENCIES LISTED HEREIN.

1.7 AS-BUILTS, OPERATION AND MAINTENANCE INSTRUCTIONS, TRAINING

- A. REFER TO ANY FRONT END SPECIFICATIONS FOR ADDITIONAL INFORMATION AND DETAIL REQUIREMENTS.
- B. OPERATION AND MAINTENANCE MANUALS, WITH A TABLE OF CONTENTS, SHALL INCLUDE:
 - 1. PRINTED MATERIAL RELATING TO ALL THE FIRE PROTECTION EQUIPMENT.
 - 2. ALL FLOW TEST INFORMATION INCLUDING DATE, TIME, LOCATION AND PRESSURE READINGS.
 - 3. CONTRACTOR'S MATERIALS AND TEST CERTIFICATES AS REQUIRED BY NFPA 13, COMPLETED AND SIGNED.
 - 4. COMPLETED AND SIGNED CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR PRIVATE FIRE SERVICE MAINS, AS REQUIRED BY NFPA 24, WHERE AN UNDERGROUND WATER SUPPLY IS INSTALLED UNDER THIS PROJECT, EITHER BY THE CONTRACTOR OR BY OTHERS.
 - 5. COMPLETED AND APPROVED AS-BUILT HYDRAULIC CALCULATIONS.
 - 6. PROVIDE A COPY OF THE VALVE SCHEDULE.
 - 7. AS-BUILT DRAWINGS. PROVIDE DRAWINGS UPDATED IN CAD.
 - 8. A SYNOPSIS OF THE REQUIREMENTS OF NFPA 25, STANDARD FOR THE INSPECTION, TESTING, AND MAINTENANCE OF WATER-BASED FIRE PROTECTION SYSTEMS.
- C. PROVIDE A MINIMUM OF 4 COPIES OF OPERATIONS AND MAINTENANCE MANUALS.
- D. A MINIMUM OF 2 HOURS OF INSTRUCTION/TRAINING SHALL BE PROVIDED TO OWNER DESIGNATED PERSONNEL.
 - 1. BEFORE FINAL INSPECTION AT A TIME DESIGNATED BY THE PROFESSIONAL, CM OR OWNER, PROVIDE A COMPETENT REPRESENTATIVE TO INSTRUCT OWNER'S DESIGNATED PERSONNEL IN OPERATION, ADJUSTMENT, AND MAINTENANCE OF PRODUCTS, EQUIPMENT, AND SYSTEMS UNDER THIS DIVISION OF THE SPECIFICATIONS. FOR EQUIPMENT REQUIRING SEASONAL OPERATION, PERFORM INSTRUCTION FOR OTHER SEASONS WITHIN SIX MONTHS UNLESS REQUESTED OTHERWISE.
 - 2. THE INFORMATION PROVIDED FOR THE OPERATION AND MAINTENANCE MANUALS SHALL BE USED AS BASIS OF INSTRUCTION. REVIEW CONTENTS OF MANUALS WITH PERSONNEL IN DETAIL TO EXPLAIN ALL ASPECTS OF OPERATION AND MAINTENANCE.
 - 3. PREPARE AND INSERT ADDITIONAL DATA IN THE OPERATION AND MAINTENANCE MANUAL WHEN THE NEED FOR SUCH DATA BECOMES APPARENT DURING INSTRUCTION.

1.8 RECORD DOCUMENTS

- A. REFER TO THE FRONT END SPECIFICATIONS FOR ADDITIONAL INFORMATION RELATED TO RECORD DOCUMENTS AND RELATED SUBMITTALS.
- B. AS-BUILT DOCUMENTS - UPON COMPLETION OF APPROVALS, INSTALLATION, TESTING, AND ACCEPTANCE THEREOF OF EACH PHASE OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE TO THE OWNER ONE COMPLETE SET OF REPRODUCIBLE DRAWINGS, ONE SET OF CAD/ELECTRONIC DRAWINGS, AND ONE SET OF CORRESPONDING HYDRAULIC AS-BUILT CALCULATIONS.

1.9 CONTRACT DRAWINGS

- A. THE DRAWINGS ARE DIAGRAMMATIC AND ARE INDICATIVE OF THE WORK TO BE PERFORMED AND SHOW GENERAL LOCATIONS OF MAIN PIPING AND EQUIPMENT. HOWEVER, IT IS NOT INTENDED THAT THEY SHOW EVERY PIPE, FITTING, OR APPARATUS REQUIRED FOR A COMPLETE INSTALLATION.
- B. WHEN SPRINKLER CONNECTIONS ARE SHOWN ON THE FIRE PROTECTION CONTRACT DRAWINGS OR THE ARCHITECTURAL REFLECTED CEILING PLANS, THEY ARE ALSO DIAGRAMMATIC AND ARE INDICATIVE OF THE WORK TO BE PERFORMED. CONTRACTOR IS RESPONSIBLE FOR DETERMINING FINAL LOCATIONS IN ACCORDANCE WITH NFPA 13 AND THE REFLECTED CEILING PLANS.
- C. WHERE A SPECIFIC PIPE ROUTING, EQUIPMENT ARRANGEMENT OR PIPE SIZE IS INDICATED, THE FIRE PROTECTION CONTRACT DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS CIRCUMSTANCES WILL PERMIT UNLESS PRIOR APPROVAL IS GRANTED BY THE PROFESSIONAL. THE CONTRACTOR MAY IMPROVE UPON EQUIPMENT LOCATIONS AND PIPE ROUTINGS AS REQUIRED TO FACILITATE THE PROPER INSTALLATION OF THE SYSTEM.
- D. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF ALL MATERIALS AND EQUIPMENT REQUIRED FOR A COMPLETE INSTALLATION WITHIN THE INTENT AND MEANING OF THE FIRE PROTECTION CONTRACT DOCUMENTS AND NFPA 13.
- E. THE CONTRACTOR SHALL FOLLOW DRAWINGS AND SPECIFICATIONS IN LAYING OUT WORK AND CHECK DRAWINGS OF OTHER DISCIPLINES RELATING TO WORK TO VERIFY SPACE CONDITIONS. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF ALL FIRE PROTECTION EQUIPMENT AND WATER SERVICE CONNECTIONS. SCALING DRAWINGS WITHOUT FIELD VERIFICATION IS NOT SUFFICIENT.
- F. EQUIPMENT LAYOUT IS BASED ON ONE TYPICAL MANUFACTURER'S PRODUCT. WHERE EQUIPMENT SELECTED BY THE CONTRACTOR FOR USE ON THE JOB DIFFERS FROM THE LAYOUT INDICATED ON THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING SPACE REQUIREMENTS AND CONNECTION ARRANGEMENTS.

1.10 GUARANTY

- A. THE COMPONENTS OF THE FIRE PROTECTION SYSTEMS SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE THEREOF, EITHER FOR BENEFICIAL USE OR FINAL ACCEPTANCE, WHICHEVER IS EARLIER, AGAINST DEFECTIVE MATERIALS, DESIGN, AND WORKMANSHIP. UPON RECEIPT OF NOTICE FROM THE PROFESSIONAL, CM OR OWNER OF FAILURE OF ANY PART OF THE EQUIPMENT DURING THE GUARANTEE PERIOD, THE AFFECTED PART OR PARTS SHALL BE REPLACED PROMPTLY. THIS INCLUDES ALL PARTS AND LABOR INVOLVED IN REMOVING THE DEFECTIVE PART OR PARTS AND SUBSEQUENTLY REPLACING AND INSTALLING THE NEW PART OR PARTS AT THE EXPENSE OF THE CONTRACTOR.

1.11 FIELD MEASUREMENTS

- A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION OF ANY AND ALL UNDERGROUND UTILITIES IN THE VICINITY OF THE WORK CONTAINED HEREIN INCLUDING THE LOCATION OF THE FIRE WATER SERVICE. WHEN IT HAS BEEN INDICATED THAT THESE UTILITIES ARE TO REMAIN IN PLACE, THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF SUPPORT AND PROTECTION DURING EXCAVATION OPERATIONS.
- B. BEFORE ORDERING ANY EQUIPMENT AND MATERIAL, OR PERFORMING ANY WORK, THE CONTRACTOR SHALL VERIFY ALL MEASUREMENTS AND DIMENSIONS AT THE JOB SITE AND SHALL BE HELD RESPONSIBLE FOR THE CORRECTNESS OF SAME.
- C. NO EXTRA COMPENSATION WILL BE ALLOWED ON ACCOUNT OF DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND MEASUREMENTS AND THOSE INDICATED ON THE DRAWINGS.
- D. ANY DIFFERENCE WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE PROFESSIONAL FOR CONSIDERATION BEFORE PROCEEDING WITH THE WORK.

1.12 LINES AND GRADES

- A. THE CONTRACTOR SHALL LAY OUT HIS WORK, ESTABLISHING HEIGHTS AND GRADES FOR ALL EXTERIOR AND INTERIOR PIPING INCLUDED IN THESE SPECIFICATIONS IN STRICT ACCORDANCE WITH THE INTENT OF THE DRAWINGS, THE PHYSICAL CONDITIONS OF THE BUILDING AND THE FINISHED SITE GRADES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF SUCH HEIGHTS AND GRADES AND MAKE SURE THAT THEY MEET ALL PHYSICAL CONDITIONS OF THE BUILDING AND THE REQUIREMENTS OF THESE SPECIFICATIONS.

1.13 PROTECTION OF SERVICES AND EQUIPMENT

- A. THE CONTRACTOR, AT HIS OWN EXPENSES, SHALL REPAIR, REPLACE AND MAINTAIN IN SERVICE ANY UTILITIES, FACILITIES OR SERVICES (UNDERGROUND, ABOVEGROUND, INTERIOR OR EXTERIOR) DAMAGED, BROKEN, OR OTHERWISE RENDERED INOPERATIVE DURING THE COURSE OF CONSTRUCTION DUE TO ACTIVITIES OF THE PART OF THE CONTRACTOR. THE METHOD USED BY THE CONTRACTOR IN REPAIRING, REPLACING, OR MAINTAINING THE SERVICES SHALL BE APPROVED BY THE PROFESSIONAL AND CONSTRUCTION MANAGER.
- B. THE CONTRACTOR SHALL PROTECT, AT HIS OWN EXPENSE, ALL MATERIALS OR EQUIPMENT RELATED TO HIS WORK THAT IS LIABLE TO DAMAGE DURING THE CONSTRUCTION PERIOD. ALL OPENINGS INTO ANY PIPING, DUCTS, EQUIPMENT, OR BUILDING COMPONENTS, MUST BE SECURELY COVERED, OR OTHERWISE PROTECTED, TO PREVENT INJURY, DUE TO ACCIDENTAL ENCROACHMENT OF, OR CARELESSLY OR MALICIOUSLY DROPPED TOOLS, MATERIALS, DIRT, OR ANY FOREIGN MATTER. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ALL DAMAGE SO DONE UNTIL HIS WORK IS FULLY AND FINALLY ACCEPTED.
- C. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT MOTORS, PUMPS, ELECTRICAL EQUIPMENT, AND ALL SIMILAR ITEMS OF EQUIPMENT FROM DIRT, GRIME, PLASTER, WATER, ETC. DURING ALL PHASES OF CONSTRUCTION. THIS PROTECTION SHALL BE PROVIDED BY COVERING EQUIPMENT WITH TRANSPARENT PLASTIC SHEETING TO THE SATISFACTION OF THE PROFESSIONAL OR CONSTRUCTION MANAGER.

1.14 INTERRUPTION OF SERVICES

- A. THE CONTRACTOR SHALL SCHEDULE HIS WORK TO AVOID ANY MAJOR INTERRUPTION OF ANY UTILITY SERVICES.
- B. THE CONTRACTOR SHALL NOT INTERRUPT EXISTING UTILITIES SERVING FACILITIES OCCUPIED AND USED BY OWNER OR OTHERS DURING OCCUPIED HOURS EXCEPT WHEN SUCH INTERRUPTIONS HAVE BEEN AUTHORIZED IN WRITING BY OWNER, CONSTRUCTION MANAGER OR PROFESSIONAL AND THEN INTERRUPTIONS SHALL OCCUR ONLY AFTER ACCEPTABLE TEMPORARY UTILITY SERVICES HAVE BEEN PROVIDED. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 10 WORKING DAYS NOTICE TO PROFESSIONAL, OWNER AND CONSTRUCTION MANAGER AND RECEIVE WRITTEN NOTICE TO PROCEED BEFORE INTERRUPTING ANY UTILITY.

1.15 EQUIPMENT STORAGE AND EQUIPMENT HANDLING

- A. DELIVER AND STORE EQUIPMENT IN THE ORIGINAL MANUFACTURER'S SHIPPING CONTAINERS.
- B. PIPING AND OTHER SUPPLIES THAT ARE NOT PROVIDED IN ORIGINAL MANUFACTURER'S SHIPPING CONTAINERS SHALL BE STORED IN A NEAT AND ORDERLY MANNER THAT MINIMIZES THE POTENTIAL FOR DAMAGE.
- C. PROTECT PIPE, FITTINGS, AND OTHER FIRE PROTECTION EQUIPMENT FROM THE WEATHER SO AS TO AVOID UNDO RUST. ANY COMPONENT EXHIBITING RUST SHALL BE REPLACED AT THE DISCRETION OF THE PROFESSIONAL, CM OR OWNER AT NO ADDITIONAL COST.

1.16 COORDINATION

- A. THE CONTRACTOR SHALL PARTICIPATE IN THE DEVELOPMENT OF INTER-TRADE COORDINATION DRAWINGS.
- B. THE CONTRACTOR MUST COORDINATE HIS WORK WITH THAT OF THE OTHER CONTRACTORS SO THAT THE WORK OF ALL TRADES WILL BE PERFORMED IN AN ORDERLY MANNER AND WITH THE LEAST POSSIBLE INTERFERENCE. IN THE CASE WHERE INTERFERENCE WITH THE WORK OF OTHER CONTRACTORS SHOULD OCCUR, THE DECISION OF THE PROFESSIONAL OR CONSTRUCTION MANAGER AS TO CHANGES TO BE MADE IN THE WORK SHALL BE FINAL.
- C. THE CONTRACTOR MUST THOROUGHLY FAMILIARIZE HIMSELF WITH ALL SPECIFICATIONS AND DRAWINGS FOR THE PROJECT SO THAT HE CLEARLY UNDERSTANDS HIS RESPONSIBILITY IN RELATIONSHIP TO THE WORK TO BE PERFORMED UNDER THIS CONTRACT. THE CONTRACTOR MUST PLAN AND PERFORM HIS WORK SO AS TO PERMIT THE USE OF THE BUILDING AT THE EARLIEST POSSIBLE DATE.
- D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FIRE PROTECTION EQUIPMENT LOCATIONS WITH THE LOCATIONS OF ALL LIGHTING FIXTURES, HVAC DIFFUSERS, CEILING ARCHITECTURAL FEATURES, AND STRUCTURAL MEMBERS. FITTING VALVES, FITTING ACCESSORIES SHALL BE MANUFACTURED IN THE UNITED STATES.
- E. THE CONTRACTOR SHALL COORDINATE LOCATIONS OF ALL FIRE PROTECTION PIPING WITH RESPECT TO ELECTRICAL EQUIPMENT AND THE NEC. ROUTING OF PIPING DIRECTLY ABOVE ELECTRICAL EQUIPMENT SHALL BE AVOIDED.
- F. THE CONTRACTOR SHALL COORDINATE LOCATIONS OF FIRE PROTECTION SYSTEM PIPING WITH RESPECT TO FRESH AIR INTAKE LOUVERS. ROUTING OF PIPING DIRECTLY IN FRONT OF SUCH LOUVERS SHALL BE AVOIDED DUE TO POTENTIAL FREEZING CONDITIONS. REFER TO MECHANICAL DRAWINGS FOR EXACT LOCATIONS FOR ALL LOUVERS. ALL LOUVERS SHALL BE SHOWN ON THE SHOP DRAWING SUBMITTALS.

1.17 CUTTING, PATCHING, AND FINISHING

- A. UNLESS OTHERWISE NOTED, THE CONTRACTOR SHALL CUT, PATCH AND FINISH ALL PENETRATIONS AND OPENINGS IN WALLS, AND FLOOR/CEILING ASSEMBLIES REQUIRED FOR THE INSTALLATION OF WORK TO BE PERFORMED UNDER THIS CONTRACT IN ACCORDANCE WITH THIS SECTION OF THE SPECIFICATION AND ANY ADDITIONAL FRONT END SPECIFICATION REQUIREMENTS. ALL PATCHING AND FINISHING SHALL MATCH EXISTING ADJACENT UNDISTURBED SURFACES.
- B. PENETRATIONS MADE IN EXISTING OR NEW FIRE RATED CHASES, PARTITIONS, FLOORS, ETC. SHALL BE SEALED WITH AN APPROVED MATERIAL AND METHOD AS REQUIRED TO MAINTAIN THE INTEGRITY OF THE FIRE SEPARATION IN ACCORDANCE WITH A UL METHOD AS WELL AS ANY ADDITIONAL REQUIREMENTS HEREIN.
- C. CUTTING OF THE CONSTRUCTION EXCESSIVELY OR CARELESSLY DONE SHALL BE REPAIRED TO MATCH THE ORIGINAL WORK BY THE CONTRACTOR AND TO THE SATISFACTION OF THE PROFESSIONAL, OWNER, AND CONSTRUCTION MANAGER WHO WILL MAKE THE FINAL DECISION WITH RESPECT TO EXCESSIVE OR CARELESS CUTTING WORK. THE CONTRACTOR SHALL SEAL ALL OPENINGS MADE IN PLENUM SPACES, FIRE RATED FLOORS, CEILINGS OR PARTITIONS AFTER ALL WORK HAS BEEN INSTALLED. THE MATERIAL USED FOR SEALING THE OPENINGS SHALL HAVE A FIRE RATING EQUAL TO OR GREATER THAN THE RATING OF THE FLOOR, CEILING OR PARTITION MATERIAL.
- D. WHERE PRESENT EQUIPMENT IS REMOVED AND UNUSED OPENING REMAIN IN WALLS, FLOORS, PARTITIONS, ETC., THE CONTRACTOR SHALL PROPERLY PATCH ALL SUCH OPENINGS EXCEPT AS HEREINAFTER SPECIFIED UNDER "WORK BY OTHERS". ALL PATCHING AND REPAIRING SHALL BE DONE BY WORKMEN SKILLED IN THIS TYPE OF WORK AND SHALL MATCH PRESENT OR NEW FINISHES.
- E. NO CUTTING SHALL BE DONE WHICH MAY AFFECT THE BUILDING STRUCTURALLY OR ARCHITECTURALLY WITHOUT FIRST SECURING THE APPROVAL OF THE PROFESSIONAL. CUTTING SHALL BE ACCOMPLISHED IN SUCH A MANNER AS NOT TO CAUSE DAMAGE TO THE BUILDING OR LEAVE UNSIGHTLY SURFACES THAT CANNOT BE CONCEALED BY PLATES, ESCUTCHEONS OR OTHER CONSTRUCTION. CUTTING SHALL NOT CAUSE DAMAGE TO THE BUILDING OR LEAVE UNSIGHTLY SURFACES. WHERE SUCH UNSIGHTLY CONDITIONS ARE CAUSED, THE CONTRACTOR SHALL BE REQUIRED, AT HIS OWN EXPENSE, TO REPAIR THE DAMAGED AREAS.
- F. NO STRUCTURAL MEMBER SHALL BE CUT.
- G. THE CONTRACTOR SHALL CONTACT THE HOLDER OF THE GUARANTEE AND OBTAIN WRITTEN APPROVAL BEFORE CUTTING THE ROOFING MEMBRANE SO AS NOT TO VOID SAID GUARANTEE.
- H. THE CONTRACTOR SHALL SET ALL SLEEVES, HANGERS, AND ANCHORS REQUIRED FOR THE WORK UNDER THIS CONTRACT AND SHALL BE RESPONSIBLE FOR THEIR PROPER AND PERMANENT LOCATION.



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SOUTH SOUND COMMERCE CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

CLIENT:

PROJECT:

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:
SPECIFICATIONS - FIRE PROTECTION

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

FP0.01



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DEVELOPMENT

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SOUTH SOUND COMMERCE
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SPECIFICATIONS - FIRE
PROTECTION

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

FP0.02

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL (CONT.)

1.18 PAINTING AND INDICATOR

- A. PAINTING
 1. STEEL EQUIPMENT HANGARS, SUPPORTS, AND PIPE SHALL BE PREPARED AS INDICATED BELOW.
 2. THE PAINTING CONTRACTOR SHALL PAINT EXPOSED SPRINKLER PIPING IN ALL FINISHED AREAS OF THE BUILDING. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING PIPE SURFACE TO ACCEPT PRIMER AND PAINT TO THE SATISFACTION OF THE PAINTING CONTRACTOR. ALL SURFACES SHALL BE THOROUGHLY CLEANED OF RUST, SCALE, DIRT, GREASE, DUST, AND LIKE ITEMS, AND SANDED SO AS TO PROVIDE A BOND FOR NEW PAINT.
 3. THE CONTRACTOR SHALL PAINT ALL PIPING WITHIN THE FIRE PUMP ROOM. THE COLOR SHALL BE RED.
 4. SHOP PAINT ALL PIPE WITH A POWDER COATING APPLICATION. IF CONVENTIONAL PAINTING IS PROVIDED IN LIEU OF POWDER COATING APPLY AT LEAST 1 COAT OF APPROVED PRIMER AND 2 COATS OF MACHINERY ENAMEL ON ALL PIPING.
 5. ALL PAINTING SHALL CONFORM TO THE MANUFACTURER'S REQUIREMENTS AS WELL AS ANY ADDITIONAL FRONT END PAINTING SPECIFICATION.
 6. ALL PAINTING SHALL BE DONE IN A CAREFUL, NEAT AND WORKMANLIKE MANNER, WITH PARTICULAR CARE BEING EXERCISED TO PROTECT BUILDING EQUIPMENT AND FINISHES.
 7. PROVISIONS SHALL BE MADE TO PROTECT SPRINKLERS FROM BEING PAINTED. ALL SPRINKLERS HAVING "NON-FACTORY-APPLIED PAINT" ON THEM SHALL BE REPLACED.
 8. THE MANUFACTURER SHALL PAINT ALL ITEMS OF EQUIPMENT. ALL EQUIPMENT MANUFACTURERS SHALL SUPPLY SUFFICIENT PAINT TO COMPLETELY PAINT EACH UNIT ONE COAT IN THE FIELD TO COVER ALL SCRATCHES, ETC., DUE TO INSTALLATION. THE PROFESSIONAL WILL CAREFULLY INSPECT ALL EQUIPMENT FOR ACCEPTANCE. IF PAINTWORK DOES NOT MEET THE PROFESSIONAL'S APPROVAL, THE CONTRACTOR SHALL REPAINT ALL EQUIPMENT FOUND TO BE DEFECTIVE AS DIRECTED BY THE PROFESSIONAL.
 9. ALL EXPOSED HANGERS AND SUPPORTS SHALL BE PRIMED AND FINISHED WITH RUST INHIBITOR PAINT.
 10. ALL NAMEPLATES AND DATA PLATES THAT INDICATE OR IDENTIFY DATA ON EQUIPMENT SHALL NOT BE PAINTED, BUT SHALL BE CAREFULLY MARKED AND LEFT UNPAINTED.
 11. WHERE PIPE SUPPORT MEMBERS ARE WELDED TO THE STRUCTURAL BUILDING FRAMING, SCRAPE AND/OR BRUSH CLEAN AND APPLY ONE COAT OF ZINC PRIMER TO WELDING.
 12. ALL COLORS TO BE USED SHALL BE SUBMITTED TO THE PROFESSIONAL FOR APPROVAL.
- B. IDENTIFICATION
 1. THE CONTRACTOR SHALL PROVIDE PERMANENTLY AFFIXED IDENTIFICATION OF FIRE PROTECTION PIPING. THIS MAY INCLUDE STENCILLED PAINTING OR LABELS.
 2. IDENTIFY ALL SPRINKLER PIPING (EXCEPT BRANCH LINES), CONCEALED OR EXPOSED, WITH PERMANENTLY AFFIXED IDENTIFICATION. INSTALL IN CLEAR VIEW AND ALIGN WITH AXIS OF PIPING. LOCATE IDENTIFICATION NOT TO EXCEED 15-FEET ON STRAIGHT RUNS INCLUDING RISERS AND DROPS, ADJACENT TO EACH VALVES AND "T", AT EACH SIDE OF PENETRATION OF STRUCTURE OR ENCLOSURE, AND AT EACH OBSTRUCTION.
 3. IDENTIFY SERVICE AS "FIRE PROTECTION" AND MARK THE DIRECTION OF FLOW. LETTERS SHALL BE OF HEIGHT EQUAL TO THE DIAMETER OF THE PIPE ON PIPING UP TO AND INCLUDING 1 1/2 INCHES, AND 2 INCHES HIGH ON PIPES 2 INCHES IN DIAMETER AND OVER. FLOW ARROWS SHALL BE APPROXIMATELY 4 INCHES LONG HAVING A 1 INCH WIDE HEAD AND BASE WITH A 1/2 INCH WIDE SHAFT.
 4. THE BAND COLOR SHALL BE RED AND LETTER COLOR SHALL BE WHITE.
 5. BACKGROUND COLOR CODING AND STENCILING FOR PIPING, EQUIPMENT, AND RELATED APPURTENANCES PROVIDED UNDER THIS CONTRACT SHALL MEET THE MINIMUM STANDARDS FOR IDENTIFICATION AS SET FORTH BY THE LATEST EDITION OF THE ANSI A13.1.
- C. CONTRACTOR INDICATIONS
 1. CLEARLY MARKED PERMANENT LABELS WHICH ARE SECURELY FASTENED TO THE CEILING SHALL BE GREASED TO IDENTIFY ACCESS POINTS FOR CONCEALED CONTROL VALVES IN ACCORDANCE WITH NFPA 13.
 2. PLACE TAGS ON ALL VALVES INDICATING FUNCTION.
 3. THE FOLLOWING SCHEDULES SHALL BE USED FOR MANUFACTURE AND APPLICATION OF INDICATION:
 - a. PLASTIC NAMEPLATES: LAMINATED 3 LAYER PLASTIC WITH ENGRAVED WHITE LETTERS ON RED BACKGROUND COLOR.
 - b. METAL TAGS: BRASS WITH STAMPED LETTERS; TAG SIZE MINIMUM 1 1/2 INCH DIAMETER WITH SMOOTH EDGES.

1.19 EXCAVATION, BACKFILLING, AND COMPACTION

- A. GENERAL
 1. THIS SECTION IS APPLICABLE TO ALL UNDERGROUND FIRE PROTECTION LINES.
 2. THE CONTRACTOR SHALL NOTIFY THE CM PRIOR TO COMMENCING ANY EXCAVATION.
 3. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION, BACKFILLING, COMPACTION, AND NECESSARY FINISHING FOR ALL LINES, EQUIPMENT, AND ACCESSORIES INSTALLED UNDER THIS CONTRACT. PIPING INSTALLATION AND TESTING SHALL BE IN ACCORDANCE WITH NFPA 24 AND APPLICABLE STATE AND LOCAL CODES.
 4. THE CONTRACTOR SHALL PROVIDE ALL BRACING, SHEATHING, AND SHORING NECESSARY TO PERFORM AND PROTECT THE EXCAVATIONS. SAFETY RAILS, LIGHTS, SIGNS, ETC. SHALL BE PROVIDED AS NECESSARY OR REQUIRED FOR SAFETY, AS DIRECTED BY THE CM OR AS REQUIRED TO CONFORM TO GOVERNING LAWS.
 5. THE CONTRACTOR SHALL FURNISH, MAINTAIN, AND OPERATE PUMPING EQUIPMENT OF SUFFICIENT CAPACITY TO INSURE THAT ALL EXCAVATIONS AND TRENCHES REQUIRED HEREIN ARE KEPT FREE OF WATER AT ALL TIMES.
 6. ALL SURFACES OF STREETS, WALKWAYS, SEEDED AREAS, OR FINISHED GRADE AREAS DISTURBED BY THE EXCAVATION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND/OR AS SHOWN ON THE CIVIL SITE PLANS AND SPECIFICATIONS.
 7. EXISTING STRUCTURES, UTILITIES, SIDEWALKS, PAVEMENTS, AND OTHER FACILITIES NOT INDICATED FOR REMOVAL SHALL BE PROTECTED FROM DAMAGE CAUSED BY SETTLEMENT, LATERAL MOVEMENT, UNDERMINING, WASHOUT, AND/OR HAZARDS RESULTING FROM THE EXCAVATION OPERATIONS SPECIFIED HEREIN.
 8. IF IT BECOMES NECESSARY TO INSTALL ANY LINES OR EQUIPMENT IN LOCATIONS OTHER THAN THOSE SHOWN, THE CM'S ACCEPTANCE SHALL BE OBTAINED BEFORE STARTING SAID EXCAVATION.
 9. THE PRESENCE OF EXPLOSIVE SITE OR THE USE OF EXPLOSIVES IN THE EXECUTION OF THE WORK UNDER THIS CONTRACT IS NOT PERMITTED.
- B. EXCAVATION
 1. ALL FIRE PROTECTION EXCAVATION IS UNCLASSIFIED.
 2. TRENCHES SHALL BE DUG TO UNIFORM WIDTH NOT LESS THAN 12 INCHES OR MORE THAN 16 INCHES WIDER THAN THE BELL DIAMETER. TRENCH SIDES SHALL BE VERTICAL. EXCAVATE TRENCHES TO DEPTH INDICATED OR REQUIRED. CARRY DEPTH OF TRENCHES FOR PIPING AS REQUIRED TO ESTABLISH DESIRED FLOW LINE AND INVERT ELEVATIONS. BEYOND BUILDING PERIMETER, KEEP BOTTOM OF TRENCH SUFFICIENTLY BELOW FINISHED GRADE TO PROTECT AGAINST FROST AND ALLOW FOR THE MINIMUM REQUIRED DEPTH OF COVER. THE BOTTOM OF TRENCHES SHALL BE ACCURATELY GRADED TO PROVIDE UNIFORM AND SMOOTH FLOW THROUGHOUT. ANY OVER-EXCAVATION SHALL BE BACKFILLED WITH NO. 2A MODIFIED AGGREGATE AND THOROUGHLY TAMPED.
 3. IF TRENCH EXCAVATION OPERATIONS ARE PERFORMED WHEN THE ATMOSPHERIC TEMPERATURE IS LESS THAN 35 DEGREES FAHRENHEIT, THE CONTRACTOR SHALL PROVIDE, AT HIS OWN EXPENSES, COLD WEATHER PROTECTION TO PROTECT EXCAVATED TRENCH BOTTOMS FROM FREEZING. UNDER NO CIRCUMSTANCES WILL ANY PIPE BE PERMITTED TO BE LAID IN A TRENCH CONTAINING WATER OR ON A SUBGRADE CONTAINING FROST.
 4. ALL MATERIAL EXCAVATED SHALL BE DEPOSITED ON THE SIDE OF THE TRENCHES AND BEYOND THE REACH OF SIDES. EXCAVATED MATERIAL SHALL NOT BE PILED WHERE IT WILL INTERFERE WITH TRAFFIC.
 5. SURPLUS EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILL SHALL BE REMOVED FROM THE BUILDING SITE OR DISTRIBUTED ON THE PREMISES AS DIRECTED BY THE CM.
 6. TAKE UP AND RE-LAY PIPE THAT IS NOT LAID TRUE TO REQUIRED ALIGNMENT OR GRADE. PIPE THAT HAS HAD THE JOINTS DISTURBED AFTER BEING LAID SHALL BE TAKEN UP AND LAID AGAIN. DEVIATION FROM THE REQUIRED LINES AND GRADES WILL NOT BE PERMITTED UNLESS APPROVED BY THE CM.
 7. PIPE EMBEDDING MATERIAL - ALL PIPE SHALL BE LAID ON A FIRST CLASS GRANULAR BEDDING. THE BEDDING SHALL BE A MINIMUM DEPTH OF 6 INCHES OR 1/4 THE PIPE DIAMETER, WHICHEVER IS GREATER. THE BEDDING SHALL PROVIDE UNIFORM LONGITUDINAL SUPPORT TO THE PIPE AND SHALL BE LAID TO PROVIDE THE GRADE AND LINE AS SHOWN ON THE DRAWING OR AS DIRECTED BY THE PROFESSIONAL. COMPACTION OF BEDDING MATERIALS UNDER THE HUNCHES AND AROUND THE SPRINGLINE OF THE PIPE SHALL BE BY HAND TAMPING. FINAL BEDDING MATERIAL FOR FERROUS PIPE MATERIALS SHALL EXTEND FROM THE SPRINGLINE OF THE PIPE TO A DEPTH OF 6 INCHES (MINIMUM) ABOVE THE TOP OF THE PIPE.
- C. BACKFILLING
 1. BACKFILLING SHALL NOT BE UNDERTAKEN UNTIL ALL TEST AND INSPECTIONS HAVE BEEN COMPLETED.
 2. BACKFILLING OPERATIONS SHALL AVOID DAMAGING OR DISPLACING INSTALLED PIPING SYSTEMS.
 3. CONTRACTOR SHALL RESTORE THE SURFACE OF ALL EXCAVATIONS TO THEIR ORIGINAL CONDITIONS, INCLUDING PAVED OR UNPAVED STREETS, GUTTERS, SHRUBBERY, FENCES, WALLS, SIDEWALKS, AND SOD. CONTRACTOR SHALL FURNISH ALL LABOR AND MATERIAL REQUIRED.
 4. ALL BACKFILL MATERIAL SHALL BE FREE FROM CINDERS, ASHES, REFUSE, VEGETABLE OR ORGANIC MATERIAL, BOULDERS, ROCKS OR STONES, FROZEN SOIL, OR OTHER MATERIAL THAT IS UNSUITABLE. THE TYPE OF BACKFILL MATERIAL IS NOT INDICATED ON THE PLANS OR IS NOT SPECIFIED, THE EXCAVATED MATERIAL MAY BE USED, PROVIDED THAT SUCH MATERIAL CONSISTS OF LOAM, CLAY, SAND, GRAVEL, OR OTHER MATERIAL THAT IS SUITABLE FOR BACKFILLING. ABOVE THE TOP OF THE PIPE TO THE SUBGRADE OF THE PAVEMENT, MATERIAL CONTAINING STONES GREATER THAN 6 INCHES IN THEIR GREATEST DIMENSION MAY NOT BE USED.
 5. ALL TRENCH BACKFILL SHALL BE BROUGHT TO SUBGRADE READY FOR BASE MATERIAL OR TOPSOIL. AFTER THE INITIAL AGGREGATE BACKFILL LAYER HAS BEEN PLACED, REFILL REMAINDER OF THE TRENCH USING BACKFILL MATERIALS SPECIFIED BELOW.
 6. WALKS AND PARKING AREAS - CLEAN EARTH BACKFILL COMPACTED IN 6 INCH LAYERS TO A POINT 8 INCHES BELOW THE ADJACENT EXISTING SURFACES. REFILL THE REMAINING 8 INCHES WITH COMPACTED 2A MODIFIED STONE AND REPLACE WALK OR PAVING AS REQUIRED.
- D. COMPACTION
 1. THOROUGHLY COMPACT SUBGRADE PRIOR TO THE INSTALLATION OF 6 INCHES OF FIRST CLASS PIPE BEDDING. FOLLOWING SATISFACTORY PIPE LAYING AND IN-LINE STRUCTURE INSTALLATION, BACKFILL TRENCHES TO A HEIGHT OF AT LEAST 12 INCHES ABOVE THE TOP OF THE OUTSIDE BARREL OF THE PIPE WITH NO. 1B CRUSHED STONE.
 2. ALL FILL SHALL BE COMPACTED TO 95 PERCENT. EACH LAYER SHALL BE COMPACTED TO THE SPECIFIED PERCENT OF MAXIMUM DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT, IN ACCORDANCE WITH ASTM D1557, METHOD D AND ASTM D1556 SAND CONE METHOD.
 3. COMPACTION SHALL BE ACCOMPLISHED BY APPROVED EQUIPMENT SUITED TO THE SOIL BEING COMPACTED. MATERIAL SHALL BE MOISTENED OR AERATED AS NECESSARY TO PROVIDE THE MOISTURE CONTENT THAT WILL READILY FACILITATE OBTAINING THE SPECIFIED COMPACTION WITH THE EQUIPMENT USED.
 4. THOROUGHLY COMPACT SUCCESSIVE LAYERS OF BACKFILL MATERIAL WITH A VIBRATING COMPACTOR OF A TYPE AND SIZE SATISFACTORY TO THE CM. COMPACTION OF THIS BACKFILL BY PLODDING OR JETTING WILL NOT BE PERMITTED. USE MECHANICAL TAMPERS TO COMPACT BACKFILL MATERIALS IN TRENCH REFILL OPERATIONS TO PRODUCE A DENSITY OF BACKFILL AT THE BOTTOM OF EACH LAYER OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY OBTAINED AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY AASHTO T99 WHEN REQUESTED BY THE CM. PERFORM FIELD DETERMINATIONS OF BACKFILL DENSITY IN ACCORDANCE WITH AASHTO T 191.
 5. THE USE OF SPECIAL EQUIPMENT SUCH AS THE "HYDRA-HAMMER" FOR COMPACTION OF BACKFILL IS PROHIBITED.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. PIPE AND FITTING SHALL BE AS SPECIFIED HEREIN AND USED ON THE SERVICES INDICATED. PIPE SHALL BE CLEAR AND FREE OF DIRT, DEBRIS, OR ANY OTHER OBSTRUCTION.
- B. "PLAIN-END" PIPE/FITTINGS AND THREADABLE LIGHT-WALL PIPE ARE NOT PERMITTED. ALL PIPE MUST HAVE A CORROSION RESISTANCE RATIO ≥ 1.00 FOR THE JOINT SPECIFIED.
- C. ALL GATE VALVES, SPRINKLER HOSES AND FITTINGS SHALL BE STEEL. ADDITIONALLY, ALL PIPE AND FITTINGS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13. ALL PIPING AND FITTINGS FOR THE WET PIPE SYSTEM SHALL BE BLACK. ALL PIPING WHICH UTILIZES THREADED FITTINGS SHALL BE SCHEDULE 40.
- D. SPRINKLER PIPING 1-1/4 INCHES IN DIAMETER OR LARGER, CONNECTED BY WELDED FLANGED FITTINGS OR ROLL GROOVED FITTINGS, SHALL BE SCHEDULE 40, SCHEDULE 30, OR SCHEDULE 10 AS PERMITTED BY NFPA 13. CUT GROOVES ARE NOT PERMITTED. ALL SPRINKLER PIPING 2 INCHES IN DIAMETER AND SMALLER (THAT IS NOT ROLL GROOVED OR WELDED) SHALL BE SCHEDULE 40 UTILIZING SCREWED FITTINGS (PLAIN END FITTINGS SHALL NOT BE ACCEPTED).
- E. ALL MISCCELLANEOUS DRAIN AND TEST PIPING AND FITTINGS SHALL BE SCHEDULE 40 INTERNALLY AND EXTERNALLY GALVANIZED.
- F. ALL ABOVE GROUND PIPING ON THE SUPPLY SIDE OF THE BACKFLOW PREVENTION DEVICE/FIRE PUMP SHALL BE LISTED FOR POTABLE SERVICE AND IN ACCORDANCE WITH THE LOCAL WATER DEPARTMENT REQUIREMENTS AND INTERNALLY AND EXTERNALLY GALVANIZED STEEL PIPE.
- H. OUTSIDE UNDERGROUND PIPING SHALL BE CLASS 52, CEMENT-LINED DUCTILE-IRON PIPE LISTED FOR POTABLE SERVICE AND SHALL BE IN ACCORDANCE WITH NFPA 24. HOPE PIPING, LISTED FOR FIRE WATER SERVICE APPLICATIONS, MAY BE UTILIZED.

2.2 VALVES - GENERAL

- A. ALL VALVES IN EACH SYSTEM, EXCEPT FOR SPECIAL TYPES, SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER. VALVES SHALL HAVE THE NAME OR TRADEMARK OF THE MANUFACTURER AND THE WORKING PRESSURE STAMPED OR CAST ON THE VALVE BODY.
- B. ALL VALVES REQUIRING PACKING SHALL BE DESIGNED AND CONSTRUCTED SUCH THAT THEY CAN BE REPACKED UNDER PRESSURE.
- C. HANDWHEELS FOR VALVES 2 INCHES AND SMALLER SHALL BE MALLEABLE IRON OR ALUMINUM EXCEPT WHERE SPECIFIED OTHERWISE. HANDWHEELS FOR VALVES 2 1/2 INCHES AND LARGER SHALL BE MALLEABLE OR CAST IRON EXCEPT WHERE SPECIFIED OTHERWISE.
- D. VALVES SHALL HAVE LISTING OR APPROVAL AGENCY IDENTIFICATION MARK STAMPED OR CAST ON VALVE BODY. ALL VALVES SHALL BE LISTED FOR FIRE PROTECTION SERVICE USE.
- E. ALL FIRE PROTECTION SERVICE VALVES SHALL BE UL LISTED AND FM APPROVED, WITH MINIMUM 175 PSIG (1200-KPA) NON-SHOCK WORKING-PRESSURE RATING. VALVES FOR GROOVED-END PIPING MAY BE FURNISHED WITH GROOVED ENDS INSTEAD OF TYPE ENDS SPECIFIED.

2.3 GATE VALVES

- A. ALL GATE VALVES SHALL BE IN ACCORDANCE WITH UL 262.
- B. GATE VALVES (2 1/2 INCHES IN SIZE AND LARGER) SHALL BE OS&Y TYPE WITH IRON BODY, BRONZE TRIM, SOLID WEDGE, AND FLANGED ENDS.
- C. GATE VALVES (2 INCHES IN SIZE AND SMALLER) SHALL BE OS&Y TYPE WITH BRONZE BODY, SOLID WEDGE, AND THREADED END.
- D. INDICATOR-POST, GATE VALVES SHALL BE IRON BODY, BRONZE MOUNTED, SOLID-WEDGE DISC, AND NON-RISING STEM WITH OPERATING NUT AND FLANGED ENDS.
- E. INDICATOR POSTS SHALL BE UL 789, CAST-IRON BODY, WITH WINDOWS FOR TARGET PLATES THAT INDICATE VALVE POSITION, EXTENSION ROD AND COUPLING, LOCKING DEVICES, HANDWHEEL OPERATION AND RED ENAMEL FINISH.

2.4 BUTTERFLY VALVES

- A. BUTTERFLY VALVES SHALL BE LUG TYPE WITH DUCTILE IRON BODY, STAINLESS STEEL STEM, BUNA N OR EPDM SEAT, NICKEL OR ALUMINUM PLATED BRASS DISC, AND GEAR OPERATOR. VALVE SHALL BE LISTED FOR FIRE SERVICE AND RATED FOR THE ANTICIPATED OPERATING PRESSURE.
- B. INDICATING VALVES: NPS 2-1/2" AND SMALLER SHALL BE IN ACCORDANCE WITH UL 1091 AND BE BUTTERFLY OR BALL-TYPE UTILIZING A BRONZE BODY WITH THREADED ENDS AND INTEGRAL INDICATING DEVICES.

2.5 CHECK VALVES

- A. ALL CHECK VALVES SHALL BE IN ACCORDANCE WITH UL 312.
- B. CHECK VALVES (2 1/2 INCHES IN SIZE AND LARGER) SHALL BE CLASS 150, HORIZONTAL SWING TYPE WITH IRON BODY, BRONZE TRIM, AND FLANGED OR GROOVED ENDS.
- C. CHECK VALVES (2 INCHES IN SIZE AND SMALLER) SHALL BE CLASS 150, HORIZONTAL SWING TYPE WITH BRONZE BODY, COMPOSITION DISC, AND THREADED ENDS.

2.6 GLOBE AND ANGLE VALVES

- A. GLOBE VALVES SHALL HAVE BRONZE BODY, RISING STEM, COMPOSITION DISC, AND BE THREADED.
- B. GLOBE VALVES HAVING CAST IRON HANDWHEELS SHALL BE PERMITTED.
- C. ANGLE VALVES SHALL HAVE BRONZE BODY, RISING STEM, COMPOSITION DISC, AND THREADED ENDS.

2.7 FLOW SWITCHES

- A. VANE TYPE WATERFLOW SWITCH/DETECTORS SHALL BE INSTALLED ON THE SPRINKLER SYSTEM PIPING AS DESIGNATED ON THE DRAWINGS. WATERFLOW SWITCHES SHALL BE FURNISHED AND INSTALLED BY THE SPRINKLER SYSTEM CONTRACTOR. FIRE ALARM CONTRACTOR SHALL CONNECT THE FLOW SWITCHES TO THE FIRE ALARM CONTROL PANEL. THE TWO CONTRACTORS SHALL WORK IN A COORDINATED BASIS TO TEST THE UNITS.
 1. SAID SWITCH/DETECTORS SHALL BE DESIGNED FOR MOUNTING ON EITHER VERTICAL OR HORIZONTAL PIPING, BUT SHALL NOT BE MOUNTED IN A FITTING OR WITHIN 12 INCHES OF ANY FITTING THAT CHANGES THE DIRECTION OF WATER FLOW.
 2. SAID SWITCH/DETECTOR SHALL HAVE A SENSITIVITY SETTING TO SIGNAL ANY FLOW OF WATER THAT EQUALS OR EXCEEDS THE DISCHARGE FROM ONE RETARD ELEMENT.
 3. THE WATERFLOW SWITCHES SHALL HAVE A MINIMUM RATED CAPACITY OF 15 AMPS AT 125V AC AND 2 AMP AT 0-30V DC RESISTIVE, TWO (2) NORMALLY OPEN CONTACTS, AND SHALL BE ACTUATED BY A POLYETHYLENE VANE EXTENDING INTO THE WATERWAY OF THE PIPING.
 4. THE WATERFLOW SWITCH/DETECTORS SHALL BE OF WEATHERPROOF, DUST TIGHT CONSTRUCTION, SHALL PROVIDE A 1/2 INCH CONDUIT ENTRANCE, AND SHALL BE FINISHED IN RED BAKED ENAMEL.
 5. THE WATERFLOW SWITCH MECHANISMS SHALL INCORPORATE AN INSTANTLY RECYCLING PNEUMATIC RETARD ELEMENT IN THE ADJUSTABLE RANGE OF 0 TO 70 SECONDS.

2.8 VALVE SUPERVISORY SWITCHES/EQUIPMENT

- A. SUPERVISORY SWITCHES SHALL BE INSTALLED ON THE SYSTEM CONTROL VALVES. SUPERVISORY SWITCHES SHALL BE FURNISHED AND INSTALLED BY THE SPRINKLER SYSTEM CONTRACTOR. FIRE ALARM CONTRACTOR SHALL CONNECT THE SUPERVISORY SWITCHES TO THE FIRE ALARM CONTROL PANEL. THE TWO CONTRACTORS SHALL WORK IN A COORDINATED BASIS TO TEST THE UNITS.
- B. THE MECHANISM SHALL BE CONTAINED IN A WEATHERPROOF, DIE CAST ALUMINUM HOUSING, WHICH SHALL PROVIDE A 3/8 INCH TAPPED CONDUIT ENTRANCE AND INCORPORATE THE NECESSARY FACILITIES FOR ATTACHMENT TO THE VALVE.
- C. POST INDICATOR VALVE AND OUTSIDE SCREW AND YOKE TYPE SWITCHES SHALL CONTAIN ONE SINGLE POLE, DOUBLE THROW CONTACT (FORM C NOMINALLY RATED FOR 2.5 AMP AT 0-30V DC RESISTIVE.) SWITCHES SHALL BE MOUNTED SO AS NOT TO INTERFERE WITH THE NORMAL OPERATION OF THE VALVE. THE SWITCH SHALL ACTIVATE WHEN THE VALVE IS CLOSED DURING THE FIRST TWO REVOLUTIONS OF THE HAND WHEEL OR DURING ONE-FIFTH OF THE TRAVEL DISTANCE OF THE VALVE CONTROL APPARATUS FROM ITS NORMAL POSITION. THE SWITCH SHALL PROVIDE FOR A RESTORATION SIGNAL WHEN THE VALVE IS RETURNED TO THE NORMAL POSITION. THE SWITCH COVER SHALL BE TAMPER RESISTANT AND CAUSE THE SWITCH TO ACTIVATE IF THE COVER IS REMOVED OR IF THE LINES ARE REMOVED FROM ITS MOUNTING.
- D. VALVE SUPERVISORY SWITCHES SHALL BE DESIGNATED FOR VALVE MOUNTING EITHER VERTICALLY OR HORIZONTALLY.
- E. THE FIRE PROTECTION CONTRACTOR SHALL PROVIDE A SUPERVISORY SWITCH ON THE POST INDICATOR VALVE. WIRING EXTENDED TO THE MECHANICAL ROOM AND CONNECTION TO THE FIRE ALARM PANEL WILL BE PROVIDED BY OTHERS.

2.9 IDENTIFICATION SIGNS

- A. IDENTIFICATION SIGNS SHALL BE PROVIDED ON ALL VALVES IN ACCORDANCE WITH NFPA 13.
- B. PROVIDE RISER PLACARDS FOR EACH REMOTE AREA OF EACH SYSTEM.
- C. IN ADDITION TO THE REQUIRED IDENTIFICATION SIGNS ABOVE, A MEANS FOR IDENTIFYING THE LOCATIONS OF CONCEALED CONTROL VALVES SHALL BE PROVIDED WITH SIGNAGE IN THE VICINITY OF EACH VALVE IN A CONSPICUOUS LOCATION. THE INFORMATION PROVIDED ON THE IDENTIFYING PLATE SHALL BE AS REQUIRED BY NFPA 13, INCLUDING THE LOCATION OF THE CONTROL VALVE, THE AREA ISOLATED BY THE VALVE, AND THE "NORMAL" POSITION OF THE VALVE, AND SHALL BE APPROVED BY THE FIRE MARSHAL'S OFFICE AND THE PROFESSIONAL PRIOR TO INSTALLATION.
- D. SIGNS SHALL BE MANUFACTURED OF METAL OR PLASTIC, AND SHALL BE SECURELY FASTENED.
- E. A VALVE CHART SHALL BE PROVIDED INDICATING THE LOCATION OF ALL VALVES WITH THE FUNCTION AND AREAS SERVED BY SAID VALVES. THE VALVE CHART SHALL BE ACCOMPANIED BY LEGIBLE SCALED PLAN VIEWS OF THE BUILDING INDICATING THE RELATIVE LOCATION OF ALL REMOTELY LOCATED ISOLATION VALVES AND THE BULK FEED SUPPLY PIPING TO SAID VALVES.

2.10 FLANGES

- A. FLANGES IN THREADED PIPELINES SHALL BE CAST IRON SCREWED FLANGES.
- B. FLANGES IN WELDED PIPELINES SHALL BE STEEL WELD NECK OR SLIP-ON TYPE WELDING FLANGES.
- C. FLANGES SHALL SPECIFICALLY BE OF FLAT FACES. ALL FLANGES MATING WITH ADJACENT FLANGES, VALVE FITTINGS, AND EQUIPMENT SHALL BE OF THE SAME TYPE.
- D. FLANGE GASKET SHALL BE 1/16 INCH NON-METALLIC, NON-ASBESTOS, RING TYPE.
- E. FLANGE BOLTS SHALL BE CARBON STEEL, ALL THREADED TYPE. NUTS SHALL BE CARBON STEEL HEXAGON TYPE. STEEL FOR BOLT AND NUTS SHALL CONFORM TO NFPA 24 REQUIREMENTS.

2.11 GROOVED COUPLINGS

- A. GROOVED COUPLINGS SHALL BE TWO-PIECE MALLEABLE IRON OR DUCTILE IRON, ASTM A536, WITH GASKET AND TWO BOLTS. GASKET SHALL BE BUNA N. COUPLING SHALL BE RATED FOR 300 PSIG WORKING PRESSURE.
- B. ALL MECHANICAL FITTINGS SHALL BE MANUFACTURED BY THE SAME COMPANY.
- C. ONLY FULL FLOW FITTINGS SHALL BE PERMITTED.
- D. MECHANICAL TEES MAY BE USED TO CONNECT TO 1.25 INCH OR LARGER PIPE ONLY. MECHANICAL TEES, WHICH INCORPORATE A "U" BOLT OF HINGED STRAP ARRANGEMENT, SHALL NOT BE USED.
- E. FITTINGS SHALL BE ROLL GROOVED. CUT GROOVES ARE NOT PERMITTED.
- F. FLANGED CONNECTIONS SHALL BE APPROVED BY THE PROFESSIONAL.
- G. THE GROOVED COUPLING MANUFACTURER'S REPRESENTATIVE SHALL PROVIDE AN ON-SITE TRAINING SESSION WITH THE CONTRACTOR'S SPRINKLER FITTERS TO ENSURE THAT THE PRODUCTS ARE BEING PROPERLY INSTALLED AND UTILIZED. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION OF SUCH TRAINING TO THE PROFESSIONAL.

2.12 HANGERS

- A. ALL HANGING METHODS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS CONTAINED IN NFPA 13. THE PORTION OF THE HANGER THAT DIRECTLY ATTACHES TO THE PIPING OR THE BUILDING STRUCTURE SHALL BE LISTED FOR THAT PURPOSE.
- B. FIRE PROTECTION SYSTEM PIPING SHALL NOT BE SUPPORTED FROM THE BOTTOM CHORD OF BAR JOISTS.
- C. HANGERS USED ON SLOPED OR ANGLED STRUCTURES SHALL BE OF THE ARTICULATING BEAM CLAMP STYLE. DO NOT BEND OR ANGLE THREADED ROD.
- D. THE USE OF POWDER DRIVEN ANCHORS FOR HANGING OF FIRE PROTECTION EQUIPMENT IS GENERALLY PROHIBITED. THE USE OF POWDER DRIVEN ANCHORS MAY BE PERMITTED FOR CERTAIN APPLICATIONS WHERE NO OTHER REASONABLE ALTERNATIVE EXISTS. SPECIFIC APPROVAL BY THE PROFESSIONAL OR CM IS REQUIRED PRIOR TO USE.
- E. METHODS OF HANGING FIRE PROTECTION PIPING SHALL INCLUDE THE REQUIREMENTS OF SEISMIC RESTRAINTS OF PIPING INDICATED IN NFPA 13, IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE, FOR ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENTS AND SYSTEMS.

PART 3 - EXECUTION - NOT USED

-END OF SECTION-

SECTION 211313 - AUTOMATIC SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 STIPULATIONS

- A. GENERAL PROVISIONS OF THE CONTRACT DOCUMENTS INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATIONS SECTIONS APPLY TO ALL WORK IN THIS SECTION.
- 1.2 WORK INCLUDED**
- A. THIS SPECIFICATION APPLIES TO THE INSTALLATION OF THE AUTOMATIC SPRINKLER SYSTEM AT SOUTH SOUND COMMERCE CENTER BUILDING A.
 - B. PROVIDE A NEW 10-INCH CLASS 52, CEMENT LINED, DUCTILE IRON FIRE PROTECTION UNDERGROUND SERVICE LINE FROM 5- FEET OUTSIDE THE BUILDING AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL OBTAIN THE FLUSHING AND TESTING CERTIFICATE, AS REQUIRED BY NFPA 24, FROM THE CONTRACTOR INSTALLING THE OUTSIDE UNDERGROUND PRIOR TO CONNECTION OF SPRINKLER PIPE. IF THIS CERTIFICATE CANNOT BE OBTAINED, THE CONTRACTOR IS RESPONSIBLE FOR FLUSHING THE OUTSIDE UNDERGROUND.
 - C. PROVIDE A DOUBLE DETECTOR CHECK TYPE BACKFLOW PREVENTER IN THE ROOM WITH THE SPRINKLER RISER FOR THE FIRE PROTECTION SERVICE.
 - D. PROVIDE AND COORDINATE A CONFIRMING WATER FLOW TEST FOR THE SITE IN ACCORDANCE WITH NFPA 291, PRIOR TO SUBMITTING ALL HYDRAULIC CALCULATIONS/SHOP DRAWINGS. INCLUDE TEST RESULTS WITH THE SUBMITTAL.
 - E. DESIGN AND INSTALL A HYDRAULICALLY DESIGNED WET-PIPE AUTOMATIC SPRINKLER SYSTEM THROUGHOUT THE ENTIRE BUILDING IN ACCORDANCE WITH NFPA 13, ALL REFERENCED CODES, AND THE REQUIREMENTS SPECIFIED UNDER "SPRINKLER SYSTEM DESIGN" BELOW. SEE SPECIFICATION 21 05 00 COMMON WORK RESULTS FOR FIRE SUPPRESSION FOR ALL APPLICABLE CODES.
 - F. PROVIDE DRY SPRINKLERS FOR USE IN AREAS SUBJECT TO COLD AND FREEZING AS REQUIRED.
 - G. PROVIDE ALL ALARM AND SUPERVISORY SPRINKLER SYSTEM EQUIPMENT (E.G., FLOW AND TAMPER SWITCHES) FOR INTERFACE WITH THE BUILDING FIRE ALARM SYSTEM. THE CONTRACTOR SHALL COORDINATE THESE EQUIPMENT LOCATIONS WITH THE FIRE ALARM CONTRACTOR.
 - H. PROVIDE A FREESTANDING SIAMESE FIRE DEPARTMENT CONNECTION AS INDICATED ON THE DRAWINGS.
 - I. PROVIDE FIRE HOSE VALVES AT ALL FIRE DEPARTMENT ENTRANCES INTO THE WAREHOUSE IN ACCORDANCE WITH NFPA 13.
 - J. COORDINATE ALL EQUIPMENT INSTALLATIONS WITH THE BUILDING ARCHITECTURAL AND STRUCTURAL FEATURES AND WITH THE OTHER TRADES TO ENSURE A COMPLETE, SUPERVISED, AND OPERATIONAL SYSTEM. REVIEW ARCHITECTURAL PLANS TO UNDERSTAND ANY VARYING, SLOPED, AND OPEN CEILINGS, SOFFITS, OR BULKHEADS THROUGHOUT THE BUILDING.
 - K. THE CONTRACTOR SHALL BECOME KNOWLEDGEABLE OF ANY PHASING PLAN IN PLACE AND BID THE JOB ACCORDINGLY.

1.3 SUBMITTALS

- A. ALL SUBMITTALS SHALL COMPLY WITH ANY FRONT-END SPECIFICATION REQUIREMENTS AS WELL AS SECTION 21 05 00.
- B. PRODUCT DATA SHALL BE SUBMITTED ON THE FOLLOWING ITEMS. WHERE MORE THAN ONE ITEM, OR A SPECIFIC ITEM WITH MULTIPLE OPTIONS APPEAR ON A SINGLE CUT SHEET, THE ITEMS SHALL BE SPECIFICALLY INDICATED:
 - 1. WATERFLOW SWITCHES
 - 2. SUPERVISORY SWITCHES
 - 3. SPRINKLER HEADS, CABINET, ESCUTCHEONS, AND GUARDS
 - 4. FIRE DEPARTMENT CONNECTION
 - 5. HOSE VALVES
 - 6. PIPING, FITTINGS, AND MECHANICAL COUPLINGS
 - 7. HANGERS AND SUPPORTS
 - 8. TEST/DRAIN ASSEMBLIES
 - 9. CONTROL VALVES
 - 10. ALARM CHECK VALVES
 - 11. BACKFLOW PREVENTION DEVICE
 - 12. MEANS OF IDENTIFICATION OF PIPING AND VALVES
 - 13. MEANS OF IDENTIFICATION OF CONCEALED CONTROL VALVE LOCATIONS
- C. OPERATION AND MAINTENANCE DATA SHALL BE SUBMITTED ON THE FOLLOWING ITEMS:
 - 1. WATERFLOW SWITCHES
 - 2. SUPERVISORY SWITCHES
 - 3. SPRINKLER HEADS
 - 4. FIRE DEPARTMENT CONNECTION
 - 5. TEST/DRAIN ASSEMBLIES
 - 6. CONTROL VALVES
 - 7. ALARM CHECK VALVES
 - 8. BACKFLOW PREVENTION DEVICE
 - 9. COMPLETED FINAL CERTIFICATES FOR ALL SYSTEM TESTS
- D. HYDRAULIC CALCULATIONS
 - 1. DATA AND ALL RELEVANT DRAWINGS SHALL BE SUBMITTED INDICATING HYDRAULIC DESIGN CALCULATIONS, FLOWS, PRESSURES, PIPE SIZES, AND LAYOUT OF ALL PIPING; INCLUDING THE OUTSIDE UNDERGROUND TO THE EFFECTIVE POINT OF AVAILABLE WATER SUPPLY DATA. CALCULATIONS AND PIPE LAYOUT SHALL ALSO BE SUBMITTED AND APPROVED BY THE AHJ. PROVIDE ANY AND ALL COMMENTS RECEIVED FROM THE AHJ AND RESOLUTION THEREOF TO THE PROFESSIONAL FOR RECORD.
 - 2. INCLUDE THE ALLOWANCE FOR INSIDE HOSE STREAM CONNECTIONS AT THE POINT OF CONNECTION. INCLUDE THE ALLOWANCE FOR OUTSIDE HOSE STREAMS.
 - 3. HYDRAULIC CALCULATIONS SHALL BE PROVIDED FOR THE REMOTE AREA OF EACH SPECIFIC HAZARD CLASS (E.G., LIGHT, ORDINARY GROUP 1, AND ORDINARY GROUP 2).
 - 4. COMMON PIPING THROUGHOUT DIFFERENT SETS OF CALCULATIONS SHALL UTILIZE THE SAME NOMENCLATURE.
- E. SHOP DRAWINGS
 - 1. CAD DRAWINGS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 21 05 00 AND NFPA 13. PROVIDE CAD WORKING PLAN DRAWINGS AND DATA AS REQUIRED BY NFPA 13. THE SHOP DRAWINGS, SCALED AT A MINIMUM OF 1/8" INCH = 1'-0" SHALL:
 - a. PROVIDE ROOM NAMES AND/OR NUMBERS ALONG WITH THE REFLECTED CEILING LAYOUT, INCLUDING LIGHT FIXTURE LOCATIONS, HVAC DIFFUSER LOCATIONS, AND OTHER CEILING MOUNTED FIXTURES AND DEVICES TO VERIFY THAT THE SPRINKLER SYSTEM LAYOUT HAS BEEN COORDINATED WITH THE OTHER TRADES.
 - b. PROVIDE THE NODDED AND DIMENSIONED PORTION OF THE SPRINKLER SYSTEM DRAWING INDEPENDENTLY OF THE REFLECTED CEILING PLAN DRAWINGS (FOR CLARITY IN SUBMITTAL REVIEWS).
 - c. PROVIDE CEILING ELEVATIONS AND PIPE ELEVATIONS.
 - d. INDICATE MAKE, TYPE, AND ORIFICE SIZE OF SPRINKLER HEADS.
 - e. IDENTIFY ALL LOCATIONS WHERE PIPING AND/OR FITTINGS WILL BE EXPOSED TO SIGHT ALONG WITH IDENTIFICATION OF ALL TRAPPED SEGMENTS OF PIPE AND AUXILIARY/LOW-POINT DRAINS.
 - f. IDENTIFY ALL WALLS AND/OR FLOORS WHICH ARE FIRE-RATED, SMOKE BARRIERS, OR SMOKE PARTITIONS THAT ARE PENETRATED BY THE FIRE PROTECTION PIPING OR EQUIPMENT. IDENTIFICATION OF THE WALL/FLOOR AND PENETRATION THERETO SHALL INCLUDE THE REQUIRED RATING, TYPE OF CONSTRUCTION, AND REFERENCE TO TYPE OF PENETRATION SEAL THAT IS TO BE USED (INCLUDING UL SYSTEM NUMBER). REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS.
 - g. INCLUDE A DIAGRAM OF ALL CONTROL VALVES, CHECKS, DRAIN PIPES, AND TEST PIPES.
 - h. INCLUDE A DIAGRAM OF THE UNDERGROUND WATER SUPPLY TO THE BUILDING. INCLUDE ALL PIPING BETWEEN THE BUILDING AND THE LOCATION OF THE CONFIRMING WATER FLOW TEST DATA. IDENTIFY SOURCE OF WATER SUPPLY, PRESSURE, AND ELEVATION.
 - i. PROVIDE A COPY OF THE HYDRAULIC DESIGN INFORMATION SIGN THAT WILL BE INSTALLED ON THE RISER.
 - F. AS-BUILTS
 - 1. PRIOR TO FINAL ACCEPTANCE, COMPLETE CAD AS-BUILT DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BE SUBMITTED TO THE PROFESSIONAL FOR REVIEW. AS-BUILTS SHALL REFLECT ALL PIPING AND HEAD LOCATION DEVIATIONS FROM THE APPROVED SHOP DRAWINGS INCLUDING ADDITIONAL FITTINGS.
 - 2. PROVIDE ONE HALF-SIZED, LAMINATED SET OF APPROVED AS-BUILT DRAWINGS. INSTALL A COMPLETE SET OF THESE DRAWINGS AT THE SPRINKLER RISER LOCATION.
 - 3. PROVIDE A COPY OF THE REVISED HYDRAULIC DESIGN INFORMATION SIGN. UPON APPROVAL, INSTALL ON THE SPRINKLER RISER.
 - 4. COORDINATE AS-BUILT SUBMISSION WITH SECTION 21 05 00.

1.4 SPRINKLER SYSTEM DESIGN

- A. THE FIRE PROTECTION CONTRACTOR IS RESPONSIBLE FOR A CONFIRMING WATER FLOW TEST IN ACCORDANCE WITH NFPA 291. THE RESULTS SHALL BE SUBMITTED IN ACCORDANCE WITH SPECIFICATION 21 05 00. FOR BIDDING PURPOSES, THE WATER SUPPLY FOR THE MAIN ALONG CENTER STREET IS 71.31 PSI STATIC AND 62.61 PSI RESIDUAL AT 2002.40 GPM. THESE NUMBERS WERE PROVIDED BY THE CITY OF TUMWATER BASED ON THE RESULTS OF A HYDRAULIC MODEL. THE NUMBERS FOR THIS SITE ARE TAKEN FROM POINT J10-30 NEAR THE POINT OF CONNECTION TO THIS SITE. THE LOCATION UTILIZED IN THE CALCULATIONS SHALL BE THE EFFECTIVE POINT OF THE FLOW TEST. THE HYDRAULIC CALCULATIONS SHALL UTILIZE EITHER THIS WATER SUPPLY DATA OR THE "CONFIRMING" WATER FLOW TEST DATA, WHICHEVER IS LESS AT THE SPRINKLER SYSTEM DEMAND FLOW RATE.
- B. DE-RATE THE WATER SUPPLY BY 10% OF THE STATIC PRESSURE READING AT BOTH THE STATIC AND RESIDUAL PRESSURE VALVES.
- C. HYDRAULIC CALCULATIONS SHALL BE DONE UTILIZING THE AREA/DENSITY METHOD OUTLINED IN NFPA 13 AND SHALL ENTAIL ALL PERTINENT PIPING INCLUDING ALL OUTSIDE UNDERGROUND EXTENDING TO THE POINT OF THE AFOREMENTIONED CONFIRMING WATER FLOW TEST DATA.
- D. HYDRAULIC CALCULATIONS SHALL NOT BE DONE UTILIZING THE ROOM DESIGN METHOD PROVIDED IN NFPA 13.
- E. THE HYDRAULIC CALCULATIONS SHALL USE THE FOLLOWING "C" VALUES: UNLINED CAST OR DUCTILE IRON PIPE: C=100, CEMENT-LINED CAST OR DUCTILE IRON PIPE: C=140, HDPE/PVC UNDERGROUND PIPE: C=150, AND BLACK STEEL IN WET-PIPE SYSTEMS: C=120.
- F. THE SPRINKLER SYSTEM DEMAND PRESSURE SHALL BE AT LEAST 5 PSI LESS THAN THE AVAILABLE PRESSURE FROM THE SYSTEM ADJUSTED FROM THE EFFECTIVE POINT OF THE WATER FLOW TEST. WITH THE FIRE PUMP INCLUDED, IT SHALL BE MEASURED AT NOT MORE THAN 125 PERCENT OF THE RATED PUMP CAPACITY.

- G. THE DESIGN AREA FOR ALL HYDRAULIC CALCULATIONS SHALL BE A MINIMUM OF 1500 SQUARE FEET FOR WET PIPE SYSTEMS, UNLESS OTHERWISE ALTERED BY NFPA 13, AND REPRESENT THE HYDRAULICALLY MOST REMOTE AREA. SPRINKLER SPACING AND DESIGN DENSITY FOR ALL HYDRAULIC CALCULATIONS SHALL BE AS FOLLOWS:
 - 1. WHERE SPRINKLER HEAD LOCATIONS ARE NOT SPECIFICALLY SHOWN, THEY SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13 AND THESE SPECIFICATIONS TO FORM A COMPLETE SYSTEM.
 - 2. OFFICES, CONFERENCE ROOMS, CORRIDORS, CONCEALED SPACES, AND OTHER AREAS OF LOW COMBUSTIBLE LOADING AS DEFINED BY NFPA 13 SHALL HAVE MINIMUM DESIGN DENSITY OF 0.10 GPM PER SQUARE FOOT OVER THE MOST HYDRAULICALLY REMOTE 1,500 FT².
 - 3. MECHANICAL SPACES, JANITOR'S CLOSETS, AND OTHER AREAS OF MODERATE COMBUSTIBLE LOADING AS DEFINED BY NFPA 13 SHALL HAVE MINIMUM DESIGN DENSITY OF 0.15 GPM PER SQUARE FOOT OVER THE MOST HYDRAULICALLY REMOTE 1,500 FT². MAXIMUM SPRINKLER PROTECTION AREA WILL BE LIMITED TO 130 FT².
 - 4. STORAGE ROOMS, MACHINE SHOP AREAS, AND OTHER AREAS OF MODERATE TO HIGH COMBUSTIBLE LOADING AS DEFINED BY NFPA 13 SHALL HAVE A MINIMUM DESIGN DENSITY OF 0.20 GPM PER SQUARE FOOT OVER THE MOST HYDRAULICALLY REMOTE 1,500 FT². MAXIMUM SPRINKLER PROTECTION AREA IS LIMITED TO 130 FT².
- H. THE INSIDE/OUTSIDE HOSE STREAM DEMAND SHALL BE 100 OR 150 GPM FOR LIGHT OR ORDINARY HAZARD CALCULATIONS RESPECTIVELY. THE INSIDE/OUTSIDE HOSE STREAM DEMAND SHALL BE ADDED TO THE HYDRAULIC CALCULATIONS IN ACCORDANCE WITH NFPA 13.
- I. HYDRAULIC CALCULATIONS SHALL BE REVISED AND RESUBMITTED TO INCLUDE ALL SYSTEM DESIGN MODIFICATIONS, AT NO ADDITIONAL COST TO THE OWNER, UNTIL A SATISFACTORY DESIGN IN ACCORDANCE WITH THESE SPECIFICATIONS IS PROVIDED.
- J. PIPING FOR 2 1/2 INCH HOSE CONNECTIONS SHALL BE SIZED IN ACCORDANCE WITH NFPA 14.
- K. ALL PIPING SHALL BE CONCEALED IN AREAS WITH FINISHED CEILINGS OR CHASSES UNLESS OTHERWISE INDICATED. SIDEWALL SPRINKLER HEADS IN LIEU OF RUBBERS EXPOSED PIPING SHALL BE UTILIZED WHERE POSSIBLE. WHERE PIPING CANNOT BE RUN CONCEALED (E.G., AREAS WITHOUT CEILINGS), THE EXPOSED PIPING SHALL BE ROUTED AS INCONSPICUOUSLY AS POSSIBLE IN A NEAT AND ORDERLY FASHION.
- L. THE CONTRACTOR IS RESPONSIBLE FOR THE ROUTING OF SPRINKLER PIPING SUCH THAT ONLY PIPING SERVING THE ELECTRICAL ROOMS, WIRING CLOSETS, AND TELECOMMUNICATION OR DATA ROOMS SHALL BE PERMITTED TO ENTER THESE ROOMS. ROUTE PIPING SO THAT IT ENTERS THE ROOM OVER THE DOOR. ROUTING OF ANY PIPING ABOVE ELECTRICAL EQUIPMENT OR PANELS SHALL BE AVOIDED THROUGHOUT THE BUILDING.
- M. ALL SPRINKLER HEADS IN AREAS THROUGHOUT THE BUILDING THAT ARE BELOW 7 FOOT CLEARANCE OR SUBJECT TO MECHANICAL DAMAGE SHALL BE EQUIPPED WITH HEAD GUARDS.
- N. PROVIDE A SUPERVISED CONTROL VALVE ON ALL SPRINKLER BRANCH LINES THAT PROTECT THE AREAS FOR THE MAIN ELECTRICAL SERVICE ENTRANCE. THE CONTROL VALVES SHALL BE LOCATED OUTSIDE OF THE EQUIPMENT ROOM.
- O. SPRINKLERS SHALL BE INSTALLED UNDER ALL DUCTS OR OBSTRUCTIONS, GREATER THAN 48 INCHES IN WIDTH, INCLUDING OVERHEAD RETRACTABLE DOORS, IN ACCORDANCE WITH NFPA 13.
- P. SPRINKLERS NEAR HEAT SOURCES SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13, WITH RESPECT TO TEMPERATURE RATING AND LOCATION.
- Q. PROVIDE AN INSPECTORS TEST CONNECTION FOR EACH SPRINKLER SYSTEM ZONE, AS REQUIRED. TEST CONNECTIONS MAY BE LOCATED OFF THE SYSTEM RISER PERMITTING THAT THE INITIAL SYSTEM TEST CAN BE CONDUCTED OFF THE HYDRAULICALLY MOST REMOTE HEAD. THE MOST REMOTE HEAD SHOULD BE AN OUTLET WITH HOSE BIB AND CAP.
- R. ALL CONTROL, DRAIN, AND TEST CONNECTION VALVES SHALL BE PROVIDED WITH PERMANENTLY MARKED WEATHERPROOF METAL OR RIGID PLASTIC IDENTIFICATION SIGNS. THE SIGN SHALL BE SECURED WITH CORROSION-RESISTANT WIRE, CHAIN, OR OTHER APPROVED MEANS.
- S. WHERE ZONE CONTROL VALVES ARE CONCEALED ABOVE CEILINGS, IDENTIFICATION SIGNS SHALL BE PROVIDED IN THE VICINITY OF THE CONTROL VALVE TO INDICATE LOCATION OF SAID VALVE, THE AREA ISOLATED BY SAID VALVE, AND NORMAL POSITION OF SAID VALVE.
- T. ALL DRAINS AND INSPECTORS TEST CONNECTIONS SHALL BE PIPED TO THE EXTERIOR OR SUITABLY SIZED DRAIN RISERS AS INDICATED ON THE DRAWINGS.
- U. AUXILIARY AND LOW-POINT DRAINS SHALL BE KEPT TO A MINIMUM. AUXILIARY DRAINS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13 EXCEPT THAT ALL TRAPPED SECTIONS SHALL BE PROVIDED WITH AN AUXILIARY DRAIN CONSISTING OF A VALVE 3/4" OR LARGER AND A PLUG OR NIPPLE AND CAP. AUXILIARY AND LOW-POINT DRAINS THAT ARE REQUIRED TO BE PIPED TO AN ACCESSIBLE LOCATION TO DISCHARGE TO THE BUILDING EXTERIOR, DRAIN RISERS, MOP RECEPTORS/SINKS, OR FLOOR DRAINS. ALL PIPE SEGMENTS THAT TRAP MORE THAN ONE HEAD SHALL CONTAIN A LOW-POINT DRAIN.
- V. ALL PIPING AND FITTINGS ON THE DISCHARGE SIDE OF ALL DRAIN VALVES SHALL BE INTERNALLY AND EXTERNALLY GALVANIZED.

1.5 EXTRA STOCK

- 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. SPRINKLER HEADS WITH NFPA 13 SHALL BE FINISHED, WALL-MOUNTED STEEL CABINETS WITH A HINGED COVER AND SPACE FOR THE MINIMUM REQUIRED SPARE SPRINKLERS PLUS SPRINKLER WRENCH. INCLUDE A SEPARATE WRENCH FOR EACH TYPE OF SPRINKLER ON PROJECT.
 - 2. PROVIDE 3 SPARE SPRINKLER HEAD GUARDS FOR EVERY 12 INSTALLED OR PORTION THEREOF.
 - 3. LOCATE EXTRA STOCK NEAR THE SPRINKLER RISER.

PART 2 - PRODUCTS

2.1 ALARM VALVES

- A. A 6-INCH ALARM CHECK VALVE SHALL BE PROVIDED FOR THE SYSTEM.
- B. PROVIDE A FULL TRIM PACKAGE INCLUDING PRESSURE GAUGES AND MAIN DRAIN.

2.2 SPRINKLER HEADS

- A. ALL SPRINKLER HEADS SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER, UL LISTED, AND FM APPROVED. ALL HEADS SHALL BE THE SAME MODEL YEAR/INCH. THE PRESSURES SHALL APPROXIMATE ANY DEVIATIONS.
- B. AUTOMATIC SPRINKLERS SHALL HAVE A HEAT RESPONSIVE ELEMENT COMPLYING WITH UL 199 AND UL 1767, FOR EARLY SUPPRESSION, FAST-RESPONSE APPLICATIONS.
- C. SPRINKLERS SHALL HAVE AN ORDINARY TEMPERATURE RATING UNLESS OTHERWISE REQUIRED BY NFPA 13.
- D. ALL AREAS SHALL BE PROVIDED WITH QUICK RESPONSE SPRINKLER HEADS.
- E. UPRIGHT OR PENDENT TYPE SPRINKLER HEADS HAVING A BRASS FINISH SHALL BE UTILIZED IN ALL AREAS WITHOUT FINISHED CEILINGS.
- F. DRY-PENDENT OR DRY-HORIZONTAL TYPE SPRINKLER HEADS SHALL BE PROVIDED FOR AREAS SUBJECT TO FREEZING SUCH AS, COOLERS AND FREEZERS OR LOADING DOCKS. ALSO, UTILIZE LISTED DRY SPRINKLERS WHERE PENDENT SPRINKLERS ARE REQUIRED ON DRY PIPE SYSTEMS. DO NOT INSTALL WET-TYPE SPRINKLERS IN THESE AREAS.
- G. SPRINKLER HEAD GUARDS SHALL BE WIRE-CAGE TYPE AND INCLUDE A FASTENING DEVICE FOR ATTACHING TO SPRINKLER. THEY SHALL BE ORIENTED TO PROVIDE THE MAXIMUM ACCESSIBILITY FOR OPERATION. PENDENT HEADS WITH GUARDS OR CONCEALED TYPE SPRINKLERS MAY BE UTILIZED IN LIEU OF RECESSED HEADS TO COMPLY WITH THIS REQUIREMENT.

2.3 SPECIALTY SPRINKLER FITTINGS

- A. SPECIALTY FITTINGS SHALL BE UL LISTED AND FM APPROVED. THEY SHALL BE MADE OF STEEL, DUCTILE IRON, OR OTHER MATERIALS COMPATIBLE WITH PIPING.
- B. MECHANICAL T FITTINGS SHALL COMPLY WITH UL 213 AND HAVE A DUCTILE IRON HOUSING WITH PRESSURE RESPONSIVE GASKETS, BOLTS, AND THREADED OR LOCKING-LUG OUTLET.
- C. MECHANICAL-CROSS FITTINGS SHALL COMPLY WITH UL 213 AND HAVE A DUCTILE IRON HOUSING WITH PRESSURE RESPONSIVE GASKETS, BOLTS, AND THREADED OR LOCKING-LUG OUTLETS.
- D. DROP-NIPPLE FITTINGS SHALL COMPLY WITH UL 1474 AND HAVE A THREADED INLET, THREADED OUTLET, AND SEALS THAT ARE ADJUSTABLE.
- E. SPRINKLER DRAIN AND ALARM TEST FITTINGS SHALL BE UL LISTED AND UTILIZE A CAST OR DUCTILE IRON BODY. THEY SHALL HAVE A THREADED INLET AND OUTLET, A TEST VALVE, AND ORIFICE AND SIGHT GLASS.
- F. SPRINKLER BRANCH-LINE TEST FITTINGS SHALL BE UL LISTED AND HAVE A BRASS BODY WITH THREADED INLET AND CAPPED DRAIN OUTLET AND THREADED OUTLET FOR SPRINKLER.
- G. SPRINKLER INSPECTOR'S TEST FITTINGS SHALL BE UL LISTED UTILIZING A CAST OR DUCTILE IRON HOUSING. THEY SHALL HAVE A THREADED INLET, DRAIN OUTLET, AND SIGHT GLASS.

2.4 ESCUTCHEON PLATES

- A. PROVIDE ESCUTCHEONS FOR ALL EXPOSED PIPES PASSING THROUGH WALLS, PARTITIONS, OR CEILING. ESCUTCHEONS SHALL BE STEEL, PRIMED AND FINISH PAINTED TO MATCH ADJACENT WALL FINISH.

2.5 BACKFLOW PREVENTION ASSEMBLIES

- A. THE BACKFLOW PREVENTION DEVICE SHALL BE A MINIMUM 10-INCH DOUBLE CHECK DETECTOR TYPE BACKFLOW PREVENTION ASSEMBLY. BACKFLOW PREVENTION ASSEMBLIES SHALL BE UL LISTED FOR FIRE PROTECTION SERVICE, LISTED FOR USE IN THE VERTICAL ORIENTATION (IF SO INSTALLED), AND IN ACCORDANCE WITH THE AHJ REQUIREMENTS.

2.6 FIRE DEPARTMENT CONNECTION (FDC)

- A. THE FDC SHALL BE ROUGH, BRASS FREESTANDING SIAMESE TYPE, 2 1/2 INCHES BY 2 1/2 INCHES BY 4 INCHES, SINGLE CLAPPER WITH FEMALE THREAD CONNECTIONS MATCHING LOCAL FIRE DEPARTMENT SPECIFICATIONS, 2 1/2-INCH CAPS/PLUGS, FINISH TO MATCH FDC AND CHAINS.
- B. THE FDC SHALL BE EQUIPPED WITH AN EXTERIOR WALL PLATE LABELED "AUTO SPKR" AND CHECK VALVE WITH BALL DRIP ARRANGED TO MAINTAIN THE FDC IN A DRY STATE. ALL EXPOSED SURFACES SHALL BE FINISHED TO MATCH THE FDC.

2.7 HOSE VALVE CONNECTIONS

- A. 1 1/2-INCH HOSE CONNECTIONS SHALL BE PROVIDED FOR FIREFIGHTING AND OVERHAUL OPERATIONS IN ACCORDANCE WITH NFPA 13.
- B. HOSE VALVES SHALL BE LOCATED AT ALL FIRE DEPARTMENT ENTRANCE DOORS INTO THE WAREHOUSE.
- C. HOSE VALVES SHALL BE SUPPLIED FROM THE CROSS MAIN OF THE ADJACENT SPRINKLER SYSTEM.
- D. THE HOSE OUTLET THREADS SHALL MATCH THE FIRE DEPARTMENT SPECIFICATIONS.

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CLIENT:



PANATTONI

PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:

SPECIFICATIONS - FIRE
PROTECTION

Proj. No21.0003934.080 Reviewed By:TB

SHEET No:

FP0.03

SECTION 211313 - AUTOMATIC SPRINKLER SYSTEMS

PART 3 - EXECUTION

3.1 INSTALLATION

- A. THE INSTALLATION SHALL COMPLY WITH ALL APPLICABLE CODES AND STANDARDS.
- B. THE DRAWINGS SHOW THE RISER LOCATIONS AND GENERAL ROUTINGS FOR THE MAINS. THE RISER LOCATIONS SHALL BE ADHERED TO AS CLOSELY AS POSSIBLE. THE INDICATED LOCATIONS FOR THE MAINS ARE BASED ON PROPOSED ROUTINGS OF EQUIPMENT BY OTHER TRADES AND STRUCTURAL ELEMENTS. THE CONTACTOR IS RESPONSIBLE FOR PROVIDING COORDINATION DRAWINGS TO THE PROFESSIONAL REFLECTING THE OTHER TRADES WORKS PRIOR TO INSTALLATION.
- C. THE DRAWINGS MAY SHOW PROPOSED HEAD LOCATIONS (DOTS). THE CONTRACTOR SHALL DETERMINE FINAL HEAD LOCATIONS IN ACCORDANCE WITH NFPA AND IN COORDINATION WITH THE REFLECTED CEILING PLAN. ANY HEADS SHOWN ARE NOT INTENDED TO SHOW ALL ACTUAL LOCATIONS OR BE REPRESENTATIVE OF THE TOTAL DEVICE COUNT. ANY HEADS SHOWN ON THE FIRE PROTECTIONS DRAWINGS OR REFLECTED CEILING PLANS ARE TO SHOW THE INTENT ONLY.
 1. SPRINKLER HEADS SHALL BE LOCATED AS REQUIRED AND COORDINATED WITH THE REFLECTED CEILING PLANS. DEVIATIONS FROM SUBMITTED LOCATIONS SHALL BE APPROVED BY THE PROFESSIONAL PRIOR TO INSTALLATION.
 2. SPRINKLER HEADS SHALL BE INSTALLED IN A SYMMETRICAL AND ORDERLY FASHION.
 3. SPRINKLER HEADS IN SUSPENDED ACOUSTICAL TILE CEILING SHALL BE LOCATED IN CENTER OF CEILING TILE. WHERE THE CEILING TILE IS SCORED, CREATING MULTIPLE SURFACES, THE LOCATION OF THE SPRINKLER HEAD SHALL BE WITH RESPECT TO THE SURFACE.
 4. ALL RECESSED SPRINKLER HEADS SHALL BE FULLY RECESSED. A MAXIMUM TOLERANCE OF +/- 1/4-INCH BETWEEN ANY RECESSED SPRINKLER HEADS WITHIN A ROOM OR COMMON VISUAL AREA SHALL BE ACCEPTED.
 5. POSITIONING OF SPRINKLER HEADS WITH RESPECT TO OBSTRUCTIONS LOCATED BELOW OR ADJACENT TO THE SPRINKLER HEADS SHALL BE EVALUATED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13.
 6. SPRINKLER HEADS IN STORAGE AREAS, JANITOR'S CLOSETS, AND LIKE AREAS SHALL NOT BE LOCATED WITHIN 3 FEET OF THE WALLS. IF THIS MINIMUM DIMENSION CANNOT BE MET DUE TO THE ROOM DIMENSION OR CEILING COORDINATION FEATURES, THE HEAD SHALL BE PLACED IN THE BEST ALTERNATE LOCATION.
 7. SPRINKLER HEADS SHALL BE KEPT FREE OF DIRT AND DEBRIS AT THE TIME OF INSTALLATION BY COVERING WITH PLASTIC BAGS OR COVERS. REMOVAL OF THE BAGS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
 8. REMOVE AND REPLACE HEADS HAVING PAINT OTHER THAN FACTORY FINISH.
- D. THE CONTRACTOR MAY UTILIZE TREE, LOOP, GRID TYPE, OR COMBINATION THEREOF PIPING SYSTEMS AS NECESSARY FOR THE WET PIPE SYSTEM.
- E. CONCEALED COMBUSTIBLE CONSTRUCTION SHOULD NOT BE ANTICIPATED BY THE CONTRACTOR DURING THE DEVELOPMENT OF THEIR BID AND SUBSEQUENT DESIGN. IF IDENTIFIED BY THE CONTRACTOR DURING THE COURSE OF THE PROJECT, IT SHALL BE BROUGHT TO THE PROFESSIONAL'S ATTENTION.
- F. COORDINATE THE WORK OF THIS SECTION WITH THE RELATED WORK SPECIFIED UNDER OTHER SECTIONS AND ALL ELECTRICAL EQUIPMENT LOCATIONS.
- G. PIPING SHALL BE PITCHED TO PERMIT DRAINING OF THE SPRINKLER SYSTEMS. DRAIN VALVES SHALL BE INSTALLED AT LOW POINTS IN ACCORDANCE WITH NFPA 13, EXCEPT THAT ALL DRAINS SHALL HAVE A 3/4 INCH VALVE AND CAP OR PLUG AND NIPPLE AS A MINIMUM.
- H. THE INSTALLATION SHALL NOT ADD HEADS OR INSTITUTE PIPE CHANGES IN DIRECTION OR SIZE WITHOUT SUBMITTING REVISED CALCULATIONS.
- I. ALL PIPING IN AREAS WITH FINISHED CEILINGS SHALL BE CONCEALED.
- J. LOCATE PIPE RUNS TO MINIMIZE OBSTRUCTIONS OF OTHER WORK AND TO AVOID OBVIOUS CONFLICTS.
- K. PIPING SHALL BE ROUTED IN AN ORDERLY MANNER, PLUMB AND PARALLEL TO THE BUILDING STRUCTURE. PENDENT SPRINKLER "DROPS" SHALL BE VERTICAL TO THE CEILING. PIPING SHALL BE INSTALLED TO CONSERVE BUILDING SPACE, AND IN SUCH A MANNER THAT IT DOES NOT INTERFERE WITH THE USE OF SPACE, OTHER WORK, OR THE REQUIRED HEADROOM.
- L. WHERE TRAPEZE HANGERS ARE USED, DOCUMENTATION SHALL BE PROVIDED TO THE PROFESSIONAL FOR EACH SUCH HANGER INDICATING LOCATION, SIZE, LENGTH, TYPE, AND ALL PERTINENT INFORMATION FOR REVIEWING AGAINST THE REQUIREMENTS OF NFPA 13.
- M. CHANGES IN DIRECTION OF PIPING SHALL BE MADE WITH FITTINGS.
- N. "TEE" FITTINGS WITH PLUGS SHALL NOT BE USED AS A SUBSTITUTE FOR "ELBOW" FITTINGS UNLESS APPROVED BY THE PROFESSIONAL PRIOR TO INSTALLATION.
- O. PIPE SIZE TRANSITIONS SHALL BE MADE WITH REDUCING FITTINGS. BUSHINGS SHALL NOT BE USED.
 1. DO NOT USE WELDED JOINTS WITH GALVANIZED STEEL PIPE.
 2. FLANGES, UNIONS, AND TRANSITION AND SPECIAL FITTINGS WITH PRESSURE RATINGS THE SAME AS OR HIGHER THAN SYSTEM'S PRESSURE RATING MAY BE USED IN ABOVEGROUND APPLICATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- Q. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR:
 1. MAINTAINING ALL COMPONENTS OF THE FIRE PROTECTION SYSTEM FREE AND CLEAR OF ALL DIRT, DEBRIS, OR OTHER POTENTIAL OBSTRUCTIONS.
 2. NOT STORING MATERIALS DIRECTLY ON THE GROUND.
 3. MAKING SURE THAT THE OPEN ENDS OF PIPING ARE PLUGGED OR CAPPED DURING THE CONSTRUCTION TO PREVENT DIRT OR DEBRIS FROM ENTERING THE PIPE WHERE PIPES, FITTINGS, AND EQUIPMENT ARE LOCATED IN AREAS SUBJECT TO DIRT OR DEBRIS.
 4. USING METHODS THAT PREVENT DAMAGE, DETERIORATION, AND OTHER LOSS DURING SHIPPING AND ON-SITE STORAGE. THESE INCLUDE: USING PADDED OR STRAP SLINGS, ETC. AS APPROPRIATE FOR MATERIALS BEING HANDLED, LIFTING EQUIPMENT BY LIFT POINTS PROVIDED OR RECOMMENDED BY THE MANUFACTURER, AND STORING EQUIPMENT AWAY FROM THE EFFECTS OF RAIN, WIND-DRIVEN DUST, AND OTHER SIMILAR PHENOMENA.
- R. EXTENDED COVERAGE SPRINKLERS MAY BE USED, EXCEPT FOR MECHANICAL ROOMS OR OTHER POTENTIALLY OBSTRUCTED AREAS.
- S. TEST CONNECTIONS SHALL NOT DISCHARGE TO THE INTERIOR OF THE BUILDING.
- T. ALL PIPING ON THE DISCHARGE SIDE OF DRAIN VALVES SHALL BE INTERNALLY AND EXTERNALLY GALVANIZED.
- U. PROVIDE A CONCRETE SPLASH BLOCK ON GRADE FOR ALL EXTERIOR SPRINKLER/STANDPIPE DRAINS.

3.2 PENETRATIONS

- A. ALL PENETRATIONS SHALL BE COMPLETED IN A NEAT AND ORDERLY FASHION.
- B. PENETRATIONS OF FIRE-RATED WALL AND/OR FLOOR ASSEMBLIES SHALL BE WITH A UL LISTED FIRE STOPPING ASSEMBLY APPROPRIATE FOR THE RATING AND CONFIGURATION OF THE PENETRATED ASSEMBLY. THE NUMBER OF PENETRATIONS SHALL BE KEPT TO A MINIMUM. SEE THE ARCHITECTURAL DRAWINGS TO VERIFY FLOOR OR WALL RATINGS.
- C. EXCEPT WHERE CONCRETE WALLS/FLOORS/PARTITIONS ARE CORE-DRILLED, PROVIDE PIPE SLEEVES WHERE PIPING PASSES ENTIRELY THROUGH WALLS, FLOORS, AND/OR PARTITIONS. SECURE SLEEVES TO THE WALL, FLOOR, AND/OR PARTITION IN POSITION DURING CONSTRUCTION IN A PERMANENT MANNER.
- D. PROVIDE SLEEVES OF SUFFICIENT LENGTH TO PASS THROUGH ENTIRE THICKNESS OF WALLS, FLOORS, AND ROOFS.
- E. PROVIDE 1-INCH MINIMUM CLEARANCE BETWEEN EXTERIOR OF PIPING AND INTERIOR OF SLEEVE (I.E., 1-INCH ANNULAR SPACE). FIRMLY PACK ANNULAR SPACE WITH MINERAL WOOL INSULATION.
- F. SEAL SPACE AT BOTH ENDS OF THE SLEEVE WITH PLASTIC WATERPROOF CEMENT THAT WILL DRY TO A FIRM BUT PLIABLE MASS, OR PROVIDE A MECHANICALLY ADJUSTABLE SEGMENTED ELASTOMERIC MATERIAL.

3.3 JOINTS

- A. ALL JOINTS SHALL BE MADE UP USING INDUSTRY STANDARD PRACTICES FOR SEALING SUCH AS TEFLON TAPE AND PIPE DOPE.
- B. AFTER CUTTING, BUT PRIOR TO THREADING, SPRINKLER PIPING SHALL BE REAMED AND DEBURRED. ADDITIONALLY, THE PIPING SHALL BE "WIPE" OUT WITH AN ABSORBENT CLOTH OR RAG FOLLOWING THREADING OPERATIONS (AND PRIOR TO INSTALLATION OF FITTINGS TO THE PIPE) FOR THE PURPOSE OF CLEANING AND SOPPING UP EXCESS OIL.
- C. WELDED JOINTS FOR STEEL PIPE SHALL BE FUSION WELDED IN ACCORDANCE WITH THE AMERICAN STANDARDS CODE FOR PRESSURE PIPE, ANSI B31.1, SECTION 6. ALL WELDING SHALL BE PERFORMED AT THE SHOP.
- D. FLANGED JOINTS SHALL BE MADE WITH RING TYPE NON-METALLIC GASKETS, BOLTS AND NUTS.
- E. OUTSIDE UNDERGROUND PIPING:
 1. ALL PIPING SHALL BE INSTALLED PER NFPA 24.
 2. TIE ROD ANCHORS:
 - a. ROD AND CLAMP TYPE ANCHORS SHALL BE INSTALLED ON ALL HUB AND SPIGOT JOINTS IN UNDERGROUND PIPE INCLUDING MECHANICAL JOINT AND PUSH-ON JOINTS WHERE CHANGE IN DIRECTION OF PIPE RUN OCCURS UNLESS UL LISTED OR FM APPROVED RESTRAINED JOINTS ARE USED. STRAIGHT RUNS OF PIPE DO NOT REQUIRE ROD AND CLAMPS.
 - b. AFTER INSTALLATION, RODS AND CLAMPS SHALL BE COVERED WITH COAL TAR COATING.
 3. THRUST BLOCKS:
 - a. CONCRETE THRUST BLOCKS SHALL BE INSTALLED AT EACH CHANGE IN PIPE DIRECTION ON UNDERGROUND PIPING AND AT EACH TEE AND DEAD END IN ACCORDANCE WITH NFPA 24.
 - b. RESTRAINED JOINTS THAT ARE LISTED IN THE FACTORY MUTUAL APPROVAL GUIDE MAY BE USED WITH DUCTILE IRON PIPE INSTEAD OF THRUST BLOCKS OR TIE ROD ANCHORS.

3.4 WATERFLOW SWITCHES

- A. THIS CONTRACTOR SHALL PROVIDE ALL VANE TYPE WATERFLOW SWITCHES UNDER THIS CONTRACT.
- B. THE FIRE ALARM CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY WIRE, CONDUIT, AND BOXES TO PROPERLY CONNECT FLOW SWITCHES TO THE FIRE ALARM SYSTEM.
- C. THIS CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR TO INSURE THAT THE FLOW SWITCHES PROVIDED ARE COMPATIBLE WITH THE FIRE ALARM SYSTEM AND MEET THE REQUIREMENTS OF THE NEC.
- D. THE WATERFLOW SWITCHES SHALL BE INSTALLED WITH THE RETARD SETTING SET TO BETWEEN 20 AND 30 SECONDS.

3.5 VALVE SUPERVISORY SWITCHES/EQUIPMENT

- A. VALVE POSITION SUPERVISORY SWITCHES SHALL BE INSTALLED ON ALL CONTROL VALVES.
- B. THIS CONTRACTOR SHALL PROVIDE ALL SPRINKLER VALVE SUPERVISORY SWITCHES UNDER THIS CONTRACT INCLUDING THE TAMPER SWITCH ON THE POST INDICATOR VALVE. THE CONTRACTOR SHALL ALSO VERIFY THE MAKE AND MODEL OF ALL VALVES TO ENSURE THAT THE SWITCHES PROVIDED ARE COMPATIBLE.
- C. THE FIRE ALARM CONTRACTOR SHALL PROVIDE ALL NECESSARY WIRE, CONDUIT, AND BOXES TO PROPERLY CONNECT SUPERVISORY SWITCHES TO THE FIRE ALARM SYSTEM.
- D. THIS CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR TO INSURE THAT THE SUPERVISORY SWITCHES PROVIDED ARE COMPATIBLE WITH THE FIRE ALARM SYSTEM AND MEET THE REQUIREMENTS OF THE NEC.

3.6 SPRINKLER GUARDS AND SHIELDS

- A. PROVIDE AND INSTALL GUARDS ON SPRINKLER HEADS WHERE HEADS ARE WITHIN 7 FEET OF THE FINISHED FLOOR OR WHEREVER SPRINKLERS MAY BE SUBJECT TO MECHANICAL INJURY, SUCH AS SMALL CLOSETS.

3.7 FIRE DEPARTMENT CONNECTION (FDC)

- A. LOCATE THE FDC SUCH THAT SUFFICIENT CLEARANCE FROM ALL WALLS, OBSTRUCTIONS, OR OTHER EQUIPMENT IS PROVIDED TO ALLOW FULL SWING OF THE FIRE DEPARTMENT WRENCH HANDLE.
- B. THE FDC SHALL BE MOUNTED AT LEAST 18 INCHES ABOVE PAVEMENT, SIDEWALKS OR GRADE ADJACENT TO THE EXTERIOR OF THE BUILDING.

3.8 SPECIALTY SPRINKLER FITTING INSTALLATION

- A. INSTALL SPECIALTY SPRINKLER FITTINGS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.9 VALVE INSTALLATION

- A. REFER TO DIVISION 15 FOR INSTALLING GENERAL-DUTY VALVES. INSTALL FIRE-PROTECTION SPECIALTY VALVES, TRIM, FITTINGS, CONTROLS, AND SPECIALTIES ACCORDING TO NFPA 13, MANUFACTURER'S WRITTEN INSTRUCTIONS, AND THE AHJ.
- B. GATE VALVES: INSTALL FIRE-PROTECTION-SERVICE VALVES SUPERVISED-OPEN, LOCATED TO CONTROL SOURCES OF WATER SUPPLY EXCEPT FROM FIRE DEPARTMENT CONNECTIONS. PROVIDE PERMANENT IDENTIFICATION SIGNS INDICATING PORTION OF SYSTEM CONTROLLED BY EACH VALVE.
- C. ALARM CHECK VALVES: INSTALL VALVES IN VERTICAL POSITION FOR PROPER DIRECTION OF FLOW, INCLUDING BYPASS CHECK VALVE AND RETARD CHAMBER DRAIN-LINE CONNECTION.
- D. ALL VALVES INSTALLED IN HORIZONTAL LINES SHALL BE INSTALLED WITH THE STEMS HORIZONTAL OR ABOVE. VALVE HANDWHEELS SHALL BE ORIENTED, WHEN INSTALLED, TO PROVIDE MAXIMUM ACCESSIBILITY FOR OPERATION.

3.10 LABELING AND IDENTIFICATION

- A. INSTALL LABELING AND PIPE MARKERS ON EQUIPMENT AND PIPING ACCORDING TO REQUIREMENTS OF NFPA 13 AND SPECIFICATION 21 05 00.

3.11 COMMISSIONING

- A. VERIFY THAT SPECIALTY VALVES, TRIM, FITTINGS, CONTROLS, AND ACCESSORIES ARE INSTALLED AND OPERATE CORRECTLY.
- B. VERIFY THAT SPECIFIED TESTS OF PIPING ARE COMPLETE.
- C. VERIFY THAT DAMAGED SPRINKLERS AND SPRINKLERS WITH PAINT OR COATING NOT SPECIFIED ARE REPLACED WITH NEW, CORRECT TYPE.
- D. VERIFY THAT SPRINKLERS ARE CORRECT TYPES, HAVE CORRECT FINISHES AND TEMPERATURE RATINGS, AND HAVE GUARDS AS REQUIRED FOR EACH APPLICATION.
- E. VERIFY THAT INTERCONNECTED POTABLE-WATER SUPPLIES, WHERE PERMITTED, HAVE CORRECT TYPES OF BACKFLOW PREVENTION INSTALLED.
- F. FILL WET-PIPE SPRINKLER PIPING WITH WATER.
- G. ENERGIZE CIRCUITS TO ELECTRICAL EQUIPMENT AND DEVICES.
- H. ADJUST OPERATING CONTROLS AND PRESSURE SETTINGS.
- I. COORDINATE WITH FIRE ALARM TESTS. OPERATE AS REQUIRED.
- J. COORDINATE WITH FIRE PUMP TESTS. OPERATE AS REQUIRED.

3.12 DEMONSTRATION

- A. DEMONSTRATE EQUIPMENT, SPECIALTIES, AND ACCESSORIES. REVIEW OPERATING AND MAINTENANCE INFORMATION.
- B. SCHEDULE DEMONSTRATION WITH OWNER. ALLOW AT LEAST 7 DAYS ADVANCE NOTICE.

3.13 TESTING

- A. THE CONTRACTOR SHALL NOTIFY THE PROFESSIONAL AND THE AHJ 3 WEEKS OR MORE IN ADVANCE OF ALL TESTS TO BE CONDUCTED.
- B. ALL UNDERGROUND PIPING SHALL BE FLUSHED PRIOR TO CONNECTION TO SYSTEM RISERS IN ACCORDANCE WITH NFPA 24 AND DOCUMENTED AS SUCH.
- C. THE ENTIRE SYSTEM, INCLUDING THE OUTSIDE UNDERGROUND, SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13, NFPA 24, AND ALL LOCAL REQUIREMENTS. CONTRACTOR'S MATERIAL AND TEST CERTIFICATES SHALL BE COMPLETED, SIGNED, AND DATED AND INCLUDED IN THE OPERATIONS AND MAINTENANCE MANUALS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING COPIES OF THE CONTRACTOR'S MATERIAL AND TEST CERTIFICATES FOR THE UNDERGROUND INSTALLED BY THE CIVIL CONTRACTOR. IF SUCH A CERTIFICATE CANNOT BE OBTAINED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING THE TEST AND PREPARING THE CERTIFICATE.
- D. ANY RETESTING THAT IS REQUIRED DUE TO FAILURE OF ANY TEST FOR ANY REASON SHALL BE CONDUCTED AT NO ADDITIONAL COST TO THE OWNER. ANY CORRECTIONS OR REPAIRS TO THE SYSTEM OR BUILDING NECESSARY DUE TO SUCH A FAILURE, AND RETESTING OF THE SYSTEM SHALL BE PERFORMED AT NO COST TO THE OWNER.
- E. REPORT TEST RESULTS PROMPTLY AND IN WRITING TO THE PROFESSIONAL AND AHJ.

-END OF SECTION-

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SECTION 213000 - FIRE PUMPS

PART 1 - GENERAL

1.1 STIPULATIONS

- A. GENERAL PROVISIONS OF THE CONTRACT DOCUMENTS INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATIONS SECTIONS APPLY TO ALL WORK IN THIS SECTION.

1.2 WORK INCLUDED

- A. PROVIDE AND INSTALL A FIRE PROTECTION PUMPING SYSTEM FOR THE BUILDING WHICH INCLUDES THE FOLLOWING:
 - 1. ELECTRIC FIRE PUMP AND JOCKEY PUMP
 - 2. FIRE PUMP CONTROLLER AND JOCKEY PUMP CONTROLLER
 - 3. ALL ASSOCIATED MOUNTING PADS FOR FIRE PUMP AND JOCKEY PUMP
 - 4. TEST HEADER AND ASSOCIATED PIPING AND FITTINGS
- B. INTERFACE THE FIRE PUMP CONTROLLERS WITH THE BUILDING FIRE ALARM SYSTEM

1.3 SUBMITTALS

- A. GENERAL: ALL SUBMITTALS SHALL COMPLY WITH THE REQUIREMENTS OF ANY FRONT-END SPECIFICATIONS, SECTION 21 05 00 COMMON WORK RESULTS FOR FIRE SUPPRESSION AND THE FOLLOWING:
 - 1. PRODUCT DATA SHALL BE SUBMITTED FOR THE FOLLOWING ITEMS:
 - 1. FIRE PUMP
 - 2. JOCKEY PUMP
 - 3. FIRE PUMP CONTROLLER
 - 4. JOCKEY PUMP CONTROLLER
 - 5. TEST HEADER AND VALVES
 - 6. PIPING AND FITTINGS
 - C. DESIGN DATA SHALL BE SUBMITTED FOR THE FOLLOWING ITEMS:
 - 1. ELECTRICAL REQUIREMENTS
 - 2. START AND STOP PRESSURE SETTINGS
 - 3. PUMP CURVES
 - D. LAYOUT DRAWINGS OF THE FIRE PUMP ROOM IN PLAN AND ELEVATION VIEWS.
 - E. OPERATION AND MAINTENANCE INSTRUCTIONS. DATA SHALL BE PROVIDED FOR THE FOLLOWING ITEMS:
 - 1. FIRE PUMP
 - 2. JOCKEY PUMP
 - 3. FIRE PUMP CONTROLLER (INCLUDING "START" AND "STOP" PRESSURE SETTINGS)
 - 4. JOCKEY PUMP CONTROLLER (INCLUDING "START" AND "STOP" PRESSURE SETTINGS)
 - 5. TEST HEADER
 - 6. ACCEPTANCE TEST REPORTS

1.4 QUALITY ASSURANCE

- A. UTILIZE THE IBC/IFC REFERENCED EDITIONS OF THE FOLLOWING NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS IF SO DESIGNATED, OTHERWISE USE THE LATEST EDITION.
 - 1. NFPA 13: STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
 - 2. NFPA 20: STANDARD FOR THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS
 - 3. NFPA 70: NATIONAL ELECTRICAL CODE
 - 4. NFPA 72: NATIONAL FIRE ALARM CODE
- B. QUALIFICATIONS OF MANUFACTURERS: PIPE, FITTINGS, PUMPS AND CONTROLLERS SHALL BE MANUFACTURED IN THE UNITED STATES.

1.5 FIRE PUMPING SYSTEM DESIGN

- A. THE FIRE PUMP AND ASSOCIATED EQUIPMENT INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH NFPA 20 AND ARRANGED AS CLOSELY AS POSSIBLE AS INDICATED ON THE CONTRACT DRAWINGS.
- B. THE FITTINGS AND COUPLINGS IN THE PUMPING SYSTEM SHALL BE RATED FOR THE ANTICIPATED SYSTEM OPERATING PRESSURES.
- C. THE FIRE PROTECTION PUMPING SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:
 - 1. AN ELECTRIC-MOTOR-DRIVEN FIRE PUMP
 - 2. ELECTRIC-MOTOR-DRIVEN JOCKEY PUMP WITH ALL ASSOCIATED PIPING
 - 3. A WYE-DELTA TYPE FIRE PUMP CONTROLLER FOR THE ELECTRIC-MOTOR-DRIVEN FIRE PUMP
 - 4. A PUMP CONTROLLER FOR THE ELECTRIC-MOTOR-DRIVEN JOCKEY PUMP
 - 5. MOUNTING PADS FOR BOTH JOCKEY AND FIRE PUMPS
 - 6. PIPING, VALVES AND APPURTENANCES
 - 7. TAMPER SWITCHES
 - 8. A 6 PORT FIRE PUMP TEST HEADER WITH VALVES
 - 9. SYSTEM BYPASS LINE

1.6 EXTRA STOCK

- A. PROVIDE 1 SET OF GASKETS FOR EACH PUMP TYPE AND MODEL ON THE SYSTEM.

PART 2 - PRODUCTS

2.1 FIRE PUMP

- A. FIRE PUMP SHALL BE SINGLE STAGE, HORIZONTAL SPLIT-CASE TYPE WITH ELECTRIC-MOTOR DRIVE MOUNTED ON A COMMON STEEL BASE. PUMP AND DRIVE UNIT SHALL BE UNDERWRITER'S LABORATORY (UL) LISTED FOR FIRE PROTECTION SERVICE AND CONSTRUCTED IN ACCORDANCE WITH NFPA 20.
- B. PRELIMINARY SIZING OF THE FIRE PUMP FOR BIDDING PURPOSES SHALL BE RATED FOR 1500 GPM AT 90 PSI. THE ELECTRIC-MOTOR-DRIVEN FIRE PUMP SHALL BE DRIVEN BY AN ELECTRIC MOTOR DESIGNED WITH A MAXIMUM RATING OF 125 HP, 3 PHASE, 60 CYCLE MOTOR, 480 VOLT AND DESIGN LETTER "B".
- C. PUMP SHALL BE DESIGNED TO DELIVER 150 PERCENT OF RATED CAPACITY AT MINIMUM OF 65 PERCENT OF RATED HEAD.
- D. PUMP CASING SHALL BE CAST IRON WITH FLANGED SUCTION AND DISCHARGE CONNECTIONS. FLANGES SHALL BE EQUIVALENT TO ANSI B16.1 FLANGE RATINGS. CASING SHALL BE SPLIT ON THE SHAFT CENTERLINE TO ALLOW ACCESS TO ROTATING ELEMENTS WITHOUT DISTURBING DRIVE ALIGNMENT.
- E. CASING AND IMPELLER WEAR RINGS SHALL HAVE RENEWABLE BRONZE RINGS LOCKED IN POSITION TO PREVENT ROTATION.
- F. BEARINGS SHALL BE STEEL, GREASE LUBRICATED AND SHALL HAVE A MINIMUM B-10 LIFE OF 20,000 HOURS. THE BEARING HOUSING SHALL BE DESIGNED TO FLUSH LUBRICANT THROUGH AND PROVIDE CONTINUOUS CLEANING OF BEARING SURFACES. BEARINGS SHALL BE REMOVABLE WITHOUT REMOVING THE ROTATING ELEMENT OR DISMANTLING THE PUMP.
- G. PUMP SHAFT SHALL BE STEEL.
- H. SHAFT SLEEVES SHALL BE RENEWABLE, BRONZE SLIP-FIT OVER THE SHAFT, SHALL EXTEND FULL LENGTH THROUGH THE SEAL BOX AND SHALL BE LOCKED IN PLACE.
- I. IMPELLERS SHALL BE ENCLOSED BRONZE DOUBLE SUCTION TYPE HYDRAULICALLY AND DYNAMICALLY BALANCED.
- J. PUMP SHAFT SEAL SHALL BE STUFFING BOX DESIGN WITH SPLIT BRONZE GLANDS.
- K. PUMP AND MOTOR BASE SHALL BE FORMED STEEL OR CAST IRON WITH DRAIN PAN BASE. THE PUMP SHALL BE CONNECTED TO THE DRIVING ELECTRIC-MOTOR THROUGH A FLEXIBLE COUPLING. COUPLING SHALL HAVE A FORMED SHEET STEEL COUPLING GUARD BOLTED TO THE BASE PLATE.
- L. MOTOR SHALL BE OPEN DRIP PROOF TYPE WITH MOUNTING BASE. MOTORS SHALL COMPLY WITH NFPA 20.
- M. PUMP SHALL BE FITTED WITH THE FOLLOWING ACCESSORIES:
 - 1. AUTOMATIC CASING AIR RELIEF VENT.
 - 2. CASING DRAIN COCKS.
 - 3. DISCHARGE PRESSURE GAUGE (0-300 PSIG).
 - 4. SUCTION PRESSURE GAUGE (30 INCHES HG TO 80 PSI).
 - 5. NAME PLATE WITH CAPACITY, HEAD, IMPELLER DIAMETER, SPEED, MODEL NUMBER AND SERIAL NUMBER.
- N. FIRE PUMP SHALL BE CONSTRUCTED TO PERMIT COMPLETE SERVICING WITHOUT BREAKING THE PIPE OR MOTOR CONNECTIONS.
- O. THE FIRE PUMP SHALL BE EQUIPPED WITH STATICALLY AND DYNAMICALLY BALANCED ROTATING PARTS.
- P. A CHECK VALVE SHALL BE PROVIDED IN THE DISCHARGE LINE OF THE FIRE PUMP.
- Q. A BYPASS LINE SHALL BE PROVIDED FOR THE FIRE PUMP WHICH IS EQUIPPED WITH OS AND Y VALVES AND A CHECK VALVE.
- R. OS AND Y VALVES SHALL BE PROVIDED ON THE SUPPLY AND DISCHARGE LINES OF THE FIRE PUMP AND ON THE SYSTEM SIDE OF THE CHECK VALVE TO PERMIT THE PUMP AND CHECK VALVE TO BE ISOLATED.

2.2 FIRE PUMP CONTROLLER

- A. THE FIRE PUMP SHALL BE EQUIPPED WITH A FIRE PUMP CONTROLLER. THE CONTROLLER SHALL BE COMPLETELY ASSEMBLED, WIRED AND TESTED BY THE CONTROLLER MANUFACTURER PRIOR TO SHIPMENT FROM THE FACTORY AND LABELED "FIRE PUMP CONTROLLER".
- B. THE CONTROLLER SHALL BE LOCATED AS INDICATED ON THE DRAWINGS. THE CONTROLLER SHALL BE SO LOCATED OR PROTECTED THAT IT WILL NOT BE INJURED BY WATER ESCAPING FROM THE PUMP OR CONNECTIONS.
- C. FIRE PUMP CONTROLLER SHALL BE WYE DELTA, CLOSED TRANSITION TYPE ASSEMBLED, WIRED AND TESTED AT THE FACTORY. CONTROLLERS SHALL BE DESIGNED IN ACCORDANCE WITH NFPA 20 FOR FIRE PUMP SERVICE. ASSEMBLY SHALL BE LISTED UL FOR SAID USE.
- D. CONTROLLER CABINETS SHALL BE FLOOR MOUNTED TYPE NEMA 3 FORMED STEEL CONSTRUCTION WITH BAKED ENAMEL FINISH. ALL INTERNAL COMPONENTS SHALL BE ACCESSIBLE FROM THE FRONT.
- E. FIRE PUMP CONTROLLER COMPONENTS SHALL BE DESIGNED FOR SHORT CIRCUIT CAPACITY OF 30,000 AMPERES AT 480 VOLTS.
- F. ELECTRIC FIRE PUMP CONTROLLER SHALL INCLUDE ALARM OR SUPERVISORY FEATURES FOR REMOTE MONITORING VIA THE FIRE ALARM SYSTEM. THE CONTROLLER SHALL PROVIDE ALL REQUIRED VISIBLE LIGHTS ON THE CONTROLLER PANEL AND ALL CONTACTS REQUIRED TO OPERATE CIRCUITS SUCH AS CONNECTION TO THE ALTERNATE POWER SOURCE.
 - 1. ALARM CONTACTS FOR REMOTE PUMP "RUNNING".
 - 2. SUPERVISORY CONTACTS FOR REMOTE PUMP "LOSS OF PHASE".
 - 3. SUPERVISORY CONTACTS FOR REMOTE PUMP "PHASE REVERSAL OR FAILURE".

2.3 JOCKEY PUMP

- A. FURNISH AND INSTALL A JOCKEY PUMP TO OPERATE AT 3,500 RPM WITH A CAPACITY OF 15 GPM AT A 90 PSIG BOOST. UNIT SHALL BE DRIVEN BY A 1.5 HP, 480 VOLT, 3 PHASE 60 CYCLE MOTOR.
- B. JOCKEY PUMP SHALL BE A CENTRIFUGAL CLOSE-COUPLED, VERTICAL TYPE WITH ELECTRIC MOTOR MOUNTED ON COMMON BASE. THE PUMP SHALL BE BRONZE-FITTED CONSTRUCTION WITH CASING RELIEF VALVE AND EQUIPPED WITH A MECHANICAL SEAL. "TURBINE" TYPE JOCKEY PUMPS ARE NOT ACCEPTABLE.
- C. MOTOR SHALL BE OPEN DRIP-PROOF TYPE WITH FOOT MOUNTING BASE.
- D. THE JOCKEY PUMP SHALL BE EQUIPPED WITH SHUT-OFF VALVES AND A CHECK VALVE ON THE DISCHARGE SIDE.
- E. PUMP CASING SHALL BE CAST IRON.

2.4 JOCKEY PUMP CONTROLLER

- A. CONTROLLER SHALL BE SAME MANUFACTURER AS FIRE PUMP CONTROLLER.
- B. JOCKEY PUMP CONTROLLER SHALL BE COMBINED MANUAL/AUTOMATIC TYPE ASSEMBLED, WIRED AND TESTED AT THE FACTORY.
- C. ASSEMBLY SHALL BE LISTED BY UL FOR SAID USE.
- D. CONTROLLER CABINET SHALL BE FLOOR MOUNTED NEMA 3 FORMED STEEL CONSTRUCTION WITH BAKED ENAMEL FINISH. ALL INTERNAL COMPONENTS SHALL BE ACCESSIBLE FROM THE FRONT.
- D. CONTROLLER SHALL INCLUDE THE FOLLOWING:
 - 1. PROVIDE 1 EXTERNALLY OPERATED FUSIBLE DISCONNECT SWITCH.
 - 2. PROVIDE 1 ACROSS THE LINE MAGNETIC STARTER WITH THERMAL OVERLOAD PROTECTION.
 - 3. PROVIDE 1 MANUAL OFF AUTOMATIC SELECTOR SWITCH.
 - 4. PROVIDE 1 RUNNING PERIOD TIMER TO KEEP MOTOR RUNNING FOR A PREDETERMINED TIME AFTER EACH AUTOMATIC START.
 - 5. 1 PRESSURE REGULATOR OF THE BOURBON TUBE TYPE WITH ADJUSTABLE CUT-IN AND CUTOUT POINTS THAT CONTROL THE AUTOMATIC OPERATION OF THE MOTOR.

2.5 VALVE SUPERVISORY SWITCHES

- A. SUPERVISORY SWITCHES SHALL BE INSTALLED ON EACH SYSTEM SHUT-OFF VALVE IN ACCORDANCE WITH SECTION 21 05 00.

2.6 TEST HEADER

- A. TEST HEADER SHALL BE SURFACE MOUNTED, 6 PORT TYPE WITH CAST IRON BODY, 2 1/2-INCH STRAIGHT BRONZE VALVES AND VALVE CAPS WITH CHAIN. ALL EXPOSED SURFACES OF THE TEST HEADER SHALL BE ROUGH BRASS FINISHED.
- B. THE HEADER SHALL BE MOUNTED 24 INCHES ABOVE PAVEMENT, SIDEWALKS OR GRADE ADJACENT TO THE EXTERIOR OF THE BUILDING.
- C. COORDINATE FINAL LOCATION PRIOR TO INSTALLATION WITH RESPECT TO ACCESS AND DRAINAGE.
- D. THE FIRE PROTECTOR SHALL PROVIDE VALVES FOR EACH TEST OR LET. THE VALVES SHALL BE LOCATED IN A CABINET IN THE FIRE PUMP ROOM. THE TEST HEADER WILL NORMALLY HAVE VALVE CAPS AND CHAINS ONLY.

2.7 VALVES

- A. REFER TO SPECIFICATION SECTION 21 05 00.

2.8 DRAIN, RELIEF AND DISCHARGE PIPING

- A. MISCELLANEOUS DRAIN, RELIEF AND DISCHARGE PIPING SHALL BE COPPER TYPE M OR SCHEDULE 40 INTERNALLY AND EXTERNALLY GALVANIZED STEEL PIPE.

PART 3 - EXECUTION

3.1 FINAL FIRE PUMP SIZING

- A. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE FINAL FIRE PUMP SIZING BASED ON THE RESULTS OF THE CONFIRMING WATER FLOW TEST AND FINAL HYDRAULIC CALCULATIONS FOR THE SPRINKLER AND STANDPIPE SYSTEMS.
- B. WATER SUPPLY TO BE DERATED BY 10 PERCENT OF THE STATIC PRESSURE AT BOTH THE STATIC AND RESIDUAL PRESSURES FOR FUTURE DEGRADATION.
- C. SHOW ALL FRICTION LOSS AND ELEVATION CHANGES BETWEEN THE EFFECTIVE POINT OF THE HYDRANT FLOW TEST AND THE SUPPLY SIDE OF THE FIRE PUMP.
- D. FIRE PUMP MAXIMUM DISCHARGE PRESSURE NOT TO EXCEED 175 PSI, WITHOUT THE USE OF EXTRA HEAVY PATTERN FITTINGS. MINIMUM SUCTION PRESSURE MUST REMAIN OVER 20 PSI AT THE PUMP SUCTION.
- E. TOTAL FIRE DEMAND IS THE SPRINKLER DEMAND PLUS INSIDE AND OUTSIDE HOSE STREAMS.
- F. THE SPRINKLER SYSTEM DEMAND PRESSURE SHALL BE AT LEAST 10 PERCENT BUT NOT LESS THAN 5 PSI, LESS THAN THE AVAILABLE PRESSURE FROM THE SYSTEM, INCLUDING THE FIRE PUMP, WHEN MEASURED AT THE APPROPRIATE POINT ON THE FIRE PUMP CURVE. THIS POINT SHALL NOT EXCEED 125 PERCENT OF THE RATED CAPACITY OF THE FIRE PUMP.
- G. CONTRACTOR SHALL SUBMIT ALL CALCULATIONS TO THE PROFESSIONAL FOR APPROVAL PRIOR TO ORDERING THE FIRE PUMP.

3.2 INSTALLATION

- A. FIRE PUMP SHALL BE INSTALLED IN STRICT ACCORDANCE WITH NFPA 20 AND ARRANGED AS CLOSELY AS POSSIBLE TO THAT INDICATED ON THE CONTRACT DOCUMENTS.
- B. JOCKEY PUMP SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 20.
- C. CONTROLLERS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 20.
- D. FIRE PUMP AND JOCKEY PUMP PRESSURE CONTROL SENSORS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 20.
- E. FIRE PUMP DRIP PAN BASE SHALL BE PIPED TO FLOOR DRAIN.
- F. ALL VALVES INSTALLED IN HORIZONTAL LINES SHALL BE INSTALLED WITH THE STEMS HORIZONTAL OR ABOVE. VALVE HANDWHEELS SHALL BE ORIENTED, WHEN INSTALLED, TO PROVIDE MAXIMUM ACCESSIBILITY FOR OPERATION.
- G. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND CONNECT THE POWER TO THE CONTROLLERS. THE FIRE PROTECTION CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONNECTIONS BETWEEN THE CONTROLLERS AND THE RESPECTIVE PUMP.
- H. PROVIDE A CABINET WITH 2 SETS OF EAR MUFF TYPE HEARING PROTECTION AND A FLASHLIGHT. IDENTIFY CABINET ACCORDINGLY AND MOUNT IN PROXIMITY TO THE FIRE PUMP CONTROLLER.

3.3 STORAGE

- A. FIRE PUMP, JOCKEY PUMP AND CONTROL PANELS SHALL BE STORED ON WOODEN PALLETS OR SHIPPING SKIDS. PUMPS AND CONTROLLERS SHALL BE COVERED WITH 6 MIL POLYETHYLENE SECURED IN PLACE.

3.4 PAINTING AND MARKING

- A. THE FIRE PROTECTION CONTRACTOR SHALL PAINT ALL PIPES WITHIN THE FIRE PUMP ROOM. THE COLOR SHALL BE RED.
- B. ALL PIPE SECTIONS SHALL ALSO BE STENCILED IN ACCORDANCE WITH SPECIFICATION SECTION 21 05 00.
- C. ALL VALVES SHALL BE PROVIDED WITH METAL IDENTIFICATION TAGS INDICATING THE FUNCTION AND NORMAL POSITION (OPEN OR CLOSED) AS REQUIRED.

3.5 TESTING

- A. THE FIRE PUMPING SYSTEM SHALL BE FLUSHED AND TESTED IN STRICT ACCORDANCE WITH NFPA 20. THE ENTIRE SYSTEM SHALL BE HYDROSTATICALLY TESTED FOR 2 HOURS.
- B. THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING ALL TESTS REQUIRED BY THE AHJ AS WELL AS THOSE SPECIFIED HEREIN OR BY NFPA 20.
- C. THE CONTRACTOR SHALL NOTIFY THE AHJ AND THE PROFESSIONAL 5 DAYS OR MORE IN ADVANCE OF ALL TESTS TO BE CONDUCTED.
- D. ALL UNDERGROUND PIPING SHALL BE FLUSHED PRIOR TO CONNECTION TO THE PUMP IN ACCORDANCE WITH NFPA 24 AND DOCUMENTED AS SUCH.
- E. ANY RETESTING THAT IS REQUIRED DUE TO FAILURE, FOR ANY REASON, OF ANY TEST SHALL BE CONDUCTED AT NO ADDITIONAL COST TO THE OWNER. ANY CORRECTIONS OR REPAIRS TO THE SYSTEM OR BUILDING NECESSARY DUE TO SUCH FAILURE, AND RETESTING OF THE SYSTEM SHALL BE PERFORMED AT NO COST TO THE OWNER.
- F. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SYSTEMS THAT ARE ACCEPTABLE TO THE AHJ AND THE PROFESSIONAL.
- G. FINAL ACCEPTANCE OF THE SYSTEMS IS BASED ON APPROVAL FROM BOTH THE AHJ AS WELL AS THE PROFESSIONAL.
- H. PROVIDE DOCUMENTATION OF ALL TESTING INCLUDING CERTIFICATION AND CONFIRMATION OF COMPLETION OF ALL NFPA 20 REQUIRED TESTS, PUMP CURVES, AND START AND STOP PRESSURE SETTINGS.

-END OF SECTION-

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CLIENT:



PANATTONI

**PANATTONI
DEVELOPMENT**

PROJECT:

**SOUTH SOUND COMMERCE
CENTER**

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

CITY STAMP:

SHEET NAME:

**SPECIFICATIONS - FIRE
PROTECTION**

Proj. No21.0003934.080 Reviewed By:TB

SHEET No:

FP0.05



GENERAL NOTES

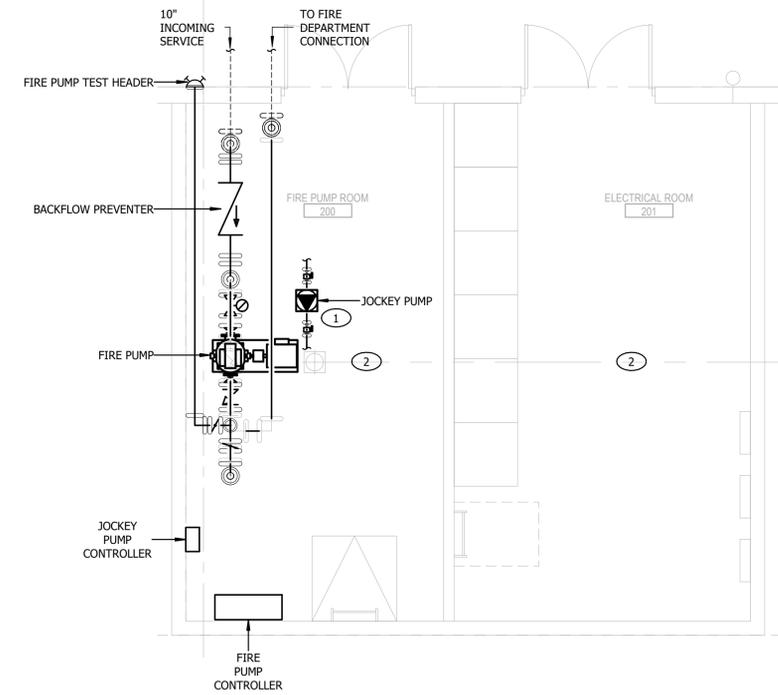
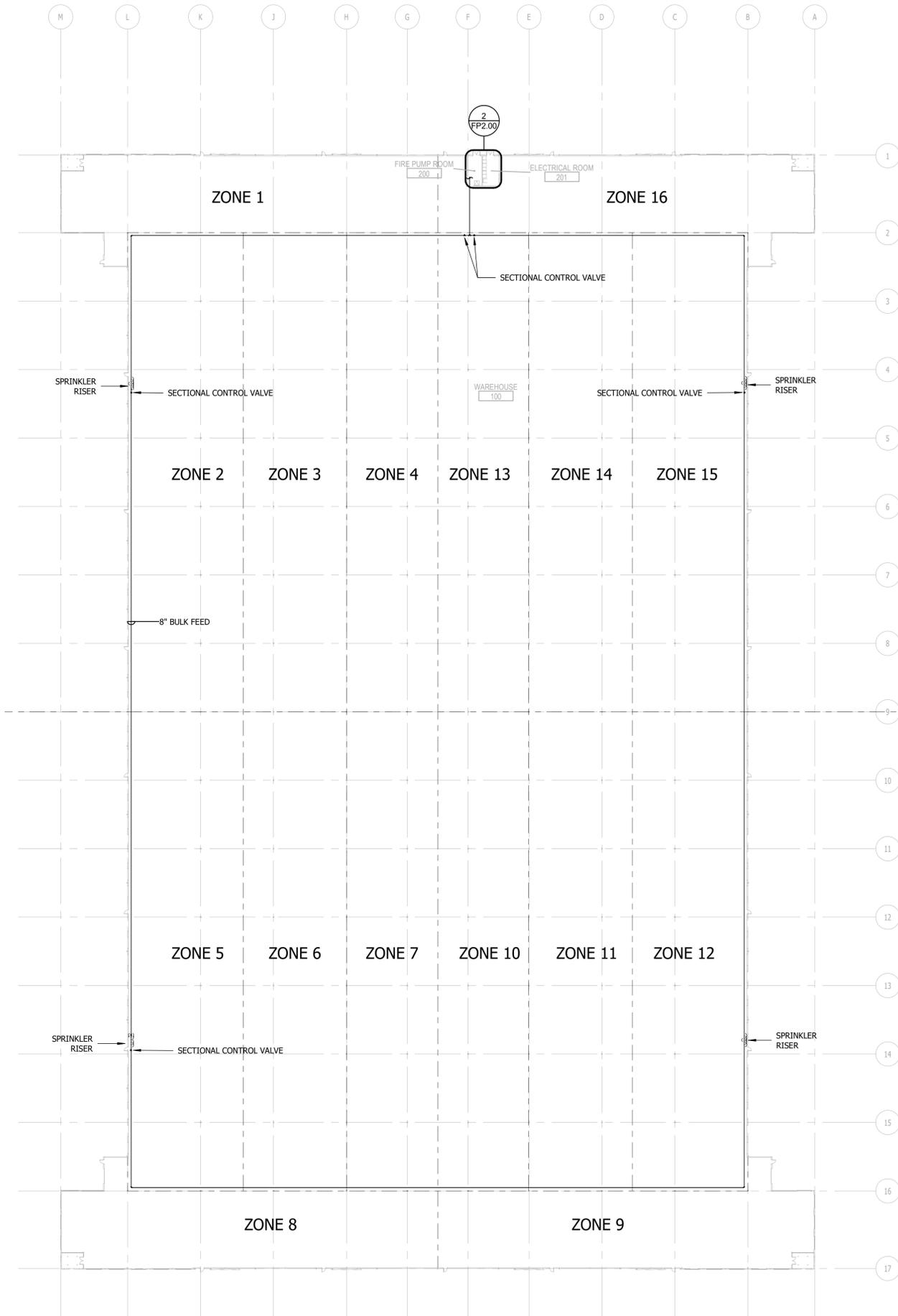
1. THE SPACE IS TO BE DESIGNED AS A SHELL WAREHOUSE WITH THE POSSIBILITY OF DIVISION INTO 4 SEPERATE TENANTS. THE ZONING LAYOUT PROVIDED IS BASED ON THE ASSUMPTION THAT THE BUILDING WILL BE SPLIT ALONG ITS HORIZONTAL AND VERTICAL AXES TO DIVIDE UP THE TENANT SPACES.
2. THE INTENT IS THAT THE SPRINKLER ZONES PROTECTING A TENANT'S SPACE ARE ACCESSIBLE WITHIN THAT SPACE AND ONLY PROTECT THAT SINGLE TENANT (I.E. DO NOT CROSS DEMISING WALLS INTO AN ADJACENT TENANT SPACE).

KEYED NOTES

1. PROVIDE MONITORED CONTROL VALVES ON THE JOCKEY PUMP INLET AND OUTLET.
2. EXTEND A BRANCH LINE DOWN FROM THE SPRINKLER ZONE ABOVE TO PROTECT THE FIRE PUMP ROOM AND MAIN ELECTRICAL ROOM. BOTH SPACES SHALL BE DESIGNED AS ORDINARY HAZARD GROUP 1. PROVIDE A VALVE WITH TAMPER SWITCH ON THE LINE SERVING THE ELECTRICAL ROOM. AVOID INSTALLING SPRINKLER PIPING OR EQUIPMENT OVER ANY ELECTRICAL EQUIPMENT.

INTERIOR HOSE CONNECTION NOTES

1. PROVIDE SMALL HOSE CONNECTION FOR FIRST-AID FIREFIGHTING AND OVERHAUL THROUGHOUT THE FACILITY.
2. EACH INTERIOR FIRE HOSE CONNECTION (NFPA 13) SHALL CONSIST OF A 2-1/2 IN. HOSE VALVE WITH A 1-1/2 IN. REDUCER, AND A CAP WITH CHAIN, WITHOUT HOSE.
3. INTERIOR FIRE HOSE CONNECTIONS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS:
 - A. AT EACH SPRINKLER RISER MANIFOLD UPSTREAM OF ANY SPRINKLER SYSTEM RISER CHECK VALVE.
 - B. AT EACH FIRE DEPARTMENT ACCESS MAN DOOR ON GROUND LEVEL.
 - C. AT OTHER LOCATIONS WHEN REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
4. INTERIOR FIRE HOSE CONNECTIONS SHALL BE SUPPLIED FROM AN ADJACENT SPRINKLER SYSTEM MAIN AND NOT A BRANCH LINE. SUPPLY PIPE SHALL NOT BE LESS THAN NOMINAL 2.5 IN. IN DIAMETER. ALL PIPING INSTALLATIONS SHALL BE IN ACCORDANCE WITH NFPA 13.



2 ENLARGED FIRE PUMP & ELECTRICAL ROOM - FIRE PROTECTION
FP2.00 SCALE: 1/4" = 1'-0"

CLIENT:



PANATTONI
DEVELOPMENT

PROJECT:

SOUTH SOUND COMMERCE
CENTER

BUILDING A

TUMWATER, WASHINGTON

Description: No: Date:
BUILDING PERMIT 04/22/2022

SEAL:



04/21/2022

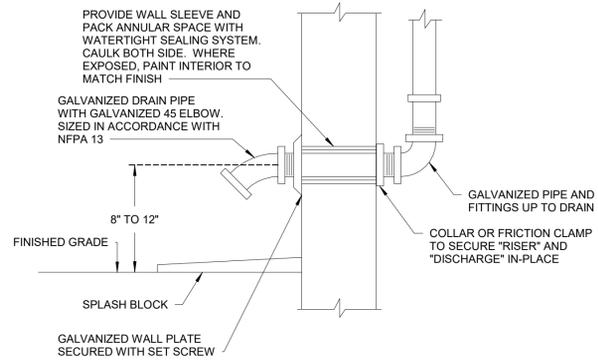
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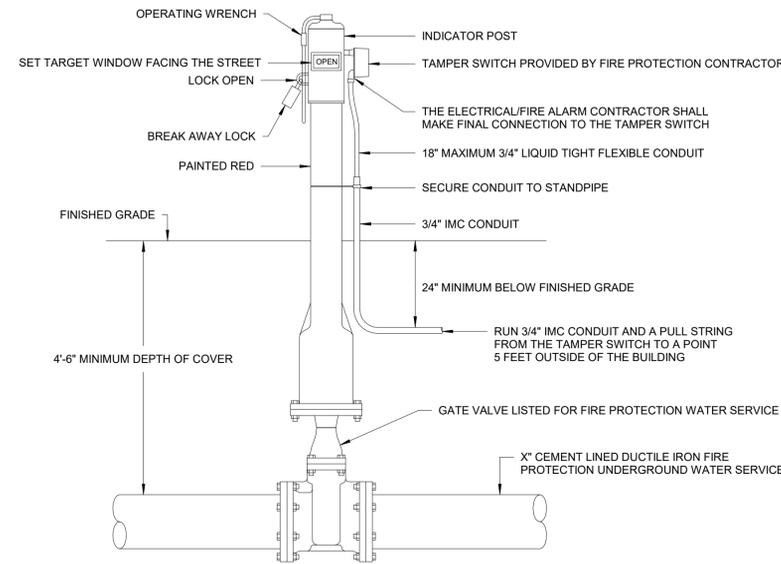
DETAILS - FIRE PROTECTION

Proj. No21.0003934.080 Reviewed By:TB
SHEET No:

FP8.00

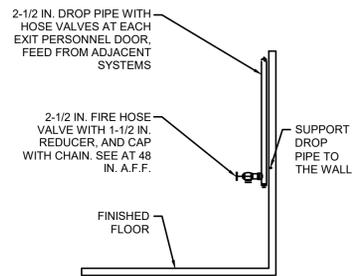


6 DRAIN DISCHARGE DETAIL
NO SCALE

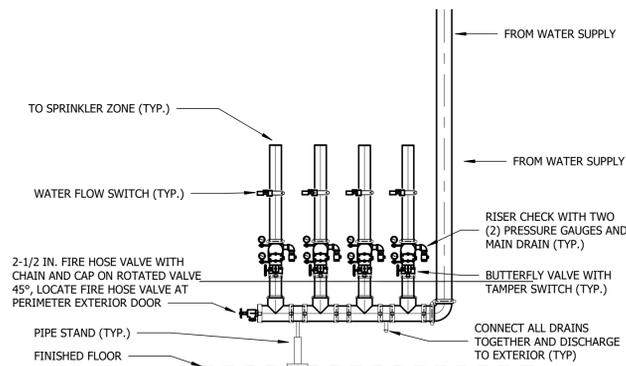


DETAIL NOTES:
1. INSTALL PIPE AND VALVES IN ACCORDANCE WITH NFPA 24.

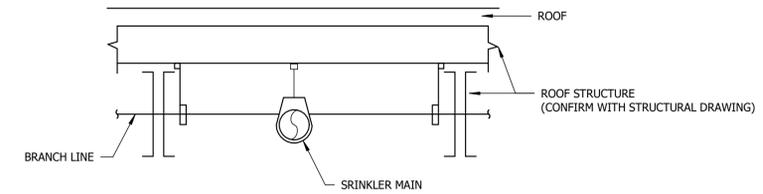
4 POST INDICATOR VALVE WITH TAMPER SWITCH DETAIL
NO SCALE



7 FIRE HOSE VALVE DETAIL
NO SCALE

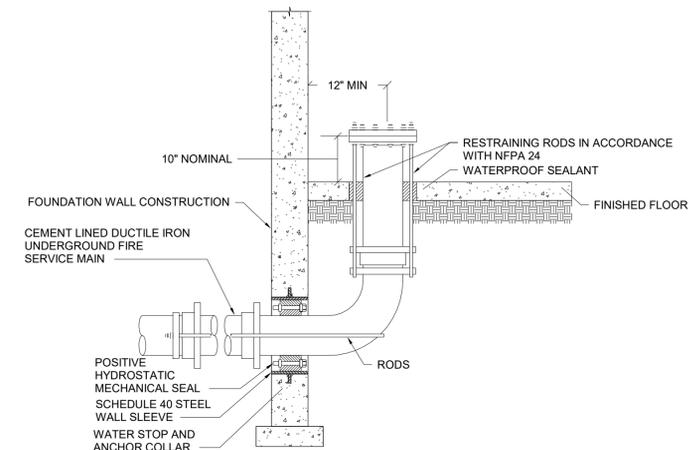


5 TYPICAL RISER MANIFOLD DETAIL
NO SCALE



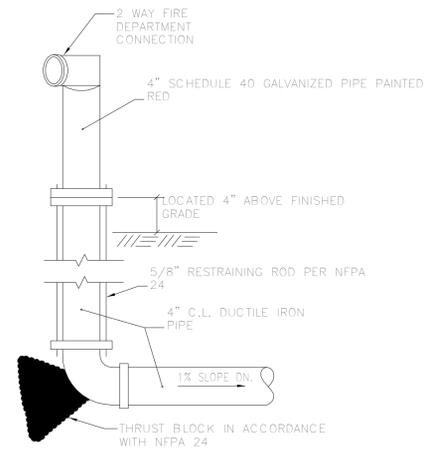
DETAIL NOTES:
1. INSTALL THE MAIN AND BRANCH LINE PIPING ABOVE THE BOTTOM OF THE TRUSSES TO PROVIDE THE REQUIRED CLEAR HEIGHT.
2. REFER TO STRUCTURAL DRAWINGS FOR DETAILS. COORDINATE SPRINKLER PIPE SIZE AND WEIGHTS WITH THE STRUCTURAL ENGINEER.
3. DO NOT SUPPORT PIPE FROM THE BOTTOM CHORD OF TRUSSES.
4. DO NOT INSTALL PIPE IN THE CLEAR HEIGHT SPACE.

1 CLEAR HEIGHT - FIRE PROTECTION DETAIL
NO SCALE



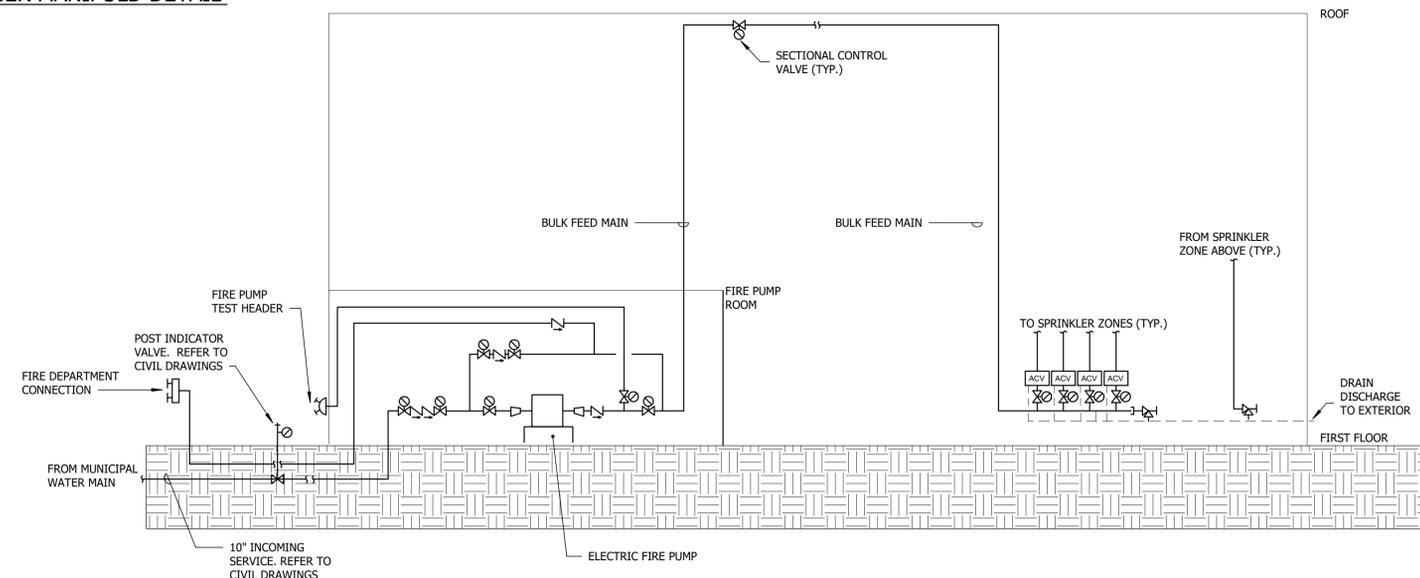
DETAIL NOTES:
1. THE FIRE PROTECTION CONTRACT SHALL BEGIN APPROXIMATELY 5 FEET FROM THE BUILDING.
2. WATER LINE SHALL PENETRATE THROUGH THE WALL ABOVE THE FOOTER.

2 FIRE WATER SERVICE - FOOTING WALL PENETRATION DETAIL
NO SCALE



DETAIL NOTES:
1. INSTALL IN ACCORDANCE WITH NFPA 24.

8 FREESTANDING FIRE DEPARTMENT CONNECTION DETAIL
NO SCALE



3 FIRE PROTECTION RISER DIAGRAM DETAIL
NO SCALE