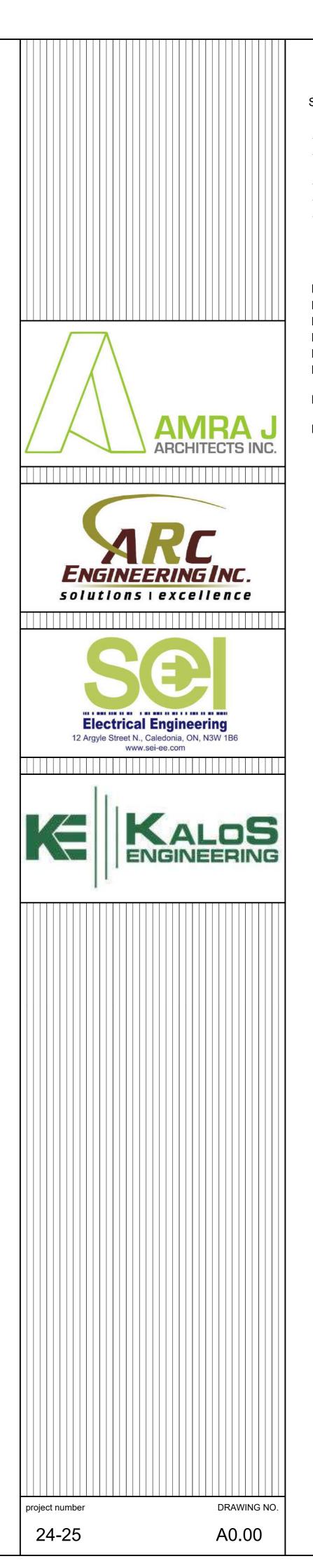


Boiler Room Renovation and HVAC Upgrades 465 East 16th Street, Hamilton, ON



| | DRAWING LIST |
|-------------------------|--|
| SHEET | ARCHITECTURAL DRAWINGS |
| | COVER PAGE SITE LOCATION, GENERAL NOTES, KEY PLAN, & LEGENDS |
| A1.01 A1.02 A2.01 | DEMOLITION FLOOR PLANS GROUND FLOOR DEMOLITION PLAN BOILER ROOM PLAN , GROUND FLOOR PLAN, DOOR & DOOR FRAME TYPE, DOOR SCHEDULE, SECTION DETAILS |
| | MECHANICAL DRAWINGS |
| M-100 M-101 | LEGENDS, SCHEDULES AND DETAILS SPECIFICATIONS |
| M-102 M-103 | CONTROLS SPECIFICATIONS DETAILS & CONTROLS |
| M-300 | BASEMENT PLAN - MECHANICAL DEMOLITION |
| M-310 | BOILER ROOM UPGRADES - PLUMBING, HYDRONIC AND HVAC NEW CONSTRUCTION |
| M-311 | GROUND FLOOR - MECHANICAL NEW CONSTRUCTION |
| M-312 | SECOND FLOOR - MECHANICAL NEW CONSTRUCTION |
| | ELECTRICAL DRAWINGS |
| E000 | GENERAL NOTES, LEGENDS, DRAWING LIST & SCHEDULES |
| | SPECIFICATIONS |
| E100 E101 | BASEMENT FLOOR SITE PLAN FIRST FLOOR SITE PLAN |
| E101 | SECOND FLOOR SITE PLAN |
| E200 | DEMOLITION BOILER ROOM FLOOR PLAN |
| | PROPOSED ELECTRICAL BOILER FLOOR PLAN |
| | PRE-EXISTING MCC DETAILS |
| E401 | UPDATED MCC DETAILS |
| | STRUCTURAL DRAWINGS |
| S1 | BOILER ROOM UPGRADES & HOUSEKEEPING PADS |
| S2 | PART GROUND FLOOR AND ROOF FRAMING PLAN |
| | |

NOTES AND SPECIFICATIONS

1. <u>GENERAL:</u>

THE PROJECT SCOPE INCLUDES PARTIAL RENOVATION OF THE BOILER ROOM & GENERAL PURPOSE RM 1026 AT 465 EAST 16TH STREET, HAMILTON ON AS REQUIRED FOR THE COMPLETE REDESIGN OF THE HVAC BOILER SYSTEM AND DOMESTIC HOT WATER SYSTEM.

TOTAL AREA OF WORK IS 207 SQ. M.

FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO CONSTRUCTION AND MAKE MODIFICATIONS TO SUIT EXISTING SITE CONDITIONS.

FOR THE FULL SCOPE OF WORK, REFER ALSO TO THE MECHANICAL, ELECTRICAL & STRUCTURAL DRAWINGS INCLUDED IN THE PACKAGE.

CONTRACTOR TO PROTECT EXISTING CONDITIONS TO REMAIN FROM DAMAGE DURING CONSTRUCTION.

CONTRACTOR SHALL FULLY ENCLOSE CONSTRUCTION AREA AND COORDINATE ALL DEMOLITION AND NEW WORK IN SUCH MANNER NOT TO DISTURB DAY-TO-DAY OPERATION OF THE SURROUNDING AREAS.

CONTRACTOR TO COORDINATE THEIR WORK WITH THE ABATEMENT CONTRACTOR FOR WORK LOCATED WITHIN BUT NOT LIMITED TO 'GENERAL PURPOSE RM 1026'. 2. DEMOLITION:

REFER TO DEMOLITION PLAN AND NOTES INCLUDED WITHIN THE ARCHITECTURAL DRAWING SET AND ALSO MECHANICAL, ELECTRICAL & STRUCTURAL DEMOLITION DRAWINGS AND NOTES. REPAIR AND MAKE GOOD EXISTING FLOORS AND WALLS DAMAGED DURING DEMOLITION PROCESS AND NEW SERVICE INSTALLATION. PATCH ALL FLOORS AS REQUIRED.

PATCH AND REPAIR WALL AS REQUIRED AT ALL LOCATIONS WHERE EX THERMOSTATS HAVE BEEN REPLACED WITH NEW. INSTALL STAINLESS STEEL COVER PLATE ON ALL THERMOSTAT LOCATIONS THAT HAVE BEEN ABANDONED. COORDINATE THIS WORK WITH MECHANICAL AND ELECTRICAL DRAWINGS.

3. EXISTING MECHANICAL ROOM:

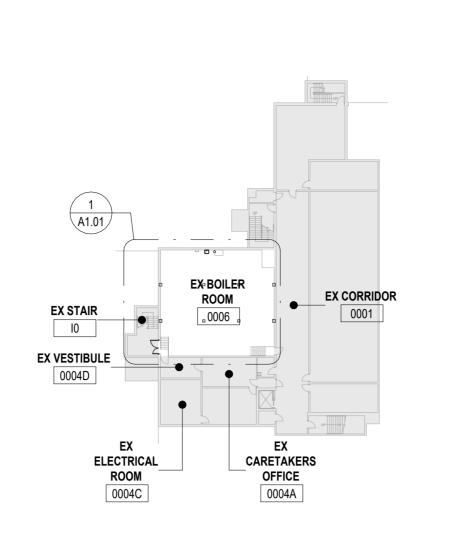
ONCE DEMOLITION IS COMPLETED, THROUGHLY CLEAN ALL EXISTING SURFACES IN (WALLS, CEILINGS, FLOORS) AND PREPARE FOR PAINTING.

PAINT ALL NEW AND EXISTING SURFACES: WALLS, CEILINGS AND DOORS/FRAME BOTH SIDES AND EXPOSED PIPING, CONDUITS AND DEVICES WITHOUT FACTORY FINISH COAT. APPLY PRIME COAT TO NEW SURFACES AND 2 FINISH COATS ON ALL ITEMS TO BE PAINTED.

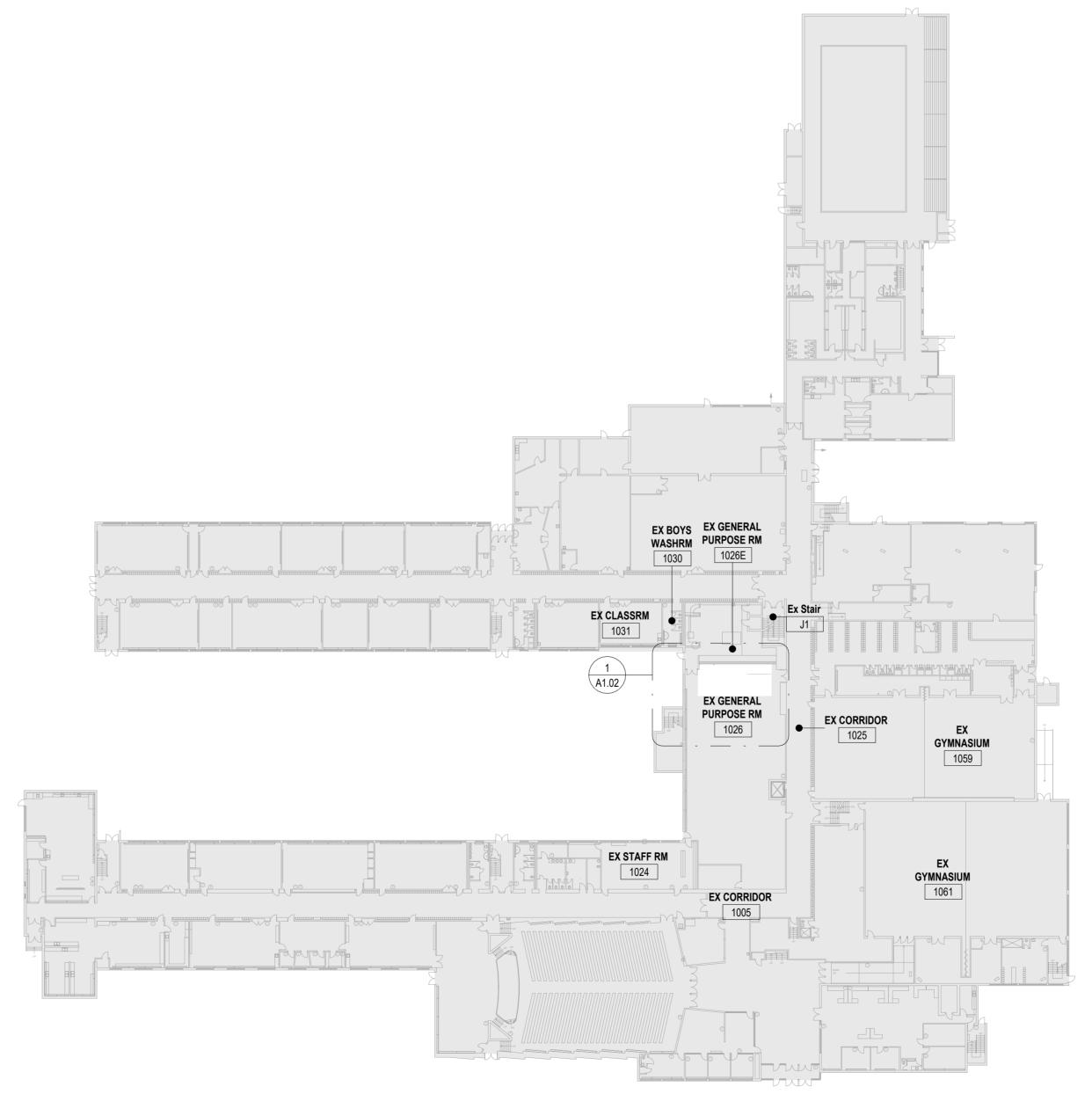
COLOUR TO MATCH EXISTING.

4. <u>ROOFING</u>:

ROOFING SCOPE IS THROUGH THE CASH ALLOWANCE.

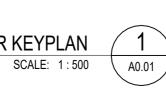


EX BASEMENT KEYPLAN



EX GROUND FLOOR KEYPLAN

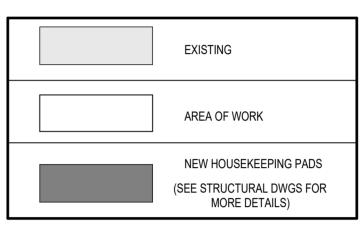




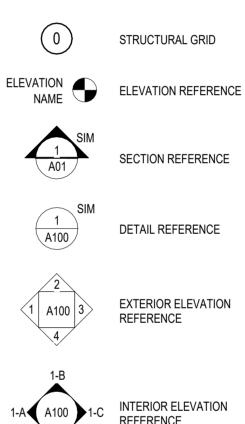


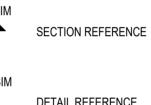
SITE LOCATION

DRAWING LEGEND



SYMBOL LEGEND





| DETAIL REFERENCE | |
|------------------|--|

| DETAIL | REFERE | NCE |
|--------|--------|-----|
| | | |
| | | |
| | | |

| 00 3 | EXTERIOR ELEVATION REFERENCE | |
|------|---------------------------------|--|
| В | | |

REFERENCE

INTERIOR ELEVATION

ABBREVIATION LEGEND



STRU. STRUCTURE

TYP. TYPICAL u/s UNDERSIDE

Τ/

TOP OF

| MATER | RIAL |
|-------|-------------------------|
| ACT | ACOUSTICAL CEILING TILE |
| CAR | CARPET |
| | |

CMU CONCRETE MASONRY UNIT CONC CONCRETE GB GYPSUM BOARD

GW GEORGIAN WIRE HM HOLLOW METAL

÷EL.

?

101

(1-10)

 $\langle A \rangle$

W1

W1

(1i)

R1

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ROOM NAME

SPOT ELEVATION

CONSTRUCTION TAG

DEMOLITION /

ROOM TAG

DOOR TAG

WALL TAG

FLOOR TAG

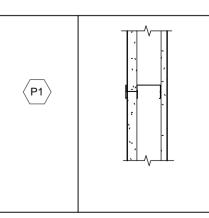
ROOF TAG

REVISION TAG

WINDOW / SCREEN TAG

- INT INTEGRAL PT PAINT
- RB RUBBER BASE SC SOLID CORE SHT SHEET
- S.S. STAINLESS STEEL STAIN ST
- TG TEMPERED GLASS VCT VINYL COMPOSITE TILE

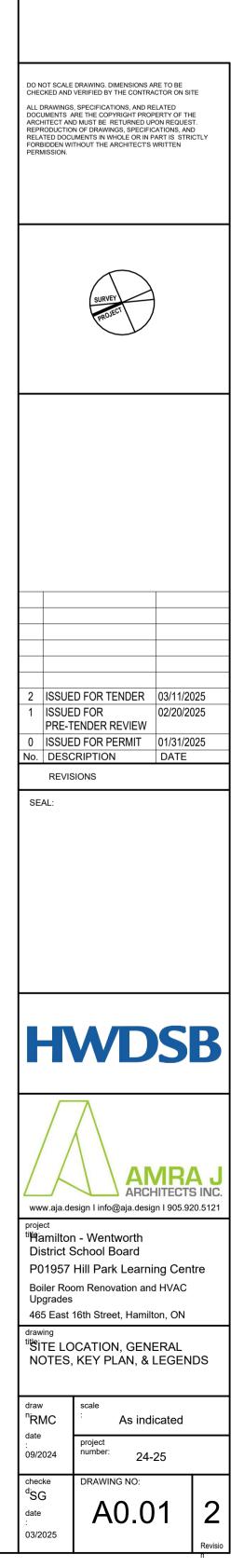
PARTITION SCHEDULE



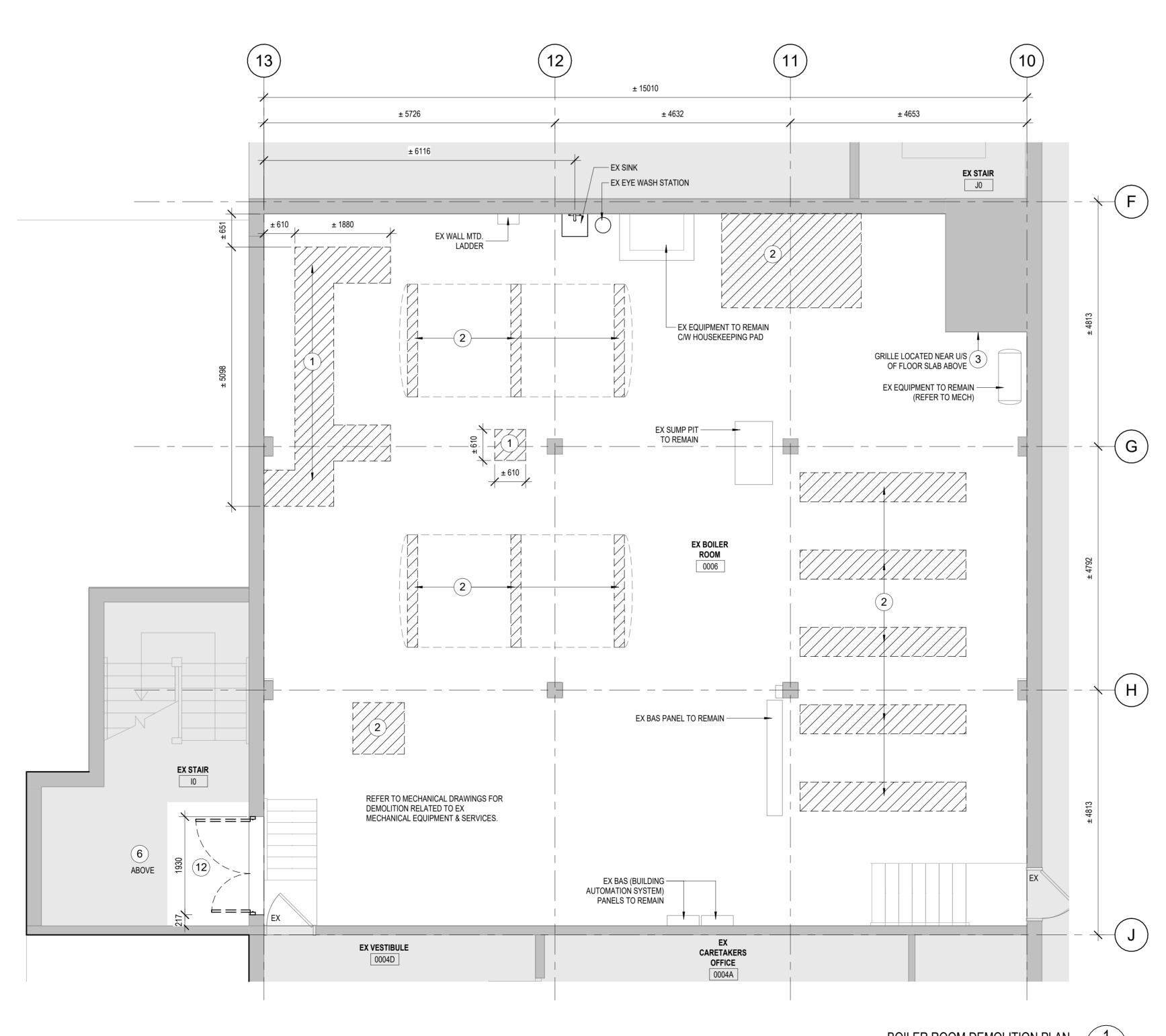
SHAFT WALL ASSEMBLY 16mm TYPE X GWB • 64mm C-H STUDS 25 GAUGE @ 610mm O.C. • 25mm GYPSUM LINER PANEL

1 HR FIRE RESISTANCE RATING AS PER ULC ASSEMBLY No. W452, SYSTEM A

NOTE: EXPOSED FACE OF SHAFT WALL TO BE PRIMED AND PAINTED







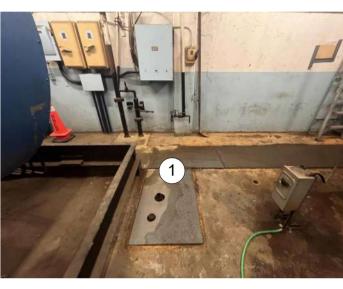
BOILER ROOM DEMOLITION PLAN SCALE: 1:50 A1.01

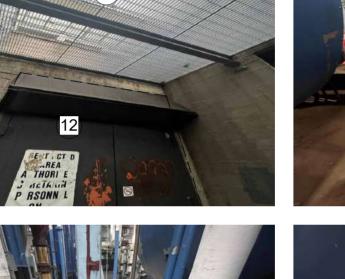
DEMOLITION NOTES

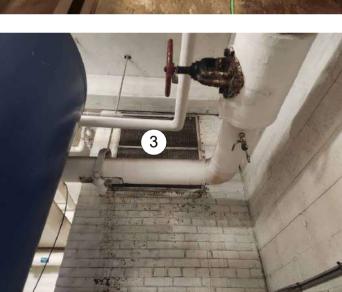
- 1 REMOVE EXISTING METAL FLOOR PLATES OVER FLOOR TRENCHES. REFER TO STRUCTURAL DRAWINGS FOR DETAILS REGARDING CONCRETE INFILL OF EX FLOOR TRENCHES.
- 2 DEMOLISH EXISTING CONCRETE HOUSEKEEPING PADS & EQUIPMENT FOUNDATIONS. PATCH EX FLOOR TO REMAIN AS REQUIRED TO MAINTAIN A SMOOTH & FLAT FLOOR SURFACE.
- 3 REMOVE EX AIR INTAKE GRILLE. CLEAN & PREP OPENING FOR BLOCK INFILL. REFER TO MECHANICAL DRAWINGS.
- 4 REMOVE EXISTING FLOOR MOUNTED STAINLESS STEEL RAILING. PATCH EXISTING FLOORING AS REQUIRED WITH CONCRETE & GRIND SMOOTH TO BE LEVEL WITH EXISTING FLOOR.
- 5 REMOVE EXISTING STAINLESS STEEL CAFETERIA TRAY SUPPORT IN ITS ENTIRETY.
- 6 CAREFULLY REMOVE EXISTING STEEL FLOOR GRATING, SUPPORT FRAMING, GUARDRAILS, ETC. COVERING EXTERIOR STAIRWELL AS REQUIRED TO BRING NEW MECHANICAL ETC, COVERING EXTERIOR STAIRWELL AS REQUIRED TO BRING NEW MECHANICAL EQUIPMENT INTO THE BOILER ROOM. RE-INSTALL TO IT'S EXISTING CONDITION FOLLOWING CONSTRUCTION. MAKE GOOD ALL EX ADJACENT SURFACES TO REMAIN AFFECTED BY ITS REMOVAL AND RE-INSTALLATION.
- CUT HOLE IN EX CONC FLOOR SLAB & TERRAZZO FLOOR TO ACCOMMODATE MECH VENTING TO ROOF, COORDINATE W/ MECHANICAL AND STRUCTURAL DRAWINGS. VENTING TO ROOF. COORDINATE W/ MECHANICAL AND STRUCTURAL DRAWINGS.
- 8 CORE HOLES IN EX CONC FLOOR SLAB & TERRAZZO FLOOR TO ACCOMODATE MECH VENTING TO ROOF. COORDINATE W/ MECHANICAL AND STRUCTURAL DRAWINGS.
- 9 REMOVE EX CEILING TILES AS REQUIRED TO MAKE NECESSARY MECHANICAL ROOF PENETRATIONS & CONSTRUCT SHAFT WALL. COORDINATE WORK W/ ABATEMENT CONTRACTOR.
- 10 REMOVE EX MECH GRILLE. CLEAN & PREP OPENING FOR WALL INFILL. REFER TO MECHANICAL DRAWINGS.
- 11 PROVIDE ROOF PENETRATIONS TO ACCOMMODATE MECH VENTING FROM BOILER ROOM. COORDINATE W/ MECHANICAL AND STRUCTURAL DRAWINGS.
- (12) REMOVE EXISTING METAL DOORS & FRAME C/W ABOVE DOOR LOUVER & CRANK MECHANISM AND EXTERIOR AWNING. MAKE GOOD EXISTING & PREPARE OPENING FOR NEW DOOR.

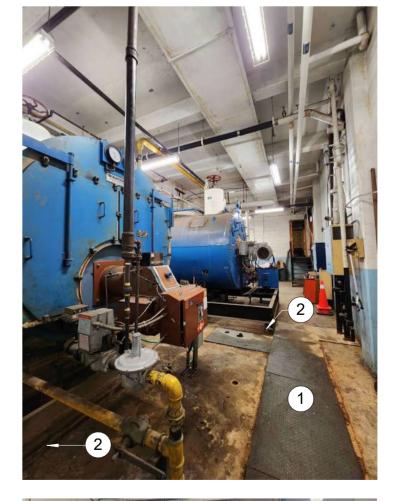
BOILER ROOM - PHOTO REFERENCES



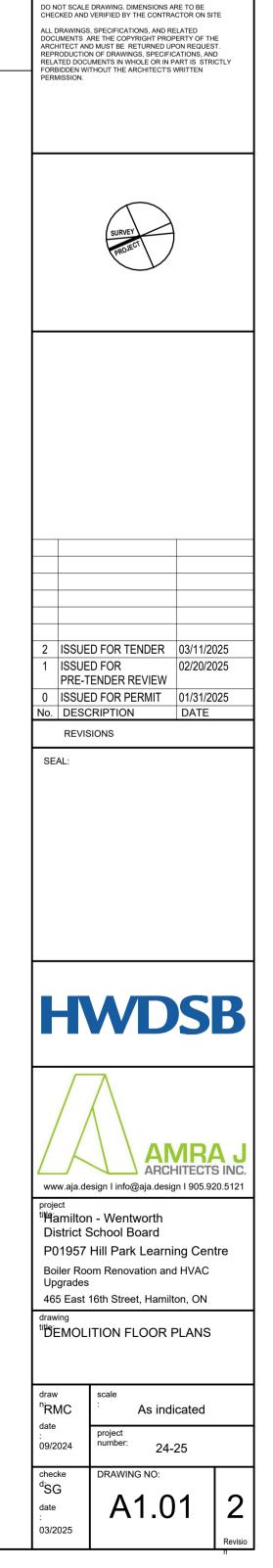


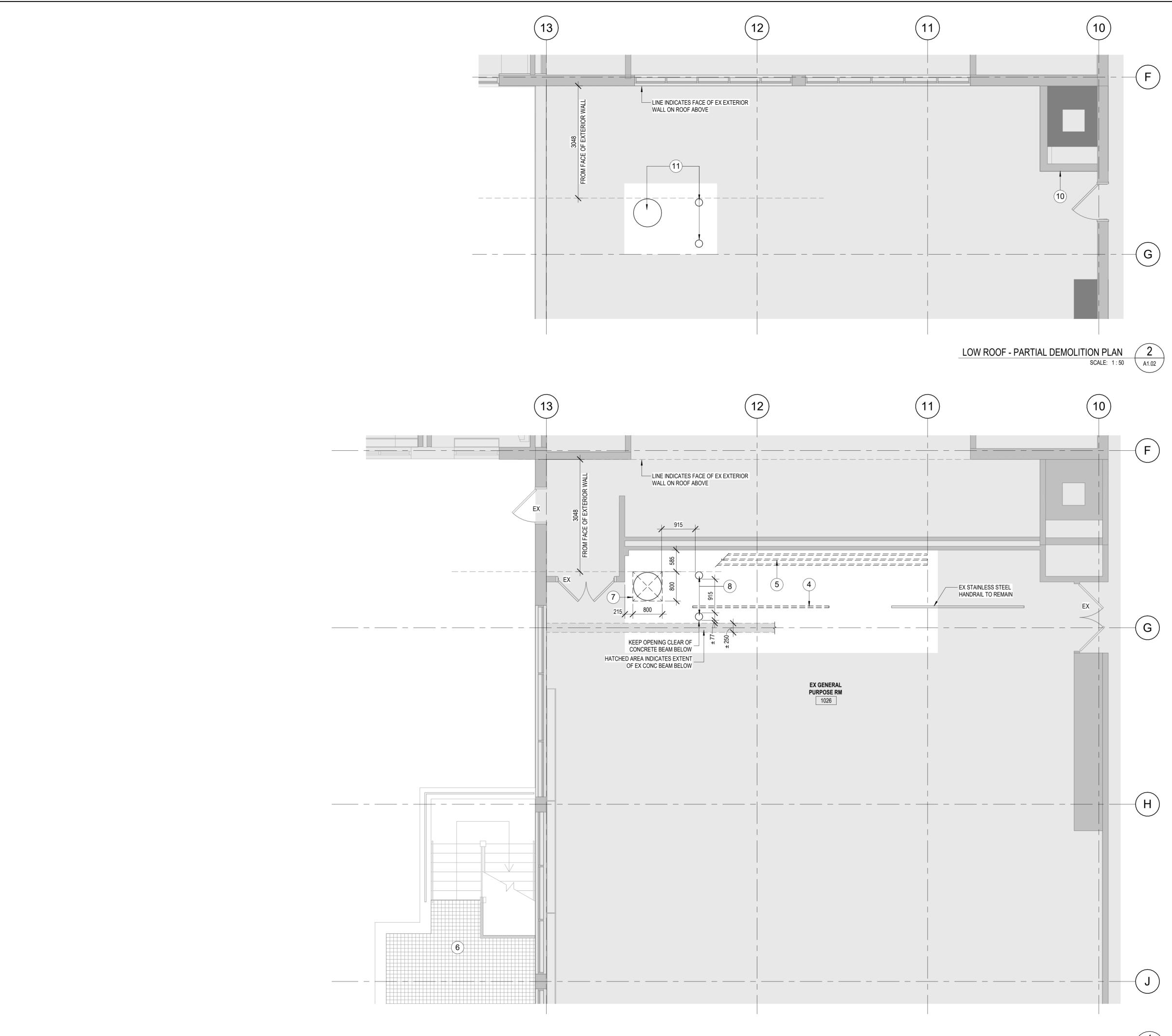










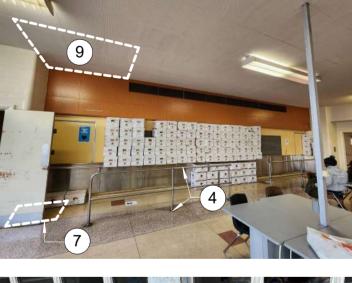


DEMOLITION NOTES

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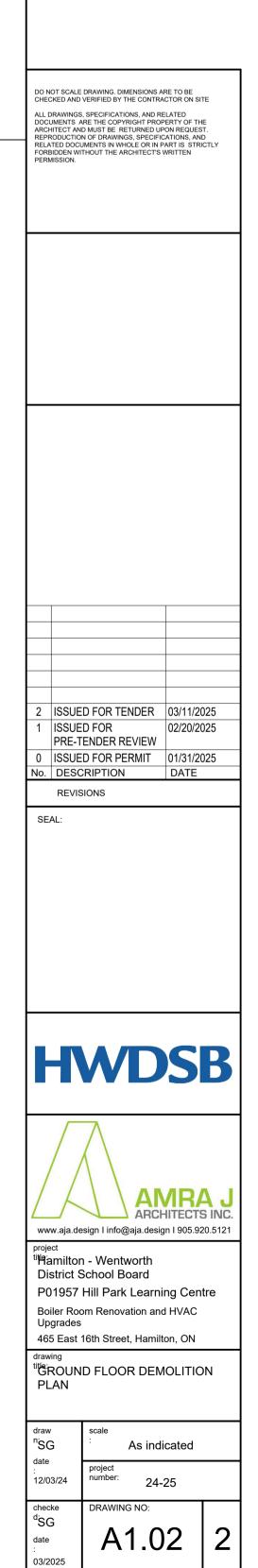
PHOTO REFERENCES



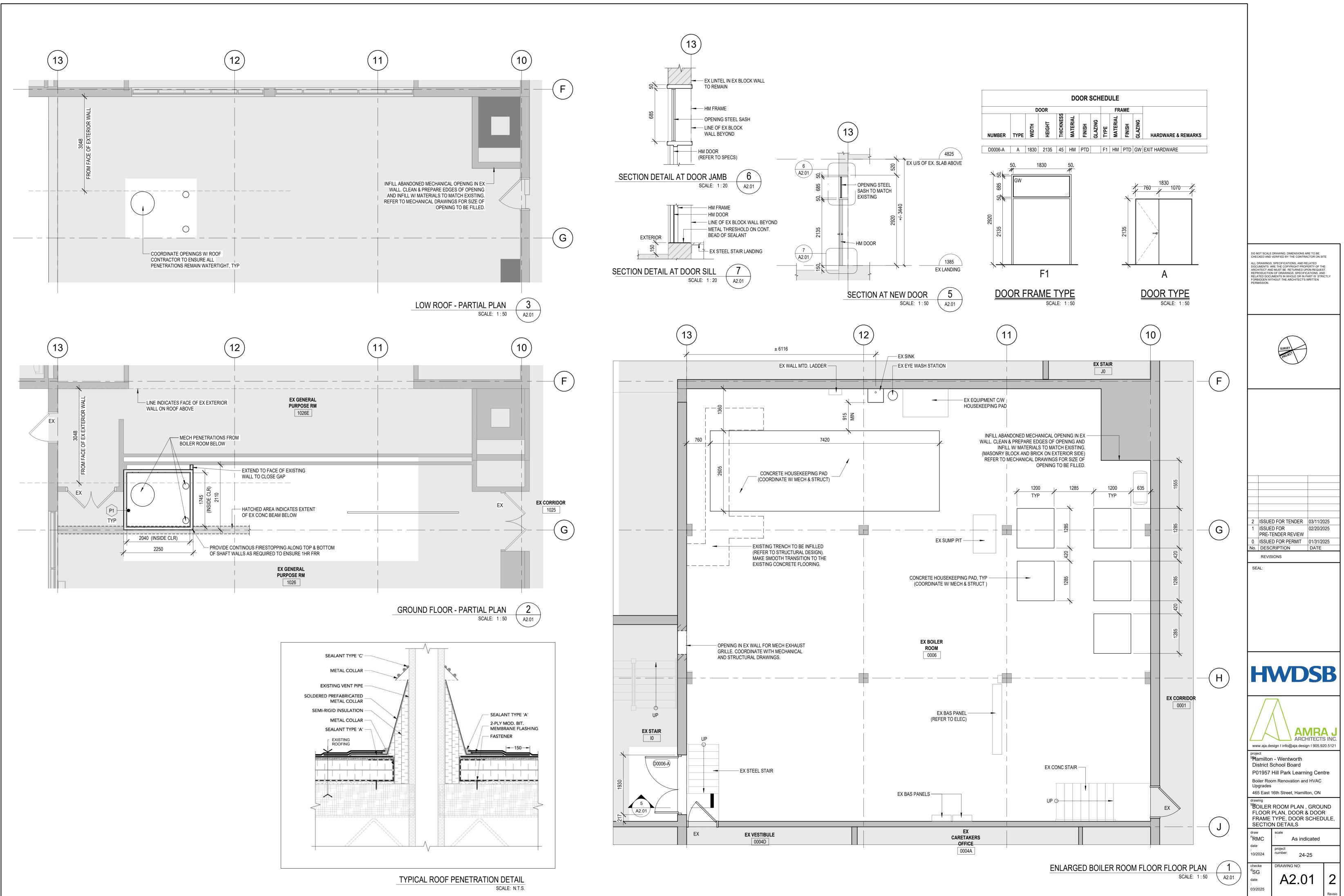


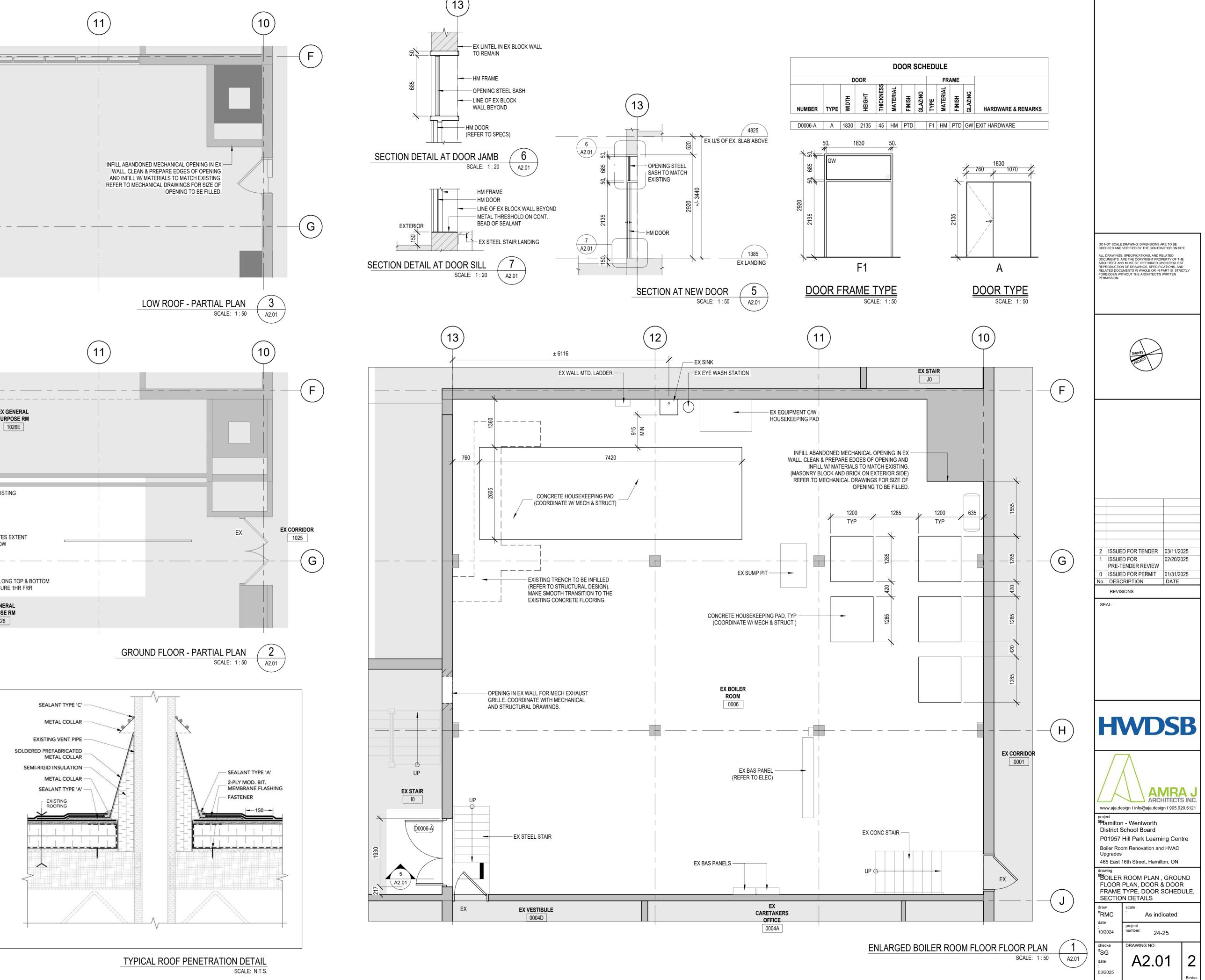




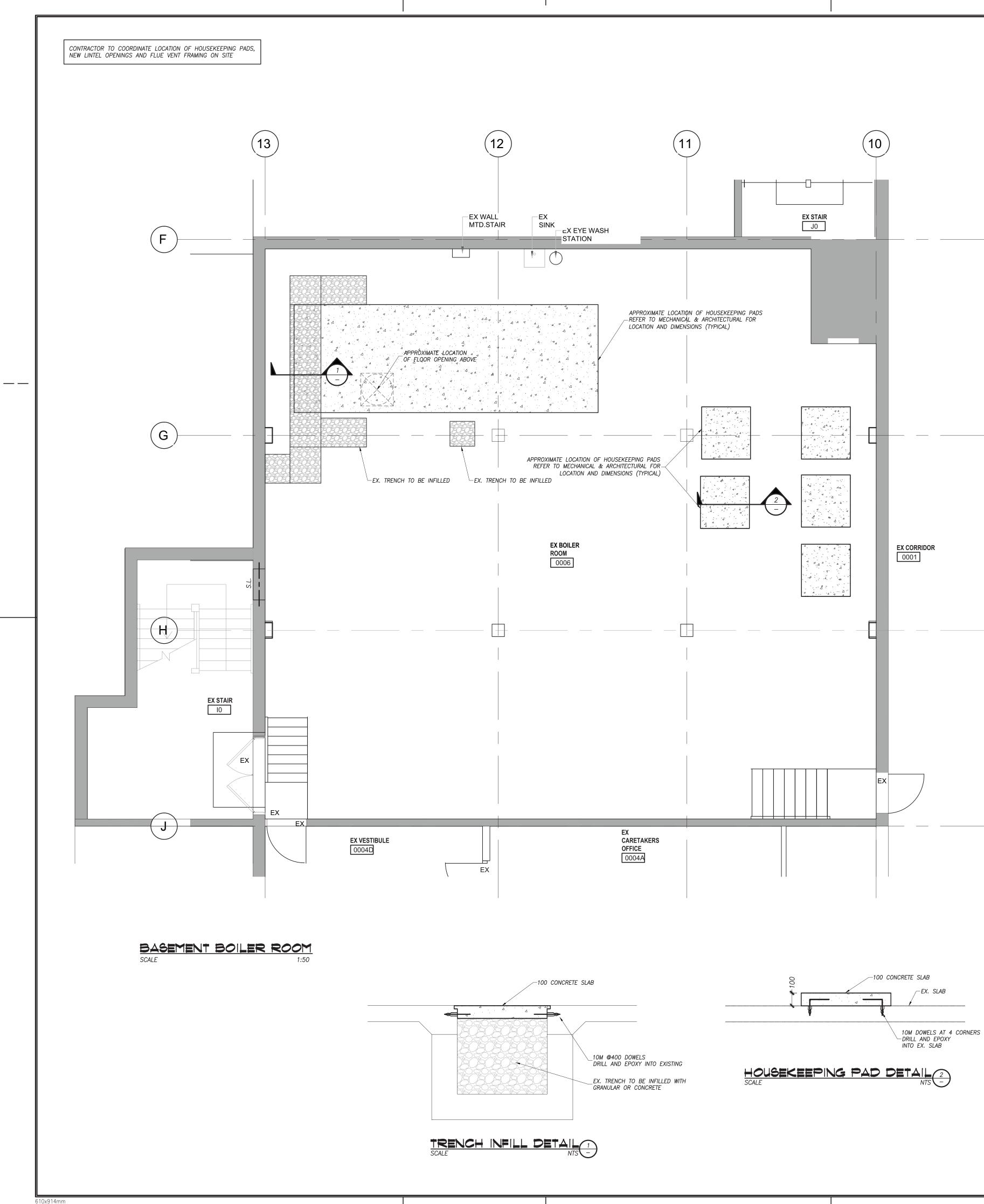


SCALE: 1:50 A1.02









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CONCRETE NOTES

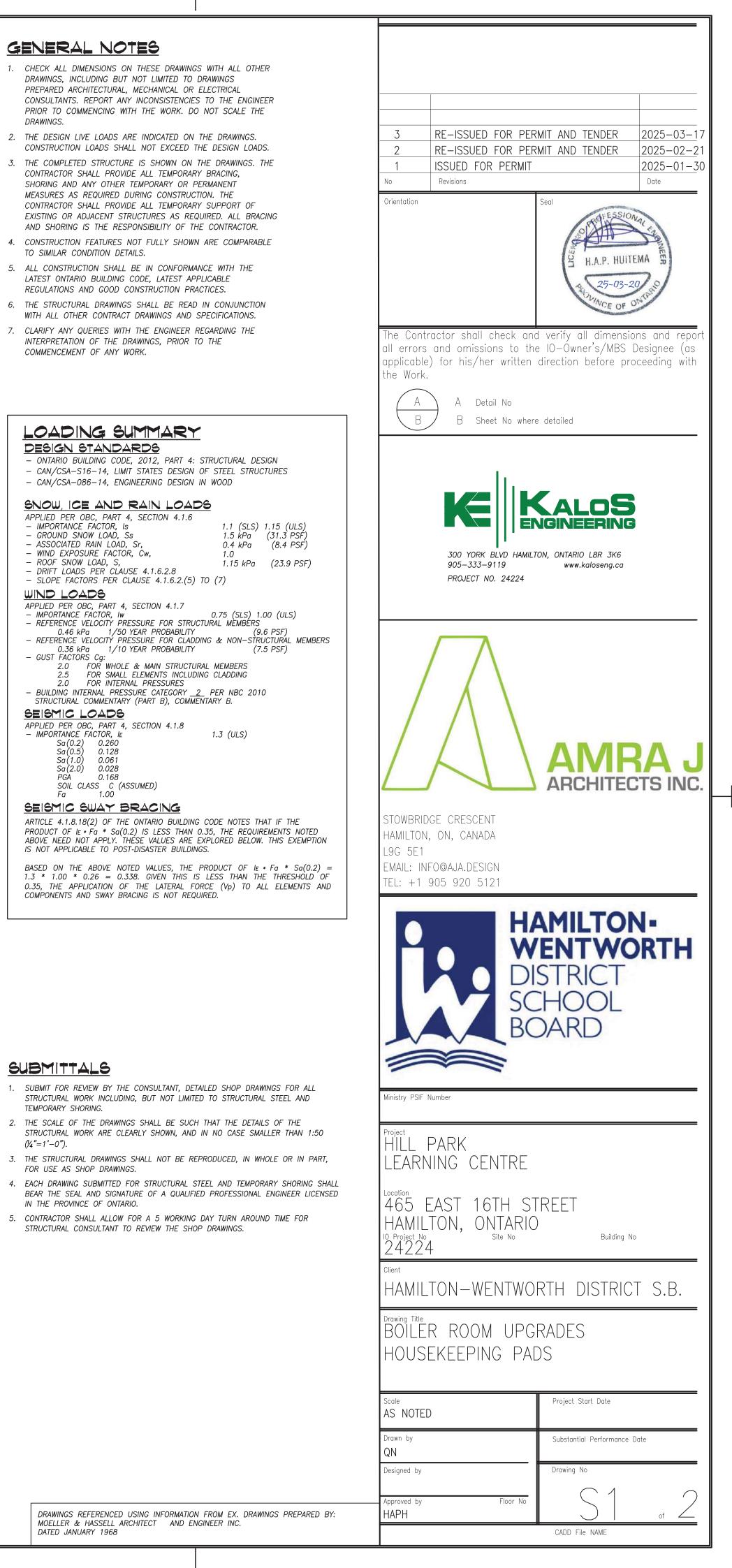
- 1. ALL STRUCTURAL CONCRETE ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA STANDARD CAN/CSA A23.3. ALL CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH CSA STANDARD CAN/CSA A23.1.
- 2. MINIMUM CONCRETE STRENGTH AT 28 DAYS SHALL BE: – SLAB ON GRADE – 25 MPa TYPE C1 AGGREGATE SHALL BE 20 MAXIMUM. AIR ENTRAINMENT TO BE 6% \pm 1% WHEN EXPOSED TO EXTERIOR. CONTRACTOR TO SUBMIT CONCRETE MIX DESIGN FOR
- REVIEW 3. THE DEFORMED REINFORCING STEEL SHALL CONFORM TO CSA STANDARD G30.18M-09 GRADE 300R FOR STIRRUPS AND TIES AND GRADE 400R FOR ALL OTHER REINFORCING. UNLESS OTHERWISE NOTED THE REINFORCING LAP LENGTH SHALL BE 'CLASS B' IN SPLICES. ALL REINFORCING HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH A23.1.
- 4. THE REINFORCING COVER FOR CONCRETE SHALL BE: – 75mm FOR CONCRETE AGAINST EARTH – 40mm FOR FORMED CONCRETE EXPOSED TO EARTH OR
- WEATHER WHERE THE REINFORCING BAR IS 15M OR SMALLER – 50mm FOR FORMED CONCRETE EXPOSED TO EARTH OR WEATHER WHERE THE REINFORCING BAR IS 20M OR LARGER
- 5. THE FOOTING DESIGN IS BASED ON INFORMATION AVAILABLE AT THE TIME OF DESIGN. THE FOOTING DESIGN MAY BE ALTERED DURING CONSTRUCTION, IF THE SITE CONDITIONS WARRANT, BUT ONLY WITH THE EXPRESS PERMISSION OF THE ENGINEER.

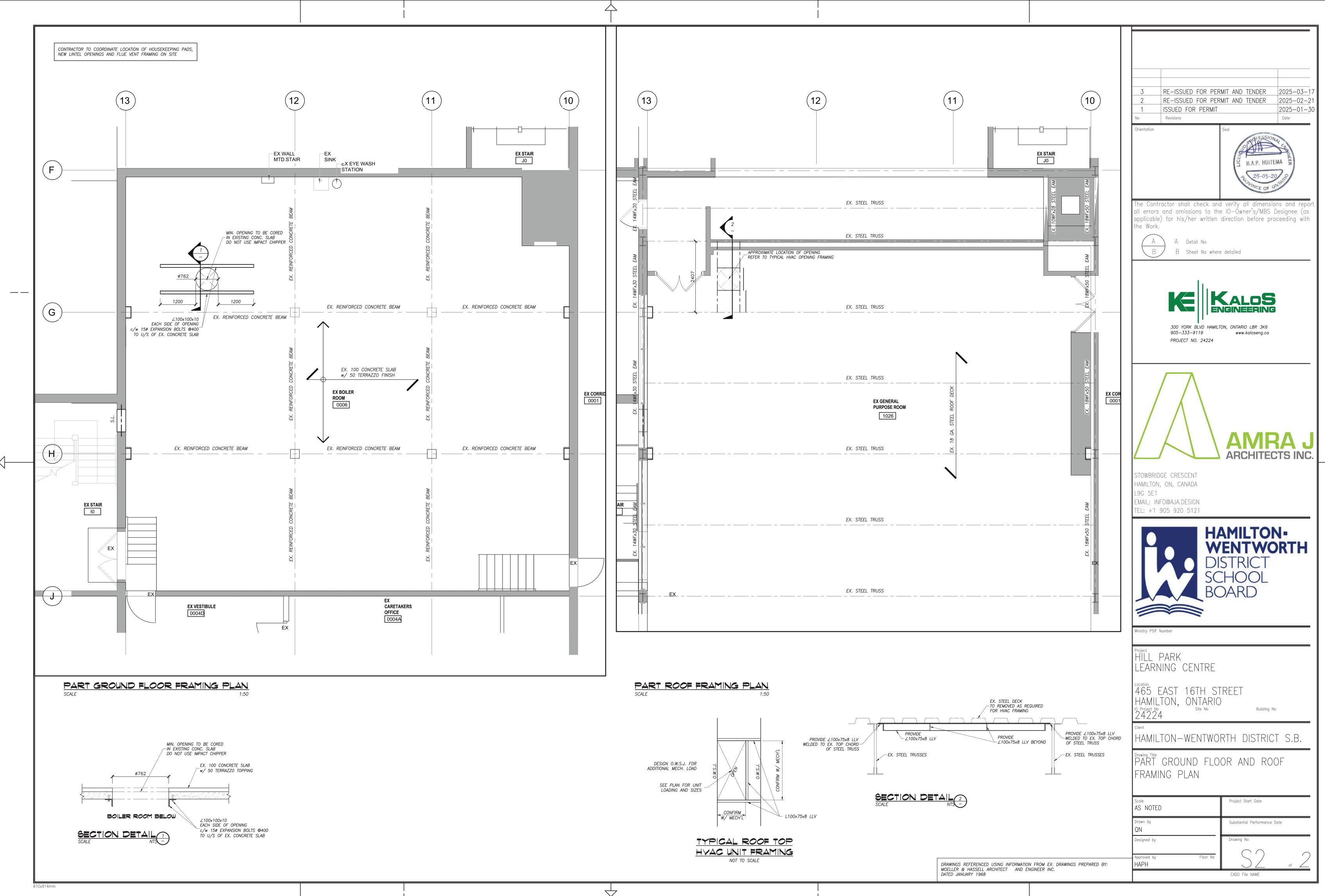
| | 1 <u>50 MIN.</u> | | CLEAR SPAN | | 150 MIN. |
|---|------------------|-----|---------------|-----|--------------|
| Ł | ///7 | | | , | =/// |
| | | | | | |
| | CLEAR SPAN | | 140 WALL | | 190 WALL |
| | UP to 1200 | _#_ | 2∠s 75x65x8 | ╀ | 2∠s 90x90x8 |
| | 1200 to 1800 | _#∟ | 2∠s 90x65x8 | ╀ | 2Ls 125x90x8 |
| | 1800 to 2100 | Щ | 2∠s 90x65x10 | ⊥₽ | 2Ls 150x90x8 |
| | | | | | |
| | CLEAR SPAN | | 240 WALL | | 290 WALL |
| | UP to 1200 | Ŀ | 2Ls 100x100x8 | J₽L | 3Ls 90x90x8 |
| | 1200 to 1800 | _#L | 2Ls 150x100x8 | ΨL | 3Ls 125x90x8 |
| | 1800 to 2100 | Ŀ | 2Ls 150x100x8 | J₽L | 3Ls 150x90x8 |

FOR LINTELS IN 90 VENEER, USE 1 ANGLE OF THAT NOTED FOR 190 WALL ON SIMILAR SPAN.

DOUBLE ANGLES TO BE STITCH WELDED BACK TO BACK.

TYPICAL STEEL LINTEL DETAIL NOT TO SCALE





| | LEGEND - | - HVAC | | | LEGEND – | GENERA | L | | | | | | AIR | SEPA | RATOR | SCHE | DULE | | | | |
|------------------|--------------------------------|-----------|---|-----------------|---|------------|----------------------------------|---------------------|---------------------|-----------------------|------------------|------|--------|--------|----------|------|--------|-----------|------------|----------------------|--------------|
| SYMBOL | DESCRIPTION | SYMBOL | DESCRIPTION | SYMBOL | DESCRIPTION | SYMBOL | DESCRIPTION | TAG | LOCATION | BELL & GOSSETT | SERVICE | MAX | FLOW | DESIGN | FLOW | SIZE | SHIPF | PING WEIG | энт | | |
| - HWS - HEATE | TED WATER SUPPLY | | Single line rigid duct | M | ISOLATION VALVE | tC | D PIPE UP | | | MODEL | | LPS | GPM | LPS | GPM N | | S KG | LBS | <u> </u> | TYPE | REMARKS |
| - HWR - HEATE | | | SINGLE LINE DUCT WITH | | GLOBE VALVE | +> | PIPE DOWN | | BOILER ROOM | | | | | | | | | | | | |
| | | | | X | LOCKABLE FLOW CONTROL VALVE | | CAPPED PIPE | AS-1 | [006] | R–18FB | BUILDING HEATING | 72.5 | 1149.0 | 64.3 | 1018.5 4 | 50 1 | B 1451 | .5 3200 | 0.0 CENTRI | FUGAL, WITH STRAINER | NOTES 1, & 2 |
| | | | SINGLE LINE FLEXIBLE DUCT | ю | BALL VALVE | | - DIRECTION OF FLOW | NOTES: 1. ACCEPT | ABLE ALTERNATES SU | BJECT TO SHOP DRAW | ING REVIEW. | | | | | | | | | | |
| — RWR — — RADIA | NATION WATER RETURN | | DOUBLE LINE FLEXIBLE DUCT | | CHECK VALVE | | | 2. REFER | TO PLANS, ELEVATION | NS, DETAILS, AND CONT | IROLS. | | | | | | | | | | |
| — CHWS — CHILL | LLED WATER SUPPLY | \bowtie | SUPPLY AIR DIFFUSER | 0~1×1 | FLOAT VALVE | | - Continuous Pipe | | | | | | | | | | | | | | |
| — CHWR — — CHILL | LLED WATER RETURN | | RETURN AIR GRILLE | | HOSE-END DRAIN VALVE VALVED AND CAPPED | | - METER | | | | | | | | | | | | | | |
| — cws — cond | IDENSER WATER SUPPLY | A1-100 | NUMBER/DIFF NECK SIZE DIFF TYPE/SUPPLY AIR CFM | | PROVISION | | | | | | | | | | | | | | | | |
| - CWR COND | IDENSER WATER RETURN | FD | FIRE DAMPER | | GATE VALVE AND FLOW SWITCH SHUT-OFF VALVE AND ACCESS | BFP | - STRAINER BACKFLOW PREVENTER | | | | | | | | | | | | | | |
| | AM MAIN (PRESSURE AS CATED) | | SMOKE DAMPER | | PANEL BUTTERFLY VALVE | WFA | WATER FEEDER ASSEMBLY | | | | | | | | | | | | | | |
| C COND | · · · | MD | MOTORIZED DAMPER | | LOCKSHIELD VALVE | | FLEXIBLE PIPE CONNECTION | | | | | | | | | | | | | | |
| - FOS - FUEL | | BD | MANUAL BALANCING DAMPER | | PLUG VALVE | | EXPANSION COMPENSATOR | | | | | | | | | | | | | | |
| | | | | <u>v</u> | PRESSURE REDUCING VALVE | | PIPE ANCHOR | | | | | | | | | | | | | | |
| — FOR — — FUEL | | BDD | | | | | | | | | | | | | | | | | | | |
| RL REFRI | RIGERANT LIQUID | G FS | AND SMOKE DAMPER | | FLOW SWITCH | \square | | | | | | | | | | | | | | | |
| RD REFRI | RIGERANT DISCHARGE | Ø | FIRE DAMPER (IN RISER) | | FLOW METER, VENTURI | ₽ | PRESSURE GAUGE WITH COCK | | | | | | | | | | | | | | |
| RS REFRI | RIGERANT SUCTION | X | SMOKE & FIRE DAMPER (IN RISER) | N N N | SOLENOID VALVE | Щ. Ц. | THERMOMETER | | | | | | | | | | | | | | |
| — GS — GLYCO | COL SUPPLY | ф | BALANCING DAMPER IN (IN RISER) | | | | STARTER | | | | | | | | | | | | | | |
| — GR — — GLYCC | COL RETURN | ⊸ | MOTORIZED DAMPER (IN RISER) | | BALANCING VALVE (PLUG) | * | FAN SPEED CONTROLLER | | | | | | | | | | | | | | |
| SUPPI | PPLY OR OUTSIDE AIR DUCT | Ū | THERMOSTAT | M | NEEDLE VALVE PRESSURE DIFFERENTIAL VALVE | STB STW | SLEEVE THROUGH BEAM | | | | | | | | | | | | | | |
| | URN OR EXHAUST DUCT | B | HUMIDISTAT | ł | PRESSURE DIFFERENTIAL VALVE | DTF | DOWN THROUGH FLOOR | | | | | | | | | | | | | | |
| | | | | Ž | SAFETY RELIEF VALVE | CTE | CONNECT TO EXISTING | | | | | | | | | | | | | | |
| | PPLY DUCT DOWN | UC | DOOR UNDERCUT | | AUTOMATIC CONTROL VALVE | AP | ACCESS PANEL | | | | | | | | | | | | | | |
| | URN DUCT DOWN | DG | DOOR GRILLE | | AUTOMATIC CONTINUE VALVE | AD | ACCESS DOOR | | | | | | | | | | | | | | |
| | IND DUCT UP | OA | OUTDOOR AIR | l ll | 3 WAY BUTTERFLY CONTROL | | | | | | | | | | | | | | | | |
| | IND DUCT DOWN | RA | RETURN AIR | ⇒⇒ | VALVE | | | | | | | | | | | | | | | | |
| DUCT | T WITH ACOUSTIC LINING | RF | RELEIF AIR | | MOTORIZED BUTTERFLY VALVE | | | | | | | | | | | | | | | | |
| DOUB | IBLE LINE DUCT | SA | SUPPLY AIR | \ <} | VALVE IN RISER | | | | | | | | | | | | | | | | |
| | IND ATTENUATOR | | | | BACKWATER VALVE INLINE | | | | | | | | | | | | | | | | |
| | | | | | BACKWATER VALVE WITH ACCESS | | | | | | | | | | | | | | | | |

| | | | | | | | | BO | ILER | s S | CHED | ULE | | | | | | |
|---------|--|---|---------|------|-------|--------|------|---------|---------|---------|-----------|-----------|----------|-------------|---------|-----------|----------|---|
| TAG | LOCATION | PATTERSON KELLEY MODEL | INP | TUT | OUT | PUT | EV | VT | LV | VT | FLO | ow | FLUID | ELECTRI | CAL | WEI | GHT | REMARKS |
| | | | ĸw | MBH | ĸw | MBH | ċ | ۰F | ·c | ۴ | L/S | us gpm | FLOID | VOLTAGE | MCA | KG LBS | | |
| B-1 | BOILER ROOM | PK STORM ST-3500 | 1,024.8 | 3500 | 994.1 | 3395.0 | 82.2 | 180 | 71.1 | 160 | 21.4 | 339.5 | WATER | 208/3/60 | 20.0 | 1257.4 | 2772.0 | NOTES 1, 2, + 3 |
| B-2 | BOILER ROOM | PK STORM ST-3500 | 1,024.8 | 3500 | 994.1 | 3395.0 | 82.2 | 180 | 71.1 | 160 | 21.4 | 339.5 | WATER | 208/3/60 | 20.0 | 1257.4 | 2772.0 | NOTES 1, 2, + 3 |
| B-3 | BOILER ROOM | PK STORM ST-3500 | 1,024.8 | 3500 | 994.1 | 3395.0 | 82.2 | 180 | 71.1 | 160 | 21.4 | 339.5 | WATER | 208/3/60 | 20.0 | 1257.4 | 2772.0 | NOTES 1, 2, + 3 |
| REFER T | BLE ALTERNATES, SUBJE O Plans, Elevations, I E with fused disconn R, and barometric dam | DETAILS, AND CONTRO ECT, CIRCULATING P | DLS. | | | | | e relie | f valve | , LOW V | VATER CUT | Toff, flo | w switch | , temperatu | jre sei | NSORS, MO | DULATING | BURNER, VARIABLE SPEED PUMP CONTROL, ACID |

| 1. ACCEPTABLE ALTERNATES, SUBJECT TO SHOP DRAWING REVIEW ARE LOCHINVAR AND VEISSMANN. 2. REFER TO PLANS, ELEVATIONS, DETAILS, AND CONTROLS. |
|--|
| 3. COMPLETE WITH FUSED DISCONNECT, CIRCULATING PUMP INTERLOCK(S), TEMPERATURE & PRESSURE RELIEF VALVE, LOW WATER CUTOFF, FLOW SWITCH, TEMPERATURE SENSORS, MODULATING BURNER, VARIABLE SPEED PUMP ON NEUTRALIZER, AND BAROMETRIC DAMPER. |
| |

| | PUMPS | | | | | | | | | | | | | | |
|----------------|---------------|-------------|--|---------------|------|-------|------|------|-------------|----------------|----------|--------|------|-----------------|--|
| TAG | SERVICE | LOCATION | BELL & GOSSETT MODEL | FLUID | FL | FLOW | | HEAD | | RPM OP DUTY | ELECTRIC | CAL DA | TA | REMARKS | |
| | | | MODEL | | L/S | USGPM | М | ft. | DUTY PT. | PT. | VOLTAGE | ĸw | HP | | |
| P-01 | DHWR | BOILER ROOM | E-90-1.5AB 6.750"Ø IMPELLER | POTABLE WATER | 1.5 | 24.0 | 12.2 | 40.0 | 48.7 | 1536 | 208/3/60 | 1.12 | 1.50 | NOTES 1, 2, + 3 | |
| BP-01 | B01 | BOILER ROOM | E15103AD 6.375 ° Ø IMPELLER | WATER | 21.4 | 339.5 | 5.9 | 19.6 | - | - | 208/3/60 | 2.24 | 3.00 | NOTES 1, 2, + 3 | |
| BP-02 | B02 | BOILER ROOM | E15103AD 6.375 ° Ø IMPELLER | WATER | 21.4 | 339.5 | 5.9 | 19.6 | - | - | 208/3/60 | 2.24 | 3.00 | NOTES 1, 2, + 3 | |
| BP-03 | B03 | BOILER ROOM | E-1510-3AD 6.375 ° Ø IMPELLER | WATER | 21.4 | 339.5 | 5.9 | 19.6 | - | - | 208/3/60 | 2.24 | 3.00 | NOTES 1, 2, + 3 | |
| CP01A CP01B | EAST BUILDING | BOILER ROOM | E-1510-4BD 7.625 * Ø IMPELLER | WATER | 28.4 | 450.0 | 9.1 | 30.0 | 82.2 | 1469 | 208/3/60 | 5.60 | 7.50 | NOTES 1, 2, + 3 | |
| CP02A CP02B | GYMNASIUM | BOILER ROOM | E-1510-2AD-ES 5.750 ° Ø IMPELLER | WATER | 4.8 | 76.0 | 9.1 | 30.0 | 70.1 | 1742 | 208/3/60 | 0.75 | 1.00 | NOTES 1, 2, + 3 | |
| CP03A CP03B | OFFICE | BOILER ROOM | E-1510-2AD-ES 6.375 ° Ø IMPELLER | WATER | 7.6 | 120.0 | 9.1 | 30.0 | 78.6 | 1659 | 208/3/60 | 1.12 | 1.50 | NOTES 1, 2, + 3 | |
| CP04A CP04B | WEST BUILDING | BOILER ROOM | E-1510-3AD 6.375 ° Ø IMPELLER | WATER | 15.1 | 240.0 | 9.1 | 30.0 | 80.3 | 1643 | 208/3/60 | 2.24 | 3.00 | NOTES 1, 2, + 3 | |
| CP05A CP05B | FANS | BOILER ROOM | E-1510-3AD 7.000 " Ø IMPELLER | WATER | 25.2 | 400.0 | 9.1 | 30.0 | 82.9 | 1663 | 208/3/60 | 3.73 | 5.00 | NOTES 1, 2, + 3 | |

NOTES: 1. SCHEDULE IS BASED ON BELL & GOSSETT. ACCEPTABLE ALTERNATES SUBJECT TO SHOP DRAWING REVIEW: S. A. ARMSTRONG, TACO, AND WILO. 2. REFER TO PLANS, ELEVATIONS, DETAILS, AND CONTROLS. 3. COMPLETE WITH VARIABLE SPEED DRIVE, AND VIBRATION ISOLATION.

| | DOMESTIC WATER HEATER SCHEDULE | | | | | | | | | | | | | | | | | | |
|-------|--------------------------------|------------------|------|-------|------|-------|------|-------|--------|-------|-----|-------|---------------|------------|-----|-------|--------|-----------------|--|
| TAG | LOCATION | A.O. SMITH | INF | PUT | OUT | PUT | RI | SE | RECO | VERY | FL | OW | | ELECTRICAL | | WEI | GHT | REMARKS | |
| | | MODEL | K₩ | мвн | KW | MBH | •C∆T | ⁺F∆T | LPH | GPH | LPS | GPM | FLUID | VOLTAGE | MCA | КG | LBS. | 1 | |
| GWH01 | BOILER ROOM | CYCLONE BTH-150A | 43.9 | 150.0 | 43.0 | 147.0 | 55.6 | 100.0 | 1256.8 | 445.0 | 379 | 100.0 | POTABLE WATER | 120/1/60 | 5.0 | 613.7 | 1353.0 | NOTES 1, 2, + 3 | |
| GWH02 | BOILER ROOM | CYCLONE BTH-150A | 43.9 | 150.0 | 43.0 | 147.0 | 56.6 | 100.0 | 1256.8 | 445.0 | 379 | 100.0 | POTABLE WATER | 120/1/60 | 5.0 | 613.7 | 1353.0 | NOTES 1, 2, + 3 | |
| NOTES | | | | | | | | | | | | | | | | | | | |

NOTES: 1. ACCEPTABLE ALTERNATES, SUBJECT TO SHOP DRAWING REVIEW, RHEEM. 2. REFER TO PLANS, ELEVATIONS, DETAILS, AND CONTROLS. 3. COMPLETE WITH FUSED DISCONNECT, TEMPERATURE & PRESSURE RELIEF VALVE, MODULATING BURNER, ACID NEUTRALIZER, BACKDRAFT DAMPER, AND CONTROLS.

| | LOUVRE/PENTHOUSE SCHEDULE | | | | | | | | | | | | | | | |
|--------|---------------------------|------|------|------|------|--------|----------|-----------|---------|--------|-----------|--------|--------|-----------|---------|-------------|
| | | | AIRF | LOW | | | LOUVRE D | IMENSIONS | | | | | | | | |
| TAG | | | | | | LENGTH | X WIDTH | LENGTH | X WIDTH | LENGTH | X WIDTH X | HEIGHT | LENGTH | X WIDTH X | REMARKS | |
| | | | LFJ | CFM | | ММ | ММ | INS | INS | ММ | ММ | ММ | INS | INS | INS | |
| L-1 | COMB./VENT. AIR | 2625 | 708 | 1500 | 50.8 | 762 | 762 | 30 | 30 | - | - | - | - | - | - | NOTES 1 + 2 |
| NOTES: | | | | | | | | | | | | | | | | |

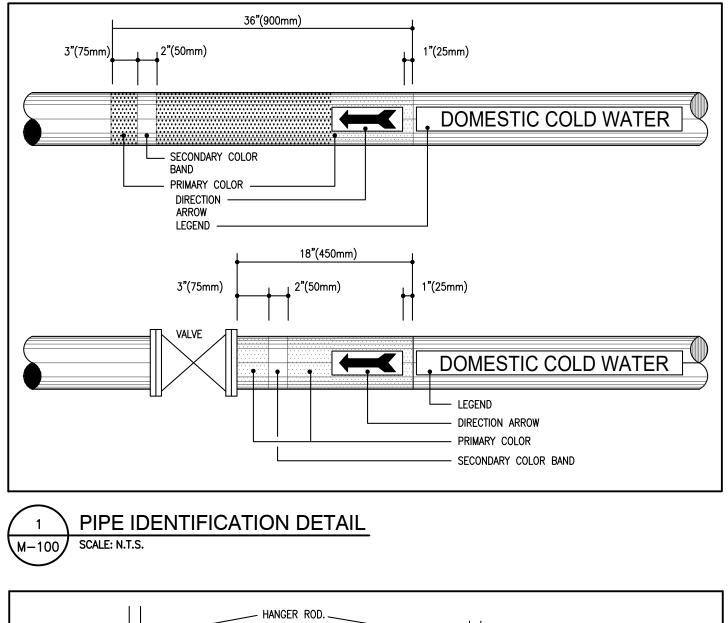
1. ACCEPTABLE ALTERNATES SUBJECT TO SHOP DRAWING REVIEW: VENTEX, E.H. PRICE, AND GREENHECK. 2. COMPLETE WITH INSECT SCREEN, BURGLAR BARS, AND STANDARD FINISH. COLOUR TO BE SELECTED AT SHOP DRAWING REVIEW.

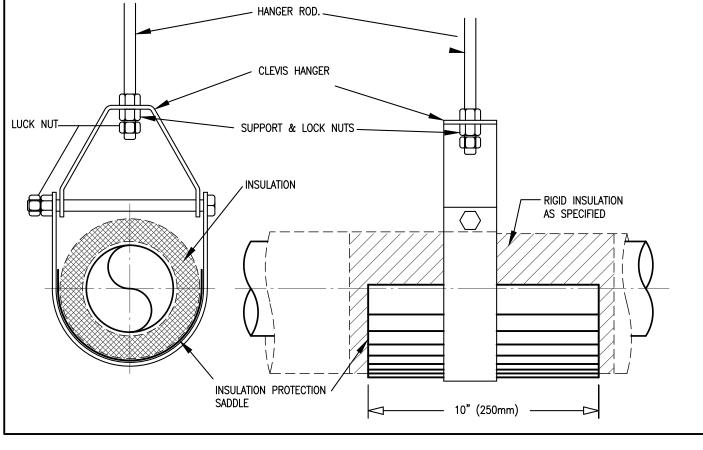
| | | | | PRE | ESSU | IRE | REDI | JCIN | G VA | ALVE | SCH | HEDU | JLE | | |
|--------|---------------|--------------------|---------|----------|---------|---------|------|--------------|------|--------------|--------|--------|----------|--------|-------------|
| TAG | SERVICE | FISCHER MODEL | INLET P | ipe size | INLET P | RESSURE | | t pipe Ze | | ilet Sure | ORIFIC | e size | CAPACITY | DEMAND | REMARKS |
| | | MUDEL | мм | INS | kPa | PSI | мм | INS | kPa | PSI | ММ | INS | СҒН | CFH | |
| PRV-1 | GWH01 + GWH02 | CS80 - 1.25IN BODY | 25 | 1 | 13.79 | 2 | 32 | 1.25 | 3.48 | 0.505 | 6 | 0.25 | 684.0 | 300 | NOTES 1 + 2 |
| PRV-2 | B01 | CS80 - 2IN BODY | 51 | 2 | 13.79 | 2 | 76 | 3 | 3.48 | 0.505 | 35 | 1.375 | 3800.0 | 3500 | NOTES 1 + 2 |
| PRV-3 | B02 | CS80 - 2IN BODY | 51 | 2 | 13.79 | 2 | 76 | 3 | 3.48 | 0.505 | 35 | 1.375 | 3800.0 | 3500 | NOTES 1 + 2 |
| PRV-4 | B03 | CS80 - 2IN BODY | 51 | 2 | 13.79 | 2 | 76 | 3 | 3.48 | 0.505 | 35 | 1.375 | 3800.0 | 3500 | NOTES 1 + 2 |
| NOTES: | | | | | | | | | | | | | | | |

<u>NUILS:</u> 1. ALTERNATES ARE SUBJECT TO SHOP DRAWING REVIEW. 2. REFER TO PLANS, ELEVATIONS, DETAILS, AND CONTROLS.

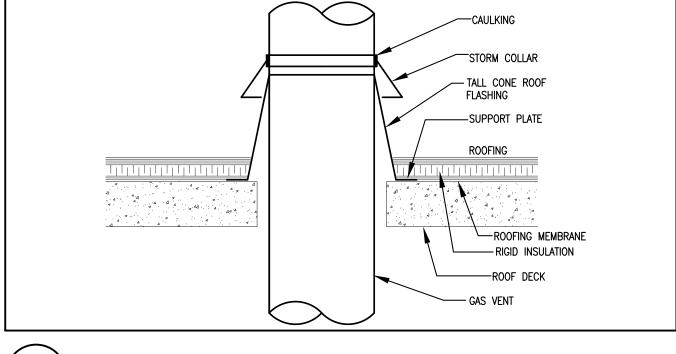
| TAG | LOCATION | BELL & GOSSETT MODEL | SERVICE | CONNE | CTIONS | VOL | UME | ACCEP VOL | | SHIPPING | WEIGHT | TYPE | REMARKS |
|------|----------------------|-------------------------|------------------|-------|--------|-------|-----|--------------|------|----------|--------|-------------------|--------------|
| | | | | ММ | INS | L | GAL | L | GAL | KG | LBS | | |
| ET-1 | BOILER ROOM [006] | D180 | BUILDING HEATING | 40 | 1.50 | 340.7 | 90 | 276.3 | 73 | 128 | 283 | ASME DIAPHRAGM | NOTES 1, & 2 |
| ET-2 | BOILER ROOM [006] | PTA-180V | POTABLE WATER | 40 | 1.50 | 234.7 | 62 | 129.1 | 34.1 | 40.5 | 89 | DIAPHRAGM | NOTES 1, & 2 |







² PIPE HANGER DETAIL M-100 SCALE: NTS



GAS VENT THROUGH ROOF M-100 SCALE: N.T.S.

- GENERAL NOTES: 1. PERFORM ALL WORK IN ACCORDANCE WITH THE LATEST EDITION OF ALL APPLICABLE CODES, STANDARDS AND BULLETINS, AND TO THE LOCAL AUTHORITIES' REQUIREMENTS.
- 2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND CHECK THE EXISTING CONSTRUCTION PRIOR TO AND DURING CONSTRUCTION. ANY CHANGES AND/OR DISCREPANCIES SHALL BE REPORTED AND REVIEWED BY THE ENGINEER AND/OR PROJECT MANAGER PRIOR TO PROCEEDING.
- 3. INFORMATION REPRESENTED ON THESE DRAWINGS HAS BEEN TAKEN IN GOOD FAITH FROM THE DRAWINGS LISTED BELOW AND RANDOM VISUAL FIELD REVIEW. ARC ENGINEERING AND ITS REPRESENTATIVES ARE NOT RESPONSIBLE FOR ANY DISCREPANCIES AND/OR ERRORS.
- a. PRACK & PRACK, DATED DECEMBER 1953. b. QUIST, ARMITAGE & ASSOCIATES, DATED FEBRUARY 1969. c. WALTER, EUL, & ELLIOT LTD., DATED APRIL 1972. d. P.T. ENGINEERING, DATED MARCH 1993. e. P.T. ENGINEERING, DATED MARCH 1994.
- f. P.T. ENGINEERING, DATED FEBRUARY 1996. 4. THE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND THE DOCUMENTS PERTAINING TO THE WORK OF OTHER TRADES.
- 5. OBTAIN EXACT DIMENSION FROM SITE MEASUREMENTS. DO NOT SCALE THESE DRAWINGS. 6. PENETRATIONS OF EITHER THE FIRE OR SMOKE BARRIERS SHALL
- BE SLEEVED/SEALED AGAINST THE PASSAGE OF FLAME AND/OR SMOKE WITH A SUITABLE NON-COMBUSTIBLE MATERIAL EQUAL TO THE CONSTRUCTION PENETRATED.
- 7. CHECK AND VERIFY THE LOCATIONS OF ALL PIPES, DUCTWORK AND EQUIPMENT WITH THE WORK OF OTHER TRADES TO PREVENT INTERFERENCE. REMOVAL AND RELOCATION OF ANY SUCH WORK INTERFERING WITH THE WORK OF OTHER TRADES IS THE RESPONSIBILITY OF THE MECHANICAL TRADES, UNLESS OTHERWISE APPROVED IN WRITING. 8. PROVIDE ACCESS DOORS AS REQUIRED FOR ALL CONCEALED
- SERVICEABLE COMPONENTS, LOCATED ABOVE, BEHIND OR BELOW INACCESSIBLE CONSTRUCTION. 9. EXISTING EQUIPMENT AND ASSOCIATED COMPONENTS SHALL BE
- REMOVED AND DISPOSED IN AN APPROPRIATE MANNER. 10. ALL SYSTEMS ARE SHOWN IN DIAGRAMMATIC FORM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE NEW SYSTEMS ARE CONFIGURED/INSTALLED WITHIN THE EXISTING AVAILABLE SPACE. MODIFY THE NEW SYSTEMS CONFIGURATION AS REQUIRED TO SUIT. 11. REFER TO THE 'REQUEST FOR TENDER' DOCUMENTS REGARDING ALTERNATES AND/OR SUBSTITUTIONS. THE RFT DOCUMENTS WILL
- SUPERCEDE THE REQUIREMENTS NOTED ON THESE DRAWINGS UNLESS NOTED OTHERWISE.

| | DRAWING LIST | | | | | | | |
|--------|--|--|--|--|--|--|--|--|
| DWG NO | DRAWING TITLE | | | | | | | |
| M-100 | LEGENDS, SCHEDULES AND DETAILS | | | | | | | |
| M-101 | SPECIFICATIONS | | | | | | | |
| M-102 | CONTROLS SPECIFICATIONS | | | | | | | |
| M-103 | CONTROLS | | | | | | | |
| M-300 | BOILER ROOM - HVAC AND PLUMBING DEMOLITION | | | | | | | |
| M-310 | BOILER ROOM - HVAC AND PLUMBING NEW CONSTRUCTION | | | | | | | |
| M-311 | FIRST FLOOR - MECHANICAL NEW CONSTRUCTION | | | | | | | |
| M-312 | SECOND FLOOR - MECHANICAL NEW CONSTRUCTION | | | | | | | |

| IMPERIAL TO METRIC SIZING CONVERSION | | | | | | |
|---|------|--------|-------|--|--|--|
| 1/8" | 3mm | 1 1/2" | 40mm | | | |
| 1/4" | 8mm | 2" | 50mm | | | |
| 3/8" | 10mm | 2 1/2" | 65mm | | | |
| 1/2" | 15mm | 3" | 80mm | | | |
| 3/4" | 20mm | 4" | 100mm | | | |
| 1" | 25mm | 6" | 150mm | | | |
| 1 1/4" | 32mm | 8" | 200mm | | | |

| 5 | RE-ISSUED FOR PE TENDER RE-ISSUED FOR PE | | MAR 20, 2025 MAR 14, | S.H. S.H. |
|---------------------------|--|--------------------|---|--------------|
| 3 | TENDER RE-ISSUED FOR PE TENDER | | 2025 MAR 04, 2025 | S.H. |
| 2 | RE-ISSUED FOR PE TENDER ISSUED FOR PERM | | FEB 18, 2025 JAN 31, | S.H. |
| 1 No. | TENDER DESCRIPTION | | 2025 DATE | S.H. BY |
| | | SIONS | | |
| - Survey | | A.F. 383 24- | REBEK 851508 127-110 Mar-25 OF ONTA | INEER |
| 50 | Stoney Cree T ● (905 F ● (905 www.arce contact@arc | | Inc | |
| PROJE | HILL PARK CENTRI ND PLUMBIN 465 EAST 1 | E - HVAC | ADES | |
| START 2024 09 DRAWI | | I BY: DE S.I | SIGNED I H. | BY: |
| | LEGENDS, | SCHEDUI ETAILS | LES | |
| SCALE NTS | : | DRAWING No. | : | |
| PROJE | ст: 27-110 | M- | 100 | |
| :m | | | | C |
| | | | | |

| | GENERAL |
|----------|---|
| | The scope of work is to demolish and replace the HVAC boiler system and domestic hot water system in the boiler room of Hill Park Learning Centre. Perform all mechanical work detailed on these drawings to provide a complete and fully functional operating system to the satisfaction of the |
| | where there is discrepancy between specified, or scheduled equipment, and information indicated |
| | elsewhere on the drawings, the most stringent shall apply. Where there is apparent discrepancy of any kind, between any drawings, equipment tables, schedules, |
| | specifications, or other bid documents, submit questions via the bidding platform, for direction and clarification during the tender period. Consideration will not be granted for misunderstanding the intent of the contractual documents, the |
| | extent of work to be performed, or the intent required to provide complete and fully operational and controlled systems upon completion installation. Specified work described or indicated on drawings does not delegate function to any specified |
| | subcontractor or identify absolute contractual limits between mechanical or subcontractors. Arrange for milestone inspections. Contact ARC Engineering Tel: (905) 643–8530 E-mail: contact@arcengineering.ca. |
| | As a minimum, base building standards shall form the basis for this construction. Comply with Landlord's requirements for system shutdown and connection. |
| | Coordinate all work with base building work. Refer to base building drawings and specifications. Codes and bylaws shall be strictly adhered to. Obtain necessary permits, approvals and inspections |
| | from the authorities having jurisdiction. Permits and fees required by the authorities having jurisdiction shall be obtained and paid for by |
| | this contractor. Include all applicable taxes. It is the Contractor's responsibility to verify and check the existing construction prior to and during construction. Contractor shall conduct ongoing reviews during demolition and construction and immediately notify the consultants of any deviations from drawing dimensions/details/schematics. |
| | Failure to do so shall not relieve contractor of full contract responsibility. Cutting, patching and core drilling required by this trade shall be paid for by this contractor. Provide details of new opening through structural components for engineer's approval. Incur all costs related for structural approval. |
| | Fire stop shall be ULC listed for the required separation and provided at all pipe and duct penetrations through rated assemblies. |
| | Premium time costs shall be included for work outside of normal working hours. Comply with construction schedule prepared by Management. Flashing and counter flashing for exterior penetrations or water-proofed floors shall be provided |
| • | under this contract. Shop drawings shall be complete with contractors reviewed stamp. Submit four (4) copies and/or |
| | one (1) electronic copy of all shop drawings. Allow one (1) week for consultant's review. Base bid equipment and suppliers in Base Building Mechanical Specifications shall apply to this contract. |
| .1. | If the Contractor chooses to submit alternates: Contractor to submit alternates in addition to base bid products, and show savings by utilizing alternates. Where modifications to the work of Other Trades are required as a result or part of the |
| .2. | alternative offered, include the cost of said modifications in the alternative price offered. Contractor responsible for ensuring alternate equipment meets physical requirements of existing site |
| 3. | conditions to remain and proposed design with respect to but not limited to: size, weight, service access clearances, duct connection arrangement, & air intake clearances. Contractor responsible for ensuring alternate equipment meets functions and performance |
| J. | specifications specified in schedule and/or shown on Drawings. Equipment substitutions after award of contract will not be considered without written explanation and consultant's written authorization. The quality and performance characteristics of substituted product shall be equivalent to the specified product. All substitute products shall be approved by consultants. Any additional costs incurred by all trades for substituted equipment installation must be incurred by |
| | this contract. Control wiring and devices shall be provided under this contract. |
| • | Electrical devices shall be provided for all Division 15 equipment, including load side wiring, starters, disconnect, etc. Verify and coordinate voltage, phase, and short circuit interrupting capacity with the electrical contractor prior to ordering equipment. Provide conduit and wiring materials and methods in strict accordance with Division 16 requirements. |
| | Access doors shall be provided for all inaccessible mechanical equipment and services requiring inspection or service. Finish shall suit architect/designers requirements. Access doors shall be recessed as required to suit wall finish (e.g., tile). |
| | recessed as required to suit wall finish (e.g., tile). Architect/Designer/Owner approval of air terminal, thermostat, and access door locations must be obtained prior to installation. |
| | One (1) year written warranty shall be provided for the complete mechanical installation from date of acceptance. |
| | As-built drawings shall be submitted in PDF format and AutoCAD format. Record accurately installed work. |
| | Operating and maintenance manuals containing approved shop drawings, air and water balancing reports, equipment data sheets, written warranty, operating instructions and maintenance procedures shall be submitted to consultant for review electronically. Manuals shall be separated with dividers in appropriate sections. Make all corrections requested by consultant and resubmit for review. |
| | Provide one (1) electronic copy of the operating and maintenance manuals referenced in section 1.27 to the building owner in PDF format. Change Notice Quotations shall be submitted complete with cost breakdown of labour and materials. |
| | Failure to provide will result in rejection. All Mechanical Change Notices shall be priced in accordance with "MECHANICAL CONTRACTORS ASSOCIATION" (MCA) labour units strictly for labour. |
| | DEMOLITION Provide labour, materials, products, equipment and services required to complete the demolition work specified herein. |
| | Dispose, off site, of all debris in accordance with the jurisdictional authorities. Removal and storage of salvageable items as directed by this specification section and the Owner of |
| | their representative. Mechanical demolition work associated with this building is indicated on the demolition drawings and |
| | generally consists of the following: — Plumbing and Drainage — HVAC systems and equipment |
| | HVAC systems and equipment Hydronic systems and equipment Building Control Systems |
| | Disposed materials which have not been designated for salvage from the demolition shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris or selling of materials on the site will not be permitted. |
| | Present to the Owner exisiting equipment removed but not identified for salvage on site. Acceptance of removed equipment is at the discretion of the Owner. Remove such items from site when deemed unsuitable. |
| | Conform to requirements of municipality's Works Department regarding disposal of waste materials. Materials prohibited from municipality waste management facilities shall be removed from site and disposed to recycling companies specializing in recyclable materials. |
| | Contractor shall be responsible for all fees required for the disposal of demolished materials, equipment, etc. |
| | Store materials only in areas designated by the Owner and as permitted by the local jurisdictional authorities. |
| | <u>HVAC PIPING SYSTEMS</u> Piping material for hydronic hot water heating and chilled water systems to 2068 kPa [300 psig] operating pressure use ASTM A-53 or A-106 schedule 40 black carbon steel, seamless or ERW with |
| | the following fittings: For small bore, 50 mm [2 in.] and under to [1034 kPa]150 psi use 1034 kPa [150 psi] screwed |
| | black malleable iron or 125# cast iron fittings. For large bore 65 mm [2-1/2 in.] and over to 1034 kPa [150 psi] use schedule 40 black carbon steel welded fittings |
| | steel welded fittings. Use of copper piping for small branches and run—outs is acceptable for 20mm [3/4 in.] and below, with type L pipe, wrought copper fittings, and soldered joints for pressures up to 100 psig and silver soldering for higher pressures. |
| | Valves: (part numbers listed): To 1379 kPa [200 psi] working pressure, up to 50mm [2 in.] — soldered or threaded |
| 1. | Gate Valves — 125S/200 W.O.G. rated, bronze body to ASTM—B62, solid wedge disc, bronze trim, rising stem. (Soldered — Kitz 44, Threaded — Kitz 24) |
| 2. | Globe Valves — 125S/200 W.O.G. rated, bronze body to ASTM—B62, bronze trime, rising stem. (Soldered — Kitz 12, Threaded — Kitz 11) |
| 3. 4. | Ball Valves – 150/600 W.O.G. rated, two piece full port brass body (C37700), solid chrome plated brass ball, PTFE seats, double o-ring stem seals, lever operated. (Soldered – Kitz 59, Threaded – Kitz 58) Check Valves – 125S/200 W.O.G. rated, bronze body to ASTM B62, bronze trim, Y pattern. |
| т. | (Soldered - Kitz 23, Threaded - Kitz 22) To 1379 kPa [200 psi], 65mm [2-1/2 in.] and larger - flanged |
| 1. | Gate Valves — 125S/200 W.O.G. rated, cast iron body to ASTM A126 class B, bronze trim, OS&Y (Kitz 72) |
| 2. | Globe Valves — 125S/200 W.O.G. rated, cast iron body to ASTM A126 class B, bronze trim, OS&Y (Kitz 76) |
| 3. 4. | Ball Valves – 125S/200 W.O.G. rated, two piece full port, cast iron ASTM 126 class B body, epoxy coated to NSF 61, teflon fused ball, RPTFE seats, seals, and packing, lever or gear operated. Butterfly Valves – 200 psi rated, ductile iron body, aluminum bronze disc, stainless steel stem, |
| 4. 5. | Butternly Valves – 200 psi rated, ductile iron body, aluminum bronze disc, stainless steel stem, moulded or cartridge style seats (EPDM). Valve to be rated for full dead end service with the downstream flanged removed. Lever operated to 6", gear operated 8" and over, LUG pattern. (Lever operated – Kitz 6122EL, Gear operated – Kitz 6122EG) Check Valves – 125S/200 W.O.G. rated, cast iron body to ASTM A126, bronze trim, bolted bonnet. |
| | (Flanged - Kitz 78) Butterfly valves are to be molded or cartridge style only. |
| | Ball valves are to be solid ball style only. Provide ball or butterfly valves for all shut-off requirements. Gate valves will not be approved. |
| | Provide 20 mm [3/4" in.] hose end drain valves with cap and chain at all system low points. Provide di-electric couplings for connection of dissimilar piping materials. |
| | Provide al-electric couplings for connection of alsofiniar piping materials. Provide circuit balancing valves as required to balance water flow. Circuit balancing valves shall be Armstrong Model CBVI – Y pattern style, all metal, with soldered or screwed connections, built-in drain connection with shut off valve and protective caps and integral valve insulation. Provide for each valve: |
| | Vernier type handwheel settings for precision flow balancing. Positive shut off valve with no drip seat and plug type stem with Teflon disc. |
| | Tamper proof hidden memory. Select circuit balancing valve size to give a pressure drop at 100% open between 3.0 kPa [1 ft.] |
| | and 21 kPa [7 ft.]. Select valves location remote from the pumps in the circuit near minimum pressure drop and those located near the pumps at higher pressure drops. Provide safety and relief valves for all closed water systems. Pipe relief to nearest floor drain. |
| | Provide Watts 174A valves rated at 1035 kPa [150 psig] at 99°C [210°F] ASTM rated, cast iron body bronze disc and seat, steel spindle assembly, carbon steel spring. |
| | Provide strainers upstream of each pump and where indicated on drawings. Strainers shall be bronze body type with screwed connections, stainless steel screens with 1.6 mm [1/16 in.<-] perforations and capable of system pressure of 860 kPa [125 PSI]. |
| | Automatic de constante processe en constante de la 1714 abail de analidad at all bieb acieta af |

the flushing process. After flushing process, clean all strainers and check all low points to ensure removal of all loose dirt. Chemically clean all piping systems utilizing low foaming chemical detergents which shall not adversely affect system components. After flushing and cleaning, pressure

- Provide ULC classified firestopping products by 3M or Hilti which have been tested in accordance with CAN4-S115, install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration. Ensure that fire ratings of floors and walls are maintained, fill spaces between openings and pipes passing through fire separations.
- CHEMICAL TREATMENT
- Cleaning and water treatment services are to be performed by Aquarian Chemicals Inc., in accordance with owner's standard and as specified herein. After completion of flush cleaning and pressure testing, chemically clean all piping systems utilizing
- low foaming chemical detergents which shall not adversely affect system components. Provide each closed system with a 7.6 Litre [2 US Gal.] capacity by-pass chemical feeder. Pipe across pumping system and locate not more than (1m) [3 ft.] above floor. Pipe to floor drain, using 20mm [3/4"] pipe c/w ball valves. Provide feeders with pressure rating suitable for the
- system working pressure To compensate for initial losses of chemicals and water during startup of system, provide twice as much corrosion inhibitor and biocide as are necessary to treat systems
- Maintain chemical levels from the time the system is filled after cleaning, up to Substantial Performance of the Contract. The water treatment specialist shall supply all necessary supervision during installation and shall
- check the systems during construction. Provide a service program from a specialist with the water treatment supplier/contractor for a period of one year from Substantial Completion. Include initial water analysis and recommendations,
- service startup training of operating personnel and laboratory and technical assistance. Provide service visits as required to stabilize and commission the systems and a minimum of one visit per month by the Water Treatment Specialist for the year following Substantial Completion to ensure that a proper treatment program is maintained. Perform corrosion tests to verify
- performance requirements are being achieved. Document recommendations and submit a written report to the Owner's representative after each visit.
- <u>GAS PIPING SYSTEMS</u> Provide all labour, materials, products, equipment and services to supply and install the natural gas
- piping system indicated on the Drawings and specified in this Section of the Specifications. Install natural gas system only with fitters certified to Natural Gas and Propane Installation Code
- requirements. If necessary, arrange and pay for a gas service to the building, including regulating station gas
- meter, and associated accessories. Provide all equipment and materials required for the building natural gas distribution systems in accordance with the requirements of the current version of Natural Gas and Propane Installation
- Provide complete natural gas system, to CSA and CGA requirements
- Steel gas piping:
- Piping: ASTM A-53 schedule 40 seamless
- Joining Material: screwed fittings with pulvarised lead paste for {12mm} [1/2"] to {50mm} [2"]; welded to CSA W47.1 for {65mm} [2-1/2"] and over
- 3.1. Malleable iron: screwed to ANSI B16.3, Class 150 for service pressures up to and including 861
- 6.3.2. Unions: malleable iron, brass to iron, ground seat, to ASTM A47M.
- 3.3. Nipples: schedule 40, to ASTM A53.
- Flange gaskets shall me non-metallic flat type;
- Manual shut-off valves shall be Full port, forged brass ball valve for two piece body construction complete with the following blowout-proof stem, adjustable packing gland, chrome-plated ball, class 150 WSP, 600 WOG, CGA 3.16 approved. Provide complete with CRN, lever handle and ANSI B1.20.1 NPT end connections.
- Provide pressure reducing, regulating and relief valving required for compatibility between equipment and building natural gas distribution system. Provide gas pressure reducing station(s) where noted on Drawings and where required to reduce
- building Distribution system pressures to appliance operating pressure ranges. Pressure regulators shall be spring-loaded self-operated design and shall be tight closing with replaceable orifices and discs and concealed accessible manual adjustment. Valve bodies shall be cast iron rated for {1034 kPa} [150 psig] gas pressure and all valve materials shall be epoxy
- painted to resist corrosive ambient conditions. Provide gas pressure relief stations downstream of all pressure reducing stations where required. Provide relief valves of spring-loaded design with throttling characteristics to reduce system pressure
- surges. Valve bodies shall be cast iron rated for {1034 kPa} [150 psig] gas pressure with replaceable orifices and discs and concealed accessible manual adjustment. All valve materials shall be epoxy painted to resist corrosive ambient conditions.
- Install natural gas service to meet Natural Gas and Propane Installation Code and all authorities having jurisdiction. Provide 25mmø [1"ø] opening at the top and bottom of any chase containing a gas pipe.
- Distribute gas within the building at {14 kPa} [2 psig]. pressure reducing valves to maintain downstream pressures within +5% range of setting.
- Submit sizing data for each valve with Shop Drawings. Select pressure relief valves for the maximum capacity of the pressure reducing station served plus
- not less than 25%. Submit sizing data for each valve with Shop Drawings. Pipe all relief vents individually to outdoors. Size piping for a maximum pressure drop of 10% of
- the pressure reducing valve setpoint gauge pressure with a 25% capacity safety factor. Provide upstream and downstream isolating valves and pressure gauges complete with gauge cocks at all pressure reducing stations. Connect relief valves so that they cannot be isolated from the
- appliances which they serve. Provide supports (roof supports Dura Block or pressure treated wood blocks complete with rigid
- insulation at bottom of block) at maximum spacing as follows: 20mm [3/4 in.] - 25mm [1 in.] : 2.4m [8 ft.]
- 30mm [1–1/4 in.] 65mm [2–1/2 in.] : 3m [10 ft.]
- Anchor gas piping supports as per OBC, CSA, and seismic requirements. Connect gas piping to all gas fired equipment.
- Paint gas service piping to meet code requirements.
- PLUMBING SYSTEM EXISTING SANITARY DRAIN locations and invert elevations shall be verified on site prior to
- commencement of work. PIPING MATERIALS:
- Domestic hot and cold water piping type "L" copper with copper fittings use 95/5 tin/antimony solder. Provide type "K" soft copper piping without joints below ground.
- Drainage and Vent Piping (60mm $[2-1/2^n]$ and smaller):
- .2.1. Sanitary piping, above ground DWV copper pipe with drainage fittings and 50/50 solder joints.
- 2.2.2. Sanitary piping, below ground Type L copper with 50/50 solder joints. 2.2.3. Vent piping, above ground — DWV copper pipe with drainage fittings, 50/50 solder joints. .2.2.4. Vent piping, below ground — Type L copper pipe with wrought copper fittings and 50/50 solder
- Drainage and Vent Piping (75mm [3"] and larger): .3.1. Sanitary piping, above ground - CSA class 4000 cast iron soil pipe and fittings, with mechanical
- 2.3.2. Sanitary piping, below ground CSA class 4000 cast iron soil pipe and fittings, with mechanical
- .2.3.3. Vent piping, above ground CSA class 4000 cast iron soil pipe and fittings, with mechanical
- .2.3.4. Vent piping, below ground CSA class 4000 cast iron soil pipe and fittings, with mechanical
- Butterfly valves are to be molded or cartridge style only.
- Ball valves are to be solid ball style only.
- Provide ball or butterfly valves for all shut-off requirements. Gate valves will not be approved. Provide all bronze ball type shut off valves on main and branch lines and isolating valves for each individual plumbing fixture served. Plumbing fixtures shall be new, of first quality, in perfect condition and installed in best workmanlike
- manner. Verify plumbing fixture quantities and locations with Architect's/Designer's drawings. Reuse of domestic water heater is not permitted.
- Hot water heaters shall be as indicated on drawings and in schedule. Provide di-electric couplings for connection of dissimilar piping materials.
- Trap seal primer must be provided on all new Floor Drains, Funnel Floor Drains and Hub Drains.
- Exposed piping and fittings within washrooms shall be chrome plated. Provide chrome plated escutcheons on all piping passing through finished surfaces and millwork. Stainless steel water hammer arrestors equal to Zurn Shoktrol shall be provided on all lines serving
- groups of fixtures, quick closing valves and flush valves. Provide ULC classified firestopping products by 3M or Hilti which have been tested in accordance with CAN4-S115, install firestopping systems in accordance with the appropriate ULC system number
- for the products and type of penetration. Ensure that fire ratings of floors and walls are maintained, fill spaces between openings and pipes passing through fire separations.
- INSULATION
- Provide all labour, materials, products, equipment and services to supply and install thermal insulation, vapour barriers and finishes for mechanical work as indicated on the drawings and specified in this section of these specifications. PIPING INSULATION:
- Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and
- insulating cements. Insulation materials must be manufactured at facilities certified and registered with an approved Registrar to conform o ISO 9000 quality standard.
- All insulation pertaining to Division 15 shall be carried out by one firm specializing in insulation work. Do not mix similar products of multiple manufacturers.
- Acceptable insulation manufacturers are Owens Corning Canada, Johns Manville, Manson Insulation Inc. Knauf Fiber Glass and Certainteed. Provide insulation and covers in strict accordance with authorities governing combustibility and
- fireproofing of materials and in accordance with manufacturer's recommendations. Provide non-combustible insulation, jackets and finishes having a Flame Spread/Smoke Developed
- rating of 25/50 or less.
- Provide insulation materials with a minimum thermal conductivity of 0.24BTU.in/(hr. sq.ft'F) at 100°F mean temperature. On hot piping applications, hold insulation in place with flare type staples (outward clinch).
- Apply pipe insulation over 1-1/2" thickness in two layers with joints staggered.
- 2.10. Insulate fittings with fabricated mitered or preformed sections of specified insulation. 1. Insulate over flanges and mechanical couplings with specified insulation and thickness, sized to suit
- flange diameters. Fill spaces between insulation and adjoining pipe insulation with similar material. 2. Insulate valves and inline components with flexible insulation density (3/4 lbs./cu.ft.) compressed not more than 50% of original thickness. Build up to specified thickness with approved asbestos free finishing cement.
- 2.13. Do not insulate terminal unit automatic control valves installed in hot piping.
- 2.14. Under all domestic cold water, provide an insert between support shield and piping for piping 1—1/2" or larger. 6.2.15. Provide the following pipe insulation type as indicated in the pipe insulation table below.
- 'Type P1' Owens Corning Fiberglas Pipe Insulation, Johns Manville Micro-Lok Pipe Insulation, Manson Alley-K Pipe Insulation or Knauf Earthwool 1000° Pipe Insulation with factory applied all purpose vapour barrier jacket where scheduled. 'Type P2' - Armacell AC Accoflex fiber-free piping insulation, painted with WB Finish where installed

- 3.14. Insulation shall be provided to match base building standards or refer to insulation section.
- 3.15. Flush clean all HVAC piping systems. Bypass and isolate any equipment that may be damaged during

- test all HVAC piping systems.

INSULATION VAPOUR DUTY TYPE THICKNESS BARRIER DOMESTIC COLD WATER 1/2" Less than 1" P-1 Yes Less than 8" P-1 1" Yes 8" and larger P-1 1-1/2" Yes DOMESTIC HOT WATER Less than 1-1/2" P-1 1" No P-1 1–1/2" and larger 1-1/2" No BUILDING HOT WATER Less than 1-1/2" 1-1/2" P-1 No 1–1/2" and larger P-1 2" No TESTING, ADJUSTING, AND BALANCING Balancing contractor shall be qualified by the following: 7.1. 7.1.1. Associated Air Balance Council (AABC) National Standards for Total System Balancing, NM-1 7.1.2. National Balancing Council (NBC) Certified Air Balancing Specifications and Certified Hydronic Balancing Specifications 7.1.3. National Environmental Balancing Bureau (NEBB) TABES Proceedural Standard for Testing, Adjusting, and Balancing Environmental Systems 7.1.4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) HVAC TAB HVAC Systems Testing, Adjusting and Balancing 7.1.5. National Building Comfort Testing Association (NBCTA) 7.2. Balancing contractor shall be one of: - Troup Engineering Services Inc. – Air Audit – Dynamic — T.M.A. Balancing Inc. 7.3. List selected balancing contractor on tender form. Balancing scope of work shall include water and

air side balancing of all equipment, ductwork and terminal devices provided as part of this contract, as well as base building equipment revised by this contract. 7.4. Balance as listed on mechanical drawings.

7.5. Balance to the following tolerances of design values: 7.5.1. Hydronic System: +/- 10%

7.5.2. Measured volumes to be accurate to with 2% of actual volumes.

7.6. Instruments 7.6.1. Prior to balancing, submit to owner representation a list of instruments to be used together with

matching serial numbers. 7.6.2. Calibrate instruments in accordance with requirements of most stringent of referenced standard for

applicable system. 7.6.3. Calibrate instruments with (3) months of balancing and provide certificate of calibration to owner's representative.

Submit balancing report in triplicate to the consultant and the owner, indicating terminal design and 7.7. measured flow rates.

<u>VALVE TAGS</u> Provide 40 mm dia., 1 mm thick lamacoid tags with 10mm high die-stamped black letters, except

for fire and sprinkler systems, provide red lamacoid tags with white letters in lieu of brass tags. Attach to valves with 100 mm long brass chains. 8.3. Tag all valves except for small valves isolating a single piece of equipment such as a unit heater, fan coil unit, terminal reheat coil and radiation section.

EQUIPMENT NAMEPLATES

9.1. Identify equipments, starters, and, remote control devices in a manner consistent with the Drawings. 9.2. Use solid black capitalized lettering 100 mm high.

9.3. Where equipment size does not permit stencil identification, use lamacoid labels, engraved white on black, mechanically fastened to the equipment. Minimum lettering size 10 mm.

30cm 20cm

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| 1. | BUILDING AUTOMATION SYSTEM | | second. The number of possible dynamic points per display shall be at least 30. It shall be possible to include at least 8 contemporary real—time trend curves in different colours |
|------------------------|--|------------------------------|---|
| 1.1. | Modify and expand the existing building automation system (BAS) as required to suit the boiler room retrofit upgrades. | 1.8.1.8. | (minimum sample interval no more than 10 seconds), in each colour graphic display. Alarm Handling — All alarms shall be able to be grouped into different priority levels. |
| 1.2. | Provide all labour, materials, tools, incidentals, equipment and services to supply, install, commission a complete BAS. | 1.8.1.8.1. | Alarms shall be able to be generated on at least the following different conditions: defined alarm limits are exceeded, change of state, messages from the system and time intervals |
| 1.3. 1.3.1. | GENERAL SYSTEM ARCHITECTURE Provide a complete BAS which uses a communication architecture consisting of at least two tiers. Each tier will utilize local area networks with totally open protocols based on industry leading | 1.8.1.8.2. | reached. The following features shall be provided: |
| 1.3.2. | standards. The first tier of the BAS network (level 1) will be based on Ethernet (ISO 8802-3/IEEE 802.3) | 1.8.1.8.2.1. 1.8.1.8.2.2. | Programming of individual time delays for every alarm. Disabling (Blocking) of any alarm to prevent nuisance alarms, e.g. due to faults or during repairs etc. Blocked alarms shall be displayed on command from the operator. |
| 1.0.2. | communications. This level 1 network shall provide communication to other third party control systems via the ANSI/ASHRAE BACnet standard 135–2016. Future connected systems will have | 1.8.1.8.2.3. | Programming of a time interval for which repeated alarms from the same point (object) are automatically blocked. |
| | compatibility specifications to provide communication with the first tier LAN. The operator workstations will also be supported on the high speed LAN level 1. Provide Wireless Ethernet 802.11 b/g/n as required to connect to local tablet computer. | 1.8.1.8.3. | For each alarm object, a unique alarm message shall be be presented in an alarm overview window on the screen. Alarms, where required, shall also result in the activation of a certain |
| 1.3.3. | The lower tiers of the BAS network will be based on using open control networks which provide the interconnection of Network Control Units (NCU) and the Local Control Units (LCUs) on a | | colour graphic. Alarms, where required, shall be transmitted to other connected units, such as paging devices, telefax machines, electronic mail, or other workstations. |
| | peer-to-peer open, ring bus, or star topology. Controllers can utilize each others data without assistance from the workstation. Plugging a portable terminal into any LCU allows access to any | 1.8.1.8.4. 1.8.1.8.5. | Limit monitoring alarms shall include the current limit value. In the event of communication problems on the lower level buses there shall be an alarm the |
| 1.3.4. | other LCU on the BAS. Each LCU shall utilize direct digital control (DDC) and be BACnet compliant. The network controllers and individual local controllers shall be selected so that each mechanical | 1.8.1.8.6. | includes identification of the affected units. Each alarm shall have time and date of occurrence, its own descriptor of up to 80 character (possibility for different descriptors for tripped and reset alarm), and a chain graphic or repor |
| | system operation is completely standalone. Each system operation, such as central chillers, air handling units, packaged cooling units or terminal devices such as VAV boxes and fan coil units, will | | For selected high priority alarms, such as fire or emergency alarms, the screen should automatically display a customized colour graphic showing e.g. where in the building(s) the |
| 1.3.5. | be controlled by a single standalone DDC controller. The system shall have capabilities to expand and control a 25% increase in points without any degrading of system performance. | 1.8.1.8.7. | alarm originates from. The alarm overview screen shall use different user selectable foreground and background colou |
| 1.3.6. | In no circumstance shall multiple application controllers be employed to control a single piece of equipment. | 1.8.1.8.8. | for the following: tripped and unacknowledged alarms, acknowledged but not reset alarms, reset and unacknowledged alarms, disabled alarms, and interlocked alarms. |
| 1.3.7. | Provide network interface modules or connections to third party controllers which are supplied as part of their equipment (e.g. chillers) to achieve the level of interface specified in the control | 1.0.1.0.0. | The BAS shall provide a buffer (queue) to enable up to 4000 alarms to queue up pending action. The alarm queue shall consist of alarms sorted automatically either by priority or chronologically, and separated into the first three groups listed above. It shall also be possible |
| | diagrams on the drawings. Provide interface software, coordinated with the third party protocols, to achieve the specified interface communication across the full BAS. | | to view selected parts of all alarms, e.g. only selected priority levels. The total number of alarms shall always be displayed at the top of the alarm overview. |
| 1.3.8. | The BAS shall effectively manage the facility and its activities to optimize the operation of HVAC systems to minimize energy consumption and extend equipment life during variations in occupancy, loads, schedules and weather conditions. | 1.8.1.8.9. | The alarm overview shall, if required, be presented as an icon. An incoming alarm — tripped and unacknowledged — shall always cause the icon to flash or to change colour. The alarm icon shall always appear foremost on the screen, no matter how many windows are open, so |
| 1.3.9. | The BAS shall operate on a management by exception concept, enabling automatic operation and requiring minimal manual intervention and supervision. | | will always be seen. The total number of alarms shall always appear in connection with the icon. |
| 1.3.10. | | 1.8.1.8.10. | Acknowledgement or blocking of alarms shall be performed directly in the alarm overview by simply pointing with the mouse arrow and clicking, by pressing a function key, or by touching the designated area on a touch screen. No alarm shall be deleted from the screen without a |
| 1.3.11. | on one module shall not affect the operation of other system components. Backup and fail safe criteria shall be inherent. Any failure shall not place the system in a hazardous | 1.8.1.8.11. | acknowledgement from an operator. Statistics shall be available for each alarm object, including time of most recent alarm and |
| 1.3.12. | condition. Output current and historical data on energy, building loads, equipment operation and control status. | 1.8.1.8.12. | number of alarms since statistics were reset. Total response time from an alarm condition occurring to registration at the BAS user interfac |
| 1.3.13. | Provide efficient interfaces between the operator and BAS. The interface shall be user friendly, so as to promote the training and turnover of the BAS to the building owner and operators. | | must not exceed 10 seconds. Time control — The system shall have functions for Time Scheduling, which are used to start a stop different eauipment. |
| 1.3.14. | Provide communications software and hardware to allow offsite monitoring and control of the system. With the correct password all system functions shall be available to the offsite operator. | 1.8.1.9.1. | For this purpose logical time variables are needed. Each time variable is controlled from one several timetables, where the on- and off-times shall be defined with an accuracy of 1 |
| 1.3.15. | Provide English language operator interface using readily understood English language abbreviations and mnemonics. | 1.8.1.9.2. | minute. An alternative timetable shall be able to be programmed for scheduling times different to the |
| 1.4. 1.4.1. | QUALITY ASSURANCE BAS work shall be performed by one firm specializing in the manufacture and installation of control | | normal schedule. It shall be possible to utilize so called wild cards for repeated timetables e.g. every year or monthly. Alternative timetables schedules shall override the normal time schedule |
| 1.4.2. | systems for building environmental control. Products referenced under this Section establish the minimum acceptable standards of product | 1.8.1.9.3. | The system shall have provisions for automatic scheduling of holidays. It shall be possible to define which days, day or part of a day are to be a holiday. Holidays shall override the norm weekly timetables. |
| 1.4.3. | quality, features and performance. The equipment and software provided by the supplier shall be the latest version currently in | 1.8.1.9.4. | Time Scheduling shall operate in accordance with a yearly calendar which contains automatic adjustment for leap year and daylight savings time. |
| 4.5 | manufacture. No custom products shall be allowed. All products shall be supported for a minimum of 5 years, including spare parts, board repairs and software revisions. | 1.8.1.9.5. 1.8.1.9.6. | The system time shall be expressed as a date and time format programmable by the operato The system shall include an automatic function for time synchronization, which ensures that a |
| 1.5. 1.5.1. | RELATED WORK Provide all control devices and instrumentation to meet the control and monitoring points and | | units in the system are running on identical time. Safety backup — It shall be possible to make back—up copies of the systems data at regu |
| 1.5.2. | sequence of operations as shown on the drawings. Provide all damper operators, damper end switches, relays, etc. showing in the control diagrams. | i 1.8.1.10.1. | intervals. It shall be possible to set the program to back up only data that has changed since the last |
| 1.5.3. 1.5.4. | Provide new wells for electronic immersion temperature sensors. Coordinate the work of this Section with that of other Sections and Divisions. Avoid interference of | 1.8.1.10.2. | backup (differential back—up). It shall be possible to back up all application data, or parts thereof. |
| 1.6. | this work with other work. SHOP DRAWINGS | | Trend Logging — Trend logging module shall be for the collection (logging) and storage of de (values) at defined intervals, for subsequent adaptation and presentation. |
| 1.6.1. | Submit all shop drawings for review before preceding with procurement or site specific software development and according to a schedule to be established with the consultant. | 1.8.1.11.1. | Both short (seconds and minute intervals) and long (day, week and month intervals) processes can be measured. Logged points can be numerical variables (floating point or integers) or |
| 1.6.2. | Submit Shop Drawings for all equipment to be provided, including but not limited to: software packages, specification data sheets of each hardware component or software module, schematic | | logical variables (e.g. Digital Inputs). Logged values shall be date- and time-stamped. It shall be possible to define the log interval as well as the reserved storage space. It shall also be possible to program for cyclical storage, i.e. oldest values are continuously overwritten with ne |
| | diagrams showing system configuration and interconnection of workstations and all field panels in accordance with the specified level 1 and level 2 networks, schematic diagrams for all building systems showing control devices, instrumentation, product interconnection, panel wiring, interlocking | 1.8.1.11.2. | ones when the storage space is full. Logging may take place after the definitions of which points to be logged, during what period |
| | and component tag identification as well as written sequence of operation (showing panel spare capacity), descriptive data of all operating, user and application software including complete | | and in which way. Start and stop of logging can be controlled by several different conditions, e.g. a time variable, a logical variable or it can be manually forced. A message is generated |
| | operators manuals, programmers manuals, and alphanumeric mnemonic point name convention sheet, and other drawings as appropriate. General advertising type literature is only acceptable as additional support information. | 1.8.1.11.3. | start and stop of logging. If contact with a logged point is lost for any reason during logging the trend log shall estima the logged value which shall be clearly marked. Estimated values shall be able to be edited o |
| 1.6.3. | Submit final as—built documentation including the above items and complete with troubleshooting procedures. | 1.8.1.11.4. | removed. The shortest log interval shall be no longer than 10 seconds. |
| 1.6.4. | Shop drawings and final documentation will be reviewed to ensure that such documents are in keeping with the intent of this specification and fully meet the requirements in terms of content and | 1.8.1.11.5. | It shall be possible to export logged data to spreadsheet format for display and manipulation to create ASCII files for export of data. |
| 1.6.5. | format. Make all required changes to this documentation at no additional cost. Delivery of the final approved documentation, in hardcover 3—ring binders with index page and index | | ONTROL UNIT GENERAL REQUIREMENTS All control units shall be capable of having data loaded from a workstation. Individual control un |
| 1.7. | tabs, is required before the Certificate of Substantial Completion will be issued. REFERENCE STANDARDS | s | shall perform all specified control functions without interaction to other field panels or workstatior All control units shall have the capability to communicate with a remote workstation and all |
| 1.7.1. 1.7.2. | Meet Division 26 Electrical requirements. Provide electrical material and installation in accordance with the appropriate requirements, and in | c | monitoring of every supported sensing point and control point data indicated on the drawir and/or input/output schedules. |
| | accordance with applicable sections of the current edition of the applicable local codes for electrical work and signalling systems. Install wiring in conduit or approved totally enclosed raceways. Do not use cable raceways or troughs. Approved ceiling plenum cable is acceptable where permitted by the | f | Failure of one or more control units shall not prevent other control units on the same netwo from communicating with each other. |
| 1.7.3. | local authorities. Provide electrical and electronic equipment which is CSA and ULC or UL approved. | | Printed circuit boards shall be able to be removed without having to disconnect any field wiring. TWORK CONTROL UNITS (NCU) |
| 1.7.4. | Provide (ASCII) American Standard for Communication and Information Interchange coded input/output devices with standard (EIA) Electronic Industry Association interface. | c | Provide the number of NCUs required to support the BAS system to ensure any, and all input a putput field points connected to individual Local Control Units (LCUs) are able to be networked a |
| 1.7.5. | Provide an BAS system which will support the ANSI/ASHRAE BACnet Standard 135–2016. | F | may be monitored, changed or commanded anywhere throughout the BAS. The number of fi- points supported by an NCU controller will be limited to a maximum of 250 points. |
| 1.7.6. | Provide field processing units having the capability for accommodating inputs and outputs meeting ISA Instrument Society of American standards. | N | Provide Network Control Units (NCU) which allow a multi—tasking, multi—user operating system. T NCU controllers shall permit the simultaneous operation of all control, communication, facilit management and operator interface software, as programmed by the contractor or us |
| 1.7.7. | All equipment and systems installed under this Contract shall meet all required performance specifications when subjected to VHF, UHF, FM, AM or background RFI as generated by commercial or private, portable or fixed transmitters that meet regulatory codes. | N 1.8.3.3. | Modification of the onboard NCU controller database shall be performed online. All programming defining the functions to be performed by the NCU shall be protected from k |
| 1.7.8. 1.7.9. | Meet FCC Rules and Regulations, Part 15, Subpart J for Class A computing devices. Components installed within motor control devices shall be designed to operate within transient | S | due to power failure for a minimum of 500 hours. Systems not provided with non—volatile memo shall provide a system rechargeable battery backup system sufficient to provide protection for t specified 500 hour period. Systems not in compliance shall provide for uninterrupted power to ec |
| | electrical fields within these devices. | ١ | RCU. Equip NCU controllers with a minimum of one service port. The service port shall be either |
| | following minimum ambient condition ranges: Temperature – {0 to 32.2°C{[32 to 90°F] | t F | built—in RS—232 port, RJ—11 jack, or USB 2.0 port. Connection of a service device, to a serv port, shall not cause the NCU controller to lose communications with its peers or other network |
| 1.7.10.2. | Relative Humidity 10% to 90% non-condensing | 1.8.3.5. F | device controllers. Provide modular designed NCUs with UL listing and software facilities to receive signals fr system sensors, meters, transmitters and other pertinent equipment where required without the ι |
| 1.7.10.3. 1.7.11. | The limits above, are minimums and shall not take precedence over ranges detailed in this or the | c | of LCUs, to use peer—to—peer communication, and to provide power fail safe, automatic rest facilities. |
| 1.8. | manufacturers specification. PRODUCTS | s | Provide sufficient NCUs in approved locations to equalize total system processing load, provide t specified spare capacity and to limit the field points supported by each as previously specified, |
| 1.8.1. 1.8.1.1. | BAS USER INTERFACE The BAS user interface supplied must allow for the BAS to incorporate the specified points and | s | minimize installation of long signal wire and cables, and to enhance system modular sectionalized reliability, availability and maintainability. |
| | sequences including spare capacity as defined, without degradation of the BAS performance described in this specification. | f | Provide sufficient NCUs and LCUs to meet the specified functionality and point count as determin from the control diagrams on the drawings. Locate these to permit convenient access for operat interfacing in all mechanical equipment rooms. Provide all NCUs with operator interfac |
| 1.8.1.2. | The BAS user interface shall display correctly in any internet brower compliant with World Wide Web Consortium (W3C) standards. | c | capabilities to permit status interrogation and set point and schedule adjustments. Obtain appro for location of all NCU panels. |
| 1.8.1.3. | All BAS user interface will allow the operator to interface via the mouse and touch with a minimum requirement to perform the following: acknowledgement of alarms, menu selection, start and stop of connected equipment, altering setpoints in the colour graphics displays, and override | 1.8.3.8. 1 1.8.3.8.1. | To facilitate fault finding, provide the following: Comprehensive diagnostics programs. These routines shall continuously monitor the operation o |
| 1.8.1.4. | digital and analog outputs. The Basic Software Module shall consist of the following: | 1.8.3.8.2. | the NCU and report faults. Indication that the NCU processor is functioning via LED or similar. |
| | — System access control — Man Machine Interface | 1.8.3.8.3. | Indicator on the communication section of the NCU to show that communication with the network is active. |
| | - Help functions | (| Each NCU must contain a crystal controlled real time clock providing time in the form of da (day, month, year), day of the week (e.g. Monday), hour, minute and second. Accuracy should a minimum of + or — 5 minutes per year. Leap years are to be automatically catered for over |
| | Dynamic Colour Graphics Alarm Handling | | minimum of the next 25 years. Battery backup of the clock during continuous mains failure should not be less than 500 hours. |
| | — Time control — Safety backup | | Each NCU shall provide an alarm should the battery maintaining the clock and RAM be consider close to the end of its charge. |
| | Reports All points listing with descriptions split into functional sections. | s | For each NCU it shall be possible to declare alarms on every supported input. Alarming of poin shall be operator definable on a per point basis and shall comprise of at minimum high/low limi |
| | Alarm history – total and by functional section. Operator activity by functional section. | i | nigh/low differential from set point limits, eng. units and timed dead bands, and special a interlocked alarms |
| 1015 | - Controller current alarms and alarm history. | 1.8.3.13. N 1.8.3.13.1. | NCUs must be capable of handling the following functions: Programmed Start/Stop — This program shall enable the start/stop of equipment on a |
| 1.8.1.5. | System Access Control — Before accessing the system, each workstation operator shall successfully specify both their name and personal password. Every entered character in the password shall be hidden on the screen, not to expose it. The password shall be stored in encrypted form such that | | scheduled basis using time schedules including special provision for holidays. Changes to start/stop times shall be achievable from the BAS user interface. Provide for automatic overri- of the programmed start/stop based on outside temperature. This facility shall be operator |
| | unauthorized reading of passwords via other means will not be successful. In addition, the password may only be changed by the operator concerned or the system manager. | | initiated for each system individually to the automatic override mode and shall be based on the outside temperature reaching or exceeding an adjustable value, unique for each system. |
| 1.8.1.5.1 1.8.1.5.2 | and log-off by operators shall be recorded. | 1.8.3.13.2. | Optimal Start/Stop Program – Provide temperature compensated start/stop time program to automatically add, delete, shorten or extend a start/stop time program(s) based on outdoor and indeer temperatures. Both warmup and academic calculations and the start academic calculations and academic calculations |
| 1.8.1.5.2 | . Every individual password shall be matched with user profiles unique for each operator and those profiles will determine the extent of system access. System access control shall be defined in three dimensions: | | and indoor temperatures. Both warmup and cooldown calculations shall use an adaptive modelling or self learning algorithm such that it automatically adjusts the start/stop time. The adjustments shall be made based on the monitored rate-of-change of building temperature for |
| | Category – determines which sections of the entire system to which that operator will have access. | 1.8.3.13.3. | various inside and outside temperature conditions. Temperature Based Load Control — Provide temperature setback or setup according to |
| | Authority – determines which points that operator will have access to view and command. | | programmed occupancy schedules. Provide the capability to assign separate schedules to each control zone. Provide for control of setback or setup through setpoint adjustment, cycling of systems or system temperature adjustment. |
| 1.8.1.5.3 | | 1.8.3.13.4. | Duty Cycling — Provide a software package that cycles parallel equipment on/off in order to equalize or minimize equipment runtime. Provision shall exist to enable the online definition of |
| | level of the password used to log—on. If a Colour Graphic has points or objects from higher access levels, only those points or objects matching the operators access shall be displayed. Operators shall be able to perform only those commands available for their respective | | the minimum time between the switching of a cycled equipment set. The minimum switching period shall be individually assignable for each included equipment set. |
| 1.8.1.5.4 | passwords. | 1.8.3.13.5. | Supply Air Temperature Reset – This program shall establish the supply air temperature set point for air handling systems. This program shall determine the individual optimum supply ai temperature setpoints which will minimize the need for reheat in terminal reheat and cooling i |
| | preset user—defined time period. It shall be possible for system managers to alter this time and to disable the automatic log—off function. The system manager shall be able to log—off an | | all HVAC systems. Provide a program which automatically adjusts fan discharge set point temperature as high as possible (cooling discharge) or as low as possible (heating discharge) |
| 1.8.1.6. | operator. Stand—by mode shall also be an alternative to log—off, meaning the user interface screen is dynamically updated while the unit is blocked against all commands etc. Point Designation — Each field point, apart from any other unique designation e.g. point number, is | | to just satisfy the building zones requiring the greatest heating or cooling. Zone heating/coolin requirements shall be determined by monitoring space temperature. An operator adjustable comfort range shall be assigned to each measured input. Discharge temperatures shall be |
| | to have the possibility of a free format plain language text designation, of up to a total of 80 alphanumeric characters and plain language point designation with at least four levels, separated by | | adjusted up or down (as appropriate) until at least one of the measured inputs is at its comfort limit, indicating additional reset would cause zone discomfort. Return air humidity she |
| 1.8.1.7. | delimiters, where each level comprises 2 to 20 alphanumeric characters. Dynamic Colour Graphics — The colour graphics shall include both static and dynamic information, | | be used to override cooling discharge reset. Cooling coil discharge shall be increased as described above unless the return humidity exceeds an operator adjustable limit, indicating insufficient dehumidification is being provided. Cooling discharge temperature shall then be |
| 1.8.1.7.1 | as well as the ability to include animated symbols and 3-dimensional rectangles and symbols. . The colour graphics shall be operated by a mouse and/or touch screen. Setpoint values displayed on graphics, if varied at the NCU by a portable terminal, should be up line loaded | | adjusted downward until return air humidity is again below the limit. The supply air temperature setpoint shall not exceed the high and low limits established online by the |
| 1.8.1.7.2 | such that the revised set point is then displayed. It shall be possible to provide an indication on a graphic of any item manually set, e.g. valve. | 1.8.3.13.6. | Operator. Deleted |
| 1.8.1.7.3 | position, damper position. Fans, pumps etc. shall show this as a change of colour. . The presentation, including updating, of a typical colour graphic display shall be provided in less | 1.8.3.13.7. 1.8.3.13.8. | Deleted Power Demand Control — Provide an online electrical prediction and demand control package t control demand while building is on normal power. Predict the probable power demand such |
| | than 7 seconds. The dynamic information shall be updated with a minimum of 1 point per | | control demand while building is on normal power. Predict the probable power demand such that action can be taken to prevent an increase in demand limit. When demand prediction |
| | | | |

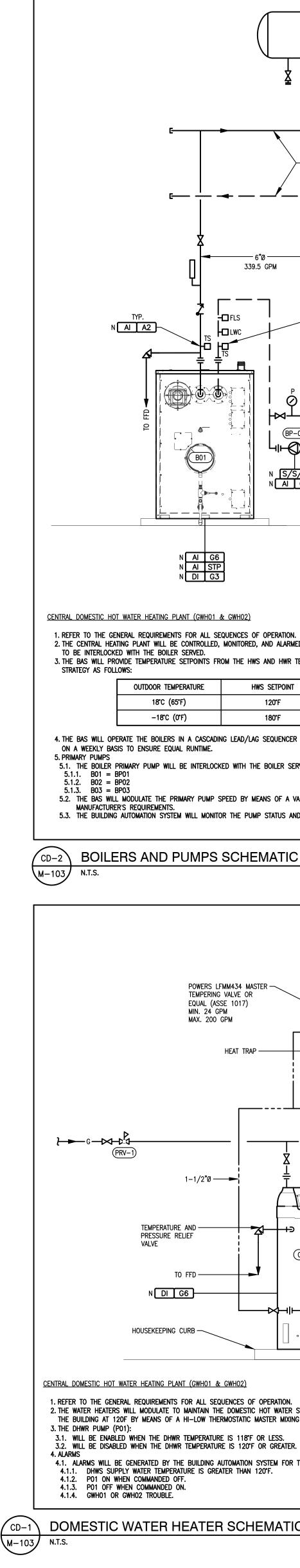
| ns: defined e intervals | | | |
|---|--------------------------------|--|------------------------|
| | | local electric utility computes demand charges. This program shall be such as to ensure that electrical demand charges are minimized. Online changes shall be possible as to add and delete of loads controlled by this program, changes in demand intervals, change individual equipment power requirements, change demand limit for the meter(s), change maximum equipment shutoff time and minimum equipment shutoff time, change the predetermined manner of load shedding | 1.9.5.16. 1.9.5.17. |
| or during | | and load restoring, and lockout equipment from control by this program. Loads shall be cycled during normal occupancy hours. Cycling shall be suspended during warmup, cooldown, purge and unoccupied hours | 1.9.5.18. |
| (object) are | 1.8.3.13.9. | · | 1.9.5.19. |
| arm overview of a certain units, such as | 1.8.3.14. | To ensure standalone functionality, each NCU shall store 32 independent time schedules, comprising normal weekly timetables and prioritized alternative (incl. holiday) timetables. Alternative timetables shall be able to be programmed for scheduling times different to the normal schedules. It shall be | 1.9.5.20. |
| an alarm that | | possible to utilize so called wild cards for repeated timetables e.g. every year or monthly. Alternative timetables schedules shall override the normal time schedules. Each timetable shall define one set of start and stop times (accuracy 1 minute) and for which days they are valid. Furthermore each NCU shall store 16 independent logical time variables. Every time variable shall | 1.9.6. 1.9.6.1. |
| 80 characters aphic or report. | 1.8.4. l | be controlled from one or several timetables. .OCAL CONTROL UNITS (LCU) | |
| should Jing(s) the | 1.8.4.1. | Each AHU, packaged cooling unit, VAV box, fan powered VAV box or fan coil unit shall have a unique DDC controller as a Local Control Unit (LCU). This should be provided by the manufacturer | |
| ckground colours t alarms, reset | 1.8.4.2. | unless otherwise stated. Each pump and fan (other than local washroom exhaust and hooded exhaust fans, unless otherwise specified) shall be connected to a LCU. Multiple independent devices may be connected | 1.9.6.2. |
| up pending riority or so be possible | 1.8.4.3. 1.8.4.4. | to a single LCU given that there are enough inputs/outputs available on the LCU. Each LCU shall be compliant with the BACnet standard and be so designated. Provide modular designed LCUs with UL listing and software facilities to receive signals from | 1.9.6.3. |
| number of m — tripped :. The alarm | | system sensors, meters, transmitters and other pertinent equipment; accept, process and execute commands from other input devices; transmit output signals to control system end devices or other pertinent equipment; use peer-to-peer communication to transmit to, receive from and check the integrity of data and other information received from other system NCUs and LCUs; | 1.9.6.4. |
| are open, so it on with the | | record, evaluate and report changes of state and/or values; and to provide power fail safe, automatic restart facilities. | 1.9.6.5. |
| overview by or by touching | 1.8.4.5. 1.8.4.6. | The LCU shall be capable of performing its assigned local loop control and other functions as a standalone unit. The LCU software and microprocessor operating system shall reside in non-volatile memory. | 1.9.6.6. |
| een without an alarm and | 1.8.4.7. | Each LCU shall consist of a micro computer-based controller, input/output modules, termination modules. | 1.9.6.7. |
| S user interface | 1.8.4.8. | Provide additional LCUs if required to support the control loops specified, the sequence of operations, number of monitoring points or other criteria to permit the field panel capacity to meet the specified functional requirements of the project. | |
| sed to start and | 1.8.4.9. | Each LCU shall be capable of operation as a completely independent unit and as a part of a facility wide control system. All LCUs are to be equipped to enable transmission of all input and | 1.9.6.8. 1.9.6.9. |
| ed from one or acy of 1 | 1.8.4.10. | and transducers. Each LCU shall have the capability to monitor the types of inputs and outputs as | 1.9.7. |
| fferent to the timetables e.g. time schedules. e possible to rride the normal | 1.8.4.10.1. | N1—1000, NTC thermistor and potentiometer). It shall be possible to carry out signal type declarations from the workstation, or locally via a portable terminal. Normalization and | 1.9.7.1. |
| ns automatic | 1.8.4.10.2. | linearization routines shall exist for all supported inputs. Binary Inputs — from volt free contacts normally open or normally closed, including pulsed contacts at a rate of 20 pulses per second minimum. | 1.9.7.2. 1.9.7.3. |
| by the operator. Insures that all | 1.8.4.10.3. | Analog Outputs — true analog i.e. 0 to 10 volts DC or 2 to 10 volts DC. Pulse width modulation is acceptable only for VAV box LCUs. | 1.9.7.4. |
| data at regular | 1.8.4.10.4. 1.8.4.11. | contacts. | 1.9.7.5. |
| since the last | 1.8.4.12. | Adding the derivative function or modifying loop parameters should not require further programming of algorithms, but only entering the desired changes via the workstation or portable terminal. | 1.9.7.6. |
| storage of data | 1.8.4.13. | | 1.9.7.7. |
| vals) processes tegers) or | 1.8.4.14. 1.8.4.15. | To prevent serious damage to the LCU from surges, RFI, electrically induced spikes, etc., protection in the following form shall be provided, as a minimum: Digital outputs singularly or collectively shall be galvanically isolated from the main LCU processor. | 1.9.7.8. |
| mped. It shall shall also be vritten with new | 1.8.4.16. | Digital and analog inputs and analog outputs shall have noise and surge suppressers fitted to prevent damage or malfunction due to induced voltages in series or common mode. | 1.9.7.9. |
| g what period ent conditions, is generated at | 1.8.4.17. 1.8.4.18. | LCU application programs are usually to be entered by downline loading from a workstation. Limited program changes e.g. control parameters, setpoints, time delays, etc. may be carried out via a portable terminal plugged into the LCU. For each LCU it shall be possible to declare alarms on every input, digital as well as analog. | 1.9.7.10. |
| g shall estimate o be edited or | | Alarming of points shall be operator definable on a per point basis and shall comprise of, at minimum, high/low limits, high/low, differential from setpoint limits, eng. units and timed deadbands, and special and interlocked alarms. | |
| manipulation or | 1.8.4.19. 1.8.4.20. | capability by AHU system to affect all boxes in a system simultaneously to set full open damper, | |
| ual control units or workstations. | 1.8.4.21. | temperature and by the radiant heat in the zone. Each zone temperature sensor shall have a | |
| tation and allow on the drawings | | modular jack for connection of a portable terminal (PT). The PT via the jack shall be able to communicate to the controller which the sensor is connected to or any other controller or LCU within the system. | |
| e same network | | EXECUTION INSTALLATION | |
| / field wiring. | 1.9.1.1. 1.9.1.2. | Install all equipment, accessories, conduit and interconnecting wiring in a neat and protected manner by skilled and qualified work persons using the latest standard practices of the industry. Unless otherwise specified, meet manufacturers latest printed instructions for materials, planned | |
| nd all input and e networked and number of field | 1.9.1.3. | maintenance and installation methods. Install all thermostats, switches, and other publically accessible control devices in accordance with | |
| ting system. The ication, facilities ractor or user. | 1.9.1.4. 1.9.1.5. | the Accessabiliy for Ontarians with Disabilities Act (AODA). Clean and calibrate all existing thermstats upon completion of construction. Notify construction manager in writing of any conflict between these specifications and manufacturers instructions. Within 2 weeks of submission of tender, contract award may be | |
| tected from loss -volatile memory rotection for the | 1.9.1.6. | determined by these deviations. No deviations will be considered after this time period. Coordinate with other Division 15 work and provide the necessary relays, auxiliary contacts and transformers required to interconnect equipment. Retain original equipment suppliers to provide contacts as required. | |
| d power to each | 1.9.1.7. 1.9.1.8. | All equipment installed shall be mechanically stable and fixed to wall or floor. Install equipment so as to allow for easy maintenance access and such that it does not interfere | |
| hall be either a ce, to a service other networked | 1.9.1.9. | in any way with access to adjacent equipment and personnel traffic in the surrounding space. Install equipment in locations providing acceptable ambient conditions for its specified functioning, allowing for adequate ventilation and with no condensation traps. | |
| ve signals from without the use uutomatic restart | 1.9.1.10. 1.9.1.11. | Meet Division 26 installation and materials requirements. Shield and ground communication trunk wiring at a single end. | |
| oad, provide the usly specified, to | 1.9.1.12. 1.9.1.13. | Do not splice trunk cables. Provide complete installation, testing, debugging and interfacing of specified software. | |
| tem modularity, | 1.9.2. I 1.9.2.1. | DENTIFICATION Provide all pieces of supplied equipment with a minimum 25 mm x 75 mm [1 in x 3 in] black and white lamacoid nameplate with, at minimum, 6 mm high bold lettering and affix to control | |
| ess for operator rator interfacing Obtain approval | 1.9.2.2. | device or on panel front. Identify in accordance with the shop drawing descriptions. Except where specifically noted otherwise, permanently attach using self tapping screws or bead chain. Within each field panel provide a complete listing of points connected, system schematic diagrams, | |
| e operation of | 1.9.2.3. | calculated point codes and other information useful to assist an operator using a PT for diagnostic purposes. Fasten information to inside of front door using adhesive backed paper, or mount information in sealed plastic covers and secure to field cabinet. Identify all field wiring terminations with labels corresponding to shop drawing identifications. | |
| with the | 1.9.3. F 1.9.3.1. | POWER Provide single phase, dedicated ground, nominal 125V AC, 60 Hz power to the field panels from emergency panels in locations identified to Division. Provide suitably sized breaker compatible with | |
| e form of date uracy should be | 1070 | existing power panels, provide wiring from breaker to all equipment unless specifically indicated otherwise. | |
| tered for over a n 500 hours. | 1.9.3.2. 1.9.3.3. | Provide class II 24VAC transformers where required. Under normal conditions, no single power supply shall be operated at more than 75% of its rated maximum continuous load. | |
| M be considered | 1.9.4. \ 1.9.4.1. | WIRING Provide all wiring required for Instrumentation. Install in EMT conduit or use plenum rated cable, and otherwise comply with Division 26 requirements. Approved plenum cable wire may be used | |
| arming of points high/low limits, and special and | 1.9.4.2. | where allowed by code. Provide power wiring from nearest 125 volt emergency powered panel to each field device as | |
| | 1.9.4.3. | required. Provide necessary relays required to interconnect equipment. | |
| t on a inges to tomatic override | 1.9.4.4. 1.9.5. 1.9.5.1. | Install wiring parallel and perpendicular to building planes. TESTING Provide all labour, materials, products, equipment and services to demonstrate to the owner and | |
| be operator be based on the system. | | the consultant that the equipment, networks, installations, programs and services supplied, installed and tested under this contract meet the requirements of the contract documents in all respects. | |
| program to on outdoor daptive stop time. The | 1.9.5.2. | The owner/consultant reserves the right to use any piece of equipment, device or material installed under this contract for such reasonable lengths of time and at such times as they may require to make complete and thorough tests of same before undertaking the final acceptance testing. Do not construe such tests as evidence of acceptance of any part of the contract. No claim for damage will be made by the Contractor for any injury or breakage to any parts of the above due | |
| temperature for | 1057 | to the aforementioned tests where caused by weakness or inaccuracy of the parts or by defective materials or workmanship of any kind whatsoever. | |
| dules to each t, cycling of | 1.9.5.3. 1.9.5.4. | Conduct such operation following prior agreement between the owner/consultant and the contractor as to the format and scheduling of the tests. Arrange work to enable the owner to change over local AHU control systems to the new system | |
| in order to e definition of ım switching | 1.9.5.5. | for extended operating periods to ensure proper functioning of software and hardware. Do not withhold consent to the execution of such operation when reasonably requested by the owner/consultant. | |
| perature set num supply air and cooling in | 1.9.5.6. | Make BAS available for the use of the owner once the individual work items are such that they can be used for their intended function(s) as detailed herein. | |
| and cooling in set point ing discharge) | 1.9.5.7. 1.9.5.8. | The warranty period shall not commence until the owner's Certificate of Substantial Completion is issued. The owner and/or consultant reserve the right to defer acceptance testing on any item until all | |
| heating/cooling adjustable es shall be | 1.9.5.9. | work included in this contract has been completed by the contractor or can be fully tested. Submit preliminary as-built drawings and documentation at least 4 weeks prior to the | |
| is at its ir humidity shall reased as | 1.9.5.10. | commencement of final acceptance testing. Submit data relevant to point index, functions, limits, sequences, interlocks, software routines and associated parameters and other pertinent information for the operating system and data base. | |
| indicating all then be air by the | 1.9.5.11. | Submit point log sheets to the consultant at least 4 weeks prior to the test. Submit sample point log sheets for consultant review prior to completion and final data entry. | |
| by the | 1.9.5.12. | each test/inspection. All hardware and software system components and all other work items shall be fully tested/inspected during the demonstration. | |
| trol package to emand such | 1.9.5.13. 1.9.5.14. | prior to online operation. | |

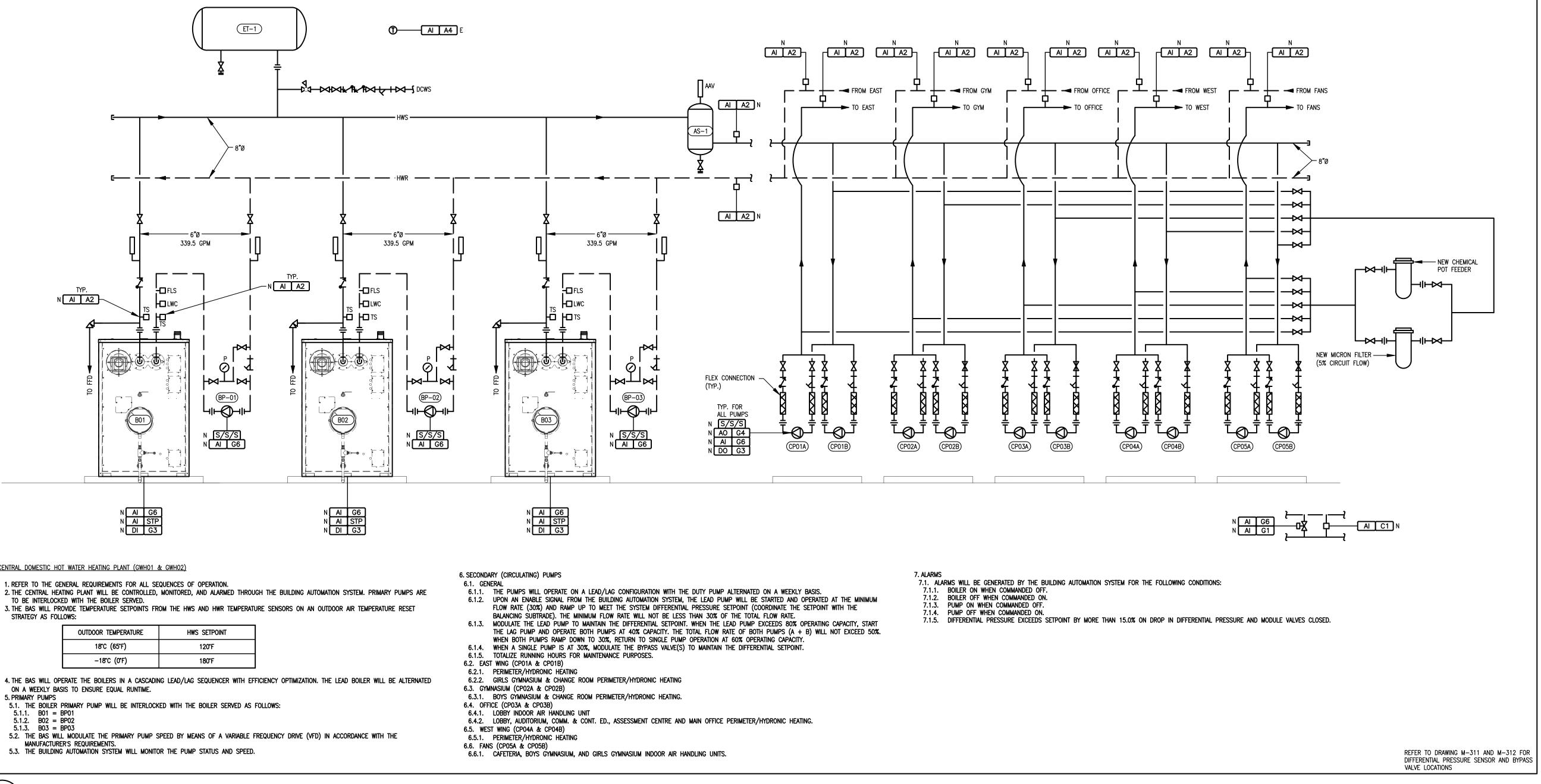
Note deficiencies and correct before starting and continuing tests. Perform calibration and operational checks prior to the commencement of final acceptance testing for all relevant system parts. Make available on site for the duration of these tests, all installation, engineering, software, system

- and personnel, required to enable test completion. Demonstrate the specified performance of the BAS software and hardware, at all levels from individual end devices through to total system operation and the proper operation/undertaking of all other items of work performed under this Contract.
- Specifically orient acceptance test procedures to demonstrate the satisfactory operation of aspects of the operator interface terminals. Perform a complete and detailed calibration and operational check for each individual BAS point and control function contained within the supplied system. Check to ensure that all equipment, software, network elements, modules and circuits provided are functioning to meet the specification and record on log sheets.
- Repeat acceptance testing until acceptable performance has been established. TRAINING
- Provide practical training for the owners designated representatives. Direct training towards the requirements of the following user groups: - Supervisors: Control, Monitoring including Offsite Monitoring, Report Generation, Data Base Management - Operators: Control, Monitoring including Offsite Monitoring and Maintenance
- Electricians: System Hardware, Instrumentation and System Wiring Provide training at the site at locations specified by the client. Allow for four separate groups of
- training sessions which will be scheduled according to the project schedule and the groups may be held weeks apart. Allow 4 full 8 hour days of training for each group (total 16 days) to cover the three user categories above and allow for these days to be staggered to meet the owner's schedule. Training sessions will be scheduled during normal working days and during normal working hours, excluding holidays.
- Training shall cover the complete operation of the BAS. Supervision training shall include for the software procedures to allow for the appropriate operators or supervisors to add, or modify points, programs, reports or graphics. Submit to the construction manager, check lists for each system or piece of equipment indicating that all components have been checked and are complete prior to instruction period.
- Provide all equipment and supplies, as required by the Contractor in order to execute the training program. Submit a complete record of instructions given to the owners user groups and those present
- during each instruction period. Provide at least four complete sets of approved training manuals including final documentation of systems, instructions for hardware and all software, troubleshooting procedures, etc. Provide these manuals as a draft submission for review by the lead consultant before submission of the four final sets. Make changes or additions as directed based on the draft submission. Submit the final sets in time for the training sessions.
- Verification of completed training shall be submitted to the construction manager prior to final release of holdback. Selected clients representatives shall be sufficiently trained so as to be qualified to perform emergency maintenance during the warranty period, without affecting, in any way, the warranty
- coverage provided. At the end of such training, provide qualification certificate. WARRANTY AND WARRANTY SERVICE Warrant in writing, all provided equipment, accessories, installations, software and firmware against defects in workmanship and materials for a period of one year commencing from the date of
- issue of the Certificate of Completion. Include emergency 24 hour service. These warranties shall take precedence over any other warranties.
- Maintain the affected parts operational during repair of defective equipment covered by the warranty. All warranty repairs shall be carried out on site or a replacement component shall be issued to
- the facility at no charge. During the warranty, all components described above shall be routinely inspected and serviced by trained BAS technicians with written reports to the owner regarding condition, adjustments or changes made to any equipment following each inspection. Change consumable items as required
- at these inspections. Provide all service at no additional cost during the warranty period, with the specified exception of the supply of consumable items as defined above.
- Perform a final inspection in conjunction with the client and Consultant, 60 days prior to the termination of the warranty period. Submit a full report, to the client at least 30 days prior to the termination of the warranty period.
- . During the warranty period, replace or repair all supplied equipment, documentation and software, at no additional cost. All defective equipment and software shall be replaced or repaired as soon as is reasonably possible after it is considered to be defective.
- Maintain an inventory of sufficient normal replacement parts, components, materials, tools, equipment and testing devices such that repair or replacement can commence within 8 hours of
- notification of an inoperable condition. At the end of the warranty period, update software such that all software will be the most recent

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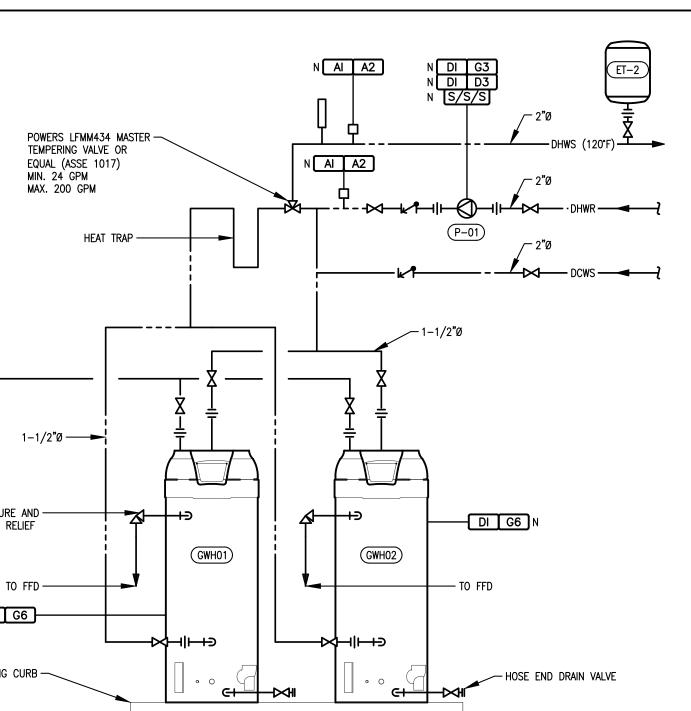
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3. THE BAS WILL PROVIDE TEMPERATURE SETPOINTS FROM THE HWS AND HWR TEMPERATURE SENSORS ON AN OUTDOOR AIR TEMPERATURE RESET

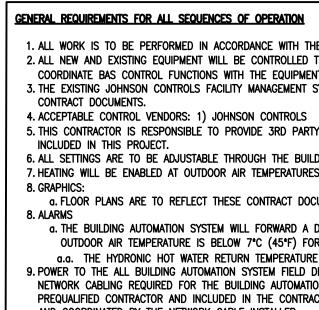
(CD-2) BOILERS AND PUMPS SCHEMATIC AND CONTROLS



2. THE WATER HEATERS WILL MODULATE TO MAINTAIN THE DOMESTIC HOT WATER STORAGE TEMPERATURE AT 140F BY MEANS OF THEIR INTEGRAL CONTROLS. WATER WILL BE SUPPLIED TO THE BUILDING AT 120F BY MEANS OF A HI-LOW THERMOSTATIC MASTER MIXING VALVE.

4.1. ALARMS WILL BE GENERATED BY THE BUILDING AUTOMATION SYSTEM FOR THE FOLLOWING CONDITIONS:

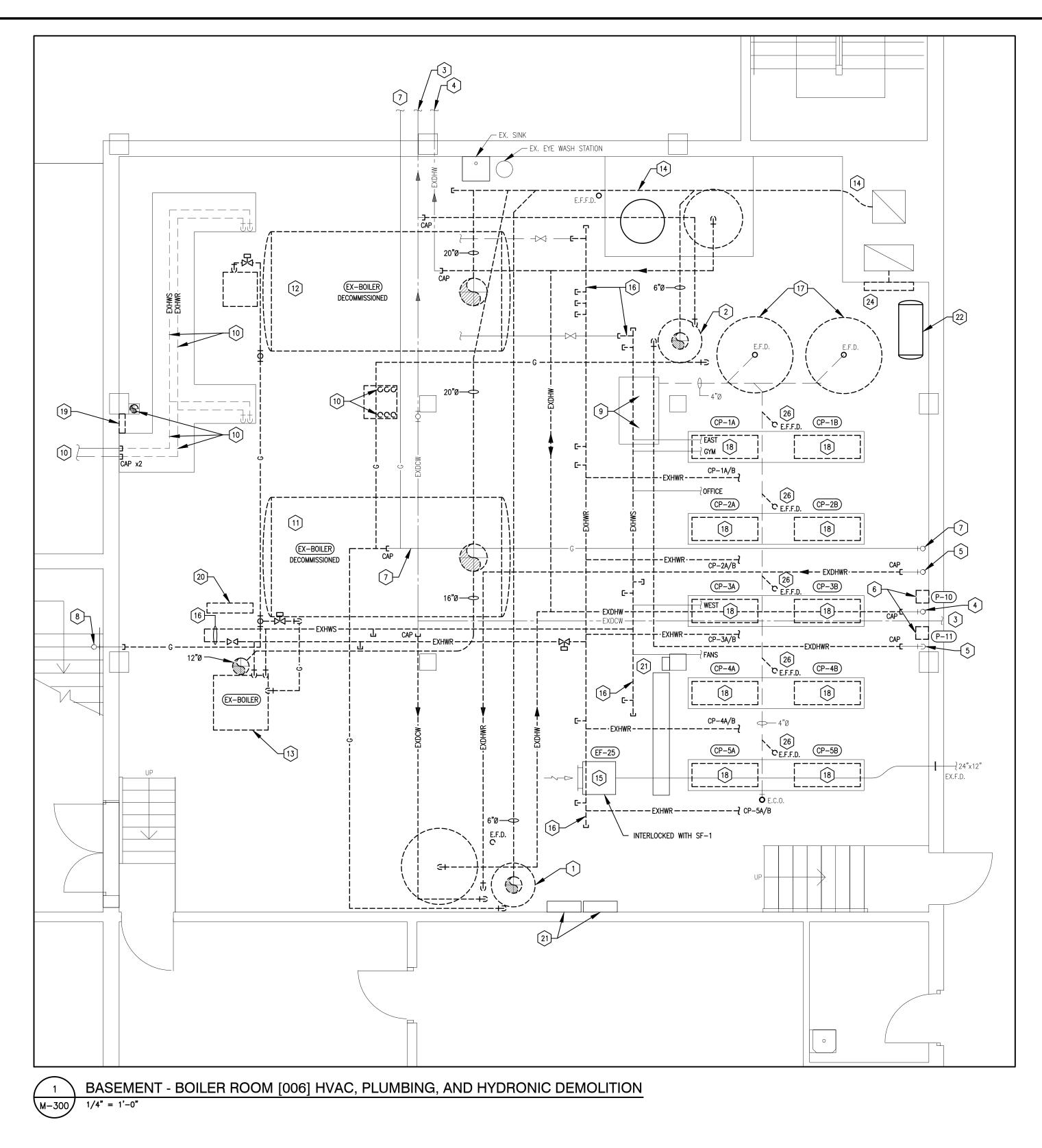
DOMESTIC WATER HEATER SCHEMATIC AND CONTROLS



SENSOR AND INSTRUMENT CODES ABBREVIATIONS 1. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE OWNER'S STANDARDS. 2. ALL NEW AND EXISTING EQUIPMENT WILL BE CONTROLLED THROUGH HARDWIRED TERMINAL STRIP(S). SUPPLY, INSTALL, AND TEMPERATURE SENSOR, PIPE MOUNTED ANALOG INPUT COORDINATE BAS CONTROL FUNCTIONS WITH THE EQUIPMENT MANUFACTURER, ALL REQUIRED COMPONENTS AS REQUIRED. TEMPERATURE SENSOR, AVERAGING ELEMENT TEMPERATURE SENSOR, OUTSIDE AIR TYPE ANALOG OUTPUT 3. THE EXISTING JOHNSON CONTROLS FACILITY MANAGEMENT SYSTEM IS TO BE MODIFIED AND EXPANDED AS INDICATED IN THESE BUILDING AUTOMATION SYSTEM CENTRAL ALARM & CONTROL FACILITY BAS CACF TEMPERATURE SENSOR, ROOM TYPE CHWS CHILLED WATER SUPPLY CHILLED WATER RETURN EMPERATURE SENSOR, LOW LIMIT TEMPERATURE SENSOR, HIGH LIMIT 5. THIS CONTRACTOR IS RESPONSIBLE TO PROVIDE 3RD PARTY COMMISSIONING FOR ALL EQUIPMENT AND CONTROL SYSTEMS CLG CWS CWR COOLING HUMIDITY SENSOR, DUCT MOUNTED CONDENSER WATER SUPPLY 6. ALL SETTINGS ARE TO BE ADJUSTABLE THROUGH THE BUILDING AUTOMATION SYSTEM. HUMIDITY SENSOR, ROOM TYPE HUMIDITY SENSOR, OUTSIDE AIR TYPE CONDENSER WATER RETURN 7. HEATING WILL BE ENABLED AT OUTDOOR AIR TEMPERATURES OF 18°C (65°F) AND BELOW. DIGITAL INPUT DIGITAL OUTPUT HUMIDITY SENSOR, HIGH LIMIT TYPE DISTAL OUTFOIL DISFERENTIAL PRESSURE DAMPER END SWITCH EXHAUST AIR TEMPERATURE EXHAUST FAN a. FLOOR PLANS ARE TO REFLECT THESE CONTRACT DOCUMENTS DIFFERENTIAL PRESSURE a. THE BUILDING AUTOMATION SYSTEM WILL FORWARD A DIGITAL OUTPUT TO THE EXISTING SECURITY SYSTEM WHEN THE PRESSURE SENSOR STATIC PRESSURE SENSOR OUTDOOR AIR TEMPERATURE IS BELOW 7°C (45°F) FOR THE FOLLOWING CONDITIONS: EWT FPVAV FCS FCR FCU FS PRESSURE SWITCH ENTERING WATER TEMPERATURE a.a. THE HYDRONIC HOT WATER RETURN TEMPERATURE IS BELOW 38°C (100°F). FAN POWERED VAV TERMINAL WATERFLOW SWITCH WATERFLOW SWITCH DAMPER STATUS SWITCH AIR VOLUME PULSED OUTPUT FROM POWER METER PULSED OUTPUT FROM WATER METER EMMERSION HEATER ON/OFF 9. POWER TO THE ALL BUILDING AUTOMATION SYSTEM FIELD DEVICES IS TO BE INCLUDED IN THE CONTRACT PRICE. ALL NEW FAN COIL SUPPLY NETWORK CABLING REQUIRED FOR THE BUILDING AUTOMATION SYSTEM INTEGRATION IS TO BE INSTALLED BY AN OWNER FAN COIL RETURN FAN COIL UNIT PREQUALIFIED CONTRACTOR AND INCLUDED IN THE CONTRACT PRICE. IP CONFIGURATION WILL BE COMPLETED BY THE OWNER'S FLOW SENSOR HIGH LIMIT AND COORDINATED BY THE NETWORK CABLE INSTALLER. 10. THIS CONTRACTOR IS TO INCLUDE IN THE CONTRACT FOR AN ADDITIONAL TEN (10) CONTROL POINTS. hws hwr htg CURRENT SENSOR HEATED WATER SUPPLY Co2 SENSOR HEATED WATER RETURN HEATING CARBON DIOXIDE SENSOR CARBON MONOXIDE SENSOR LOW LIMIT LEAVING WATER TEMPERATURE C02 LLL MIXED AIR TEMPERATURE OUTSIDE AIR RELATIVE HUMIDITY OUTSIDE AIR TEMPERATURE mat Oarh MOTOR CONTROL RELAYS, START/STOP/STATUS TYPE CURRENT TRANSFORMERS AND RELAYS MOTOR STATUS CONTACTS OCCUPANCY SENSOR LEVEL SWITCH, FLOAT TYPE **RETURN AIR** RETURN AIR RELATIVE HUMIDITY RARH RETURN AIR TEMPERATURE DIFFERENTIAL PRESSURE TRANSMITTER CURRENT SENSITIVE RELAY RETURN FAN RUN TIME TOTALIZATION SUPPLY AIR SUPPLY AIR RELATIVE HUMIDITY SUPPLY AIR TEMPERATURE LEVEL TRANSMITTER SARH WATERFLOW TRANSMITTER, ANNUBAR TYPI WATERFLOW TRANSMITTER, TURBINE TYPE SUPPLY FAN STATIC PRESSURE AIRFLOW TRANSMITTER, DIGITRON TYPE AIRFLOW TRANSMITTER, ANNUBAR AIRBAR SPACE TEMPERATURE SETPOINT ENERGY METER, DELTA T AND FLOW GAS DETECTOR SPACE TEMPERATURE SENSOR TERMINAL UNIT CONTROLLER VARIABLE AIR VOLUME INTERFACE CONTACT TO CACF VAV VIBRATION DETECTOR INTERFACE CONTACT EXISTING NEW INTERFACE TO HOOD SUPPRESSION OUTPUT TO VALVE OUTPUT TO DAMPER START/STOP OUTPUT TO VSD FAULT INPUT STATUS VIBRATION CUT-OUT ELECTRICAL POWER CONSUMPTION - G8 AO C6 SENSOR CODE AO C6 DAMPER CONTROL (AO) WITH DAMPER END SWITCH WIRE SWITCH TO CACF & STARTER SIGNAL TYPE - MONITOR OPEN AND CLOSED POSITION S/S/S START/STOP/STATUS RELAYS FOR MOTOR CONTROL S/S START/STOP RELAYS FOR MOTOR CONTROL AO — ANALOG OUTPUT TO CONTROLLED DEVICE WITHOUT ADDITIONAL SENSORS NORMALLY OPEN PORT - COMMON PORT CD-1 CONTROL LEGEND **M**-103

CONTROL LEGEND

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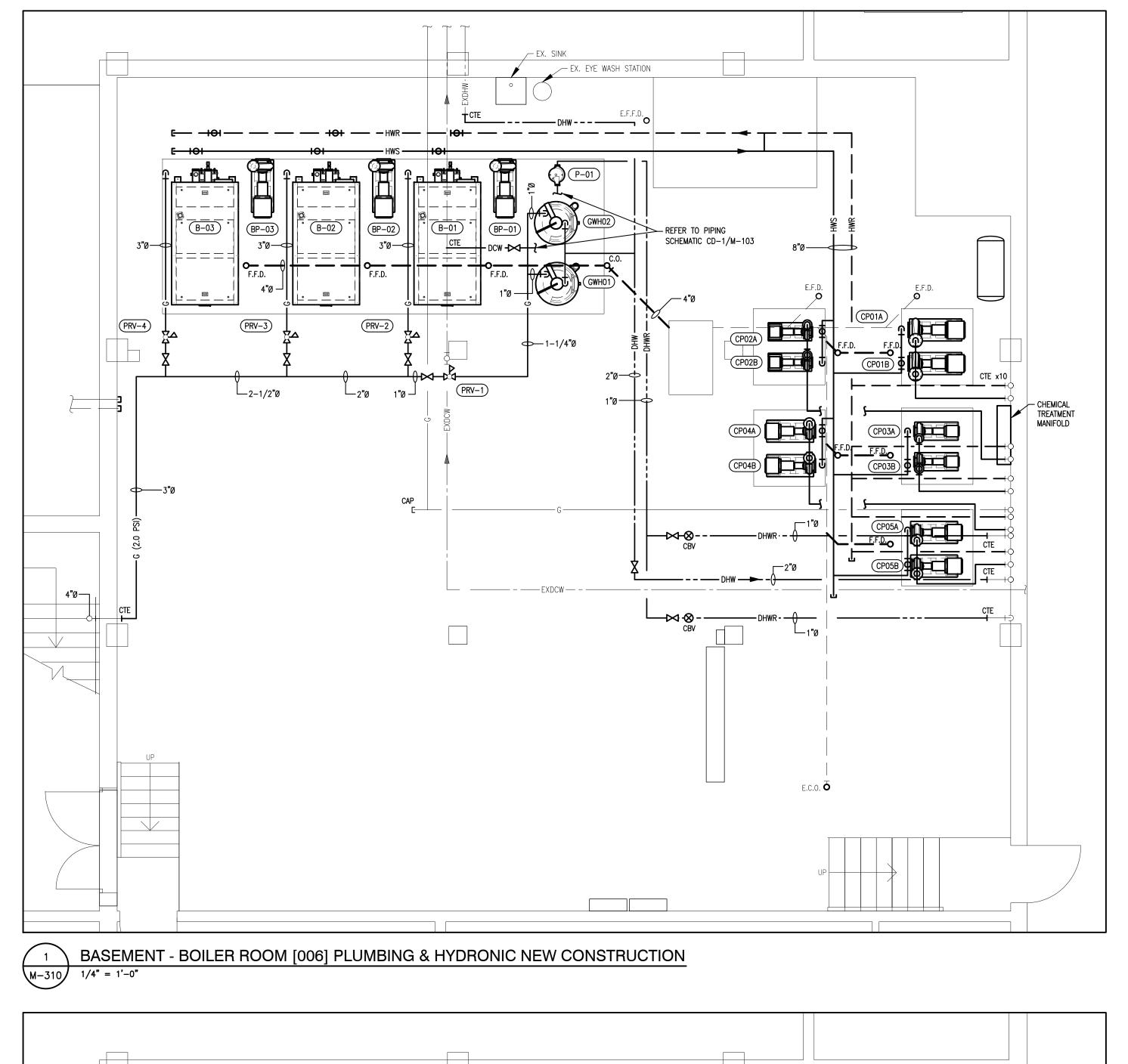
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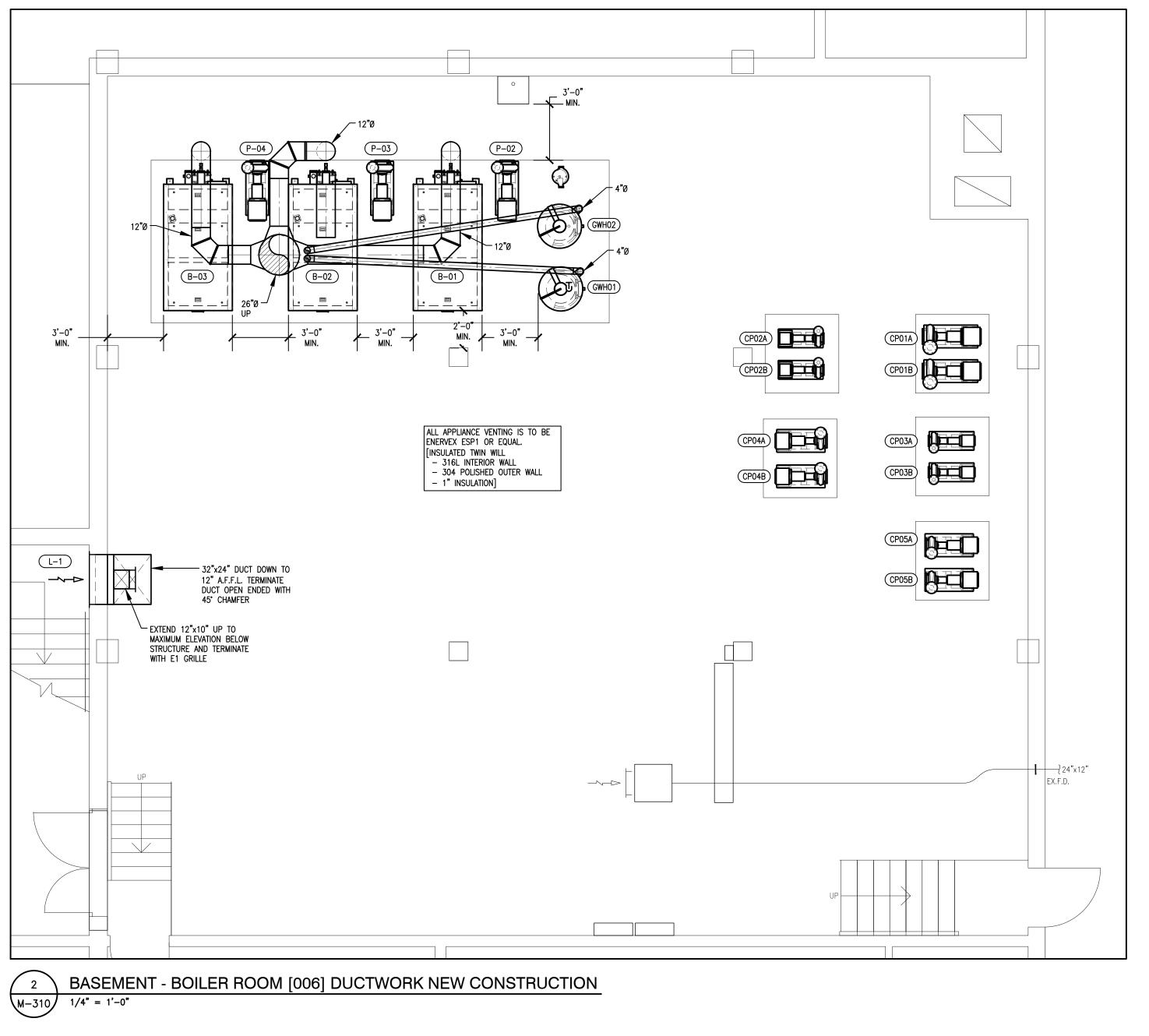
- EXISTING RHEEM 199.9 MBH INPUT NATURAL GAS FIRED, ATMOSPHERIC 76GAL. TANK TYPE WATER HEATER TO BE DISCONNECTED, REMOVED, AND DISPOSED, COMPLETE WITH DCWS, DHWS, & NATURAL GAS PIPNG, VERTICAL STORAGE TANK, TANK CIRCULATING PUMP AND PIPING, DHWR PUMP, AND FLUE GAS VENTING. CAP THE DCWS, DHWS, & NATURAL GAS PIPING AND THE VENTING AT THE TAKE-OFF FROM THE MAIN.
- EXISTING RHEEM 114.0 MBH INPUT NATURAL GAS FIRED, ATMOSPHERIC 67GAL. TANK TYPE WATER HEATER TO BE DISCONNECTED, REMOVED, AND DISPOSED, COMPLETE WITH DCWS, DHWS, & NATURAL GAS PIPING, VERTICAL STORAGE TANK, TANK CIRCULATING PUMP AND PIPING, DHWR PUMP, AND FLUE GAS VENTING. CAP
- THE DCWS, DHWS, & NATURAL GAS PIPING AND THE VENTING AT THE TAKE-OFF FROM THE MAIN. (3) EXISTING DCWS MAIN TO REMAIN. MAKE GOOD THE EXISTING TO REMAIN MAIN SUITABLE FOR RECONNECTION.
- EXISTING DHWS MAIN TO REMAIN. MAKE GOOD THE EXISTING TO REMAIN MAIN SUITABLE FOR RECONNECTION. EXISTING DHWR MAIN TO REMAIN. MAKE GOOD THE EXISTING TO REMAIN MAIN SUITABLE FOR RECONNECTION.
- EXISTING DHWR PUMP TO BE DISCONNECTED, REMOVED, AND DISPOSED. MAKE GOOD THE EXISTING DHWR MAIN PIPING SUITABLE FOR REUSE.
- 7
 EXISTING 1-1/2"Ø, 14"W.C. NATURAL GAS MAIN TO REMAIN.

 8
 EXISTING 4"Ø. 2.0PSIG INCOMING NATURAL GAS MAIN UP TO D
- 8 EXISTING 4"Ø, 2.0PSIG INCOMING NATURAL GAS MAIN UP TP BUILDING ROOF TO REMAIN. 9 EXISTING SUMP PIT AND PUMPS TO REMAIN COMPLETE WITH ALL ASSOCIATED PIPING.
- EXISTING FUEL OIL SUPPLY, RETURN, AND VENT PIPING TO BE DISCONNECTED, REMOVED, AND DISPOSED. PERMANENTLY CAP ALL LINES AT THE FOUNDATION WALL. EXISTING ABANDONED POWERMASTER 18.4MMBH INPUT NATURAL GAS FIRED BOILER TO BE DISCONNECTED,
- REMOVED, AND DISPOSED, COMPLETE WITH HWS, HWR, AND NATURAL GAS PIPING, CONTROLS, SUPPORT STRUCTURE, AND FLUE GAS VENTING.
 EXISTING BOILERSMITH 8.5MMBH INPUT NATURAL GAS FIRED BOILER TO BE DISCONNECTED, REMOVED, AND DISPOSED, COMPLETE WITH HWS, HWR, AND NATURAL GAS PIPING, CIRCULATING PUMP AND PIPING, VALVES,
- CONTROLS, SUPPORT STRUCTURE, AND FLUE GAS VENTING. CAP THE HWS, HWR, & NATURAL GAS PIPING, VALVES, AND THE FLUE GAS VENTING AT THE TAKE-OFF FROM THE MAIN. EXISTING PATTERSON KELLY 2.0MMBH INPUT NATURAL GAS FIRED BOILER TO BE DISCONNECTED, REMOVED, AND DISPOSED, COMPLETE WITH HWS, HWR, AND NATURAL GAS PIPING, CIRCULATING PUMP AND PIPING, VALVES, CONTROLS FLUE GAS VENTING, AND COMODETE UNION CONTROL OF COMPLETE WITH HWS, HWR, AND NATURAL GAS PIPING, CIRCULATING PUMP AND PIPING, VALVES, CONTROLS FLUE GAS VENTING, AND COMODETE UNION CONTROL OF COMPLETE WITH HWS, HWR, AND NATURAL GAS PIPING, CIRCULATING PUMP AND PIPING,
- VALVES, CONTROLS, FLUE GAS VENTING, AND CONCRETE HOUSEKEEPING CURB. CAP THE HWS, HWR, & NATURAL GAS PIPING AND THE VENTING AT THE TAKE-OFF FROM THE MAIN.
- EXISTING 32" X 32" FLUE GAS VENT TO BE REMOVED AND DISPOSED COMPLETE WITH ALL ASSOCIATED COMPONENTS. REMOVE AND DISPOSE THE EXISTING MASONRY CHIMNEY LINER TO THE ENTIRE CHIMNEY HEIGHT.
 EXISTING EXHAUST FAN AND DUCTWORK TO REMAIN.
- EXISTING HWS / HWR MAIN TO BE DISCONNECTED, REMOVED, AND DISPOSED COMPLETE WITH ALL FITTINGS, VALVES, AND SUPPORTS, MAKE GOOD THE EXISTING TO REMAIN PIPING SUITABLE FOR RECONNECTION.
- 17 EXISTING VERTICAL BUFFER TANK TO BE DRAINED, DISCONNECTED, REMOVED, AND DISPOSED COMPLETE WITH ALL ASSOCIATED COMPONENTS.
- 18
 EXISTING BASE MOUNTED SECONDARY PUMP TO BE DISCONNECTED, REMOVED, AND DISPOSED COMPLETE WITH HOUSEKEEPING CURB, FITTINGS, VALVES, AND PIPING BACK TO THE MAINS.

 19
 EXISTING FUEL OIL CONTROL PANEL TO BE DISCONNECTED, REMOVED, AND DISPOSED COMPLETE WITH ASSOCIATED CONDUCTS. CARDING AND DISPOSED COMPLETE WITH
- ASSOCIATED CONDUITS, CABLING, AND DEVICES. (20) EXISTING PNEUMATIC CONTROL PANEL TO BE REMAIN.
- 21 EXISTING BUILDING AUTOMATION SYSTEM (BAS) PANEL TO REMAIN. DISCONNECT, REMOVE, AND DISPOSE ALL CONDUIT, CABLING, AND DEVICES ASSOCIATED WITH THE EQUIPMENT BEING REMOVED IN THIS PROJECT. EXISTING AIR COMPRESSOR TO REMAIN.
- EXISTING 36"X36" COMBUSTION AND VENTILATION AIR INTAKE GRILLE TO BE DISCONNECTED, REMOVED, AND DISPOSED. CLEAN VERTICAL AIR SHAFT UP TO LOW ROOF LOUVRE. DISCONNECT, REMOVE, AND DISPOSE LOW ROOF LOUVRE.
- 25 INTENTIONALLY LEFT BLANK
- 26 Existing floor drain to be disconnected, removed, and permanently capped with the finished floor.
- (27) existing natural gas meter and regulator assembly to remain.

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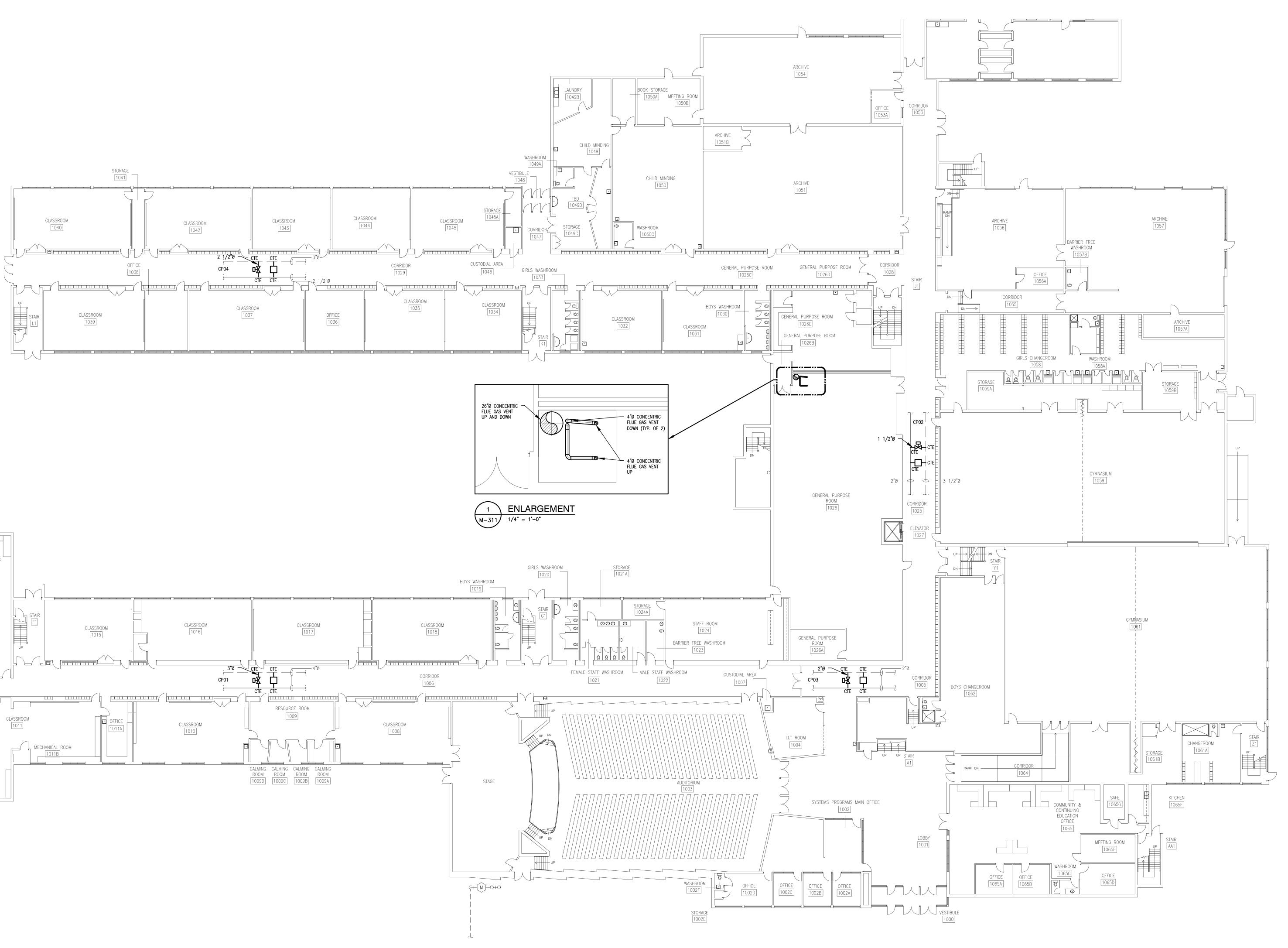


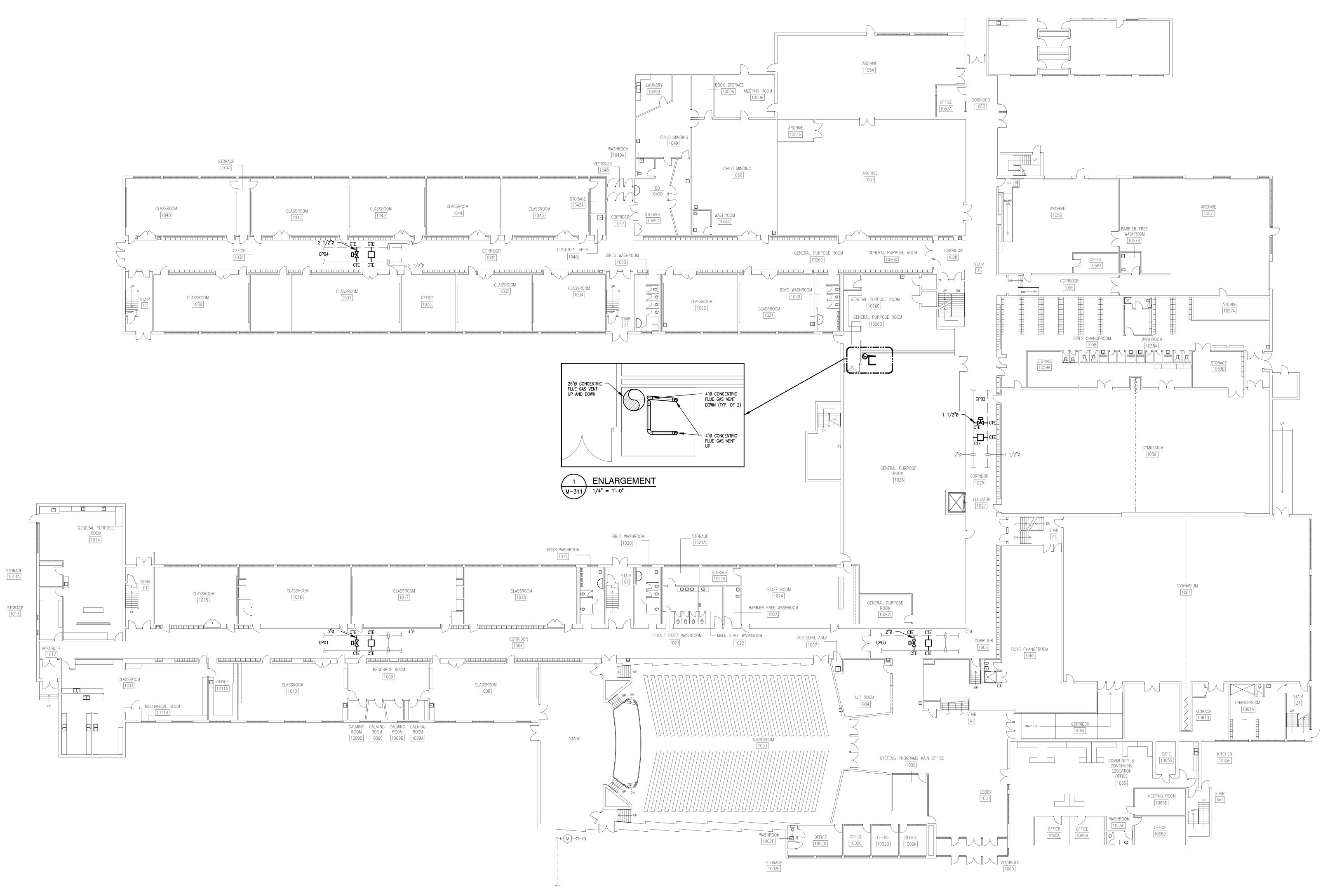


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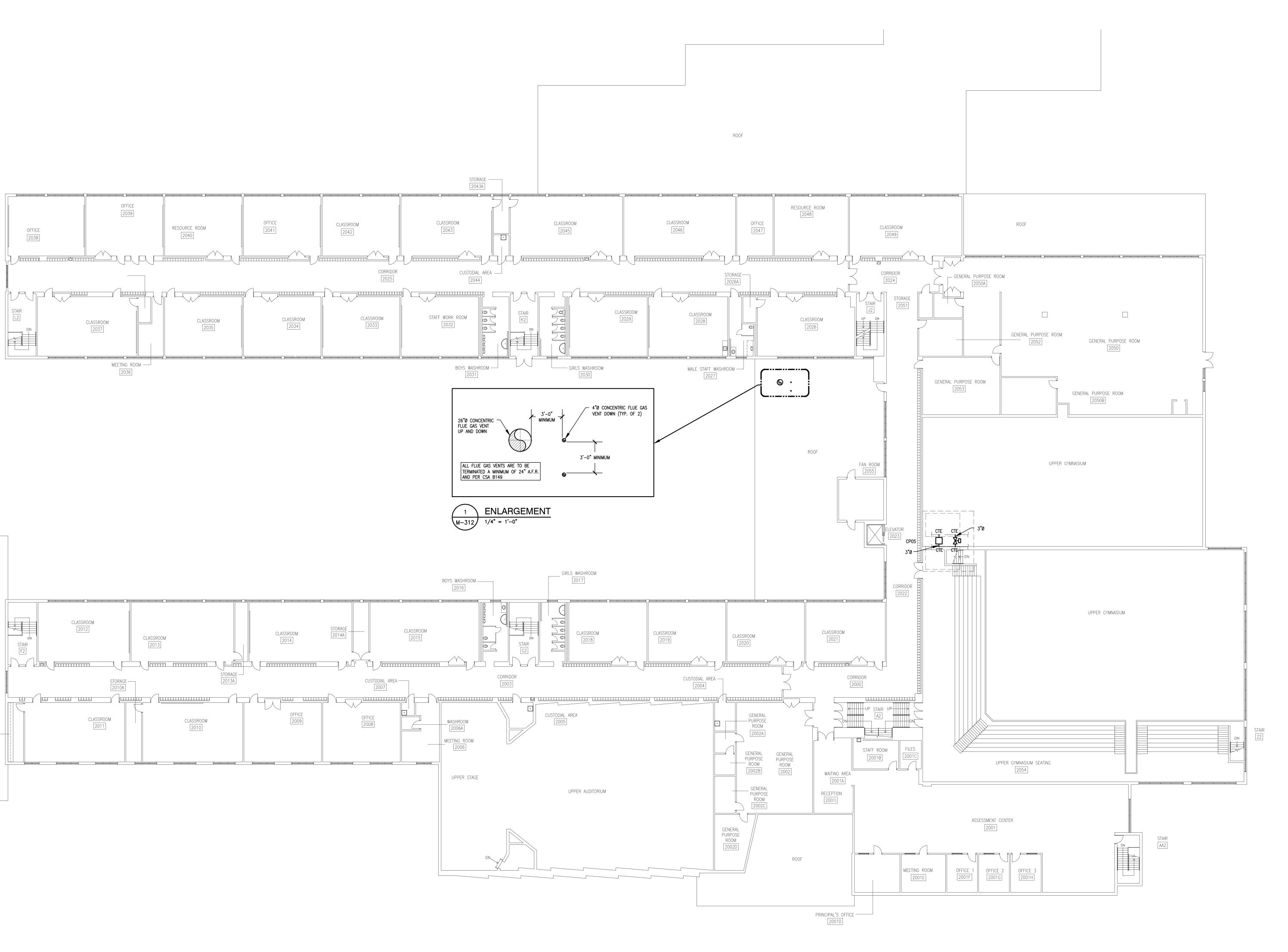
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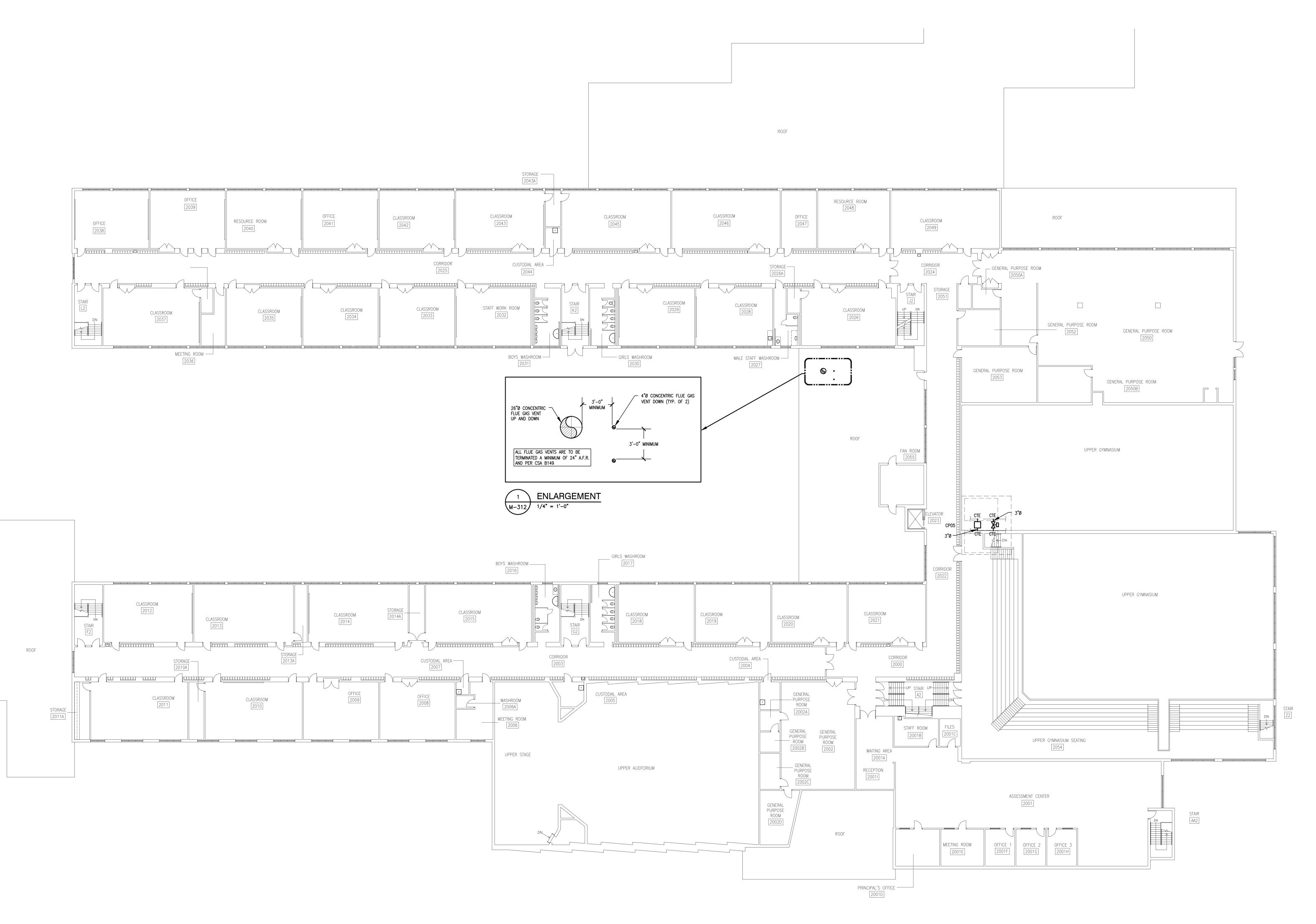
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| A Contact@arcengineering.ca | | | | | |
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| COMMUN | ICATIONS |
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| \triangleleft | COMPUTER OUTLET IN CONDUIT C/W DATA CABLING (SEE SPECS) AND RJ45 OUTLET |
| | VOIP OUTLET IN CONDUIT C/W DATA CABLING (SEE SPECS) AND RJ45 OUTLET |
| ▼ | COMBINATION TELEPHONE AND COMPUTER OUTLET IN CONDUIT C/W 2x DATA CABLING (SEE SPECS). 1x RJ45 AND 1x RJ11 OUTLETS |
| [WAP] | WRELESS ACCESS POINT BACKBOX, FACEPLATE, CONDUIT C/W DATA CABLING (SEE SPECS) AND RJ45 OUTLET |
| ((ෆෟ)) | WFI TRANSMITTER |
| | COMBINATION TELEPHONE AND COMPUTER OUTLET FOR MODULAR FURNITURE. 2x DATA CABLING (SEE SPECS) 1x RJ45 AND 1x RJ11 OUTLETS. FISH CABLING THROUGH FURNITURE AND TERMINATE AT DESK. PROVIDE ADAPTER PLATES FOR DESK. |
| ß | COMPUTER OUTLET FOR MODULAR FURNITURE. DATA CABLING (SEE SPECS) AND RJ45 OUTLET. FISH CABLING THROUGH FURNITURE AND TERMINATE AT DESK. PROVIDE ADAPTER PLATES FOR DESK. |
| $\hat{\nabla}$ | CABLE TV OUTLET – 3/4" (19mm) CONDUIT C/W RG6 CABLING AND F CONNECTOR. |
| ¢ | CLOCK |
| \triangle \triangle | COMMUNICATION DEVICES MOUNTED IN 2 CHANNEL RACEWAY |
| ⊲2 | COMMUNICATION NOTES: NUMBER BESIDE THE OUTLET DENOTES NUMBER OF OUTLETS |

| POWER L | AYOUT |
|------------|--|
| C | DISCONNECT SWITCH (DS) |
| ¥ | COMBINATION STARTER (CS) |
| | MAGNETIC STARTER (MG) |
| ď | MANUAL STARTER (MS) |
| | POWER PANEL - EXISTING |
| | POWER PANEL - NEW |
| | POWER TRANSFORMER |
| | ELECTRIC HEATING EQUIPMENT |
| \bigcirc | EQUIPMENT SUPPLIED BY OTHERS REQUIRING ELECTRICAL POWER CONNECTION REFER TO EQUIPMENT SCHEDULE |
| \bigcirc | EQUIPMENT SUPPLIED BY OWNER REQUIRING ELECTRICAL POWER CONNECTION REFER TO OWNER EQUIPMENT SCHEDULE |
| Þ | MECHANICAL EQUIPMENT/MOTOR REQUIRING ELECTRICAL POWER |
| €₽ | ALL MODES OF OPERATION OF EQUIPMENT SO NOTED TO BE SHUT DOWN BY THE ALARM CONDITION OF THE FIRE ALARM CONTROL PANEL. |
| · | PUSH BUTTON |
| ••• | PUSH BUTTON STATION |
| Ð | THERMOSTAT |
| F | TIME CLOCK |
| L | JIFFY POLE |
| ۲ | 120V HARDWIRE CONNECTION |
| ۲ | 208V, 1Ø HARDWIRE CONNECTION |
| | 208V, 30 HARDWIRE CONNECTION |
| ٩ | 600V, 30 HARDWIRE CONNECTION |
| JB | JUNCTION BOX |
| H | HAND DRYER |
| | FLOOR BOX |

| LEGEND | | | | |
|---|---|--|--|--|
| THIS LEGEND REPRESENTS THE SYMBOLS COMMONLY USED. NOT ALL SYMBOLS MAY APPEAR ON THE DRAWINGS. SHOULD A SYMBOL BE FOUND ON THE DRAWING AND NOT APPEARING ON THE LEGEND, THE CONTRACTOR SHALL SUBMIT A QUESTION TO HAVE THE SYMBOL CLARIFIED IN AN ADDENDUM PRIOR TO SUBMITTING A BID. | | | | |
| ABBREVI | ATIONS | | | |
| 20A | DENOTES 5-20R DEVICE | | | |
| AC | ABOVE COUNTER | | | |
| ADO | AUTOMATIC DOOR OPENER | | | |
| AE | APPROVED EQUAL | | | |
| AFF | ABOVE FINISHED FLOOR | | | |
| AN | FIRE ALARM ANNUNCIATOR | | | |
| BED | RECEPTACLE DEDICATED FOR PATIENT BED | | | |
| BH | BASEBOARD HEATER | | | |
| СВ | CIRCUIT BREAKER | | | |
| ER | EXISTING TO BE RELOCATED | | | |
| EX | EXISTING TO REMAIN | | | |
| FH | FORCED-AIR HEATER | | | |
| GFI | EQUIPMENT SO NOTED TO BE SUPPLIED WITH A GROUND FAULT CIRCUIT INTERRUPTER | | | |
| HSKP | HOUSEKEEPING | | | |
| JB | JUNCTION BOX | | | |
| PD | POWER DOOR | | | |
| R | RELAY WITH AUXILIARY CONTACTS | | | |
| REL | RELOCATED ITEM IN NEW LOCATION | | | |
| REM | EXISTING TO BE REMOVED IN IT'S ENTIRETY | | | |
| Т | TRANSFORMER | | | |
| UH | UNIT HEATER | | | |
| UNO | UNLESS NOTED OTHERWISE | | | |
| W | WALL MOUNT - VERIFY HEIGHT | | | |
| WP | EQUIPMENT SO NOTED TO BE SUPPLIED WITH THE MANUFACTURER'S WEATHER-PROOFING OPTION(S) | | | |
| 3 | KEYNOTE – SEE KEYNOTE No. 3 ON DRAWINGS | | | |
| 3 | KEYNOTE – SEE KEYNOTE No. 3 ON DRAWINGS | | | |
| | | | | |
| SECURITY | Y, ACCESS CONTROL, CCTV | | | |
| ⊞ | AREA TYPE BREAK GLASS DETECTOR | | | |
| _ | | | | |

| SECURITY, ACCESS CONTROL, CCTV | | | |
|--------------------------------|---|--|--|
| ⊞ | AREA TYPE BREAK GLASS DETECTOR | | |
| | SINGLE-PANE TYPE BREAK GLASS DETECTOR | | |
| •• | DOOR CONTACT | | |
| | ROLL-UP OR OVERHEAD DOOR DOOR CONTACT | | |
| ┠ | MOTION DETECTOR | | |
| Ľ | PHOTO-ELECTRIC BEAM SOURCE | | |
| ۵ | PHOTO-ELECTRIC BEAM REFLECTOR | | |
| Ы | SECURITY SYSTEM ALARM SIGNAL | | |
| Σ | TYPE 1 INDOOR CCTV CAMERA, POWER OVER ETHERNET (POE) C/W CAT 6 CABLE & TERMINATION. CEILING MOUNT OR PROVIDE WALL MOUNTING WHERE REQUIRED. REFER TO SPECIFICATIONS. | | |
| 3 | TYPE 3 CCTV CAMERA, IP66 PROTECTION, OUTDOOR 360DEGREE, POE C/W CAT 6 CABLE & TERMINATION. PROVIDE CORNER MOUNTING BRACKET. REFER TO SPECIFCATIONS. | | |
| ß | POWER DOOR PUSH BUTTON OPERATOR | | |
| ADO | AUTOMATIC DOOR OPENER | | |
| С | CARD READER | | |
| ES | ELECTRIC STRIKE | | |
| ELR | ELECTRIC LATCH RETRACTION | | |
| K | ELECTRONIC KEY PAD | | |
| MAG | MAGNETIC LOCK | | |
| OCC | OCCUPIED LIGHT CAMDEN LED ANNUNCIATOR CM-AF-500 | | |
| PTR | PUSH TO RELEASE | | |
| PTL | PUSH TO LOCK CAMDEN PUSHBUTTON CM-400/8 | | |
| REX | REQUEST TO EXIT | | |
| SP | SCRAMBLE PAD | | |
| W | HANDS FREE SWITCH CAMDEN SUREWAVE CM-324/3 | | |

DEMOLITION NOTES

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXACT SCOPE OF DEMOLITION WORK, QUANTITIES AND THOROUGHLY UNDERSTAND THE SITE CONDITIONS FOR CARRYING OUT THE SAME. REQUESTS FOR EXTRAS DUE TO FAILURE TO PROPERLY EVALUATE THE CONDITIONS THAT AFFECT DEMONSTRATE CONDITIONS THAT AFFECT DEMOLITION SCOPE OF WORK WILL NOT BE CONSIDERED.

- 2. BECOME FAMILIAR WITH THE EXISTING BUILDING CONSTRUCTION AND THE LOCATIONS OF THE EXISTING COMMUNICATION CLOSETS, LOCAL POWER PANELS, FIRE ALARM AND OTHER SYSTEMS BEING WORKED ON AS PART OF THIS CONTRACT.
- OPEN EXISTING PANELS AND SYSTEMS TO BECOME FAMILIAR WITH THE EXISTING SYSTEMS AND TO DETERMINE THE FULL SCOPE OF WORK REQUIRED TO CARRY OUT THE PROJECT. THE CONTRACTOR SHALL PROVIDE NEW BREAKERS, DATA/VOICE COMPONENTS, FIRE ALARM DEVICES, LIGHTING SYSTEM COMPONENTS, ETC TO FACILITATE A COMPLETE AND FUNCTIONING SYSTEM AT PROJECT COMPLETION.
- 4. THE CONTRACTOR SHALL MEASURE OFF ANY DISTANCES NOT INDICATED FOR HOME RUNNING NEW SERVICES (POWER, FIRE ALARM, SECURITY ETC) AND INCLUDE MATERIALS AND LABOUR REQUIRED IN THEIR BID PRICE.
- 5. COORDINATE ALL DEMOLITION WITH GENERAL CONTRACTOR. EVERY EFFORT HAS BEEN MADE TO OUTLINE THE DEMOLITION SCOPE OF WORK, HOWEVER THE DEMOLITION DRAWINGS REPRESENT ONLY THE GENERAL LOCATION AND NUMBER OF FITTINGS, FIXTURES, DEVICES, EQUIPMENT ETC. TO ASSIST IN EVALUATING THE DEMOLITION SCOPE OF WORK. DRAWINGS ARE BASED ON PREVIOUS AS-BUILTS OR FIELD EVALUATIONS.
- SHOULD THE CONTRACTOR ENCOUNTER ANY ASBESTOS DURING THE WORK, THEY SHALL STOP WORK AND NOTIFY THE OWNER IMMEDIATELY.
- 7. THE CONTRACTOR SHALL PATCH, REPAIR AND RESTORE FIRE-SEPARATIONS AS REQUIRED FOR INSTALLATION OF ELECTRICAL RACEWAYS AND OUTLETS IN WALLS AND EXTERIOR WALLS.
- 8. THE CONTRACTOR SHALL SUBMIT QUESTIONS IN WRITING 5 DAYS PRIOR TO TENDER CLOSING TO ALLOW FOR QUESTIONS TO BE FORMALLY ANSWERED IN AN ADDENDUM.
- 9. UNLESS EXISTING CIRCUITS NUMBERS ARE INDICATED ON THE DEMOLITION PLANS, ALL CIRCUITS SHOWN ON THE NEW LAYOUTS ARE NEW CIRCUITS. EXCEPTIONS TO THIS INCLUDE CIRCUITS SHOWN ON THE DEMOLITION PLAN AND AGAIN ON THE NEW LAYOUT. THE CIRCUIT SHOWN BOTH TIMES IS EXISTING AND LOCALIZED IN THE AREA OF WORK. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING FOR ALL NEW CIRCUITS: NEW CONDUIT, WIRING, BREAKERS, SUPPORTS, BACKBOXES, FACEDLATES, DECERTACIES, STO, FOR A CONDUST. FACEPLATES, RECEPTACLES, ETC FOR A COMPLETE SYSTEM.
- 10. EXISTING CIRCUITS BEING REUSED WILL BE INDICATED BY A CIRCUIT NUMBER (IE 2A15) OR A GENERIC NUMBER (IE CCT7). CCT 7 INDICATES THAT THE LIGHTING OR DEVICE IS TO BE CONNECTED TO 1 OF 7 EXISTING CIRCUITS IN THE AREA THAT HAS BECOME FREE AFTER DEMOLITION. THE CONTRACTOR SHALL BALANCE LOADS AND SHUFFLE BREAKERS AFTER THE PANEL LOADS HAVE BEEN CONNECTED TO EQUALLY LOAD EACH PHASE.
- 1. WHERE EXISTING LIGHTING CIRCUITS HAVE BEEN REUSED, CONTRACTOR SHALL VERIFY EXISTING VOLTAGE OF CIRCUITS PRIOR TO SUBMITTING ANY SHOP DRAWINGS OR ORDERING OF FIXTURES, SENSORS, CONTROLS, ETC. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES IN FIXTURE VOLTAGE AND EXISTING CIRCUIT VOLTAGE.

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| 1. THE ELECTRICAL DRAWINGS REPRESENT A PORTION OF THE CONTRACT. THE CONTRACTOR IS TO FAMILIARIZE | than that authorized by Seguin Engineering Inc. is forbidden. |
| THEMSELVES WITH ALL OF THE DRAWINGS IN THE PACKAGE AS SOME WORK MAY BE SHOWN ON OTHER DRAWINGS IN THE PACKAGE. CONTRACTOR IS TO | The drawing is not to be scaled. The Contractor shall verify and be responsible for all dimensions. Any errors or omissions shall be reported to Sequip Engineering Inc. |
| DETERMINE FULL EXTENT OF PROJECT PRIOR TO SUBMITTING BID. | © COPYRIGHT 2025 - Seguin Engineering Inc. |
| THE DRAWINGS ARE NOT TO BE SCALED FOR | |
| INSTALLATION PURPOSES. ALL MEASUREMENTS ARE TO BE OBTAINED FROM ARCHITECTURAL PLANS, ELEVATIONS, SHOP DRAWINGS OR BE OBTAINED FROM | Notes: |
| FIELD MEASUREMENTS. | |
| CONTRACTOR IS TO REVIEW ARCHITECTURAL DRAWINGS AND PROVIDE ALL NECESSARY PARTS AND ACCESSORIES AND FIRESTOPPING AS REQUIRED TO CONFORM WITH ARCHITECTURAL FIRE RATINGS. | |
| CONTRACTOR IS TO REMOVE ALL EXISTING DEAD AND ABANDONED CONDUIT AND WIRING BACK TO SOURCE. | |
| WHERE NOT POSSIBLE TO REMOVE EXISTING CONDUIT, CONDUIT IS TO BE LEFT BEHIND AND EXISTING WIRE IS TO BE REMOVED AND REPLACED WITH A PULL ROPE. CONTRACTOR IS TO PATCH AND PAINT WHERE REQUIRED FOR ALL REMOVALS. | |
| CONTRACTOR IS TO PROVIDE ELECTRONIC CAD 'AS-BUILT' DRAWINGS IN DWG AND PDF FORMAT AT THE COMPLETION OF THE PROJECT. CAD FILES ARE TO BE AUTOCAD 2010. | |
| UNLESS NOTED OTHERWISE ALL WIRING SHALL BE IN CONDUIT AND CONCEALED IN WALLS AND CEILING SPACES. BX IS PERMITTED IN SPECIAL CIRCUMSTANCES AND SHORT DROPS FROM JUNCTION BOXES TO LIGHT FIXTURES, REFER TO SPECIFICATIONS. CONDUIT RUNS | |
| ARE TO BE PARALLEL TO WALL STUDS AND DROP FROM JUNCTION BOXES MOUNTED IN THE CEILING SPACE. HORIZONTAL RUNS IN WALLS WILL ONLY BE ACCEPTED UNDER SPECIAL CIRCUMSTANCES (IE OFFSET TO AVOID STRUCTURAL ABOVE) WITH WRITTEN APPROVAL FROM THE OWNER/CONSULTANT. | |
| ALL DATA/COMM WIRING FROM EACH OUTLET IS TO BE PROVIDED IN MIN. 1" (25mm) CONDUITS FROM OUTLET | |
| TO THE SOURCE (RACK AND/OR BIX BLOCK). CONTRACTOR CAN GROUP CABLING AND INSTALL A LARGER RUN BACK TO THE SOURCE. WHERE CABLE IS | |
| PERMITTED TO RUN FREE-AIR; A CONDUIT SHALL BE INSTALLED FROM THE OUTLET INTO AN ACCESSIBLE | |
| CEILING SPACE. PROVIDE BUSHINGS AT TOP OF WALL AND TRANSITION TO J-HOOKS (WITHIN ROOM) OR | |
| CABLE TRAY (AT CORRIDOR). CABLE IS NOT PERMITTED TO BE LAYING ON CEILING. COMM WIRING SHALL BE IN CONDUIT FOR ALL EXPOSED AREAS. | |
| FREE AIR COMM WIRING TRANSITIONING FROM ACCESSIBLE CEILINGS TO EXPOSED CEILINGS SHALL BE | |
| IN CONDUIT THROUGHOUT THE EXPOSED AREA. PROVIDE 12" (300mm) STUBS INTO THE EXPOSED AREAS WITH BUSHINGS. CONDUIT SHALL NOT EXCEED | |
| 40% FILL. | |
| UNLESS SPECIFICALLY NOTED AS "CABLING BY OTHERS", THE CONTRACTOR SHALL INCLUDE FOR ALL CABLING TO DEVICES, OUTLETS, ETC AS SHOWN FOR A COMPLETE AND FUNCTIONING SYSTEM(S). | |
| EQUIPMENT BEING REMOVED AND NOT BEING REUSED REMAIN THE PROPERTY OF THE OWNER AND IS TO BE | |
| STORED ON SITE. ANY EQUIPMENT THE OWNER DEEMS NO INTEREST IN IS TO BE DISPOSED OF IN A LAWFUL | |
| AND SAFE MANNER BY THIS TRADE. | |
| WING LIST | |
| D GENERAL NOTES, DRAWING LIST, LEGEND AND | |
| FIXTURE SCHEDULE D SPECIFICATIONS | |
| D BASEMENT FLOOR SITE PLAN | |
| 1 FIRST FLOOR SITE PLAN | |
| 2 SECOND FLOOR SITE PLAN | |
| 0 DEMOLITION BOILER ROOM FLOOR PLAN 0 PROPOSED BOILER ROOM FLOOR PLAN | 0 ISSUED FOR PERMIT/TENDER 2025.03.13 KS |
| 0 PROPOSED BOILER ROOM FLOOR PLAN 0 PRE-EXISTING MCC DETAILS | No. Revision Date By |
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- GENERAL
- THIS SPECIFICATION SHALL APPLY TO AND GOVERN ALL WORK 1.1. OF DIVISION 16. THE ELECTRICAL CONTRACTOR SHALL BE A SUBCONTRACTOR TO THE GENERAL CONTRACTOR AND HIS BID SHALL BE TENDERED DIRECTLY TO THE GENERAL CONTRACTOR THE CONTRACTOR SHALL SUPPLY, INSTALL, WIRE AND CONNECT ALL EQUIPMENT, ACCESSORIES, DEVICES ETC SHOWN UNLESS SPECIFICALLY NOTED OTHERWISE. SHOULD THE CONTRACTOR BE UNSURE, THEY ARE TO SUBMIT A QUESTION PRIOR TO TENDER CLOSE TO HAVE AN ADDENDUM ISSUED TO CLARIFY THE DEVICE, EQUIPMENT OR WORK SCOPE IN QUESTION.
- 1.2. IT IS THE CONTRACTORS RESPONSIBILITY TO OBTAIN ALL DRAWINGS AND SPECIFICATIONS PRIOR TO TENDER SUBMITTAL ELECTRICAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS. ANY DISCREPANCIES BETWEEN THESE SPECIFICATIONS AND THE DRAWINGS THAT CAUSES DOUBT AS TO THE TRUE MEANING O INTENT OF THE DRAWINGS AND SPECIFICATIONS, A RULING SHALL BE OBTAINED FROM THE ENGINEER PRIOR TO TENDER SUBMITTAL NO ALLOWANCE WILL BE MADE FOR FAILURE TO DO SO. I CLARIFICATION CAN NOT BE OBTAINED IN TIME. THE CONTRACTOR SHALL INCLUDE FOR THE MORE COSTLY INSTALLATION IN THEIR BID.
- LIABILITY INSURANCE: OBTAIN AND CARRY PROPER INSURANCE TO FULLY PROTECT BOTH THE OWNER AND HIMSELF FROM ANY 1.3. AND ALL CLAIMS DUE TO ACCIDENTS, MISFORTUNES, ACTS OF GOD. ETC.
- 1.4. CODES, PERMITS AND INSPECTION
 - 1.4.1. BE RESPONSIBLE FOR AND OBTAIN ALL PERMITS, INSPECTION, ETC., AS REQUIRED BY ALL AUTHORITIES HAVING JURISDICTION OVER THIS WORK AND PAY FOR ALL FEES RELATED TO SAME. 1.4.2. DELIVER ALL PERMITS TO THE ENGINEER AS SOON AS

- THEY BECOME AVAILABLE. 1.5. <u>CLOSE OUT DOCUMENTS AND AS-BUILT DRAWINGS</u>:
 - 1.5.1. THE CONTRACTOR SHALL SUBMIT AN ENQUIRY TO THE ARCHITECT/OWNER TO OBTAIN THE FINAL ROOM NAMES AND NUMBERS TO BE USED IN ALL THE CLOSE OUT DOCUMENTS. REPORTS. FIRE ALARM/NURSE CALL PROGRAMMING, PANEL SCHEDULES ETC. FAILURE TO USE THE FINAL NAMES AND NUMBERS WILL REQUIRE TH CONTRACTOR TO REPLACE DOCUMENTATION/REPROGRAM AS REQUIRED AT THEIR EXPENSE. THEY SHALL KEEP A SEPARATE SET OF WHITE PRINTS ON THE SITE AND NOTE ALL CHANGES AND DEVIATIONS FROM THE ORIGINAL DESIGN. DEVICES ETC NOTED AS "EX" (EXISTING) AND "REL" RELOCATED ARE TO HAVE THE CIRCUIT TRACED AND DESIGNATED ON THE DRAWINGS. DEVICES ETC DESIGNATED AS CONNECT TO EXISTING CIRCUIT IN AREA ARE TO HAVE THE CIRCUIT INDICATED ON THE PLANS. PROVIDE AS-BUILT DRAWINGS IN AUTOCAD FORMAT (MIN. RELEASE 2010), PDF FORMAT AND (2) TWO SETS OF THESE PLANS SHOWING ALL AS-BUILT CONDITIONS ' THE OWNER AT THE COMPLETION OF THIS CONTRACT AND BEFORE APPLYING FOR FINAL PAYMENT. (INCLUDE IN-SLAB CONDUIT RUNS). SHOULD NO MARKUPS BE REQUIRED TENDER AND/OR SEALED PLANS BY THE ENGINEER WILL NOT BE ACCEPTED.
 - 1.5.2. CLOSE OUT BINDERS SHALL BE PROVIDED WITH ALL TEST RESULTS, WARRANTY LETTERS AND SHOP DRAWINGS. A PDF COPY SHALL BE PROVIDED ALONG WITH THE HARD COPY VERSIONS. PDF VERSION SHALL BE ASSEMBLED VERSIONS WHERE POSSIBLE. SHOULD A DOCUMENT REQUIRE SCANNING, IT SHALL BE PROVIDED IN HIGH RESOLUTION AND BE CLEARLY LEGIBLE. ILLEGIBLE DOCUMENTS WILL NOT BE ACCEPTED.
- 1.6. <u>CODES AND STANDARDS</u>: (CURRENT EDITIONS)
 - 1.6.1. DO COMPLETE INSTALLATION IN ACCORDANCE WITH C.S.A C22.1 EXCEPT WHERE SPECIFIED OTHERWISE. 1.6.2. COMPLY WITH C.S.A. ELECTRICAL BULLETINS IN FORCE AT
 - TIME OF TENDER SUBMISSION, WHILE NOT IDENTIFIED AND SPECIFIED BY NUMBER IN THIS DIVISION, ARE TO BE CONSIDERED AS FORMING PART OF RELATED C.S.A. PART II STANDARD 1.6.3. DO OVERHEAD AND UNDERGROUND SYSTEMS IN
 - ACCORDANCE WITH C.S.A. C22.3 NO. 1 EXCEPT WHERE 1.16 SPECIFIED OTHERWISE. 1.6.4. ABBREVIATIONS FOR ELECTRICAL TERMS: TO C.S.A. Z85.
 - 1.6.5. COMPLY ALSO WITH THE FOLLOWING CODES:
 - 1.6.5.1. ONTARIO ELECTRICAL SAFETY CODE
 - 1.6.5.2. NATIONAL BUILDING CODE 1.6.5.3. ONTARIO BUILDING CODE
 - 1.6.5.4. LOCAL HYDRO UTILITY REQUIREMENTS
 - 1.6.5.5. CAN/ULC S524, S537 AND S1001
- <u>VISITING THE SITE</u>: VISIT THE SITE OF THE PROJECT AND BECOME FAMILIAR WITH THE SITE CONDITIONS. REPORT ANY 1.7. DEVIATION AND/OR CONFLICTS BETWEEN TENDER DOCUMENTS AND SITE CONDITIONS.
- LOCATION OF OUTLETS: CHANGE LOCATION OF OUTLETS, 1.19. EQUIPMENT AT NO EXTRA COST OR CREDIT, PROVIDING DISTANCE 1.8. DOES NOT EXCEED 10'-0" (3m) AND INFORMATION IS GIVEN BEFORE INSTALLATION.
- <u>CUTTING AND PATCHING</u>: PROVIDE ALL CUTTING, PATCHING AND PAINTING FOR ELECTRICAL WORK, UNLESS NOTED OTHERWISE. 1.9.
- EQUIPMENT AND MATERIAL; ALL EQUIPMENT AND MATERIAL, UNLESS SPECIFICALLY NOTED OTHERWISE, SHALL BE NEW AND 1.10. WITHOUT BLEMISH OR DEFECT. ALL MATERIAL AND EQUIPMENT SHALL BEAR U.L.C. OR C.S.A. LABELS.
- WARRANTY: WARRANT ALL WORK AND APPARATUS INSTALLED UNDER THIS CONTRACT FOR A PERIOD OF ONE YEAR AFTER 1.11. ACCEPTANCE OF SAME BY THE OWNER.
- MAINTENANCE OF SERVICE: PROVIDE ALL LABOUR AND MATERIALS NECESSARY TO ENSURE THAT POWER, LIGHTING AND 1.12. ALL OTHER MISCELLANEOUS ELECTRICAL SERVICES ARE MAINTAINED IN FULL OPERATING CONDITION, IN ALL AREAS OF THE EXISTING BUILDING, DURING THE CONSTRUCTION PERIOD. DISCONNECT, MOVE, RELOCATE, AND RECONNECT CONDUIT AND WIRING AS NECESSARY TO ACCOMMODATE THE NEW WORK AND MECHANICAL INSTALLATION.
- 1.13. <u>CLEANING</u> 1.13.1. DO FINAL CLEANING.
 - 1.13.2. AT TIME OF FINAL CLEANING, CLEAN EQUIPMENT SURFACES THAT HAVE BEEN EXPOSED TO CONSTRUCTION DUST AND DIRT.
- 1.13.3. VACUUM INSIDE OF ALL PANEL BOARDS, ETC., ON COMPLETION OF THE PROJECT. 1.14. SHOP DRAWINGS. PRODUCT DATA AND SAMPLES
 - 1.14.1. SUBMIT SHOP DRAWINGS, PRODUCT DATA AND/OR SAMPLES FOR ALL EQUIPMENT, POWER DISTRIBUTION, POWER DEVICES, COMMUNICATIONS DEVICES, RACEWAY LIGHT FIXTURES, EMERGENCY LIGHTING, ETC. TH DRAWINGS ARE TO BE REVIEWED AND STAMPED BY BOTH THE GENERAL AND ELECTRICAL CONTRACTOR PRIOR TO
 - 1.14.2. SHOP DRAWINGS SHALL INCLUDE ALL RELEVANT 1.22 ACCESSORIES AND LAYOUTS WHERE REQUESTED.
 - 1.14.3. SHOP DRAWINGS THAT ARE ILLEGIBLE AND OF POOR QUALITY WILL BE REJECTED.
 - 1.14.4. SHOP DRAWINGS WILL BE REVIEWED AND RETURN MARKED "REVIEWED", "REVIEWED AS MODIFIED" OR "REVISE AND RESUBMIT". THE DRAWING REVIEW DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR ITS ACCURACY OR FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS.
 - 1.14.5. INSTALLATION OF ANY EQUIPMENT SHALL NOT START UNTIL AFTER FINAL REVIEW OF SHOP DRAWINGS BY THE CONSULTANT HAS BEEN OBTAINED.
 - 1.14.6. INCOMPLETE OR INCORRECT SHOP DRAWINGS THAT ARE REJECTED. WHICH ADVERSELY CAUSE OR RESULT IN ANY DELAY OF THE DELIVER SCHEDULE OF ANY EQUIPMENT SHALL BE THE CONTRACTORS RESPONSIBILITY.
 - 1.14.7. IF INCORRECT SHOP DRAWINGS ARE SUBMITTED AND REJECTED ANY SUBSEQUENT DELIVERY DELAY WILL RESULT IN THE CONTRACTOR PROVIDING TEMPORARY FACILITIES UNTIL SAID EQUIPMENT IS DELIVERED AND INSTALLED AT NO EXTRA COST TO THE OWNER.
 - 1.14.8. PROVIDE SPACE FOR SHOP DRAWING REVIEW STAMPS FOR THE CONTRACTOR AND CONSULTANT. THIS SPACE SHALL BE CLEAR OF ALL TECHNICAL INFORMATION AND SHALL NOT BE ON THE BACK OF ANY SHEETS.
 - 1.14.9. SUBMIT SHOP DRAWINGS IN DIGITAL (PDF) FORMAT.

| | BE RETURNED. ALL COPIES REQUIRED BY TRADES, SUPPLIERS OR OTHER CONSULTANTS WILL BE PROVIDED | 1.20. | 1.23.1. MEASURE NORMAL |
|-------|---|-------|--|
| | AND/OR PRINTED BY THE CONTRACTOR. 1.14.11. FAILURE TO SUBMIT SHOP DRAWINGS WILL NOT RELIEVE THIS CONTRACTOR FROM ENSURING THAT ALL INSTALLED EQUIPMENT MEETS THE INTEND OF DESIGN DOCUMENTS. ALL COSTS ASSOCIATED WITH ANY ISSUES ASSOCIATED | | ACCEPTA REQUIREI BETWEEN 1.23.2. MEASURE TRANSFO |
| | WITH ALTERNATE OR NOT SUBMITTED EQUIPMENT WILL THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR. 1.14.12. SHOP DRAWING SUBMITTAL SHALL BE (BUT NOT LIMITED | | OF EQUIF 1.23.3. SUBMIT, |
| | TO) FOR ANY EQUIPMENT AS LISTED; 1.14.12.1. HIGH VOLTAGE EQUIPMENT 1.14.12.2. SWITCHBOARD, METER CENTERS, PANEL | | PHASE DRY-COF CENTRES AND DAT VOLTAGE |
| | BOARDS 1.14.12.3. FIRE ALARM SYSTEMS 1.14.12.4. LUMINAIRES INCLUDING LAMPS AND BALLASTS | 1.24. | 1.24.1. INSTALL |
| | 1.14.12.5. LIGHTING CONTROLS | | CONCRET STEEL PI PROTRUD |
| | 1.14.12.6. EMERGENCY BATTERY UNITS AND FIXTURES 1.14.12.7. ELECTRICAL HEATERS | | 1.24.2. IF PLAST FLOORS, |
| | 1.14.12.8. SECURITY SYSTEM 1.14.12.9. MASTER CLOCK AND PROGRAM | | 1.24.3. INSTALL EMBEDDE BUILDING |
| | 1.14.12.10.INTERCOM SYSTEM 1.14.12.11. PUBLIC ADDRESS SYSTEM | 1.25. | MINIMUM. |
| | 1.14.12.12. MILLWORK 1.14.12.13. DEVICES | | 1.25.1. THE FOL THE SPE |
| 1.15. | DRAW BREAKDOWNS: | | 1.25.1.1. |
| | 1.15.1. THIS CONTRACTOR <u>MUST</u> SUBMIT A BREAKDOWN OF THE TENDER PRICE INTO SEPARATE CLASSIFICATION TO THE SATISFACTION OF THE CONSULTANT AND TOTALING THE TOTAL CONTRACT AMOUNT. EACH ITEM IS TO BE BROKEN INTO MATERIAL AND LABOUR COSTS. | | 1.25.1.2. |
| | 1.15.2. PROGRESS DRAWS, WHEN SUBMITTED, ARE TO BE ITEMIZED AGAINST EACH OF THE DRAW BREAKDOWNS AND SHALL BE IN TABLE FORM IDENTIFYING CONTRACT AMOUNT, AMOUNT OF THIS DRAW, TOTAL TO DATE, | | 1.25.1.3. |
| | PERCENTAGE COMPLETE AND BALANCE. 1.15.3. BREAKDOWN SHALL FOLLOW, BUT NOT BE LIMITED TO; 1.15.3.1. PERMITS AND FEE | | 1.25.1.4. 1.25.1.5. |
| | 1.15.3.2. MOBILIZATION 1.15.3.3. DEMOLITION | | 1.25.1.6. |
| | 1.15.3.4. DISTRIBUTION EQUIPMENT (IE. SWITCHBOARDS, PANELBOARDS, ETC.) | | |
| | 1.15.3.5. INCOMING FEEDERS AND CONDUITS 1.15.3.6. BRANCH WIRING CONDUITS | | |
| | 1.15.3.7. BRANCH WIRING | | 1.25.1.7. |
| | 1.15.3.8. MECHANICAL EQUIPMENT WIRING 1.15.3.9. FIRE ALARM DEVICES | 1.26. | <u>PHASING</u> 1.26.1. THE CO |
| | 1.15.3.10. FIRE ALARM WIRING 1.15.3.11. FIRE ALARM VERIFICATION AND CERTIFICATION | | INDICATE ARCHITEC DRAWING |
| | 1.15.3.12. EXIT AND EMERGENCY LIGHTING 1.15.3.13. LIGHTING | | 1.26.2. THE CO CONNECT |
| | 1.15.3.14. LIGHTING CONTROLS 1.15.3.15. VOICE AND COMMUNICATION CONDUITS | | 1.26.3. THE CON AND PR |
| | 1.15.3.16. VOICE AND COMMUNICATION WIRING AND TERMINATIONS | 2. | PHASING <u>PRODUCTS</u> |
| | 1.15.3.17. ACCESS CONTROL AND SECURITY 1.15.3.18. MISCELLANEOUS AND SPECIALTY EQUIPMENT | 2.1. | ELECTRICAL EQUI 2.1.1. EQUIPMEN |
| | (IE. PUBLIC ADDRESS, SOUND, ETC.) 1.15.4. ABOVE BREAKDOWN MUST BE APPROVED BY THE | | FRONT 0 2.1.2. ELECTRIC |
| | CONSULTANT PRIOR TO SUBMISSION OF THE FIRST DRAW, MOBILIZATION AMOUNT MAY ONLY BE DRAWN WHEN ALL REQUIRED SHOP DRAWINGS HAVE BEEN REVIEWED BY THE | | SHALL H EQUIPMEN 2.1.3. ALL EQU |
| 1.16. | CONSULTANT REVISIONS TO CONTRACT: | 2.2. | TO BE CO |
| | 1.16.1. PROVIDE ITEMIZED LISTS OF MATERIALS/ASSOCIATED COSTS, LABOUR RATE/LABOUR FOR EACH ITEM, COPY OF MANUFACTURERS INVOICE, IF REQUESTED, FOR EACH ITEM | | 2.2.1. PANEL LOADCEN |
| 1.17. | GIVEN CHANGE NOTICE. ROOF AND WALL OPENINGS: | | 2.2.2. PANEL B MANUFAC |
| | 1.17.1. LOCATION OF CONDUITS PASSING THROUGH ROOF AND WALLS TO BE COORDINATED WITH DIVISION 15. ALL OPENINGS TO BE MADE WATERTIGHT. | | 2.2.3. 120/208 BREAKER INTERRUF |
| 1.18. | <u>SCHEDULE OF CONSTRUCTION:</u> 1.18.1. CONSULT GENERAL DIVISION FOR SCHEDULE OF | | DRAWING 2.2.4. MAIN COMPART |
| | CONSTRUCTION BEFORE COMMENCING WORK AND COORDINATE DETAILS WITH ENGINEER, OWNER AND ALL TRADES DURING CONSTRUCTION. | | MAIN BF WILL NOT |
| 1.19. | DIRECTORIES AND LABELLING; | | 2.2.5. SEQUENC BREAKER BREAKER |
| | 1.19.1. IDENTIFY ALL ELECTRICAL EQUIPMENT. IDENTIFICATION SHALL CONSIST OF ENGRAVED LAMACOID NAMEPLATES HAVING BLACK BACKGROUND WITH WHITE LETTERS. | | IDENTIFIC |
| | SHALL CONSIST OF ENGRAVED LAMACOID NAMEPLATES HAVING BLACK BACKGROUND WITH WHITE LETTERS. FASTEN NAMEPLATES TO DEVICE USING SELF-TAPPING, COUNTERSUNK SCREWS. TAPE-TYPE NAMEPLATES WILL NOT BE ACCEPTED. | | |
| | 1.19.2. ALL RECEPTACLE COVER PLATES SHALL BE LABELED WITH TAPE-TYPE NAMEPLATES. THE LABEL SHALL | | 2.2.7. TWO (2) BOARDS 2.2.8. COPPER |
| | INDICATE THE PANEL DESIGNATION AND CIRCUIT NUMBER. (IE A19). TAPE SHALL BE NEATLY TRIMMED ON EACH END AND PLACED PLUMB AND LEVEL ON THE FACE PLATE. LABELS SHALL HAVE A NEAT, CLEAN AND | | 2.2.9. MAINS F |
| | PLATE. LABELS SHALL HAVE A NEAT, CLEAN AND PROFESSIONAL APPEARANCE. LABELS NOT TRIMMED OR POORLY POSITIONED WILL NOT BE ACCEPTED. | | 2.2.10. FINISH TH SAME AS |
| | 1.19.3. ALL PANELS WITH CIRCUITS ADDED OR REMOVED SHALL HAVE NEW COMPUTER GENERATED PANEL SCHEDULES | | 2.2.11. COMPLET SHOWING LOCATION |
| | PLACED IN THEM. SCHEDULE SHALL INDICATE PANEL DESIGNATION, WHERE PANEL IS FED FROM, VOLTAGE, PHASE, BRANCH CIRCUIT NUMBERS, BREAKER AMPERAGE | | 2.2.12. EATON C MANUFAC |
| 1.20. | AND CIRCUIT DESCRIPTION. GROUNDING: | 2.3. | BREAKERS GENE 2.3.1. BOLT-ON |
| | 1.20.1. GROUND ALL EQUIPMENT IN ACCORDANCE WITH CODE REQUIREMENTS AND AS INDICATED. | | (I.E., 1" TYPE, FO TEMPERA |
| | 1.20.2. GROUNDING CONDUCTORS: COPPER, INSULATED (GREEN); SIZE PER CODE. | | (MINI-BR 2.3.2. MAGNETIC |
| | 1.20.3. GROUNDING LUGS, CONNECTORS: APPROVED GROUNDING TYPE. 1.20.4. ALL GROUND CONDUCTORS #8AWG OR SMALLER SHALL | | BREAKER CURRENT |
| 1.21. | 1.20.4. ALL GROUND CONDUCTORS #8AWG OR SMALLER SHALL BE RUN IN EMT. FIREPROOFING: | 2.4. | DISCONNECT SWI 2.4.1. ENCLOSE |
| · | 1.21.1. WHERE CABLES PASS THROUGH FLOORS OR FIRE RATED WALLS, PACK SPACE BETWEEN WIRING AND SLEEVE FULL | | NON-HAZ |
| | WITH APPROVED RATED FIRE STOPS AND SEAL WITH CAULKING COMPOUND CONFORMING TO CGSB 19—GP—9Ma. | | 2.4.3. FUSIBLE INDICATE 2.4.4. PROVISIO |
| 1.22. | MOUNTING HEIGHTS: 1.22.1. MOUNTING HEIGHT OF EQUIPMENT IS FROM FINISHED | | BY THRE 2.4.5. MECHANI |
| | FLOOR TO CENTRELINE OF EQUIPMENT UNLESS SPECIFIED OR INDICATED OTHERWISE. 1.22.2. IF MOUNTING HEIGHT OF EQUIPMENT IS NOT SPECIFIED | | OPENING 2.4.6. QUICK-M |
| | OR INDICATED, VERIFY BEFORE PROCEEDING WITH INSTALLATION | | 2.4.7. ON/OFF ENCLOSU |
| | 1.22.3. INSTALL ELECTRICAL EQUIPMENT AS SPECIFIED IN THE OBC FOR BARRIER FREE DESIGN. IF NOT NOTED, INSTALL AT FOLLOWING CENTERLINE HEIGHTS: | | 2.4.8. C.S.A. EN 2.4.9. EATON C |
| | 1.22.3.1. LOCAL SWITCHES: 3'-5" (1050mm). | 2.5. | MANUFAC CONDUCTORS |
| | 1.22.3.2. WALL RECEPTACLES: 1.22.3.2.1. GENERAL: $1'-6''$ (450mm). | | 2.5.1. ALL CON OTHERWS 2.5.2. CONDUCT |
| | 1.22.3.2.2. ABOVE TOP OF CONTINUOUS BASEBOARD HEATER: 10" (250mm). 1.22.3.2.3. ABOVE TOP OF COUNTERS OR COUNTER | | 2.5.2. CONDUCT CONDUCT 2.5.3. CONDUCT |
| | 1.22.3.2.3. Above for or counters or counter SPLASH BACKS: 6" (150mm). 1.22.3.2.4. MECHANICAL ROOMS: $3'-5"$ (1050mm). | | EXCEPT MINIMUM INDICATE |
| | 1.22.3.3. PANELBOARDS: AS REQUIRED BY CODE OR AS INDICATED. | | 2.5.4. PANEL VERIFIED |
| | 1.22.3.4. TELEPHONE AND INTERPHONE OUTLETS: 1'–6" (450mm). | | SO AS INSTALLA |

1.14.10. ONE (1) ORIGINAL COPY IN DIGITAL FORMAT (PDF) WILL 1.23. LOAD BALANCE:

- TELEPHONE AND INTERPHONE OUTLETS: 1'-6" (450mm). 1.22.3.4.
- 1.22.3.5. TELEVISION OUTLETS: 1'-6" (450mm).
- 1.22.3.6. FIRE ALARM PULL STATIONS: 3'-9" (1150mm).

- 1.23.1. MEASURE PHASE CURRENT TO PANELBOARDS WITH LOADS (LIGHTING) OPERATING AT TIME OF ANCE. ADJUST BRANCH CIRCUIT CONNECTIONS AS ED TO OBTAIN BEST BALANCE OF CURRENT N PHASES AND RECORD CHANGES. RE PHASE VOLTAGES AT LOADS AND ADJUST ORMER TAPS TO WITHIN 2% OF RATED VOLTAGE AT COMPLETION OF WORK, REPORT LISTING AND NEUTRAL CURRENTS ON PANELBOARDS, DRE TRANSFORMERS AND MOTOR CONTROL S, OPERATING UNDER NORMAL LOAD. STATE HOUR
 - TE ON WHICH EACH LOAD WAS MEASURED, AND E AT TIME OF TEST. CABLE INSTALLATION: L CONDUIT AND SLEEVES PRIOR TO POURING OF ETE. SLEEVES THROUGH CONCRETE: SCHEDULE 40
 - PIPE, SIZED FOR FREE PASSAGE OF CONDUIT, AND JDING 2" (50mm). STIC SLEEVES ARE USED IN FIRE RATED WALLS OR REMOVE BEFORE CONDUIT INSTALLATION.
 - CABLES, CONDUITS AND FITTINGS TO BI DED OR PLASTERED OVER, NEATLY AND CLOSE TO G STRUCTURE SO FURRING CAN BE KEPT TO
 - OLLOWING ARE DEFINITIONS OF WORDS FOUND IN PECIFICATION AND ON ASSOCIATED DRAWINGS: "CONCEALED" - HIDDEN FROM NORMAL SIGHT IN FURRED IN SPACES, SHAFTS, CEILING SPACES, WALLS, UNDERFLOOR AND PARTITIONS. "EXPOSED" - ALL ELECTRICAL WORK EXPOSED

2.6.

2.7.

- TO BUILDING OCCUPANTS. WIRE AND CABLING SHALL BE IN CONDUIT UNLESS SPECIFICALLY NOTED OTHERWISE. "PROVIDE" (AND ALL TENSES OF "PROVIDE") SUPPLY, INSTALL, WIRE AND CONNECT
- COMPLETE. "INSTALL" (AND ALL TENSES OF "INSTALL") INSTALL WIRE AND CONNECT COMPLETE PRODUCTS AND SERVICES SPECIFIED.
- "SUPPLY" SUPPLY ONLY "OR APPROVED EQUAL" MATERIAL OR EQUIPMENT PROPOSED BY THE CONTRACTOR IN LIEU OF THAT SPECIFIED AS APPROVED BY THE CONSULTANT. MATERIAL OR EQUIPMENT SHALL MEET OR EXCEED THE SAME QUALITY. MATERIAL, EFFICIENCY, ETC AS THE SPECIFIED PRODUCTS.
- "AS INDICATED" AS SHOWN ON DRAWINGS AND/OR NOTED IN SPECIFICATIONS.
- CONTRACTOR SHALL REVIEW THE PHASING AS TED ON ALL PLANS. THIS INCLUDES ECTURAL, MECHANICAL PLANS ETC IN THE ENTIRE IG PACKAGE.
- CONTRACTOR SHALL INCLUDE FOR TEMPORARY CTIONS AS REQUIRED TO FACILITATE THE WORK. ONTRACTOR SHALL INCLUDE FOR ALL WEEKEND PREMIUM TIME REQUIRED TO FACILITATE THE G AS INDICATED IN THE PLANS PACKAGE.

UIPMENT

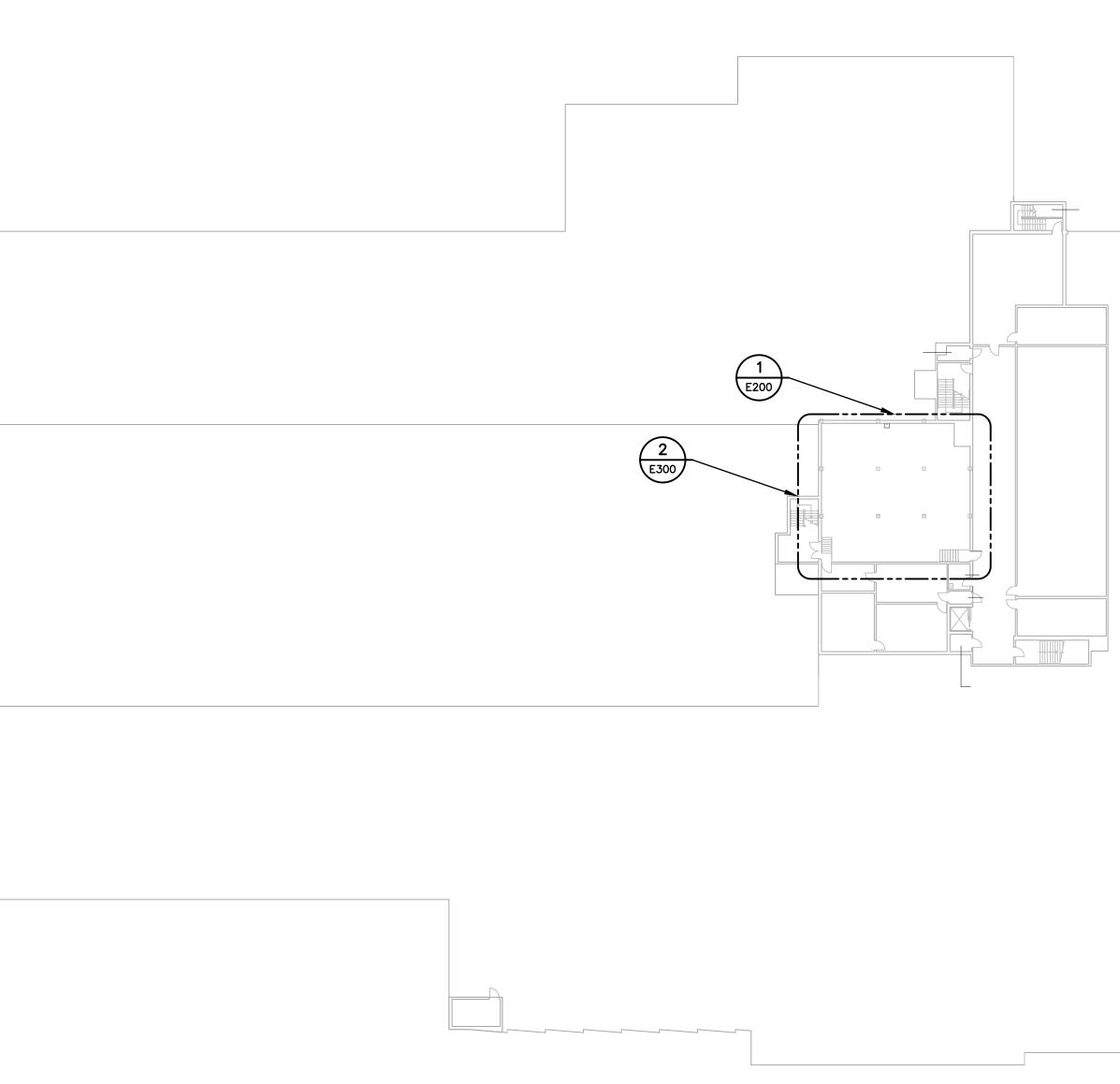
- ENT SHALL HAVE 1.0m (39") CLEARANCE IN OF SAID EQUIPMENT ICAL EQUIPMENT RATED AT 1200A AND OVER HAVE 1.5m (59") CLEARANCE IN FRONT OF SAID QUIPMENT INSTALLED IN SPRINKLERED AREAS ARE COMPLETE WITH DRIP SHIELDS.
- BOARDS: TO C.S.A. C22.2, NO. 29. ENTRES ARE NOT ACCEPTABLE. BOARDS ARE TO BE THE PRODUCT OF ONE (1)
- 08V-3 PHASE-4 WIRE PANEL BOARDS: BUS AND ERS RATED FOR MINIMUM 10,000A (SYMMETRICAL) JPTING CAPACITY OR AS INDICATED ON THE
- BREAKER SHALL OCCUPY A SEPARATE 2.9. TMENT FROM BRANCH BREAKERS. PANELS WITH BREAKERS IN BRANCH BREAKER COMPARTMENT DT BE ACCEPTED.
- ICE PHASE BUSSING WITH ODD NUMBERED RS ON LEFT AND EVEN ON RIGHT, WITH EACH IDENTIFIED BY PERMANENT NUMBER CATION AS TO CIRCUIT NUMBER. BOARDS: MAINS, NUMBER OF CIRCUITS, AND
- AND SIZE OF BRANCH CIRCUIT BREAKERS AS TED KEYS FOR EACH PANEL BOARD AND KEY PANEL ALIKE.
- BUS WITH FULL SIZE COPPER MAINS AND FOR BOLT-ON BREAKERS.
- TRIM AND DOOR BAKED GRAY ENAMEL. PAINT TUB AS DOOR.
- ETE CIRCUIT DIRECTORY WITH TYPEWRITTEN LEGEND CIRCUIT LABEL, AMPERAGE AND PANEL ON UNDER PLASTIC COVER. CUTLER HAMMER, SQUARE D, SIEMENS CANADA
- ACTURE. <u>IERAL</u> ON MOLDED CASE CIRCUIT BREAKER, FULL MODULE "MINIMUM WIDTH), QUICK-MAKE, QUICK-BREAK FOR MANUAL AND AUTOMATIC OPERATION WITH
- ATURE COMPENSATION FOR 400C AMBIENT. BREAKERS NOT ACCEPTABLE) TIC INSTANTANEOUS TRIP ELEMENTS IN CIRCUIT RS, TO OPERATE ONLY WHEN THE VALUE OF NT REACHES SETTING.
- WITCHES FUSED AND UNFUSED SED MANUAL AIR BREAK SWITCHES IN AZARDOUS LOCATIONS: TO C.S.A. C22.2 NO. 4.
- IOLDER ASSEMBLIES TO C.S.A. C22.2 NO. 39. AND NON-FUSIBLE DISCONNECT SWITCHES AS ſED.
- ION FOR PADLOCKING IN ON/OFF SWITCH POSITION REE LOCKS NICALLY-INTERLOCKED DOOR TO PREVENT G WHEN HANDLE IN "ON" POSITION
- MAKE, QUICK-BREAK ACTION. SWITCH POSITION INDICATION ON SWITCH
- SURE COVER. ENCLOSURE 1 UNLESS NOTED OTHERWISE.
- CUTLER HAMMER, SQUARE D, SIEMENS CANADA
- ONDUCTORS SHALL BE COPPER UNLESS INDICATED MISE CTORS #10 AWG AND SMALLER SHALL BE SOLID.
- CTORS #8 AND LARGER SHALL BE STRANDED. CTORS SHALL BE SIZED #12 AWG MINIMUM, FOR CONTROL CIRCUITS WHERE #14 AWG SIZE IS PERMITTED. FEEDER SIZES AS
- FEEDER LENGTHS SHALL BE CONTRACTOR D FOR LENGTH OF PROPOSED INSTALLATION PATH NOT TO EXCEED 3% VOLTAGE DROP ON INSTALLATION. FEEDERS EXCEEDING THE LENGTH OF THE ALLOWABLE AMPACITY SHALL BE BROUGHT TO THE ENGINEERS ATTENTION PRIOR TO BEGINNING ANY

ROUGH-INS

- 2.5.5. SIZE CONDUCTORS FOR A 2% MAXIMUM VOLTAGE DROP FROM OVERCURRENT DEVICE TO FARTHEST OUTLET
- 2.5.6. CONDUCTOR INSULATION RATED FOR 600V MINIMUM UNLESS STATED OTHERWISE.
- 2.5.7. CONDUCTOR TYPES: 2.5.7.1. TW75, TWU TO C.S.A. #C22.2 NO. 75
 - 2.5.7.2. RW90, RWU90 (XLPE) TO C.S.A. #C22.2 NO. 38 2.5.7.3. TW75, RW90 (XLPE) - INSIDE BUILDING.
 - 2.5.7.4. TWU, RWU90 (XLPE) CONDUCTORS DIRECT BURIED OR IN CONDUIT OUTSIDE BUILDING.
 - 2.5.7.5. BX (ARMOURED CABLE) IS ONLY PERMITTED FOR LIGHT FIXTURE DROPS IN ACCOUSTIC CEILINGS (MAX LENGTH 5'-0"), AND MAY BE USED IN HOLLOW PARTITIONS FOR SWITCH OR SUSPENDED CEILING FOR FIXTURE DROPS ONLY ANY DROPS SHALL NOT EXCEED 3.0m (10'-0"). AC-90 (BX ARMOURED CABLE) IS NOT TO BE INSTALLED IN OPEN CEILINGS OR ANY OTHER EXPOSED APPLICATION. ALL CABLES ARE TO BE PROPERLY FASTENED TO BUILDING STRUCTURE IN A NEAT AN PROFESSIONAL MANNER. EXCESSIVE USE OF AC-90. IN THE OPINION OF THE ENGINEER WILL REQUIRE ELECTRICAL CONTRACTOR TO REPLACE ALL NEW WIRING WITH PROPER CONDUIT AND WIRE AT CONTRACTORS EXPENSE.
- FASTENINGS AND SUPPORTS 2.6.1. SUPPORT EQUIPMENT, CONDUIT OR CABLES USING CLIPS SPRING-LOADED BOLTS, CABLE CLAMPS DESIGNED AS ACCESSORIES TO BASIC CHANNEL MEMBERS.
- 2.6.2. INSTALL FASTENINGS AND SUPPORTS AS REQUIRED FOR EACH TYPE OF EQUIPMENT CABLES AND CONDUIT AND IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION. CONDUITS
- 2.7.1. RIGID, GALVANIZED STEEL THREADED CONDUIT TO C.S.A. C22.2, NO. 45, SIZE AS INDICATED.
- 2.7.2. ELECTRICAL METALLIC TUBING (EMT) WITH COUPLINGS AND EXPANDED ENDS AS REQUIRED, TO C.S.A. C22.2, NO. 83. SIZE AS INDICATED.
- 2.7.3. RIGID PVC (UNPLASTICIZED) CONDUIT FOR EXPOSED, ABOVE GROUND WORK, TO C.S.A. C22.2, NO. 211.2, SIZE AS INDICATED. FLEXIBLE PVC IS NOT PERMITTED. 2.7.4. FLEXIBLE METAL CONDUIT AND LIQUID-TIGHT FLEXIBLE
- METAL CONDUIT TO C.S.A. C22.2, NO. 56. 2.7.5. EMT CONDUIT FITTINGS, IE. CONNECTORS, COUPLINGS, TO C.S.A. C22.2, NO. 18, ZINC-PLATED STEEL/MALLEABLE IRON CONSTRUCTION. ALL CONNECTIONS AND COUPLINGS TO BE SET SCREW TYPE, IE. CONCRETE TIGHT
- 2.7.6. CONDUIT SIZES SHALL BE A MINIMUM OF 3/4" AND CONFORM TO ELECTRICAL SAFETY CODE. WHERE SIZES ARE INDICATED AND THEY EXCEED CODE, THEY SHALL NOT BE REDUCED.
- 2.7.7. USE RIGID, GALVANIZED STEEL, THREADED CONDUIT WHERE CONDUIT IS SUBJECT TO MECHANICAL INJURY. 2.7.8. RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES.
- 2.7.9. USE EMT FOR ALL WIRING FROM OUTLET BOX TO SOURCE.
- 2.7.10. INSTALL NYLON FISH WIRE IN EMPTY CONDUITS AND TERMINATE UNDER SCREW LEAVING 12' SLACK. TAG FISH WIRE IDENTIFYING SYSTEM.
- 2.7.11. DO NOT LOCATE CONDUITS LESS THAN 3" (75 MM) PARALLEL TO STEAM OR HOT WATER LINES WITH A MINIMUM OF 1" (25 MM) AT CROSS-OVERS.
- 2.7.12. IN-SLAB CONDUIT: LOCATE TO SUIT REINFORCING STEEL INSTALL IN CENTRE 1/2 OF SLAB.
- 2.7.13. PROVIDE AND INSTALL 4-38mm (4 1-1/2") SPARE CONDUITS UP TO CEILING SPACE FROM EACH FLUSH MOUNTED ELECTRICAL PANEL. TERMINATE IN 300mm > 300mm (12"x12") JUNCTION BOXES IN ACCESSIBLE CEILING SPACE.
- 2.8. JUNCTION AND PULL BOXES 2.8.1. WELDED STEEL CONSTRUCTION WIRE SCREW-ON FLAT COVERS FOR SURFACE MOUNTING. 2.8.2. COVERS WITH 1" (25 MM) MINIMUM EXTENSION ALL
 - AROUND, FOR FLUSH-MOUNTED PULL AND JUNCTION BOXES. 2.8.3. INSTALL PULL BOXES IN CONDUIT RUNS SO AS NOT TO
 - EXCEED 30 M OF CONDUIT RUN OR THE EQUIVALENT OF TWO (2) 90° BENDS BETWEEN PULL BOXES. OUTLET AND CONDUIT BOXES:
 - 2.9.1. ALL LIGHTING FIXTURES, RECEPTACLES AND OTHER WIRING DEVICES FOR ANY CONDUIT SYSTEM SHOWN SHALL BE PROVIDED WITH AN OUTLET BOX.
 - 2.9.2. 4" (102 MM) OCTAGON OR SQUARE OUTLET BOXES OR LARGER, COMPLETE WITH FITTINGS FOR LIGHTING FIXTURES AND AS REQUIRED FOR SPECIAL DEVICES.
 - 2.9.3. WALL OUTLET BOXES SHALL BE: 2.9.3.5. NO. 1104 SERIES, FLUSH MOUNTED IN DRYWALL PARTITIONS, U.N.O. 2.9.3.6. MBS SERIES MASONRY BOXES (GALVANIZED
 - STEEL) FLUSH MOUNTED IN MASONRY WALLS (BLOCK WALLS). 2.9.3.7. GANG BOXES SHALL BE USED AT LOCATIONS
 - WHERE DEVICES ARE GROUPED. PROVIDE BARRIERS AS REQUIRED. 2.9.3.8. BLANK COVER PLATES FOR BOXES WITHOUT WIRING DEVICES.

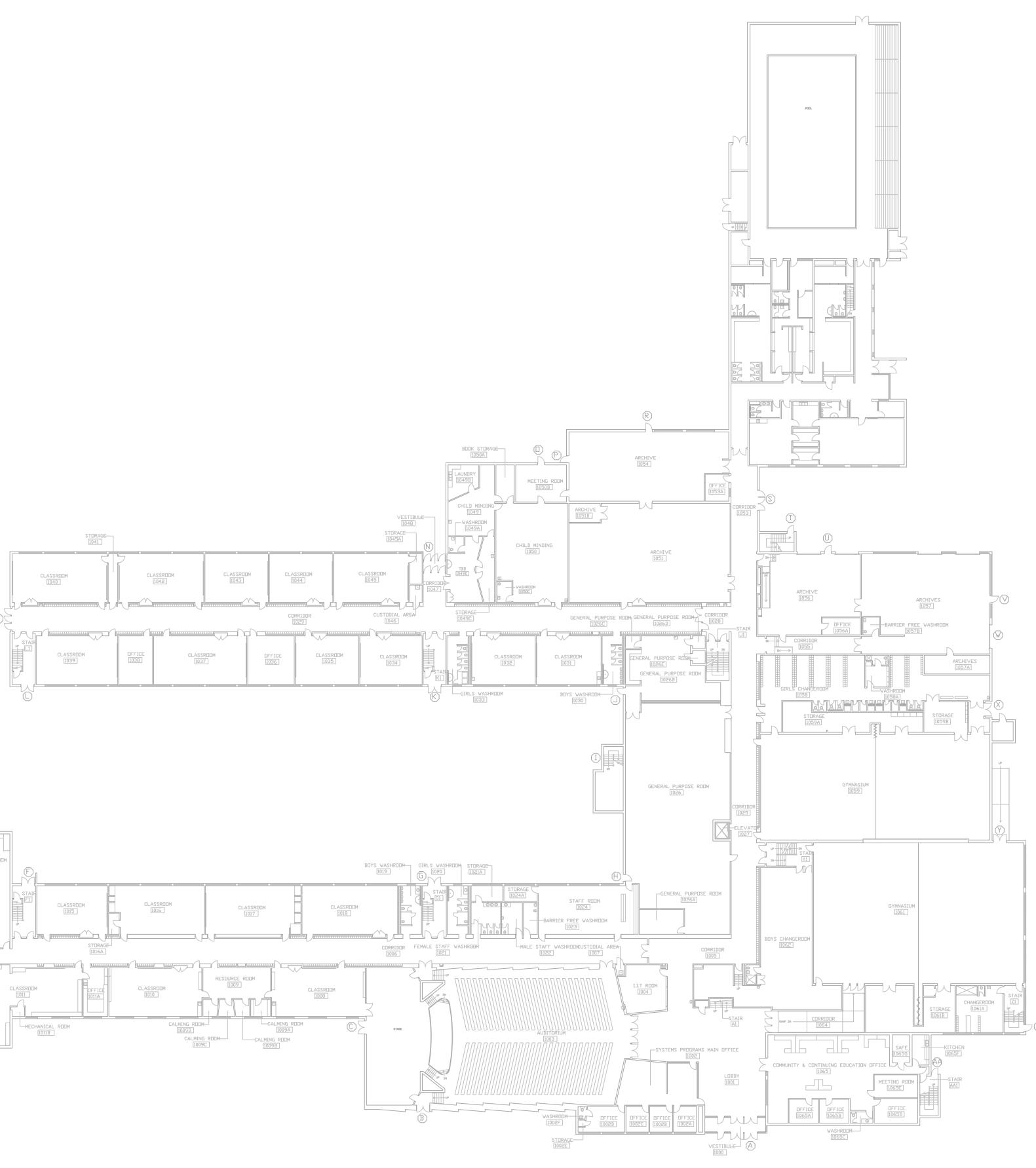
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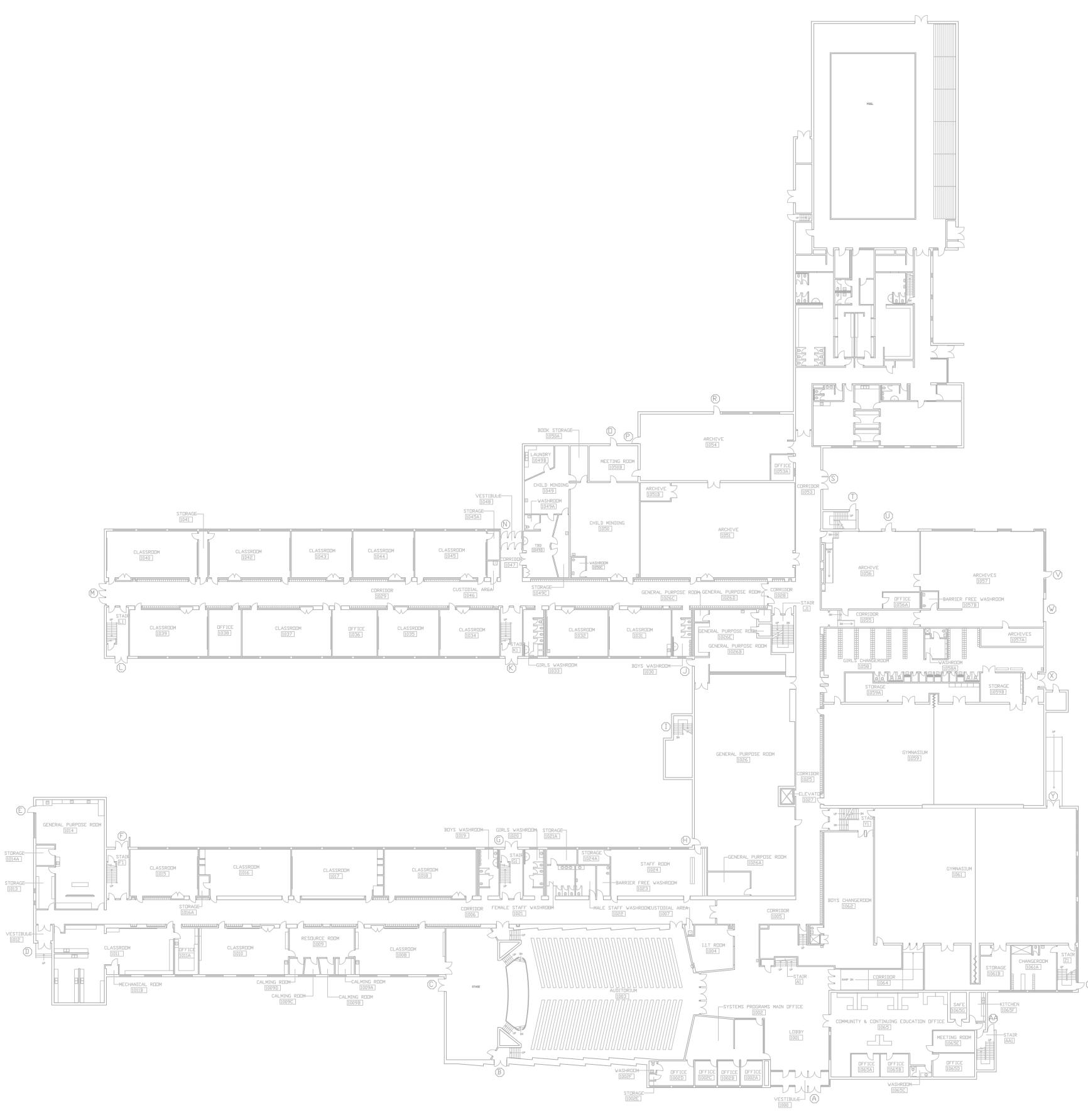
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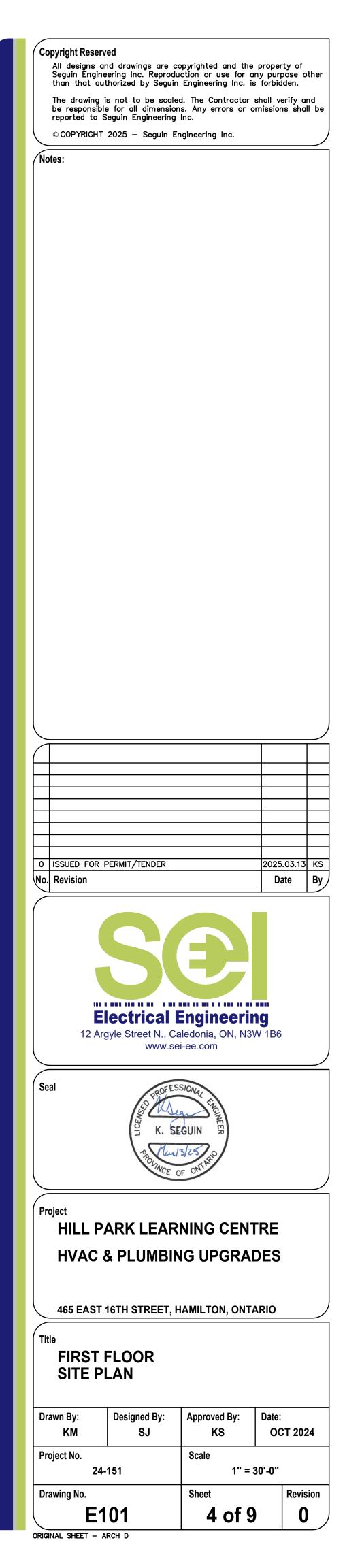


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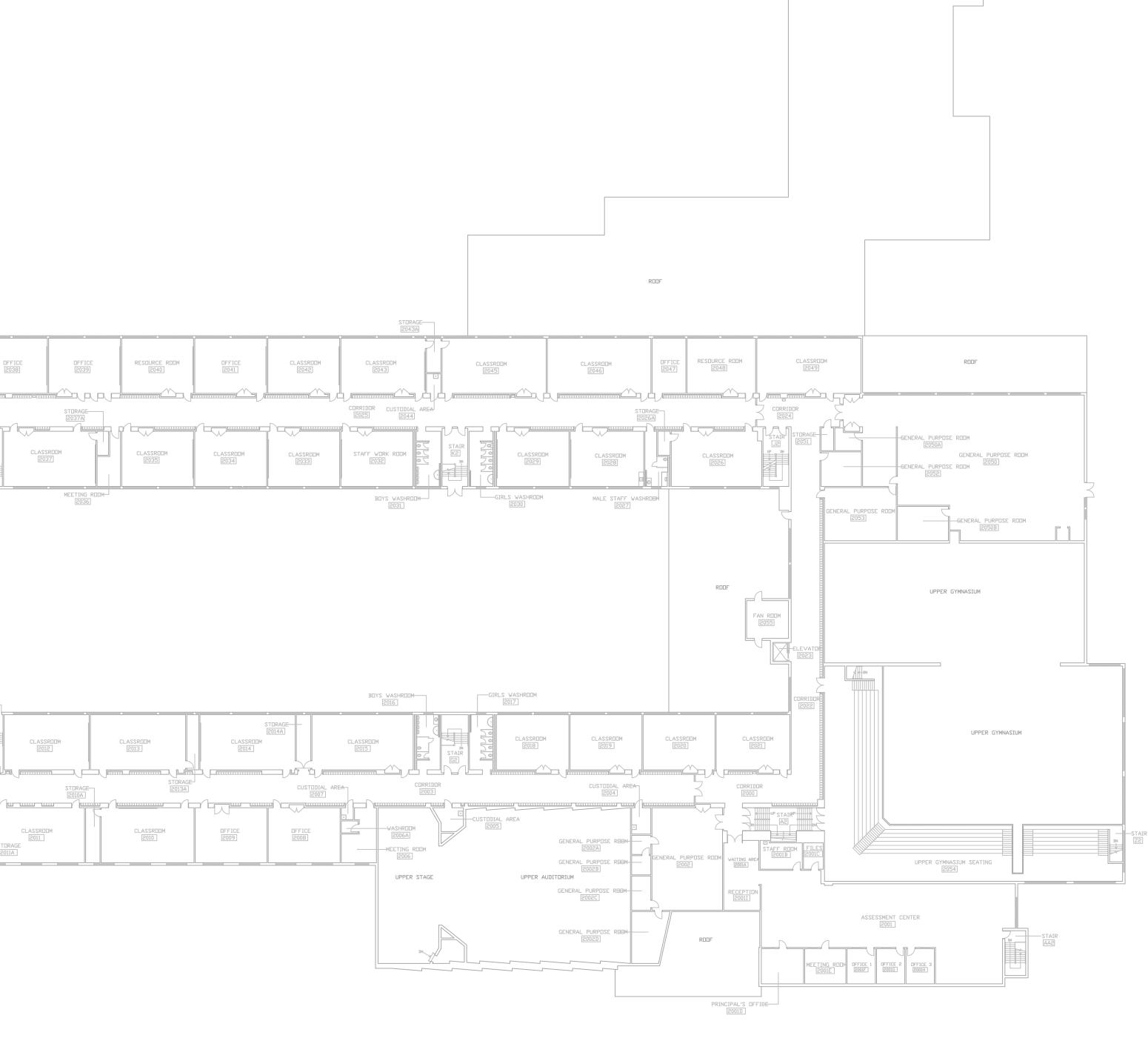






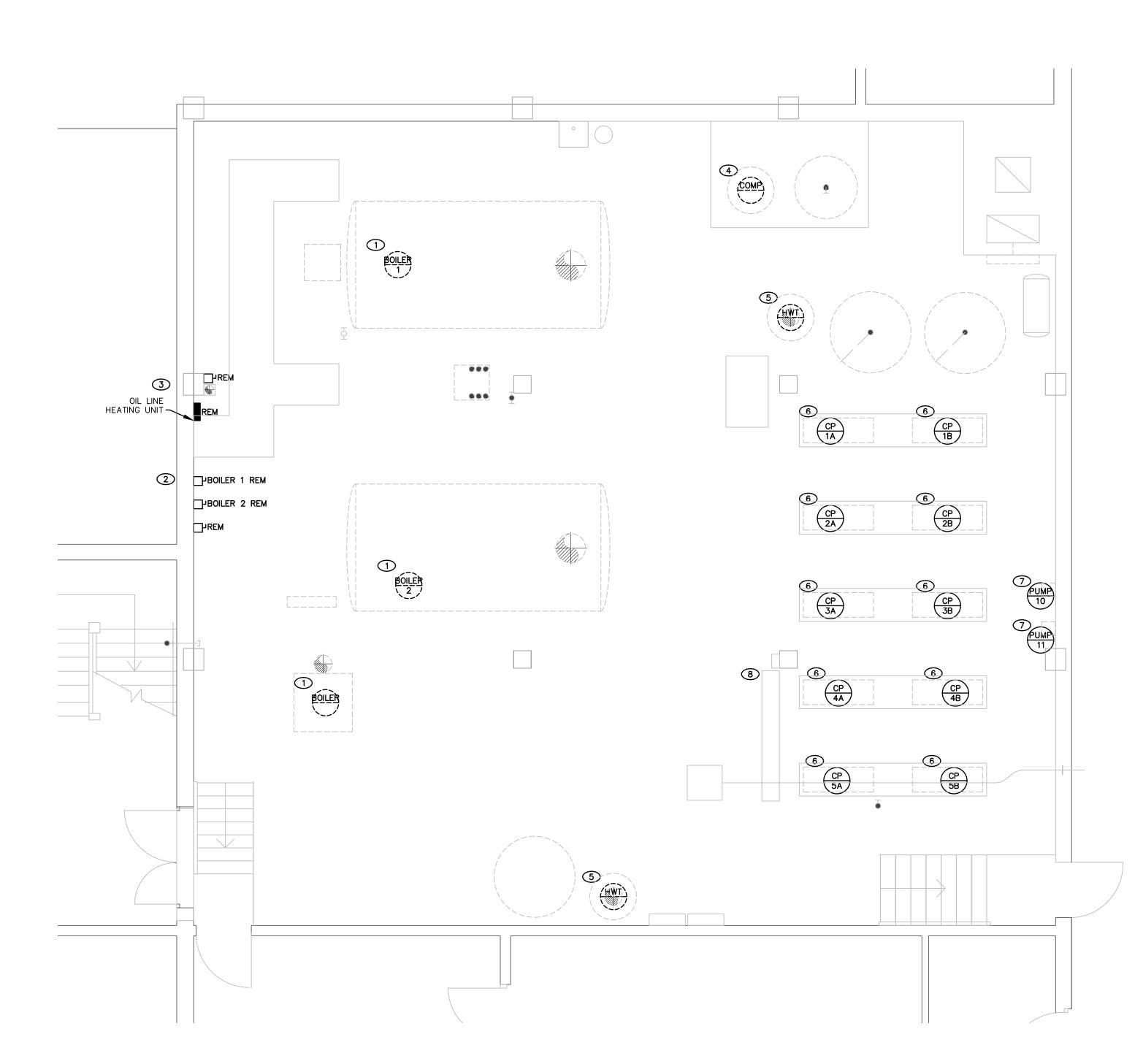
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| ORIGINAL SHEET - ARCH D | | | |



GENERAL NOTES:

1 EXISTING NATURAL GAS FIRED BOILER AND ASSOCIATED CIRCULATION PUMPS AND DISTRIBUTION EQUIPMENT TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE.

2 ELECTRICAL CONTRACTOR TO DISCONNECT AND REMOVE EXISTING BOILER DISCONNECT SWITCHES.

3 EXISTING FUEL OIL CONTROL PANEL TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE.

4 EXISTING PNEUMATIC CONTROL AIR COMPRESSOR TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE.

5 EXISTING GAS FIRED HOT WATER HEATER TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE.

6 EXISTING CIRCULATION PUMP TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE.

TEXISTING DHWR PUMP TO BE DISCONNECTED AND REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS WIRING BACK TO SOURCE TO SOURCE.

8 EXISTING CUTLER-HAMMER FREEDOM 2100 MOTOR CONTROL CENTER TO REMAIN. ELECTRICAL CONTRACTOR TO DISCONNECT AND REMOVE ALL POWER AND CONTROLS DEVICES, STARTERS, AND ASSOCIATED WIRING IN ALL MCC BUCKETS FEEDING EQUIPMENT THAT ARE BEING REMOVED AS PART OF THE SCOPE OF WORK. REFER TO DETAIL ON SHEET E400 FOR EXISTING MCC LAYOUT.

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ORIGINAL SHEET - ARCH D

E200

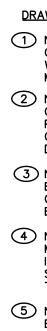
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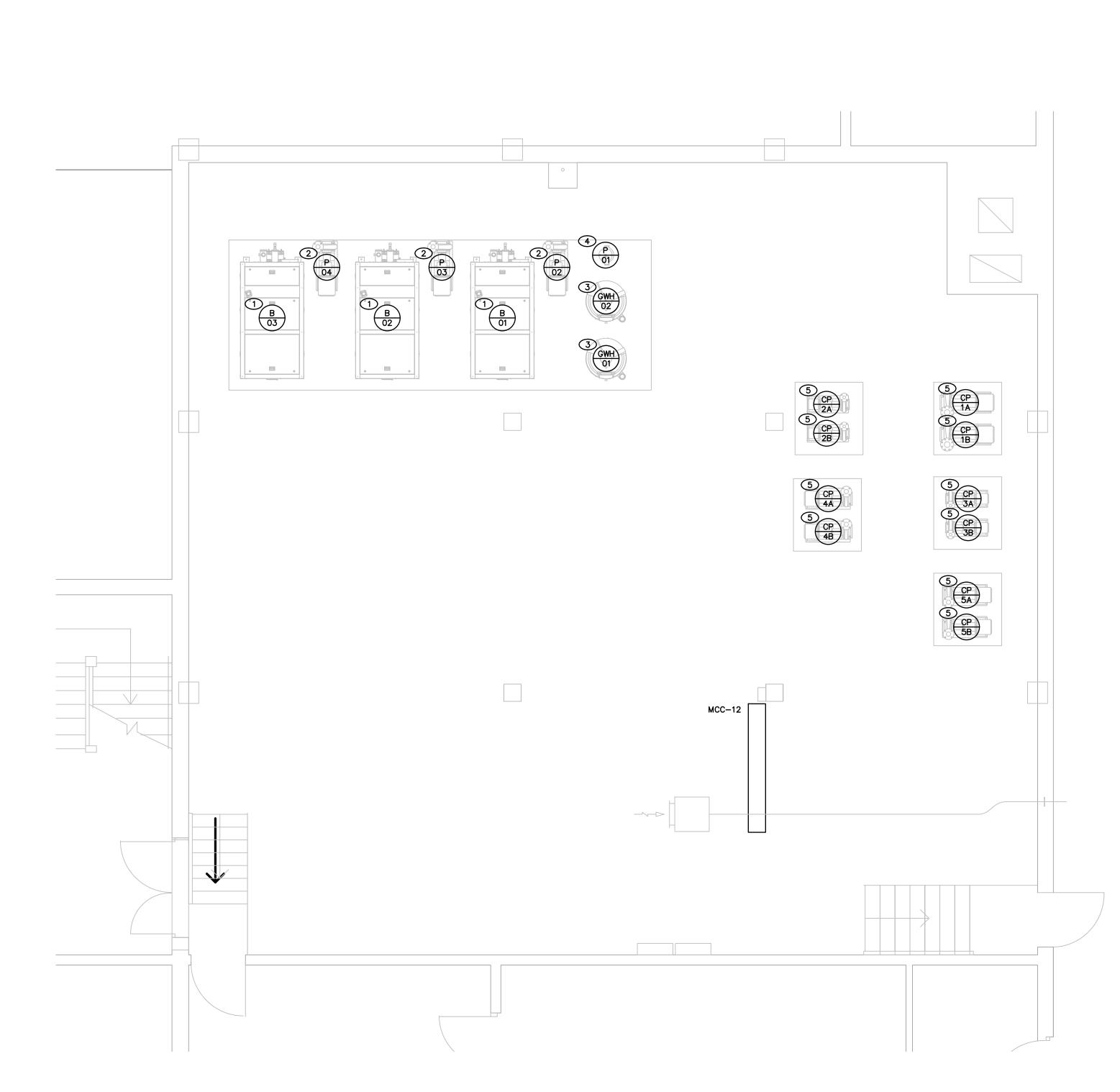
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1 NEW BOILER TO BE INSTALLED BY MECHANICAL CONTRACTOR, ELECTRICAL CONTRACTOR TO COORDINATE TO INSTALL NEW POWER AND CONTROLS WIRING. NEW POWER CONNECTIONS TO BE PROVIDED FROM EXISTING MCC-12, REFER TO DRAWING E-401 FOR DETAILS.

2 NEW BOILER CIRCULATION PUMP TO BE INSTALLED BY MECHANICAL CONTRACTOR, ELECTRICAL CONTRACTOR TO COORDINATE TO INSTALL NEW POWER AND CONTROLS WIRING. NEW POWER AND MOTOR STARTER CONNECTIONS TO BE PROVIDED FROM EXISTING MCC-12, REFER TO DRAWING E-401 FOR DETAILS.

3 NEW WATER HEATER TO BE INSTALLED BY MECHANICAL CONTRACTOR, ELECTRICAL CONTRACTOR TO COORDINATE TO INSTALL NEW POWER AND CONTROLS WIRING. NEW POWER CONNECTIONS TO BE PROVIDED FROM EXISTING MCC-12, REFER TO DRAWING E-401 FOR DETAILS.

A NEW WATER HEATER CIRCULATION PUMP TO BE INSTALLED BY MECHANICAL CONTRACTOR, ELECTRICAL CONTRACTOR TO COORDINATE TO INSTALL NEW POWER AND CONTROLS WIRING. NEW POWER AND MOTOR STARTER CONNECTIONS TO BE PROVIDED FROM EXISTING MCC-12, REFER TO DRAWING E-401 FOR DETAILS.

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ORIGINAL SHEET - ARCH D

<u>GENERAL NOTES:</u>

- A. REFER TO EXISTING MOTOR CONTROL CENTER, MCC-12, EXISTING LAYOUT. ALL EXISTING LOADS NOT BEING REPLACED AS PART OF THIS PROJECT (SHOWN DIMMED) ARE TO REMAIN AS CURRENTLY INSTALLED. ALL EXISTING LOADS THAT ARE BEING REPLACED AS PART OF THIS PROJECT (SHOWN IN BOLD) ARE TO HAVE NEW REPLACEMENT BUCKETS AND INTERNAL COMPONENTS PROVIDED AS PART OF THE PROJECT SCOPE.
- B. CONTRACTOR TO VERIFY AND CONFIRM THE DESTINATION EQUIPMENT PRIOR TO STARTING DEMOLITION ON ANY OF THE BUCKETS MARKED TO BE REPLACED AS PART OF THE PROJECT SCOPE. ANY BUCKETS FOUND CONNECTED TO EQUIPMENT OTHER THAN WHAT IS LISTED ON THE BUCKET ARE TO BE REPORTED TO THE ENGINEER PRIOR TO BEGINNING DEMOLITION.
- DRAWING NOTES:

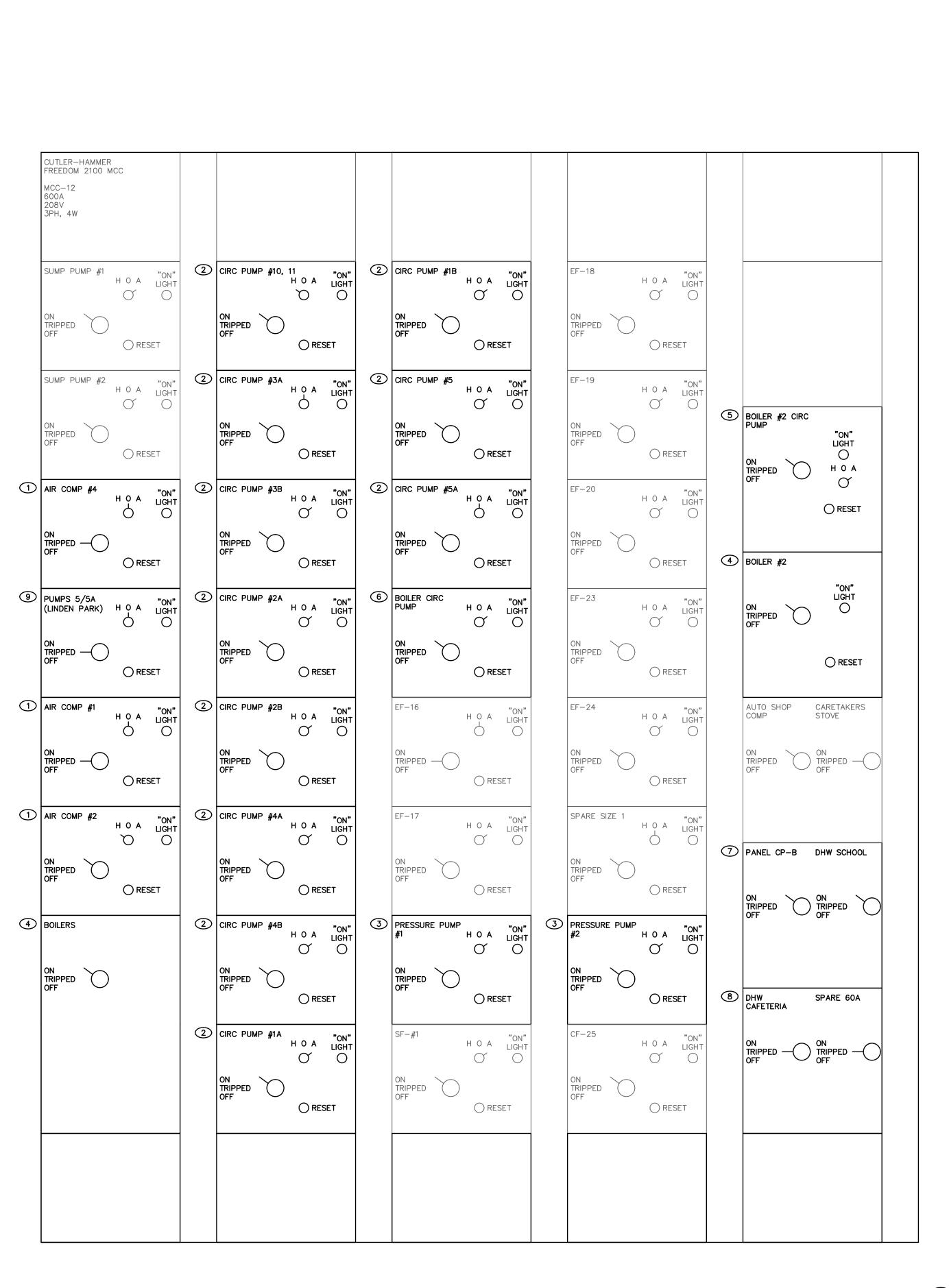
AND REPLACED.

- 1 MCC BUCKET FOR EXISTING AIR COMPRESSOR TO BE REMOVED AND REPLACED.
- (2) MCC BUCKET FOR EXISTING CIRCULATION PUMP TO BE REMOVED AND REPLACED.
- (3) MCC BUCKET FOR EXISTING PRESSURE PUMP TO BE REMOVED AND REPLACED.
- (4) MCC BUCKET FOR EXISTING BOILER TO BE DISCONNECTED AND MARKED AS SPARE.
- 5 MCC BUCKET FOR EXISTING BOILER CIRCULATION PUMP 1 TO BE REMOVED
- 6 MCC BUCKET FOR EXISTING BOILER CIRCULATION PUMP 2 TO BE

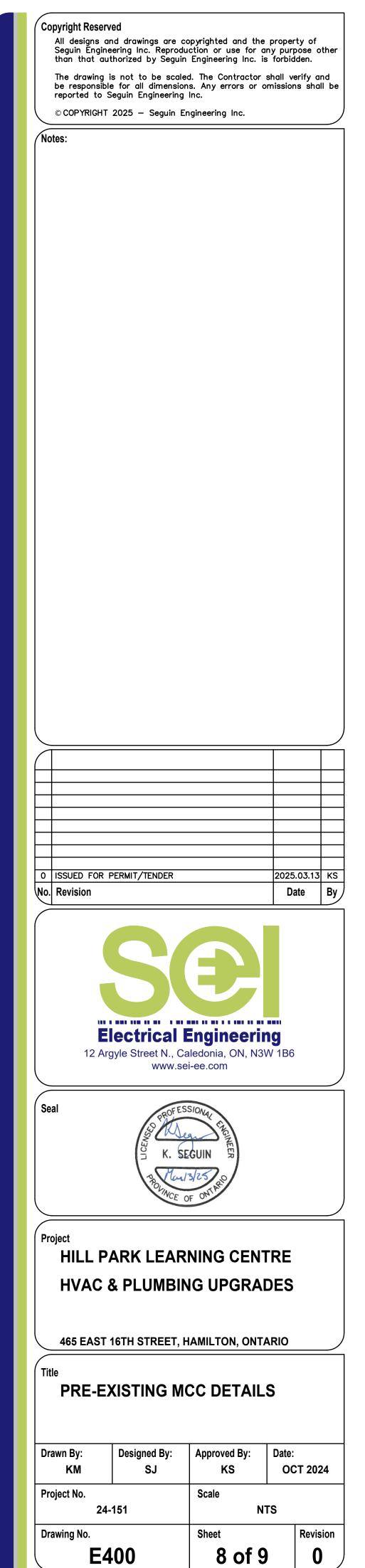
DISCONNECTED AND MARKED AS SPARE.

- MCC BUCKET FOR EXISTING PANEL CP-B FEED AND SCHOOL WATER HEATER IS TO REMAIN AND BE REUSED. BREAKER AND POWER CONNECTIONS FOR SCHOOL WATER HEATER ARE TO BE DISCONNECTED AND REMOVED. SPARE 60A BREAKER FROM MCC BUCKET BELOW TO BE RELOCATED INTO SPACE PREVIOUSLY USED FOR SCHOOL WATER HEATER. UPDATE BUCKET LABEL AS NECESSARY.
- 8 MCC BUCKET FOR EXISTING CAFETERIA WATER HEATER AND SPARE BREAKER TO BE REMOVED AND REPLACED.
- (9) MCC BUCKET FOR EXISTING LINDEN PARK PUMPS TO BE DISCONNECTED AND MARKED AS SPARE.





MOTOR CONTROL CENTER 12 - EXISTING LAYOUT 1 SCALE: NTS E400



ORIGINAL SHEET - ARCH D

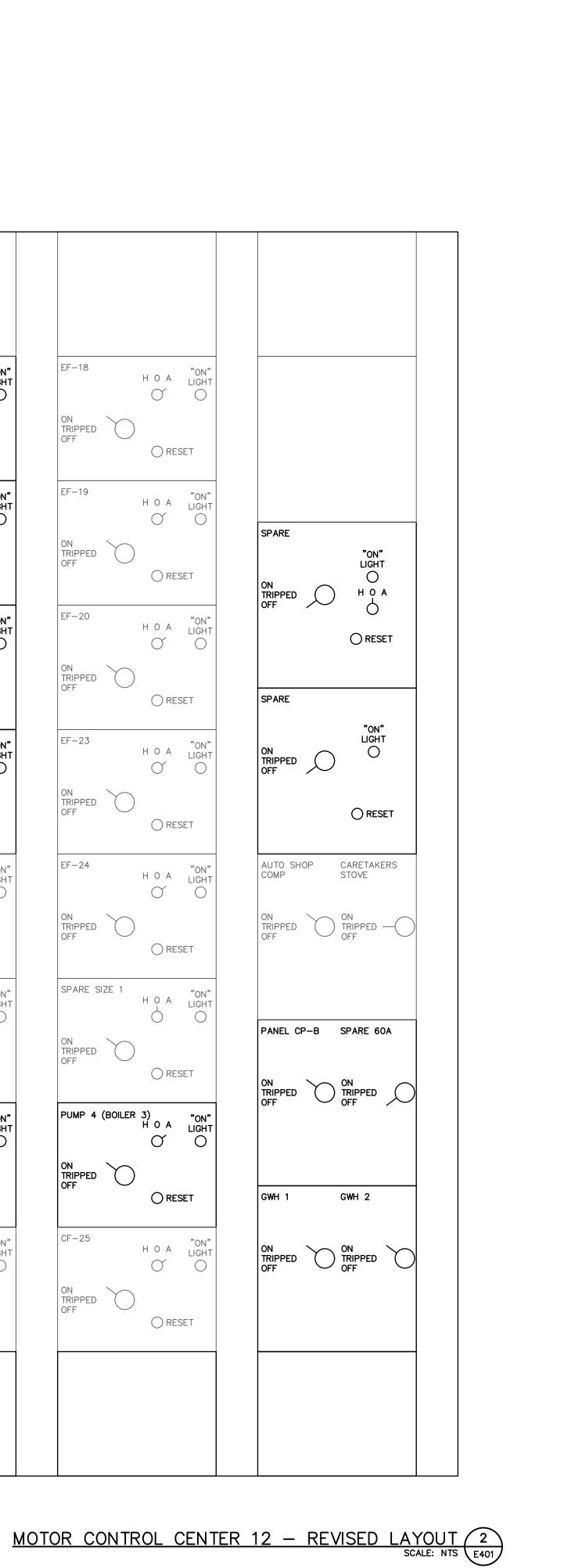
| Bucket Type | Quantity | Equipment | Breaker | Starter | Faceplate Details |
|-------------|----------|--|----------------------------------|--------------|---|
| A | 3 | - Boiler 1 - Boiler 2 - Boiler 3 | 208V, 30A, 3-pole breaker | No starter | - Lamacoid Unit label - On/Tripped/Off Switch |
| В | 2 | - Circ Pump 2A - Circ Pump 2B | 208V, 15A, 3-pole breaker | Nema Size 00 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| B1 | 3 | - Circ Pump 3A - Circ Pump 3B - Pump 1 | 208V, 15A, 3-pole breaker | Nema Size 00 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| С | 2 | - Circ Pump 4A - Circ Pump 4B | 208V, 20A, 3-pole breaker | Nema Size 0 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| D | 2 | - Circ Pump 5A - Circ Pump 5B | 208V, 30A, 3-pole breaker | Nema Size 1 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| E | 2 | - Circ Pump 1A - Circ Pump 1B | 208V, 40A, 3-pole breaker | Nema Size 1 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| F | 3 | - Pump 2 - Pump 3 - Pump 4 | 208V, 20A, 3-pole breaker | Nema Size 0 | Lamacoid Unit label On/Tripped/Off Switch Hand/Off/Auto Switch Pilot Light Reset Button |
| G | 1 | - GWH 1 - GWH 2 | (2) 120V, 15A, 1-pole breaker | No Starter | - (2) Lamacoid Unit label - (2) On/Tripped/Off Switch |

TABLE NOTES:

1. THE TABLE ABOVE SUMMARIZES THE BREAKER AND STARTER REQUIREMENTS WITHIN EACH OF THE REPLACEMENT MCC BUCKETS FOR THE REPLACED MECHANICAL EQUIPMENT. BREAKER AND STARTER SIZES ARE BASED ON THE MECHANICAL DESIGN, AT TIME OF SHOP DRAWING SUBMITTAL, BREAKER AND STARTER SIZES ARE TO BE COORDINATED WITH SUBMITTED MECHANICAL EQUIPMENT.

ELECTRICAL CONTRACTOR TO INCLUDE ALL MATERIAL REQUIRED TO COMPLETELY REPLACE EACH MCC BUCKET IN THE PROJECT SCOPE. THESE MATERIALS WILL INCLUDE BUT NOT BE LIMITED TO: STAB ASSEMBLY, BUCKET ASSEMBLY, DOOR GASKETS, BUCKET DOORS, CONTROLLER DEVICES, RELAY DEVICES, BREAKERS, STARTERS, DISCONNECTS AND WIRING.

| CUTLER-HAMMER FREEDOM 2100 MCC | | |
|-----------------------------------|---|---|
| MCC-12 600A | | |
| 208V 3PH, 4W | | |
| | | |
| SUMP PUMP #1 "ON" | CIRCULATION "ON" | CIRCULATION PUMP "ON" |
| H O A LIGHT | PUMP 1A H O A LIGHT | 5A HOALIGHT |
| | | |
| OFF | OFF ORESET | OFF OFF |
| | | |
| SUMP PUMP #2 "ON" H O A LIGHT | CIRCULATION PUMP 1B H O A LIGHT | CIRCULATION "ON" PUMP 5B H O A LIGHT |
| σ O | O O | σ o |
| ON TRIPPED OFF | ON TRIPPED OFF | ON TRIPPED OFF |
| O RESET | | O RESET |
| BOILER 1 | CIRCULATION "ON" | PUMP 1 (GWH) "ON" |
| | PUMP 2A H O A LIGHT | PUMP 1 (GWH) "ON" H O A LIGHT |
| ON | | |
| TRIPPED OFF | TRIPPED OFF | |
| | ⊖ RESET | O RESET |
| SPARE "ON" H O A LICHT | CIRCULATION ON" PUMP 2B H O A LIGHT | PUMP 2 (BOILER 1) "ON" H O A LIGHT |
| | | |
| | | |
| OFF ORESET | OFF ORESET | OFF ORESET |
| | | |
| BOILER 2 | CIRCULATION PUMP 3A H O A LIGHT | EF-16 H O A LIGHT |
| | | |
| ON TRIPPED OFF | ON TRIPPED OFF | ON TRIPPED |
| | ⊖ RESET | ○ RESET |
| BOILER 3 | CIRCULATION ON" PUMP 3B H O A LICHT | EF-17 H O A LIGHT |
| | | C O |
| | | |
| OFF | OFF ORESET | OFF ORESET |
| | | |
| SPARE | CIRCULATION "ON" PUMP 4A H O A LIGHT | PUMP 3 (BOILER 2) "ON" H O A LIGHT |
| | O O | O O |
| ON TRIPPED OFF | ON TRIPPED OFF | ON TRIPPED OFF |
| | ⊖ RESET | O RESET |
| | CIRCULATION "ON" | SF-#1 "ON" |
| | PUMP 4B H O A LIGHT | H O A LIGHT |
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