

# PENNSYLVANIA CONVENTION CENTER EXHIBIT HALLS AND TRAIN SHED BUILDINGS NEW UNIT SUBSTATIONS

## GENERAL PROJECT INFORMATION

- THE PENNSYLVANIA CONVENTION CENTER (PACC) OBTAINS ELECTRICITY AT 13.2 KV, 3Ø, 60 HERTZ FOR THE EXHIBIT HALLS AND TRAIN SHED BUILDINGS FROM TWO (2) PECO CIRCUITS AT ITS MAIN-TIE-MAIN, 13.2 KV SERVICE ENTRANCE SWITCHGEAR. REFER TO SINGLE LINE SL-4.
- THE PACC DISTRIBUTES ELECTRICITY AT 13.2 KV, 3Ø, 60 HERTZ TO TWENTY-TWO (22) LOW VOLTAGE (LV) UNIT SUBSTATIONS LOCATED IN ELECTRICAL ROOMS WITHIN THE BUILDINGS. REFER TO SINGLE LINE DIAGRAM SL-0.
- THE EXHIBIT HALLS AND TRAIN SHED BUILDINGS WERE CONSTRUCTED OVER 30 YEARS AGO AND EVEN THOUGH THE LV UNIT SUBSTATIONS HAVE BEEN WELL MAINTAINED, THESE WILL BE REPLACED FOR THE FOLLOWING REASONS:
  - THE LV UNIT SUBSTATIONS HAVE ALUMINUM DRY TRANSFORMERS THAT HAVE EXCEEDED OR NEAR THE END OF THEIR LIFE EXPECTANCY.
  - THE FEEDER DISTRIBUTION SWITCHBOARDS HAVE OBSOLETE MOLDED CASE CIRCUIT BREAKERS, IS CONSTRUCTED WITH ALUMINUM BUS WORK, AND LOCKING OUT INDIVIDUAL FEEDER CIRCUIT BREAKERS IS PROBLEMATIC; REQUIRES THE USE OF A CHAIN AND PAD LOCK.
  - THE ARC FLASH HAZARD LEVELS AT THE FEEDER DISTRIBUTION SWITCHBOARDS ARE SO HIGH THAT THE SWITCHBOARD COMPARTMENT DOORS CANNOT BE OPEN OR CLOSED WITHOUT OPENING THE LV UNIT SUBSTATIONS' MAIN 13.2 KV FUSED DISCONNECT SWITCHES.
- THE INTENT OF THIS PROJECT IS TO ENABLE THE PACC TO SELECT THE MANUFACTURER FROM WHICH THE PACC WILL PURCHASE TWENTY-TWO (22) NEW LV UNIT SUBSTATIONS THAT MEET THE FOLLOWING CRITERIA AND COMPLY WITH THE SPECIFICATIONS LISTED ON THE DRAWINGS.
  - THE LV UNIT SUBSTATIONS WILL HAVE COPPER DRY TRANSFORMERS OF THE SAME RATINGS AS THE EXISTING TRANSFORMERS.
  - THE LV UNIT SUBSTATIONS WILL HAVE COPPER BUSES AND CABLES ONLY.
  - TO MITIGATE THE ARC FLASH LEVEL AT THE FEEDER CIRCUIT BREAKERS, EACH OF THE LV UNIT SUBSTATIONS WILL BE CONSTRUCTED IN THREE (3) SECTIONS AND SUPPLIED WITH ONE (1) CONTROL COMPONENT:
    - MV SECTION – CONSISTING OF THE 13.2 KV FUSED DISCONNECT SWITCH, THE NEW COPPER TRANSFORMER, THE TRANSFORMER SECONDARY INSULATED CASE CIRCUIT BREAKER (ICCB), AND THE METERING COMPARTMENT. THE ICCB WILL BE ELECTRICALLY OPERATED, HAVE LONG, SHORT, INSTANTANEOUS, AND GROUND FAULT TRIP AND ARC ENERGY REDUCTION MODULES.
    - LV SECTION –CONSISTING OF OPEN FRONT, LV (LOW VOLTAGE) SWITCHBOARDS WITH MOLDED CASE CIRCUIT BREAKERS THAT CAN BE LOCKED IN THE OPEN POSITION FOR LOCK OUT TAG OUT. THE MCCBS WILL BE MANUALLY OPERATED AND WHERE RATED 600 AMPERES AND HIGHER, HAVE LONG, SHORT, INSTANTANEOUS, AND GROUND FAULT TRIP AND ARC ENERGY REDUCTION MODULES.
    - LV FEEDER BUS –CONSISTING OF ENCLOSED, 480 VOLT OR 240 VOLT, 3Ø, 4W COPPERBUS THAT WILL CONNECT THE LV SECTION TO THE MV SECTION. THE LV FEEDER BUS SHALL BE CONSTRUCTED SO AS NOT TO PERMIT PLASMA CREATED FROM A FROM A FAULT IN THE LV SECTION TO PROPAGATE INTO THE MV SECTION.
    - CONTROL COMPONENT –CONSISTING OF A NEMA 12 OPERATION STATION WITH TWO (2) SELECTOR SWITCHES OR PUSHBUTTONS AND PILOT LIGHTS FOR THE FOLLOWING:
      - OPENING AND CLOSING THE TRANSFORMER SECONDARY ICCB
      - SET OR UNSET THE TRANSFORMER SECONDARY ICCB FOR ARC ENERGY REDUCTION.
      - ICCB OPEN PILOT LIGHT
      - ICCB CLOSED PILOT LIGHT
      - ARC ENERGY REDUCTION ON PILOT LIGHT
- THE FOLLOWING ARE THE PECO (UTILITY) PROVIDED MAXIMUM, AVERAGE AND MINIMUM FAULT (SHORT CIRCUIT) CURRENTS AT THE POINT OF CONNECTION WITH THE PACC MEDIUM VOLTAGE SWITCHGEAR.

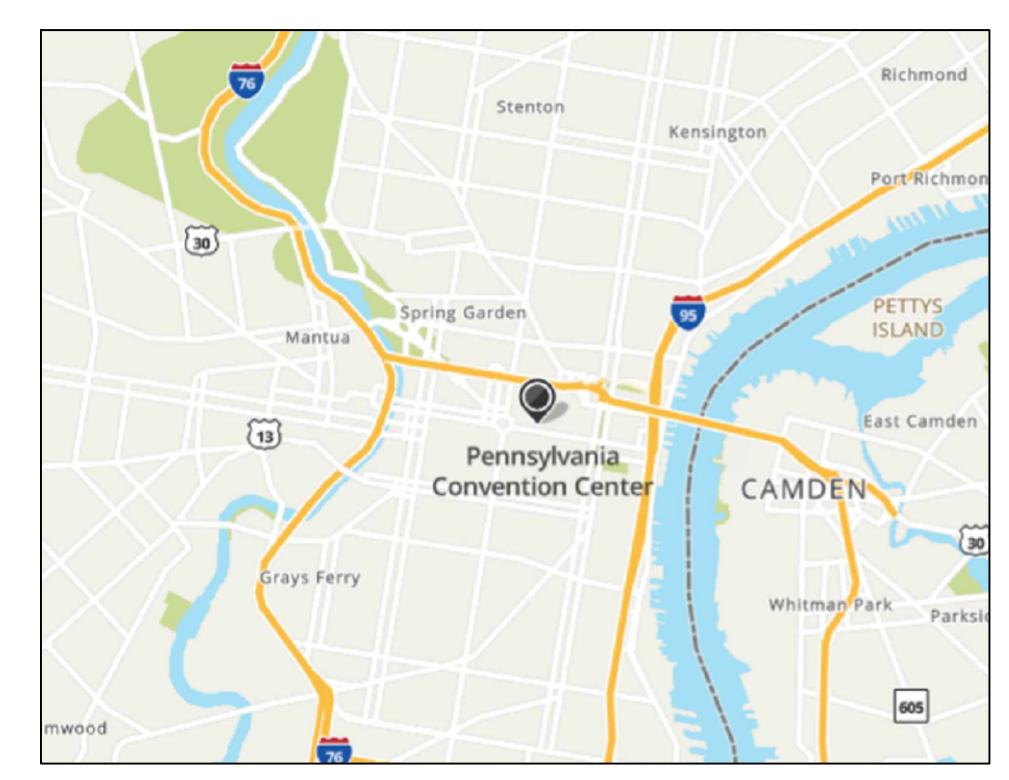
LV UNIT SUBSTATION	INCIDENT ENERGY –CALS/CM2
1	99.0
2	140.4
3	101.8
5	63.3
6	141.4
7	121.9
8	121.6
9	54.9
10	54.9
11	54.9
12	55.0
13	109.8
14	55.0
15	55.0
16	55.0
17	120.4
18	55.0
19	55.0
20	55.0
21	120.5
22	120.2
23	100.0

- LOCATING THE CONTROL COMPONENTS ON THE OPPOSITE SIDE THE NEW LV PANELBOARD OR SWITCHBOARD WILL PROVIDE A SAFER WORKING ENVIRONMENT BY ENABLING THE OPENING AND CLOSING THE ICCBS AND SETTING THE ICCBS IN ARC ENERGY REDUCTION MODE REMOTELY.
- PROVIDING ARC ENERGY REDUCTION FOR MCCB RATED 600 AMPS AND HIGHER IN THE LV PANELBOARD OR SWITCHBOARD WILL PROVIDE A SAFE WORKING ENVIRONMENT BY ENABLING WORKING ON EQUIPMENT, SUCH AS OVERHEAD PLUG-IN FEEDER BUS AT A REDUCED INCIDENT ENERGY LEVEL, IDEALLY BELOW 1.2 CALS/CM<sup>2</sup>.
- PROVIDING GROUND FAULT TRIP FOR MCCB RATED 600 AMPS AND HIGHER IN THE LV PANELBOARD OR SWITCHBOARD WILL PROVIDE SELECTIVITY THAT WOULD NOT EXISTS ON SEVERE GROUND FAULTS SUCH AS THOSE CAUSED BY DIODE SHORT CIRCUITS WITHIN VARIABLE FREQUENCY DRIVES.
- UNLESS THE MANUFACTURER CAN PROVIDE AN "AS EQUAL", THE NEW UNIT LB SUBSTATIONS' METERS SHALL BE SCHNIEDER ELECTRIC ION 9000 THAT ARE INSTALLED AND PROGRAMMED TO IN THE FACTORY. THE ION 9000 METER SHALL PROVIDE THE FOLLOWING INFORMATION AT EACH OF THE UNIT SUBSTATIONS:
  - MV SECTION
    - POSITION OF 13.2 KV LOAD BREAK DISCONNECT SWITCH.
    - 13.2 KV FUSE STATUS
    - TRANSFORMER WINDING TEMPERATURE
    - STATUS OF THE TRANSFORMER FANS
    - INSTANTANEOUS VOLTAGE (VOLTS) ON THE LINESIDE ON THE ICCB
    - INSTANTANEOUS VOLTAGE (VOLTS) ON THE LOAD SIDE ON THE ICCB
    - INSTANTANEOUS AMPERAGE (AMPS) ON THE ICCB.
    - INSTANTANEOUS LOAD (KW) ON THE ICCB.
    - DEMAND LOAD (KW) ON THE ICCB.
    - ICCB POSITION (OPEN OR CLOSED OR TRIPPED)
    - ICCB ENERGY REDUCTION STATUS (ON OR OFF)
    - LV SURGE SUPPRESSOR OPERATION
  - LV SECTION
    - INSTANTANEOUS LOAD (KW) FOR EACH MOLDED CASE CIRCUIT BREAKER (MCCB) FEEDER.
    - ENERGY REDUCTION STATUS (ON OR OFF) FOR EACH APPLICABLE MCCB.
- PACC WILL USE THE FOLLOWING CRITERIA TO SELECT THE LV UNIT SUBSTATION MANUFACTURER:
  - BEST VALUE IN TERMS OF COST AND DELIVERY.
  - COMPLIANCE WITH THE EQUIPMENT SPECIFICATION.
  - LV UNIT SUBSTATIONS THAT FIT ON THE EXISTING HOUSEKEEPING PADS AND ARRANGED TO FACILITATE REPLACING ANY ONE OF THE LV UNIT SUBSTATIONS DURING A 24 HOUR PER DAY, WORKING WEEKEND CHANGEOVER SHUTDOWN.
  - PROVIDES SHOP DRAWINGS, INSTALLATION DRAWINGS, AND INSTALLATION MANUALS THAT WILL ENABLE AN ELECTRICAL CONTRACTOR TO REPLACE THE UNIT SUBSTATIONS "WITHOUT" THE NEED OF MANUFACTURER'S TECHNICIANS OR ON-SITE TESTING.
  - HAS A LOCAL TECHNICAL STAFF THAT IS AVAILABLE IF NEEDED DURING THE CHANGEOVER SHUTDOWNS.

	LINE #2444 – CALLOWHILL SUB	LINE #573 – TUNA SUB
MAX FAULT AMPS @ 13.8 KV	6,300 SYM AMPS X/R=20.0	9,000 SYM AMPS X/R=25.0
3 PHASE AMPS @ 13.8 KV	5,086 SYM AMPS X/R=9.3	5,018 SYM AMPS X/R=3.2
1 PHASE AMPS @ 13.8 KV	4,922 SYM AMPS X/R=7.2	4,213 SYM AMPS X/R=2.5
APPROX LINE LENGTH	3,319 FEET	14,255 FEET

- THE MAXIMUM FAULT (SHORT CIRCUIT) AMPS REPRESENT THE SHORT CIRCUIT CURRENT AT PECO'S SUBSTATIONS AND ARE FOR INFORMATION ONLY.
- PECO CALCULATED THE AVERAGE FAULT (SHORT CIRCUIT) AMPS SHOWN THAT REPRESENT THE SHORT CIRCUIT CURRENTS AT PACC'S 13.2 KV SWITCHGEAR.

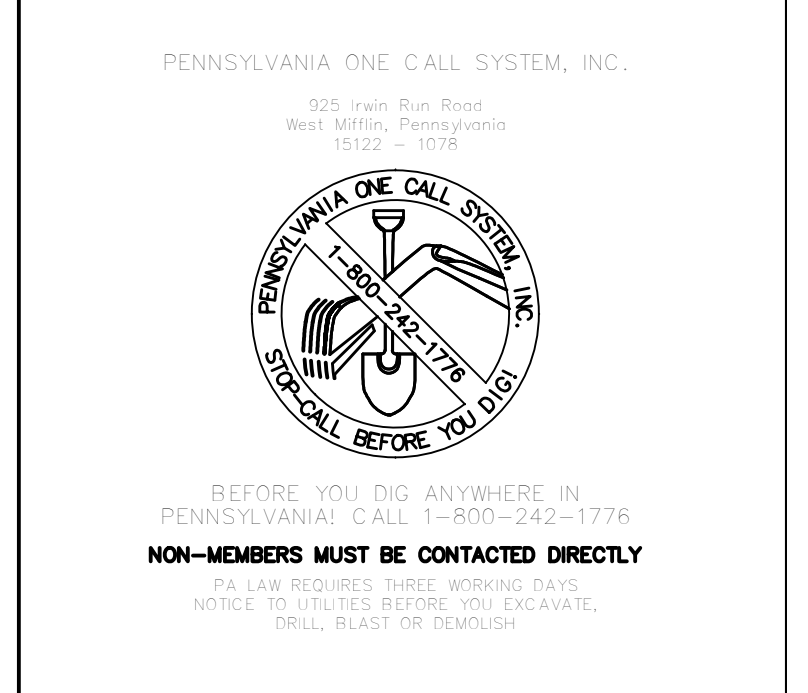
DRAWING LIST			
DRAWING NUMBER	DESCRIPTION	DATE	REV.
E-1	GENERAL PROJECT INFORMATION AND DRAWING LIST	4/23/24	0
E-2	LOW VOLTAGE UNIT SUBSTATION SPECIFICATIONS	4/23/24	0
E-3	SUBSTATION ROOM #3 – SUBSTATION #1 ELEVATION AND PLAN	4/23/24	0
E-4	SUBSTATION ROOM #3 – SUBSTATION #2 ELEVATION AND PLAN	4/23/24	0
E-5	SUBSTATION ROOM #5 – SUBSTATION #3 ELEVATION AND PLAN	4/23/24	0
E-6	SUBSTATION ROOM #4 – SUBSTATION #5 ELEVATION AND PLAN	4/23/24	0
E-7	SUBSTATION ROOM #4 – SUBSTATION #6 ELEVATION AND PLAN	4/23/24	0
E-8	SUBSTATION ROOM #6 – SUBSTATION #7 ELEVATION AND PLAN	4/23/24	0
E-9	SUBSTATION ROOM #6 – SUBSTATION #8 ELEVATION AND PLAN	4/23/24	0
E-10	SUBSTATION ROOM #1 – SUBSTATION #9 ELEVATION AND PLAN	4/23/24	0
E-11	SUBSTATION ROOM #1 – SUBSTATION #10 ELEVATION AND PLAN	4/23/24	0
E-12	SUBSTATION ROOM #1 – SUBSTATION #11 ELEVATION AND PLAN	4/23/24	0
E-13	SUBSTATION ROOM #1 – SUBSTATION #12 ELEVATION AND PLAN	4/23/24	0
E-14	SUBSTATION ROOM #1 – SUBSTATION #13 ELEVATION AND PLAN	4/23/24	0
E-15	SUBSTATION ROOM #2 – SUBSTATION #14 ELEVATION AND PLAN	4/23/24	0
E-16	SUBSTATION ROOM #2 – SUBSTATION #15 ELEVATION AND PLAN	4/23/24	0
E-17	SUBSTATION ROOM #2 – SUBSTATION #16 ELEVATION AND PLAN	4/23/24	0
E-18	SUBSTATION ROOM #2 – SUBSTATION #17 ELEVATION AND PLAN	4/23/24	0
E-19	SUBSTATION ROOM #5 – SUBSTATION #18 ELEVATION AND PLAN	4/23/24	0
E-20	SUBSTATION ROOM #5 – SUBSTATION #19 ELEVATION AND PLAN	4/23/24	0
E-21	SUBSTATION ROOM #5 – SUBSTATION #20 ELEVATION AND PLAN	4/23/24	0
E-22	SUBSTATION ROOM #5 – SUBSTATION #21 ELEVATION AND PLAN	4/23/24	0
E-23	SUBSTATION ROOM #22 – SUBSTATION #22 ELEVATION AND PLAN	4/23/24	0
E-24	SUBSTATION ROOM #23 – SUBSTATION #23 ELEVATION AND PLAN	4/23/24	0



**1 SITE LOCATION MAP**  
SCALE: NONE

OWNER: PENNSYLVANIA CONVENTION CENTER  
 ENGINEER: Joseph F. Maida, P.E.  
 215-353-8110  
 jmaida@maidaeng.com  
 SITE: SEISMIC DESIGN CATEGORY IS "B"

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

**SEAL:**



PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED

DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE: GENERAL PROJECT INFORMATION AND DRAWING LIST

PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPJ  
 CHECKED BY: JFM

**E-1**

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

## LOW VOLTAGE UNIT SUBSTATION SPECIFICATION

### 1. COMMON AND SPECIFIC REQUIREMENTS.

- A. THIS SPECIFICATION DEFINES THE COMMON REQUIREMENTS FOR TWENTY-TWO (22) LOW VOLTAGE (LV) UNIT SUBSTATIONS THAT WILL BE PURCHASED IN GROUPS OR INDIVIDUALLY FROM A SINGLE MANUFACTURER.
- B. THE FOLLOWING SPECIFIC REQUIREMENT FOR EACH OF THE LV UNIT SUBSTATION ARE ON THE PROJECT DRAWINGS:
  - I. INCOMING MV TERMINATIONS REQUIREMENTS
  - II. EXISTING TRANSFORMER RATINGS
  - III. EXISTING TRANSFORMER SECONDARY INSULATED CASE CIRCUIT BREAKER (ICCB) RATING
  - IV. EXISTING MCCBS - NEW MCCB IN THE NEW LV SECTION (LV SWITCHBOARD) TO HAVE THE SAME RATING.
- C. THE LV UNIT SUBSTATIONS AND THEIR ELECTRICAL COMPONENTS AND ACCESSORIES SHALL BE LISTED AND/OR LABELED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, NFPA 70, BY A QUALIFIED INDEPENDENT ELECTRICAL TESTING AGENCY SUCH AS UL, THAT IS ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION FOR INTENDED LOCATION AND APPLICATION.
- D. THE LV UNIT SUBSTATIONS, OR APPLICABLE PARTS THEREOF, SHALL COMPLY WITH THE LATEST VERSION OF IEEE C37.121.
- E. THE LV UNIT SUBSTATION SHALL INCLUDE THE MV SECTION, THE LV SECTION AND LV FEEDER BUS.
- F. UNLESS NOTED OTHERWISE HEREIN, THE ENCLOSURE FOR THE MV SECTION, THE LV SECTION AND THE LV FEEDER BUS SHALL BE CONSTRUCTED FROM STEEL WITH A FACTORY-APPLIED FINISH IN MANUFACTURER'S STANDARD GRAY OVER A RUST-INHIBITING PRIMER ON TREATED METAL SURFACE FOR INDOOR INSTALLATIONS.
- G. THE MV SECTIONS, THE LV SECTIONS, AND THE LV FEEDER BUSES SHALL BE DELIVERED AS COMPLETE, INDIVIDUAL ASSEMBLED UNITS THAT CAN BE INSTALLED ON THE EXISTING HOUSEKEEPING PAD, REPLACING THE EXISTING UNIT SUBSTATIONS AT THE PENNSYLVANIA CONVENTION CENTER (PACC), DURING TWENTY-TWO (22) SCHEDULED SHUTDOWNS. EQUIPMENT PAD SIZES ARE ON THE DRAWINGS.

### 2. THE MV SECTION SHALL INCLUDE THE MV TERMINATION LUGS AND 13.2 KV FUSED DISCONNECT SWITCH, THE MV LIGHTNING ARRESTORS, THE TRANSFORMER, THE TRANSFORMER SECONDARY INSULATED CASE CIRCUIT BREAKER (ICCB), AND THE METERING SYSTEM.

- A. THE MV TERMINATION LUGS AND 13.2 KV FUSED DISCONNECT SWITCH SHALL BE ENCLOSED, AIR-INTERRUPTER SWITCHGEAR, WITH CURRENT LIMITING FUSES, COMPLYING WITH THE LATEST VERSION OF IEEE C37.20.3, SHALL BE 3ø, 60 HZ, 13.2 KV NOMINAL, 15 KV MAXIMUM, FOR SOLIDLY GROUNDED-NEUTRAL SYSTEMS AND DESIGNED FOR THE SOURCE FAULT CURRENT AVAILABLE FROM PECO. REFER TO THE GENERAL PROJECT INFORMATION.
- B. THE SEISMIC DESIGN CATEGORY AT THE PACC IS "B".
- C. THE INTERRUPTER SWITCHES SHALL BE STATIONARY, GANG OPERATED, AND SUITABLE FOR APPLICATION AT MAXIMUM SHORT-CIRCUIT RATING OF INTEGRATED SWITCHGEAR ASSEMBLY WITH THE FOLLOWING FEATURES:
  - I. RATING: 600 A CONTINUOUS DUTY AND LOAD BREAK.
  - II. 95 KV BIL.
  - III. TWO-TIME DUTY-CYCLE FAULT CLOSING: 25 000 A, ASYMMETRICAL.
  - IV. SWITCH ACTION: NO EXTERNAL ARC AND NO SIGNIFICANT QUANTITIES OF IONIZED GAS RELEASED INTO THE ENCLOSURE.
  - V. SWITCH CONSTRUCTION: SUPPORTED ENTIRELY BY INTERIOR FRAMEWORK OF STRUCTURE, WITH COPPER SWITCHBLADES AND STORED-ENERGY OPERATING MECHANISM.
  - VI. PHASE BARRIERS: FULL LENGTH OF THE SWITCHBLADES AND FUSES FOR EACH POLE; DESIGNED FOR EASY REMOVAL; ALLOW VISUAL INSPECTION OF SWITCH COMPONENTS IF BARRIER IS IN PLACE.
  - VII. PROTECTIVE SHIELDS: COVER LIVE COMPONENTS AND TERMINALS.
  - VIII. FUSE MOUNTS: SINGLE FRAME MOUNTED AND DE-ENERGIZED WHEN SWITCH IS OPEN.
  - IX. MECHANICAL INTERLOCK: PREVENT OPENING SWITCH COMPARTMENT DOOR UNLESS SWITCHBLADES ARE OPEN, AND PREVENT CLOSING SWITCH IF DOOR IS OPEN. INTERLOCK AIR-INTERRUPTER SWITCH WITH TRANSFORMER SECONDARY MAIN CIRCUIT BREAKER, PREVENTING SWITCH FROM BEING OPENED OR CLOSED UNLESS SECONDARY MAIN CIRCUIT BREAKER IS OPEN.
  - X. WINDOW: PERMITS VIEWING SWITCH-BLADE POSITIONS WHEN DOOR IS CLOSED.
  - XI. PROVIDE RECOMMENDED ACCESSORY SET THAT INCLUDES TOOLS AND MISCELLANEOUS ITEMS REQUIRED FOR INTERRUPTER SWITCHGEAR TEST, INSPECTION, MAINTENANCE, AND OPERATION, INCLUDING FUSE-HANDLING TOOL.
  - XII. FUSES: SIZES RECOMMENDED BY THE LV UNIT SUBSTATION MANUFACTURER, CONSIDERING FAN COOLING, TEMPERATURE-RISE SPECIFICATION, AND CYCLE LOADING.
  - XIII. CURRENT-LIMITING FUSES: FULL-RANGE, FAST-REPLACEABLE, CURRENT-LIMITING TYPE THAT WILL OPERATE WITHOUT EXPLOSIVE NOISE OR EXPULSION OF GAS, VAPOR, OR FOREIGN MATTER FROM TUBE.
  - XIV. INDICATOR INTEGRAL WITH EACH FUSE TO SHOW WHEN IT HAS BLOWN.
  - XV. SPARES: INCLUDE THREE MV FUSES IN USE AND THREE SPARE MV FUSES IN STORAGE CLIPS IN EACH SWITCH.

- D. THE MV SURGE ARRESTERS SHALL COMPLY WITH IEEE C62.11, BE DISTRIBUTION CLASS; META L-OXIDE-VARISTOR TYPE, RATINGS AS RECOMMENDED BY THE MANUFACTURER, AND SHALL BE CONNECTED TO EACH PHASE OF INCOMING CIRCUIT AND AHEAD OF 13.2 KV DISCONNECT SWITCH.

### E. THE TRANSFORMERS SHALL COMPLY WITH THE FOLLOWING:

- I. SHALL BE DRY TYPE, TWO WINDING, COPPER, SECONDARY UNIT SUBSTATION TYPE THAT HAVE THE SAME RATING AS THE EXISTING TRANSFORMERS, THE NAMEPLATES FOR WHICH ARE ON THE DRAWINGS, AND COMPLY WITH THE LATEST VERSIONS OF IEEE C57.12.01 AND IEEE C57.12.51.
  - II. SHALL BE INDOOR, VENTILATED, VACUUM-PRESSURE, IMPREGNATED TYPE, AND WITH INSULATION SYSTEM RATED AT 220 DEG C WITH AN 80 DEG C AVERAGE WINDING TEMPERATURE RISE ABOVE A MAXIMUM AMBIENT TEMPERATURE OF 104 DEG F.
  - III. WHERE THE EXISTING LV UNIT SUBSTATION TRANSFORMERS DO NOT HAVE COOLING FANS, THE NEW TRANSFORMER SHALL BE CLASS AA, VENTILATED, AIR-COOLED COMPLYING WITH IEEE C57.12.01.
  - IV. WHERE THE EXISTING LV UNIT SUBSTATION TRANSFORMERS HAVE COOLING FANS, THE NEW TRANSFORMER SHALL BE CLASS AA/FA, VENTILATED, AIR-COOLED WITH AN ADDITIONAL FORCED AIR RATING, COMPLYING WITH IEEE C57.12.01.
  - V. WHERE FANS ARE PROVIDED, AUTOMATIC FORCED-AIR COOLING SYSTEM CONTROLS SHALL BE PROVIDED AND INCLUDE THERMAL SENSORS, FANS, CONTROL WIRING, TEMPERATURE CONTROLLER WITH TEST SWITCH, POWER PANEL WITH CURRENT-LIMITING FUSES, INDICATING LIGHTS, ALARM, AND ALARM-SILENCING RELAY.
  - VI. THE PRIMARY SIDE BIL SHALL BE 95 KV.
  - VII. THE TRANSFORMERS SHALL HAVE FULL-CAPACITY VOLTAGE TAPS: FOUR NOMINAL 2.5 PERCENT TAPS, TWO ABOVE AND TWO BELOW RATED PRIMARY VOLTAGE.
  - VIII. THE TRANSFORMERS SHALL HAVE TEMPERATURE SENSORS FOR TRANSFORMER HIGH-TEMPERATURE ALARMS THAT ARE BOTH LOCALLY AUDIBLE AND VISUAL ALARM AND HAVE CONTACTS FOR REMOTE ALARM TO THE METERING SYSTEM.
- F. THE MV SECTION'S INTERNAL CONDUCTORS SHALL BE AS FOLLOWS:
- I. CONNECTION BETWEEN THE 13.2 KV DISCONNECT SWITCH AND TRANSFORMER PRIMARY MUST BE COPPER BUS.
  - II. CONNECTION BETWEEN THE TRANSFORMER SECONDARY AND THE ICCB MUST BE COPPER BUS OR FLEXIBLE COPPER BUS BRAID.
- G. THE TRANSFORMER SECONDARY INSULATED CASE CIRCUIT BREAKER (ICCB) SWITCHGEAR IN THE MV SECTION MUST COMPLY WITH THE FOLLOWING:
- I. SHALL COMPLY WITH NEMA PB 2 AND UL 891.
  - II. SHALL BE FRONT AND REAR ACCESSIBLE WITH THE SAME FRONT SIDE ALIGNMENT AS THE TRANSFORMER AND THE 13.2 KV DISCONNECT SWITCH.
  - III. SHALL HAVE MAIN PHASE BUSES WITH UNIFORM CAPACITY THE ENTIRE LENGTH OF SECTION.

- IV. SHALL HAVE NEUTRAL BUS WITH 100 PERCENT OF PHASE-BUS AMPACITY THAT IS EQUIPPED WITH PRESSURE-CONNECTOR TERMINATIONS FOR OUTGOING CIRCUIT NEUTRAL CONDUCTORS. INCLUDE BRACES FOR NEUTRAL-BUS EXTENSIONS FOR BUSWAY FEEDERS.
  - V. THE PHASE BUSES AND NEUTRAL-BUS MATERIAL SHALL BE HARD-DRAWN COPPER OF 98 PERCENT MINIMUM CONDUCTIVITY, WITH COPPER FEEDER CIRCUIT-BREAKER LINE CONNECTIONS.
  - VI. THE GROUND BUS SHALL BE HARD-DRAWN COPPER OF 98 PERCENT MINIMUM CONDUCTIVITY, WITH PRESSURE CONNECTOR FOR FEEDER AND BRANCH-CIRCUIT GROUND CONDUCTORS, MINIMUM SIZE 1/4-BY-2 INCH.
  - VII. THE NEUTRAL BUS SHALL BE EQUIPPED WITH PRESSURE-CONNECTOR TERMINATIONS FOR OUTGOING CIRCUIT NEUTRAL CONDUCTORS. NEUTRAL-BUS EXTENSIONS FOR BUSWAY FEEDERS SHALL BE BRACED.
  - VIII. THE NEUTRAL DISCONNECT LINK SHALL BE BOLTED, UNINSULATED, 1/2" X 2" COPPER BUS, ARRANGED TO CONNECT NEUTRAL BUS TO GROUND BUS.
- H. THE INSULATED CASE CIRCUIT BREAKER (ICCB) SHALL BE DRAW-OUT MOUNTED, ELECTRICALLY OPERATED AIR-CIRCUIT BREAKER, THAT COMPLIES WITH UL 1066 AND THE FOLLOWING:
- I. HAS "CLOSE" AND "OPEN" PUSH BUTTONS AND RED AND GREEN LIGHTED BREAKER POSITION INDICATORS.
  - II. HAS A MOTOR OPERATOR WITH A CHARGING TIME THAT DOES NOT EXCEED 8 SECONDS.
  - III. OPERATOR POWER MUST BE FROM A CONTROL POWER TRANSFORMER INTERNAL TO THE SWITCHBOARD.
  - IV. HAS SOLID-STATE MONITORING AND TRIPPING SYSTEM TO PROVIDE SYSTEM STATUS MONITORING, ADJUSTABLE TIME-CURRENT PROTECTION, AND SHUNT TRIP.
  - V. HAS INTERCHANGEABLE CURRENT SENSORS AND TIMING CIRCUITS FOR ADJUSTABLE TIME-CURRENT PROTECTION SETTINGS AND STATUS SIGNALS.
  - VI. HAS LED INDICATORS OR DISPLAY, WITH MANUAL RESET, TO SHOW THE CAUSE OF AUTOMATIC TRIP.
  - VII. HAS A DISPLAY PANEL THAT INDICATES THE STATUS OF THE SYSTEM CIRCUITRY WHEN FULLY OPERATIONAL OR GIVES FAULT LOCATION BASED ON AUTOMATIC DIAGNOSIS.
  - VIII. WILL TRIP THE CIRCUIT BREAKER WHEN CLOSING ON A FAULT.
  - IX. HAS THE FOLLOWING TIME-CURRENT ADJUSTMENTS TO ACHIEVE PROTECTIVE-DEVICE COORDINATION:
    - 1) ADJUSTABLE LONG-DELAY PICKUP AND TIME.
    - 2) INDIVIDUAL ADJUSTMENTS FOR SHORT-DELAY PICKUP, TIME, AND I-SQUARED-T SETTING.
    - 3) ADJUSTABLE INSTANTANEOUS PICKUP.
    - 4) INDIVIDUALLY ADJUSTABLE GROUND-FAULT PICKUP AND TIME, WITH I-SQUARED-T SETTING.

- X. HAS AN ARC ENERGY REDUCTION MODULE THAT CAN BE ACTIVATED BOTH LOCALLY AND REMOTELY AND IS MONITORED BY THE METERING SYSTEM. REFER TO REQUIREMENT FOR THE CONTROL COMPONENT WITHIN THE GENERAL PROJECT INFORMATION.
- XI. PROVIDED WITH BUILT-IN CONNECTOR TO TEST THE BREAKER SETTINGS. PROVIDE ONE TEST SET.
- IX. PROVIDED WITH BATTERY BACKUP FOR INFORMATIONAL DISPLAYS AFTER AUTOMATIC TRIP, WITH BATTERY STATUS INDICATOR.

### I. THE METERING COMPARTMENT SHALL INCLUDE THE CONTROL POWER TRANSFORMER, THE INSTRUMENT TRANSFORMER, IF NEEDED, AND THE SCHNEIDER ION 9000 METERING SYSTEM UNIT OR AS EQUAL. THE BASE BID MUST BE BASED ON PROVIDING THE ION 9000 METERING SYSTEM.

- I. CONTROL POWER SUPPLY: CONTROL POWER TRANSFORMER SUPPLYING 120 V CONTROL CIRCUITS THROUGH SECONDARY DISCONNECT DEVICES.
- II. CONTROL WIRING: FACTORY INSTALLED, COMPLETE WITH BUNDLING, LACING, AND PROTECTION; AND COMPLYING WITH THE FOLLOWING:
  - III. FLEXIBLE CONDUCTORS FOR NO. 8 AWG AND SMALLER, FOR CONDUCTORS ACROSS HINGES AND FOR CONDUCTORS FOR INTERCONNECTIONS BETWEEN SHIPPING UNITS.
  - IV. CONDUCTORS SIZED IN ACCORDANCE WITH NFPA 70 FOR DUTY
  - V. INSTRUMENT TRANSFORMERS: COMPLY WITH IEEE C57.13.

1. POTENTIAL TRANSFORMERS: SECONDARY VOLTAGE RATING OF 120 V AND NEMA C 12.11 ACCURACY CLASS OF 0.3 WITH BURDENS OF W, X, AND Y.
  2. CURRENT TRANSFORMERS: BURDEN AND ACCURACY CLASS SUITABLE FOR CONNECTED RELAYS, METERS, AND INSTRUMENTS.
- VI. THE ION 9000 METER SHALL BE FACTORY INSTALLED, PROGRAMMED, AND CONFIGURED COMPLETE WITH ALL VOLTAGE AND CURRENT SENSORS AND INPUT AND OUTPUT CIRCUITS TO DISPLAY THE FOLLOWING:
1. PHASE CURRENTS, EACH PHASE: PLUS OR MINUS 1 PERCENT.
  2. PHASE-TO-PHASE VOLTAGES, THREE PHASE: PLUS OR MINUS 1 PERCENT.
  3. PHASE-TO-NEUTRAL VOLTAGES, THREE PHASE: PLUS OR MINUS 1 PERCENT.
  4. THREE-PHASE REAL POWER: PLUS OR MINUS 2 PERCENT.
  5. THREE-PHASE REACTIVE POWER: PLUS OR MINUS 2 PERCENT.
  6. POWER FACTOR: PLUS OR MINUS 2 PERCENT.
  7. FREQUENCY: PLUS OR MINUS 0.5 PERCENT.
  8. INTEGRATED DEMAND, WITH DEMAND INTERVAL SELECTABLE FROM 5 TO 60 MINUTES: PLUS OR MINUS 2 PERCENT.
  9. ACCUMULATED ENERGY, IN MEGAWATT HOURS, PLUS OR MINUS 2 PERCENT; STORED VALUES UNAFFECTED BY POWER OUTAGES FOR UP TO 72 HOURS.
  10. TRANSFORMER FAN OPERATION
  11. LV SURGE DETECTION

### 3. THE LV SECTION SHALL INCLUDE THE LOW VOLTAGE (LV) SURGE SUPPRESSOR AND THE LOW VOLTAGE (LV) SWITCHBOARD.

- A. THE LV SWITCHBOARD SHALL BE A SIEMENS SB-3 SWITCHBOARD OR EQUAL THAT INCORPORATES FLEXIBLE COPPER BUSWAY CONNECTION TO LV FEEDER BUS RATED AT THE AMPACITY OF THE ICCB IN THE MV SECTION.
- B. THE LV SWITCHBOARD SHALL HAVE COPPER BUS RATED FOR THE TRANSFORMER SECONDARY VOLTAGE AND 200,000 AIC RATING.
- C. THE LV SWITCHBOARD SHALL BE 96" HIGH, HAVE A WIDTH OF 36" OR 48" WHERE POSSIBLE, AND HAVE A DEPTH OF 58". THE HOUSEKEEPING PADS ARE 66" DEEP OF WIDER.
- D. THE LV SWITCHBOARDS SHALL HAVE ADEQUATELY SIZED REMOVAL CONDUIT ENTRY PLATES ON THE TOP OF THE SWITCHBOARDS TO ACCOMMODATE THE NUMBER OF FEEDERS SHOWN ON THE ONE LINE DIAGRAMS.
- E. THE LV SWITCHBOARD SHALL BE PROVIDED WITH MOLDED CASE CIRCUIT BREAKERS (MCCBS) FOR THE LOADS SHOWN ON THE ONE LINE DIAGRAMS WITH A MINIMUM IAC OF 85,000 AMPS SYMMETRICAL AT THE RATED VOLTAGE. AS AN ALTERNATIVE, PROVIDE THE PRICE FOR MCCBS WITH AN INTERRUPTING RATING OF 65,000 AMPS SYMMETRICAL.
- F. THE LV SURGE SUPPRESSORS SHALL FACTORY INSTALLED AS PART OF THE LV PANELBOARD OR SWITCHBOARD AND CONNECTED TO EACH PHASE OF INCOMING LV FEEDER VIA A 480 VOLT OR 240 VOLT, 3 POLE, 30 AMP, 85KA OR ALTERNATIVE 65 KA, MOLDED CASE CIRCUIT BREAKER WITH A 300 KA SURGE RATING PER PHASE AND THE FOLLOWING FEATURES AND ACCESSORIES:
  - I. COMPLY WITH UL 1449 SPD, TYPE 1.
  - II. HAVE AN INTEGRAL DISCONNECT SWITCH.
  - III. HAVE INTERNAL THERMAL PROTECTION THAT DISCONNECTS THE SPD BEFORE DAMAGING INTERNAL SUPPRESSOR COMPONENTS.
  - IV. HAVE INDICATOR LIGHT DISPLAY FOR PROTECTION STATUS.
  - V. HAVE FORM-C CONTACTS RATED AT 5 A AND 250 V(AC), ONE N.O. AND ONE N.C., FOR REMOTE MONITORING OF PROTECTION STATUS. CONTACTS MUST REVERSE ON FAILURE OF SURGE DIVERSION MODULE OR ON OPENING OF CURRENT-LIMITING DEVICE.
  - VI. SURGE COUNTER.

### 4. THE LV FEEDER BUS SHALL BE LOW-IMPEDANCE BUS ASSEMBLIES IN TOTALLY ENCLOSED, NONVENTILATED HOUSING RATED FOR THE SECONDARY VOLTAGE OF THE TRANSFORMER AND CURRENT EQUAL TO THE RATING OF THE ICCB THAT COMPLIES WITH THE FOLLOWING:

- A. 100% NEUTRAL WITH PHASE CONDUCTORS.
- B. CURRENT-CARRYING COPPER CONDUCTORS, FULLY INSULATED WITH CLASS 130C INSULATION EXCEPT AT JOINTS. JOINTS SHALL HAVE PLATED SURFACES.
- C. RATED FOR 200,000 AMPERES SYMMETRICAL AIC AT APPLIED VOLTAGE.
- D. TEMPERATURE RISE: 55 DEG C ABOVE 40 DEG C AMBIENT MAXIMUM FOR CONTINUOUS RATED CURRENT.
- E. GROUND: 100 PERCENT CAPACITY INTERNAL BUS BAR OF MATERIAL MATCHING BUS MATERIAL.
- F. FITTINGS AND ACCESSORIES: MANUFACTURER'S STANDARD.

### 5. SHOP DRAWINGS SUBMITTALS SHALL INCLUDE DETAILED EQUIPMENT ASSEMBLY DRAWINGS, INDICATING DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

- A. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.
  - B. DIMENSIONED PLANS AND ELEVATIONS SHOWING MAJOR COMPONENTS AND FEATURES. INCLUDE A PLAN VIEW AND CROSS SECTION OF EQUIPMENT BASE, SHOWING CLEARANCES, MANUFACTURER'S RECOMMENDED WORKSPACE THAT ACCOUNTS FOR BREAKER SERVICE AND REMOVAL, AND LOCATIONS OF PENETRATIONS FOR GROUNDING AND CONDUITS.
  - C. ONE-LINE DIAGRAM.
  - D. LIST OF MATERIALS.
  - E. NAMEPLATE LEGENDS.
  - F. THE MATERIAL, SIZE AND NUMBER OF BUS BARS, AND CURRENT RATING FOR EACH BUS, INCLUDING MAINS AND BRANCHES OF PHASE, NEUTRAL, AND GROUND BUSES.
  - G. SHORT-TIME AND SHORT-CIRCUIT CURRENT RATINGS OF SECONDARY UNIT SUBSTATIONS AND COMPONENTS.
  - H. RATINGS OF INDIVIDUAL PROTECTIVE DEVICES.
  - I. TIME-CURRENT CHARACTERISTIC CURVES: FOR OVERCURRENT PROTECTIVE DEVICES.
  - J. PRIMARY FUSES: SUBMIT RECOMMENDATIONS AND SIZE CALCULATIONS.
6. FOR EACH LV UNIT SUBSTATION PROVIDE
- A. SIX (6) OF EACH TYPE AND RATING OF FUSE AND FUSIBLE DEVICE USED, EXCEPT FOR MEDIUM-VOLTAGE FUSES. INCLUDE SPARES FOR THE FOLLOWING:
    - I. POTENTIAL TRANSFORMER FUSES.
    - II. CONTROL POWER FUSES.
  - B. TOUCHUP PAINT: THREE (3) HALF-PINT CONTAINERS OF PAINT MATCHING ENCLOSURE'S EXTERIOR FINISH.
  - C. PRIMARY SWITCH CONTACT LUBRICANT: TWO (2) CONTAINERS.

### 7. ACCEPTABLE MANUFACTURERS

- A. ABB
- B. SCHNEIDER ELECTRIC
- C. SIEMENS

### 8. MAINTENANCE TOOLS: FURNISH TOOLS AND MISCELLANEOUS ITEMS REQUIRED FOR CIRCUIT-BREAKER AND SWITCHGEAR TEST, INSPECTION, MAINTENANCE, AND OPERATION.

- A. RACKING HANDLE TO MANUALLY MOVE CIRCUIT BREAKER BETWEEN "CONNECTED" AND "DISCONNECTED" POSITIONS.
- B. PORTABLE TEST SET FOR TESTING FUNCTIONS OF CIRCUIT-BREAKER, SOLID-STATE TRIP DEVICES WITHOUT REMOVAL FROM SWITCHBOARD.
- C. RELAY AND METER TEST PLUGS SUITABLE FOR TESTING SWITCHGEAR METERS AND SWITCHGEAR CLASS RELAYS.
- D. CIRCUIT-BREAKER REMOVAL APPARATUS: PORTABLE, FLOOR-SUPPORTED, ROLLER-BASE, ELEVATING CARRIAGE ARRANGED FOR MOVING CIRCUIT BREAKERS IN AND OUT OF COMPARTMENTS.
- E. SPARE-FUSE CABINET: IDENTIFIED AND COMPARTMENTED STEEL BOX OR CABINET WITH LOCKABLE DOOR.
- F. STORAGE FOR MANUAL: INCLUDE A RACK OR HOLDER, NEAR THE OPERATING INSTRUCTIONS, FOR A COPY OF MAINTENANCE MANUAL.

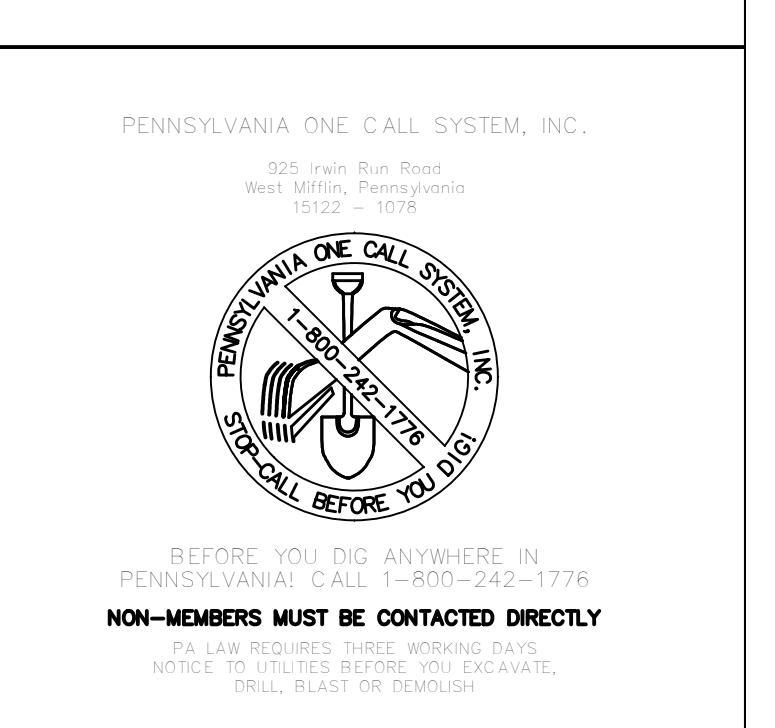
### 9. COMPARTMENT AND SECTION NAMEPLATES

- A. ENGRAVED, LAMINATED-PLASTIC FOR EACH COMPARTMENT AND FEEDER MCCB, MOUNTED WITH CORROSION-RESISTANT SCREWS.

### 10. FACTORY TESTS

- A. PERFORM DESIGN AND ROUTINE TESTS IN ACCORDANCE WITH STANDARDS SPECIFIED FOR COMPONENTS. CONDUCT TRANSFORMER TESTS IN ACCORDANCE WITH IEEE C57.12.90. CONDUCT SWITCHGEAR AND SWITCHBOARD TESTS IN ACCORDANCE WITH NEMA C37.51.
- B. PERFORM THE FOLLOWING FACTORY-CERTIFIED TESTS ON EACH SECONDARY UNIT SUBSTATION:
  - I. RESISTANCE MEASUREMENTS OF WINDINGS ON THE RATED VOLTAGE CONNECTION AND ON TAP EXTREME CONNECTIONS.
  - II. RATIOS ON THE RATED VOLTAGE CONNECTION AND ON TAP EXTREME CONNECTIONS.
  - III. POLARITY AND PHASE RELATION ON THE RATED VOLTAGE CONNECTION.
  - IV. NO-LOAD LOSS AT RATED VOLTAGE ON THE RATED VOLTAGE CONNECTION.
  - V. EXCITING CURRENT AT RATED VOLTAGE ON THE RATED VOLTAGE CONNECTION.
  - VI. IMPEDANCE AND LOAD LOSS AT RATED CURRENT ON THE RATED VOLTAGE CONNECTION AND ON TAP EXTREME CONNECTIONS.
  - VII. APPLIED POTENTIAL.
  - VIII. INDUCED POTENTIAL.
  - IX. TEMPERATURE TEST: IF A TRANSFORMER IS SUPPLIED WITH AUXILIARY COOLING EQUIPMENT TO PROVIDE MORE THAN ONE RATING, TEST AT LOWEST KVA CLASS AA RATING AND HIGHEST KVA CLASS AFA RATING.
  - X. TEMPERATURE TEST IS NOT REQUIRED IF A RECORD OF A TEMPERATURE TEST ON AN ESSENTIALLY DUPLICATE UNIT PURCHASED AT THE SAME TIME IS AVAILABLE.

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXX

SEAL:

MAIDA ENGINEERING INC.

PROJECT NO: E45032 DATE: 3/25/24

PROJECT ENG: JFM

CHECKED:

CONSULTING ENGINEERS  
Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

DPP PROJECT NUMBER: XX-XX-XXXX-XX

UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE:

LOW VOLTAGE UNIT SUBSTATION SPECIFICATIONS

PACC PROJECT NO: XX-XX-XXXX-XX DRAWING NO:

CONSULTANT PROJECT NO: E45032

DATE: 03-25-2024

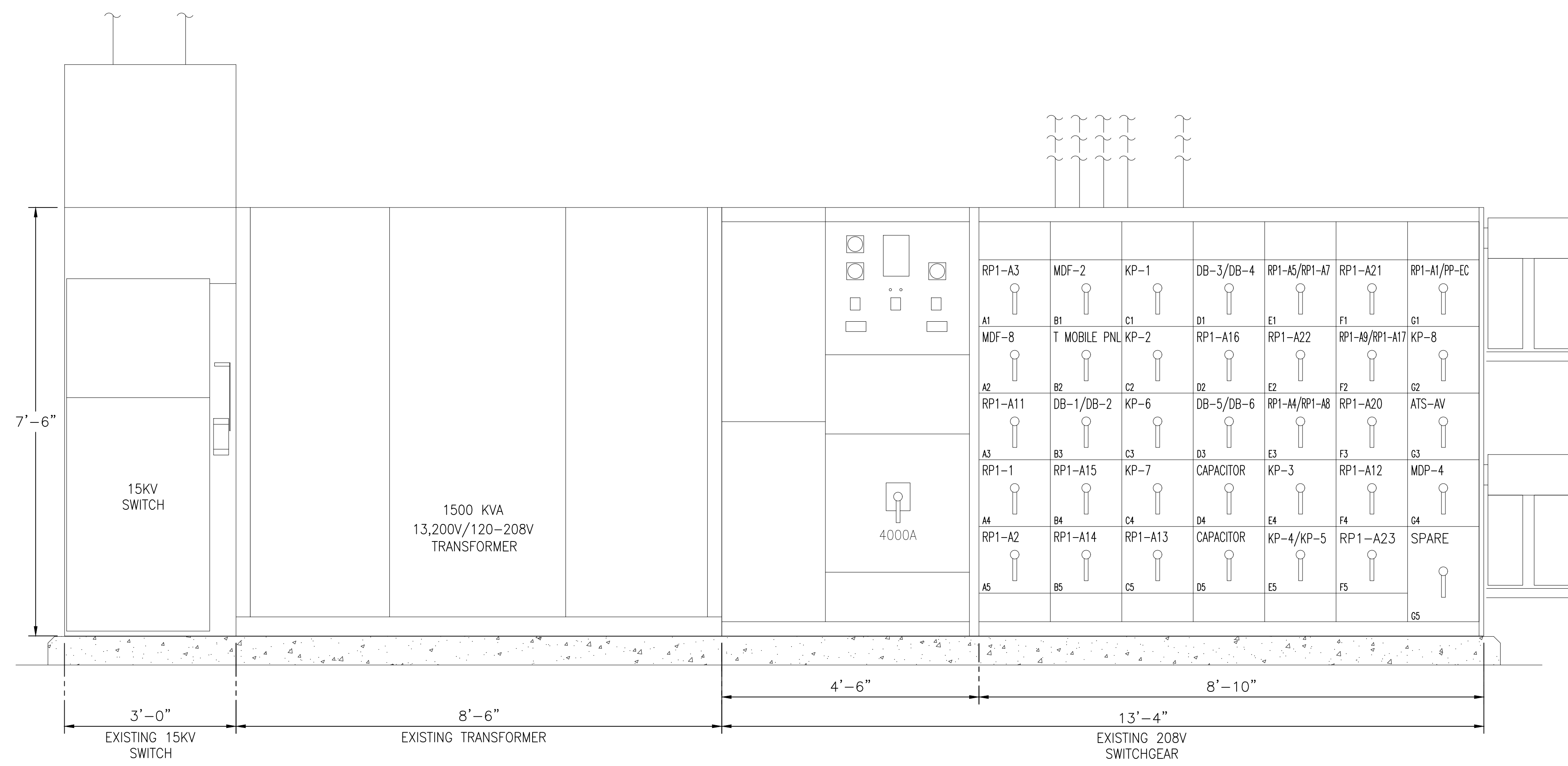
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DRAWN BY: LPI

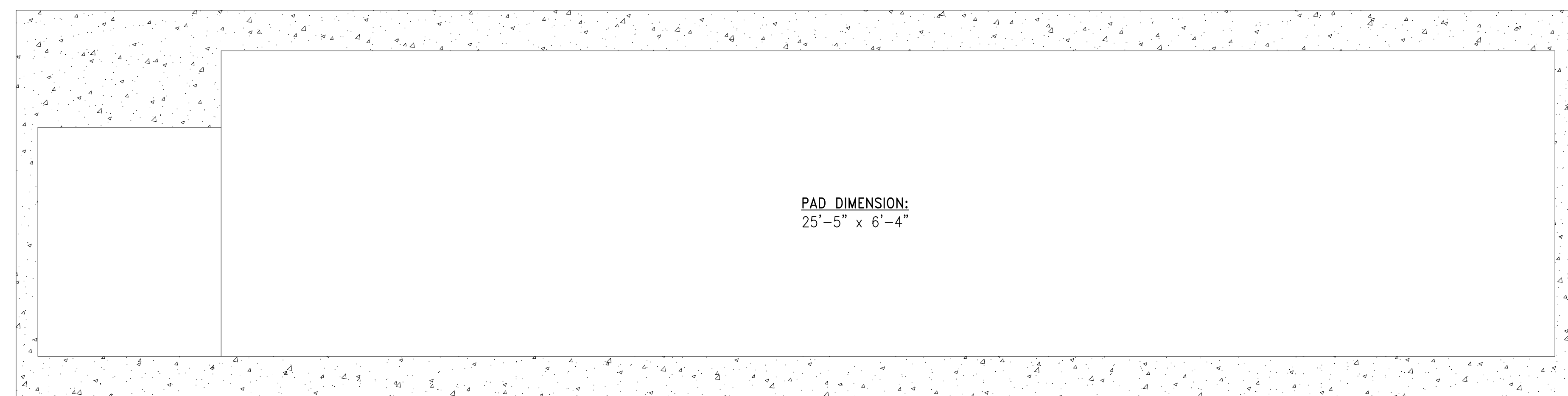
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NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

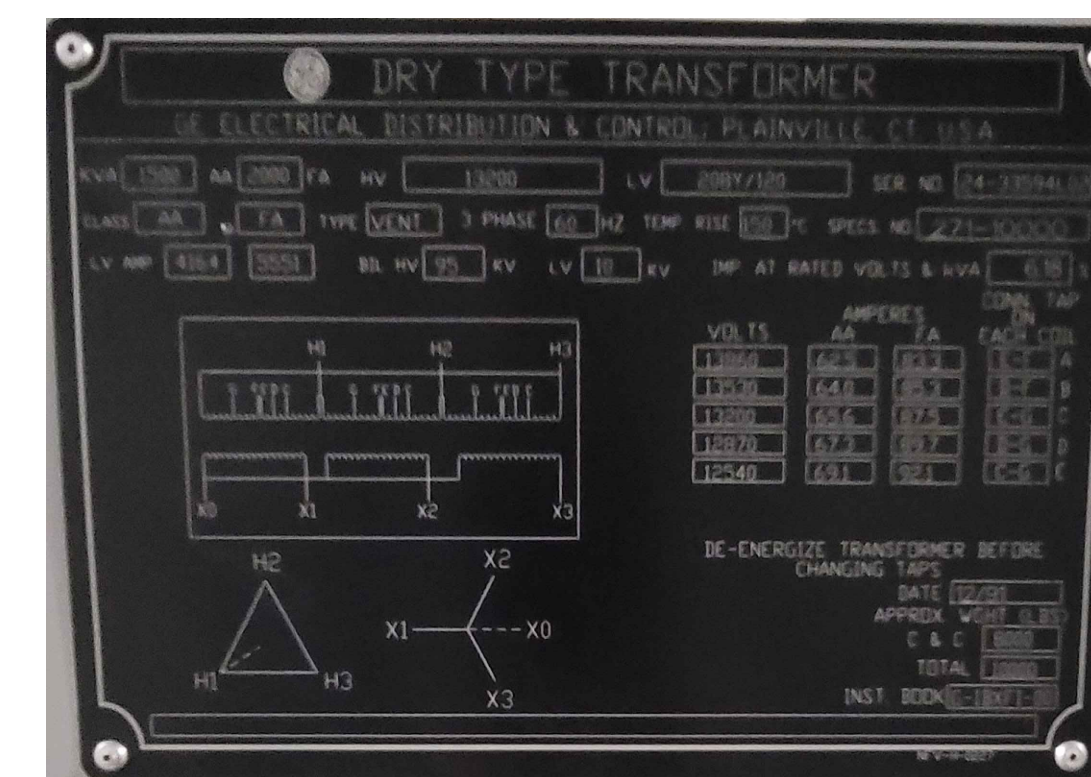
**E-2**



1 EXISTING SUBSTATION #1 FRONT VIEW  
 E3 SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #1 PLAN VIEW  
 E3 SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 1500 KVA-AA  
 2000 KVA-FA  
 208/120 VOLTS  
 99.0 cal/cm<sup>2</sup>  
 MAX DEMAND IS .56 x 800 = 448KW @ 90% PF IS 498 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID

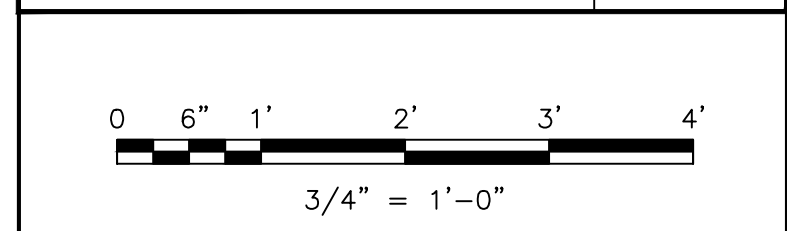


PENNSYLVANIA ONE CALL SYSTEM, INC.  
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 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
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 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX  
 SEAL: \_\_\_\_\_



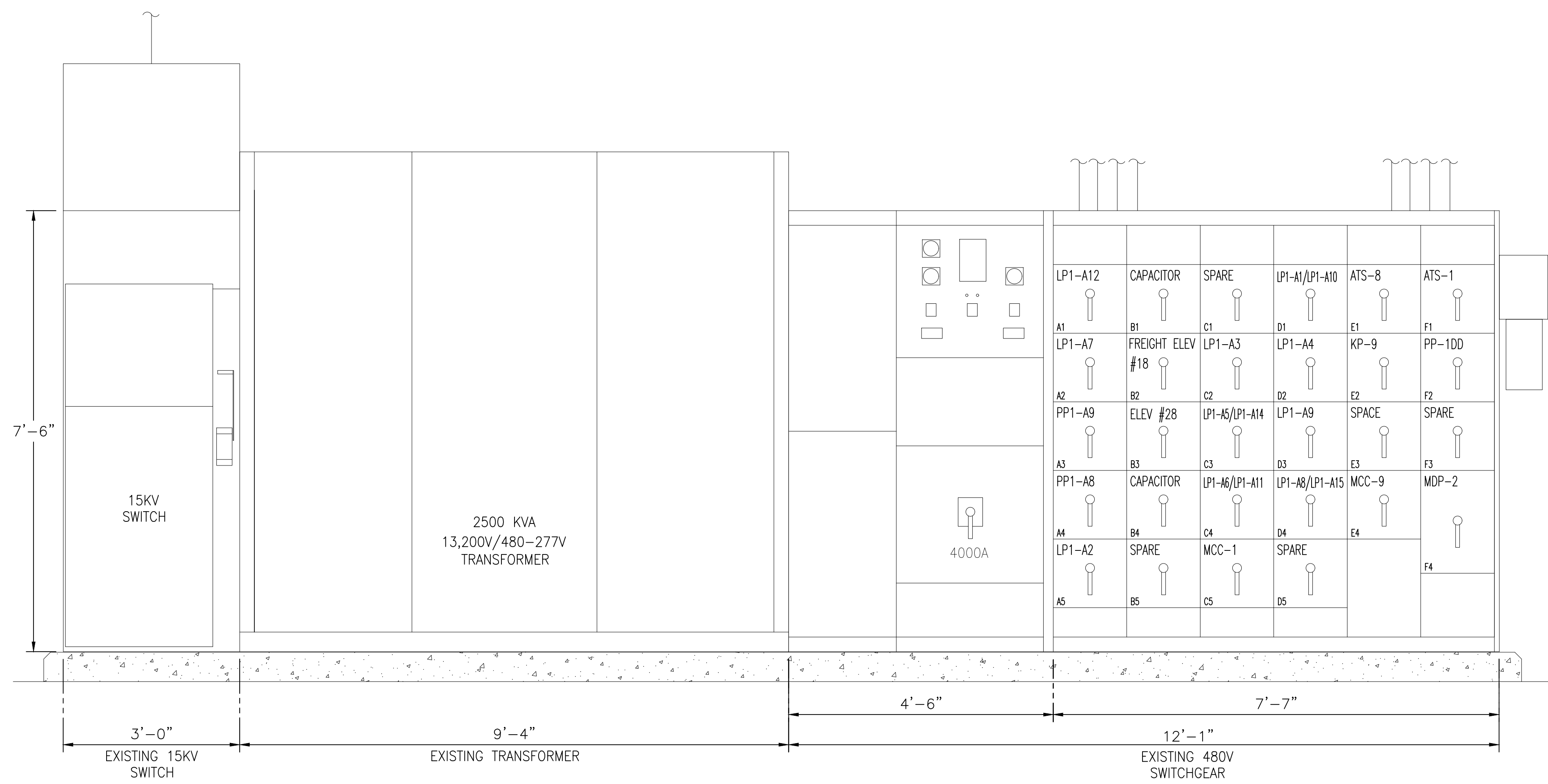
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 PROJECT ENG. JFM  
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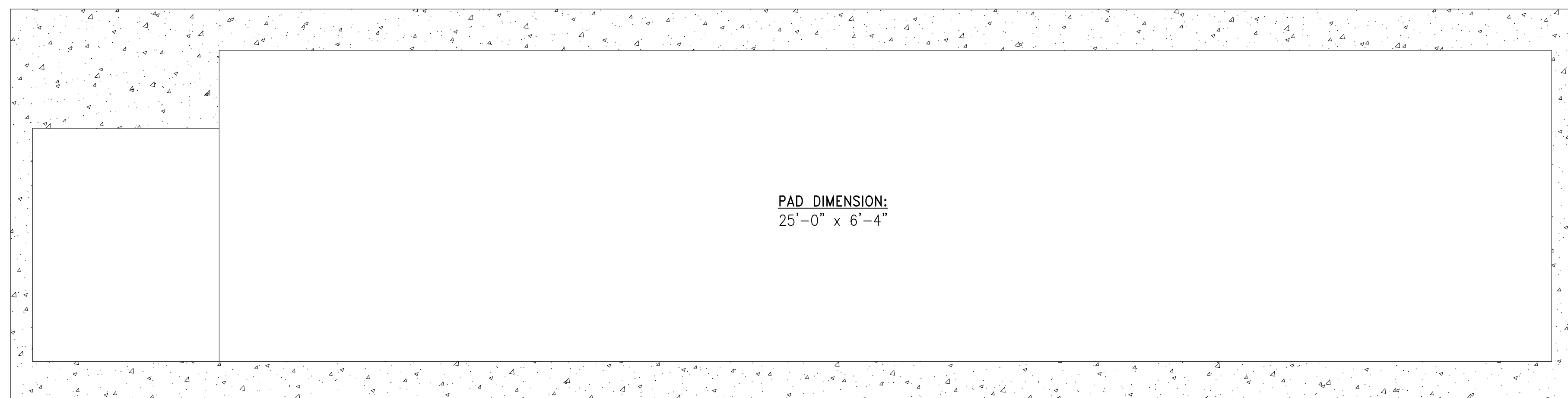
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 PROJECT TITLE: UNIT SUBSTATION MODERNIZATION  
 PHASE: \_\_\_\_\_  
 DRAWING TITLE: SUBSTATION ROOM #3, SUBSTATION #1 ELEVATION AND PLAN

PROJECT NO.: XX-XX-XXXX-XX  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM  
 NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

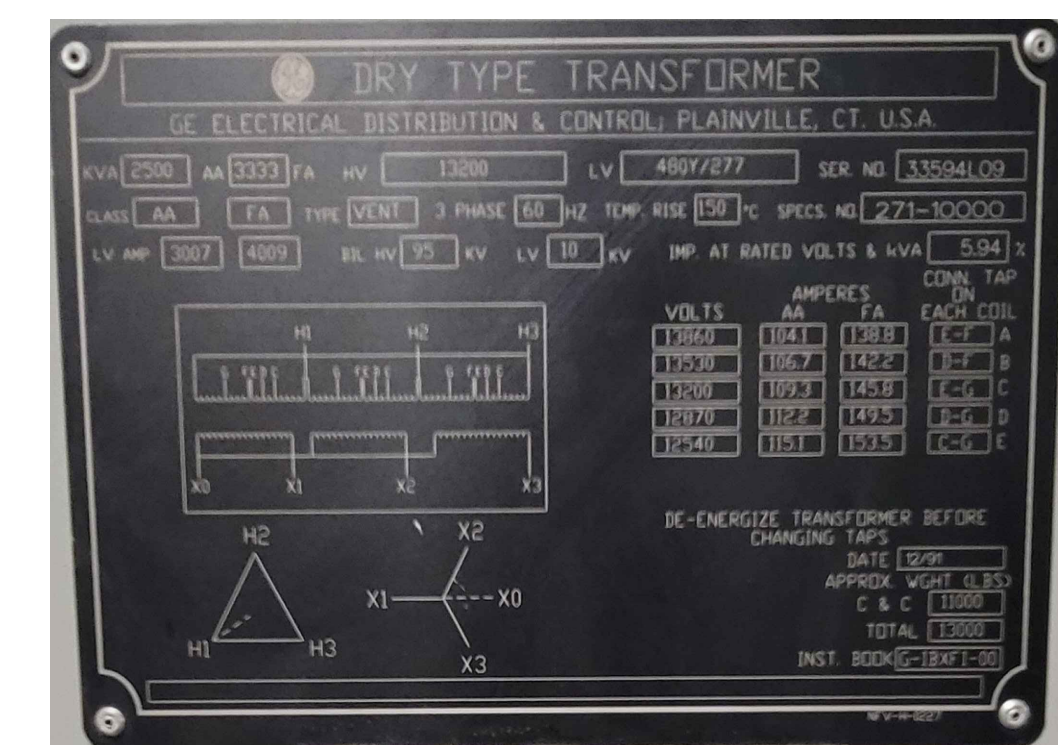
E-3



1  
E4 EXISTING SUBSTATION #2 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2  
E4 EXISTING SUBSTATION #2 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 2500 KVA-AA  
 3333 KVA-FA  
 480/277 VOLTS  
 140.4 cal/cm<sup>2</sup>  
 MAX DEMAND IS \_\_\_ x \_\_\_ = \_\_\_KW @ 90% PF IS \_\_\_ KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID

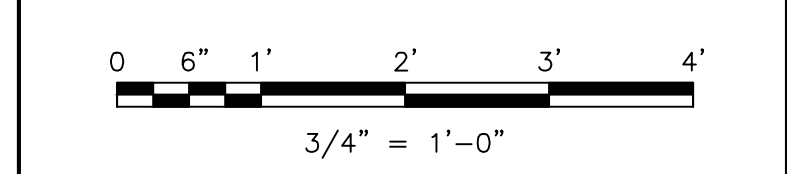


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 PENNSYLVANIA ONE CALL SYSTEM, INC.  
 1000 N. 10TH ST. SUITE 1000  
 PHILADELPHIA, PA 19107  
 (215) 542-8700

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX  
 SEAL:



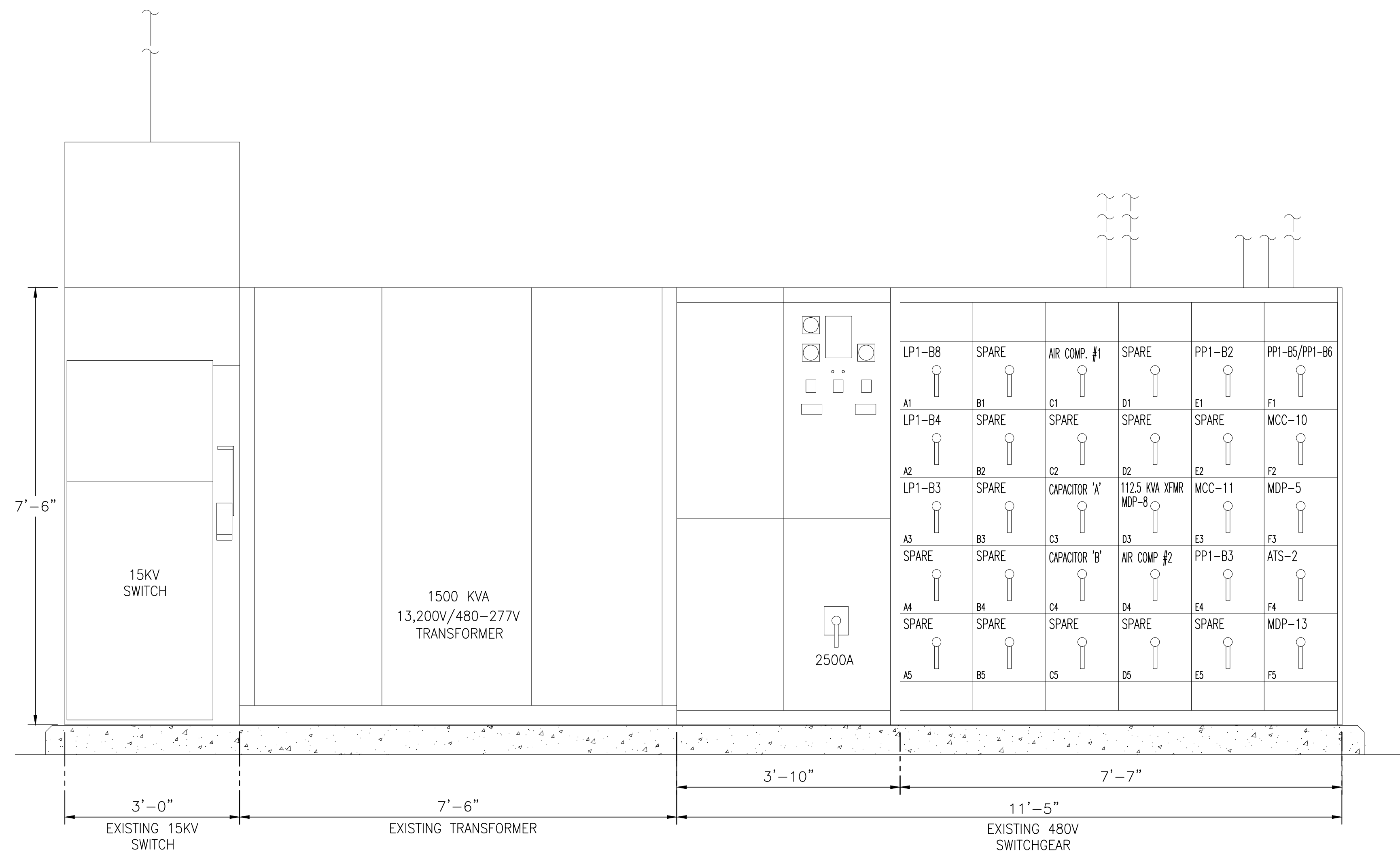
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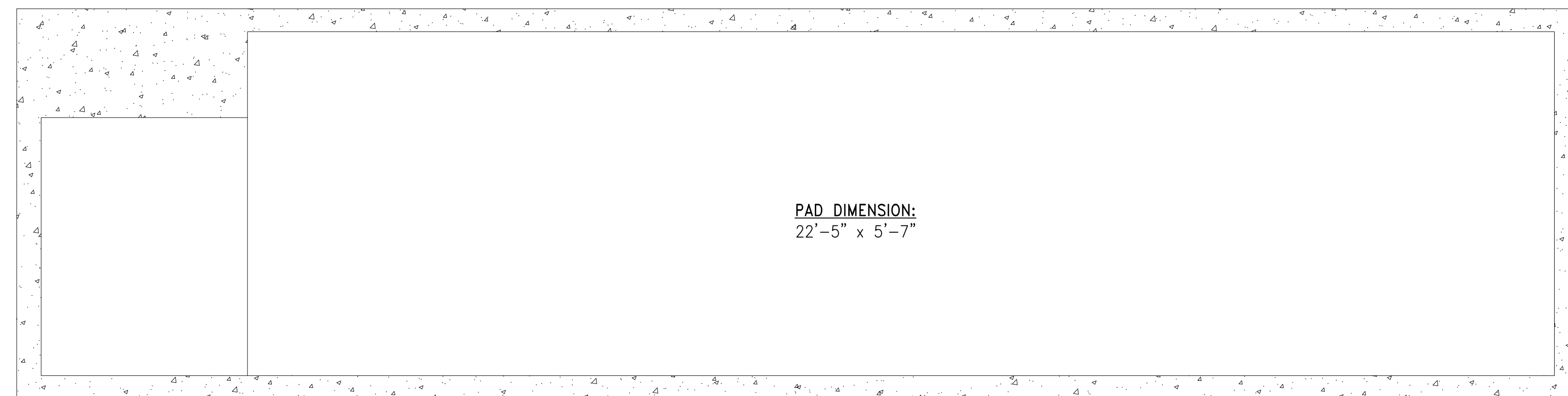
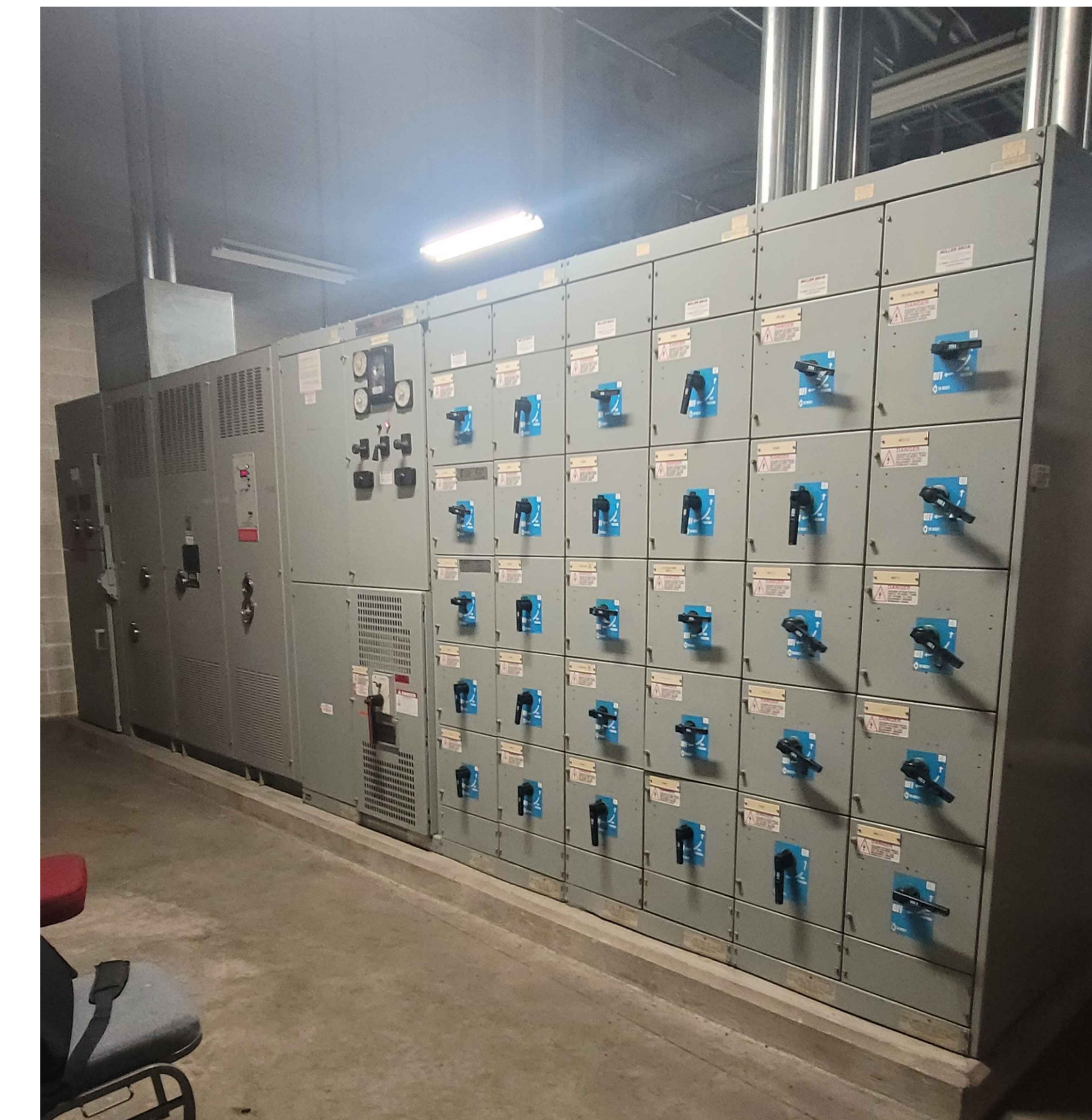
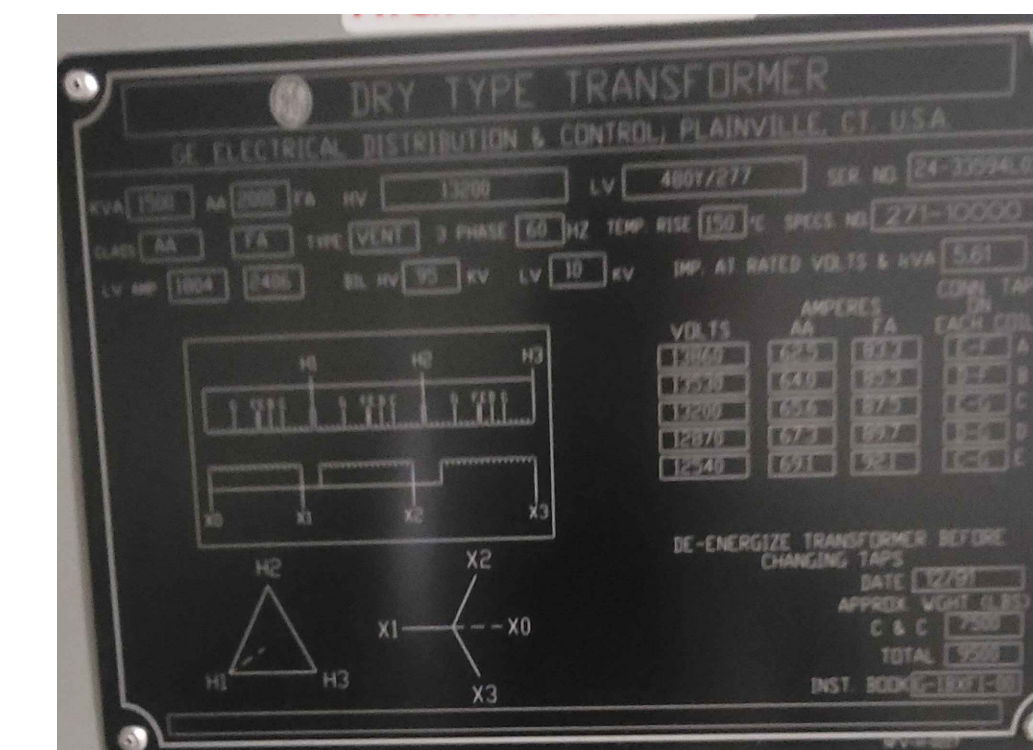
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 PROJECT TITLE:  
 UNIT SUBSTATION MODERNIZATION  
 PHASE:

DRAWING TITLE:  
 SUBSTATION ROOM #3, SUBSTATION #2 ELEVATION AND PLAN  
 PAC PROJECT NO.: XX-XX-XXXX-XX  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.  
 E-4



1  
E5 EXISTING SUBSTATION #3 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2  
E5 EXISTING SUBSTATION #3 PLAN VIEW  
SCALE: 3/4" = 1' - 0"

TRANSFORMER:  
 1500 KVA-AA  
 2000 KVA-FA  
 480/277 VOLTS  
 101.8 cal/cm<sup>2</sup>  
 MAX DEMAND IS .50 x 1200 = 600KW @ 90% PF IS 667 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



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 800-444-8888  
 1-800-242-1776  
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 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PENNSYLVANIA ONE CALL SYSTEM, INC.  
 1315 WALNUT STREET, SUITE 804  
 PHILADELPHIA, PA 19107  
 (215) 542-8700

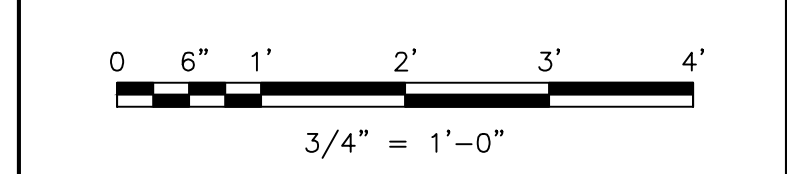
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
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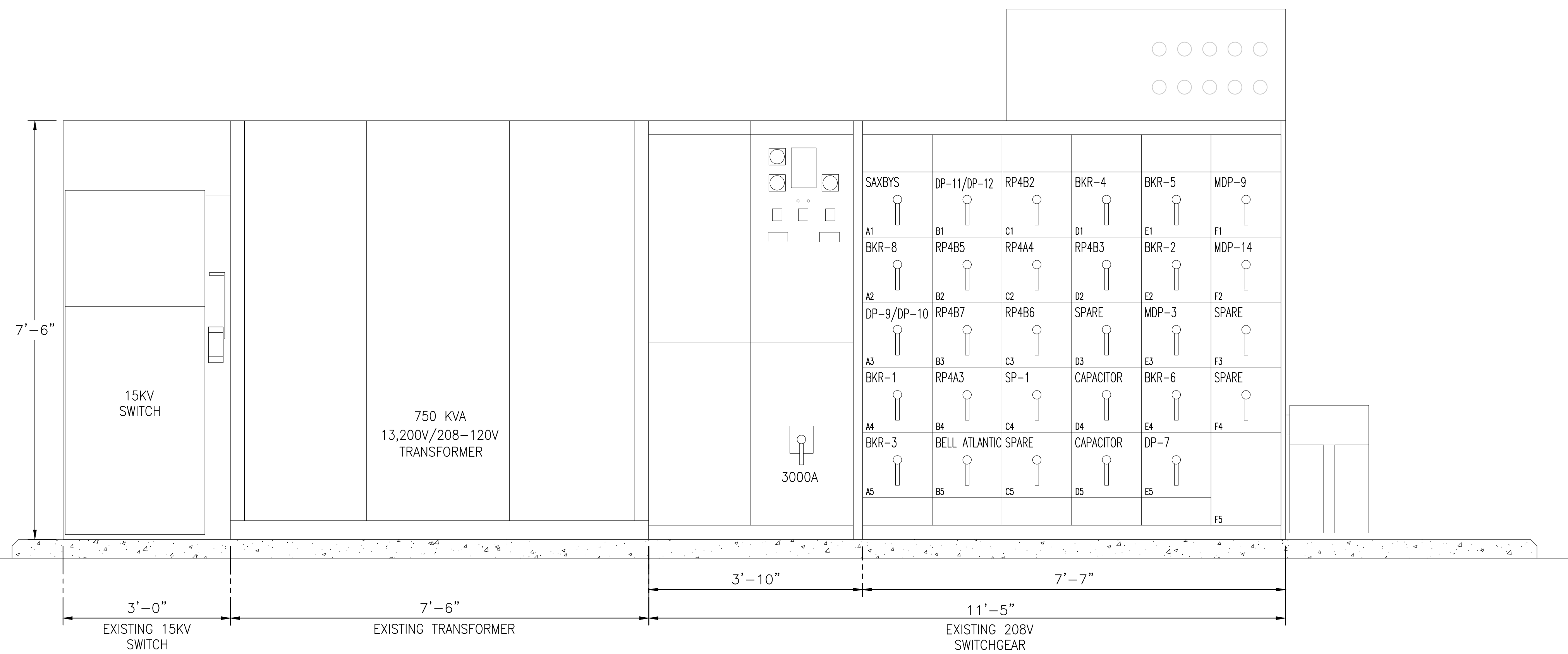
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 PROJECT TITLE:  
 UNIT SUBSTATION MODERNIZATION  
 PHASE:

DRAWING TITLE:  
 SUBSTATION ROOM #5, SUBSTATION #3 ELEVATION AND PLAN

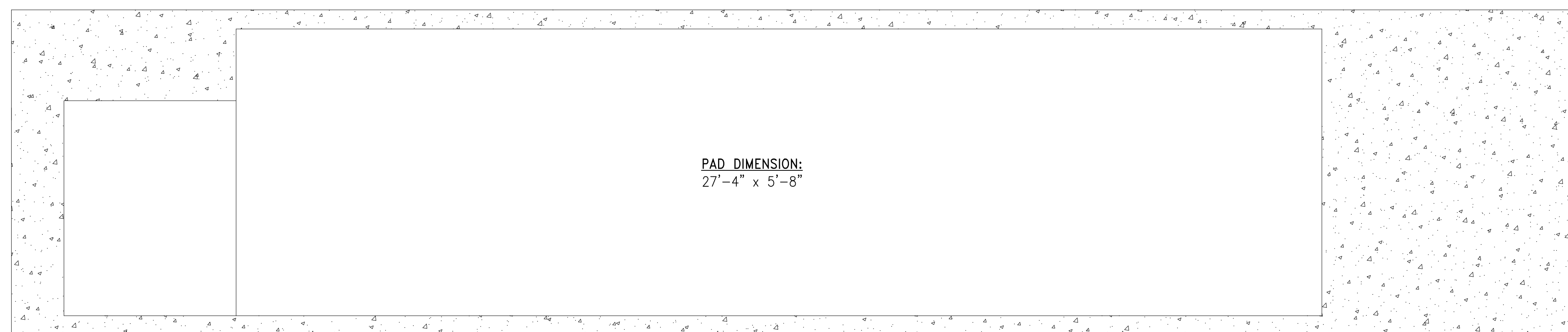
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NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

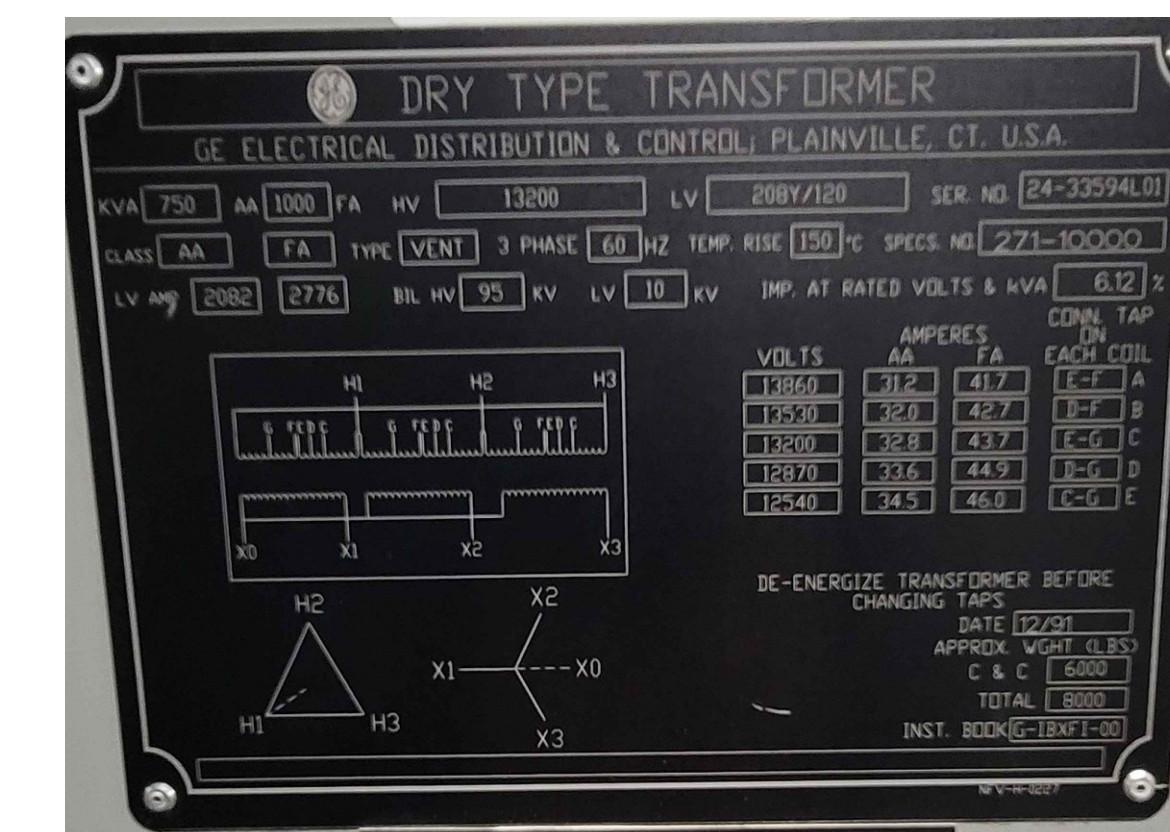
E-5



1 EXISTING SUBSTATION #5 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #5 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
750 KVA-AA  
1,000 KVA-FA  
208/120 VOLTS  
63.3 cal/cm<sup>2</sup>  
MAX DEMAND IS .44 x 600 = 264KW @ 90% PF IS 293 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
800-444-8888  
West Chester, Pennsylvania  
610-337-1000

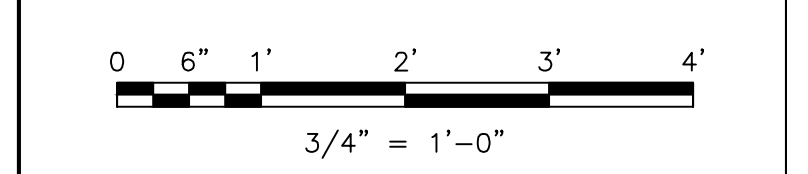
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PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

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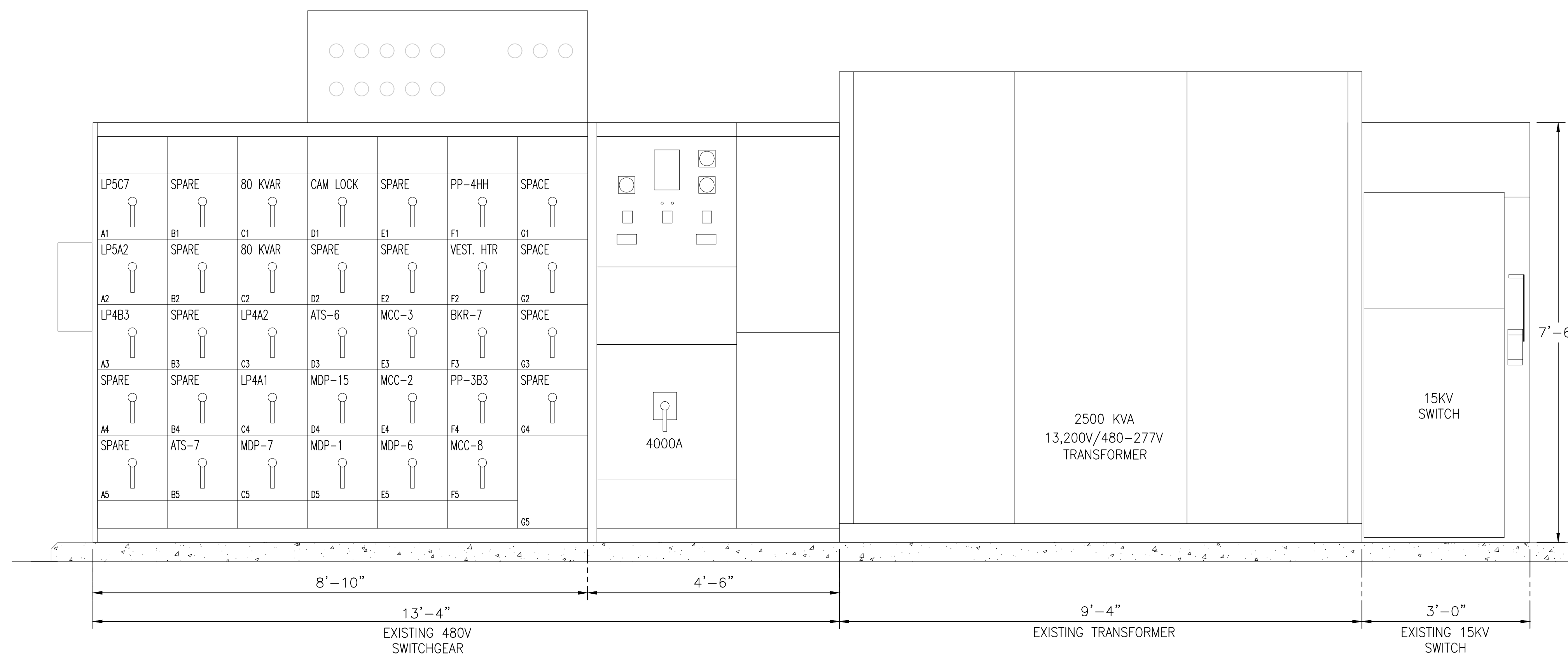
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PROJECT TITLE: UNIT SUBSTATION MODERNIZATION  
PHASE:

DRAWING TITLE: SUBSTATION ROOM #4, SUBSTATION #5 ELEVATION AND PLAN

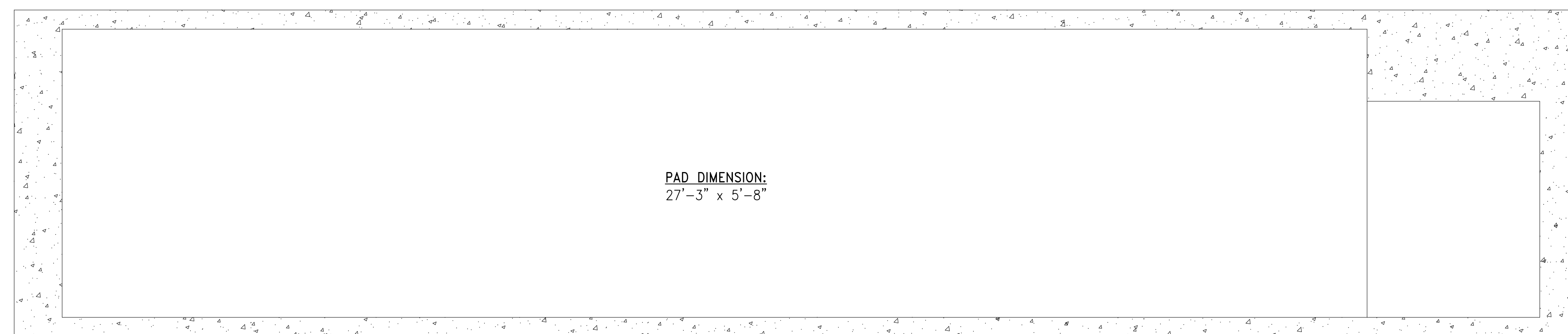
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DATE: 03-25-2024  
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DRAWN BY: LPI  
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NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

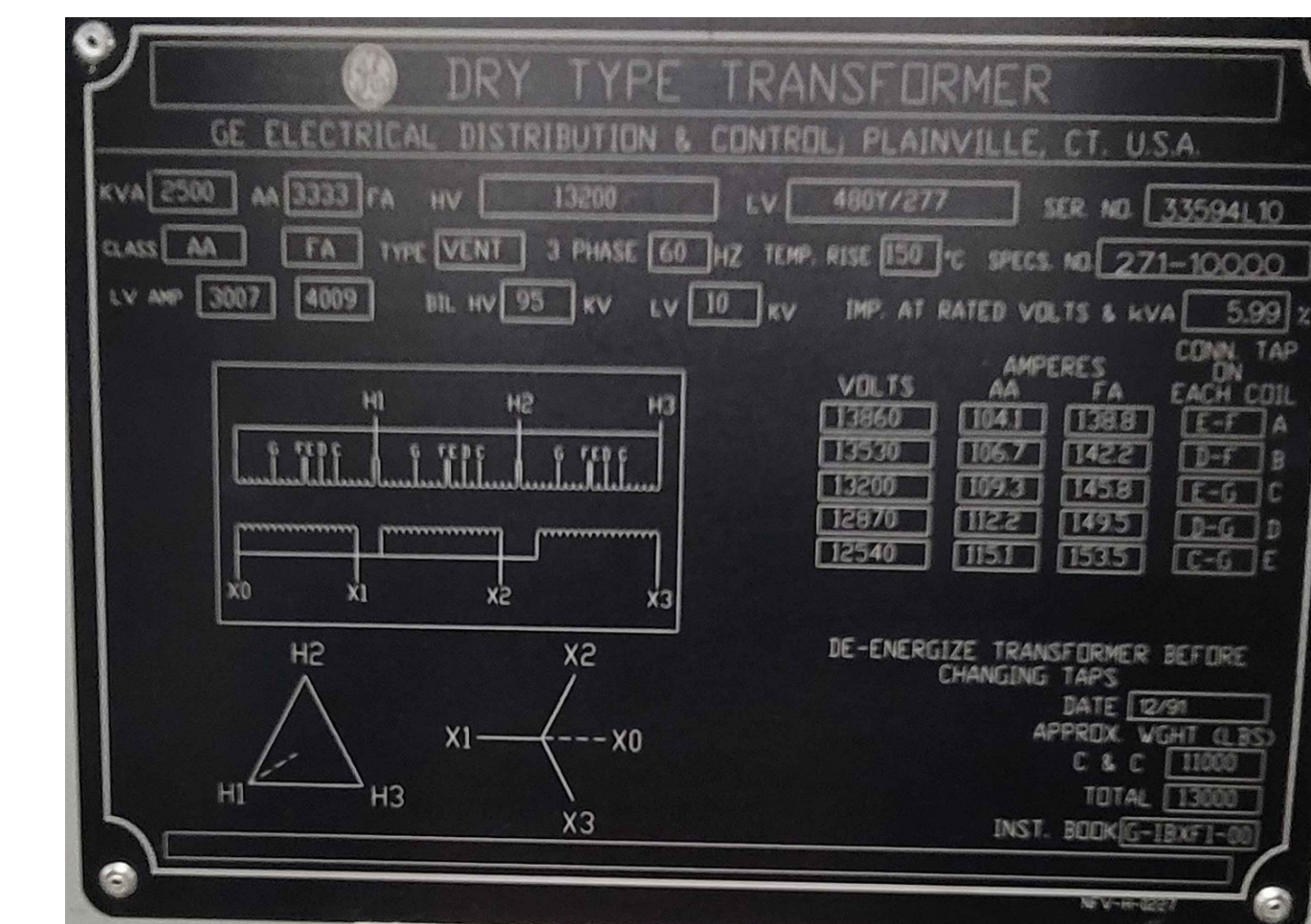
E-6



1 EXISTING SUBSTATION #6 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #6 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 2,500 KVA-AA  
 3,333 KVA-FA  
 480/277 VOLTS  
 141.4 cal/cm<sup>2</sup>  
 MAX DEMAND IS .46 x 1920 = 883KW @ 90% PF IS 981 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID

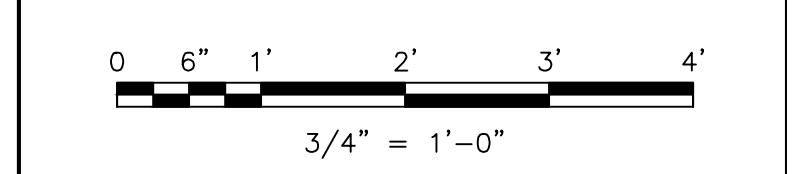


PENNSYLVANIA ONE CALL SYSTEM, INC.  
 800-444-8468  
 1-800-242-1776  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PA ONE-CALL NUMBER (IF FOR DESIGN ONLY): XXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXX

SEAL:  
 DATE APPROX. YEAR: 6/85  
 C & C 11800  
 TOTAL 11800  
 INST. BOOK: 1011-28

MAIDA CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED

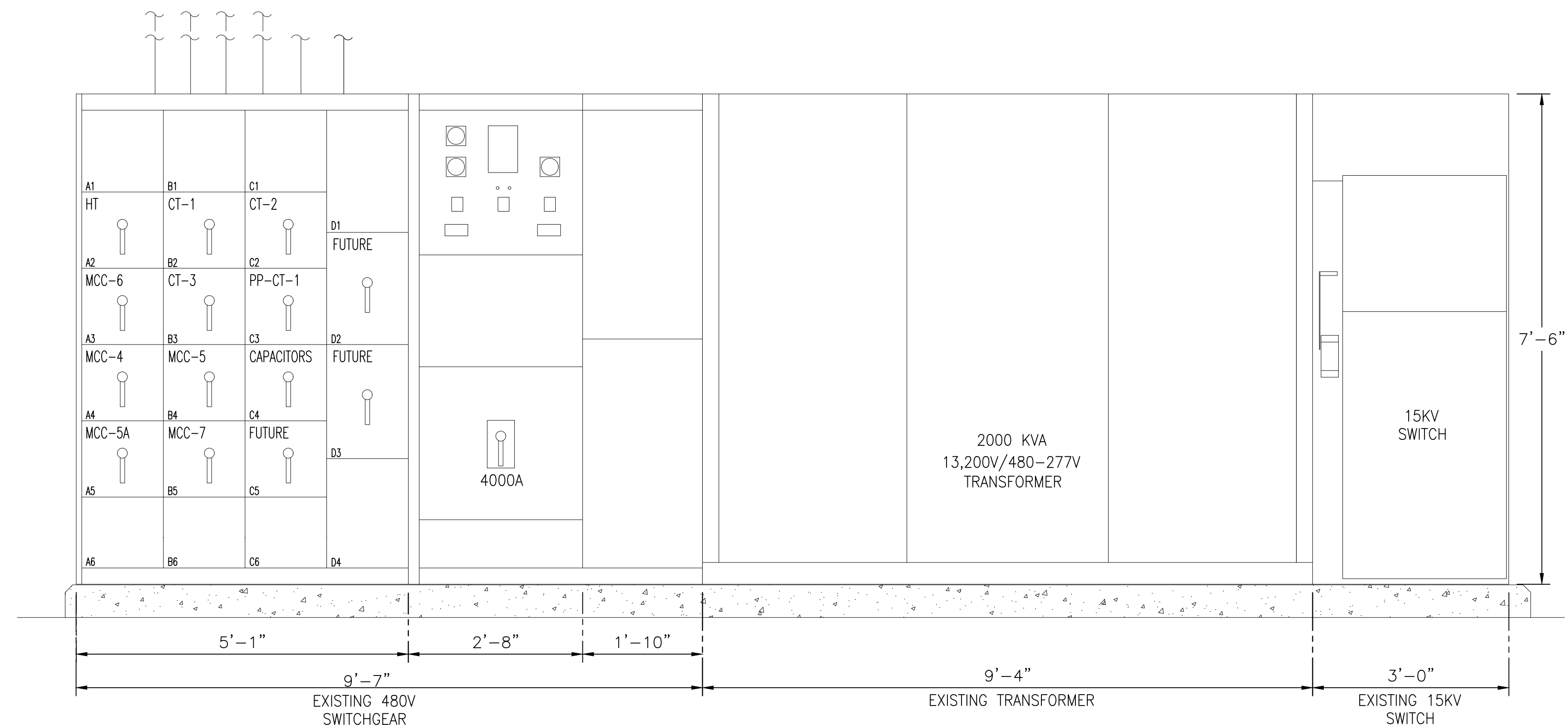


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 PHASE:

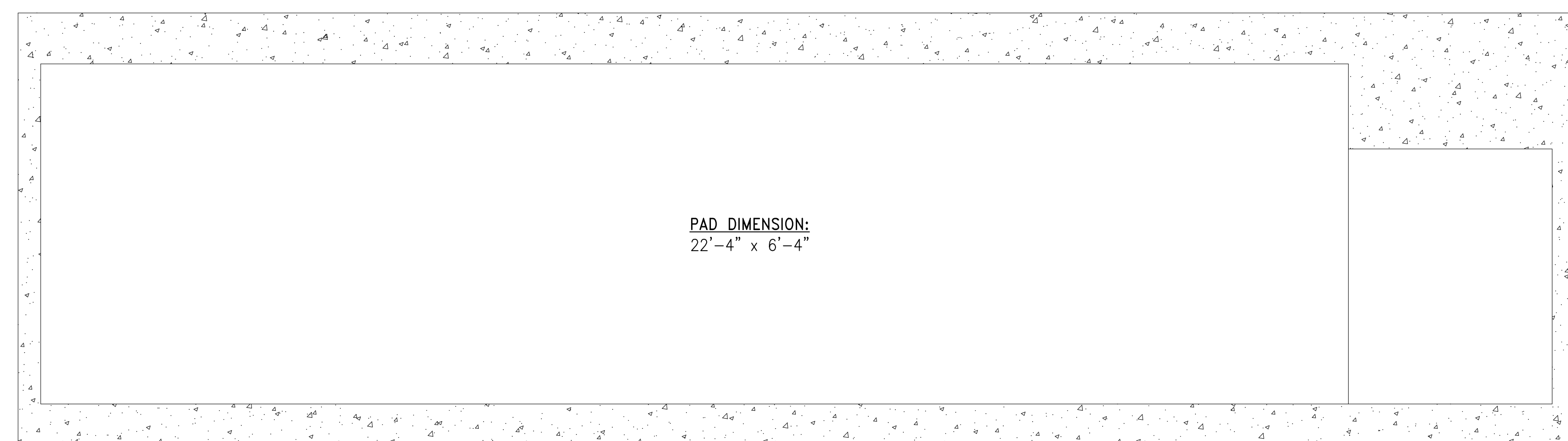
DRAWING TITLE: SUBSTATION ROOM #4, SUBSTATION #6 ELEVATION AND PLAN

PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM  
 NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

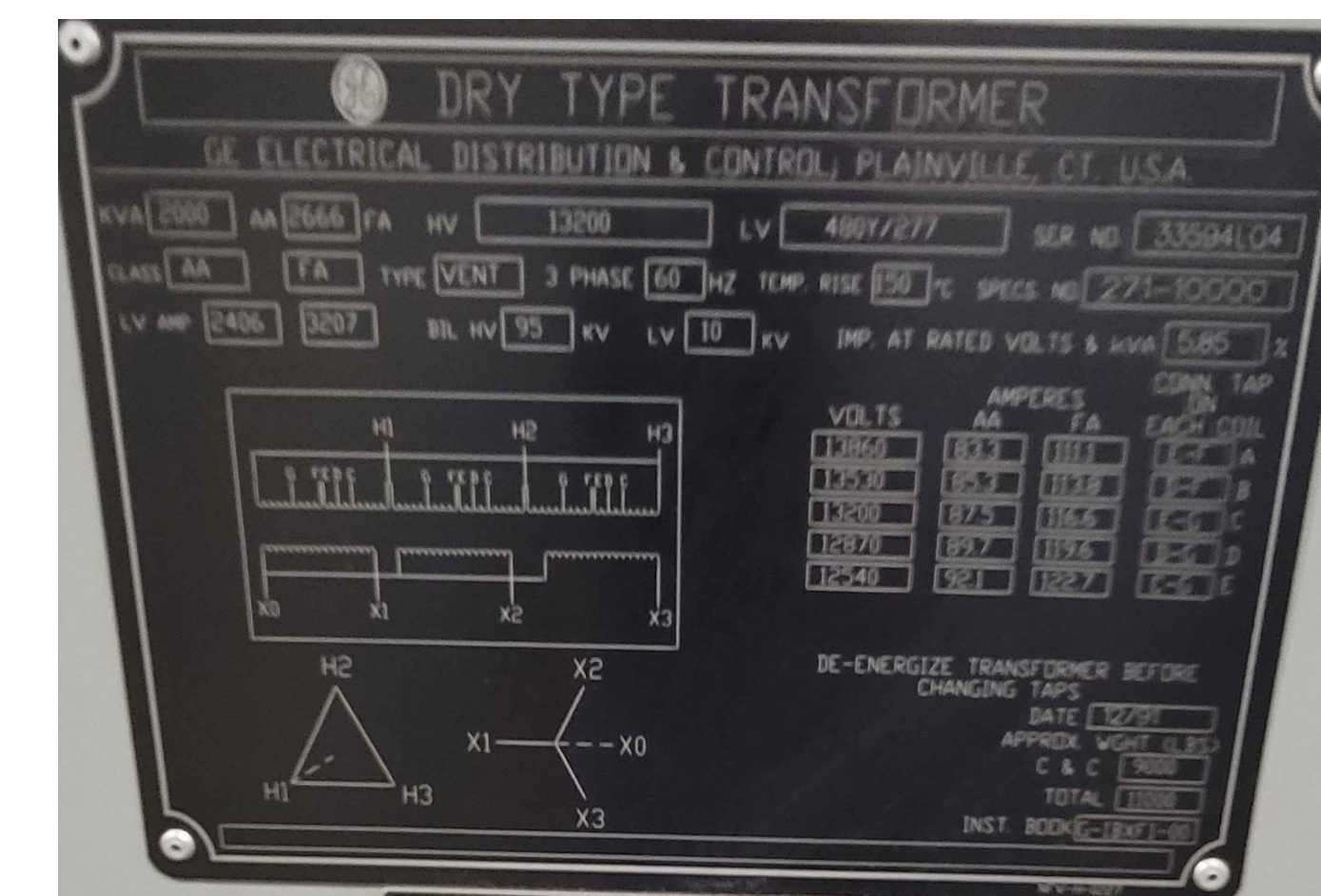
E-7



1 EXISTING SUBSTATION #7 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #7 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
2,000 KVA-AA  
2,666 KVA-FA  
480/277 VOLTS  
121.9 cal/cm<sup>2</sup>  
MAX DEMAND IS .72 x 1920 = 1,382KW @ 90% PF IS 1,536 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
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PENNSYLVANIA ONE CALL SYSTEM, INC.  
300 North 5th Street  
West Chester, Pennsylvania  
19380-1078  
  
BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
IN PA USE REQUIRED. UNDER PENNSYLVANIA STATE NOTE: TO REGISTER BEFORE YOU EXCAVATE. SHALL BE AT THE DISCRETION.

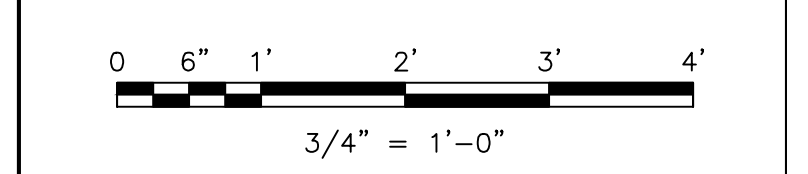
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

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Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
PROJECT ENG. JFM  
CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE: SUBSTATION ROOM #6, SUBSTATION #7 ELEVATION AND PLAN

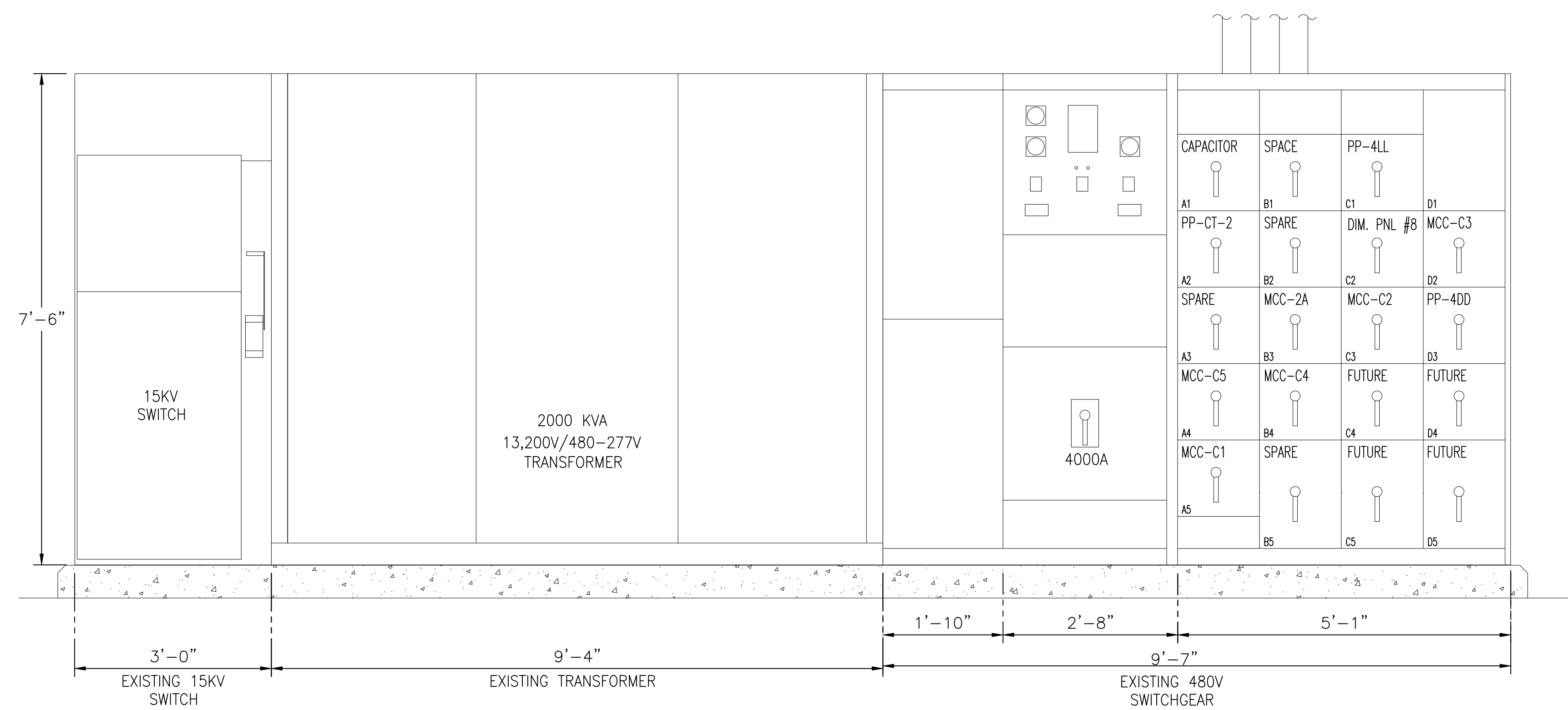
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:

CONSULTANT PROJECT NO.: E45032  
DATE: 03-25-2024  
SCALE: AS NOTED  
DRAWN BY: LPI  
CHECKED BY: JFM

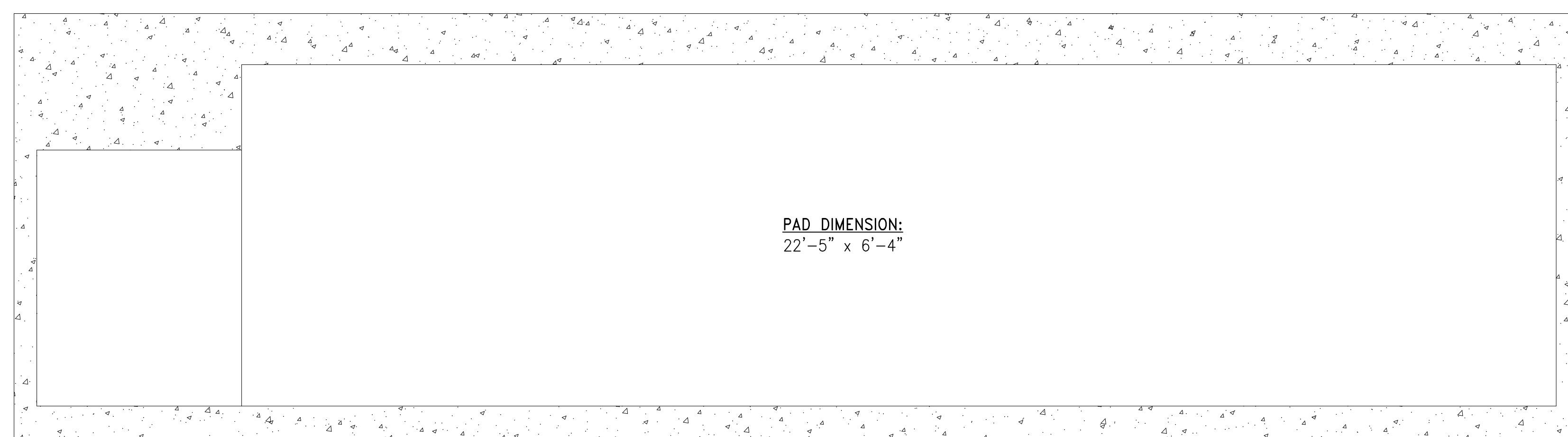
NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

E-8

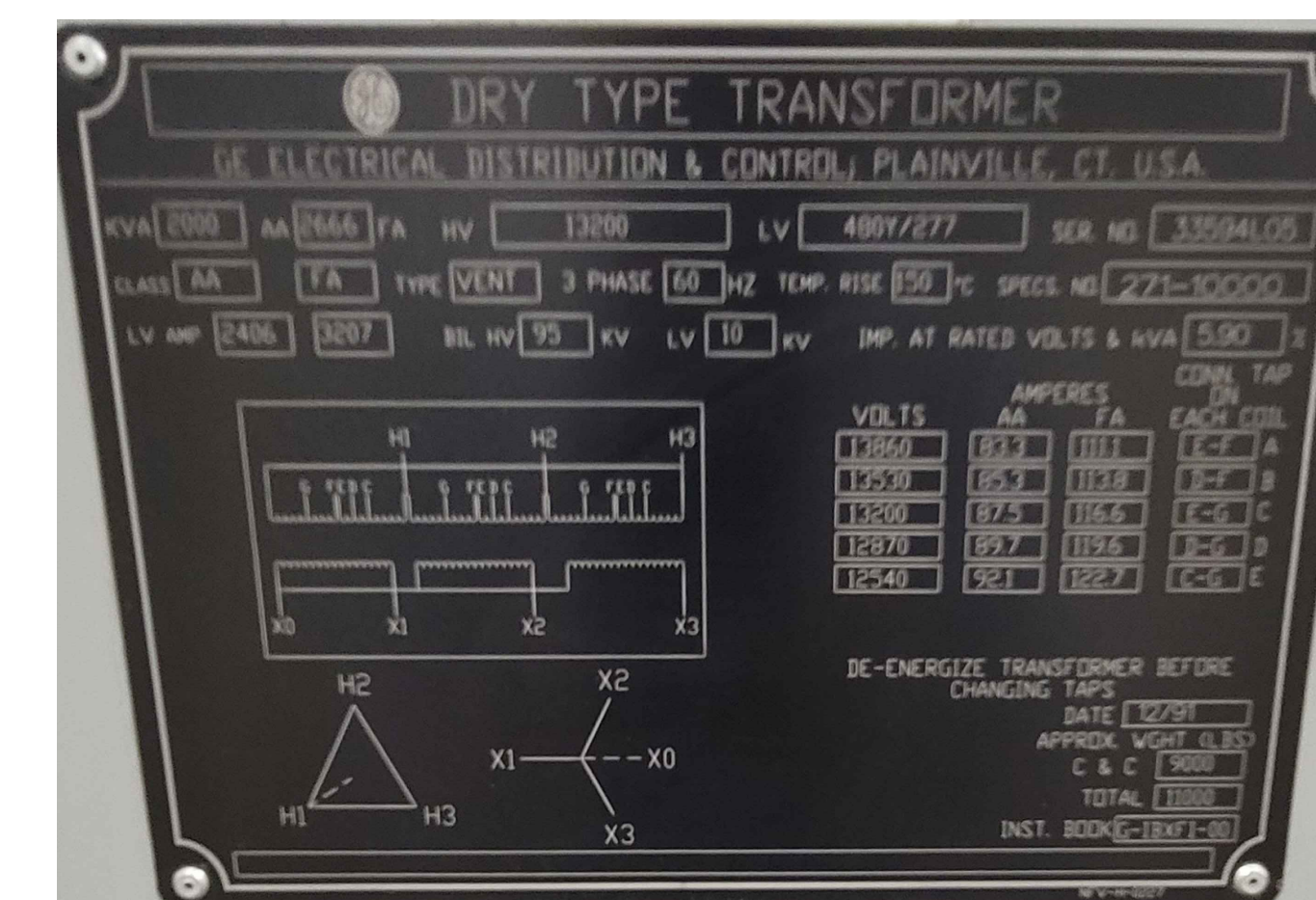
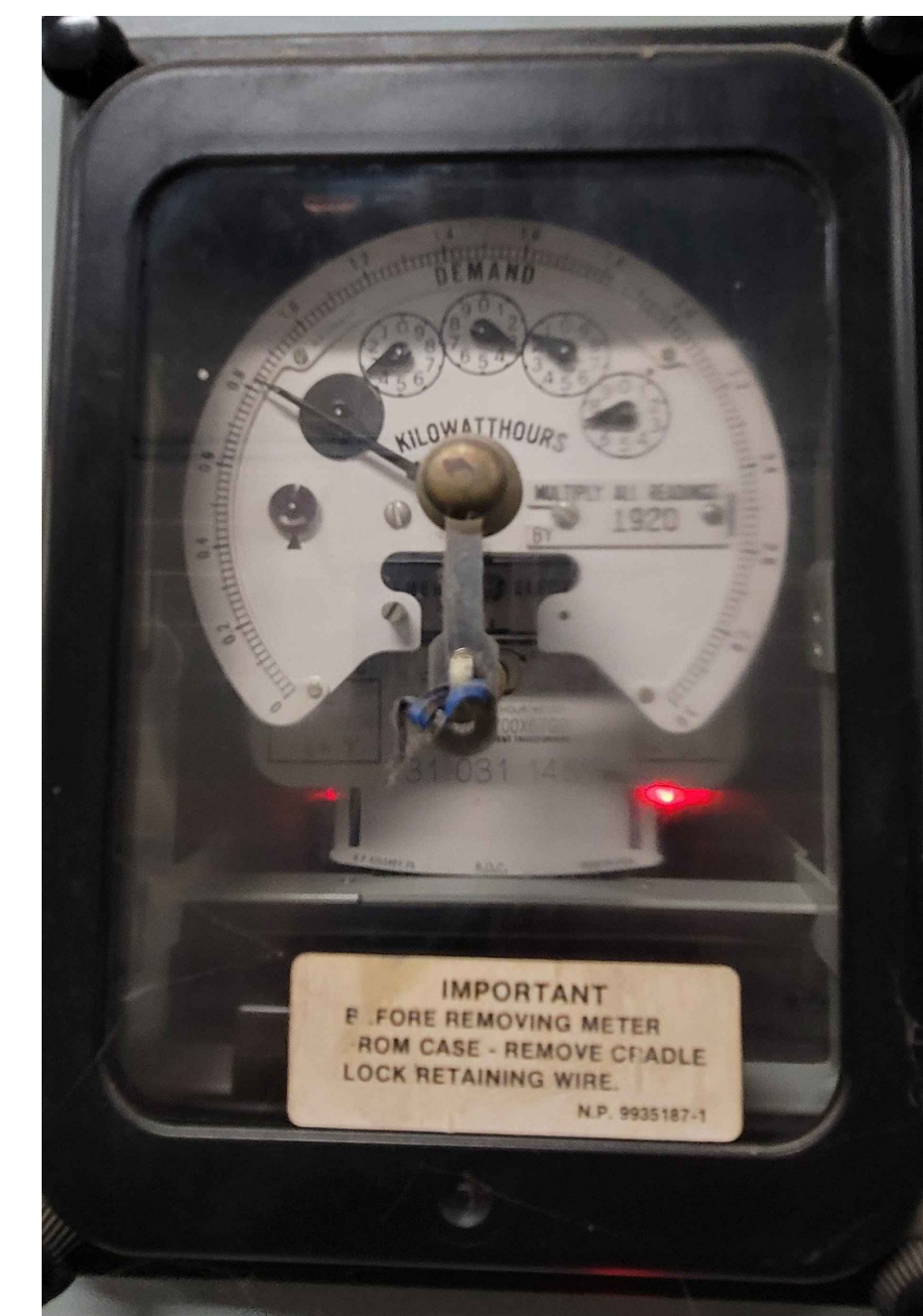




1 EXISTING SUBSTATION #8 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #8 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
2,000 KVA-AA  
2,666 KVA-FA  
480/277 VOLTS  
121.6 cal/cm<sup>2</sup>

MAX DEMAND IS .82 x 1920 = 1,574KW @ 90% PF IS 1,749 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.

BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776

IN PA WE REQUIRE THESE WARNING SIGNS. NOTICE TO UTILITIES BEFORE YOU EXCAVATE. DRILL, BLAST OR DEMOLISH!

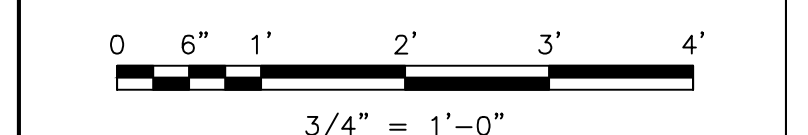
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA ENGINEERING INC. CONSULTING ENGINEERS  
Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
PROJECT ENG. JFM  
CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

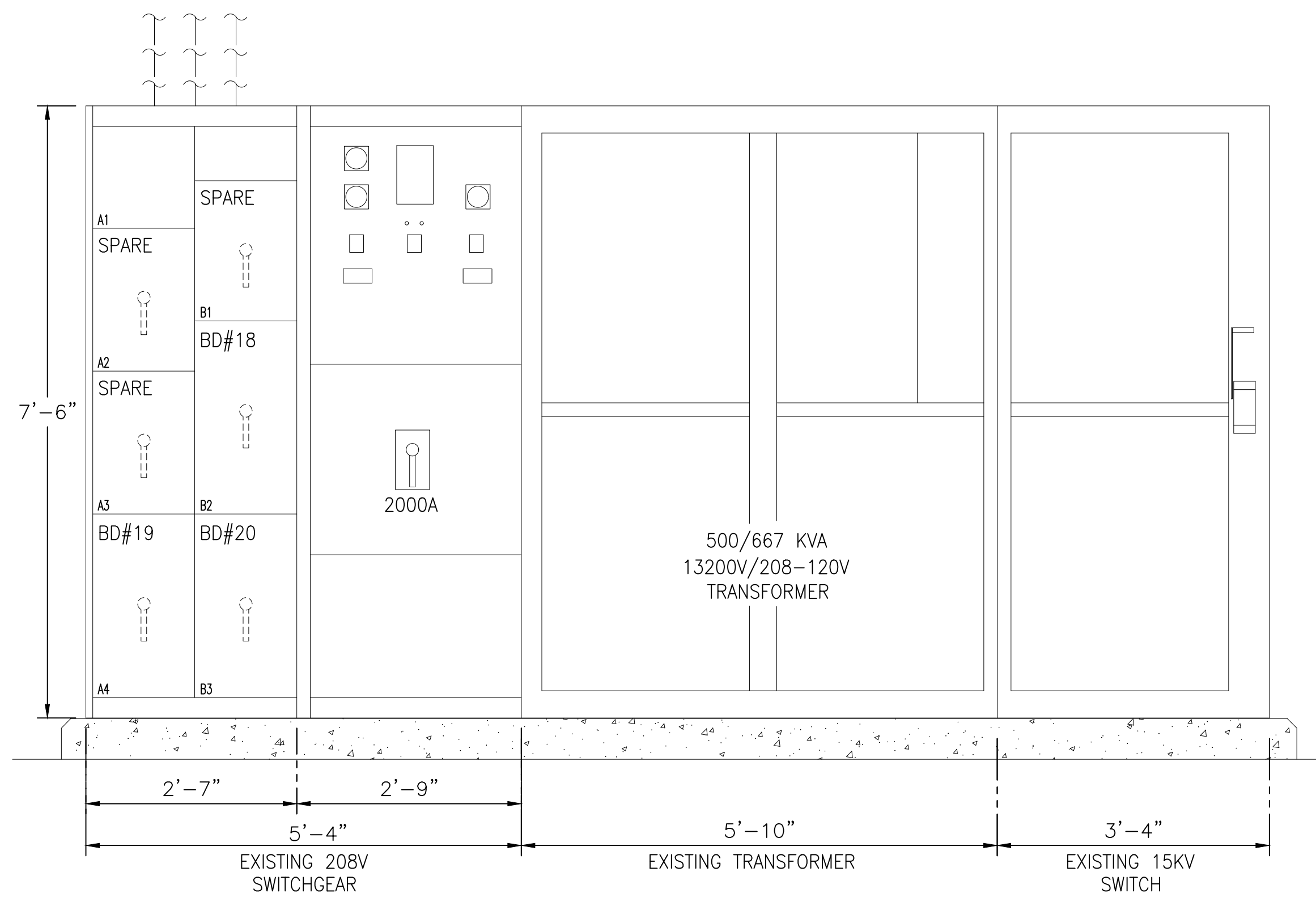
PHASE:

DRAWING TITLE: SUBSTATION ROOM #6, SUBSTATION #8 ELEVATION AND PLAN

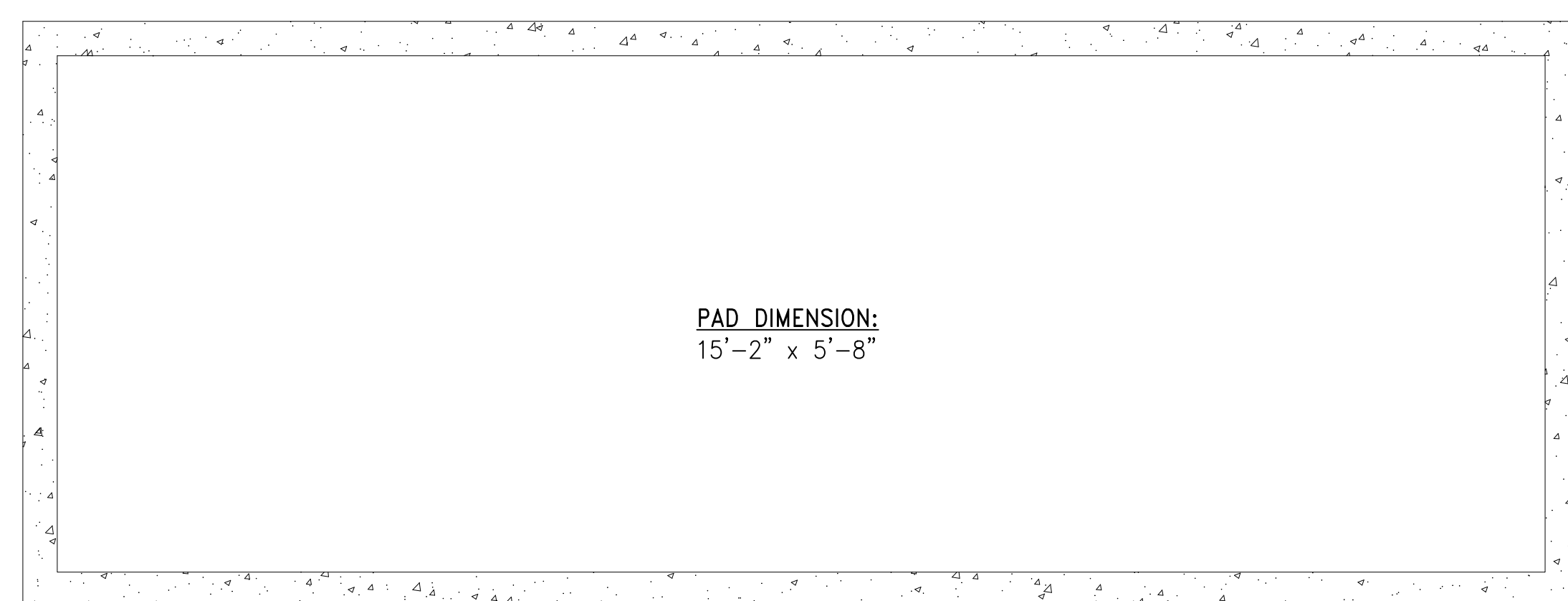
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
CONSULTANT PROJECT NO.: E45032  
DATE: 03-25-2024  
SCALE: AS NOTED  
DRAWN BY: LPI  
CHECKED BY: JFM

E-9

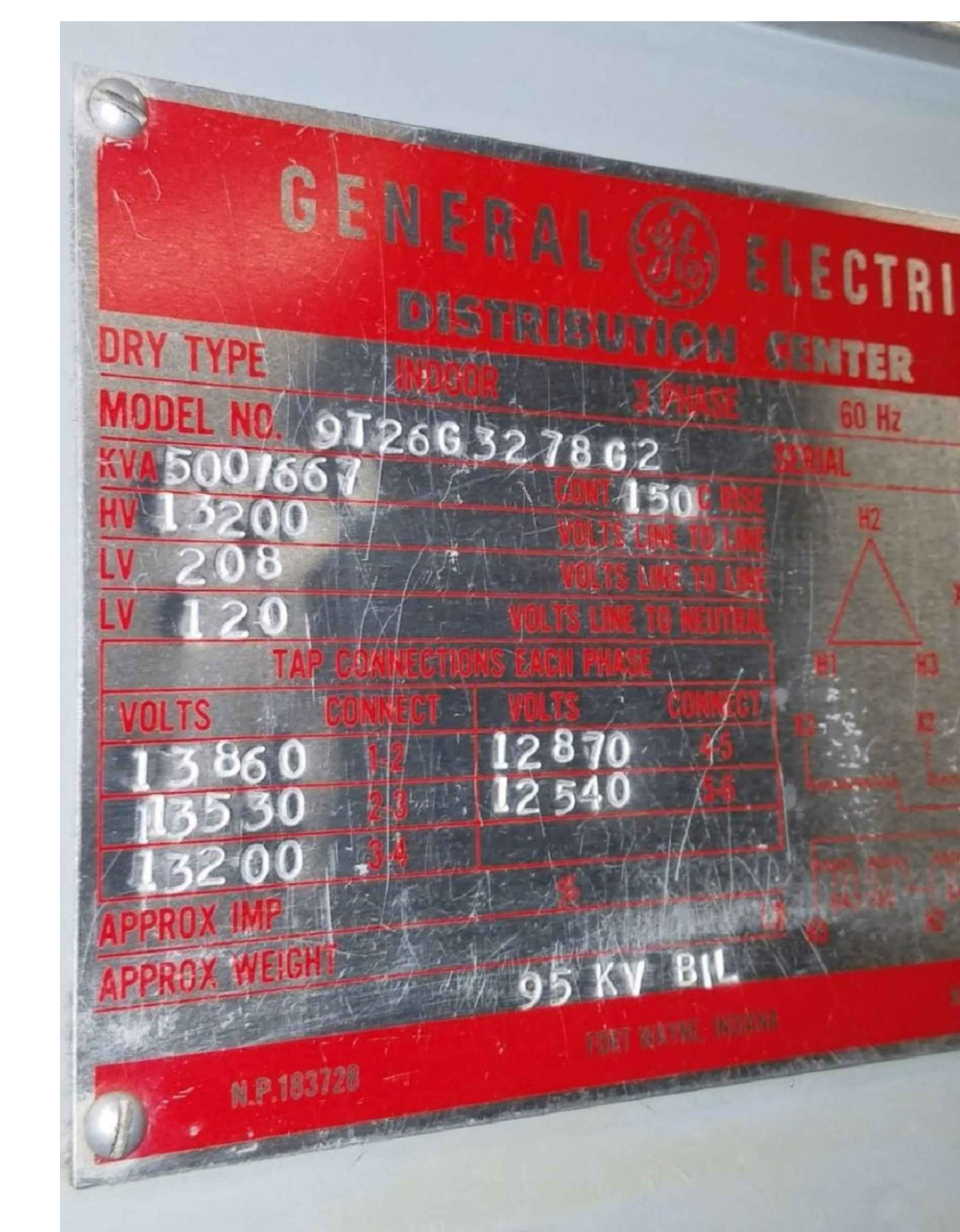
NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.



1 EXISTING SUBSTATION #9 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #9 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:

500 KVA-AA  
667 KVA-FA  
208/120 VOLTS  
54.9 cal/cm<sup>2</sup>

MAX DEMAND IS .88 x 400 = 352KW @ 90% PF IS 391 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
800-444-8888  
West Chester, Pennsylvania  
19380-1078

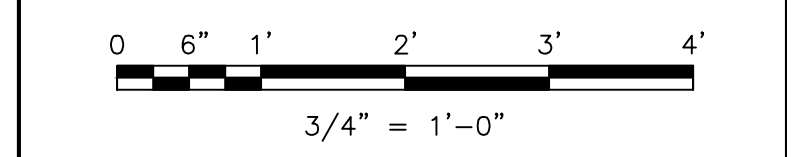
BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
OR USE REDUCED RATE NUMBERING SYSTEM  
NOTE: TO REGISTER BEFORE YOU EXCAVATE, PLEASE VISIT OR DEMONSTRATE  
NON-MEMBERS MUST BE CONTACTED DIRECTLY

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA CONSULTING ENGINEERS  
Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
PROJECT ENG. JFM  
CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX  
PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

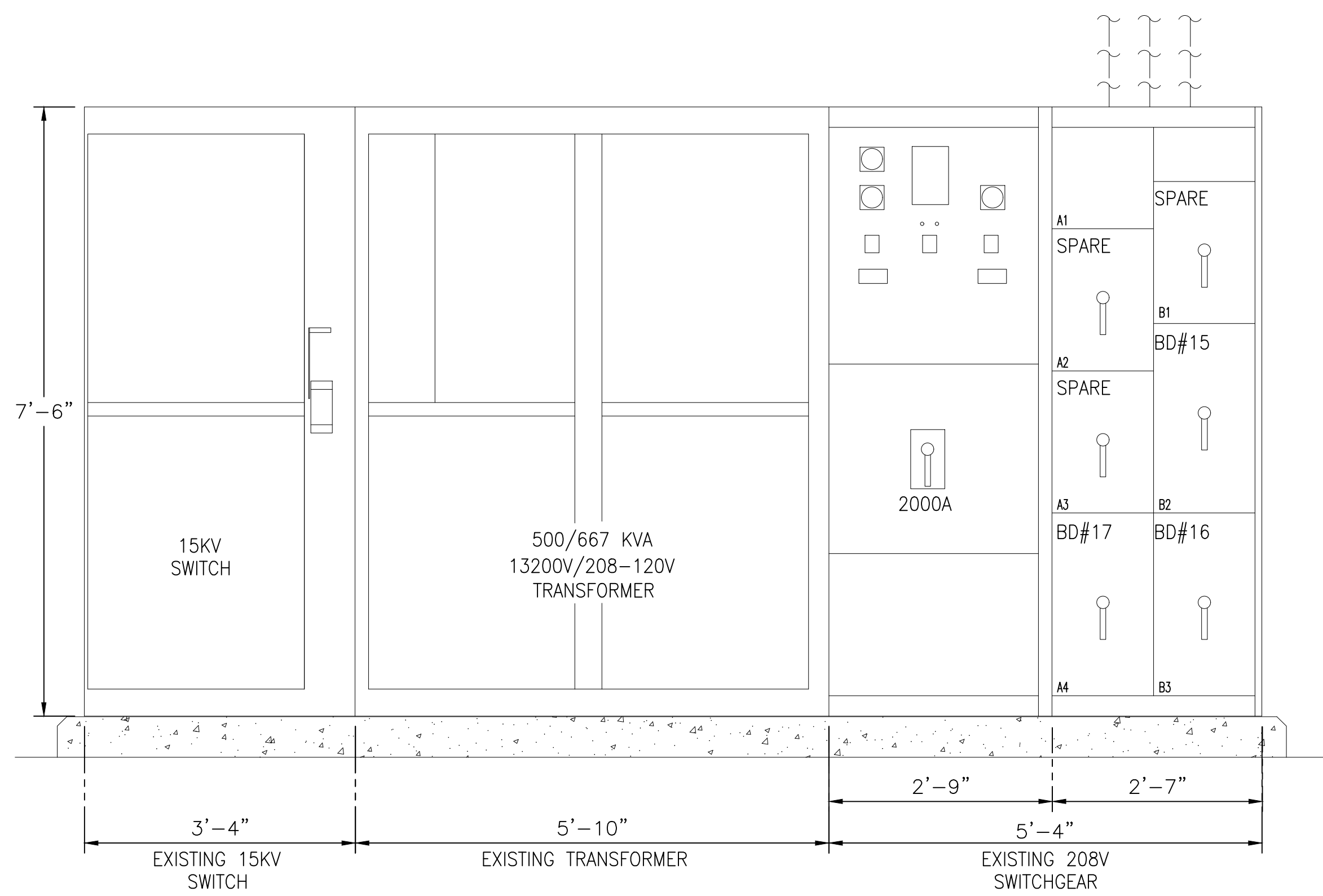
PHASE:

DRAWING TITLE: SUBSTATION ROOM #1, SUBSTATION #9 ELEVATION AND PLAN

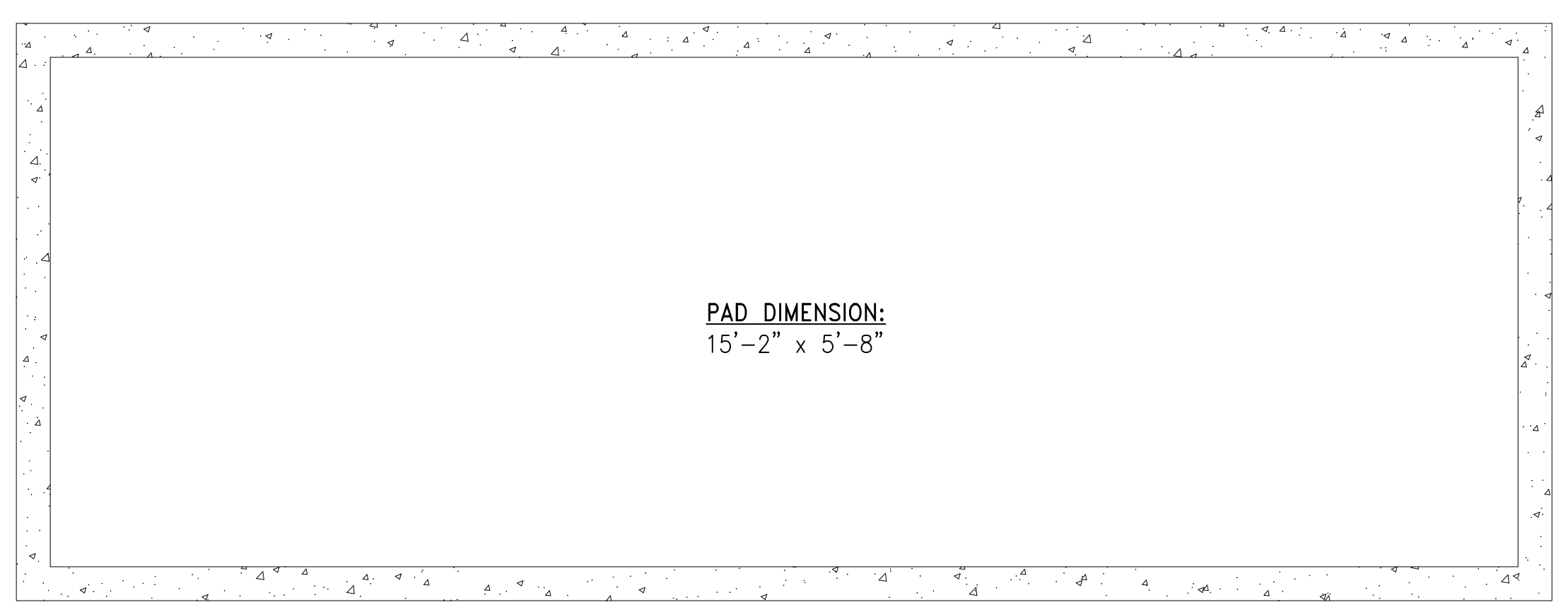
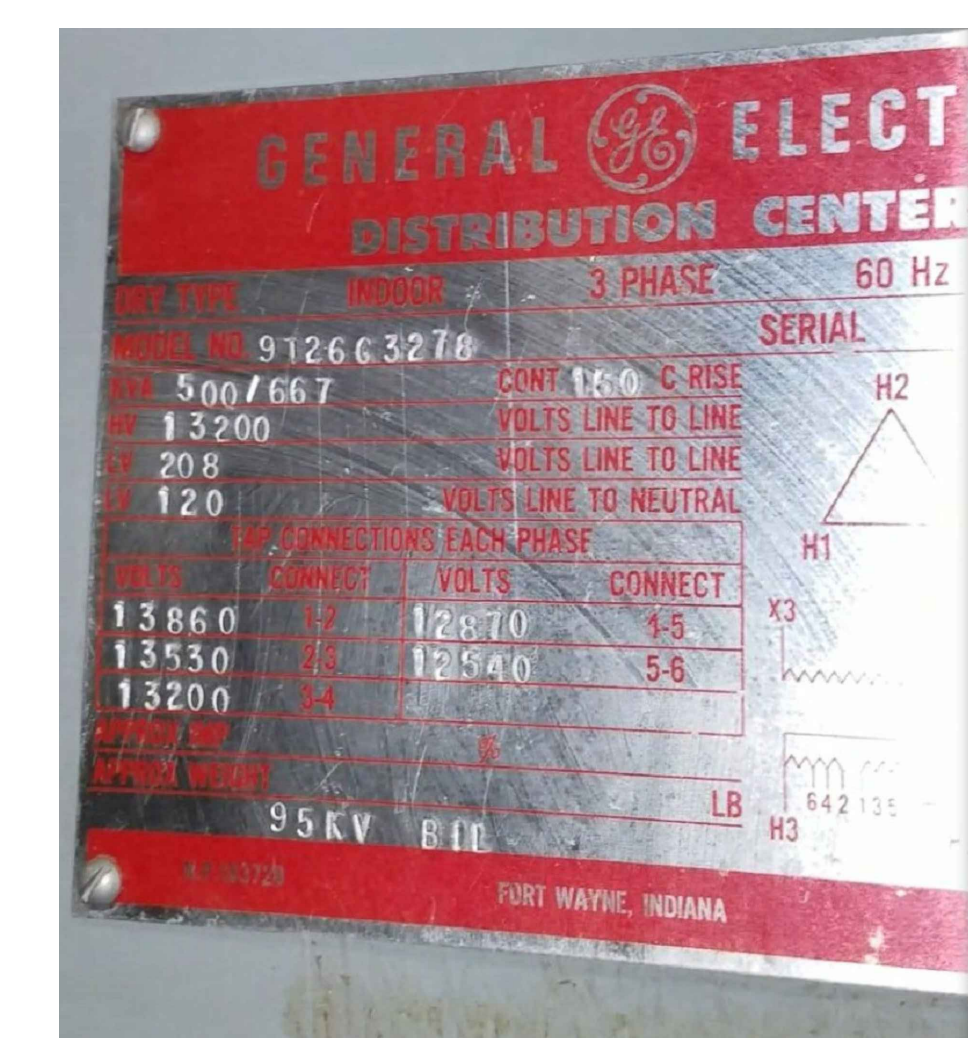
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
CONSULTANT PROJECT NO.: E45032  
DATE: 03-25-2024  
SCALE: AS NOTED  
DRAWN BY: LPI  
CHECKED BY: JFM

E-10

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.



1 EXISTING SUBSTATION #10 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #10 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 500 KVA-AA  
 667 KVA-FA  
 208/120 VOLTS  
 54.9 cal/cm<sup>2</sup>  
 MAX DEMAND IS 1.28 x 400 = 512KW @ 90% PF IS 569 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



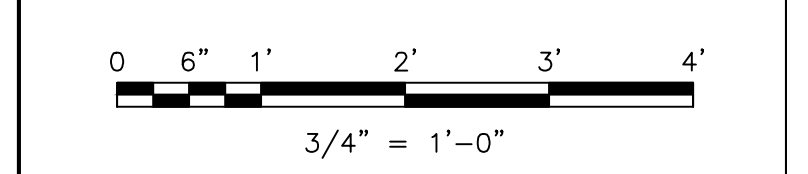
PENNSYLVANIA ONE CALL SYSTEM, INC.  
 800-444-6868  
 1-800-242-1776  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE: SUBSTATION ROOM #1, SUBSTATION #10 ELEVATION AND PLAN

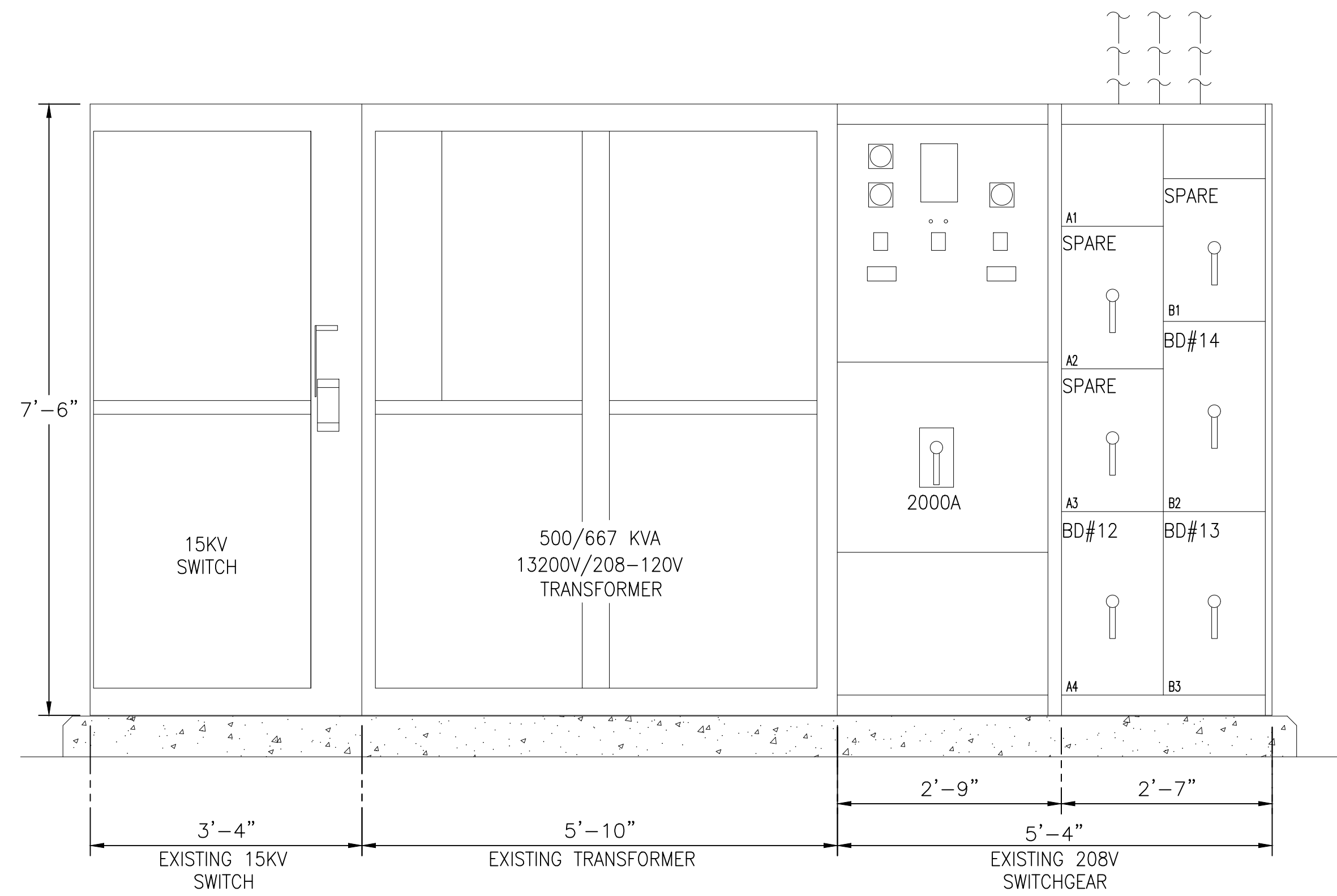
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:

CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED

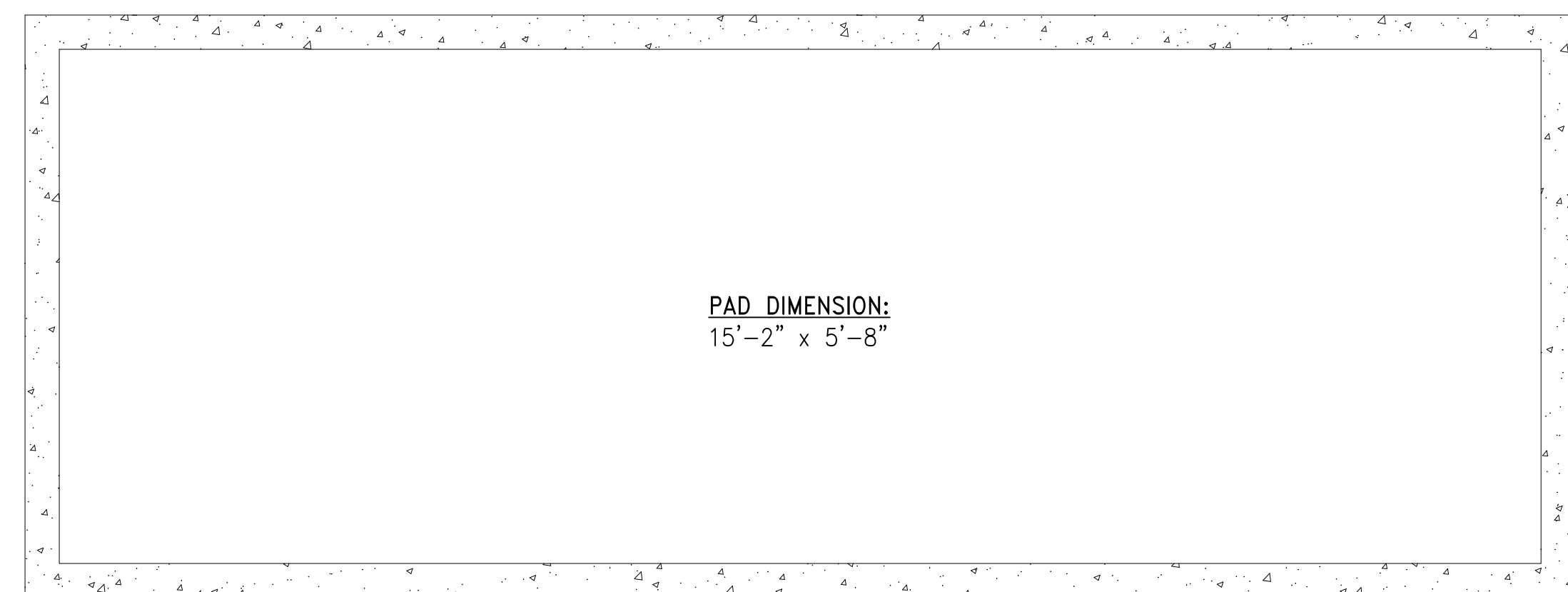
DRAWN BY: LPM  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

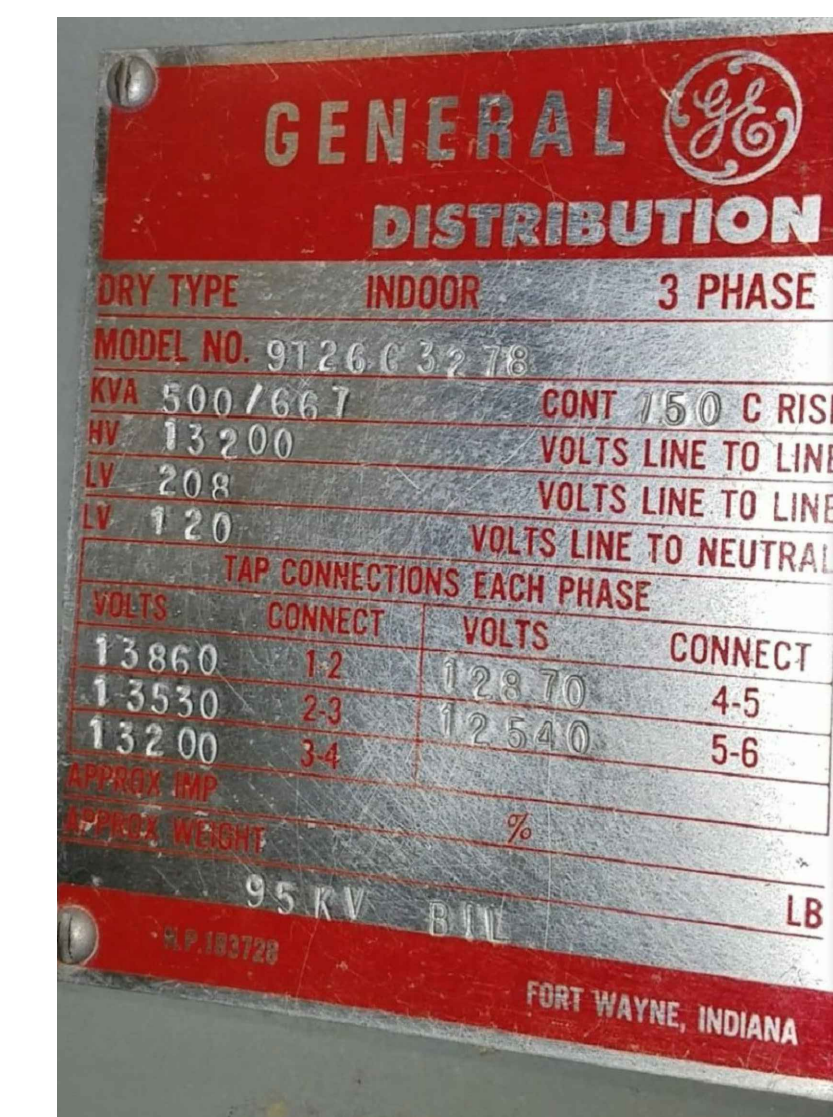
E-11



1 EXISTING SUBSTATION #11 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #11 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
500 KVA-AA  
667 KVA-FA  
208/120 VOLTS  
54.9 cal/cm<sup>2</sup>  
MAX DEMAND IS .76 x 400 = 304KW @ 90% PF IS 338 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



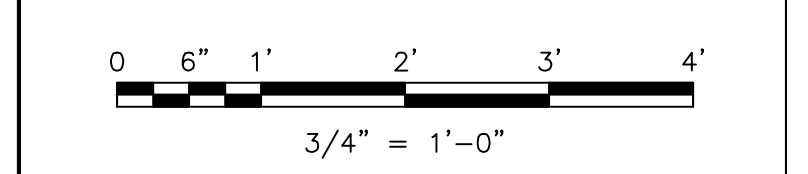
PENNSYLVANIA ONE CALL SYSTEM, INC.  
  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 NOTE: IN STATES WHERE REQUIRED BY LAW, PLEASE CONTACT THE LOCAL ONE CALL CENTER

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

**MAIDA** CONSULTING ENGINEERS  
 ENGINEERING INC.  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

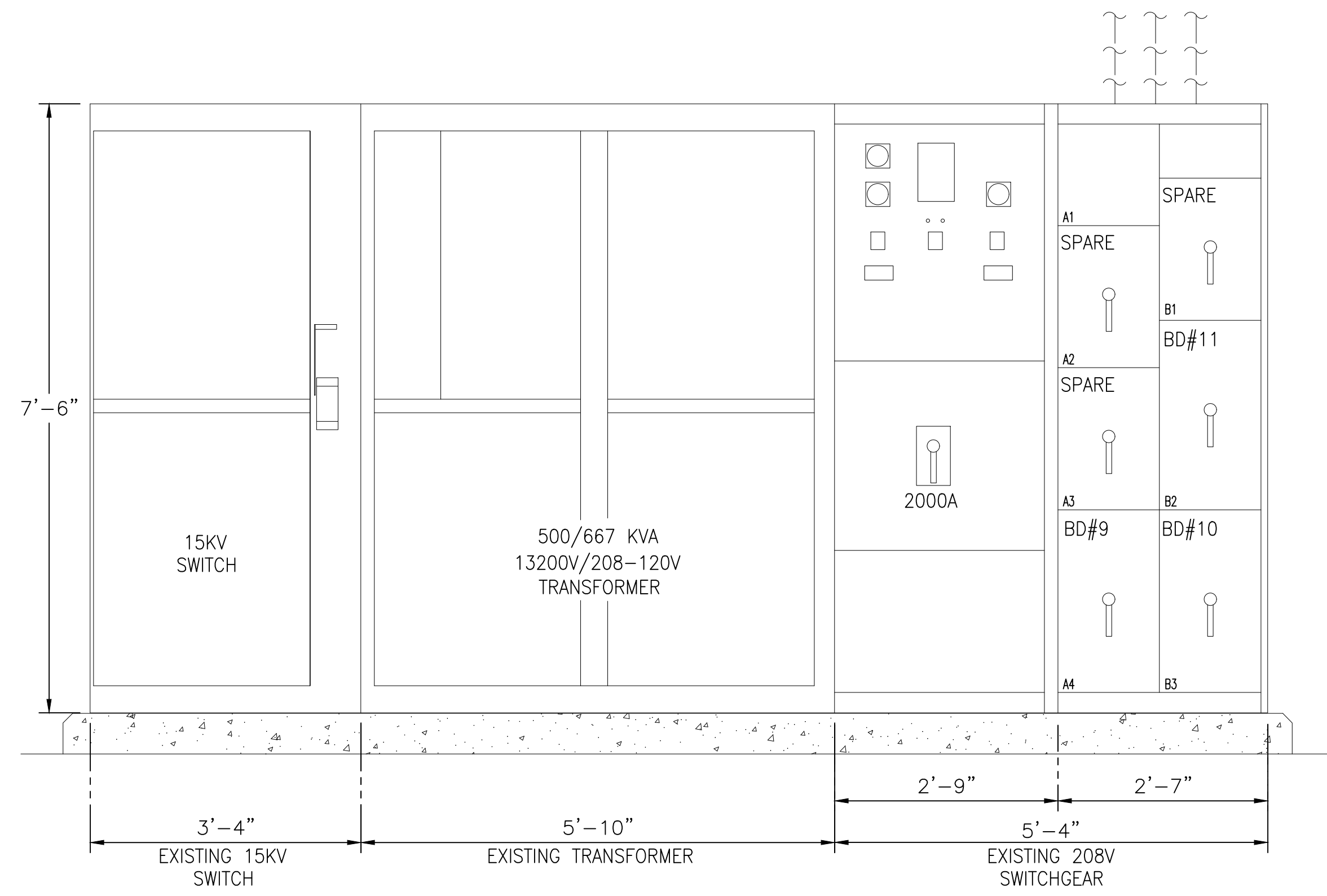
PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



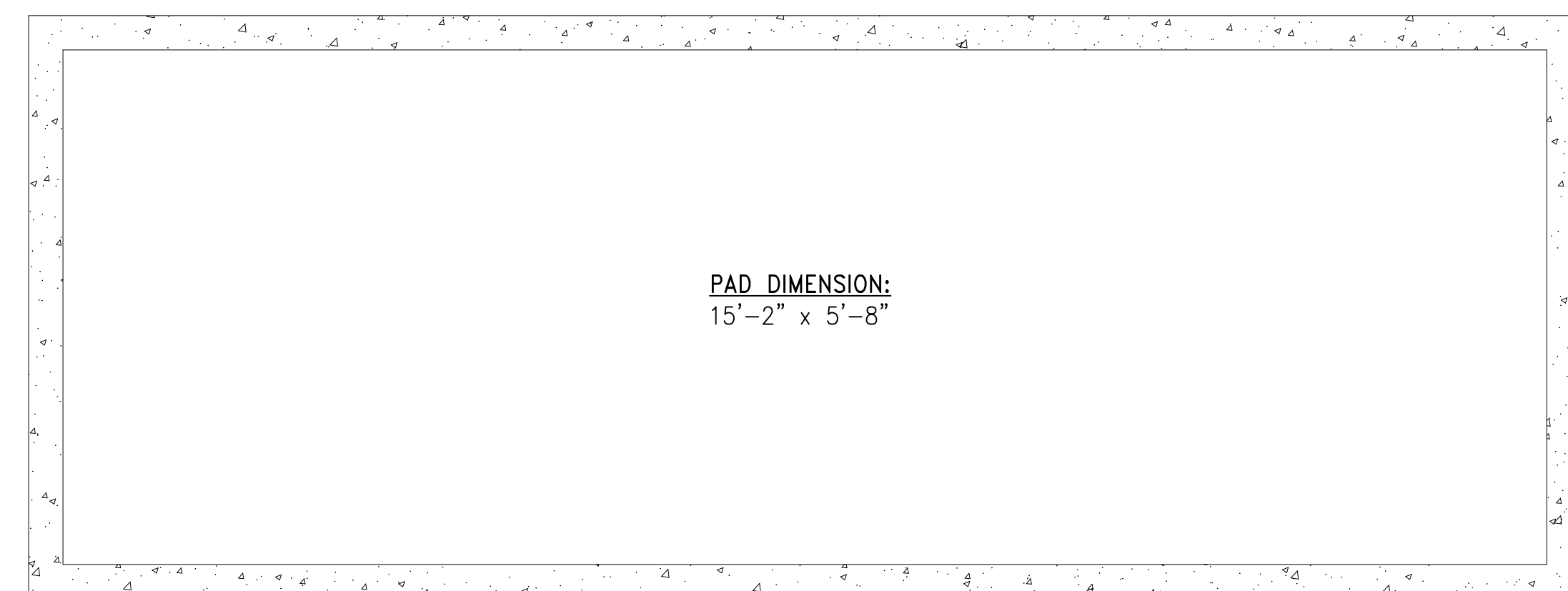
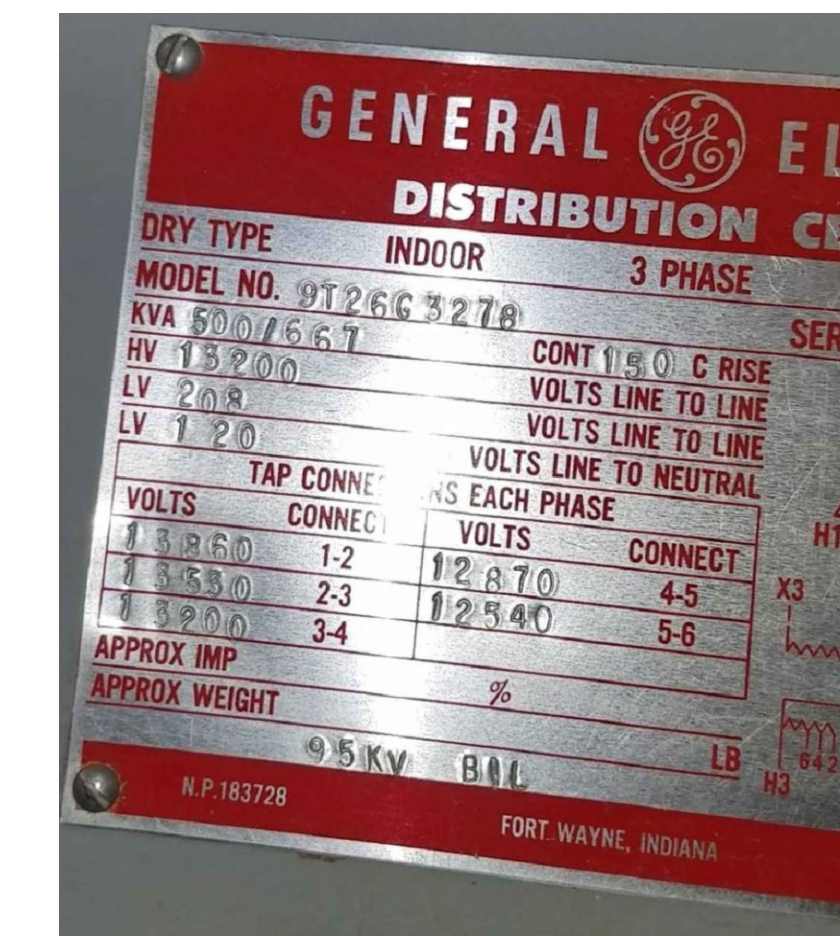
DPP PROJECT NUMBER: XX-XX-XXXX-XX  
 PROJECT TITLE: UNIT SUBSTATION MODERNIZATION  
 PHASE:

DRAWING TITLE: SUBSTATION ROOM #1, SUBSTATION #11 ELEVATION AND PLAN

PROJECT NO.: XX-XX-XXXX-XX  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM  
**E-12**  
 NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.



1 EXISTING SUBSTATION #12 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #12 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
500 KVA-AA  
667 KVA-FA  
208/120 VOLTS  
55.0 cal/cm<sup>2</sup>  
MAX DEMAND IS .58 x 400 = 232KW @ 90% PF IS 258 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
800-444-8888  
West Chester, Pennsylvania  
19380-1028  
  
BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
NON-MEMBERS MUST BE CONTACTED DIRECTLY  
IN LINE REQUIRE: 1000-000000-0000  
NOTE: TO BE USED BEFORE YOU EXCAVATE. SHALL BE AT THE DEMONSTRATION.

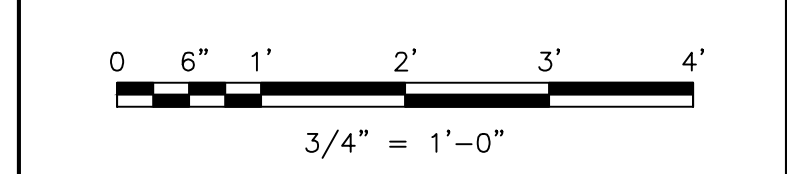
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

CONSULTING ENGINEERS  
Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
PROJECT ENG. JFM  
CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE: SUBSTATION ROOM #1, SUBSTATION #12 ELEVATION AND PLAN

PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:

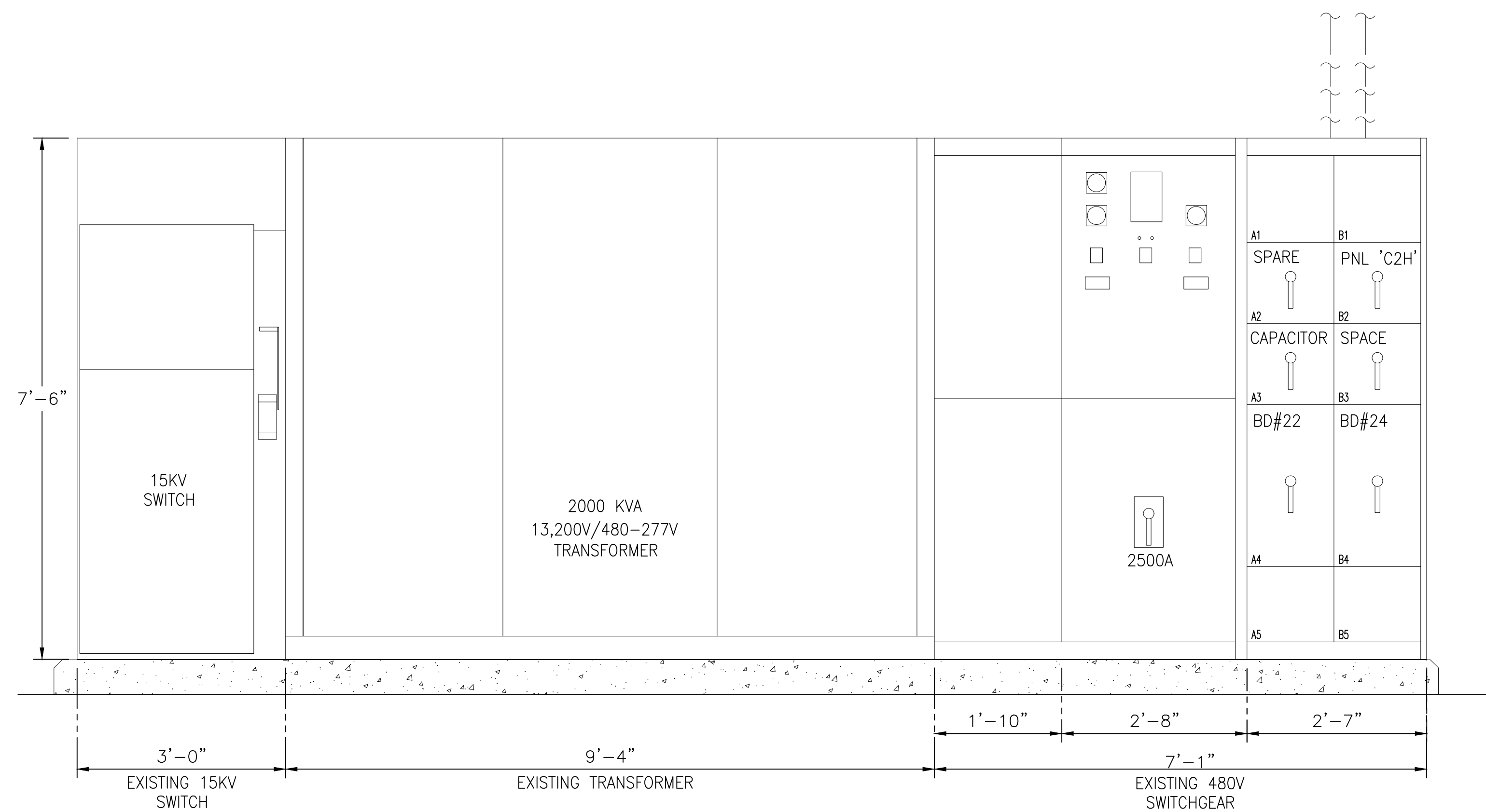
CONSULTANT PROJECT NO.: E45032

DATE: 03-25-2024

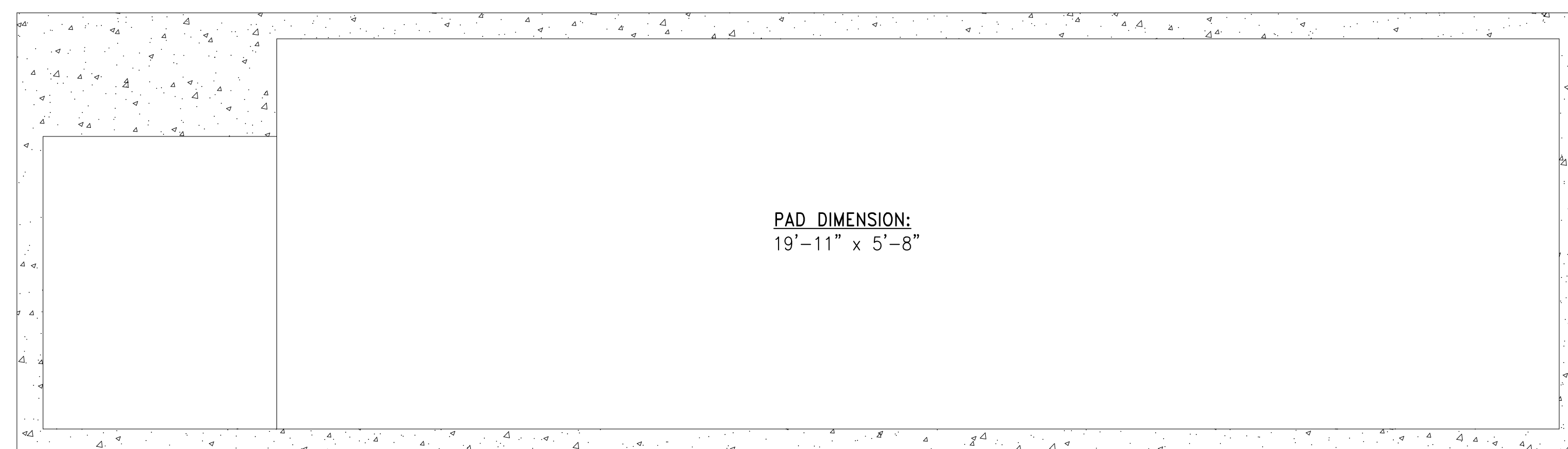
SCALE: AS NOTED

DRAWN BY: LPI  
CHECKED BY: JFM  
NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

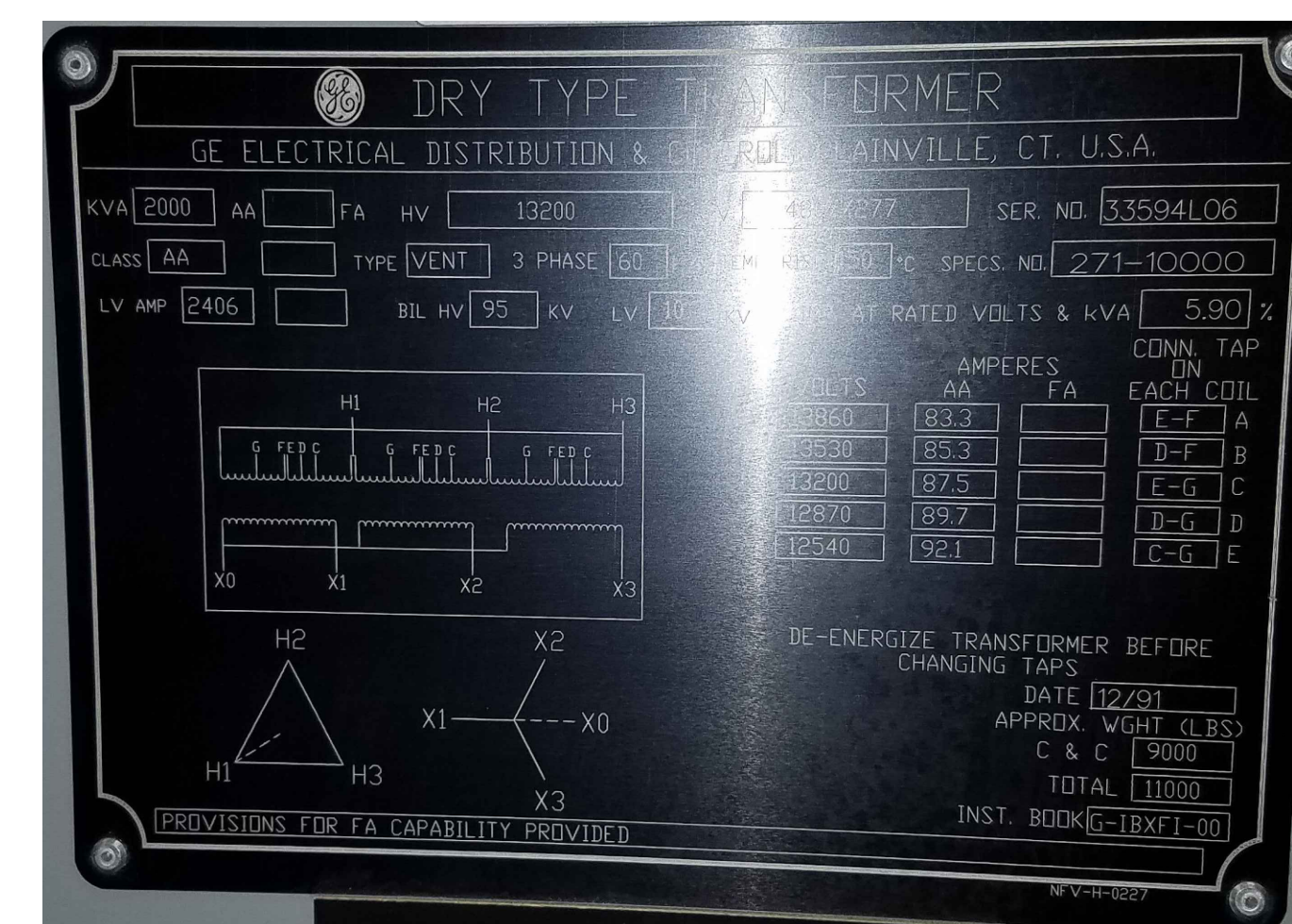
E-13



1 EXISTING SUBSTATION #13 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #13 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 2,000 KVA-AA  
 --- KVA-FA  
 480/277 VOLTS  
 109.8 cal/cm<sup>2</sup>  
 MAX DEMAND IS 1.58 x 1200 = 1,896KW @ 90% PF IS 2,107 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PENNSYLVANIA ONE CALL SYSTEM, INC.  
 1000 MARKET STREET, SUITE 1000  
 PHILADELPHIA, PA 19107  
 (215) 542-8700

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL: \_\_\_\_\_

MAIDA ENGINEERING INC. CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

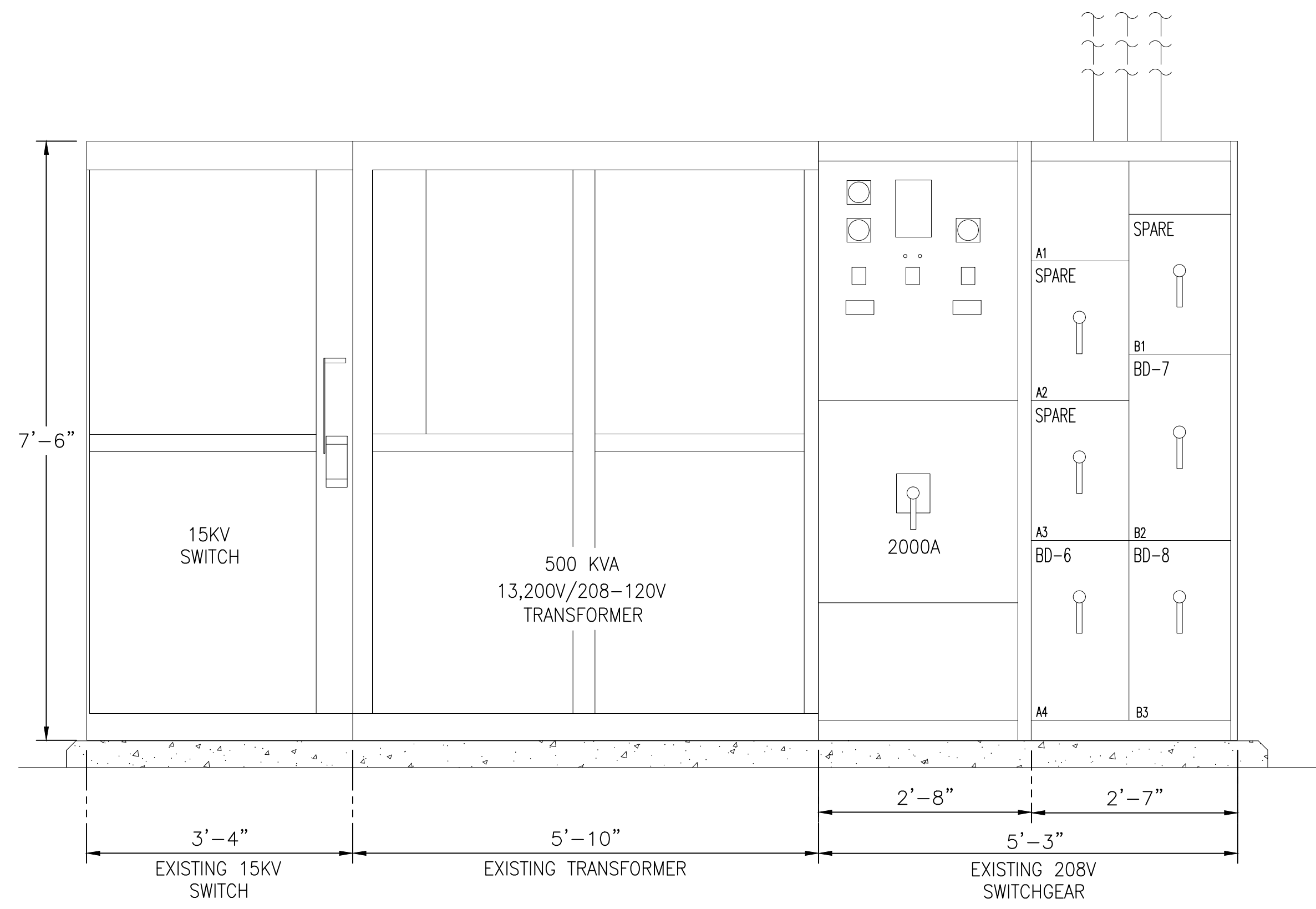
PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED

0 6" 1' 2' 3' 4'  
 3/4" = 1'-0"

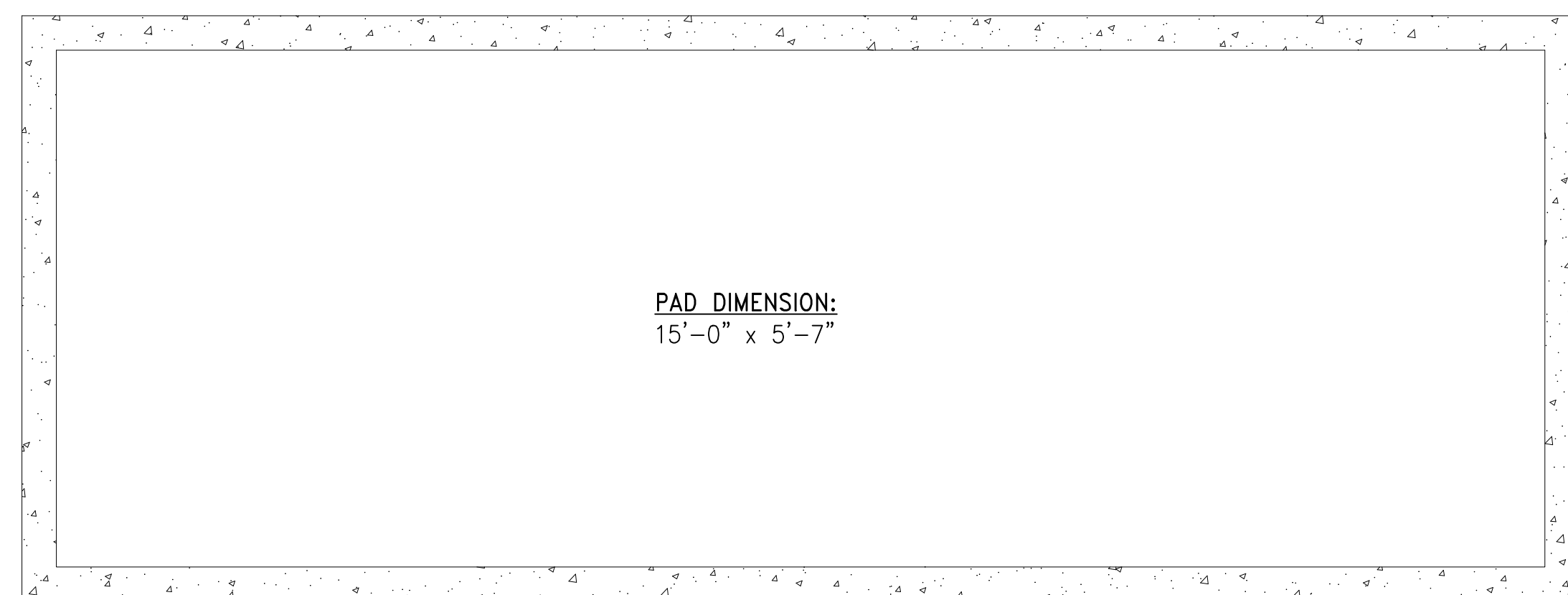
DPP PROJECT NUMBER: XX-XX-XXXX-XX  
 PROJECT TITLE: UNIT SUBSTATION MODERNIZATION  
 PHASE:

DRAWING TITLE: SUBSTATION ROOM #1, SUBSTATION #13 ELEVATION AND PLAN  
 PACO PROJECT NO.: XX-XX-XXXX-XX  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

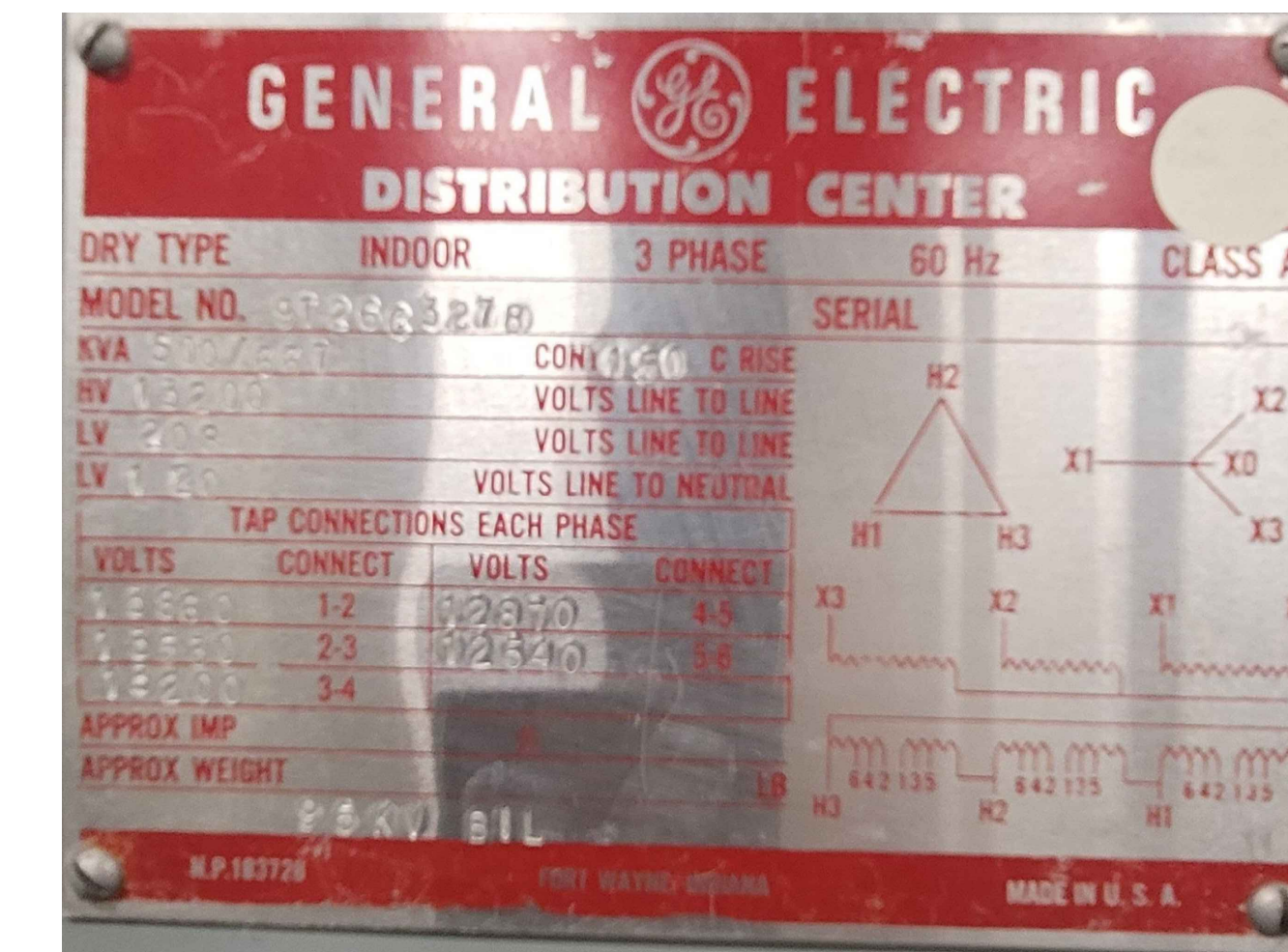
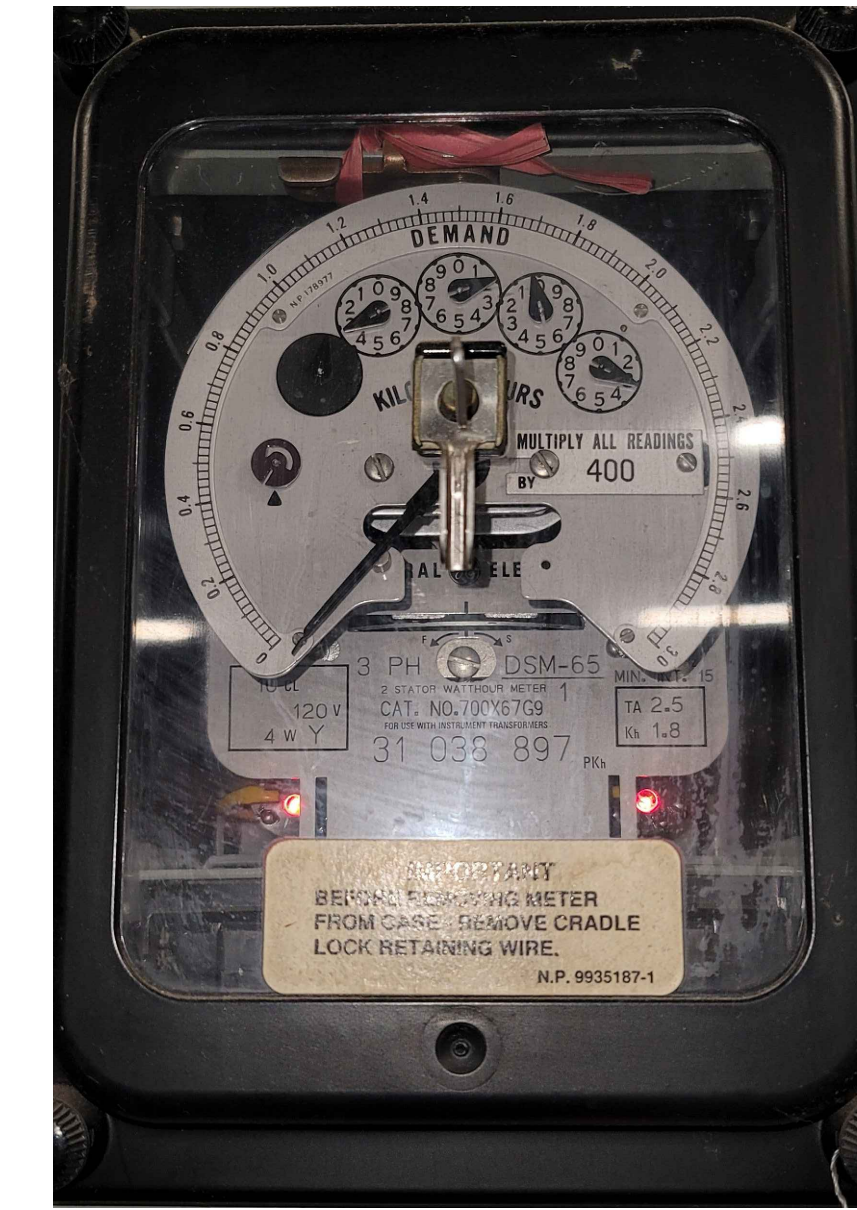
NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.  
**E-14**



1 EXISTING SUBSTATION #14 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #14 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:

500 KVA-AA  
667 KVA-FA  
208/120 VOLTS  
55.0 cal/cm<sup>2</sup>

MAX DEMAND IS 0 x 400 = 0 KW @ 90% PF IS \_\_\_ KVA

REVISIONS

ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
800-242-1776  
1315 WALNUT STREET  
SUITE 804  
PHILADELPHIA, PA 19107  
(215) 542-8700

BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
IN PA REQUIRE: 800-242-1776  
NOTE: TO REGISTER BEFORE YOU EXCAVATE, PLEASE VISIT OR CONTACT:

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

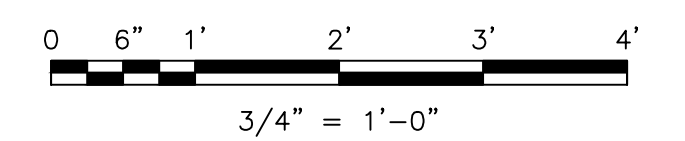
SEAL:

MAIDA CONSULTING ENGINEERS  
ENGINEERING INC.  
1315 WALNUT STREET  
SUITE 804  
PHILADELPHIA, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE

PROJECT ENG. JFM 3/25/24

CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

PHASE:

DRAWING TITLE: SUBSTATION ROOM #2, SUBSTATION #14 ELEVATION AND PLAN

PAQC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:

CONSULTANT PROJECT NO.: E45032

DATE: 03-25-2024

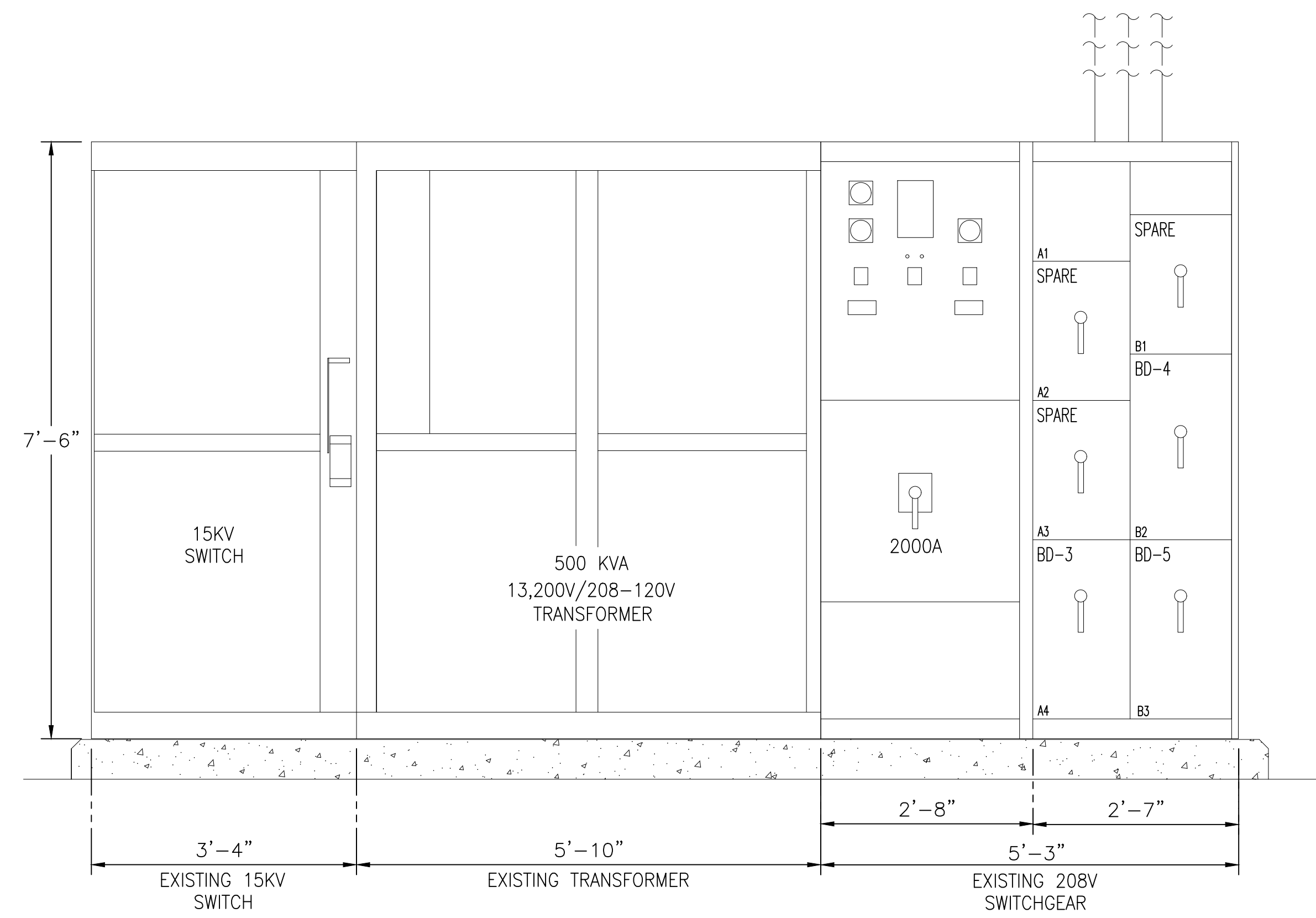
SCALE: AS NOTED

DRAWN BY: LPI

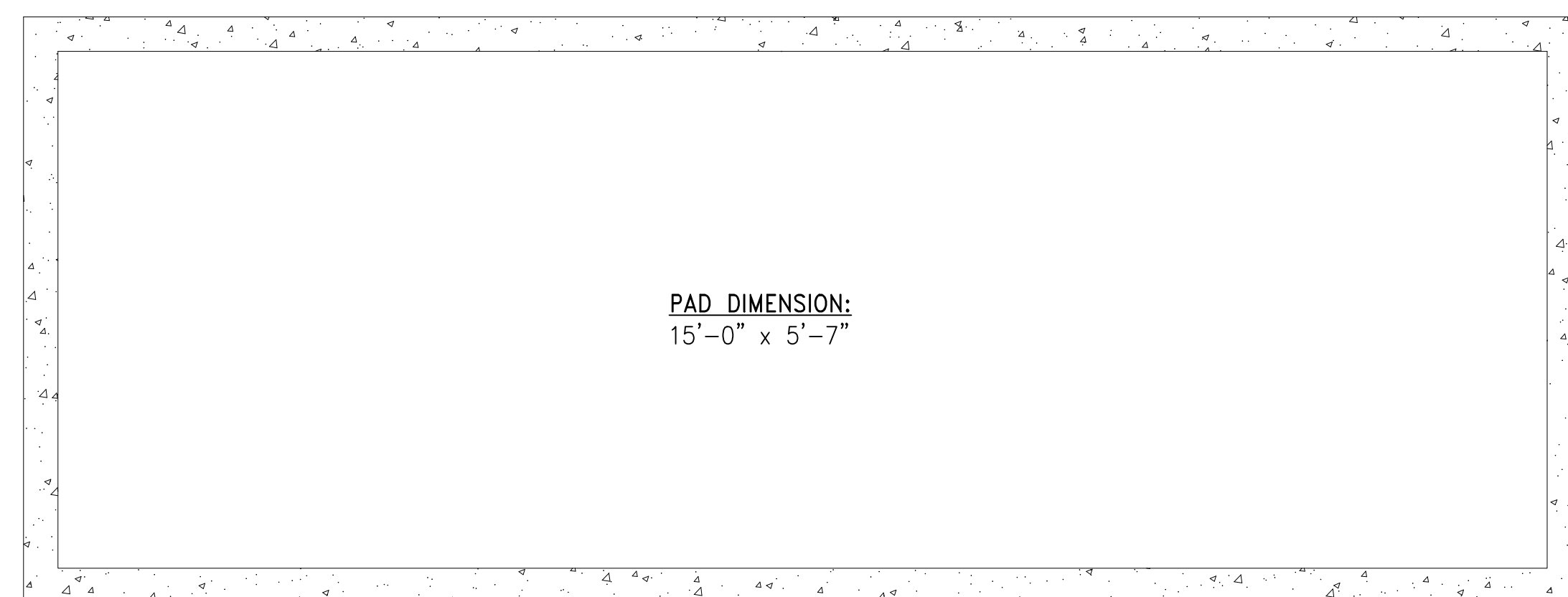
CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

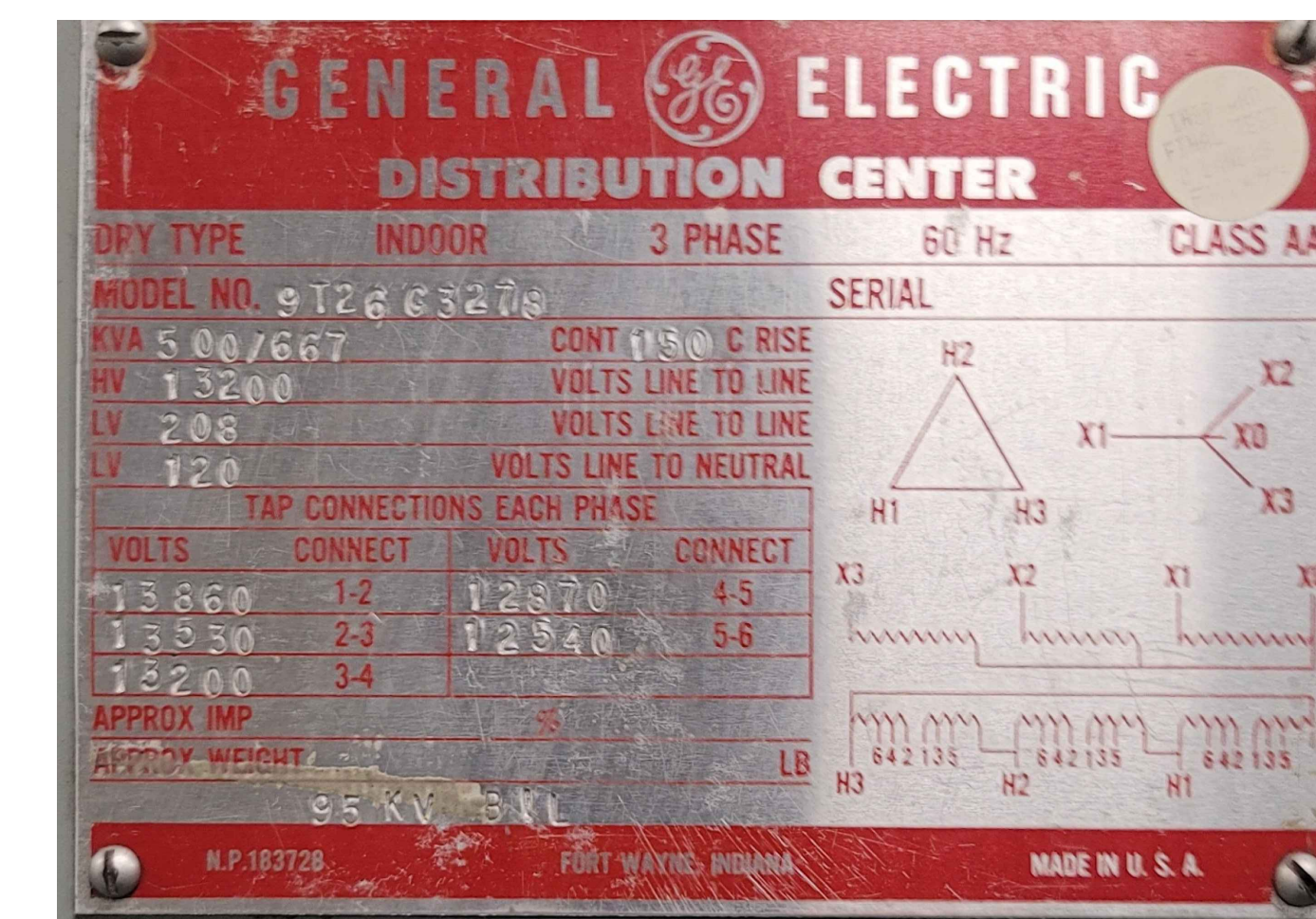
E-15



1 EXISTING SUBSTATION #15 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #15 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 500 KVA-AA  
 667 KVA-FA  
 208/120 VOLTS  
 55.0 cal/cm<sup>2</sup>  
 MAX DEMAND IS 3.0 x 400 = 1200KW @ 90% PF IS 1333 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



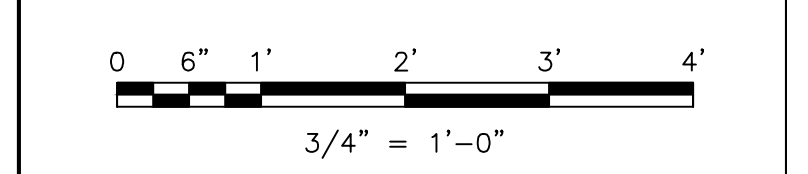
PENNSYLVANIA ONE CALL SYSTEM, INC.  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PENNSYLVANIA ONE CALL SYSTEM, INC.  
 800 North 5th Street  
 West Chester, Pennsylvania  
 19380-1078

PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:  
 \_\_\_\_\_  
 \_\_\_\_\_

**MAIDA ENGINEERING INC.** CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE  
 PROJECT ENG. JFM 3/25/24  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX  
 PROJECT TITLE:

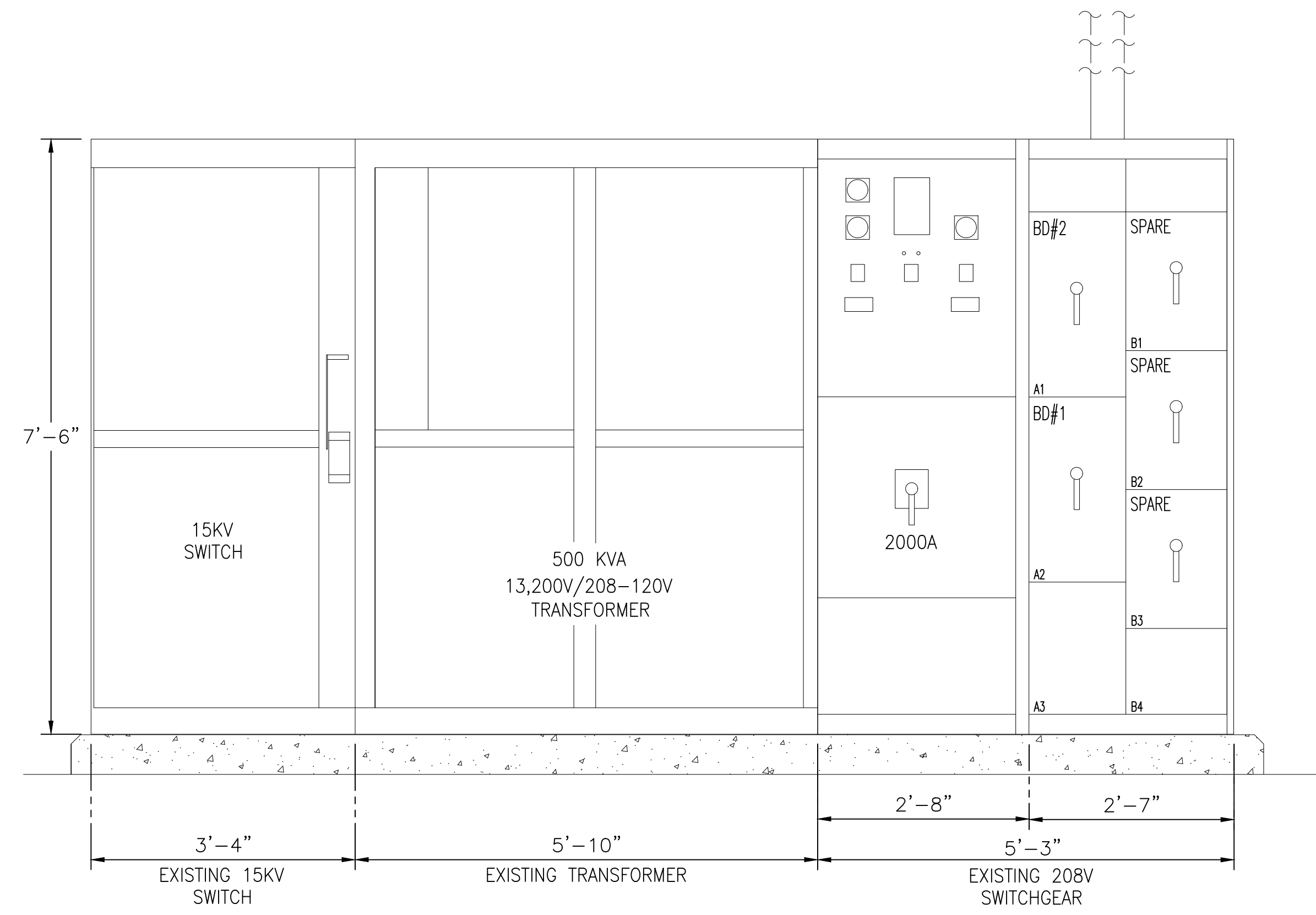
UNIT SUBSTATION MODERNIZATION  
 PHASE:

DRAWING TITLE:  
 SUBSTATION ROOM #2, SUBSTATION #15 ELEVATION AND PLAN

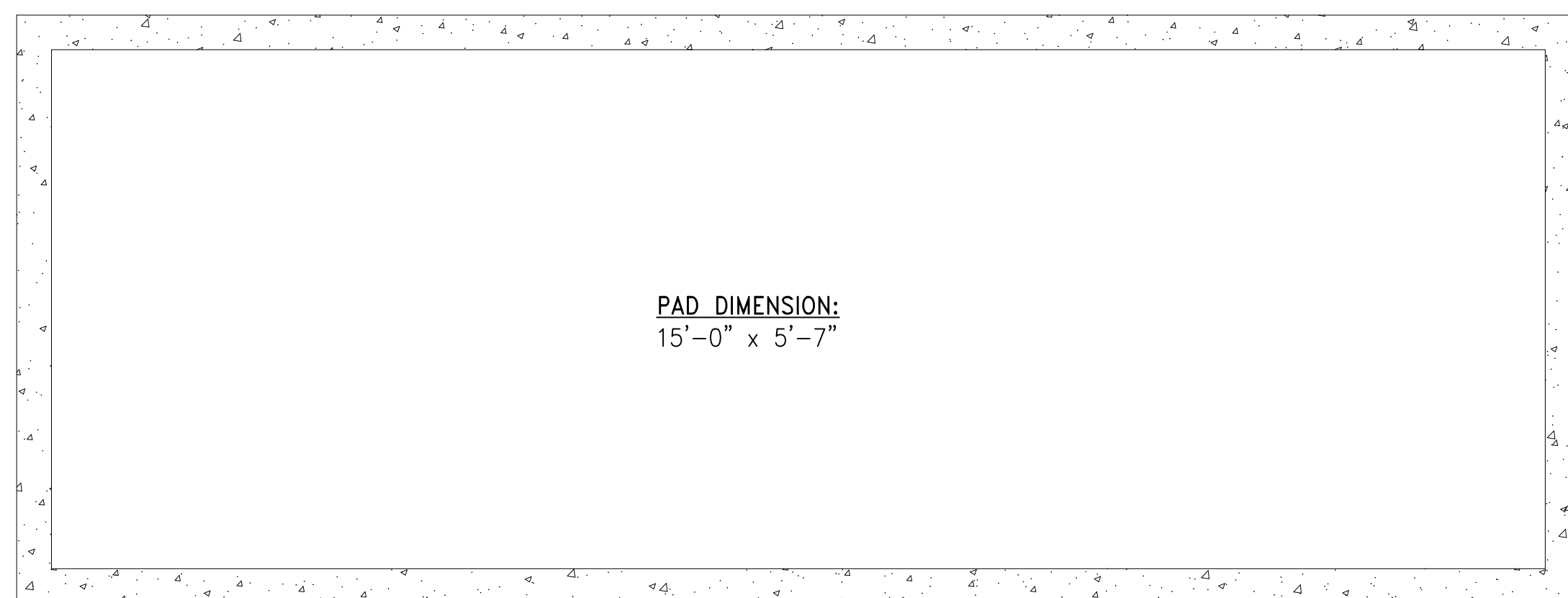
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM  
 NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

**E-16**

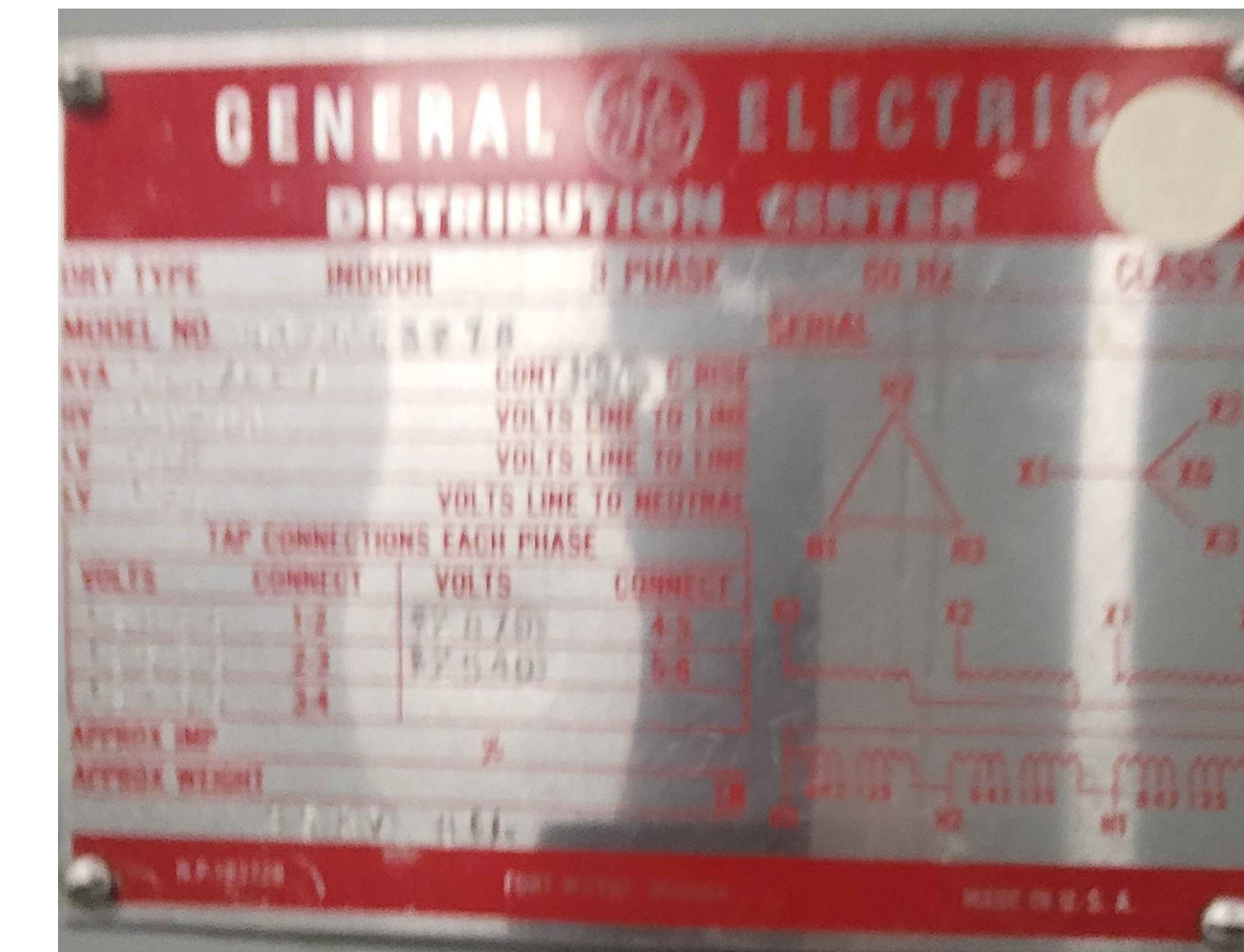




1 EXISTING SUBSTATION #16 FRONT VIEW  
 E17 SCALE: 3/4" = 1' - 0"

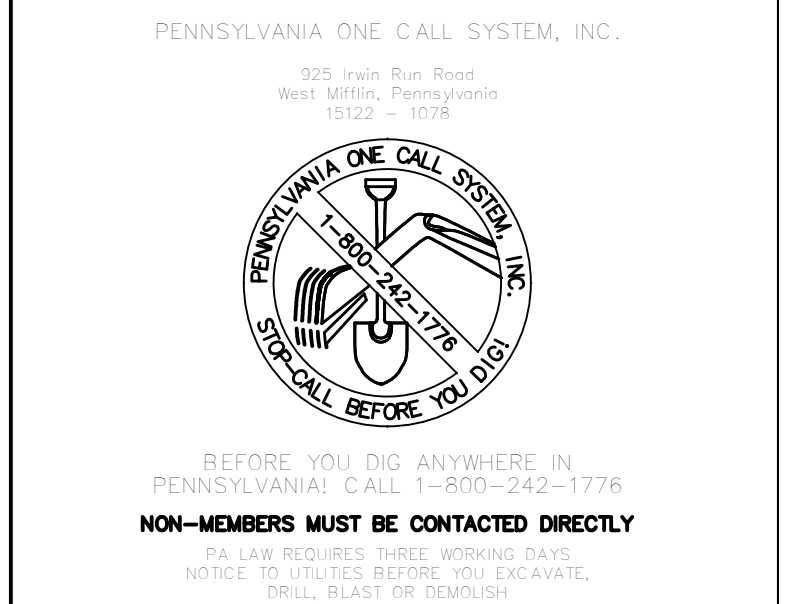


2 EXISTING SUBSTATION #16 PLAN VIEW  
 E17 SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 500 KVA-AA  
 667 KVA-FA  
 208/120 VOLTS  
 55.0 cal/cm<sup>2</sup>  
 MAX DEMAND IS .80 x 400 = 320KW @ 90% PF IS 355 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID

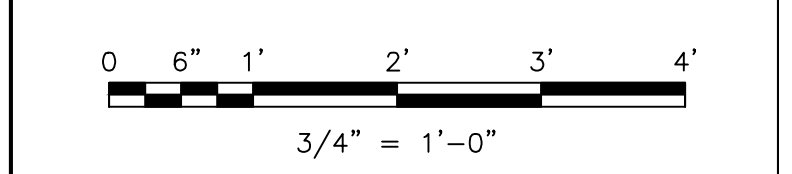


PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:



PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX  
 PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

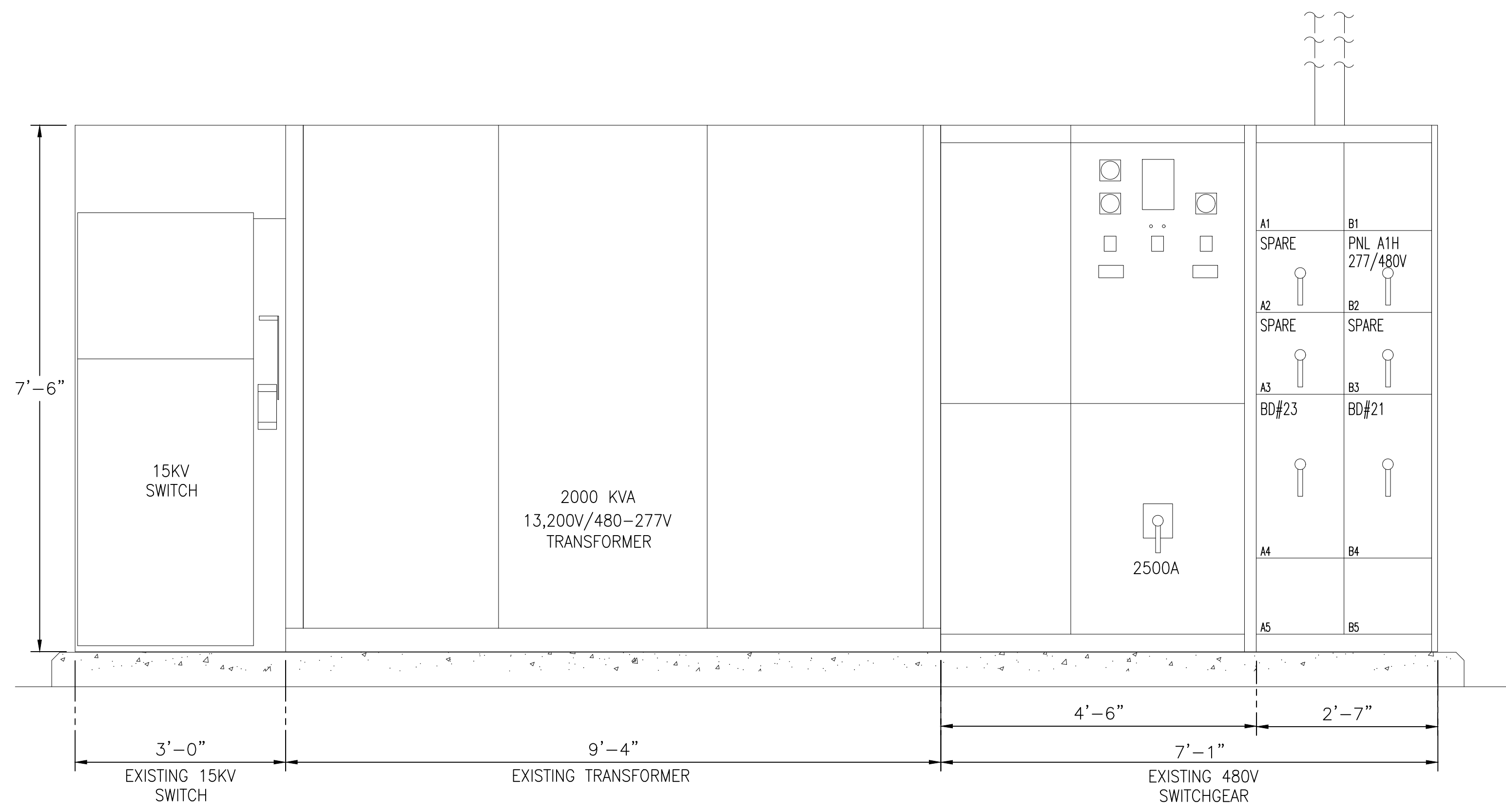
PHASE:

DRAWING TITLE: SUBSTATION ROOM #2, SUBSTATION #16 ELEVATION AND PLAN

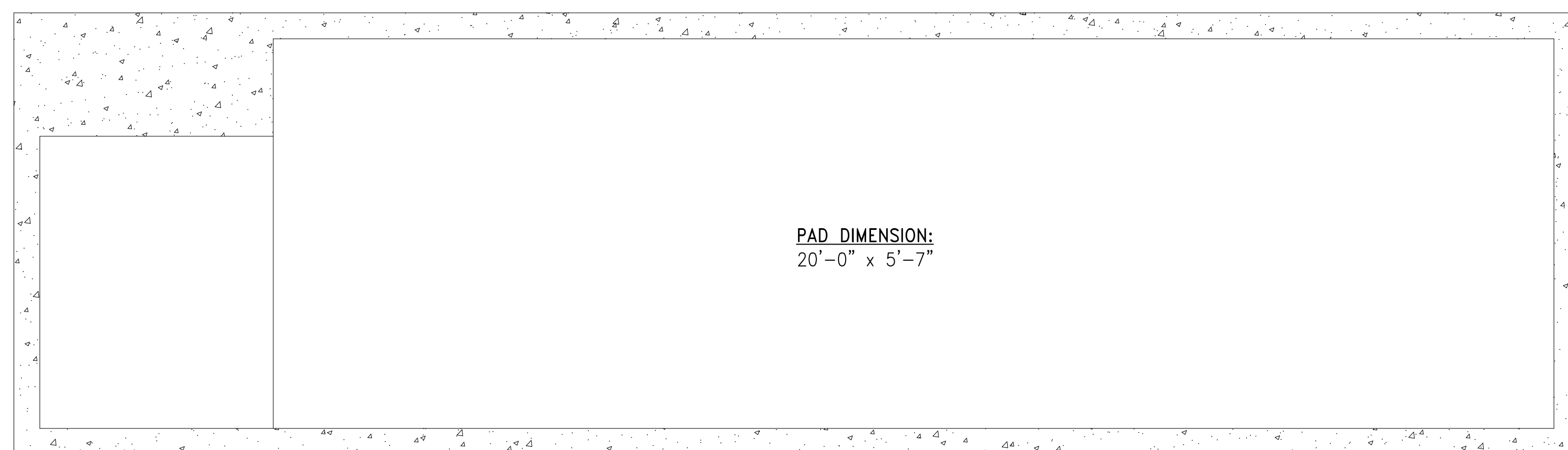
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

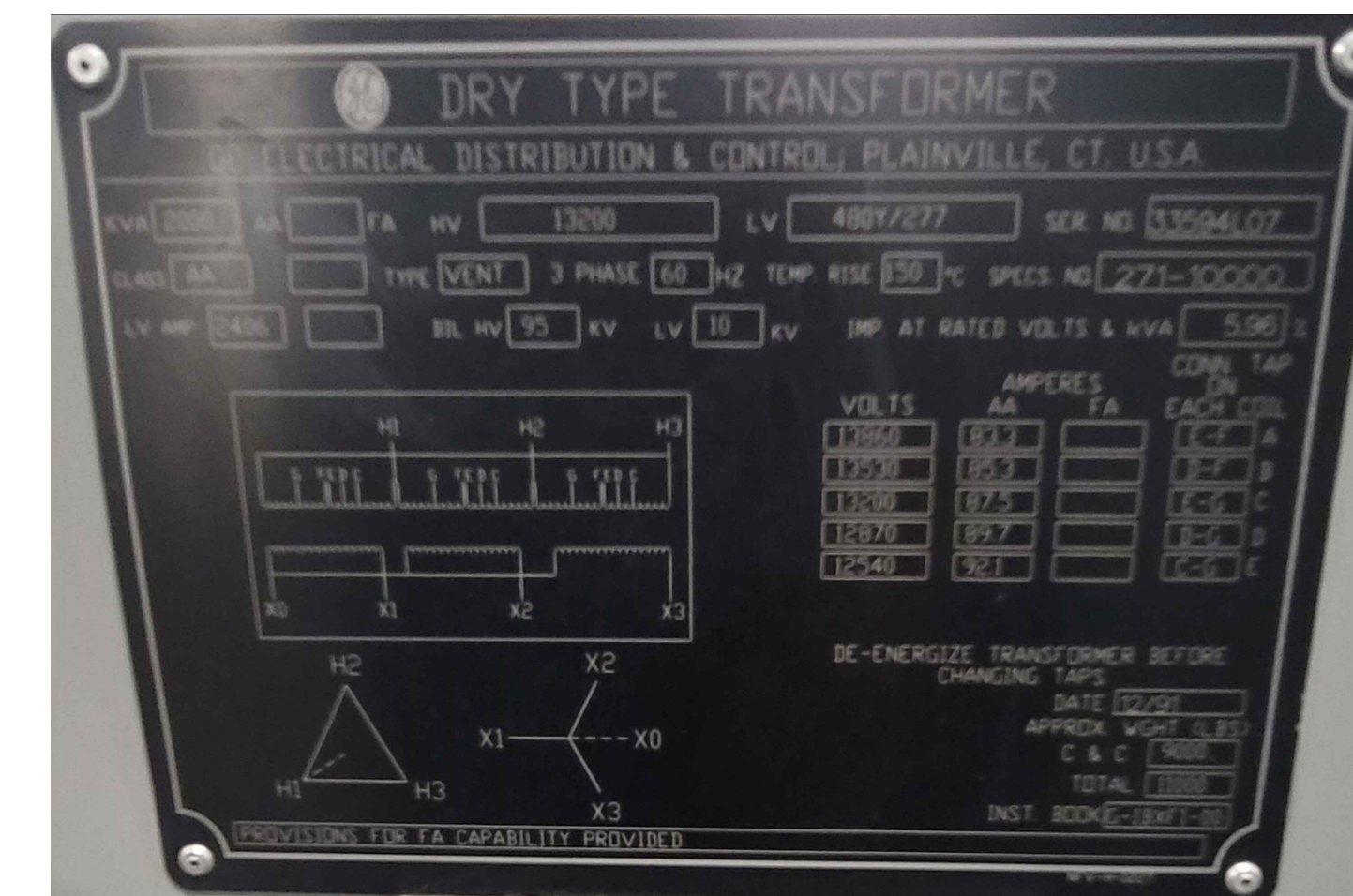
E-17



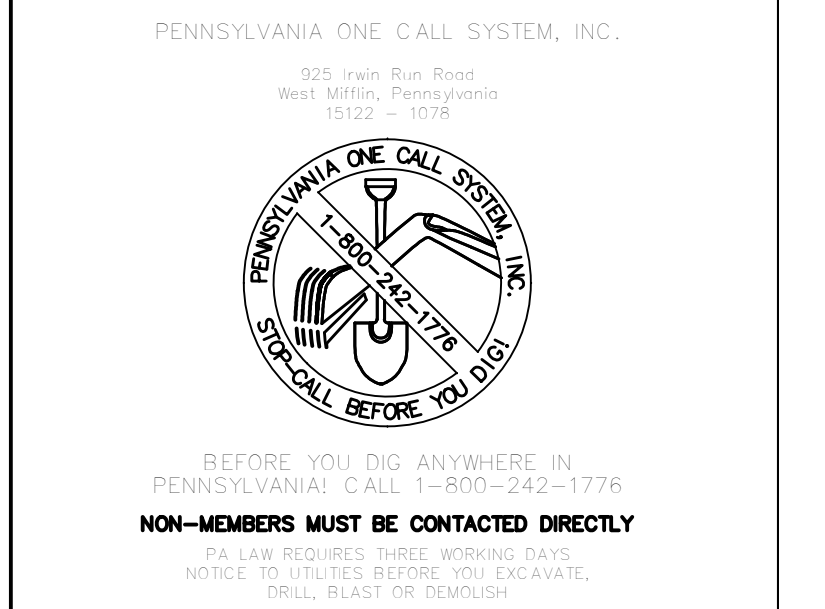
1 EXISTING SUBSTATION #17 FRONT VIEW  
E18 SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #17 PLAN VIEW  
E18 SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 2000 KVA-AA  
 --- KVA-FA  
 480/277 VOLTS  
 120.4 cal/cm<sup>2</sup>  
 MAX DEMAND IS .12 x 1200 = 144KW @ 90% PF IS 160 KVA

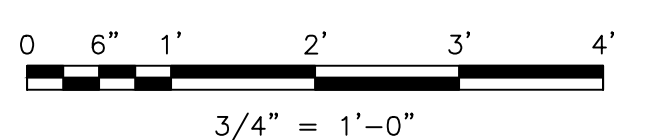


PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX  
 DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:



PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

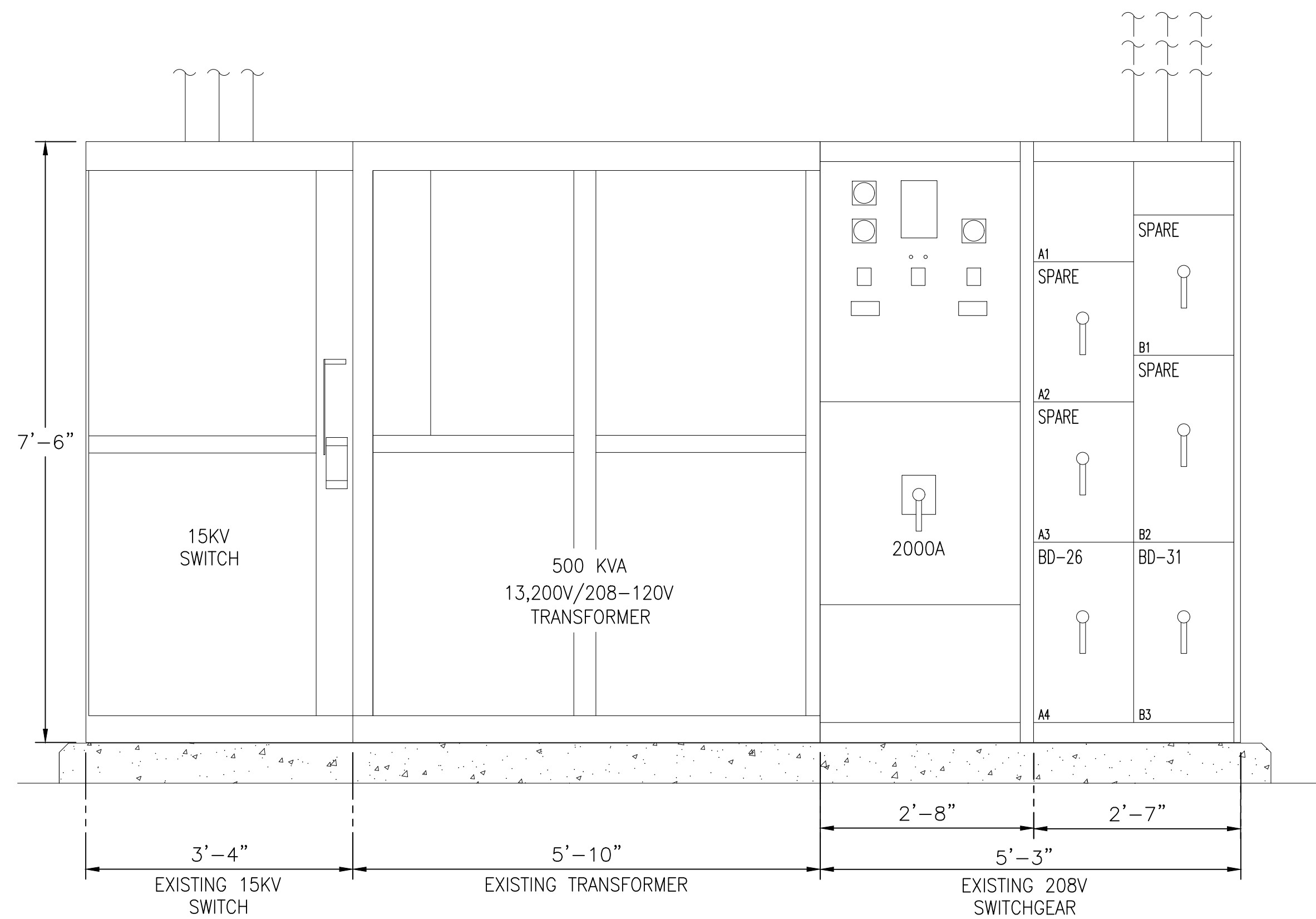
PHASE:

DRAWING TITLE: SUBSTATION ROOM #2, SUBSTATION #17 ELEVATION AND PLAN

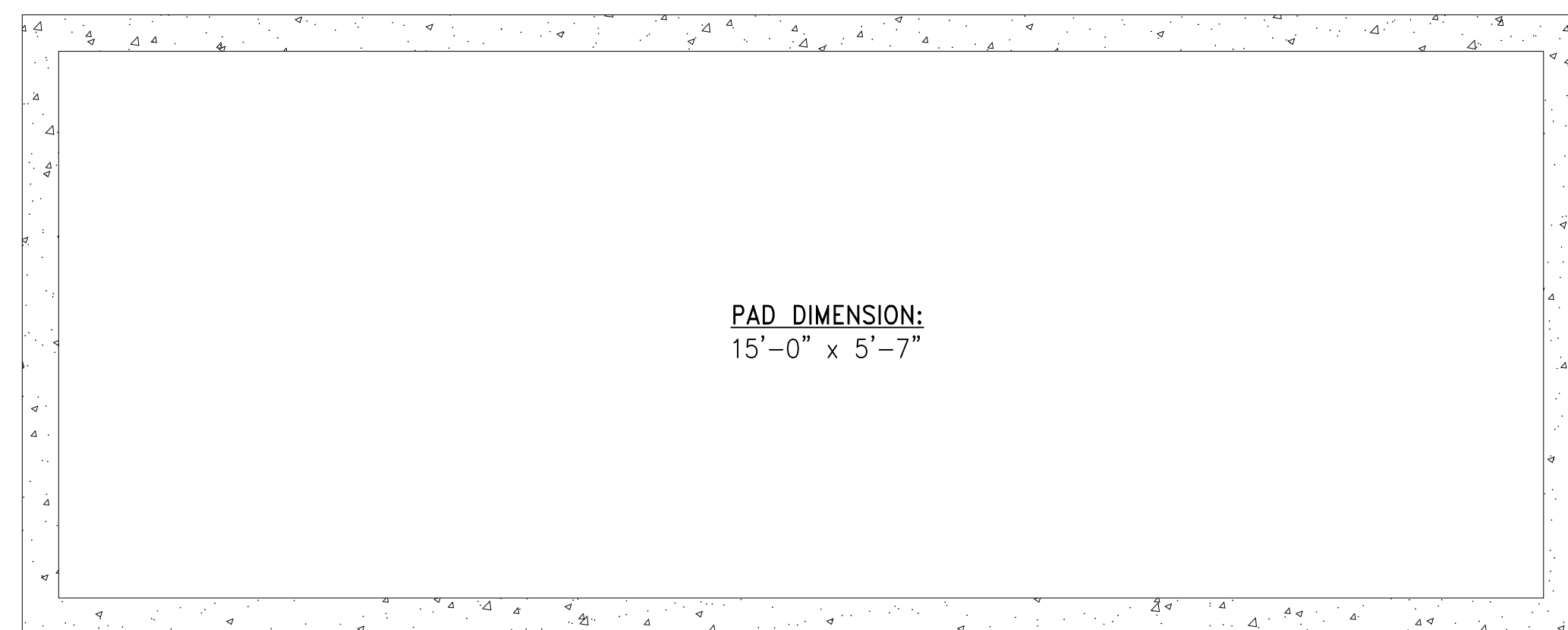
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

E-18

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.



1 EXISTING SUBSTATION #18 FRONT VIEW  
 E19 SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #18 PLAN VIEW  
 E19 SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 500 KVA-AA  
 667 KVA-FA  
 208/120 VOLTS  
 55.0 cal/cm<sup>2</sup>  
 MAX DEMAND IS 3.0 x 400 = 1200KW @ 90% PF IS 1333 KVA



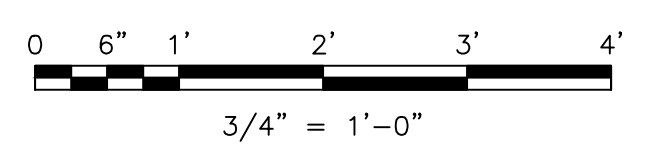
PENNSYLVANIA ONE CALL SYSTEM, INC.  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA ENGINEERING INC. CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

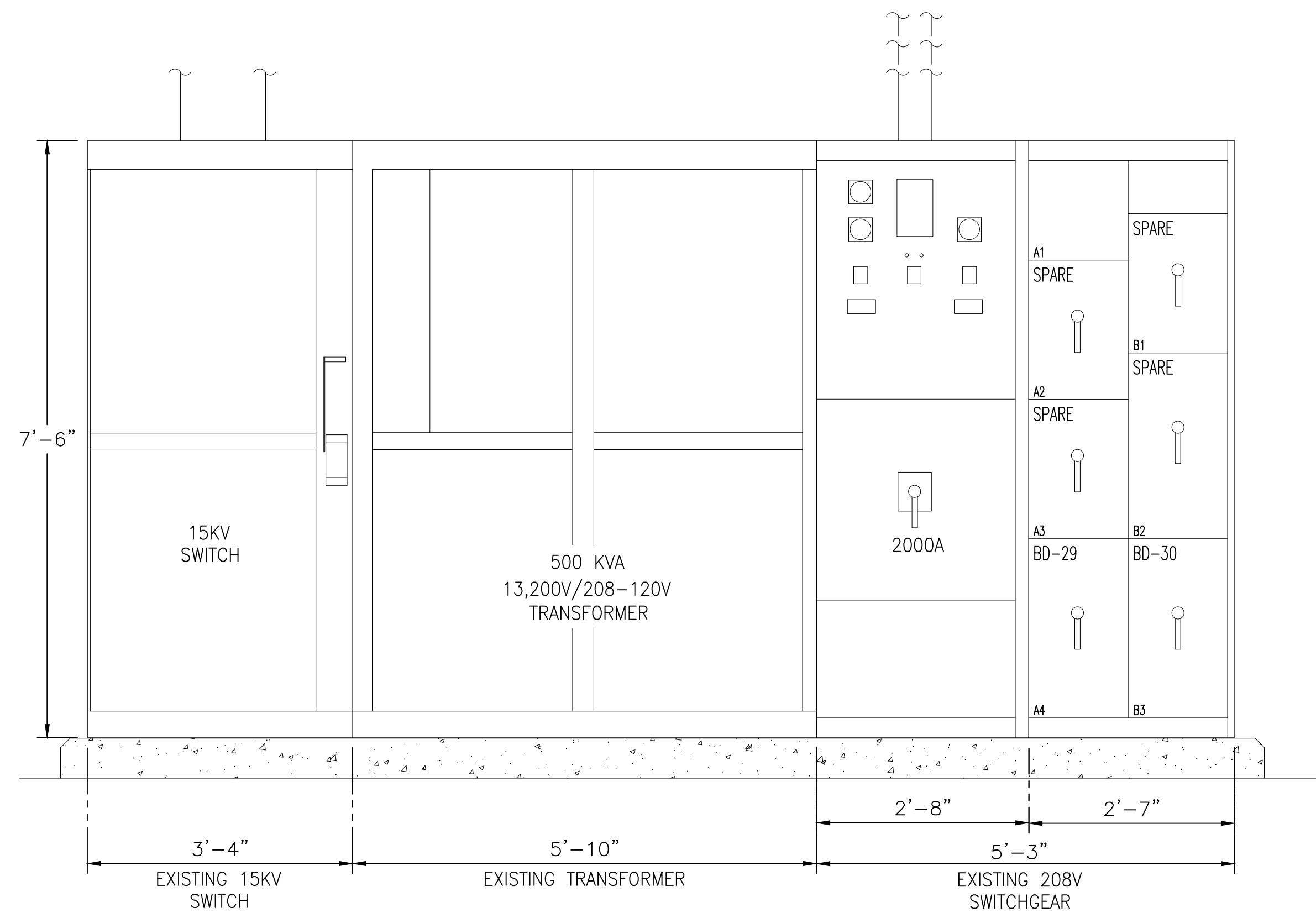
PHASE:

DRAWING TITLE: SUBSTATION ROOM #5, SUBSTATION #18 ELEVATION AND PLAN

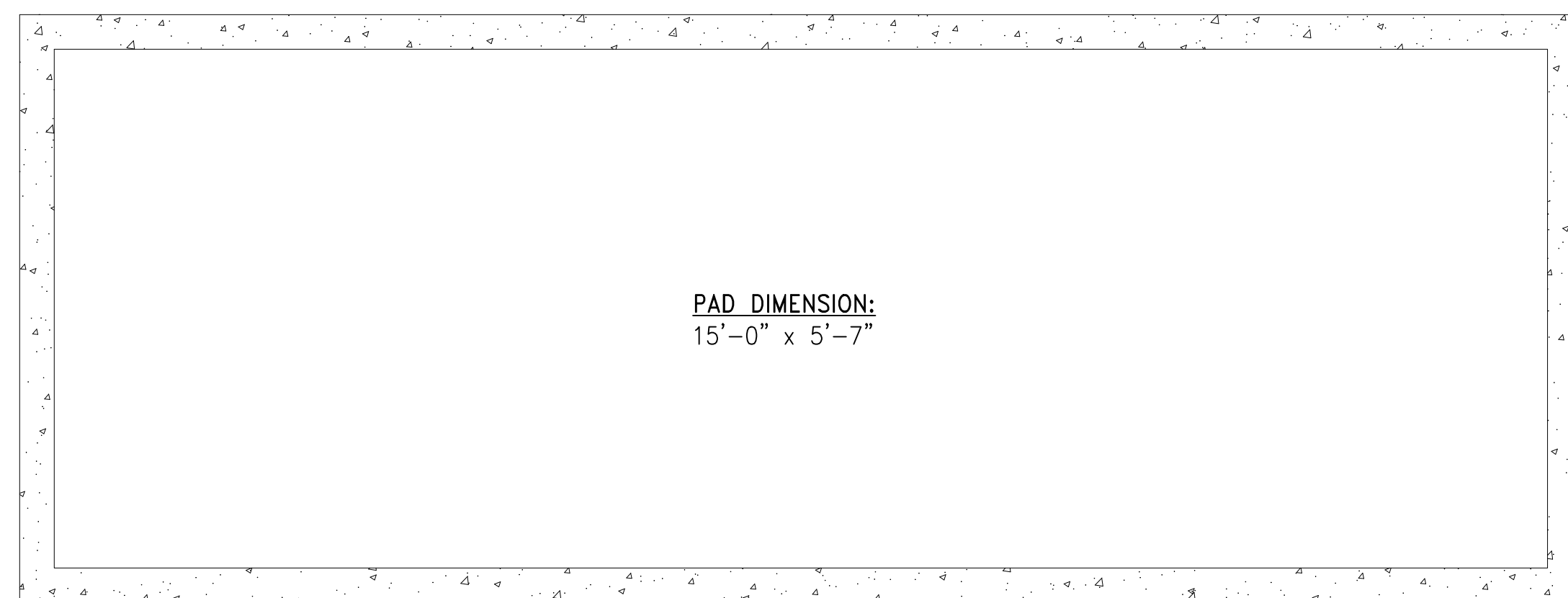
PAQC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

E-19

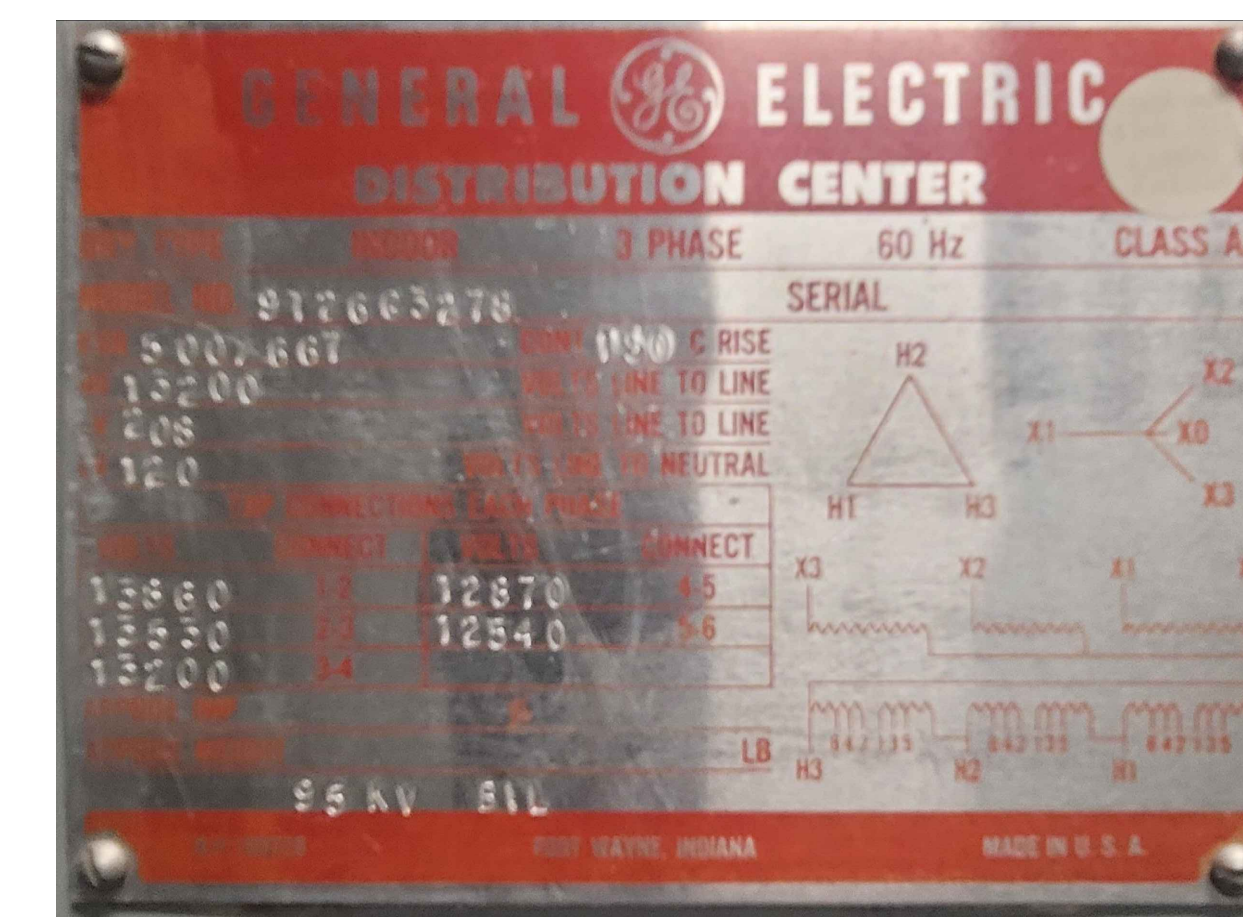
NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.



1 EXISTING SUBSTATION #19 FRONT VIEW  
 E20 SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #19 PLAN VIEW  
 E20 SCALE: 3/4" = 1' - 0"



TRANSFORMER:

500 KVA-AA  
 667 KVA-FA  
 208/120 VOLTS  
 55.0 cal/cm<sup>2</sup>

MAX DEMAND IS .20 x 400 = 80KW @ 90% PF IS 89 KVA

REVISIONS

ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PENNSYLVANIA ONE CALL SYSTEM, INC. logo with text: PENNSYLVANIA ONE CALL SYSTEM, INC. CALL BEFORE YOU DIG!

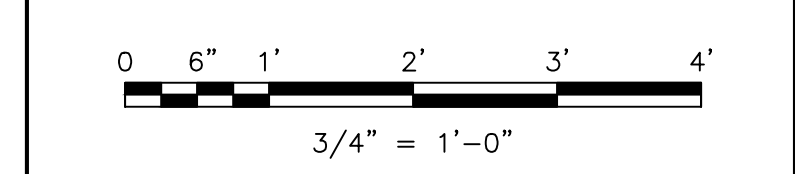
PA ONE-CALL NUMBER (IF FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA ENGINEERING INC. CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

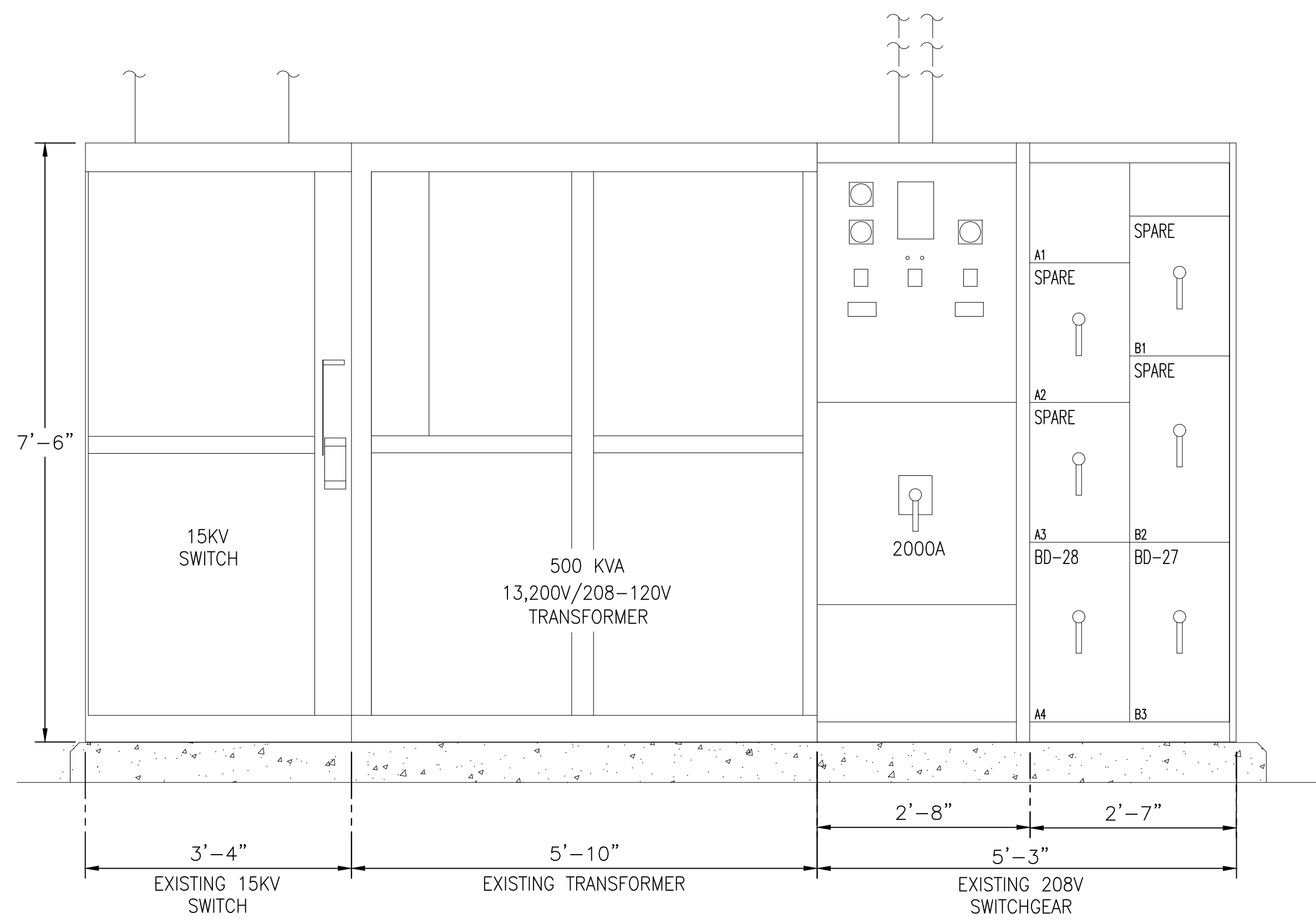
PHASE:

DRAWING TITLE: SUBSTATION ROOM #5, SUBSTATION #19 ELEVATION AND PLAN

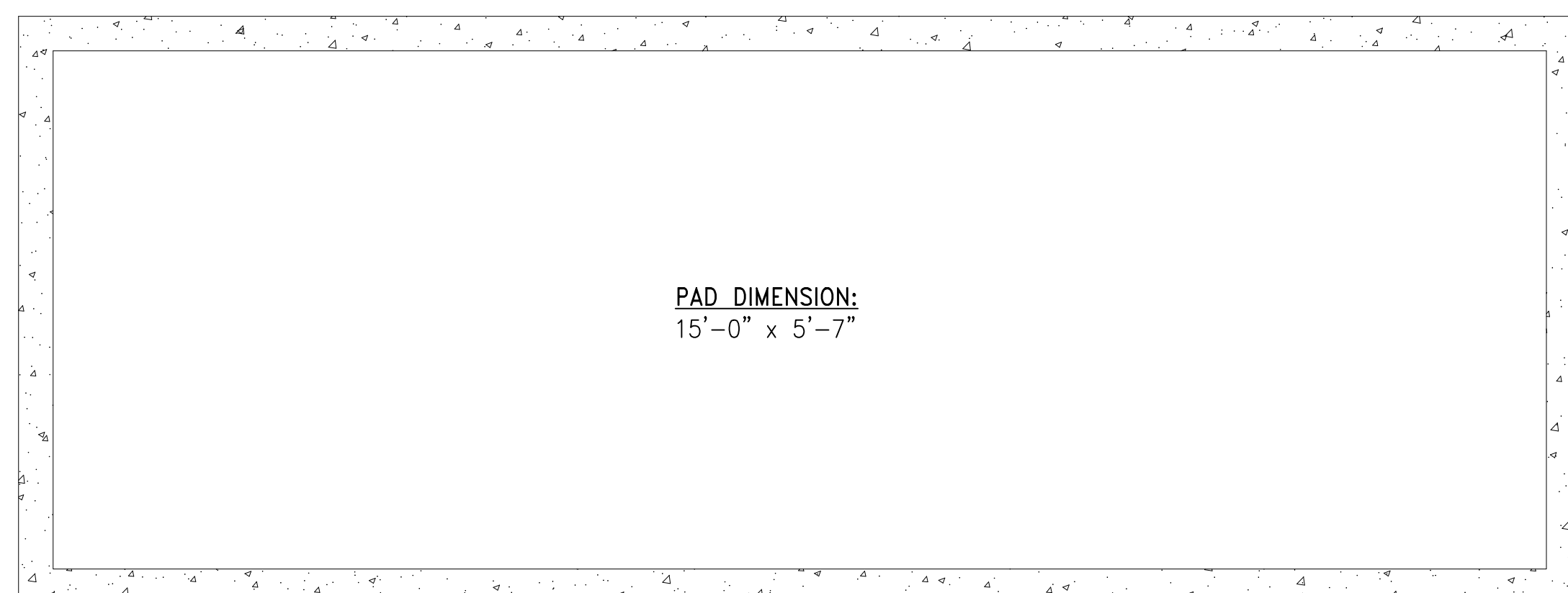
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

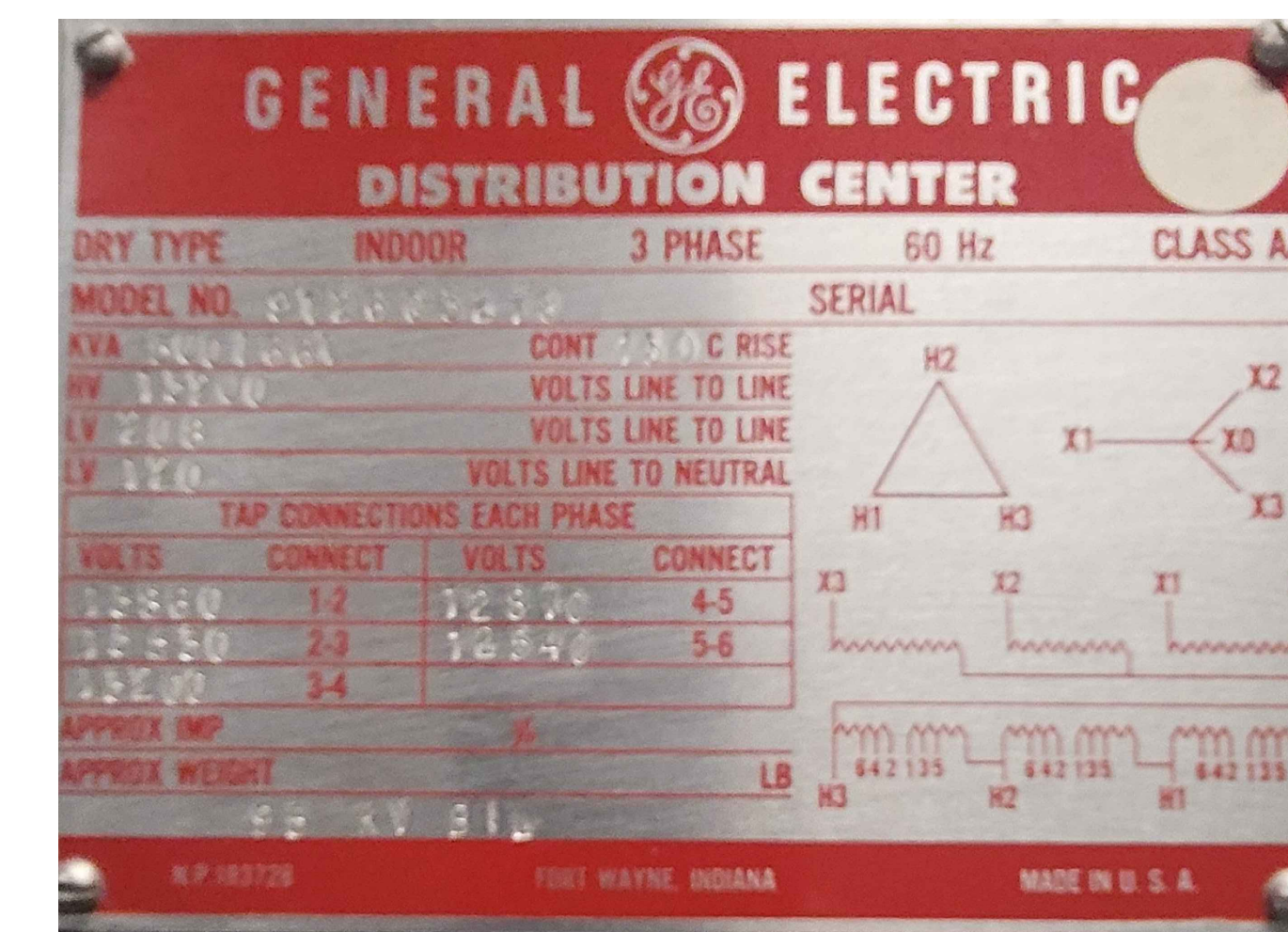
E-20



1 EXISTING SUBSTATION #20 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #20 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
500 KVA-AA  
667 KVA-FA  
208/120 VOLTS  
55.0 cal/cm<sup>2</sup>

MAX DEMAND IS .34 x 400 = 136KW @ 90% PF IS 151 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PENNSYLVANIA ONE CALL SYSTEM, INC.  
800 South 4th Street  
West Chester, Pennsylvania  
19380-4028

BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
AN LAW REQUIRED. UNDER PENNSYLVANIA'S NON-MEMBERS MUST BE CONTACTED DIRECTLY. NOTICE IS REQUIRED BEFORE YOU EXCAVATE. SHALL BE MET OR DEMONSTRATED.

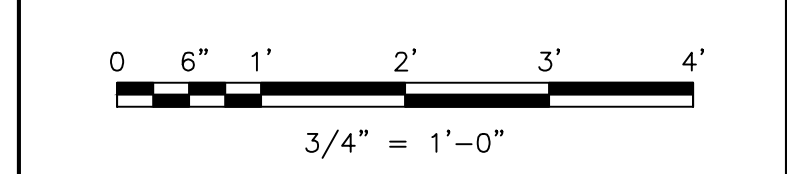
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

**MAIDA** CONSULTING ENGINEERS  
ENGINEERING INC.  
Philadelphia Office  
1315 Walnut Street  
Suite 804  
Philadelphia, PA 19107  
(215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
PROJECT ENG. JFM  
CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

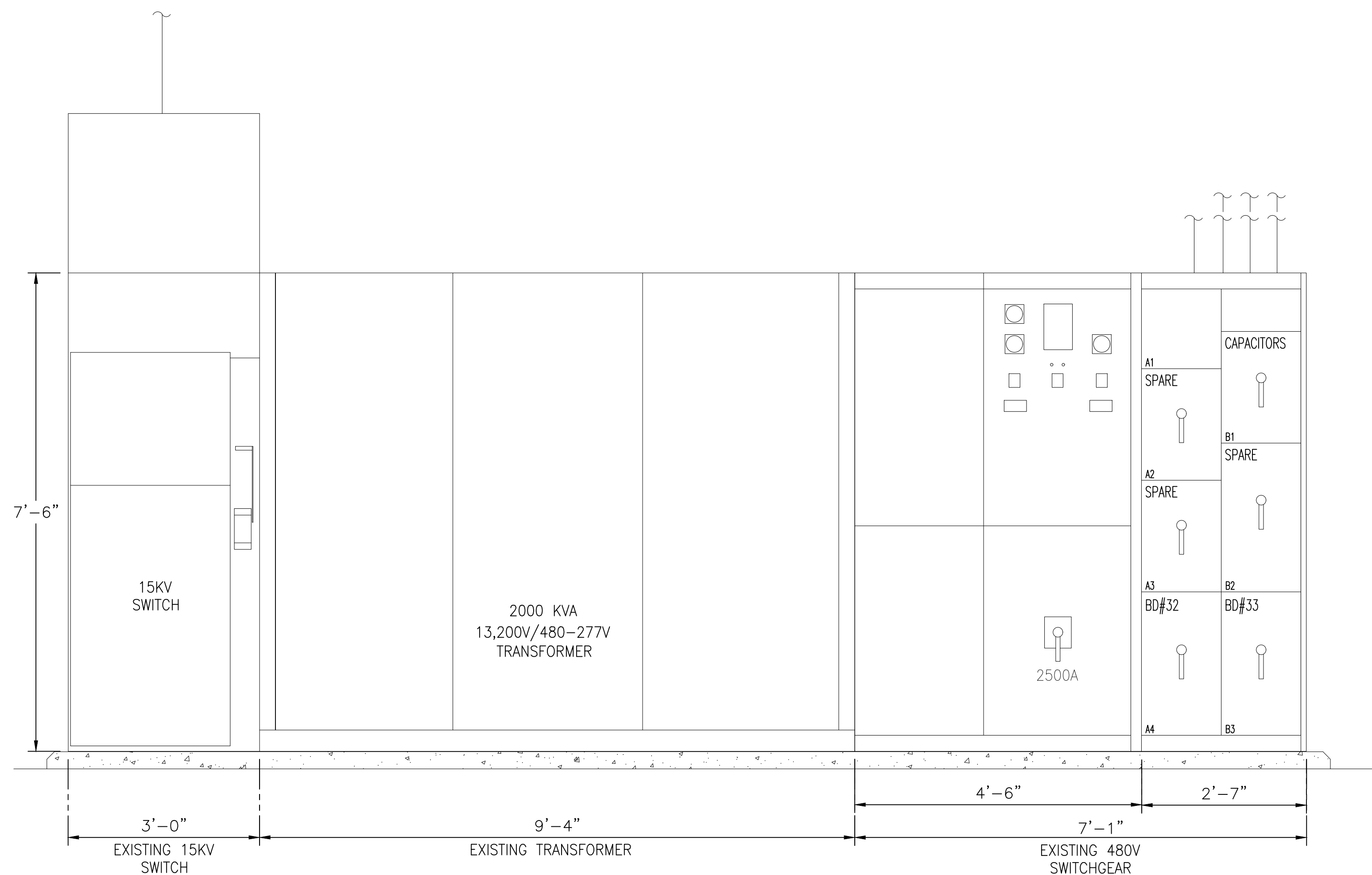
PHASE:

DRAWING TITLE: SUBSTATION ROOM #5, SUBSTATION #20 ELEVATION AND PLAN

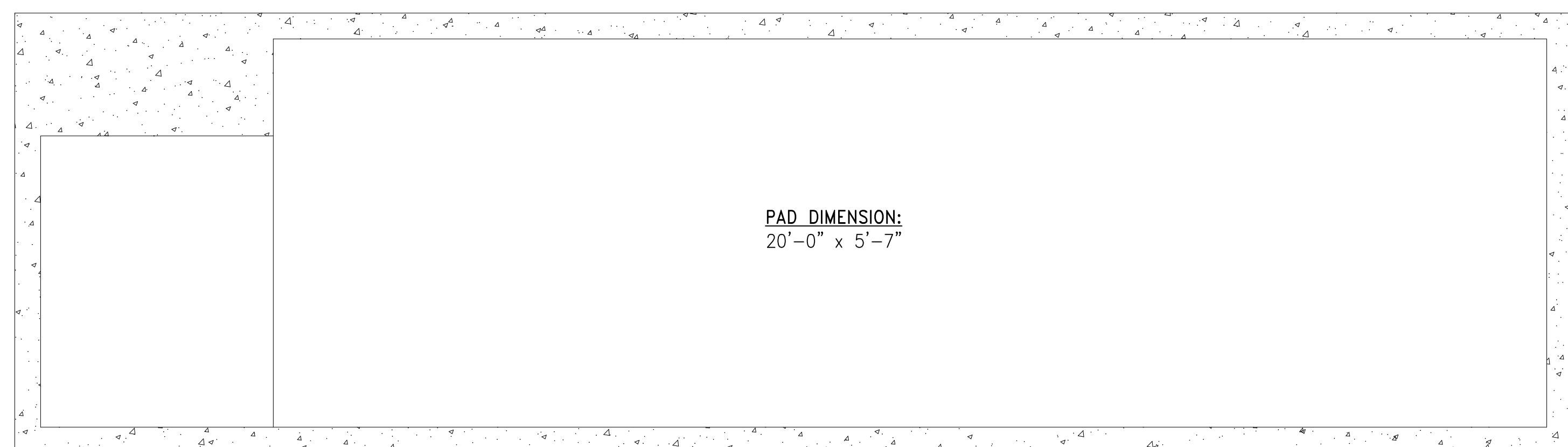
PACC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
CONSULTANT PROJECT NO.: E45032  
DATE: 03-25-2024  
SCALE: AS NOTED  
DRAWN BY: LPI  
CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

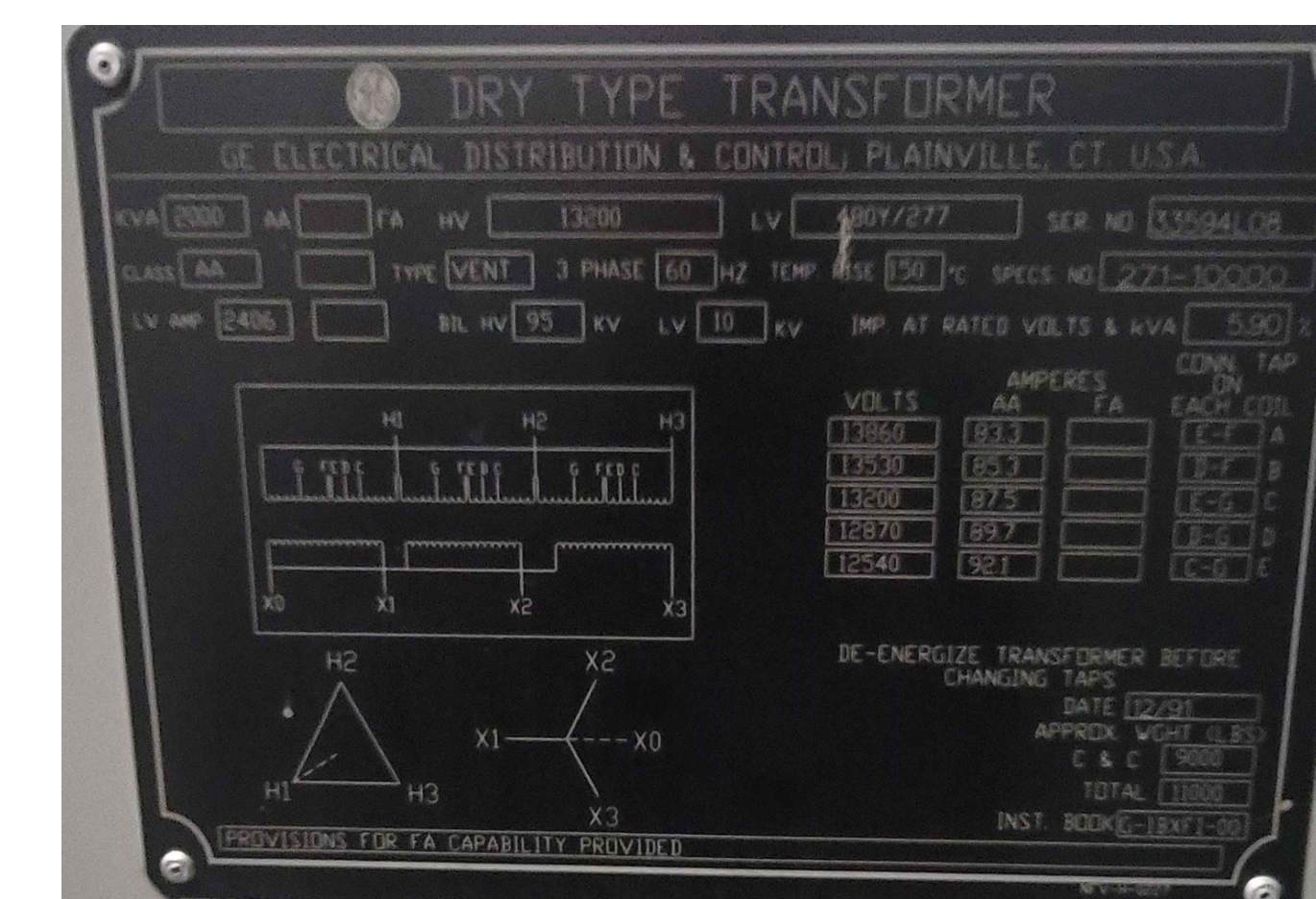
**E-21**



1 EXISTING SUBSTATION #21 FRONT VIEW  
SCALE: 3/4" = 1' - 0"

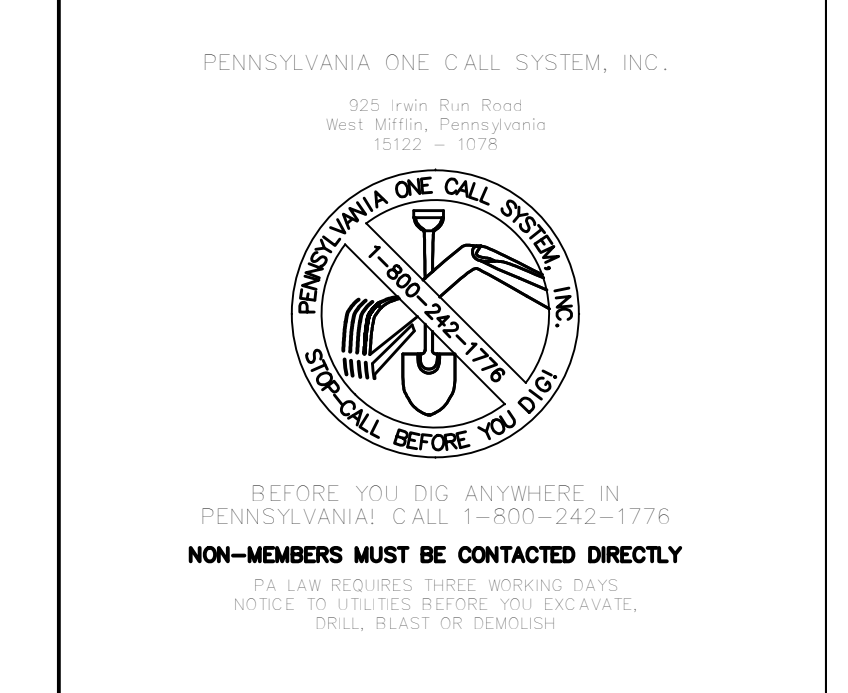


2 EXISTING SUBSTATION #21 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
 2000 KVA-AA  
 --- KVA-FA  
 480/277 VOLTS  
 120.5 cal/cm<sup>2</sup>  
 MAX DEMAND IS 1.2 x 1200 = 1440KW @ 90% PF IS 1600 KVA

REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



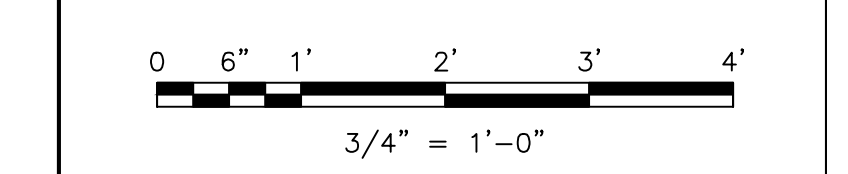
PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:



PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

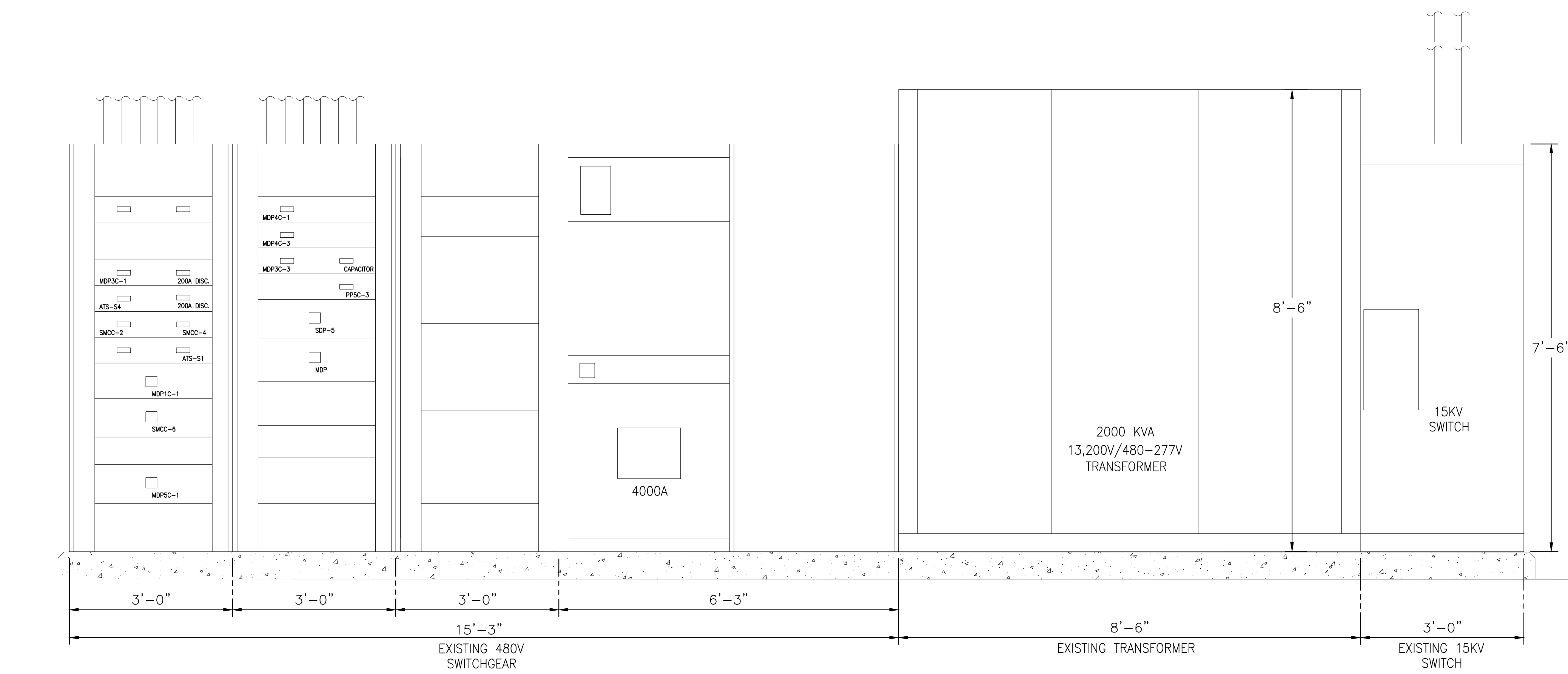
PHASE:

DRAWING TITLE: SUBSTATION ROOM #5, SUBSTATION #21 ELEVATION AND PLAN

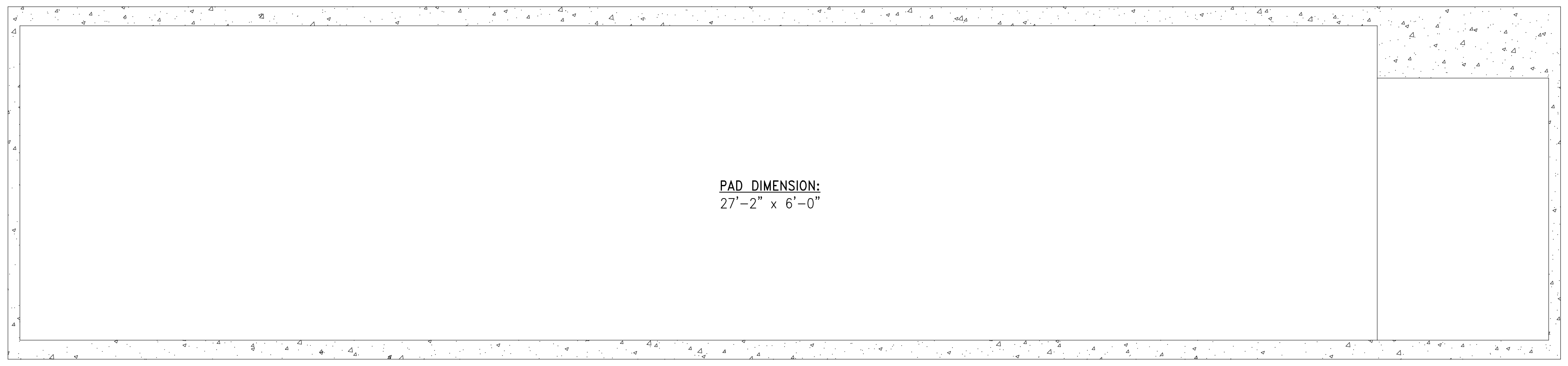
PAQC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

E-22

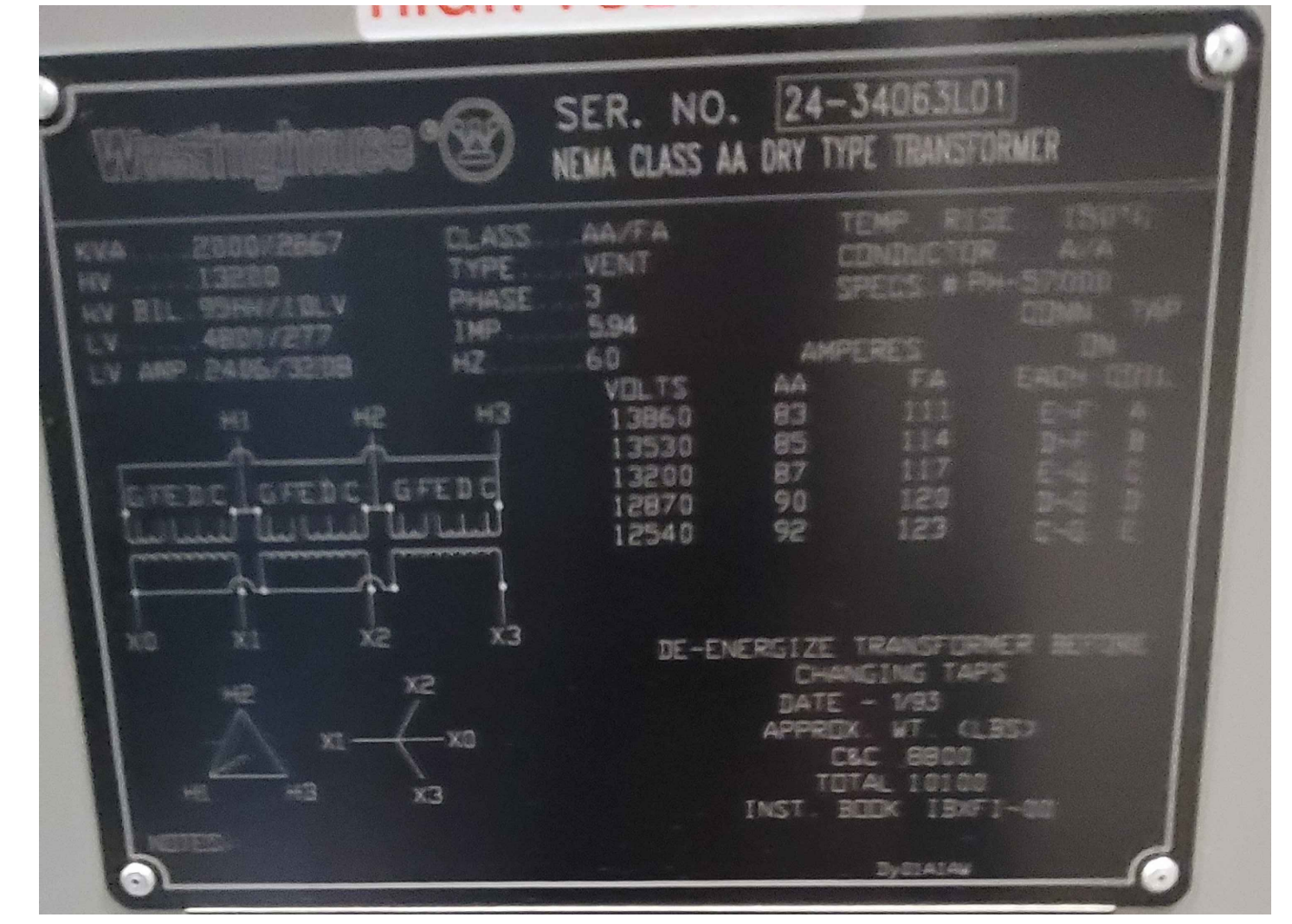
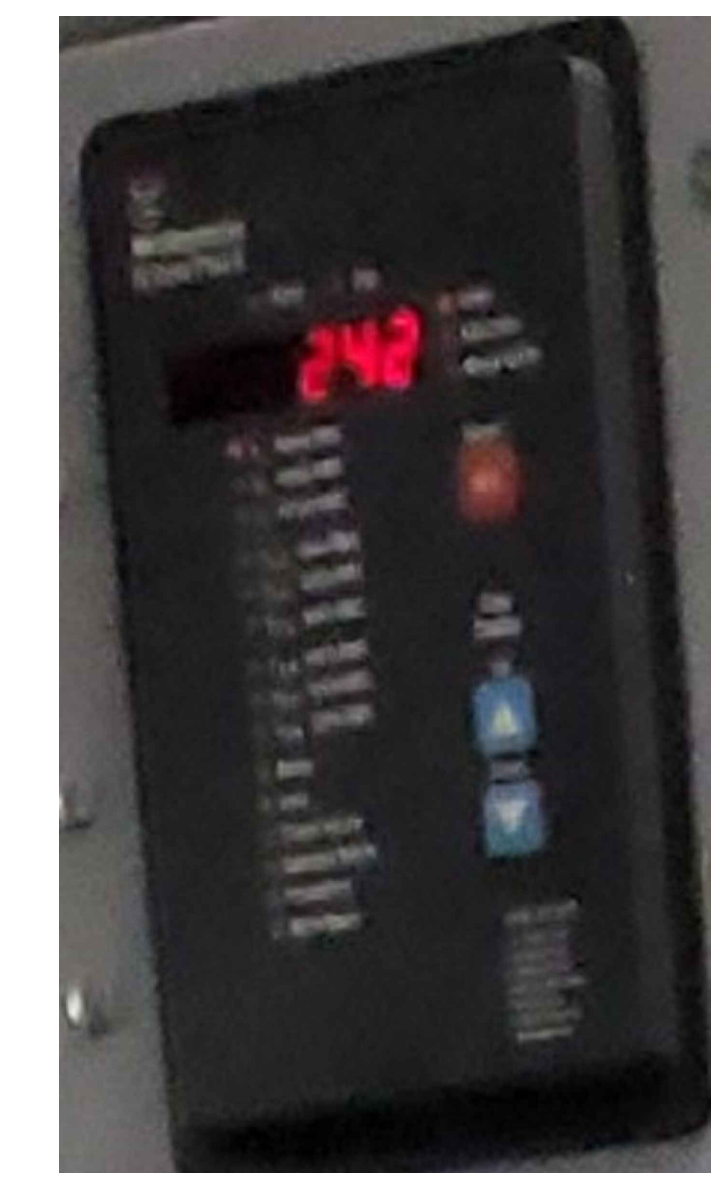


1 EXISTING SUBSTATION #22 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



2 EXISTING SUBSTATION #22 PLAN VIEW  
SCALE: 3/4" = 1' - 0"

TRANSFORMER:  
2000 KVA-AA  
2867 KVA-FA  
480/277 VOLTS  
120.2 cal/cm<sup>2</sup>



REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



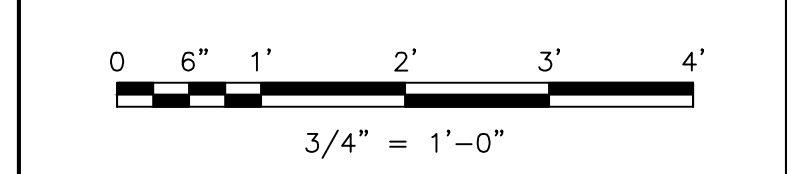
PENNSYLVANIA ONE CALL SYSTEM, INC.  
  
 BEFORE YOU DIG ANYWHERE IN PENNSYLVANIA CALL 1-800-242-1776  
 NON-MEMBERS MUST BE CONTACTED DIRECTLY  
 PA ONE-CALL NUMBER (FOR DESIGN ONLY): XXXXXXXXXXXX

DPP PROJECT COORDINATOR: XXXXXXXXXXXX

SEAL:

MAIDA CONSULTING ENGINEERS  
 Philadelphia Office  
 1315 Walnut Street  
 Suite 804  
 Philadelphia, PA 19107  
 (215) 542-8700

PROJECT NO. E45032 DATE 3/25/24  
 PROJECT ENG. JFM  
 CHECKED



DPP PROJECT NUMBER: XX-XX-XXXX-XX

PROJECT TITLE: UNIT SUBSTATION MODERNIZATION

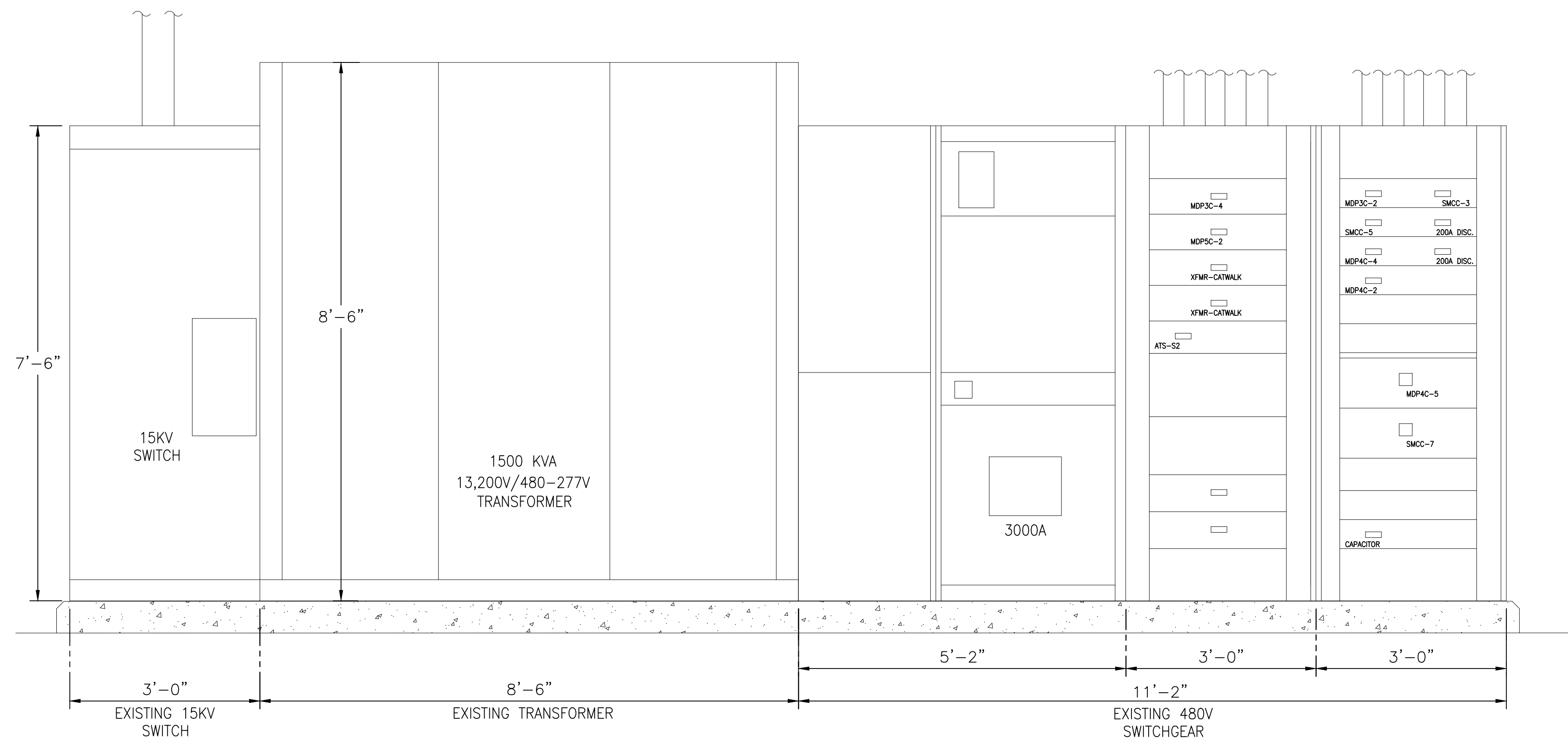
PHASE:

DRAWING TITLE: SUBSTATION ROOM #22, SUBSTATION #22 ELEVATION AND PLAN

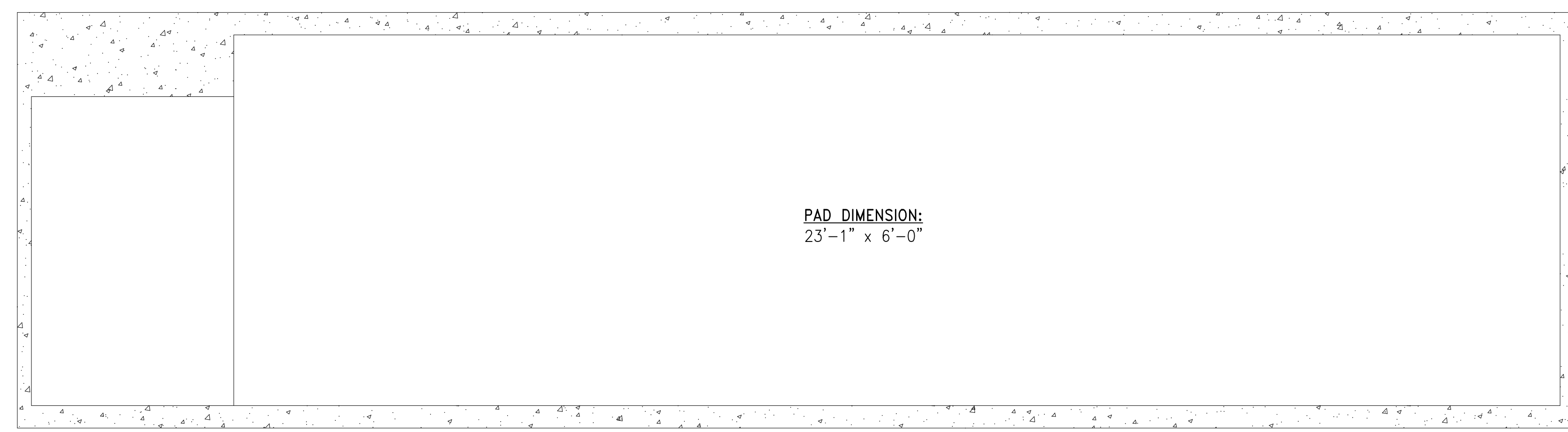
PAQC PROJECT NO.: XX-XX-XXXX-XX DRAWING NO.:  
 CONSULTANT PROJECT NO.: E45032  
 DATE: 03-25-2024  
 SCALE: AS NOTED  
 DRAWN BY: LPI  
 CHECKED BY: JFM

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.

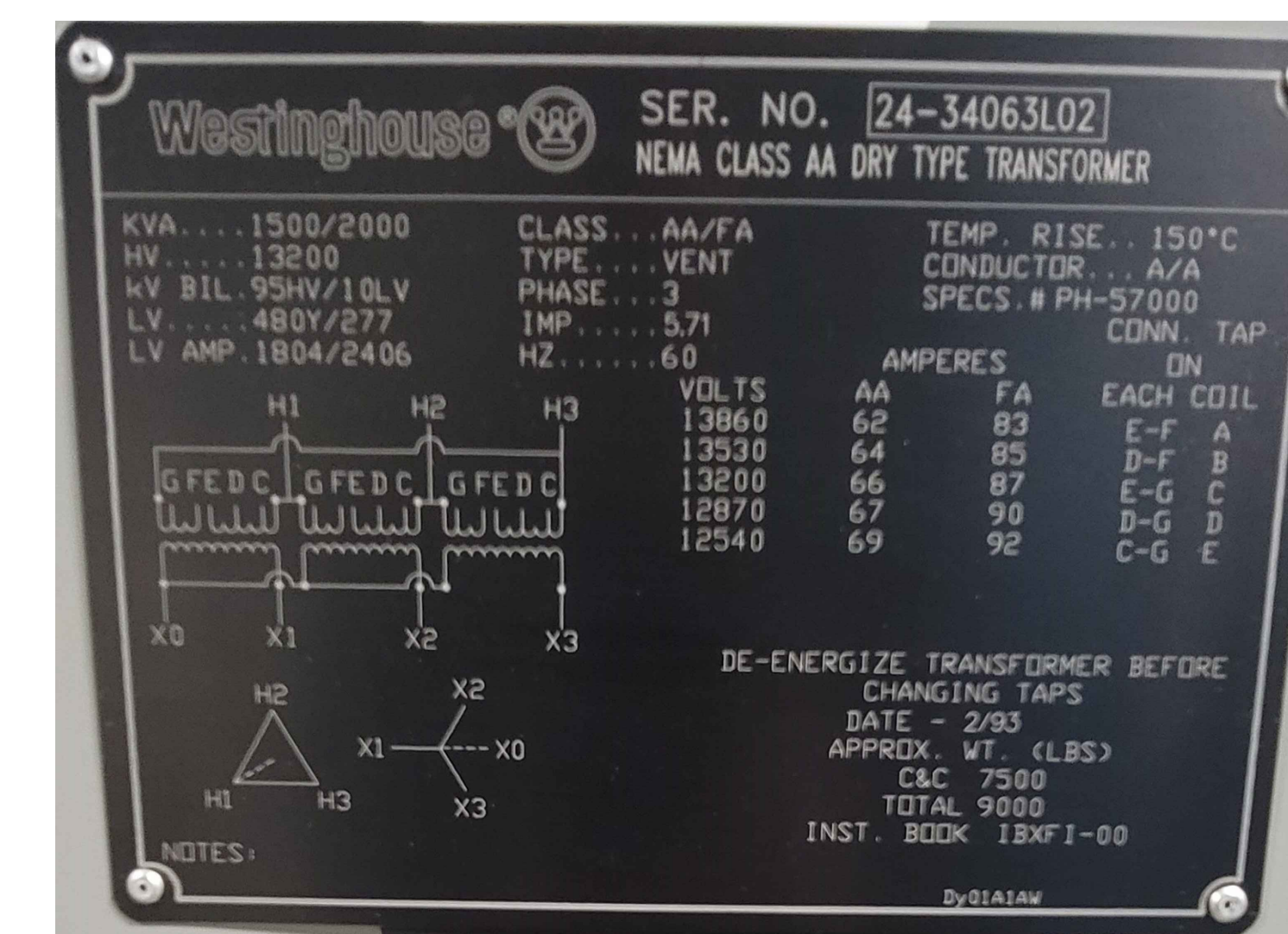
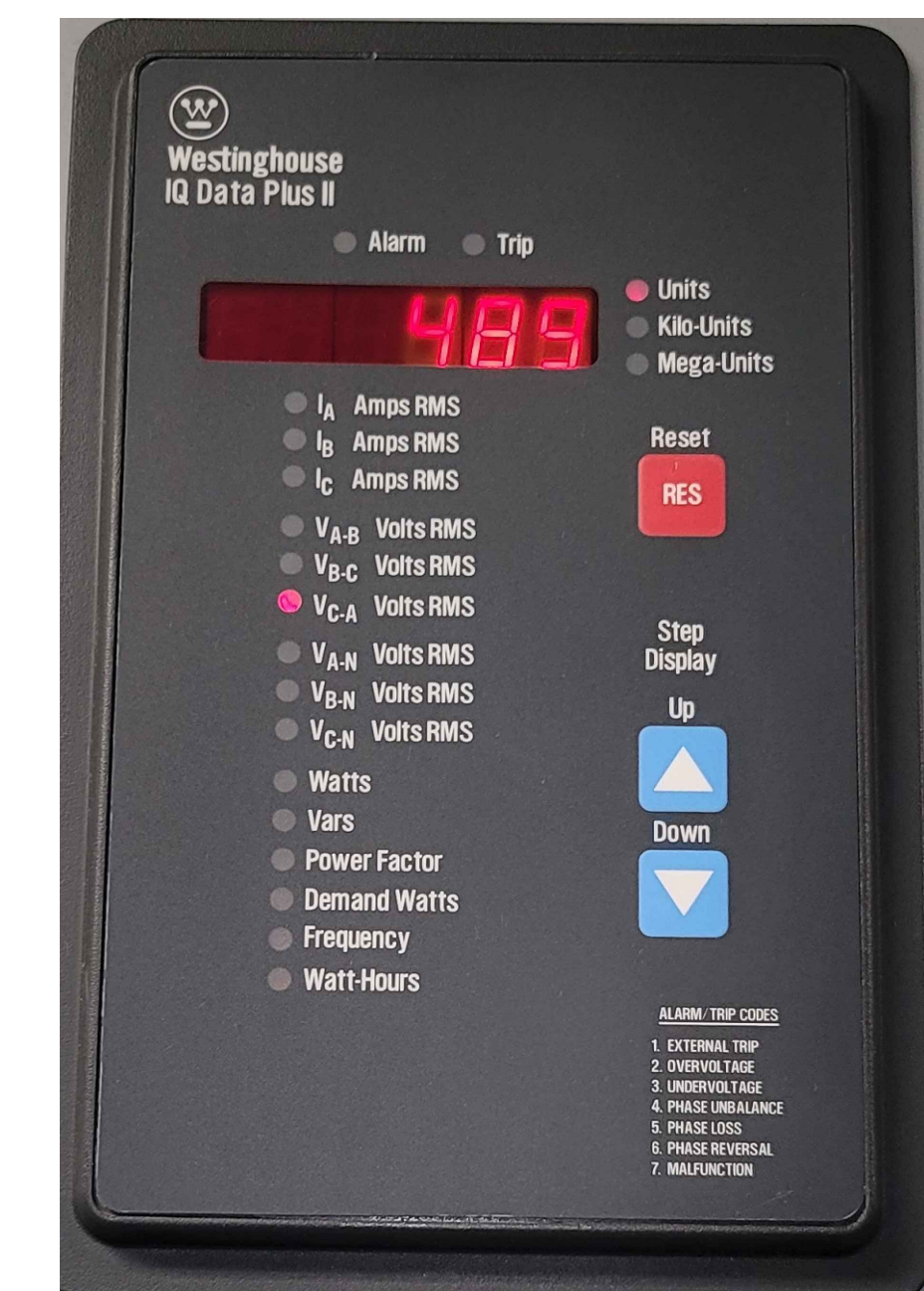
E-23



1 EXISTING SUBSTATION #23 FRONT VIEW  
SCALE: 3/4" = 1' - 0"



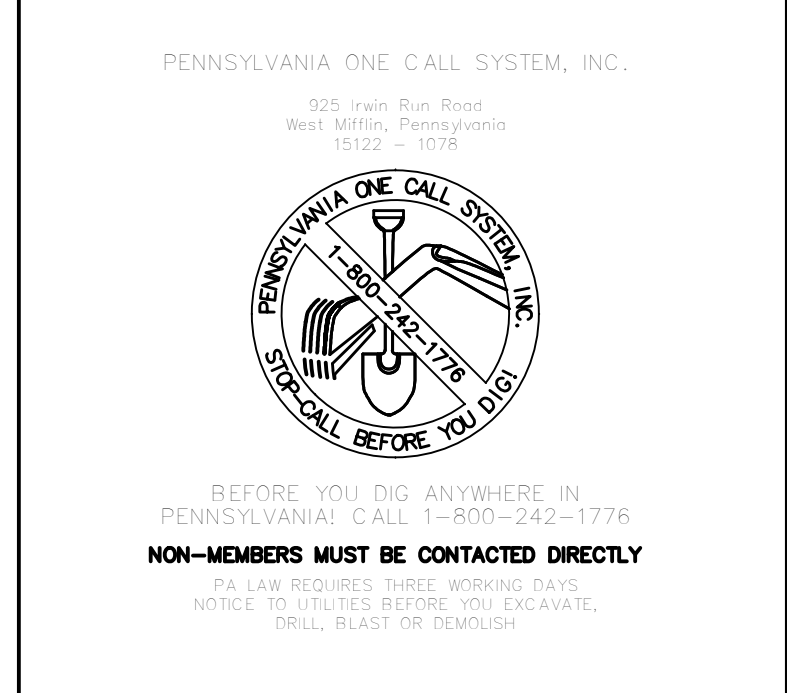
2 EXISTING SUBSTATION #23 PLAN VIEW  
SCALE: 3/4" = 1' - 0"



TRANSFORMER:  
1500 KVA-AA  
2000 KVA-FA  
480/277 VOLTS  
100.0 cal/cm<sup>2</sup>



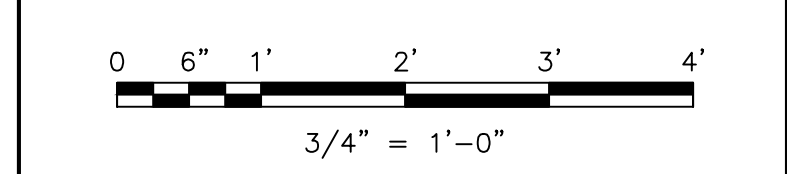
REVISIONS		
ISSUE	DATE	REVISIONS
0	4/24/24	ISSUED FOR SUBSTATION BID



PA ONE-CALL NUMBER (FOR DESIGN ONLY):	XXXXXXXXXX
DPP PROJECT COORDINATOR:	XXXXXXXXXX
SEAL:	



PROJECT NO. E45032	DATE
PROJECT ENG. JFM	3/25/24
CHECKED	



DPP PROJECT NUMBER	XX-XX-XXXX-XX
PROJECT TITLE	UNIT SUBSTATION MODERNIZATION
PHASE	

DRAWING TITLE: SUBSTATION ROOM #23, SUBSTATION #23 ELEVATION AND PLAN

PACC PROJECT NO. XX-XX-XXXX-XX	DRAWING NO. E-24
CONSULTANT PROJECT NO. E45032	
DATE: 03-25-2024	
SCALE: AS NOTED	
DRAWN BY: LPI	
CHECKED BY: JFM	

NOTE: ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR AT THE SITE BEFORE PROCEEDING WITH THE WORK.