

REPLACE SWITCHGEAR, POWER PLANT & MAINTENANCE BUILDING BONNE TERRE, MISSOURI



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OWNER: STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR
DEPARTMENT OF CORRECTIONS

PROJECT OFFICE OF ADMINISTRATION
MANAGEMENT: DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

DESIGNER: TODD KUNO

PROJECT NUMBER: C2330-01

SITE NUMBER: 7021
FACILITY NUMBER: 9327021024

PROJECT PHASING

1. PHASE 1: RIGHT SIDE
 - 1.1. PROVIDE TEMP 48VDC TO LEFT SIDE.
 - 1.2. REMOVE DEMO BUS SECTION. REMOVE ADJACENT BUS TO ALLOW FOR REMOVAL OF BUS IN THE SECTION.
 - 1.3. PROVIDE NEW BUS SECTION FOR A TIE-TIE CONFIGURATIONS.
 - 1.4. DEMO EXISTING 48V DC RECTIFIER AND BATTERIES.
 - 1.5. PROVIDE MASTER GENERATOR CONTROL.
 - 1.6. NEW 48V DC RECTIFIER AND BATTERIES.
 - 1.7. REPLACE RELAY, RELAY CONTROL WIRE, AND CIRCUIT BREAKERS
2. PHASE 2: LEFT SIDE
 - 2.1. PROVIDE TEMPORARY 120V AC TO 48VDC RECTIFIER.
 - 2.2. REPLACE RELAYS AND CIRCUIT BREAKER.
 - 2.3. REMOVE TEMPORARY RECTIFIER.
3. 2MW TEMPORARY GENERATOR SHALL BE PROVIDED WHEN UTILITY SECTION ARE DE-ENERGIZED.
 - 3.1. UTILITY SECTION CAN NOT BE DE-ENERGIZED WHEN SITE IS IN PEAK ELECTRICAL USAGE (JUNE, JULY, AUGUST)
 - 3.2. PROVIDE ALL TEMPORARY POWER INCLUDING GENERATOR, FUEL, CABLES AND OVERCURRENT PROTECTION SO THE CAMPUS DOES NOT LOOSE POWER FOR MORE THAN THE TIME TO SWITCH BETWEEN UTILITY, SITE GENERATORS, LOOP SWITCHES OR TEMPORARY GENERATOR. THE ONLY EXCEPTION IS THE MAINTENANCE BUILDING WILL NEED A FEW HOURS OF DOWN TIME TO CONNECT TEMPORARY GENERATOR CABLES INTO THE PAD MOUNTED SWITCH SHOWN.

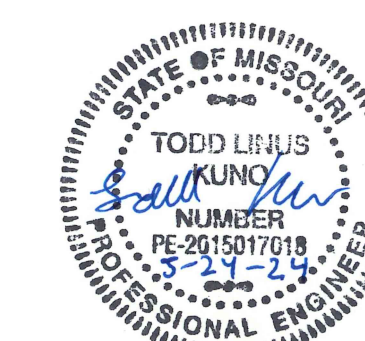
DRAWING INDEX

NUMBER	TITLE
G-00	COVER SHEET
E-00	ELECTRICAL SYMBOLS AND LEGEND
E-10	EXISTING SITE PLAN
E-11	EXISTING MV SWITCHGEAR
E-12	BUILDING ELECTRICAL ROOM
E-60	DEMO MV ONE-LINE AND ELEVATION
E-61	PHASE 1: MV ONE-LINE AND ELEVATION
E-62	PHASE 2: MV ONE-LINE AND ELEVATION

SHEET NUMBER:

G-00

01 OF 08 SHEETS
MAY 24, 2024



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REPLACE SWITCHGEAR,
POWER PLANT
& MAINTENANCE BUILDING

EASTERN R&D
CORRECTIONAL CENTER
2727 HIGHWAY K,
BONNE TERRE, MO 63628

PROJECT # C2330-01
SITE # 7021
FACILITY # 9327021024

REVISION: _____
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ISSUE DATE: 05/24/2024

CAD DWG FILE: E-00
DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

SHEET TITLE:
ELECTRICAL
SYMBOLS AND
LEGEND

SHEET NUMBER:

E-00

02 OF 08 SHEETS
05/24/2024

LEGEND AND ABBREVIATIONS (SEE SPECIFICATIONS & SCHEDULES)

NOTES: 1. ALL SYMBOLS AND ABBREVIATIONS ARE NOT NECESSARILY USED ON THESE PLANS.
2. IN GENERAL, SYMBOLS SHOWN WITH LIGHT LINES DENOTE EXISTING WORK. SYMBOLS SHOWN WITH HEAVY LINES DENOTE NEW WORK.

GENERAL NOTES

- MAKE ALL INSTALLATIONS IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG).
- MOUNTING HEIGHTS INDICATED WITHIN PLANS AND SCHEDULES ARE DIMENSIONED TO THE CENTER LINE OF THE DEVICE, EQUIPMENT, ETC. UNLESS OTHERWISE NOTED.
- COORDINATE EXACT EQUIPMENT LOCATIONS WITH EXISTING CONDITIONS. EQUIPMENT LOCATIONS SHOWN ON ELECTRICAL PLANS ARE DIAGRAMMATICAL ONLY AND MIGHT NOT BE EXACT.
- REPAIR ALL OPENINGS MADE IN EXISTING WALLS, PARTITIONS, ETC TO ACCOMMODATE WORK OF THIS DISCIPLINE TO MATCH THE SURROUNDING CONDITIONS, USING WORKERS QUALIFIED IN THE APPROPRIATE TRADE. APPROPRIATELY GROUT OR SEAL ALL CONDUITS THROUGH WALLS.

DEMOLITION NOTES

- REMOVE, CAP AND RELOCATE EQUIPMENT, DEVICES, CONDUIT, WIRE, ETC., AS SHOWN AND SPECIFIED ON DRAWINGS, AND AS MAY BECOME NECESSARY BECAUSE OF EXISTING FIELD CONDITIONS. FAILURE TO VISIT THE SITE AND TO TAKE ALL EXISTING CONDITIONS INTO ACCOUNT WILL NOT ALLOW FOR CHANGES TO THE SCOPE OF WORK.
- FOR ALL WORK SHOWN TO BE REMOVED DURING THE DEMOLITION PHASE, REMOVE ALL WIRING AND CABLES BACK TO THEIR SOURCE UNLESS NOTED OTHERWISE TO BE RE-USED FOR NEW WORK. REMOVE ALL UNUSED CONDUIT THAT IS EXPOSED OR ABOVE ACCESSIBLE CEILINGS WHICH IS AFFECTED BY OR IS IN THE AREA OF THE DEMOLITION WORK.
- WHERE EQUIPMENT, DEVICES, CONDUIT, BOXES, AND SUPPORTING HARDWARE ARE REMOVED, PATCH AND FINISH THE SURFACE AS REQUIRED TO MATCH THE EXISTING, USING WORKERS QUALIFIED IN THE APPROPRIATE TRADE.
- TAKE ALL REMOVED MATERIALS FROM THE PROJECT SITE, EXCEPT FOR THOSE TO BE RELOCATED, STORED, OR TURNED OVER TO THE USING AGENCY.
- ACCEPTANCE OF CONTRACT MEANS INSTALLER ACCEPTS EXISTING CONDITIONS.
- PROVIDE A BLANK COVER PLATE WHERE A FLUSH DEVICE IS BEING REMOVED FROM WALLS THAT ARE TO REMAIN. MATCH THE COLOR, MATERIAL AND FIRE RATING TO THE EXISTING SURFACE IN THE ROOM OR SPACE.
- LEGALLY DISPOSE OF HAZARDOUS MATERIALS OR OTHER EQUIPMENT CONTAINING PCBs. COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS.
- PATCH OR FILL ANY EXPOSED GAP BETWEEN CONDUIT AND WALL WHERE NEW HOLES ARE DRILLED IN EXISTING WALLS.
- PAINT TO A MINIMUM OF 1 FOOT ON ALL SIDES OF A PATCH OR REMOVED SURFACE FOR CONDUIT PENETRATIONS.

GENERATOR TESTING

- GENERATOR SHALL BE TESTED PRIOR TO DEMO OF SWITCHGEAR RELAY, PLCs AND CONTROLS. THE CONTRACTOR IS RESPONSIBLE FOR DOCUMENTING THE AS FOUND CONDITIONS.
- CONTRACTOR RESPONSIBLE FOR OPERATIONAL LOAD BANK SYSTEM TESTING OF GENERATOR AFTER INSTALLATION OF NEW SWITCHGEAR RELAY, PLCs AND CONTROLS.

DRAWING REFERENCES

- # PLAN DETAIL REFERENCE TITLE
- # KEYED NOTE DESIGNATION
- PLAN NORTH NORTH ARROW

ABBREVIATIONS

- A.F.F : ABOVE FINISHED FLOOR
C : CONDUIT
E.C. : ELECTRICAL CONTRACTOR
ER : EXISTING RELOCATED
ETR : EXISTING TO REMAIN
E.D. : GENERAL CONTRACTOR
GND : GROUND
TYP. : TYPICAL
U.O.N. : UNLESS OTHERWISE NOTED

LINE TYPE LEGEND

- EXISTING TO REMAIN OR NEW WORK BY OTHERS (LIGHT, SOLID LINE)
- NEW WORK BY THIS CONTRACTOR (DARK, SOLID LINE)
- EXISTING TO BE REMOVED BY THIS CONTRACTOR (DARK, DASHED LINE, DEMOLITION PLANS)
- 2-HOUR FIRE RATED WALL

POWER EQUIPMENT

- PANELBOARD (SURFACE)
- PANELBOARD (FLUSH)

MAINTENANCE REQUIREMENTS

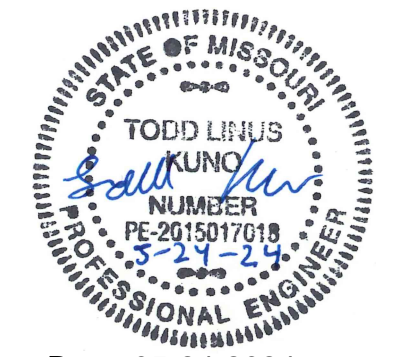
1. Below is a reference list of NETA MTS Maintenance requirements. Refer to NETA standards for full detailed list.
- 1.1. LV Switch
- 1.1.1. Mechanical-
- 1.1.1.1. Inspect Physical, anchorage, alignment, grounding.
- 1.1.1.2. Perform test before cleaning, clean unit
- 1.1.1.3. Verify mechanical operation.
- 1.1.1.4. Verify fuses size and type and support.
- 1.1.1.5. Verify bolt connection.
- 1.1.1.6. Verify operation and sequencing of interlocking.
- 1.1.1.7. Verify barrier.
- 1.1.1.8. Verify correct operation.
- 1.1.1.9. Lubrication on moving current carrying.
- 1.1.1.10. Perform as left test.
- 1.1.2. Electrical -
- 1.1.2.1. Perform resistance ohm test.
- 1.1.2.2. Measure contact resistance across each switchblade and fuse holder
- 1.1.2.3. Insulation-resistance test
- 1.1.2.4. Ground-fault test
- 1.2. LV Molded / Insulated Case CB
- 1.2.1. Mechanical-
- 1.2.1.1. Test before cleaning
- 1.2.1.2. Clean unit
- 1.2.1.3. Test operation
- 1.2.1.4. Verify bolt / lug connections.
- 1.2.1.5. Inspect for accessible contacts.
- 1.2.1.6. Verify meets study settings.
- 1.2.1.7. Perform as left test.
- 1.2.2. Electrical -
- 1.2.2.1. Test resistance
- 1.3. LV Power CB
- 1.3.1. Mechanical-
- 1.3.1.1. Test before cleaning
- 1.3.1.2. Clean unit
- 1.3.1.3. Inspect arc chutes and wear.
- 1.3.1.4. Test operation
- 1.3.1.5. Verify bolt / lug connections.
- 1.3.1.6. Inspect for accessible contacts.
- 1.3.1.7. Verify fit, alignment, racking mechanism.
- 1.3.1.8. Lubrication
- 1.3.1.9. Verify meets study settings.
- 1.3.1.10. Perform as left test.
- 1.3.2. Electrical -
- 1.3.2.1. Test resistance
- 1.3.2.2. Test trip pickup with current injection
- 1.4. MV Switches
- 1.4.1. Mechanical-
- 1.4.1.1. Inspect Physical, anchorage, alignment, grounding.
- 1.4.1.2. Perform test before cleaning, clean unit
- 1.4.1.3. Verify mechanical operation.
- 1.4.1.4. Verify fuses size and type and support.
- 1.4.1.5. Verify bolt connection.
- 1.4.1.6. Verify operation and sequencing of interlocking.
- 1.4.1.7. Verify barrier.
- 1.4.1.8. Verify correct operation.
- 1.4.1.9. Lubrication on moving current carrying.
- 1.4.1.10. Perform as left test.
- 1.4.2. Electrical -
- 1.4.2.1. Perform resistance ohm test.
- 1.4.2.2. Measure contact resistance across each switchblade and fuse holder
- 1.4.2.3. Insulation-resistance test
- 1.4.2.4. Ground-fault test
- 1.5. MV power CB (Vacuum also)
- 1.5.1. Mechanical-
- 1.5.1.1. Inspect Physical, anchorage, alignment, grounding.
- 1.5.1.2. Perform test before cleaning, clean unit
- 1.5.1.3. Verify mechanical operation.
- 1.5.1.4. Verify fuses size and type and support.
- 1.5.1.5. Verify bolt connection.
- 1.5.1.6. Verify vacuum.
- 1.5.1.7. Verify operation and sequencing of interlocking.
- 1.5.1.9. Verify barrier.
- 1.5.1.10. Verify correct operation.
- 1.5.1.11. Lubrication on moving current carrying.
- 1.5.1.12. Perform as left test.
- 1.5.2. Electrical -
- 1.5.2.1. Perform resistance ohm test.
- 1.5.2.2. Measure contact resistance across each switchblade and fuse holder
- 1.5.2.3. Insulation-resistance test
- 1.5.2.4. Ground-fault test
- 1.6. MV Relay
- 1.6.1. Mechanical-
- 1.6.1.1. Inspect Physical, anchorage, alignment, grounding.
- 1.6.1.2. Perform test before cleaning, clean unit
- 1.6.1.3. Verify mechanical operation.
- 1.6.1.4. Inspect relay case.
- 1.6.1.5. Inspect relay.
- 1.6.1.6. Perform as left test.
- 1.6.1.7. Determine pickup and dropout.
- 1.6.1.8. Inspect lights.
- 1.6.2. Electrical -
- 1.6.2.1. Test trip / protection.
- 1.6.2.2. Test trip / protection.
- 1.7. Motors and Starters
- 1.7.1. Mechanical-
- 1.7.1.1. Inspect physical and mechanical condition.
- 1.7.1.2. Clean unit
- 1.7.1.3. Verify bolt / lug connections.
- 1.7.1.4. Verify motor-running protections.
- 1.7.1.5. Perform as left test.
- 1.7.2. Electrical -
- 1.7.2.1. Low-Resistance ohmmeter
- 1.7.2.2. Insulation resistance test
- 1.7.2.3. Test trip / protection.



KEYED NOTES:

1. CONTRACTOR TO REPLACE ALL EXISTING CAT EMCP 2 GENERATOR SET CONTROLLER. PROVIDE NEW EMCP 4 WITH UPGRADE KIT TO EXISTING GENERATOR(S) AND MODIFY GENERATOR SET AS REQUIRED FOR NEW CONTROLLER.
2. CONTRACTOR TO REPLACE IN ITS ENTIRETY, THE BATTERY SYSTEM, INCLUDING THE BATTERY CHARGER, BATTERIES, BATTERY SYSTEM CABLES. IN ADDITION, REMOVE IN ITS ENTIRETY THE EXISTING NOT IN USE, ABANDONED BATTERY SYSTEM.

STATE OF MISSOURI
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PROJECT # C2330-01
SITE # 7021
FACILITY # 9327021024

REVISION: _____
DATE: _____
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CAD DWG FILE: E-10
DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

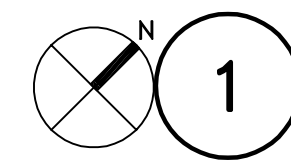
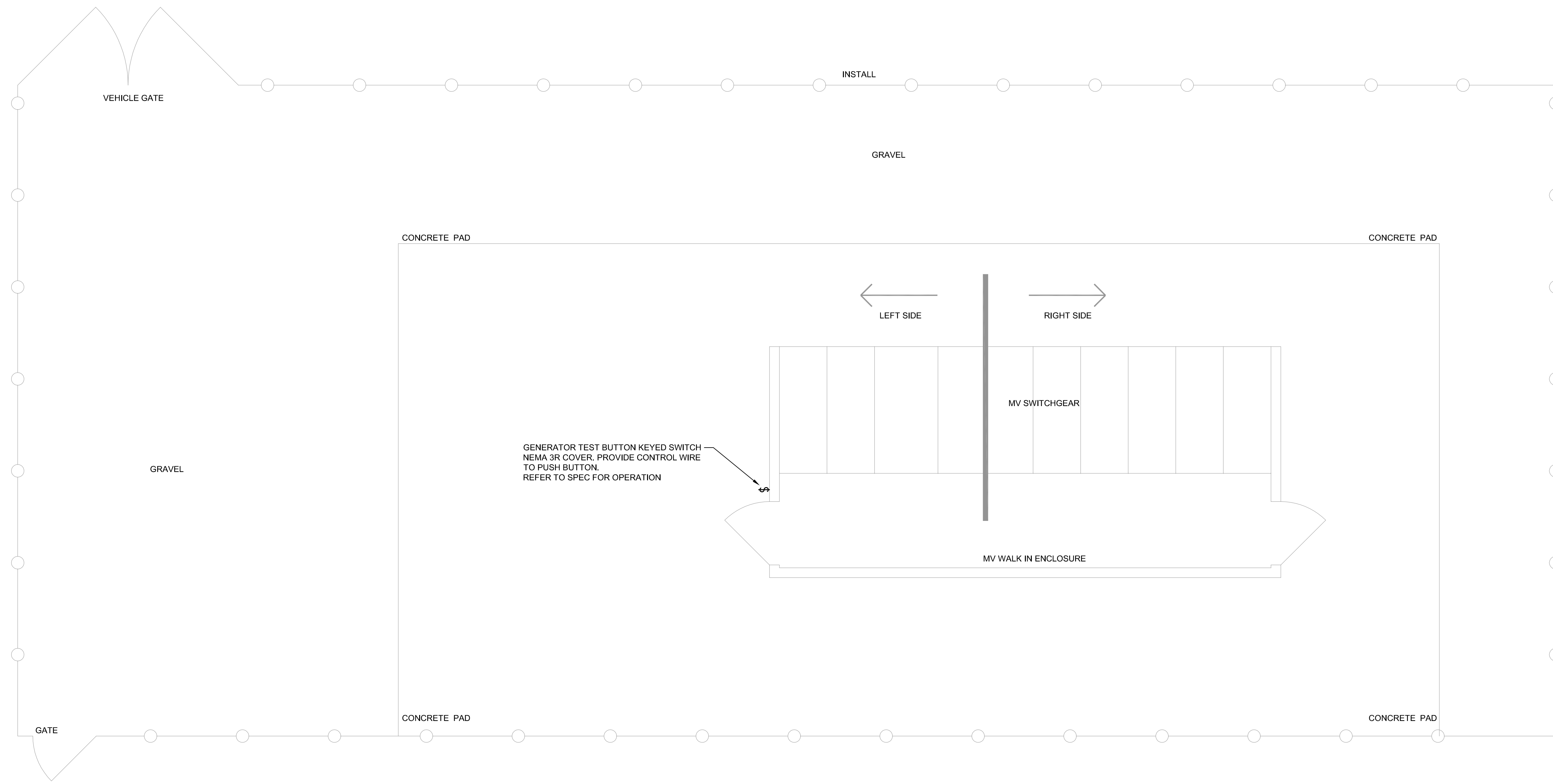
SHEET TITLE:
EXISTING
SITE PLAN

SHEET NUMBER:

E-10

03 OF 08 SHEETS
05/24/2024

1 EXISTING SITE
SCALE: 1" = 30' - 0"



EXISTING MEDIUM VOLTAGE SWITCHGEAR AREA PLAN

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



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DATE: _____
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CAD DWG FILE: E-11
DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

SHEET TITLE:
**EXISTING MV
SWITCHGEAR**

SHEET NUMBER:

E-11



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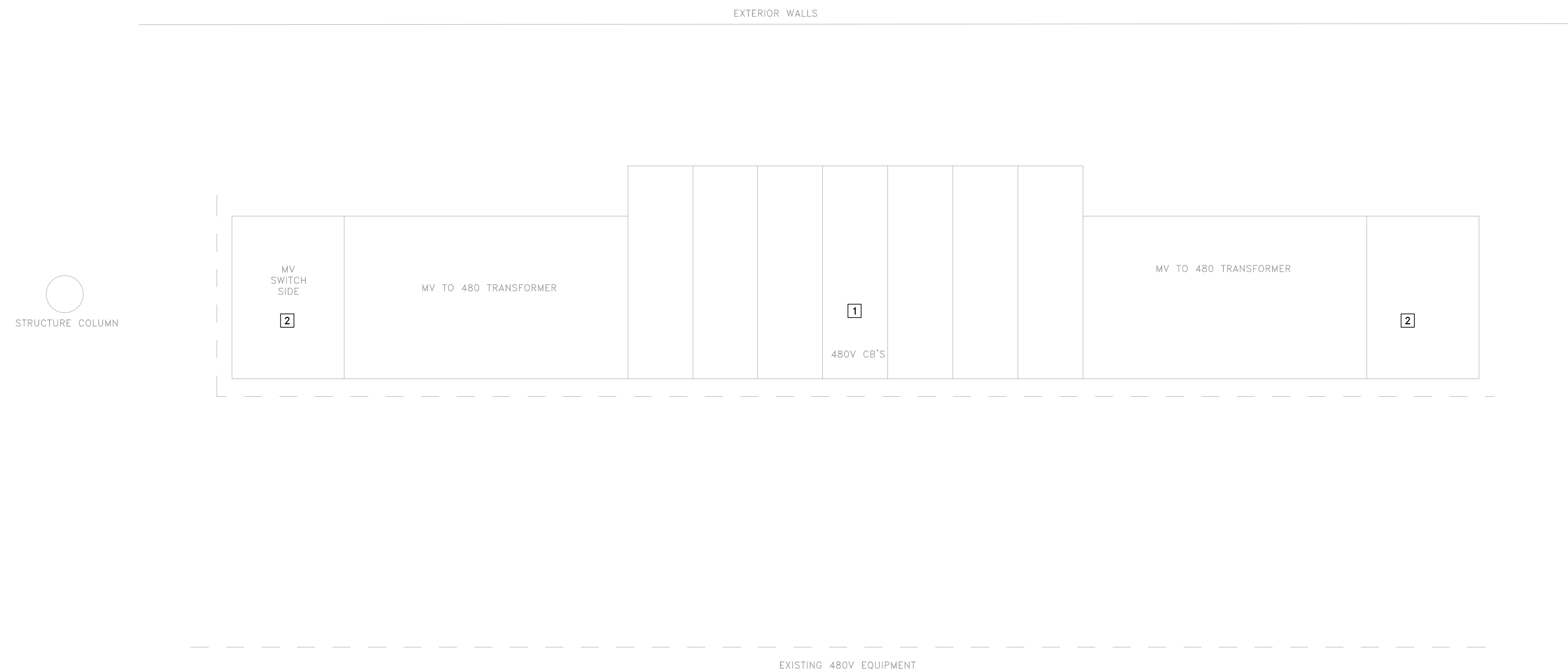
CAD DWG FILE: E-12
DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

SHEET TITLE:
MAINTENANCE AND
CHILLER BUILDING
ELECTRICAL ROOM

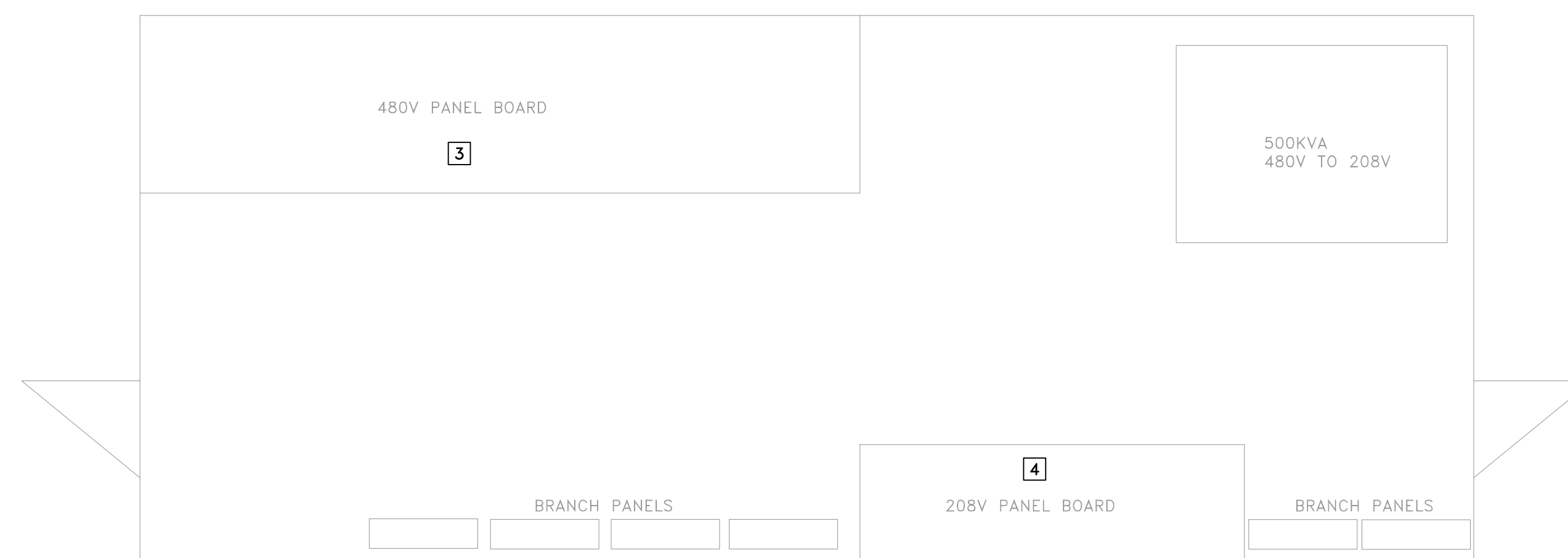
SHEET NUMBER:

E-12

05 OF 08 SHEETS
05/24/2024



 **1** MAINTENANCE BUILDING (ALTERNATE 1)
SCALE: 1/2" = 1' - 0"



 **2** CHILLER BUILDING ELECTRICAL ROOM (ALTERNATE 2)
SCALE: 1/2" = 1' - 0"

KEYED NOTES:

- SCOPE SHALL BE UNDER ALTERNATIVE ADD BID #1. CONTRACTOR TO PROVIDE NETA MTS MAINTENANCE REQUIREMENTS ON ALL OPERABLE DEVICES. FOR SQUARE D, POWER ZONE III, SERIES 2 SWITCHGEAR. REFER TO TO SHEET E-00 FOR MAINTENANCE REQUIREMENTS. SEE BELOW FOR NUMBER AND SIZE OF DRAWOUT POWER CIRCUIT BREAKERS AND MOTOR STARTERS FOR CHILLER BLDG 480V SWGR.
- SCOPE SHALL BE UNDER ALTERNATIVE ADD BID #1. CONTRACTOR TO PROVIDE NETA MTS MAINTENANCE REQUIREMENTS ON ALL OPERABLE DEVICES ON PRIMARY MEDIUM VOLTAGE SQUARE D, HVL LOAD CURRENT INTERRUPTER SWITCH. REFER TO SHEET E-00 FOR MAINTENANCE REQUIREMENTS. EACH SIDE HAS (1) 300AMP 15 KV METAL ENCLOSED FUSED SWITCHGEAR.
- SCOPE SHALL BE UNDER ALTERNATIVE ADD BID #2. CONTRACTOR TO PROVIDE NETA MTS MAINTENANCE REQUIREMENTS ON ALL OPERABLE DEVICES FOR SQUARE D, QED STYLE SWITCHBOARD, BOLTED PRESSURE SWITCH AND FUSED DISCONNECTS. REFER TO TO SHEET E-00 FOR MAINTENANCE REQUIREMENTS. SEE BELOW FOR NUMBER AND SIZE OF FUSE SWITCHES FOR ROOM 120B 480V.
- SCOPE SHALL BE UNDER ALTERNATIVE ADD BID #2. CONTRACTOR TO PROVIDE NETA MTS MAINTENANCE REQUIREMENTS ON ALL OPERABLE DEVICES SQUARE D, QED STYLE SWITCHBOARD, BOLTED PRESSURE SWITCH AND FUSED DISCONNECTS. REFER TO TO SHEET E-00 FOR MAINTENANCE REQUIREMENTS. SEE BELOW FOR NUMBER AND SIZE OF FUSE SWITCHES FOR ROOM 120B 208V.

CHILLER BLDG 480V SWGR **1**
(3) 3200A FRAME
(2) 1600A FRAME
(6) 800A FRAME
(8) 800A SPACE

ROOM 120B 480V **3**
(1) 1600A FRAME
(7) 30A FRAME
(2) 60A FRAME
(6) 100A FRAME
(3) 200A FRAME
(1) 400A FRAME
(1) 30A SPARE
(4) 60A SPARE
(1) 200A SPARE
(1) 800A SPARE

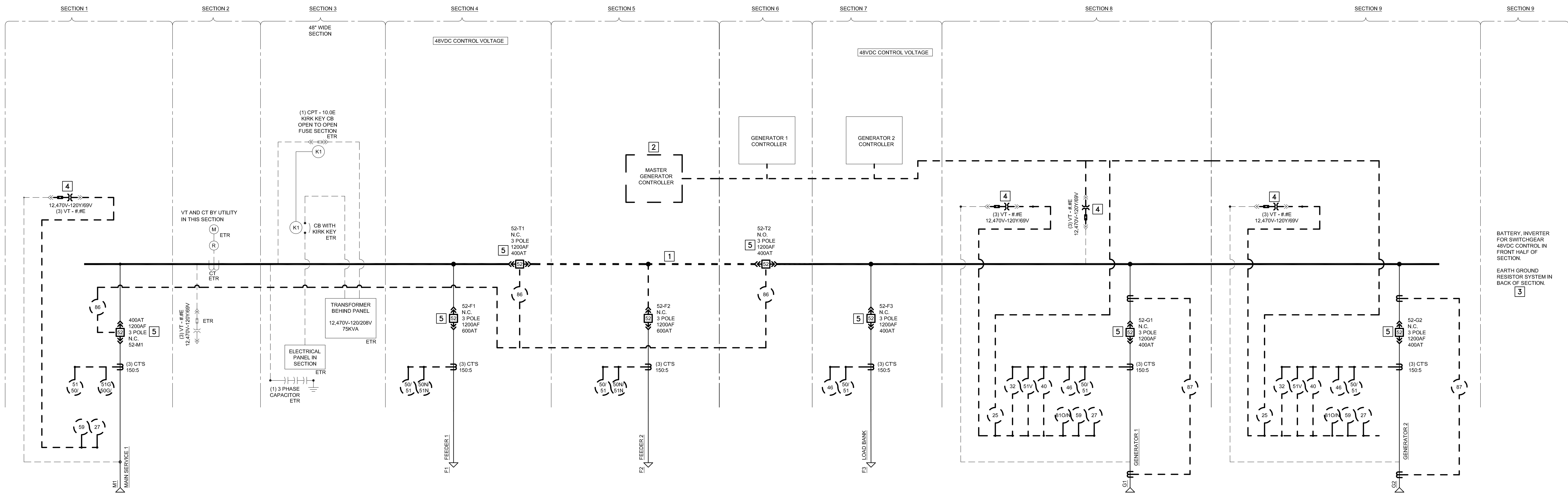
ROOM 120B 208V **4**
(1) 800A FRAME
(2) 100A FRAME
(1) 200A FRAME
(1) 400A FRAME
(1) 600A FRAME
(2) 60A SPARE
(2) 100A SPARE



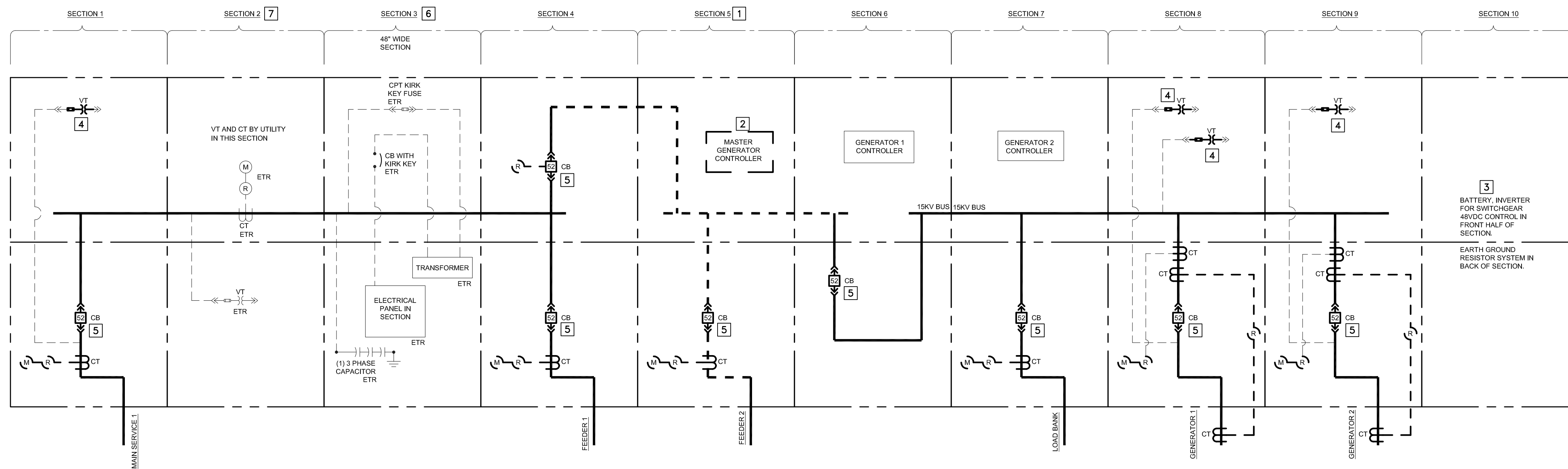
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A EXISTING ONE-LINE
SCALE: NO SCALE



B EXISTING DIAGRAM
SCALE: NO SCALE

KEYED NOTES:

1. DEMO BUS IN SECTION TO ALLOW FOR NEW TIE BREAKER.
2. DEMO GENERATOR AND SWITCHGEAR MASTER CONTROLLER. (EXISTING SYSTEM IS PLC WOODWARD SYSTEM)
3. DEMO DC RECTIFIER AND BATTERIES.
4. DEMO AND PROVIDED NEW VT AND FUSES.
5. DEMO AND PROVIDE NEW 52 POWER CIRCUIT BREAKER CT'S AND RELAYS.
6. EXISTING PANEL BOARD, TRANSFORMER, CIRCUIT BREAKER AND KIRK KEY SHALL REMAIN.
7. NO MODIFICATIONS REQUIRED IN AMEREN SECTION.

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ISSUE DATE: 05/24/2024

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DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

SHEET TITLE:
DEMO MV
ONE-LINE AND
ELEVATION

SHEET NUMBER:

E-60



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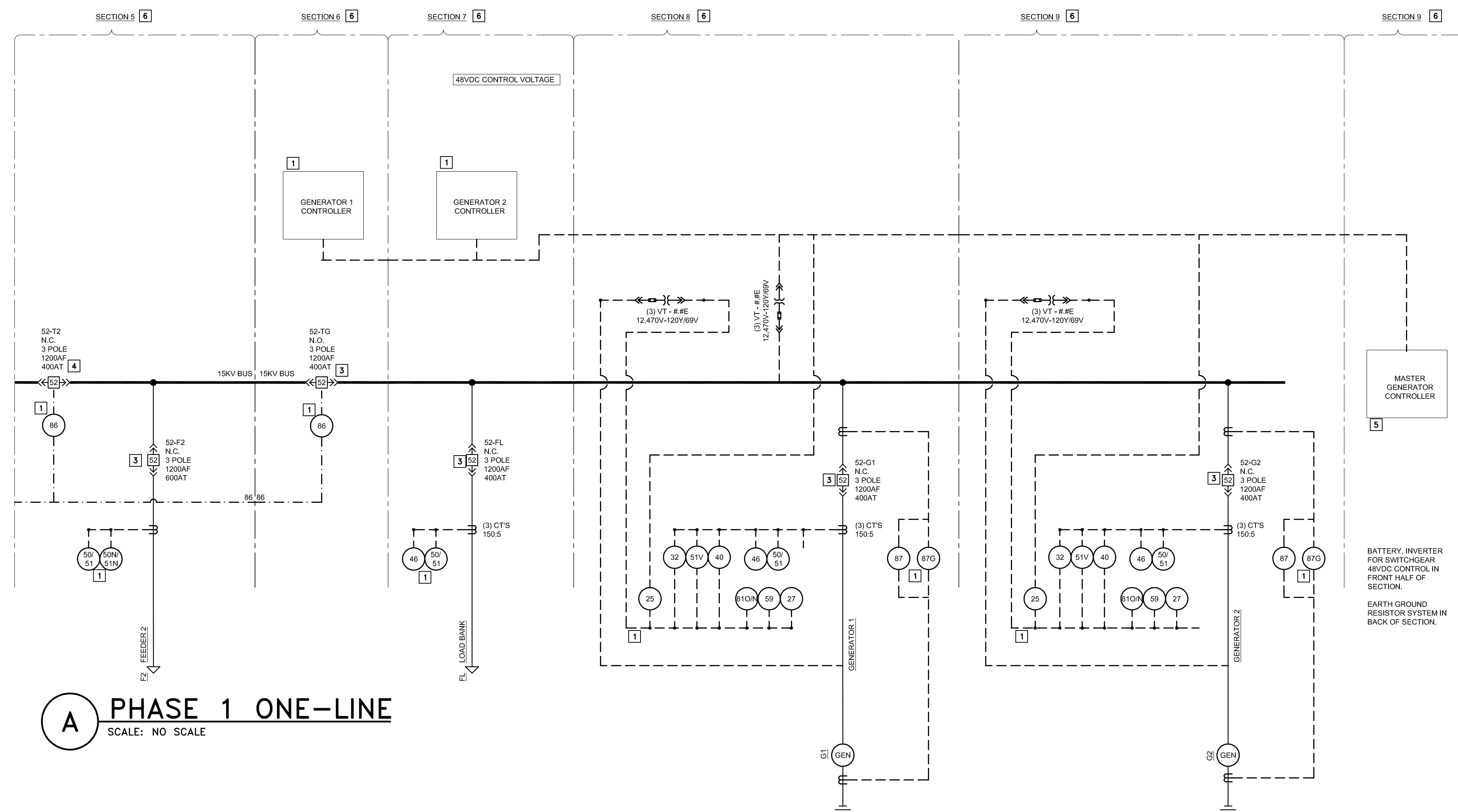
CAD DWG FILE: E-61
DRAWN BY: LB
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DESIGNED BY: TLK

SHEET TITLE:
PHASE 1: MV
ONE-LINE AND
ELEVATION

SHEET NUMBER:

E-61

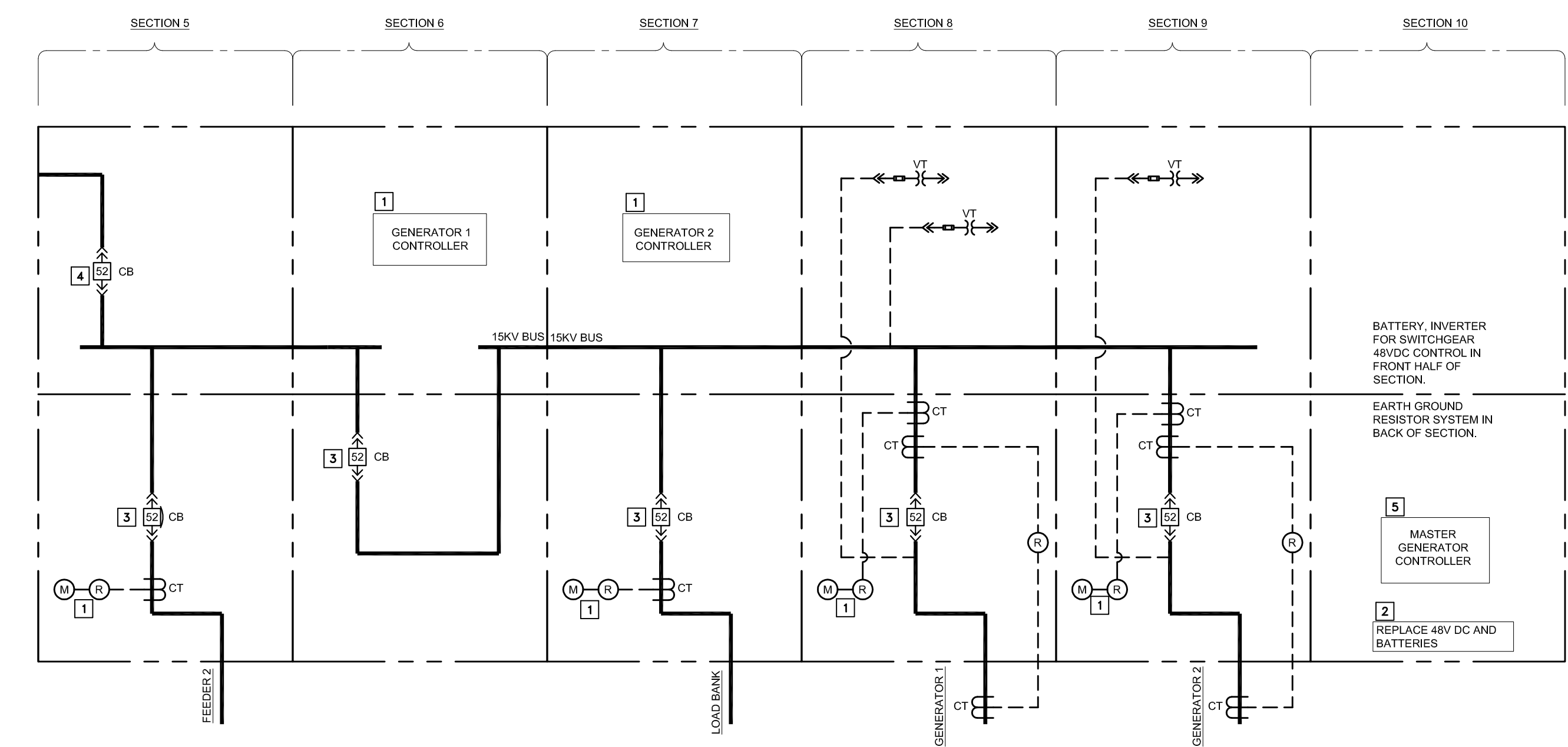
07 OF 08 SHEETS
05/24/2024



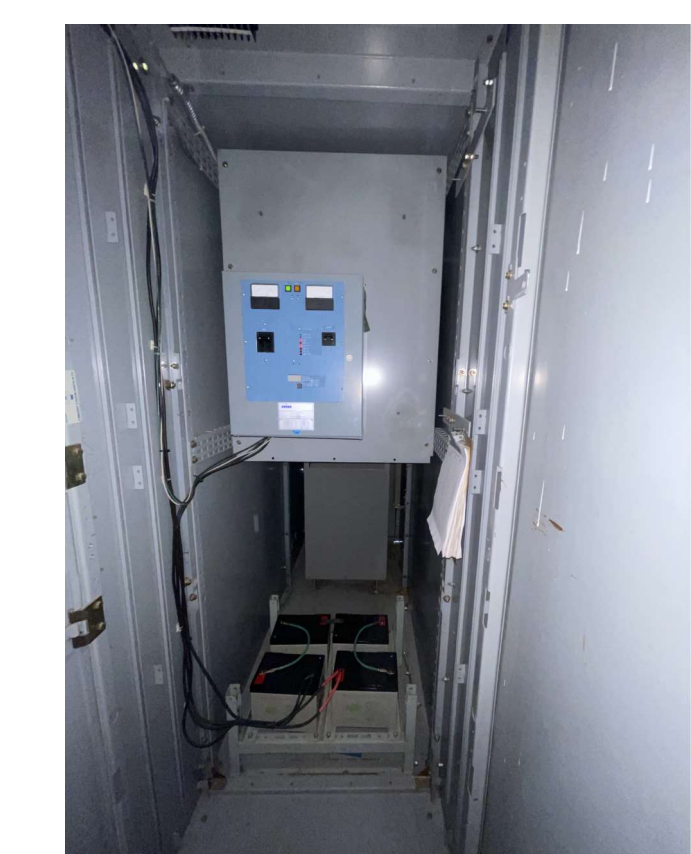
A PHASE 1 ONE-LINE
SCALE: NO SCALE

- RIGHT SIDE - PHASE 1:**
1. PROVIDE TEMP 48VDC TO LEFT SIDE.
 2. REMOVE DEMO BUS SECTION. REMOVE ADJACENT BUS TO ALLOW FOR REMOVAL OF BUS IN THE SECTION.
 3. PROVIDE NEW BUS SECTION FOR A TIE-TIE CONFIGURATION.
 4. DEMO EXISTING 48V DC RECTIFIER AND BATTERIES.
 5. PROVIDE MASTER GENERATOR CONTROLLER.
 6. NEW 48V DC RECTIFIER AND BATTERIES.
 7. REPLACE RELAY, RELAY CONTROL WIRE, AND CIRCUIT BREAKERS.

- KEYED NOTES:**
1. REPLACE EXISTING RELAY CTs, AND RELAY CONTROL WIRING.
 2. REPLACE 48V DC AND BATTERIES.
 3. REPLACE EXISTING DRAW OUT BREAKER.
 4. REPLACE SECTION TO ALLOW FOR A TIE-TIE CONFIGURATION.
 5. PROVIDE NEW MASTER GENERATOR PLC CONTROLLER IN SECTION 10. PROVIDE NEW BATTERY AND INVERTER TO SECTION 10 (SEE DRAWING B ON THIS SHEET).
 6. PROVIDE NEW FRONT DOORS FOR BOTTOM AND TOP COMPARTMENT.



B PHASE 1 DIAGRAM
SCALE: NO SCALE



END SECTION TO BE MODIFIED FOR GENERATOR MASTER CONTROLLER



Date: 05-24-2024
Exp. Date: 12-31-2025



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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES
MANAGEMENT,
DESIGN AND CONSTRUCTION

DEPARTMENT OF
CORRECTIONS

REPLACE SWITCHGEAR,
POWER PLANT
& MAINTENANCE BUILDING

EASTERN R&D
CORRECTIONAL CENTER
2727 HIGHWAY K,
BONNE TERRE, MO 63628

PROJECT # C2330-01
SITE # 7021
FACILITY # 9327021024

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____

ISSUE DATE: 05/24/2024

CAD DWG FILE: E-62
DRAWN BY: LB
CHECKED BY: GF
DESIGNED BY: TLK

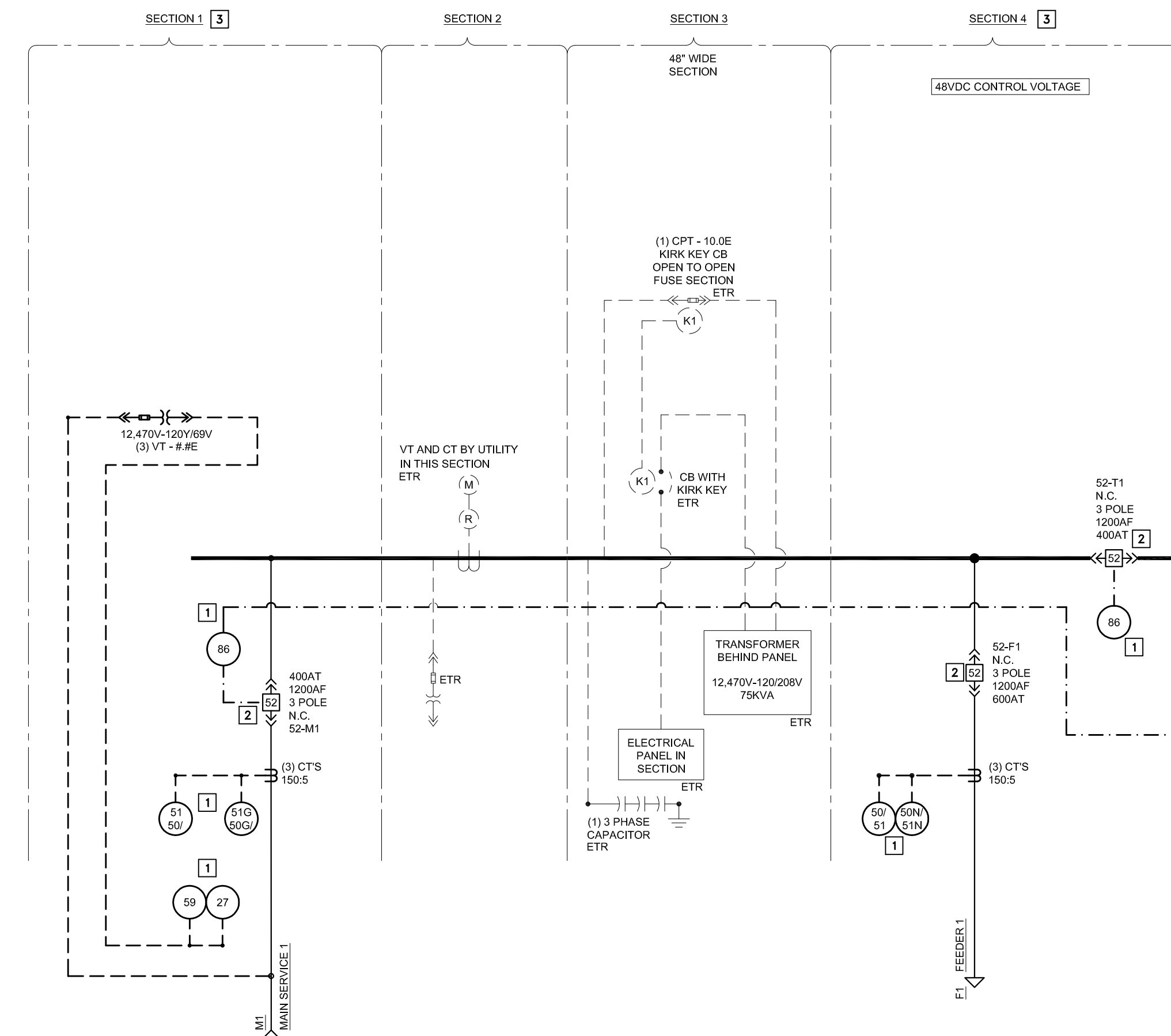
SHEET TITLE:

PHASE 2: MV
ONE-LINE AND
ELEVATION

SHEET NUMBER:

E-62

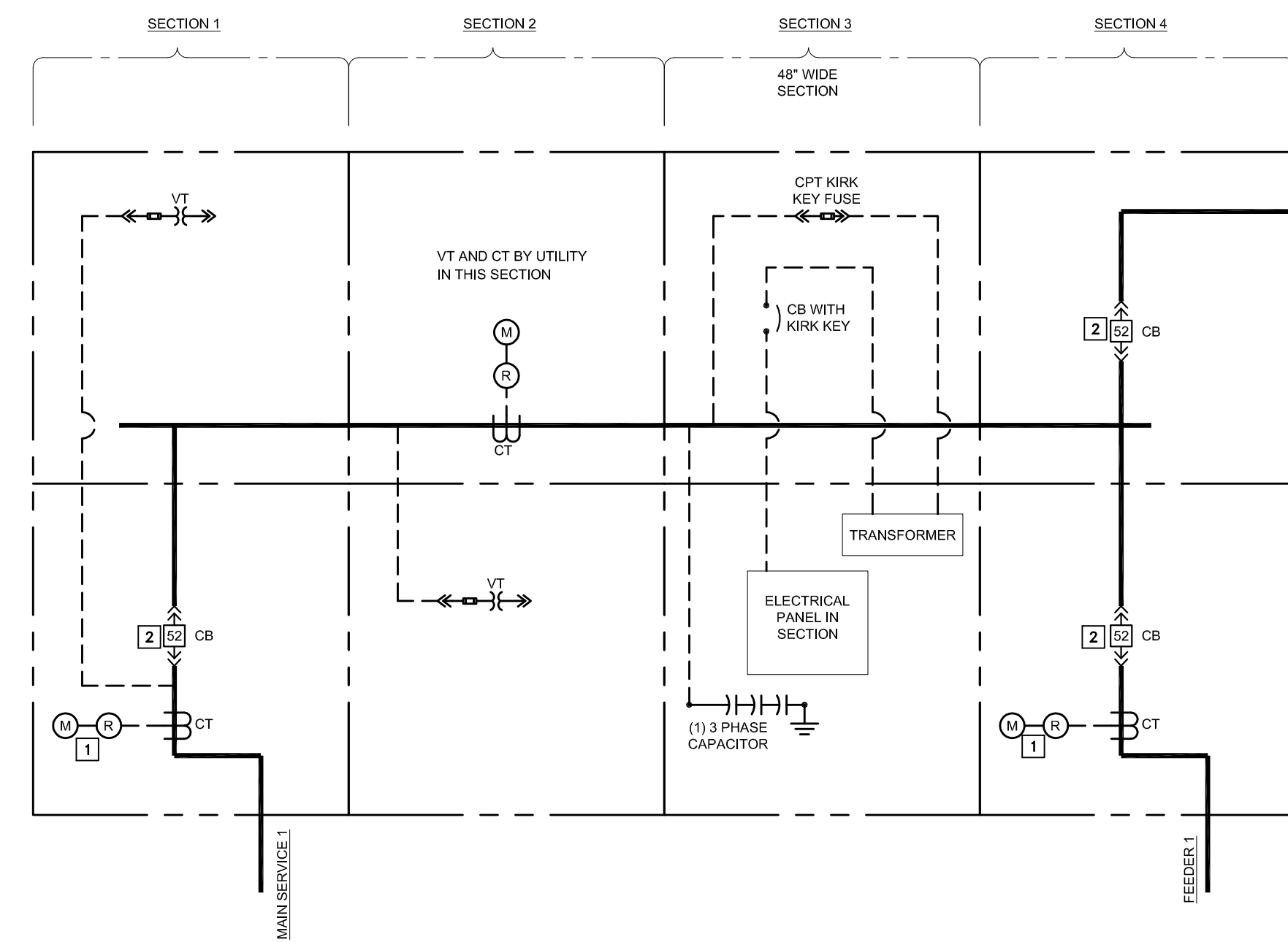
08 OF 08 SHEETS
05/24/2024



A PHASE 2: ONE-LINE
SCALE: NO SCALE

LEFT SIDE - PHASE 2:
1. PROVIDE TEMPORARY 120V AC TO 48VDC RECTIFIER.
2. REPLACE RELAYS AND CIRCUIT BREAKER.
3. REMOVE TEMPORARY RECTIFIER.

KEYED NOTES:
1. REPLACE EXISTING RELAY AND RELAY CONTROL WIRING.
2. REPLACE EXISTING DRAW OUT BREAKER.
3. PROVIDE NEW FRONT DOORS FOR BOTTOM AND TOP COMPARTMENT.



B PHASE 2: DIAGRAM
SCALE: NO SCALE