CHAPTER 11

OF THE

SERVICE INSTALLATION MANUAL

(GREEN BOOK)

2021 REVISION

Editor: Shaji T Kurian

SECTION 11

PRIMARY SERVICE INSTALLATIONS

PRIMARY METERED PRIMARY, SECONDARY METERED PRIMARY AND INDUSTRIAL SUBSTATION INSTALLATIONS

A. General

1. Purpose

The following instructions and specifications are intended to set forth the general practices and procedures to be followed in connection with customer primary and high voltage installations. These instructions define the areas in which assistance may be given to a primary customer to coordinate the customer's and DTE Electric systems, to increase the operating safety of high voltage equipment.

2. Definition of Primary Installation

A primary customer is one who takes service directly from DTE Electric primary lines (4800V and above) through primary facilities located on customer premises. The character and arrangement of these facilities vary according to the location of the customer, the size and type of load, and the number of lines from DTE Electric system. The facilities that must be provided by the customer could include any or all the following elements:

(a) DTE Primary service connections to overhead or underground lines.

(b) Primary circuit breakers or fused loadbreak interrupters.

(c) Primary step-down transformers, motors, and other primary equipment.

(d) Primary meter compartment to house DTE Electric revenue instrument transformers.

These facilities on the customer's premises, including all associated DTE and customer owned equipment and parts involved in maintaining primary service up to the point of direct utilization or transformation, make up what is known as the *Primary Installation*.

3. Definition of High Voltage Industrial Substation

In addition to the Primary Installation, there may be a DTE or customer owned high voltage substation (Class "I") on the customer's premises to reduce the utility service voltage to the customer's utilization voltage. The high voltage substation and the high voltage lines feeding the substation are not considered part of the Primary Installation and are treated separately in these instructions.

B. General Policy

Customer is solely responsible for its practices, personnel, contractors, services and equipment. DTE's requirements, recommendations, inspections, and/or approvals referenced herein shall in no way relieve customer of its responsibilities or liability for its equipment, services, personnel, practices or contractors. Customer and DTE agree that DTE is in no way liable for any of customer's work, installation, services, or equipment or the maintenance thereof. Customer is responsible for ensuring that its equipment, practices, services, and installation meets all applicable federal, state, local, and industry standards, laws and regulations.

1. Customer Responsibilities

The customer will design, build, own, and maintain the complete Primary Installation except line breakers or any switchgear that is part of the DTE system. Generally, DTE will design, build, own, operate, and maintain any associated high voltage substation and high voltage lines feeding the substation except for those customers taking service under the Alternative Primary Supply Rate. Customer installations shall not affect the reliability of service furnished to other customers. The general policy is as follows:

(a) Primary Installations:

(1) The customer's electrical system and its installation shall conform to the latest version of the National Electrical Code (NEC), IEEE National Electric Safety Code (NESC), local municipal codes, and DTE's requirements.

(2) **New installations:** The customer will design, build, own, operate, and maintain the complete Primary Installation. DTE will furnish, own, and maintain such revenue metering. It is a requirement for the customer that Arc Flash and approach distances calculations are performed for equipment before it is commissioned. The Arc Flash and Distances Values will be posted/labeled on the front of equipment. Maintenance of primary switchgear by the customer will be in accordance with the recommendations of the switchgear manufacturer.

(3) **Existing installations:** The adequate short circuit current interrupting capability of the primary switchgear is the customer's responsibility.

(4) **Primary fuses:** Primary fuses will be owned and maintained by DTE if located on a DTE owned pole or primary switch cabinet; otherwise, they will be owned and maintained by the customer.

(b) Generation Facilities

The general policy and requirements for the interconnection of generation on the DTE system are contained in the **'Electric Utility Interconnection & Net Metering'**, which can be found on the MPSC (Michigan Public Service Commission) or DTE Energy websites Interconnection Process | DTE Energy.

Any generator or regenerative source (e.g. fuel cell, wind turbine or dynamometer) that operates in parallel with DTE's electrical system must adhere to these guidelines. The primary installation requirements contained in this chapter also apply. No generation facility shall be allowed to connect to the DTE system until all requirements are met and final installation approval is granted by DTE Primary Services.

2. Company Responsibilities

The DTE Account Manager is responsible for all negotiations with the Primary Customer pertaining to high voltage and primary installations on customer premises. DTE Primary Services will follow matters of design, acceptance, inspection, and testing, as well as customer operation and maintenance of the installation. The DTE Account Manager will see that the designated parties properly carry out all steps in these instructions in accordance with the prescribed procedure.

C. Primary Installations

1. Design

The general design of a new Primary Installation is to be coordinated by DTE Primary Services and the customer's representatives. Contract drawings and specifications covering customer substation installation, including service entrance switchgear shall be submitted to DTE for review and approval prior to their release for contractual bidding. These also include one-line, three-line diagram, plan details of switchgear installation, and grounding system. Detailed equipment shops drawings (one-line, three-line, control schematic & wiring) are to be furnished by the manufacturer (IEEE device numbers should be used) and submitted to DTE for review and approval prior to the construction. DTE Primary Services will approve the design and installation of any private overhead or underground line that is extended from the DTE point of service to the main primary equipment. All drawings and designs are to be approved through DTE Primary Services.

2. Equipment

The size and class of primary switchgear or fused loadbreak interrupters and the characteristics of the primary fuses are to be specified by DTE Primary Services. In the interest of safety and service continuity to the customer, the equipment furnished must be acceptable to DTE. Relays, fuses, and control equipment will be designed so that their operation is coordinated with that of the protective equipment on the DTE system. This is subject to approval by the DTE System Protection and Automation group. DTE requires control scheme interlocks to be hard wired breaker contacts. A ground detection scheme must be installed when connecting to the 4.8kV underground delta system. Provision will be made for DTE Hazardous Energy Control (HEC) points subject to DTE Primary Services approval.

3. Supervision

DTE Primary Services group will follow the construction of all Primary Installations to see that all details are in accordance with the approved drawings, and all DTE requirements and specifications.

4. Inspection

Before the installation is placed in commission, DTE Primary Services will determine that the unmetered overhead and underground lines on the customer’s premises are completed and ready to be energized. Until the lines are ready to be energized, the rules and procedures established for lines in the out-of-commission state must be observed.

DTE Primary Services will inspect the primary switchgear, metered overhead and underground lines, transformers, and generator before they are energized.

5. Connecting Service

When the installation has been accepted for connection, DTE Primary Services will notify the customer that the installation is to be energized and will request the System Supervisor or the Lines Department to make the connection to the DTE system. The operation of the installation is the customer's responsibility. DTE Primary Services may be available, in an advisory capacity, to inform the customer as to the operation and maintenance of the equipment.

6. Periodic Maintenance

The maintenance of customer-owned switchgear and control equipment is the customer's responsibility. Primary Services will ask the customer to set up a maintenance schedule based on recommendations of the equipment manufacturer. In addition, where a customer-owned breaker or loadbreak switch is the separation point between the customer's equipment and the DTE system, Primary Services will require the customer to provide proper maintenance of the breaker or loadbreak switch.

The DTE Maintenance Organization will carry out the maintenance of DTE owned switchgear and control equipment. This maintenance will be performed at the request of Primary Services.

7. Testing

Automatic throw over equipment shall be tested according to the following schedule:

(a) Customer-Owned: Primary Services recommends that the customer operate the primary or secondary throw over equipment once a year unless it has operated automatically during that period. Certain types of loads such as hospitals may require more frequent testing.

(b) DTE-Owned: All Company-owned throw over equipment will be maintained and operated by DTE.

(c) Loop Power Lines: DTE Relay Test will test the operation of loop power line breakers, pilot cables, and control equipment. The DTE Maintenance Organization will perform maintenance of loop power line breakers.

D. High Voltage Substations (DTE-Owned)

1. New Installations

(a) Construction Coordination: The Account Manager and Primary Services will coordinate the arrangements between the customer and DTE for the installation of the high voltage lines feeding the substation and for the termination of the customer-owned lines in the substation.

(b) DTE and Customer Responsibilities: The high voltage substation (DTE-owned) serving one customer and located on customer premises is to be designed, built, owned, operated, and maintained by DTE. The customer must lease or provide an easement for the substation site to DTE and provide access to the site for DTE employees and equipment.

The customer must also provide rights-of-way across their property for the lines feeding the substation. If these are overhead lines, DTE will install, own, and maintain them. If underground construction is used, the customer will do all trenching and install, own, and maintain all conduit and manholes on their property to the substation site. DTE will install, own, and maintain the cables to feed the substation. The customer conduit/manhole must meet all DTE requirements.

The customer will install, own, and maintain the conductors from the secondary make-up bus (DTE-owned interconnection point) of the substation to their Primary Installation (Service Point). At the customer's expense, DTE will provide and install all conduit, racks, or supports required for these conductors within the substation site. The secondary conductors from the interconnection point to the Service Point fall under NESC jurisdiction. The customer's Primary Installation falls under NEC jurisdiction.

(c) Minimum Design Requirements: The customer shall meet the following design requirements for DTE-owned High Voltage Substations:

- **i.** Secondary Main Breaker
- **ii.** Current Transformers (CTs) on load side of secondary main breaker for DTE transformer differential protection. Minimum accuracy class of C400 (consult with DTE Primary Services for CT ratio)
- **iii.** Load shed provisions may be required – 'Trip and Lock Out' secondary main breaker (consult with DTE Primary Services)

(d) Energizing: When the substation has been given final approval by System Engineering, DTE Primary Services will notify the customer and, at the same time, make certain that energizing the equipment up to the primary breaker or equivalent will not cause a hazard on any part of the installation. When all safety precautions have been attended to, DTE Primary Services will request the System Supervisor to have the substation energized.

2. Existing Installations

Maintenance: DTE will maintain at its expense all overhead lines and all underground cables on the customer's property feeding the high voltage substation. The customer will maintain the conduit and manhole system for the underground cables.

E. High Voltage Substations (Customer-Owned)

Some high voltage substations are customer-owned to meet the requirement of certain rate applications:

1. Bulk Power Supply.

Customers will own the supply lines and high voltage substations on their premises. The design, supervision, testing, and operation shall be as described in paragraphs 1 through 7 beginning on page 11-1-3.

2. New Installations.

(a) Construction Coordination. The design of customer-owned high voltage substations shall be as described in paragraphs 1 and 2 under *C. Primary Installations*. The DTE Account Manager and DTE Primary Services shall coordinate the arrangements between the customer and DTE for the installation of the high voltage lines feeding the substation.

(b) Customer and DTE Responsibilities. The customer must provide right-of-way across their property for the lines feeding the substation. If these are overhead lines, the customer will install, own, and maintain them. If underground construction is used, the customer will do all trenching and install, own, and maintain all conduit and manholes on their property. The customer will install, own, and maintain the cables to feed the substation.

(c) Supervision. DTE Primary Services shall follow the construction of the substation to see that all details are in accordance with the approved drawings and that the workmanship is according to acceptable standards.

(d) Inspection. DTE Electric shall make only such inspections, as it deems necessary for the protection & safety of other customers and the public. Additional tests may be requested by DTE Primary Services.

(e) Service Connection.

When the installation has been approved for connection, DTE Primary Services will request the DTE System Supervisor to have the substation energized. The same precautions regarding hazards taken with DTE owned substations shall be observed. The operation and maintenance of the installation is the customer's responsibility. DTE Primary Services may be available, in an advisory capacity, to inform the customer as to the operation and maintenance of the equipment.

F. Primary Installations Built for 13.2 kV

All new primary installations are to be built for 13.2 kV operations, even though the installation may be operated initially at 4.8 kV or 8.32 kV. A letter from the Assigned Account Manager must confirm any exception to this policy.

Any questions pertaining to the above or other primary metered installations should be directed to the DTE Primary Services Group at 313.235.6471.

PRIMARY SERVICE CABLE INSTALLATION TO DTE CABLE POLE OR MANHOLE

Contractors are not allowed to work on DTE equipment; this includes but is not limited to, cable poles, switch cabinets, separable connection cabinets, and multiple feeder cabinets. Contractors are not allowed to enter a DTE manhole without DTE Underground Lines as an escort.

A DTE representative must designate location of cable and duct. The customer is responsible for all conduits to the pole and the 90 degree sweep at the pole. The duct should be 4" minimum.

The following is the procedure that must be adhered when installing customer-furnished primary service cable.

1. Installation of Cable on Cable Pole.

(a) Cable Pole in Energized Lead or Public Thoroughfare.

The contractor will install the cable to the pole and leave enough cable to reach the top of the fuse carriers plus 2 feet. The cable end shall be left in a minimum of 3-foot diameter coil at the base of the pole and must be protected from damage. DTE Underground Lines Crew will furnish and install the U-guard and necessary terminations on the cable pole.

(b) Private Cable Pole on Private Property without Energized Conductors.

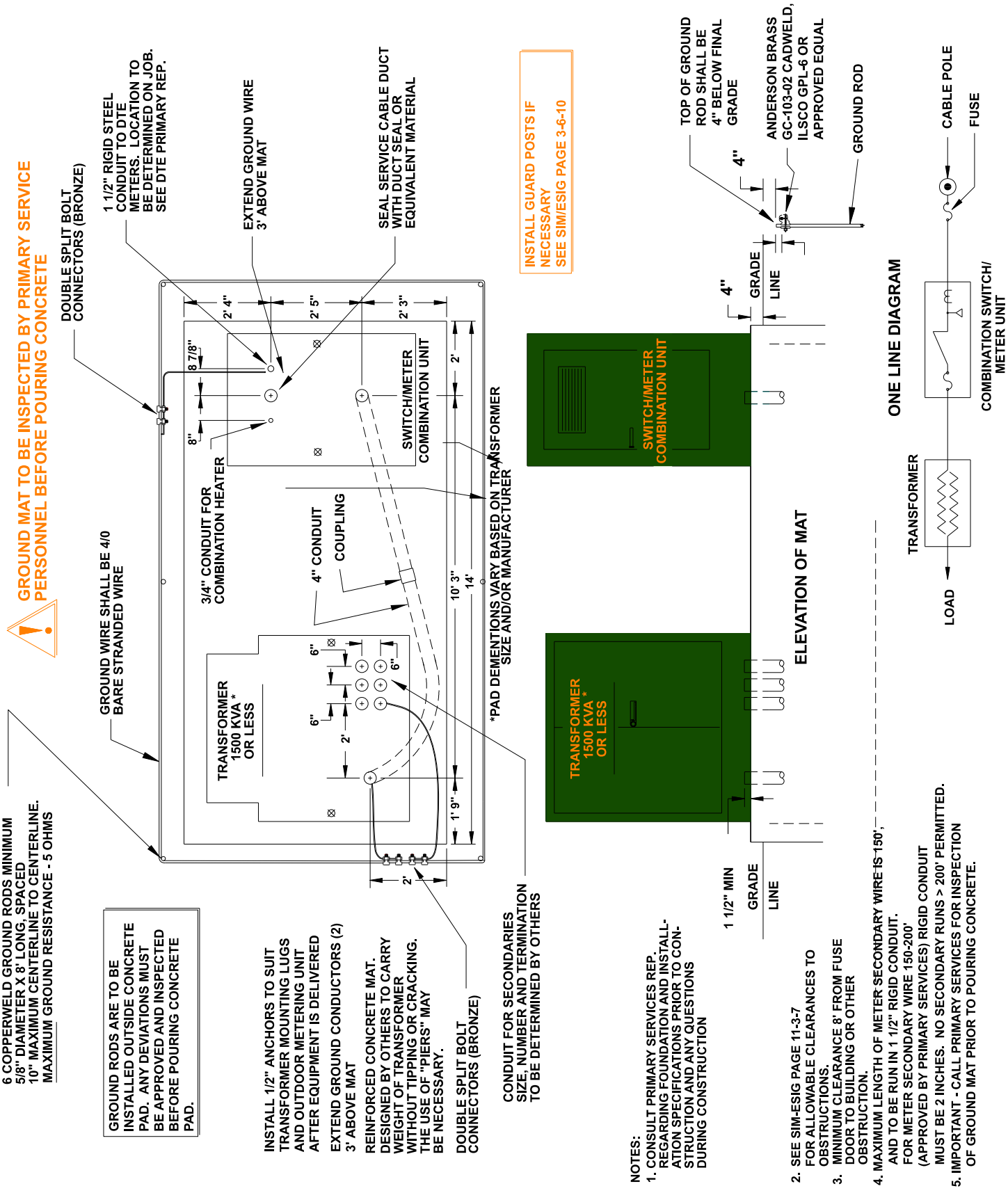
The contractor will install the cable to the pole and furnish and install the U-guard and necessary terminations on the cable pole.

2. Installation of Cable in a DTE Manhole

(a) Responsibilities. The DTE Crew will rig the DTE manhole and the contractor will pull cable between that manhole and the first private manhole or vault. The contractor will furnish all reels, jacks, lines, cable grips, and all labor and equipment necessary to pull the cable. The contractor will cut the cable off reels and the DTE Crew will train the cable in the DTE manhole. The DTE Crew will furnish labor and material for splicing. A steel pulling line will be permitted for pulling cable between manholes. Cable ends should be sealed before installation. The DTE Crew will reseal the ends in the DTE manhole if necessary.

(b) Scheduling. DTE Primary Services will schedule the pulling and terminating of the cable with the contractor and the DTE Underground Line Crew for primary metered installations. ***Minimum of eleven working days should be allowed for crew scheduling and the contractor should be ready on the scheduled date. When ITC is involved minimum 20 working days will be the requirement.***

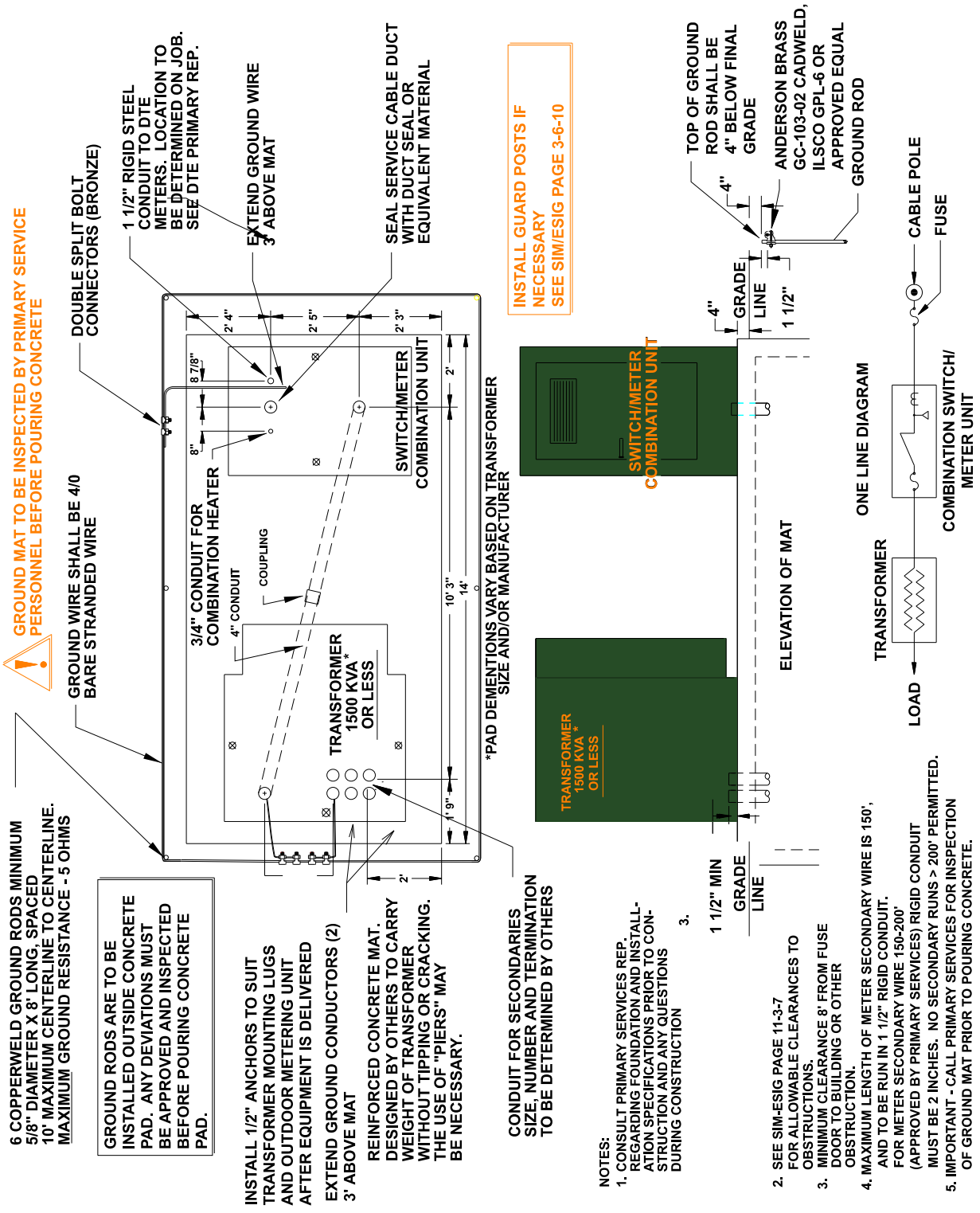
OUTDOOR PRIMARY COMBINATION UNIT & PAD MOUNTED TRANSFORMER
FOR USE WITH TRANSFORMERS OF 1500 KVA OR LESS
EXAMPLE 1



DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

OUTDOOR PRIMARY COMBINATION UNIT & PAD MOUNTED TRANSFORMER FOR USE WITH TRANSFORMERS OF 1500 KVA OR LESS

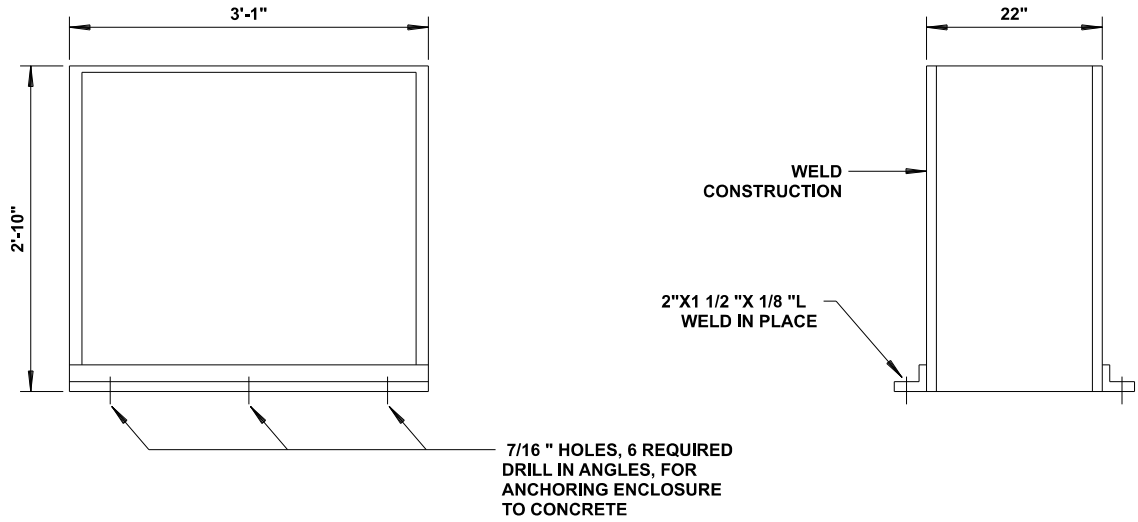
EXAMPLE 2



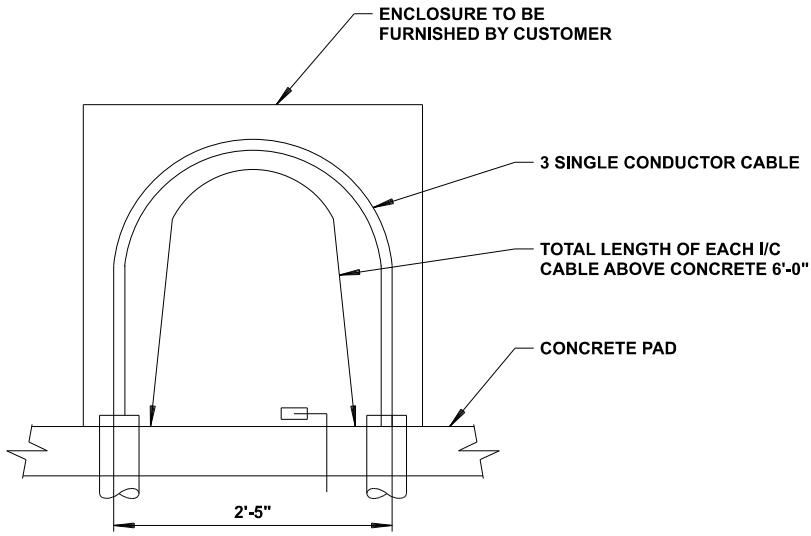
DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

OUTDOOR PRIMARY CABLE ENCLOSURE

FOR USE ON SECONDARY METERED PADMOUNT SERVICE
(SECONDARY INSTALLATION PREPPED FOR FUTURE PRIMARY INSTALLATION)



ENCLOSURE TO BE CONSTRUCTED OF 11-GA SHEET STEEL

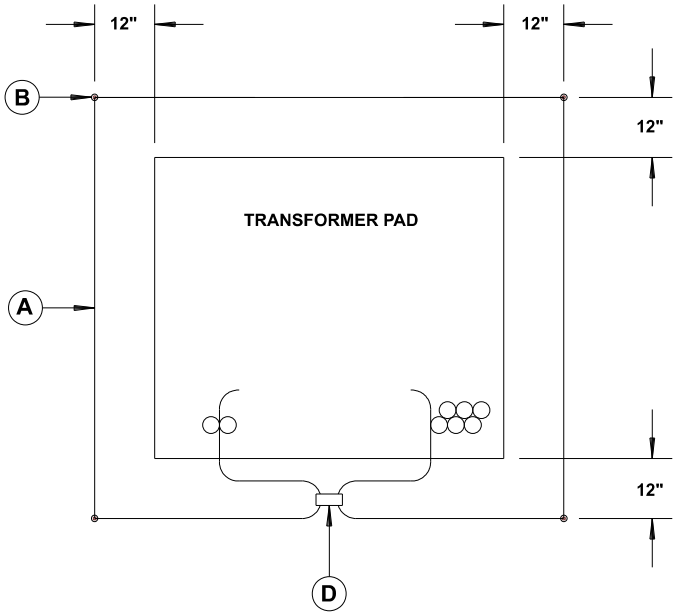


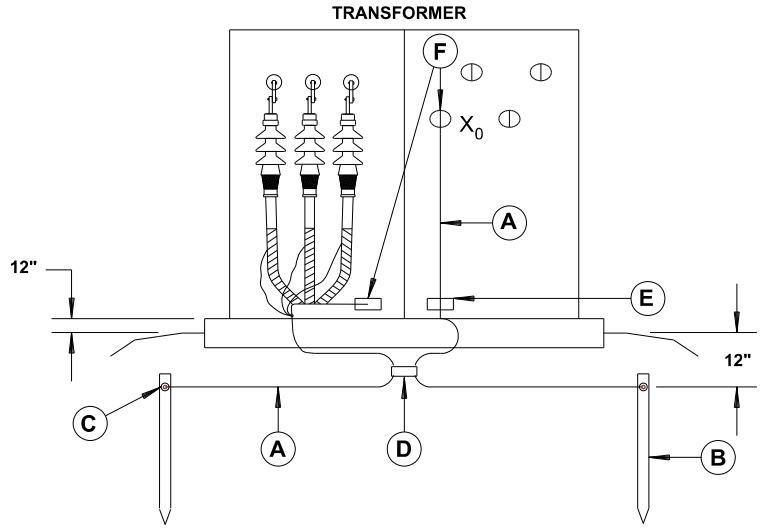
ELEVATION

NOTE:

1. TO BE USED IN LIEU OF PRIMARY METERING UNIT.
   (SEE PAGE 11-3-1,-2)
2. GROUND MAT TO BE INSPECTED BY PRIMARY SERVICES PERSONNEL PRIOR TO POURING CEMENT.
   4/0 BARE COPPER GROUND RISER TO BE CONNECTED TO ENCLOSURE.
3. ENCLOSURE MUST BE GROUNDED TO TESTED GROUND MAT
4. HIGH VOLTAGE SIGNS ON TWO SIDES OF ENCLOSURE

GROUNDING SPECIFICATION
CUSTOMER OWNED TRANSFORMER INSTALLATION





BILL OF MATERIAL:

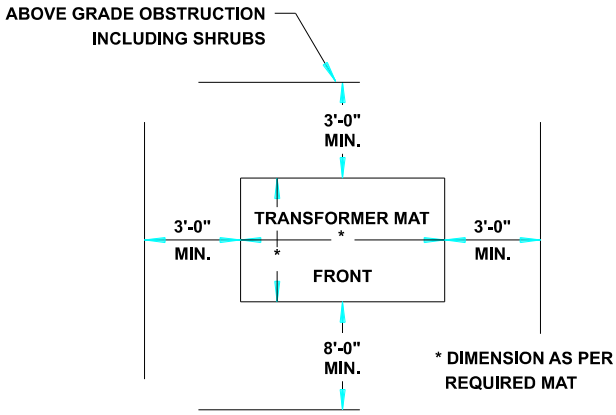
- (A) 4/0 7-STRAND HARD DRAWN COPPER CONDUCTOR
- (B) 5/8"x10' COPPER-CLAD GROUND ROD. GALVANIZED RODS UNACCEPTABLE
  (QTY 3, 5/8"x4' COPPER-CLAD GROUND RODS COUPLED WITH
  "DENMARK-5/8" CONNECTORS ACCEPTABLE AS SINGLE GROUND ROD)
- (C) ANDERSON CATALOG NO. GC-103-02 CONNECTOR
  (CADWELD ACCEPTED AS ALTERNATIVE)
- (D) ANDERSON CATALOG NO. K-3 CONNECTOR
  (4/0 BRONZE SPLIT BOLT ACCEPTABLE)
- (E) ANDERSON CATALOG NO. GTCS-41 TRANSFORMER TANK CONNECTOR
- (F) 4/0 2-HOLE COPPER COMPRESSION LUG
  (ANDERSON VHCL-4/0-12BN, OR BURNDY EQUIVALENT)
  SET SCREW LUGS UNACCEPTABLE

NOTES:

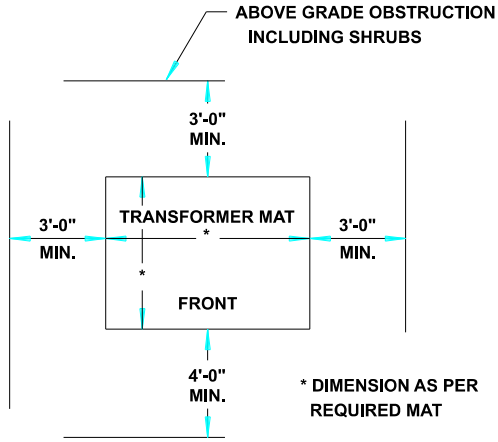
1. GROUNDING CONDUCTOR TO BE ENTIRELY CONTINUOUS.
2. CONDUCTOR TO FEED THROUGH ITEM (E).
3. TRANSFORMER GROUND STRAP TO REMAIN.
4. GROUND MAT TO MEGGER 5 OHMS OR LESS.
5. PRIMARY SERVICE REPRESENTATIVE TO INSPECT FINISHED MAT PRIOR TO BURIAL.

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

CUSTOMER OWNED
PADMOUNT TRANSFORMER OR SWITCH CABINET
MINIMUM CLEARANCE REQUIREMENTS

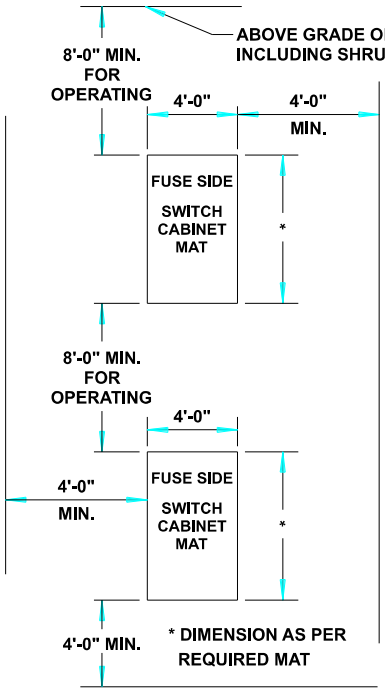


DEAD FRONT TRANSFORMER



LIVE FRONT TRANSFORMER

* DIMENSION AS PER
REQUIRED MAT



EXAMPLE A

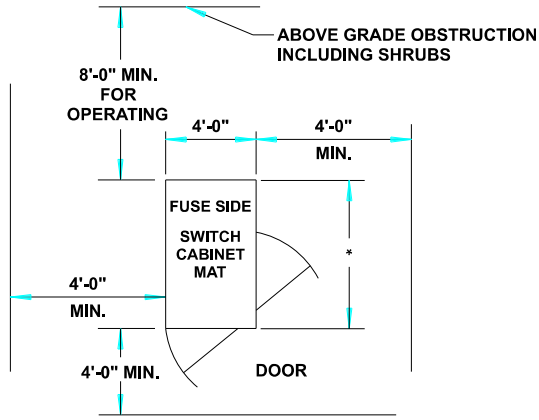
NOTE:
FOR SIDE CLEARANCES
(OTHER THAN OPERATING)
SEE NEC 110-34a

CLEARANCES

A VERTICAL CLEARANCE OF 8' IS REQUIRED FROM THE TOP OF THE TRANSFORMER OR SWITCH CABINET TO ANY OVER-HANG.

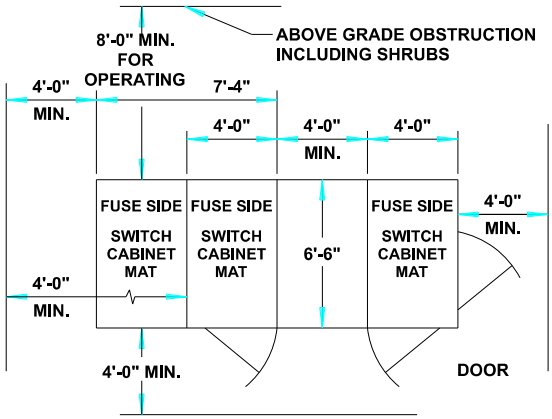
FENCE OR WALL AROUND TRANSFORMER MUST HAVE 8'-0" MIN. GATE OR LIFT-OFF SECTION FOR CHANGEOUT.

SEE NATIONAL ELECTRIC CODE 110-34a.

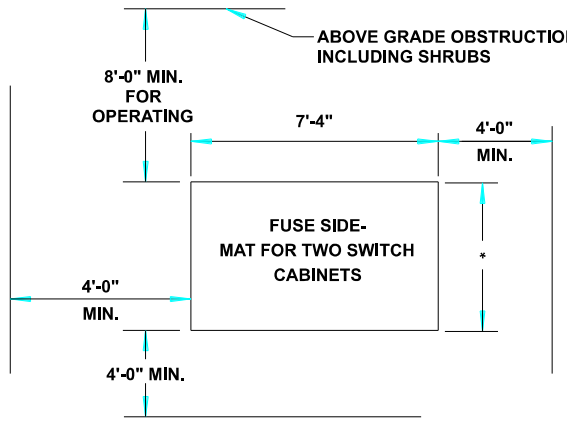


EXAMPLE B

* DIMENSION AS PER
REQUIRED MAT



EXAMPLE C



EXAMPLE D

* DIMENSION AS PER
REQUIRED MAT

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

LOCATION OF PRIMARY METERING EQUIPMENT

1. Meters

Meters should be located at the main incoming switchgear (which may be indoors or outdoors). This location shall be clean and reasonably secure from damage, and not subject to shock or vibration. Meters shall be readily accessible for reading, testing, and maintenance. A five (5) foot clearance should be maintained in front of the meters

When meters are located on balconies, mezzanines, or other floor levels, **a permanent OSHA approved stairway shall be provided for access.**

The meters shall be located as close as practical to the metering transformers, but not to exceed 150 feet. If it is necessary to exceed 150 feet, approval by DTE Primary Services will be necessary prior to the start of construction. DTE Primary Services will consult Meter Engineering for recommendations.

2. Meter Box

The meter box shall be supplied, installed & wired by the customer's contractor. See 11-4-4, 11-4-5 & 11-4-6 for mounting and 11-4-10B & 11-4-12B for wiring. Manufacturer's catalog numbers are listed in Sec. 11-4-1A.

3. Instrument Transformers

Primary current and voltage metering transformers are furnished by DTE and installed/wired by the customer's contractor on primary metering installations.

4. Wire

DTE provides the wire (9-conductor #12) between the revenue metering instrument transformers and the meter box. DTE Also provides the potential transformer primary wire. The customer's contractor pulls and wires the metering per DTE Specifications, reference section 11-4-10B & 11-4-12B.

5. Outdoor Meter House

The meter(s) may be in an outdoor meter house. See DTE Primary Services Representative for location and DTE specifications.

METER BOX MANUFACTURER'S CATALOG NUMBERS

Meter boxes should be obtained from local supply houses using the manufacturer's catolog numbers listed below:

ZS3-20 METER BOX (3-PHASE, 4-WIRE) – WYE SYSTEMS

Example: 480V, 8.3kV, 13.2 kV, 24 kV & 40 kV

Eaton	1007003CCH
Durham	1007003B
Square-D	1007003C
Midwest Electric Products	1007003B-MEP
Milbank	UC6473-0-21
Meter Devices	602-3010A13-588

ZS3-20-5S METER BOX (3-PHASE, 3-WIRE) – DELTA SYSTEM

Example: 4.8 kV

Eaton	1007361CCH
Durham	1007361B
Square-D	1007361C
Midwest Electric Products	1007361B-MEP
Milbank	UC6472-0-21
Meter Devices	602-3010A8-589

AC-10 AUXILIARY CONTACT ENCLOSURE

Cutler-Hammer	1006630A-CH
Durham	1006630A
Square-D	1006630A-SQD
Midwest Electric Products	1006630A-MEP

FUSING OF DTE METERING VOLTAGE TRANSFORMERS

Fusing of DTE metering voltage transformers must be a consideration when designing the revenue-metering cubicle.

To protect the integrity and safeguard personnel and equipment, fusing of DTE revenue metering voltage transformers at Primary Customers is required if any one of the following criteria is met:

1. All industrial substations

2. Services from transmission or subtransmission lines (includes 24 kV and above).

3. Where present or immediate future fault currents are:

7,000 amperes at 13.2 kV

10,000 amperes at 4.8 kV

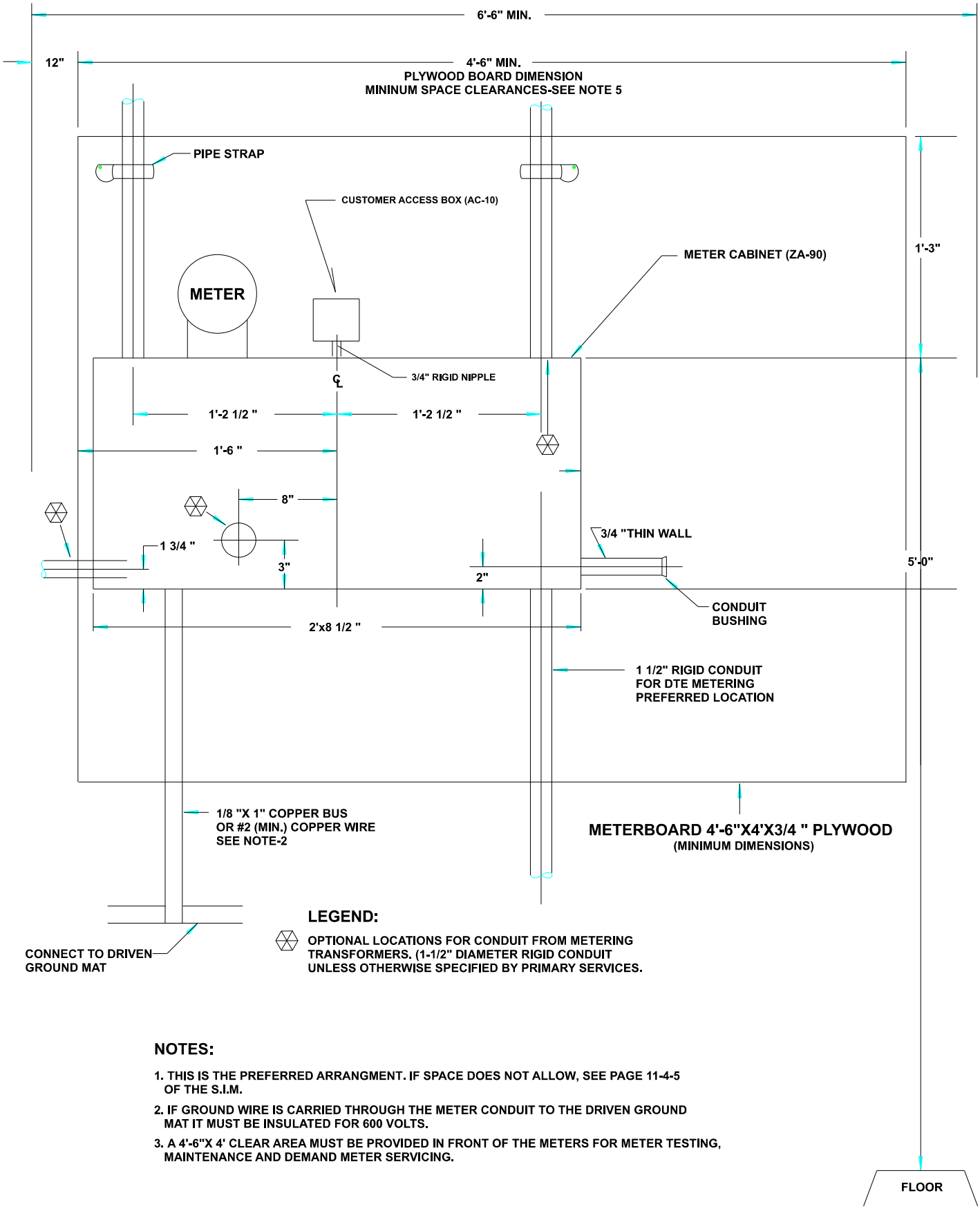
4. All underground T-tap power lines.

All fuses shall be: G.E. Type EJ-1,15kv class, Size 2E.

The customer will furnish and install the metering cubicle, including fuse carriers and fuse. Fuses shall not be mounted directly on the voltage transformers. Three space fuses are required per position.

Contact the DTE Primary Services Representative to determine whether the above conditions are present at a site-specific location.

LAYOUT 1
PRIMARY METERING BOX TYPE ZA-90
(FOR MAINTENANCE PURPOSES ONLY)
SINGLE LINE



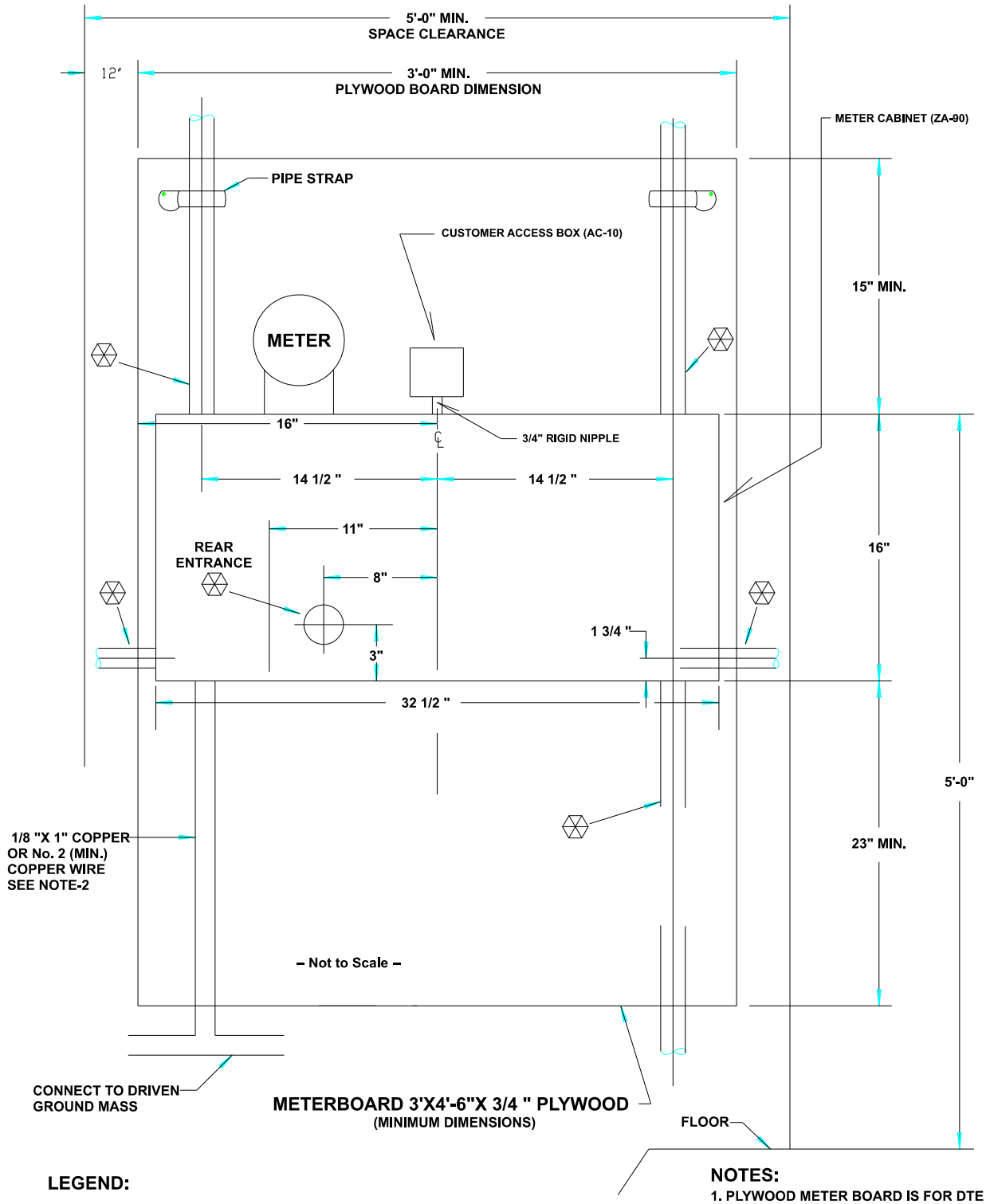
LEGEND:

OPTIONAL LOCATIONS FOR CONDUIT FROM METERING TRANSFORMERS. (1-1/2" DIAMETER RIGID CONDUIT UNLESS OTHERWISE SPECIFIED BY PRIMARY SERVICES.

NOTES:

1. THIS IS THE PREFERRED ARRANGMENT. IF SPACE DOES NOT ALLOW, SEE PAGE 11-4-5 OF THE S.I.M.
2. IF GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE DRIVEN GROUND MAT IT MUST BE INSULATED FOR 600 VOLTS.
3. A 4'-6"X 4' CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METERS FOR METER TESTING, MAINTENANCE AND DEMAND METER SERVICING.

LAYOUT 2
PRIMARY METERING BOX TYPE ZA-90
(FOR MAINTENANCE PURPOSES ONLY)
SINGLE LINE



LEGEND:

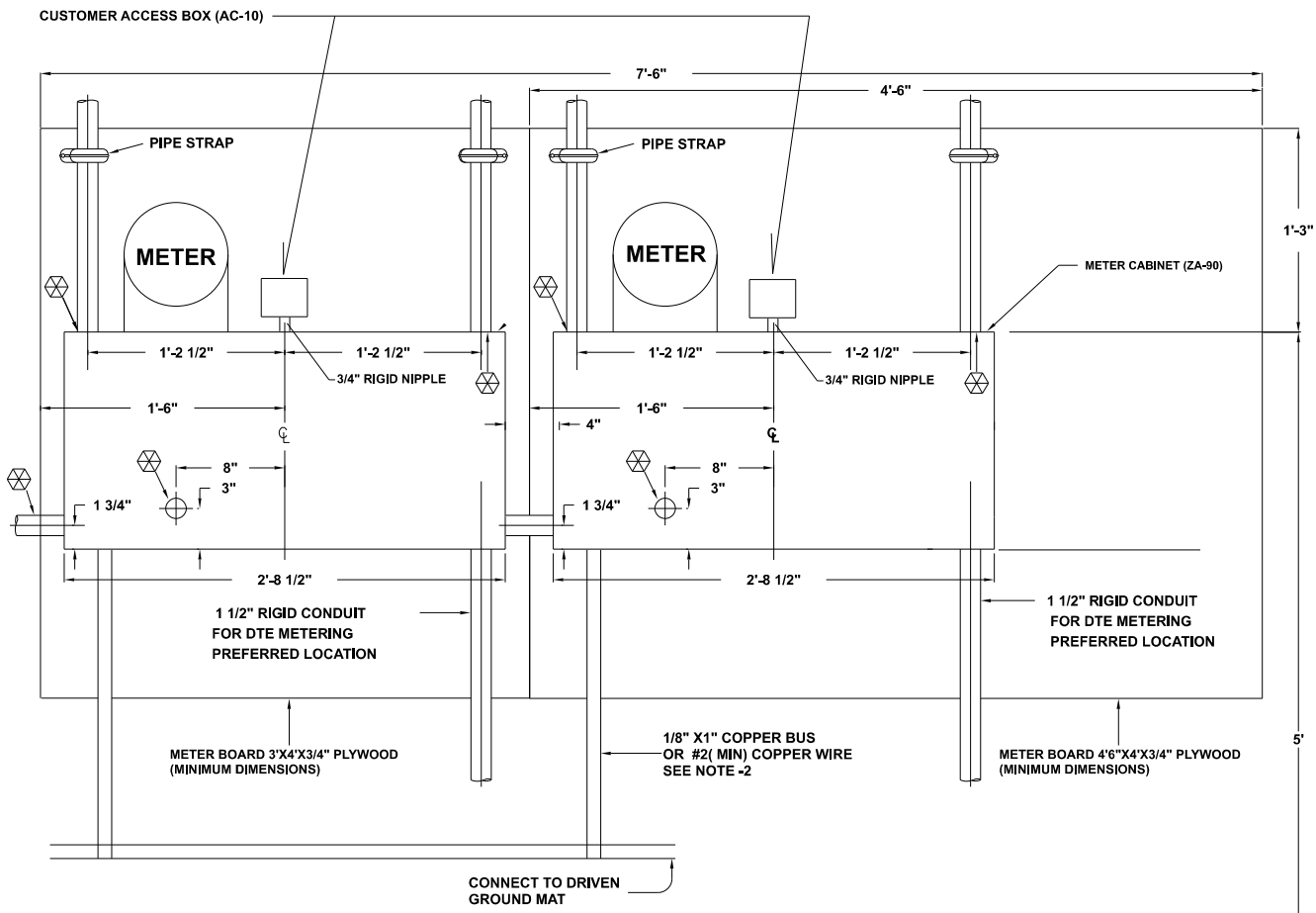
TO BE USED WHEN SPACE LIMITATIONS DO NOT ALLOW THE ARRANGEMENT SHOWN ON PAGE 11-4-3.

OPTIONAL LOCATIONS FOR CONDUIT FROM METERING TRANSFORMERS. (1-1/2" DIA. RIGID STEEL UNLESS OTHERWISE SPECIFIED BY MARKETING & METER SERVICES, METER ENGINEERING).

NOTES:

1. PLYWOOD METER BOARD IS FOR DTE EQUIPMENT ONLY.
2. IF THE GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE ~DRIVEN GROUND MASS", IT MUST BE INSULATED FOR 600 VOLTS.
3. A 5' X 4' CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METER FOR METER TESTING, MAINTENANCE AND DEMAND TAPE CHANGES.
4. A ONE FOOT CLEARANCE MUST BE MAINTAINED ON EACH SIDE OF THE METER CONNECTION CABINET (ZA-90).

LAYOUT 3
PRIMARY METERING BOX TYPE ZA-90
(FOR MAINTENANCE PURPOSES ONLY)
2 OR MORE LINES



ZA-90 CONNECTION CABINET (2 LINE INSTALLATION INSTRUCTIONS)

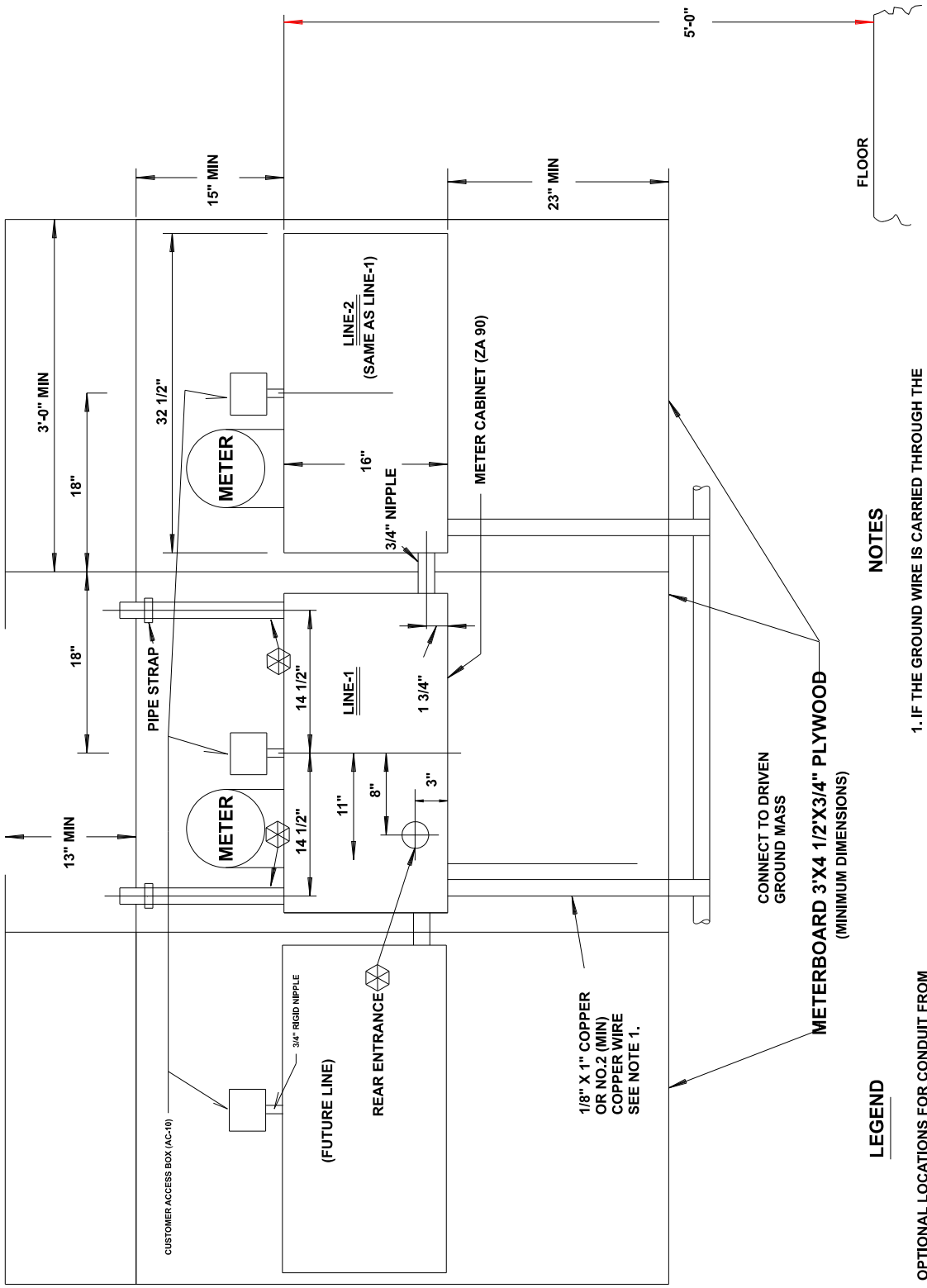
LEGEND

⬡ OPTIONAL LOCATIONS FOR C0NDUIT FROM METERING TRANSFORMERS. (1 1/2" DIAMETER RIGID CONDUIT UNLESS OTHERWISE SPECIFIED BY PRIMARY SERVICES

NOTES:

1. THIS IS THE PREFERED ARRANGEMENT, IF SPACE DOES NOT ALLOW, SEE PAGE 11-4-6 OF THE S.I.M.
2. IF GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE DRIVEN GROUND MAT IT MUST BE INSULATED FOR 600 VOLTS.
3. A 7'6"X4' CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METERS FOR METER TESTING, MAINTENANCE AND DEMAND METER SERVICING.

LAYOUT 4
PRIMARY METERING BOX TYPE ZA-90
(FOR MAINTENANCE PURPOSES ONLY)
2 OR MORE LINES



NOTES

1. IF THE GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE "DRIVEN GROUND MASS~, IT MUST BE INSULATED FOR 600 VOLTS.
2. A 4 FOOT CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METERS FOR METER TESTING, MAINTENANCE AND DEMAND TAPE CHANGES. THIS AREA MUST EXTEND 6" BEYOND EACH SIDE OF THE MOUNTING BOARD FOR THE METERS.

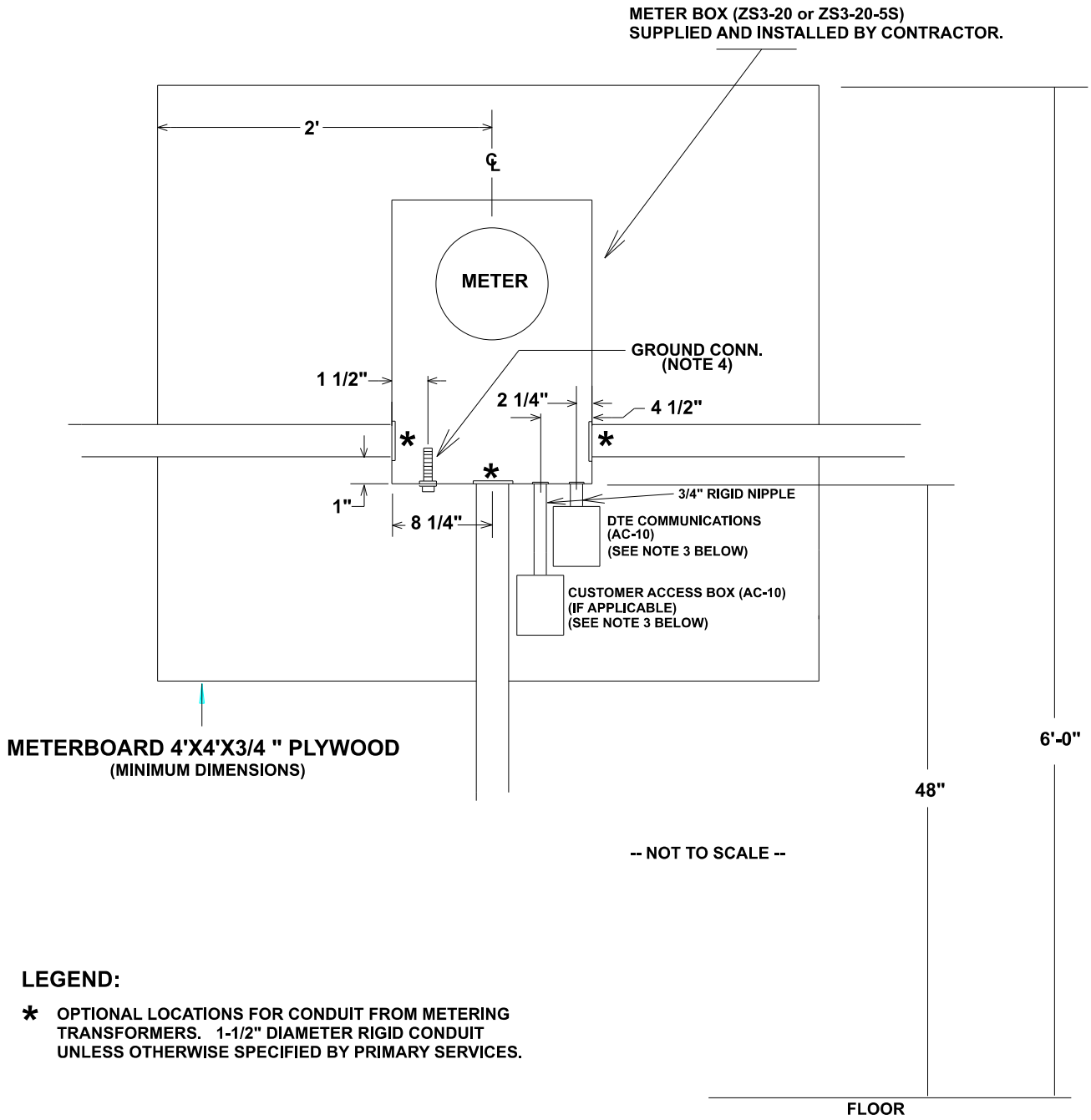
LEGEND

OPTIONAL LOCATIONS FOR CONDUIT FROM METERING TRANSFORMERS. 1 1/2 " DIA. UNLESS OTHERWISE SPECIFIED BY PRIMARY SERVICES PERSONNEL.

DTE ASSUMES NO RESPONSIBILITY FOR INJURY OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

INDOOR LAYOUT ARRANGEMENT
PRIMARY METERING BOX TYPE ZS3-20 or ZS3-20-5S

SINGLE LINE



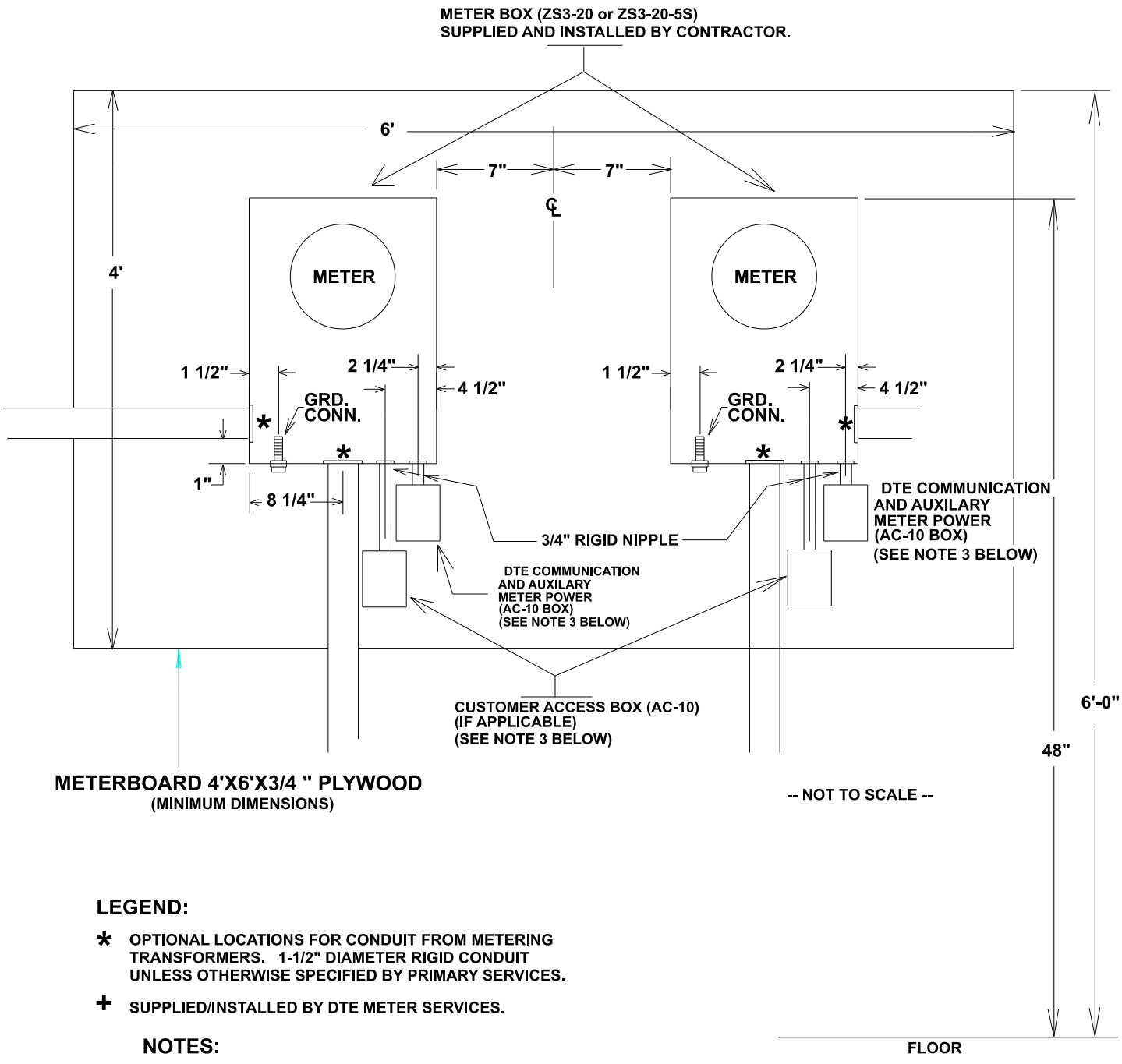
LEGEND:

* OPTIONAL LOCATIONS FOR CONDUIT FROM METERING TRANSFORMERS. 1-1/2" DIAMETER RIGID CONDUIT UNLESS OTHERWISE SPECIFIED BY PRIMARY SERVICES.

NOTES:

1. IF GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE DRIVEN GROUND MAT IT MUST BE INSULATED FOR 600 VOLTS.
2. A 5' CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METERS FOR METER TESTING AND MAINTENANCE.
3. ONE AC-10 BOX IS REQUIRED FOR DTE COMMUNICATIONS AND IF APPLICABLE ONE AC-10 BOX IS REQUIRED FOR CUSTOMER ACCESS. BOTH BOXES ARE SUPPLIED AND INSTALLED BY CUSTOMER'S CONTRACTOR.
4. GROUND CONNECTION - 3/8" x 1 1/2" BOLT, FLAT WASHER & LOCK WASHER (SILICON BRONZE)

INDOOR LAYOUT ARRANGEMENT
PRIMARY METERING BOX TYPE ZS3-20 or ZS3-20-5S
TWO OR MORE LINES



LEGEND:

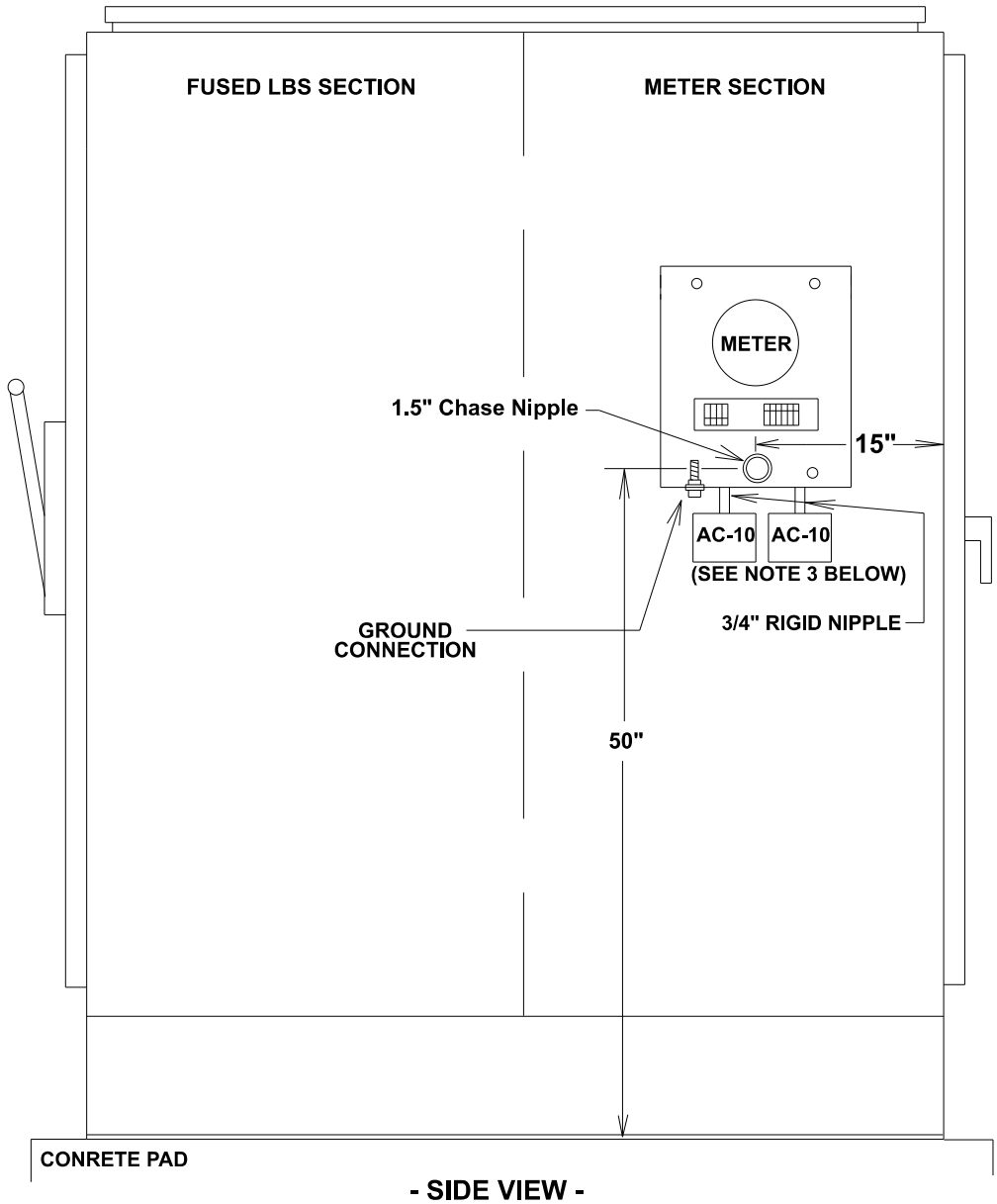
* OPTIONAL LOCATIONS FOR CONDUIT FROM METERING TRANSFORMERS. 1-1/2" DIAMETER RIGID CONDUIT UNLESS OTHERWISE SPECIFIED BY PRIMARY SERVICES.

\+ SUPPLIED/INSTALLED BY DTE METER SERVICES.

NOTES:

1. IF GROUND WIRE IS CARRIED THROUGH THE METER CONDUIT TO THE DRIVEN GROUND MAT IT MUST BE INSULATED FOR 600 VOLTS.
2. A 5' CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METERS FOR METER TESTING AND MAINTENANCE.
3. TWO SEPARATE AC-10 BOXES ARE REQUIRED FOR CUSTOMER CONTACTS
   TWO(2) ADDITIONAL AC-10 BOXES ARE REQUIRED
   FOR DTE COMMUNICATIONS & AUXILARY POWER.
   ALL BOXES ARE SUPPLIED/INSTALLED BY CUSTOMER'S CONTRACTOR.
4. THIS TWO LINE ARRANGEMENT COULD BE USED OUTDOORS MOUNTED ON SWITCHGEAR. DIMMENSIONS APPLY, SEE PRIMARY SERVICE REPRESENTATIVE PRIOR TO INSTALLATION FOR MOUNTING LOCATION.
5. GROUND CONNECTION - 3/8" x 1 1/2" BOLT (SILICON BRONZE) , FLAT WASHER & LOCK WASHER (SILICON BRONZE)

OUTDOOR INSTALLATION LAYOUT
FOR
COMBINATION FUSED LOADBREAK DISCONNECT SWITCH/METER UNIT
UTILIZING A ZS3-20 METER BOX (4-Wire)
OR
UTILIZING A ZS3-20-5S METER BOX (3-Wire)



(Not to Scale)

- SIDE VIEW -

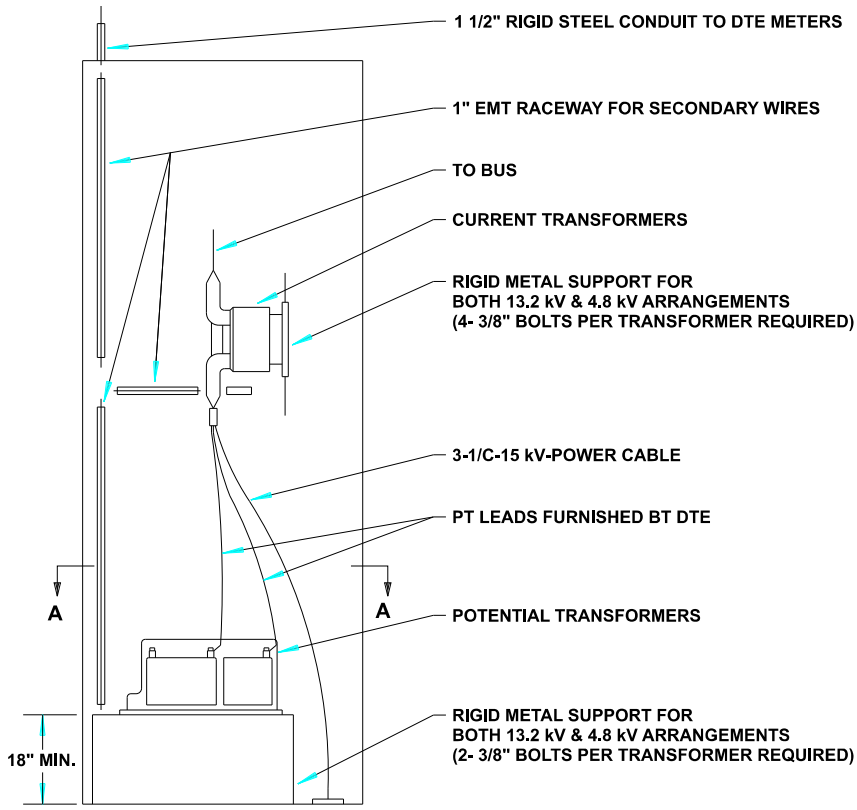
NOTES:

1. THE ZS3-20 (or ZS-20-5S) METER BOX WILL BE MOUNTED ON THE OUTDOOR SWITCHGEAR WITH FOUR 1-INCH .25 x 20 RUSTPROOF BOLTS, FLAT WASHERS AND LOCK WASHERS (STAINLESS STEEL, SILICON BRONZE, ETC.). A 1 1/2 - INCH BOLT, FLAT WASHERS & LOCK WASHERS (SILICON BRONZE) WILL BE USED IN THE LOWER LEFT HAND CORNER TO PROVIDE A GROUND CONNECTION POINT IN THE BOX. A ONE-HOLE COMPRESSION LUG IS TO BE INSTALLED ON THE END OF THE 600 VOLT #2 COPPER GROUND CONDUCTOR, THEN ENTER THE METER BOX THROUGH THE 1.5" CHASE NIPPLE.
2. A FIVE (5) FOOT CLEAR AREA MUST BE PROVIDED IN FRONT OF THE METER.
3. IF AN AC-10 IS TO BE INSTALLED FOR CUSTOMER ACCESS OR DTE COMMUNICATIONS, THE CONNECTING CONDUIT (3/4" RIGID) MUST ENTER THE ZS3-20 FROM BOTTOM PLATE. BOTH BOXES SUPPLIED AND INSTALLED BY CUSTOMER'S CONTRACTOR.
4. THIS LAYOUT CAN BE USED FOR OUTDOOR FREE STANDING SWITCHGEAR. SEE PRIMARY SERVICE REPRESENTATIVE FOR METER BOX LOCATION/INSTALLATION REQUIREMENTS.

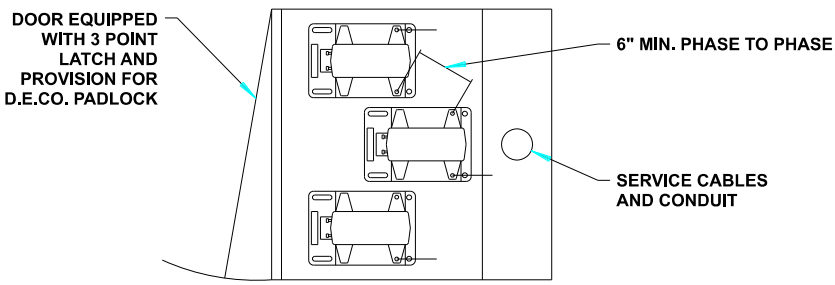
DTE GENERAL SPECIFICATIONS FOR METERING CUBICLE USED WITH METAL-CLAD SWITCHGEAR

SUGGESTED EQUIPMENT ARRANGEMENT FOR 13.2 kV SERVICE-95 KV BIL. MANUFACTURER TO PROVIDE MOUNTING AND BUS CONNECTIONS FOR DTE INSTRUMENT TRANSFORMERS IN CUBICLE. DTE WILL SPECIFY THE TYPE AND NUMBER OF TRANSFORMERS REQUIRED.

(FOR DIMENSIONS, SEE PAGES 11-4-14 through 11-4-17)



ELEVATION (SIDEVIEW)
13.2 kV



PLAN VIEW A-A
13.2 & 4.8 kV

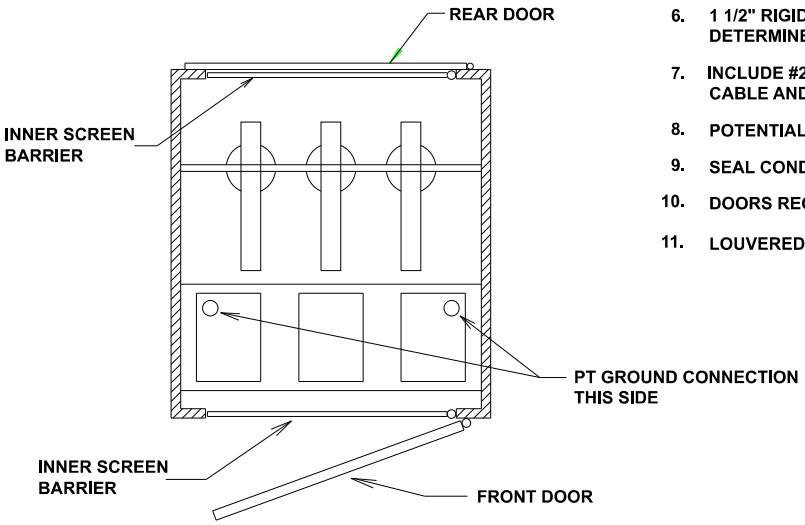
3-POTENTIAL TRANSFORMERS FOR 13.2 kV
2-POTENTIAL TRANSFORMERS FOR 4.8 kV
PROVIDE MOUNTING HOLES FOR 3 TRANSFORMERS

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

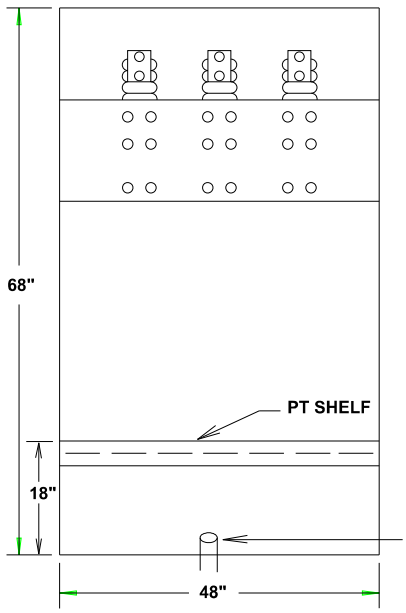
OUTDOOR METER UNIT
13.2kV OR 4.8kV

NOTES:

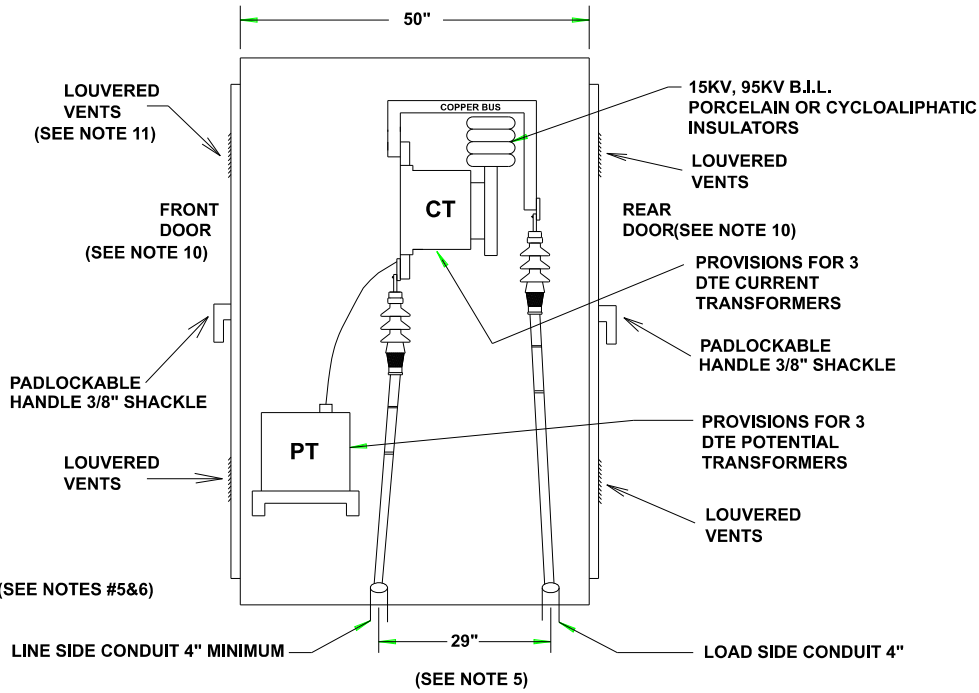
1. KIT REQUIRED FOR 4.8kV USE.
2. SEE PAGES 11-4-10, 11-4-12 & 11-4-10C FOR WIRING INSTRUCTIONS.
3. POTENTIAL AND CURRENT TRANSFORMERS PROVIDED BY DTE.
4. SECONDARY METER WIRE PROVIDED BY DTE.
5. UNIT IS INTERCHANGEABLE WITH TYPE PM-123 UNIT - MUST MAINTAIN 29" CONDUIT SPACING.
6. 1 1/2" RIGID STEEL CONDUIT TO DTE METERS. LOCATION TO BE DETERMINED ON JOB SITE - SEE PRIMARY SERVICES REPRESENTATIVE.
7. INCLUDE #2 COPPER WIRE (600V INSULATION) IN SAME CONDUIT WITH METER CABLE AND CONNECT TO UNIT GROUND MASS.
8. POTENTIAL TRANSFORMER SHELF IS REMOVABLE
9. SEAL CONDUIT WITH DUCT SEAL.
10. DOORS REQUIRE 3-POINT LATCHING
11. LOUVERED VENTS NEED TO BE RAINPROOF.



TOP VIEW



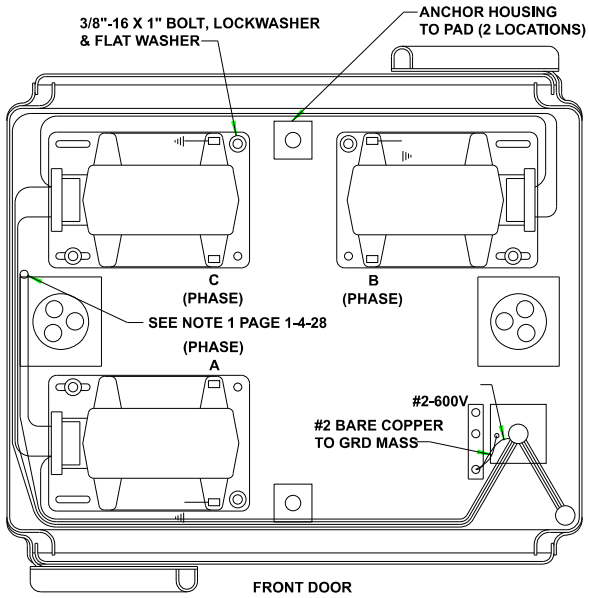
FRONT VIEW



SIDE VIEW

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

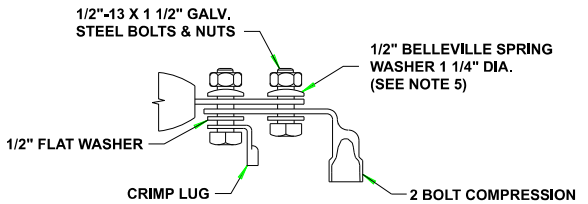
INSTALLATIONS INSTRUCTIONS
13.2KV OLD TYPE KU OUTDOOR METER UNIT (MAINTENANCE ONLY)



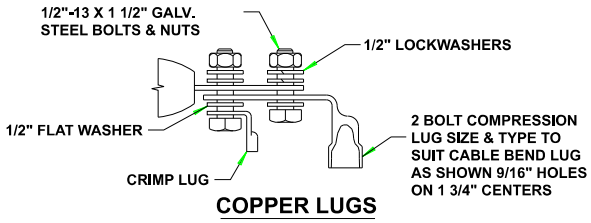
PLAN VIEW AT A-A (OF B-B)

NOTES:

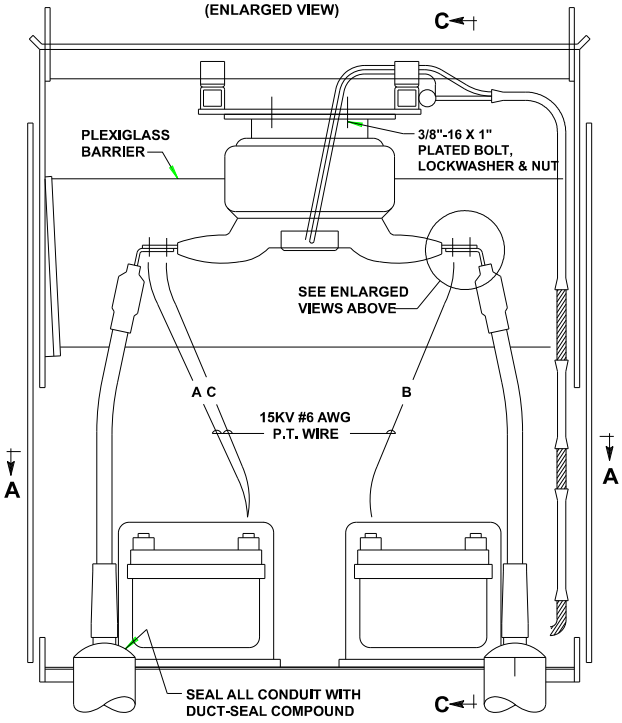
1. WATERPROOF ENTIRE PAD UNDER HOUSING. EXTEND COMPOUND 2" BEYOND ALL SIDES. A COMPLETE SEAL MUST BE FORMED BETWEEN HOUSING AND PAD.
2. SEE PAGE 11-4-28 FOR WIRING INSTRUCTIONS.
3. STRIP 15 FOOT OF JACKET OFF METER CABLE. WIRES MAY BE CUT, BUT SEE NOTE 1, PAGE 11-4-12.
4. FOR RACK MOUNTING, PLATES ARE FURNISHED TO COVER THE PRIMARY AND METER CONDUIT OPENINGS. UNIT MUST BE FASTENED TO THE RACK AT THE FOUR CORNERS. CLOSE THE TWO ANCHOR HOLES WITH THE SQUARE WASHERS PROVIDED.
5. FOR ALUMINUM LUGS, COAT WITH NO-OX-ID, TIGHTEN NUTS UNTIL BELLEVILLE SPRING WASHER FLATTENS. SEE ALUMINUM DETAIL BELOW.
6. ALL EQUIPMENT FURNISHED BY DTE EXCEPT KU UNIT, PRIMARY CABLE, TERMINATIONS AND COMPRESSION LUGS.



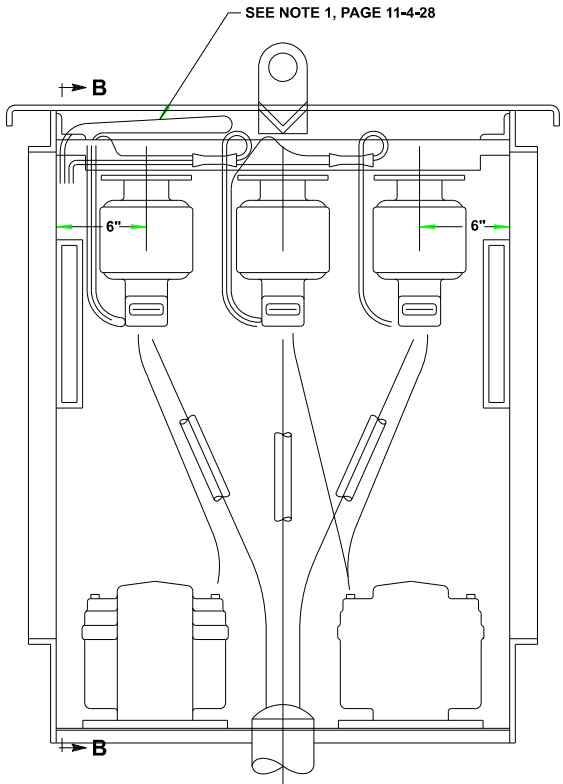
ALUMINUM LUGS
(ENLARGED VIEW)



COPPER LUGS
(ENLARGED VIEW)



B-B (OF C-C)

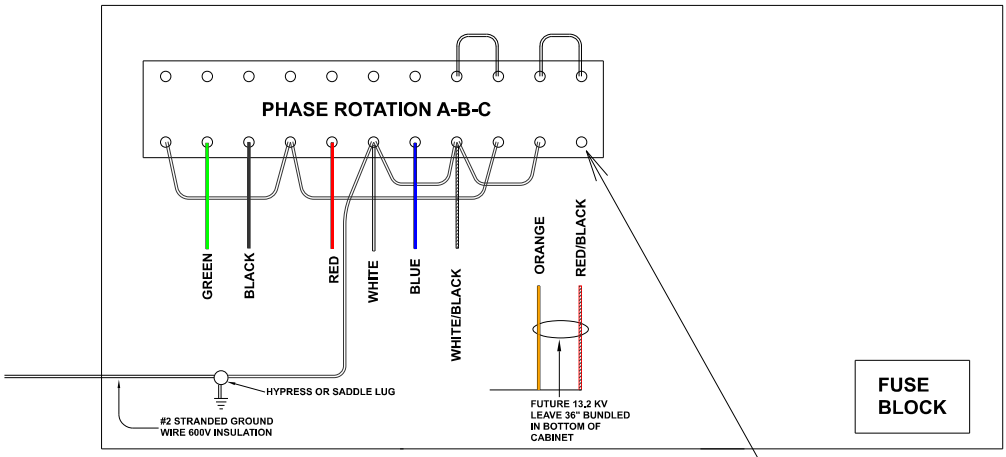


C-C (OF B-B)

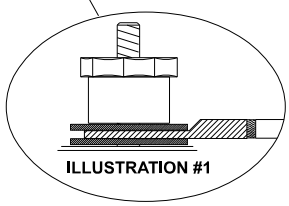
NO CUTTING OR DRILLING OF METER UNIT PERMITTED

DTE ASSUMES NO RESPONSIBILITY FOR INJURY OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

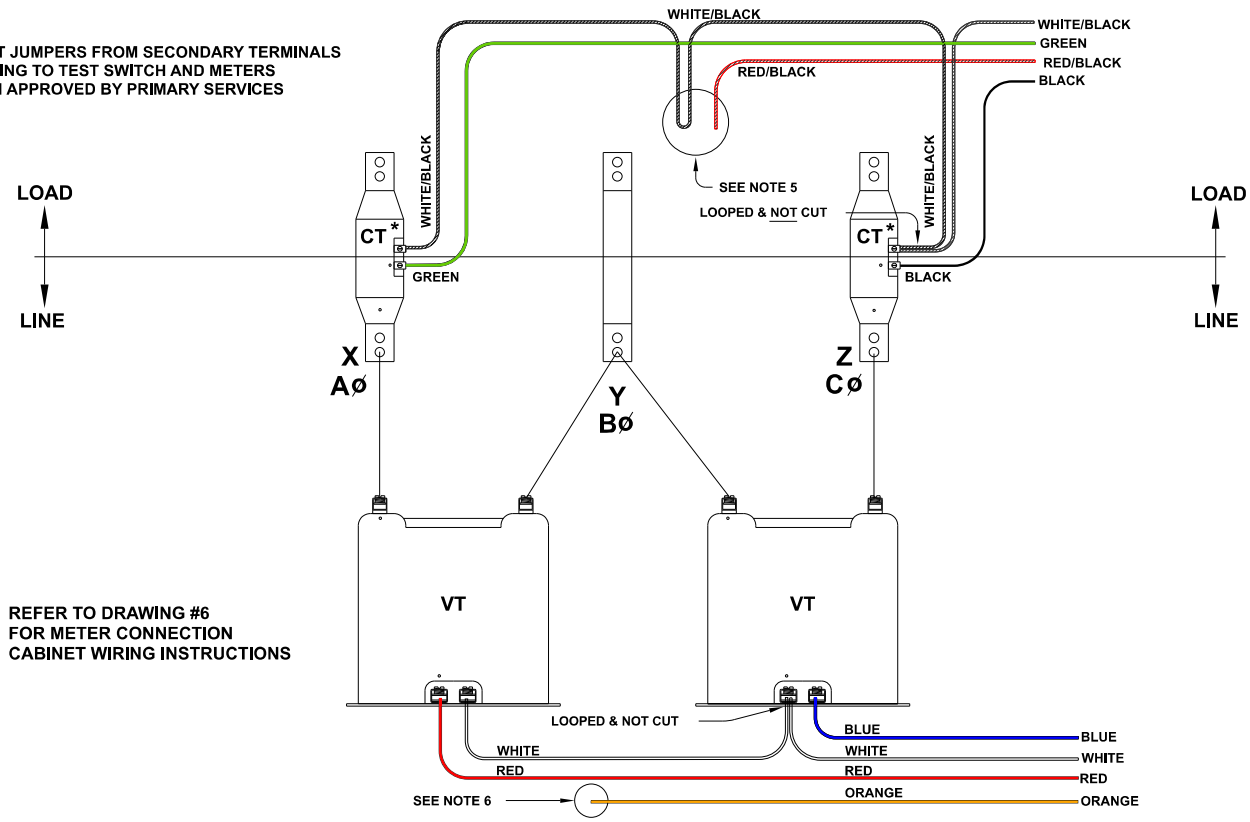
WIRING INSTRUCTIONS
4.8kV METER UNIT
(2 CURRENT TRANSFORMERS)
(FOR MAINTENANCE OF EXISTING INSTALLATIONS ONLY)
METER CONNECTION CABINET (ZA-90)



NOTE:
1. DTE METER WIRE TO BE TERMINATED WITH LOOP OR RING TYPE STAKE ON LUGS. FORK TYPE STAKE ON LUGS SHALL NOT BE PREMITTED
2. THE STAKE ON LUGS SHALL BE INSTALLED BETWEEN THE TWO FLAT WASHERS ON THE TERMINAL POST. SEE INSET ILLUSTRATION #1



* REMOVE CT JUMPERS FROM SECONDARY TERMINALS AFTER WIRING TO TEST SWITCH AND METERS HAVE BEEN APPROVED BY PRIMARY SERVICES

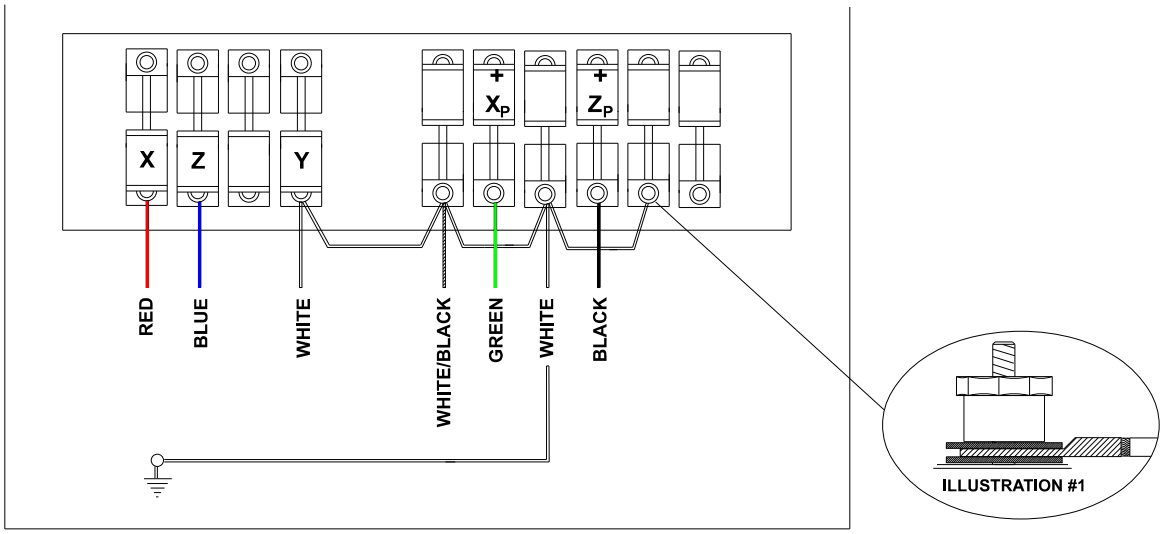


REFER TO DRAWING #6 FOR METER CONNECTION CABINET WIRING INSTRUCTIONS

NOTES:
1. CT WIRES BLACK AND GREEN SHALL BE LONG ENOUGH TO REACH EITHER CT TERMINAL.
2. VT WIRES RED AND BLUE SHALL BE LONG ENOUGH TO REACH EITHER VT TERMINAL.
3. VT AND CT WIRES SHALL BE CONTINUOUS TO THE POINT OF CONNECTION. CUTTING OR SPLICING TO THAT POINT SHALL NOT BE PERMITTED.
4. A #2 600 VOLT INSULATED GROUND CONDUCTOR (FURNISHED BY CUSTOMER) SHALL BE PULLED IN WITH THE 9 CONDUCTOR METER CABLE. ALTERNATIVES MUST BE APPROVED, PRIOR TO INSTALLATION, BY PRIMARY SERVICES.
5. FOR FUTURE 3RD CT.
6. FOR FUTURE 3RD VT (13.2 kV CONVERSION ETC.)
7. THE TOTAL LENGTH OF THE DTE 9 CONDUCTOR METER CABLE SHALL NOT EXCEED 150 FEET

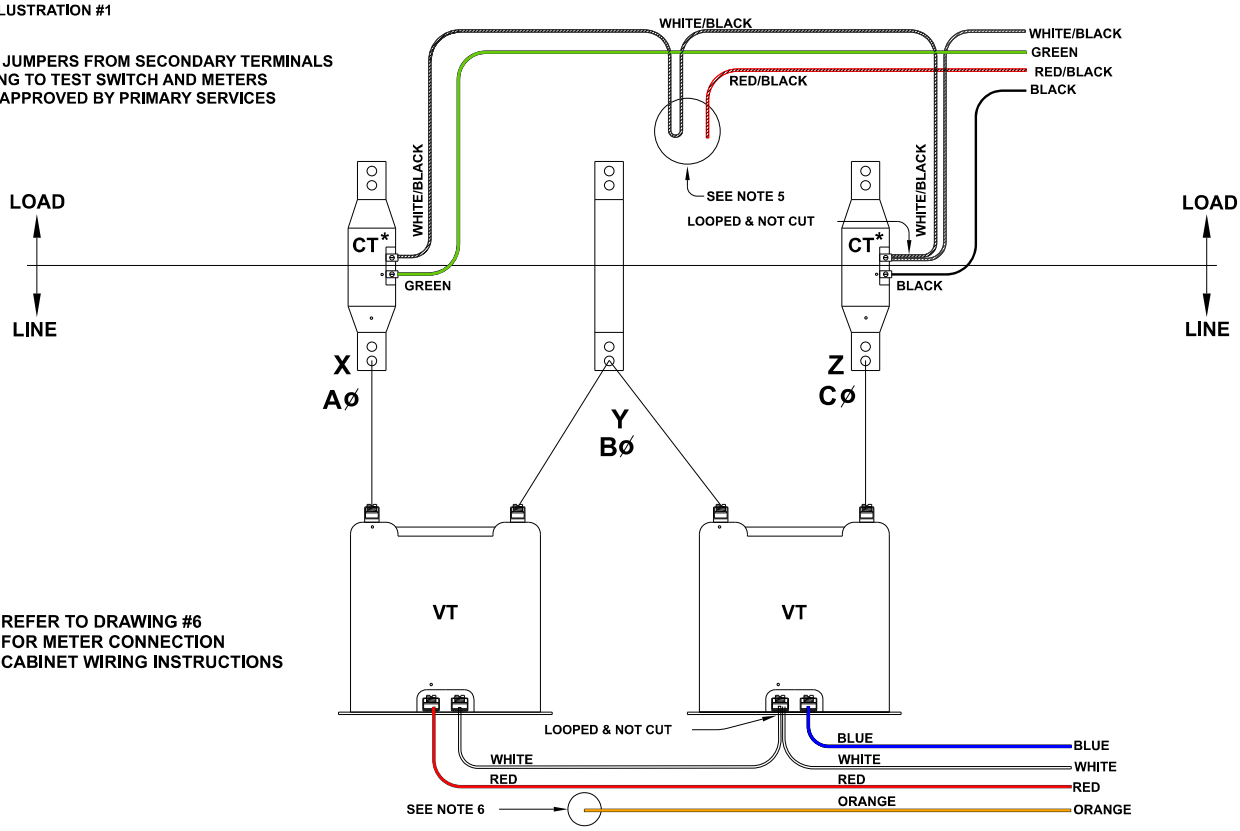
WIRING INSTRUCTIONS
4.8KV DELTA SYSTEM
(2 CURRENT TRANSFORMERS)

METER CONNECTION CABINET (ZS3-20-5S)



NOTE:
1. DTE METER WIRE TO BE TERMINATED WITH LOOP OR RING TYPE STAKE ON LUGS. FORK TYPE STAKE ON LUGS SHALL NOT BE PREMITTED
2. THE STAKE ON LUGS SHALL BE INSTALLED BETWEEN THE TWO FLAT WASHERS ON THE TERMINAL POST. SEE INSET ILLUSTRATION #1

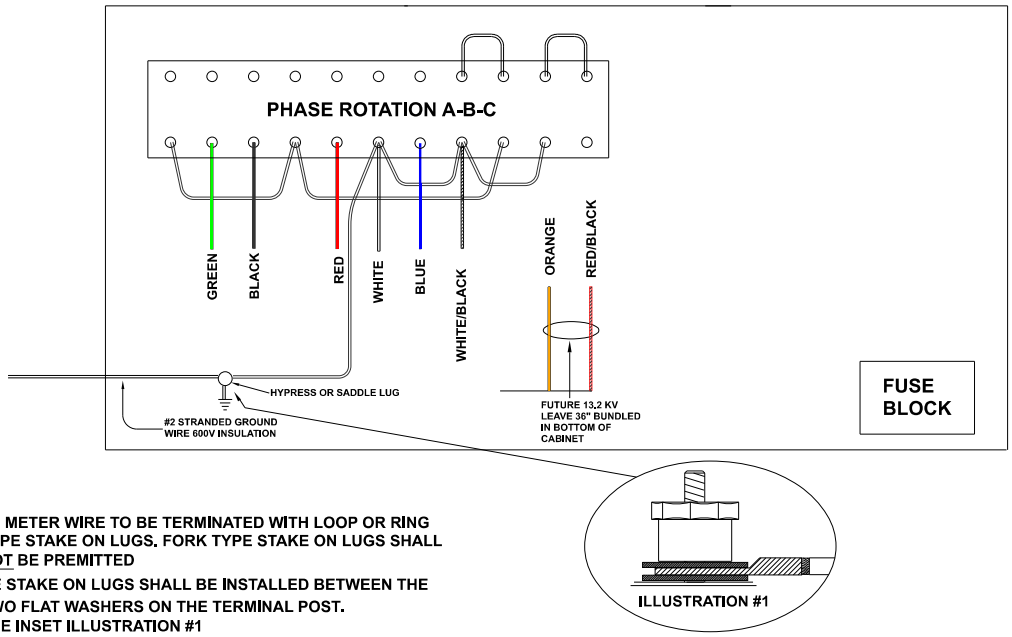
* REMOVE CT JUMPERS FROM SECONDARY TERMINALS AFTER WIRING TO TEST SWITCH AND METERS HAVE BEEN APPROVED BY PRIMARY SERVICES



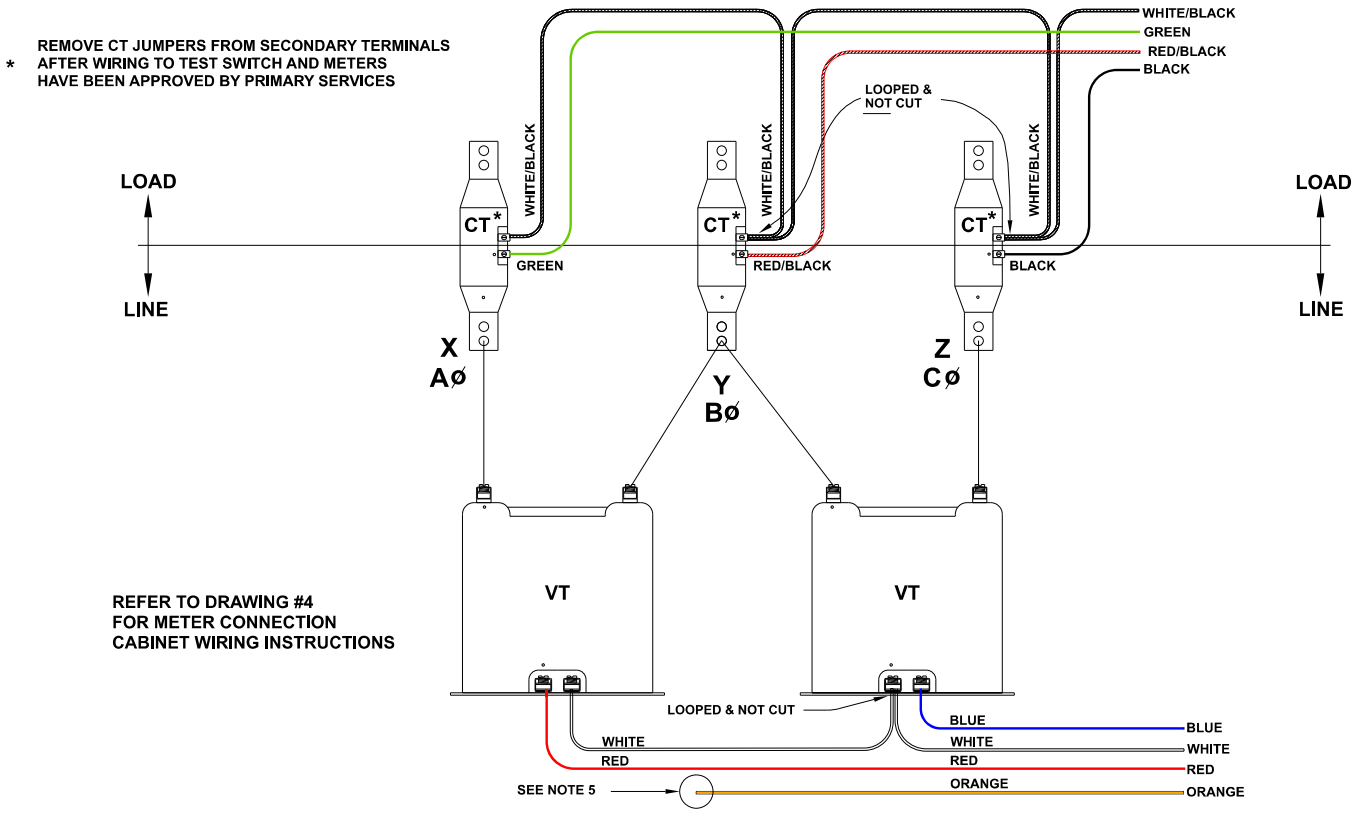
REFER TO DRAWING #6 FOR METER CONNECTION CABINET WIRING INSTRUCTIONS

NOTES:
1. CT WIRES BLACK AND GREEN SHALL BE LONG ENOUGH TO REACH EITHER CT TERMINAL.
2. VT WIRES RED AND BLUE SHALL BE LONG ENOUGH TO REACH EITHER VT TERMINAL.
3. VT AND CT WIRES SHALL BE CONTINUOUS TO THE POINT OF CONNECTION. CUTTING OR SPLICING TO THAT POINT SHALL NOT BE PERMITTED.
4. A #2 CU 600 VOLT INSULATED GROUND CONDUCTOR (FURNISHED BY CUSTOMER) SHALL BE PULLED IN WITH THE 9 CONDUCTOR METER CABLE. ALTERNATIVES MUST BE APPROVED, PRIOR TO INSTALLATION, BY PRIMARY SERVICES.
5. FOR FUTURE 3RD CT.
6. FOR FUTURE 3RD VT (13.2 kV CONVERSION ETC.)
7. THE TOTAL LENGTH OF THE DTE 9 CONDUCTOR METER CABLE SHALL NOT EXCEED 150 FEET

WIRING INSTRUCTIONS
4.8kV METER UNIT
(3 CURRENT TRANSFORMER)
(FOR MAINTENANCE PURPOSES ONLY, NOT FOR NEW INSTALLATIONS)
METER CONNECTION CABINET (ZA-90)



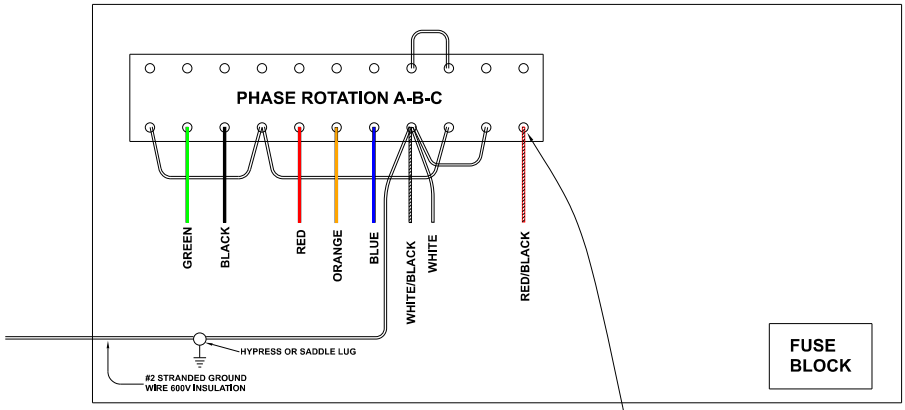
NOTE:
1. DTE METER WIRE TO BE TERMINATED WITH LOOP OR RING TYPE STAKE ON LUGS. FORK TYPE STAKE ON LUGS SHALL NOT BE PREMITTED
2. THE STAKE ON LUGS SHALL BE INSTALLED BETWEEN THE TWO FLAT WASHERS ON THE TERMINAL POST. SEE INSET ILLUSTRATION #1

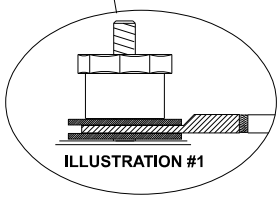


REFER TO DRAWING #4 FOR METER CONNECTION CABINET WIRING INSTRUCTIONS

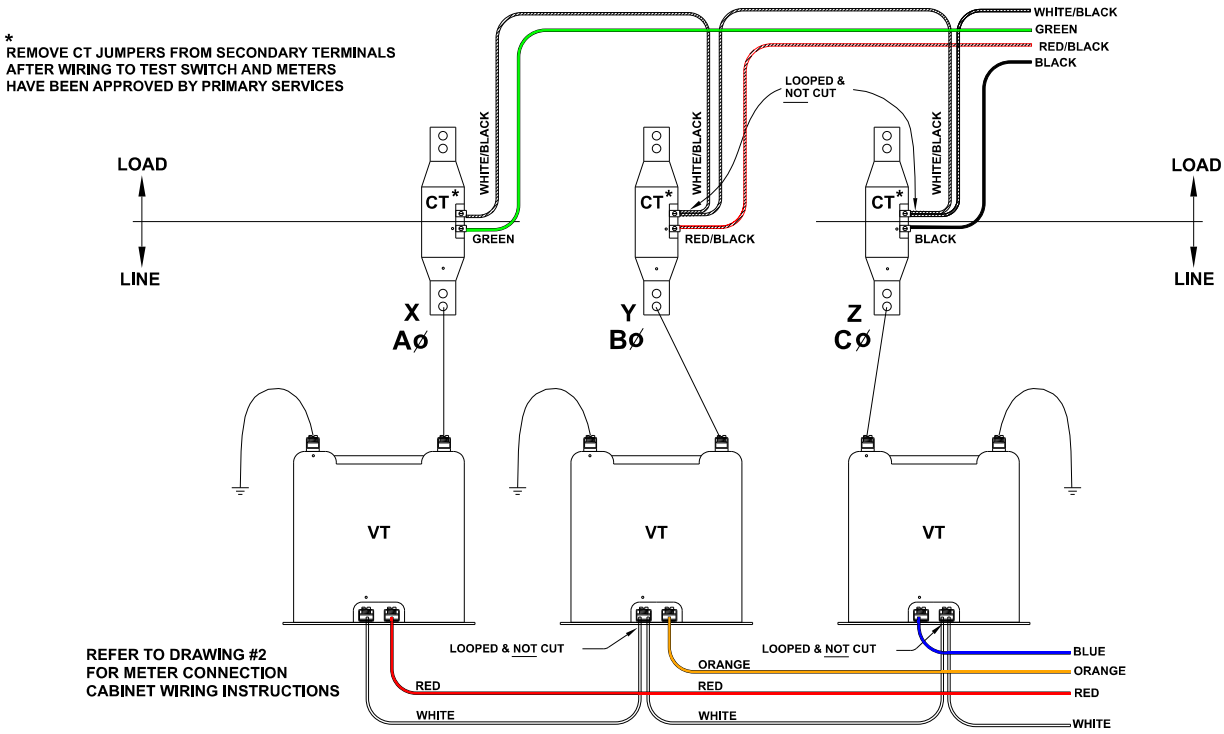
NOTES:
1. CT WIRES BLACK AND GREEN SHALL BE LONG ENOUGH TO REACH EITHER CT TERMINAL.
2. VT WIRES RED AND BLUE SHALL BE LONG ENOUGH TO REACH EITHER VT TERMINAL.
3. VT AND CT WIRES SHALL BE CONTINUOUS TO THE POINT OF CONNECTION. CUTTING OR SPLICING TO THAT POINT SHALL NOT BE PERMITTED.
4. A #2 600 VOLT INSULATED GROUND CONDUCTOR (FURNISHED BY CUSTOMER) SHALL BE PULLED IN WITH THE 9 CONDUCTOR METER CABLE. ALTERNATIVES MUST BE APPROVED, PRIOR TO INSTALLATION, BY PRIMARY SERVICES.
5. FOR FUTURE 3RD VT (13.2 kV CONVERSION ETC.)
6. THE TOTAL LENGTH OF THE DTE 9 CONDUCTOR METER CABLE SHALL NOT EXCEED 150 FEET

WIRING INSTRUCTIONS
13.2kV, 8.3kV OR 4.16kV WYE SYSTEM
(FOR MAINTENANCE OF EXISTING INSTALLATIONS ONLY)
METER CONNECTION CABINET (ZA-90)



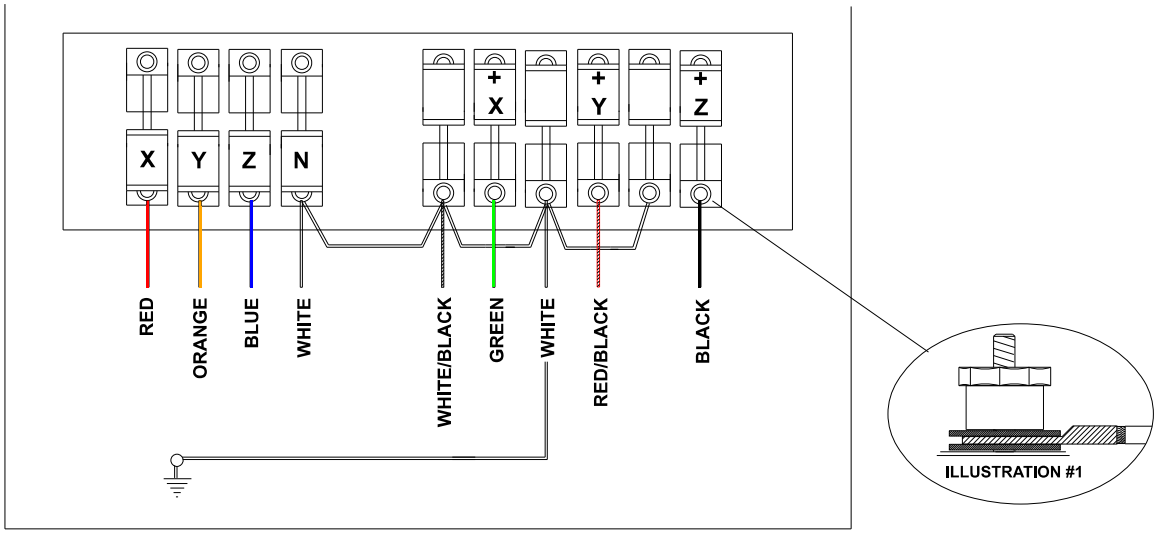


NOTE:
1. DTE METER WIRE TO BE TERMINATED WITH LOOP OR RING TYPE STAKE ON LUGS. FORK TYPE STAKE ON LUGS SHALL NOT BE PREMITTED
2. THE STAKE ON LUGS SHALL BE INSTALLED BETWEEN THE TWO FLAT WASHERS ON THE TERMINAL POST. SEE INSET ILLUSTRATION #1



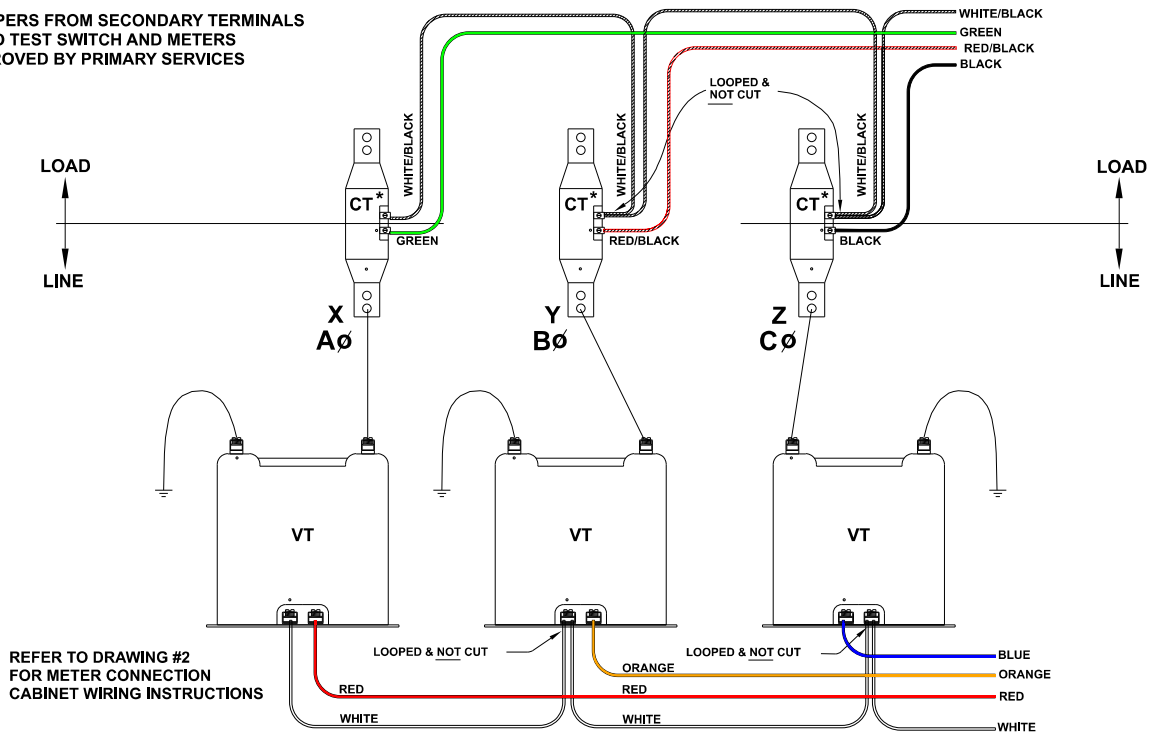
1. CT WIRES BLACK AND GREEN SHALL BE LONG ENOUGH TO REACH EITHER CT TERMINAL.
2. VT WIRES RED AND BLUE SHALL BE LONG ENOUGH TO REACH EITHER VT TERMINAL.
3. VT AND CT WIRES SHALL BE CONTINUOUS TO THE POINT OF CONNECTION. CUTTING OR SPLICING TO THAT POINT SHALL NOT BE PERMITTED.
4. A #2 600 VOLT INSULATED GROUND CONDUCTOR (FURNISHED BY CUSTOMER) SHALL BE PULLED IN WITH THE 9 CONDUCTOR METER CABLE. ALTERNATIVES MUST BE APPROVED, PRIOR TO INSTALLATION, BY PRIMARY SERVICES.
5. THE TOTAL LENGTH OF THE DTE 9 CONDUCTOR METER CABLE SHALL NOT EXCEED 150 FEET.

WIRING INSTRUCTIONS
13.2kV, 8.3kV OR 4.16kV WYE SYSTEM
METER CONNECTION BOX - TYPE ZS3-20 (4-Wire)



NOTE:
1. DTE METER WIRE TO BE TERMINATED WITH LOOP OR RING TYPE STAKE ON LUGS. FORK TYPE STAKE ON LUGS SHALL NOT BE PREMITTED
2. THE STAKE ON LUGS SHALL BE INSTALLED BETWEEN THE TWO FLAT WASHERS ON THE TERMINAL POST. SEE INSET ILLUSTRATION #1

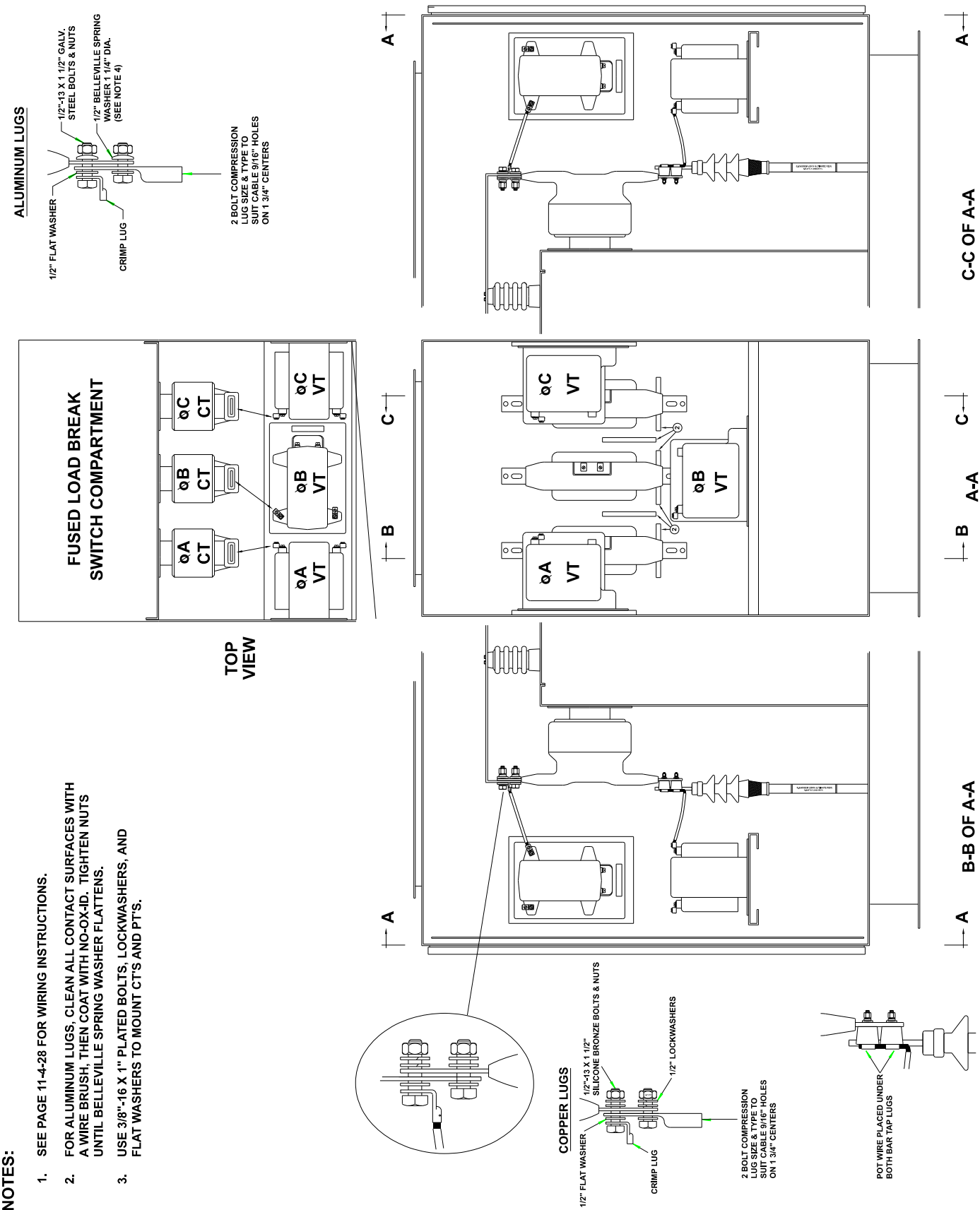
* REMOVE CT JUMPERS FROM SECONDARY TERMINALS AFTER WIRING TO TEST SWITCH AND METERS HAVE BEEN APPROVED BY PRIMARY SERVICES



REFER TO DRAWING #2 FOR METER CONNECTION CABINET WIRING INSTRUCTIONS

1. CT WIRES BLACK AND GREEN SHALL BE LONG ENOUGH TO REACH EITHER CT TERMINAL.
2. VT WIRES RED AND BLUE SHALL BE LONG ENOUGH TO REACH EITHER VT TERMINAL.
3. VT AND CT WIRES SHALL BE CONTINUOUS TO THE POINT OF CONNECTION. CUTTING OR SPLICING TO THAT POINT SHALL NOT BE PERMITTED.
4. A #2 CU 600 VOLT INSULATED GROUND CONDUCTOR (FURNISHED BY CUSTOMER) SHALL BE PULLED IN WITH THE 9 CONDUCTOR METER CABLE. ALTERNATIVES MUST BE APPROVED, PRIOR TO INSTALLATION, BY PRIMARY SERVICES.
5. THE TOTAL LENGTH OF THE DTE 9 CONDUCTOR METER CABLE SHALL NOT EXCEED 150 FEET.

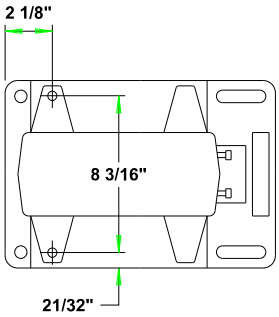
INSTALLATION INSTRUCTIONS
13.2kV OR 8.3kV OUTDOOR
COMBINATION METERING AND SWITCH UNIT



NOTES:

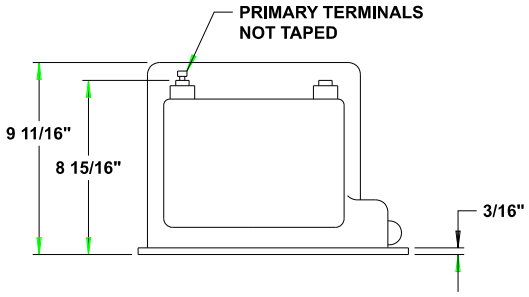
1. SEE PAGE 11-4-28 FOR WIRING INSTRUCTIONS.
2. FOR ALUMINUM LUGS, CLEAN ALL CONTACT SURFACES WITH A WIRE BRUSH, THEN COAT WITH NO-OX-ID. TIGHTEN NUTS UNTIL BELLEVILLE SPRING WASHER FLATTENS.
3. USE 3/8"-16 X 1" PLATED BOLTS, LOCKWASHERS, AND FLAT WASHERS TO MOUNT CT'S AND PT'S.

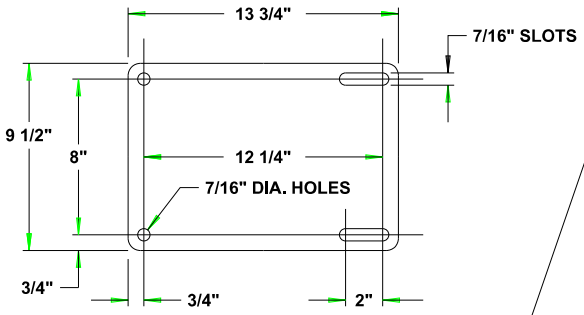
OUTLINE OF 8.7KV METERING TRANSFORMERS
5 TO 800 AMPERES - 4.8KV

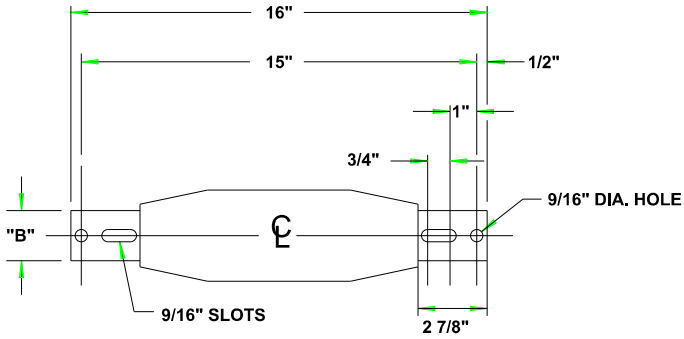


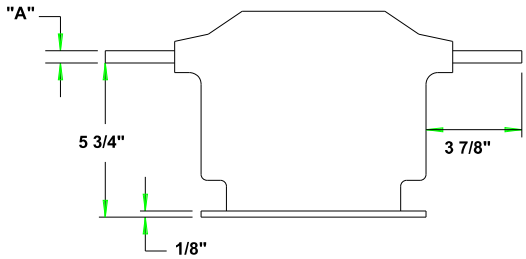
ALTERNATE LOCATION:
POTENTIAL TRANSFORMERS MAY BE LOCATED IN SWITCHGEAR SUPERSTRUCTURE. DOOR TO BE HINGED, BOLTED AND PADLOCKED.

JVM-4 POTENTIAL TRANSFORMERS (UNFUSED)
40/1 RATIO (2 REQUIRED)





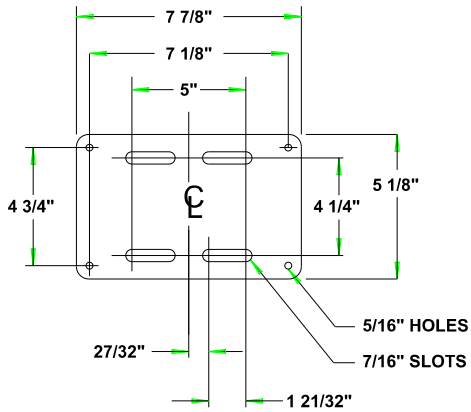




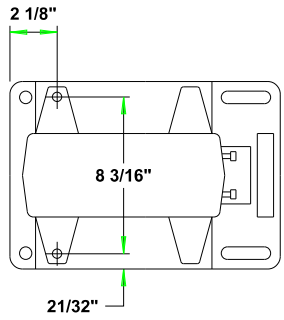
JKM-4 CURRENT TRANSFORMERS
(2 REQUIRED)

IMPORTANT
NOTE AMPERE RATING

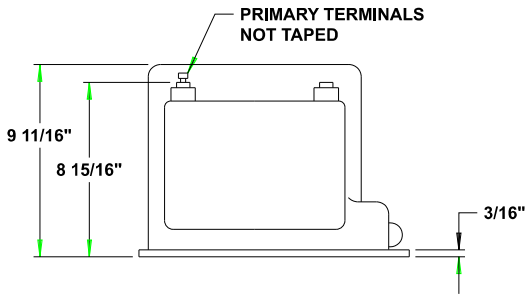
AMPERE RATING	"A"	"B"
5-150	3/16"	1 1/2"
200-400	1/4"	2"
500-800	3/8"	2"

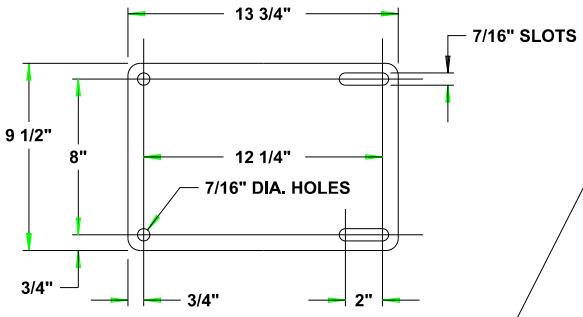


OUTLINE OF 8.7kV METERING TRANSFORMERS
1200 TO 4000 AMPERES - 4.8KV



JVM-4 POTENTIAL TRANSFORMERS (UNFUSED)
40/1 RATIO (2 REQUIRED)





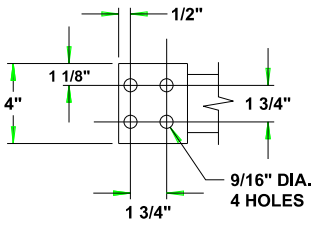


FIGURE 1

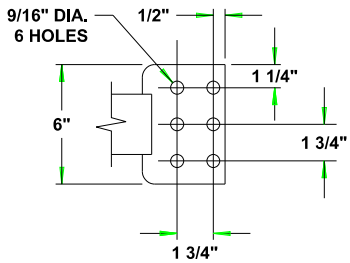
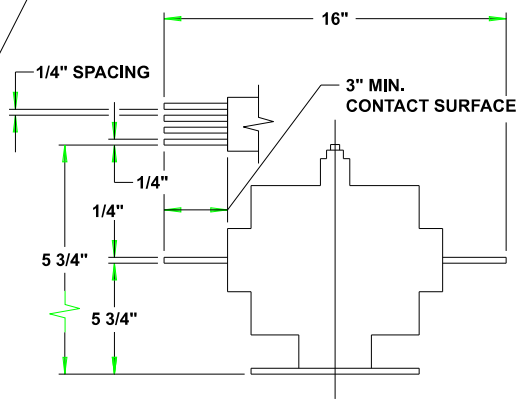
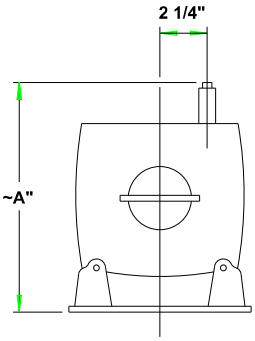


FIGURE 2

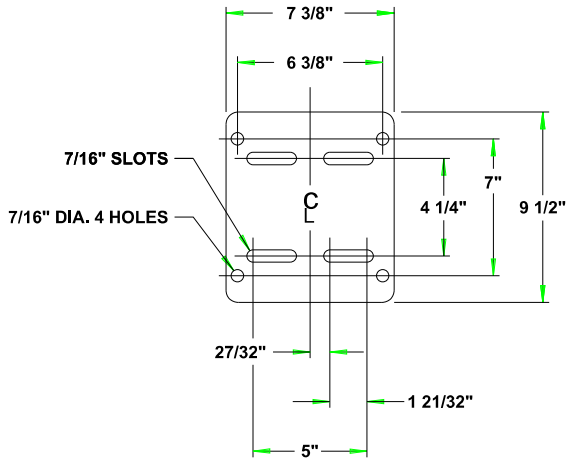




JCM-4 CURRENT TRANSFORMERS
(2 REQUIRED)

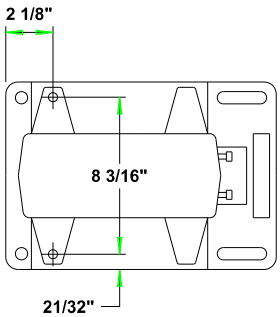
IMPORTANT
NOTE AMPERE RATING

AMPERE RATING	~A"	FIG.	NUMBER OF PADS
1200-1500	11 11/16"	1	1
2000-2500	12 3/16"	1	2
3000	12 7/16"	2	3
4000	12 11/16"	2	4

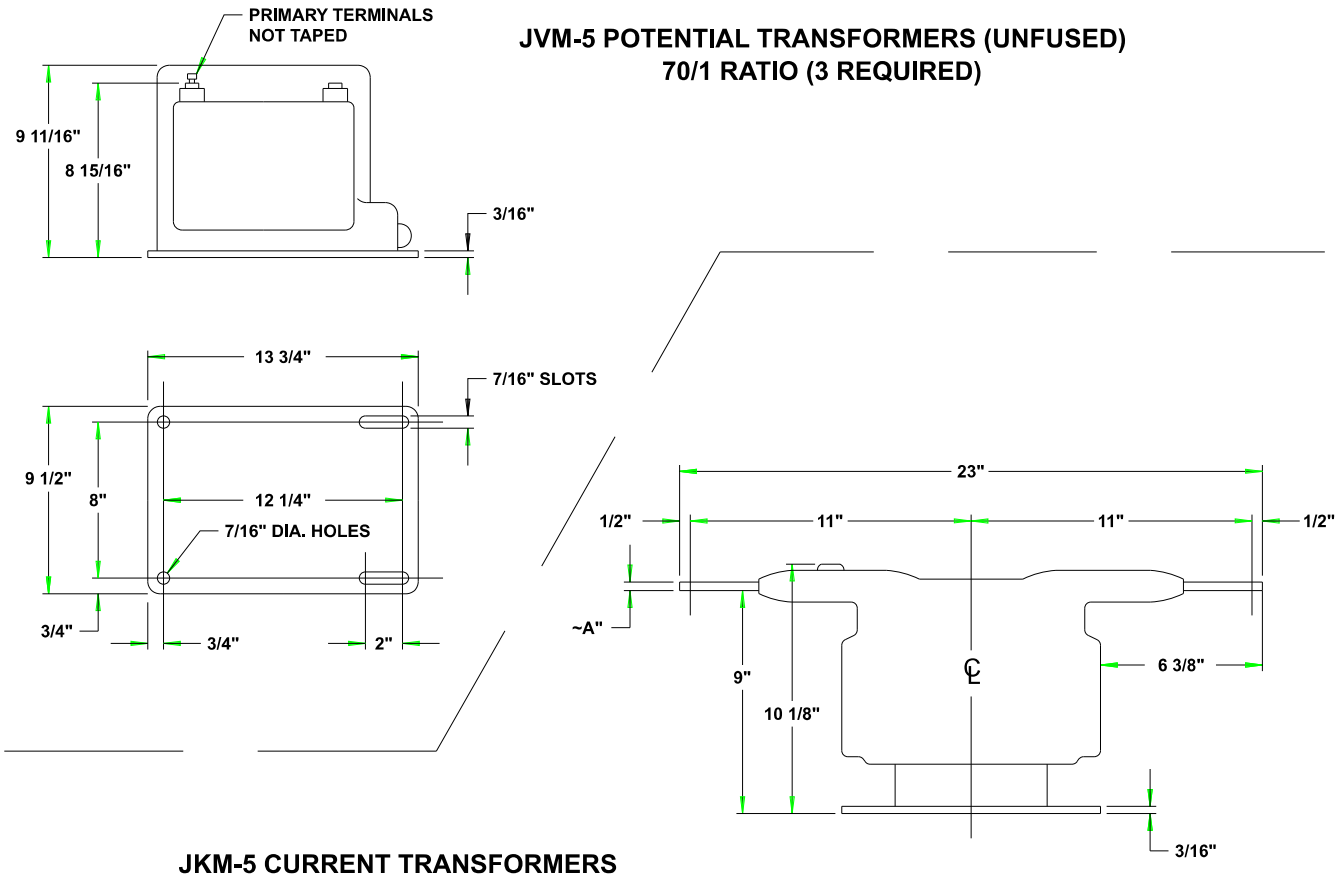


DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

OUTLINE OF 15kV METERING TRANSFORMERS
10 TO 800 AMPERES - 13.2kV



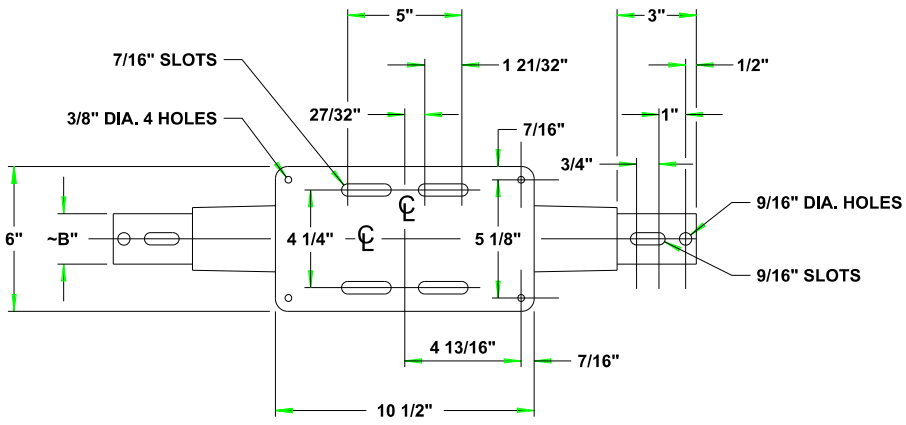
JVM-5 POTENTIAL TRANSFORMERS (UNFUSED)
70/1 RATIO (3 REQUIRED)



JKM-5 CURRENT TRANSFORMERS
(3 REQUIRED)

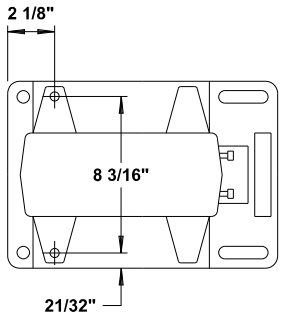
IMPORTANT
NOTE AMPERE RATING

AMPERE RATING	~A"	~B"
10-150	3/16"	1 1/2"
200-400	1/4"	2"
600-800	3/8"	2"



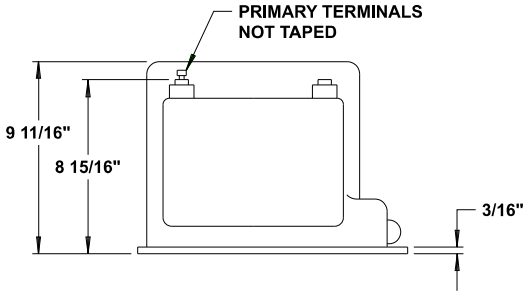
DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

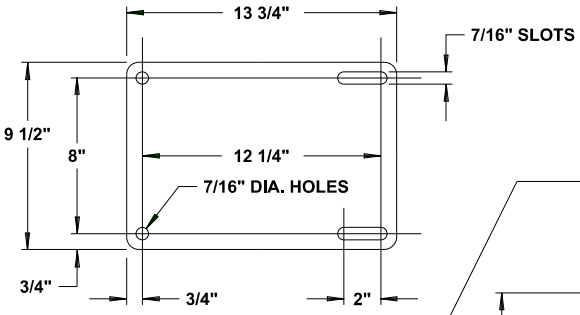
OUTLINE OF 15KV METERING TRANSFORMERS
1200 TO 4000 AMPERES - 13.2kV



ALTERNATE LOCATION:
POTENTIAL TRANSFORMERS MAY BE LOCATED IN SWITCHGEAR SUPERSTRUCTURE. DOOR TO BE HINGED, BOLTED AND PADLOCKED.

JVM-5 POTENTIAL TRANSFORMERS (UNFUSED)
70/1 RATIO (3 REQUIRED)





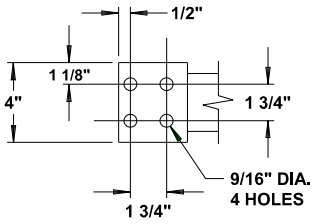


FIGURE 1

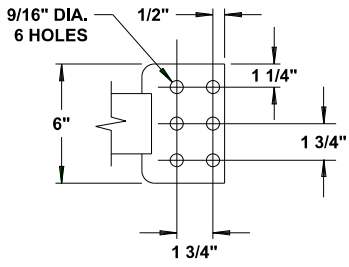
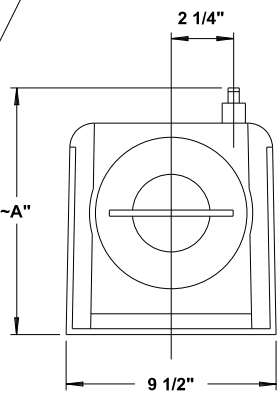
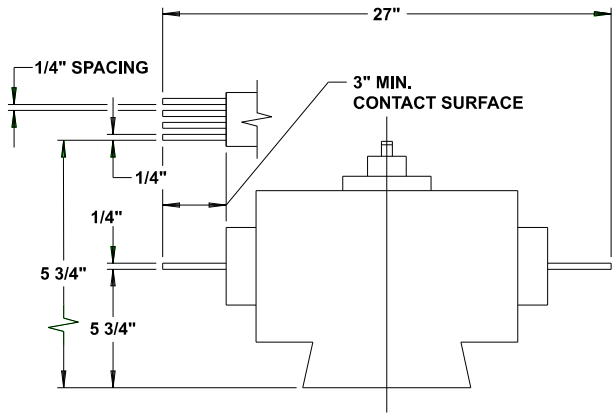
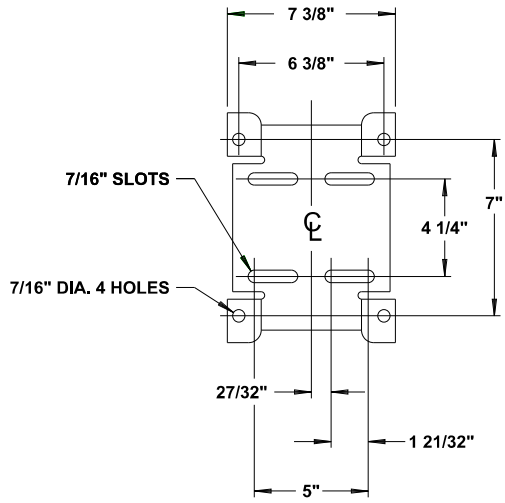


FIGURE 2





JCM-5 CURRENT TRANSFORMERS
(3 REQUIRED)



IMPORTANT
NOTE AMPERE RATING

AMPERE RATING	~A"	FIG.	NUMBER OF PADS
1200-1500	11 11/16"	1	1
2000-2500	12 3/16"	1	2
3000	12 7/16"	2	3
4000	12 11/16"	2	4

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

SINGLE CONDUCTOR PRIMARY SERVICE CABLE

All service cable must be approved by Primary Services prior to purchase. All single conductor cable must be 15kV class. Cable must be a minimum of #2 copper unless otherwise approved by PSR. Corrosion resistant covering may be required. The following types of single conductor cable are acceptable for use as primary service cable on the DTE system.

- Cross-Linked Polyethylene Concentric Cable as per DTE Specification 527, revision L or later.

- Ethylene Propylene Rubber, DTE Specification 520, revision E or later.

Note:

1. If copper tape shielded cable is used an additional 2/0, grounded conductor will be pulled into the same conduit as the power cable. The conductor shall be 2/0 copper with 600V insulation (a smaller conductor may be adequate in some cases - consult DTE Primary Services).

2. All cables must meet Local Code requirements.

RECOMMENDED JOINTS AND TERMINATIONS FOR 15 kV CROSS-LINKED POLYETHYLENE AND POLYETHYLENE CONCENTRIC SINGLE CONDUCTOR PRIMARY CABLES

(See Page 11-5-1 for Acceptable Cables)

Termination's Indoor Only*

PLM Type FSDT
RAYCHEM CAT. HVT-150-G Series
3M Type Quickterm, 5600 Series & 7600 Series

Termination's Indoor or Outdoor

3M Type 5600 Quickterm with Skirts & 7600 Series
RAYCHEM CAT. HVT-150-SG Series
G&W Type PAT 1700 or LCT
Elastimold R2T15 Series
PLM Type FSDW

Splices

3M Catalog No. 5400 & 5500 Series
RAYCHEM Catalog HVS-C-S-1520S
G&W Style 225 or 370
Elastimold 250 & 650 Series
PLM Catalog No. SA to SE-15
RTE Type 2603890A
Plymouth Plyjoint

All terminal connectors must be long barrel compression lugs with two holes, National Electrical Manufacturers Association (NEMA: 1-3/4" spaced, or bendable spike lugs).

Specify insulation thickness and cable diameter when ordering termination's and splices. For any additional information, contact DTE Primary Services.

Loadbreak Elbows and Bushings for Deadfront Transformers

FOR SPECIAL APPLICATIONS ONLY:

Elastimold 167LRT 1601A4 Series
RTE Type 2609459 A_ _/2604797B01M
Cooper LE215 Series

**An indoor installation is one that is in a structure that is conditioned for human comfort. This does not include outdoor meter units, switchgear or transformers. Installations coming within this definition will normally have proper humidity assuring that indoor terminations will be installed in dry locations.*

FUSED LOADBREAK INTERRUPTER SWITCHES, ACCEPTABLE TO DTE ELECTRIC COMPANY FOR PRIMARY SERVICE EQUIPMENT

Manufacturers	**Manufacturers Closing Amps** *(RMS Asymmetrical)*
Federal Pacific Auto-Jet Switch 600A Auto-Jet Switch 1200A	 40,000A 61,000A
S & C Electric Company Mini-Rupter 600A Alduti-Rupter 1200A	 40,000A 61,000A
Powercon Corporation Type PIF 600 A Type PIF 1200 A	 40,000A 61,000A
Square D Company Type HVL 600A	 40,000A
Eaton Type MVS 600A	 40,000A

All manufacturers must use one of these approved loadbreak switches in their switchgear.

LOADBREAK SWITCHGEAR REQUIREMENTS FOR DTE ELECTRIC PRIMARY CUSTOMERS

This document contains the requirements and recommendations for loadbreak switchgear and meter compartments intended for installation as service equipment on the DTE Electric system. It includes construction requirements as well as drawings showing several acceptable arrangements for one and two-line installations. DTE must first review and approve shop drawings of equipment prior to purchase or install.

Loadbreak switches, which have been approved, are listed on Page 11-5-3 of the Electrical Service Installation Guide.

Switch

1. The loadbreak switch(s) shall be three-phase, gang operated, single throw, motor or manual operation. It shall be quick-closing and quick-opening and be independent of the operating handle or motor drive once the blades have started independent movement. Manual switches shall not be awkward, difficult to reach, or difficult to close or open. There must be a means of deactivating and securing any automatic transfer scheme.
2. Switch elements shall be mounted on a metal, grounded frame that grounds the leakage path parallel to the open switch to provide adequate protection in the open position.
3. Switches using a chain link drive shall have a barrier installed to prevent a broken chain from contacting energized equipment.
4. Inverted switches are NOT permitted
5. Multi line customers are required to have an automatic throw over and automatic throwback scheme unless exempted by DTE

Fusing

Type and style of fuse must be approved by DTE Primary Services. The manufacturer must provide spare fuses to service switchgear. Fuses must be hinged (except for double barrel fuses).

Clearances

The following table specifies voltage clearances to be maintained throughout the switchgear including bus-work, cable terminations, metering equipment and any other high voltage equipment.

AIR CLEARANCE IN "INCHES"

	Phase-to-Phase	Phase-to-Ground
4.8kV	**5**	**4**
13.2 kV	**6**	**6**
24 kV	**10.5**	**7.5**

Four (4) inches phase-to-phase and phase-to-ground is acceptable for extruded bus insulation systems on 4.8kV and 13.2 kV.

Note that 4.8kV clearances are provided for existing equipment only, as all new switchgear must be built to 15kV class specifications. Voltage clearances from energized parts including terminations to baffle materials such as micarta and glass polyester shall be a minimum of 1-1/2" at 4.8kV or 13.2 kV and 2-1/2"at 24 kV.

Loadbreak switchgear built for use by Primary customers on the DTE system must be 15 kV class and meet the American Nation Standards Institute (ANSI) and the National Electrical Manufacturers Association (NEMA) standards in addition to the following requirements:

Switchgear Nameplate

The switchgear nameplate must be prominently displayed and include the following information:

1. ***Manufacturer***
2. ***Voltage Class***
3. ***Continuous Current Rating***
4. ***Load Interrupting Rating***
5. ***Momentary Withstand Amperage***
6. ***BIL Rating***
7. ***60-Cycle Withstand***

ACCEPTED SWITCHGEAR MANUFACTURES

The following medium voltage switchgear manufacturers are approved for use as service entrance switchgear for primary customers on the DTE Electrical System. These approvals are not a guarantee of workmanship nor do they preclude the responsibility to correct omissions of the product.

Other manufacturers may be approved after submittal of design and construction methods are substantially evaluated by DTE Primary Services.

- Continental Switchgear
- Electrical Power Products
- Eaton
- General Electric
- Federal Pacific
- Park Detroit
- Powercon
- S&C Electric
- Siemens
- Square D - Schneider Electric

Heating Element

Switchgear intended for outdoor use or for use in areas of high humidity must have strip heaters installed in each cubicle. Strip heater wiring must have high-temperature insulation and be trained away from proximity to the heater element. For longevity a 220V heater strip operated at 120V is recommended.

Locking Devices

DTE uses padlocks with a 3/8” shackle for equipment security and DTE HEC. The following items must have provisions for the installation of padlocks with a 3/8” shackle.

1. ***Switch handles for manually operated switches and spring-charging handles.***
2. ***Doors of incoming line cubicles and feeder positions.***
3. ***Doors of DTE revenue metering cubicles.***
4. ***Doors of cubicles that contain control power transformer secondary knife switches, motor-control secondary switches, or any other points that may be HEC by DTE.***

Metering Cubicle

The metering cubicle shall be easily accessible by a hinged, lockable door and remain under control of DTE. Also, an inner door screen barrier, hinged with “Danger High Voltage” sign. Refer to drawing PC894-41 in appendix for details. No customer-owned components (e.g.; line potential transformers, surge arresters, etc..) will be in the metering cubicle. High-voltage clearances and clearance to baffles will be consistent with that of the entire switchgear (See page 11-5-5).

The potential transformer shelf will be horizontal and of adequate width to accommodate three (3) transformers in an upright position while maintaining previously specified clearances. See sample drawing on Page 11-5-27 for minimum spacing of metering cubicles with or without baffles. Shelf must be a minimum of 18” above the floor.

Should Primary cable be greater than size 4/0 AWG, the meter compartment then must have insulator supported bus bars to terminate and support the cables.

Positioning of potential and current transformers must allow visual inspection of primary and secondary connections and serial numbers of same while equipment is energized. The 15kV potential transformer cable will be provided by DTE as well as the multi-conductor cable for the potential and current transformer secondaries. Contractor will provide DTE with length required to reach DTE meter connection cabinet from the meter cubicle.

Meter cubicle shall have welded condulets for training of secondaries to the outgoing conduit. The conduit from the meter cubicle to the meter connection cabinet will be 1-1/2" rigid steel and contain the potential transformer and current transformer secondary cable and a separate, #2 copper ground conductor with 600V insulation. Fused metering potential transformers may be required when metering is on the utility side of the main switch and the customer is served from all-underground power lines, industrial substation, services 24kV and above, or the available fault currents exceed 7,000A at 13.2kV or 10,000A at 4.8kV. Consult DTE Primary Services.

Switchgear for Two-Line Operation

Adjoining switchgear positions that contain both incoming lines must be gas-proofed as outlined in the Gas-Proofing section of this publication (Page 11-5-9). See example drawings for suggested bushing locations.

Switchgear fed from more than one DTE line must have an interlock system to prevent the customer from electrically paralleling any two DTE lines. A key interlock system for manual switchgear or an electrical interlock system for automatic switchgear can accomplish this. An extra key or key-operated electrical "Interlock bypass" switch must be provided to permit paralleling by DTE personnel under controlled conditions. The key will remain under sole control of DTE Primary Services. Reference DTE control scheme Spec drawings (Page 11-5-8).

Automatic Loadbreak Switchgear

Switchgear built for automatic operation shall conform to conditions previously mentioned for two-line operation as well as meeting the following requirements:

1. *Must have an automatic-manual switch.*
2. *May have a key-operated "Interlock-bypass" switch.*
3. *Must have an approved throw over scheme (drawings provided to DTE Primary Services).*
4. *Potential transformers, which are located on the line side of the main switch, must have secondaries equipped with a gang operated open knife-blade switch (blades de-energized when open) appropriately located for ease of DTE HEC. Line potential transformers are to be fused. Fuses must be easily accessible by a hinged door.*

5. *There must be a means of mechanically and electrically disabling the switch operator (motor, spring or spring charging mechanism) and a means of padlocking the switch operator to prevent closing when DTE HEC is required.*

6. *A three-phase voltmeter shall be mounted on the front side of the switchgear for each line to prove to the operator that each line is energized.*

DTE Specification Drawings

The following DTE specification drawings are available in the appendix:

5PC894-38 - Two Line Automatic Throw Over Scheme
5PC894-39 - Parallel/Radial Operation Control Scheme
PC894-40 - Partial Schematic – Normal/Alternate A.T.O. Scheme
5PC894-41 - Metering Equipment Compartment
PC894-42 - Interruptible Service Control Scheme
5PC894-43 - Two Line A.T.O./Line Select A.T.O. Scheme

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Gas Proof Bushings

Adjacent compartments, containing separate incoming services, and tie compartments must be gas proofed to prevent the transfer of ionized gasses during certain fault conditions. This may be accomplished in either of the following ways:

A. Preferred Arrangement

The preferred arrangement employs the use of a gas proof bushing and mounting flange assembly, 15 kV class with a 95 kV BIL rating as shown on Page 11-5-10. This bushing should always be mounted in a steel wall between incoming line compartments or in the horizontal wall (steel shelf) between the upper and lower sections of the tie switch compartment. It is recommended that bushing specifications be submitted to Primary Services for approval prior to the switchgear being built. Construction of the wall between adjoining compartments should also limit the transfer of gas to the adjoining compartment.

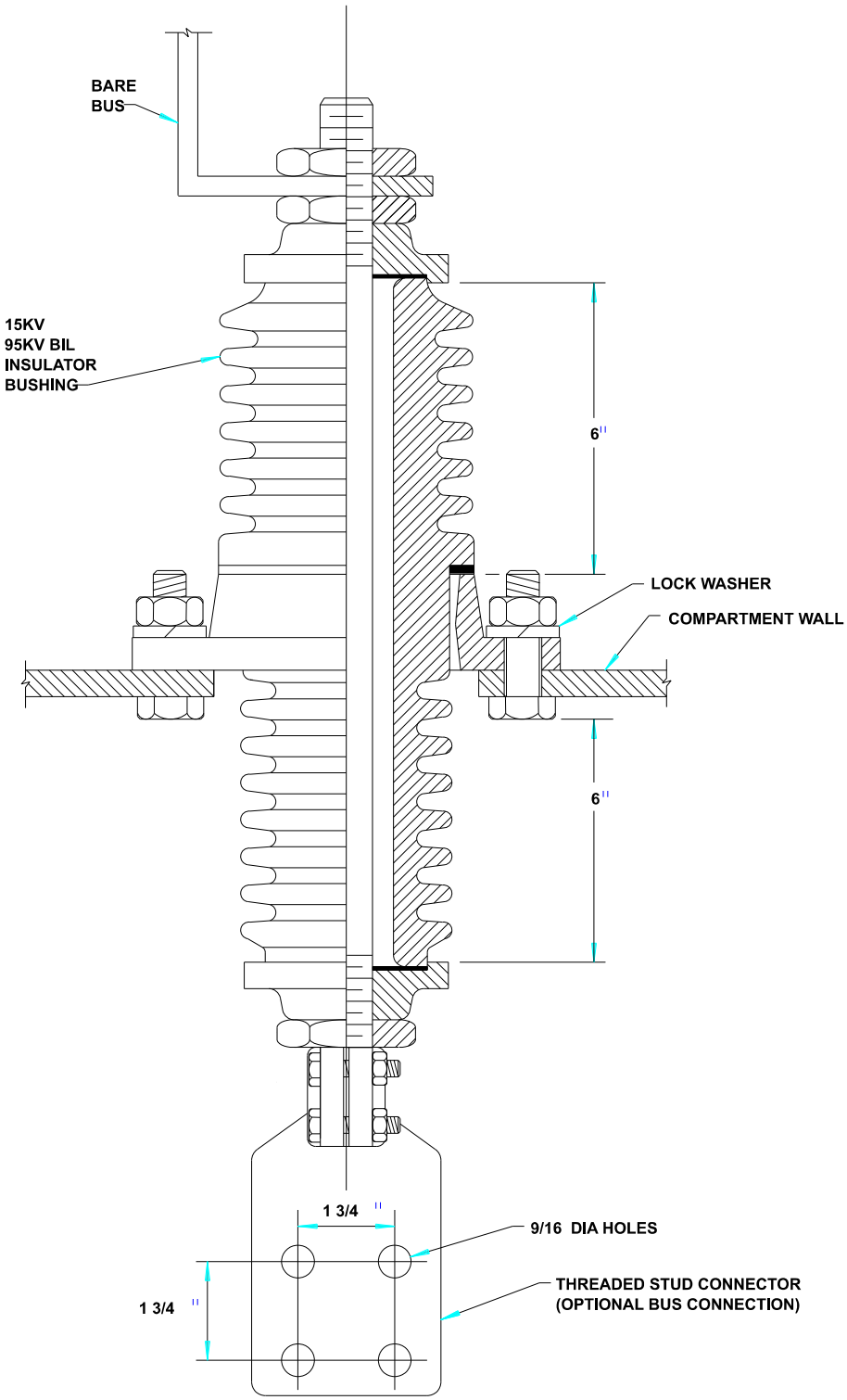
B. Alternative Arrangement

The alternative arrangement employs the use of an oval or rectangular, 15 kV 95 kV BIL rated insulator (see Page 11-5-11) having a minimum leakage distance of 1” per kV line to ground voltage (8” for 15 kV class switchgear) inserted between the bus bar and the sheet metal or insulating board compartment wall. The air space between the bus bar and insulator should be less than 1/8” on all sides of the bus and be sealed with duct seal, RTV, or in some other appropriate manner. The bus bar must have appropriate non-tracking insulation extending 6” on either side of the wall or shelf. Insulated boards must have 1/4” minimum thickness to contain forces developed in certain types of faults. Again, construction of walls between adjoining compartments should limit the transfer of gas between them.

Insulators

Porcelain or cycloaliphatic epoxy insulators are required in cubicles containing DTE meter instrument transformers & incoming power cable, and are recommended throughout the switchgear line-up. Glass polyester products are not acceptable.

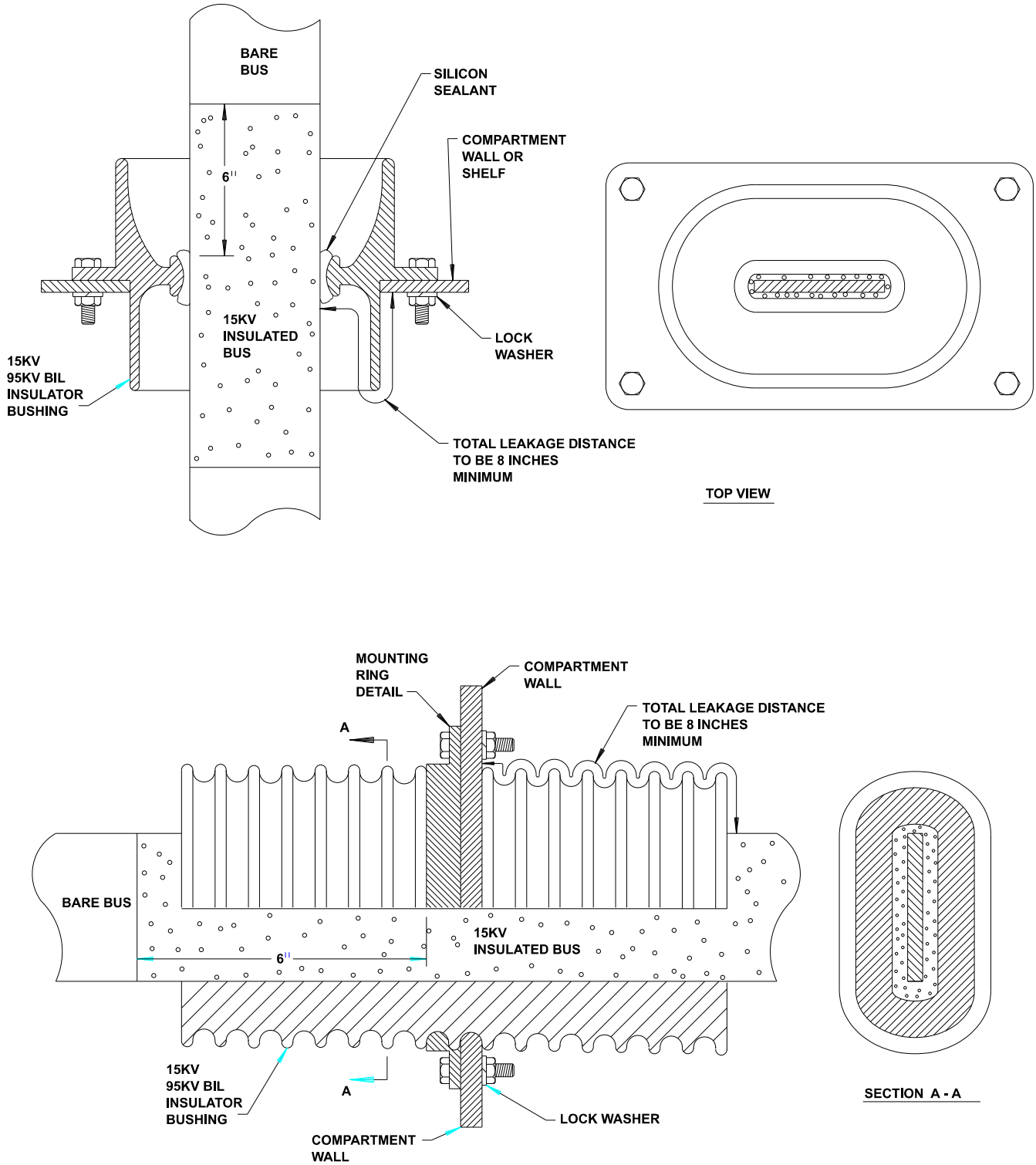
PREFERRED ARRANGEMENT FOR GAS PROOFING
TYPICAL CONFIGURATION
FIGURE #1



GAS - PROOF
FEED THROUGH BUSHING

DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

ALTERNATE ARRANGEMENT FOR GAS PROOFING
TYPICAL CONFIGURATIONS
FIGURE #2



DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

General Construction

Doors

1. Doors of fused positions must be mechanically or key-interlocked with that corresponding switch handle, so the door cannot be opened unless the switch is open. Conversely, the interlock must prevent the switch from being closed when the door is open.

2. If the tie position is fused, that position must have an upper and lower metal door, or one outer metal door and two hinged inner doors constructed of minimum 1/4" Plexiglas or sturdy screen with a sign reading, **“WARNING! OPEN BLADES MAY BE ENERGIZED.”** Inner doors may have a simple latching mechanism.

3. Door and door hardware (hinge, 3-point latch, door handle) shall be attached to switchgear by a minimum 3/8” bolts with nuts and lock washers or welded.

4. Doors must have a 3-point, heavy duty, high strength latch and sturdy handle.

5. Two hinges are required for doors under 36” high. Three hinges are required for doors from 36” through 72” high. Four hinges are required for doors over 72” high. Hinge pins must be stainless steel and 5/16” diameter minimum.

6. Switch compartments must have a window built with safety glass or equivalent for easy viewing of switch status by a person of normal height.

7. Outdoor switchgear shall be equipped with door stops.

8. Access to exposed live parts in excess of 600V shall require two separate conscious acts. The first shall be the opening of a door or barrier, which is located or otherwise, secured against unauthorized entry. The second act shall be either the opening of a door or the removal of a barrier.

Miscellaneous

1. All components are to be mounted in a suitable and adequate housing of minimum 11-gauge steel or UL equivalent. Outdoor enclosures shall be suitably rain-proof, dust-proof, and provided with a heater and ventilation adequate to prevent water condensation. Provide air filter material behind vents to filter air contaminants, snow, etc., from entering switchgear. Louvers shall be screened to prevent insertion of foreign objects into switchgear. Indoor enclosures should be rain proof if located in an area susceptible to water damage.

2. All installations shall be tamper-proof commensurate with the degree of access by unqualified personnel. Warning signs indicating **"DANGER! HIGH VOLTAGE – KEEP OUT!"** and the voltage level shall be provided on the outside of doors, panels or barriers that can be removed to expose energized equipment. Reference NEMA Standards No. 260-1996.

3. Inadequate components such as cable bus, 5kV materials, etc., will not be acceptable.

4. Compartments containing components such as current and potential transformers, surge arresters, or any components that may require periodic inspection, maintenance or testing should be easily accessible by a hinged, lockable door. There should be no hazard associated with reaching over energized equipment.

5. Arresters should be electrically located as near as possible to the components that are intended to protect yet located where a violent failure of the arrester will not damage other components such as transformer windings, cable terminations or current and potential transformers. Baffles may be required to accomplish this and must provide for easy inspection of the arresters while energized in case of suspected failures.

6. Arresters are not to be installed on the utility side of a main switch when connected to T-tapped all-underground power lines.

7. All line side bus work and components must be supported by 15kV, 95kV BIL rated porcelain or cycloaliphatic insulators.

8. On multiple service installations, the incoming service cable cubicle must be constructed so that workers can work on the cable terminations without the hazard of leaning over an energized switch, bus or other equipment. Provisions (e.g., horizontal support shelf) must also be made to prevent tools or other equipment from dropping into energized equipment while working on terminations.

9. Suitable operating instructions must be provided with switchgear.

10. Outdoor switchgear will be enclosed by a buried ground ring consisting of at least six, 8' x 5/8" driven copper-clad ground rods connected by 4/0, bare, stranded copper cable. Ground rods connect to the ring via Cadweld, Anderson or Hubbell connectors, type GC10302 or equivalent. A minimum of two 4/0 bare, copper risers will be connected to the switchgear by two-hole compression lugs or double bar taps.

11. The ground mat resistance will be five (5) ohms or less. The switchgear shall have a means to ground the cable termination neutrals/ grounds Fprimain near proximity of the cable terminations (utilize double split bolt connection). The ground bus shall be copper and continuous throughout the switchgear including the meter cubicle.

12. The customer is responsible for switchgear signage. Signage must follow ANSI standards. DTE Primary Services will notify the customer of any special signage required prior to energizing the switchgear.

13. All current circuit secondary terminations should utilize uninsulated ring lug connectors.

14. An easy means to test and ground the bus on the incoming line position needs to be provided.

General Switchgear Arrangement Drawings

The following are sample drawings of switchgear arrangements:

In preparing these drawings, it is assumed that the switch to be used is identified on the list of acceptable equipment (page 11-5-3 of the Chapter 11). The various two-line configurations in this package are designed to provide for the safety of personnel during testing and/or cable replacement while allowing the customer to maintain near normal operations. Rear cable access is preferred.

Single Line Service

Page 11-5-17 identifies the typical configuration for a single line customer. It may utilize one of the available combination meter/switch units or, as pictured, utilize freestanding switchgear. The advantage of the freestanding equipment is the ease of expansion should a second switch and transformer be required.

Two-Source One-Load Carrying Line

This arrangement requires ATO scheme. See Appendix (5PC894-38- Two Line Automatic Throw Over Scheme)

Page 11-5-18 and its alternatives identify suggested configurations wherein the customer has full redundant service available but is normally served by one load carrying line.

Page 11-5-18 identifies suggested configurations designed for rear or top entry.

Page 11-5-19 is an acceptable alternative; however, it minimizes the potential for future expansion.

Page 11-5-20 is an alternative where the equipment will be located against a wall and rear entry is not available.

Page 11-5-21 is another option for front access equipment.

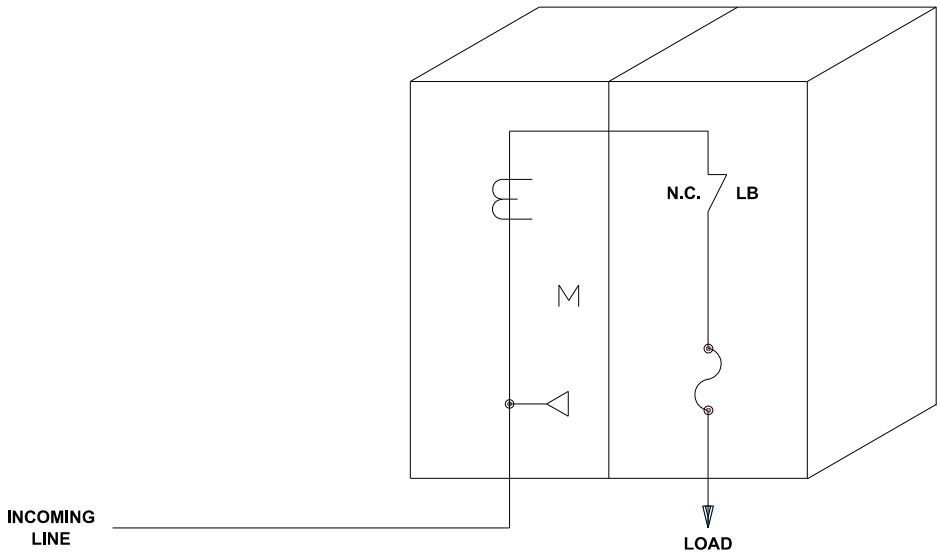
Two-Source Two-Load Carrying Lines

This arrangement requires ATO scheme. See Appendix (5PC894-38- Two Line Automatic Throw Over Scheme)

Page 11-5-22 and its alternatives can be used for two-line facilities. If bottom entry is not available a transition compartment may be required

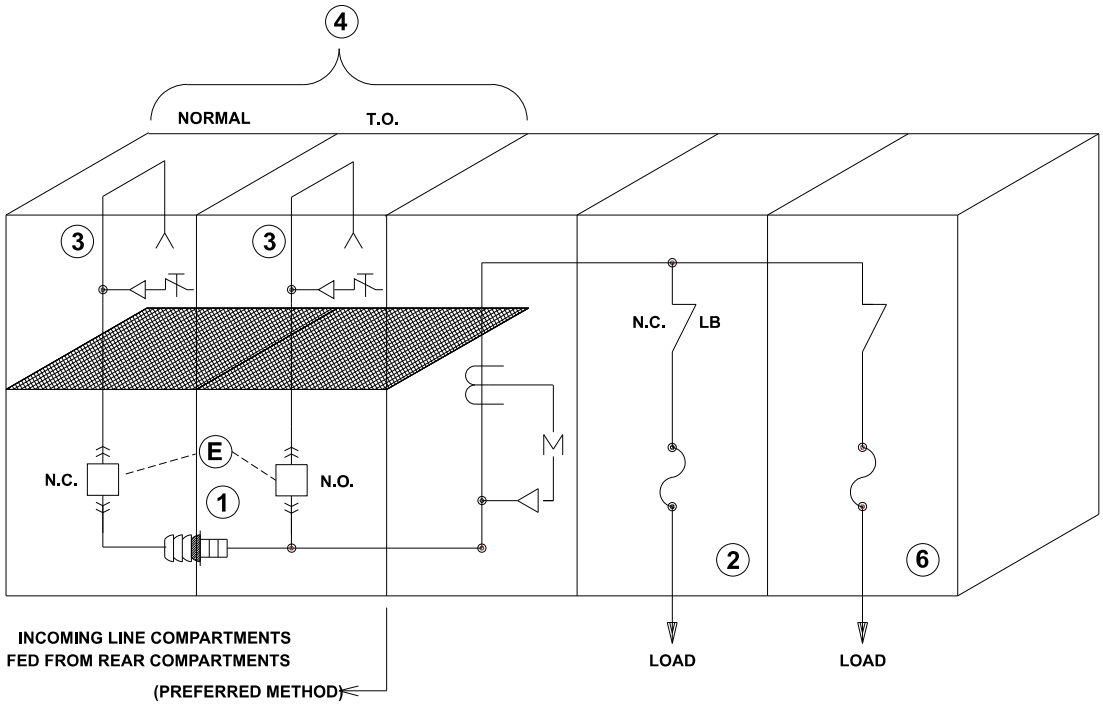
Page 11-5-23 configuration provides the greatest degree of flexibility where rear access is available.

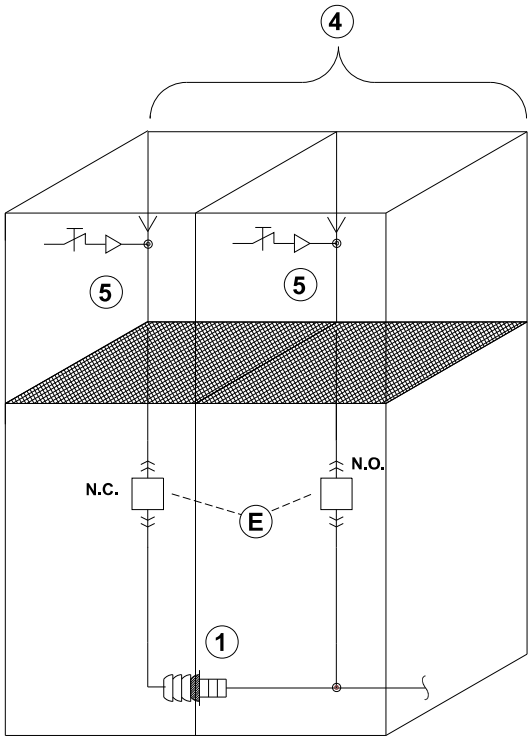
ONE LOAD CARRYING LINE
ONE SOURCE



SYMMETRICALLY OPPOSITE PERMISSIBLE

ONE LOAD CARRYING LINE
TWO SOURCES





INCOMING LINE COMPARTMENTS
FED FROM TOP COMPARTMENTS
(ALTERNATIVE METHOD)

APPLICABLE TO THE
FOLLOWING:

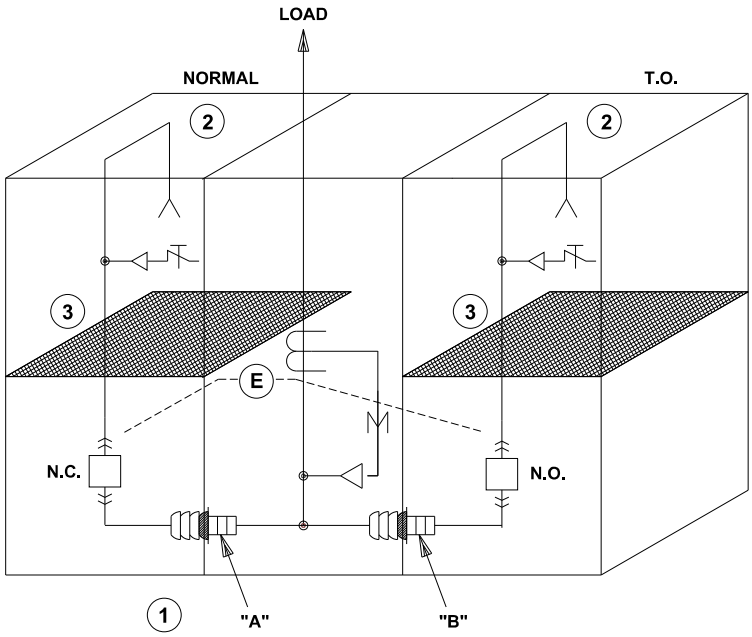
11-5-18 11-5-19
11-5-23 11-5-24

NOTES:

1. GAS BARRIER REQUIRED. 15KV, 95KV BIL, ALL SWITCHGEAR APPLICATIONS.
2. FEEDER LOADBREAK SWITCH OPTIONAL.
3. SERVICE CABLES ENTER AT REAR OF COMPARTMENT, ACCESSIBLE VIA HINGED DOORS.
4. SERVICE CABLES ENTER AT TOP OF COMPARTMENT, ACCESSIBLE VIA HINGED DOORS. PROTECTIVE SHELF REQUIRED.
5. BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15 KV, 95KV BIL.
6. ADDITIONAL BAYS AS REQUIRED.

E — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

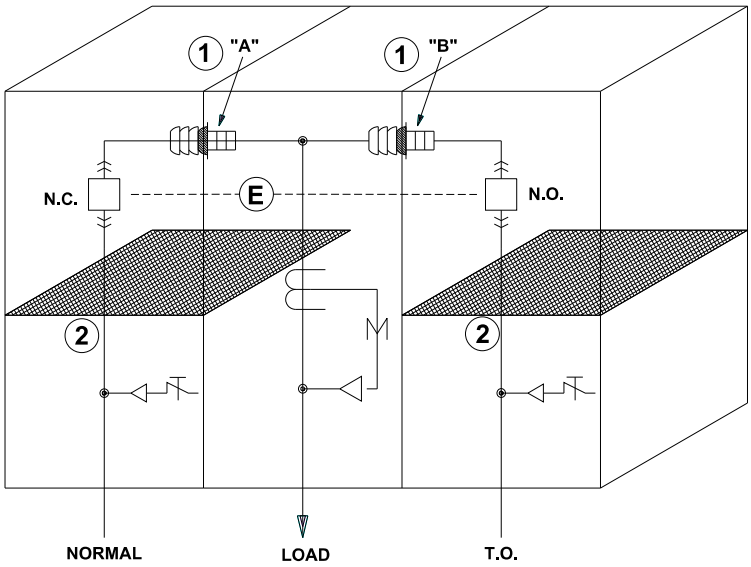
ONE LOAD CARRYING LINE (OPTION A)
TWO SOURCES



NOTES:

1. GAS BARRIER REQUIRED AT "A" AND "B".
2. SERVICE CABLES ENTER AT REAR OF COMPARTMENT ACCESSIBLE VIA HINGED DOOR. (SEE 11-5-18 FOR TOP FED ALTERNATIVE)
3. BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15 KV, 95KV BIL.
E. ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

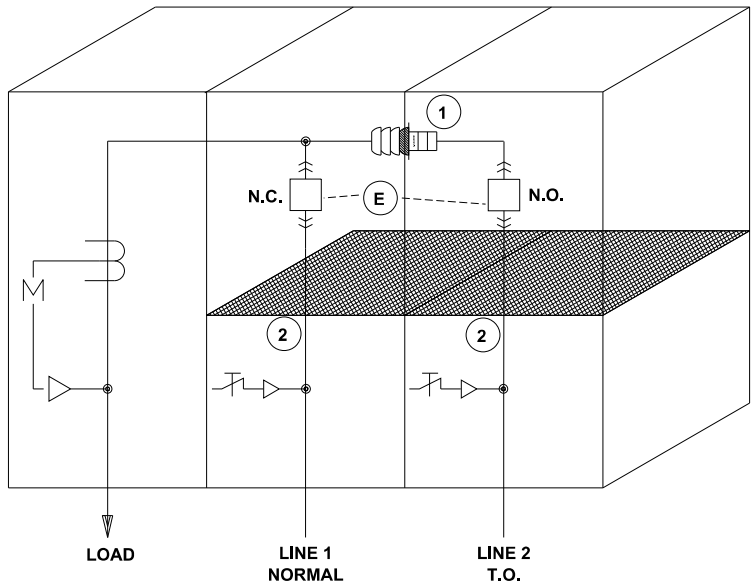
ONE LOAD CARRYING (OPTION B)
TWO SOURCES



NOTES:

1. GAS BARRIER REQUIRED
2. BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF. MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15KV, 95KV BIL.
E. ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

ONE LOAD CARRYING (OPTION C)
TWO SOURCES



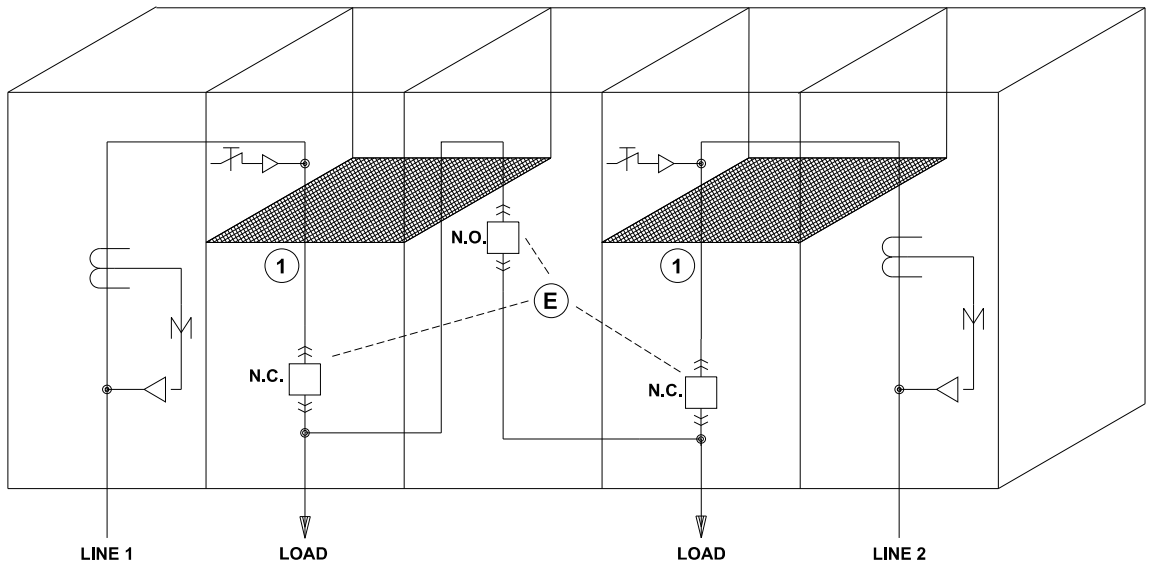
NOTES:

(1) — GAS BARRIER REQUIRED

(2) — BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF. MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15KV, 95KV BIL.

(E) — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

TWO LOAD CARRYING LINES

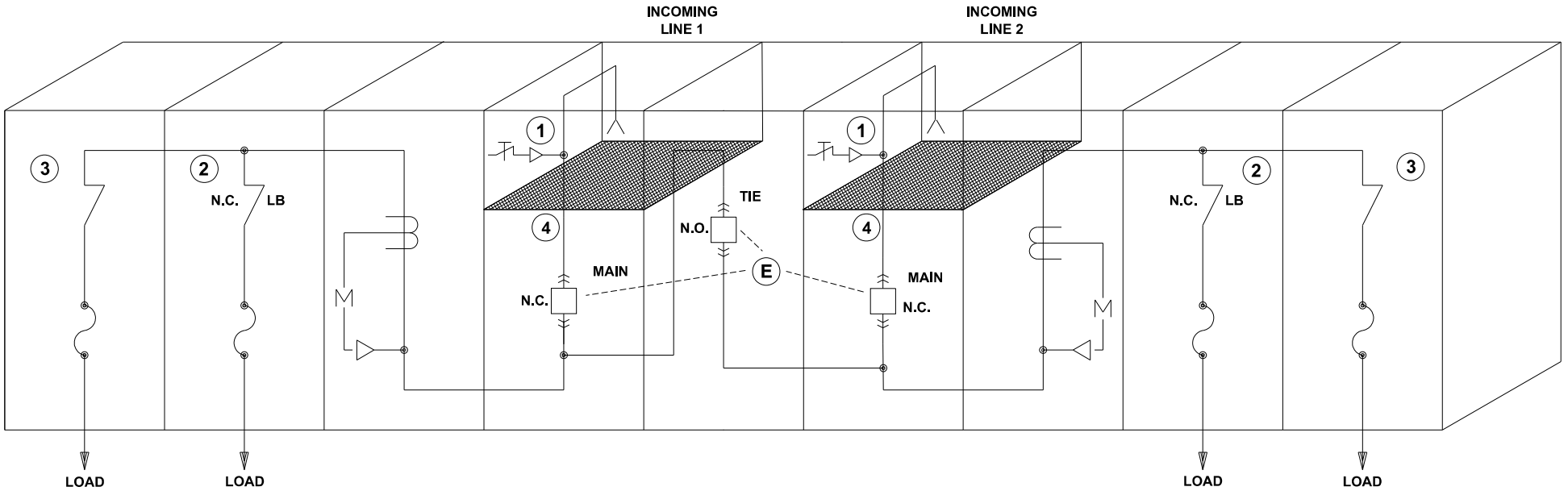


NOTES:

(1) — BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15 KV, 95KV BIL.

(E) — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

TWO LOAD CARRYING LINES (OPTION A)



NOTES:

(1) — SERVICE CABLE ENTRANCE AT REAR OF COMPARTMENT ACCESSIBLE VIA HINGED DOOR. (SEE 11-5-18 FOR TOP FED ALTERNATIVE).

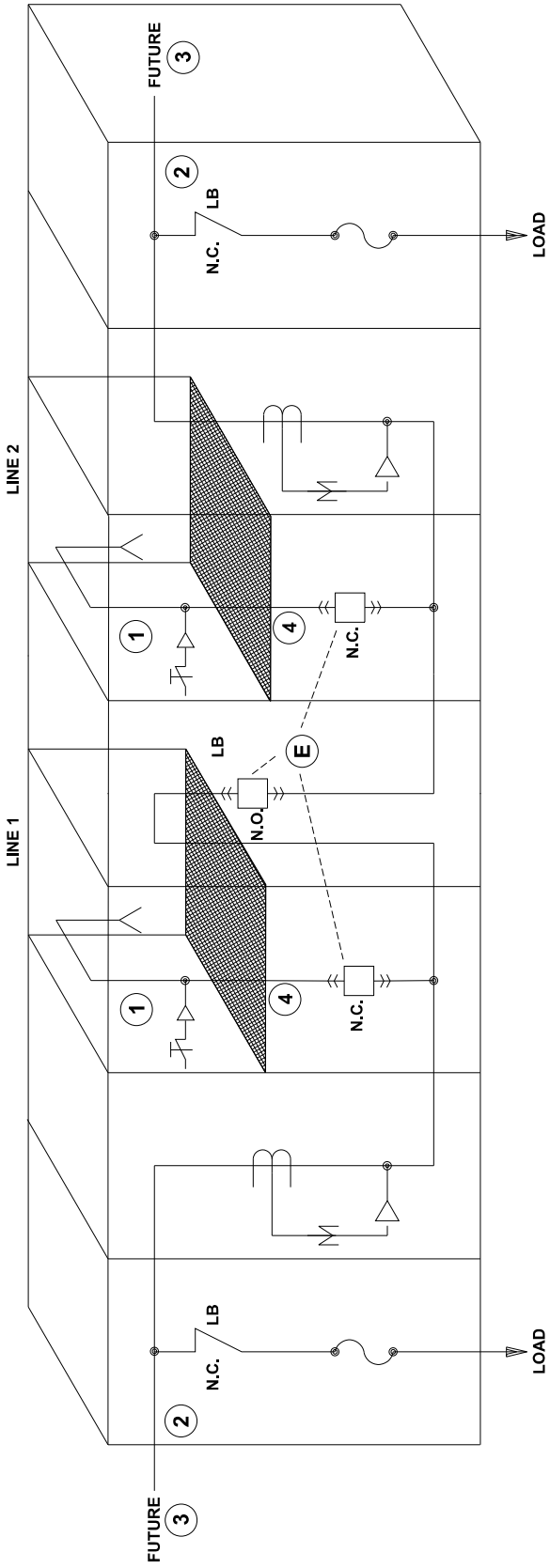
(2) — FEEDER LOAD BREAK OPTIONAL.

(3) — ADDITIONAL FEEDER POSITIONS AS REQUIRED.

(4) — BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15 KV, 95KV BIL.

(E) — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

TWO LOAD CARRYING LINES (OPTION B)

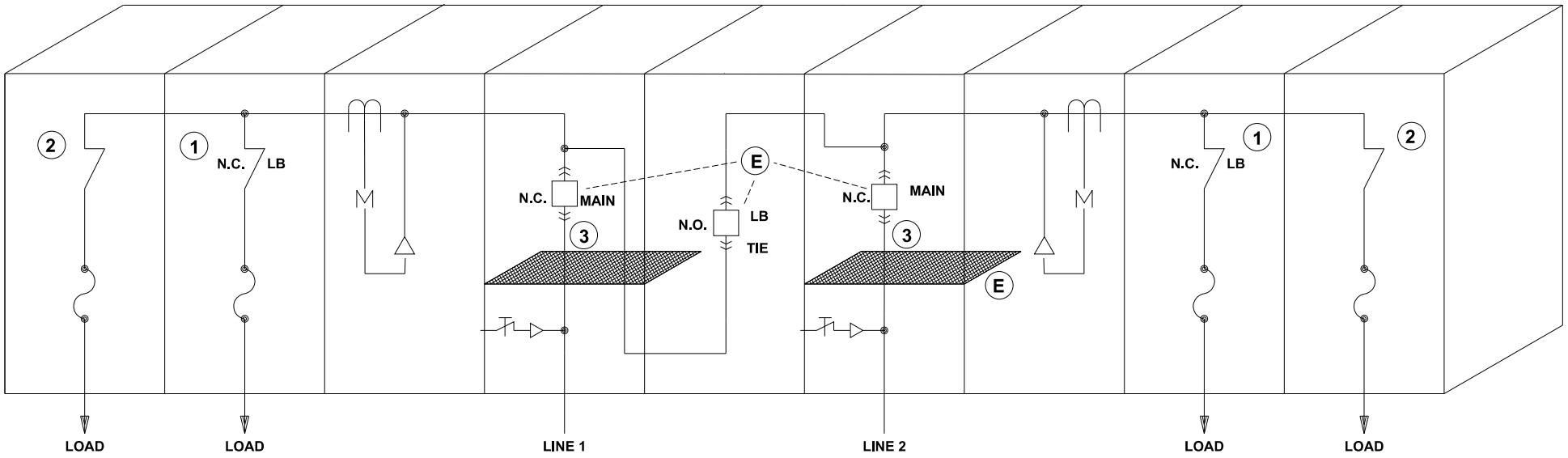


NOTES:

1. SERVICE CABLE ENTRANCE AT REAR OF COMPARTMENT ACCESSIBLE VIA HINGED DOOR. (SEE 11-7-22 FOR TOP FED ALTERNATIVE).
2. FEEDER LOAD BREAK OPTIONAL.
3. ADDITIONAL FEEDER POSITIONS AS REQUIRED.
4. BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15 KV, 95KV BIL.

E — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

TWO LOAD CARRYING LINES (OPTION C)



NOTES:

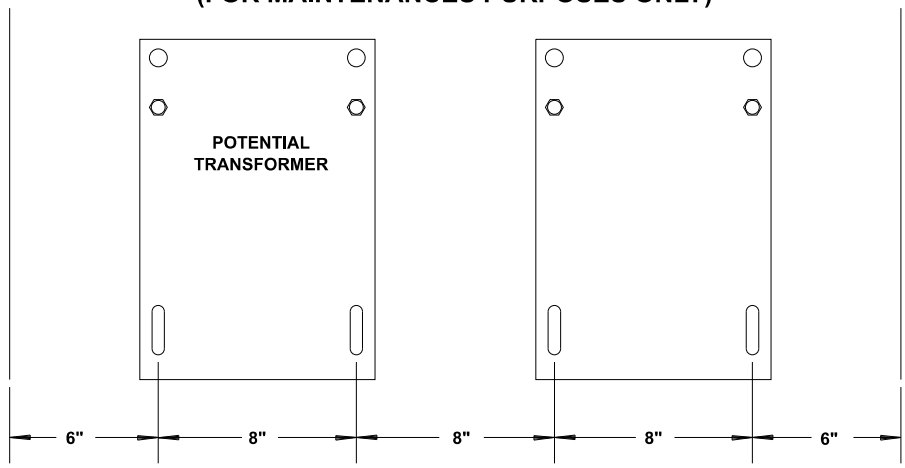
(1) — FEEDER LOADBREAK OPTIONAL.

(2) — ADDITIONAL FEEDER LOADBREAKS AS REQUIRED.

(3) — BUS NOT TO BE IN PHYSICAL CONTACT WITH SHELF. MINIMUM 1 1/2" SPACING. INSULATE BUS IN VICINITY OF SHELF FOR 15KV, 95KV BIL.

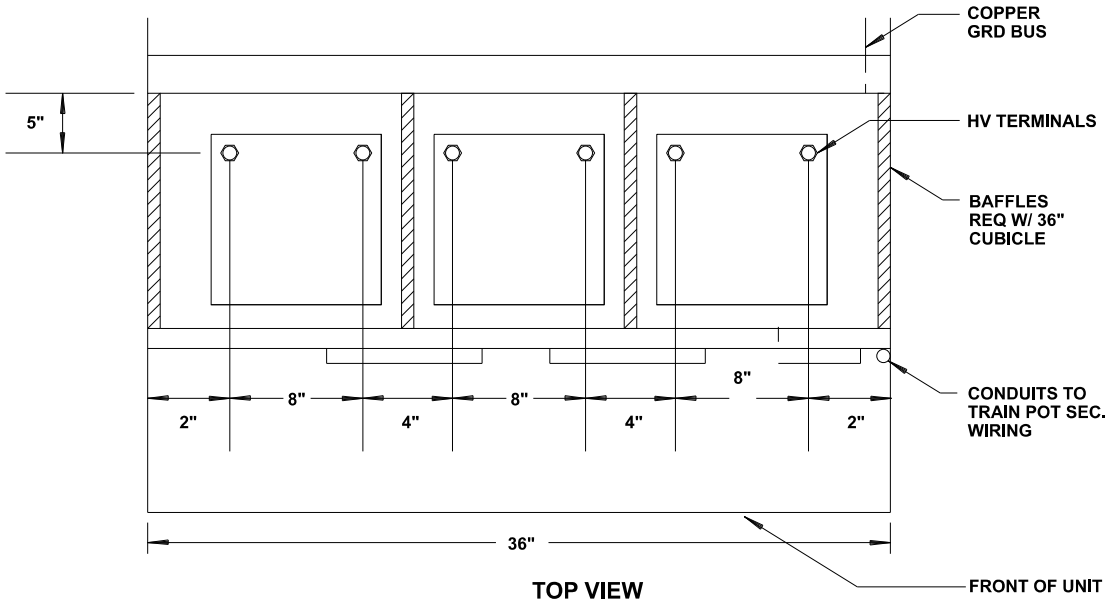
(E) — ELECTRICAL INTERLOCK AND AUTOMATIC THROWOVER

MINIMUM METERING CUBICLE CLEARANCES (36 INCH WIDE) FOR POTENIAL TRANSFORMERS (FOR MAINTENANCES PURPOSES ONLY)



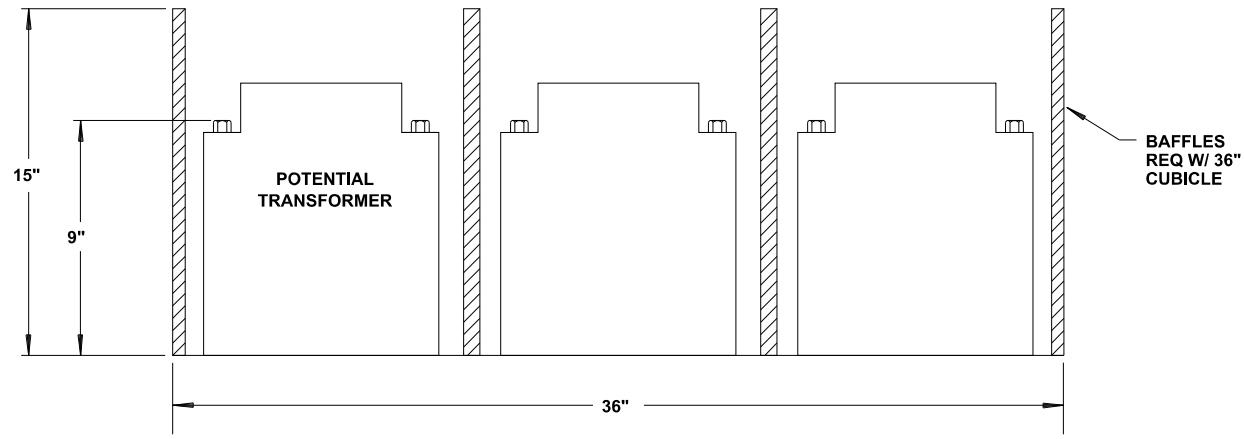
TOP VIEW

4.8 kV SPACING
(BAFFLES NOT REQUIRED)



TOP VIEW

13.2 kV

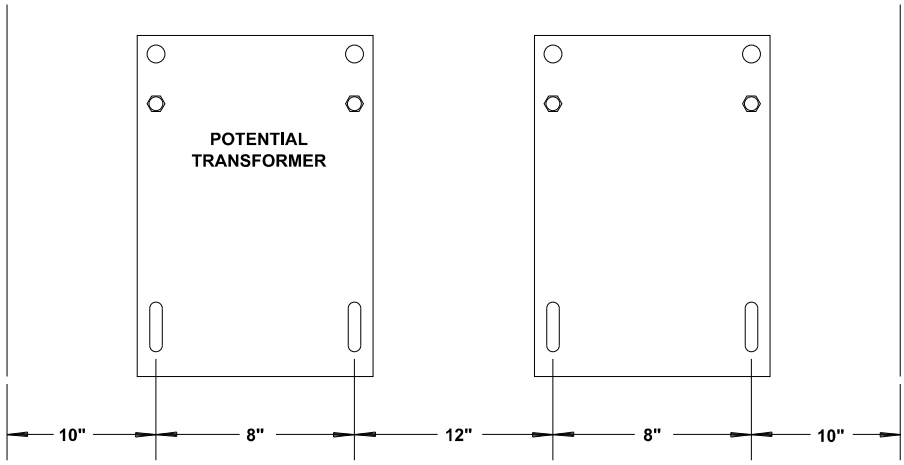


FRONT VIEW

13.2 kV MINIMUM SHELF SPACING

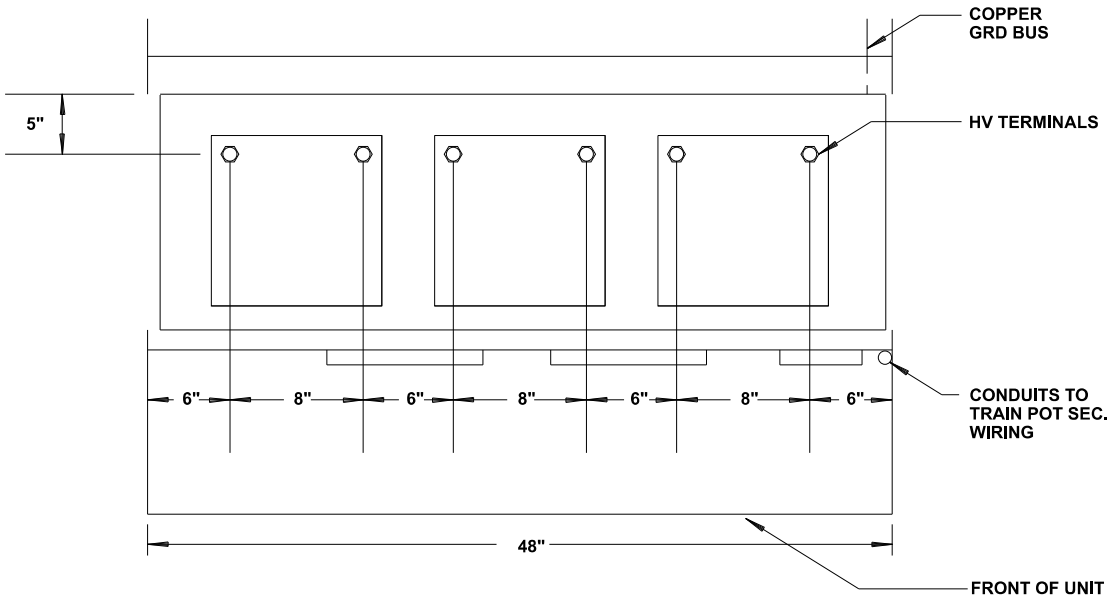
DTE ASSUMES NO RESPONSIBILITY FOR INJURY
OR DAMAGE ARISING FROM THE USE OF THIS SPECIFICATION DIAGRAM.

MINIMUM METERING CUBICLE CLEARANCES (48 INCH WIDE) FOR POTENIAL TRANSFORMERS



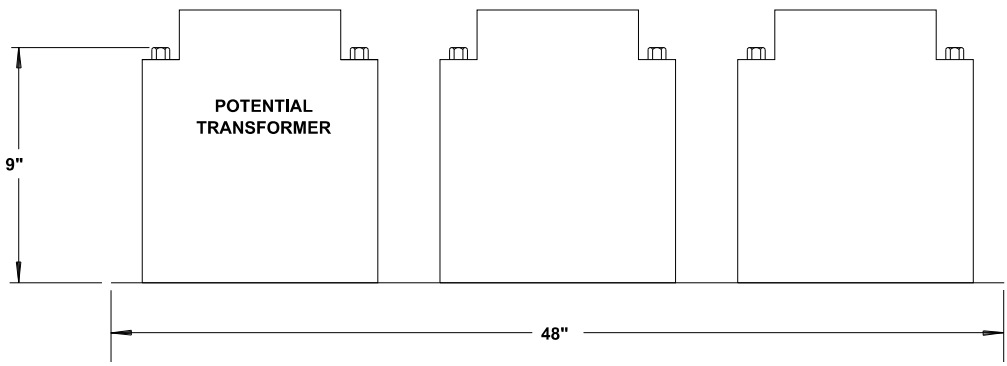
TOP VIEW

4.8 kV SPACING
(BAFFLES NOT REQUIRED)



TOP VIEW

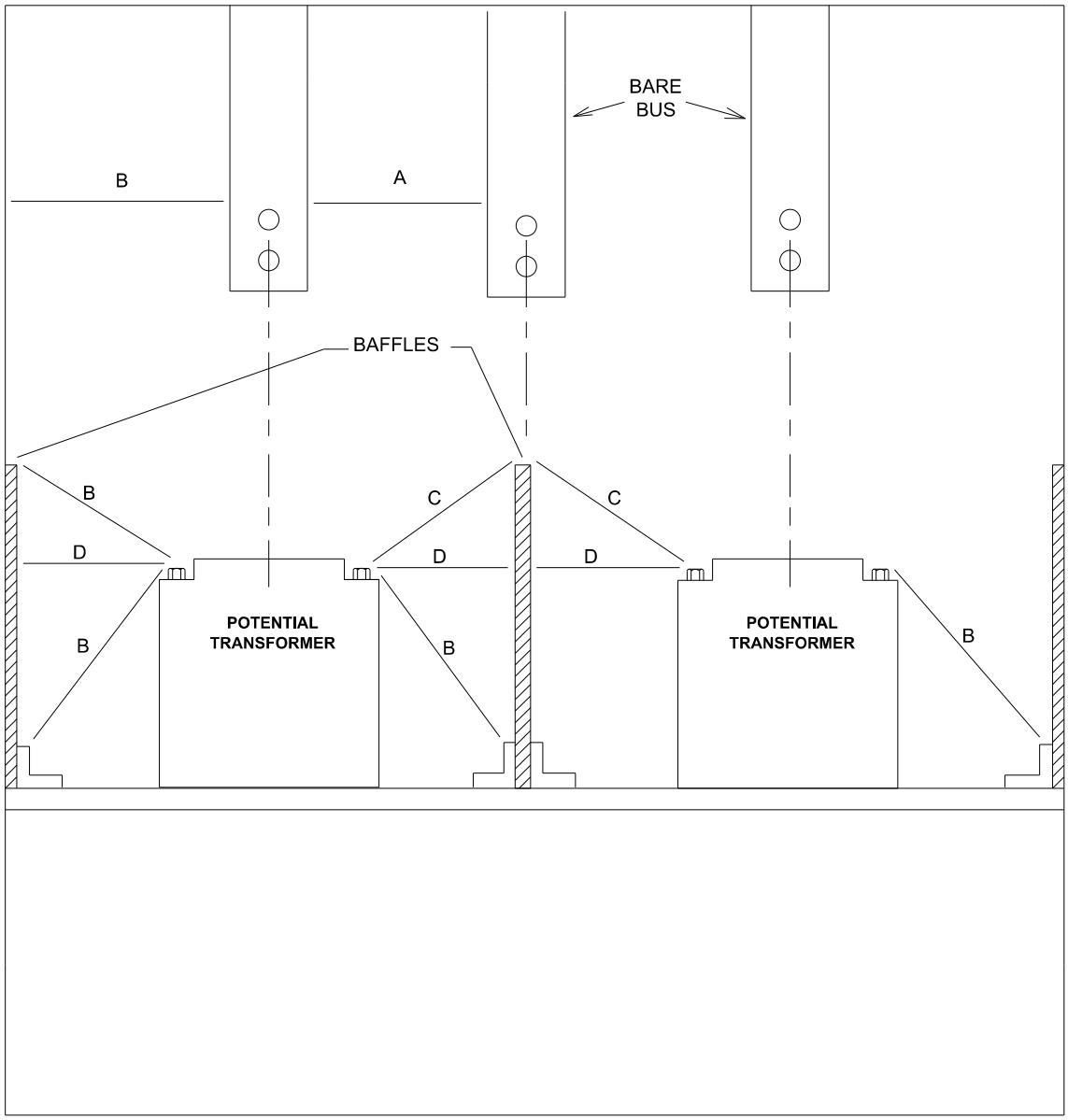
13.2 kV



FRONT VIEW

13.2 kV SHELF SPACING
(BAFFLES NOT REQUIRED)

MINIMUM AIR CLEARANCES



VOLTAGE CLASS KV	A PHASE-PHASE	B PHASE-GROUND W/O BAFFLE	C PHASE-PHASE WITH BAFFLE	D ENERGIZED PART TO BAFFLE
5	5	4	6	1.5
15	6	6	9	1.5
24	7.5	7.5	12	2.5

DIMENSIONS IN INCHES

SUBTRANSMISSION POWER SERVICES STPS INSTALLATIONS

1. Purpose

Sub Transmission Power Services are special services provided to economically supply secondary electrical loads off the DTE sub transmission grid to offset large investments on distribution line extensions that would be normally required to serve such customer loads, due to current configurations of the DTE distribution system.

2. Installation Specifics

Customer loads fed from the Subtransmission Power Service installation are typically high flicker welding loads or standard power loads that are not economically fed from the DTE medium voltage distribution system. Customer service voltages available are 480Y/277V, or 240V or 480V corner grounded delta systems. 208/120V, or ungrounded delta 240V or 480V systems are not allowed and are not available. Subtransmission Power Services installations are revenue metered at the utilization voltage of the service and located at the customer service entrance equipment. Fault duty from Subtransmission Power Service installations are usually high and may require special service entrance equipment to be adequate for installation. Subtransmission Power Services are fed from the 24 or 40 kV DTE power grid and require special requirements for customer service entrance equipment to meet current Lock-out, Tag-out protection requirements.

3. Subtransmission Power Service Components

The subtransmission line extension on and to the customers property will be designed, built, operated and maintained by DTE. The wooden structure supporting the power transformers, and secondary make-up bus on and to the customer’s property will be designed, built, operated and maintained by DTE. The transformers on the wooden structure will be installed, connected and maintained by DTE. The overhead or underground secondary drop to the customer’s riser or revenue metering enclosure will be provided and connected to the customer riser or revenue metering enclosure. Final connections at the transformer secondary make-up bus will be by DTE. The revenue metering compartment whether remote from, or part of the secondary switchboard, will be provided, installed and maintained by the customer. The customer service entrance equipment will be provided, installed and maintained by the customer. DTE Primary Services must receive detailed shop drawings and issue approvals on such equipment before it is purchased or installed. The customer must provide a service entrance ground ring around the service entrance equipment to meet requirements of DTE Primary Service Installations.

4. Customer Installation Specifics

(a) Service Drop: The service drop will be composed of either 500 of 750 MCM copper or aluminum conductors. The insulation of the conductors must be RHW/USE, XLP or jacketed EPR conductors. THHN conductors are not allowed. Overhead drops may be single conductor, bundled or messenger style conductors. All service drop conductors must be approved by Primary Services prior to purchase or installation.

(b) Revenue Metering Enclosure: The revenue metering enclosure whether remote from or incorporated into the service entrance switchgear will be installed by the customer. The meter enclosure may be a remote CT compartment, but must be rated the same as the service entrance main switch or breaker. The revenue meter compartment must be equipped to install three 600 volt class CT's and three 600 volt class PT's. The metering transformers will be provided and installed by DTE.

5. Service Entrance Equipment

Customer service entrance equipment must be approved by DTE Primary Services prior to purchasing and installing. Special requirements are required to interrupt high fault currents and DTE HEC requirements. Customers will be given the fault duty of the insulation from the DTE customer Account Representative. The customer's electrical advisor will select the service entrance device and submit the necessary shop drawings for approval. The service entrance main switch or main breaker must meet DTE Primary Services requirements. The main switch or device must be one of the three main disconnect devices:

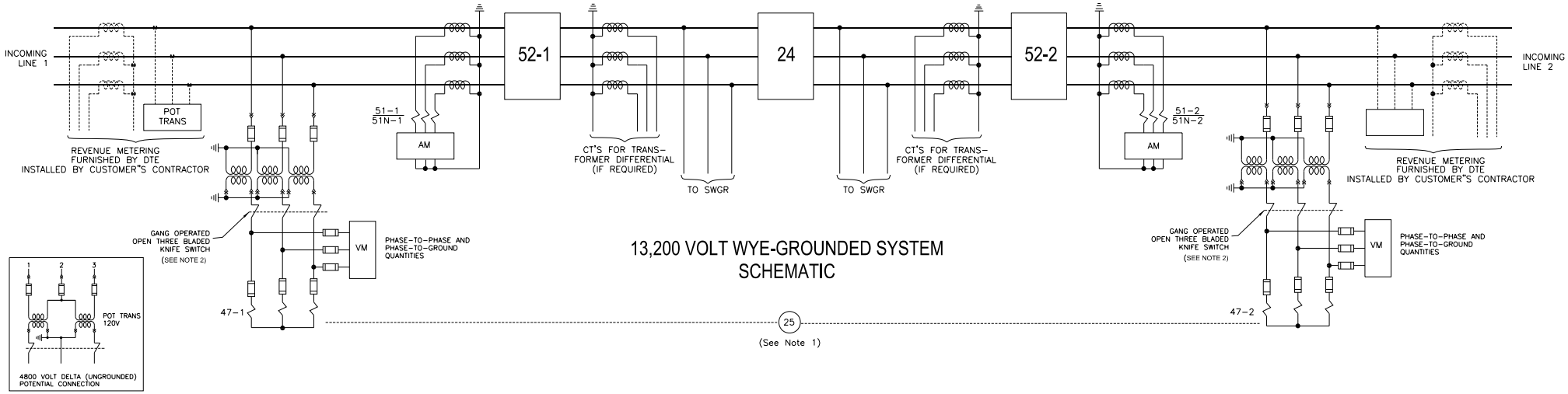
- An approved safety switch that allows clear viewing of the open switch blades when the cover is opened for inspection.
- A main disconnect switch in a fabricated switchboard that has hinged doors or a window to view the open switch blades with ease.
- A molded case circuit main breaker that has a draw-out mechanism to provide HEC provisions for circuit maintenance.

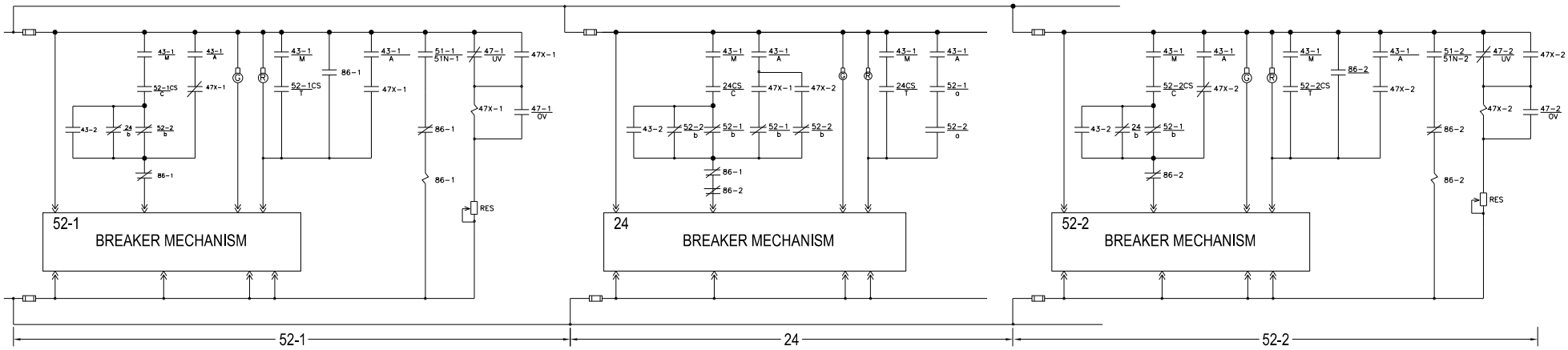
Note: Non draw-out molded case circuit breakers and disconnect switches that are unable to show status and clear opening of switchblades are not allowed as service equipment for Sub Transmission Power Services. Customer owned metering and potential devices on the line side of the main switch or circuit breaker must have a open blade knife switch as a secondary disconnecting device. The knife switch will be installed in an enclosed, labeled compartment with hinged doors that may be padlocked by a hasp or other captive device. All service entrance equipment that is capable of being padlocked must accept a hasp with 3 3/8-inch shank.

6. Special Customer Services

Subtransmission Power Services usually come with a monthly Rider-2 optional facilities charge to cover DTE investment costs of line extension and equipment installation, maintenance and repair considerations. Occasionally when the customer has faculties to install and maintain this equipment, the line extension and transformer structure on the customer's property may be purchased and installed by the customer to reduce the initial investment or Rider-2 monthly charge. In this case the transmission line, transformers and transformer structure will be installed, owned and maintained by the customer. All designs for such services must have customer solicited engineering drawings and be pre-approved by DTE Primary Services prior to the start of construction of the project. All DTE HEC requirements for STPS services also stand for customer owned services.

APPENDIX





CONTROL DIAGRAM DEVICES	
DEVICE NO.	DEVICE FUNCTION
25	SYNC CHECK. SEE NOTE 1.
43-1	SELECTOR SWITCH – "AUTO-MAN"
43-2	BY-PASS SWITCH – "INTERLOCK-BYPASS" POSITIONS. (KEY LOCKED PISTOL GRIP SWITCH) MAINTAINED POSITION. UNDER DTE CONTROL.
47	PHASE SEQUENCE & UNDERVOLTAGE RELAY
47X	AUXILLARY RELAY
86	LOCKOUT RELAY
52	BREAKER MECHANISM, OPERATED CONTACT (OPERATES IN OPERATING POSITION ONLY) DISCONNECTING CONTACT, CLOSED WHEN DEVICE IS IN THE CONNECTED POSITION
51	TIME DELAY OVERCURRENT RELAY
51N	TIME DELAY NEUTRAL OVERCURRENT RELAY
24	TIE BREAKER
CS	BREAKER CONTROL SWITCH
RES	RESISTOR

OPERATION OF AUTOMATIC TRANSFER

1. ONLY 2 OF THE 3 CIRCUIT BREAKERS MAY BE CLOSED AT THE SAME TIME. (EXCEPT SEE NOTE NO. 6)
2. THE INTERLOCK DESCREIBED UNDER 1 MAY BE DEFEATED BY THE SELECTOR SWITCH 43-2. BEFORE USING THE DEVICE 43-2, SELECTOR SWITCH 43-1 MUST BE TURNED TO THE "MANUAL" POSITION. DEVICE 43-2 IS KEY OPERATED AND MAY BE LOCKED (KEY REMOVED) IN EITHER POSITION. THE DEVICE IS UNDER THE CONTROL OF DTE.
3. NORMAL OPERATION:
   52-1 CLOSED
   24 OPEN
   52-2 CLOSED
4. LOSS OF VOLTAGE ON LINE 1 OPENS 52-1 AND CLOSES 24.
5. LOSS OF VOLTAGE ON LINE 2 OPENS 52-2 AND CLOSES 24.
6. RETURN OF VOLTAGE RECLOSES 52-1 OR 52-2 AND OPEN 24. RETRANSFER IS CLOSED TRANSITION WITHOUT POWER INTERRUPTION, PROVIDED BOTH LINES PHASE. CHECK WITH PRIMARY SERVICES.
7. OVERCURRENT TRIP OF 52-1 OR 52-2 WILL LOCK OUT AND PREVENT AN UNDER VOLTAGE TRANSFER. NORMAL CONDITIONS CAN NOT BE RE-ESTABLISHED UNTIL 86-1 OR 86-2 IS RESET.
8. IF 43-1 IS SET FOR AUTOMATIC OPERATION, 52-1, 24, OR 52-2 CAN NOT BE CLOSED OR TRIPPED FROM THIER CONTROL SWITCH.

NOTE 1: IF SERVICE FEEDS ARE OVERHEAD FED FROM THE DISTRIBUTION SYSTEM INSTALL A SYNC CHECK RELAY (DEVICE 25). CHECK WITH PRIMARY SERVICES.

NOTE 2: ALL POTENTIAL TRANSFORMERS ON THE LINE SIDE OF THE MAIN BREAKER REQUIRE A GANG OPERATED OPEN KNIFE BLADE SWITCH ON THE SECONDARY AS SHOWN ABOVE.

NOTE 3: ELECTRICAL INTERLOCKS ARE TO BE HARD WIRED BREAKER CONTACTS AND NOT VIA INTERPOSING RELAYS.

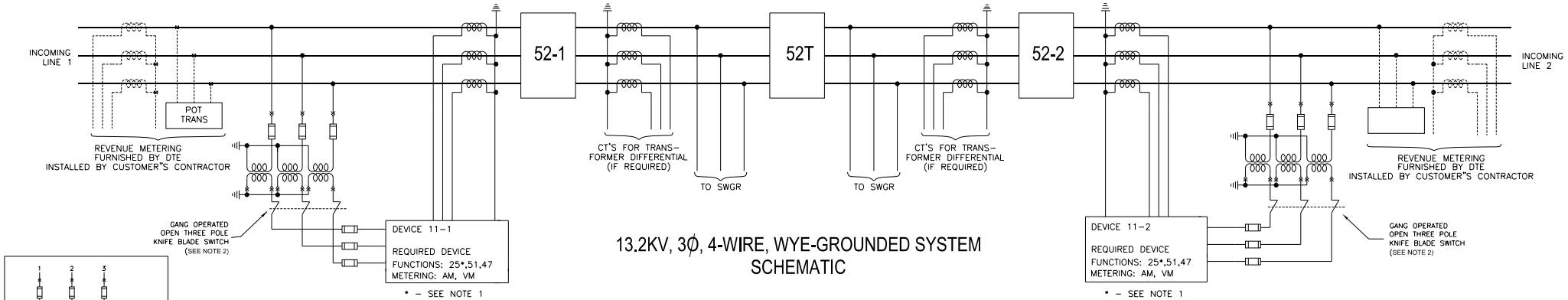
DTE

PRIMARY SERVICES

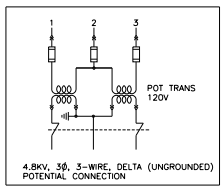
REV.3		REV.2		REV.1	SEP 2003
				ADDED DEVICE 25	

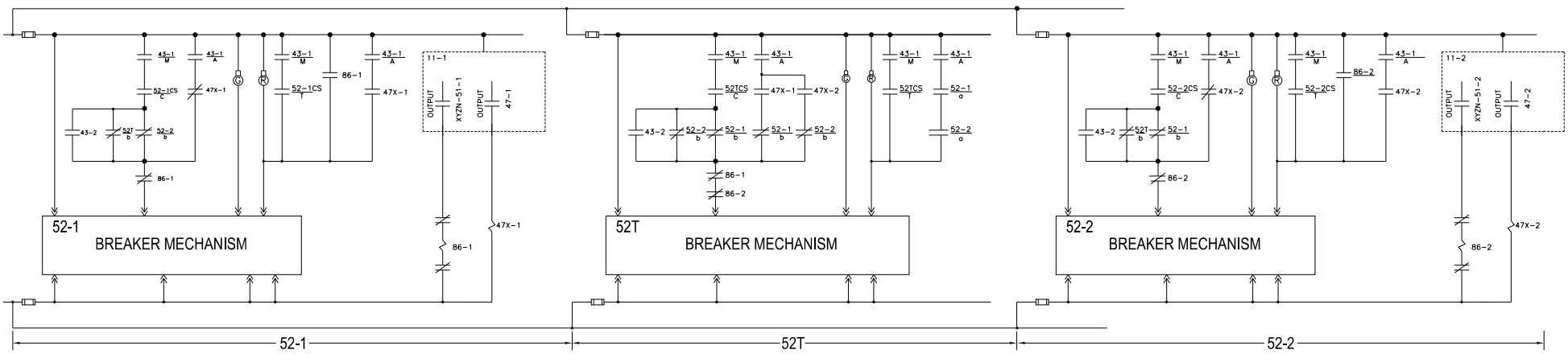
TWO LINE AUTOMATIC THROWOVER SCHEME

APPROVED BY: R. Z. | DRAWN BY: B.B. | Drawing # 5PC894-38



13.2KV, 3ϕ, 4-WIRE, WYE-GROUNDED SYSTEM SCHEMATIC





CONTROL DIAGRAM DEVICES

DEVICE NO.	DEVICE FUNCTION
11	MULTI-FUNCTION RELAY (WITH METERING)
25	SYNC CHECK. SEE NOTE 1.
43-1	SELECTOR SWITCH - "AUTO-MAN"
43-2	BY-PASS SWITCH - "INTERLOCK-BYPASS" POSITIONS. (KEY LOCKED PISTOL GRIP SWITCH) MAINTAINED POSITION. UNDER DTE CONTROL.
47	PHASE SEQUENCE & UNDERVOLTAGE RELAY
47X	AUXILLARY RELAY
86	LOCKOUT RELAY
52	BREAKER MECHANISM, OPERATED CONTACT (OPERATES IN OPERATING POSITION ONLY) DISCONNECTING CONTACT, CLOSED WHEN DEVICE IS IN THE CONNECTED POSITION
51	TIME DELAY OVERCURRENT RELAY
51N	TIME DELAY NEUTRAL OVERCURRENT RELAY
52T	TIE BREAKER
CS	BREAKER CONTROL SWITCH
RES	RESISTOR

OPERATION OF AUTOMATIC TRANSFER

1. ONLY 2 OF THE 3 CIRCUIT BREAKERS MAY BE CLOSED AT THE SAME TIME. (EXCEPT SEE NOTE NO. 6)
2. THE INTERLOCK DESCREIBED UNDER 1 MAY BE DEFEATED BY THE SELECTOR SWITCH 43-2. BEFORE USING THE DEVICE 43-2, SELECTOR SWIITCH 43-1 MUST BE TURNED TO THE "MANUAL" POSITION. DEVICE 43-2 IS KEY OPERATED AND MAY BE LOCKED (KEY REMOVED) IN EITHER POSITION. THE DEVICE IS UNDER THE CONTROL OF DTE.
3. NORMAL OPERATION:
   52-1 CLOSED
   24 OPEN
   52-2 CLOSED
4. LOSS OF VOLTAGE ON LINE 1 OPENS 52-1 AND CLOSES 24.
5. LOSS OF VOLTAGE ON LINE 2 OPENS 52-2 AND CLOSES 24.
6. RETURN OF VOLTAGE RECLOSES 52-1 OR 52-2 AND OPEN 52T. RETRANSFER IS CLOSED TRANSITION WITHOUT POWER INTERRUPTION, PROVIDED BOTH LINES PHASE. CHECK WITH PRIMARY SERVICES.
7. OVERCURRENT TRIP OF 52-1 OR 52-2 WILL LOCK OUT AND PREVENT AN UNDER VOLTAGE TRANSFER. NORMAL CONDITIONS CAN NOT BE RE-ESTABLISHED UNTIL 86-1 OR 86-2 IS RESET.
8. IF 43-1 IS SET FOR AUTOMATIC OPERATION, 52-1, 52T, OR 52-2 CAN NOT BE CLOSED OR TRIPPED FROM THIER CONTROL SWITCH.

NOTE 1: IF SERVICE FEEDS ARE OVERHEAD FED FROM THE DISTRIBUTION SYSTEM INSTALL A SYNC CHECK RELAY (DEVICE 25). CHECK WITH PRIMARY SERVICES.

NOTE 2: ALL POTENTIAL TRANSFORMERS ON THE LINE SIDE OF THE MAIN BREAKER REQUIRE A GANG OPERATED OPEN KNIFE BLADE SWITCH ON THE SECONDARY AS SHOWN ABOVE.

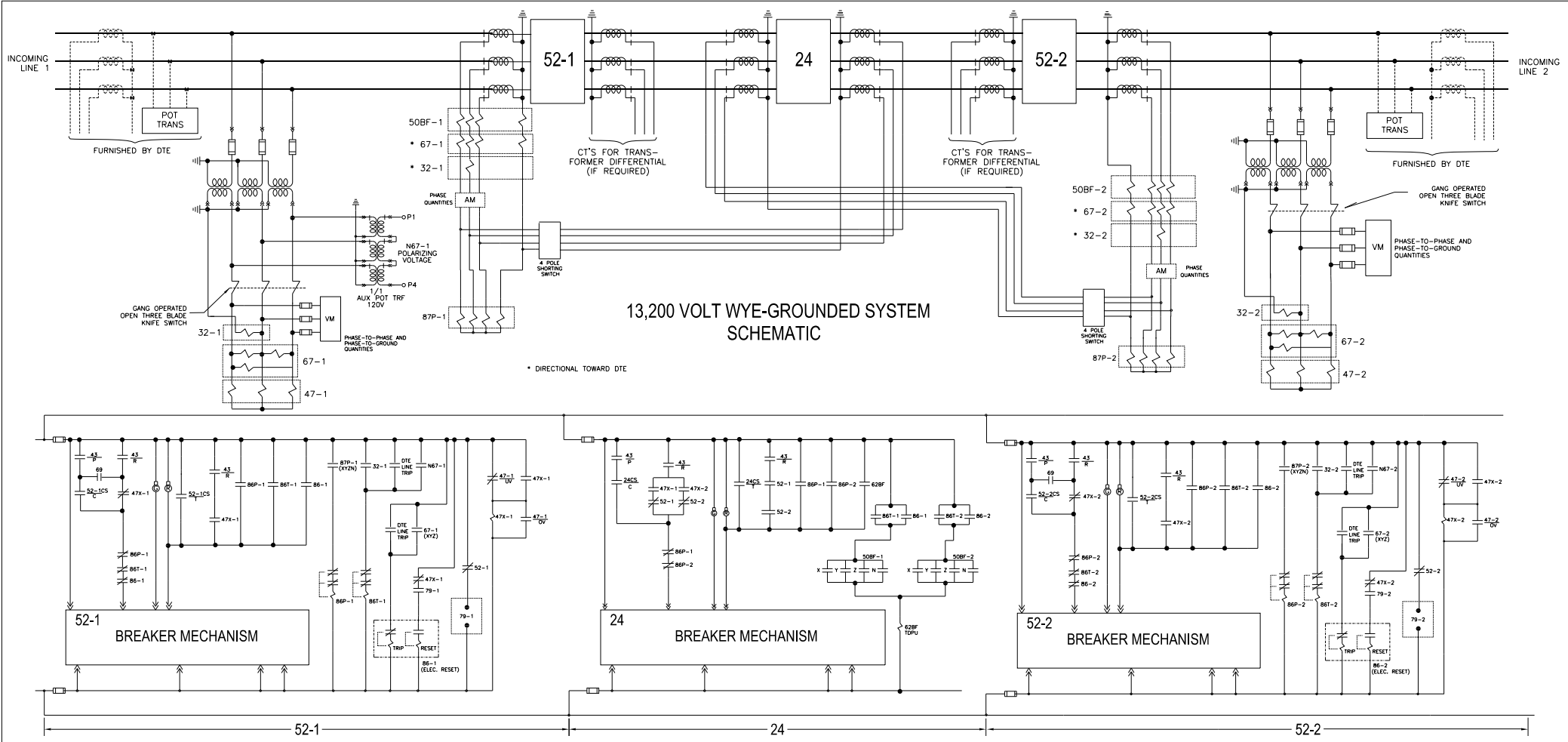
NOTE 3: ELECTRICAL INTERLOCKS ARE TO BE HARD WIRED BREAKER CONTACTS AND NOT VIA INTERPOSING RELAYS.

NOTE 4: IF CUSTOMER REQUIRES SURGE ARRESTERS, RECOMMEND 10KV, 8.4MCOV.

DTE

PRIMARY SERVICES

REV.3	SEP 2009	REV.2	JUN 2009	REV.1	SEP 2003	TWO LINE AUTOMATIC THROWOVER SCHEME		
REVISED WITH DEVICE 11		CHANGED DEVICE 24 TO 52T		ADDED DEVICE 25		APPROVED BY: J. S.	DRAWN BY: J. S.	Drawing # 5PC894-38



DEVICE NO.	DEVICE FUNCTION
CS	BREAKER CONTROL SWITCH
24	TIE BREAKER
32	REVERSE POWER RELAY
43	SELECTOR SWITCH "PARALLEL-RADIAL" SELECT
47	PHASE SEQUENCE & UNDERVOLTAGE RELAY
47X	MULTI-CONTACT AUXILLARY RELAY
50BF	BREAKER FAILURE RELAY
51	TIME DELAY PHASE OVERCURRENT RELAY
51N	TIME DELAY NEUTRAL OVERCURRENT RELAY
52	BREAKER MECHANISM, OPERATED CONTACT (OPERATES IN OPERATING POSITION ONLY) DISCONNECTING CONTACT, CLOSED WHEN DEVICE IS IN THE CONNECTED POSITION
62BF	TIMING RELAY
67	DIRECTIONAL OVERCURRENT RELAY
69	PERMISSIVE SWITCH
79	RECLOSING RELAY
86	LOCKOUT RELAY
87P	PARTIAL DIFFERENTIAL RELAY

SEQUENCE OF OPERATION

DEVICE 43P/R - TWO POSITION SWITCH, ("PARALLEL" - "RADIAL")

"P" - PARALLEL OPERATING CONFIGURATION (52-1, 52-2 & 24 CLOSED)

"R" - RADIAL OPERATING CONFIGURATION (52-1, 52-2 CLOSED, 24 OPEN

DEVICE 69 - PERMISSIVE SWITCH, ("ON" - "OFF")

"ON" - ALLOWS AUTOMATIC RESTORATION AFTER LOSS OF VOLTAGE WHEN IN THE PARALLEL OPERATING CONFIGURATION.

"OFF" - REQUIRES MANUAL RESTORATION AFTER LOSS OF VOLTAGE WHEN IN PARALLEL OPERATING CONFIGURATION.

NOTE: FOR MANUAL OPERATION OF SWITCHGEAR PLACE DEVICE 43P/R IN "P" POSITION AND DEVICE 69 IN "OFF" POSITION.

PARALLEL OPERATING CONFIGURATION
(DEVICE 43P/R IN THE "P" POSITION)

- THERE ARE NO ELECTRICAL INTERLOCKS
- EACH MAIN (52-1 & 52-2) AND TIE (24) CAN BE CLOSED BY THEIR RESPECTIVE BREAKER CONTROL SWITCH (DEVICE CS)
- IF A MAIN (52-1 OR 52-2) OPENS DUE TO A DTE LINE TRIP CONDITION, THE MAIN CAN AUTOMATICALLY CLOSE WHEN VOLTAGE IS RESTORED OR REQUIRE MANUAL RESTORATION, DEPENDING ON THE POSITION OF DEVICE 69.

RADIAL OPERATING CONFIGURATION
(DEVICE 43P/R IN THE "R" POSITION)

- ELECTRICAL INTERLOCKS PREVENT ALL THREE BREAKERS (52-1, 24 & 52-2) FROM BEING CLOSED AT THE SAME TIME FOR AN EXTENDED PERIOD OF TIME. A CLOSED TRANSITION WITH MOMENTARILY PARALLELING OF ALL THREE BREAKERS OCCURS ON RE-TRANFER AFTER LOSS OF VOLTAGE.
- LOSS OF VOLTAGE ON EITHER INCOMING LINE WILL CAUSE IT'S MAIN (52-1 OR 52-2) TO OPEN THEN THE TIE (24) WILL CLOSE. WHEN VOLTAGE RETURNS THE MAIN WILL CLOSE, THEN THE TIE WILL OPEN.

DTE

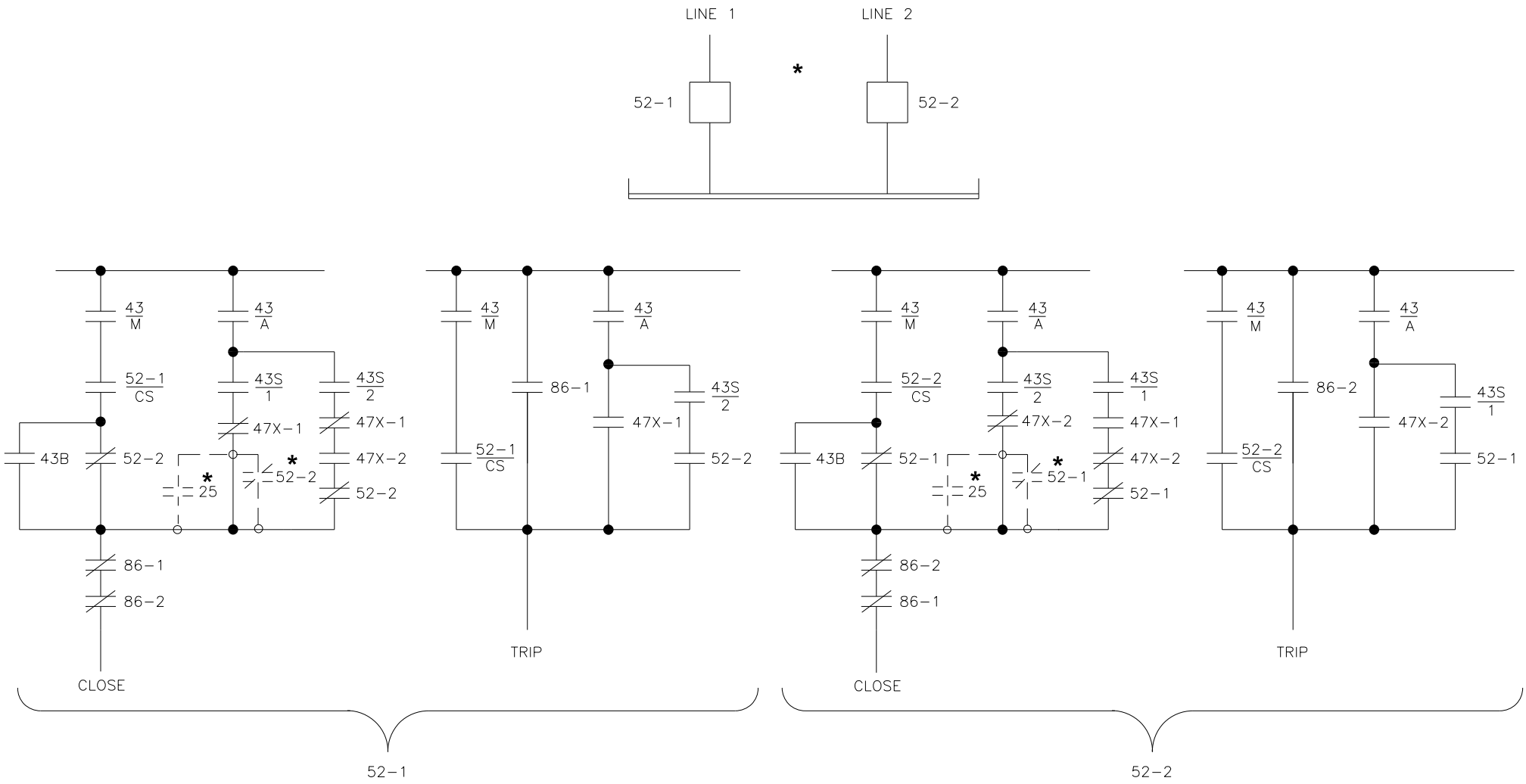
Primary Services

PARALLEL / RADIAL OPERATION CONTROL SCHEME

DESIGNED/APPROVED BY: R. Z.

ORIG 12/5/91 REV "D" 12/8/08

Drawing # 5PC894-39



PARTIAL SCHEMATIC – ATO SCHEME (NORMAL–ALTERNATE) W/ NORMAL LINE SELECTION CLOSED TRANSITION ON GO–BACK

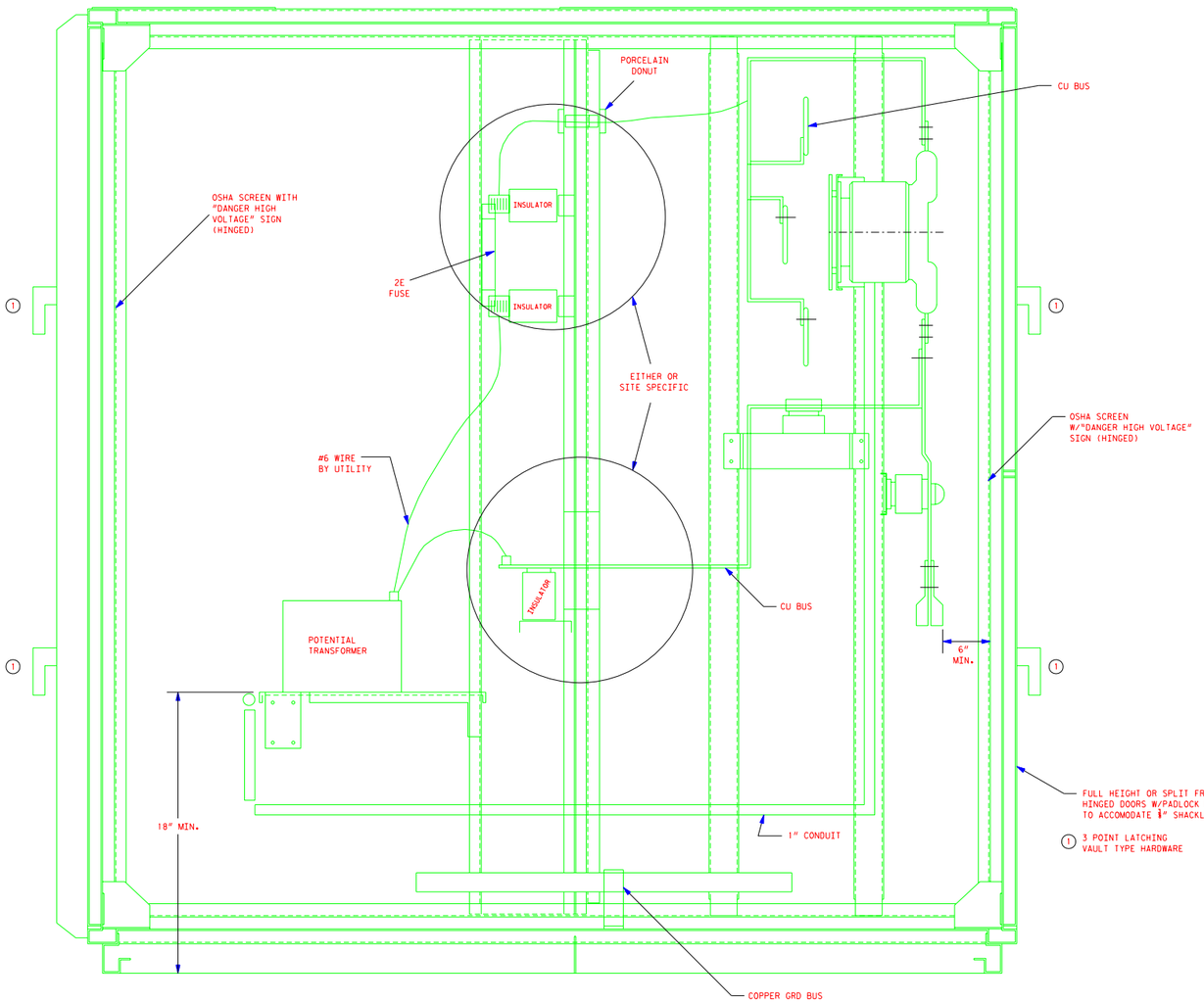
43 – MANUAL/AUTOMATIC SELECTOR SWITCH, TWO POSITION "MAN" & "AUTO"
43B – BYPASS SWITCH, TWO POSITION "NORMAL" & "BYPASS", KEYED (OPERATED BY DTE PERSONNEL ONLY)
43S – LINE SELECTOR SWITCH, TWO POSITION "LINE 1" & "LINE 2", KEYED (OPERATED BY DTE PERSONNEL ONLY)
LINE 1 – LINE 1 NORMAL, LINE 2 ALTERNATE
LINE 2 – LINE 2 NORMAL, LINE 1 ALTERNATE
*25 – SYNC. CHECK RELAY, RECOMMENDED WHEN SERVICE IS VIA AN OVERHEAD LINE ON THE DISTRIBUTION SYSTEM. CONSULT WITH DTE'S PRIMARY SERVICES GROUP.

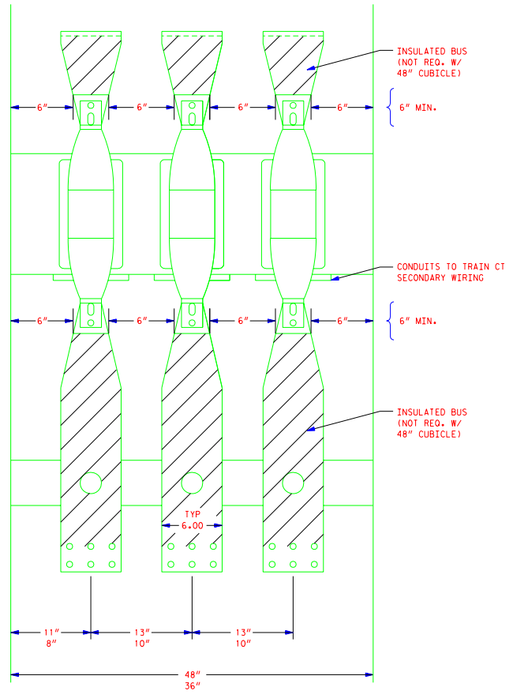
Drawing #
PC894-40

DTE
Primary Services

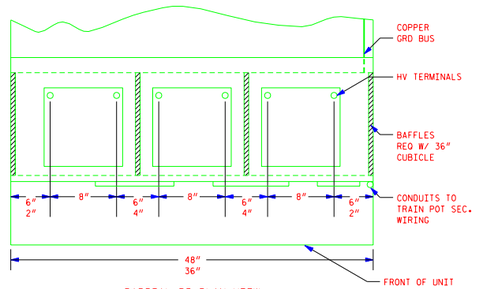
DESIGNED BY: R. Z.	
APPROVED BY: R. Z.	REVISION DATE: 12–10–05

NORTH ARROW



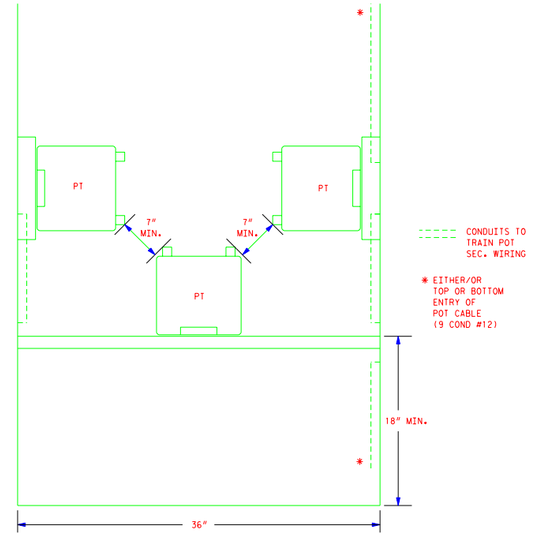


PARTIAL REAR VIEW



PARTIAL PT PLAN VIEW
(SEE OPTIONAL ARRANGEMENT)

OPTIONAL POTENTIAL TRANSFORMER ARRANGEMENT FOR 36" CUBICLE



PARTIAL FRONT VIEW

480V SYSTEM VOLTAGE

1. OMIT CENTER PHASE CURRENT TRANSFORMER AND PROVIDE BUS EXTENSION
2. OMIT CENTER PHASE POTENTIAL TRANSFORMER. REPOSITION PT'S A MINIMUM OF 6" FROM SIDE WALLS
3. PROVIDE SEPARATE BUS DETAILS FOR JKM-4 CT DIMENSIONS

(SHOWN FOR 13,200V SYSTEM VOLTAGE)

LATEST REVISION " "

NOTES

1. ALL INSULATORS-PORCELAIN-15KV RATED NEMA CLASS A-20, 6 INCH
2. 15 KV SWITCH GEAR
3. MIN. LIVE PART CLEARANCES 6" *-* & *-G

	PROJ DESIGN	PROJ MANAGER	OTHERS
DATE			

RFW

MADE BY	DATE	ACT	RELAY
CH'K BY	DATE	EP&PM	APVD FOR ISSUE

	PROJ DESIGN	PROJ MANAGER	OTHERS
DATE			

RFW

MADE BY	DATE	ACT	RELAY
CH'K BY	DATE	EP&PM	APVD FOR ISSUE

A	PROJ DESIGN	PROJ MANAGER	OTHERS
DATE			

11-7-96 REVISION TO INCORPORATE 480OV SYSTEM DETAIL

RFW

MADE BY	DATE	ACT	RELAY
CH'K BY	DATE	EP&PM	APVD FOR ISSUE

APPROVALS

	OTHER	DATE
PROJECT MANAGER		
RELAY		
EP&PM		
ACT		
OTHERS		

ENGINEERING	DATE
MADE BY	
LAYOUT BY	
CHECKED BY	
PROJECT DESIGN/ELECT	
PROJECT DESIGN/ACT	
APPROVED FOR ISSUE	
R.M. ZIENTAR	6/8/96

Detroit Edison Company — Engineering

TITLE

METERING EQUIPMENT COMPARTMENT

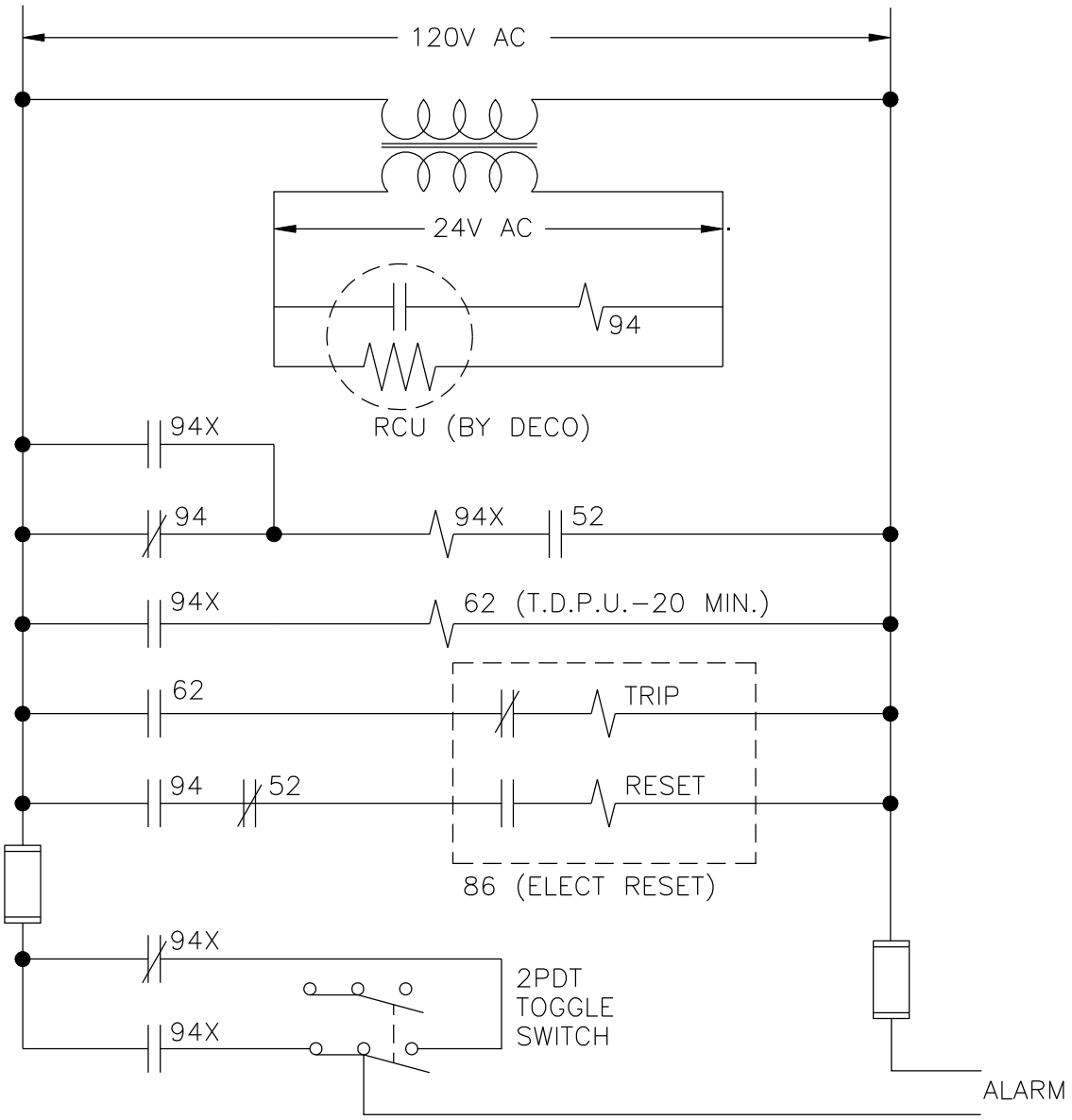
APERTURE CARD TITLE

LOCATION NAME	SERVICE CENTER	SCALE
PRIMARY SERVICES	M&S	

DRAWING NUMBER	REQUEST FOR WORK	PROJECT DOCUMENT LIST
5PC894-41		

dgn$spec
dd-mmm-yyyy hh:mm CML / user.name

INTERRUPTABLE SERVICE (RATE D3.3)

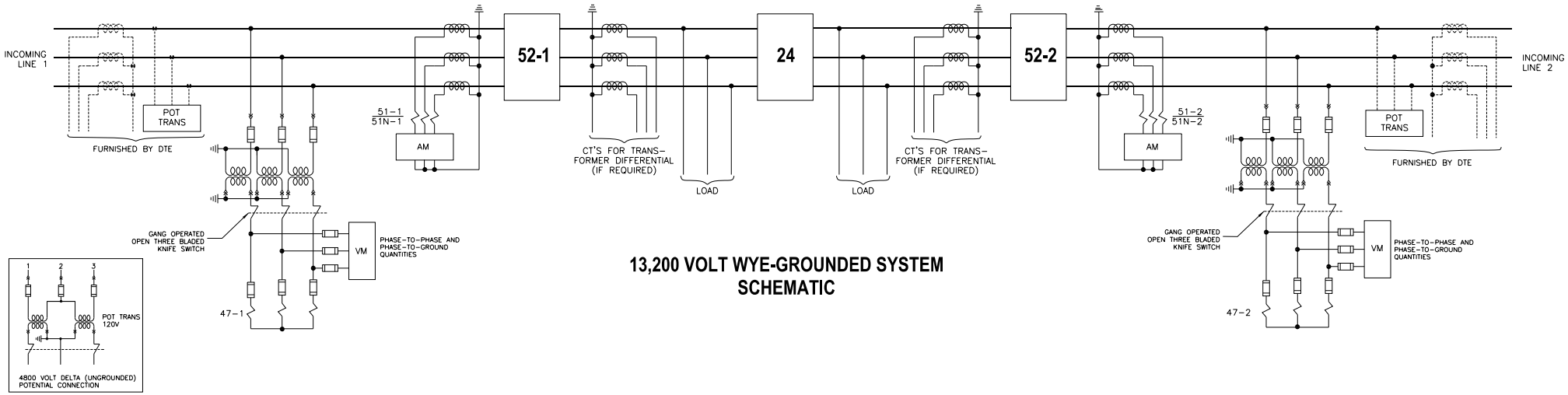


NOTE:

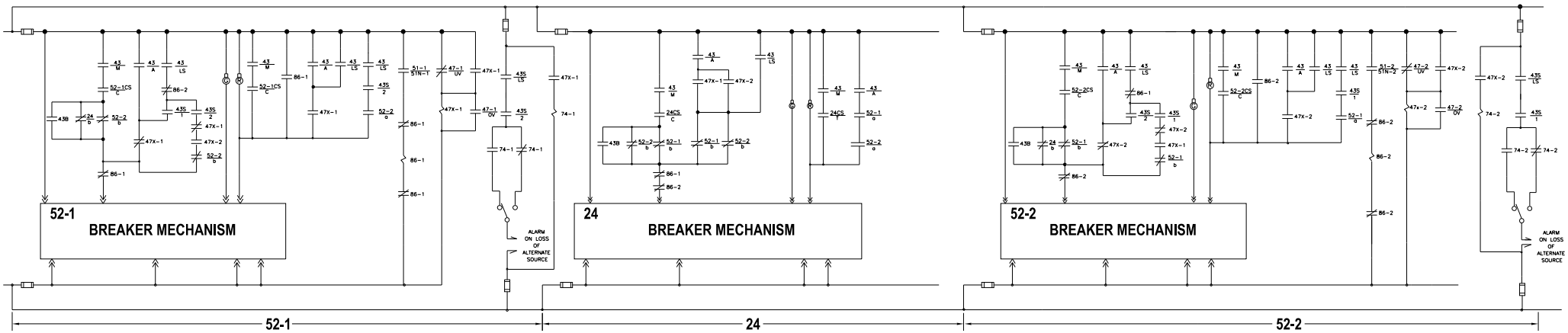
1 86 IS NOT ACCESSABLE TO CUSTOMER
2 RCU–CONTACT IS NORMALLY CLOSED
3. WIRE DEVICE 86 "a" CONTACT IN TRIP STRING, & "b" CONTACT IN CLOSE STRING

RECIEPT OF INTERRUPT SIGNAL OPENS CONTACT AND STARTS 20 MINUTE TIMER INTERNAL TO RCU. DECO WILL SEND AN INTERRUPT SIGNAL EVERY 15 MINUTES FOR THE DURATION OF THE INTERRUPTION, AFTER WHICH TIME THE TIMER WILL TIME OUT AND CLOSE THE CONTACT.

DRAWING	DETROIT EDISON–PRIMARY SERVICES
PC894–42	



13,200 VOLT WYE-GROUNDED SYSTEM SCHEMATIC



CONTROL DIAGRAM DEVICES

DEVICE NO.	DEVICE FUNCTION
43	SELECTOR SWITCH "AUTO-MAN-LINE SELECT"
43B	BY-PASS SWITCH "INTERLOCK - BYPASS" POSITIONS. (KEY LOCKED PISTOL GRIP SWITCH) MAINTAINED POSITION, UNDER DTE CONTROL.
43S	SELECTOR SWITCH "LINE 1 - LINE 2" POSITIONS. (KEY LOCKED PISTOL GRIP SWITCH) MAINTAINED POSITION, UNDER DTE CONTROL.
47	PHASE SEQUENCE & UNDERVOLTAGE RELAY
47X	MULTI-CONTACT AUXILLARY RELAY
86	LOCKOUT RELAY
52	BREAKER MECHANISM, OPERATED CONTACT (OPERATES IN OPERATING POSITION ONLY) DISCONNECTING CONTACT, CLOSED WHEN DEVICE IS IN THE CONNECTED POSITION
74	ALARM RELAY
51	TIME DELAY PHASE OVERCURRENT RELAY
51N	TIME DELAY NEUTRAL OVERCURRENT RELAY
24	TIE BREAKER
CS	BREAKER CONTROL SWITCH

MODE OF OPERATION

DEVICE 43 - THREE POSITION SWITCH, "AUTO-MAN-BEST LINE".

"MAN" POSITION:

MANUAL OPERATION OF 52-1, 24 AND 52-2 VIA BREAKER CONTROL SWITCH (DEVICE 52/CS).

"AUTO" POSITION:

AUTOMATIC OPERATION OF 52-1, 24 and 52-2

NORMAL: 52-1 and 52-2 CLOSED, 24 OPEN

UPON LOW OR LOSS OF VOLTAGE TO LINE 1 (LINE 2), 52-1 (52-2) WILL OPEN, THEN 24 WILL CLOSE.

UPON RETURN OF VOLTAGE TO LINE1 (LINE 2), 52-1 (52-1) WILL CLOSE, THEN 24 WILL OPEN. (NOTE: CLOSED TRANSITION ON THROWBACK)

"LINE SELECT" POSITION:

PROVIDES ONE NORMAL LOAD CARRYING LINE AND ONE ALTERNATE LINE.

DEVICE 43S - TWO POSITION SWITCH, "LINE 1 - LINE 2", KEYED. (NOTE: KEY IS UNDER DTE CONTROL)

NORMAL: EITHER

43S "LINE 2" - 52-2 AND 24 CLOSED WITH 52-1 OPEN.
OR
43S "LINE 1" - 52-1 AND 24 CLOSED WITH 52-2 OPEN.

UPON LOW OR LOSS OF VOLTAGE ON LINE 1 (LINE 2), 52-1 (52-2) WILL OPEN, THEN 52-2 (52-1) WILL CLOSE.

UPON RETURN OF VOLTAGE ON LINE 1 (LINE 2), 52-1 (52-2) WILL CLOSE, THEN 52-2 (52-1) WILL OPEN.

DEVICE 43B- TWO POSITION SWITCH, "INTERLOCK - BYPASS". ALLOWS DTE TO CLOSE 52-1, 24 AND 52-2 AT SOME TIME. (NOTE: KEY IS UNDER DTE CONTROL)

DTE

Primary Services

REV	DATE

TWO LINE AUTOMATIC THROWOVER & LINE SELECT AUTOMATIC THROWOVER SCHEME

DESIGNED/APPROVED BY: R. Z. (Primary Service)

JUNE 2001 | APPROVED BY: RELAY ENGINEERING:

Drawing # **5PC894-43**