2025 ELECTRIC SERVICE MANUAL

Prepared for:

WPPI Energy

OWNED & PREPARED BY:

PSE | Engineers & Consultants

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2025 ELECTRIC SERVICE MANUAL

For

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Table of Contents

1 General Information 11
1.1 Contact Information 12
1.2 Service Area 13
1.3 Purpose 14
1.4 Code Compliance 14
1.5 Interpretations and Definitions 15
1.6 Service Reliability 15
1.7 Point of Service 16
1.8 Application for Service 16
1.9 Service Size and Voltages 18
1.10 Number of Services: 19
1.11 Short Circuit Duty Requirements 20
1.12 Inspections and Maintenance 22
1.13 Service Connections 22
1.14 Conductor Identification 22
1.15 Utility Facilities and Equipment on Customer Premises 22
1.16 General Service Entrance Requirements 23
1.17 Service Entrance Upgrades 24
1.18 Service Disconnect and Meter Sequence 24
1.19 Customer Installations 25
1.20 Communication Tower Installation 25
2 Temporary Service 27
2.1 General 28
2.2 Temporary Overhead Services 28
2.3 Temporary Underground Service 29
3 Overhead Secondary Service 30
3.1 General Requirements 31
3.2 General Location of Electric Services 31
3.3 Overhead Electric Service Arrangements 31
4 Underground Secondary Service 33
4.1 General Requirements 34
4.2 General Location of Electric Services 35
4.3 Underground Electric Service Arrangements 35

4.4 Single-Phase Transformer Pad....36
4.5 Three-Phase Transformer Concrete Pad....36
4.6 Protection of Padmounted Equipment....36
5 Grounding and Bonding....37
5.1 General Requirements....38
5.2 Grounding Electrodes....38
5.3 Grounding Electrode Conductor....39
5.4 Bonding Service and Metering Equipment....39
6 Metering....41
6.1 General Requirements....42
6.2 Single-Phase, Self-Contained Meters....43
6.3 Three-Phase, Self-Contained, Meters....44
6.4 Instrument Transformer Metering....45
6.5 Overhead (600 to 800) Ampere Service with Current Transformer Metering....46
6.6 Underground (400 to 3,000) Ampere Service with Current Transformer Metering....46
6.7 Multiple Meter Installations (2 to 4 Meters)....47
6.8 Indoor Meter Clearances....48
6.9 Meter Seals....49
6.10 Meter Ice and Snow Shield....49
7 Manufactured and Mobile Home Services....51
7.1 Overview....52
7.2 Definitions....52
7.3 General Requirements....53
8 Farm Services....55
8.1 Overview....56
8.2 Non-Farm Services....56
8.3 Farm Pole Top Services....56
8.4 Key-Interlock Systems – Farm Standby Generation....58
9 Special Services....59
9.1 Cable and Communication Power Supplies....60
9.2 Unmetered Decorative Holiday Lighting....60
9.3 Communication Tower Installation....61
10 Primary Services....63
10.1 General Requirements....64
11 Clearances....65

11.1 General 66
11.2 Vertical Clearance Requirements for Overhead Conductors 66
11.3 Horizontal Clearance Requirements for Overhead Conductors 67
11.4 Padmounted Transformer Clearances 67
11.5 Clearance from Gas Lines 69
11.6 Clearance from Wells 69
11.7 Clearance from Sewer Equipment 70
11.8 Clearance from Material Storage Areas 70
11.9 Clearance from Fuel Storage Tanks 70
11.10 Clearance from Antennas 71
11.11 Requirements for Conductors under Structures 71
11.12 Clearance from Swimming Pools 71
11.13 Clearance Envelope for Grain Bins 71
11.14 Recreational Vehicles (RVs) Mobile Homes, Manufactured Homes, and Trailer Park Clearances 72
11.15 Solar Panel Clearance Requirements 72
12 On-Site Generation and Distributed Energy Resources (DER) 73
12.1 General 74
12.2 Standby Generation 74
12.2.1 Safety 74
12.2.2 Transfer System Requirements 75
12.2.3 Transfer Switch Options 75
12.3 Parallel Generation 76
12.3.1 Permission to Interconnect 76
12.3.2 Relevant Codes 76
12.3.3 Metering Equipment 76
12.3.4 Distribution System Modifications 77
12.3.5 DER Primary Metering 77
12.3.6 Optional Standby Generation Used in Conjunction with DER 77
12.3.7 LABELING REQUIREMENTS 77
12.3.8 Point of Interconnection (POI) 78
12.3.9 Interconnection Disconnect Switch (Disconnection Device) Requirements 78
12.3.10 Battery Energy Storage Systems (BESS) 79
13 Equipment Requirements to Maintain Power Quality 80
13.1 General 81

13.2 Service Impairing Equipment 81
13.3 Phase Balance 81
13.4 Power Factor Correction 82
13.5 Protection, Control, and Safety 82
13.6 Motors and Associated Equipment 82
13.7 Electric Water Heating 84
13.8 Electric Space Heating 85
13.9 Electric Welders and Furnaces 85
13.10 Harmonics and High Frequency Equipment 85
13.11 Air Conditioners 85
14 Electric Vehicles 87
14.1 General 88
14.2 Electric Vehicle Charging 88
14.3 Electric Vehicle (EV) Charging – Service Capacity 88
14.3.1 Existing Service – Adequate Service Capacity 88
14.3.2 Existing Service – Inadequate Service Capacity 88
14.3.3 Remote Building or Structure 89
14.4 Level III DC Fast Charging 89

Table of Figures

Figure 1-1. ....Electrical Service Summary Guide
Figure 2-1. ....Temporary Overhead Service
Figure 2-2. ....Temporary Underground Service
Figure 2-3. ....Temporary Underground Service
Figure 3-1. ....Service Location Clearance Requirements
Figure 3-2a. ....Through the Roof Installations with Non-fused Disconnect
Figure 3-2b. ....Through the Roof Installations with Fused Disconnect
Figure 3-3a. ....Wall Mount Installations with Non-fused Disconnect
Figure 3-3b. ....Wall Mount Installations with Fused Disconnect
Figure 3-4. ....Pole Mounted Service (Secondary Pole)
Figure 4-1a. ....Wall Mount Installation 120/240V with Non-fused Disconnect
Figure 4-1b. ....Wall Mount Installation 120/240V with Fused Disconnect
Figure 4-1c. ....Wall Mount Installation 277/480V Three-phase
Figure 4-2a. ....Outdoor Service Installation 120/240V with Non-fused Disconnect

Figure 4-2b. .....Outdoor Service Installation 120/240V with Fused Disconnect
Figure 4-2c. .... Outdoor Service Installation 277/480V Three-phase with Non-fused Disconnect
Figure 4-2d. .....Outdoor Service Installation 277/480V Three-phase with Fused Disconnect
Figure 4-3a. ..... Meter Pedestal Installation with Non-fused Disconnect
Figure 4-3b. .....Meter Pedestal Installation with Fused Disconnect
Figure 4-4. ..... Concrete Transformer Pad
Figure 4-5. ..... Protective Posts for Padmounted Transformers
Figure 5-1. ..... Wall Mounted Meter Details.
Figure 6-1. .....Instrument Transformer Metering Guide
Figure 9-1. .....Typical Cable & Communication Power Supply Arrangement
Figure 9-2. .....Typical Decorative Holiday Lighting Arrangement
Figure 10-1. .....Primary Metering Options
Figure 11-1. .....Padmounted Oil Insulated Transformer Clearance from Non-Combustible and Combustible Walls
Figure 11-2. .....Padmounted Oil Insulated Transformer Clearance from Doors, Windows & Openings
Figure 11-3. .....Padmounted Oil Insulated Transformer Clearances with Fire-resistant Barrier
Figure 11-4. ..... Padmounted Oil Insulated Transformer Clearance from Fire Escapes
Figure 11-5. ..... Clearance Envelope for Grain Bins Filled by Portable Equipment
Figure 11-6. ..... Clearance Envelope for Grain Bins Filled by Permanent Equipment
Figure 12-1a. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1b. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1c. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1d. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1e. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1f. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1g. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1h. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1i. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1j. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1k. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1m. .... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 12-1n. ..... On-Site Generation (Distributed Generation Resources) General Configuration
Figure 14-1a. .....Electric Vehicle Charger Configuration Level I
Figure 14-1b. .....Electric Vehicle Charger Configuration Level II

Figure 14-1c. ..... Electric Vehicle Charger Configuration Level II Remote Building or Structure
Figure 14-1d. .....Electric Vehicle Charger Configuration Level III DC

Updates to this manual may be necessary throughout the year.

Please see WPPI Energy's website for the most up-to-date information.

Contractors – It is your responsibility to read and understand all specifications in this manual that are required by WPPI Energy.

1 General Information

Reserved For Notes:

1.1 Contact Information

Wisconsin State Statute 182.0175 requires one to notify Diggers Hotline of intent to excavate and to allow a minimum of 3 working days prior notice before digging. Persons causing damage to underground facilities without calling Diggers Hotline will be responsible for the damage and may be subject to a fine up to $2000. Call before you dig.

Diggers Hotline contact information:
Toll Free **800-442-8511** (Dial **811**)
Hearing Impaired (TDD) **800-542-2289**
diggershotline.com

WPPI Energy Contacts
www.wppienergy.org
Main Telephone: (608) 834-4500
contact@wppienergy.org

1425 Corporate Center Drive
Sun Prairie, WI 53590-9109

1.2 Service Area

WPPI Energy is a member-owned municipal joint action agency serving 51 member electric utilities in Wisconsin, Iowa, and Michigan.

1.3 Purpose

This document serves as WPPI Energy's Electric Service Manual (ESM). The purpose of this ESM is to supply essential information to Member Utilities, their customers, employees, contractors, architects, engineers, builders, and others concerned with the planning, construction, and operation of electric service installations in the WPPI Energy members' service area. WPPI Energy's objective is to assist Members' customers in obtaining safe and efficient electric service.

Throughout the ESM, WPPI Energy may also be referred to as the "WPPI".

A "Customer" is an individual, firm, association, corporation, partnership, irrevocable trust or other business organization that meets the service qualifications of the Utility and whose application for service has been approved by the Utility.

Information supplied in the ESM is intended to cover typical electric installations. Please consult the Utility for special cases not specifically covered in the ESM.

The information contained in the ESM does not cover in detail the requirements of the Utility's rates, extension rules, or general rules. The Utility should be consulted regarding the specific information concerning these matters.

This edition of the ESM shall supersede all previous editions. The information contained in the ESM will be revised and added to from time to time. For the most recent edition please contact WPPI Energy.

1.4 Code Compliance

All the information contained in the ESM is to be used in conjunction with the Utility's Policies and Procedures, the National Electric Code (*NEC)*, the National Electric Safety Code (*NESC*), and all applicable local, state, and federal regulations.

Customer equipment must be installed in accordance with all applicable electrical codes. In some areas, state and municipal electrical inspections are required prior to service connection.

The Utility reserves the right to refuse to extend service or discontinue service where a customer's installation does not comply with these provisions and requirements as stated.

Prior to initial electrical service, an electrical inspection from the local electrical inspector and/or approval from Utility is required.

The Utility may de-energize any service if a dangerous, or unsafe condition exists on the customer's premises.

Customers are responsible for maintaining their electrical wiring and equipment in safe operating condition.

1.5 Interpretations and Definitions

The following terms and definitions are used throughout this ESM.

A. "***Shall***" denotes a rule or mandatory requirement which must be followed. The words "must" and "will" are also treated like "shall."

B. "***Should***" recommends a desirable practice for a specific condition.

C. "***May***" indicates a possible option.

D. **Definitions:** The local Authority Having Jurisdiction (AHJ) will make the final determination as to the building classification.

1. **"Building"** is defined as a structure which stands alone, or which is separated from adjoining structures by fire walls. Check with the local AHJ as to whether the building in question is a single building or classified as more than one building.

2. **"Structure"** other than a building is defined as a substation, pole, pedestal, vault, pad mounted switchgear, communication tower or other structure identified by the Utility.

3. **"Electrically Isolated Building"** is defined as a building where there are no continuous metallic paths to any other building or structure. These metallic paths include but are not limited to: electric conduit and wiring (phase, neutral, or grounds), communication systems (telephone, coaxial cable, data lines, etc.) and metallic piping (water, steam, hydraulic, augers, fencing, etc.) Separation to other buildings, structures, and equipment must be sufficient to prevent lightning flashover.

4. **"Row-house"** is defined as three or more contiguous living units, not more than three stories high. It is separated by firewalls having a minimum one-hour fire resistive rated construction which extends from the foundation to the underside of the roof deck with no doors or windows in the firewall.

5. **"Zero Lot Line Building"** is defined as buildings separated by a common firewall as allowed by the local AHJ

1.6 Service Reliability

A. The Utility's goal is to provide continuous electric service, restore service promptly, and maintain its facilities with minimal inconvenience to customers. However, the Utility does not guarantee continuous service, standard voltage or frequency at all times. The Utility shall not be liable for any loss, injury, or damage resulting from interruptions of service not due to negligence on its part.

B. Customers who are operating equipment that is sensitive or require a higher quality of service may find it necessary to install, at their own expense, power-conditioning equipment to protect, mitigate, or otherwise provide the standard of service needed by their load.

C. Utilities shall have the right to cause service to any customer to be interrupted or limited at any time without liability, by automatic devices or otherwise, when in the judgment of the Utility is such that interruption or limitation of service is necessary or desirable due to emergency conditions.

1.7 Point of Service

The energy supplied by the Utility changes ownership at the point of service. This is the location where the customer's wiring starts and Utility's ends. The point of service differs for different service types and is as follows:

A. **Overhead Services:** The point of service is where Utility's service drop wire attaches to the customers service mast wires.

B. **Single-Phase and Three-Phase Self-Contained Underground:** The point of service is where the Utility's wires terminate in the meter pedestal/cabinet.

C. **Single-Phase and Three-Phase Instrument-Metered Underground:** The point of service is at the secondary terminals of the Utility's pad-mounted transformer.

D. **Primary Metered Services:** The point of service is at the primary metering point.

1.8 Application for Service

Application for a new service or changes made to an existing service shall be made in writing and made in advance of the required service date. This will permit the Utility to plan and schedule work to provide service by the date requested. Please be ready to provide the following information: service address, service type (single or three-phase), service voltage, service size, service class (residential, commercial, or industrial), expected project timeline, load calculations, and site plan.

A. **Application Forms:** The proper application form for service shall be submitted when applying for service. Contact the Utility for information to access these forms.

B. **Service Location:**

1. The customer shall contact the Utility for assistance and approval when determining the location of the electric service on the building or structure supporting the electric service.
2. The customer shall provide the Utility with all load information and the proposed service entrance size and voltage requirements with the application for service. In some instances, the Utility may request a load calculation.

C. **Line Extension:** After review of the site and facilities in the area, the Utility will notify the customer if a line extension contract is required and if any additional charges will be required to cover the cost to extend electric service facilities. When this occurs, a contribution is necessary before the line extension can be scheduled for installation. The Utility shall utilize the most direct, engineering feasible route to determine additional charges.

D. **Easements:**

1. The customer requesting the service shall obtain any easements needed. The Utility will provide the easement document. Any costs involved in obtaining the easement will be the responsibility of the customer.

2. Construction will not begin until easements are obtained.

E. **Site Preparation:**

The customer shall be responsible for the initial clearing of the right-of-way required for line construction.

1. For overhead construction, trees and brush should be trimmed back 10 feet plus the distance equal to the four-year growth cycle on both sides of the line. 10 feet shall be the minimum distance trimmed.

2. For underground construction, the grade shall be within 6 inches of final grade. Also, any trees, brush, stumps, etc. shall be cleared back to make a path of at least 10 feet in width.

3. Any equipment re-installations required because of grade changes will be at the expense of the customer.

4. The customer can request the utility to do clearing work. In such an instance, the customer shall make a contribution to the utility in an amount equal to the utility's estimate of the cost thereof. Such a contribution shall be nonrefundable, except that after completion of the extension the utility will determine the actual cost of clearing work, recompute the contribution required, and will refund the excess, if any, of the contribution over that required as based on such actual cost.

5. Underground installation routes shall be frost free. Any frost charges incurred during installation will be passed on to the customer.

F. **Wiring Inspections:**

1. Customer wiring installations shall comply with any local, state, national electrical codes, state and local electrical codes, and the service rules of the utility.

2. A Certificate of Electrical Inspection may be required before the Utility will energize the service.

3. The Utility reserves the right to inspect for compliance with this ESM but assumes no responsibility for inspection of the customer's installation.

4. If Utility personnel are on site and notice the installation may be unsafe, the Utility reserves the right to request an inspection prior to energizing the customer.

G. **De-energized/Disconnected Services:** If an electric service has been disconnected or de- energized, for any reason, for a period greater than 12 consecutive months; the service equipment owned by the Utility shall be removed. Restarting any service subject to this

removal will be treated as a new service and the customer will be responsible for all installation charges.

Important Note: Customers and/or electrical contractors shall not schedule construction until they are ready for the Utility to complete the installation.

1.9 Service Size and Voltages

The Utility furnishes 60 hertz alternating current, single and three-phase, at various voltages. It shall be noted that not all voltages are readily available in all areas, and service extension charges may apply to extend the necessary distribution facilities. The Utility should be consulted as to the type of service available in any area before wiring layouts are made, equipment is purchased, or when extensive wiring changes are contemplated.

The types, sizes, and nominal voltages of services furnished are shown below as an example. These voltages shall conform to the *ANSI Voltage Standard C84.1*.

A. Single-phase, 120/240 Volt, Three Wire: This service voltage configuration is available to Customers where the maximum service entrance does not exceed 600 amps (limited by loading on a 167 kVA transformer).[1] The maximum single-phase 120-volt and 240-volt motor sizes shall be limited to 2.5 and 5.0 horsepower respectively. Larger services and motor sizes must receive approval from the Utility.

B. Single-phase, 120/208 Volt, Three Wire: This service voltage configuration is available in a few designated areas. The maximum service entrance shall not exceed 200 amps. The maximum single-phase 120-volt and 208-volt motor sizes shall be limited to 2.5 and 5.0 horsepower respectively. Larger motor sizes must receive approval from the Utility.

C. Three-phase, 480 Volt, Three Wire Delta: **This service voltage configuration is closed to new services and service conversions.**

D. Combination Single and Three-phase, 120/208/240 Volt, Four Wire Delta: **This service voltage configuration is closed to new services and service conversions.**

E. Three-phase, 120/208 Volt, Four Wire Wye: This service voltage configuration is available to Customers where the maximum service entrance does not exceed 2,500 amps (limited by loading on a 1,000 kVA transformer).[2] The maximum single-phase 120-volt and three-phase 208-volt motor sizes shall be limited to 10 and 40 horsepower respectively. Larger motor sizes must receive approval from the Utility.

F. Three-phase 277/480, Four Wire Wye: This service voltage configuration is available to Customers where the maximum service entrance does not exceed 3,000 amps (limited by loading on a 2500 kVA transformer).[2] The maximum single-phase and three-phase motor sizes shall be limited to 10 and 40 horsepower respectively. Larger motor sizes must receive approval from the Utility.

[1] 600 Amp Continuous or 800 Amp Intermittent Duty Service.
[2] Continuous Duty Service.

G. Single and Three-phase, Primary Voltage: Primary voltage service may be available to Members where it is deemed appropriate and available. The maximum single-phase and three-phase motor sizes shall be limited to 10 and 40 horsepower respectively. Larger motor sizes must receive approval from the Utility.

A summary of service voltages and other electric service information is provided in **Figure 1-1** at the back of this ESM. This is used as an example and may not represent the available service size and voltage for the Utility. Customers should contact the Utility to verify what voltages and service sizes are available.

1.10 Number of Services:

The Utility will normally supply the following to each Customer:

- One service lateral
- One class of service
- One meter

A. The following shall be considered as exceptions to the rule, if allowed by the *NEC* and/or state and local codes. Reference *NEC 230.2*:

1. Special Conditions – Additional services shall be permitted to supply the following:
    a. Fire pumps.
    b. Emergency systems.
    c. Legally required standby systems.
    d. Optional standby systems.
    e. Parallel power production systems.
    f. Systems designed for connection to multiple sources for the purpose of enhanced reliability.
2. Special Occupancies – By special permission, additional services shall be permitted for either of the following:
    a. Multiple occupancy buildings where there is no available space for service equipment accessible to all occupants.
    b. A single building or other structure sufficiently large to make two or more services necessary.
3. Capacity Requirements – Additional services shall be permitted under any of the following:
    a. Where the capacity requirements are in excess of 2,000 Amperes at a supply voltage of 600 Volts or less.
    b. Where the load requirements of a single-phase installation are greater than what the serving agency normally supplies through one service.
    c. By special permission.

4. Different Characteristics – Additional services shall be permitted for different voltages, frequencies, or phases, or for different uses, such as for different rate schedules.

B. Where more than one point of delivery or more than one point of metering is necessary because of interruptible service rate, dual fuel, governmental requirements or regulatory rules which require separate meters for each dwelling and commercial unit in a multi-dwelling unit residential building, mobile home park, and commercial building. This rule applies to any existing building which undergoes alterations involving a change in type of occupancy or substantial remodeling.

C. Exceptions to the above rules may be made when clearly warranted due to unusual engineering or economic circumstances. Any exception shall be compliant with the *NEC*.

D. The Utility may refuse to supply two separate services on large electrical service entrances where there is no indication of sufficient load.

1.11 Short Circuit Duty Requirements

The Customer's service equipment and other devices shall be adequate to withstand and interrupt the maximum available short circuit current.

Definitions:

1. **Short Circuit Current Requirements (SCCR)** – The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria (*NEC 100*).

2. **Fault Current** – is an abnormal current in an electrical circuit due to a fault, usually a short circuit or abnormally low impedance path. Fault Current comes in three varieties: phase-to-neutral fault, phase-to-phase fault and phase-to-earth ground fault.

3. **Ampere Interrupting Capacity (AIC)** – This applies to circuit breakers and their ability to open and protect a circuit with a specific amount of current flowing in the circuit. Short Circuit Current Ratings are from 10,000 to 65,000 amps.

4. **Arc Flash Current** – The current that sustains an arc flash, which is a dangerous and explosive release of energy caused be an arc fault in an electrical system. Arc flash current depends on:

    - The system voltage
    - The impedance of the arc
    - The gap between conductors
    - The type of enclosure of open-air condition
    - Arc flash system values change over time due to changes throughout the electrical system. Customer's equipment shall be adequate to withstand and interrupt the maximum available fault current on the Present System as of the date of the request to connect.

Informational Note: The Short Circuit Current Ratings listed in the tables below are the maximum theoretical fault current values calculated at the secondary terminals of the transformer on a 7.2/12.47 kV system.

These numbers do not take into account service wire sizes or lengths. These numbers are for informational purposes. The Utility should be consulted for actual available fault current, as it may differ from these values.

A. Single-phase Metering:

Minimum Short Circuit Current Ratings

120/240 Volt, Single-Phase & 120/208 Volt, Single-Phase	
Service Ampacity	**Minimum SCCR**
100 amp	10,000
150 amp	22,000
200 amp	22,000
320 amp	22,000
400 amp	35,000
600 amp	35,000

Notes:

1. Total service ampacity ratings of all present and future service entrance equipment connected to the same overhead service drop or underground service lateral.

B. Three-phase Metering:

Minimum Short Circuit Current Ratings

120/208 Volt Three-Phase	
Service Ampacity	**Minimum SCCR**
200	22,000
400	35,000
600	65,000
800	100,000
1200	100,000
1600	100,000

277/480 Volt Three-Phase	
Service Ampacity	**Minimum SCCR**
400	35,000
600	65,000
800	65,000
1200	65,000
1600	65,000

Notes:
1. Total service ampacity ratings of all present and future service entrance equipment connected to the same distribution transformer.

C. **Available Fault Current for Arc Flash Studies:** Consult with the Utility.

1.12 Inspections and Maintenance

In areas where electrical inspectors are provided, the inspector is the AHJ on all issues dealing with customer owned electrical wiring facilities.

1.13 Service Connections

The Utility will make all service connections to its electrical system. The Utility shall immediately disconnect any unauthorized connections or alterations to its electrical facilities and other equipment.

The Utility shall be notified when it is necessary to cut the meter seal due to situations where the electric service must be disconnected during an emergency, or where it necessary to access the meter socket by a qualified person. No persons, other than employees or agents of the Utility, may relocate meters or other equipment owned by the Utility.

1.14 Conductor Identification

The customer's neutral conductor shall be identified by white tape, white insulation, white paint, or other techniques permitted by *NEC Article 200*.

On four-wire, delta connected secondary, the phase conductor having the higher voltage to ground (i.e. wild leg) shall be identified by orange insulation, orange tape, by tagging, or other effective means. Such identification shall be placed at each location where a connection is made if the grounded conductor is also present.

1.15 Utility Facilities and Equipment on Customer Premises

A. The Utility shall have the right to install, inspect, and maintain its equipment on the Customer's premises as necessary to furnish proper service. All such equipment will

remain the Utility's property, and the Utility shall have the right to remove equipment upon discontinuance of service.

B. The customer shall provide, without cost to the Utility, the necessary easements and/or right-of-way for Utility personnel to install, maintain and access electric facilities that provide service to the customer. This shall include permission to trim and/or remove trees and brush that may interfere with the installation and operation of the Utility's facilities.

C. The Customer shall be responsible for utility equipment damages and losses resulting from Customer interference, tampering, or negligence.

1.16 General Service Entrance Requirements

A. Electrical wiring should only be done by those who have been trained in wiring techniques, code requirements, and safety. The Utility will not inspect Customer wiring or provide electrical code interpretations.

B. Service entrances shall have ample capacity per *NEC* Article 220 for any electrical load that may be expected to develop. All current carrying components of the metering installation shall have an ampacity rating equal to or greater than the required ampacity rating of the service entrance conductors

C. A single main breaker or fused disconnect is required. For services greater than 200 amps, two main breaker/fused disconnects are permitted.

D. The rating of the service disconnect is to be not less than the calculated load to be carried and not the actual load carried. (*NEC 230.79*)

E. Adjustable breakers whose maximum rating, either individually or in combination, exceed the rating of the self-contained meter are prohibited.

F. The equipment grounds, (green and bare conductors) must be bonded to the neutral in the main distribution panel. Equipment grounding conductors are not permitted in the meter socket or other entrance equipment.

G. Grounding electrode conductors are not allowed to be installed in meter pedestals or meter sockets. The only exception is free standing meter pedestals containing a main disconnect.

H. The following table shows minimum conductor sizes for residential 120/240 single-phase, three wire service entrances.

Service Size	Minimum Service Entrance Conductor (AWG or kcmil)[1]		Minimum Grounding Electrode Conductor (AWG/kcmil)[2]
Amperes	Copper	Aluminum	Copper
100	#4	#2	#4*
150	#1	2/0	#4*
200	2/0	4/0	#4
400	400	600	1/0

[1] Per NEC 310.15 and applies for wire/cable types THW, THWN, THHN, and USE.

[2] Per NEC 250.66 and table 250.66

* Sizes shown exceed NEC, however are preferred for standardization.

I. Conduit for underground services must be gray Schedule 40 PVC. Conduit for risers must be gray Schedule 80 PVC.

J. Rigid metal conduit is required for overhead masts to the weatherhead unless the weatherhead is below the roofline and secondary messenger is appropriately secured to the structure.

K. All overhead masts should be back-guyed if the service drop attachment point is more than 48 inches above the roof. No couplings are allowed in the service mast above the roof line. The top section of conduit must be securely anchored to the building just above any coupling.

1.17 Service Entrance Upgrades

The Customer shall give the Utility reasonable notice of substantial load increases (permanent or temporary) that may require increased Utility electric system capacity. The Customer shall be required to convert to a service voltage presently provided by the Utility if the load increase requires replacement of a main service disconnect.

Customers who fail to notify the Utility will be charged for the cost to replace any damaged Utility equipment.

1.18 Service Disconnect and Meter Sequence

The location of the Customer-owned service disconnect, unless specifically approved by the Utility, shall be on the load side of the metering (**meter-switch-fuse**) sequence.

Exception #1 - In multiple meter locations where the National Electric Code requires a main disconnect, the sequence shall be:

Main Service Disconnect – Meter – Switch – Fuse … “Cold Sequence”

Exception #2 - For all 277/480Y volt services with self-contained meters, the sequence shall be:

Switch – Meter – Switch – Fuse … “Cold Sequence”

1.19 Customer Installations

A. The customer installs, owns and maintains the service entrance equipment and provides a secure location for holding service wires and service entrance equipment to the building or structure. All service entrances shall include a service disconnecting means, over-current protection and Utility approved metering equipment located in the vicinity of where electric service is supplied to the building or structure.

B. The *NEC* states where the service disconnects may be located. This ESM states where utility owned service conductors shall be located, terminated and metered.

1. The National Electrical Code in Section 230.70(A) limits the location of the service disconnect to a readily accessible location either outside of the building or inside nearest the point of entrance of the service conductor's location.

2. The Wisconsin State Electrical Code, Chapter SPS 316, states where the customer owned service entrance conductors and service disconnects may be located.

3. The Wisconsin State Electric Code in SPS 416.230(3)(b) states that conduits for service conductor located according to *NEC* 230-70(A) can extend no more than 8 feet into the building from the point they enter the inside of building through the outside wall or concrete floor.

   Informational Note: The Wisconsin 8 ft. rule is in addition to NEC 230.70(A). In Wisconsin, service entrance disconnects, when located inside, must be near the point of entrance of the service conductor and must be within 8 ft. of where the conductors enter the building through the outside wall or concrete floor.

   Michigan Electrical Code, Part 8 adopts by reference the National Electrical Code (NEC) *(2023 edition) with specific Michigan amendments, deletions, and additions. It governs the* inspection, installation, and maintenance of electrical systems *and equipment within the state. Part 8 also outlines the powers and duties of the* code official*, permit requirements, and procedures for inspections and enforcement.*

4. This ESM limits the location and termination of utility owned service conductors to an installation on the outside of the customer's building or structure.

1.20 Communication Tower Installation

A. All communication towers are considered structures. The Utility will provide either one underground service lateral or one overhead service drop to a tower site, regardless of the number of tower users.

B. The tower owner will be responsible for providing metering and service entrance facilities to serve all tenants utilizing the tower facilities.

C. Metering shall be made accessible to Utility personnel. Metering shall be installed in one of the following ways:

1. Outside of the customer's secured area.

2. Inside a common fenced area or separately fenced area and provide provisions for a Utility lock. The metering shall be located 4’ to 5’ from the edge of the fence to facilitate reading the meters through the fence.

D. When additional customers request service, *NEC* Article 220 load calculations are required before the new service(s) will be energized.

E. The tower owner is required to install sufficient meter positions when the first tenant goes on the tower to accommodate all possible tenants. Label each position as Unit #1, Unit #2, etc. Do not use tenant names as tenants may change.

F. Communication towers are considered a commercial account.

2 Temporary Service

Reserved For Notes:

2.1 General

The following are general technical requirements that apply to temporary services.

A. A service application shall be required for all temporary services. The Utility will work with the customer to determine the location of the temporary service

B. Temporary services shall be located as near as possible to the location of permanent service to the building or structure. Abnormal conditions involving compliance with the foregoing provision will be cleared with and permission granted by the Utility prior to locating the Customer connection

C. The customer shall reimburse the Utility for its costs to install and remove the temporary service. The customer is also responsible for the energy usage costs.

D. All temporary service shall be maintained in a safe manner in order to keep the Utility harmless from injury to persons or property. The service shall remain temporary only for a reasonable time and must be made permanent when the Utility directs such action.

E. Customer-owned temporary service entrances are not permitted on Utility-owned poles.

F. Any required return trips because of clearance problems, or unsafe and inappropriate equipment, will be at the Customer's expense.

G. Must use GFCI protected outlets.

H. Working space clearances as defined by *NEC* 110.26, shall be required for temporary services.

I. The service entrance of a temporary service must meet all requirements of NEC Article 230 Parts I through VIII that are required for permanent service entrances.

J. Temporary services shall not be in service for more than 180 days without approval from the Utility.

K. Only the Utility shall connect the temporary service to its system.

2.2 Temporary Overhead Services

Please refer to the permanent overhead service section for additional requirements. **Figure 2-1** Temporary Overhead Service in the back of this ESM illustrates a typical acceptable temporary overhead service arrangement. Customers shall consult with the Utility for their specific arrangement guidelines. The following are technical requirements that apply to temporary overhead services:

A. The Utility shall specify the location of temporary service pole(s) to avoid clearance problems. The temporary service pole(s) will need to be clear of the route for permanent service.

B. The service drop to the temporary service pole shall not exceed 100 feet.

C. The service attachment shall be installed at a height that maintains the following clearances:

- Residential Driveways – A minimum of 16.5 feet.
- Roads, Non-Residential Driveways, and Surfaces Subject to Truck Traffic – A minimum of 18 feet.
- Pedestrian Areas – A minimum of 12.5 feet.

D. The temporary service pole shall be constructed of treated lumber.

E. If service drop must be attached at a point higher than 12 feet in order to obtain clearances to ground, 2”x4” braces shall be used for increased support.

F. Temporary services shall not be installed across public streets, roads, railroad tracks, or driveways.

G. Panel boards shall be service entrance rated. Panel boards with more than two single pole breaker positions require a main disconnect or breaker.

2.3 Temporary Underground Service

Please refer to the permanent underground service section (Chapter 4) for additional requirements. **Figure 2-2** and **Figure 2-3** Temporary Underground Service in the back of this ESM illustrate typical acceptable temporary underground service arrangements. Customers shall consult with the Utility for their specific arrangement guidelines. The following are technical requirements that apply to temporary overhead services:

A. The Customer may install a permanent meter pedestal and breaker panel to avoid using a temporary service.

B. The temporary service structure will need to be clear of the route for permanent service.

C. The service lateral to the temporary service structure shall not exceed 100 feet.

D. The temporary service support structure shall be constructed of treated lumber.

3 Overhead Secondary Service

Reserved For Notes

3.1 General Requirements

The following general requirements shall apply to overhead secondary services for residential and commercial customers.

A. The Utility will make all service connections to its electric distribution system. Connection to or alteration of the Utility's facilities by others is prohibited and such action is subject to immediate disconnection. Under emergency conditions, prior approval may be obtained from the Utility to make a temporary service connection.

B. All overhead service drop conductors are furnished and installed by the Utility.

C. The Customer shall provide and maintain an adequate service drop attachment to support the service drop conductor.

D. Only service drop facilities shall be permitted to be attached to a service mast.

E. A maximum of four service conduit risers shall be allowed at the building or structure.

F. The service weatherhead is to be located at a height such that the service drop can be attached to the support and still maintain proper code clearance above ground. The maximum allowable attachment height is 20 feet above ground. If greater attachment height is required, the Customer shall obtain prior approval from the Utility.

Grounding requirements are provided in Chapter 5. Metering requirements are provided in Chapter 6.

3.2 General Location of Electric Services

A. All metering facilities shall be on the exterior of the building.

B. The proposed service conductor route should be clear of obstructions from trees and have sufficient clearances to windows, doors, vents, and other utilities.

C. The Customer should consult with the Utility for the proper meter and service conductor attachment locations to the building.

D. The electric meter may not be installed within 10 feet of any existing or future decks.

E. Any meter location found unsuitable to the Utility will be required to be moved at the Customer's expense.

Figure 3-1 Overhead Service Location Clearance requirements, in the back of this ESM illustrates clearance requirements from doors, windows, and gas utility equipment.

3.3 Overhead Electric Service Arrangements

The following Figures are provided in the back of this ESM illustrating typical overhead electric service arrangements:

- **Figure 3-2a**: Through the Roof Installations with Non-fused Disconnect
- **Figure 3-2b**: Through the Roof Installations with Fused Disconnect

- **Figure 3-3a**: Wall Mount Installations with Non-fused Disconnect
- **Figure 3-3b**: Wall Mount Installations with Fused Disconnect
- **Figure 3-4**: Pole Mounted Service (Secondary Pole)

4 Underground Secondary Service

Reserved For Notes

4.1 General Requirements

The following general requirements shall apply to underground secondary services for residential and commercial customers.

A. An underground service lateral is defined as the Utility's underground conductors from the last pole, pedestal, transformer, or any other Utility facility connecting to the Customer's metering point, termination equipment, or disconnect equipment. The Utility will supply, own, and maintain the underground service lateral in accordance with its service extension rules.

B. The Utility will not install underground service laterals across rock quarries, tillable agricultural land, or other locations not suitable for underground cables and equipment.

C. The Utility will not allow the installation of underground service lateral unless the proposed cable route is clear of all obstructions and within 6 inches of final grade.

D. The Utility should be consulted before making any changes in grade above the Utility's underground cables.

E. The Customer shall contact the Utility for approval of the service location prior to installing their service entrance equipment. The Customer will own, maintain, and install all service entrance facilities except the service lateral, meter, instrument transformers, and instrument transformer wiring.

F. The Utility will make all service connections to its electric distribution system. Connection to or alteration of the Utility's facilities is prohibited, and such action is subject to immediate disconnection.

G. The Utility will not terminate service laterals inside the Customer's building or Customer-owned switchgear. The termination point shall be outside the Customer's building in free standing or wall-mounted equipment. The Utility will not terminate on a customer's circuit breaker or disconnect switch.

H. The Customer is responsible for providing the trench for all underground installations. Trench depths shall accommodate the following minimal burial requirements:

Minimum Burial Depth for Supply Cable, Conductor, and Ducts[1]		
Application	**Voltage (phase-to-Phase)**	**Depth (in)**
All Secondary	0 to 600	30
Single-Phase Primary	601 to 25,000	36
Three-Phase Primary	601 to 25,000	42

1. Where minimum burial depths cannot be met, lesser depths than indicate may be approved by the Member Utility if supplemental mechanical protection or duct of sufficient strength is provided.

I. Where minimal burial depths cannot be met, lesser depths may be used if supplemental mechanical protection approved by the Utility is provided. The supplemental mechanical

protection shall be sufficient to protect the cable or conduit from damage imposed by expected service usage. Where the cable is installed in conduit approved by the Utility, additional supplemental mechanical protection is not required if the conduit is of sufficient strength to protect the cable from expected surface usage.

J. All trenches will be backfilled with dirt, free of any construction waste(s) and rocks that are ½" or larger. Unsuitable backfill may be augmented with sand, or ¼"crushed limestone 6" below and 6" above installed cable.

K. Customer supplied conduits must meet the Utility's standard of gray, PVC, schedule 40 for below ground applications and schedule 80 for above ground applications. The conduit shall also contain a pulling tape with a minimum tensile strength of 1,500 lbs.

L. The Utility may provide primary and secondary conductors in conduit at an additional charge. Please contact the Utility for current availability and pricing.

Grounding requirements are provided in Chapter 5. Metering requirements are provided in Chapter 6.

4.2 General Location of Electric Services

A. All metering facilities shall be on the exterior of the building or approved meter pedestal.

B. The proposed service conductor route should be clear of obstructions from landscaping and have sufficient clearances from other utilities.

C. The Customer should consult with the Utility for the proper meter and service conductor locations.

D. The electric meter may not be installed within 10 feet of any existing or future decks.

E. Any meter location found unsuitable to the Utility will be required to be moved at the Customer's expense. **Figure 3-1** Overhead Service Location Clearance Requirements in the back of this ESM illustrate clearance requirements from doors, windows, and gas utility equipment.

4.3 Underground Electric Service Arrangements

The following Figures are provided in the back of this ESM illustrating typical underground electric service arrangements:

- **Figure 4-1a**: Wall Mount Installation – 120/240V with Non-fused Disconnect
- **Figure 4-1b**: Wall Mount Installation – 120/240V with Fused Disconnect
- **Figure 4-1c**: Wall Mount Installation – 277/480V Three-phase
- **Figure 4-2a**: Underground Service Outdoor Service Installations 120/240V with Non-fused Disconnect
- **Figure 4-2b**: Underground Service Outdoor Service Installations 120/240V with Fused Disconnect

- **Figure 4-2c**: Underground Service Outdoor Service Installations 277/480V Three-phase with Non-fused Disconnect
- **Figure 4-2d**: Underground Service Outdoor Service Installations 277/480V Three-phase with Fused Disconnect
- **Figure 4-3a**: Underground Service Meter Pedestal Installation with Non-fused Disconnect
- **Figure 4-3b**: Underground Service Meter Pedestal Installation with Fused Disconnect

4.4 Single-Phase Transformer Pad

Pads for single-phase padmounted transformers are provided by the Utility. The location of the pad shall be determined by the Utility.

4.5 Three-Phase Transformer Concrete Pad

Concrete pads for three-phase padmounted transformers are the Customer's responsibility, however the Utility may provide and install the pad at an additional charge. Contact the Utility for approval, pricing, and availability.

The location of the concrete pad shall be determined by the Utility. The Utility may require the installation of a "foundation wall" below the concrete pad, depending on site conditions and service/transformer size. Verify with the Utility to determine if a foundation wall is needed prior to the installation.

Construction specifications for concrete transformer pads and foundation walls are illustrated in **Figure 4-4** Underground Service Concrete Transformer Pad in the back of this ESM.

4.6 Protection of Padmounted Equipment

Equipment protection using protective posts is required where single-phase or three-phase padmounted transformers are subject to vehicular traffic. Installation and the cost are the responsibility of the Customer. If the Utility installs this protection, the cost will be billed to the Customer or included in the service extension contract. **Figure 4-5** Underground Service Protective Posts for Padmounted Transformers in the back of this ESM illustrates how protective posts should be installed.

5 Grounding and Bonding

Reserved For Notes

5.1 General Requirements

The grounding of electric installations is essential for the safety of those using the electric service, personnel maintaining the service, and is a safeguard for the customer's equipment.

All installations shall be grounded and bonded in accordance with the *NEC*. It is the responsibility of the Customer and the Authority Having Jurisdiction (AHJ) to verify all applicable code grounding requirements are met. Additional requirements at the service entrance include:

A. A permanent and effective grounding system shall be provided for all service entrance equipment.

B. The neutral conductor shall be bonded to the grounding system.

C. The grounding electrodes and conductor shall be buried a minimum of 6 inches below final grade.

D. **Figure 5-1** Grounding and Bonding Wall Mounted Meter Details in the back of this ESM illustrates grounding and bonding arrangements for various service entrance configurations.

5.2 Grounding Electrodes

A. Grounding electrodes identified by *NEC* 250.52 include:

- Metal Underground Water Pipe – *NEC* 250.52(A)(1)
- Metal Frame of a Building of Structure – *NEC* 250.52(A)(2)
- Concrete Encased Electrode – *NEC* 250.52(A)(3)
- Ground Ring – *NEC* 250.52(A)(4)
- Rod and Pipe Electrodes – *NEC* 250.52(A)(5)
- Plate Electrodes – *NEC* 250.52(A)(6)

B. If present on the premise at each building or structure served, each item in *NEC* 250.52 (A) 1-7, shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes exist, one or more of the grounding electrodes specified in *NEC* 205.52(A) (4) through (A) (8) shall be installed and used.

C. Metal underground gas piping systems on the line side of the gas meter shall not be used as a grounding electrode or bonded to the grounding electrode system.

D. Two ground rods are installed (*NEC* 250.53(A)(2)), at a minimum distance of 6 feet apart. Both ground rods shall be installed to the left or right of the meter socket but not in front.

E. For all three-phase, four-wire services, the customer's grounded (neutral) conductor shall be terminated on the first service disconnect or series of service disconnects (6 switch rule) reference (*NEC* 250.24(C)).

5.3 Grounding Electrode Conductor

A. The grounding electrode conductor shall not run through meter sockets, metering transformer cabinets, or the Utility's portion of a meter pedestal.

B. The grounding electrode conductor may be terminated in one of the following ways:

- Service disconnect(s).
- Metering equipment containing a service disconnect.
- Termination compartment of multiple metering installations.

C. The grounding conductor shall be one piece in length and supported and protected by rigid conduit or as required by *NEC* 250.64(B) and where physical damage may occur.

D. The Utility requires a minimum #4 copper grounding electrode conductor. All other grounding electrode conductors shall follow the minimum requirements defined by the *NEC*.

Size of Largest Ungrounded Service Entrance Conductor or Equivalent Area for Parallel Conductors (AWG/kcmil)		**Size of Grounding Electrode Conductor (AWG/kcmil)[1]**
Copper	**Aluminum or Copper-Clad Aluminum**	**Copper**
#2 or smaller	1/0 or smaller	#4*
#1 or 1/0	2/0 or 3/0	#4*
2/0 or 3/0	4/0 or 250	#4
Over 3/0 through 350	Over 250 through 500	#2
Over 350 through 600	Over 500 through 900	1/0
Over 600 through 1100	Over 900 through 1750	2/0
Over 1100	Over 1750	3/0

[1] Per *NEC* 250.66 and table 250.66

* Sizes shown exceed NEC, however are preferred by the Member Utility for standardization.

5.4 Bonding Service and Metering Equipment

A. The Customer or Customer's electrical contractor shall be responsible for all bonding connections.

B. The meter socket enclosure, termination cabinet, and metering transformer cabinet shall be bonded to:

1. The system neutral when they are located on the line side of or at the main disconnect.

2. The equipment grounding conductor, when all the following apply:

a) Installed on the load side of the main disconnect, and
b) Service ground-fault protection does not exist, and
c) Located immediately adjacent to the main disconnect.

C. Bonding shall be provided where necessary to ensure electrical continuity and to have the capacity to safely conduct any fault current likely to be imposed on it.

D. Intersystem bonding – CATV, satellite dish systems, and telephone companies shall bond to the grounding electrode system, if available. If the grounding electrode system is not readily available, bonding shall be done at the ground terminal bar in the main service entrance equipment (*NEC* 250.94 (2) or (3) only). The intersystem bonding shall not be done in or on the metering equipment, refer to Wisconsin PSC 114.099. Michigan and Iowa have no specific rule and fall under NEC code.

E. Meter disconnect switches nominally rated not in excess of 600 volts shall have a short circuit rating equal to or greater than the available short circuit current. These devices shall also be grounded and bonded according to parts V and VII of *NEC* 250.

6 Metering

Reserved For Notes

6.1 General Requirements

Customers shall provide a suitable location for meters and associated metering equipment without charge to the Utility. The Utility shall review and approve the proposed location of metering equipment before it is installed. Additional requirements include:

A. Meter shall be located outdoors unless special approval has been provided by the Utility.

B. Meter shall be in an accessible location to permit the Utility to read, inspect and test at reasonable times.

C. Meter shall be located in a location free of hazardous conditions such as explosive fumes or materials.

D. Meter face shall generally be 5 feet above final grade unless it is incorporated in an underground pedestal or meter bank.

E. Meter face shall be no lower than 3 feet above grade and no higher than 6 feet above grade if incorporated in a meter pedestal or meter bank.

F. Meter and associated equipment shall be located on a solid structure that is free from vibration, possible mechanical damage, and supported to maintain the meter socket in a level and plumb position.

G. Meter and associated equipment shall be protected from damage by falling ice, snow, or other objects. A protective shield for the meter should be provided where the meter is not shielded by a roof overhang.

H. Meter and associated equipment shall have a minimum 3-foot clearance in the front, a vertical clearance of 5 feet 6 inches, and 2 feet of horizontal clearance on either side. Where instrument transformer cabinets are used, the clear working space in front of the cabinet shall be 2 feet greater than with the cabinet cover in an extended position, or 3 feet, whichever is greater.

I. Have a minimum of 4 inches of clearance on all sides of the meter socket.

J. Residential customers may use a residential or commercial meter socket. Commercial, farm, and non-residential customers shall use a commercial meter socket.

K. All meters located on a commercial property shall meet commercial requirements.

L. Have a single disconnecting means for group-metered installations of more than six meters.

M. Have pedestal style meter sockets for outdoor locations if the design permits. This is applicable for installations of up to 4-meter positions.

N. In addition to the above requirements, multiple meter installations shall also:

   1. Be grouped at a location suitable to and approved by the Utility. Have each meter socket and service switch permanently marked with the location being served.

   2. The location being served shall be similarly labeled. The identifications shall be on the outside of the metering panels (for the meter readers and tenants), inside the meter enclosure on a non-movable surface and at the service panel that the meter serves. Inside identification is often done with a permanent black marker or white paint.

The meter **shall not**:

- Be installed in a patio, porch, deck, or carport area, or areas likely to be enclosed. Changes to the Customer's service area shall not result in making an existing metering location unsafe or inaccessible for reading, inspecting, or testing. The Customer will be required to make changes to this wiring if such changes do not comply with these rules. If after a reasonable length of time has passed after receiving a non-compliance notification from the Utility and the Customer has not suitably brought the installation into compliance, the Utility will terminate service until the non-compliance has been remedied.

- Be installed on mobile homes.

- Have Customer or Customer-owned lightning arrestors or surge protection devices installed in metering equipment. The Customer should install these devices on the load side of the service over current protection devices. Similarly, metered and unmetered conductors shall not be installed in the same raceway or conduit, nor shall any Customer meters or instruments be connected to the Utility's meter wiring.

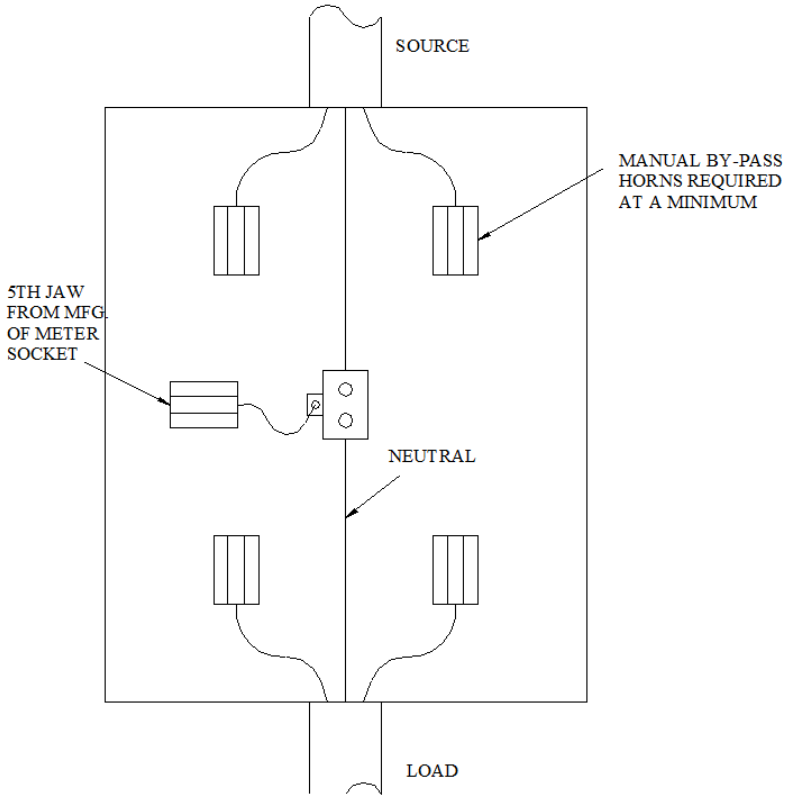
6.2 Single-Phase, Self-Contained Meters

A. Single-phase, 120/240 Volt, services with an electric panel rating of 400 Amperes or less will be metered with 100, 200 or 320 class, self-contained meters. 320 class meters are used for 400 Ampere services.

B. Single-phase, 120/280 Volt, network services are limited 200 class, self-contained meters which are rated at 200 Amperes. Services greater than 200 Amperes under this category shall use a balanced load three-phase service to supply single-phase loads.

C. The fifth jaw can be added to most new single-phase 120/240 Volt meter sockets for single-phase, 120/208 Volt, network services. The fifth jaw shall be added at the 9 o'clock position, anchored to the meter socket, and secured as shown in the following illustration.

METER SOCKET - SINGLE PHASE 120/208 VOLT NETWORK SERVICE



D. Typical meter installation arrangements for single-phase, self-contained, meters are illustrated in the following Figures in the back of this ESM:

- **Figure 2-1:** Temporary Overhead Service
- **Figures 2-2 & 2-3:** Temporary Underground Service
- **Figures 3-1 through 3-5:** Overhead Services
- **Figures 4-1 through 4-3:** Underground Services

E. Meter and grounding arrangements are illustrated in **Figure 5-1** in the back of this ESM.

F. The service disconnect shall be located in the meter pedestal if the service panel is more than 8 feet from the outer building wall.

6.3 Three-Phase, Self-Contained, Meters

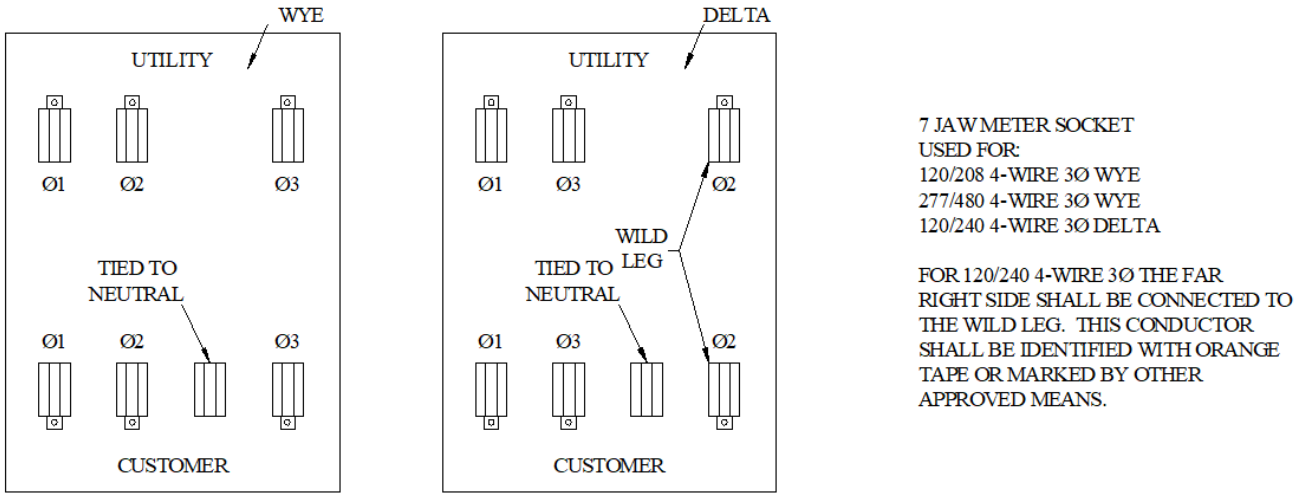
A. Three-phase, 120/208 Volt and 277/480 Volt, services with an electric panel rating of 400 Amperes or less will be metered with 200 or 320 class, self-contained, meters. 320 class meters are used for 400 Ampere services.

B. Minimum meter socket requirements shall include:

1. Rated up to 400 Amperes, 600 Volts, ringless, clamp type jaws, sealable, with wrench operated connectors.

2. A manual levered bypass switch designed to permit visual checking of the bypass connections with the meter installed. The socket must also be designed so that the cover cannot be installed in the bypass closed position.

C. The following illustrates the typical electrical connections for three-phase, four wire, applications at 400 Ampere or less. (**Note**: *Four-wire delta applications only pertain to existing installations and are no longer provided as new services by the Utility*)



D. Termination enclosures may be necessary with certain wiring, spacing, clearance or equipment choices. The Customer shall consult with the Utility before planning or utilizing these enclosures.

6.4 Instrument Transformer Metering

A. Commercial installations over 200 Amperes will be evaluated to determine if the class 320 meter will be adequate.

B. Current transformers (CT) for underground and overhead services shall be installed in an approved cabinet, typically pad-mounted or wall-mounted. All low side wiring on the current transformers will be done by the Utility. Polarity marks (H1 or white dot) on the CT window must face in the direction of the supply. Conductors from the utility supply shall enter the CT at the end with the polarity mark. All conductors of one phase shall pass through the same current transformer. The Utility will furnish all current transformers.

C. Voltage transformers (VT)may be required on all transformer rated 480-volt services. Voltage transformers shall be mounted in the same cabinet as the current transformers. On overhead services, they may be mounted on the mast head along with the current transformers. The voltage transformers should be mounted in a location where the conductors will not interfere with proper access. The Utility will furnish the voltage transformers and complete all voltage transformer wiring.

D. Instrument transformer cabinet must have provisions for a padlock and meter seal, must be weather tight, and must be large enough to allow ample space for CTs, VTs, and conductors.

E. The instrument transformer cabinet must be bonded and grounded as illustrated in **Figure 5-1** Ground and Bonding Wall Mounted Meter Details and **Figure 6-1** Metering Instrument Transformer Metering Guideline provided in the back of this ESM.

F. **Figure 6-1** Metering Instrument Transformer Metering Guideling, provided in the back of his ESM, illustrates the typical arrangements for three-phase current transformer cabinets.

6.5 Overhead (600 to 800) Ampere Service with Current Transformer Metering

A. This metering requirement is applicable for overhead services from 600 Amperes through 800 Amperes. For 400 Amp single-phase services, a 320 Ampere plug-in meter socket is standard for residential and some commercial services. The Customer shall submit its plan to the Utility for review and approval before using CT cabinets. Other general requirements are noted below.

B. The Customer shall install the meter socket, current transformer cabinet, and conduit between the meter socket and CT cabinet. The Utility will supply the meter, current transformers, and meter wiring.

C. The CT cabinet must be bonded in accordance with applicable electrical codes. A bonding conductor table can be found in **Figure 6-1** Meter Instrument Transformer Metering Guideline that provided in the back of this ESM.

D. The minimum clear space in front of the CT cabinet shall be 3 feet or 2 feet beyond the maximum cover swing distance, whichever is greater.

E. In existing four wire, 120/240 Volt, three-phase installations, the wild leg shall be located on the right side and identified with orange tape. (**Note***: Four wire delta applications only pertain to existing installations and are no longer provided as new services by the Utility*)

F. The Customer should contact the Utility for an approved list of meter sockets, meter pedestals and current transformer cabinets.

6.6 Underground (400 to 3,000) Ampere Service with Current Transformer Metering

A. This metering arrangement is applicable to underground service from 400 to 3,000 Amps using bolt-in current transformers only. For 400 Ampere single-phase services, a 320 Class self-contained meter is standard for residential and certain commercial services.

B. The Customer shall consult with the Utility early in the planning and design phase on metering and current transformer layouts to obtain timely approval before ordering equipment.

C. The CT cabinet must be mounted outdoors.

D. The CT cabinet must be bonded in accordance with applicable electrical codes.

E. The following summarizes the typical arrangement for three-phase current transformer cabinets.

1. The minimum depth of the CT cabinet is 24".
2. Doors shall be hinged and have a lockable hasp.
3. Buses should be braced to support conductors and CTs.
4. CTs must be adjustable for depth and height.
5. Buses shall be adequately braced to support CT's and conductors.

F. See **Figure 6-1** Metering Instrument Transformer Metering Guideline, provided at the back of this ESM, for instrument transformer metering guidelines.

G. Minimum working clearance in front of the CT cabinet shall be 3 feet, or 2 feet beyond the maximum cover swing distance, whichever is greater.

H. For existing four-wire, 120/240 Volt, three-phase installations, the wild leg shall be identified with orange tape or other appropriate means. (**Note:** *Four-wire delta applications only pertain to existing installations and are no longer provided as new services by the Utility*)

6.7 Multiple Meter Installations (2 to 4 Meters)

A. All multi-meter socket equipment must be approved by the Utility before installation.

B. Meter sockets must be ringless style, 200 Amp minimum rating, clamp type jaws, sealable, wrench operated connectors, with a protective shield covering the jaws.

C. The design of the meter socket shall be such that the cover cannot be installed with the bypass closed.

D. Each meter position must be permanently labeled on the inside and on the exterior of the meter socket identifying the service panel. If possible, avoid exterior labeling on removable portions of the socket.

E. Each meter socket must have a horn type or manual lever by-pass, be ringless, and UL approved.

F. A minimum clear working space of 3 feet in front and 2 feet on either side of the meter panel must be maintained. Headroom shall be a minimum of 6'-6". The main entrance enclosure or termination enclosure shall be at least 4" from any barrier or wall. Also, meter sockets shall be located no closer than 10" to a barrier or wall.

G. Each meter socket must be identified with the same permanent label identification as the space it meters both inside and outside of the metering panel. If possible, this identification should be on a non-removable part of this metering equipment.

H. Customers shall furnish, install, and maintain the metering equipment. This includes all meter sockets, switches, fuses, circuit breakers, termination enclosures, load conductors, lugs, and associated equipment.

I. Meters shall be individually sealable.

6.8 Indoor Meter Clearances

Indoor meters are normally not allowed and require Utility approval. The following requirements shall apply for any type of metering installation located indoors.

A. The Utility shall review and approve the proposed location of metering equipment before it is installed.

B. A key shall be provided by the owner to the utility for 24-hour access. No other materials shall be stored in the indoor metering area.

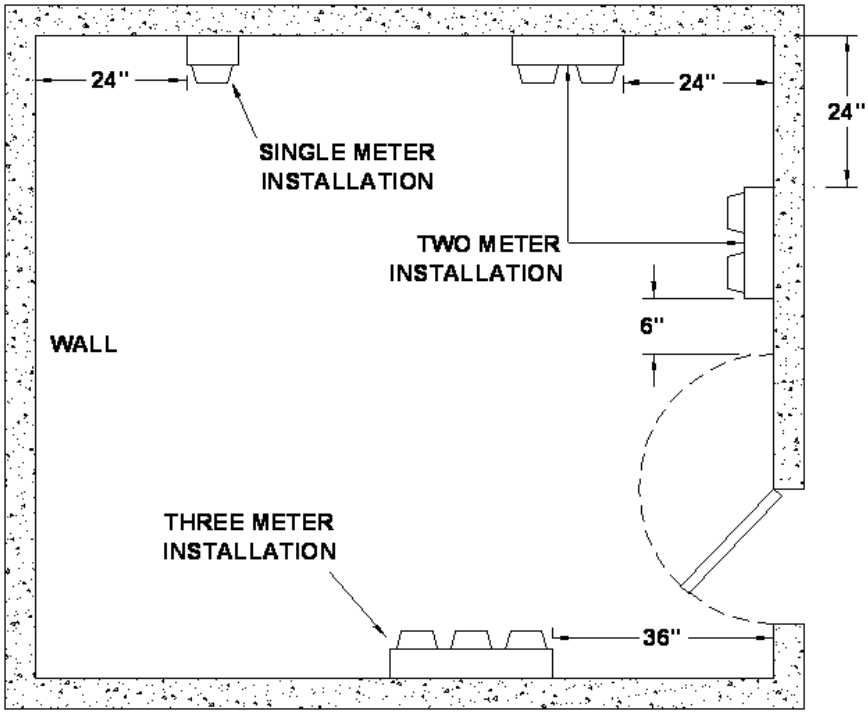
C. Meters shall not be installed on walls where they will be behind an open swinging door.

D. Meters require protective barriers if traffic through a doorway could cause damage to the meter. A minimum clearance of 12 inches is required from the center line of the meter-connection device to the barrier.

E. The minimum separation distance from meter stacks on adjacent walls is 24 inches.

F. A 3-foot minimum working space shall be provided in front of all metering.

G. The location of the electric meter must comply with the minimum clearances shown in the following illustration.



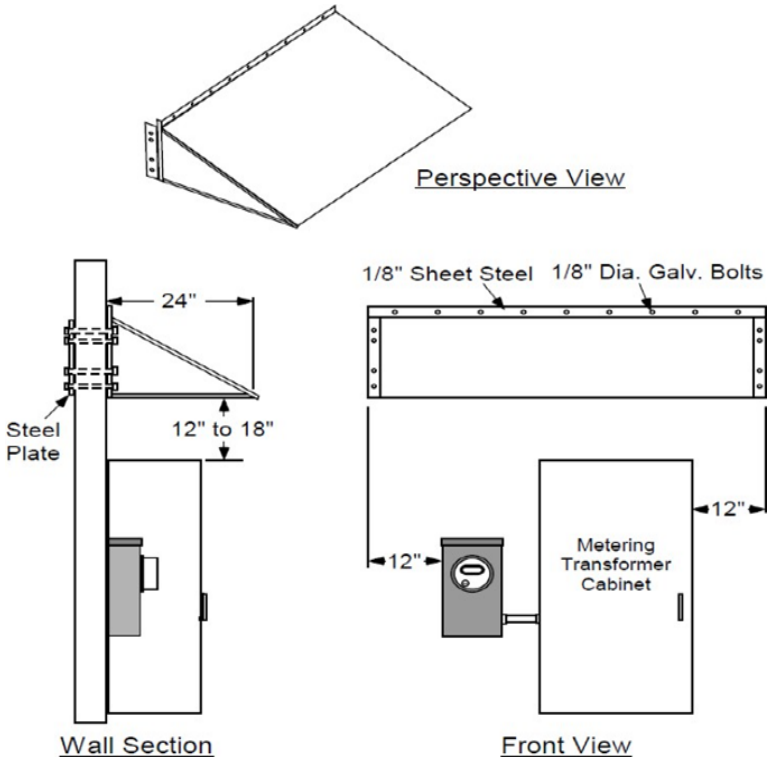
6.9 Meter Seals

The Utility will seal all meters, meter facilities and points of access to un-metered wiring on the customer's premises. All cabinets, conduit fittings, and equipment enclosures containing un-metered conductors shall be made sealable before the service is energized. It is illegal for customers or contractors to remove meters or seals. Contact the Utility if access to any Utility-sealed cabinet is required. Violation of this rule could result in immediate disconnection and prosecution

6.10 Meter Ice and Snow Shield

The customer is responsible for protecting Utility meter(s) and customer's own metering equipment from damage caused by falling ice, snow, or other objects. If protection is not provided for meter equipment by adequate roof overhang the customer shall construct a protective shield, or the metering equipment location shall be moved to a safe area. The customer will be charged for meter replacement if damage occurs and typically an outage will be required to replace any damaged equipment. An adequate roof overhang shall extend a minimum of 18" – 24" out from the face of the wall to which the meter is mounted.

The following illustrates typical ice and snow shield configurations.


Perspective View
24"
Steel Plate
12" to 18"
Wall Section
1/8" Sheet Steel
1/8" Dia. Galv. Bolts
12"
12"
Metering Transformer Cabinet
Front View

7 Manufactured and Mobile Home Services

Reserved For Notes

7.1 Overview

This chapter covers service requirements for all manufactured homes constructed to the requirements of the United States Housing and Urban Development (HUD) standards and all mobile homes. The term MANUFACTURED HOME as used in this chapter shall also apply to all mobile homes (see definition of mobile home). This chapter does not cover campgrounds.

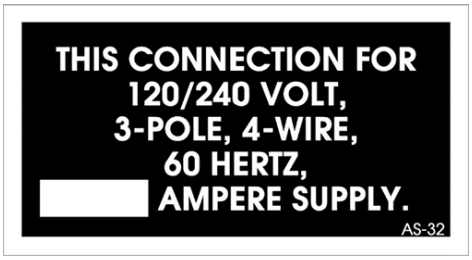
7.2 Definitions

Mobile Homes: ***NEC* 550.2**: A factory-assembled structure or structures transportable in one or more sections that are built on a permanent chassis and designed to be used as a dwelling without a permanent foundation where connected to the required utilities; these include the plumbing, heating, air-conditioning, and electric systems. (The term “mobile home” refers to factory-built homes that were produced prior to June 15, 1976; when the HUD requirement went into effect.)

Manufactured Homes: These are homes built entirely in the factory under a federal building code administered by the U.S. Department of Housing and Urban Development (HUD). The Federal Manufactured Home Construction and Safety Standards (commonly known as the HUD code) went into effect June 15, 1976. Manufactured homes may be single- or multi-section and are transported to the site and installed. The federal standards regulate manufactured housing design and construction, strength and durability, transportability, fire resistance energy efficiency, and quality. The HUD code also sets performance standards for the heating, plumbing, air-conditioning, thermal, and electrical systems. It is the only federally regulated national building code. On-site additions, such as garages, decks, and perches, often add to the attractiveness of manufactured homes and must be built to local, state, or regional building codes.

Manufactured homes will have a plate (sticker) located on the end of transportable section:

If the manufactured home is built to ***NEC* 550.32A** there will be a sticker located near the panel indicating a four-wire feeder is required, these homes will be provided service according to this chapter:



If the manufactured home is built to meet the conditions of ***NEC* 550.32B**, the manufacturer will place a sticker on the outside of the home near the service panel indicating that grounding is required prior to connection of service, these homes will be provided service according to ESM Chapters 1 through 6:

Modular Homes: These factory-built homes are built to the state, local, or regional code where the home will be located. Modules are transported to the site and installed. These homes will have a state sticker (right) indicating that it has been constructed to the applicable state code requirements if installed in Wisconsin. Labels in Michigan must comply with Michigan Administrative Code R408.31137. Labels in Iowa must comply with Compliance Seals must comply with Iowa Administrative Code Chapter 661-16.610(22)

Panelized Homes: These are factory-built homes in which panels – a whole wall with windows, doors, wiring, and outside siding – are transported to the site and assembled. The homes must meet state or local building codes where they are sited.

Pre-Cut Homes: This is the name for factory-built housing in which building materials are factory-cut to design specifications, transported to the site and assembled. Pre-cut homes include kit, log, and dome homes. These homes must meet local, state or regional building codes.

Modular homes, panelized homes, and pre-cut homes will be supplied electric service according to ESM Chapters 1 through 6.

7.3 General Requirements

Manufactured and mobile home service extensions shall comply with the following standards:

A. The Utility will provide and install the service cable to individual or group metering points for manufactured homes. The Customer will provide and install the meter socket(s) and service equipment. Manufactured homes receiving service at a central location shall obtain prior approval from the Utility for each installation. Group metering installations shall follow the same rules as individually metered units.

B. Each meter socket shall be permanently marked or tagged to coincide with the address or unit of the location served. Appropriate marking shall consist of a permanent plaque and/or directory. A permanent marking shall also be inside each meter socket base. Meters shall not be installed until these requirements are met.

C. Service will be 120/240 Volt single-phase.

D. Minimum rating of a manufactured home service entrance shall be 100 amps. Receptacles shall have overcurrent protection no greater than their rated capacity.

E. The manufactured home service entrance equipment shall contain a means for serving an accessory building, structure, or additional electrical equipment located outside a manufactured home by a fixed wiring method.

F. Manufactured home service entrance equipment is permitted to have additional receptacles for connection of electrical equipment located outside the home and all such 120-volt, single-phase, 15 and 20-amp receptacles shall be protected by listed ground-fault circuit interrupter (GFCI) protection.

G. All branch circuit breakers and feeder breakers shall be connected on the load side of a single service entrance breaker.

H. A field installed manufactured home service entrance shall be located adjacent to the manufactured home and not mounted on or in the manufactured home and not more than 30 feet from the home. If the manufactured home is placed on a permanent foundation a conventional service may be installed on the foundation, if the following provisions are met:

1. Service entrance rated equipment is located immediately adjacent to the meter pedestal or is an integrated part of the meter pedestal.

2. The service entrance shall contain a means for serving an accessory building structure of additional electrical equipment outside the manufactured home by a fixed wiring method.

3. A four-wire feeder is run from the load side of the service entrance to the electrical panel in the manufactured home.

I. Typical mobile home service installation arrangements for single-phase, self-contained, meters are illustrated in the following Figures provided in the back of this ESM:

- **Figure 3-4:** Pole Mounted Service (Secondary Pole)
- **Figures 4-2a-d:** Outdoor Service Installation
- **Figures 4-3a-b:** Meter Pedestal Installation

Please contact the Utility to discuss the arrangement for installations involving more than one meter at a single location.

8 Farm Services

Reserved For Notes

8.1 Overview

This chapter includes single and three-phase services to farms, acreages where animals may be present, and/or irrigation installations. The service shall connect to an approved field-built structure. The Utility will not install underground service laterals across rock quarries, tillable agricultural land, or other locations not suitable for underground cables and equipment.

8.2 Non-Farm Services

Services for installations not covered in this chapter shall be installed in accordance with services as shown in ESM Chapter 3 and Chapter 4.

8.3 Farm Pole Top Services

A. The farm service yard pole or field-built structure is owned by the Customer. This pole or field-built structure shall be located on the Customer's property. Under no circumstances may the customer's pole or field-built structure be located in road right-of-way.

B. Utility distribution poles shall not be used as farm service yard poles, for fencing, signage, or any other non-Utility purpose.

C. The transformer should be located 20 feet from the Customer's service entrance and any other Customer owned structure/facilities for potential neutral isolation request in the future. If this cannot be achieved due to physical limitations, the transformer may be located 12 feet but no more than 30 feet from the Customer's service.

D. For safety concerns, the Customer shall consult the Utility before installing any equipment on a yard pole or field-built structure.

E. All underground circuits extending from the yard pole or field-built structure shall be feeders or branch circuits (*NEC* 547).

F. The Customer shall protect the yard pole or field-built structure and equipment on it from damage by vehicles and/or farm equipment. The yard pole or field-built structure and equipment on it shall be maintained in good operating condition and repaired or replaced, at the Customer's expense, when warranted.

G. All meters shall be installed so the meter faces an area that is accessible and clear.

H. The Customer's pole top transfer switch (*NEC* 547.2 Site Isolation Device) shall be approved by the Utility as a single switch unit mounted in one enclosure. The site isolation device shall disconnect all underground conductors on the premise from utility service.

I. Pole top switch installations shall have a minimum switch size of 400 Amps.

J. The bonding conductor from the pole top transfer switch and all grounding and grounded conductors for the Customer's wiring system shall be connected together at the yard pole.

K. Customers are encouraged to convert to three-phase, 480/277 volt whenever practical and when appropriate for present loads or future expansion. To convert to three-phase, a Customer shall have:

1. A three-phase loads or immediate plans to install such.

2. A farm load that has exceeded single-phase service sizes offered by the Utility.

When converting to three-phase, the Customer shall make appropriate wiring changes on their side of the meter to utilize and balance all three phases as best as practical.

L. For animal confinement facilities and associated/connected premises, one service per property applies. All exceptions shall be approved at Utility discretion.

M. The Utility will not install additional service drops or laterals to any farm building or farm structure when any portion of the building or structure is located within 150 feet of the yard pole distribution center. If another service may be warranted, the separation between the services shall be 300 feet minimum, measured in a straight line.

N. A separate service may be installed to a building on the farm site if that building is not part of the farm operation. The separate service shall not originate from the yard pole.

O. All farm use meters shall be installed on the yard pole or field-built structure. A house (or houses) on a farm site may be considered as part of the farm operation and may be metered as part of the farm service or metered separately from the yard pole or field-built structure. Meters for house services not involved with farming operations are not permitted on the yard pole and may require a separate transformer.

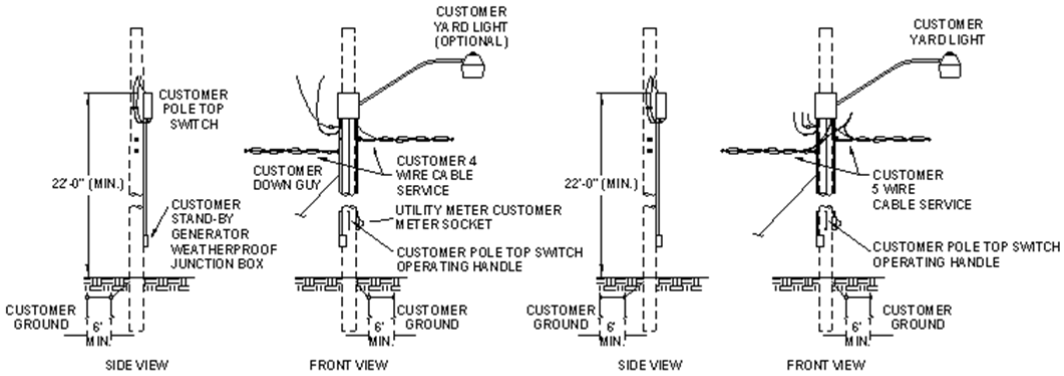
Informational Note: To prevent flicker issues caused by the farm loads, customers not involved with farm operation should be served from a separate transformer provided there are no electrically conductive pathways between the two services. Large motors should also be reviewed by the Utility.

P. Farms with two or more services on the same tract or parcel of land shall maintain a permanent plaque at each service location indicating its usage (*NEC* 547).

Q. Customer underground circuits extended from the yard pole shall have overcurrent protection. All Customer wires on the yard pole shall be installed in conduit.

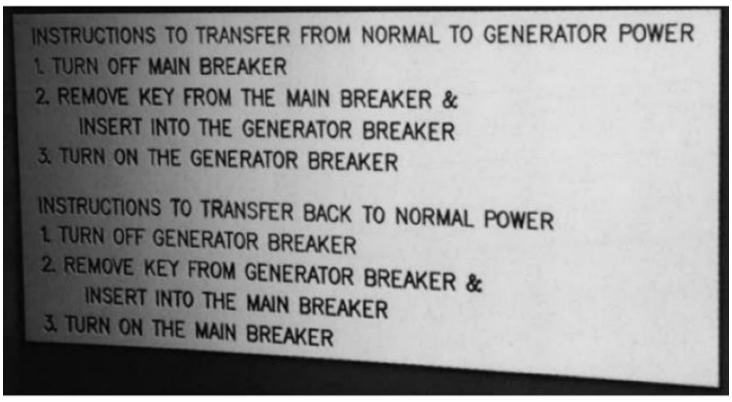
R. The Customer’s drip loop conductors shall provide a minimum of 36" leads from the pole top switch.

S. The following illustrates typical farmyard pole arrangements.



8.4 Key-Interlock Systems – Farm Standby Generation

Keyed interlock systems for standby generation may be allowed at farm installations with prior approval from the Utility. Labeling and instructional placards shall be installed by the customer as shown below.



9 Special Services

Reserved For Notes

9.1 Cable and Communication Power Supplies

Cable and communication power supply service is available at 120/240 Volt, three-wire, single-phase. The cable or communication company should contact the Utility to ensure that this voltage is available at the desired location.

The following requirements apply:

A. All installations must conform to all applicable electrical codes and the Utility's requirements for clearances, climbing space, and working space.

B. Only qualified and authorized representatives for the cable or communication company shall make this installation. Those representatives shall be trained and knowledgeable of clearance requirements and working rules of the *NESC* and requirements of OSHA. The qualified and authorized representatives shall be trained and competent in:

    1. Identifying and distinguishing electric utility system components and exposed live parts.

    2. The techniques necessary to determine the nominal voltage of exposed live parts.

    3. The minimum safe approach distances corresponding to the voltages to which the qualified representatives will be exposed.

C. The cable or communication company shall furnish and install all equipment and materials except the Utility's meter.

D. The meter socket shall be a minimum of 100 Ampere, ringless, and have manual bypass horns for 120/240 Volt three wire service.

E. The service entrance conductors shall be run in non-metallic conduit. The service entrance conductors shall use 600 Volt insulation and shall extend a minimum of 36" beyond the weather head. The Utility will make the service connections.

F. The service disconnect, power supply unit, meter socket and cable television cable shall be located in the same quadrant on the pole. There shall also be a maximum of 6" between the service entrance conductors and the cable television cable.

G. Service grounding shall comply with the *NEC* which requires a separate ground, ground lead, and two ground rods for the service.

H. The service conductor should be sized for the actual disconnect size utilized.

I. **Figure 9-1** Special Services Typical Cable & Communication Power Supply Arrangement provided at the back of this ESM illustrates typical cable and communication power supply arrangements.

9.2 Unmetered Decorative Holiday Lighting

Unmetered decorative holiday lighting service is available to local governmental units only with Utility approval. A master agreement between the Utility and the governmental unit is required.

The Utility reserves the right to deny such attachments. The preferred method is to meter this service.

Decorations and festoonery should be removed when billing is terminated. All decorative materials and service equipment must be of approved materials. Decorations shall not be strung between utility poles. **Figure 9-2** Special Services Typical Decorative Holiday Lighting Arrangement (Unmetered and where permitted) provided in the back of this ESM illustrates a typical decorative lighting arrangement.

The following requirements apply:

A. All installations must conform to all applicable electrical codes and the Utility's requirements for clearances, climbing space, and working space.

B. All work must be done by trained and qualified personnel.

C. The service entrance may be 120 Volts or 120/240 Volts, depending on the load requirements and the availability of the supply voltage at the service location.

D. Service equipment should be securely bonded or lagged to the pole. Drilling of holes in poles is not permitted without specific authorization from the Utility.

E. Service entrances shall not be installed on poles with transformers, regulation, switching or protective devices, or on corner poles.

F. If the entire installation is above communications conductors, the receptacle can be as close as 40" above the communications conductors.

G. Non-current carrying metallic parts of decorations operating at less than 150 Volts to ground may be installed no closer than 20" to communications cable or 20" above and 24" below communications conductors.

H. An earth ground is not required, provided that a separate grounding conductor is run from the entrance switch enclosure with the service entrance conductors and connected to the secondary neutral by the Utility. The green ground wire must connect the switch box, receptacle, and conduit.

I. The weatherproof receptacle must have a minimum ground clearance of 10 feet.

9.3 Communication Tower Installation

All communication towers are considered to be structures. The Utility will provide either one underground service lateral or one overhead service drop to a tower site regardless of the number of tower users.

The tower owner shall be responsible for providing metering and service entrance facilities to serve all tenants utilizing the tower facilities. The owner shall contact the Utility in advance to plan a suitable metering arrangement and location. Meters will be located outside of the fenced-in tower site.

Services for cell towers may require the use of special filtering equipment. Consult with the Utility before installing. The cost of any additional filtering equipment or other protective device will be borne by the Customer.

10 Primary Services

Reserved For Notes

10.1 General Requirements

Primary service (service at voltages above 600 Volts) is only available upon Utility approval. The Customer must make application to the Utility for the proposed primary service and obtain approval of the location, equipment, and design before starting installation of the service entrance.

The Utility furnishes, installs, and maintains the primary service and metering equipment in accordance with the Utility 's applicable rates and extension rules. The Customer furnishes, installs, and maintains all service entrance facilities at the service point other than the metering equipment, regardless of the metering location.

Other general requirements for primary metered service include:

A. The Customer's system beyond the metering point must comply with all applicable *NESC*, *NEC*, state, and local electric code requirements.

B. Service entrance equipment located at the point of service shall include:

   1. a three-phase, gang-operated load break disconnecting means and over current protection for a three-phase-service, or;

   2. a single-phase handle operated disconnect and overcurrent protection for a single-phase service.

C. Overcurrent protection shall be provided for all branch lines and transformers.

D. Customers shall only use grounded wye/grounded wye five-legged or triplex core transformers. Customers may only use delta-wye wound transformers with advance approval from the Utility. Customers may not use three-legged transformers because they can cause substantial overvoltage damage to the Utility and Customer owned equipment during single-phase outages.

E. The disconnecting device shall be located to provide a visible open and operating capability to both the member and the Utility.

F. Clearances and separations must be maintained to the Utility's metering equipment. Refer to Chapter 11 for required clearances.

G. The sequence of the equipment toward the load shall be **meter-switch-fuse** with any variations approved by the Utility.

H. **Figure 10-1** Primary Services Primary Metering Options provided in the back of this ESM illustrates the typical primary service metering schematic and point of service.

11 Clearances

Reserved For Notes

11.1 General

The *NESC*, *NEC*, OSHA and public road authorities specify minimum clearance from electric lines and equipment for safety. Unless otherwise noted, all clearances are from surface-to-surface, and all distance requirements are measured center-to-center.

11.2 Vertical Clearance Requirements for Overhead Conductors

The below table provides preferred minimum vertical clearance requirements for overhead secondary and primary conductors. These clearances are under the following conductor temperature and loading conditions, whichever produces the largest final sag:

A. 120-degree Fahrenheit, no wind displacement

B. Maximum conductor temperature for which the line is to operate, with no wind displacement.

C. 32-degree Fahrenheit, ½" radial ice, no wind displacement.

Some of these clearances may be reduced if allowed by *NESC* exceptions. Verify with the Utility before applying lesser clearances than those identified in the below table.

Preferred Minimum Vertical Clearances to Overhead Conductors		
Nature of Surface Underneath Conductors	**Secondary Voltage Conductors** (ft)	**Primary Voltage Conductors** (ft)
Ground below drip loop of service conductor.	12.5	N/A
Streets, alleys, parking lots, driveways, and other areas subject to truck traffic.	16.5	18.5
State and county roads	20.0	20.0
Roofs, balconies, and decks.	11.5	13.5
Roofs not readily accessible, and outside a 6' radius from service mast, where insulated service wire is attached to a service mast.	3.0	N/A
Roofs not readily accessible, and inside a 6' radius from service mast, where insulated service wire is attached to a service mast.	1.5	N/A
Signs, chimneys, billboards, antennas, flagpoles, banners, and tanks.	6.0	8.0

11.3 Horizontal Clearance Requirements for Overhead Conductors

The table below provides preferred minimum horizontal clearance requirements for overhead secondary and primary conductors.

Some of these clearances may be reduced if allowed by *NESC* exceptions. Verify with the Utility before applying lesser clearances than those identified in the below table.

Preferred Horizontal Clearances to Overhead Conductors		
Nature of Object Horizontal to Conductors	**Secondary Voltage Conductors** (ft)	**Primary Voltage Conductors** (ft)
Building walls, projections, windows, balconies, fire escapes signs, chimneys and antennas from conductor not attached to the building.	5.5	7.5
Windows, balconies and fire escapes from insulated service wire attached to the building.	3.0	N/A

11.4 Padmounted Transformer Clearances

The Utility shall approve the location of all padmounted transformers. Padmounted transformer locations shall be in accordance with the requirements of *NEC*, *NESC*, and National Fire Protection Association (NFPA). In addition, they are to be located far enough from the building overhang so they will not be subject to damage by falling snow and ice.

Padmounted transformer locations shall be graded for proper drainage and be readily accessible by truck or other means for change-out. Where danger of snow plowing or traffic damage exists, barriers consisting of concrete filled pipe shall be provided for protection. Costs for these barriers shall be borne by the Customer.

Transformers shall have a minimum separation of 5 feet from natural gas service equipment. A minimum separation of 5 feet shall be maintained between transformers and liquid petroleum facilities on site but not filled on site. If the liquid petroleum facilities are filled on-site, the minimum separation is 10 feet.

A 10-foot clearance is required in front of the padmounted transformer doors.

The following clearances apply to the location of oil-insulated padmounted transformers near buildings.

A. Non-Combustible Walls
(Includes wood framed brick veneered buildings, metal clad steel framed buildings, asbestos-cement-board walled metal framed buildings and masonry buildings with a one hour fire rating.)

1. Padmounted oil-insulated transformers may be located a minimum distance of 2 feet from the roof overhang of a non-combustible walled building if all clearances are maintained from doors, windows, and other building openings.

2. If a combustible first floor overhang exists, a 10-foot distance from the edge of the transformer to the edge of the overhang or its associated roof overhang (combination of vertical and horizontal distance) shall be required in addition to other clearance requirements.

3. **Figure 11-1** Clearances Padmounted Oil Insulated Transformer Clearance from Non-Combustible and Combustible Walls provided in the back of this ESM illustrates clearances from non-combustible walls.

B. Combustible Walls
(Includes wood buildings and metal clad building with wood framed construction.)

1. Padmounted oil-insulated transformers shall be located a minimum of 10 feet from the roof overhang of combustible walled buildings if all clearances are maintained from doors, windows, and other building openings.

2. If a combustible first floor overhang exists, a 10-foot distance from the edge of the transformer to the edge of the overhang or its associated roof overhang (combination of vertical and horizontal distance) shall be required in addition to other clearance requirements.

3. **Figure 11-1** Clearances Padmounted Oil Insulated Transformer Clearance from Non-Combustible and Combustible Walls provided in the back of this ESM illustrates clearances from combustible walls.

C. Doors, Windows, and Building Openings
(Building openings are defined as operable and stationary windows, air intakes and exhaust vents.)

1. Padmounted oil-insulated transformers shall not be located within a zone extending 20 feet outward and 10 feet to either side of a building door used primarily as an entrance or exit. Doors to electrical equipment rooms are not considered a primary entrance.

2. Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet outward and 10 feet to either side of an opening located at the level of the transformer. If the opening is located above the transformer, the distance from the top of the transformer to the opening shall be a minimum of 10 feet.

3. **Figure 11-2** Clearances Padmounted Oil Insulated Transformer Clearance from Doors, Windows & Openings provided in the back of this ESM illustrates clearances from doors, windows, and other openings.

D. Fire-Resistant Barrier Walls
(Includes reinforced concrete, brick, or concrete block barrier walls with a three-hour fire rating.)

1. If the above clearances cannot be established, a barrier wall may be required.

2. The barrier wall shall have a minimum distance of 2 feet from the padmounted oil-insulated transformer.

3. The barrier wall shall extend three feet beyond each side of the padmounted oil-insulated transformer. The height of the barrier shall be 3 feet above the top of the padmounted oil-insulated transformer.

4. If a combustible first floor overhand exists, the barrier wall must be a minimum distance of 2 feet from the roof overhang.

5. The barrier wall shall extend to a projection line from the corner of the padmounted transformer to the furthest corner of a window, door or opening.

6. **Figure 11-3** Clearances Padmounted Oil Insulated Transformer Clearances with Fire-resistant Barrier provided in the back of this ESM illustrates clearances with fire-resistance barriers.

E. Fire Escapes

1. Padmounted oil-insulated transformers shall be located such that a minimum clearance of 20 feet is maintained from a fire escape.

2. This distance can be reduced if a fire resistance barrier is constructed around the padmounted oil-filled transformer (side wall and roof). The barrier shall extend a minimum of one foot beyond the transformer in all directions. A clearance of 10 feet is required in front of the padmounted transformer doors. Adequate transformer accessibility and ventilation must be provided.

3. **Figure 11-4** Clearances Padmounted Oil Insulated Transformer Clearances from Fire Escapes provided in the back of this ESM illustrates clearances from fire escapes.

11.5 Clearance from Gas Lines

The separation in any direction between buried gas and electric and/or communications facilities shall be a minimum of 12 inches. If this clearance cannot be attained, the gas line shall be protected from damage that might result from the proximity of the electric supply or communication direct-buried system.

11.6 Clearance from Wells

Overhead open supply conductors shall not run over wells. The horizontal clearance with conductors at rest shall not be less than ¾ of the vertical clearance to ground. The horizontal clearance shall not be less than 10 feet while the conductors are displaced by wind.

Underground supply cable shall have at least a 5-foot separation to the well installation.

11.7 Clearance from Sewer Equipment

The horizontal separation between direct-buried cable and other underground sewer equipment should not be less than 12 inches, to permit maintenance access to either facility without damage to the other.

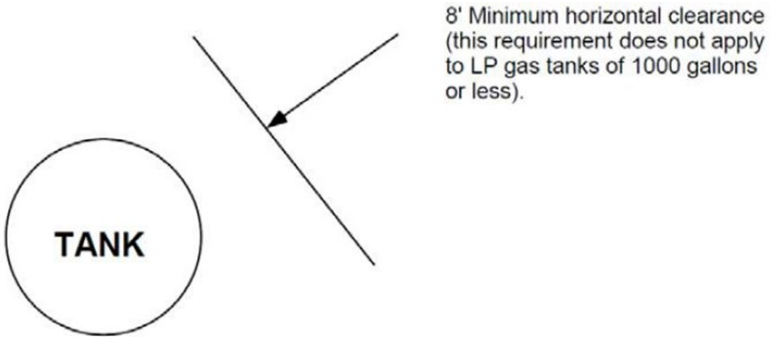
The separation in any direction between buried electric conductors and drain fields, alternate fields, or septic tanks should be at least 5 feet if less than 480 Volts and 10 feet if 480 Volts or more.

11.8 Clearance from Material Storage Areas

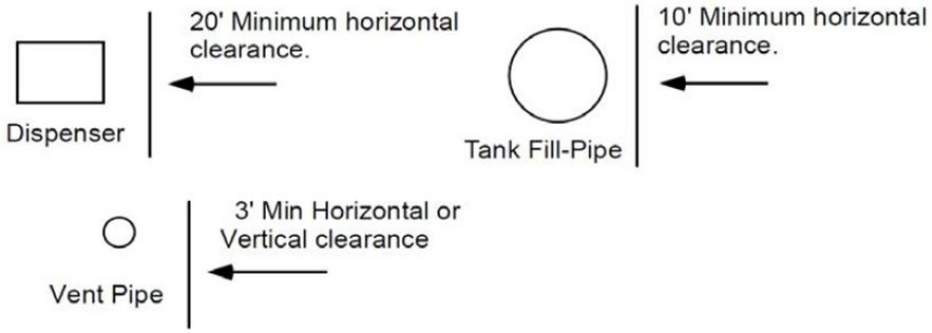
Overhead lines shall not be run over designated material storage areas where material is regularly stored and handled by cranes, dump trucks, elevators, or other types of high machinery, unless the clearance of such lines is adequate to permit the full use of the equipment.

11.9 Clearance from Fuel Storage Tanks

Electric lines shall not be run over above-ground flammable liquid or liquefied petroleum gas (LPG) storage tanks. A horizontal clearance of not less than 8 feet is required for services and secondary cables and 15 feet for all other conductors. LPG tanks with a capacity of 1,000 gallons or less or tanks enclosed in a building or fully covered by a roof or canopy capable of preventing a falling overhead supply conductor from directly contacting the tank are exempt from this requirement.



A horizontal clearance of not less than 20 feet is required from gasoline dispensers, not less than 10 feet is required from tank fill pipes, and not less than 3 feet is required from tank vent pipes.



Underground supply cables shall not come within 10 feet of above ground or below ground fuel storage tanks. Underground cables shall not go under fuel storage tanks.

11.10 Clearance from Antennas

Outdoor antennas and supporting structures attached to buildings shall have a horizontal clearance from utility electric lines greater than the total height of the antenna and supporting structure.

Service cables of 150 Volts or less to ground shall have a minimum clearance of 3 feet 6 inches from the antenna and supporting structure except a minimum clearance of 2 feet is permitted from the service conductor drip loop.

11.11 Requirements for Conductors under Structures

Any electric facilities proposed to pass under structures must be approved by the Utility. All such approved facilities shall be installed in conduit.

11.12 Clearance from Swimming Pools

Utility owned supply cables operating at 750 Volts or less shall have at least 22.5 feet of clearance in any direction from the pool's water level, edge, base of diving platform, or anchored raft. The clearance shall be at least 14.5 feet in any direction from the diving platform, tower, water slide, or other fixed, pool-related structures.

11.13 Clearance Envelope for Grain Bins

NESC rule 234F specifies the minimum clearances of wires, conductors, cables, and rigid live parts from grain bins.

A. The horizontal clearance requirement on the loading side of a grain bin filled with portable auger/elevator systems is increased to the sum of the grain bin height plus 18 feet. A clearance of not less than 18 feet is required in all directions from probe ports in the grain bin roof to all wires, conductors and cables. **Figure 11-5** Clearances Clearance Envelope for Gran Bins Filled by Portable Equipment provided in the back of this ESM illustrates clearances from grain bins filled by portable augers, conveyors, or elevators.

B. A vertical clearance of at least 13.5 feet and a horizontal clearance of at least 15 feet shall be maintained between grain bins with permanently installed elevator systems and open supply conductors operating from 0-22,000 Volts. The distances are measured from the outermost and uppermost parts of the grain bin/elevator structure. **Figure 11-6** Clearances Clearance Envelope for Gran Bis Filled by permanent Equipment provided in the back of this ESM illustrates clearances from grain bins filled with permanently installed augers, conveyors, or elevators.

Consult with the Utility prior to siting new bin installations. If *NESC* clearance violations are found, the cost for moving Utility facilities shall be borne by the Customer.

11.14 Recreational Vehicles (RVs) Mobile Homes, Manufactured Homes, and Trailer Park Clearances

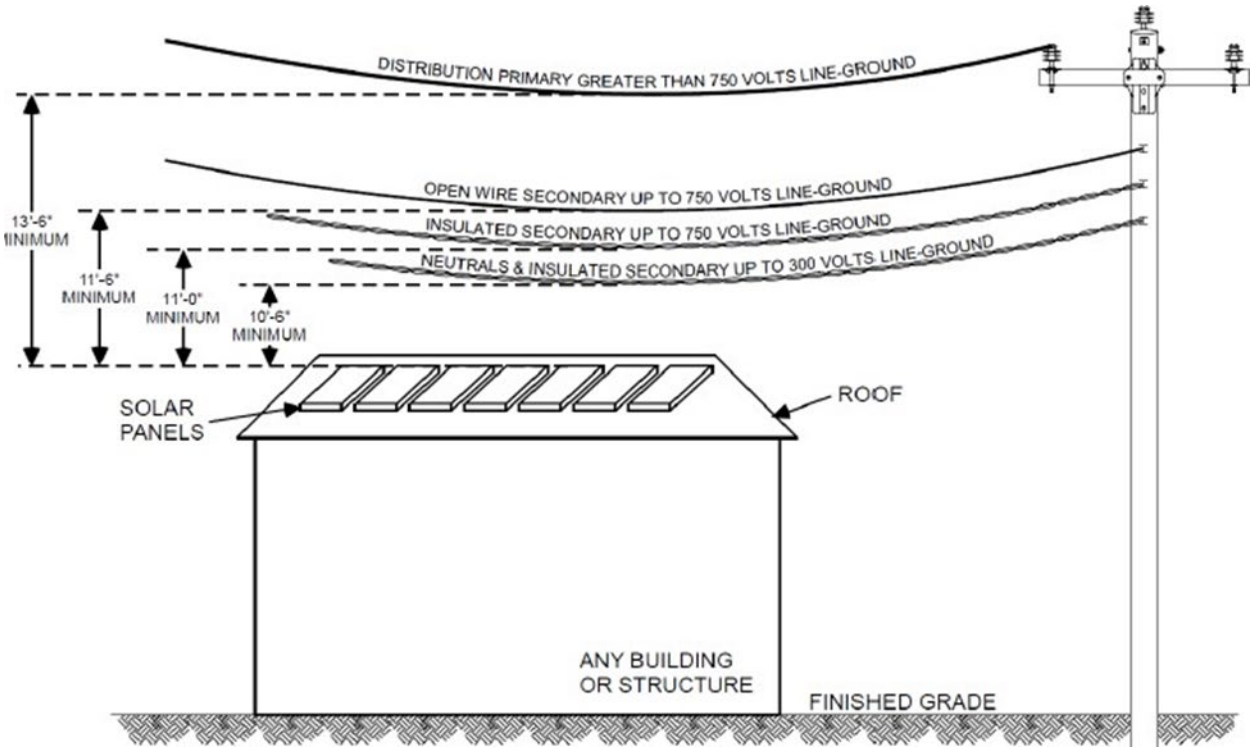
RV and mobile home parks shall conform to *NEC* 550, 551, and 552 as required by code in addition to state and local laws.

A. Recreational Vehicles: Open conductors 1000 volts and less, nominal, shall have a minimum vertical clearance of 18 feet and a minimum horizontal clearance of 3 feet in all areas subject to recreational vehicle movement. See *NEC* 551.79 Clearance for Overhead Conductors.

B. All other Areas: Clearances shall conform to the *NEC* and/or the rest of this chapter.

11.15 Solar Panel Clearance Requirements

A minimum vertical clearance of 10.5-feet is required from any Utility secondary or service conductors that cross over any building or structure containing solar panels. Additional clearances are required based on the type of conductor spanning over the location of the proposed solar panel installation.



12 On-Site Generation and Distributed Energy Resources (DER)

Reserved For Notes

12.1 General

Customer owned emergency, standby, and parallel generation systems are also referred to distributed energy resources (DER). These systems are subject to the Utility's distributed generation policy in addition to transmission owner, federal, state, and local rules. The Utility's rules include:

A. The Customer shall inform the Utility of plans to install and connect any generating equipment to its electrical system.

B. The generating equipment shall not introduce potentially dangerous situations to the Utility's personnel or the public.

C. Generation that can operate either momentarily or continuously in parallel with the Utility's facilities shall incorporate protective devices (relays, circuit breakers, etc.) and metering equipment as specified by the Utility's specific interconnection agreement with the Customer.

D. The interconnection of a DER facility to an electric service must be to the same electric service that is common to the electrical system of a building or premises where the DER facility is physically installed. Conversely a DER facility CANNOT be interconnected with an electric service that is not common to the electric system of a building or premises where the DG facility is physically installed.

12.2 Standby Generation

This section addresses any customer owned generation system not operated in parallel with the Utility's electric distribution system including closed transition type transfer switches that parallel the generator system and the normal supply for a maximum of 100 milliseconds (1/10 second).

Definitions:

Closed transition = make before break, no disruption to load

Open transition = break before make, requires disruption to load

12.2.1 Safety

A. No generator may be electrically connected to the Utility's distribution system without the written consent of the utility and with adequate physical arrangements to prevent hazard to life and damage to utility property.

B. The customer shall fill out a standby generation application, available from the Utility, prior to installing standby generation. This application will suffice as the written consent of the utility when returned to the customer. Accompanying this application shall be a one-line diagram utilizing ANSI electrical symbols and spec sheets for the generator and any transfer or disconnect switches installed with the generator.

C. **Figures 12-1a-n** On-site Generation (Distributed Energy Resources) General configuration in the back of this ESM provides drawings intended to aid the interconnection application process.

D. Transfer switches may only be located before the main service disconnects where they meet the short circuit duty (AIC Rating).

E. The customer's transfer device shall be installed to mechanically prevent any possibility of power from the customer's standby source feeding back onto the Utility's distribution system.

F. It is the responsibility of the Customer to comply with all rules and labeling requirements of the *NEC* or any other jurisdictional codes.

12.2.2 Transfer System Requirements

A. The Utility shall approve automatic transfer systems.

B. The Customer may supply any portion of their electrical load from a standby generator.

C. The Customer shall install a transfer switch or contactor in order to transfer load from ungrounded conductors between the normal supply and standby generator.

D. All transfer switch devices that meet UL 1008 Rated and designed with open transition connections will not require a Standby Generation Disconnect.

E. Transfer Switches that do not meet UL 1008 shall have a lockable, visually open break in the circuit that isolates the utility normal supply from the customers transfer switch. This break, referred to as the Standby Generation Disconnect, shall be accessible to the Utility and should be located within 10' of the meter, unless otherwise labeled. A circuit breaker may be considered if installed with a locking mechanism and approved by the Utility.

F. Permanent labeling is required; Labeling shall be rigid engraved plastic, engraved self-sticking brass, or engraved self-sticking aluminum with a minimum of ¼ inch block lettering. Customer shall install a label at the disconnect reading: "Standby Generation Disconnect".

12.2.3 Transfer Switch Options

A. Permitted:

1. Manual or automatic double throw switches
2. Double throw relays
3. Mechanically interlocked switches
4. Breakers with factory designed mechanical interlocks

B. Not permitted:

1. Key interlocked switches or breakers
2. Switches that plug into the meter-socket
3. The addition of splices or taps in meter sockets and metering transformer cabinets
    - **Exception**: Key interlocked switches or breakers are permitted for existing Farm Services with prior Utility approval.

12.3 Parallel Generation

This section includes distributed or Customer-owned generation interconnected in parallel and operating with the Utility's electric distribution system. Collectively, these generation and battery energy storage systems are known as Distributed Energy Resources (DER).

12.3.1 Permission to Interconnect

DER interconnection may be an option for single and three-phase customers. Characteristics of the Utility's electrical system vary by circuit. Not every size, voltage, or type of generator can be interconnected at every location.

The customer shall supply the Utility with the required electrical drawings and application for the proposed DER prior to installation. The Utility may specify and require certain protective schemes based on the size, location, and other factors for the generating unit proposed. An example of the procedure the Utility follows for processing DER requests can be found in Chapter PSC 119.04 of the WI Administrative Code. For Michigan Public Act 235 of 2023, introduced Michigan's DER framework. In Iowa interconnection procedures for Distributed Energy Resources (DERs) is governed by the Iowa Utilities Board (IUB) under the rules in Iowa Administrative Code (IAC) Chapter 199—45. This procedure primarily applies to the state's two investor-owned utilities (IOUs)—MidAmerican Energy and Alliant Energy. Municipal and cooperative utilities are not required to follow these exact rules but often have their own similar procedures.

12.3.2 Relevant Codes

All DER installations shall comply with the National Electrical Code (*NEC*) and state electrical codes. For Wisconsin Public Utilities, Wisconsin Administrative Code Chapter PSC 119 – Rules for Interconnecting Distributed Generation Facilities shall be followed. Wisconsin Utilities require the use of the proper WI PSC 119 forms #6029, #6030, and #6031 based on the DER facility size. These forms may be obtained at:

https://psc.wi.gov/Pages/ForConsumers/MoreResources/CustomerOwnedGeneration.aspx

The proper supplemental form(s) shall be submitted with the standard application based on the DER technology/technologies intended to interconnect with the Utility's distribution system.

The primary "DER code" in Michigan is the *Michigan Interconnection and Distributed Generation Standards* (also known as the MIXDG rules), which are set by the Michigan Public Service Commission (MPSC) and found in the Michigan Administrative Code (Mich. Admin. Code R. 460.901a to 460.992).

Municipal and cooperative utilities in Iowa do not fall under Iowa DER code.

12.3.3 Metering Equipment

A. A bi-directional meter is required at all DER facilities to properly meter forward and reverse energy flow. This meter will be placed at the time of commissioning the DER system, assuming the DER system is working properly.

B. Metering equipment may require replacement to accommodate DER metering. Such as, but not limited to:

1. Round-ring sockets
2. Rusted or damaged sockets or cabinets
3. Sockets or cabinets with inadequate internal or external clearances.

C. Modifying or installing lugs in a meter socket, pedestal, or instrument metering transformer cabinet other than what is listed on the manufacturer's drawing associated with the UL Listing is not allowed.

D. Metering equipment shall be accessible to the Utility's personnel. Accessible means the metering equipment shall be capable of being reached/accessed for programming, reading, probing, inspections, and service without climbing, removing obstacles, utilizing ladders, entering locked areas, etc. Metering equipment that is not readily accessible will be required to be made accessible by the customer before interconnection of the DER will be allowed.

E. The DER facility shall only be interconnected with a single metered service.

Informational Note: This means the Customer is not allowed to feed DER from one building's electrical system into another building's electrical system when the two buildings are fed from separate metered electrical services.

12.3.4 Distribution System Modifications

All required modifications and additions to the Utility's electrical distribution system in order to accommodate DER facilities will be at the Customer's expense.

12.3.5 DER Primary Metering

All primary metered customers shall meet the requirements of ESM Chapter 10. Contact the Utility for requirements related to specific installation of DER facilities on a primary service.

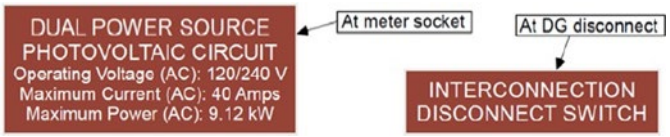
12.3.6 Optional Standby Generation Used in Conjunction with DER

Where a Customer operates both DER and an optional standby generator, the standby generator shall be installed in accordance with the connection and transfer switch requirements of ESM Chapter 12, Section 2.

12.3.7 LABELING REQUIREMENTS

A. It is the responsibility of the Customer to comply with all labels required by the *NEC* or other jurisdictional codes and requirements.

B. The Customer shall provide and install a "Dual Power Source" label at the meter socket indicating the operating voltage, maximum current, and maximum power of the solar PV system that is installed. Customer shall provide an "Interconnection Disconnect Switch" label at the DG disconnect. Example labels shown below:



C. Permanent labeling is required; labeling shall be rigid engraved plastic, engraved self- sticking brass, or engraved self-sticking aluminum.

D. Labeling shall use a minimum of ¼ inch block lettering.

12.3.8 Point of Interconnection (POI)

A. Preferred Methods

1. DER Connected via properly sized sub-breaker downstream from the main in-service panel
2. Meter socket/pedestal with Main for Alternative Energy
3. Meter socket /pedestal with factory installed dual lugs, 320A
4. Attached to instrument metering transformer cabinet with available lugs

B. Optional Method

1. Insulation piercing connectors on the line side of customer's service entrance overcurrent protective device (Breaker/Fuse)

C. Not Permitted when connecting DG on the line side of customer's service entrance overcurrent protective device (Breaker/Fuse).

5. Splices
6. Split bolts
7. Tap connectors
8. Installing more cables than lugs are designed to handle
9. Modifying or installing lugs on any equipment on the line side of the overcurrent protective device, other than what is listed on the manufacturer's drawing associated with the UL Listing. All single throw disconnect switches shall be connected such that their blades are de-energized when the switch is in the open position.
10. Any other modifications to meter sockets/pedestal or instrument metering transformer cabinet

12.3.9 Interconnection Disconnect Switch (Disconnection Device) Requirements

A. A device capable of disconnecting DER facilities from the electrical distribution system shall be installed at every DER site. The disconnection device shall be located within 10 feet of the utility electric meter on residential and single building structures. The disconnection device shall be located in an accessible location and within line of sight of the electric meter.

B. Disconnection device shall be mounted at a height between 30 and 72 inches.

C. Disconnection device shall open with a visual break, be able to be locked open, be capable of disconnecting and de-energizing distributed generation, and shall conform to state requirements.

D. The disconnection device should disconnect DER only and should not disconnect any load.

E. Any DER connection on the line side of the main service disconnect(s) shall have a service entrance rated disconnect switch with overcurrent protection.

F. For farm services utilizing a site-isolating device, DER interconnections shall not be allowed on the line side of the site-isolating device as defined by *NEC* 547.9.

G. Sample one-line diagrams for DER interconnections are shown in Figures 12-1a through 12-1k in the back of this ESM. The Utility should be consulted for all DG installations.

12.3.10 Battery Energy Storage Systems (BESS)

A. Battery energy storage systems shall use UL-1741 listed utility-interactive inverters.

B. Energy storage system transfer devices are subject to the same requirements as standby generation system, see ESM Chapter 12.

C. Sample one-line diagrams for DER containing a BESS are shown in Figures 12-1m and 12-1n in the back of this ESM. The Utility should be consulted for all DER and BESS installations.

13 Equipment Requirements to Maintain Power Quality

Reserved For Notes

13.1 General

This chapter covers the requirements for customer-owned equipment that may affect the quality of the service provided by the Utility. Supplemental to the requirements identified in this ESM, Customer installations, Customer-owned equipment, power quality parameters, and other operating standards must also comply with the Utility's Engineering Manual.

13.2 Service Impairing Equipment

A. Service impairing equipment, because of its use, can lower the quality of power to other customers. Equipment that cannot be modified to prevent this shall be eliminated or controlled within performance limits required by the Utility. If the customer meets these limits but still causes issues, such as but not limited to flicker, harmonic distortion, voltage fluctuation, the customer causing the issues shall have the equipment installed, at their expense, that addresses the service impairment.

   1. Common types of service impairing equipment include welders, arc furnaces, electric motors, augers, conveyors, plasma cutters, motor driven compressors, instantaneous water heaters, distribution generation (Inverter based resources), power factor correction equipment, or other equipment having highly fluctuating or large instantaneous demands.

   2. Other types of service impairing equipment include those with loads that cause harmonic distortion, such as data centers, inverter-based equipment, rectifiers and variable frequency drives.

   3. Equipment causing high-frequency current or harmonic distortion shall comply with IEEE standard 519-2022.

B. The customer shall obtain pre-approval from the Utility before installing equipment such as those listed above.

C. In most circumstances, the Utility's electrical supply facilities are adequate to serve normal load additions. Customers installing service impairing equipment shall be billed the costs for additional facilities, metering, and alterations specifically required to prevent impairment of service to other customers caused by this service impairing equipment.

13.3 Phase Balance

Where a Customer connects single-phase equipment to a three-phase service, the single-phase equipment shall be connected to prevent unbalance of the loads on the three-phase service more than 10 percent. Such a Customer shall maintain a power factor of 90 percent (or as otherwise specified in the Utility's tariffs). When these requirements cannot be met, the customer shall apply for a separate single-phase service.

A. Customers shall make appropriate wiring changes on their side of the meter to utilize and balance all 3 phases as best as practical.

B. Each phase conductor should carry a minimum of 25 percent of the total kVA at normal operating and maximum load conditions.

C. Exceptions to this rule may exist in certain locations as approved by the Utility.

D. Exceptions may also include lightly loaded systems.

E. Imbalance shall not create negative system impact, negative customer impacts, or safety

13.4 Power Factor Correction

Power factor correction may be driven by the state regulatory commissions, wholesale providers, transmission owners or others.

A. The Customer may be required to limit the size of static power factor correction installations or to maintain effective control of the capacitors in order to prevent excessively high voltage at the service location.

B. Customer owned power factor corrective equipment shall be installed on the load side of the service disconnecting device and metering.

13.5 Protection, Control, and Safety

A. The Customer is responsible for providing protection, uninterruptible power supplies, or other accessories needed to prevent undesirable operation of other Customer's equipment or the Utility's sensitive equipment created by voltage or current waveform distortion within the thresholds established in IEEE Standard 519.

B. The Customer shall be responsible for the protection against voltage fluctuations, transients, sags, and swells, or phase loss wherever these or unexpected restarting could cause damage to the Customer's equipment or result in personal injury.

C. A control apparatus equipped with approved reverse-phase relays shall be installed by the Customer on all poly-phase motor installations for:

    1. Elevators, hoists, and cranes.
    2. Manufactured processes where accidental reversal of rotation is liable to cause injury to persons or damage to machinery, equipment, or work in progress.

D. The Customer is responsible for notifying the Utility in advance of planned load increases as well as planned service modifications or upgrades. Advance notification will permit the Utility to evaluate the adequacy of the existing facilities to serve the load increase and/or service capacity of the facilities, if necessary.

13.6 Motors and Associated Equipment

To prevent impairment of service to other customers, it is necessary to establish limits for the allowable starting currents of motors.

Prior to selecting and purchasing motor equipment, it is the Customer's responsibility to consult the Utility to determine the availability of specific service voltages and capacity limitations at any location. Customer installed motors shall not cause problematic momentary voltage fluctuations on the Utility's electric distribution system. The table below is an example of motor sizes that may

be installed if the starting current does not exceed the limits illustrated under the various services and starting types listed at a Utility voltage of 7.2/12.47 kV. Multiple motors starting simultaneously shall be classified as one motor.

Service Type	Motor Type	Maximum HP*	Source Voltage at Starter	Reduced Voltage/ Frequency Starter Type	Maximum Locked Rotor Amps	Maximum kVA Inrush
1-Phase	1-Phase	5.0 hp	120	None (Across the Line)	260	30
1-Phase	1-Phase	7.5 hp	240	None (Across the Line)	200	45
1-Phase	1-Phase	10 hp	240/480	Autotransformer & Solid State	200/100	45
1-Phase	1-Phase	15 hp	240/480	Variable Frequency Drive	200/100	45
1-Phase	3-Phase	10 hp	240/480	Rotary Converter, 20 kVA	200/100	45
1-Phase	3-Phase	40 hp **	120/208	Across the Line **	620	225
1-Phase	3-Phase	40 hp **	277/480	Across the Line **	270	225

* Based on NEC locked rotor indicating code letters A-G.

** As with single-phase motors, the allowable size of these 3-phase motors can be increased with use of reduced voltage/frequency starters or soft-start motors.

Upon request of the Customer, the Utility will evaluate services for motor starting conditions that exceed the maximum allowable kVA motor inrush. kVA motor starting inrush may or may not be permitted at locations where the Utility facilities are adequate.

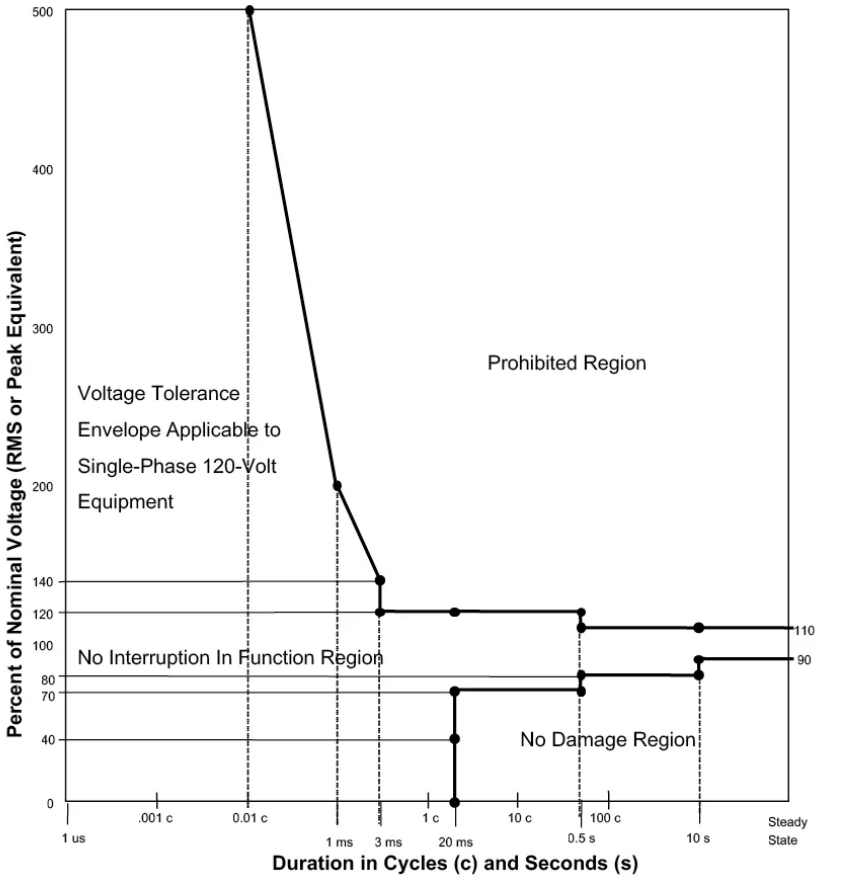
Single-phase to three-phase rotary phase converters may be connected only if the inrush current of the rotary converter itself does not exceed that for single-phase motor kVA inrush listed in the previous table. Rotary phase converters typically require a kVA rating twice that of the largest three-phase motor they supply. After the rotary converter attains full speed, the starting of the motor fed from the phase converter must not cause current on the source side of the converter to be greater than that allowed for the converter on its source side.

When reduced voltage starters are applied to motors to minimize flicker, the motor starting torque is also reduced. The Customer is responsible for verifying that the reduced voltage or lower frequency applied to the motor will allow starting for all required load conditions.

Motors subject to frequent starts and inrush currents, such as elevators and hoist and rock crushers, when connected to the secondary distribution system, shall have their starting current limited to 100 amperes at 208-240 volts basis.

The Customer is responsible for complying with IEEE Standard 141 and ANSI C84.1 Electric Power Systems and Equipment with respect to power quality and voltage regulation, and any other applicable industry standards.

Voltage fluctuations at the point of common connection in the sub-transient and transient (near instantaneous) realm, due to Customer's controlling of motor(s), must not adversely affect sensitive electronic equipment installed at this or other Customer locations, or the Utility's equipment. The standard voltage tolerances for operating electronic equipment represented by the Information Technology Information Council (ITI) curve shall not be infringed upon. The ITI curve is an update of the CBEMA curve shown below.



Motors used to drive equipment that creates an extreme variation in electric load over a short period of time in a continuous manner, such as sawmills, electrical welding machines, x-ray machines, arc furnaces, etc., are subject to engineering review before they will be allowed to be connected to the Utility's distribution system.

Motors that create a voltage rise when switched off, which cause the voltage flicker to exceed the values stated herein are not allowed. Voltage flicker limits that are exceeded when motors are switched off require mitigation methods typically found in a solid-state starter or a variable speed drive where the ramp down feature gradually reduces the load so as not to create an excessive rise in voltage flicker above the stated limits herein.

For larger motors that do not meet the limitations stated herein, the locked rotor current limits, or the maximum number of starts per hour, preapproval in writing of the installation will be required by the Customer after an engineering evaluation and before connection is permitted. The Customer's design criteria are intended to limit the primary line voltage flicker to 3 percent or less and limit the secondary voltage flicker to 5 percent for the Customer. Approval by the Utility of a motor based on analyzing the effect of voltage flicker does not necessarily imply that the motor meets other requirements, such as harmonics.

13.7 Electric Water Heating

All electric water heaters shall be connected in accordance with local and state plumbing codes.

Water heaters shall be equipped with resistive heating elements which may be connected to 120 Volts or 240 Volts. If connected at 120 Volts, the maximum heating element is 1,650 Watts. If connected at 240 Volts, the maximum heating element size shall be 5,500 Watts. Water heaters having two or more elements shall have the heating elements interlocked to limit the connected load to the above limits.

Instant recovery water heaters with wattages above 5,500 require the permission of the Utility to connect. If allowed by the Utility, the Customer may be responsible for the cost of transformer and secondary conductor upgrades required to accommodate the water heater.

13.8 Electric Space Heating

Electric space heating equipment designed to operate at 120 Volts shall be limited to 1,650 Watts controlled by a single thermostat. Electric space heating equipment designed to operate at 208 Volts and greater shall be limited to 6,000 Watts controlled by a single thermostat. Equipment exceeding 6,000 Watts shall be energized in stages not exceeding 6,000 Watts per stage and at time intervals between stages of at least 3 seconds.

13.9 Electric Welders and Furnaces

Electric welders and furnaces may not cause interference or impairment to the service of other Customers. The Utility requests notification before a welder or furnace is connected to ensure that its facilities have adequate capacity and that service to other Customers is not impaired.

13.10 Harmonics and High Frequency Equipment

The Utility will provide electric service to the Customer in compliance with the latest version of IEEE Standard 519. In return, the Customer is responsible to comply with the same Standard in respect to current harmonic distortion.

Customer owned utilization and production equipment causing high frequency current or harmonics must comply with IEEE Standard 519.

All wiring carrying high-frequency current shall be located as remotely as possible from the meter and wiring of the building. The Utility may require the Customer to install an isolation transformer or filters to protect the meter and metering devices, and limit service interference to adjacent Customers.

13.11 Air Conditioners

Air conditioners for use at 120 Volt single-phase are limited to a maximum locked rotor current of 50 amps and a maximum of 4 starts per hour.

Air conditioners and heat pumps for use at 240 Volts or 208 Volts single-phase are limited to locked rotor currents as follows and a maximum of 4 starts per hour.

BTU per Hour Rating (BTUH)	Total Locked Rotor Current Limitation
up to 20,000	60 amperes
20,000 to 36,000	60 amperes plus 3 amperes per 1,000 BTHU in excess of 20,000 BTUH
over 36,000	Consult with Member Utility

Note: 12,000 BTU = 1 Ton

Please refer to the table in Section 13.5 for starting limitations on three-phase air conditioners.

14 Electric Vehicles

Reserved For Notes

14.1 General

This chapter covers Electric Vehicle (EV) charging and public charging stations. All sections of this ESM apply in addition to *NEC* 625 and all applicable local and federal electrical, building and fire codes.

For more specific information, Customers should consult with their Utility directly.

14.2 Electric Vehicle Charging

A. Customers considering installing an Electric Vehicle Charging Station should work with a licensed electrical contractor to fully understand the costs involved.

B. In many cases, a second meter is not required, and Customers may wire from their existing service panel.

C. Customers should consult with the Utility to explore possible different rate options such as Time-of-Use Rates.

14.3 Electric Vehicle (EV) Charging – Service Capacity

14.3.1 Existing Service – Adequate Service Capacity

A. Level I EV Charging (120V):

1. Requires a dedicated circuit and standard outlet.
2. A second meter is not required.
3. Customer should verify with licensed electrician if the existing wiring is sufficient to accommodate a Level I EV Charging Station.
4. **Figure 14-1a** EV Charger Configurations Level I (120V) and Level II (240V or 208V) at the back of this ESM provides an example of a typical Level I charger configuration.

B. Level II EV Charging (240V Residential or 208V Commercial)

1. Requires a dedicated circuit and outlet with adequate capacity
2. Customer should verify with licensed electrician if the existing wiring, service panel, and meter are sufficient to accommodate a Level II EV Charging Station.
3. **Figure 14-1b** EV Charger Configurations Level I (120V) and Level II (240V or 208V) at the back of this ESM provides an example of a typical Level II charger configuration.

14.3.2 Existing Service – Inadequate Service Capacity

If the existing electric service is deemed inadequate by a licensed electrician to supply a Level I or Level II EV Charging Station, several options exist for the customer:

1. Replace or upgrade service panel
2. Replace or upgrade metering equipment
3. Install a duplex (ganged) meter socket (**Figure 14-1c** EV Charger Configurations Remote Building or Structure at the back of this ESM)

14.3.3 Remote Building or Structure

A Remote Building or Structure <u>has</u> a dedicated service:
If remote building or structure has an existing electrically isolated service, a Level I or Level II EV Charging Station may be added based on previous sections

B Remote Building or Structure <u>does not have</u> a dedicated service:
A second electric service may be allowed in order to install a Level II EV Charging Station on an unattached garage or remote building/structure as long as the remote building/structure is isolated electrically from any building with an existing electric service.

14.4 Level III DC Fast Charging

Level III DC Fast Charging (DCFC) Stations require a separate, stand-alone 480V service. Customers should first consult with the Utility to verify that the correct service voltage is available at the Customer location. All previous sections of the ESM for establishing a new service point apply to Level III DCFC locations. **Figure 14-1d** EV Charger Configurations Level III DC (480 V) at the back of this ESM provides a typical configuration for a Level III DCFC charger.

DATE: 07/11/2025

DRAWN BY: KI

APPROVED BY: HJA

SCALE: None

REVISED:

WPPI ENERGY

Electrical Service Summary Guide

(Figure 1-1)

WPPI Energy Electric Services

Phase	Wire	Voltage (Volts)	Min Service (Amps)	Max Service (Amps)	Meter Form	Meter Connection	Min Breaker kAIC Rating (kA)	# of Conduits	Conduit Size (in)	Min Bend Radius (steel)	Min Bend Radius (pvc)
Single	Three-Wire	120/240	100 (OH Only)	150 (OH Only)	2S	Self-Contained	10,000	1	2	9.5"	18"
			200	400	2S		22,000	1	2.5	13"	24"
			600	600	4S	CTs required	42,000	2	4	16"	30"
	Three-Network	120/208	100	200	12S	Self-Contained	22,000	1	2	9.5"	18"
Three	Four-Wye	120/208	200	400	16S	Self-Contained	22,000	1	4	16"	30"
			400	600	9S	CTs required	42,000	2	4	16"	30"
			800	800			42,000	3	4	16"	30"
			>800	1,200			65,000	5	4	16"	30"
			> 1,200	1,600			42,000	4	5	24"	36"
			> 1,600	2,500			65,000	7	5	24"	36"
		277/480	0	200	16S	Self-Contained	22,000	1	4	16"	30"
			> 200	400			22,000	1	4	16"	30"
			400	700	9S	CTs Required	22,000	3	4	16"	30"
			> 700	1,100			22,000	5	5	24"	36"
			>1100	3,000			65,000	8	5	24"	36"

Notes:

1. Service Location, Service Lateral Length and Service Lateral Route shall be determined and/or approved by WPPI Energy
2. Conduits shall be Schedule 40 PVC below grade and Schedule 80 PVC above grade. NO DRAIN TILE ALLOWED.
3. 400 amp service with self-contained meter current connection shall not exceed 320 amps of continuous current.

Notes:

(1) Temporary overhead service drop not to exceed 100 ft. Overhead service drop conductor and wire holder provided and installed by Member Utility.

(2)(2) The service attachment shall be installed at a height that maintains NEC and NESC clearance requirements for service drop conductors at final worst case sag and not be less than:

(a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.

(b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.

(c) Pedestrian areas: A minimum of 12.5' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians.

(3)(3) Point of Demarcation (service point) between Member Utility and Customer. Customer service conductors shall extend beyond weather-head a minimum of 36".

(4) Service drop wire holder provided and installed by the Customer at a minimum height of 10'-0" above final grade.

(5) Service mast provided, securely installed and maintained by Customer. Conduit straps as required by conduit size.

(6) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

(7) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(8) Meter provided and installed by Member Utility.

(9) Fuse/breaker box and switch (weather-proof or covered) provided and installed by Customer on a board base on structure.

(10) Customer to provide and install receptacle. Mount outlets down. Ground Fault Interrupter (GFI) as required by NEC and the local governing authority.

(11) 8'-0" (min.) copper clad ground rods furnished and installed by Customer.

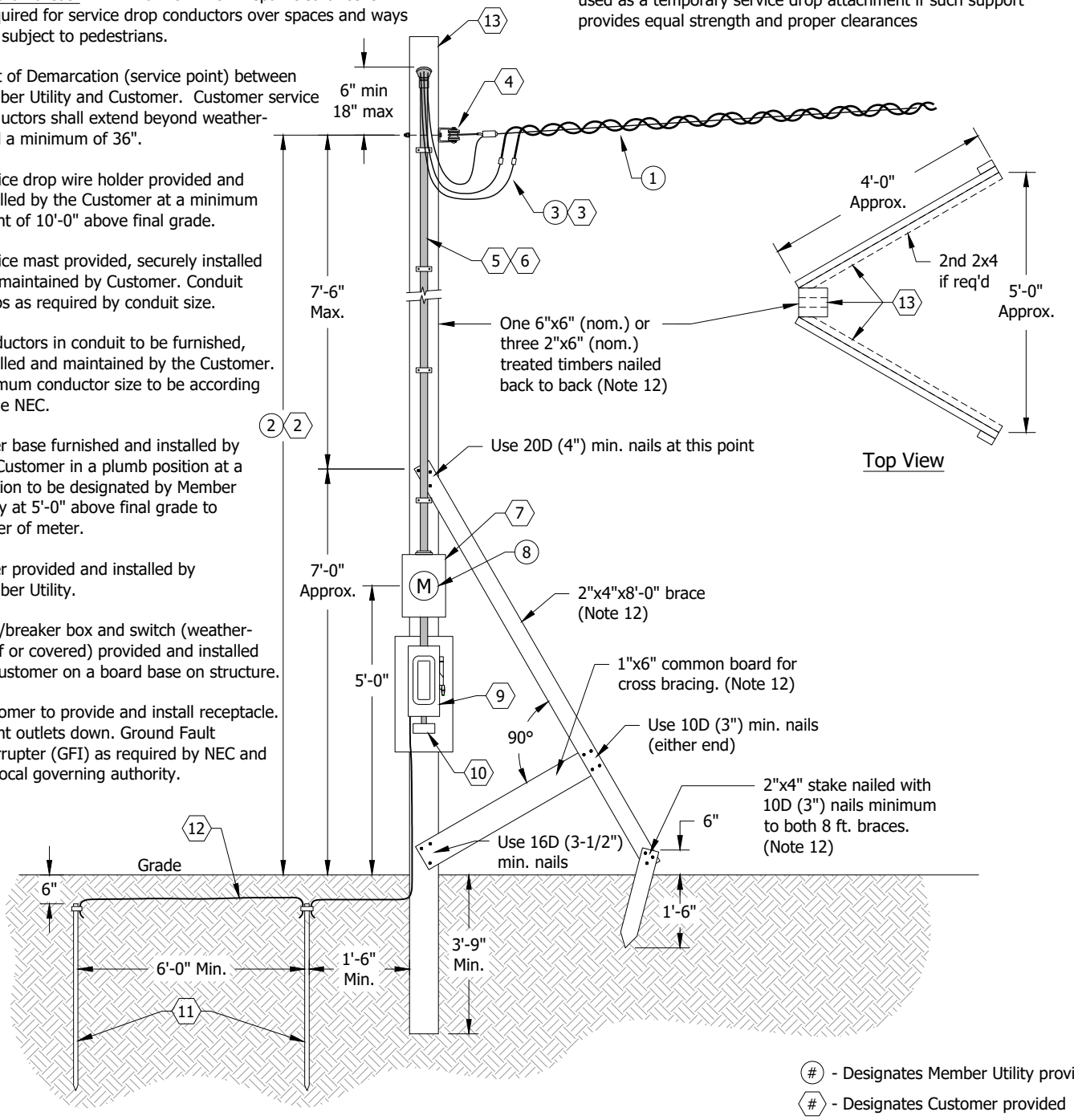
(12) Grounding electrode conductor, #6 copper minimum, provided and installed by Customer in accordance with NEC and local regulations.

(13) Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.

(a) Nail 2"x6" timbers full length, minimum size 16D (3-1/2") nails.

(b) If service drop must be attached at a point higher than 12' in order to obtain required clearance to ground, use two 2" x 4" x 8'-0" braces nailed together for increased stiffness.

(c) A tool shed (if available) or other type of fixed support may be used as a temporary service drop attachment if such support provides equal strength and proper clearances



(#) - Designates Member Utility provided

(#) - Designates Customer provided

WPPI ENERGY

Temporary Service

Temporary Overhead Service (Figure 2-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

(1)(1) Temporary service lateral not to exceed 100 ft.

(2) Conduit on pole provided and installed by Member Utility.

(3) Customer to trench to pole or transformer.

(4) Right of way strip for trenching must be graded to within 4" of final grade prior to trenching.

(5) Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand or screened earth for the first 6" above directly buried cable.

(6) Under driveway, walkway and patio crossings Customer to provide 2" minimum diameter galvanized rigid steel conduit or schedule 80 or better PVC listed for underground use.

(7) Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.

(8) Customer to provide insulated bushings required on all conduit ends.

(9) 90 degree conduit sweep required at 36" trench depth.

(10)(10) Depth must be maintained to final grade.

(11) If concrete is to be poured around conduit Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.

(12) Secondary cable conduit provided by Customer.

(13) Slip joint with a minimum of 12" travel supplied by Customer.

(14) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(15) Meter provided and installed by Member Utility.

(16) Fuse/breaker box and switch (weatherproof or covered) provided and installed by Customer on board base on post.

(17) Customer to provide and install receptacle. Mount outlets down. Ground Fault Interrupter (GFI) as required by NEC and the local governing authority.

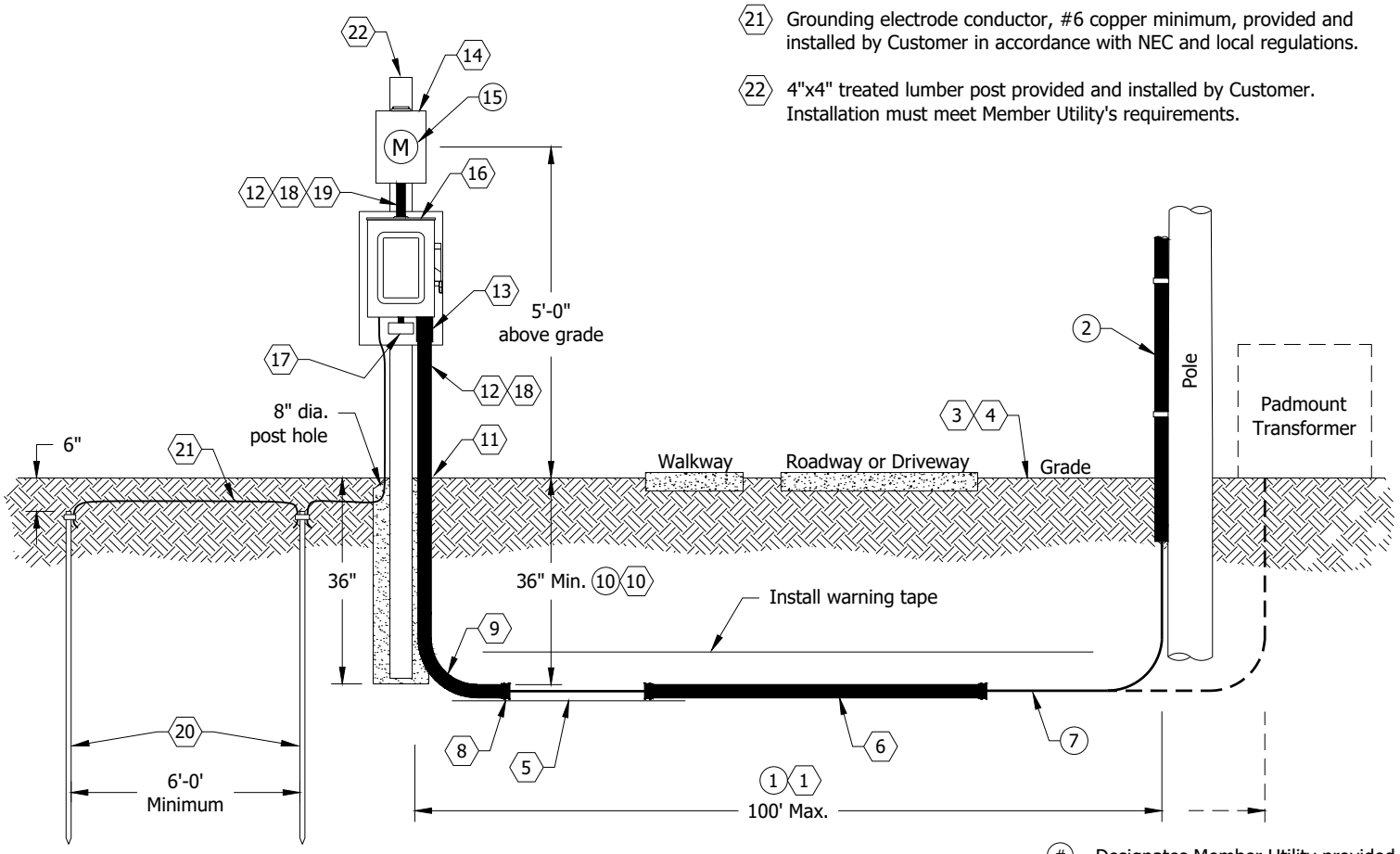
(18) Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.

(19) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

(20) 8'-0" (min.) copper clad ground rods furnished and installed by Customer.

(21) Grounding electrode conductor, #6 copper minimum, provided and installed by Customer in accordance with NEC and local regulations.

(22) 4"x4" treated lumber post provided and installed by Customer. Installation must meet Member Utility's requirements.



(#) - Designates Member Utility provided

(#) - Designates Customer provided

WPPI ENERGY

Temporary Service

Temporary Underground Service (Figure 2-2)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

(1)(1) Temporary service lateral not to exceed 100 ft.

(2) Conduit on pole provided and installed by Member Utility.

(3) Customer to trench to pole or transformer.

(4) Right of way strip for trenching must be graded to within 4" of final grade prior to trenching.

(5) Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand or screened earth for the first 6" above directly buried cable.

(6) Under driveway, walkway and patio crossings Customer to provide 2" minimum diameter galvanized rigid steel conduit or schedule 80 or better PVC listed for underground use.

(7) Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.

(8) Customer to provide insulated bushings required on all conduit ends.

(9) 90 degree conduit sweep required at 36" trench depth.

(10)(10) Depth must be maintained to final grade.

(11) If concrete is to be poured around conduit Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.

(12) Secondary cable conduit provided by Customer.

(13) Slip joint with a minimum of 12" travel supplied by Customer.

(14) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(15) Meter provided and installed by Member Utility.

(16) Fuse/breaker box and switch (weatherproof or covered) provided and installed by Customer on field built structure.

(17) Customer to provide and install receptacle. Mount outlets down. Ground Fault Interrupter (GFI) as required by NEC and the local governing authority.

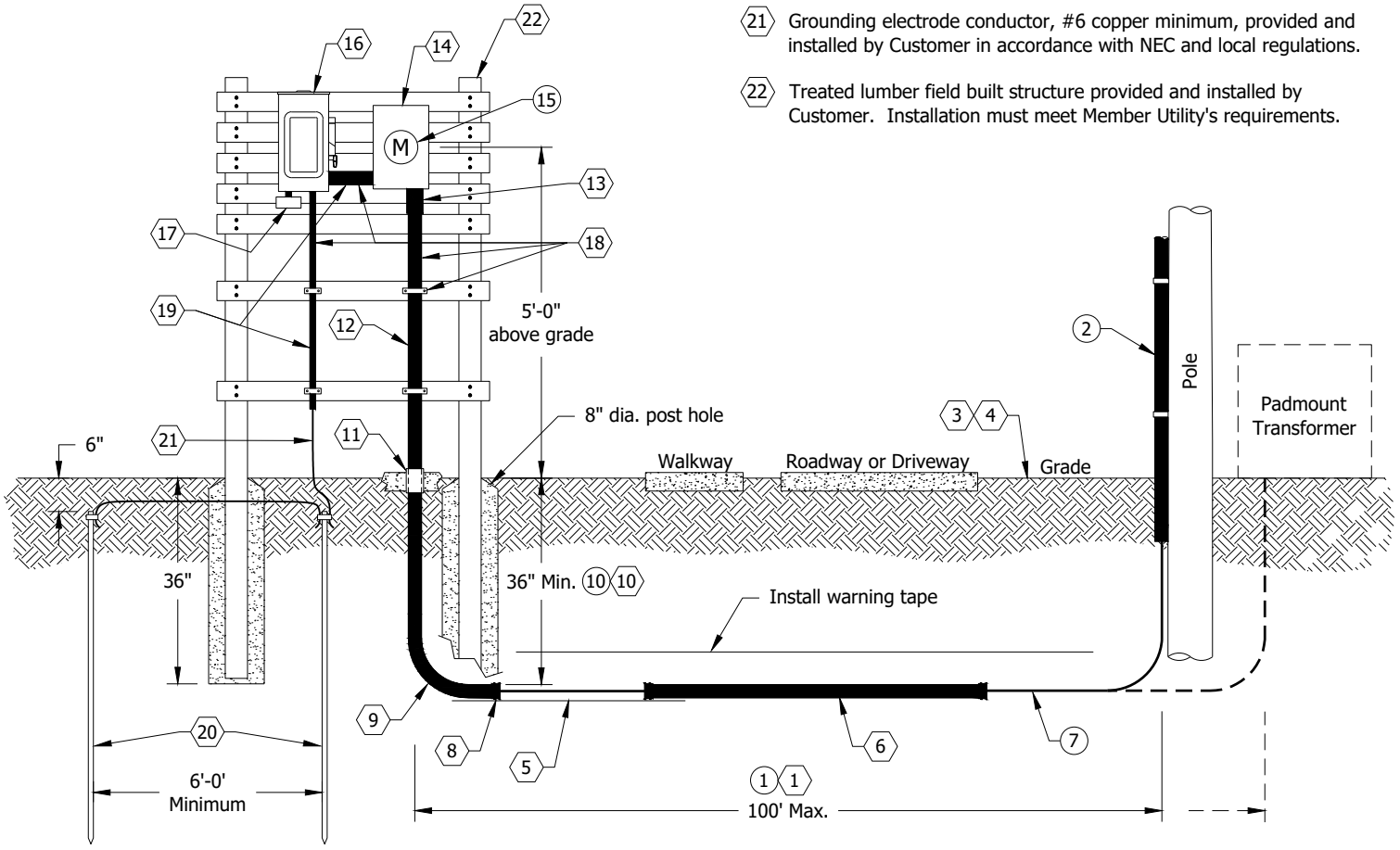
(18) Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.

(19) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

(20) 8'-0" (min.) copper clad ground rods furnished and installed by Customer.

(21) Grounding electrode conductor, #6 copper minimum, provided and installed by Customer in accordance with NEC and local regulations.

(22) Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.



(#) - Designates Member Utility provided

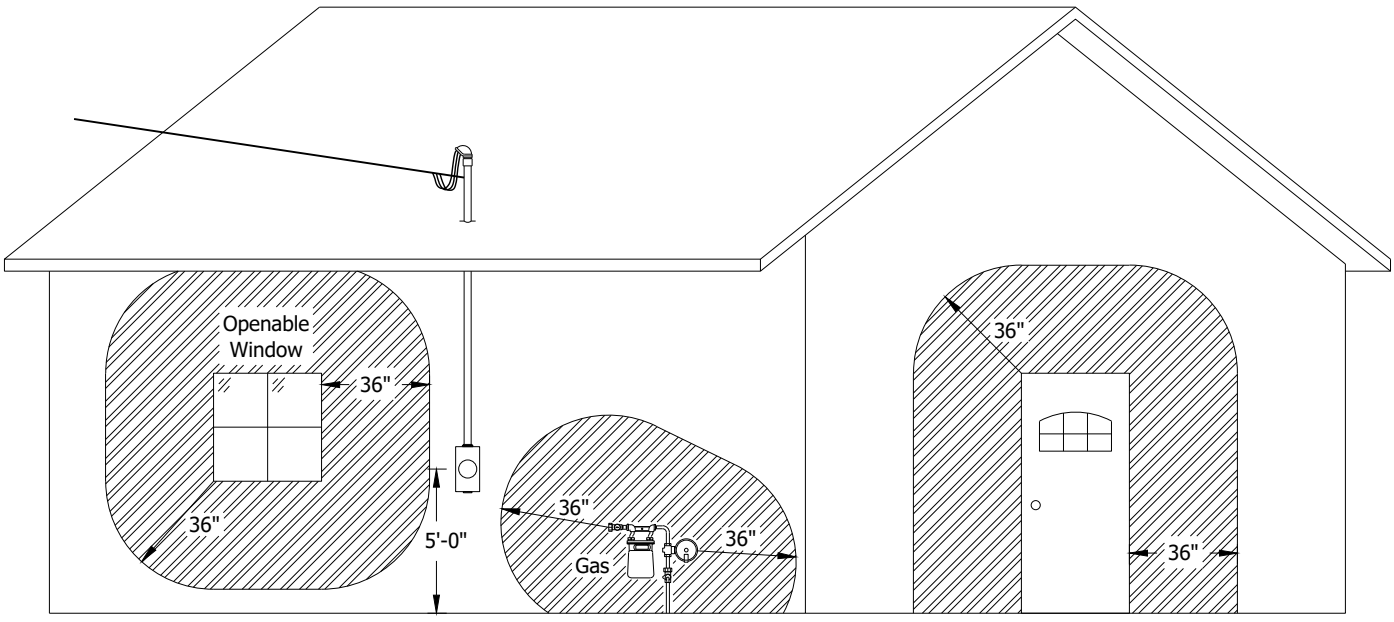
(#) - Designates Customer provided

WPPI ENERGY

Temporary Service

Temporary Underground Service (Figure 2-3)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



= Areas to avoid with meter and service mast

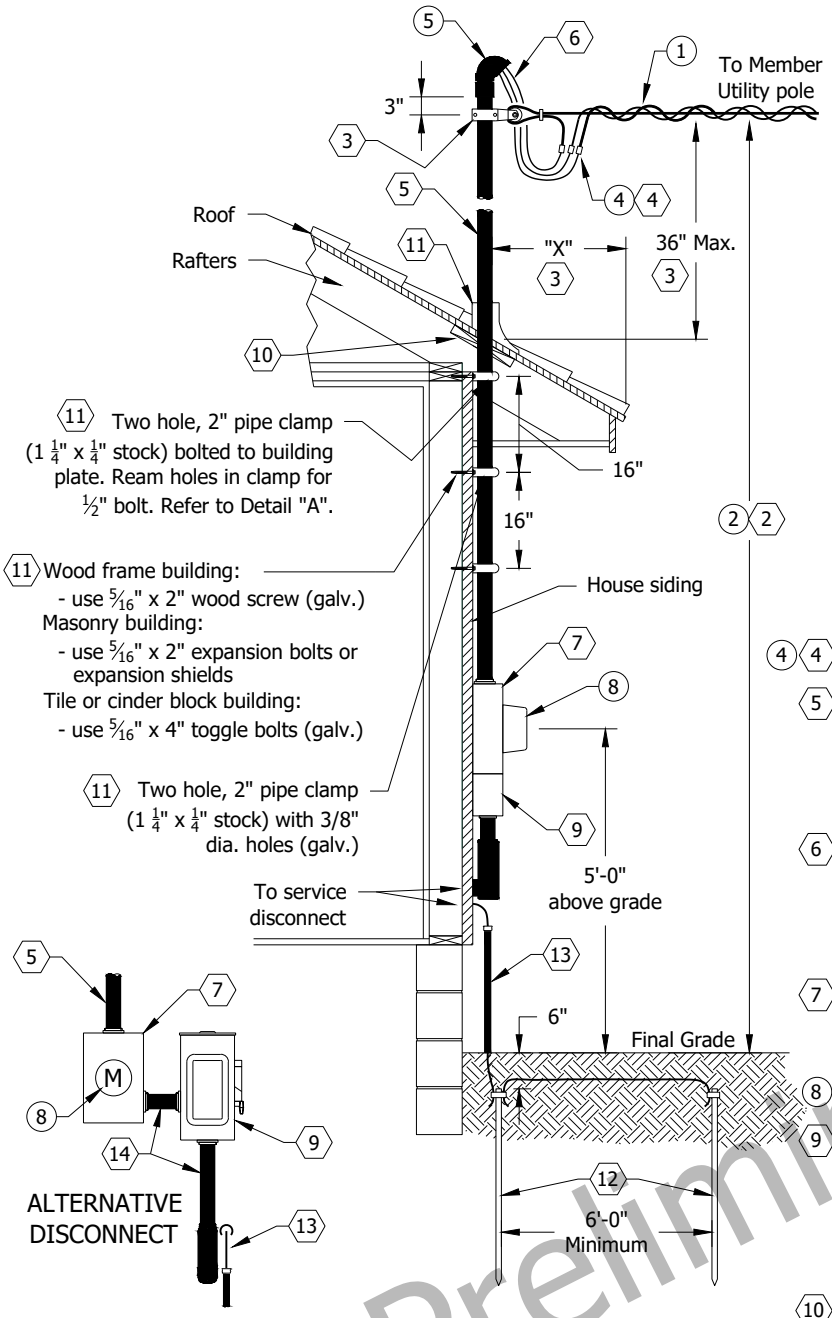
WPPI ENERGY

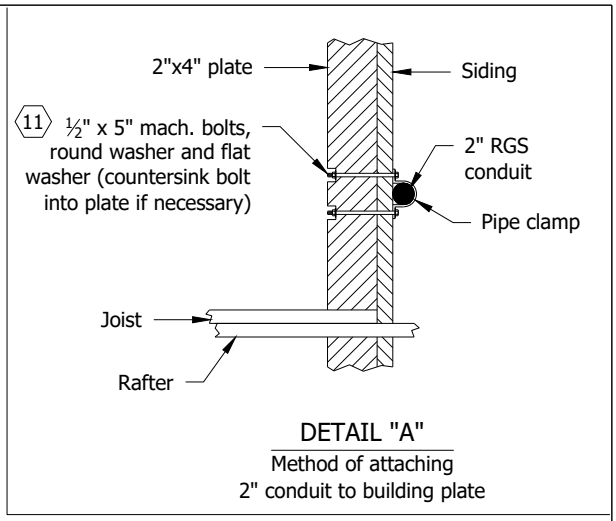
Overhead Service

Service Location Clearance requirements

(Figure 3-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:





DETAIL "A"
Method of attaching 2" conduit to building plate

mast. Minimum allowable distance between roof and service attachment is 18" if dimension "X" is 4'-0" or less. Maximum height without guying is 36".

(4 4) Point of Demarcation (service point) between Member Utility & Customer.

(5) Rigid steel conduit service mast and weather head provided, securely installed and maintained by Customer. Location designated by Member Utility. Service mast to be used as service drop attachment point only where it is impossible to attach wire holders to the building wall and maintain proper clearance.

(6) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".

(7) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(8) Meter provided and installed by Member Utility.

(9) Non-fused disconnect switch provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).

(10) Customer to install service mast through a 2-3/8" dia. hole in a 2"x12" min. block solidly mounted between rafters using 3/8"x4" wood screws, four on each side.

(11) Customer to provide and install roof flashing with waterproof seal around conduit, building plate attachment and building attachments. Conduit straps as noted on drawing.

(12) 8'-0" (min.) copper clad ground rod provided and installed by Customer in accordance with NEC and local regulations.

(13) Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.

(14) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

Notes:

(1) Overhead service drop conductors provided and installed by Member Utility.

(2 2) The service attachment shall be installed at a height that maintains the following clearances for service drop conductors at final worst case sag.
(a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.
(b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.
(c) Pedestrian areas: A minimum of 12.5' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians.

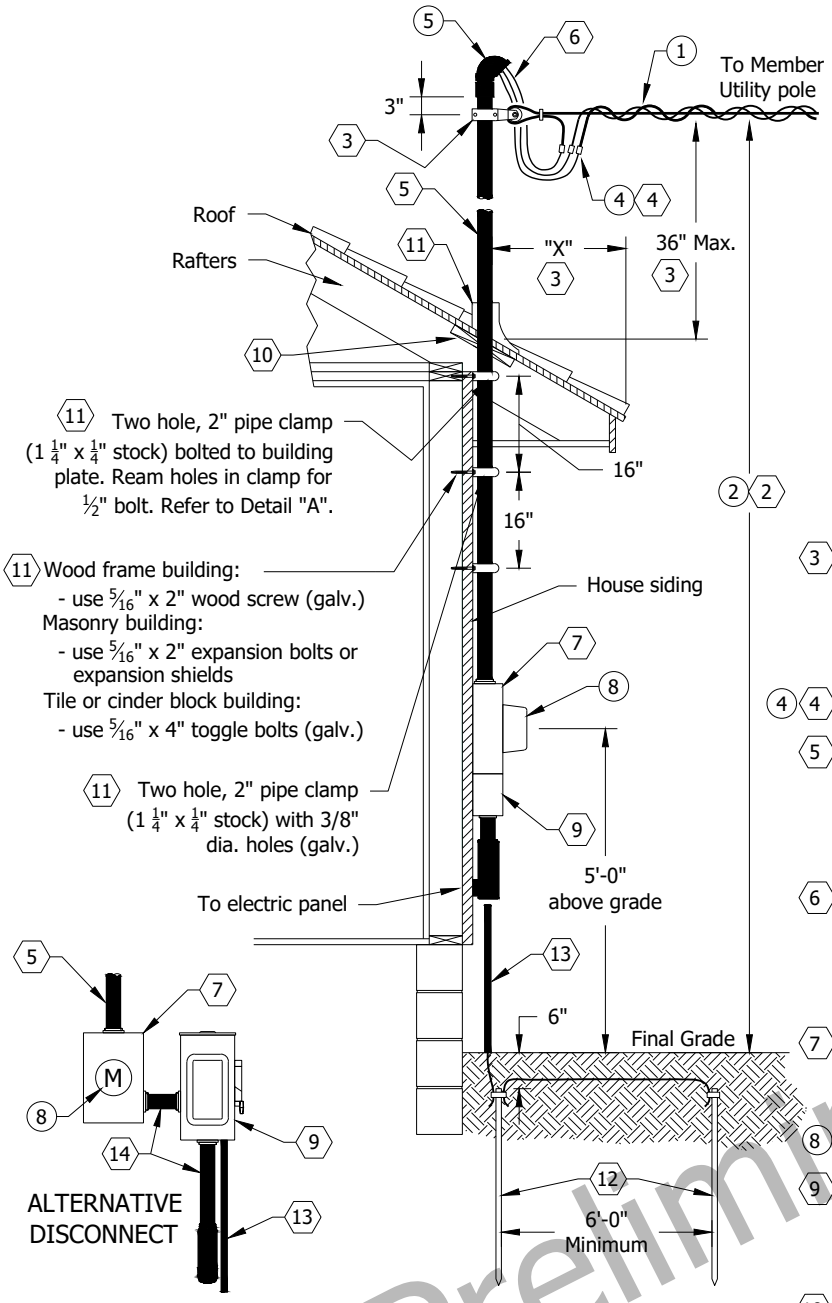
(3) Wireholder with pipe mounting bracket provided and installed by Customer. Only Member Utility service conductors are allowed to contact the service

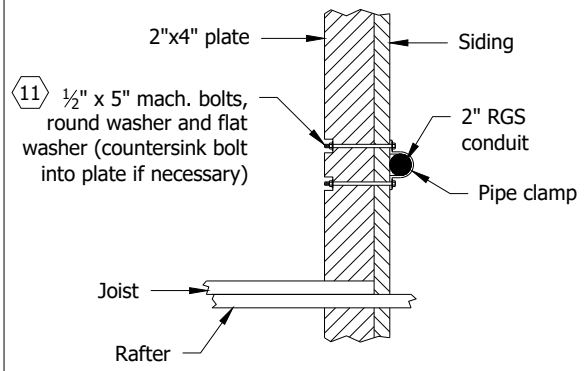
(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

Overhead Service
Through the Roof Installations with Non-fused Disconnect
(Figure 3-2a)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:





DETAIL "A"
Method of attaching 2" conduit to building plate

(3) Wireholder with pipe mounting bracket provided and installed by Customer. Only Member Utility service conductors are allowed to contact the service mast. Minimum allowable distance between roof and service attachment is 18" if dimension "X" is 4'-0" or less. Maximum height without guying is 36".

(4)(4) Point of Demarcation (service point) between Member Utility & Customer.

(5) Rigid steel conduit service mast and weather head provided, securely installed and maintained by Customer. Location designated by Member Utility. Service mast to be used as service drop attachment point only where it is impossible to attach wire holders to the building wall and maintain proper clearance.

(6) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".

(7) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(8) Meter provided and installed by Member Utility.

(9) Service disconnect and overcurrent device provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).

(10) Customer to install service mast through a 2-3/8" dia. hole in a 2"x12" min. block solidly mounted between rafters using 3/8"x4" wood screws, four on each side.

(11) Customer to provide and install roof flashing with waterproof seal around conduit, building plate attachment and building attachments. Conduit straps as noted on drawing.

(12) 8'-0" (min.) copper clad ground rod provided and installed by Customer in accordance with NEC and local regulations.

(13) Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.

(14) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

Notes:

(1) Overhead service drop conductors provided and installed by Member Utility.

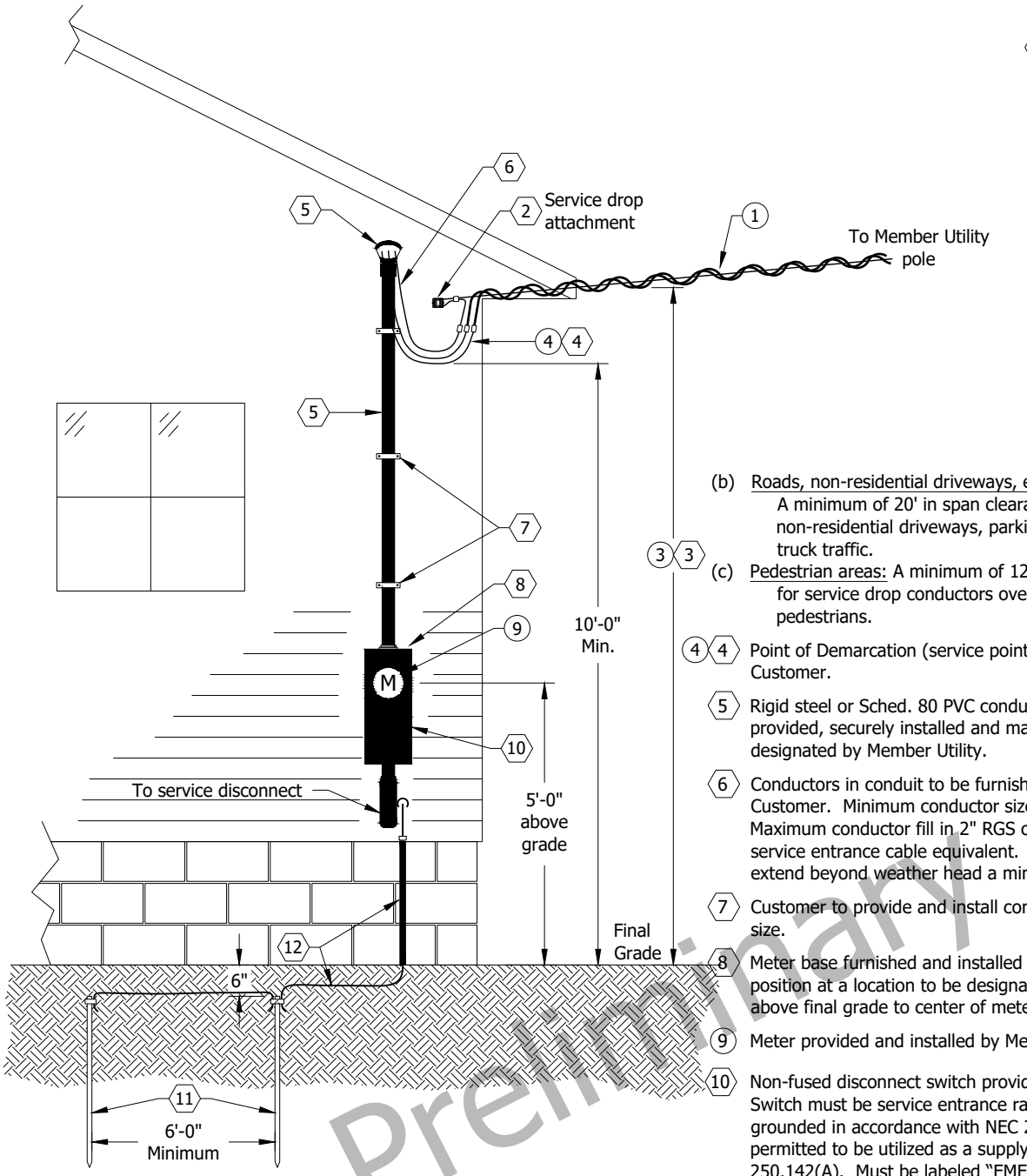
(2)(2) The service attachment shall be installed at a height that maintains the following clearances for service drop conductors at final worst case sag.
(a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.
(b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.
(c) Pedestrian areas: A minimum of 12.5' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians.

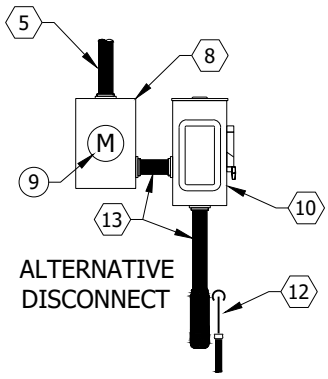
(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

Overhead Service
Through the Roof Installations with Fused Disconnect
(Figure 3-2b)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:





(b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.

(c) Pedestrian areas: A minimum of 12.5' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians.

(4)(4) Point of Demarcation (service point) between Member Utility & Customer.

(5) Rigid steel or Sched. 80 PVC conduit service mast and weather head provided, securely installed and maintained by Customer. Location designated by Member Utility.

(6) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".

(7) Customer to provide and install conduit straps as required by conduit size.

(8) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(9) Meter provided and installed by Member Utility.

(10) Non-fused disconnect switch provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).

(11) 8'-0" (min.) copper clad ground rods provided and installed by Customer in accordance with NEC and local regulations.

(12) Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.

(13) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

Notes:

(1) Overhead service drop conductors provided and installed by Member Utility. Service drop tension to be limited to 500 lbs. under loaded conditions.

(2) Service drop wire holder provided and installed by the Customer at a minimum height of 10'-0" above final grade.

(3)(3) The service attachment shall be installed at a height that maintains NEC and NESC clearance requirements for service drop conductors at final worst case sag and not be less than:

(a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.

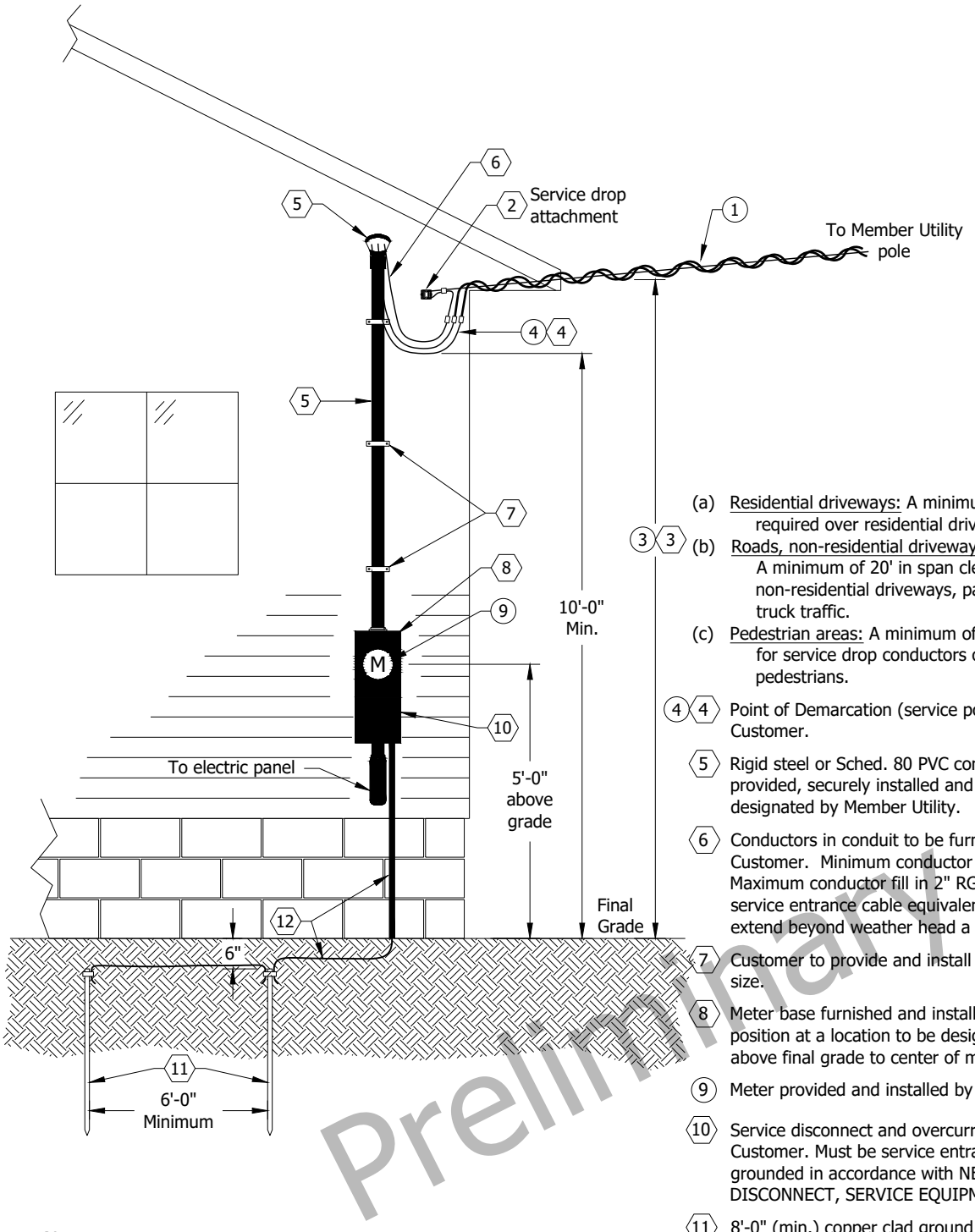
(#) - Designates Member Utility provided (#) - Designates Customer provided

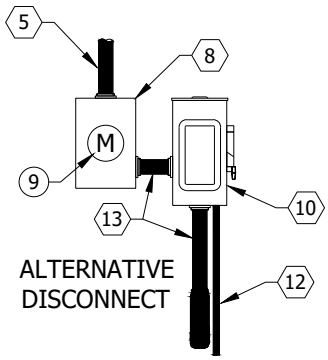
WPPI ENERGY

Overhead Service

Wall Mount Installations with Non-fused Disconnect (Figure 3-3a)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:





(a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.

(3)(3) (b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.

(c) Pedestrian areas: A minimum of 12.5' in-span clearance is required for service drop conductors over spaces and ways subject to pedestrians.

(4)(4) Point of Demarcation (service point) between Member Utility & Customer.

(5) Rigid steel or Sched. 80 PVC conduit service mast and weather head provided, securely installed and maintained by Customer. Location designated by Member Utility.

(6) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".

(7) Customer to provide and install conduit straps as required by conduit size.

(8) Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.

(9) Meter provided and installed by Member Utility.

(10) Service disconnect and overcurrent device provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).

(11) 8'-0" (min.) copper clad ground rods provided and installed by Customer in accordance with NEC and local regulations.

(12) Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.

(13) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.

Notes:

(1) Overhead service drop conductors provided and installed by Member Utility. Service drop tension to be limited to 500 lbs. under loaded conditions.

(2) Service drop wire holder provided and installed by the Customer at a minimum height of 10'-0" above final grade.

(3)(3) The service attachment shall be installed at a height that maintains NEC and NESC clearance requirements for service drop conductors at final worst case sag and not be less than:

(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

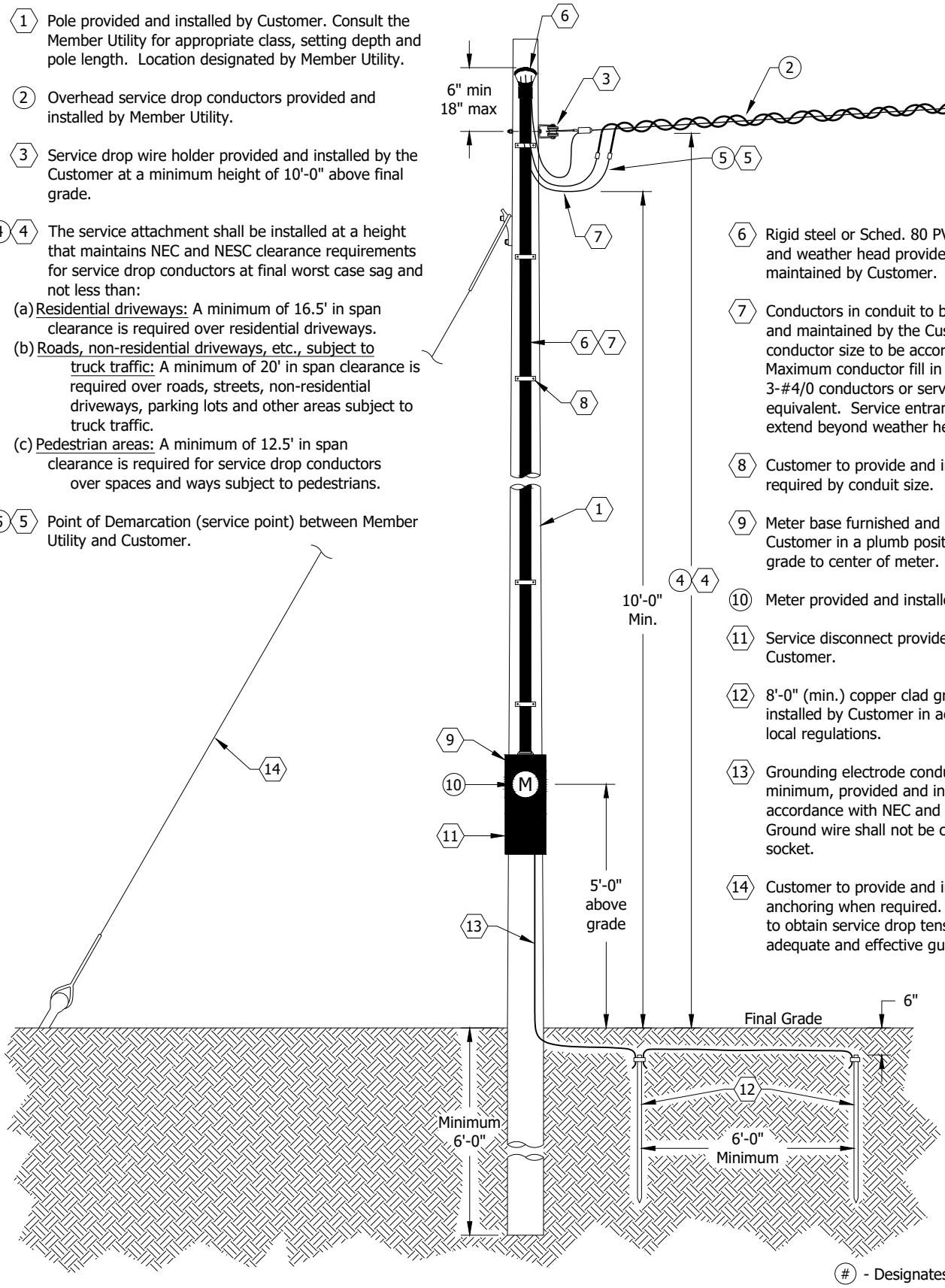
Overhead Service

Wall Mount Installations with Fused Disconnect (Figure 3-3b)

DATE:	DRAWN BY:	APPROVED BY:	SCALE:	REVISED:
07/11/2025	KI	HJA	N.T.S.	

Notes:

1. Pole provided and installed by Customer. Consult the Member Utility for appropriate class, setting depth and pole length. Location designated by Member Utility.
2. Overhead service drop conductors provided and installed by Member Utility.
3. Service drop wire holder provided and installed by the Customer at a minimum height of 10'-0" above final grade.
4. The service attachment shall be installed at a height that maintains NEC and NESC clearance requirements for service drop conductors at final worst case sag and not less than:
   (a) Residential driveways: A minimum of 16.5' in span clearance is required over residential driveways.
   (b) Roads, non-residential driveways, etc., subject to truck traffic: A minimum of 20' in span clearance is required over roads, streets, non-residential driveways, parking lots and other areas subject to truck traffic.
   (c) Pedestrian areas: A minimum of 12.5' in span clearance is required for service drop conductors over spaces and ways subject to pedestrians.
5. Point of Demarcation (service point) between Member Utility and Customer.



6. Rigid steel or Sched. 80 PVC conduit service mast and weather head provided, securely installed and maintained by Customer.
7. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".
8. Customer to provide and install conduit straps as required by conduit size.
9. Meter base furnished and installed by the Customer in a plumb position at 5'-0" above final grade to center of meter.
10. Meter provided and installed by Member Utility.
11. Service disconnect provided and installed by Customer.
12. 8'-0" (min.) copper clad ground rods provided and installed by Customer in accordance with NEC and local regulations.
13. Grounding electrode conductor, #6 copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Ground wire shall not be connected to meter socket.
14. Customer to provide and install down-guy and anchoring when required. Consult Member Utility to obtain service drop tension and direction so adequate and effective guying can be installed.

(#) - Designates Member Utility provided

(#) - Designates Customer provided

WPPI ENERGY

Overhead Service

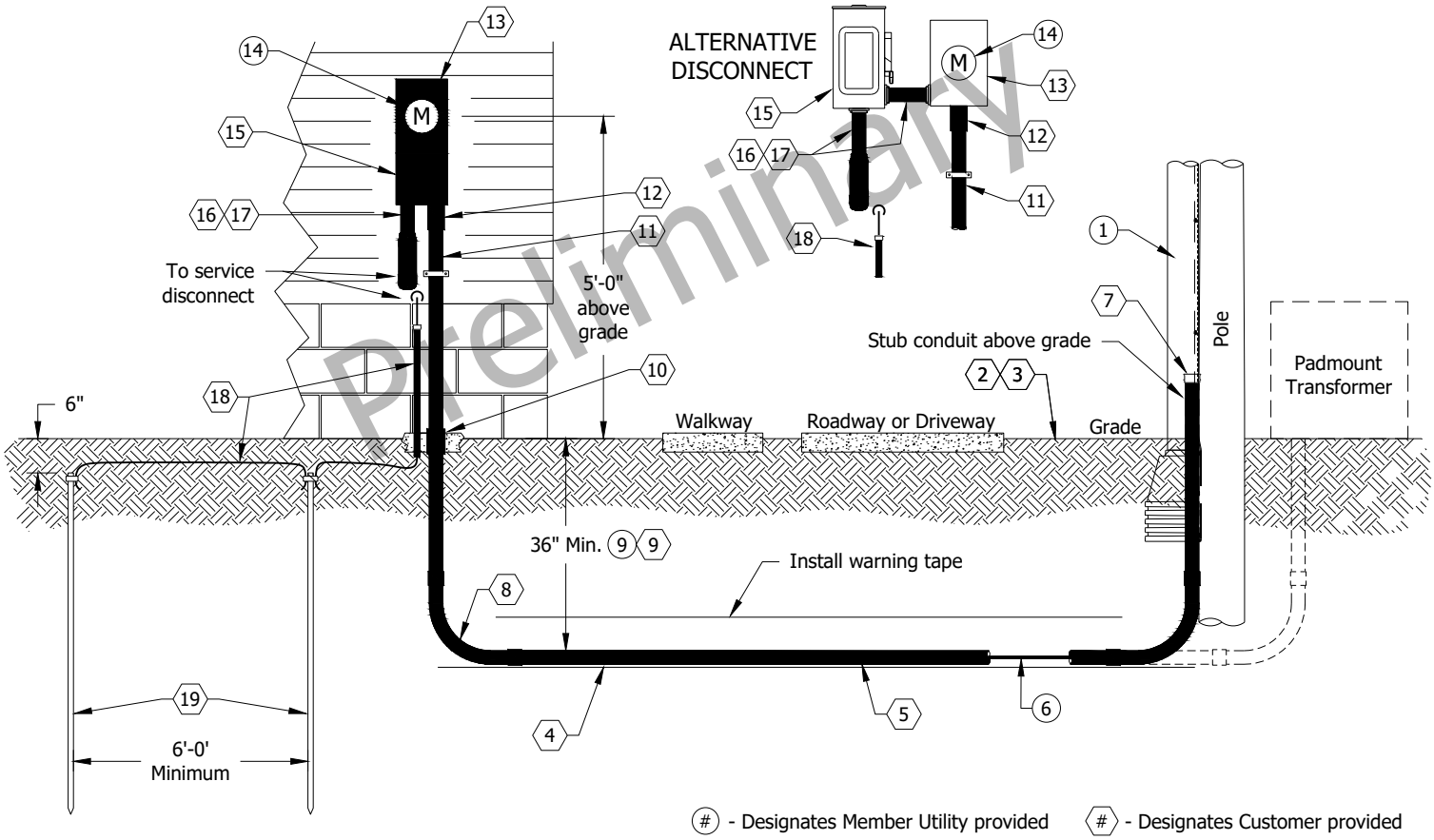
Pole Mounted Service (Secondary Pole)

(Figure 3-4)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends (or bushings) required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1-1/4" larger than conduit O.D.
11. Secondary cable conduit provided by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Non-fused disconnect switch provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
17. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.
18. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.
19. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

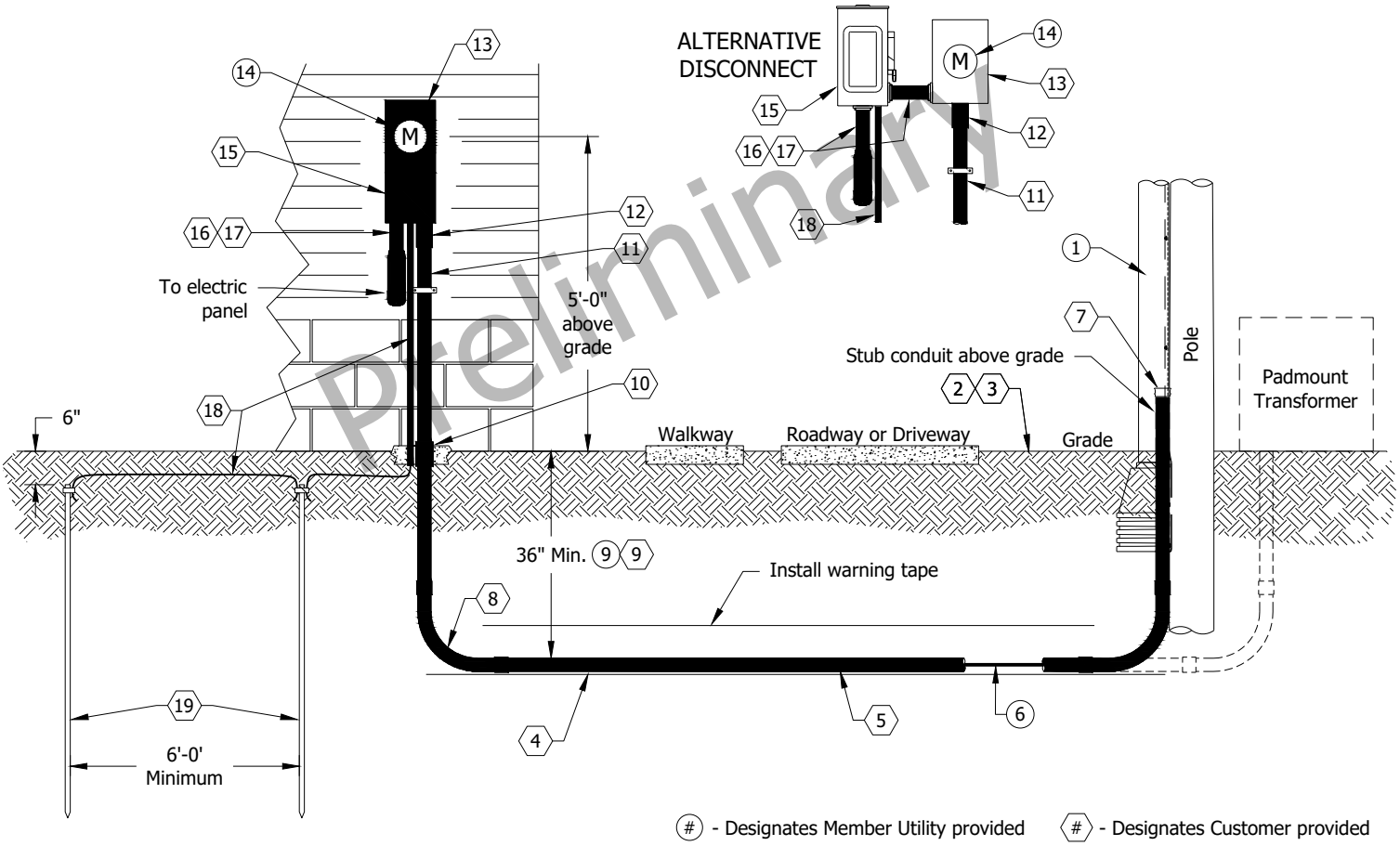
Underground Service

Wall Mount Installation - 120/240V with Non-fused Disconnect (Figure 4-1a)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends (or bushings) required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1-1/4" larger than conduit O.D.
11. Secondary cable conduit provided by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Service disconnect and overcurrent device provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
17. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.
18. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.
19. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

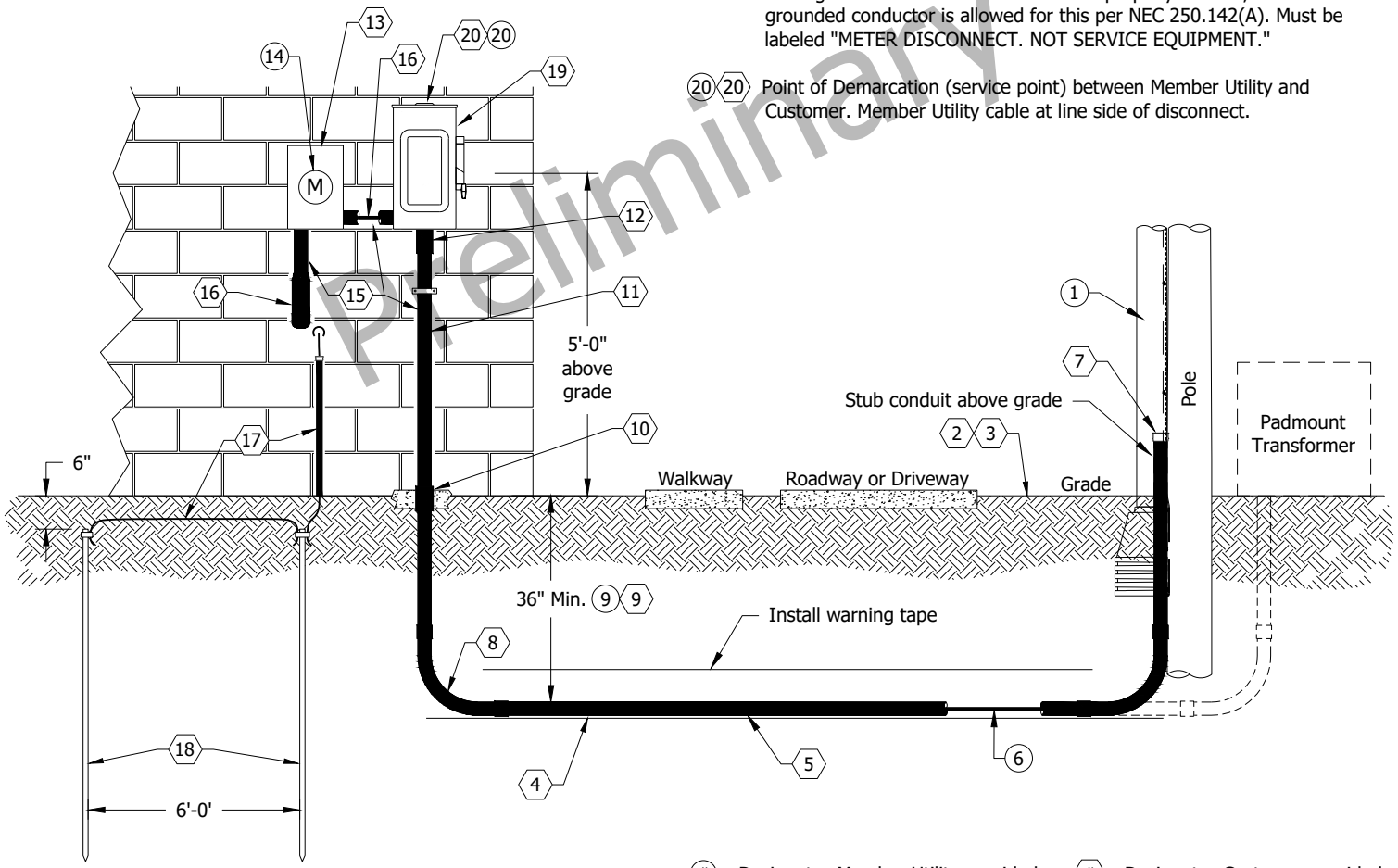
Underground Service

Wall Mount Installation - 120/240V with Fused Disconnect (Figure 4-1b)

DATE:	DRAWN BY:	APPROVED BY:	SCALE:	REVISED:
07/11/2025	KI	HJA	N.T.S.	

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends (or bushings) required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. 9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
11. Secondary cable conduit provided by Customer.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
16. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.
17. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.
18. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.
19. Meter disconnect, lockable in the on/closed position. Rating to match or be greater than meter base. Must be properly bonded, the grounded conductor is allowed for this per NEC 250.142(A). Must be labeled "METER DISCONNECT. NOT SERVICE EQUIPMENT."
20. 20. Point of Demarcation (service point) between Member Utility and Customer. Member Utility cable at line side of disconnect.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

Underground Service

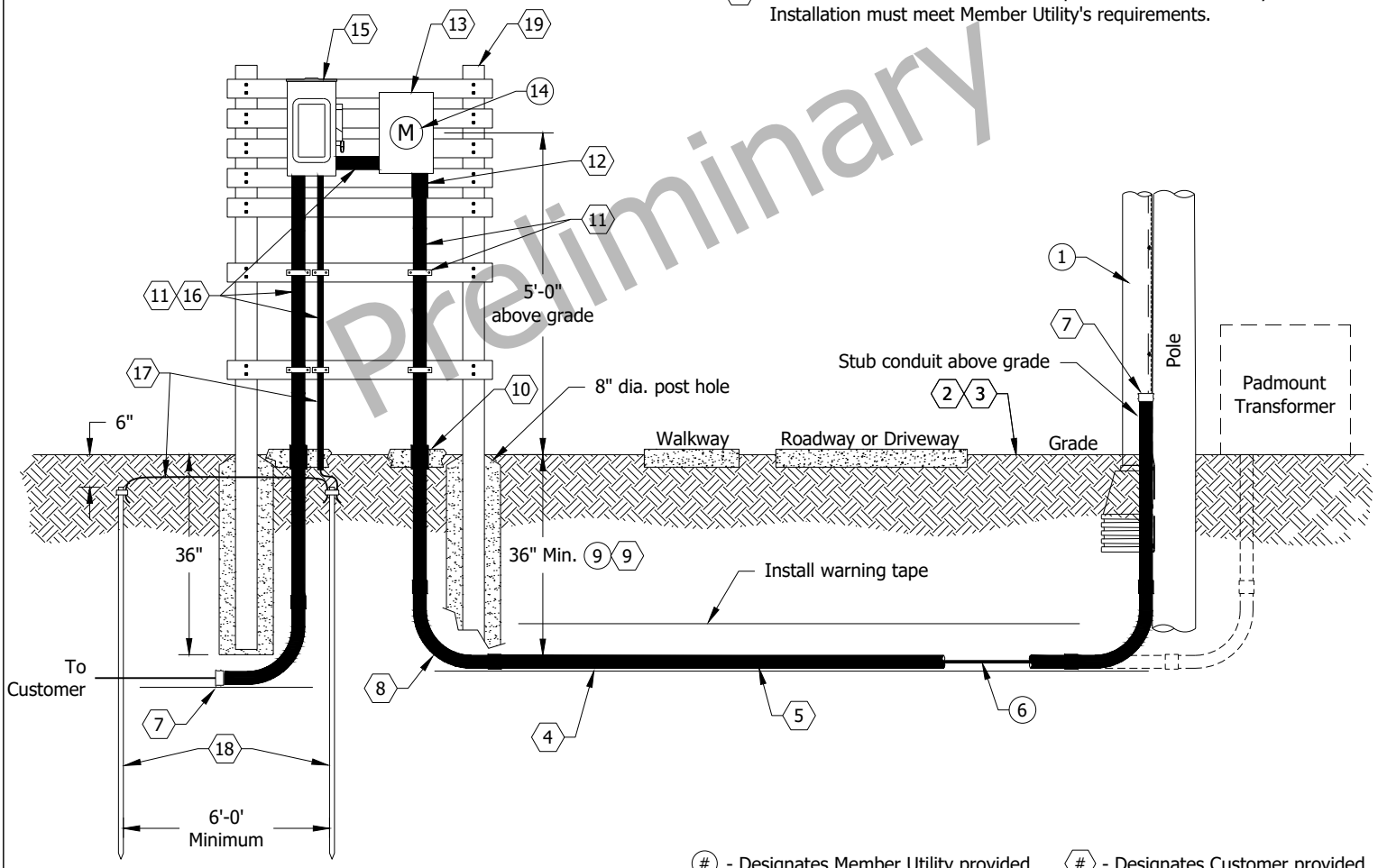
Wall Mount Installation - 277/480V Three Phase

(Figure 4-1c)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/ meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends (or bushings) required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
11. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Non-fused disconnect switch provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.
17. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.
18. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.
19. Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

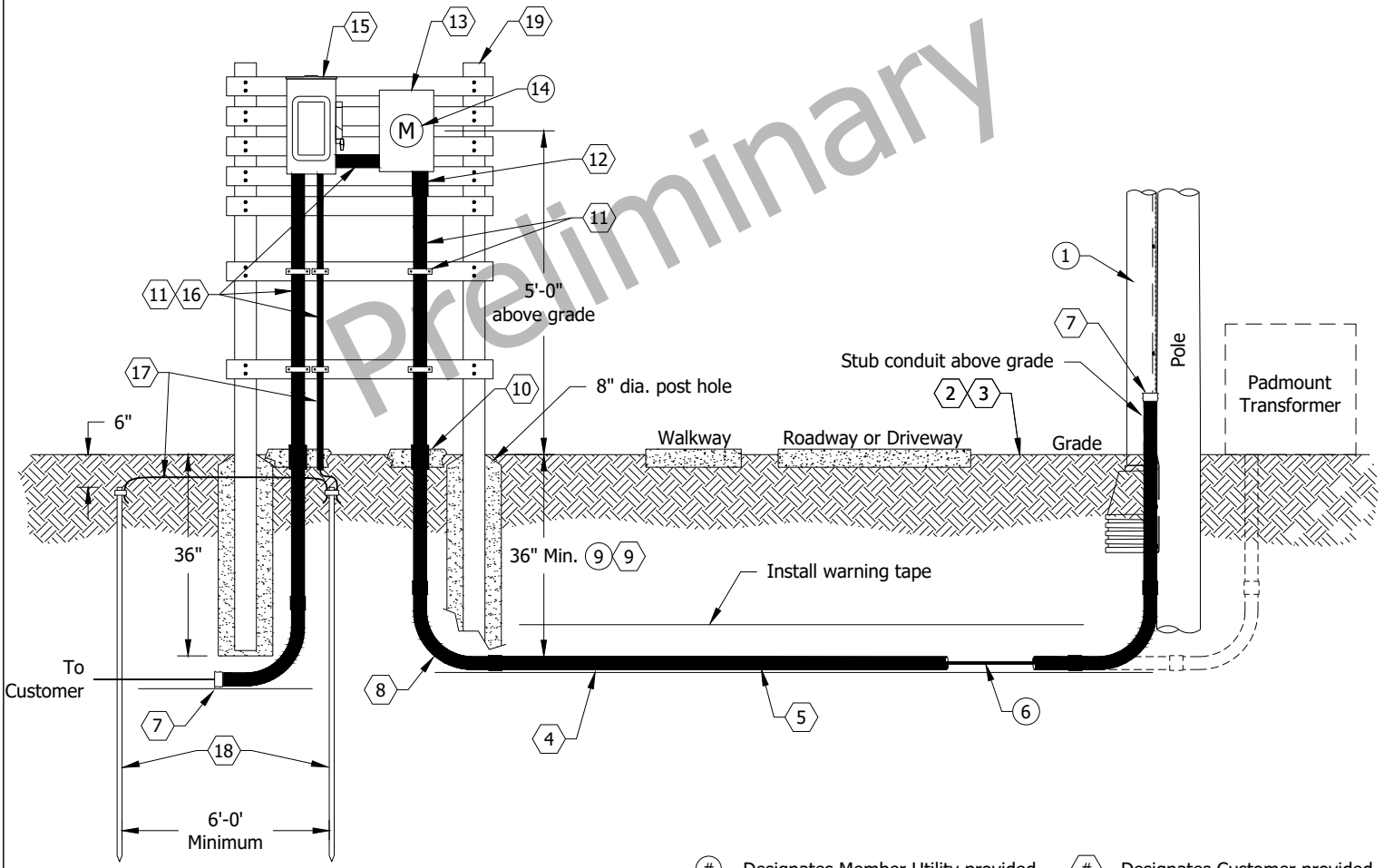
Underground Service

Outdoor Service Installation - 120/240V with Non-fused Disconnect (Figure 4-2a)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/ meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends (or bushings) required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
11. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Service disconnect and overcurrent device provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC.
17. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.
18. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.
19. Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

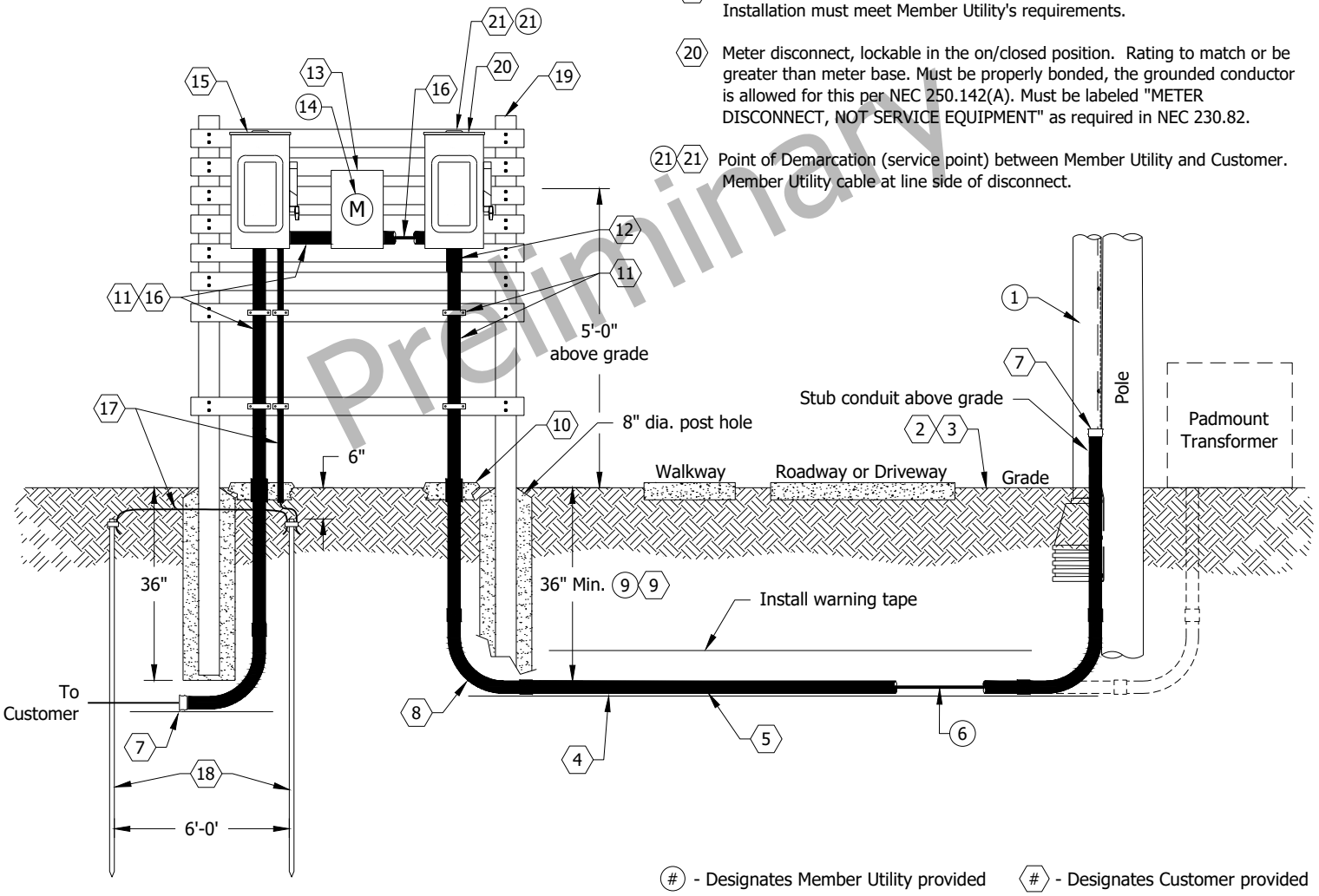
Underground Service

Outdoor Service Installation - 120/240V with Fused Disconnect (Figure 4-2b)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
11. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Non-fused disconnect switch (weatherproof or covered) provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conductors from the load of the line side disconnect, in conduit, to be furnished, installed, and maintained by the Customer. Minimum conductor size to be according to the NEC.
17. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.
18. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.
19. Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.
20. Meter disconnect, lockable in the on/closed position. Rating to match or be greater than meter base. Must be properly bonded, the grounded conductor is allowed for this per NEC 250.142(A). Must be labeled "METER DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.82.
21. 21 Point of Demarcation (service point) between Member Utility and Customer. Member Utility cable at line side of disconnect.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

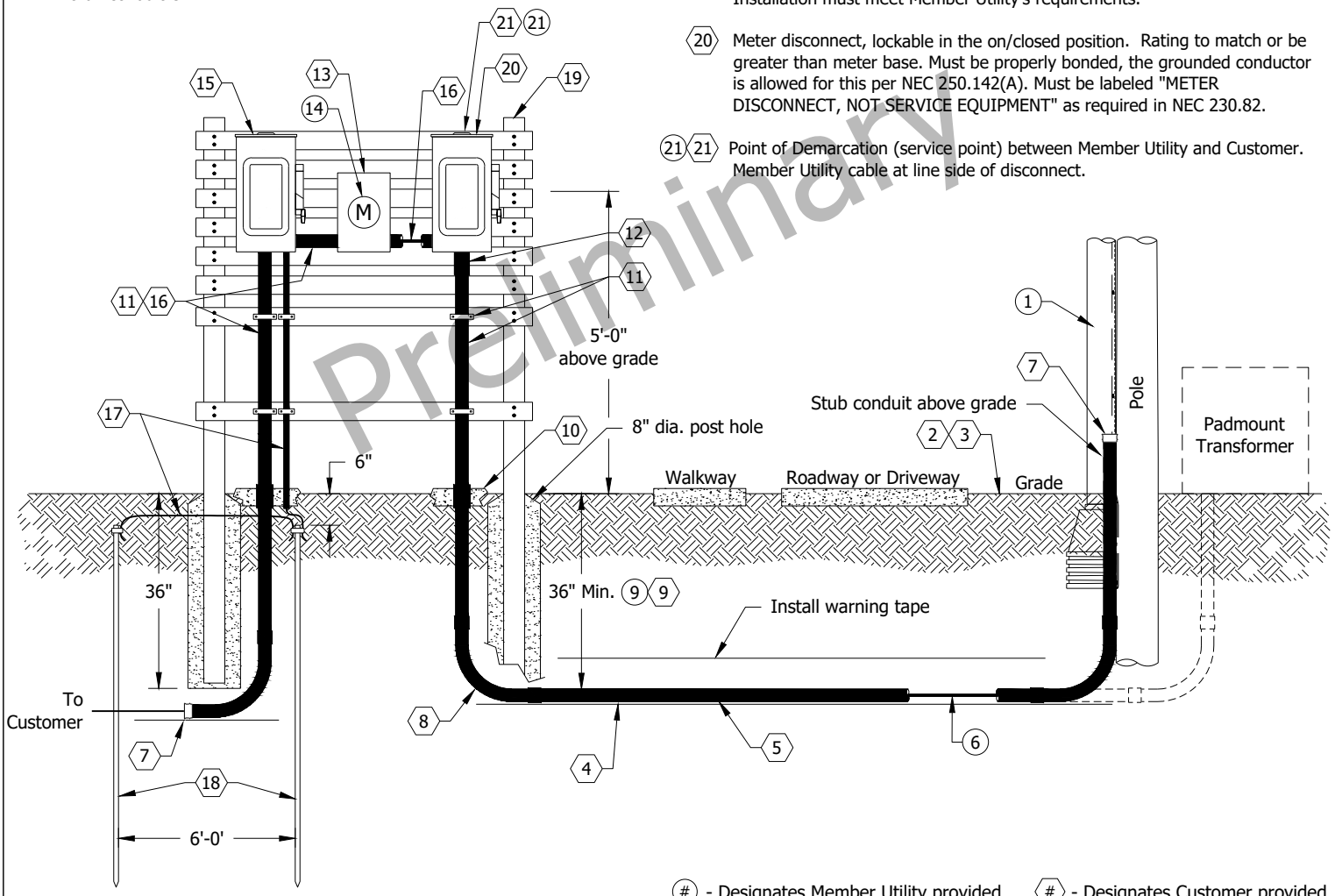
Underground Service

Outdoor Service Installation - 277/480V Three Phase with Non-fused Disc. (Figure 4-2c)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide bell ends required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. Depth must be maintained to final grade.
10. If concrete is to be poured around conduit, Customer shall use sleeve to provide clearance between conduit and concrete. Sleeve to be 1 1/4" larger than conduit O.D.
11. Conduit to be furnished, securely installed and maintained by Customer. Conduit straps as required by conduit size.
12. Slip joint with a minimum of 12" travel supplied by Customer.
13. Meter base furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
14. Meter provided and installed by Member Utility.
15. Service disconnect and overcurrent device (weatherproof or covered) provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).
16. Conductors from the load of the line side disconnect, in conduit, to be furnished, installed, and maintained by the Customer. Minimum conductor size to be according to the NEC.
17. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.
18. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.
19. Treated lumber field built structure provided and installed by Customer. Installation must meet Member Utility's requirements.
20. Meter disconnect, lockable in the on/closed position. Rating to match or be greater than meter base. Must be properly bonded, the grounded conductor is allowed for this per NEC 250.142(A). Must be labeled "METER DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.82.
21. Point of Demarcation (service point) between Member Utility and Customer. Member Utility cable at line side of disconnect.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

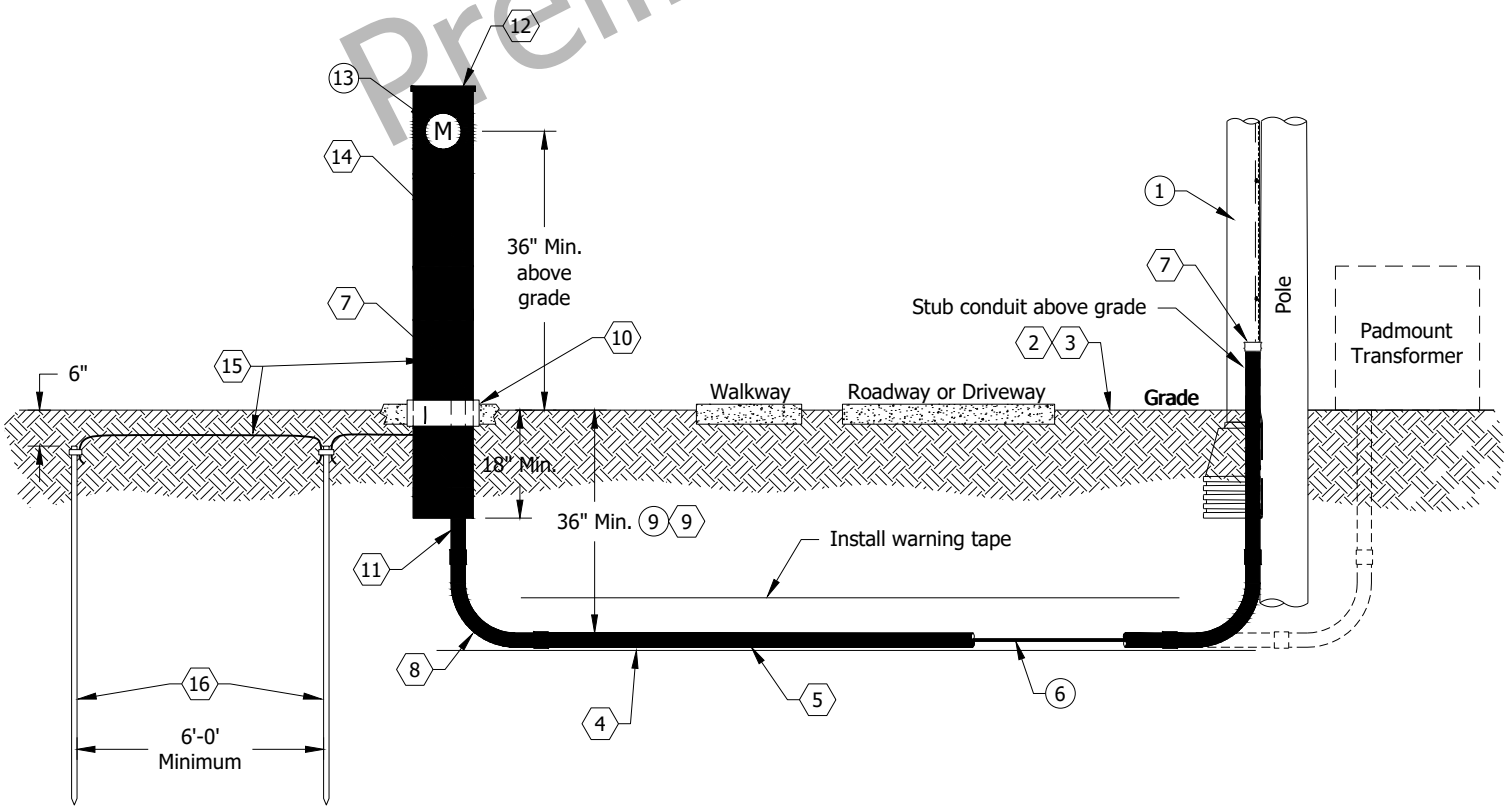
Underground Service

Outdoor Service Installation - 277/480V Three Phase with Fused Disc. (Figure 4-2d)

DATE:	DRAWN BY:	APPROVED BY:	SCALE:	REVISED:
07/11/2025	KI	HJA	N.T.S.	

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide insulated bushings required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. 9 Depth must be maintained to final grade.
10. If concrete is to be poured around pedestal, Customer shall use sleeve to provide clearance between pedestal and concrete.
11. Secondary cable conduit provided by Customer.
12. Meter pedestal furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility.
13. Meter provided and installed by Member Utility.
14. Non-fused disconnect switch provided and installed by Customer. Switch must be service entrance rated and properly bonded and grounded in accordance with NEC 250. Grounded conductor is permitted to be utilized as a supply side bonding jumper per NEC 250.142(A). Must be labeled "EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT" as required in NEC 230.85(E).
15. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage. This conductor shall not be connected to the meter socket.
16. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.



(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

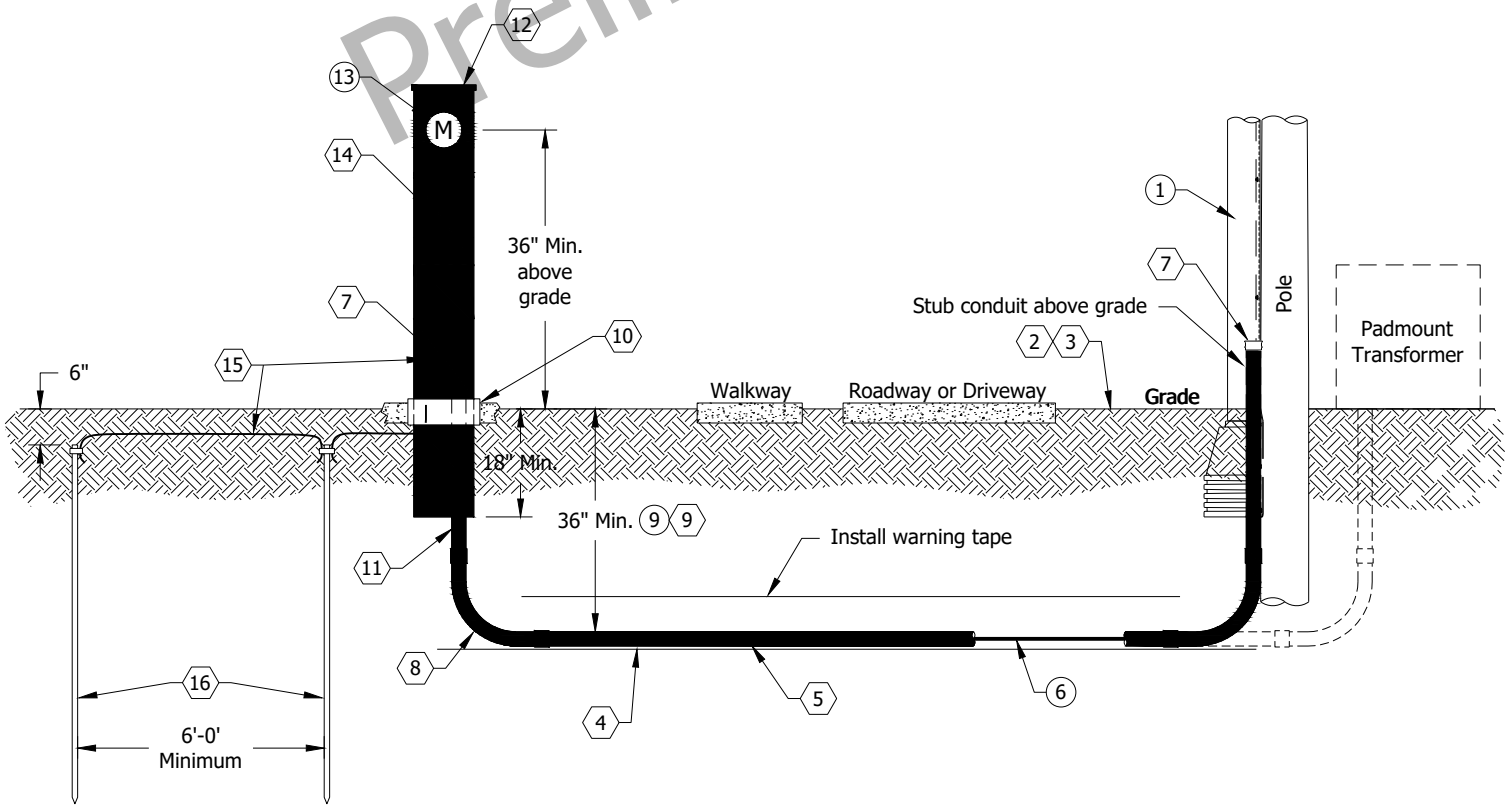
Underground Service

Meter Pedestal Installation with Non-fused Disconnect (Figure 4-3a)

DATE:	DRAWN BY:	APPROVED BY:	SCALE:	REVISED:
07/11/2025	KI	HJA	N.T.S.	

Notes:

1. U-Guard on pole provided and installed by Member Utility.
2. Customer to trench to pole or transformer.
3. Right of way strip for trenching must be graded to within 6" of final grade prior to trenching.
4. Bottom of trench must be level and free of loose or projecting stones and debris. Backfill shall be sand, 1/4" crushed limestone or screened earth for the first 6" above directly buried cable.
5. Customer to provide continuous conduit, minimum schedule 40 PVC listed for underground use, from service pole/transformer to meter socket/meter disconnect with pull string. Under driveway, walkway and patio crossings, conduit must be galvanized rigid steel or schedule 80 or better PVC. Required conduit size to be determined by Member Utility.
6. Underground secondary cables to be furnished, installed and maintained by the Member Utility under the conditions of the existing underground service policy.
7. Customer to provide insulated bushings required on all conduit ends.
8. 90 degree conduit sweep required at 36" trench depth.
9. 9 Depth must be maintained to final grade.
10. If concrete is to be poured around pedestal, Customer shall use sleeve to provide clearance between pedestal and concrete.
11. Secondary cable conduit provided by Customer.
12. Meter pedestal furnished and installed by the Customer in a plumb position at a location to be designated by Member Utility.
13. Meter provided and installed by Member Utility.
14. Service disconnect and overcurrent device provided and installed by Customer. Must be service entrance rated and be properly bonded and grounded in accordance with NEC 250. Must be labeled "EMERGENCY DISCONNECT, SERVICE EQUIPMENT" as required in NEC 230.85(E).
15. Grounding electrode conductor, #6 AWG copper minimum, provided and installed by Customer in accordance with NEC and local regulations. Where exposed, conductor shall be securely fastened and protected from physical damage.
16. 8'-0" (min.) copper clad ground rods furnished and installed by Customer.



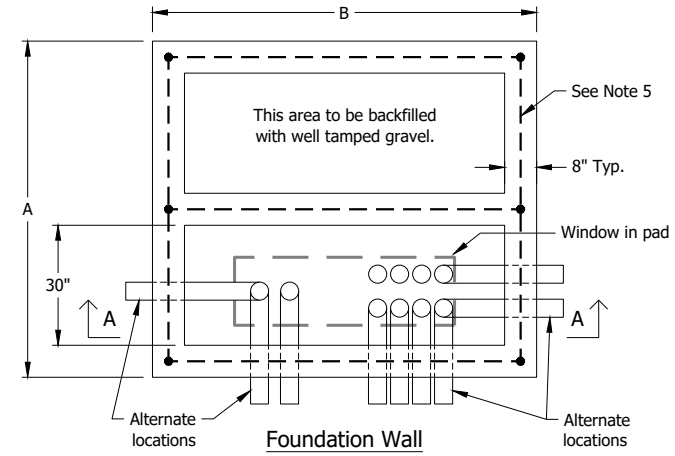
(#) - Designates Member Utility provided (#) - Designates Customer provided

WPPI ENERGY

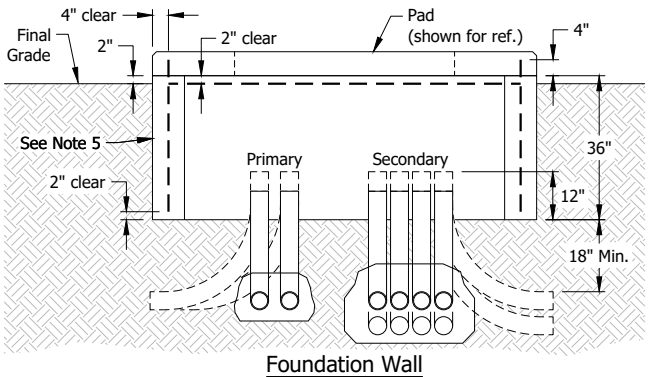
Underground Service

Meter Pedestal Installation with Fused Disconnect (Figure 4-3b)

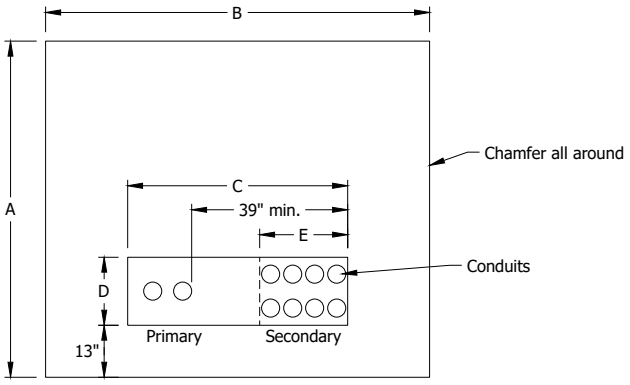
DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



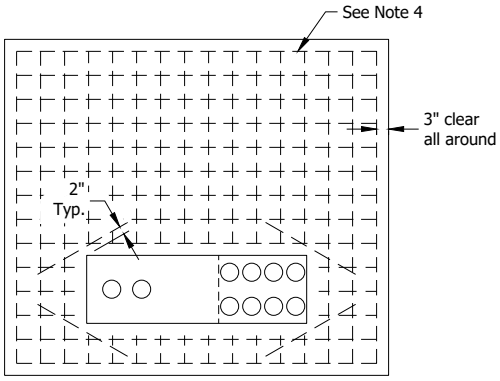
Foundation Wall
Top View



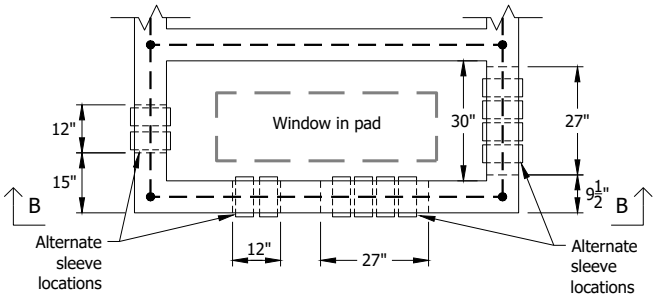
Foundation Wall
Section A-A



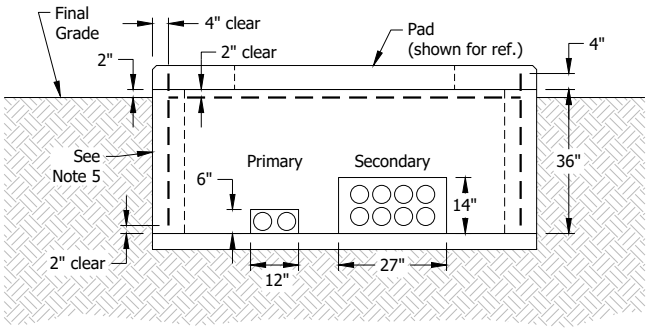
Foundation Pad Dimensions
Top View



Foundation Pad Reinforcing
Top View



Partial Foundation Wall - Alternate
Top View



Foundation Wall - Alternate
Elevation B-B

Pad	XFMR kVA	Dimensions in Inches					
		A	B	C	D	E	Thickness
I	75-500	84	96	55	18	22	6
II	750-2500	105	108	60	18	27	8

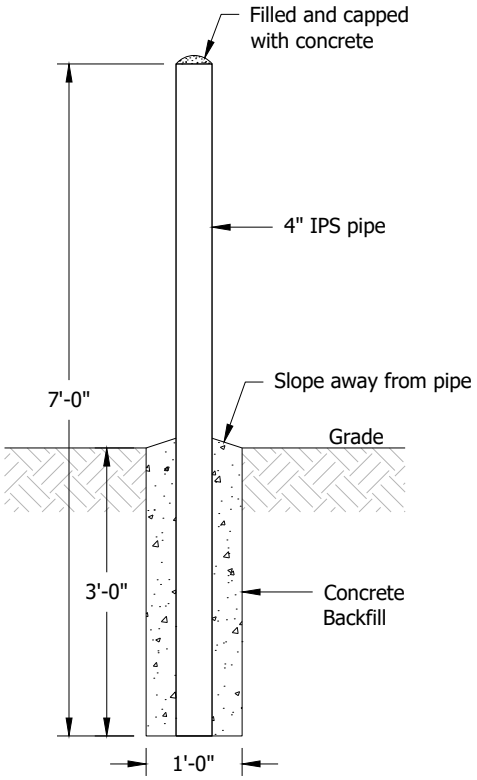
Notes:

1. The Customer shall install, own and maintain a concrete pad whenever the underground service requires a 3ϕ transformer pad.
2. If required by the Member Utility, additional transformer pad foundation walls shall be used for locations having poor soil conditions or a large number of secondary cables.
3. Concrete testing: 3000 lbs. min. per square inch, 4% to 6% entrained air, 3/4" max. size aggregate.
4. Foundation pad to be reinforced with #4 rebar, place approx. 6" O.C. each way and securely tied together.
5. Foundation walls to be reinforced with #4 rebar, place 12" O.C. each way and securely tied together. Extend corner rebar 4" above wall for anchoring to pad.
6. Minimum concrete cover over reinforcing steel 2" unless noted.
7. Wood float finish, leaving no depressions.
8. The contractor shall contact the Member Utility for sizes and number of primary and secondary conduits.
9. For a service requiring more than eight conduits, contact the Member Utility for details on transformer pad design.
10. A clear space of 10 ft. shall be maintained in front of the transformer to provide working space for hot-stick operation of the transformer and 3 ft. on all other sides. Transformers or other pad-mounted equipment shall not be covered with decorative objects.
11. All conduits shall enter through the window opening provided in the pad foundation. these conduits shall be cut off so the top of the conduit is flush with the surface of the pad
12. All metallic conduits shall be fitted with an insulating bushing.
13. The top of the pad shall be level and all edges and corners chamfered.
14. Plug ends of conduit. Mark ends of conduit with a stake labeled "conduit".
15. Contractor to install primary conduit with 36" or 48" standard elbows for Member Utility primary conductors. Backfill around conduits with sand or soil, not gravel.

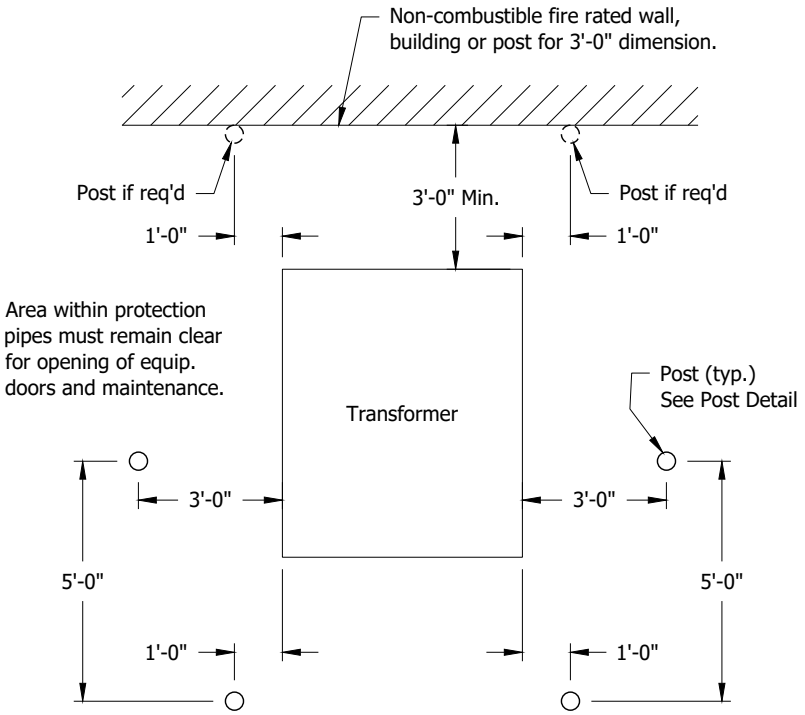
WPPI ENERGY

Underground Service
Concrete Transformer Pad
(Figure 4-4)

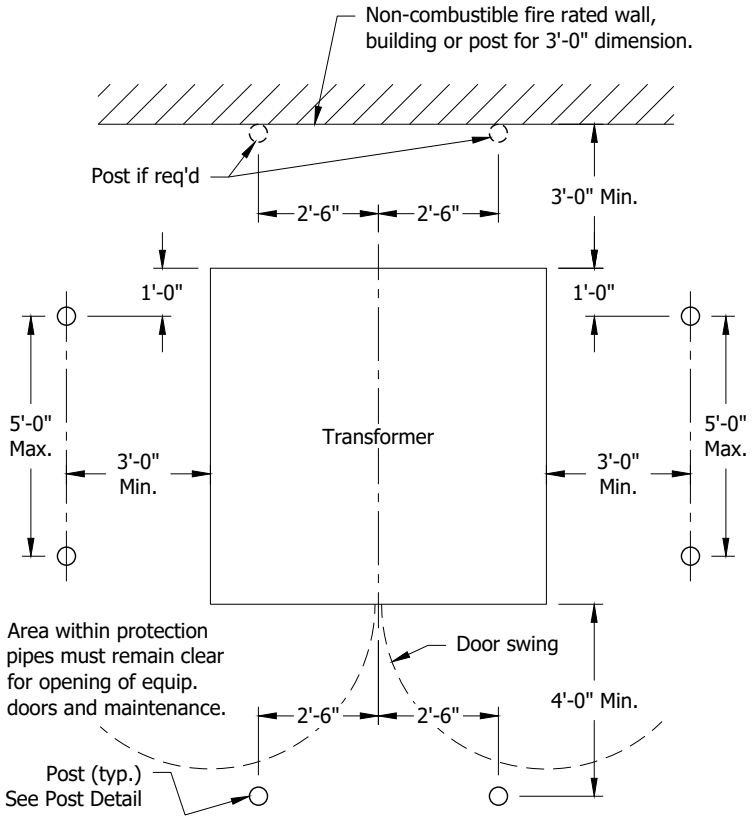
DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



Post Detail



Single-phase Padmount Transformer



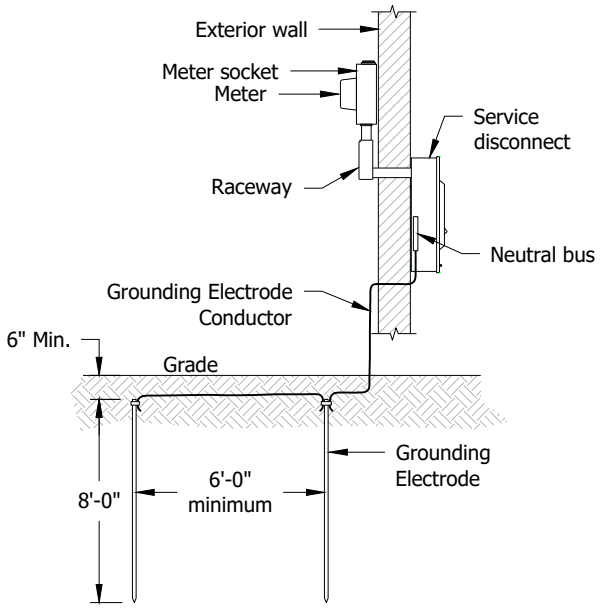
Three-phase Padmount Transformer

WPPI ENERGY

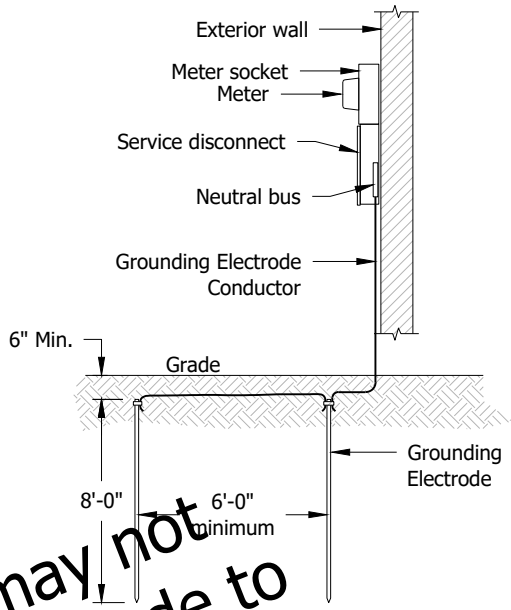
Underground Service

Protective Posts for Padmounted Transformers (Figure 4-5)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

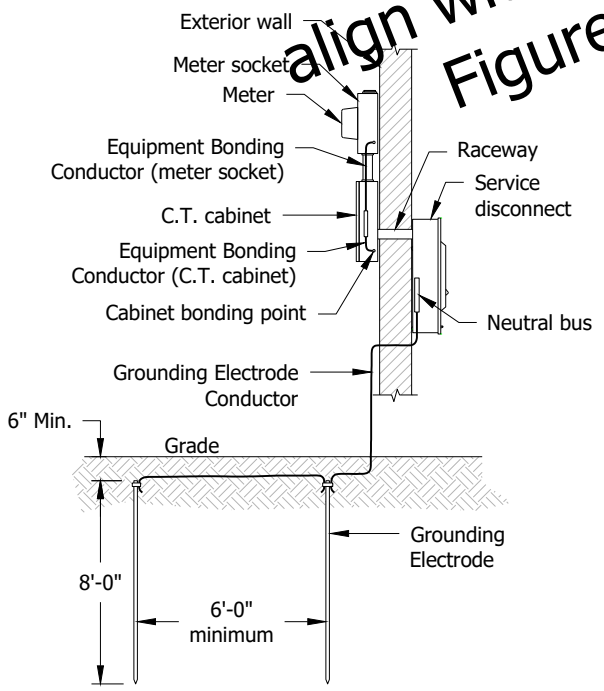


Wall Mounted Meter Socket
(Figure 5-1a)



Wall Mounted Meter/Main Combination
(Figure 5-1b)

These details may not align with upates made to Figures 3 and 4.



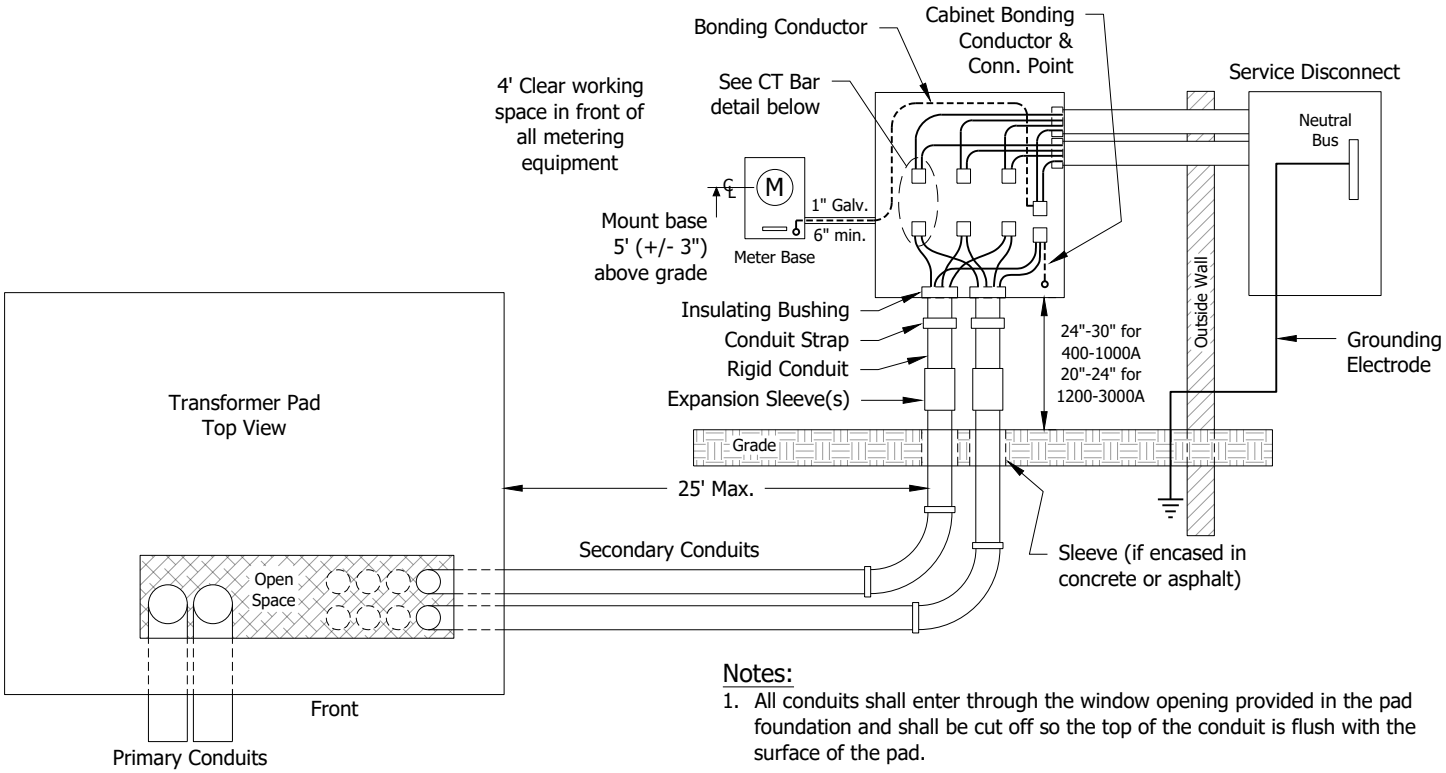
Wall Mounted Meter Socket
with Instrument Transformer Cabinet
(Figure 5-1c)

WPPI ENERGY

Grounding and Bonding

Wall Mounted Meter Details
(Figure 5-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



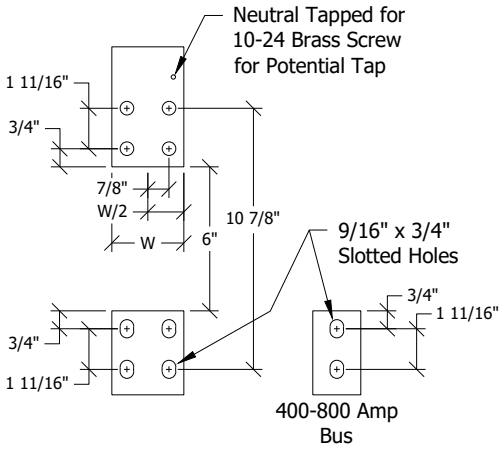
Notes:

1. All conduits shall enter through the window opening provided in the pad foundation and shall be cut off so the top of the conduit is flush with the surface of the pad.
2. All metallic conduits (if installed) shall be fitted with an insulating bushing.
3. Riser material shall be Schedule 80 PVC (electric rated), galvanized steel or IMC.

Bonding Conductor Table

Metering Cabinet Rating (Amps)	No. of Runs	Service Entrance Cond. Size 75°C (CU)	Min. Equipt. Bonding Cond. Size or Equivalent Area for Parallel Conds (CU, AWG/kcmil)		Min. Equipt. Bonding Cond. Size or Equivalent Area for Parallel Conds (AL, AWG/kcmil)
400	2	3/0	2	#2	1/0
	2	4/0	2	1/0	3/0
	1	600	2	1/0	3/0
600	3	3/0	2	1/0	3/0
	3	4/0	2	2/0	4/0
	2	350	2	2/0	4/0
800	3	350	2	2/0	4/0
	3	500	1	4/0	350
1200	4	350	1	4/0	350
	4	500	1	250	400
	3	750	1	350	600
1600	6	350	1	350	600
	5	500	1	350	600
	4	600	1	350	600
	4	750	1	400	600
2000	7	350	1	350	500
	6	500	1	400	600
	5	600	1	400	600
	5	750	1	500	750
2500	7	500	1	500	750
	6	600	1	500	750
	6	750	1	700	1200
3000	8	500	1	500	750
	8	600	1	700	1200
	7	750	1	700	1200

CT Bar Requirements



Amps	400	600	800	1000	1200	1600	2000	3000
W (in.)	2	2-1/2	3-1/4	3	3	3	3	3
W/2 (in.)	1	1-1/4	1-5/8	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2

Customer shall furnish 1/2" mounting bolts for CT's.

WPPI ENERGY

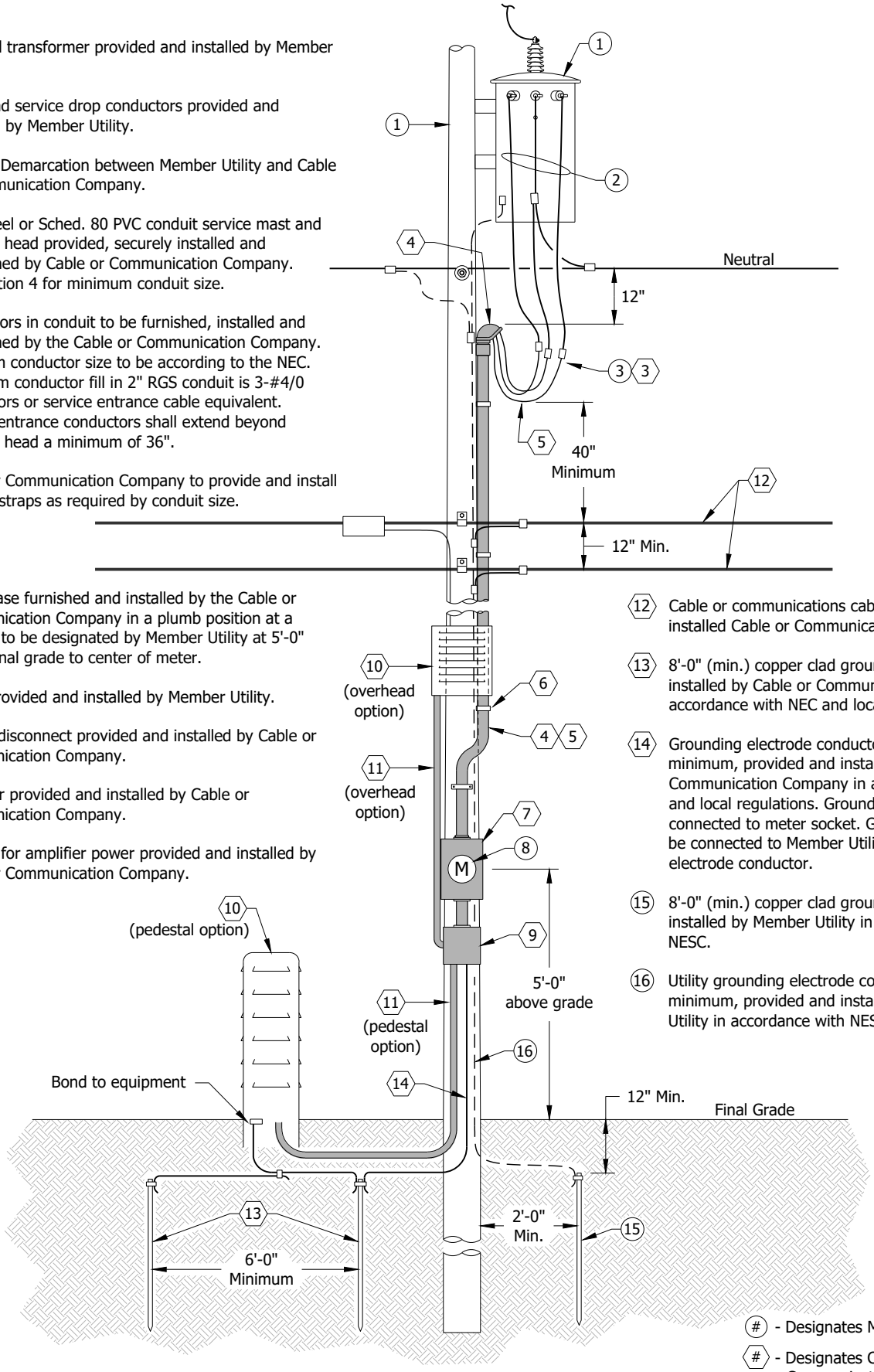
Metering

Instrument Transformer Metering Guideline (Figure 6-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Notes:

1. Pole and transformer provided and installed by Member Utility.
2. Overhead service drop conductors provided and installed by Member Utility.
3. Point of Demarcation between Member Utility and Cable or Communication Company.
4. Rigid steel or Sched. 80 PVC conduit service mast and weather head provided, securely installed and maintained by Cable or Communication Company. See Section 4 for minimum conduit size.
5. Conductors in conduit to be furnished, installed and maintained by the Cable or Communication Company. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".
6. Cable or Communication Company to provide and install conduit straps as required by conduit size.
7. Meter base furnished and installed by the Cable or Communication Company in a plumb position at a location to be designated by Member Utility at 5'-0" above final grade to center of meter.
8. Meter provided and installed by Member Utility.
9. Service disconnect provided and installed by Cable or Communication Company.
10. Amplifier provided and installed by Cable or Communication Company.
11. Conduit for amplifier power provided and installed by Cable or Communication Company.
12. Cable or communications cable provided and installed Cable or Communication Company.
13. 8'-0" (min.) copper clad ground rods provided and installed by Cable or Communication Company in accordance with NEC and local regulations.
14. Grounding electrode conductor, #6 copper minimum, provided and installed by Cable or Communication Company in accordance with NEC and local regulations. Ground wire shall not be connected to meter socket. Ground wire shall not be connected to Member Utility grounding electrode conductor.
15. 8'-0" (min.) copper clad ground rod provided and installed by Member Utility in accordance with NESC.
16. Utility grounding electrode conductor, #6 copper minimum, provided and installed by Member Utility in accordance with NESC.



(#) - Designates Member Utility provided

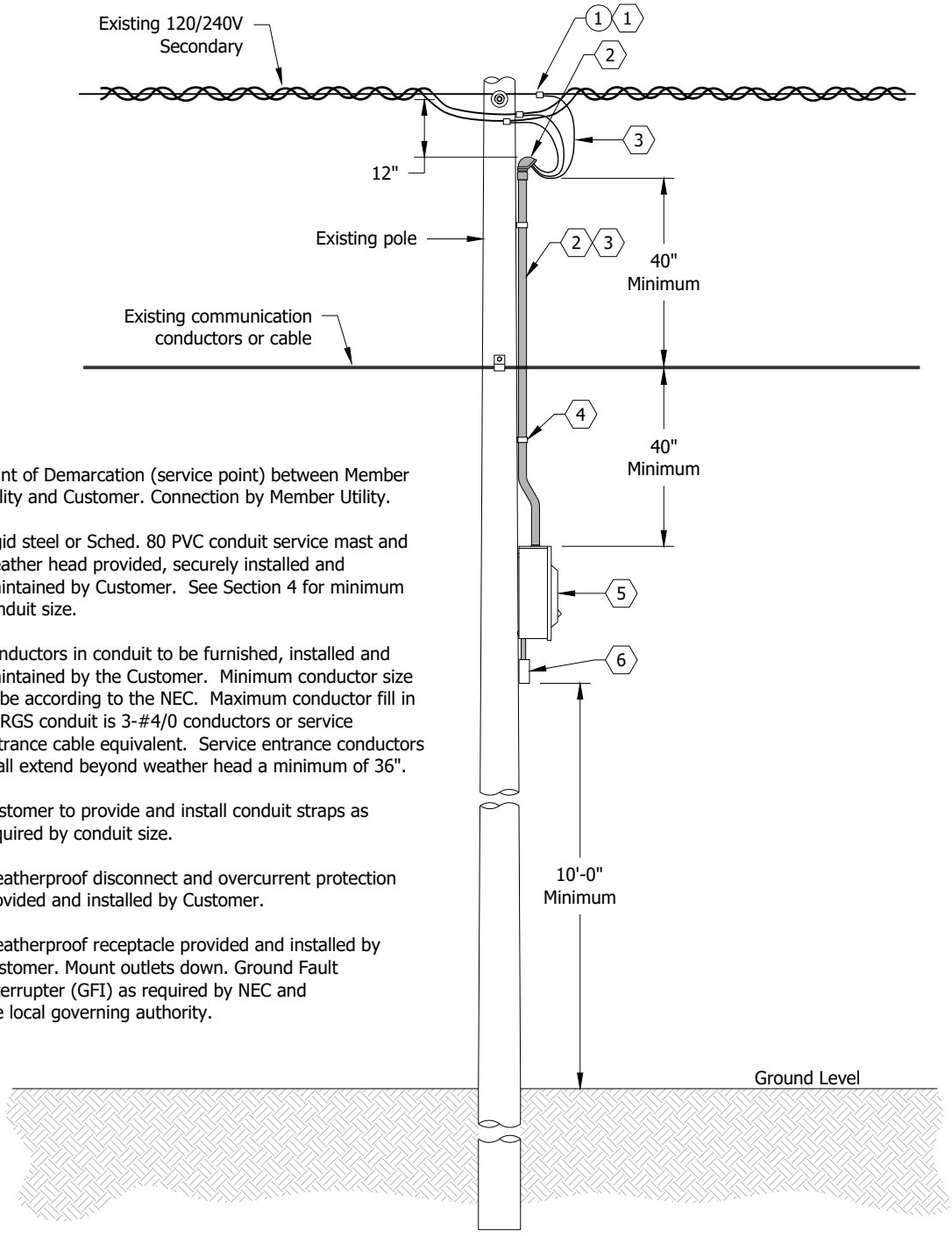
<#> - Designates Cable or Communication Co. provided

WPPI ENERGY

Special Services

Typical Cable & Communication Power Supply Arrangement (Figure 9-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



Notes:

(1 1) Point of Demarcation (service point) between Member Utility and Customer. Connection by Member Utility.

(2) Rigid steel or Sched. 80 PVC conduit service mast and weather head provided, securely installed and maintained by Customer. See Section 4 for minimum conduit size.

(3) Conductors in conduit to be furnished, installed and maintained by the Customer. Minimum conductor size to be according to the NEC. Maximum conductor fill in 2" RGS conduit is 3-#4/0 conductors or service entrance cable equivalent. Service entrance conductors shall extend beyond weather head a minimum of 36".

(4) Customer to provide and install conduit straps as required by conduit size.

(5) Weatherproof disconnect and overcurrent protection provided and installed by Customer.

(6) Weatherproof receptacle provided and installed by Customer. Mount outlets down. Ground Fault Interrupter (GFI) as required by NEC and the local governing authority.

(#) - Designates Member Utility provided

<#> - Designates Customer provided

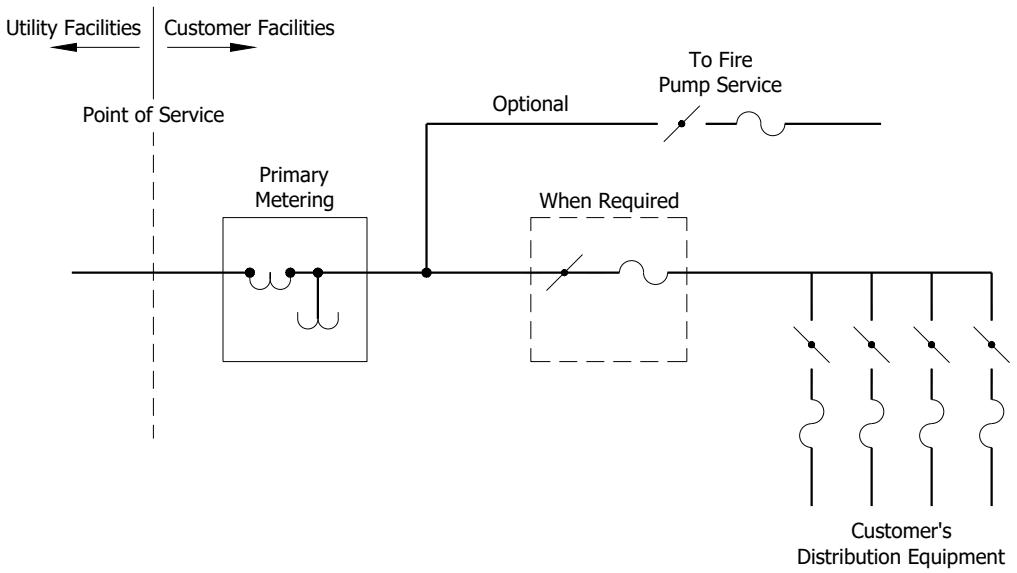
WPPI ENERGY

Special Services

Typical Decorative Holiday Lighting Arrangement (Unmetered and where permitted) (Figure 9-2)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

Meter - Switch - Fuse



Legend

- Gang Operated Switch
- Fuses to Coordinate with Member Utility System Requirements
- Member Utility Instrument Transformers

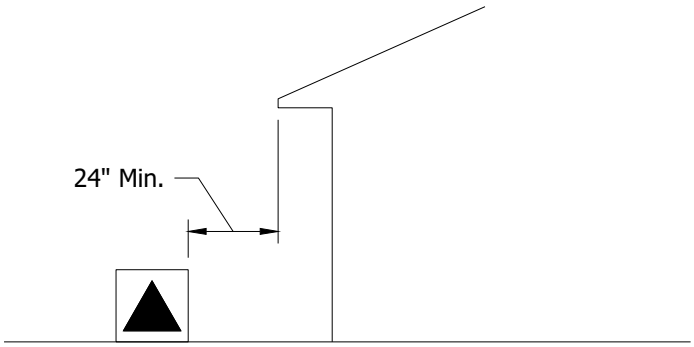
WPPI ENERGY

Primary Services

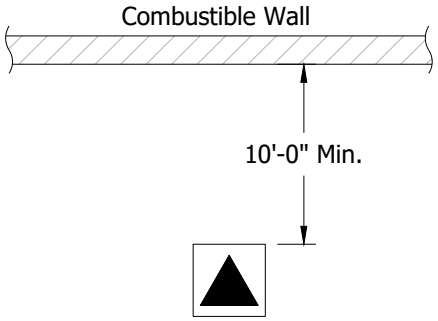
Primary Metering Options

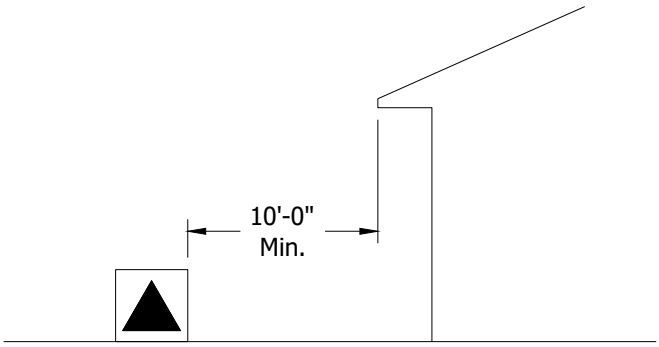
(Figure 10-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: None	REVISED:



Non-Combustible Walls





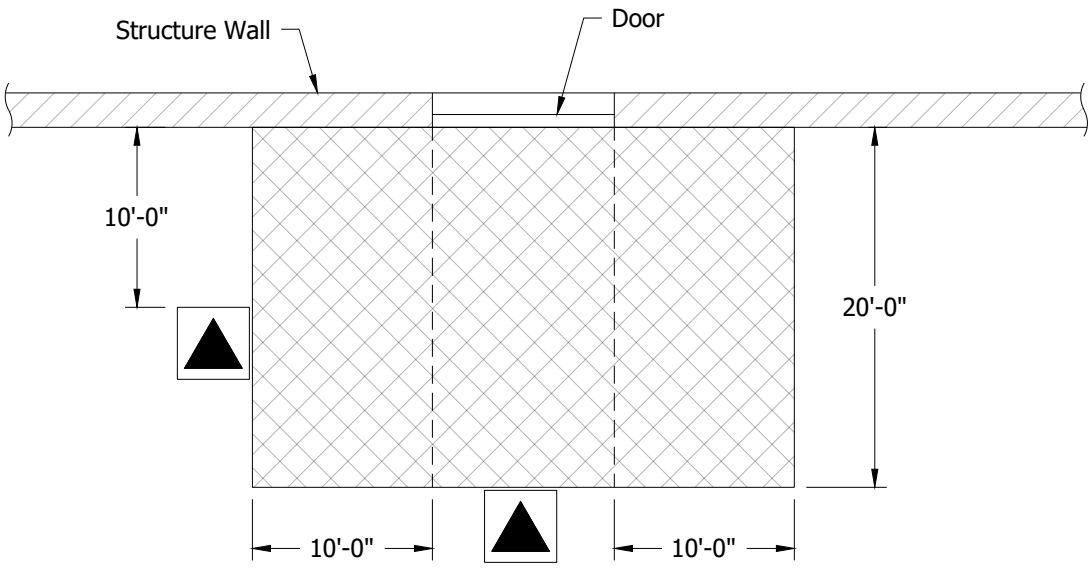
Combustible Walls

WPPI ENERGY

Clearances

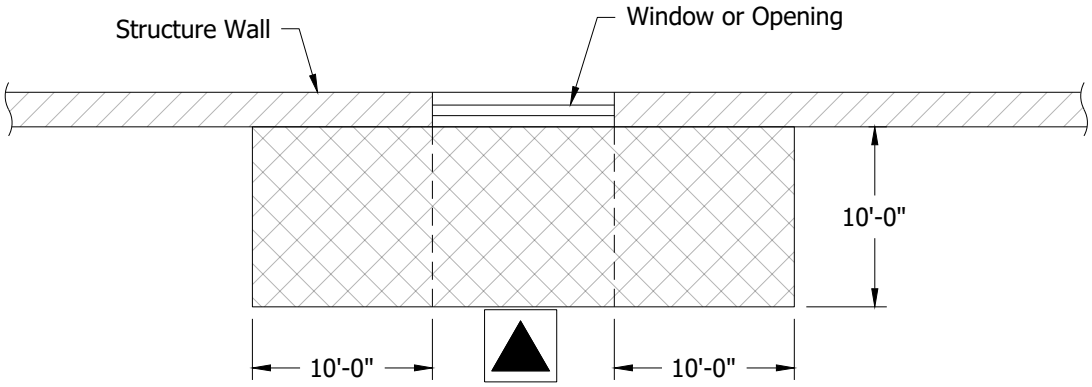
Padmounted Oil Insulated Transformer Clearance from Non-Combustible and Combustible Walls (Figure 11-1)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



Clearance from Doors

Note:
Hatched area denotes area transformer cannot be located.



Clearance from Windows & Openings

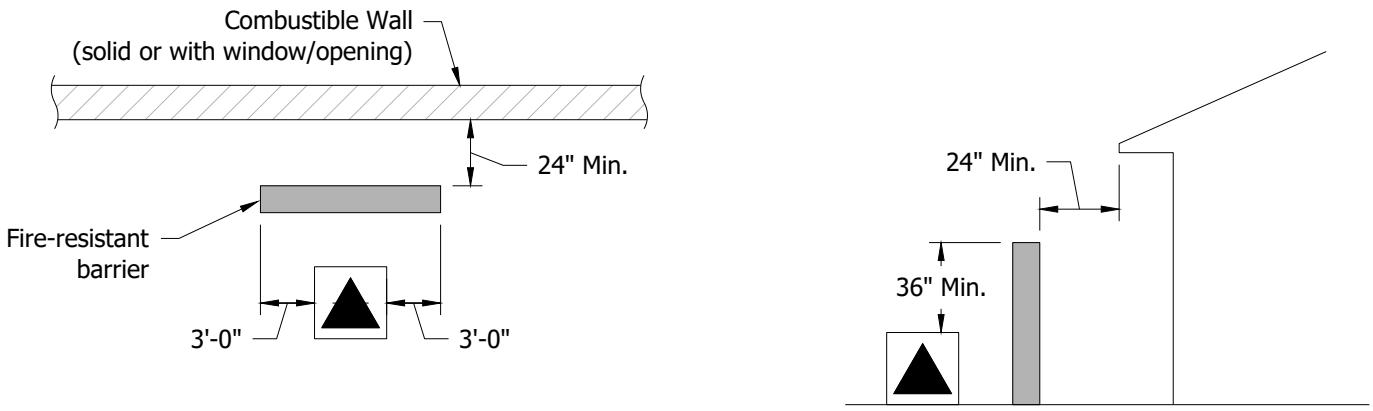
Note:
Hatched area denotes area transformer cannot be located.

WPPI ENERGY

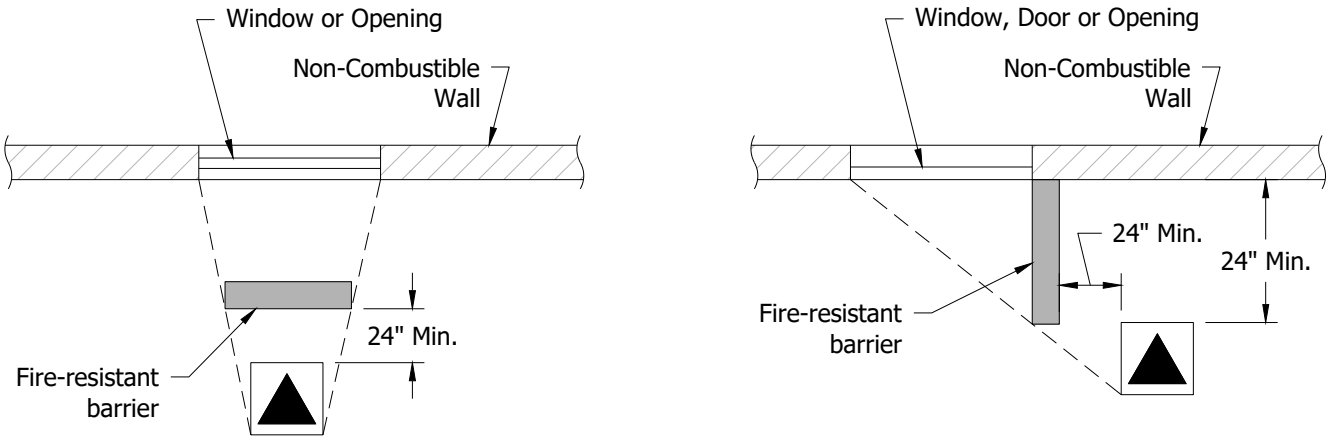
Clearances

Padmounted Oil Insulated Transformer Clearance from Doors, Windows & Openings (Figure 11-2)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



Combustible Wall with Fire-resistant Barrier



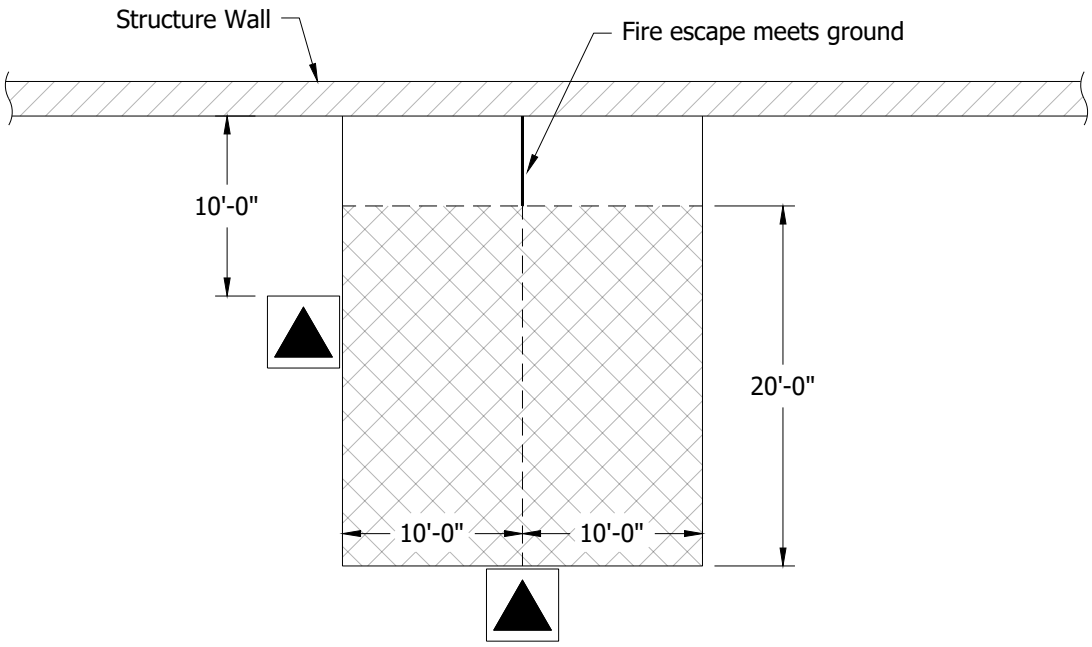
Non-Combustible Wall with Fire-resistant Barrier

WPPI ENERGY

Clearances

Padmounted Oil Insulated Transformer Clearances with Fire-resistant Barrier
(Figure 11-3)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



Note:

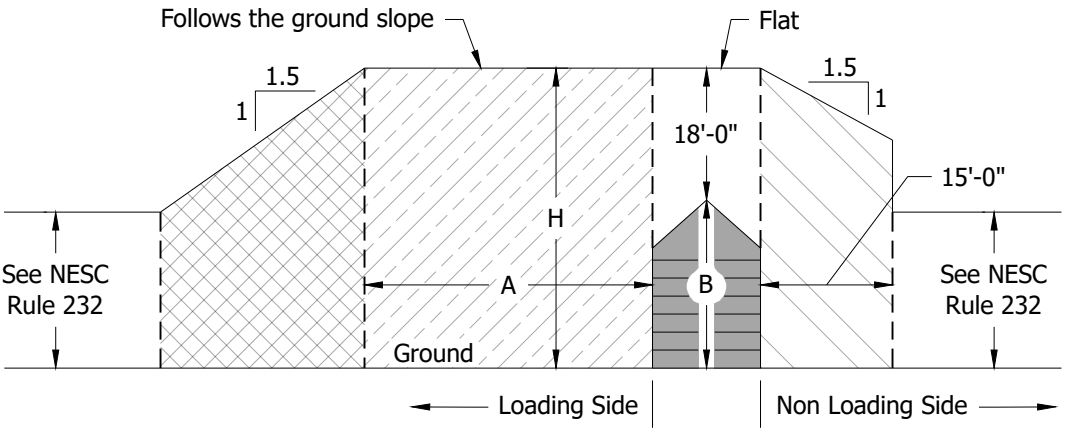
Hatched area denotes area transformer cannot be located.

WPPI ENERGY

Clearances

Padmounted Oil Insulated Transformer Clearances from Fire Escapes (Figure 11-4)

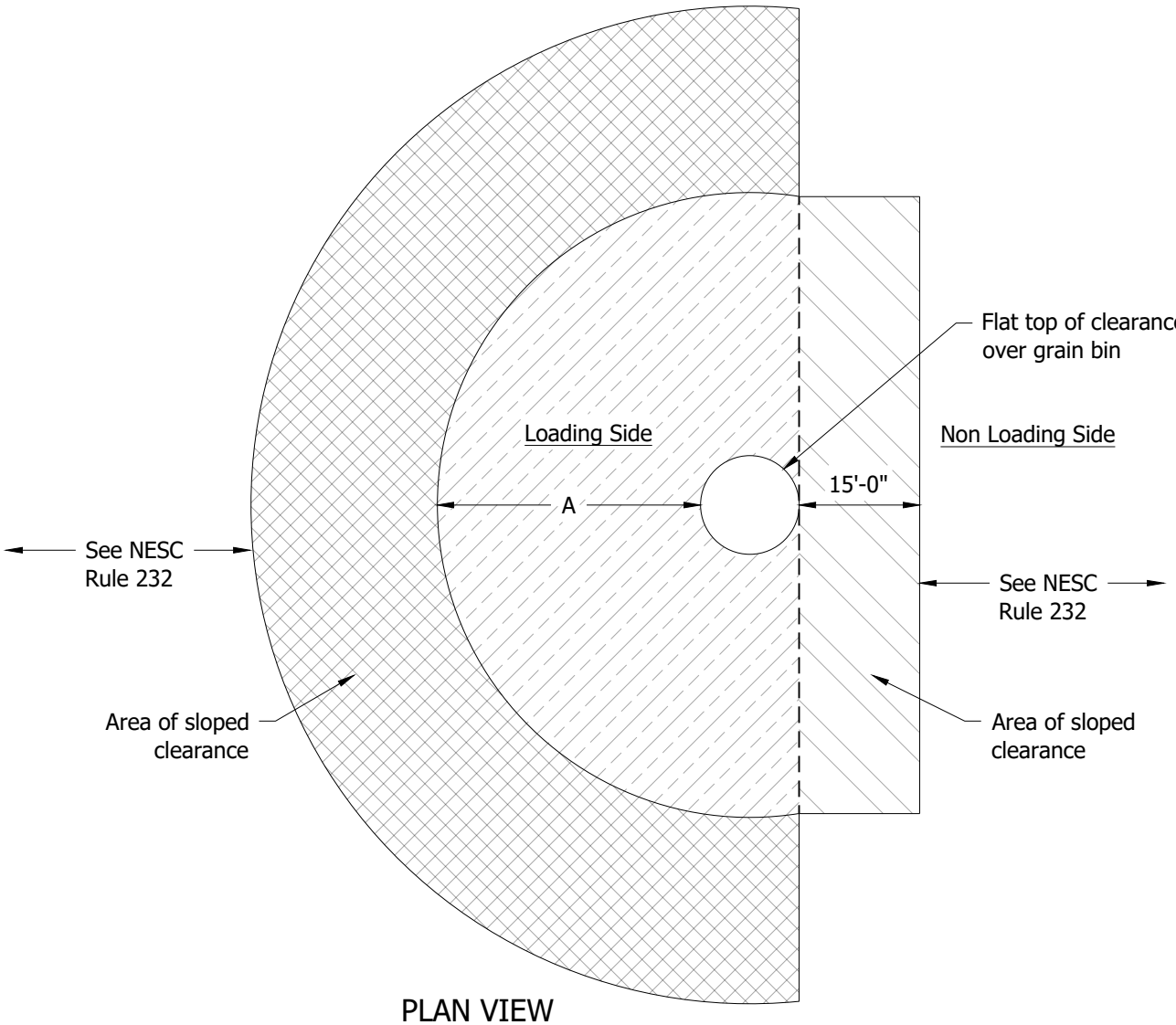
DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



B = Height of highest filling or probing port on grain bin
A = B + 18ft
H = B + 18ft

ELEVATION

In the area of sloped clearance, the vertical clearance is reduced by 1 ft. for each 1.5 ft. of horizontal distance from the grain bin.



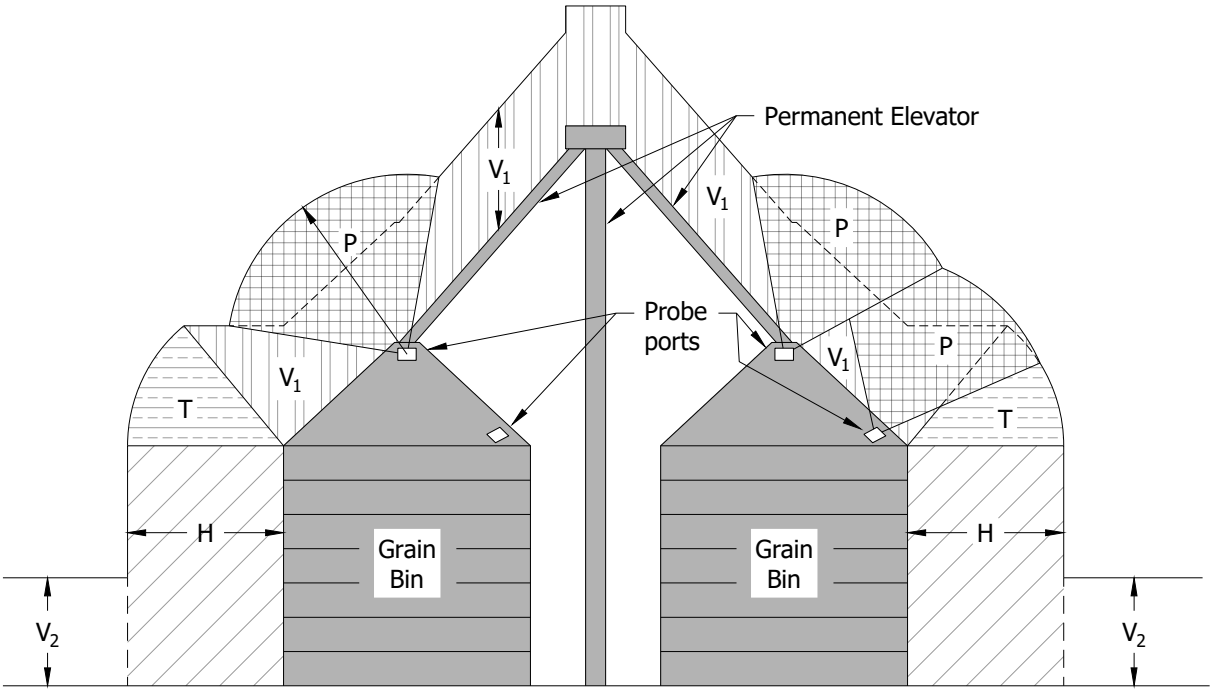
PLAN VIEW

WPPI ENERGY

Clearances

Clearance Envelope for Grain Bins Filled by Portable Equipment (Figure 11-5)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:



ELEVATION

P = Probe clearance 18 ft required by Rule 234F1a
H = Horizontal clearance 15 ft required by Rule 234F1b
T = Transition clearance
V_1 = Vertical clearance above a building required by Rule 234C (Table 234-1)
V_2 = Vertical clearance above a building required by Rule 232B (Table 232-1 or 232-2)

WPPI ENERGY

Clearances

Clearance Envelope for Grain Bins Filled by Permanent Equipment (Figure 11-6)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED:

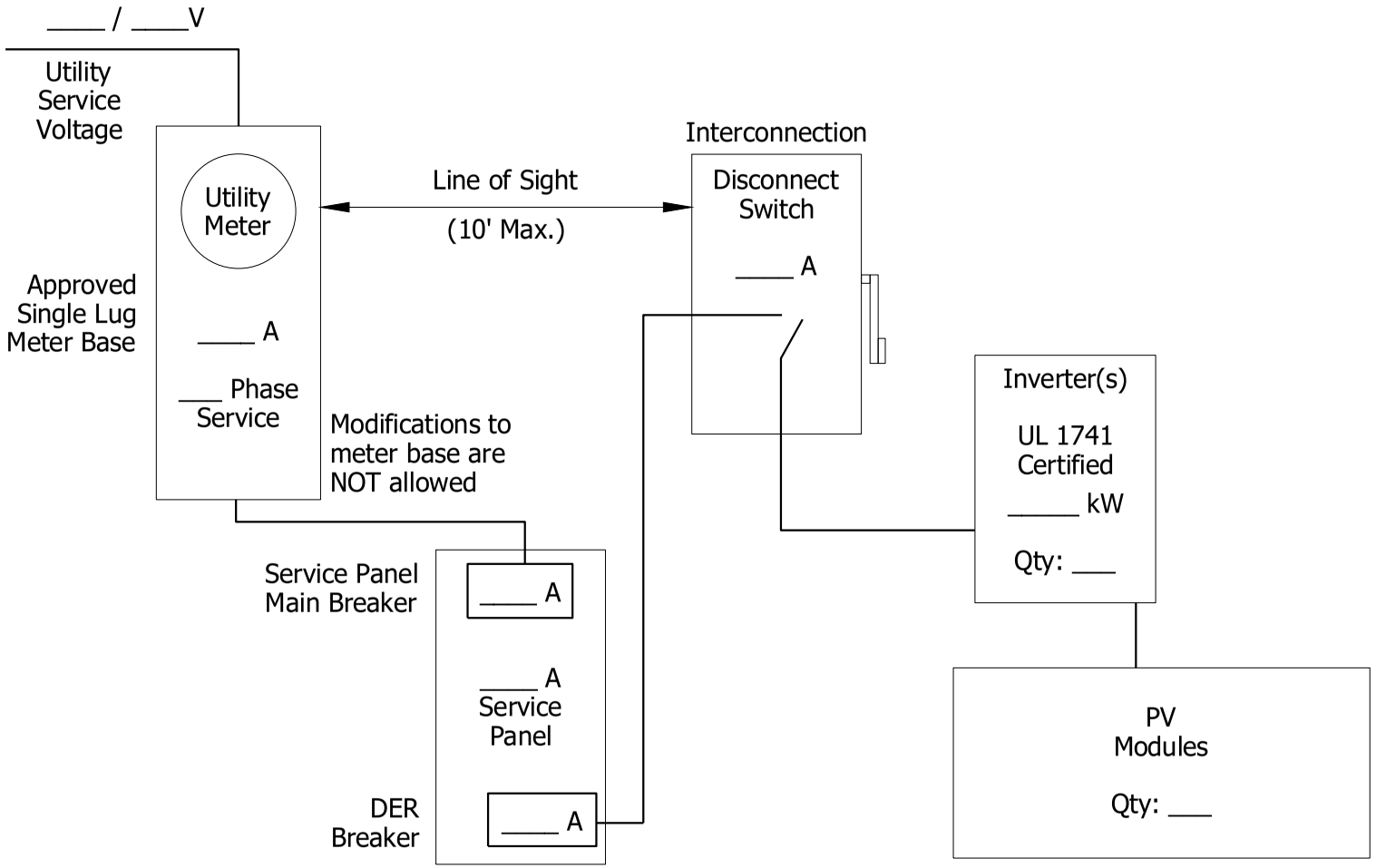
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1a)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Single Lug Meter Base
Service Panel Main Breaker + DER Breaker ≤ 120% of Service Panel Bus Rating

Notes:
Neither the rated ampacity of the service panel main breaker nor the rated ampacity of the Interconnection Disconnect Switch fuse shall exceed the rated ampacity of the utility meter.

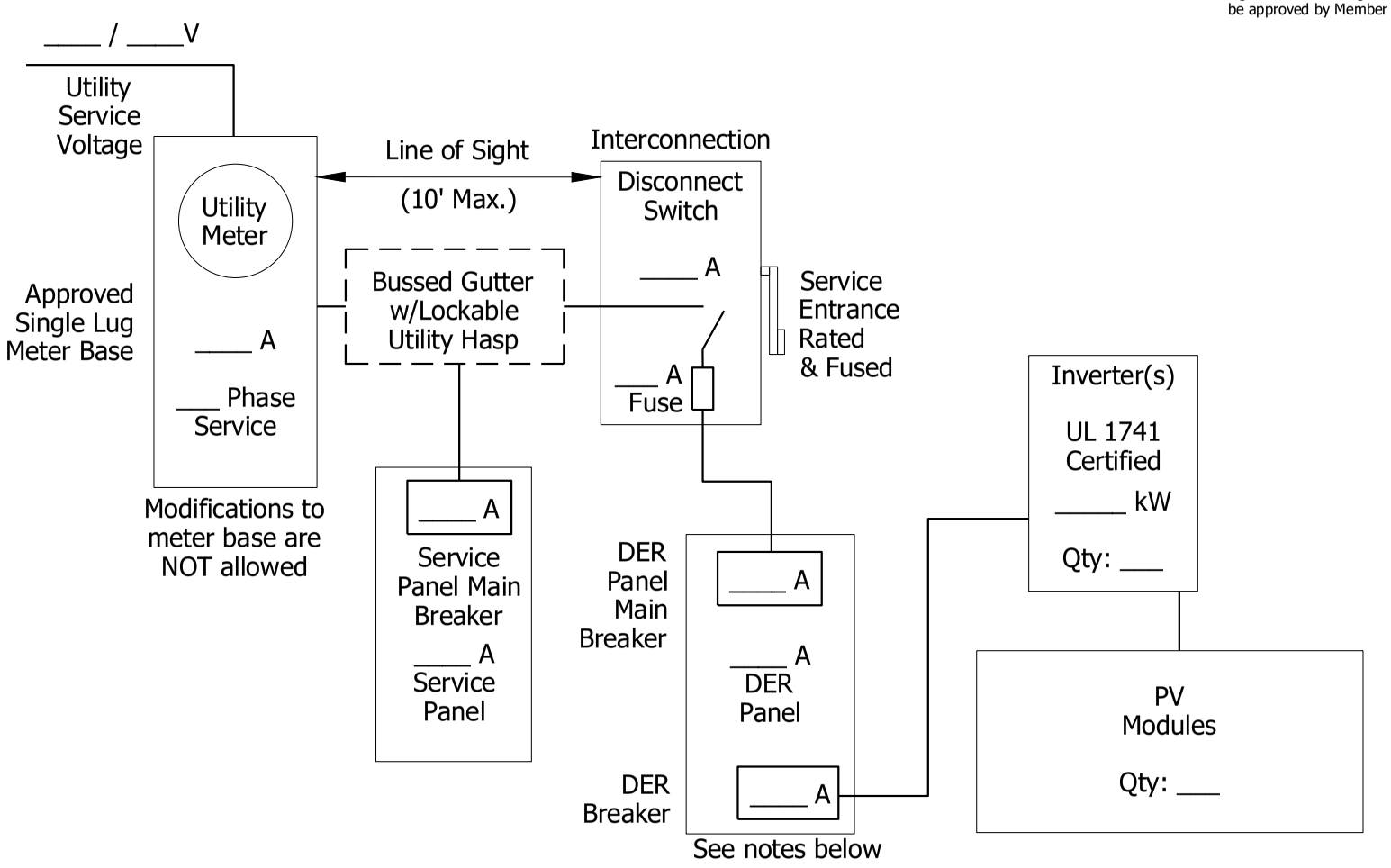
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1b)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Single Lug Meter Base
Service Panel Main Breaker + DER Breaker > 120% of Service Panel Bus Rating

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the interconnection disconnect switch fuse shall not exceed the rated ampacity of the utility meter.

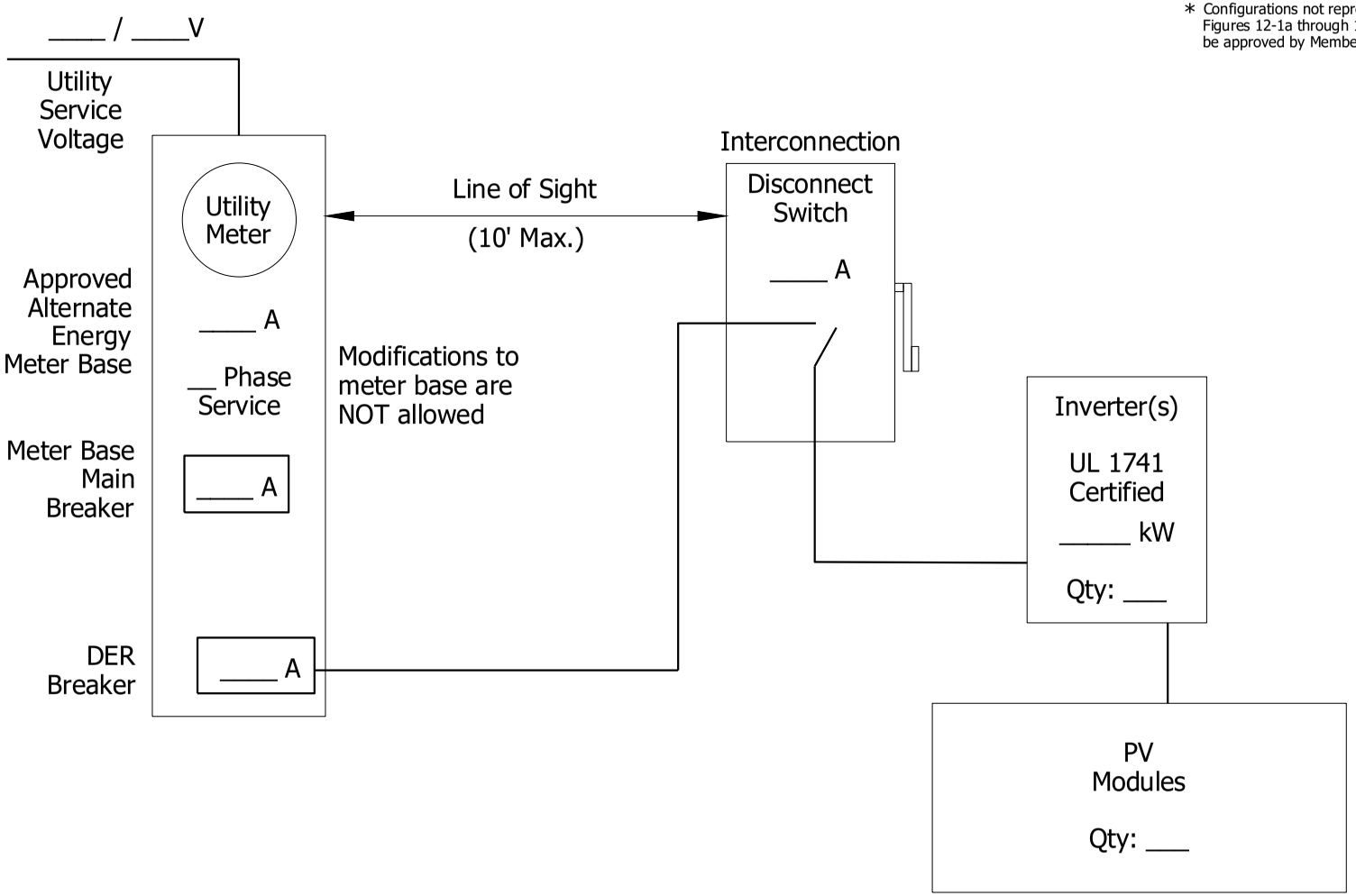
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1c)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Alternate Energy Meter Socket
200 Amp Meter Base Main Breaker and 60-70 Amp DER Breaker

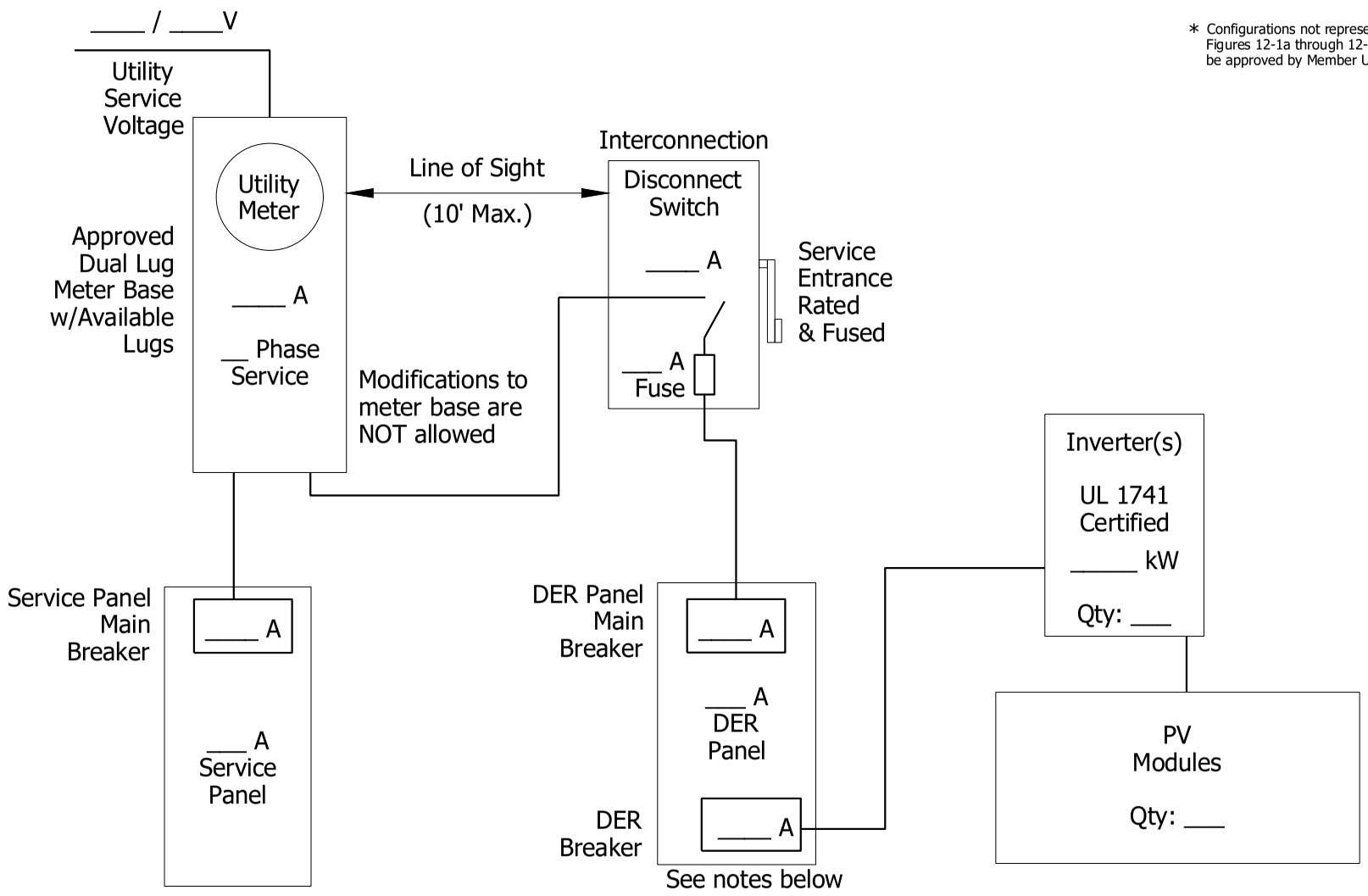
Notes:
Neither the rated ampacity of the service panel main breaker nor the rated ampacity of the Interconnection Disconnect Switch fuse shall exceed the rated ampacity of the utility meter.

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1d)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:



* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.

Single-Phase, Self-Contained Meter with Approved Dual Lug Meter Base

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the interconnection disconnect switch fuse shall not exceed the rated ampacity of the utility meter.

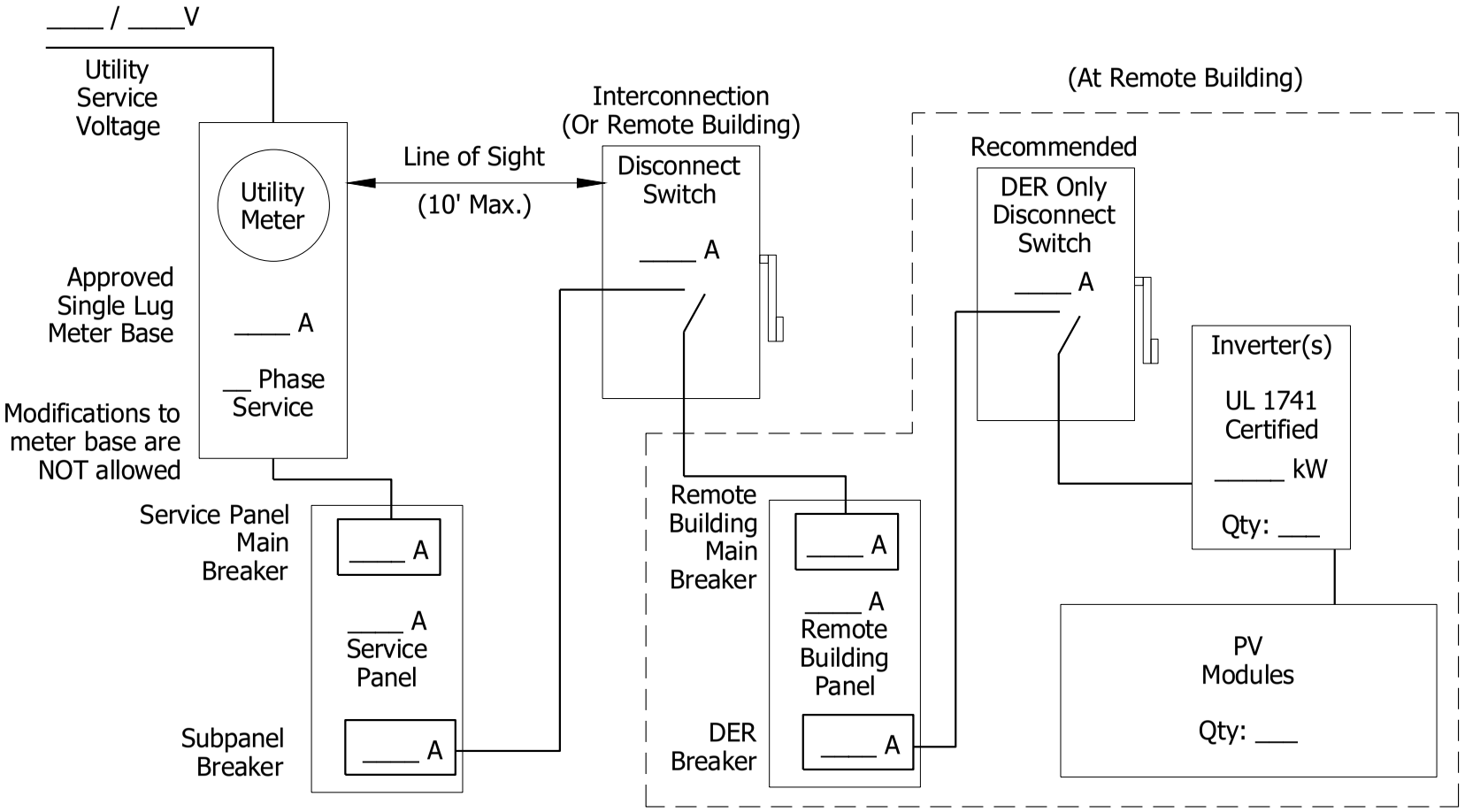
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1e)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Single Lug Meter Base
Service Panel Main Breaker + DER Breaker ≤ 120% of Service Panel Bus Rating
Remote Building with DER > 30 Feet from Meter

Notes:
Neither the rated ampacity of the service panel main breaker nor the rated ampacity of the Interconnection Disconnect Switch fuse shall exceed the rated ampacity of the utility meter.

DATE: 07/11/2025

DRAWN BY: KI

APPROVED BY: HJA

SCALE: None

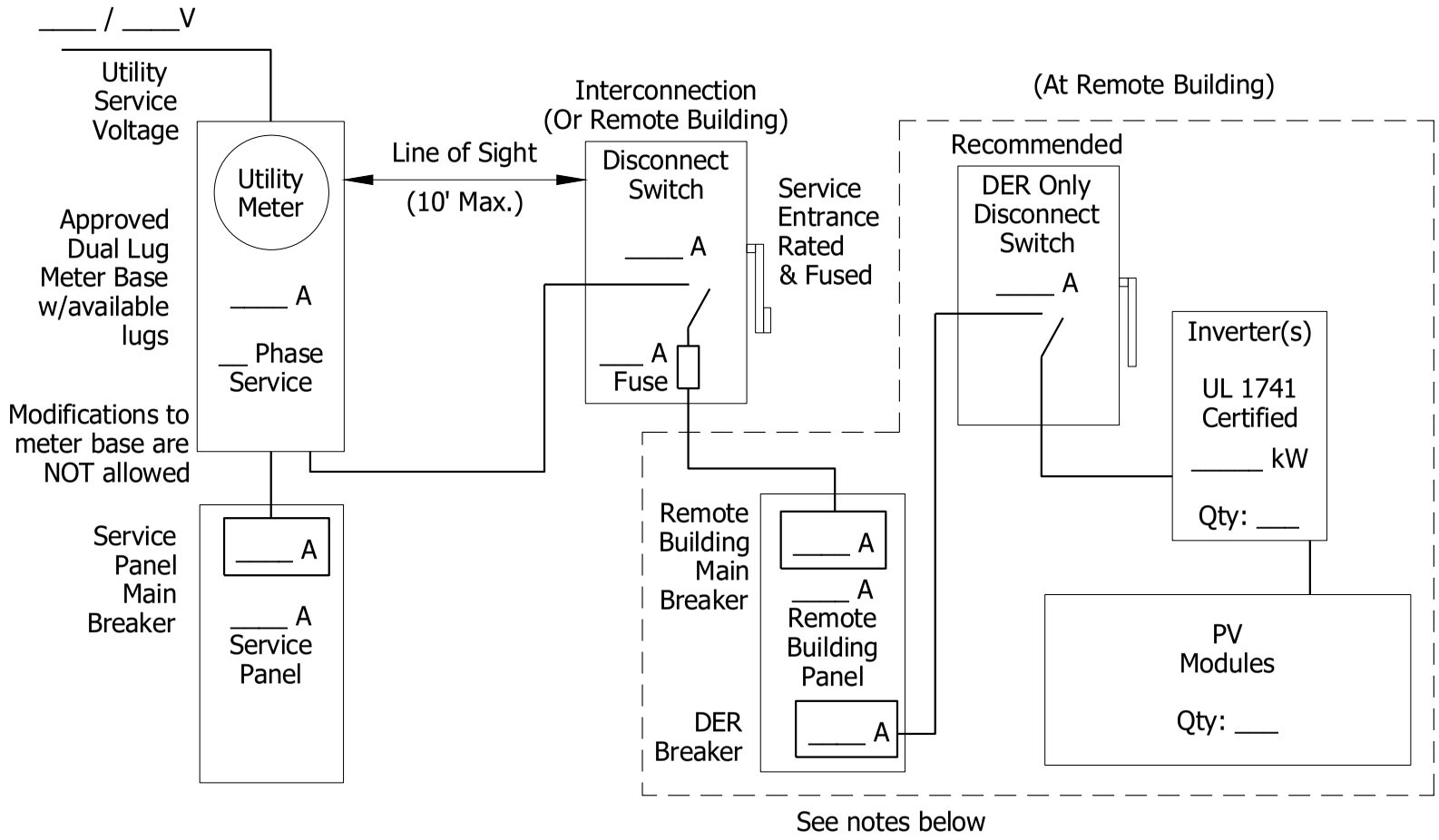
REVISED:

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1f)

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Dual Lug Meter Base
Service Panel Main Breaker + DER Breaker > 120% of Service Panel Bus Rating
Remote Building with DER > 30 Feet from Meter

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the interconnection disconnect switch fuse shall not exceed the rated ampacity of the utility meter.

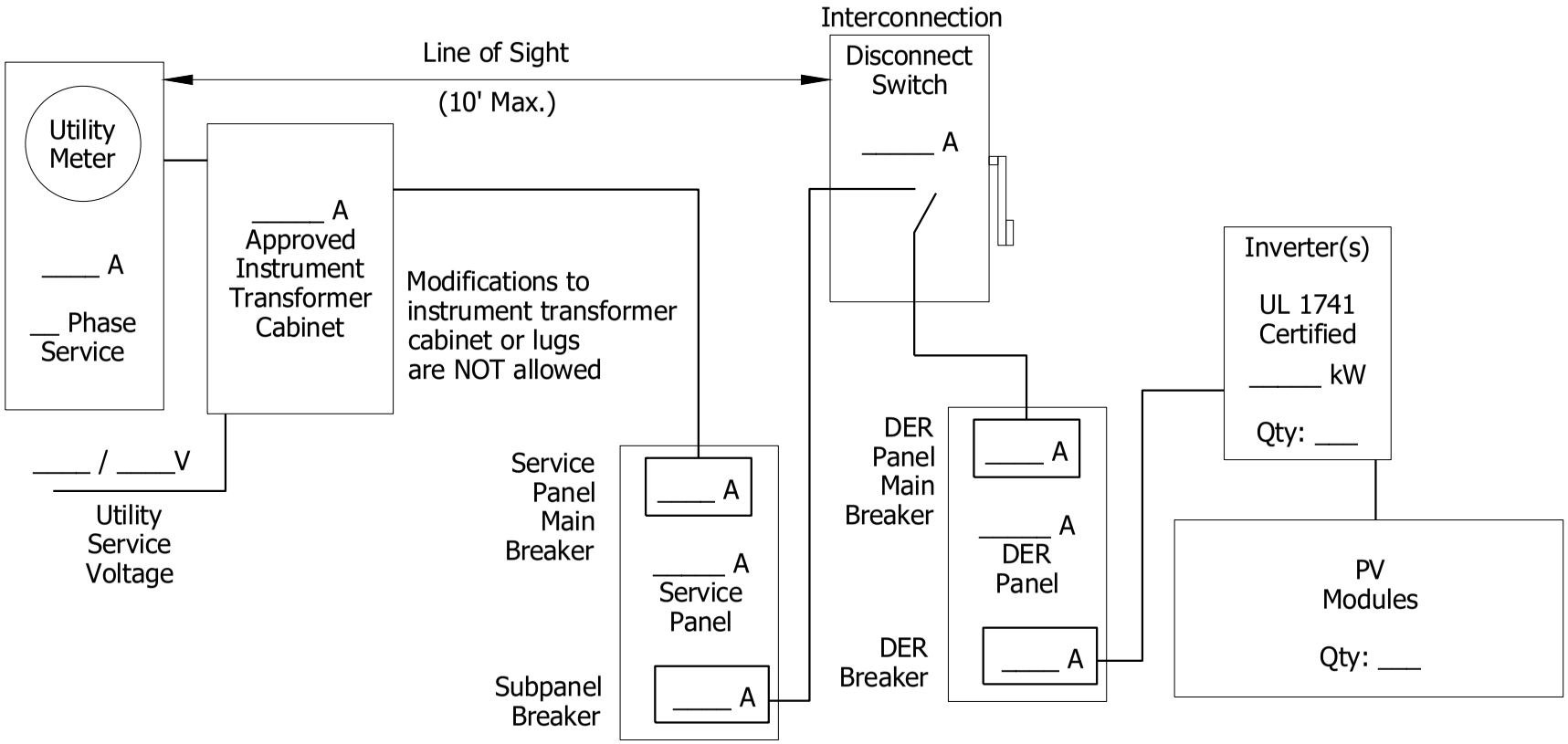
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1g)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase or Three-Phase, CT Metered with Approved Single Lug Instrument Transformer Cabinet
Service Panel Main Breaker + DER Breaker ≤ 120% of Service Panel Bus Rating

Notes:
Neither the rated ampacity of the service panel main breaker nor the rated ampacity of the Interconnection Disconnect Switch fuse shall exceed the rated ampacity of the utility meter.

DATE: 07/11/2025

DRAWN BY: KI

APPROVED BY: HJA

SCALE: None

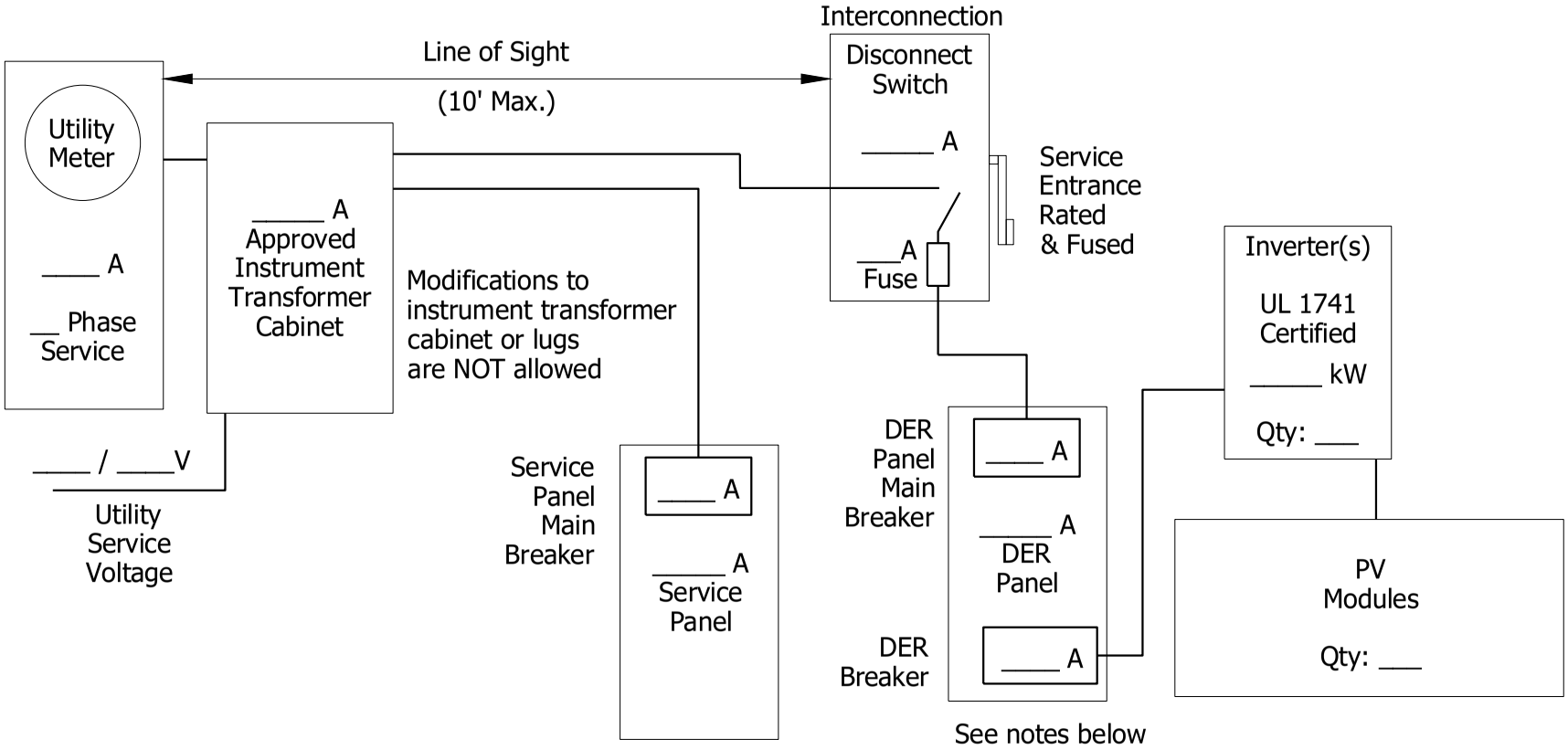
REVISED:

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1h)

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase or Three-Phase, CT Metered with Approved Multiple Lug Instrument Transformer Cabinet
Service Panel Main Breaker + DER Breaker > 120% of Service Panel Bus Rating

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the interconnection disconnect switch fuse shall not exceed the rated ampacity of the utility meter.

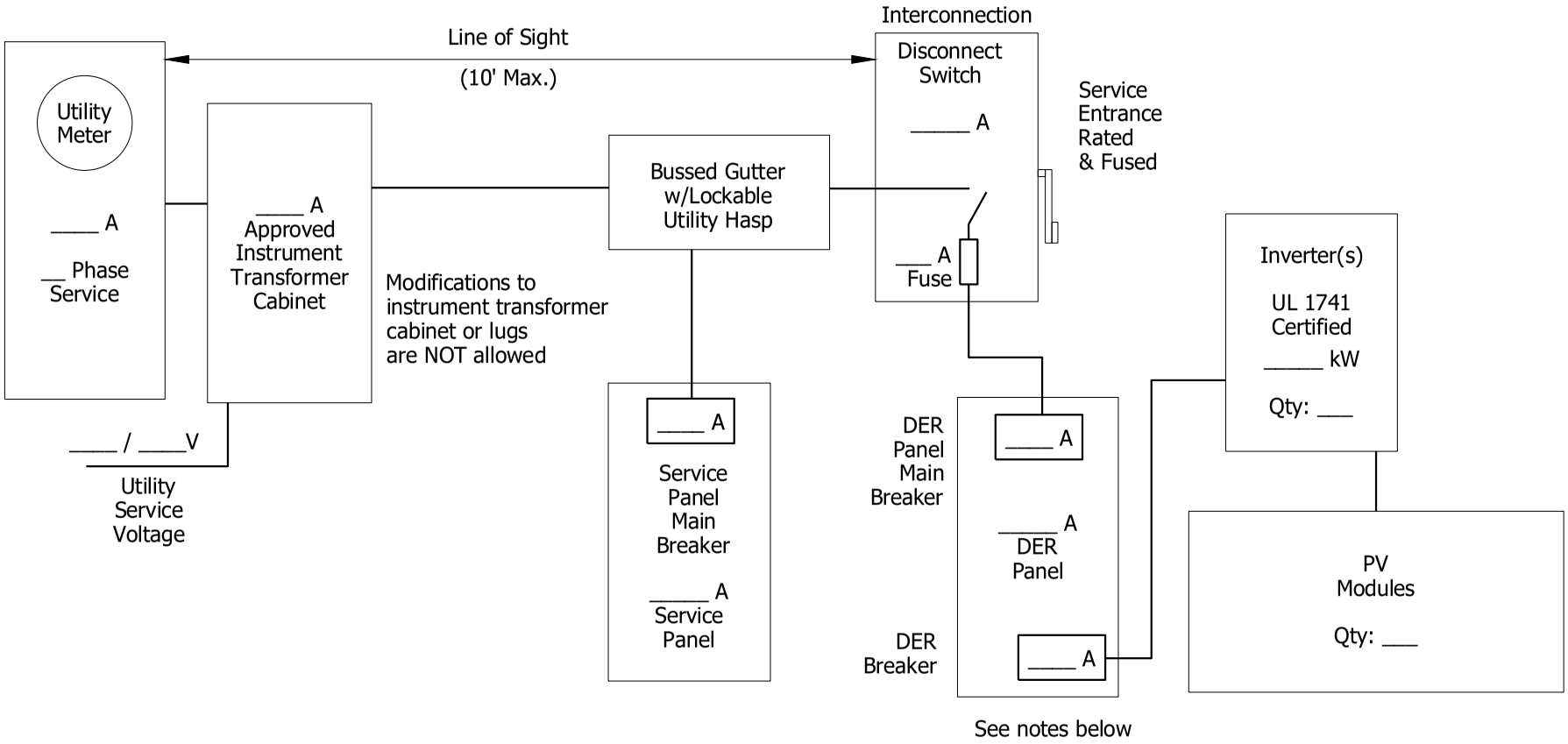
DATE: 07/11/2025 | DRAWN BY: KI | APPROVED BY: HJA | SCALE: None | REVISED:

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1i)

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase or Three-Phase, CT Metered with Approved Single Lug Instrument Transformer Cabinet
Service Panel Main Breaker + DER Breaker > 120% of Service Panel Bus Rating

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the interconnection disconnect switch fuse shall not exceed the rated ampacity of the utility meter.

DATE: 07/11/2025

DRAWN BY: KI

APPROVED BY: HJA

SCALE: None

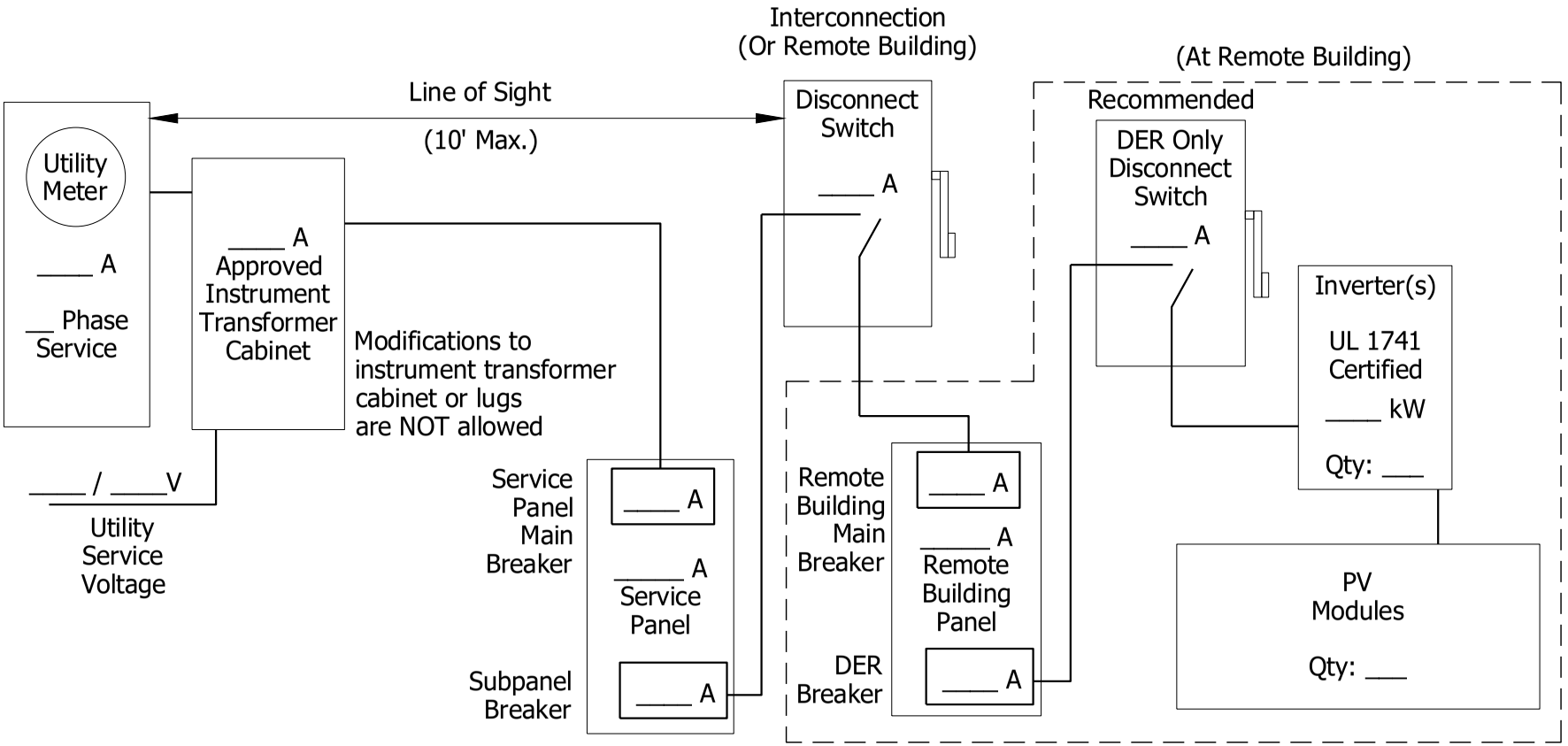
REVISED:

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1j)

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase or Three-Phase, CT Metered with Approved Single Lug Instrument Transformer Cabinet
Service Panel Main Breaker + DER Breaker ≤ 120% of Service Panel Bus Rating
Remote Building with DER > 30 Feet from Meter

Notes:
Neither the rated ampacity of the service panel main breaker nor the rated ampacity of the Interconnection Disconnect Switch fuse shall exceed the rated ampacity of the utility meter.

DATE: 07/11/2025

DRAWN BY: KI

APPROVED BY: HJA

SCALE: None

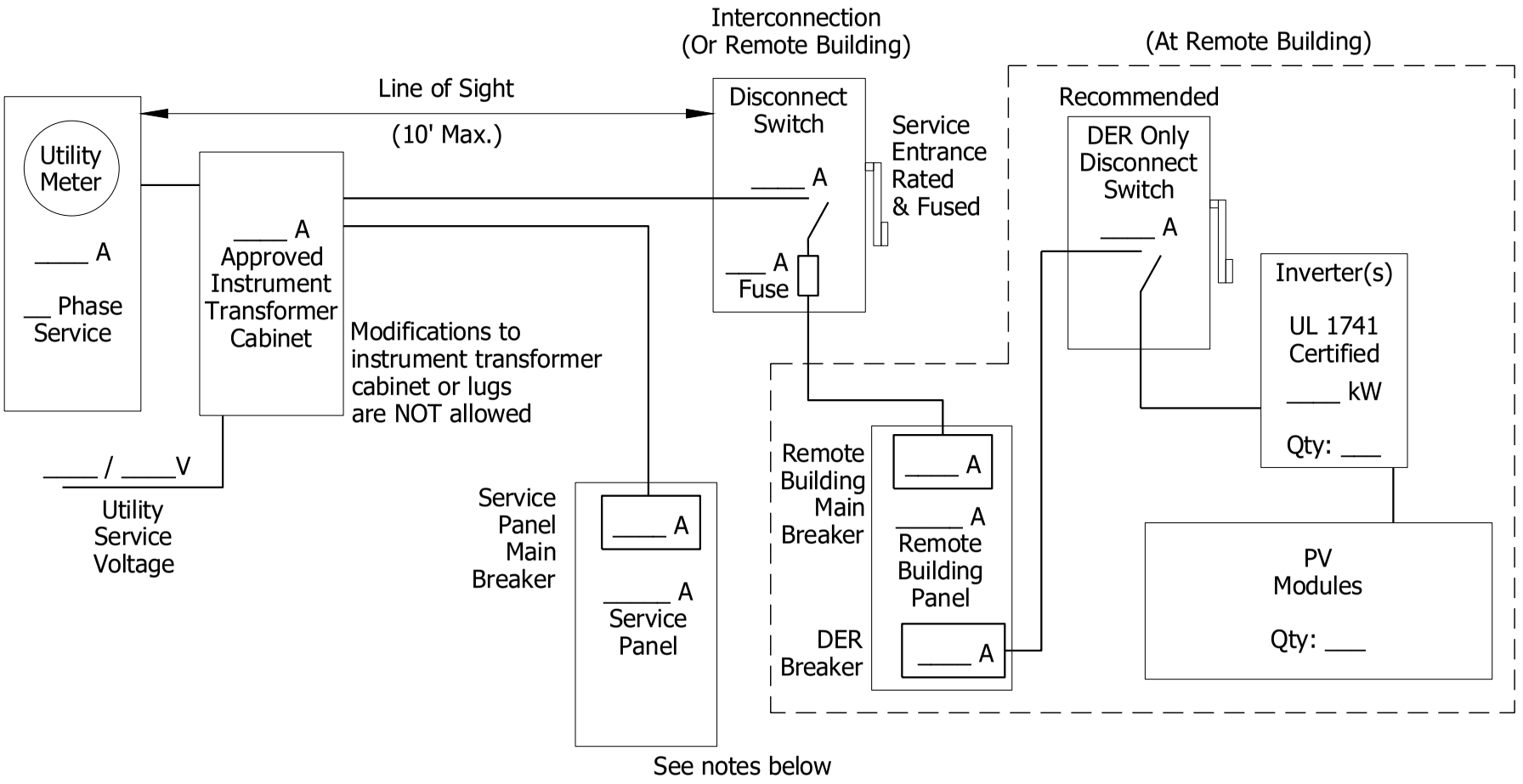
REVISED:

WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1k)

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase or Three-Phase, CT Metered with Approved Multiple Lug Instrument Transformer Cabinet
Single Panel Main Breaker + DER Breaker > 120% of Service Panel Bus Rating
Remote Building with DER > 30 Feet from Meter

Notes:
The summation of the rated ampacity of the service panel main breaker and the rated ampacity of the Interconnection Disconnect Switch fuse shall not exceed the rated ampacity of the metering transformer cabinet.

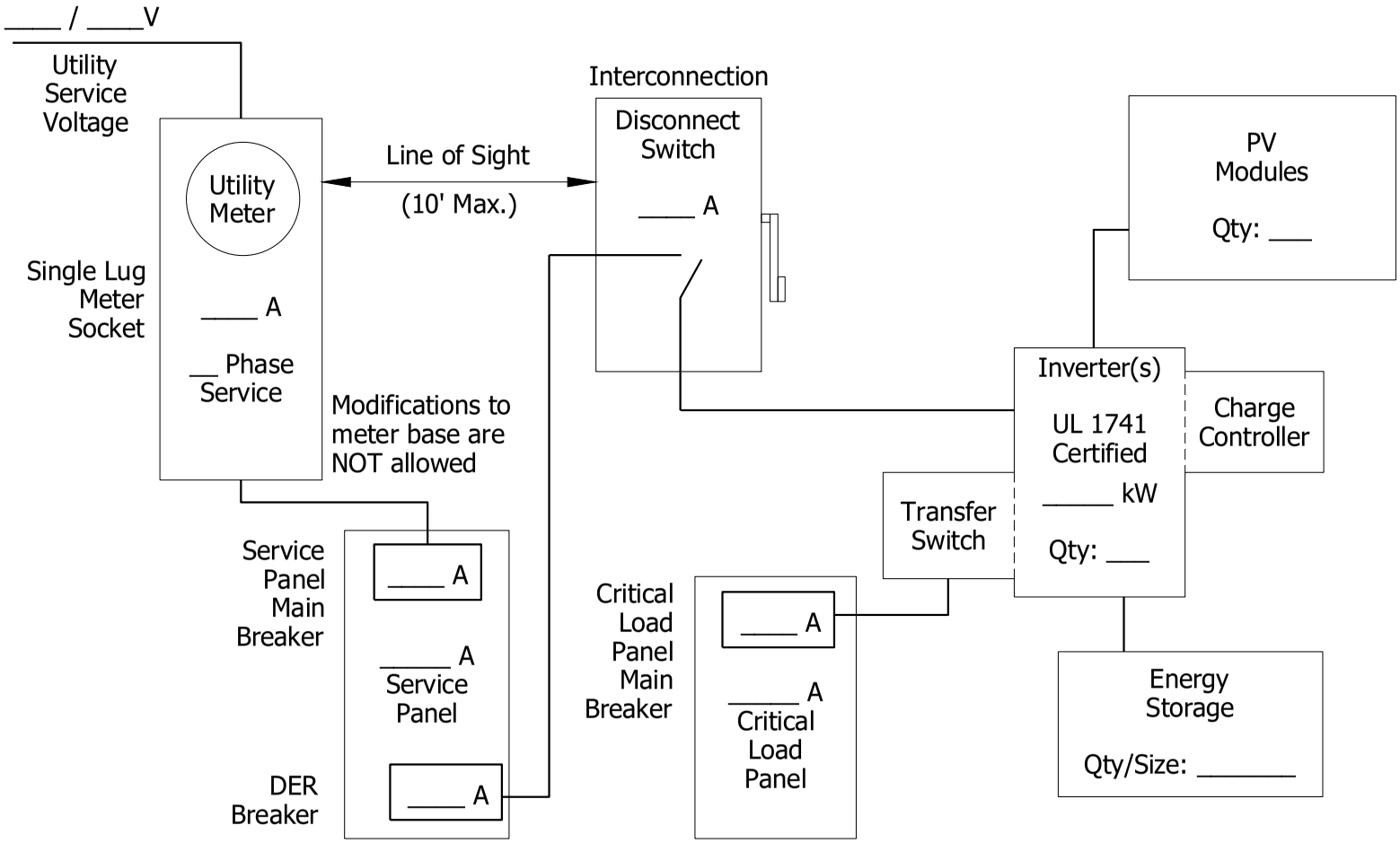
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1m)

DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



Single-Phase, Self-Contained Meter with Approved Single Lug Meter Base
Service Panel Main Breaker + DER Breaker (Including Battery Storage System) ≤ 120% of Service Panel Bus Rating

Notes:
The rated ampacity of the service panel main breaker shall not exceed the rated ampacity of the utility meter.

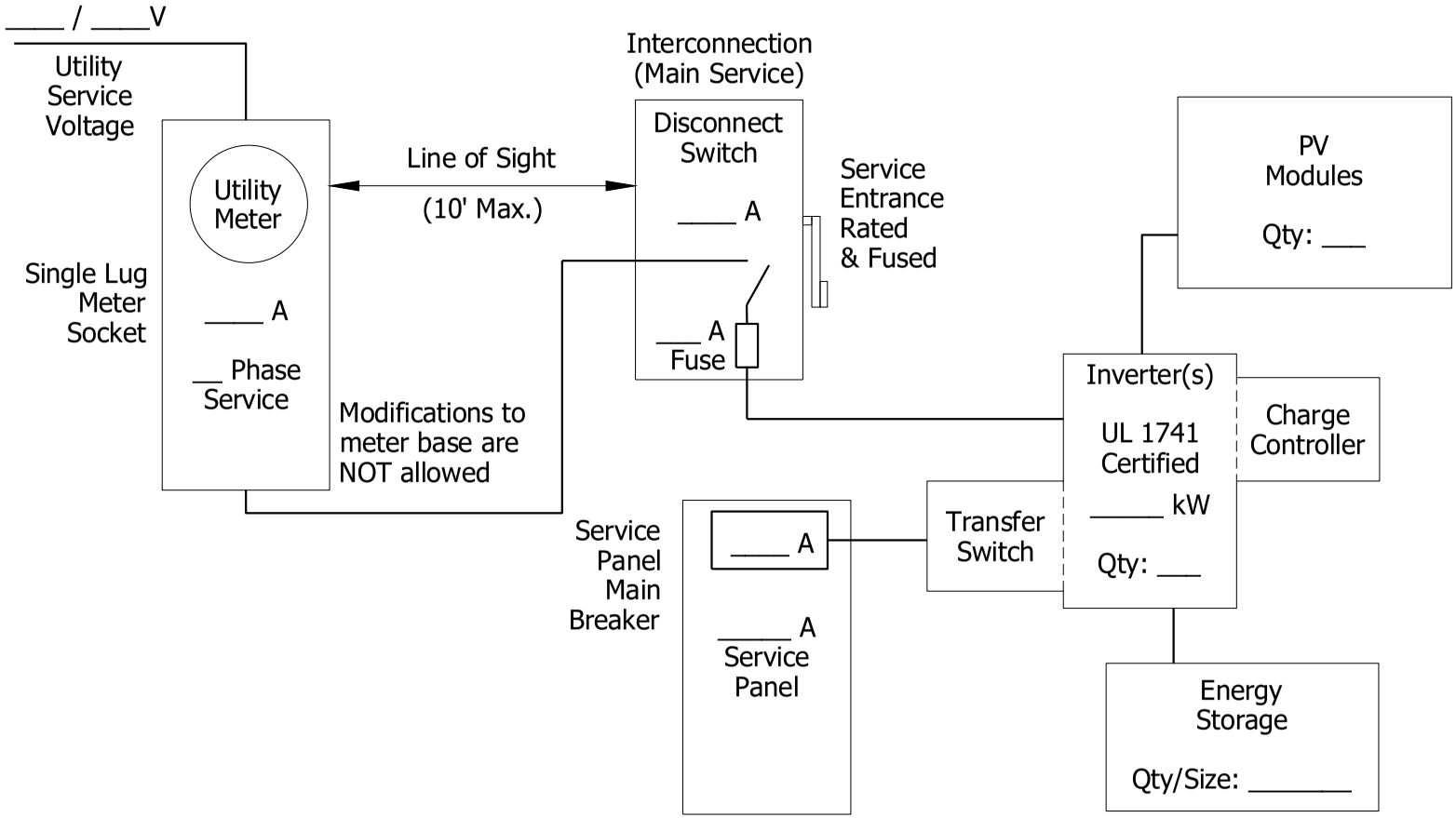
WPPI ENERGY

On-Site Generation (Distributed Energy Resources)

General Configuration
(Figure 12-1n)

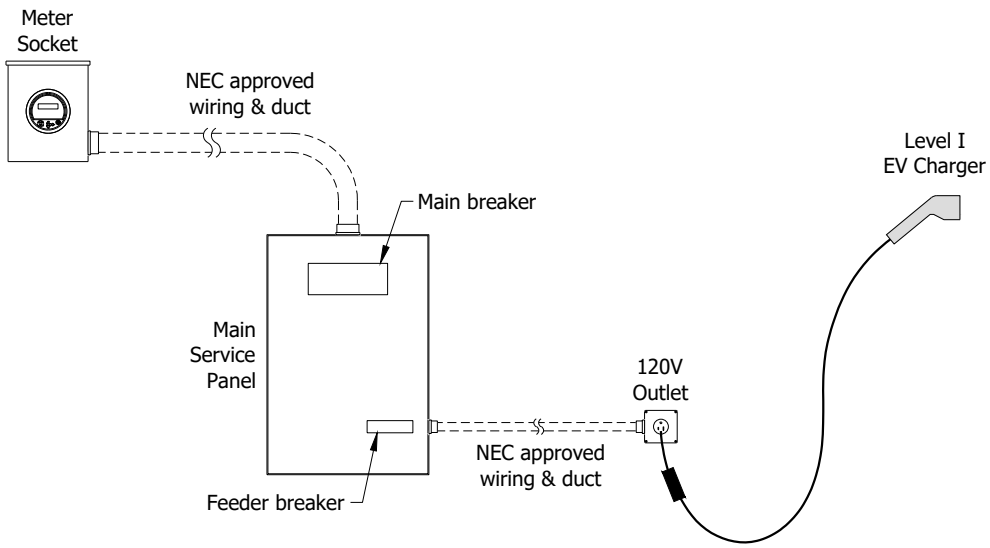
DATE: 07/11/2025
DRAWN BY: KI
APPROVED BY: HJA
SCALE: None
REVISED:

* Configurations not represented in Figures 12-1a through 12-1n must be approved by Member Utility.



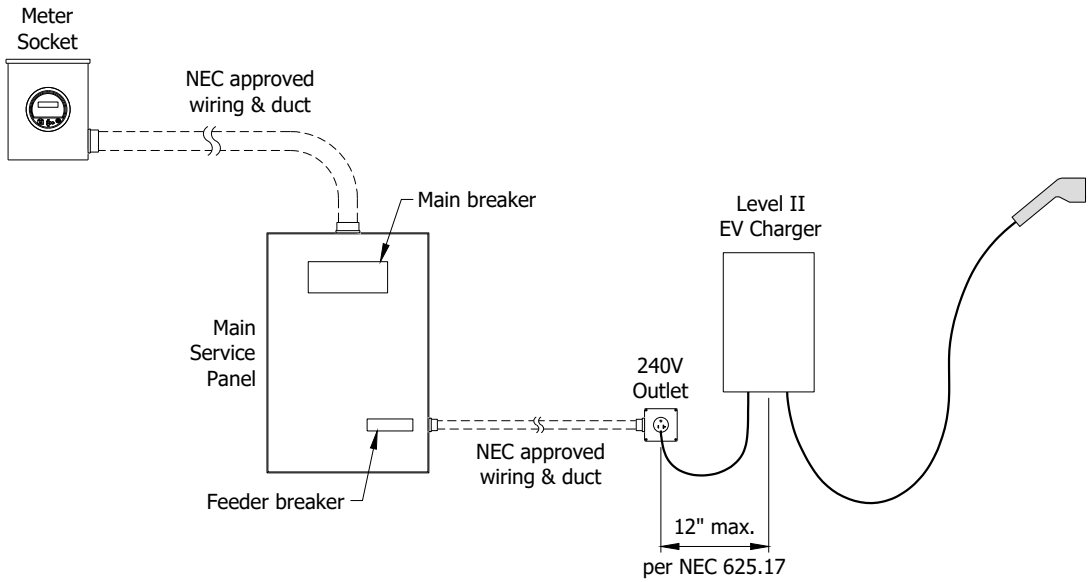
Single-Phase, Self-Contained Meter with Approved Single Lug Meter Base
DER and Battery Storage System
Interconnection Disconnect Rating < Self-Contained Meter Rating

Notes:
The rated ampacity of the Interconnection Disconnect Switch fuse shall not exceed the rated ampacity of the utility meter.



Level I (120V)

Fig. 14-1a



Level II (240V or 208V)

Fig. 14-1b

WPPI ENERGY

Electric Vehicle Charger Configurations

Level I (120V) and Level II (240V or 208V)

(Figure 14-1a & 1b)

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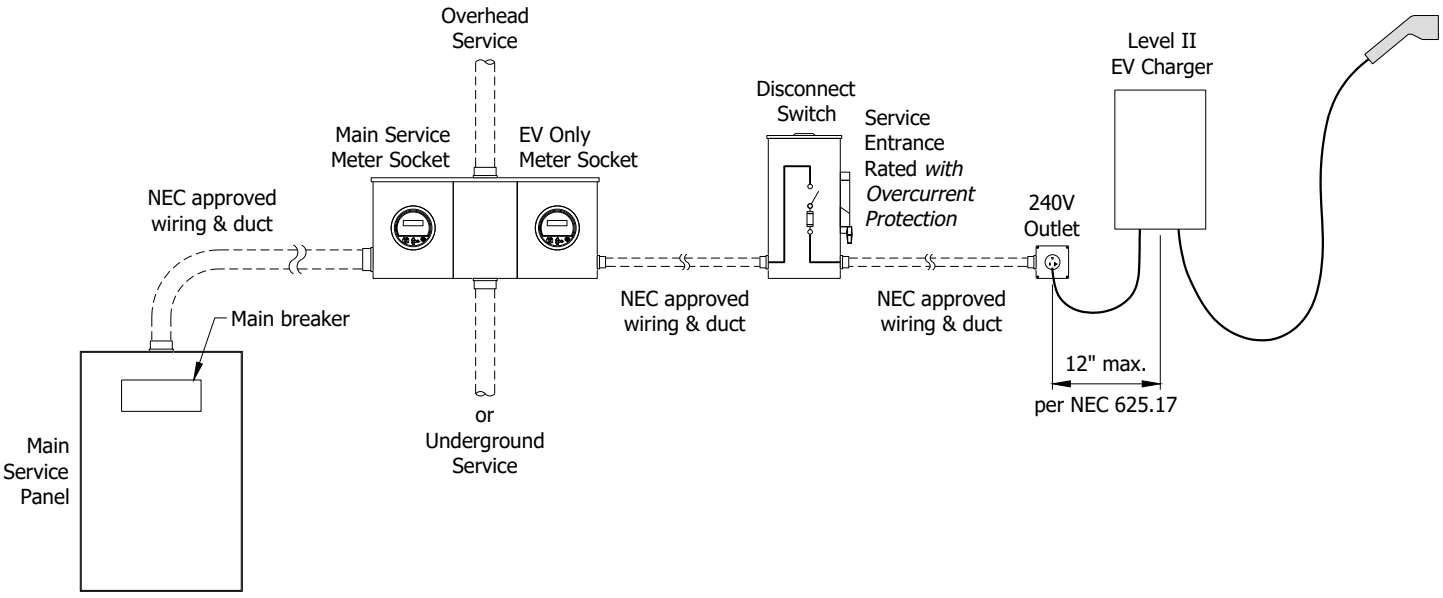

Remote Bldg. Level II (240V or 208V)

Fig. 14-1c

WPPI ENERGY

Electric Vehicle Charger Configurations

Remote Building or Structure

(Figure 14-1c)

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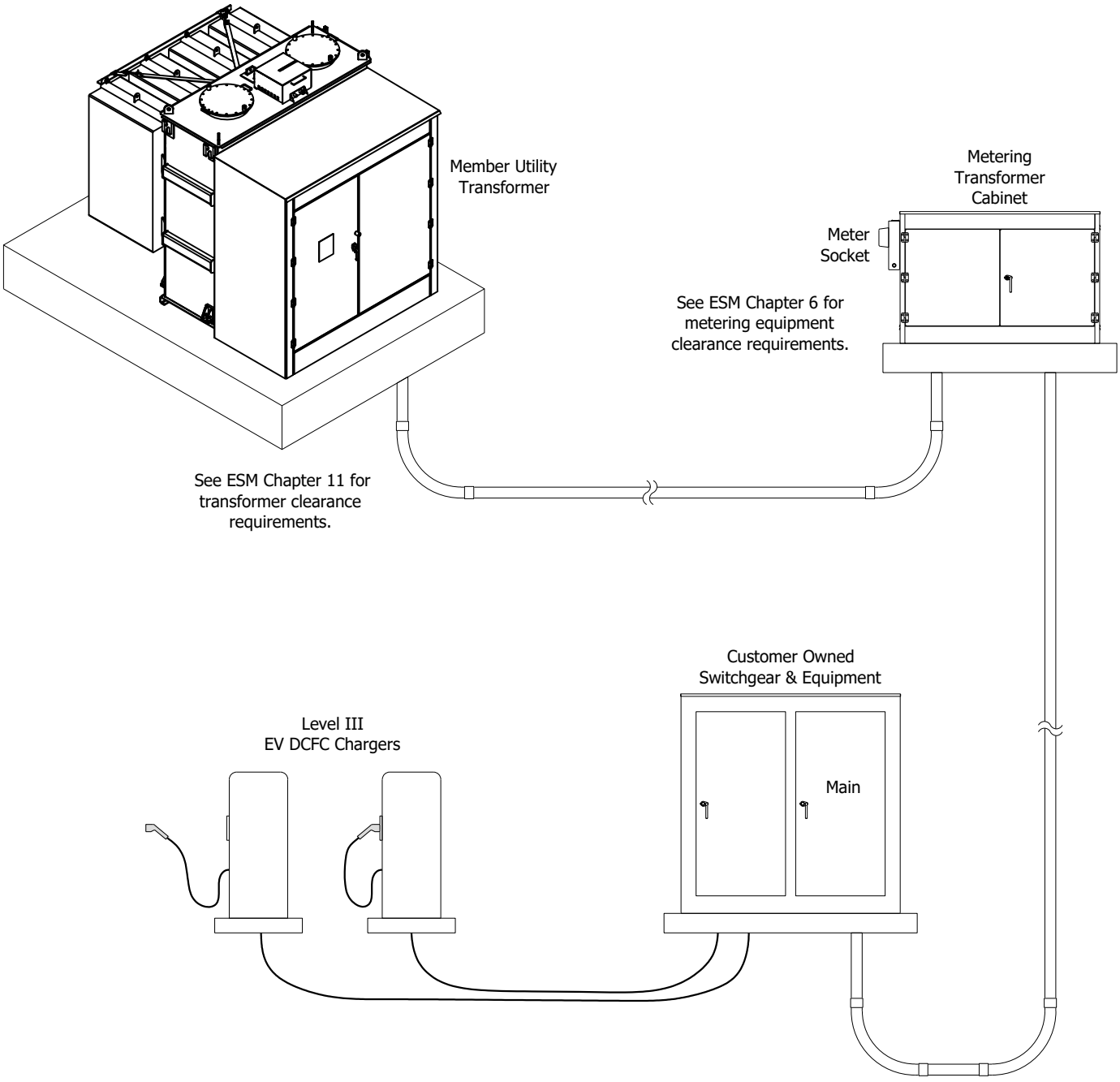

Level III DC Fast Charging (DCFC) (480V)
Fig. 14-1d

WPPI ENERGY

Electric Vehicle Charger Configurations

Level III DC (480V)
(Figure 14-1d)

DATE: 07/11/2025	DRAWN BY: KI	APPROVED BY: HJA	SCALE: N.T.S.	REVISED: