CITY OF ASPEN

Electric Standards

2024 Update

The Design Standards ensure the public welfare, preserve the community aesthetic, and promote efficient development within the city limits of Aspen.

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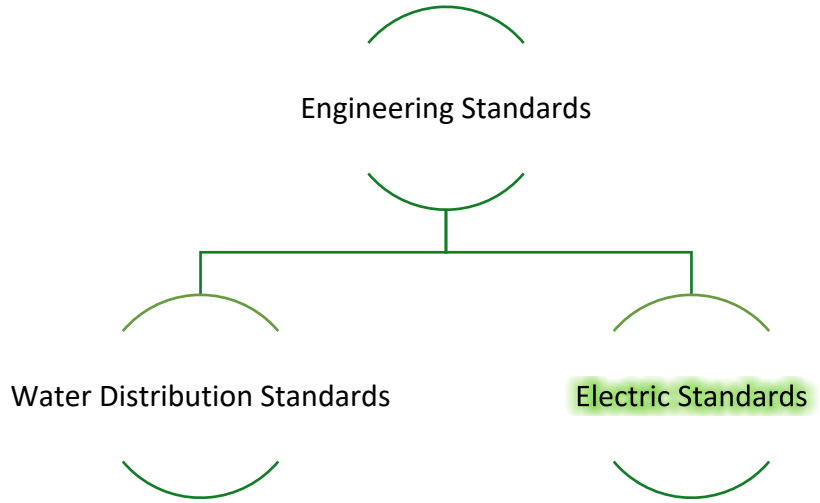
Contents

Introduction

Objective

The *Electric Standards* provide policies, design, and construction guidelines for governmental agencies, design professionals, contractors, private developers, and community groups. These standards strive to maintain the public welfare, ensure safe and reliable service for all customers, and promote efficient development within the electric service area. Below is a chart that shows how the standards correspond to the Utilities Department's other requirements.



This publication has been prepared to assist in planning electrical installation(s). The uniform standards contained in this publication are necessary for the City of Aspen (COA) to serve its customers in a safe and orderly manner and expedite service connections.

Purpose & Intent

It is the policy of the City of Aspen Electric Department (COA Electric) to serve all its customers in an orderly manner, and these standards contain the requirements and uniform standards necessary to achieve this policy. Uniform enforcement of these standards throughout COA will expedite service connections and ensure all customers are treated equally and fairly.

Service furnished by the COA is subject to these Electrical Standards, the Utility's Rules and Regulations and electric rates and fees, the National Electric Code® (NEC®), the National Electrical Safety Code® (NESC®), Title 25 of the City of Aspen Municipal code, Title 29 City of Aspen Engineering Design Standards, and the Rules and Regulations of these Regulatory Commissions.

Applicability

The City of Aspen, under the direction of the City of Aspen Director of Utilities, publishes the *Electrical Standards* to provide minimum design and construction criteria for all planning, design, construction, development, redevelopment, and modifications to electrical components within the City of Aspen Electric Utility service area. To protect the community and the electrical distribution system, the Electric Department reserves the right to disconnect electrical service to any property if standards set forth in this document are not met and maintained.

Chapter 1: General Information

Service furnished by COA Electric is also subject to COA Electrical Standards and the COA adopted editions of the NEC® and the NESC®.

COA assumes no responsibility for the manufacturer's, supplier's, electrician's, or engineering consultant's compliance with all applicable NEC® and NESC® codes as well as all COA adopted building codes.

Any waiver at any time of COA's rights or privileges under the Rules and Regulations will not be deemed a waiver as to any breach or other matter subsequently occurring.

The following are brief statements of those operating rules and practices, which affect the majority of connections made to the COA infrastructure. Where information not included herein is needed, COA Electric will provide additional information upon request.

New, reworked, altered, or repaired installations intended for connection to COA's distribution system shall comply with the rules of the COA, the National Electrical Code® and any other codes or regulations in effect in the area served. COA performs limited inspections of customers' wiring for adequacy, safety, and compliance with electrical codes. However, it is the customer's responsibility to provide an electrical installation that conforms to the applicable requirements as outlined in the following pages.

The Electric Department recommends that questions concerning large and complicated electrical projects be directed to the Director of Utilities or the Electric Superintendent prior to construction and/or purchase of equipment to reduce the risk of project delays or construction changes.

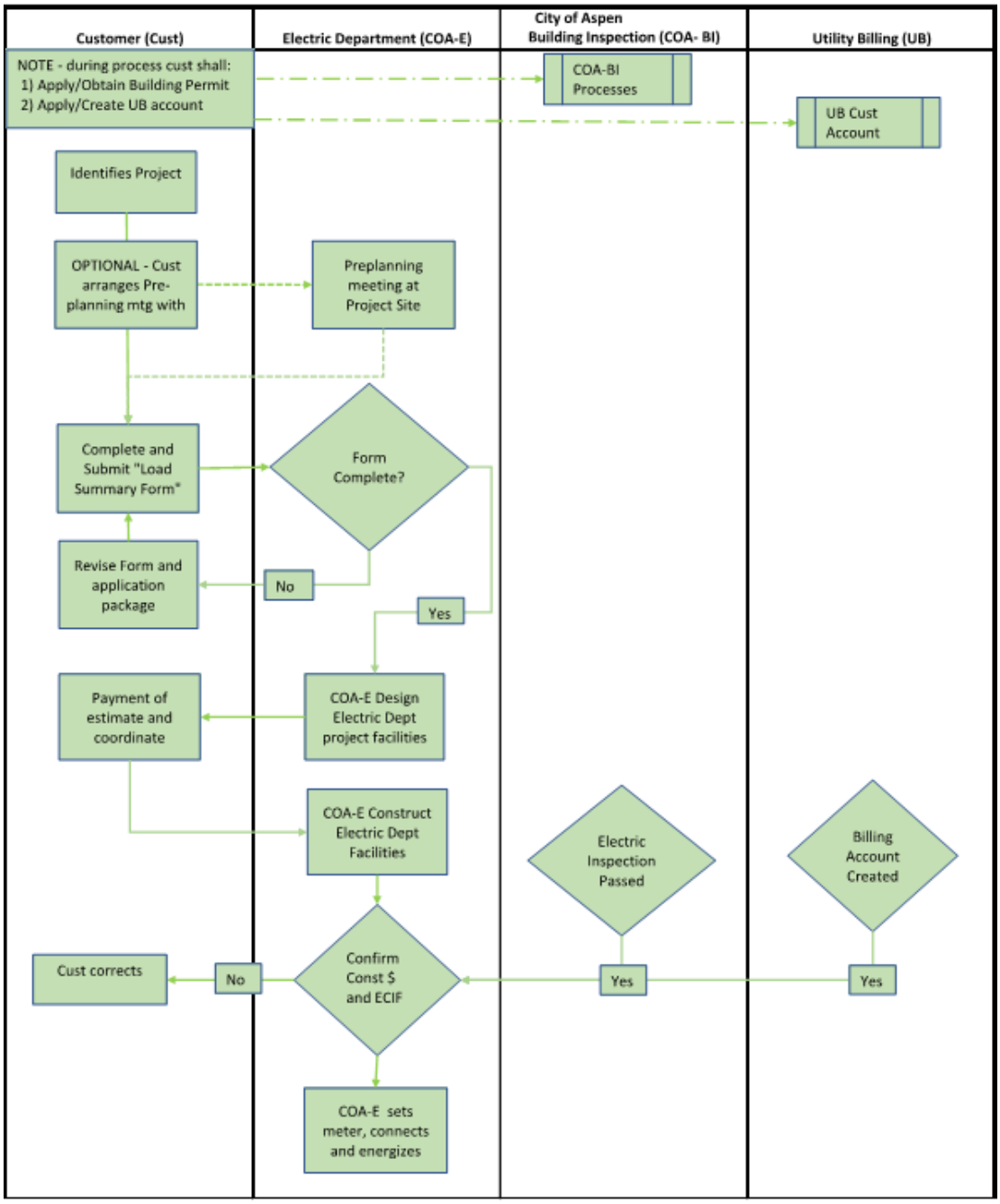
1.1 Effective Date

This edition of the COA Electrical Standards may be used at any time on or after the publication date. These Standards are updated on an annual basis.

1.2 Application for Service

The customer may contact COA Electric to secure information relative to any application for new electric service connections or changes in existing service. Application for Service - Generalized Flow Chart shown below:

City of Aspen Electric Department
Application for Service - Generalized Flow Chart



Before an electric service connection can be made to the customer's (applicant's) wiring system, it is necessary that:

1. The customer has made application for service. A City of Aspen Load Form and a copy of a recent City of Aspen Electric Bill, if applicable, must be filled out for each affected account and must be submitted with the permit application. It is

strongly recommended that customer(s) consult the City Electric Department to discuss the customer's plans and the City's service requirements. The Building Department submittal will not proceed until the Load Summary Form has been submitted and approved by COA Electric.

2. The applicant has met all requirements of these *Electrical Standards*, and the Rates, Rules, Regulations and Extension Policy in effect and on file with COA at the time of application.
3. It is highly recommended that the customer's contractor coordinate with COA Electric on anticipated schedule durations and milestone dates to ensure that construction is performed in a timely fashion.
4. An approved permit is required to begin construction.
5. The Building Department has notified the Electric Department of approval of the installation by providing an inspection release. Accurate record drawings must be submitted to COA at the completion of construction to document all electrical connections made by the customer to COA equipment. Construction will not be considered completed until record documents have been received.
6. Payment of any construction fees required must be received. An electrical meter will not be installed, or service activated, until all fees have been received. The Electric Community Investment Fee payment must be received by the City as required by Municipal Code Sec. 25.04.35. This fee must be submitted at the Finance Department Window.

1.3 Rate Schedules

Electric service is supplied to customers under COA's established rates, rules, regulations, and marketing programs. The Rate schedules for residential, commercial, and industrial customers, covering rate and their application are covered in Title 25 of the Municipal Code. COA Electric will assist the customer in understanding COA's rates and in applying them to the customer's load conditions.

1.4 Electric Community Investment (ECI) Fee

The City must expand the electric system facilities to accommodate new development without decreasing current reliability and service standards. The City distributes electricity to the customers in its service area by means of an integrated and interdependent system-wide network of electric facilities. The Electric Community Investment (ECI) fee will be charged to any customer requesting services for new development or expansion of existing services within the City of Aspen Electric Service Area. The ECI fee will provide additional capital to the Electric

Department to pay for a portion of the new facilities needed to deliver electric services to new or expanded services. Effective January 1, 2018, all residential, commercial and city facilities customers of Aspen Electric Department shall pay the ECI fee.

1.5 Service Line Limitations

Service will be rendered to the customer from the Electric Department's nearest suitable power line of sufficient capacity to furnish adequate service at the service voltage available. Absolutely no secondary power supplies shall be installed in the City of Aspen Public Right of Way (ROW) other than alleys where service is being requested. Service shall not be used by the customer for purposes other than those specified in the applicable Rate Schedule.

1.6 Connection

Connection to or disconnection from COA Electric's distribution system shall be made by COA Electric. Under no circumstances will the customer be permitted to access the COA's underground facilities, or make connections to COA's lines, except as specified in Section 1.15.

COA Electric shall be notified in advance 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 COA, may relocate meters or other equipment owned by COA.

1.7 Customer-Owned Meter Equipment Restrictions

Under no circumstances shall customers' equipment:

1. Be connected to, or in any way be served from, the secondary terminals of the voltage or current metering transformers.
2. Be installed within any metering enclosures including, but not limited to, metering transformer cabinets, transformer compartments, or meter sockets.
3. Be connected to an unmetered bus or conductor.

1.8 Diversion of Electricity

Under no circumstances shall devices or attachments be connected to COA’s facilities in such a manner as to permit the use of unmetered energy except in

emergencies where specifically authorized by the City Electric Department. Refer to Section 3.3.

1.9 Easements for the City of Aspen's Facilities

Public utility easements shall comply with the standards set forth in Titles 21 and 25 of the Municipal Code, which includes the Water Distribution Standards, Electric Standards, and Engineering Standards. All public electric utilities shall be located within public right-of-way (ROW) or public utility easements or centered within an easement across private property. If, during the building permit process, it is discovered that a public electric utility is not located within an easement, the City shall require that an easement be created for that utility. Additionally, existing prescriptive easements for electric utilities will require the dedication of an easement for the respective utility.

The customer shall provide, at the request of, and at no cost to, the City necessary easements and suitable land area owned and controlled by the customer for installation, construction, maintenance, operation, control, and use of the COA's underground facilities used or useful to render service to the customer. All clearances must be accounted for within limits of easement. Refer to Standard Detail CR-90 and the City's standard Easement Agreement appended to these standards, for additional information on easement sizing and language. All easement agreements are subject to final approval by the City Attorney's Office.

Easement requirements are as follows:

- Transformer Easement Requirements
    - Front clearance: a minimum of ten (10) feet clearance is required to be maintained in front of transformer doors, as measured from either side of the transformer **pad/vault** (not edge of transformer).
    - Side clearance: a minimum of three (3) feet clearance is required to be maintained, as measured from either side of the transformer **pad/vault** (not edge of transformer).
    - Rear clearance: a minimum of three (3) feet clearance is required to be maintained, as measured from the back of the transformer **pad/vault** (not edge of transformer).
- Primary Electric Conduit Easement Requirements

- The minimum width of an easement is normally 1.5 times the normal depth of bury for the underground utility. So, if a primary electric conduit is normally buried four (4) feet deep, the minimum easement width is six (6) feet. Future needs for vehicular access, as well as excavation access to the utility may require a wider easement. The width determination is made on a case-by-case basis with the Electric Department.

- If a property re-develops and there are prescriptive easements, then the easements shall be described, dedicated, and recorded based upon the above dimensional criteria.

1.10 Customer's Responsibility

COA will not install facilities to serve a customer until the customer agrees to take the service under the applicable Rate Schedule and all applicable charges for construction and service, as required by COA's Extension Policy, are paid. Under no circumstances shall a customer dig for installation of electrical facilities (including upsizing transformers) in the public right of way (ROW) without a ROW permit. ROW Permits are issued between April 1st and October 31st.

COA Electric shall not under any circumstances be required to make an extension, which would be unprofitable and thereby cause undue hardship upon other customers of COA Electric.

The customer shall give authorized employees of COA access to the premises of the customer to obtain information concerning connected load, to measure or test service, to read meters, or for other purposes incidental to the supplying of electric service.

It is the responsibility of the customer to adequately protect COA's equipment located on the customer's property against damage. The customer shall be responsible for any damages or loss resulting from improper protection or neglect.

Pad-mounted transformers, switchgear, metering equipment and other related appurtenances shall be installed with adequate clearances for normal maintenance work as specified in subsequent chapters and details of these Standards.

Customers shall connect their equipment so that the load at the point of delivery will be balanced as nearly as practicable. Refer to Section 5.8 *Load Balance* for more information. Where three-phase service (except 3-phase, 4-wire delta) is supplied, the customer will attempt to connect equipment so that the load in any

one phase at the point of delivery will not exceed the load in any other phase by more than ten (10) percent. Refer to Section 5.1, *Three-Phase Voltage Unbalance* for further details.

COA, for the customer's protection, may require written confirmation from a qualified individual that the customer's installation conforms to the NEC®

1.11 Customer-Owned Facilities

COA Electric does not assume responsibility for the design, operation, or condition of the customer's installation. Distribution facilities beyond COA's point of delivery are to be installed, maintained, and operated by the customer under all the following conditions:

1. All energy is to be metered at one location.
2. Each installation is subject to the provisions of COA's Rules and Regulations, the applicable Rate Schedule, and the approval of COA.
3. Under rates providing for delivery at secondary voltages, COA will install and maintain only a single transformer installation for the customer, except as specified in Section 4.1, SERVICES.
4. COA will not install or permit the installation of any of the following customer-owned equipment on equipment owned by COA such as meter sockets, metering equipment, distribution wires, radio or television aerials, or other devices or small cell communication equipment. Only after a request has been made and approved by COA zoning department can banners be strung from steel streetlight standards. Refer to the COA web site for information and an application.
5. Exception: Wires for municipal fire alarm systems, police signal systems, or equipment covered by Joint Use Agreement.
6. The customer's distribution system shall be in conformance with the National Electrical Code® in effect in Colorado at the time of installation, and the Electrical Standards of COA.
7. The distribution facilities of the customer beyond the point of delivery shall be connected to COA's distribution system at one central point through a service entrance disconnecting means, approved by COA, installed, and maintained at the expense of the customer.
8. Customers shall maintain their distribution system in a safe operating condition so that it does not constitute a hazard to themselves or to other customers or persons. COA assumes no responsibility for customer's lines and facilities and shall not be liable for injury to persons or damage to property when occurring on or caused by the customer's lines or equipment.

9. Customer's service entrance disconnect, CT cabinet and meter shall be located outside of the customers building, supported as follows in this document in Section 4.09 Meter Location and Installation.
10. Refer to Section 4.3 for additional requirements for customer-owned facilities.

1.12 Safety

Refer to federal regulations and individual state laws concerning safety requirements relating to high voltage power lines of public utilities, which produce, transmit, or deliver electricity. The following explanations should not be regarded as a substitute for reading the laws but are meant to highlight some of the major points.

1.13 Underground Safety

Caution: Stakes, flags, or painted lines mark the locations of underground utilities. Excavate with caution within 18 inches on each side of the markings. Refer to the 811 Colorado website for the Excavator Handbook showing more information on safe digging.

Colorado 811 must be notified, and any existing lines must be marked/located, prior to excavation. Colorado revised statutes require that anyone who engages in any type of excavation must provide advance notice to the underground facility owner(s)/operator(s). The notice must be provided by the excavator at least three (3) full business days, prior to any excavation, not including the day of the call. To process normal Locate Requests, calls must be made to Colorado 811, Monday through Friday, 7:00 a.m. to 5:00 p.m., excluding holidays.

Colorado, Utility Notification Center----------8-1-1 (or) 800-922-1987

City of Aspen Electric Department----------970-920-5148

City of Aspen Water Department ----------970-920-5110

After Hours: City of Aspen Dispatch ----------970-920-5310

Utility	Color-Code*
Electric Power Lines, Cables, Conduit and Lighting Cables	Red
Gas, Oil, Steam, Petroleum, or Gaseous Materials	Yellow
Communication, Alarm or Signal Lines, Cables or Conduit, including Cable Television	Orange
Water, Irrigation and Slurry Lines	Blue

Utility	Color-Code*
Storm Drain Lines/Sewer	Green
Survey Markings	Pink
Proposed Excavation	White
* Verify color-codes used within your locale.	

1.14 Depth of Cover Requirements

- **Primary Conduit:**
  - Minimum: 48-inches
  - Maximum: 60-inches
- **Secondary Conduit:**
  - Minimum: 24-inches

1.14.1 Change of Grade

The grade in any public right-of-way or easement shall not be changed without first contacting and obtaining the appropriate permitting from COA to determine if electric facilities are within the right-of-way or easement. COA Electric may grant a variance request for grade changes if the change will not adversely affect the clearance between utilities and cover requirements. COA Electric may need to provide construction services if the grade change necessitates moving COA equipment or facilities. COA Electric can provide an estimate of the probable cost to relocate COA facilities when necessary.

1.15 Procedure for Unlocking, Opening, De-energizing any City of Aspen Electric Power Equipment

COA established procedures to assure maximum safety to protect all individuals prior to unlocking, opening, or de-energizing electric power equipment where access by authorized personnel is required. The following procedures apply to, but are not limited to, energized COA facilities such as meters, vaults, transformers, manholes, switchgear, and secondary pedestals. Only licensed Master or Journeyman Electricians, as defined by the State of Colorado, are permitted to access COA electrical equipment:

1. A Courtesy Lock and Liability Waiver Form must be filled out and submitted to COA (see the Appendices). The customer shall request authorization from COA Electric for unlocking, opening, or de-energizing

any electric power equipment. Work can proceed only after the request has been approved by COA Electric.

2. Charges may apply when COA personnel presence is required for extended periods or specialized requests. COA Electric will determine the amount to be charged.

1.16 Energization of Electric Service

COA will not energize an electric service or set meters on new, rewired, altered, or repaired wiring installations unless all the following conditions have been met:

1. The premises served have been properly identified by the customer.
2. All fees, including ECIF, and permit drawings have been received and accepted by COA.
3. An inspection release from COA Electric has been received.
4. COA Electric has verified that the service entrance shows no continuity, load, or voltage feedback on the load-side terminals of the electric meter socket or CT metering installation.
5. COA Electric has verified that the customers' equipment has a mechanical means to disconnect and isolate equipment from the load-side terminals of the self-contained electric meter socket or current transformers (CT's). This requirement includes, but is not limited to, any load produced by transformers (dry-type or oil- filled) that are used for a separately derived system.
6. Note: This requirement does not add an additional main disconnect on the load side of a cold sequence meter installation. It shall be the customer's responsibility to close the service disconnecting switch and energize their service.
7. COA Electric has verified that the electric service meets all the requirements in Section 4.
8. Note: The meter socket shall meet all requirements listed under subsequent sections of these Standards.
9. As-Built drawings have been received and accepted by COA. Refer to subsequent section for requirements of As-builts.

1.17 As-Built Drawings and Approvals

1.17.1 General

As-built drawings are accurate, scaled representations of appurtenances and infrastructure as they exist in the field at the time of the project's completion. As-built drawings of electric system infrastructure submitted to the City of Aspen Electric Department for final acceptance shall be in accordance with the sections below. As-built drawings of electric system infrastructure shall include at minimum the requirements specified below.

The following are not considered as-constructed drawings and will not be accepted:

- Construction plans.
- Freehand drawings or sketches.
- Drawing measurements that are based on electric system infrastructure locations after the installation work has been buried.

The design engineer of record for the project submitting the reviewed and approved construction plans shall certify in writing that the installation has been accomplished in accordance with the plans and specifications approved by the City.

A complete list of installed items shall be submitted to the City with an inventory of conduit sizes, schedules, lengths, bends/sweeps, splice vaults, pull boxes, meter pedestals, light bases, transformer or switch gear pads, and any additional appurtenances installed.

1.17.2 As-Built Formats

Two hard copies of all as-built drawings and a saved version of the drawings in ArcView format shall be given to the Electric Department.

- Two (2) hard copies (on standard 24" x 36" sheets) with the engineer's stamp and signature; labeled "As-Constructed".
- One (1) electronic copy of as-builts in .dwg format.
- One (1) disk with the ArcView drawing in both .mxd and PDF formats.
- As-built survey shots in .mxd format.

1.17.3 As-Built Certification

A Colorado-licensed professional land surveyor (PLS) shall survey the electric system installations.

1.17.4 As-Built Drawing Requirements

1.17.4.1 General As-Built Requirements

- Surveyor's/Engineer's statement (with embossed or wet seal and with an original signature on each sheet) shall verify that as-built drawings reflect the true conditions in the field.
- Contractor's statement (with an original signature on each sheet) shall verify that all construction specifications and product qualities have been met or exceeded.
- "AS-BUILT DRAWING" or "RECORD DRAWING" shall be labeled on each sheet in one-inch-high letters.
- Street names shall be on all streets. All easements and right-of-ways (ROWs) shall be shown and clearly labeled.
- The location and elevation of the benchmark referenced shall be shown on the drawing. If the referenced benchmark is not within the project, then a complete description of its location will be provided to assist in future locating.
- The locations and description of any utility lines and other installations of any kind or other description known to exist within the construction area. The location includes the dimensions to permanent features.
- Locations and dimensions of any changes to buildings and structures.
- Correct grade and alignment of roads.
- Changes in details of design or additional information such as approved placement details, pipe sizes, material changes, etc.
- Where drawings and/or specifications allow options, only the option used in the construction shall be shown on the as-built drawings.

- The plan view must be drawn to a scale that displays the plan in a way that is clearly legible. Recommended scale(s) are 1-inch equals 5, 10, or 20 feet.

1.17.4.2 Primary Electric System As-Built Requirements

- Locate and clearly label all conduit runs, fittings, splice vaults, pull boxes, meter pedestals, light bases, transformer or switch gear pads, and other appurtenances in two directions. Swing ties should be made from objects that are permanent in nature.
- Show all sizes and material types of pipes and conduits.
- All horizontal distances shall be shown to the nearest tenth of a foot. All vertical distances shall be shown to the nearest tenth of a foot.
- Show location and elevations on pipes and fittings where changes or deflections in direction occur.
- Special detail drawings may be required where installations are not shown on approved construction drawings or where required for clarity.
- Typical service installation details with deviations from original plans or standard details shall be noted on as-builts.

1.18 Utilities and the Public Right-of-Way (ROW)

1.18.1 Colorado Department of Transportation ROW

All work within the Colorado Department of Transportation (CDOT) ROW shall meet all CDOT requirements and standards in addition to these Electric Standards. All work occurring within the CDOT ROW shall require a permit. To determine the appropriate permitting, contact CDOT for specific requirements.

1.18.2 City of Aspen Right-of-Way

All work within the City of Aspen ROW shall meet all City of Aspen Engineering Department requirements and standards in addition to these Electric Standards. All work occurring within the City of Aspen ROW shall require a ROW permit. To determine the appropriate permitting, contact the City of Aspen Engineering Department for specific requirements.

1.19 Separation Requirements

The minimum horizontal and vertical separations of electric utilities from parallel and crossing utilities, respectively, shall be in accordance with the tables below.

Table 3.2.7.1 – Minimum horizontal separation for parallel utilities (feet)*

	Communications	Electric	Gas	Storm	Water**	Sanitary
Communications	1	1	3	2	2	2
Electric	1	1	1	1	Depth of water line minus 4-ft	Depth of sanitary line minus 4-ft
Gas	2	3	-	2	2	2
Storm	2	2	2	-	10	2
Water**	***	***	2	10	10	10
Sanitary	***	***	***	2	10	-

* These depths are based on 2018 Utility Standards. Please confirm depths with utility provider for any updates.

** Includes, but not limited to, potable, raw water, pressurized raw water and re-use water. Separation requirements include from manholes, culverts, etc.

*** Horizontal separation is not applicable, because vertical separation is achieved. For example, a shallow communications line can be located above a water line as long as vertical separation is achieved.

Table 3.2.7.2 – Minimum vertical separation at utility crossings (feet)*

	Communications	Electric	Gas	Storm	Water**	Sanitary
Communications	1	1	1	2	2 above	2
Electric	1	1	1	2	2 above	2
Gas	1	1	1	2	2 above	2
Storm	2	2	2	2	1.5 above	2
Water**	2 below	2 below	2 below	1.5 below	2	1.5
Sanitary	2	2	2	2 below	1.5	2

* All depths are based on 2018 Utility Standards. Please confirm depths with utility provider for any updates.

** Includes, but not limited to, potable, raw water, pressurized raw water and re-use water.

1.19.1 Identification

Electric conduit and cable shall be marked with red identification tape. Tape shall be installed 2 feet above the conduit.

Chapter 2: Character of Service Available

Contact COA for information regarding availability of any desired type of service in a given locale. Delays and perhaps unnecessary expense may be avoided by contacting COA in advance of construction.

2.1 Type of Service

The service voltages listed below may not be available at all service locations. COA will assist in determining whether the service voltage requested is offered under COA's Rules and Regulations within the service territory. These service voltages are all derived from grounded transformer banks. Depending upon the service voltage, either the neutral or one phase conductor is grounded at the supply transformer and will be run from the transformer installation to the meter socket. Customers requiring an ungrounded service for operation of a ground detection system, or for other operations permitted by the NEC® or NESC®, shall submit an exception request detailing the special circumstances necessitating the request. Customers accepting three-phase service from an open-delta transformer bank shall sign a liability waiver form indicating the customer's acceptance of potential damage to customer's equipment due to voltage unbalance.

1. 1P, 3W- 120/240VAC
2. 1P, 3W- 120/208VAC
3. 3P, 4W Wye- 120/208VA
4. 3P, 4W Wye- 277/480VAC

2.2 Meter Sockets for Types of Service

1. Self-Contained - Supplied by the customer (Refer to Section 3.7):
    a. 1P, 3W and 3P, 3W Delta- 5 terminal meter sockets
    b. 3P, 4W Wye and 3P, 4W Delta- 7 terminal meter sockets
2. Transformer Rated (CT 's) - Supplied by COA:
    a. 1P, 3W and 3P, 3W Delta- 8 terminal meter sockets
    b. 3P, 4W Wye and 3P, 4W Delta- 13 terminal meter sockets

Chapter 3: Service Facilities

COA Electric will provide electrical service to customers from underground distribution facilities and the customer should confer with COA Electric before purchasing equipment, beginning construction of a proposed installation, or altering existing service installations. COA Electric will determine if the type of service and voltage desired by the customer is available and if additions to COA's facilities will be required, and will secure a definite meter location and point of delivery. COA Electric will arrange for all necessary alterations of its facilities. The customer, at their expense, shall provide and route their service entrance conductors and metering equipment to the point of delivery.

3.1 Services

3.1.1 General

In general, only one electrical service is allowed per mailing address. Additional services may be allowed, at the discretion of COA Electric. One service lateral and associated transformer is typical to serve a single building or groups of buildings, located on the same plot owned by one individual or corporation. Additional service laterals may be allowed, at the discretion of COA Electric. In most cases, additional charges for initial construction and perpetual maintenance costs will apply for each additional service. Contact COA Electric for specific information.

1. Capacity Requirements - Additional services may be provided where COA determines that it cannot adequately provide service at a single point of delivery.
2. Different Characteristics — Additional services may be provided by COA for different voltages or number of phases, or for loads with different rate schedules.

3.1.2 Underground Service

Underground System- Low Voltage (0-600 Volts) General Requirements:

1. Point of Delivery - COA shall specify the location for the underground service lateral and metering equipment that is most suitable for connection with COA's facilities. COA Electric will not allow underground service laterals through basement walls or above the first floor level.

2. Ice and Snow Shields - A meter ice and snow shield may be required on all new or rewired services in locations with heavy snowfall or ice loading. COA Electric is to determine requirements; A drawing showing typical method for installing Ice and Snow Shields is contained in the Standard Electrical Details Section, Drawing SC-40.

3. Underground Service Laterals - Installation of underground service laterals shall not be made until property is to final grade (+/- six inches), property pins are in place, and the cable route is free of obstructions. Customer owned commercial and industrial service laterals shall be installed in customer owned duct. All service laterals shall be installed at a depth of not less than 24 inches or greater than 48 inches from final grade.

4. Ground Movement — Slip sleeves (expansion joints) will be furnished by the Customer and shall be installed by the customer on all new underground residential meter installations in areas. An 18" length of 3" Schedule 80 PVC conduit shall be installed at the bottom of the underground riser. Refer to NEC® Article 300.5(J) (Informational Note), or as may be amended, and to the Standard Electrical Details Section, Drawings SC-40, SC-50, SC-90, and TR-10 for typical slip sleeve installations.

5. Service Entrance Conductors - Service entrance conductors shall have a current carrying capacity at least as great as required by the NEC®. Primary (line) and secondary (load) conductors are not permitted in the same raceway or conduit. No conductors, other than service conductors, shall be installed in the service lateral conduit. Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed on the underground service riser. Drawings showing typical methods for installing service-entrance conductors are contained in the Standard Electrical Details Section, Drawings SC-40, SC-50, SC-90, and TR- 10.

6. Secondary service cable size selection must be sized to minimize cables within transformer. In other words, there is a preference for individual larger conductors, rather than smaller paralleled conductors. The sizing is reviewed during electrical permit application process.

7. Conductors in Meter Socket — Line-side and load-side conductors entering and leaving an underground meter socket shall only enter and exit through opposite sides of the socket. The center knockout in the bottom of the socket, if provided, shall not be utilized. Line conductors shall enter through the knockouts provided at either end of the bottom

horizontal surface of the meter socket. The line conductors shall be routed along the outermost edges of the meter socket allowing for conductor settling. The knockouts on either end of the horizontal surface or the knockouts provided on the vertical surfaces of the meter socket may be used for load conductors. Load conductors shall exit the right side of the meter socket when a lever type bypass meter socket is used. Refer to the Standard Electrical Details Section, Drawings SC-140 and SC-150.

3.2 Application for Electric Service

The customer applying for new service shall submit a Load Summary Form showing a proposed connected load summary, for review and approval of COA Electric. The Report shall be prepared by a master or journeyman electrician licensed in the State of Colorado or by an Electrical Professional Engineer licensed in the State of Colorado and will be used to determine if the existing transformer on a property or an adjacent property has sufficient capacity for the proposed new load. The customer shall be required to pay to upgrade an existing transformer or pay for an additional transformer and provide a transformer location if additional capacity is needed. The location and size of the new transformer will be approved by COA Electric prior to being installed. The customer shall dedicate an easement to allow for COA Utility Personnel to access the city owned equipment for maintenance purposes.

Customer shall submit a Load Summary Form to the COA Electric as early in their project as possible due to the extended lead time for transformers. Order times on some transformers are as long as one year. Refer to the Appendices for the *Application for Electrical Service Load Form*.

3.3 Metering

3.3.1 New Services

COA Electric will not permit a temporary unmetered service (closed loop/ jumpered) on new electrical services. Service may be supplied from a temporary meter panel prior to a final inspection release on new services. Refer to Section 6.1 and the Standard Electrical Details Section, Drawing TM-20. COA Electric shall have received and approved all items as shown in Section 1.16 before a service will be energized.

3.3.2 Classification of Metering

COA classifies its metering installations as:

1. Residential Rate:

a. Self-Contained (Hot Sequence required.)

b. Current Transformer (Hot Sequence required.)

2. Commercial and Industrial Rates:

a. Self-Contained (Cold Sequence required.)

b. Current Transformer (Hot Sequence required.)

c. Temporary Construction (Cold Sequence required for Self-Contained.)

The type of metering used will be determined by COA Electric based upon the service voltage, the load supplied, the available fault current, and the applicable Rate Schedule.

Current transformer metering is required on residential and commercial services when the available fault current is in excess 10,000 amps. Refer to Section 3.14 *Hot Sequence Metering*.

All services shall be metered on the secondary side of COA's transformer unless the applicable Rate Schedule specifies that the service be metered on the primary side of the transformer. COA Electric may install its meter on either the primary or secondary side of the transformer and losses occurring between the point of delivery and the meter will be computed and applied to the reading of the meter.

3.3.3 Self-Contained Metering

Single-phase and three-phase services with loads of 320 amps and less may be metered by self-contained meters. Services where the load current exceeds, or anticipated to exceed, 320 amps shall use instrument transformer (CT) metering. The connected load on self-contained metering shall not be more than the continuous duty rating of the meter socket.

3.3.4 Current Transformer Metering, Secondary Voltage

Hot sequence is the required installation method for commercial/industrial current transformer metering. Hot sequence is the required installation method for Residential current transformer metering. A cold sequence disconnect is not allowed ahead of a CT cabinet.

The CT's and meter-socket will be supplied, owned, and maintained by COA and shall be installed by the customer and are installed outdoors. The instrument transformer compartment in a CT cabinet, service connection cabinet, or switchgear CT compartment,

and the necessary conduit and fittings shall be supplied, owned, installed, and maintained by the customer. The customer shall terminate the line-side and load-side conductors in the CT cabinet or service connection cabinet. The secondary metering conductors will be supplied, owned, installed, and maintained by COA Electric. Customer-owned equipment, other than service conductors, shall not be installed in the space dedicated to current transformers.

All CTs shall be installed in a CT cabinet, service connection cabinet, or switchgear CT compartment. Refer to Sections 3.3, 3.4, and 3.5.

The following CT installations are not allowed:

1. Rack mounted on mast, pole or side of building using donut or window type CT's.
2. Grecian urn or over-the-bushing type CT's mounted in the COA's distribution transformer.

The CT's shall be installed in such a manner that the secondary (metering) terminals are readily accessible from the door of the CT compartment. The CT's shall be mounted such that the H1 "white dot" marking for polarity is on the utility side. When bar-type CT's are installed, the bolts used to make the connections shall be the largest standard diameter that will fit through the holes or slots provided for this purpose. Conductors in CT cabinets and service connection cabinets shall be installed in accordance with the minimum wire-bending space requirements of NEC® Article 312.

Metering conduit installed below grade (underground) from the meter-socket to the CT cabinet (or compartment) shall be minimum 1" Schedule 40 PVC.

Metering conduit installed above grade (above ground) from the meter-socket to the CT cabinet (or compartment) shall be minimum 1" GRC, IMC, EMT, or Schedule 80 PVC.

Metering conduit shall be a continuous run between the meter socket and the CT cabinet. The conduit run shall not exceed 10 feet in length. If the conduit run exceeds 10 feet in length, the total degrees of bends shall not exceed 180°.

Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed without specific written approval from COA Electric. The meter socket shall be bonded with a separate bonding conductor in accordance with NEC® Article 250.

3.4 CT Cabinets

In addition to the general requirements in Section 3.3, the following requirements shall also be met:

1. The CT cabinet shall meet NEMA 3R standards and shall be factory labeled "NEMA 3R".
2. The CT cabinet shall be UL listed and labeled as a CT enclosure.
3. Installations of 800-amp rating and below shall have mounting provisions for an ABB Type CBT-H bar-type CT.
4. Installations from 1000 to 4000-amp rating shall have a minimum 12" length removable bus section and CT support angles which will accommodate an ABB Type CLC window-type CT. The removable bus section shall have an enclosed screw type compression terminal to accommodate a minimum #12 AWG metering potential conductor.
5. The CT cabinet shall be furnished with factory installed landing pads and lugs for phase and neutral conductors.
6. The neutral bus shall have a grounding lug which will accommodate one #12 AWG solid through two #10 AWG stranded wire(s) for the metering neutral conductors.
7. The phases and neutral shall be separated by insulating barriers.
8. The door shall be hinged either on the left or right side and be equipped with a hasp for a COA padlock with a 5/16" diameter shackle.
9. The installation height of the CT's shall be between 3'-0" minimum, and 6'-0" maximum measured from the center of the CT's to final grade. Clearance from the bottom of a wall- mounted CT cabinet to final grade shall be 3'-0".

Note: On some types of 400- and 800-amp bar-type CT cabinets, the neutral bus bar can be physically relocated to the center phase position for use in a 3-phase, 3-wire corner-grounded system. Refer to Section 3.1 Services and Section 3.3 Metering.

3.5 Switchgear CT Compartments

In addition to the general requirements in Section 3.3, the following requirements shall also be met:

1. Installations of 800-amp rating and below shall have mounting provisions for an ABB Type CBT-H bar-type CT.
2. Installations from 1000 to 4000-amp rating shall have a minimum 12" length removable bus section and CT support angles which will accommodate an ABB Type CLC window-type CT. The removable bus section shall have an enclosed screw type compression terminal to accommodate a minimum #12 AWG metering potential conductor.
3. A metering neutral lug, which will accommodate one #12 AWG solid through two #10 AWG stranded wires for the metering neutral conductors, shall be available

near the front of the CT compartment so that it can be safely accessed even if the switchgear is energized.

4. The phases and neutral shall be separated by insulating barriers.
5. The door shall be hinged either on the left or right side and be equipped with a hasp for a COA padlock with a 5/16" diameter shackle.

3.6 Self-Contained 200 Amp and 320 Amp Meter Sockets

Purchasing, installing, connecting, and maintaining self-contained meter sockets shall be the responsibility of the customer. All meter sockets shall be UL listed and labeled, used in accordance with their labeling, installed per the NEC®, or as may be amended, and meet any code requirements that maybe enforced by COA.

All single and multiple position meter sockets installed on COA's system shall meet COA's standards for these devices as listed below. The COA Electric Meter Personnel are instructed not to install a meter at a location where the meter socket does not comply with all criteria listed below. Meter sockets will be considered un-approved unless they adhere to this criteria. Meters will not be installed unless all criteria for meter socket specifications outlined below are met:

1. Sockets shall be constructed from steel in accordance with Underwriters Laboratories (UL) Standard No. 414 revised January 05, 2016, for meter sockets or equal.
2. Sockets fed from underground installations shall have the following minimum dimensions:
    a. 200 amp - 19" height x 13" width
    b. 320 amp - 26 1/2" height x 13"width
3. Temporary cover plates for meter sockets shall be constructed from a non-metallic material.
4. Single-phase and three-phase meter sockets shall be equipped with an approved lever- actuated locking-jaw bypass constructed such that the bypass lever cannot be in the bypass position with the socket cover installed. The only approved bypasses are the Landis & Gyr HQ and Milbank HD (Heavy Duty).
5. Sockets shall be equipped with an insulating, track-resistant polycarbonate safety shield.
6. Single-phase and three-phase, three-wire sockets shall have a fifth terminal installed in the 9 o'clock position with minimum #16 AWG wire and connected to the neutral within the socket. COA will not furnish or install the fifth terminal.

7. Three-phase, four-wire sockets shall have the seventh terminal connected with minimum #16 AWG wire to the neutral within the socket.
8. Sockets shall have ringless style covers.
9. Sealing means shall provide for a plastic padlock seal and a key type of padlock.

Additional Requirements for Self-Contained Multiple Metering Panels:

1. Each meter socket shall have an individual ringless style cover with sealing provisions.
2. The panel shall have permanent barriers to isolate the customer's disconnect switch and wiring from the metering areas.
3. Each line-side compartment shall have provisions for COA seals, whether the compartment is designed to house a meter.

3.7 Current Transformer Meter Sockets

COA will furnish current transformer meter sockets. For commercial or industrial installations, COA shall be contacted first to determine the rate, load, and service voltage. Contact COA Electric to obtain metering equipment and to coordinate meter installation.

3.8 Meter Location

3.8.5 General

Only authorized COA Electric employees or qualified individuals authorized by COA are permitted to connect, disconnect, move, or remove meters. All meters, service wires, and other electrical facilities installed upon the customer's premises for delivering or measuring electrical energy to the customer shall continue to be the property of COA Electric. All metering equipment owned by COA Electric and not installed shall be returned to COA Electric.

The meter socket, service riser, or any conduit containing conductors on the utility side of meters shall not be covered or concealed except when necessary to pass through floor structures within a building. Refer to the Standard Electrical Details Section, Drawing SC-40 for typical meter mounting heights.

3.8.6 Metering Location

The customer shall provide and maintain, without cost to COA Electric, a readily accessible, exterior metering location. COA Electric will locate an acceptable point of delivery and meter location upon the customer's request. No wiring dependent upon a

meter location or granting of an easement shall be started until a definite meter location has been established. COA Electric will not be responsible for the relocation of the service attachment, service entrance, or meter socket resulting from an improper location chosen by the customer, which does not meet the requirements of COA Electric.

Meters originally installed in accessible locations satisfactory to COA Electric, which become inaccessible by virtue of alterations or new construction, shall be reinstalled at a point designated by COA Electric at the expense of the property owner. The relocated service entrance installation shall conform to current COA Electrical Standards.

Meters shall be installed:

1. Outdoors in a location that will be readily accessible to COA personnel at all reasonable hours for reading and maintenance.
2. In a location where they will be safe from damage.

Meters shall not be installed:

1. On fences, mobile homes, or construction trailers.
2. Where the meter will, in the opinion of COA, interfere with traffic on sidewalks, driveways, hallways or passageways.
3. Where the meter will, in the opinion of COA, obstruct the opening of doors or windows.
4. In a location that may, in the opinion of COA, be considered hazardous.
5. Where meter reading or servicing may, in the opinion of COA, become impracticable.

3.8.7 Residential self-contained and transformer-rated meter location

Residential self-contained and transformer-rated meters (including CT cabinets) shall be installed outdoors. COA Electric will determine meter locations in all instances. Residential meters originally installed outdoors that, due to alterations or additions to the residence, become enclosed within the building structure (e.g. enclosed patio or garage) in the original location, shall be relocated to an outdoor location designated by COA Electric at the expense of the property owner. The relocated service entrance installation shall conform to current COA Electrical Standards.

3.8.8 Non-residential meter location

Mobile homes, construction trailers, and those buildings not intended as a dwelling units, such as, but not limited to, contractor's onsite offices, sales offices, mobile studios, mobile stores, or construction job dormitories intended for sleeping purposes only, shall have

the meter socket located adjacent to and in line of sight of the structure it supplies. The meter socket shall not be mounted on or attached to the structure. Refer to NEC® Article 550, or as may be amended.

3.8.9 Manufactured home meter location

Manufactured homes may have the meter socket attached to the structure provided the structure meets the definition of a Manufactured Home as defined in NEC® Article 550.2, or as may be amended, and meets the requirements of NEC® Article 550.32(B), or as may be amended. The manufactured home shall be installed on and secured to a permanent foundation and shall provide the necessary structural support for the meter socket attachment.

3.9 Meter Installation

Installation of line-side (ahead of the meter) facilities shall be in conformance with the Standard Electrical Details Section drawings.

Installation of the meter socket is the responsibility of the customer. Meter sockets and associated equipment, both indoors and outdoors, shall be mounted securely and plumb. Expansion bolts, plugs, or anchors shall be used where attachment is made to masonry, concrete, or plaster walls. Refer to the Standard Electrical Details Section, Drawings SC-40.

The customer shall provide suitable protective equipment approved by COA Electric if a meter location puts the meter at risk of damage from any means, including falling ice or snow from roof overhangs.

All line-side unmetered conductors shall be in a continuous length of conduit (except for conduit couplings) from the point of delivery to the meter socket, cold sequence disconnect, or CT cabinet. No conductors other than line-side conductors shall be permitted in line-sideconduits, troughs, or lug landings. Access to the line-side conductors shall be sealable. Junction boxes, conduit bodies (e.g. LB's), or other devices are not allowed without specific written approval from COA Electric.

On an underground service, the center knockout in the bottom of the socket, if provided, shall not be utilized. Line side conductors shall enter through the knockout provided at the left end of the bottom horizontal surface of the meter socket. The line conductors shall be routed along the outermost edges of the meter socket allowing for ground settling, which could pull the line conductors down. Either the knockout on the right end of the bottom horizontal surface, the lower knockout on the right vertical surface, or the lower knockout on the back vertical surface of the meter socket may be used for load

conductors. Load conductors shall not exit the left side of the meter socket. Refer to the Standard Electrical Details Section, Drawings SC-140 and SC-150.

The use of line-side disconnects may be required by COA Electric. Line-side disconnects shall be installed on the same wall directly ahead of and within 24" of the meter. Commercial and industrial self-contained meter installations shall comply with the requirements in Section 3.13 *Cold Sequence Metering.*

Outdoor meters serving structures designed for multiple occupancy, such as an office building or apartment, shall be grouped together at a point nearest the service entrance. Individual meter sockets may be placed as close together as the fittings will permit, but in no case less than 2" apart.

A customer-owned service connection cabinet may be utilized to augment an installation where additional services or metering points would be desirable but are prohibited by this document. Arrangements for a service connection cabinet may be made by contacting COA Electric.

3.10 Meter Socket Identification

The unit number served by the meter shall be plainly marked by a permanent durable means at the meter socket, corresponding main service breaker, tenant panelboard, and doorway or entrance to the apartment, office, store, or other premise. The method of identifying the corresponding unit on the meter socket shall be with a stamped brass, aluminum, or stainless-steel tag securely attached to the meter socket. The stamped tag shall be attached to the exterior, non-removable portion of the meter socket or at the individual meter main disconnect. Any other means of identification at the meter is not acceptable.

3.11 Meter Mounting Heights

The mounting height of meters, measured from the center of the meter to final grade or platform outdoors, or to the floor when installed indoors, are as follows:

1. Single meter sockets:
    a. Self-contained or transformer-rated ---------- 4-ft minimum to 6-ft maximum
    b. Meter pedestals ---------- 4-ft minimum to 6-ft maximum
2. Multiple meter sockets, vertically aligned:
    a. Indoor ---------- 2-ft minimum to 6.5-ft maximum

b. Outdoor ---------- 3-ft minimum to 6.5-ft maximum

The height of multiple meter sockets, either horizontally or vertically aligned, shall be evenly distributed from the center point of the meter stack between the upper and lower height limitations.

If a platform is used to achieve the required mounting heights for a meter installation, it shall be permanent and accessible by a stairway. The minimum horizontal dimensions of the platform shall meet the NEC® requirements for working space as specified in *Meter Clearances* in these Standards and the Standard Electrical Details Section, Drawing CR-120.

Mounting heights are also shown throughout the drawings in the Standard Electrical Details Section.

3.12 Meter Clearances

The minimum working space in front of metering equipment shall be 3 feet, 3.5 feet, or 4 feet in accordance with NEC® Article 110.26(A)(1) and Table 110.26(A)(1). The minimum width of the working space in front of metering equipment shall be the width of the metering equipment or 2'-6", whichever is greater, in accordance with NEC® Article 110.26(A)(2), or as may be amended. Metering equipment includes cold sequence disconnects, CT cabinets, service connection cabinets, switchgear CT compartments, and meter sockets.

Refer to the Standard Electrical Details Section, Drawing CR-120 for working space clearance requirements.

3.12.10 Clearances from Gas Meter Sets

Electrical metering equipment shall be installed a minimum distance from any gas service equipment and shall not be installed in the space above gas service equipment. Refer to the tables below, and the Standard Electrical Details Section, Drawing CR-10 for clearance requirements.

Minimum Clearances from Gas Meter Sets and Sources of Ignition	
Minimum clearance between gas meter sets and sources of ignition.	There shall be a 3' radial minimum clearance between the discharge/release point of the relief device line or regulator vent or connected terminal outlet piping of all gas meter sets and sources of ignition. Any discharge/release point of the relief device line or regulator vent or connected terminal outlet piping must be located outside where the gas can escape freely into the atmosphere and away from any opening into the building.

Minimum Working Clearances from Gas Meter Sets	
Minimum working clearance between gas meter sets and electrical equipment. As an example: electric meter, breaker box, air conditioning unit, electric outlet, etc.	No electrical equipment shall be installed directly above a gas meter or in an area 12" on either side of a gas meter set.
Working clearance between gas meter sets and other obstructions.	In all cases, sufficient working space (3' preferred) in front of and on either side of the gas meter and associated piping shall allow access for inspection, reading, replacement, or necessary maintenance.

3.13 Cold Sequence Metering

All new, rewired, altered, or repaired commercial and industrial self-contained meter installations require the installation of a fusible load-break safety switch with fault current- limiting fuses ahead of each individual meter. Commercial and industrial installations may be subject to available fault currents up to 100,000 symmetrical RMS amps. Current-limiting fuses shall be selected to limit faults to 10,000 symmetrical RMS amps at the meter.

Exception 1: A fault current-limiting circuit breaker may be utilized in lieu of a fusible load-break safety switch if pre-approved by COA Electric. The request for approval shall be submitted in writing and include a fault-current analysis report sealed and signed by a registered Professional Engineer. All requests for approval will be responded to in written form. All calculations shall be based upon the worst-case transformer percent resistance, percent reactance, and percent impedance values.

Exception 2: Multiple commercial tenant meter sockets are permitted to have a single current- limiting main disconnect ahead of the common bus to limit fault current to 10,000 amps. Each individual meter shall have a safety switch or circuit breaker on its line-side to serve as a cold sequence disconnecting means. If a fusible load-break safety switch is utilized for the main disconnect, the current-limiting fuses shall meet all the NEC requirements.

Exception 3: Single-phase commercial installations up to 320 amps are permitted to be hot sequence provided all three of the following conditions are met.

1. Only one meter is served by underground service lateral.
2. The available fault current is below 10,000 amps.
3. The service voltage is 240 volts or less.

Note. Three-phase meters do not qualify for this exception except as specified in Residential Hot Sequence Metering in this Section.

The cold sequence disconnect(s) shall contain provisions for COA Electric wire seal for the cover and COA Electric padlock in the operating handle lock-off position. Wire seals will be used by COA Electric to secure the enclosure from unauthorized entry and will allow the customer emergency access to reset breakers or to replace fuses. A padlock from COA Electric will only be used to lock disconnects in the off position for services that are shut off.

The cold sequence disconnect(s) shall be furnished, owned, and maintained by the customer.

3.14 Hot Sequence Metering

3.14.11 Residential

Residential self-contained meter installations, both single-phase and three-phase, shall be hot sequence metering. Available fault currents in excess of 10,000 amps at the electric meter on residential applications are uncommon. In cases where the available fault current does exceed 10,000 amps, instrument transformer type (CT) metering shall be utilized.

Exception 1: Where the fault current does exceed 10,000 amps, cold sequence metering with a fault current-limiting circuit breaker may be utilized if pre-approved by COA Electric. The request for approval shall be submitted in writing and include a fault-current analysis report sealed and signed by a registered Professional Engineer. Exceptions will not be granted for the use of any type of fault current-limiting fuses ahead of the meter installation. All requests for approval will be responded to in written form. All calculations shall be based upon the worst-case transformer percent resistance, percent reactance, and percent impedance values.

Exception 2: Multiple residential tenant meter sockets are permitted to have a single current- limiting main disconnect ahead of the common bus to limit fault current to 10,000 amps. Single-phase or three-phase commercial house power meters (e.g. common lighting, emergency lighting, or laundry facilities) may be protected by the current-limiting main disconnect that serves the residential meter stack. Common lighting, emergency

lighting, or laundry facility meters not fed from a protected meter stack shall be cold sequence. If a fusible load-break safety switch is utilized for the main disconnect, the current-limiting fuses shall meet the NEC requirements. A fault current-limiting circuit breaker may be utilized for the main disconnect if approved by COA in accordance with exception 1 above.

3.14.12 Commercial and Industrial

Hot Sequence metering is the required installation method for commercial and industrial instrument transformer type (CT) metering. Cold sequence disconnects are not allowed ahead of the CT cabinet.

Chapter 4: Transformers

4.1 General

Transformers are installed and maintained by COA Electric.

COA Electric will not furnish transformers unless they are of standard size and voltage as established by COA Electric. The customer shall notify COA Electric in advance of any change in the customer's load requirements that may affect the installed transformer capacity.

1. If the customer's power requirements within six months after the installation of transformers proves to be significantly greater or less than shown in the application for service, COA Electric may make a change in the installed transformer capacity and the customer may be required to pay COA the cost of making the change.
2. An increase in the transformer capacity may increase the available fault current and might affect the adequacy of the interrupting capability of the main disconnect.

4.2 Pad Mounted Transformers

1. Clearance - A minimum of ten (10) ft clearance, for hot stick operation, shall be maintained in front of the doors of the pad mounted transformer in perpetuity. Transformers will not be located under any overhang (roof, balcony, stairs, etc.). Provide a minimum of 36" rear and side clearances from the pad (not the transformer). Pad mounted transformers require air circulation for cooling. Clearances required in specific cases may be obtained from COA Electric.
2. Vaults - Pre-cast concrete vaults are located beneath each pad mounted transformer. The vault provides space to allow extra length of primary (14,400 volt) cable to be coiled in case terminators need to be replaced. The vault also contains the ground rod and grounding conductor for the primary distribution system. All services fed from this transformer will also occupy space in the vault. The top of vault shall be a minimum of 6-inches above finished grade. Refer to *Underground Service* in Section 3 for additional information. The installation shall conform with the practical limits to the Standard Electrical Details Section, Drawing CR-100.
3. COA Electric will own, operate, and maintain the primary underground installation between the adjacent distribution facilities and the transformer, including the primary cable, ducts, transformer, and protective equipment. The

customer will own and operate the secondary installation, including all equipment downstream of the transformer secondary terminals, except for the meter.

4. COA Electric will make and maintain all connections at the transformer terminals. No customer-owned switches, fuses, etc. may be located within the area designed to contain a transformer installation without written approval from COA Electric.
5. The property shall be to final grade (+/- 6 inches) except at the equipment location, which shall be to exact final grade. Property pins shall be in place with the structure staked or the foundation in, prior to installation of the pad-mounted equipment and splice boxes.
6. If, in the judgment of COA Electric, the selected location for the installation of the pad- mounted equipment is not adequately protected from traffic, the customer shall be required to furnish and install either a fence, guardrail, or guard post bollards to protect the pad-mounted equipment installation. The installation shall conform within practical limits to the Standard Electrical Details Section, Drawing CR-90.
7. An underground cable vault is required for all new transformer installations.
8. When conditions require the replacement of an existing transformer, a new cable vault shall be provided for the replacement transformer.
9. Boom truck access to transformer must be provided.
10. In general, transformer secondary conductors shall not be routed through the public right of way and must remain on the same block as the transformer, unless specifically granted a variance by the COA Electric.

Refer to the Standard Electrical Details Section, Drawings CR-30, CR-30A, CR-40, CR-50, CR-60 and CR-90 for typical pad-mounted transformer installation and clearance requirements.

Customer-Owned Service Conductors

All customer owned service conductors must be installed in conduit and conform to the requirements of NEC® 230 Parts I, III and IV. The number and size of customer-owned conductors that may be terminated to COA Electric may be limited by the existing installation. Consult with COA Electric for existing capacity.

4.4 Point of Delivery

The point of delivery for a customer served by an underground service lateral is the secondary terminals of the pad mounted transformer. Customer installed service installations shall be 500 kcmil conductor, or smaller, for termination to facilities within COA. The number of conductors that may be terminated is limited by the type of installation.

The maximum number of runs within a single-phase transformer is eight runs of three wire cable.

The maximum number of runs within a three-phase transformer is twelve runs of four wire cable.

4.5 Grounding

All separately derived service systems that operate below 1000 volts (phase to ground) contain a grounded neutral or a grounded phase conductor used as a circuit conductor in the system. The grounded neutral or grounded phase conductor is grounded at the service transformer and will be run from the transformer bank to the meter socket and to each service disconnection means in accordance with NEC® Article 250.

4.6 Fault Current Interrupting Rating for Transformers

It is the intent of COA Electric to address the customer's need for information concerning fault current requirements pertaining to transformer fuses, and breakers for new construction, rewire, or additional load. Refer to NEC® Article 110.9 and 110.10.

4.7 Outdoor Transformer Building Separation Requirements

Spacing of transformers from buildings depends on the quantity of oil contained within the transformer and the type of insulating oil utilized. Outdoor installation requirements are shown in NEC® 450 and are summarized as follows:

Table 1: Outdoor Transformer Installation Requirements

NEC Section 450.23 Requirements - Outdoor Installations

INSTALLATION TYPE Non-combustible building* and no combustible materials stored in area	INSTALLATION TYPE Combustible building* or combustible materials stored in area
NEC REQUIREMENT ■ Either of the following listing requirements** A. Underwriters Laboratories B. FM Global	NEC REQUIREMENT ■ In accordance with NEC Section 450.27, Oil Insulated Transformers Installed Outdoors i.e. space separation, fire barriers or water spray systems

* Refer to NFPA 220 for definition of non-combustible Type I and II building construction.
** Fine Print Note, Section 450.23, (B)(1) states: "Installations adjacent to combustible material, fire escapes, or door and window openings may require additional safeguards such as those listed in Section 450.27.

All COA Electric transformer installations shall conform to the requirements of NEC® 450, UL and FM Global requirements. A summary of oil quantity, types and separation requirements are shown below:

Table 2a: Separation Distance between Outdoor Liquid Insulated Transformers and Buildings

Liquid	FM Approved Transformer or Equivalent	Liquid Volume gal/(m^3)	Horizontal Distance**			Vertical Distance ft/(m)
			Fire Resistant ft/(m)	Non-Combustible ft/(m)	Combustible ft/(m)	
Less-Flammable (Approved)	Yes	N/A	3 (0.9)	3 (0.9)	3 (0.9)	5 (1.5)
	No	≤10,000 (38)	5 (1.5)	5 (1.5)	25 (7.6)	25 (7.6)
		>10,000 (38)	15 (4.6)	15 (4.6)	50 (15.2)	50 (15.2)
Mineral Oil	N/A	<500 (1.9)	5 (1.5)	15 (4.6)	25 (7.6)	25 (7.6)
		500-5,000 (1.9-19)	15 (4.6)	25 (7.6)	50 (15.2)	50 (15.2)
		>5,000 (19)	25 (7.6)	50 (15.2)	100 (30.5)	100 (30.5)

* FM Global Loss Prevention Data Sheet 5-4, Table 2a
** All transformer components must be accessible for inspection and maintenance.

Liquid	FM Approved Transformer or Equivalent	Fluid Volume gal/(m^3)	Distance** ft/(m)
Less-Flammable (Approved)	Yes	N/A	3 (0.9)
	No	≤10,000 (38)	5 (1.5)
		>10,000 (38)	25 (7.6)
Mineral Oil	N/A	<500 (1.9)	6 (1.5)
		500-5,000 (1.9-19)	25 (7.6)
		>5,000 (19)	50 (15.2)

* FM Global Loss Prevention Data Sheet 5-4, Table 2b
** All transformer components must be accessible for inspection and maintenance.

Table 2b: Outdoor fluid insulated Transformers Equipment Separation Distance

Chapter 5: Utilization Equipment

All electric wiring, ducts, cables, and apparatus, including protective equipment, necessary for utilization of electric service on the customer's side of the point of delivery, shall be furnished, installed, and maintained by the customer. Such equipment should be selected to provide efficient use of energy and good voltage regulation. The customer shall not use any equipment or device that will adversely affect service to any COA customers. The customer's equipment shall be suitable for the service supplied and shall be installed and maintained in good and safe condition by the customer in accordance with the rules and requirements of the National Electrical Code®, and COA Electric.

5.1 Three-Phase Voltage Unbalance

$$Percent\ Voltage\ Unbalance = 100 \times Maximum\ Voltage\ Deviation\ from\ Average\ Voltage$$

Example: Voltages of 220, 216 and 209. The average is 215, the maximum deviation from the average is 6, and the Percent Voltage Unbalance = 2.79%

COA's goal is to limit the maximum steady-state voltage unbalance to 3 percent, in accordance with ANSI C84.1. Voltage unbalance will be measured at the customer's service entrance with all loads disconnected. The customer's load may affect voltage measurements because of 3-phase load and power factor unbalance. Because it is not always practical to require the customer to disconnect all load, COA may take measurements by measuring individual phase loads and power factors and calculating their effect on measurements taken without disconnecting the load.

When a customer's three-phase service voltage is found to have an unbalance greater than 3 percent, COA will act to reduce the unbalance and bring it within these limits within a reasonable length of time.

5.2 Harmonics

There are a growing proportion of harmonic producing non-linear loads on distribution systems. Excessive harmonic distortion on the distribution system can have adverse effects on both utility and customer equipment. To limit the harmonic currents and resulting harmonic voltages created by non-linear loads, the guidelines included in IEEE Std 519-2014 "IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems" shall be followed. The following table gives the allowable limits of electric current distortion at the point of delivery.

Current Distortion Limits for General Distribution Systems (120 through 69,000 V)

Maximum Harmonic Current Distortion in Percent of IL						
	Individual Harmonic Order (Odd Harmonics)					
Isc /IL	h <11	11=h <17	17=h <23	23=h <35	35=h	TDD
<20	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

“Isc” is the short circuit current available from COA’s transformer.

“IL” is the maximum demand load current (fundamental frequency component) on The COA’s transformer. IL may be calculated as the average current of the maximum demand for the preceding twelve months.

“h” is the order of the harmonic.

Even harmonics are limited to 25% of the odd harmonic limits listed in the table. The current distortion limits apply to a demand interval of 15 minutes. Current distortions that result in a direct current offset (e.g. half- wave converters) are not allowed.

“TDD” is the total demand distortion in percent where:

$$TDD = \frac{\sqrt{I_2^2 + I_3^2 + I_4^2 + \ldots I_h^2}}{I_L} \times 100$$

Individual harmonic current distortion is:

$$\%I_h = \frac{I_h}{I_L} \times 100$$

5.3 Power Factor Adjustment

Requirements for power factor adjustment vary depending on COA’s established Rates, Rules, and Regulations. Contact COA Electric for specific information.

Low power factor has an adverse effect, not only on COA's electric system, but also on the customer's electric system. Improvement in the latter alone often warrants the customer's installation of high power-factor equipment.

5.4 Motors

Appliances and apparatus should be equipped with motors which will provide the customer with satisfactory operation of the appliance and at the same time avoid

interference with service to other customers. Motors may cause voltage disturbances resulting in flickering lights, television interference, and other objectionable conditions.

5.4.1 Motor Identification

All motors connected to COA's lines shall bear a manufacturer's nameplate indicating horsepower, continuous or intermittent duty, speed, voltage, and current ratings. When a motor is rewound to produce a change in the original design, a new nameplate shall be attached indicating the new characteristics.

5.4.2 Motor Voltage

All new motor installations shall be designed to operate on the type of service provided by COA. COA Electric will advise the customer as to the type of service available at the location where the motor is to be used. Inquiry should be made before purchasing or installing the motor.

5.4.3 Allowable Starting Current

The starting current characteristics of an electric motor are of primary importance to the voltage disturbance the motor will create on COA's system. The starting kVA/hp for large motors generally does not exceed 6 times the full load kVA/hp. The resulting voltage drop to the system may be acceptable under certain conditions. Starting current can be limited by the motor design or by use of auxiliary control equipment which reduces the voltage drop at the motor terminals during the starting interval. The auxiliary control equipment shall comply with the limitations provided under HARMONICS in this Section. Automatically controlled motors shall be adjusted to not exceed the starting limitations provided by COA. The voltage flicker that is produced by starting automatically controlled motors shall meet the limitations specified under *Voltage Flicker* in these Standards.

Depending on the service size, the starting current of residential central air conditioners can cause objectionable voltage flicker. The magnitude of the voltage flicker increases with the size of the air conditioner. Air conditioners 4 tons or larger are of special concern. Contact COA Electric when assistance is required to determine actual field conditions and limitations.

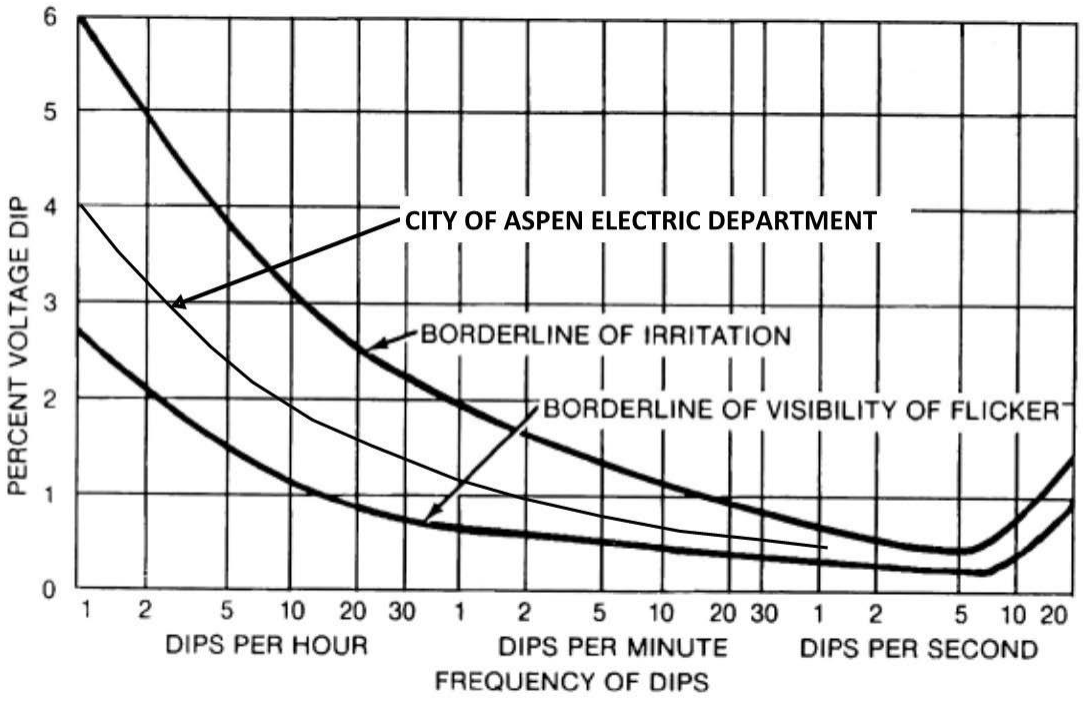
5.4.4 Voltage Flicker

COA uses IEEE Standard 141-1993 as a guideline for the level of allowable flicker. Customers are not allowed to start any load on the COA’s electric system that produces unacceptable levels of flicker which affect other customers. Customers are responsible for correcting unacceptable flicker problems in a timely manner when notified by the COA.

COA offers assistance to customers in regard to flicker problems. Fees may apply for these services.

Flicker Curve

Source: IEEE141-1993



5.4.5 Horsepower Rating

Motors rated 5 horsepower or smaller shall be single-phase unless an established three-phase service exists. Single-phase motors larger than 5 horsepower will not be permitted on services supplied on a residential rate schedule without permission of COA. Single-phase motors larger than 5 horsepower may be permitted on services supplied on a non-residential rate schedule with COA's approval. Larger motors may require starting compensation to limit voltage variation on the system - consult COA if there is any doubt. COA will not be held responsible for, nor continue service to, motors with unacceptable starting characteristics.

5.4.6 Grounding

The frame of all motors and starters shall be grounded in accordance with the NEC®.

5.4.7 Protection of Customer-Owned Equipment

Whenever the inherent design of a motor or the characteristics of the load which it serves are such that either automatic reclosing of the electric circuit after a power interruption or sustained low voltage would damage either the motor or the driven equipment, the customer should provide adequate protection to prevent such damage. Starting compensators, auto starters, or equivalent apparatus included in each motor installation should be equipped with under-voltage protection to return the starting apparatus to the “off" position upon failure of the supply circuit.

Three-phase motors which would cause damage to the driven equipment due to a reversal of motor rotation should be equipped with reverse-phase relays to disconnect the motor from the line if it should receive single-phase or reverse-phase power. In addition, mechanical devices should be installed to prevent damage due to travel of the driven mechanism in the wrong direction. COA assumes no liability for damage resulting from single-phase or reverse- phase operation of three-phase equipment.

Over-current protective devices that protect against under-voltage and single phasing events should be provided for three-phase motors and it is the responsibility of the customer to provide them.

5.5 Non-Linear Loads

It is necessary that welders, x-ray machines, variable-speed drives, and any other large non- linear loads, permanent or temporary, be installed and operated in such a manner that they will not impair service to other customers.

The limited use of single-phase transformer type welders is permitted when adequate transformer and distribution capacity is available, provided the maximum welder input cannot at any time exceed 60 amperes at 240 volts or 30 amperes at 120 volts. The customer shall consult COA Electric prior to the purchase or installation of welders exceeding these limits. Service for motor-generator and synchronous converter type welders will be governed by the rules and regulations for motors.

5.6 Water Pipe Thawing

Because of the danger of damage to its equipment and impairment of its service, COA Electric does not permit direct line connection to water pipes for thawing purposes. Customers or contractors desiring service for water pipe thawing apparatus should consult COA Electric.

5.7 Special Apparatus

The customer shall consult with COA Electric before any special apparatus or any apparatus requiring extremely close voltage regulation is connected. It is necessary that electrical equipment be installed and operated in a manner that will not impair service to other customers. The use of welding machines, x-ray machines, elevators, or other equipment having fluctuating or intermittent load characteristics, or having an abnormal effect on voltage, may require furnishing service through isolated transformers and separate service drops or excess capacity facilities to protect the quality of service to the customer or to other customers. COA reserves the right to charge the customer the full cost of facilities necessary to provide any special service required by such equipment and to prevent any impairment in service to other customers.

5.8 Load Balance

The customer's wiring on three-wire, single-phase installations shall be so arranged that the connected load from one phase to neutral shall not exceed 200 amps. The use of single-phase loads on three-phase services shall not unbalance the current per phase more than ten (10%) percent.

The percentage unbalance is calculated by taking the maximum deviation from average amperage and dividing it by the average amperage as shown in the following example:

Given:

- A phase current = 38A
- B phase current = 38A
- C phase current = 44A

Then:

- Average current = 40A
- Maximum Deviation = 44A – 40A = 4A
- Percent Unbalance = (Maximum Deviation/Average Current) x 100% = 10%

COA Electric normally will not install three-phase where single-phase is adequate. Exceptions can be made where it is mutually advantageous to both COA Electric and the Customer. Normally, only motors up to and including 5 horsepower rated at NEMA Codes A through G can be served single-phase. It is strongly recommended that no residential customers be served from any single-phase transformer which serves a single-phase motor of 5hp or greater. Three-phase motors connected using phase converters are considered as single- phase motors.

Chapter 6: Special Types of Services

6.1 Temporary Service

Temporary service may be made available prior to the installation of the permanent meter. Temporary service shall be restricted to as short a time as possible, such as the time necessary for the construction of a building. Temporary service will be provided by COA in accordance with its established Rate Schedules.

6.1.1 Underground Temporary Service

Where permitted by COA, temporary service may be supplied and installed in accordance with the requirements shown in the Standard Electrical Details Section, Drawing TM-20. The underground service lateral and meter support shall be supplied and installed by the customer in accordance with the requirements shown in the Standard Electrical Details Section, Drawing TM-20 and the additional requirements of this Section. The meter support shall be installed at a distance not less than 6 feet from the service pedestal or pad-mounted transformer and shall clear all utility easements and underground obstructions. The temporary service lateral conductors shall be an approved type for direct burial installation and installed by the customer in accordance with the National Electrical Code. The grounding electrode conductor shall be furnished and installed by the customer and shall comply with NEC® Article 250, or as may be amended. The ground rod(s) shall be furnished and installed by the customer and shall be installed outside of all utility easements.

6.1.2 General Requirements for Temporary Service

The service address shall be prominently displayed on the temporary service installation. Entry into and connections within all pad-mounted or underground facilities will be made by COA. Temporary service to be disconnected within 30 days of energizing of permanent service.

The meter socket shall be furnished and installed by the customer unless it is a CT metered service above 400A. Temporary service installations shall be braced as shown in the respective Drawings in the Standard Electrical Details Section to withstand normal service drop tension and normal use of the facility.

Temporary meter service panels shall not be attached to vehicles or trailers. Refer to the Standard Electrical Details Section, Drawing TM-20 for acceptable temporary meter panel designs. In the event that a temporary service installation fails or collapses, it will be disconnected by COA until repaired by the customer.

The service equipment shall be rated NEMA 3R and all 120 volt, single-phase, 15, 20 and 30 amp circuits shall be equipped with ground-fault circuit interrupters in accordance with NEC.®

6.2 Distribution Connected Customer-Owned Generation

The customer shall inform COA of plans to install and connect generating equipment to COA's system. It is in the best interest of both COA and the customer to obtain acceptance for interconnection and approvals from COA before the customer completes final designs or purchases any equipment. Customer-owned generating equipment shall be installed without causing adverse effects to COA's or customer's equipment, without introducing potentially dangerous situations to COA's personnel or the public and shall be limited in capacity to the customer's energy usage.

Generation that can operate either momentarily or continuously in parallel with COA facilities shall incorporate protective devices (relays, circuit breakers, etc.) and metering equipment as specified by COA Electric. The customer's installation shall meet state Commission rules for distributed generation, all applicable national, state, and local construction and safety codes, and applicable FERC, regional reliability council, and OATT rules.

Close coordination with COA Electric is required. The specific Interconnection guidelines depend on the type, size, and operating mode of the generation that is proposed. Normally, generation facilities totaling over 10 MW are connected to the area electric transmission system. The local transmission provider should be contacted for a copy of the interconnection requirements for larger facilities.

COA will not assume any responsibility for the protection of the customer's facility or any portion of the customer's electrical equipment. The customer is fully responsible for protecting their equipment from damage caused by faults or other disturbances on the COA's system.

COA will review the customer's design for interconnection acceptance only. COA will not approve the reliability or adequacy of the customer's design.

6.3 Generators Operating as a Backup Source

There are three types of backup power systems considered in this Section:

1. Emergency System
2. Legally Required Standby System
3. Optional Standby System

All three types of backup power systems are required to follow all of the appropriate codes, rules, regulations and policies (federal, state, local and COA). All three types of facilities are required to follow manufacturer's recommendations for the installation of equipment and protective devices. Any conflict between the codes, rules, regulations, policies and manufacturer's recommendations will be resolved by COA Electric.

General statements concerning Non-interconnected Power Producing systems are as follows:

1. Use of any power producing backup power systems must be in accordance with the National Electric Code® and the manufacturer's recommendations.
2. Power producing backup power systems must be connected in such a manner that back feed to the utility is not possible.
3. Permanently connected power producing backup power systems shall use a properly rated double-throw switch (break before make switch) to disconnect from the utility and connect to the load.
4. Transfer switches other than double-throw switches (break before make switches) are not allowed.
5. Transfer switches shall be connected on the load side of the service disconnect. Consideration to be connected between the transformer and main disconnect will be given to legally required standby systems and permission only granted with written approval from COA.
6. Portable generators should only be connected to the load after the source-side disconnect is opened, locked, and tagged.

6.4 Generators Operating as a Parallel Source

Any generator that can be operated in parallel with the COA electrical system shall meet the requirements of COA Electric. Metering and labeling requirements for parallel generators are included herein for reference. Contact COA Electric for more information.

The COA will allow customers to connect certain on-site generating equipment to the COA electric distribution system. All generating equipment shall be "non-islanding" per IEEE-1547.

The customer shall inform COA of plans to install and connect generating equipment to COA's electric distribution system. It is in the best interest of both COA and the customer to obtain COA's interconnection acceptance and approvals before the customer completes final designs or purchases any equipment. Customer-owned generating equipment shall be installed without causing adverse effects to COA's electrical

distribution or customer's equipment and without introducing potentially dangerous situations to COA's personnel or the public.

If the customer's service does not meet the requirements for Section 3 of this document, it shall be brought into compliance prior to parallel operation of the generator.

Generation that can operate in parallel with COA's facilities shall incorporate protective devices (relays, circuit breakers, etc.) and metering equipment. The customer's installation shall meet state Commission rules for distributed generation, all applicable national, state, and local construction and safety codes, and applicable Federal Energy Regulatory Commission, regional reliability Council, and COA's rules and regulations.

The specific Interconnection guideline that is applicable depends on the type, size, and operating mode of the generation that is proposed. COA may limit distribution voltage interconnections for large generators to preserve the reliability of the distribution system.

COA will not assume any responsibility for the protection of the customer's facility or any portion of the customer's electrical equipment. The customer is fully responsible for protecting their equipment from damage caused by faults or other disturbances on COA's distribution system.

COA Electric will review the customer's design for interconnection acceptance only. COA Electric will not approve the reliability or adequacy of the customer's design.

1. Labeling/Placard Requirements – All required labels or placards shall be weatherproof, durable and permanently (screws or rivets) attached to the meter socket, or other equipment as necessary. Check with COA for additional requirements, such as sizing, color, and verbiage. In addition to any labels required by the state or Authority Having Jurisdiction, the following labels are required:
    a. "Generation System Connected" or similar, located on or directly adjacent to the revenue meter socket.
    b. "Utility AC Disconnect" located on the utility accessible AC disconnect.
    c. "Generation Production Meter" or similar, located on or directly adjacent to the production meter socket.
    d. If the AC Disconnect or Generation Production Meter are not within close proximity and line of sight to the revenue meter, the customer shall post at the revenue meter a clearly labeled map showing the location of the revenue meter, AC disconnect, production meter, and generation facility.
2. Metering Requirements – Certain types of generating equipment may qualify for net metering. Check the Rules and Regulations and electric rates and fees for net metered rates.

a. Net Metering – Net meters are bi-directional meters that measure both directions of power flow and are used on distributed generation that utilizes renewable energy sources. Metering both directions of power flow allows customers to generate in parallel with COA. For all installations of net metered generation approved after 6/1/2016, a meter capable of two-way communications via the COA's standard meter communications system must be installed.
b. Production Meters – Production meters are COA's meters that measure the gross generation of a distribution connected generator. When production meters are used, there are additional requirements to ensure the safety of the COA's personnel and the public. All production meters shall be capable of two-way communications via the COA's standard meter communications system.

3. A single point of manual AC disconnecting means shall be installed between the generation source and the production meter, adjacent to the production meter. This point of manual AC disconnecting means shall provide a visible, lockable open and be readily accessible to the utility at all times.
4. The customer supplied production meter socket or CT compartment shall meet all of the requirements of the COA.
5. The production meter shall be located within ten (10) feet and clear line of sight of the revenue meter. If this cannot be accomplished, additional labeling at each meter directing personnel to the other meter location is required. Written approval of each location from the COA is also required.
6. Self-contained production meter sockets shall have the generation source wired to the load-side terminals of the self-contained meter socket. When instrument transformers are used for production metering, the H1 polarity marking shall be facing the customer generation source.
7. The production meter socket shall be labeled in accordance with the requirements of this Section.
8. The production meter must be protected by an overcurrent protective device with a minimum interrupting rating of 10,000 amps symmetrical current or greater. Such disconnect must meet the requirements in Section 3, *Service Facilities*.

A customer-owned production meter may be installed at customer's expense. This meter will not be supplied, installed, or maintained by COA. If the customer owned production meter is in series with the COA required production meter, there shall be a manual means of disconnect between the two production meters.

6.5 Connecting an Electric Vehicle Charger

COA will allow customers to connect certain Electric Vehicle (EV) chargers to the COA electric distribution system. Refer to the manufacturer's installation instructions.

The steps to connect an Electric Vehicle charger are as follows, but not limited to:

1. Notify COA Electric.
2. COA Electric will review the installation.
3. If it is necessary to increase the electrical service size to accommodate the Electric Vehicle charger, the customer is responsible for all associated costs.
4. Customer to perform infrastructure upgrades, if necessary.
5. A sub-meter may be required.

Chapter 7: Variance Requests

7.1 General

The City will review written requests and/or suggestions for revisions to these standards when submitted to the Electric Department. If the proposed suggestion offers equal or better safety and reliability than the current practice, then the suggestion will be reviewed for possible incorporation.

7.1.1 Variance Requests

Only requests for exceptions based on extenuating circumstances will be evaluated. The request shall be submitted in advance of construction and purchase of equipment. Requests are granted on a case-by-case basis and exceptions will not be granted verbally.

Variances requests from the standards, policies, or submittal requirements of this document shall be submitted in writing with appropriate documentation and justification to the Director of Utilities or Electric Superintendent. Variance requests must, at a minimum, contain the following information:

- Criteria from which the applicant seeks a variance.
- Justification for not complying with the criteria.
- Alternate criteria or standard that is proposed to comply with the intent of the criteria.
- Supporting documentation, including necessary calculations, etc.
- Potential adverse impacts of the proposed variance and alternate criteria on electrical safety and reliability for equipment on public and private property.
- An analysis of the variance request may need to be signed and stamped by a Professional Engineer licensed in the state of Colorado, depending on the variance request.

Upon receipt of a complete application for a variance, the Director of Utilities will prepare a statement, based on the ability of the proposed project to meet the requirements of the COA Electrical Standards, recommending approval or disapproval, or requesting modifications of the proposed variance. Refer to the Appendices for the required Variance Request Form.

Chapter 8: Appendices

City of Aspen
Request for Variance Form

A completed form must be submitted with any request for variance.

This form is to be used when requesting a variance to the *City of Aspen Electrical Standards*. Exceptions will not be granted if reliability or safety is compromised. Please print legibly or type. Attach this form to any supporting documentation, including necessary calculations, one-line diagrams, sketches, etc. Form must be completed by a Professional Engineer or qualified individual as defined in these standards.

Submit this completed form to the COA Electrical Superintendent for review.

I seek a variance to the following Section(s): _____

Address of Project: _____
Construction Start Date:_____

This Section is responsible for the following problem(s):

I request the following variance:

This practice will maintain/improve safety and reliability by:

Submitter:_____Date:_____

Signature &/or PE Stamp:_____
I certify that the above information is true and correct to the best of my knowledge.

Company name:_____
Company address:_____
City:_____State:_____Zip:_____
Telephone:_____Email:_____

CITY OF ASPEN

Request for Courtesy Lock and Liability Waiver

A completed form must be submitted with any request for a courtesy lock.

This form is to be used when requesting a courtesy lock. Please print legibly or type. Submit this completed form to the COA Electrical Superintendent for review.

I,_____, (referred to herein as "Owner") an electrician duly licensed by the State of Colorado, request access to transformers owned by City of Aspen Electric Department, on behalf of myself and, if applicable, the undersigned company (herein '"We" or "Us"). We agree that the City of Aspen Electric Department will place a Courtesy Transformer Lock on a transformer at our request allowing us or our employees access to such. We hereby assume full responsibility for all onsite activities, equipment, and facilities, whether owned and maintained by City of Aspen Electric Department or by us, for as long as the Courtesy Transformer Lock is installed, and we agree to perform our activities and operate such equipment and facilities, according to applicable electrical standards of City of Aspen ElectricDepartment.

In addition to the City of Aspen Electric Department standards and requirements, we agree to comply with all applicable provisions of Federal, State, and Municipal construction, safety, health and sanitation statutes, codes, and regulations, and by higher than minimum standards, if necessary or prudent. We shall furnish City of Aspen Electric Department with any documentation necessary to show such compliance.

We agree to defend, pay on behalf of and hold harmless City of Aspen Electric Department and its directors, officers, agents, and employees from all claims of whatsoever nature or kind, including those brought by employees of the undersigned owner or company or subcontractors, arising out of or as a result of any act or failure to act, whether or not negligent, in connection with the performance of the work to be performed pursuant to this contract by the undersigned, its employees, agents and subcontractors. We agree to defend and pay all costs in defending these claims, including attorney fees.

We also agree to pay to City of Aspen Electric Department any damages to its property, or injury to its employees or agents, occurring during the period of granted access, and shall be liable for City of Aspen Electric Department attorney's fees and costs incurred in enforcing the provisions of this paragraph.

Further, we agree to maintain public liability and property damage insurance (including automobile public liability and property damage insurance) to cover the obligations set forth above. The minimum insurance limits of liability shall be $1,000,000 bodily injury and property damage. We further agree to maintain statutory minimum or greater levels of Workers' Compensation Insurance. City of Aspen Electric Department shall receive a minimum 30-day notice in the event of cancellation of insurance required by this agreement.

We shall furnish a certificate of insurance to City of Aspen Electric Department showing that the above obligations and requirements are provided for by a qualified insurance carrier prior to access being granted.

We will immediately notify City of Aspen Electric Department when our access to the transformers is no longer needed or required.

NAME OF OWNER/COMPANY NAME: TELEPHONE:

SIGNATURE: DATE:

TITLE:

City of Aspen Utilities
ELECTRIC LOAD FORM
To be submitted by Electrical Designer or Electrical Contractor

REMINDER: This Load Form, along with copies of any associated City of Aspen electric bills, are required as part of your Electric Permit submittal on the Salesforce Portal.

Contact Information

Name of Person Submitting:		Date:
Property Owner Name:	Phone #:	Email:

Electrical Contractor Information

Electrical Contractor Company Name:		Contact Person:
Phone #:	Master Permit #:	Email:

Location Information

Service Location:

Service Information:

The information in this section will be used by Electric Field staff to accurately establish new or updated electric service on this parcel.

Existing Service Information		New Service Information	
◯ N/A – No Existing Service at this Location		◯ N/A – Existing Service at Service Entrance will Remain Unchanged	
Service Type:		Service Type:	
Transformer #:		Service:	
Transformer Size: Keva			
Voltage:		Voltage:	
Service Terminates In:		Service Terminates In:	
Service Entrance Size: Amps		Service Entrance Size: Amps	
Conductors/Phase:	Conductor Size:	Conductors/Phase:	Conductor Size:
# of Cables/Wires	Solar: ◯ Yes ◯ No	# of Cables/Wires	Solar: ◯ Yes ◯ No

Meter Information:

The information in this section will be used by Aspen's Utility Billing staff to correctly create Electric Work Orders and to properly update all associated City of Aspen Electric accounts and rate structures.

***Required: Existing Meter Information for ALL Meters on Site**

◯ N/A – No Existing Meter sat this Location

Required: All City of Aspen Electric Account #s Associated with Current Electric Meters and this Electric Permit.

***Required: New Meter Information**

For multi-occupancy buildings, tenant meters will only be installed for spaces being furnished under this permit. Core and Shell only projects will only receive a house meter on the C&S permit.

Max. Potential # of Meters at Build Out: _____Commercial _____Residential

Meter Number:	Breaker Size at Meter:	Meter Will:
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove
#_____	____Amps	☐ Stay ☐ Remove

***Required--Number of Meters Being Requested**

Commercial Meters:	Residential Meters:
____Phase ____W____/____V	____Phase ____W____/____V
Number of Meters Needed:_____	Number of Meters Needed:_____
Breaker Size at Meter:	Breaker Size at Meter:
_____ @ _____Amps	_____ @ _____Amps
_____ @ _____Amps	_____ @ _____Amps
_____ @ _____Amps	_____ @ _____Amps
_____ @ _____Amps	_____ @ _____Amps
_____ @ _____Amps	_____ @ _____Amps

City of Aspen Electric Service – Phone: 970.920.5110 Email: electricservice@aspen.gov

APPLICATION FOR SOLAR PHOTOVOLTAIC INSTALLATION

This Application MUST be submitted with all other required documentation for proposed Interconnection at https://www.aspen.gov/1211/Permit-Portal-Support

NOTE: THIS APPLICATION IS FOR CITY OF ASPEN ELECTRIC CUSTOMERS ONLY. IF YOU ARE A HOLY CROSS ENERGY CUSTOMER, DO NOT PROCEED WITH FILLING OUT THIS APPLICATION FOR SOLAR PV.

CITY OF ASPEN ELECTRIC ACCOUNT # (12 Digits): _____
*** You must also provide a copy of a current CoA Electric bill.**

Deadline for Required Approvals and Operation of System

1. This Application must be signed and dated by the property owner/CoA Electric customer.
2. The PV system must be installed, inspected, and approved by the City of Aspen and operational at the time of inspection.
3. All required Interconnection Agreements, Government Inspections, Insurance Certificates, Customer Application, and other documentation, as may be required, must be received and approved by the City of Aspen.

CITY OF ASPEN CUSTOMER OF RECORD INFORMATION	
Property Owner/Electric Customer Name:	
Installation Address:	
Contact Phone (Home):	Mobile:
Email Address:	

APPLICANT INFORMATION	
Designer/Installer Contact Name:	Email:
Company:	
Address:	
City, State, Zip:	Phone:

PHOTOVOLTAIC SYSTEM INFORMATION	
Size (DC Nameplate rating in kW):	Inverter Manufacturer:
PV Module Manufacturer:	Inverter Model Number:
Number of Modules:	Number of Inverters:
Size of Modules:	A/C Disconnect:
Mounting Type:	Estimated Date for "Full Time" Operation:
Existing Electric Service Size (Amps):	Proposed Electric Service Size (Amps):
Existing Consumption Requirement (kWh):	Proposed Consumption Requirement (kWh):
Proposed Annual Production (kWh):	***Please include Internal Load Calcs and CoA Load Form***

BATTERY/STORAGE SYSTEM INFORMATION	
Size (Nameplate Rating):	Discharge Capacity (kW):
Battery Manufacturer:	Model Number:
Number of Batteries:	

METERING ENVIRONMENT
Current Electric Meter Number(s):
***Production and Net Meter Sockets Required for Interconnection**

Having read and understood the requirements associated with this Application form, I (and/or) we, as the City of Aspen Customer of Record, do hereby acknowledge and agree to all terms and conditions set forth in the City of Aspen Municipal Code and Electric Distribution Standards.

Property Owner Name:	
Property Owner Signature:	**Date:**
Applicant Name:	
Applicant Signature:	**Date:**

CITY OF ASPEN USE ONLY	
Service Location:	Utilities Account Number:
Meter Number:	
Consumption History—prior 36 months' average usage, if applicable:	
Date Received:	
Comments:	
APPROVED ○ / DENIED ○ Signature: Date:	

CITY OF ASPEN
EASEMENT AGREEMENT

This Easement Agreement is entered into this _____ day of _____, 20__, by and between THE CITY OF ASPEN ("City" or "Grantee"), a Colorado municipal corporation and home rule city, whose address is 427 Rio Grande Place, Aspen, CO., and _____, whose address is _____ ("Grantor").

Recitals

A. The City owns and operates the City of Aspen municipal electric system.

B. The City owns, operates, maintains, repairs and replaces the electric distribution mains and other infrastructure (excluding individual service lines) required for the provision of electric service.

C. Grantor owns real property legally described in Exhibit A, incorporated by this reference (the " Subject Property").

D. In order to use, operate, maintain, repair and replace its electric facilities and other infrastructure, the City requires an easement from Grantor over Grantor's Property.

E. Grantor is willing to grant and convey an easement to the City on the terms and conditions herein provided;

THEREFORE, IN CONSIDERATION of the promises and agreements set forth below, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. Grant of Easement. Grantor does hereby grant and convey to the City a perpetual non-exclusive easement and access (the "Easement") for the purposes of excavation, installation, operation, use, maintenance, repair, and replacement of the City's electric lines, and associated facilities located within the easement premises. The Easement is described on Exhibit A, which is attached hereto and incorporated herein by reference. The Easement, and access thereto, are granted over, upon, across, in and through the Subject Property. This Easement shall run with the land for the benefit of the City, and shall be binding upon and inure to the benefit of the City, and its successors and assigns.

2. Use of Easement Premises by City. The City's agents, employees, contractors and other designated persons may go upon the Easement at all reasonable times to undertake routine use, operation and maintenance of the City's electric system and associated facilities. In the event the City plans major repairs or replacement of infrastructure within the Easement premises, it shall

provide Grantor with reasonable advance notice of the work to be undertaken, and the estimated time of completion. Notwithstanding the foregoing, the City may go upon the Easement premises at any time in the event of any emergency situation or condition, and undertake such repair or replacement activities as it deems necessary to properly resolve the emergency situation.

After the exercise of any of its rights hereunder, the City shall grade, re-seed or re-sod if necessary to restore the surface of the ground to its former condition and contour, *provided* however, that the City shall not be required to restore or replace any trees, bushes, brush, gardens or other vegetation on the Easement premises, nor any structures or paving thereon.

3. Use of Easement Premises by Grantor. Grantor shall retain the right to use and enjoy the Subject Property including the Easement premises so long as such use and enjoyment do not interfere with the City's rights hereunder, and provided that Grantor shall not install or allow any obstructions or permanent encroachments on the Easement premises, including but not limited to fences, buildings, gates, or other structures, or trees, bushes, brush, gardens, or pavement, and shall not obstruct or permit obstruction of access to the Easement premises. In the event any such obstructions or encroachments are erected, installed, or permitted to remain upon the Easement premises notwithstanding this paragraph, Grantor understands and agrees that such obstructions or encroachments may be removed by the City at Grantor's cost, and that the City shall have no responsibility or liability for any damage or destruction thereto.

In the event Grantor discovers an emergency condition pertaining to the City's electric distribution system located on, over, in or through the Easement premises, Grantor shall make reasonable attempts to promptly notify the City of such condition.

4. Liability to Others. Each party shall be responsible for any and all claims, demands, actions, losses, liabilities, or expenses of whatever sort, including attorney's fees, that are incurred by any person or entity arising out of or in connection with such party's use or occupation of the Easement premises, or the use or occupation the Easement premises by its agents, employees, contractors, invitees or licensees, *provided*, however, that nothing herein shall be construed to abrogate or diminish any protections and limitations afforded to the City by the Colorado Governmental Immunity Act, C.R.S. § 24-10-101 *et seq.* as amended, or other law. In the event the City and Grantor, or their respective officers, directors, members, employees, agents, contractors, representatives, heirs or assigns may be held jointly and severally liable under any statute, decision, or other law providing for such joint and several liability for their respective activities on the Easement premises, the obligations of each to respond in damages shall be apportioned, as between the City and Grantor, in proportion to the contributions of each as measured by the acts and omissions of each which in fact caused such legal injury, damage or harm and the City and Grantor shall indemnify each other to the extent necessary to assure such apportionment.

5. Notices. All notices required to be given shall be deemed given upon deposit in the United States mail, first class postage prepaid, properly addressed to the person or entity to whom directed at its address shown herein, or at such other address as shall be given by notice pursuant to this paragraph. Copies of such notices shall also be sent in the same manner to the City Attorney,

City of Aspen, 427 Rio Grande Pl, Aspen, Colorado 81611. Notwithstanding the foregoing, Grantor may notify the City of emergency conditions as provided in paragraph 3 above by direct delivery of notice to the City Electric Department at 219 Puppy Smith Rd Aspen, Colorado, or by telephone or telefacsimile communication with the City Electric Department. The City Electric Department telephone number is (970) 920-5148, and the telefacsimile number is (970) 544-3160.

6. Binding Agreement - Recording. This Agreement is binding upon the parties hereto, their successors and assigns, and any sale of the Subject Property, or any portion thereof shall be subject to this Agreement. This Agreement shall be recorded with the Pitkin County Clerk and Recorder, and shall impose an easement and covenants running with the land upon the Subject Property. Deeds to subsequent owners of the Subject Property shall provide notice of this Agreement and the obligations contained herein.

7. Governing Law; Venue; Attorneys' Fees. This Agreement and the rights and obligations of the parties hereunder shall be governed by and construed in accordance with the laws of the State of Colorado. Venue for all actions arising under this Agreement shall be Pitkin County, Colorado. In the event legal remedies must be pursued to resolve any dispute or conflict regarding the terms of this Agreement or the rights and obligations of the parties hereto, the prevailing party shall be entitled to recover costs incurred in pursuing such remedies, including expert witness fees and reasonable attorneys' fees.

8. Authorization of Signatures. The parties acknowledge and represent to each other that all procedures necessary to validly contract and execute this Agreement have been performed and that the persons signing for each party have been duly authorized to do so.

9. Counterparts. This Agreement may be signed using counterpart signature pages, with the same force and effect as if all parties signed on the same signature page.

IN WITNESS WHEREOF, the parties have executed this Agreement the date and year first above written.

GRANTEE
THE CITY OF ASPEN, COLORADO
A Municipal Corporation and
Home Rule City

By_____
Electric Director

STATE OF _____)
) ss.
COUNTY OF _____)

SUBSCRIBED AND SWORN to before me this ___ day of _____, 20__, by _____.

WITNESS my hand and official seal.

[SEAL]

_____
Notary Public

My commission expires: _____

APPROVED AS TO FORM:

_____
Aspen City Attorney

GRANTOR

_____
_____
Address:_____
_____

STATE OF _____)
) ss.
COUNTY OF _____)

SUBSCRIBED AND SWORN to before me this ___ day of _____, 20__, by _____.

WITNESS my hand and official seal.

[SEAL]

_____
Notary Public

My commission expires: _____

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UTILITIES
CITY OF ASPEN

City of Aspen
Electric Service Area

Electric Service Area

N

Map Date: January 9th, 2024

1 inch equals 600 feet
when printed at 24" x 36"

Chapter 9: Standard Electrical Details

Standard Detail No.	Description
ELE-68	Drawing SC-40: Meter and Service Installation
ELE-69	Drawing SC-40: Table of Responsibility
ELE-70	Drawing SC-40: Under Hard Surface from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential)
ELE-71	Drawing SC-50: Table of Responsibility
ELE-72	Drawing SC-50: Permanent Service Installation from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential)
ELE-73	Drawing SC-60: Table of Responsibility
ELE-74	Drawing SC-60: Meter Pedestal Attached to Building from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential)
ELE-75	Drawing SC-90: Table of Responsibility
ELE-76	Drawing SC-90: Permanent Service Pedestal Installation from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential)
ELE-77	Drawing SC-100: Table of Responsibility
ELE-78	Drawing SC-100: Multiple Metering from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential)
ELE-79	Drawing SC-110: Table of Responsibility
ELE-80	Drawing SC-110: Fabricated Multiple Metering from an Underground Secondary Supply (Services up to 320A 1Ø-3Ø Residential or Commercial)
ELE-81	Drawing SC-140: Table of Responsibility
ELE-82	Drawing SC-140: Wiring Configuration for Underground Installation 120/208V Wye, or 277/480V Wye 3Ø 4-Wire
ELE-83	Drawing SC-150: Table of Responsibility
ELE-84	Drawing SC-150: Wiring Configuration for Underground Installation 120/208V or 120-240V 1Ø 3-Wire

Standard Detail No.	Description
ELE-85	Drawing TR-10: Table of Responsibility
ELE-86	Drawing TR-10: Current Transformer Installation from an Underground Secondary Supply (Services over 400A 1Ø-3Ø Residential)
ELE-87	Drawing TR-20: Table of Responsibility
ELE-88	Drawing TR-20: Current Transformer Enclosures (Services from 400A – 800A)
ELE-89	Drawing TR-30: Table of Responsibility
ELE-90	Drawing TR-30: Typical Arrangements for CT Compartments within Customer Owned Gear
ELE-91	Drawing TR-40: Table of Responsibility
ELE-92	Drawing TR-40: Current Transformer Mounting Requirements for Cabinets and Switchgear
ELE-94	Drawing CR-10: Clearance Requirements from Gas Meter
ELE-95	Drawing CR-30: Clearance for Oil Filled Equipment Located Near Buildings
ELE-96	Drawing CR-30A: Location of Pad-Mounted Transformers
ELE-97	Drawing CR-40: Location of Pad-Mounted Transformers Near Buildings
ELE-98	Drawing CR-50: Location of Pad-Mounted Transformers Near Buildings
ELE-99	Drawing CR-60: Location of Pad-Mounted Transformers Near Buildings
ELE-100	Drawing CR-90: Obstruction and Bumper Protection Clearance Requirements for Pad-Mounted Equipment
ELE-101	Drawing CR-120: Clearance Requirements for Electric Meters in Enclosed Spaces
ELE-102	New Style Double Base for Light Pole
ELE-103	Old Style Double Base for Light Pole
ELE-104	Single Base for Light Pole

Standard Detail No.	Description
ELE-105	Photovoltaic (PV) Installation Requirements
ELE-106	PV System Details
ELE-107	PV System Contains Tap between Main Disconnect and Meter
ELE-108	Photovoltaic (PV) with Energy Storage System (ESS) Installation Requirements
ELE-109	PV with Battery Storage (Configuration 1)
ELE-110	PV with Battery Storage (Configuration 2)
ELE-111	Three Phase Transformer Vault Specification
ELE-112	Single Phase Transformer Vault Specification

Selecting the Correct Self-Contained Meter Socket

Self-contained meter sockets for services less than 600 volts and up to 320 amps

SINGLE-PHASE SERVICE	PROPER METER SOCKET
120/240 Volts 3-Wire	5 - Terminal
120/208 Volts 3-Wire	5 - Terminal

THREE-PHASE SERVICE	PROPER METER SOCKET
120/208 Volts 4-Wire	7 - Terminal
277/480 Volts 4-Wire	7 - Terminal

TABLE OF RESPONSIBILITY

Drawing SC-40		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer*	Customer*
Underground Service Lateral (Commercial)	Customer*	Customer*
Slip Sleeve/Expansion Joint	Customer	Customer
Service Entrance Conduit	Customer	Customer
Service Entrance Conduit Under Hard Surface	Customer	Customer
Meter Socket	Customer	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer
Production Meter	***COA Elec Dept***	***COA Elec Dept***
Snow and Ice Shield, if Required	Customer	Customer

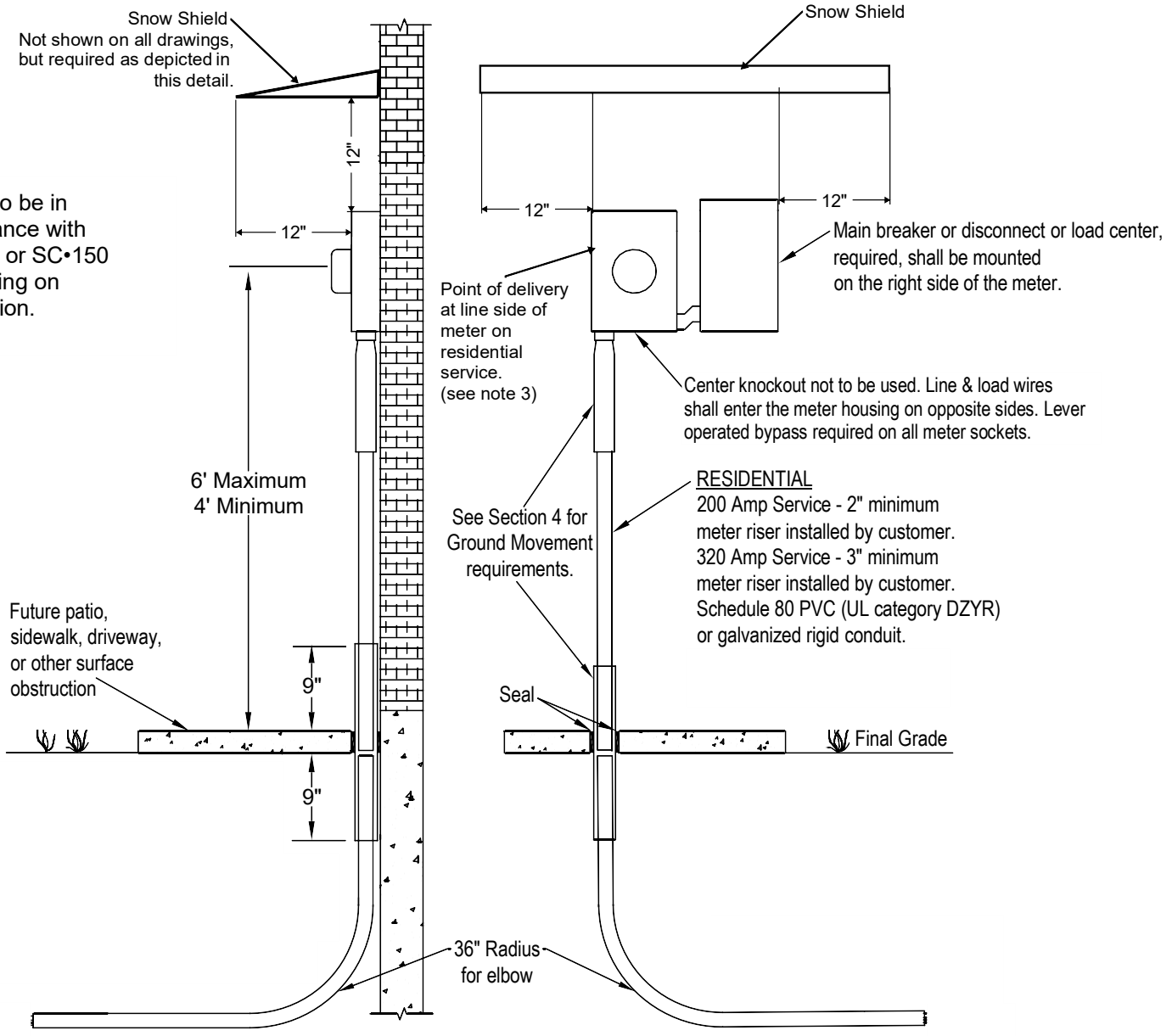
Point of Delivery:

Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

UNDER HARD SURFACE FROM
AN UNDERGROUND SECONDARY SUPPLY
Services up to 320 amp 1Ø-3Ø
Residential
(Hot Sequence Installation Shown)
Installation of conduit under patio, sidewalk,
driveway or other surface obstruction



NOTES:
1. See Sections 4 for cold and hot sequence metering requirements.
2. Check with the COA Electric Department to determine if ice and snow shield are required.

DRAWING SC-40

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 70
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILITY

Drawing SC-50		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer*	Customer*
Underground Service Lateral (Commercial)	Customer*	Customer*
Slip Sleeve/Expansion Joint	Customer	Customer
Service Entrance Conduit	Customer	Customer
Meter Socket	Customer	Customer
Meter Socket Mounting Structure	Customer	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

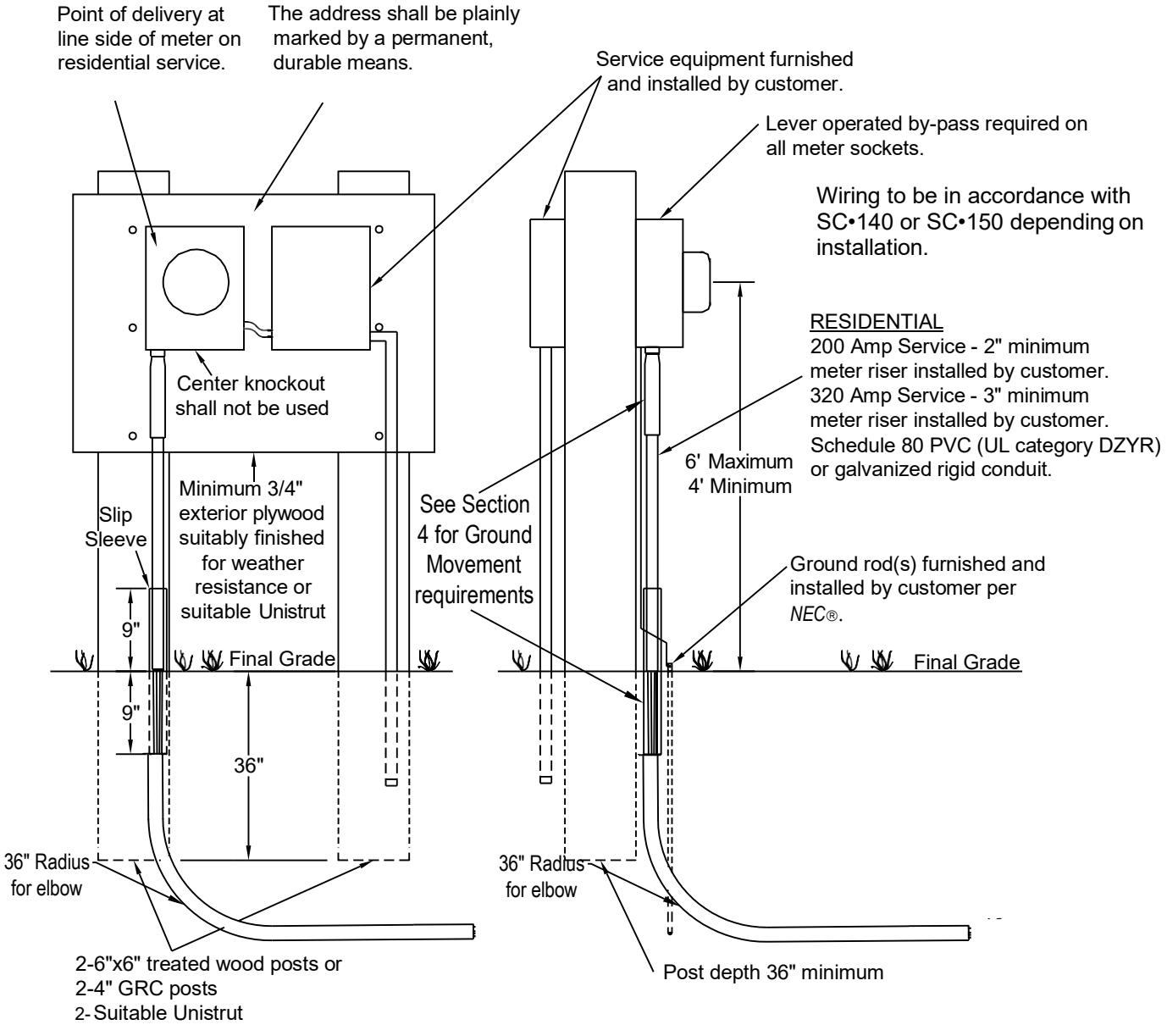
Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

PERMANENT SERVICE INSTALLATION FROM AN UNDERGROUND SECONDARY SUPPLY
Services up to 320 amp 1Ø-3Ø
Residential
(Hot Sequence Installation Shown)

Installation shall be outside of the utility easement and shall be more than 6' from the service pedestal, pull box or pad-mounted transformer.



NOTE:
1. See Sections 4 for cold and hot sequence metering requirements.

DRAWING SC-50

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 72
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILITY

Drawing SC-60		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer*	Customer*
Underground Service Lateral (Commercial)	Customer*	Customer*
Service Entrance Conduit Under Hard Surface	Customer	Customer
Meter Pedestal	Customer	Customer
Meter Pedestal Extension Unit (Required)	Customer	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

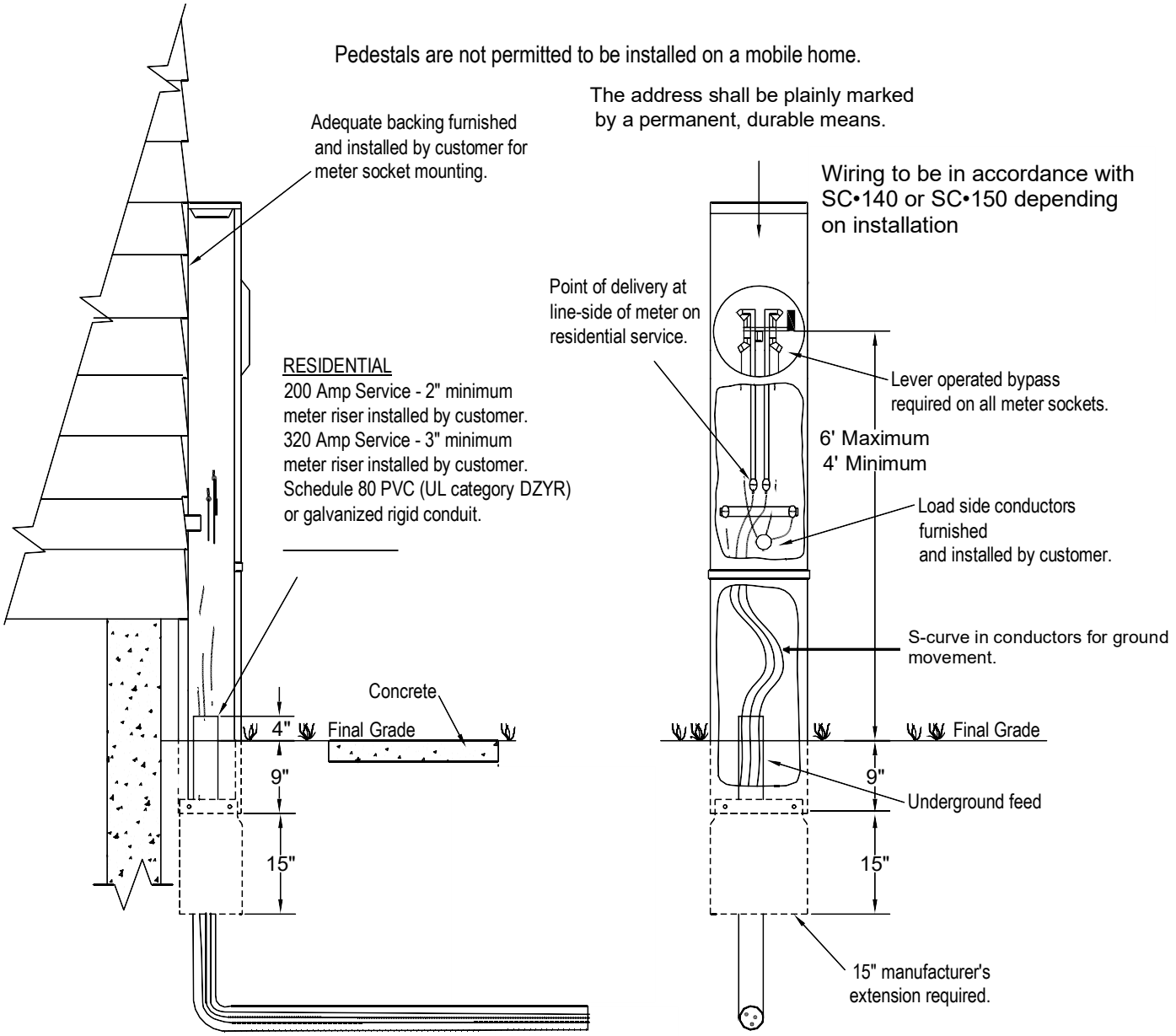
Point of Delivery:

Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

METER PEDESTAL ATTACHED TO BUILDING FROM AN UNDERGROUND SECONDARY SUPPLY
Services up to 320 amp 1Ø-3Ø
Residential
(Hot Sequence Installation Shown)



NOTES:
1. Adequate space shall be provided for removal of meter pedestal cover when underground conductors are located beneath concrete.
2. If concrete is to be installed, conduit shall be furnished and installed by customer. Conduit shall extend 4" above final grade.
3. 15" manufacturer's extension required to be installed on all pedestals.

DRAWING SC-60

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 74
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILITY

Drawing SC-90		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer*	Customer*
Underground Service Lateral (Commercial)	Customer*	Customer*
Slip Sleeve/Expansion Joint	Customer	Customer
Service Entrance Conduit	Customer	Customer
Meter Socket(s)	Customer	Customer
Meter Socket Mounting Structure	Customer	Customer
Optional Wireway (Lockable)	Customer	Customer
Billing Meter(s)	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit(s) And Conductor(s)	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

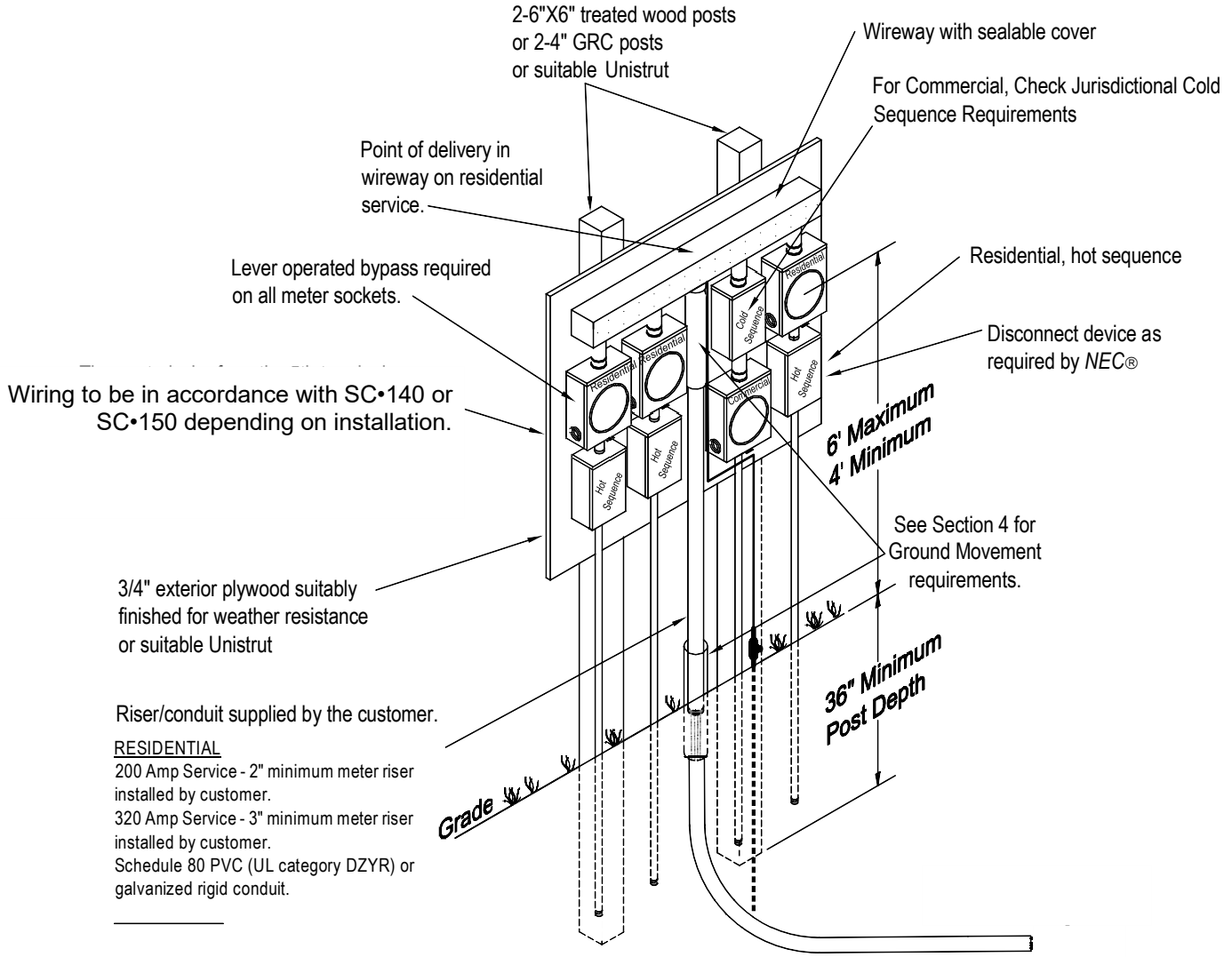
Underground Service Residential (6 meters or fewer)

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

PERMANENT SERVICE INSTALLATION FROM AN UNDERGROUND SECONDARY SUPPLY
Services up to 320 amp 1Ø-3Ø
Residential

Installation shall be outside of the utility easement and must be more than 6' from the service pedestal, pull box, or pad-mounted transformer.



RESIDENTIAL
200 Amp Service - 2" minimum meter riser installed by customer.
320 Amp Service - 3" minimum meter riser installed by customer.
Schedule 80 PVC (UL category DZYR) or galvanized rigid conduit.

NOTES:
1. Ground rod(s) furnished and installed by the customer per *NEC*®.
2. See Sections 4 for meter socket identification requirements.
3. See Sections 4 for cold and hot sequence metering requirements.

DRAWING SC-90

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 76
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILITY

Drawing SC-100		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Overhead Service Drop	N/A	N/A
Underground Service Lateral (6 or fewer Residential)	Customer*	Customer*
Underground Service Lateral (Commercial) (except WI and MI)	Customer*	Customer*
Service Entrance Conduit	Customer	Customer
Multiple Meter Center	Customer	Customer
Main Disconnect, If Required	Customer	Customer
Billing Meter(s)	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit(s) And Conductor(s)	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

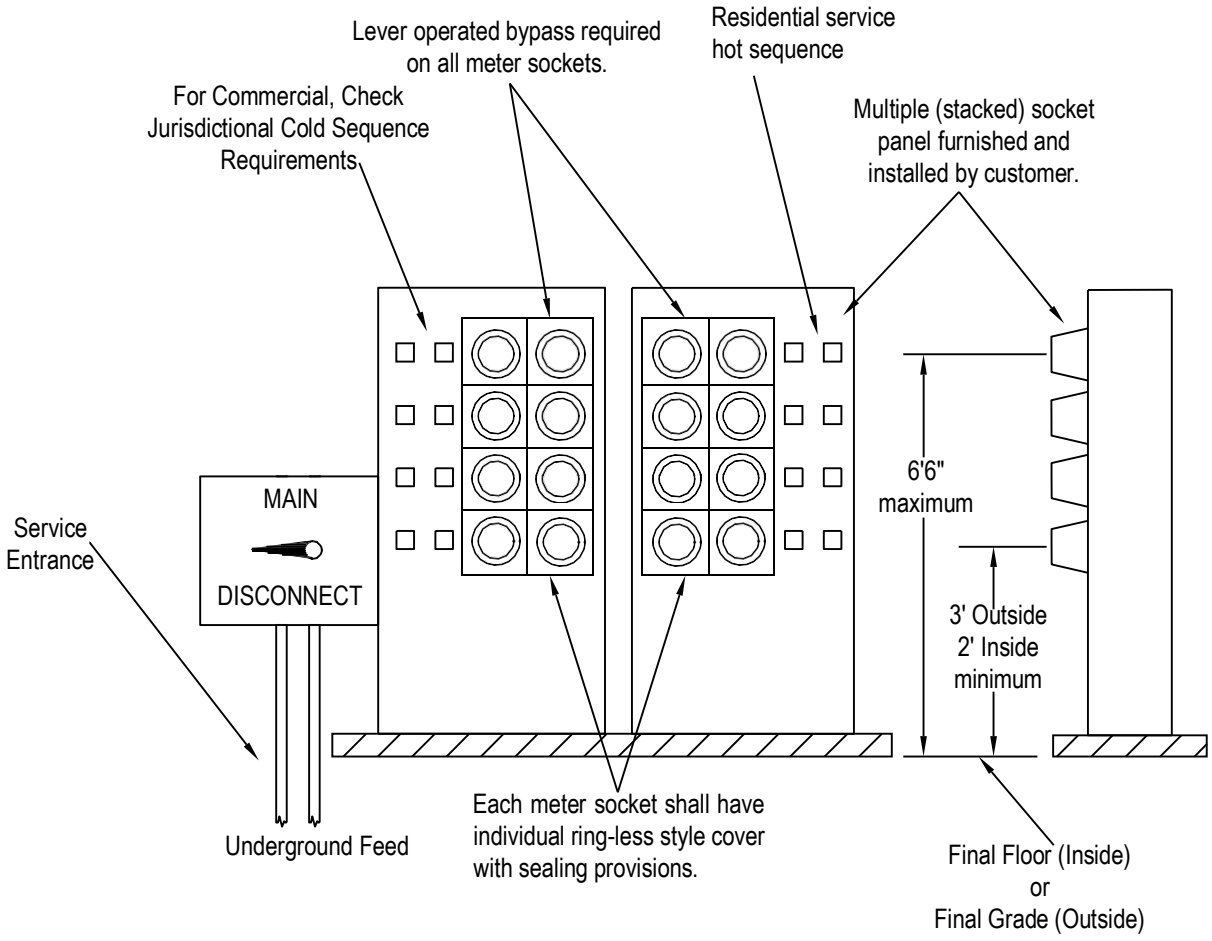
Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

MULTIPLE METERING FROM AN UNDERGROUND SECONDARY SUPPLY (PREFERRED METHOD TO DRAWING SC-110)

Services up to 320 amp 1Ø-3Ø

Residential

Wiring to be in accordance with SC•140 or SC•150 depending on installation.



NOTES:

1. See Section 4 for meter socket identification requirements.
2. See Section 4 for meter socket requirements.
3. See Section 4 for multiple meter panel requirements.
4. See Section 4 for cold and hot sequence metering requirements.
5. Transformer-rated services can be utilized in multiple metering installations, and they are permitted to have a single main disconnect ahead of the CT compartment.

DRAWING SC- 100

TABLE OF RESPONSIBILITY

Drawing SC-110		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Meter Socket(s)	Customer	Customer
Optional Wireway (Lockable)	Customer	Customer
Billing Meter(s)	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit(s) And Conductor(s)	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

Underground Service Residential

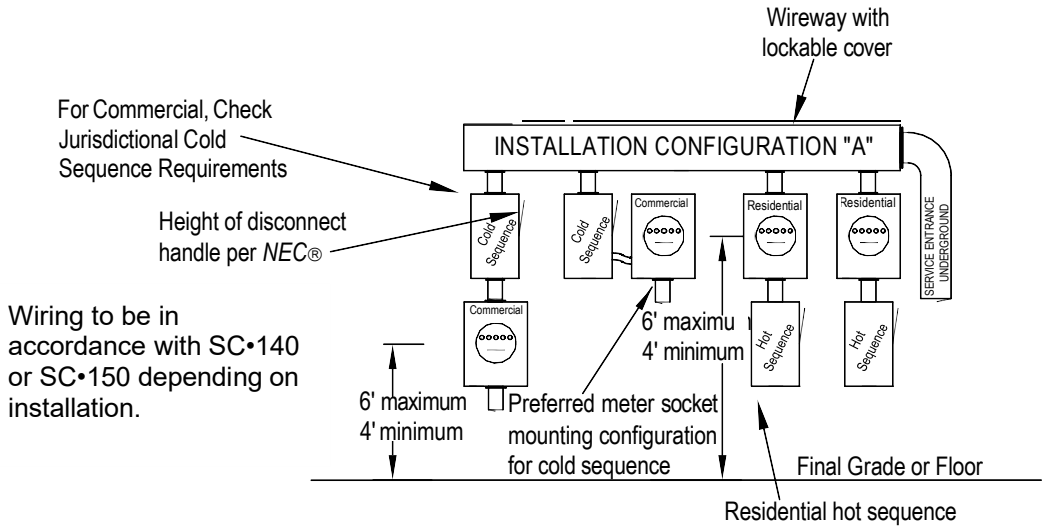
- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

FABRICATED MULTIPLE METERING FROM AN UNDERGROUND SECONDARY SUPPLY (ALTERNATIVE METHOD TO DRAWING SC-100)

Services up to 320 amp 1Ø-3
Residential or Commercial

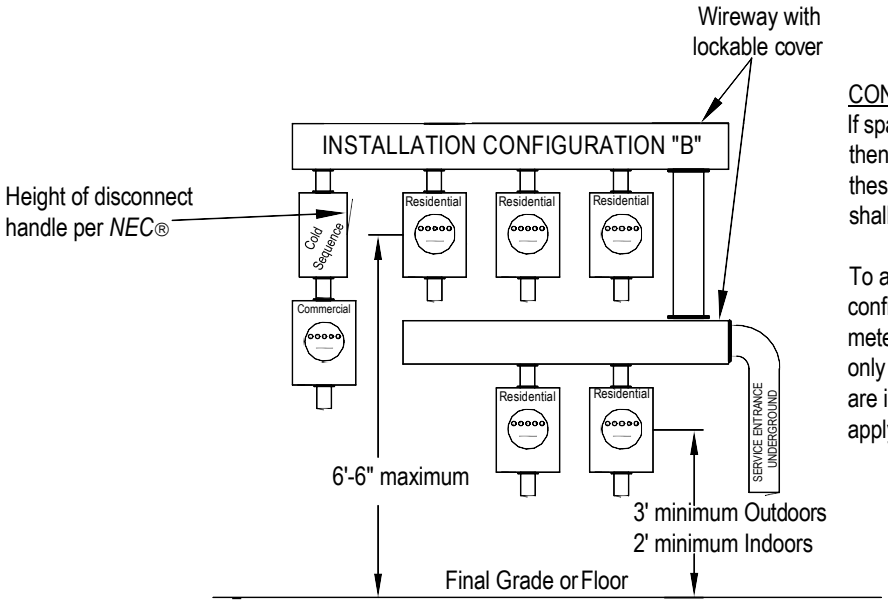
Lever operated bypass required on all meter sockets.



CONFIGURATION "A"
Mounting height of meters shall be at least 4' and no greater than 6' from final grade.

A single bank of meters is the preferred installation configuration.

If space does not allow the single bank installation, then configuration "B" may be used.



CONFIGURATION "B"
If space does not allow configuration "A", then configuration "B" may be used and these mounting height requirements shall apply.

To apply the meter mounting heights of configuration "B", two or more rows of meter mounting devices must exist. If only one row of meter mounting devices are installed, configuration "A" shall apply.

NOTES:
1. Meter sockets and service equipment are furnished by customer.
2. See Sections 4 for meter socket identification requirements.
3. See Sections 4 for cold and hot sequence metering requirements.

DRAWING SC-110

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 80

LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILTY

Drawing SC-140		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Meter Socket	Customer	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit(s) And Conductor(s)	Customer	Customer
Ground Rod(s)	Customer	Customer

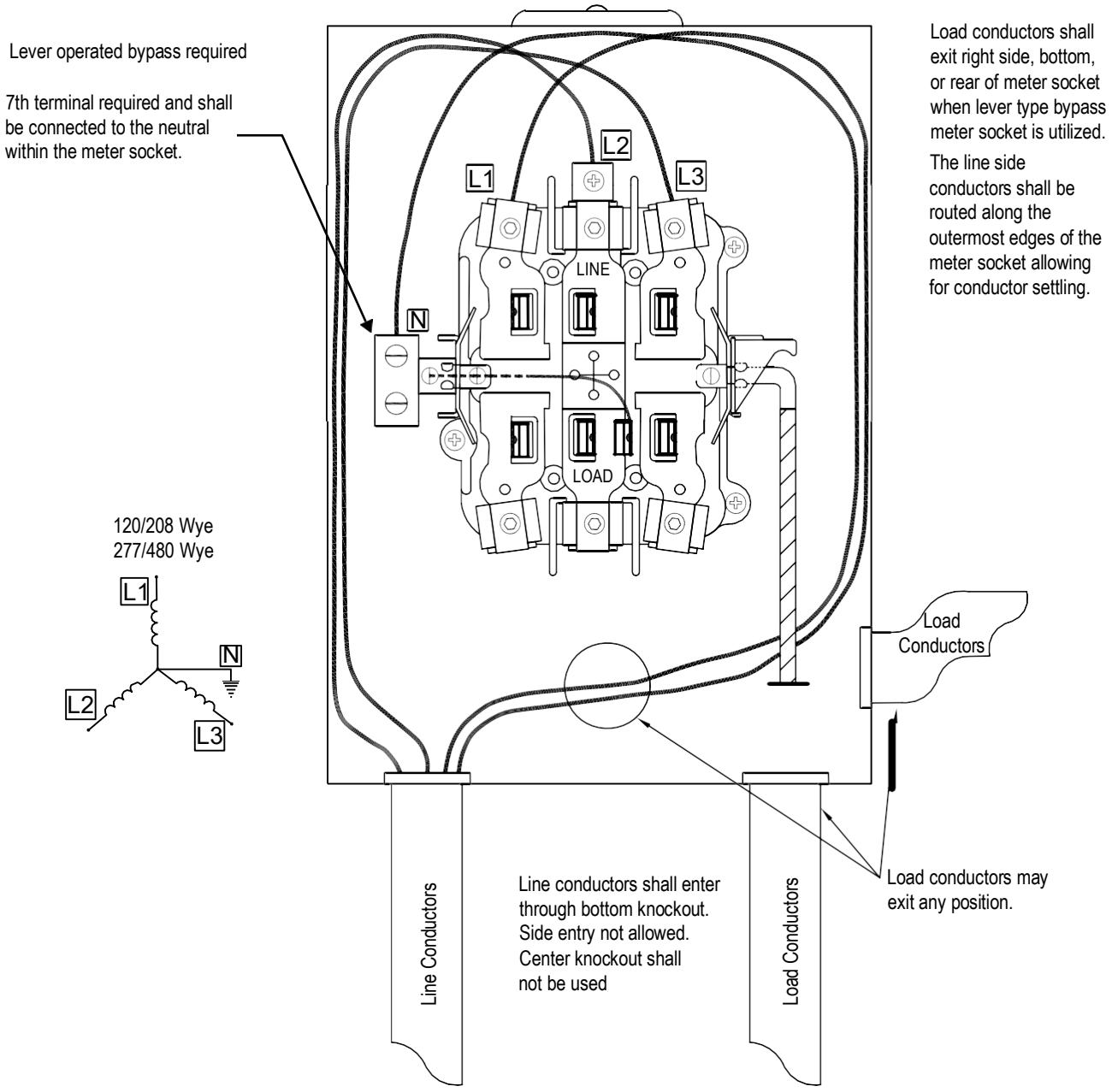
Point of Delivery:

Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

WIRING CONFIGURATION FOR UNDERGROUND INSTALLATION
120/208 Volt Wye, or 277/480 Volt Wye 3-Phase 4-Wire



NOTES:
1. See Sections 4 for cold and hot sequence metering requirements
2. Meter housing shall be grounded per NEC®.

DRAWING SC-140

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 82
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
12/07/18	
06/15/20	

TABLE OF RESPONSIBILITY

Drawing SC-150		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Meter Socket	Customer	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit And Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

Underground Service Residential

- At line side terminals of meter socket; or
- Line side of disconnect if main disconnect is used ahead of metering.

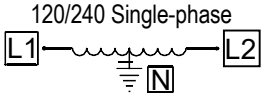
Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

WIRING CONFIGURATION FOR UNDERGROUND INSTALLATION
120/208 Volt or 120/240 Volt 1-Phase 3-Wire

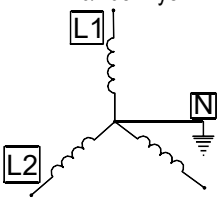
Lever operated bypass required.

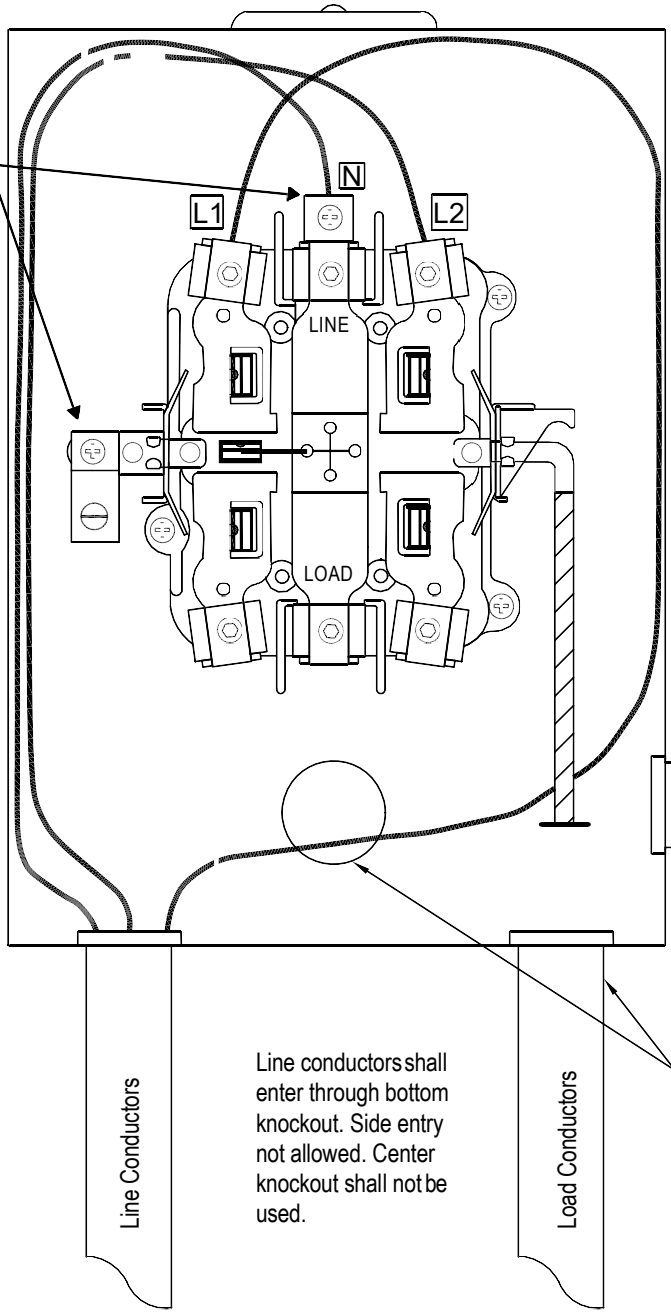
5th terminal required and shall be connected to the neutral on 1-phase, 3-wire or the gounded phase on 3-phase, 3-wire within the meter socket.

120/240 Single-phase



120/208 Wye





Load conductors shall exit right side, bottom, or rear of meter socket when lever type bypass meter socket is utilized.

The line side conductors shall be routed along the outermost edges of the meter socket allowing for conductor settling.

Load Conductors

Line Conductors

Line conductors shall enter through bottom knockout. Side entry not allowed. Center knockout shall not be used.

Load Conductors

Load conductors may exit any position.

NOTES:
1. See Sections 4 for cold and hot sequence metering requirements.
2. Meter housing to be grounded per NEC®.

DRAWING SC-150

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS

#:ELE - 84

LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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TABLE OF RESPONSIBILITY

Drawing TR-10		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Meter Mounting Structure, Pole	Customer	Customer
Underground Service Lateral (Residential)	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit and OH Point of Attachment	Customer	Customer
Current Transformer Enclosure	Customer	Customer
Metering Circuit Conduit	Customer	Customer
Metering Circuit Conductors	***COA Elec Dept***	***COA Elec Dept***
Current Transformers	***COA Elec Dept***	Customer
Meter Socket	***COA Elec Dept***	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

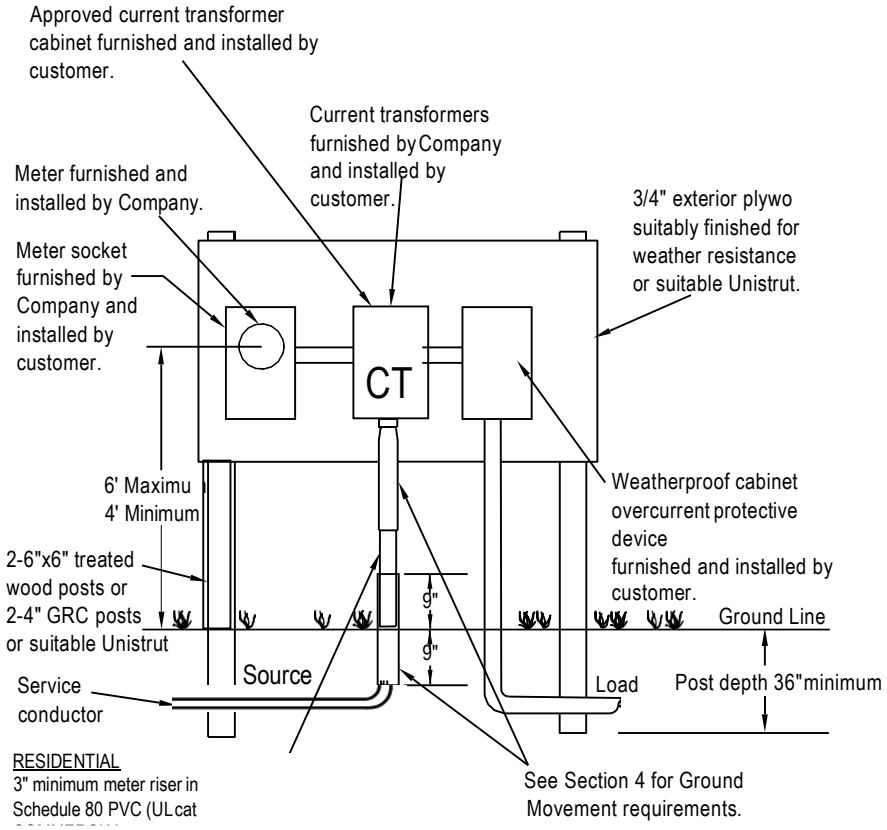
Point of Delivery:

Underground Service Residential – At line side terminals of CT Cabinet

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

CURRENT TRANSFORMER INSTALLATION FROM AN UNDERGROUND SECONDARY SUPPLY
Services Over 400 amp 1Ø-3Ø
Residential

Installation shall be outside of the utility easement and shall be more than 6' from the service pedestal, pull box or pad-mounted transformer.



All outside cabinets must meet 3R minimum.

NOTES:
1. See Section 4 for current transformer metering requirements.
2. White dot on CT is polarity mark and faces line-side.

DRAWING TR•10

TABLE OF RESPONSIBILITY

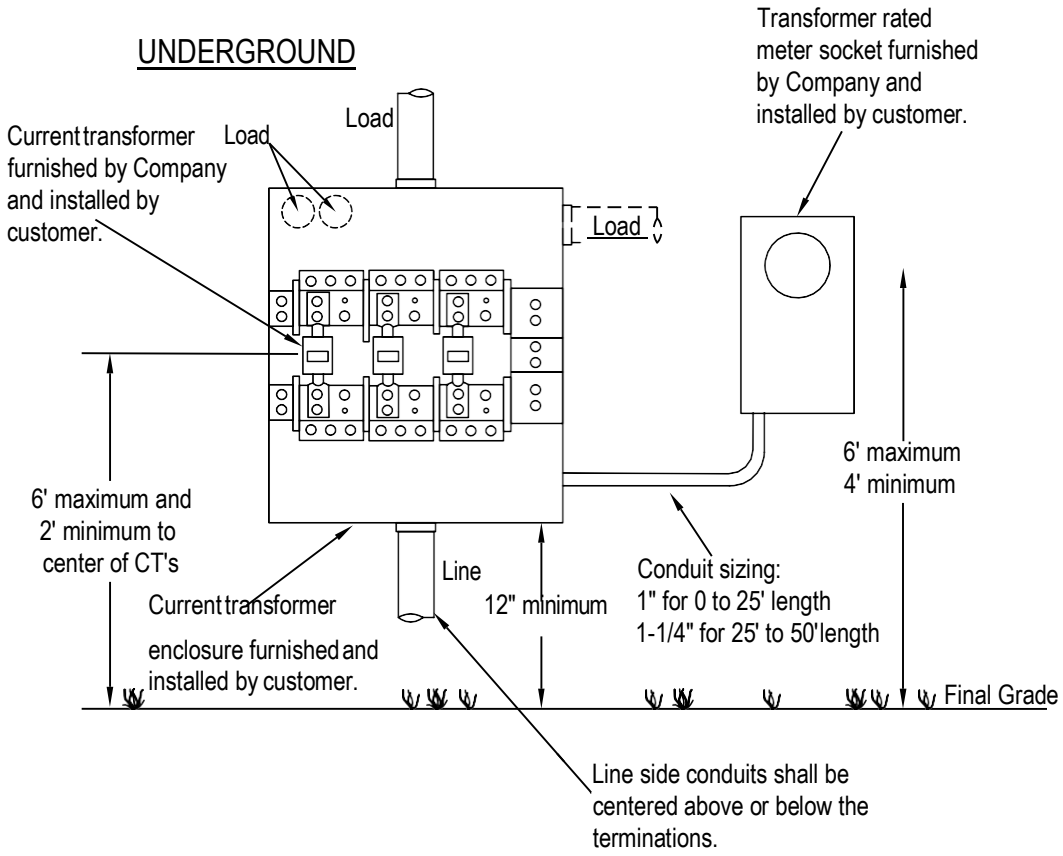
Drawing TR-20		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Current Transformer Enclosure	Customer	Customer
Metering Circuit Conduit	Customer	Customer
Metering Circuit Conductors	***COA Elec Dept***	***COA Elec Dept***
Current Transformers	***COA Elec Dept***	Customer
Meter Socket	***COA Elec Dept***	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

Underground Service Residential – At line side terminals of CT Cabinet

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

CURRENT TRANSFORMER ENCLOSURES
Services from 400-800 amps



Notes:

1. Service conductors are not allowed to cross in front of CT's.
2. See Section 4 for instrument type, installation details and requirements.
3. White dot on CT is polarity mark and faces line-side.

DRAWING TR-20

CITY OF ASPEN

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ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

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STANDARD DETAILS
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LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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TABLE OF RESPONSIBILITY

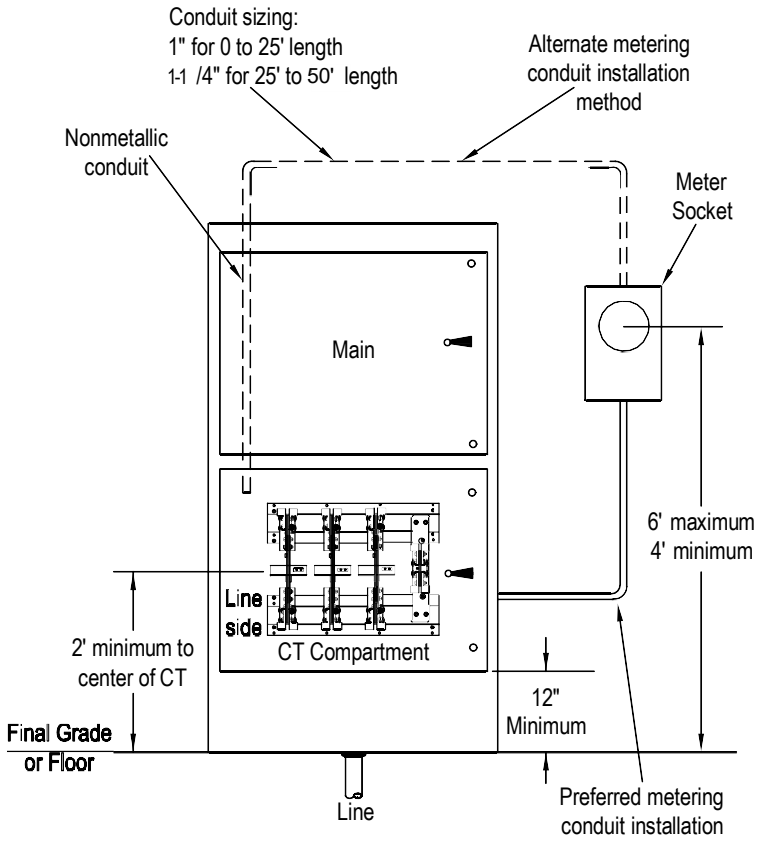
Drawing TR-30		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Switchgear with Current Transformer Compartment	Customer	Customer
Metering Circuit Conduit	Customer	Customer
Metering Circuit Conductors	***COA Elec Dept***	***COA Elec Dept***
Current Transformers	***COA Elec Dept***	Customer
Meter Socket	***COA Elec Dept***	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:

Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

TYPICAL ARRANGEMENTS FOR C.T. COMPARTMENTS WITHIN CUSTOMER OWNED GEAR

UNDERGROUND



SEE DRAWING TR-40 FOR CURRENT TRANSFORMER MOUNTING REQUIREMENTS

NOTES:
1. All cabinets shall be UL approved.
2. CT compartment shall be locked separately by company.
3. Nonmetallic conduit shall extend into CT compartment.
4. Center conduits under/over terminations.
5. 5/16" diameter shackle and shall be hinged on the right or left side only

DRAWING TR-30

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
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STANDARD DETAILS
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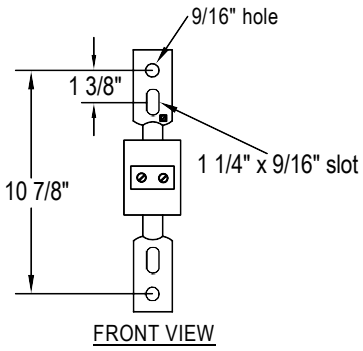
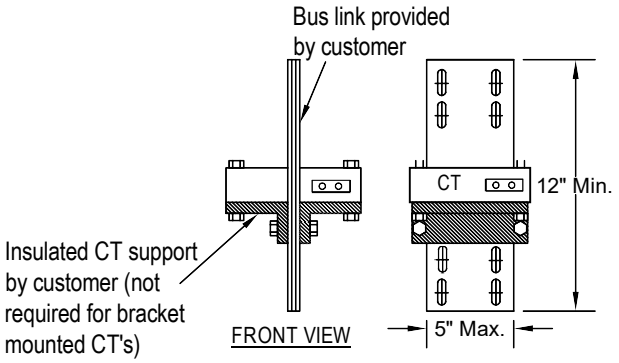
TABLE OF RESPONSIBILITY

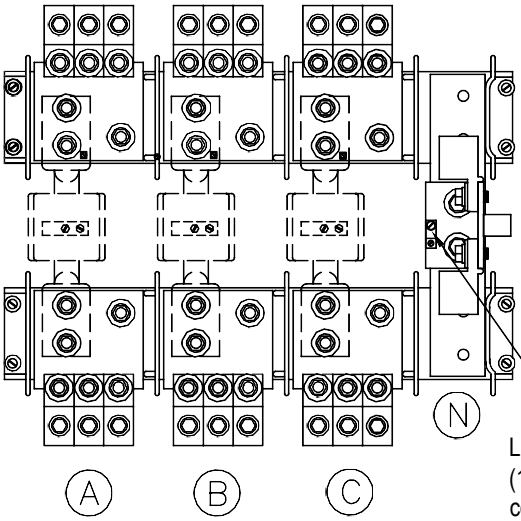
Drawing TR-40		
ITEM, MATERIAL OR WORK DESCRIPTION	PARTY TO FURNISH, OWN AND MAINTAIN	PARTY TO INSTALL
Permits	Customer	N/A
Underground Service Lateral (Residential)	Customer	Customer
Underground Service Lateral (Commercial)	Customer	Customer
Service Entrance Conduit	Customer	Customer
Switchgear with Current Transformer Compartment	Customer	Customer
Metering Circuit Conduit	Customer	Customer
Metering Circuit Conductors	***COA Elec Dept***	***COA Elec Dept***
Current Transformers	***COA Elec Dept***	Customer
Meter Socket	***COA Elec Dept***	Customer
Billing Meter	***COA Elec Dept***	***COA Elec Dept***
Load Side Conduit and Conductor	Customer	Customer
Ground Rod(s)	Customer	Customer

Point of Delivery:
Underground Service Commercial – Point where the COA Electric Department facilities are first connected to the electric facilities of the customer.

CURRENT TRANSFORMER MOUNTING REQUIREMENTS FOR CABINETS AND SWITCHGEAR

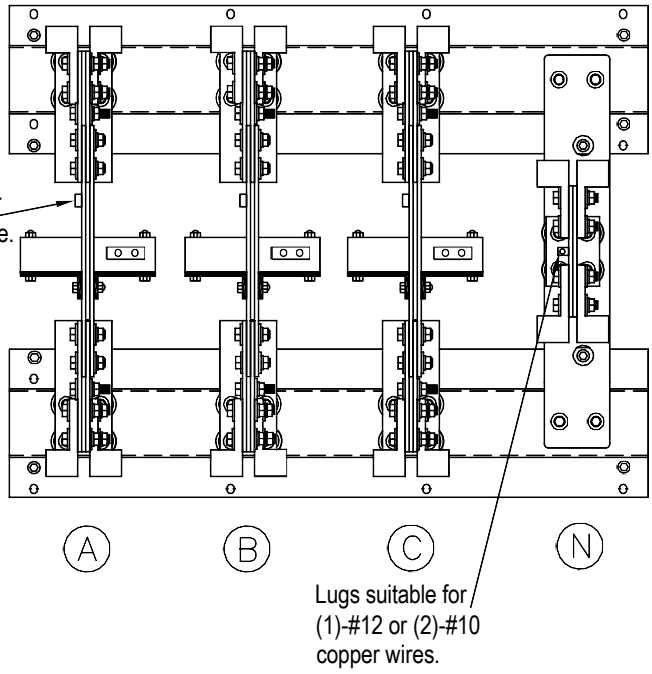






Lug suitable for #12 copper wire.

Lugs suitable for (1)-#12 or (2)-#10 copper wires.



Lugs suitable for (1)-#12 or (2)-#10 copper wires.

For services 400-800 Amps

For services 801 - 4000 amps

NOTES:

1. White dot on CT is polarity mark and faces line-side.
2. See Section 4 for current transformer cabinet requirements.
3. Enclosure door shall have provisions for a standard Company padlock with a 5/16" diameter shackle and shall be hinged on the right or left side only.

DRAWING TR-40

CITY OF ASPEN

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ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

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STANDARD DETAILS

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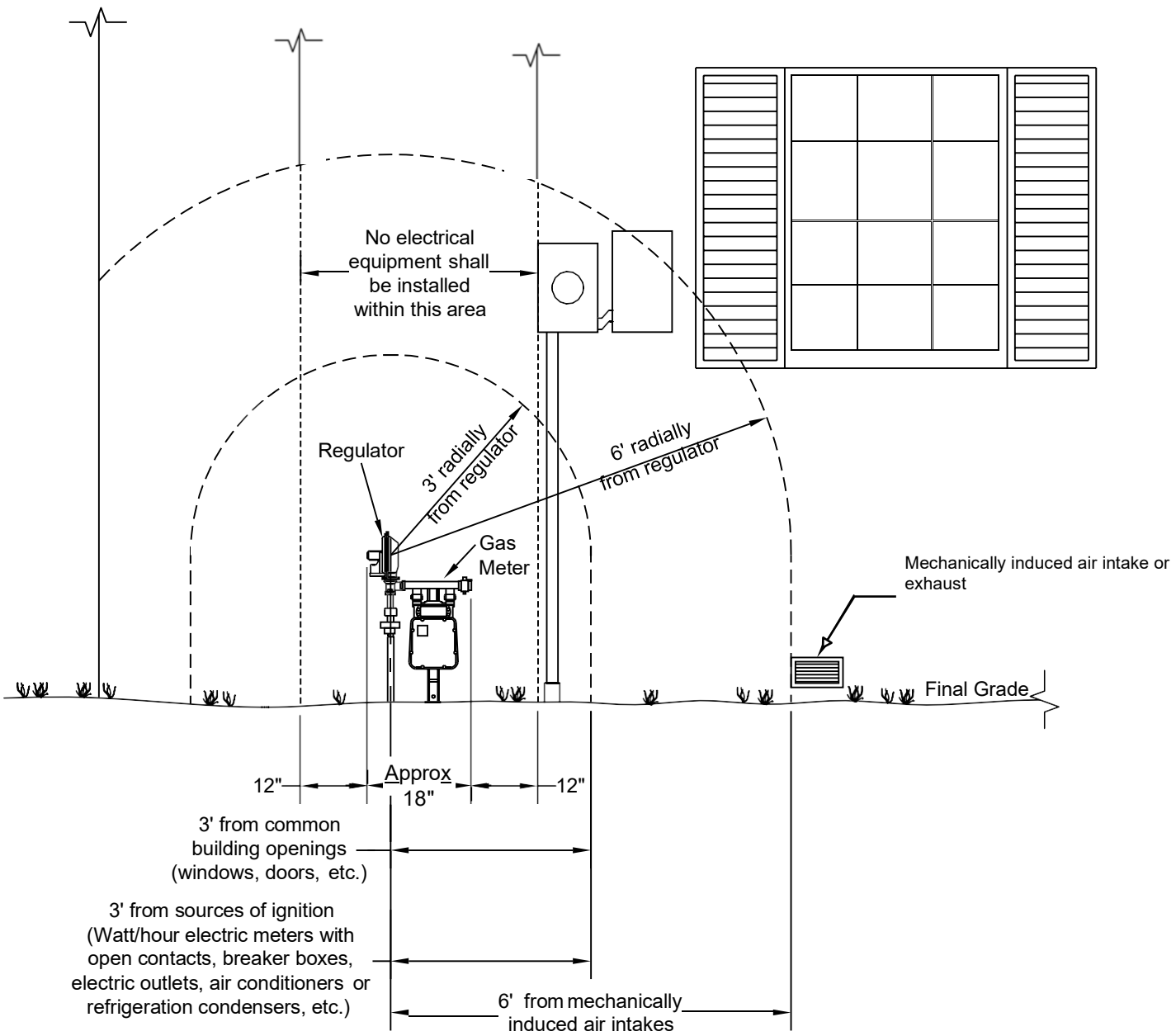
CLEARANCE REQUIREMENTS FROM GAS METER



NOTES:

1. 3' minimum working clearance from non-electrical obstructions is preferred around gas meter set.
2. Disregard clearances when measuring around corners of structure.
3. See Sections 4 and drawing SC- 40 for ice and snow shield requirements.

DRAWING CR-10

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219 PUPPY SMITH ROAD
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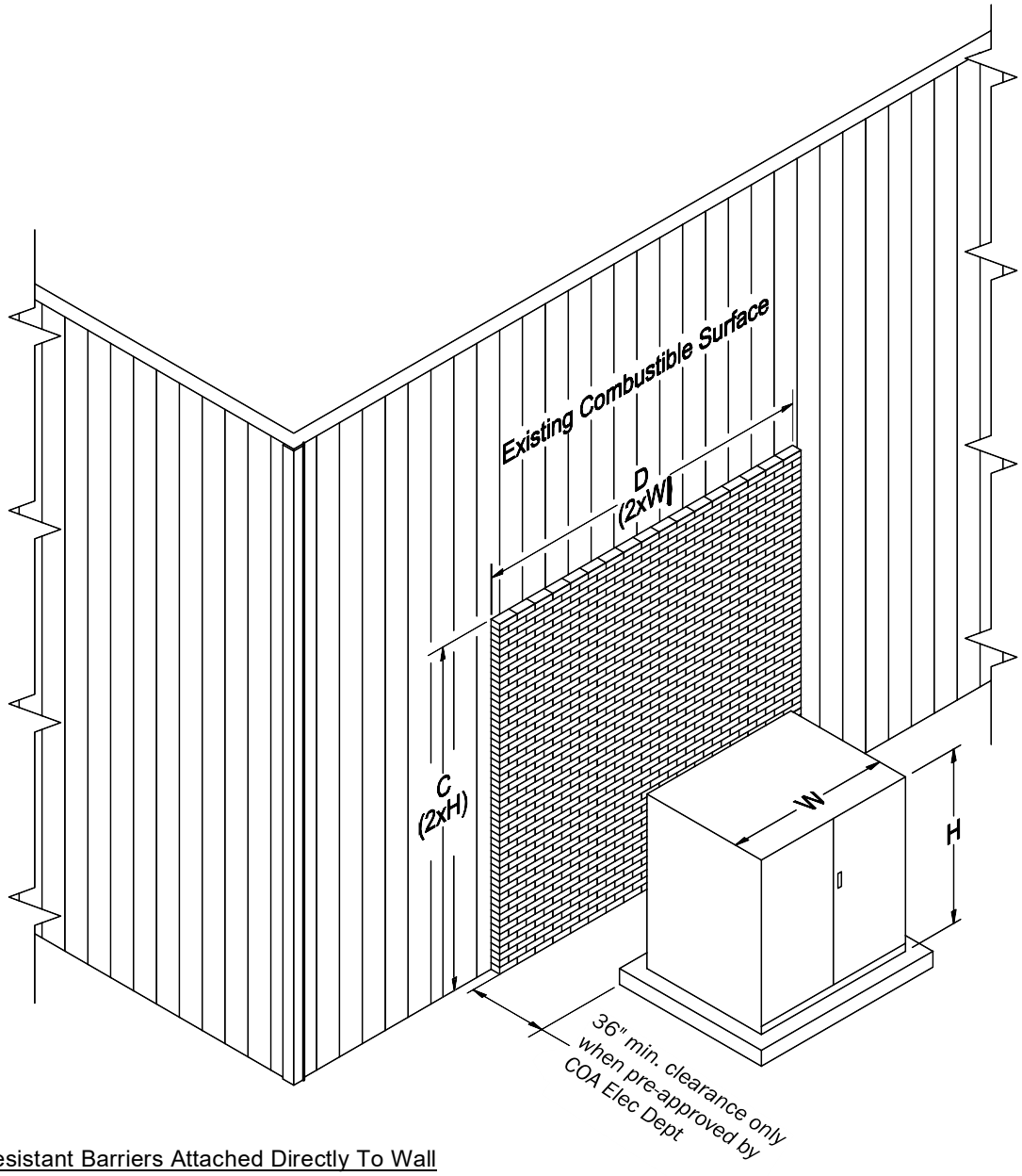
CLEARANCES FOR OIL FILLED EQUIPMENT LOCATED NEAR BUILDINGS



Fire Resistant Barriers Attached Directly To Wall

In locations where basic clearances cannot be met, a fire resistant barrier shall be installed either by the customer or at the customer's expense to reduce the required clearance to combustible walls, doors air intakes or windows. The barrier shall be constructed of non-combustible material certified to have a 2 hour fire rating. It shall be of sufficient strength and have stability to resist tipping and satisfy local building ordinances. If a specific ruling regarding fire ratings is necessary, contact the local fire protection district. The COA Electric Department will coordinate the construction and location of the barrier, however the customer is responsible for all maintenance. The barrier will satisfy the following dimensional requirements:

H = Height in inches of oil filled equipment.
W = Width in inches of oil filled equipment.
C = Height of barrier required to obtain a projected height of two times the height of the oil filled equipment on the building wall (2xH).
D = Width of barrier required to obtain a projected width of two times the width of the oil filled equipment on the building wall (2xW) .

DRAWING CR-30

CITY OF ASPEN

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ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
#:ELE - 95
LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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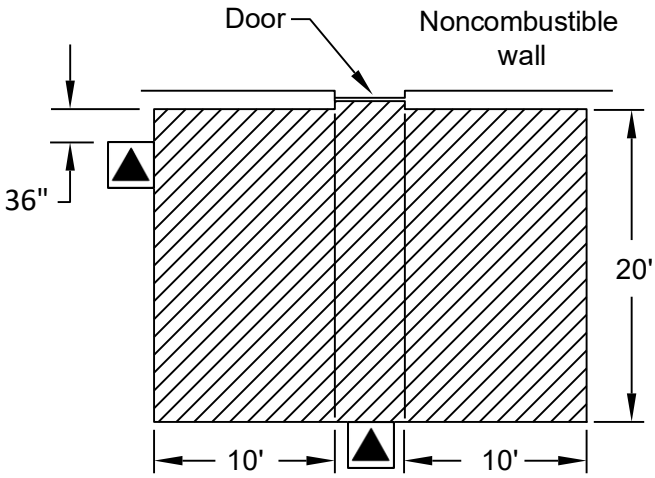
LOCATION OF PAD-MOUNTED TRANSFORMERS

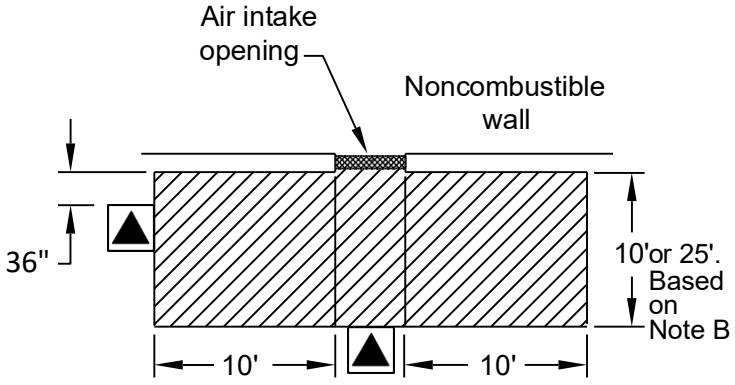
I.

~~NONCOMBUSTIBLE WALLS~~ (Included in this class would be wood framed brick veneered buildings, metal clad steel framed buildings, asbestos•cement•board walled metal framed buildings and masonary buildings and masonary buildings with a one hour fire rating.)
Oil insulated, pad•mounted transformers may be located a minimum distance of 36" from noncombustible walls if all the following clearances are maintained from doors, windows, and other building openings.
Contact COA Electric Department for sump specifications. If a combustible first floor overhang exists, a 10' distance from the edge of the transformer to the edge of the overhang (combination of vertical and horizontal distance) shall be required in addition to the other clearances shown.

A. DOORS
Oil insulated, pad-mounted transformers shall not be located within a zone extending 20' outward and 10' to either side of a building door.



B. AIR INTAKE OPENINGS
Oil insulated, pad-mounted transformers shall not be located within a zone extending 10' outward and 10' to either side of an air intake opening located within 10' of the ground. If the air intake opening is located more than 10' above the ground, the distance from the transformer to the opening shall be a minimum of 25'.



DRAWING CR-30A

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611
CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS
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LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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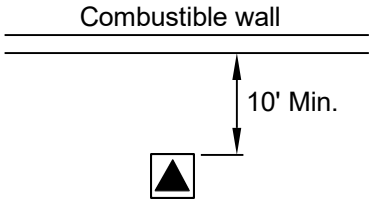
LOCATION OF PAD-MOUNTED TRANSFORMERS NEAR BUILDINGS

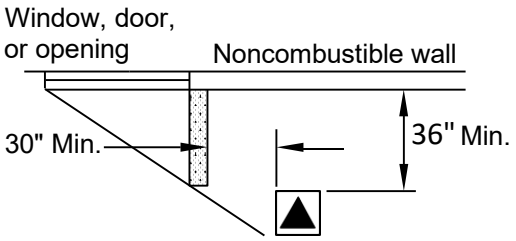
II. COMBUSTIBLE WALLS

(Included in this class would be wood buildings and metal clad buildings with wood frame construction.) Oil insulated, pad-mouted transformers shall be located a minimum 10' from the building wall in additon to the clearance from building doors, windows, and other openings set forth for noncombustible walls.

Contact Customer Service and Technical Support for sump specifications. If a combustible first floor overhang exists, a 10' distance from the edge of the transformer to the edge of the overhang (combination of vertical and horizontal distance) shall be required in addition to the other clearances as shown.

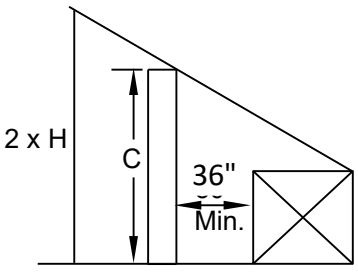


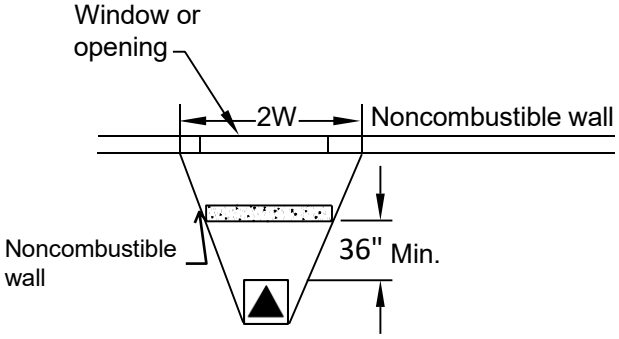
III. BARRIERS (Included in this class are reinforced concrete, brick, or concrete block barrier walls with a 3 hour fire rating.) If the clearance specified above cannot be obtained, a fire resistant barrier shall be constructed in lieu of the separation. The barrier (when required) is provided by the customer. The following methods of construction are acceptable.



A. NONCOMBUSTIBLE WALLS

The barrier shall extend to a projection line from the corner of the pad-mounted to the furthest corner of the window, door, or opening in question.





DRAWING CR-50

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS

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LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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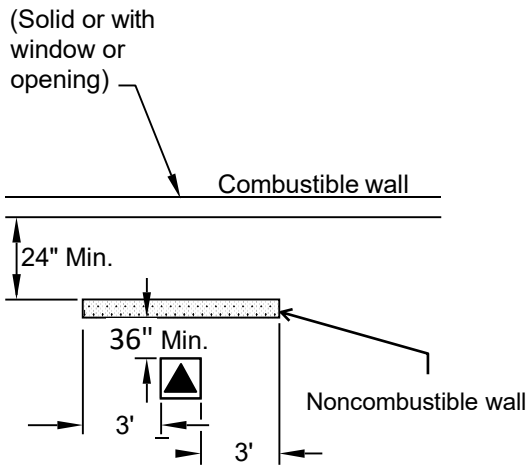
LOCATION OF PAD-MOUNTED TRANSFORMERS NEAR BUILDINGS

B. COMBUSTIBLE WALLS

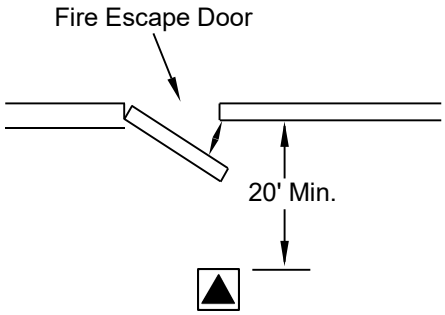
The barrier shall extend 3' beyond each side of the oil insulated, pad-mounted transformer. The height of the barrier shall be 3' above the top of the pad-mounted transformer. If a combustible first floor overhang exists, the 24" specified shall be measured from the edge of the overhang rather than from the building wall.



IV. FIRE ESCAPES

Oil insulated, pad-mounted transformers shall be located such that a minimum clearance of 20' is maintained from fire escapes at all times.

Exception: Oil insulated, pad-mounted transformers may be located closer to a fire escape than the 20' minimum when a fire resistant barrier is constructed around the transformer (side walls and roof). The barrier shall extend a minimumof 1' beyond the transformer. The transformer andbarrier shall not in any way obstruct the fire escape exit. 10' clearance is required in front of padmount transformer doors. Adequate transformer accessibility and ventilation must be provided. If transformer is installed underneath a fire escape, maintain 10' vertical clearance.



V. DECORATIVE COMBUSTIBLE ENCLOSURE

Decorative combustible enclosures (fence) installed by the customer around oil insulated, pad-mounted transformers adjacent to a combustible building wall shall not extend more than 24" beyond the transformer towards the combustible wall. 10' clearance required in front of pad-mounted transformer doors. Adequate transformer accessibility and ventilation must be provided.

VI. NONCOMBUSTIBLE AND COMBUSTIBLE WALLS - FIRE RESISTANT BARRIERS

Noncombustible walls shall meet the requirements of the International Building Code, chapter six for Type III construction through the use of materials that are listed by Underwriters Laboratories Inc. under the product category "Noncombustible Building Materials" or which are authorized by UL to bear an adjunct marking indicating compliance with ASTM E 136.

DRAWING CR-60

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

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STANDARD DETAILS
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LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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DATE	COMMENTS
12/07/18	
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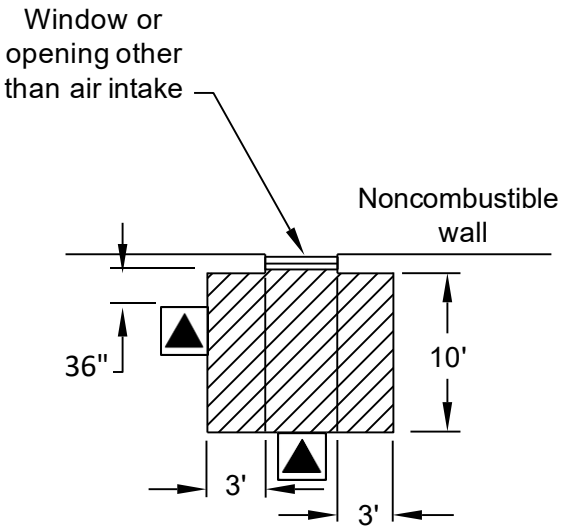
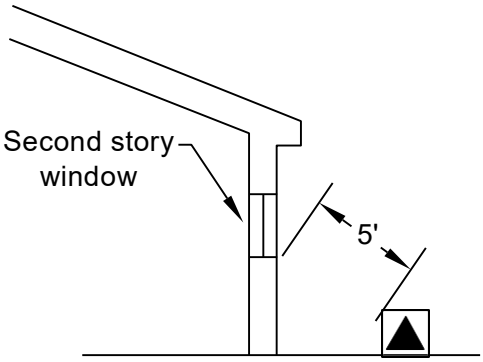
LOCATION OF PAD-MOUNTED TRANSFORMERS NEAR BUILDINGS

C. WINDOWS OR OPENINGS OTHER THAN AIR INTAKE



1. First Story
   Oil insulated pad-mounted transformers shall not be located within a zone extending 10' outward and 3' to either side of a building window or opening other than an air intake.



2. Second Story
   Oil insulated, pad-mounted transformers shall not be located less than 5' from any part of a second story window or opening other than an air intake.

   Oil filled equipment shall not be placed below an operating window on any floor. No exceptions will be made!

DRAWING CR-40

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

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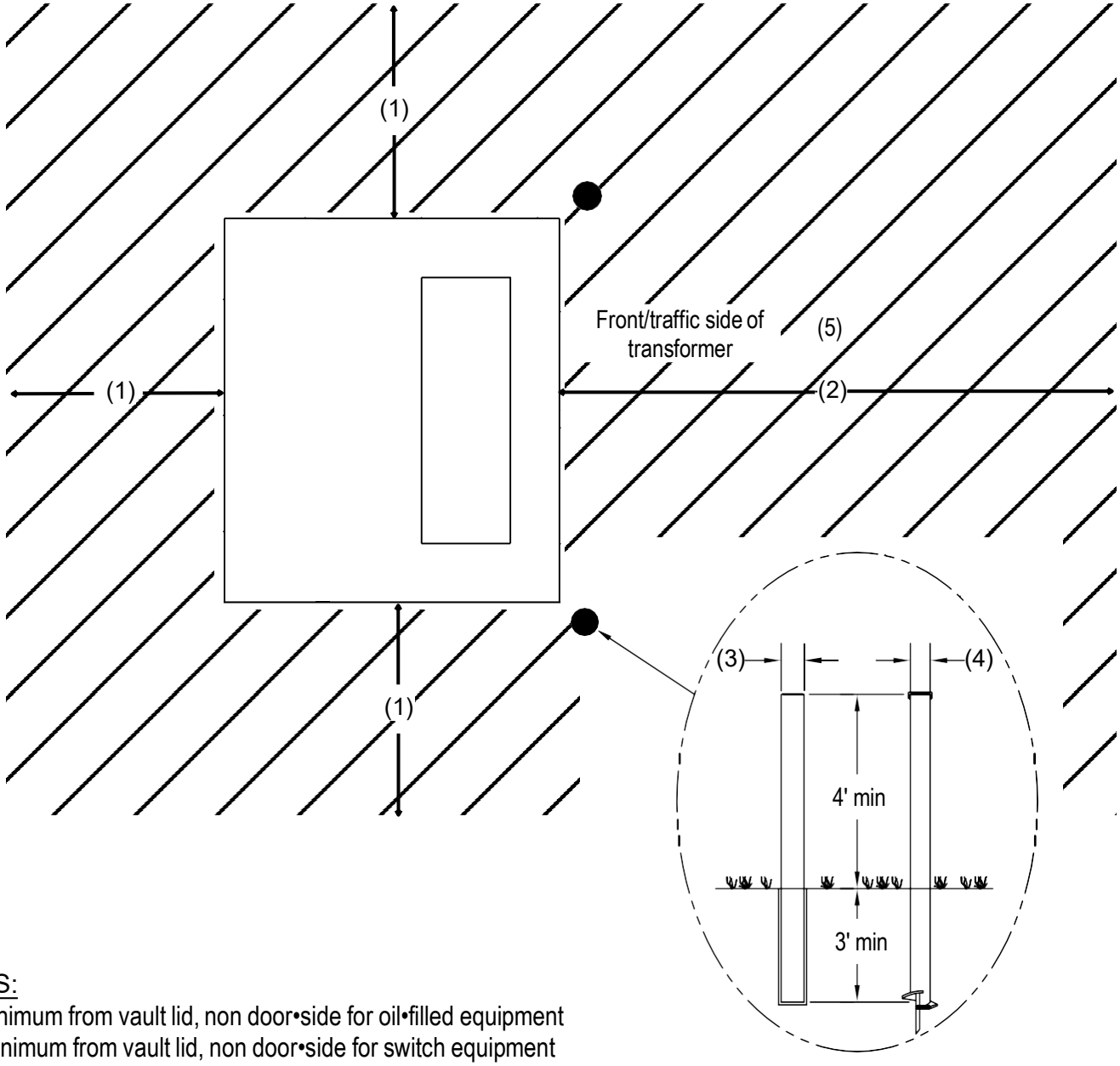
OBSTRUCTION AND BUMPER PROTECTION CLEARANCE REQUIREMENTS FOR PAD-MOUNTED EQUIPMENT



NOTES:

(1) 3' minimum from vault lid, non door•side for oil•filled equipment
3' minimum from vault lid, non door•side for switch equipment
(2) 10' minimum from vault lid, door•side for pad•mounted equipment except primary metering
(3) 4" diameter (slugged)
(4) 3•1/2" diameter with helix
(5) The hatched area shown above must be level and free from obstructions.

* Additional bollards may be required as determined by COA Electric Department.

DRAWING CR-90

CITY OF ASPEN

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ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
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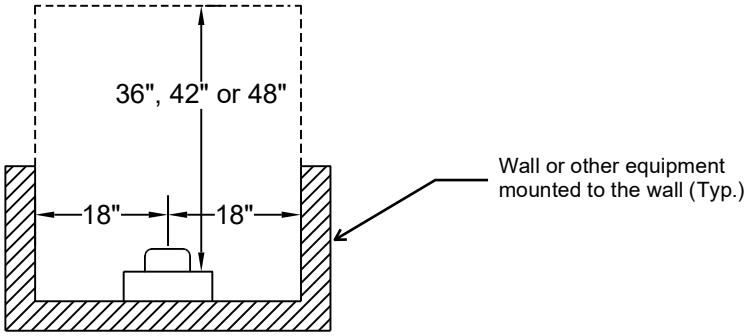
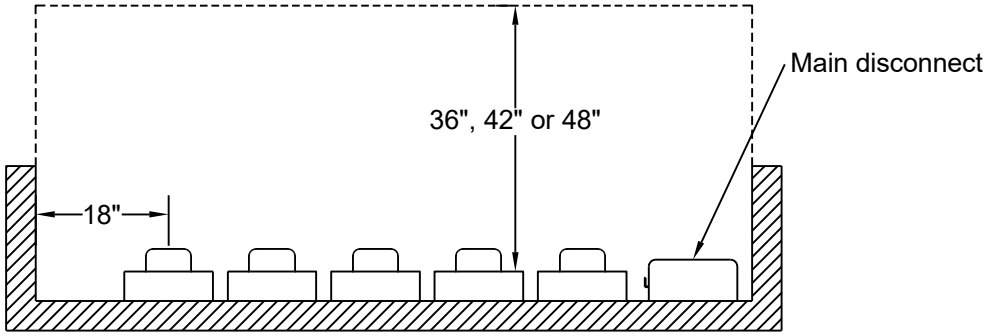
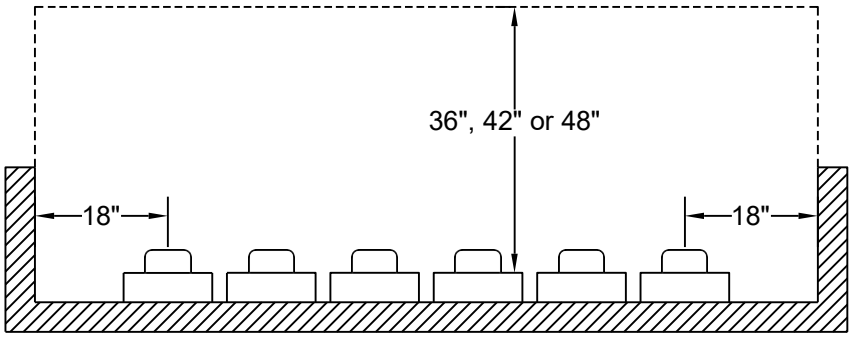
CLEARANCE REQUIREMENTS FOR ELECTRIC METERS IN ENCLOSED SPACES







NOTES:

1. Area within dashed lines shall be clear of all obstructions.
2. 18" clearance shall be maintained to either side of the center line of the meter socket per NEC®.
3. 36", 42" or 48" clearance shall be maintained in front of meter socket per NEC®.
4. Height of working clearance shall be per NEC®.

DRAWING CR-120

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS

#:ELE - 101

LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

REVISIONS	
DATE	COMMENTS
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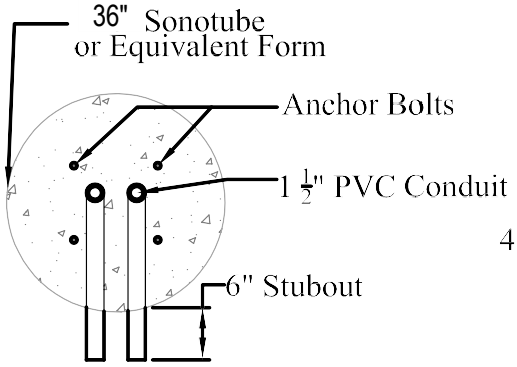
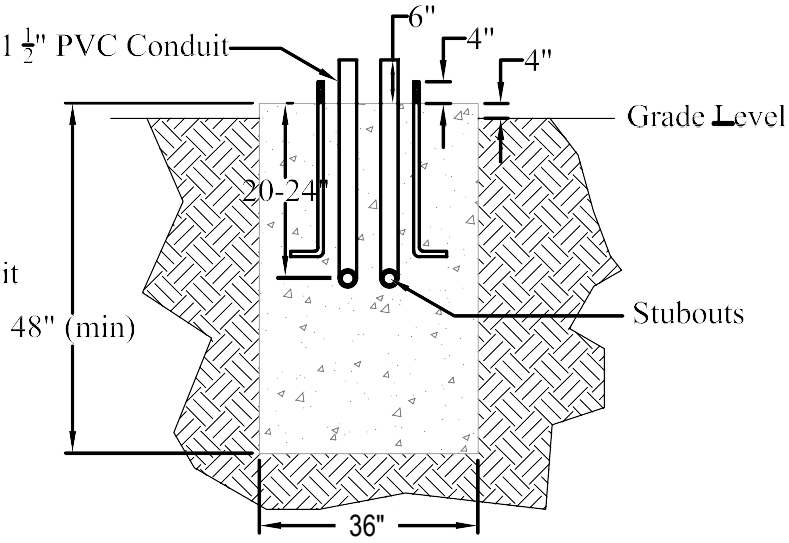


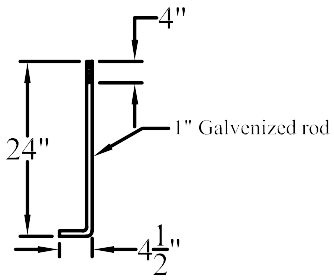
Plan View



Section View

Notes:

1. Bolts will be provided with pole.
2. Concrete for base shall conform to CDOT's Class "D" (minimum 28-day compressive strength of 4500 psi).
3. Stubouts are 6" in length and are made 20" below grade for single fixture light poles and 24" below grade for new double fixture light poles.



Anchor Bolt Detail

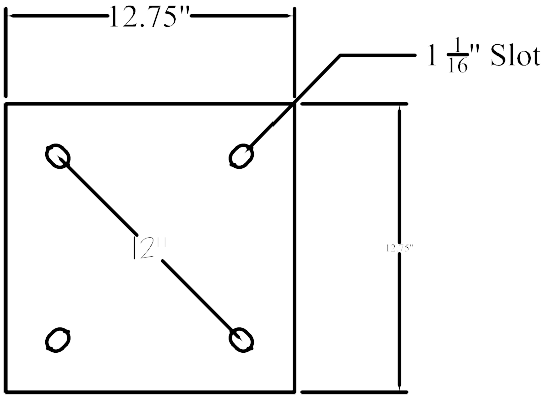
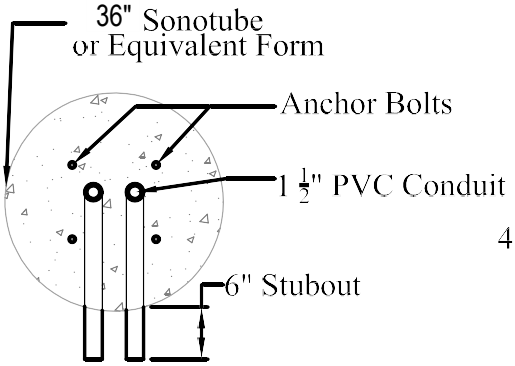


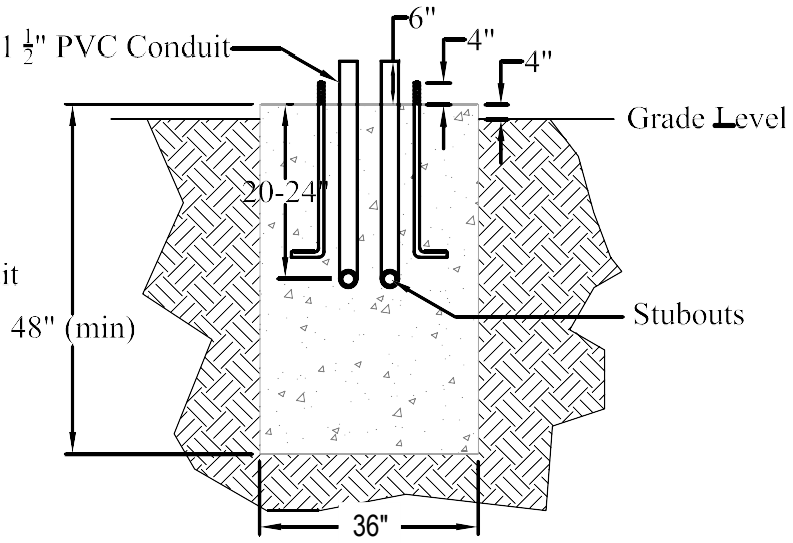
Plate Detail

NEW STYLE DOUBLE BASE FOR LIGHT POLE

CITY OF ASPEN	CITY OF ASPEN ELECTRICAL DEPARTMENT 219 PUPPY SMITH ROAD ASPEN, CO 81611	CITY OF ASPEN STANDARD DETAILS #:ELE - 102	REVISIONS: DATE 12/07/18, 06/15/20; COMMENTS
	CREATION DATE: 11/01/13 INITIALS: GCS	LAST MODIFICATION DATE: 06/15/20 INITIALS: MH	



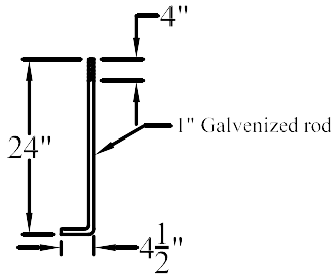
Plan View



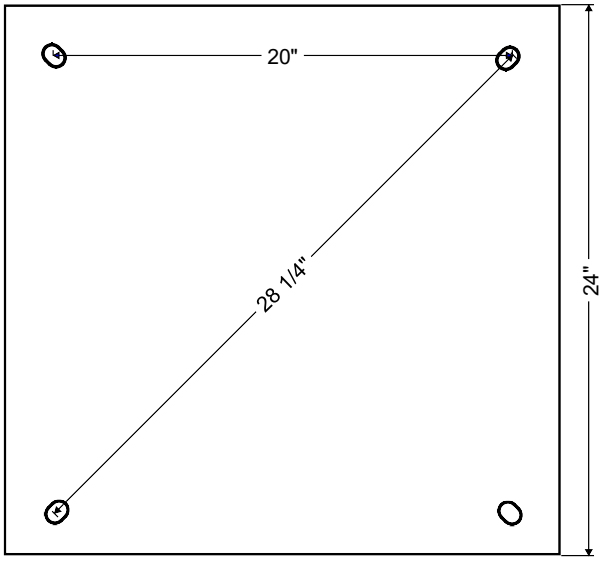
Section View

Notes:

1. Bolts will be provided with pole.
2. Concrete for base shall conform to CDOT's Class "D" (minimum 28-day compressive strength of 4500 psi).
3. Stubouts are 6" in length and are made 20" below grade for single fixture light poles and 24" below grade for new double fixture light poles.



Anchor Bolt Detail



5/8" ANCHOR BOLTS

OLD STYLE DOUBLE BASE FOR LIGHT POLE

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

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STANDARD DETAILS

#:ELE - 103

LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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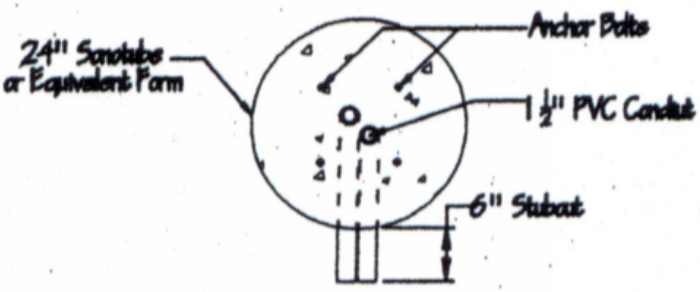
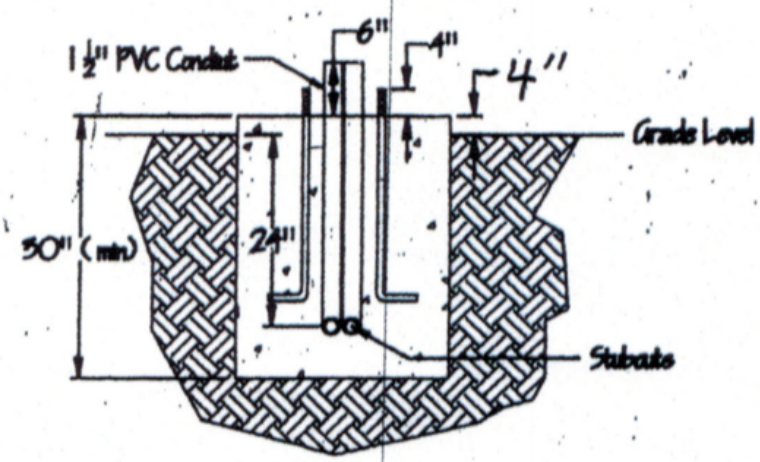


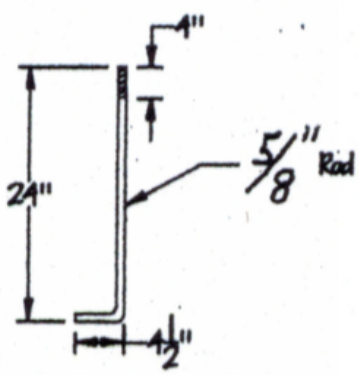
Plan View



Section View

Notes:

1. Bolts will be provided with pole.
2. Concrete for base shall conform to CDOT's Class "D" (minimum 28-day compressive strength of 4500 psi).
3. Stubouts are 6" in length and are made 24" below grade



Anchor Bolt Detail

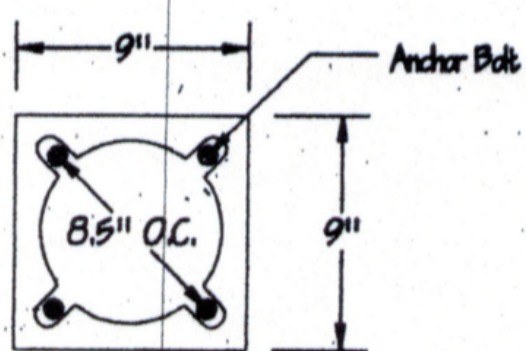


Plate Detail

SINGLE FIXTURE BASE FOR LIGHT POLE

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS

#:ELE - 104

LAST MODIFICATION DATE: 12/07/18 INITIALS:

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DATE	COMMENTS
12/07/18	

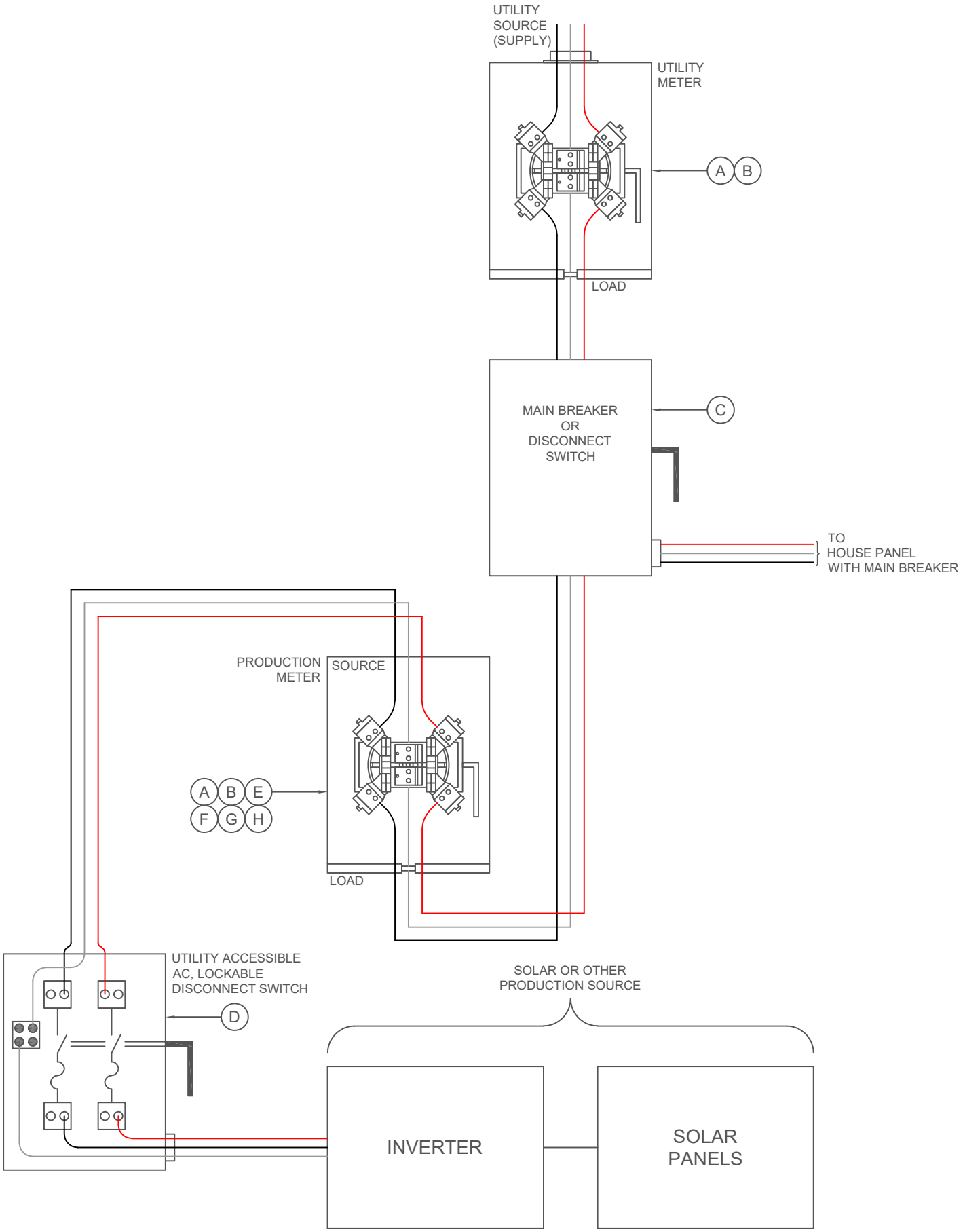
PHOTOVOLTAIC (PV) INSTALLATION REQUIRMENTS

General Notes:

1. Utility meter location and installation shall be in compliance with this standard. If a service does not have a Disconnect that is complaint with Section 4 of this document, a complaint Disconnect must be installed.
2. The use of piercing tap connectors within a self-contained meter socket or CT enclosure/compartment is strictly prohibited. The City of Aspen will not permit the use of the meter socket or CT enclosure/compartment as a junction box unless it is used in accordance with its listing and labeling.
3. Grounding and bonding of all equipment shall be in in accordance with the NEC code required by the City of Aspen.
4. All 480-volt services will require instrument metering that is compliant with Section 4 of this document.
5. All components must be labeled in accordance with the NEC code required by the City of Aspen. The net meter, production meter, disconnect, and interior circuit break must all be properly labeled.

Production Meter Notes:

A. Appropriate meter socket, as described in Section 4 of this document are to be furnished and installed by the customer.
B. Production and utility meters are provided and installed by the City of Aspen at the customer's expense.
C. Rain tight, load beak fused disconnect or circuit breaker is required at meter location. It may be a combined meter/disconnect (factory built/UL listed) assembly. Disconnect must be on load side of meter and be located within 24 inches of meter socket.
D. Utility Accessible AC Disconnect shall be located within 10' of the utility meter, shall be lockable and provide a visible open to the City of Aspen personnel. It shall be labeled in accordance with the requirements for Meter Identification in Section 4 of this document. This is optional when the production meter is self-contained.
E. Inverter based, customer-owned generation shall be wired to the load side terminals of the Production Meter (bottom of meter block).
F. Productions meter socket shall be marked with a stamped brass, aluminum, or stainless steel tag, indicating the address including the unit in accordance with the requirements for Meter Identification in Section 4 of this document.
G. Production meter socket shall be located within 10' and line of sight of the utility meter. If there is any reason this cannot be accomplished, a site plan showing proposed equipment locations shall be submitted for review. The City of Aspen shall review and approve/deny the proposed equipment location prior to installation.
H. A meter socket cover shall be installed at all times to secure the meter socket prior to the installation of the production meter.
I. A customer-owned (optional) meter may be connected behind the utility accessible disconnect. Such a meter will not be supplied nor maintained by the City of Aspen.
J. The City of Aspen's production meter must be protected by an over current protection device with a minimum interrupting rating of 10,000amps symmetrical current or greater. Such device must meet the distance requirements in Section 4 of this document.



CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: INITIALS:

CITY OF ASPEN STANDARD DETAILS

#:ELE - 106

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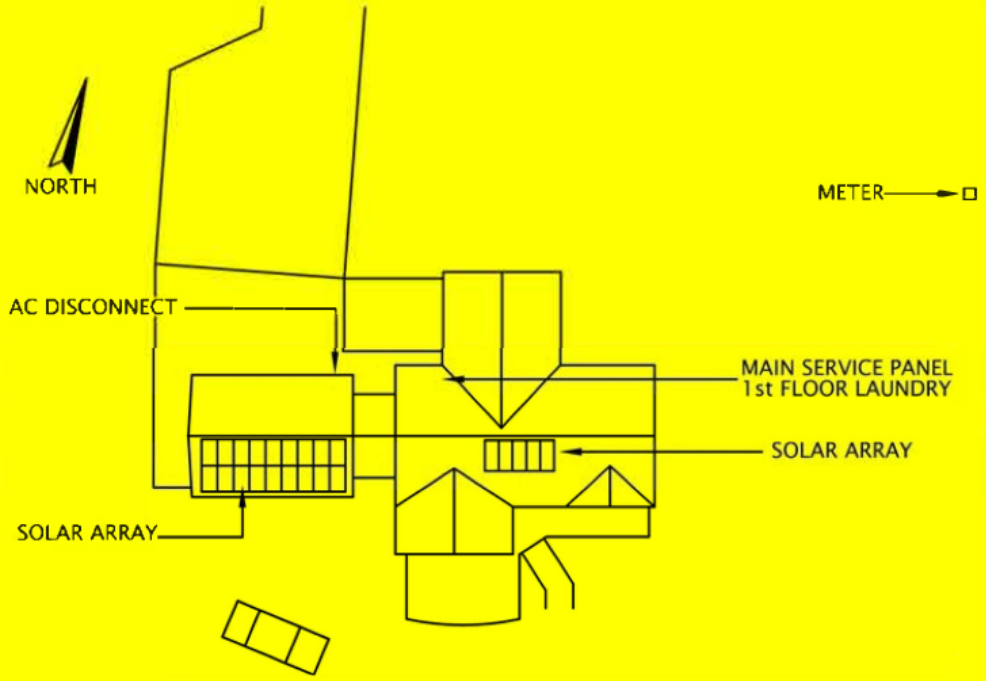
REVISIONS	
DATE:	COMMENTS

PV SYSTEM CONTAINS A TAP BETWEEN THE MAIN DISCONNECT AND THE METER.

The PV AC Disconnect and Main Breaker must BOTH be turned off prior to any electrical work on this panel or meter .

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN:



CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CREATION DATE: 11/01/13 INITIALS: GCS

CITY OF ASPEN
STANDARD DETAILS

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LAST MODIFICATION DATE: 06/15/20 INITIALS: MH

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PHOTOVOLTAIC (PV) WITH ENERGY STORAGE SYSTEM (ESS) INSTALLATION REQUIREMENTS

GENERAL NOTES:

1. ALL REQUIREMENTS DESCRIBED IN ELE-105 - PHOTOVOLTAIC INSTALLATION REQUIREMENTS APPLY.

2. ESS MAY ONLY BE CHARGED BY PV. CHARGING OF THE ESS FROM UTILITY-SUPPLIED POWER IS PROHIBITED.

3. IF A PROTECTED LOAD PANEL IS USED, PV/ESS INVERTER/CHARGER APPARATUS SHALL HAVE THE ABILITY TO DELIVER UTILITY POWER TO THE PROTECTED LOAD PANEL WHILE ESS IS 100% CHARGED.

4. PV PRODUCTION SHALL BYPASS ESS WHEN ESS IS 100% CHARGED.

5. ESS DISCHARGE SHALL NOT EXCEED 150% OF THE SIZE OF THE INSTALLED PV SYSTEM.

6. ESS DISCHARGE SHALL NOT BE EXPORTED ONTO THE CITY OF ASPEN'S DISTRIBUTION SYSTEM UNDER ANY CIRCUMSTANCES. ESS SHALL DISCHARGE TO CUSTOMER LOADS ONLY.

7. ESS REMOTE EMERGENCY SHUTOFF SHALL BE LOCATED NEAR THE NET METER AND CLEARLY LABELED "ENERGY STORAGE SYSTEM DISCONNECT." ESS DISCONNECTING MEANS SHALL ALSO BE AVAILABLE WITHIN SIGHT OF THE ESS.

8. THESE REQUIREMENTS ARE SUBJECT TO CHANGE UPON IMPLEMENTATION OF AMI.

PV & BATTERY STORAGE REQUIREMENTS

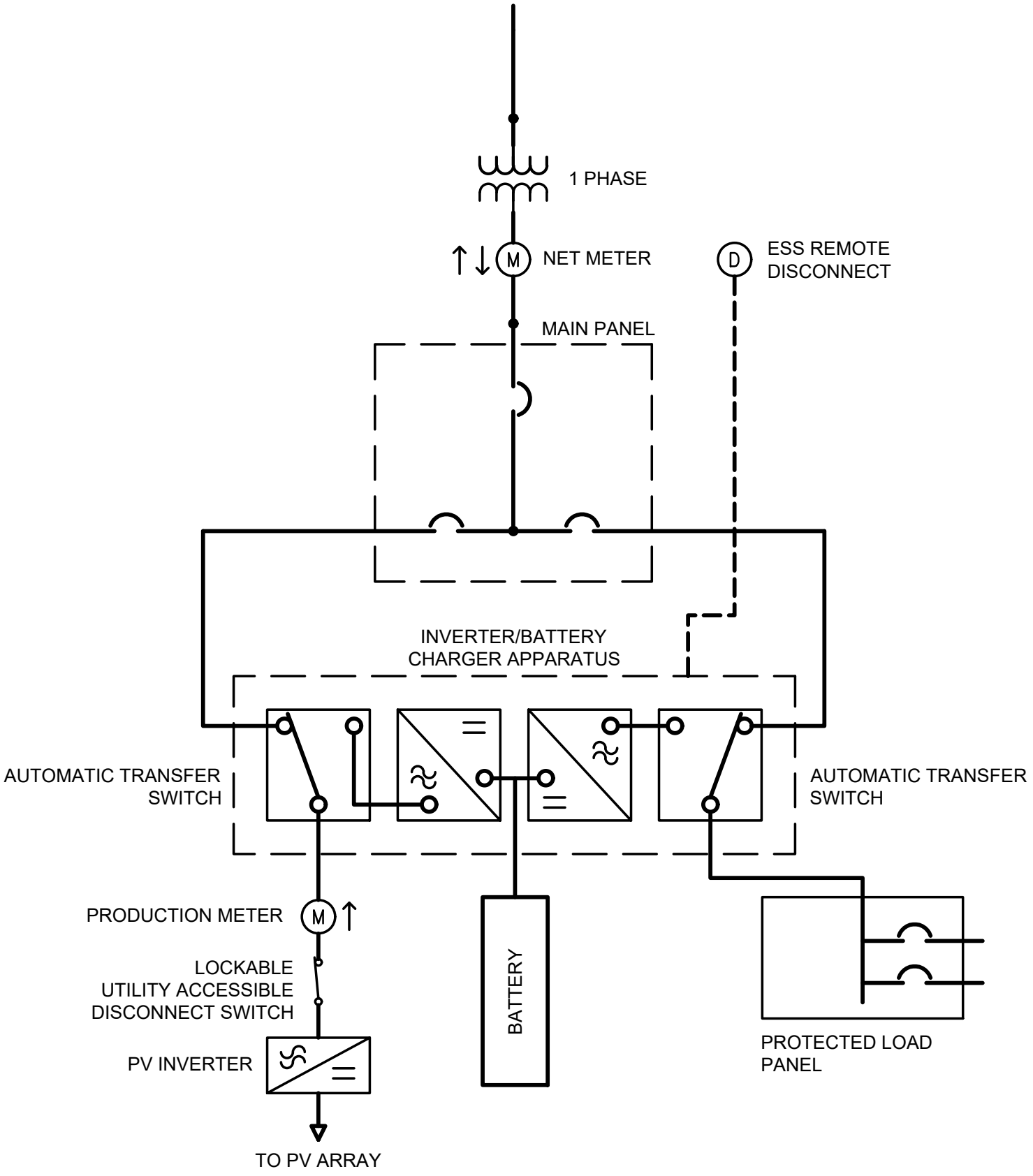
CITY OF ASPEN
ENGINEERING DEPARTMENT
130 S GALENA ST
ASPEN, CO 81611
PHONE: (970) 920-5148

CITY OF ASPEN STANDARD DETAILS

ELE-108

REVISIONS	
DATE	COMMENTS
10/29/21	FOR REVIEW

CREATION DATE: 10/28/21 INITIALS: KLO | LAST MODIFICATION DATE: INITIALS: | SCALE: NOT TO SCALE



PV & BATTERY STORAGE CONFIGURATION #1

CITY OF ASPEN

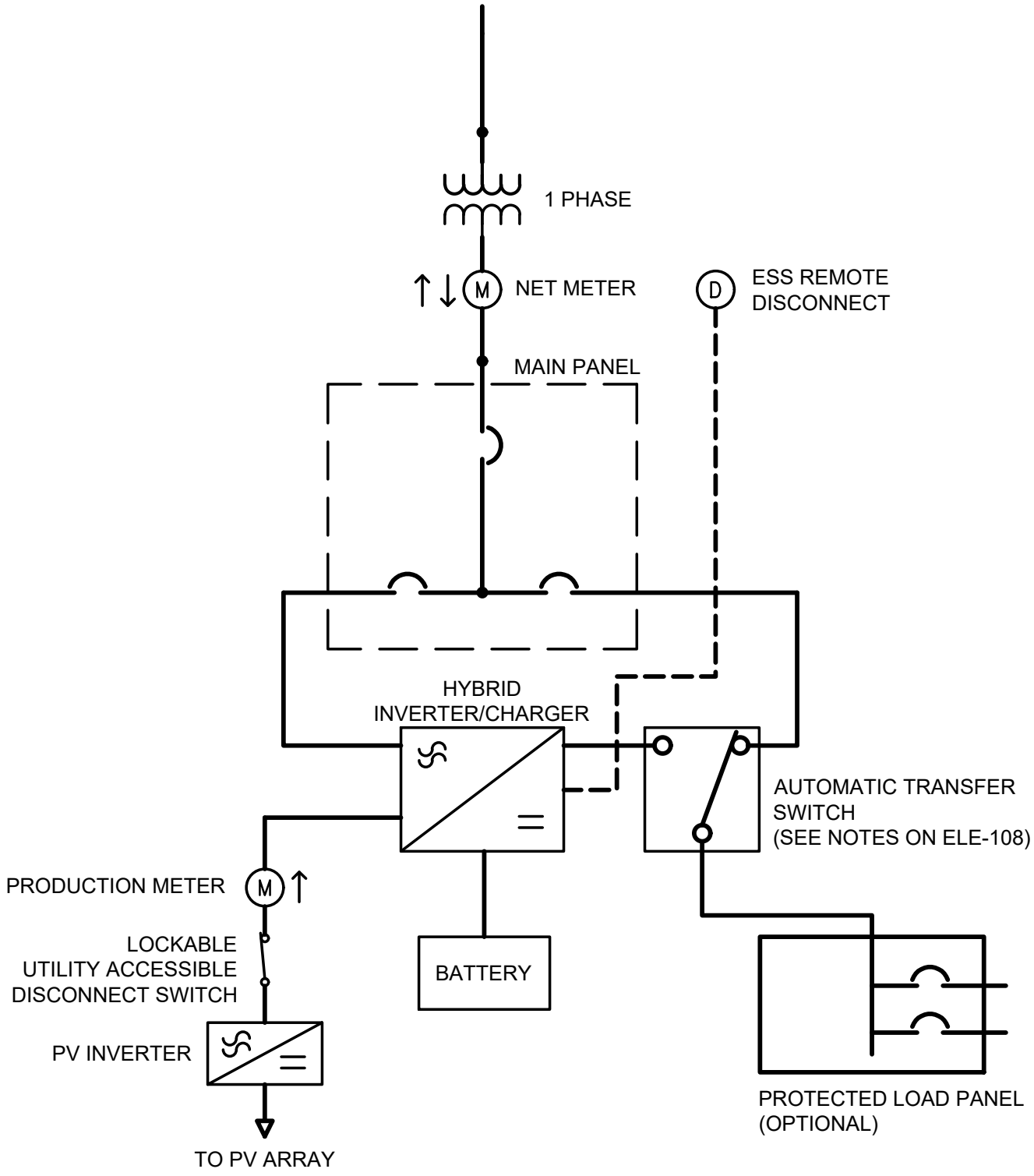
CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CITY OF ASPEN
STANDARD DETAILS
ELE-109

REVISIONS	
DATE	COMMENTS
10/29/21	FOR REVIEW

CREATION DATE: 10/28/21 INITIALS: KLO | LAST MODIFICATION DATE: INITIALS: | SCALE: NONE

WWW.ASPENPITKIN.COM/DEPARTMENTS/ELECTRIC



PV & BATTERY STORAGE CONFIGURATION #2

CITY OF ASPEN

CITY OF ASPEN
ELECTRICAL DEPARTMENT
219 PUPPY SMITH ROAD
ASPEN, CO 81611

CITY OF ASPEN
STANDARD DETAILS
ELE-110

REVISIONS	
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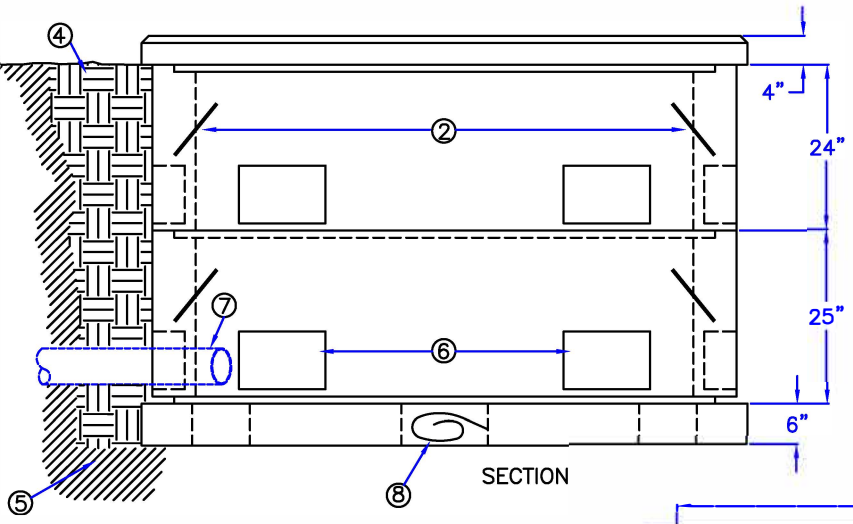
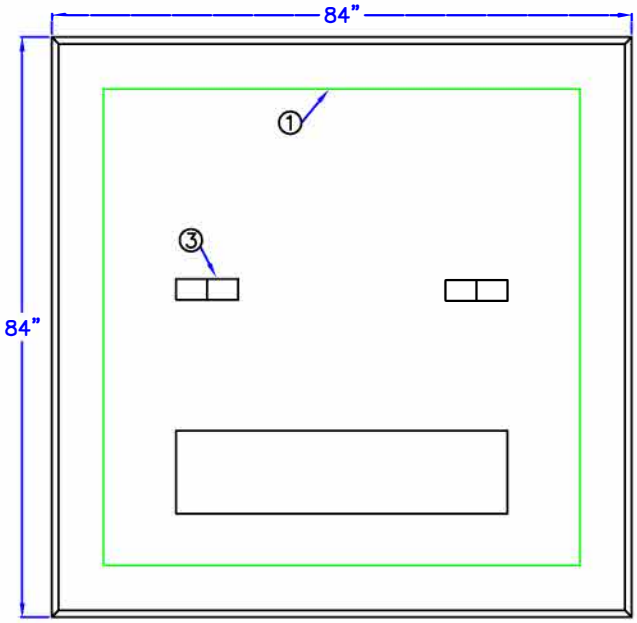
10/29/21	FOR REVIEW

CREATION DATE: 10/28/21 INITIALS: KLO | LAST MODIFICATION DATE: INITIALS: | SCALE: NOT TO SCALE

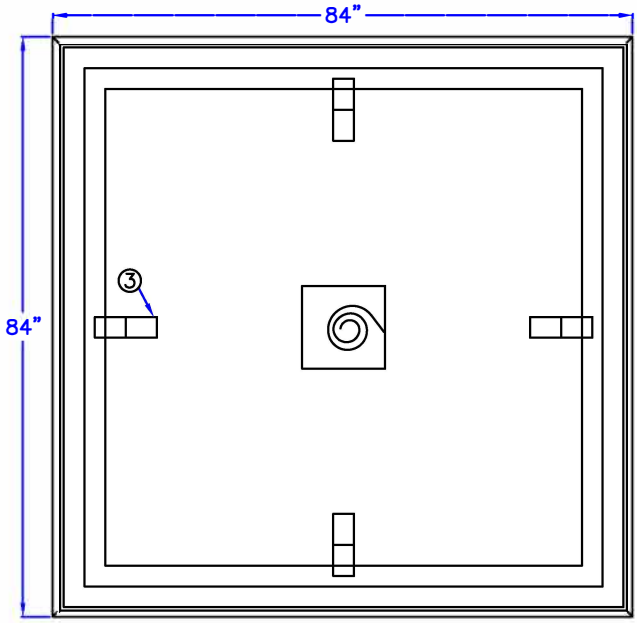
3 PHASE TRANSFORMER VAULT SPECIFICATION



SECTION



PAD CENTERED ON VAULT
TRANSFORMER ON PAD



VAULT CENTERED ON BASE

NOTES _____

1. TYPICAL TRANSFORMER OUTLINE
2. LIFTING HANDLES (2) PER VAULT SECTION
3. LIFTING HOLES
4. BACKFILL TO BE WELL COMPACTED
5. SOIL UNDER BASE TO BE UNDISTURBED OR WELL COMPACTED
6. (6) KNOCKOUTS 8"X12" PER VAULT SECTION
7. CONDUIT(S) INSTALLED THROUGH KNOCKOUTS SHALL BE GROUTED
8. BOND #2 COPPER INTO GROUND SYSTEM WITH ROD AND NEUTRAL

THREE PHASE TRANS. VAULT (500 KVA & Larger)	
1 - 40200 Large Base	-3,600 lbs.
2 - 40800 Vault, 6'x2'H	-3,000 lbs. Each
1 - 40500 Pad, 3Phase	-3,400 lbs.

CITY OF ASPEN

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STANDARD DETAILS

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LAST MODIFICATION DATE: 12/07/18 INITIALS:

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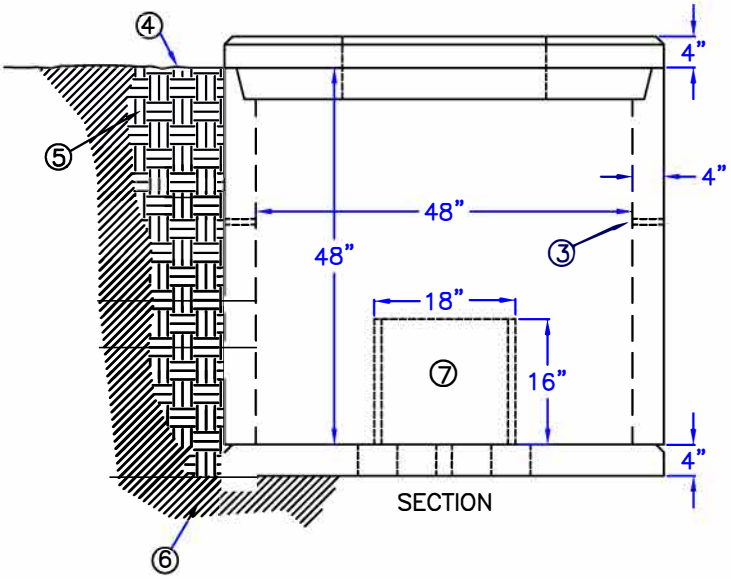
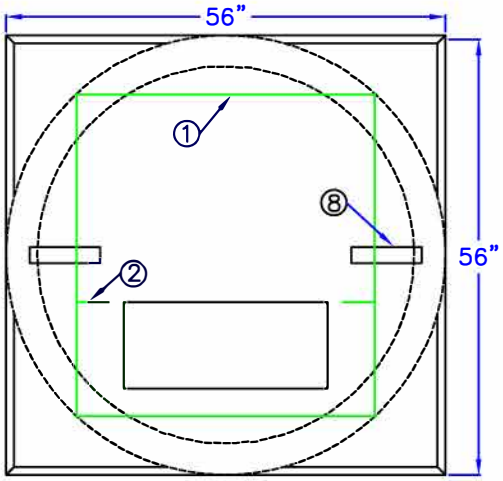
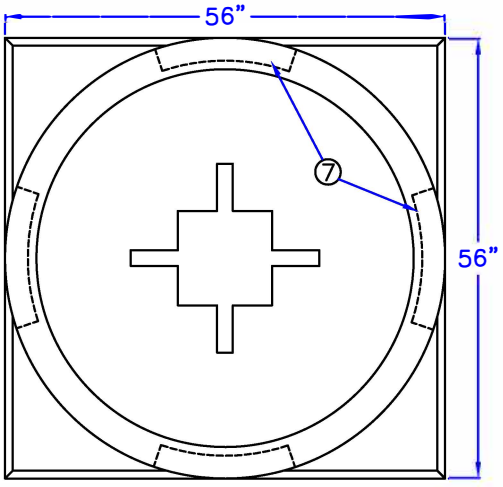
1 PHASE
TRANSFORMER VAULT
SPECIFICATION



SECTION



PAD CENTERED ON VAULT
TRANSFORMER ON PAD



VAULT CENTERED ON BASE

NOTES

1. TYPICAL TRANSFORMER OUTLINE
2. BACK EDGE OF TRANSFORMER OPENING
3. 3/4" HOLE (TOTAL OF FOUR)
4. GROUND LEVEL
5. BACKFILL TO BE WELL COMPACTED
6. SOIL UNDER BASE TO BE UNDISTURBED OR WELL COMPACTED
7. FOUR KNOCKOUTS (16"X18")
8. GROUT HOLE IF CONCRETE BOTTOM IS BROKEN OUT
9. FOR CONSUMERS INSTALLING SECONDARIES, CABLE TAILS SHALL BE 60" LONG MEASURED FROM TOP OF PAD

SINGLE PHASE TRANSFORMER VAULT (Round)	
1 - 40150 Small Base	-1,100 lbs.
1 - 40750 Vault, 4'x4'H or 40760 Vault, 4'x3'H	-2,500 lbs.
1 - 40450 Pad, 1Phase	-1,200 lbs.

CITY OF ASPEN

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