Electric Service Requirements

August 2022

supersedes all previous editions

"Blue Book"

myavista.com/construction

Electric Service Requirements ("Blue Book")

August 2022

1411 E Mission Ave
Spokane, WA 99202
(800) 227-9187
myavista.com/construction

This publication supersedes all previous editions. Requirements for service are subject to change without notice, including in-between publications. Please contact Avista prior to starting construction for latest requirements.

This publication does not include all applicable federal, state, and local codes and regulations. Avista assumes no liability for damages that may arise from the use of information contained herein, including that which may be in error. Consult your authority having jurisdiction for additional construction requirements.

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Preface

Please contact **Avista at 800-227-9187** or myavista.com/construction prior to starting construction, while still planning your project. We're here to help!

While great effort has been made to assemble pertinent information to support your construction project, this publication is not comprehensive and is subject to change without notice, including in-between publications.

Consult your authority having jurisdiction (typically your city or county) for additional requirements and permits. All new services, modified services, and services de-energized for more than one year must pass an electrical inspection before Avista can energize or re-energize. Limited exceptions apply.

In addition to all applicable federal, state, and local codes and regulations, installations must also comply with Avista's electrical service requirements as a condition of service. Approval from the authority having jurisdiction does not guarantee that all Avista's service requirements have been met. Contact Avista prior to starting for latest requirements and to coordinate construction.

Any service modification or other construction activity that results in a violation to Avista's service requirements and/or any applicable code or regulation may be grounds for discontinuance of service. Please contact Avista prior to starting any construction occurring near or on Avista's electrical infrastructure, point of service, or the electric meter.

0.1 Electrical Safety

Only qualified Avista personnel and contractors are authorized to disconnect service conductors, pull meters, and climb utility poles.

Electrical permits and inspections are required for all electrical work on the customer's side of the meter, including the installation of the meter base. Electricity is deadly and should only be worked upon using industry recognized safety precautions.

0.2 Digging Safety

You're liable for dig-in related damages. **Call 811 before you dig**; it's the law and the service is free:

1. Mark proposed excavation in white paint (use pink if covered by snow).
2. Call 811 minimum two business days before digging.
3. Wait for all utilities on locate ticket to be marked before digging.
4. Maintain locate marks/flags until locate ticket expires.
5. Hand digging is required within 24-inches of all marked utilities.

811®

Know what's below.
Call before you dig.

Utility Marking Color Codes
Electric: Red
Gas-Oil: Yellow
Communication: Orange
Water: Blue
Sewer: Green
Temporary Survey: Pink
Irrigation: Purple
Proposed Excavation: White

Only utility owned, and operated lines will be located through the 811 service. Privately owned lines (e.g., anything beyond the meter point) will not be marked. A private locator can be hired for a fee.

If you hit or nick an electric or natural gas line, immediately call Avista at **800-227-9187.**

0.3 Overhead Clearances

Always maintain minimum clearances to overhead powerline:

- 20 feet for transmission lines (up to 345 kV)
- 10 feet for distribution lines (up to 50 kV)

Never dump rock, rubble, or topsoil under an overhead wire as it reduces mandatory ground clearances.

0.4 Ground Clearances

0.5 Contact Information

Avista Utilities Call Center	**(800) 227-9187**
Clarkston / Lewiston / Orofino	(208) 798-1472
Coeur d'Alene	(208) 769-1377
Colville	(800) 227-9187
Davenport	(509) 725-2467
Deer Park	(800) 227-9187
Electric Meter Department	(800) 227-9187
Grangeville	(208) 983-0711
Kellogg	(208) 786-6931
Othello	(800) 227-9187
Pullman / Moscow	(509) 336-6240
Sandpoint	(800) 227-9187
Spokane	(509) 495-4180
St. Maries	(208) 245-2222

Definitions

Ampere (I): unit of current or rate of electricity flow.

Commercial services: all other services not classified as residential.

Demand factor: ratio of maximum demand of a system to the total connected load.

Diversity factor: ratio of the sum of individual maximum demands of the various parts of a system to the maximum demand of the whole system.

Horsepower (hp): measure of the rate work is performed Equivalent to; 746 watts or raising 33,000 lbs, one ft, in one minute.

Kilovolt-ampere (KVA): 1000 volt-amperes.

Kilowatt (kW): 1000 watts.

Kilowatt-hour (kWh): 1000 watt-hours.

Load factor: ratio of the average load over a designated period of time to the peak load occurring in that period.

NEC: National Electrical Code is the primary code that governs all electric and communication construction except for mining, railroads, and utilities.

NESC: National Electrical Safety Code is the primary code that governs utility electric and communication construction.

Ohm (R): unit of resistance to electrical flow.

Point of delivery: location where Avista's service conductors and the Customer's service entrance conductors are connected.

Power Factor (PF): ratio of real to apparent power.

Residential services: services that serve individual residences, apartments, mobile homes or living units for domestic purposes.

Volt (V): unit of voltage or potential difference between two points. Similar to pressure.

Volt-amperes (VA): unit of apparent power.

Watt (W): unit of real power.

Watt-hour (Wh): unit of electrical work.

Chapter 1 General Requirements

1.1 Utility Rates & Regulations

Copies of Avista's currently effective rates, rules, and regulations filed with the Public Utility Commission are available to you on request or at myavista.com.

1.2 Electrical Permit and Inspection

The customer or their electrician is responsible for obtaining an electrical permit before work is started and having their completed work inspected by the authority having jurisdiction. The authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. Federal buildings must have electrical inspection by third party. A passed inspection by Authority Having Jurisdiction does not constitute approval by Avista. Avista has final approval.

1.3 Connection Requirements

Avista will only connect a new service meeting Avista's requirements to equipment which has passed local inspection and has a visible inspection sticker posted on the meter socket.

When Avista disconnects a service to allow an electrical upgrade or altered service it will be reconnected if the modifications meet our current standard requirements and;

1. If work is performed by the property owner – a final inspection approval must be posted on site
2. If work is performed by a licensed electrician - inspection requirements vary by local electrical inspection office. The electrician should call the local Avista office for current Avista standard requirements. See Contact Information in a previous section.
3. Inspection of that service and equipment is required before reconnection and service must meet current Avista standards. In some cases, an official inspection by the governing agency may also be required.
4. If any service has been disconnected for a period of one year or more both an Avista inspection and a safety inspection by the governing agency is required.
5. 48-hour notice must be given to Avista for disconnection of service conductors or removal of any meter locking device.

6. Avista will not attach any services and facilities to trees.
7. Replacement of mobile homes at a service constitute a major change and require both an Avista inspection and a local electrical inspection by the governing agency.
8. Seasonal installations that are shut off for less than a year are subject to an Avista safety inspection and can be required to bring installation up to current code requirements if deemed unsafe.
9. In rural areas or on service equipment not attached to a permanent structure, customer must install a phenolic label with the address on the meter can. Phenolic labels can be purchased from the following suppliers: Engraver at 3817 N. Monroe, Spokane; Quick Engraving at 1527 E 9th, Spokane; and Northwest Business Stamp at 5218 N Market, Spokane.

1.4 Availability of Service

It is important that Avista be provided, as soon as possible, with accurate load information and other requested data before the purchase or installation of equipment and wiring. This will allow Avista to determine the availability of service, service location and available voltage.

1.5 Service Agreement

For new installations a signed service agreement and payment is required before Avista's work can be scheduled.

1.6 Point of Delivery

The point of delivery is the location where Avista's service conductors and the Customer's service entrance conductors are connected. Avista requires a building be served using a single point of delivery supplied through a single meter installation, at a single voltage and phase classification unless permitted by exception.

- Avista owns, installs, and maintains equipment on the source side of the point of delivery as well as the meter and instrument transformers. The Customer is responsible for the equipment on the load side.
- Buildings, subdivided into individual tenant spaces, require multiple meters for the individual tenants. The service entrance conductors for these meters must be fed from a main disconnect, switch board or bussed together to provide a single point of delivery.
- Metering equipment is located outside of building as close as practical to the point of delivery, but in no case more than 25 feet.
- The customer is responsible for providing equipment to Avista specifications needed to provide one point of connection. See the Commercial Section for acceptable point of delivery equipment.
- The point of delivery is to be located outside and above ground except in the Spokane Downtown Network. Avista will no longer pull underground secondary conductors through an outside wall or through a slab into a customer's building or structure. The point of delivery will be on the outside wall in a customer provided Pulling/termination enclosure or free-standing pulling enclosure mounted on (2) 2-inch rigid steel pipe (in concrete) with unistrut as needed and must be within 25 feet of metering equipment. An underground service over 1200 amps will require outside mounted switch gear if multiple meters are needed and the transformer is not dedicated to one service.

Note: Contact with the appropriate Avista representative during the early planning and design phase of a project is recommended to help alleviate costly and time-consuming modifications (made by the customer) and required by the utility to meet these requirements.

1.6.1 Exceptions Allowing Multiple Services

Exceptions require prior written approval by Avista and if required, approval by the Authority Having Jurisdiction: Additional services may be subject to Exceptional Costs.

- Single buildings that are sufficiently large to make two or more services necessary. For example, it may be impractical to serve an industrial plant with a single service that has sufficient capacity for any and all future loads. It may also be impractical to design long feeders with acceptable voltage drops. Voltage drop calculation per National Electrical Code shall be provided by the customer to confirm this problem.
- Buildings with multiple privately owned townhouses or zero lot line construction must be provided with an individual point of delivery for each premise.
- Large commercial multi-story buildings require a single point of delivery. Metering for individual premises may be provided with a minimum number of meter rooms located on various floors if it is impractical to design long feeders with acceptable voltage drop. Voltage drop calculation per National Electrical Code shall be provided by the customer.
- Buildings designed for multiple services to supply enhanced reliability.
- At the request of a Customer, multiple buildings or structures in close proximity used in a single integrated commercial, industrial, or institutional enterprise can be considered a single premise and served from a single point. In this case the Customer shall own and be responsible for installation, operation and maintenance of the electrical distribution system between buildings. Under some circumstances Avista may provide, own and maintain this system under an agreement.
- Existing single space buildings sub-divided into two or more separate buildings, having two or more separate addresses due to installations of approved Party Walls, constructed as fire walls without openings, in accordance with the International Building Code (Section 706) and approved by the local jurisdiction, can each be served with separate electric and or gas services.
- Fire pumps may be fed with a separate service terminating at a Manual Circuit Closing (MCC) meter socket and be within 25-feet of the building service.
- Where multiple services supply a building, meters shall be clearly marked with phenolic labels.
- Buildings accommodating multiple services that have walls moved such as strip malls, the electrical services must be altered to match new space and preapproved by Avista representative.

1.6.2 Location

Contact an Avista Construction Representative to determine the location of the point of delivery and meter before installing any equipment. Avista provides service locations based on capacity requirements, service quality, safety, access, and cost. All of the following will be considered when determining the location for the point of delivery.

- Overhead point of delivery at a location with line of site to Avista's facilities.
- For accessibility it should be installed outside in an unlocked area. Enclosed patios, porches, carports, and fenced areas which prevent access must be avoided. Fenced areas accessible by Avista must be preapproved by Avista representative**.**
- Provide required clearances from and over present and future buildings, garages, driveways, parking areas etc. for overhead service conductors.
- Provide required clearances from buried objects, like septic systems, drain fields and fuel tanks for underground service conductors.
- Avista will not route underground primary URD cable or service wire under buildings. Any building built over existing underground primary or secondary conductor will not be energized until overbuilt conductor is moved at customer expense. [60]
- Altered Services normally do not require relocation unless there are serious conflicts with Avista's service location requirements. For example, serious conflicts would be failure to meet code required clearances, critical access, or safety concerns.
- Preferred Residential Locations
- For overhead installations, temporary service meter must be located on the same side of the building as the permanent service location.

Failure to install service entrance in a location approved by Avista could result in customer having to move equipment at their expense.

Figure 1.1 – New Underground or Overhead Electric Service
Transformer or Handhole on the Street Side

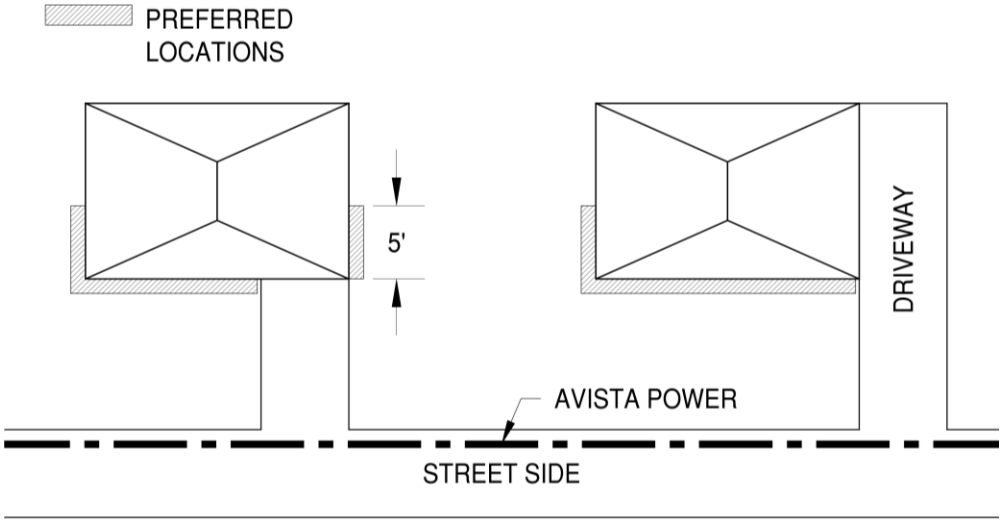
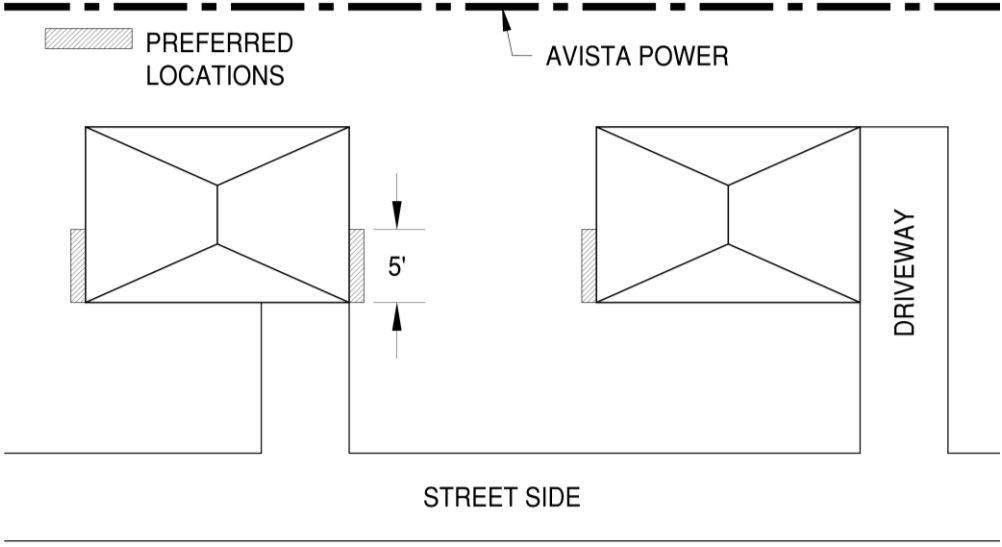


Figure 1.2 – New Underground or Overhead Electric Service
Transformer in Backyard



1.7 Flat Rate Accounts

Avista requires all loads to be metered but reserves the right to flat rate certain fixed loads under special circumstances (such as lighting). The terms related to any flat rate situations must be set forth in an agreement between Avista and the customer. Under no circumstances will Avista flat rate any variable loads.

1.8 Available Service Voltages [17]

Not all listed service types are available in all locations. Contact Avista for the available number of phases and voltages that can be delivered based upon the location, system capacity, and intended use. Special permission is required for more than one service voltage serving a single building.

Single phase 120/240V services shall not exceed 800 amps of continuous load. If load exceeds 800 amps, then service must be 3 phase 120/208 or 277/480 volt.

Service voltage variations and unbalance requirements:

1. Service voltage is measured at the point of delivery. This point is where Utility service conductors and customer service entrance conductors are connected. Service voltage ranges may differ from those listed during emergencies or for some rural customers because of the distance from the source. Voltages may temporarily fluctuate outside the listed ranges as loads start and stop or during fault conditions.
2. Objectionable voltage variations caused by customer loads are corrected at customer expense.
3. On three phase services, all single-phase loads must be balanced between the three phases, except for a four-wire delta service.
4. The utility system is designed and operated to limit the maximum voltage unbalance between phases. A maximum of 3% is expected under normal conditions at the point of delivery of an unloaded service. All three phase voltages must still be within the Service Voltage Range. Motors and other three phase equipment may need to be de-rated for unbalance over 1%. For further information refer to *Voltage Unbalance Calculations* in the Appendix.

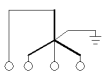
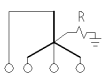
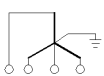
Nominal Voltage		Line-Neutral	Line - Line	Transformer (kVa)	Application
				Single Phase	
120V 2 Wire		114-126	--	3-100 – OHD NA - URD	Street and traffic lights, controls, signs etc. 120V 2-wire meter socket required.
120/240V 3 Wire		114-126	228-252	3-100 – OHD 15-167-URD	Residential, small commercial. OHD maximum limited by the largest transformer that can be pole mounted
120/208 3 wire		114-126	197-218	--	Residential, small commercial where 120/208 three phase is available. Maximum load on a single service may be limited to provide three phase load balance.
480V 3 wire		--	456-504	3-100 – OHD Special App - URD	Special applications, freeway and ball field lighting, rail and other. URD transformers are special order, contact Engineering. Center tap grounded for safety & limit line to ground voltage.
				Three Phase	
120/240V 4 Wire Delta		114-126	228-252	3PH 15-500 -OHD	Small commercial / industrial serving a combination of single phase 120/240 and three phase 240V loads. Service may be URD fed from OHD transformer bank.
120/240V 4 Wire Open Delta		114-126	228-252	--	Use to supply large single-phase 120/240 volt loads and small three-phase 240 volt loads. Maximum simultaneous three-phase motor load is 25 hp.
120/208V 4 wire		114-126	197-218	3PH 15-500 - OHD 3PH 45-1000 - URD	Commercial, small industrial, large apartment buildings. Spokane Core Network. Contact Network Engineering for services in the Core Network.
480V 3 wire Ungrounded Delta			456-504	NA	NOT OFFERED FOR NEW SERVICES See DO-4.126 for replacement OHD banks.
277/480V 4 wire Resistance Grounded			456-504	3PH 15-500 - OHD 3PH 45-1500 - URD	Resistance grounded service limited to special industrial applications to limit ground faults. Customer to supply grounding resistor. Contact Engineering.
277/480V 4 wire		263-291	456-504	3PH 15-500 - OHD 3PH 45-1500 - URD	Large commercial, industrial. Normally limited to loads above 20-30 kVa Spokane Core Network. Contact Network Engineering for services in the Core Network.
2400V 3 wire			2340-2520	NA - OHD 3PH 300-1000 - URD	Large pumps, industrial motors. OHD Services are a special application not offered for new services.

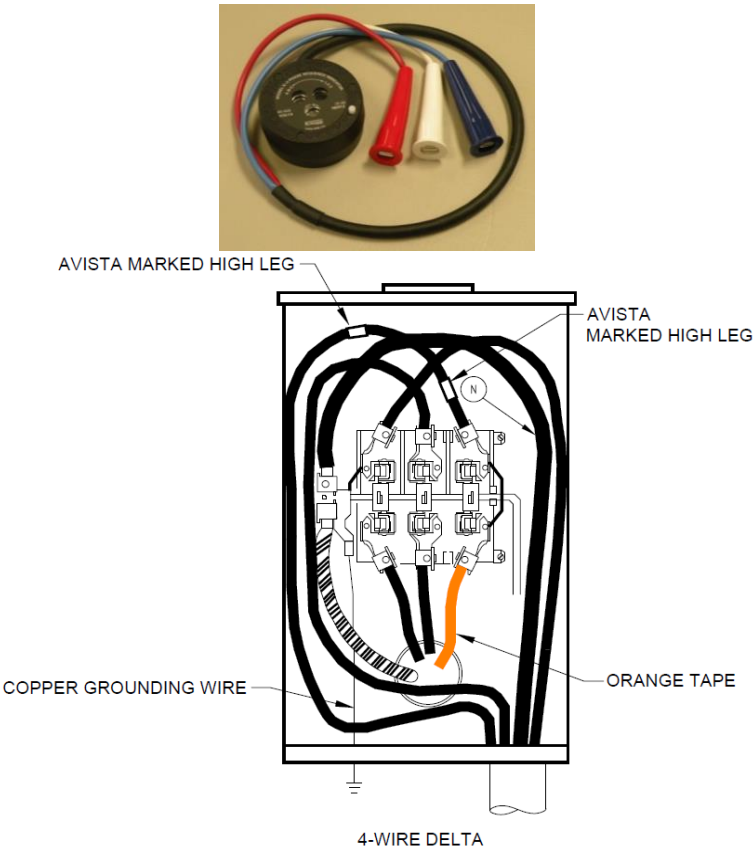
Figure 1.3 – Service Voltages

1.9 Service Entrance Conductors [50]

Service entrance conductors must be specified and installed in accordance with the national, state, and local electrical codes. In addition, they must meet Avista's specific requirements.

- The neutral conductor shall be marked with a white strip or tape.
- The customer service entrance conductors will be connected to bottom position in socket.
- On four-wire, 120/240-volt delta installation, an orange marker shall be used to identify that phase which is approximately 208 volts to ground (high leg or power leg). This shall be located on the right side of the meter socket, CT landing platform and in the middle of the main disconnect.
- Metered and non-metered circuits shall not be run in the same raceway or conduit.
- The long-standing practice is to only mark secondary cable at the service point with tape that marks phase rotation and not phase designation.

Figure 1.4 – Cable Phase Rotation Marking



1.9.1 Markings

1. Always verify voltage and rotation before working on any existing 3 phase service regardless of existing markings.
2. Avista's standard practice is to use red, white and blue tape only for marking phase rotation on the utility side of the service point. No other color tape will be used to mark rotation on the utility side of the service point.
3. On a 4 wire 120/240 service, always mark the high leg or (power leg) blue. The other two hot legs shall be marked red and white.
4. The NEC code for marking the high leg or (power leg) on a 4 wire 120/240-meter socket or weatherhead is orange. Always connect the blue marked conductor to the orange marked lug or conductor for this voltage. On 3 phase services and secondaries, red, white and blue tape is used for marking phase rotation only and does not indicate any specific voltage.
5. Avista will supply ABC or CBA rotation to the weatherhead or meter socket. On new installations, it is up to the electrician to establish the desired rotation.
6. Red, white, and blue tape can also be used for marking both ends of service conductors during installation on multiple run services.
7. Red, white, and blue tape matches the red, white, and blue leads on Avista standard purchased rotation meters.
8. The NEC code for marking the neutral is white. Avista does not mark the neutral. On multiplex underground cables, the neutral conductor is marked with a yellow stripe. The NESC code does not specify any color coding for phase rotation or voltage.
9. While performing maintenance on an existing 3 phase overhead or underground service, the established rotation must be maintained.
10. During a scheduled or unscheduled outage, customer electrician may need to be on site to reestablish the correct phase rotation.
11. All secondary and service cables shall be marked on both ends using Avista standard cable marking tags [39].

1.10 Service Changes/Altered Service

Whenever major changes, relocations, or additions are made to the electrical service, metering must be modified to meet current Avista standards.

Avista will consider a service to be altered when one of the following occurs and will require the customer to bring their service entrance including point of attachment up to the current Avista standards before permanent connections will be made.

1. Customer mast or conductors in mast are changed/moved or upgraded.
2. Location of the service entrance is moved.
3. The meter can is changed/repaired/ or upgraded.

In the event of Avista replacing an existing Delta 480V 3-wire 3 phase service with a 277/480V Wye 4-wire 3 phase service, Avista will notify customer in writing that the existing 3-wire three phase service has been replaced with a 3 phase 277/480V 4-wire service. Available fault currents will change significantly at the service if the neutral is connected at the service. Refer to *Available Fault Current at Point of Delivery* within this chapter. The neutral will be available from Avista for connection at the service panel.

1.11 Load Additions

It is the customer's responsibility to notify Avista when adding significant load. Before installing electric tankless water heating systems, central air conditioners, electric vehicle chargers, central electric space heating, large motors and/or other major loads please contact Avista. Avista representatives will help to determine it the transformer and service wires are adequate for the increased load. In some cases, Avista will need to install larger transformers and wires to accommodate the increased load. The costs of these changes may be charged to the customer.

1.12 Installation and Repair

The customer provides, maintains, and operates at their expense all wiring and equipment, except the meter, on the load side of the point of delivery.

The customer owns the meter socket and is responsible to remove or remount it to facilitate the installation of siding. Siding shall be installed so as not to interfere with the installation or removal of the meter.

Avista provides, maintains, and operates at their expense all wiring, poles and equipment, on the source side of the point of delivery. In addition, Avista is responsible for the installation, repair, and calibration of the electric meter.

Note: On new construction and customer requested changes/alterations to the existing system, the customer will be responsible for the costs of material and labor required by

the utility to meet the customer's request. Contact local Avista representative for details on requirements and costs

1.13 Landscaping

Avista provides information on acceptable methods for screening of pad-mounted transformers and switching enclosures. These designs should be tailored to fit specific needs of the home or business owner. This information is available from your local Construction Office.

1.14 Tree Trimming

The customer is responsible to keep trees and bushes away from overhead service conductors from the pole to the building. Avista will disconnect the service to make trimming safe. Call Avista 48 hours in advance of the work. Service disconnects done on weekends and after normal Avista business hours will require a charge to the customer.

A minimum of 3 feet of clearance is required from service conductors.

1.15 Other Utilities

It is the customer's responsibility to coordinate the use of a joint ditch or poles before the permanent service is connected. Required clearances between utilities must be met.

1.16 Equipment Protection

It is the responsibility of the customer to provide power conditioning devices that may be required to provide the quality of "power" necessary for optimum performance of their sensitive equipment such as computers or other electronic appliances. Since power disturbances can be created on the utility or customer side of the delivery point, the best locations of these devices may be at the equipment.

Residential customers using computers or critical non-interruptible equipment are encouraged to upgrade their meter sockets to provide manual circuit closing to prevent accidental outages during meter maintenance.

Customers are responsible to provide protection for their equipment that could be damaged by single phasing of three-phase loads.

Customers are responsible for mast and meter protection from ice and snow loading.

1.17 Customer Owned Equipment on Avista Poles

Customer owned metering, switches, luminaries, signs, or other equipment shall not be mounted on Avista's poles.

1.18 Meter Seals

The purpose of meter seals is for safety and prevention of tampering. Only Avista personnel shall remove seals.

Caution: With some types of meter bases, removal of the meter does not de-energize the service.

Any person, who cuts Avista seals and/or wrongfully obtains electric service by by-passing, tampering with, or modifying a meter, may be convicted of a crime, and billed for costs associated with investigation.

Bypassing meter sockets by electricians or customers is not allowed for any reason without Avista approval. All power must be metered.

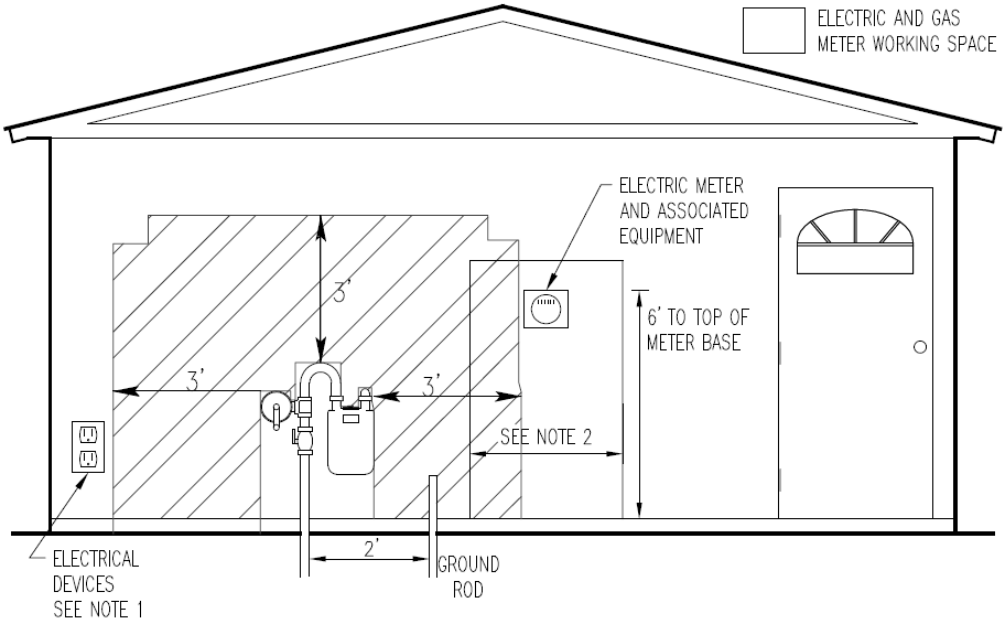
1.19 Motors

Three phase motors 35 horsepower or larger and frequently started 10 horsepower and larger motors may require reduced-voltage starting equipment. Avista requires reduced-voltage starting in some cases to limit voltage flicker and the problems it causes. Avista will furnish starting flicker calculations on request. The allowed starting current will depend on the frequency of starting, and the size of the electrical service. Customers can install reduced voltage starting equipment to reduce voltage flicker. Three phase motors 25 horsepower or larger require closed delta or wye service

1.20 Clearance of Gas Meters to Electric Meters

The drawing below depicts required clearance between gas and electric meters on the same building. Do not use this drawing as a guide for installation or clearances for electric meters.

Figure 1.5 – Gas and Electric Meter Clearances



1. Electrical components, devices, and equipment including switches, receptacles, light fixtures, disconnects, circuit breakers, pad mounted air conditioners or heat pumps that do not supply ventilation air, generators, and transformers should be at least 36-inches away from regulator vent.
2. Electric meter working space shall be the greater of 30-inches wide or the total width of the electric service and metering equipment, centered on the equipment, and a clear space of at least 36-inches in front and permit at least a 90-degree opening of equipment doors or hinged panels. No bollards are allowed in this space. Electric meter shall be located a minimum of 36-inches from the gas service.
3. For specific gas metering clearance requirements refer to gas engineer standards. Any exceptions must be approved by gas engineering.

1.21 Available Fault Current at Point of Delivery

Customer must provide service entrance equipment rated to interrupt the amount of fault current available. Contact Distribution Engineering for information on available fault current at the service point and for information for arc flash study. Minimum main circuit breaker fault duty rating shall be 10,000 amperes for residential and 22,000 amperes minimum for multi-family and all commercial installations. Higher ratings may be required depending on transformer and service wire size and proximity to service entrance. Please reference maximum fault currents for frequently used transformers below.

Note: All construction temps require a minimum of 15 ft of #2 AL conductor between transformer and meter.

Customer equipment AIC and SCCR ratings shall exceed maximum available fault current without exception.

Table 1.1 – Single Phase Fault Current at 240V with Noted Conductor

Transformer KVA	Max fault current at transformer	Conductor size, length, and fault current
15	5,208	4/0AL and smaller = under 10,000
25	8,013	4/0AL and smaller = under 10,000
37.5	11,161	2AL @15ft =7,413 2/0AL @15ft =8,771 4/0AL @15ft =9,399
50	14,881	2AL @15ft =8,890 2/0AL @15ft =10,915 4/0AL @15ft =11,906
75	20,833	2AL @15ft =10,719 2/0AL @15ft =13,809 4/0AL @15ft =15,434
100	26,042	2AL @15ft =119,49 2/0AL @15ft =15,920 4/0AL @15ft =18,119
167	33,135	2AL @15ft =13,250 2/0AL @15ft =18,317 4/0AL @15ft =21,290

Note: This table is only for reference to help with residential/commercial services and single-phase temporary service installations. If your application is not shown here, please call Avista Utilities.

A permanent label with service equipment AIC rating must be affixed to outside of service equipment for all multi-family and commercial meter installations

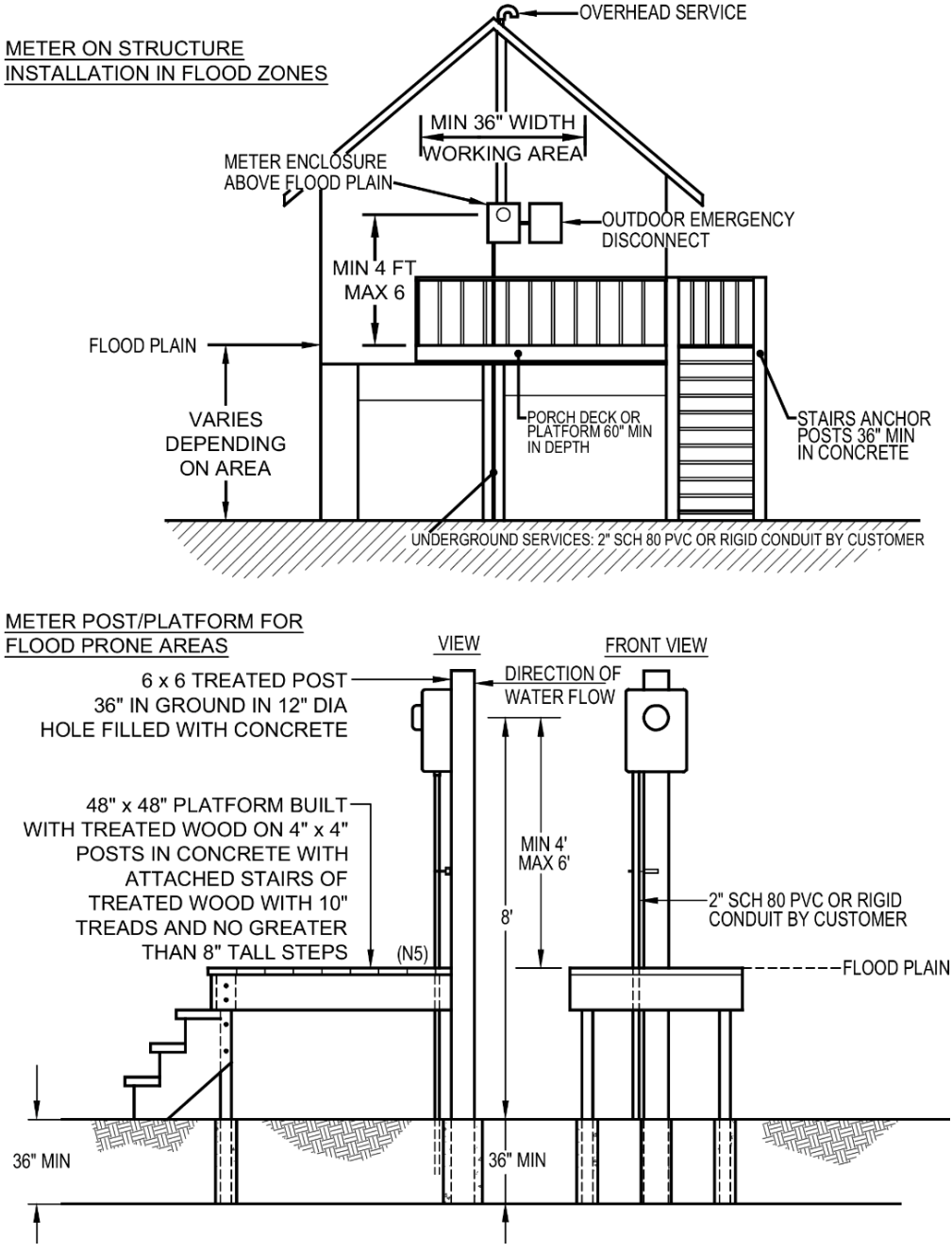
Table 1.2 – Three-Phase Point of Delivery Available Fault Current

Transformer KVA	Secondary Voltage	Max Fault Current
45	208	8,922
45	480	3,866
75	208	14,870
75	480	6,444
112.5	208	22,306
112.5	480	9,666
150	208	27,758
150	480	12,028
225	208	41,637
225	480	18,043

Transformer KVA	Secondary Voltage	Max Fault Current
300	208	41,637
300	480	18,043
500	208	42,058
500	480	18,225
750	208	39,280
750	480	17,021
1000	208	52,374
1000	480	22,695
1500	480	34,043

1.22 Meter Enclosure Installation in Flood Zones [25]

Figure 1.6 – Flood Zone Meter Enclosure Installation



1. When elevation of the meter enclosure is required by the authority having jurisdiction, the permanent installation of deck/platform and stairs shall be installed and provided by customer prior to energizing the facility.
2. Meter and conduit to face downstream when installed near flowing water such as rivers and streams.
3. Additional meter protection required in areas with possible log flows.
4. Stairs must be treated wood, no taller than 8-inches rise per step.
5. Guard rails needed if deck or platform 12-inches or higher, above grade.

1.23 Power Quality

It is the customer's responsibility to meet industry power quality standards as recorded at the point of service with Avista and any alterations shall be at the customer's expense.

< 5% Total Harmonic Distortion at point of common coupling of voltage. [61]

1.24 Residential Service Requirements

For the purposes of this book, residential service is defined as an individual residence, apartment, mobile home or living unit used for domestic purposes.

Non-diversified continuous load cannot exceed 800 amps of true load for single phase service. For loads larger than 800 amps, a 120/208V or 277/480V 3 phase service is required. All service meters must be located on outside of building.

1.24.1 Residential Overhead Service Checklist

All of the following customer work must be completed before Avista can energize a new or modified service.

☐ Avista has agreed with the proposed location of service entrance and meter location. (i.e., meter location with meter 4 to 6 feet up from the ground (See **Service Location**).

☐ A service agreement with Avista has been signed by customer and returned with payment.

☐ An insulated strike knob on the mast or two-bolt strike plate on the house has been installed 8-inches below the weather head and 24-inches of extra wire has been left hanging out of the weather head for utility connection. Strike plate shall be installed on the source side of the service entrance mast. Neutral wire extending from weather head has been taped with white tape for identification.

☐ Avista has approved the mast height. If the mast is 24-inches above the roof, or the distance from the building to the Avista pole exceeds 100 feet, or the distance from the meter pole to the Avista pole exceeds 125 feet, then a back guy on the mast or meter pole is required.

☐ Treated 8″x8″ wood permanent meter pole was approved by Avista for this application before it was installed and meets all requirements and must be truck accessible. Metal poles/structures are not allowed.

☐ Residential services must have properly labeled outdoor emergency disconnect installed per NEC 230.85.

☐ AIC rating of service equipment has been verified to be adequate to handle the available fault current from the supply transformer with the reduction due to the conductor size and length added into the total.

☐ State or City Electrical Inspector has inspected and approved service entrance.

1.24.2 Residential Underground Service Checklist

All of the following customer work must be completed before Avista can energize a new or modified service.

☐ Avista has approved the proposed location of service entrance and meter location. See Service Location within this chapter.

☐ A service agreement with Avista has been signed by customer and returned with payment.

☐ A locate request has been called into the National One Call center (#811) at least 2 business days before digging is scheduled to begin.

☐ Location of transformer and ditch route has been approved by Avista prior to digging.

☐ Poly pulling string has been installed into conduit by customer and all conduit joints have been glued and proper sized sweeps have been installed on conduit ends (**Section 1.21.4** of handbook) and all conduit that exits the ground is schedule 80.

☐ Ditch and conduit have been inspected by Avista for proper depth and placement of conduit including sand bedding (if needed) BEFORE backfilling ditch.

☐ Residential services must have properly labeled outdoor emergency disconnect installed per NEC 230.85.

☐ AIC rating of service equipment has been verified to be adequate to handle the available fault current from the supply transformer with the reduction due to the conductor size and length added into the total.

☐ State or City Electrical Inspector has inspected and approved service entrance.

1.25 Commercial Service Requirements

For the purposes of this book, a commercial premise is used for other than domestic living.

A single point of delivery will be provided to a commercial building. Metering will be located as close as practical to this point. See Point of Delivery and Service Location sections in General section for additional information.

Commercial service design requirements vary widely depending on customer needs, site requirements and electrical design constraints. To determine transformer and service conductor requirements contact Avista Construction Project Coordinators during architectural design phase and before construction of commercial site to answer your questions and ours when planning begins. Please provide a copy of the physical and electrical site plans to the CPC before construction begins. Spending some extra time up front can save time and minimize confusion as the project moves ahead.

Commercial customers with a non-diversified continuous load cannot exceed 800 amps of true load for single phase service. For loads larger than 800 amps, a 120/208V or 277/480V 3 phase service is required. All service meters must be located on outside of building.

Any singe phase commercial customer over 200 amp must have CT metering.

In multi-tenant facilities where customer owned wiring is used between the building service entrance and an Avista meter, all wiring beyond the service entrance, including that used to feed Avista meters, must be sized and installed by the customer according to NFPA 70: National Electric Code (NEC) [58] and inspected by the authority having jurisdiction before energization. In addition, to these requirements, Avista requires that the maximum voltage drop between the service entrance and each meter be no greater than 2% as calculated using NEC Chapter 9 Table 9 Note 2 [58]. The voltage drop between the service entrance and meter is included in the overall voltage drop requirement contained in NEC 210.19(A) Informational Note No. 4 [58].

1.25.1 Customer Responsibility

The customer will supply and install:

- Service entrance mast(s), and anchor points and guying or bracing if needed.
- A single point of connection for Avista service drop or lateral conductors.
- Meter socket for self-contained meter or
- CT enclosure w/CT mounting base and meter socket or enclosure.
- See Metering Requirements for specific information on the metering equipment needed for various services.

- Additional specific requirements are listed below.
- All commercial services require manual circuit closing (MCC) meter sockets.

1.25.2 Avista Responsibility

Avista will supply and Install:

- Transformer(s)
- Service conductors to point of delivery
- Current Transformers and instrument wiring if required
- Meter(s)
- Avista will make all electrical connections at agreed upon point of delivery (line side for termination enclosures and both line/load sides for pad transformers and secondary enclosures).

Chapter 2 Temporary Services

2.1 Temporary Service General Requirements

There is an installation fee for temporary service and additional charges for correction trips.

Each new house should have one duplex outlet available when temporary power is disconnected.

Temporary single-phase service from a 120/208 three phase transformer or transformer bank requires a 5 terminal meter socket.

Temporary CT Enclosures are allowed on wood posted for a period of one year.

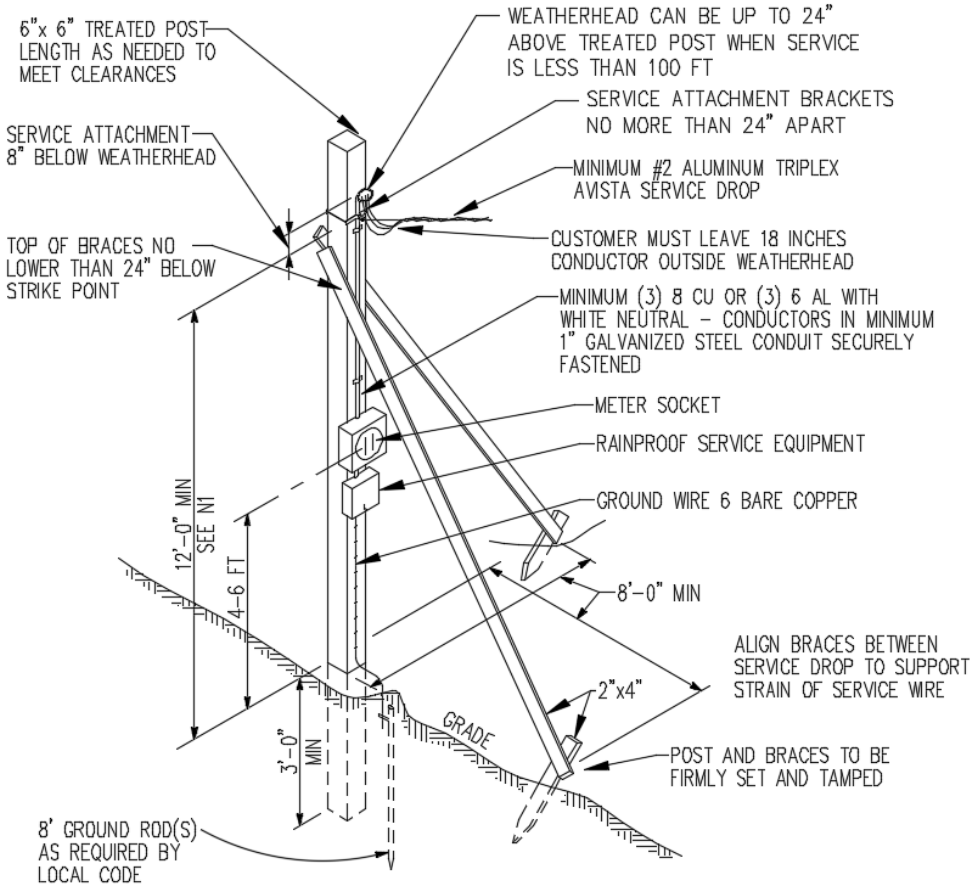
Connection point for overhead temporary service must be on the same side of building as the permanent service point.

Location of overhead temporary service point must be at least 15′ away from source.

Refer to *Available Fault Current at Point of Delivery* within this publication.

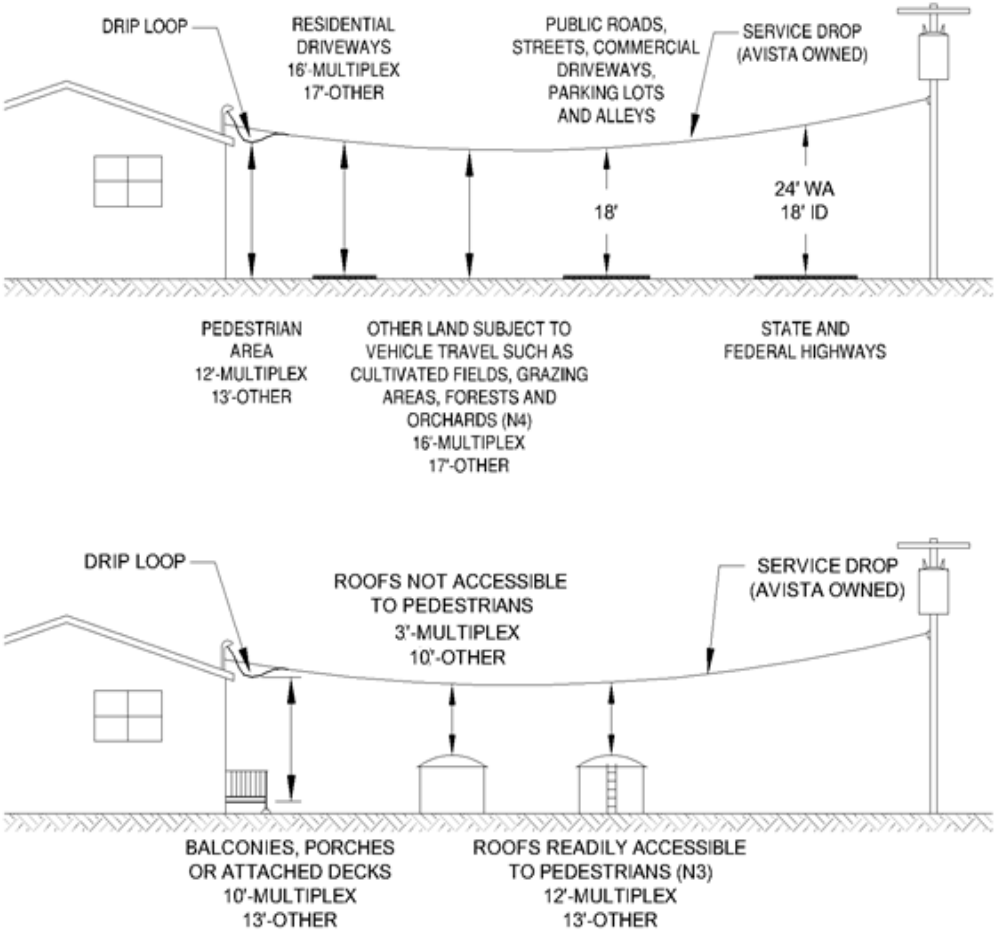
2.2 Temporary Overhead Service [28]

Figure 2.1 – Temporary Overhead Service



1. The customer or their electrician must consult the local electrical code authority for specific requirements. An electrical inspection permit must be displayed <u>on meter can</u> before a service connection can be made.
2. Contact the local Avista Utilities office before installation to request temporary service and to determine available voltage and location. Whenever possible the temporary service must be located within 125 feet of the nearest pole and as near as possible to the permanent service mast location.
3. The customer provides and installs all materials shown. Avista will install the service conductor and meter.
4. <u>Temporary Service must be located on the same side of building as permanent service</u>.
5. Customer must follow the rules for clearances. Reference figure below:

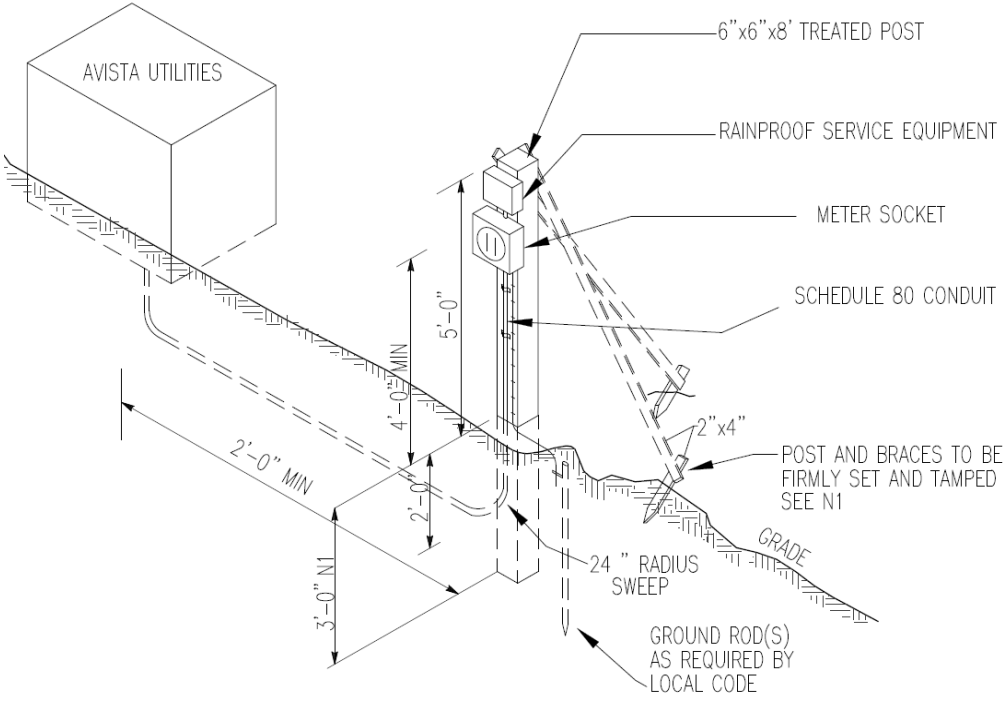
Figure 2.2 – Overhead Service Clearances over Ground and Buildings [20]



1. Location and height of post must allow service drop to meet the same clearance requirements as a permanent service.
2. The temporary service must be overhead when the permanent service is from an overhead transformer.
3. Temporary Service shall be at least 3-feet from all electric and gas service stubs.
4. Temporary Service shall be at least 3-feet from all electric and gas service stubs.

2.3 Temporary Underground Service [57]

Figure 2.3 – Temporary Underground Service



These are general Avista Utilities requirements. The customer or their electrician must consult the local electrical code authority for specific requirements. An electrical inspection permit must be displayed before a service connection can be made.

Contact the local Avista Utilities office before installation to request temporary service and to determine available voltage and location. The temporary service must be located to avoid interference with existing or future services.

1. If the full 3-foot burial depth cannot be met or the backfill does not support the post adequately, then the post must be braced. Bracing for the post must be positioned away from the source.
2. The temporary service must be overhead when the permanent service is from an overhead transformer, even if the permanent service is to be fed underground.
3. Call 811 before digging to locate buried utilities.
4. Temp shall be at least 3 feet from all electric and gas service stubs.

2.3.1 Customer Provides and Installs

- all materials including the service conductor and 2-inch conduit. The service conductor must be long enough to reach the source plus 5 feet and be approved by Avista. Minimum of (3) 8 CU or (3) 6AL with white neutral; maximum conductor size is 1/0 AL. Below grade 2-inch conduit shall be schedule 40 PVC and schedule 80 PVC above grade. Avista does not allow conduit bodies between the service transformer and meter enclosure.
- The service conductor length must be long enough to be compliant with the AIC rating of their service equipment. This may require extra conductor to be coiled up and buried by the customer opposite the transformer side of the temp meter post. AIC rating and utility max. available fault current must be noted on outside of temp meter can.

2.3.2 Avista Installs

- the meter and connects the service conductor to the source
- If the post is between 2 and 5 feet from the source, Avista will dig and backfill the ditch.
- If the post is further than 5 feet from the source, the customer will dig and backfill the ditch. Backfill can not contain any rock larger than 4 inches. The customer is responsible for the costs required due to additional trench length

Chapter 3 Overhead Services

3.1 Point of Delivery

Point of delivery for self-contained metering is at the ends of the service entrance conductor extending from the mast head. Provide 24-inch tail beyond the weatherhead for utility connection. Neutral must be marked with factory stripe or white tape.

3.2 Service Masts [23]

Avista requirements may be more stringent than National Electrical Code and local requirements. Avista will assist in determining the service location, attachment height and metering equipment. Please contact Avista early in the planning stage.

Also contact local inspectors for specific information regarding design of the service entrance. The service entrance must be inspected by local authorities and approved by Avista before service conductors can be installed.

3.2.1 Service Clearances

The mast and anchor point must be located to provide the required clearances over buildings and ground. Call Avista to determine design clearances based on service conductor size and length. Additionally, all overhead services must maintain the following clearances without exception.

1. Electric and communication service drops shall have clearance no less than 12-inches from each other at point of attachment on building being served.
2. Service mast shall be a minimum horizontal distance of 15-feet from the source. This applies to both temporary and permanent overhead services without exception. Meter bases located within 15-feet horizontally of the source must be fed via an underground service.
3. Service attachments located under an eave on the gable side shall have 36-inch clearance from the weatherhead to roof. If there is no gable side eave, the clearance from the weatherhead to the roof may be reduced to 18-inches.
4. Service conductors shall maintain minimum clearances to roof surfaces as indicated in the table below.

Avista will no longer attach to a customer provided steel “Dead Mast” or “Roof Horse” to obtain required clearances. Other options will need to be considered when trying to lift an overhead service wire over a shop or garage. Contact your local Avista representative before construction.

Table 3.1 – Minimum Conductor to Roof Surface Clearances

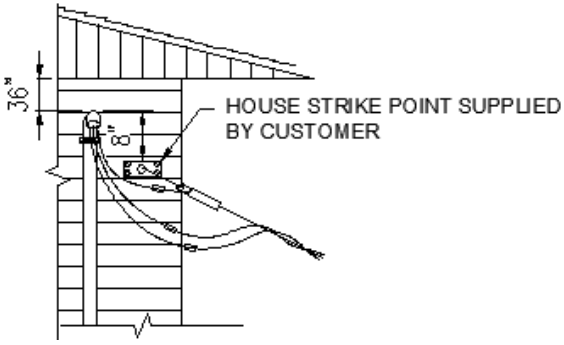
Roof Type	0 - 300V (phase-to-phase)	300 - 600V (phase-to-phase)
Overhanging portion of roof (eave) where roof mast extends through the roof overhang. Conductor length crossing eave shall be less than 6 feet in length.	18 inches	8 feet
Sloped roofs at or greater than 4 in 12	3 feet	
Flat or low sloped roofs (less than 4 in 12)	8 feet	
Roofs surfaces subjected to pedestrian or vehicle traffic	Refer to *Overhead Service Clearances Over Ground and Buildings* section.	

3.2.2 Wall Mounted Mast Location (Gable Side)

Wall mounted service masts and the associated meter socket shall only be installed on the gable end of a sloped roof or on a wall connected to a flat roof. Wall mounted service masts are the preferred location because:

1. It is one less roof penetration that has the potential to fail and cause to water damage to the building.
2. Locating the mast and meter base outside the path of snow and ice falling or sliding off a roof reduces the potential for damage.

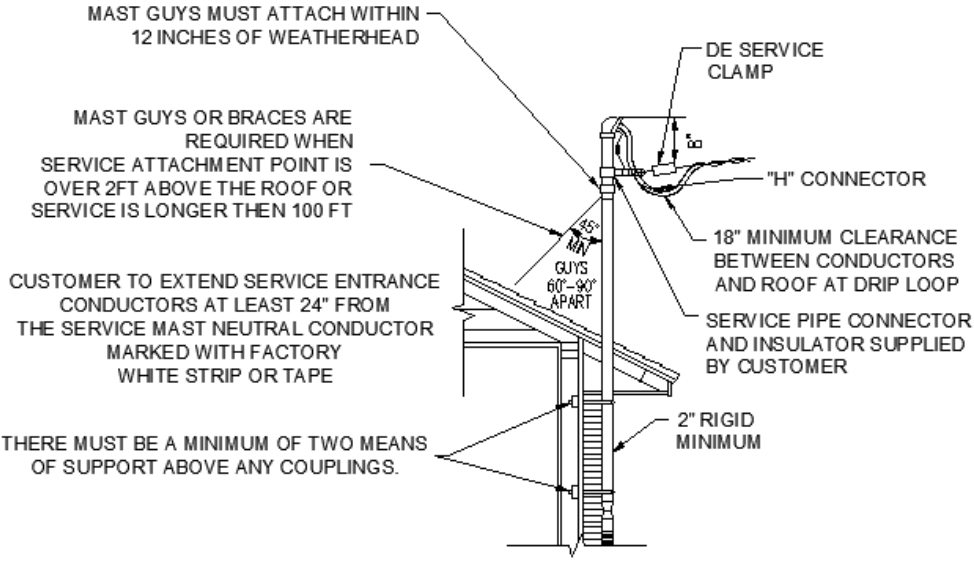
Figure 3.1 – Overhead Mast on Gable End



3.2.3 Roof Mast Locations

Meter bases installed on the eave-side of a sloped roof shall have a mast that extends through the roof. Service masts shall not be installed under the eave of sloped roofs, except by special permission when it can be demonstrated that all clearances can be maintained. Exceptions will not be granted on metal structures or buildings with metal roofs. Construct roof masts according to the diagram below.

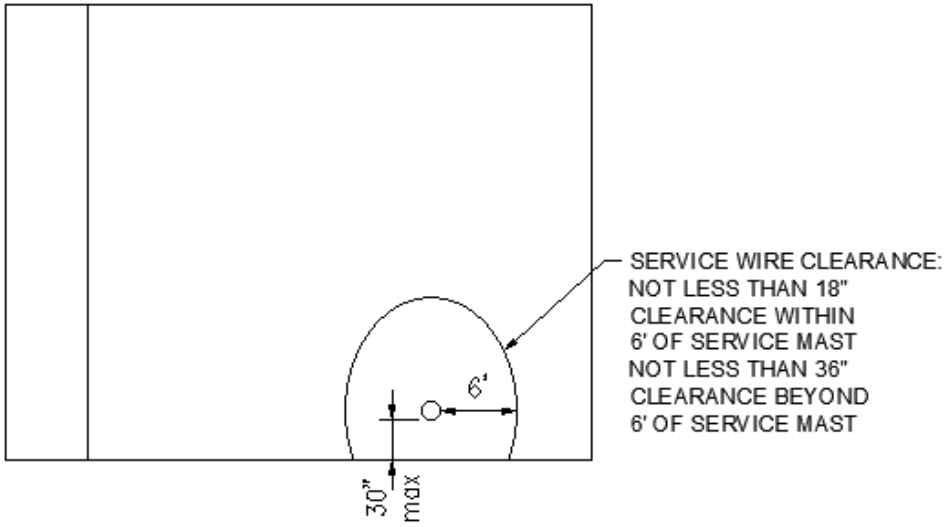
Figure 3.2 – Overhead Roof Mast Above Eave



When the length of overhead service conductor is over 100 feet or the service wire attachment point on the roof mast is over 2 feet above the roof, the mast shall be back guyed. Back guy shall attach to the mast within 12-inches of the weatherhead and have a one-to-one or longer lead length.

Roof masts must be within 30-inches of the roof's edge. Masts more than 6-feet above the roof require Avista's preapproval and shall be truck accessible.

Figure 3.3 – Roof Mast Location



3.2.4 Mast Conduit

The service mast shall consist of a minimum 2-inch galvanized rigid steel conduit. Transitioning from PVC to rigid conduit between the weatherhead and meter is prohibited. Additionally, there shall be no conduit bodies (condulets, LBs, etc.), junction boxes, or other accessible points between the weatherhead and meter. Conduit sweeps are permissible. Conduit couplings are prohibited above the roofline.

For flush-mount meter enclosures, rigid or intermediate metal conduit must be used between the meter and weatherhead. Service conductors are not allowed to traverse through any interior space apart from flush-mount meter applications.

3.2.5 Snow and Ice Protection

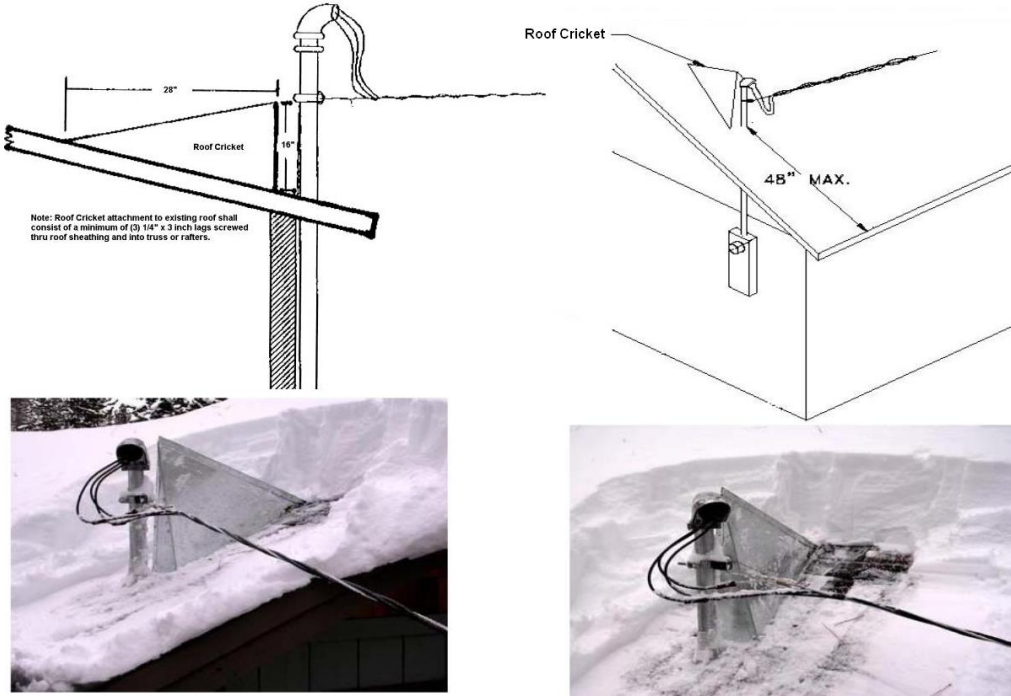
Metering equipment shall be protected from snow and ice. Adequate protection consists of at least one of the following options:

1. Roof cricket (similar to a chimney cricket), with a minimum dimension of 16″ high x 30″ wide x 28″ deep, built just above the mast to protect the meter below the roof. Roof crickets need to be lagged through the roof sheathing and into a roof framing member.
2. Roof eave or extension of roof eave that provides a minimum of 18″ deep x 30″ wide of overhang to protect the electric meter. Additional depth is appreciated up to the maximum allowed 30-inches. Extensions must be built for local snow loading.

3. Minimum 18″ deep x 30″ wide mini roof attached to the wall above the electric meter socket. Additional depth is appreciated up to the maximum allowed 30-inches. Roof must be built for local snow loading.
4. Meter and mast located on gable end of building, outside the path of falling or sliding snow and ice may suffice. If, however, Avista deems the wall mounted meter location at-risk, one of the aforementioned methods of snow and ice protection will be required. Consult an Avista representative.

Metal roof snow brakes are not adequate protection!

Figure 3.4 – Roof Cricket



Masts extending through metal roofs must be also be protected from sliding snow and ice either through back guying or with the use of a roof cricket (described above as an option for protecting metering equipment).

3.2.6 Multiple Masts

Avista will connect the service entrance conductors from multiple masts and supply them with a single set of service drop conductors. Multiple masts must be grouped together within no more than 24-inch spacing so there is a single point of delivery for Avista's service drop conductors. Extend service entrance conductor from each mast to a common point near the service drop attachment. Avista will normally make the connections between customer and utility conductors unless size, number of conductors and/or improperly spaced masts prevent this. A maximum of three grouped masts are allowed for residential installations. Additional masts may be granted for commercial applications at Avista's sole discretion. Check with Avista for approval.

3.2.7 Service Wire Anchor Points

All service entrances must be located so that the utility service drop can be anchored to the building at only one point. These anchoring points must meet Avista strength and height requirements. The strength needed will depend on the service drop conductor size and number. Guying may be required on a roof mast used as the anchor point. Contact Avista for information.

Overhead service drops will be run and attached to the anchor point by Avista. The anchor point is furnished and installed by the customer or their electrician.

Service anchor brackets attached to service masts are preferred. Avista will not anchor to PVC or EMT conduit. Avista will no longer attach to house knobs or chubs on new or altered construction. (A strike plate with 2 or 4 lags is the recommended attachment point when not attaching to the mast).

The attachment bracket can be mounted on the mast or building. Screw type attachment brackets (house knob or chub) are inadequate for modern services and are no longer allowed for new or altered construction. A strike plate with 2 or 4 lag screws is recommended when not attaching to mast.

3.2.8 Current Transformers

Current transformers for building points of delivery will be installed in a wall mounted meter enclosure.

3.2.9 Customer Supplied Material

- Service wire
- Meter base
- Mast conduit
- Weatherhead
- Attachment bracket with insulator.
-

3.2.10 Avista Supplied Material

- Overhead service conductor from transformer
- "H" connectors to connect to customer service wire
- Deadend service clamps to attach to mast.

3.3 Customer Owned Service Poles [26] [27]

3.3.1 Installations

1. The customer provides and installs all equipment on the load side of Avista's mast head connections; pole, ground electrode(s), mast conduit, weather head, meter socket, service panel, entrance wires, service bracket (service attachment point), and down guy if required.
2. The customer must construct the service entrance per local code requirements and have it inspected by local authorities before Avista conductor can be installed. Permit and inspection sticker must be displayed.
3. Contact Avista Customer Project Coordinator for help in determining service attachment height, pole locations and clearance from cable TV and telephone conductors. Avista must determine the service attachment point to meet required clearances
4. 5/16-inch galvanized steel guy cable and approved anchor is required if the service drop is longer than 125 feet and/or if the span crosses other structures, or if required by Avista or the electrical inspector. Two to 1 slope required.
5. Extend the service wire tails 24 inches or more from the weather head to allow for Avista's connections. The neutral wire shall be marked with a factory white stripe or white tape.
6. Depending on the meter socket style, line and load side conduit may need reversal.
7. Customer-provided and installed service poles shall meet the service pole or square service post requirements noted below.

3.3.2 Service Pole

Service poles must be a class 5 or better new commercial butt treated Western Red Cedar or Full Pressure Treated pole. Set the pole to a depth of 2ft plus 10% of pole height or at least 6 ft. The pole must be plum. Class 5 pole or better is required if no truck access.

Table 3.2 – Class 5 Pole Dimensions

Length of Pole (ft)	20	25	30	35	40	45	50
Minimum circumference at 6 ft from butt (in)	25.0	28.0	30.0	32.0	34.0	36.0	37.5

*Minimum circumference of pole top is 19 inches

3.3.3 Square Service Post

An 8″X8″ square post can be used for a permanent overhead single phase residential service with the following stipulations:

1. Post is (non-laminated) full length commercially treated and has a length (before being installed into the ground) of no longer than 25ft and that the access to the post is bucket truck accessible.
2. Service wire being attached by Avista is no larger than a #2 triplex (1 run) and the span is 75 ft or less and it does not pass over a roadway (Passing over residential driveways is allowed if the driveway is not subject to large truck traffic: i.e., garbage truck)
3. An insulated strike plate or thru bolt with insulated clevis is installed 8 inches below the weather head for the attachment point. A house knob or "Chub" is no longer an approved attachment point.
4. Post will be installed in a hole with a minimum of 12-inch diameter totally filled with concrete and will be to the depth of 4 ft for posts up to 20ft and 5 ft depth for poles from 20 ft 6 inch to 25 ft.
5. Permission to use a post instead of a pole for each application has to be preapproved by the local Avista office before it is installed. (The post can and will be rejected by the Avista field representative if it is determined to be subpar in anyway: i.e. (large multiple knots in one location, deep surface rot, excessively twisted, large chunks missing or if the post begins to pull over under the required tension of the service wire upon connection or anytime thereafter.)

Figure 3.5 – Overhead to Overhead Service Pole

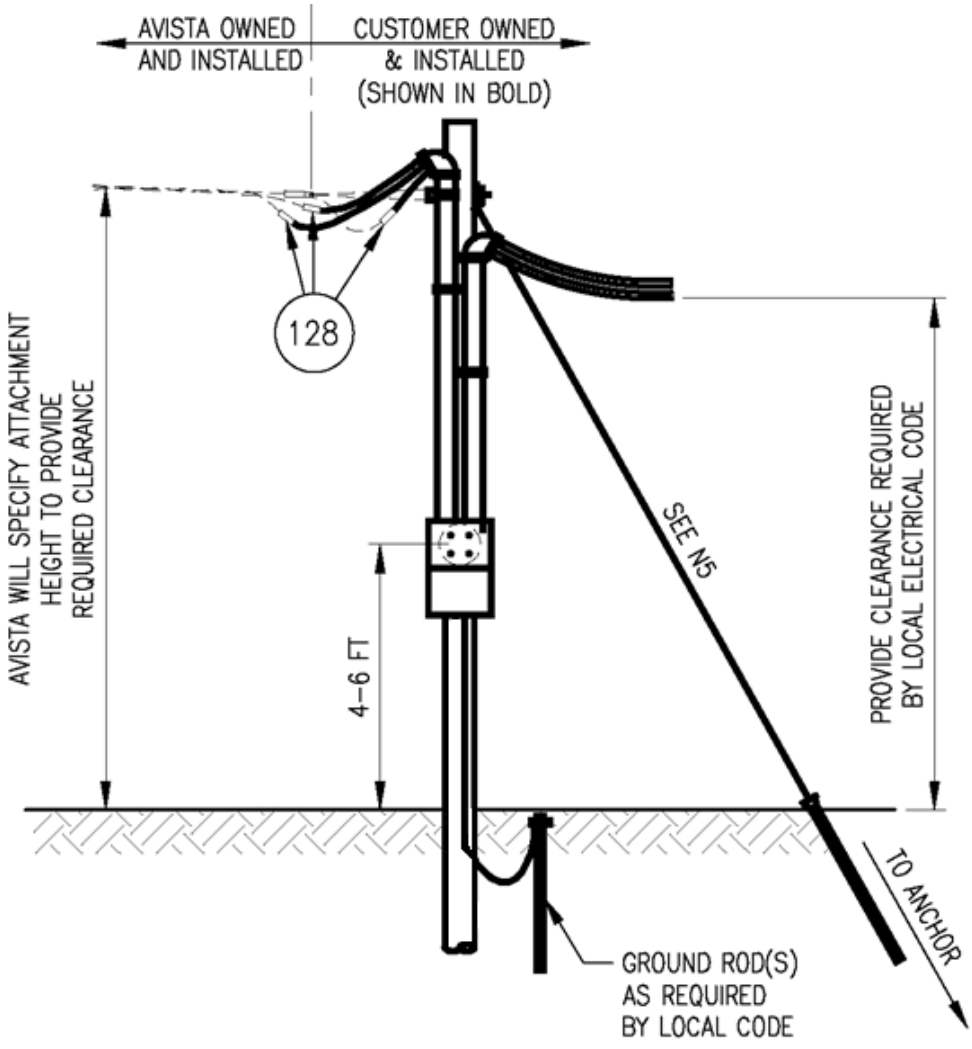
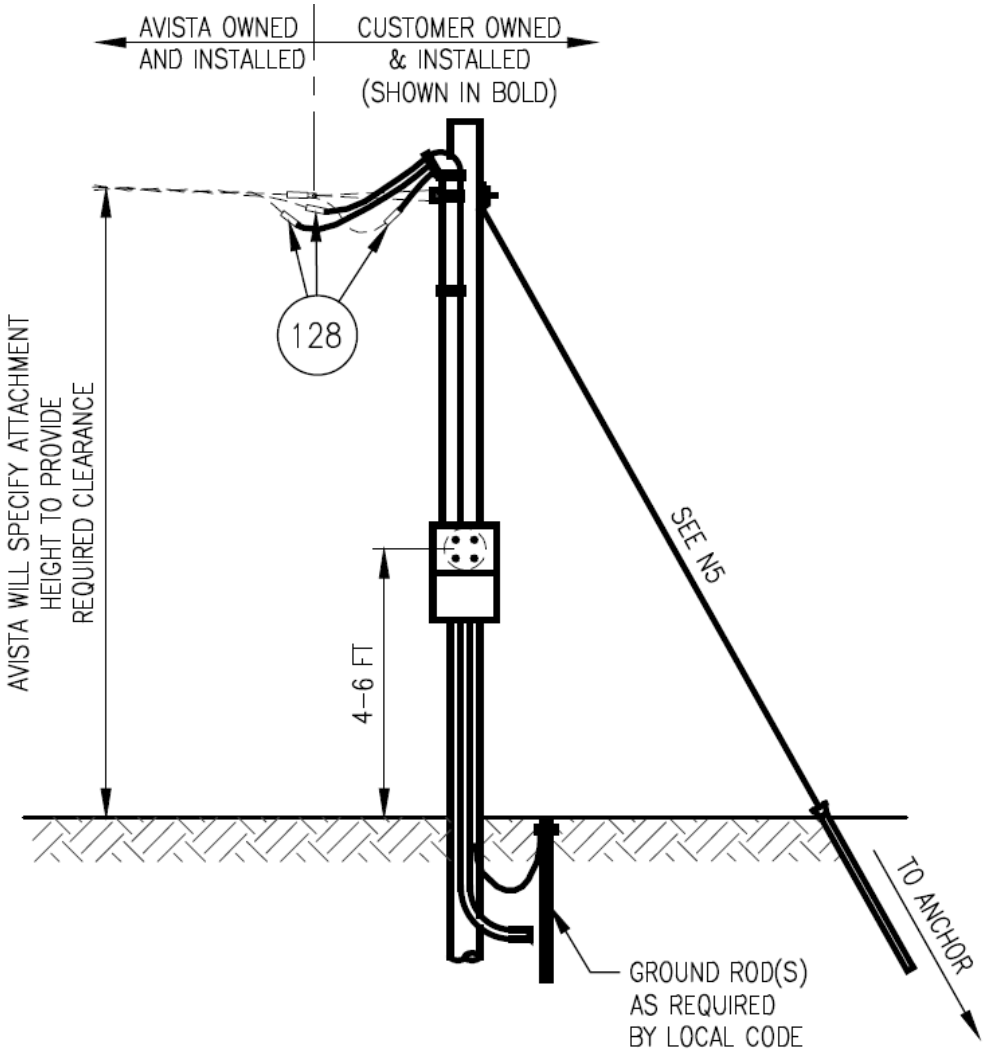


Figure 3.6 – Overhead to Underground Service Pole

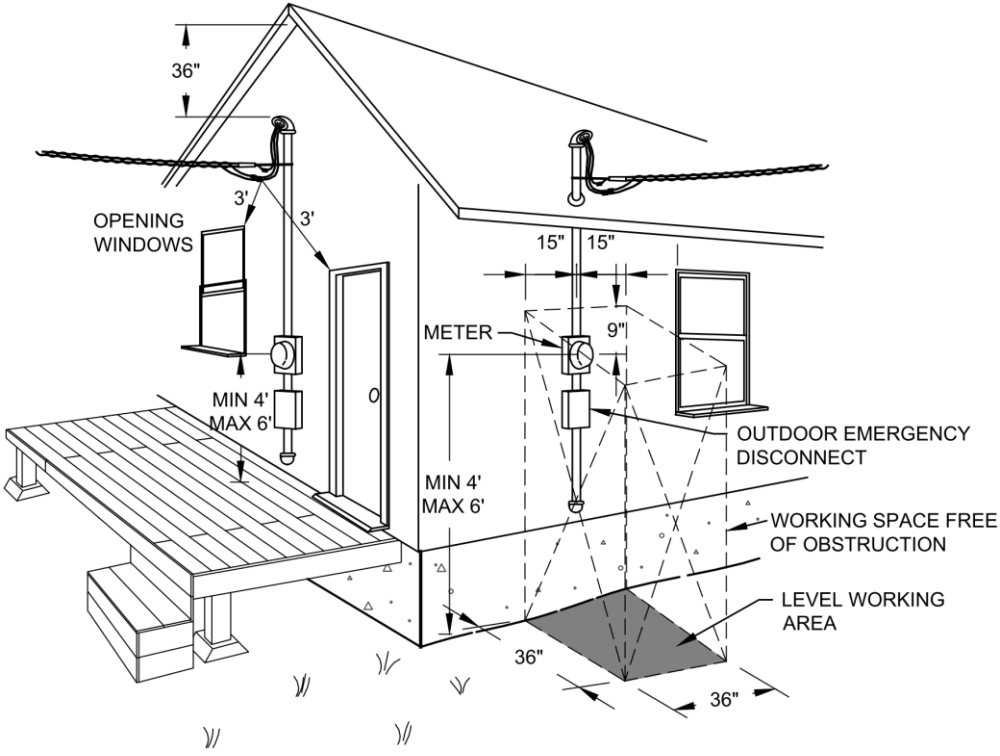


3.4 Overhead Clearances

3.4.1 Overhead Service Clearances at Building [22]

1. A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 feet or more from the ground or other permanently installed accessible surface.
2. These clearances to building openings apply to the closest point on the service drop, conductor, drip loop, or connectors. They do not apply to the meter.
3. Service attachment height must be such that these minimum building clearances as well as clearances above ground, driveways and streets can be met. Avista can assist the customer in determining the service mast height to meet these requirements. Call the local office number listed in the Electric Service Requirements Handbook early in the planning stage.
4. Services cannot be connected if service drop attachment height prevents required clearances from being met.
5. Conductors may be run above the top level of a window but shall be no less than 18-inches above window.
6. Meter sockets installed within 15 inches from center of meter to wall of structure (inside corner) will not be approved nor hooked up.

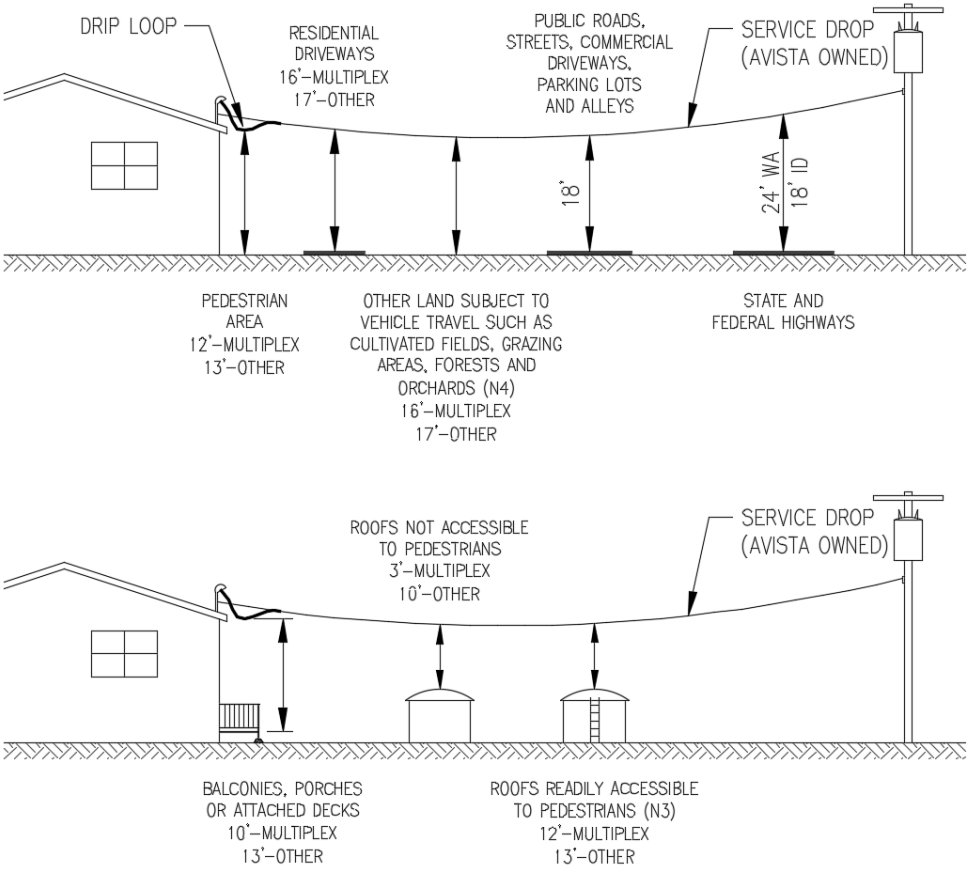
Figure 3.7 – Overhead Service Clearances at Building



3.4.2 Overhead Service Clearances Over Ground and Buildings [20]

Provide the clearances shown using final sag. Clearances are code or Avista Utilities Standard Practices. Clearances less than those listed or for higher voltages must be approved by the Avista Utilities Engineering Department.

Figure 3.8 – Overhead Service Clearances over Ground and Buildings



1. Trees cannot be used to support service conductor.
2. A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 ft or more from the ground or other permanently installed accessible surface.
3. In areas subject to combine harvesting increase clearances to 20 ft when possible.

4. Altered services will require the customer to change clearances (as needed) to meet Avista's current clearance requirements.

3.4.3 Human and Machinery Clearances [13]

A minimum 10-foot working clearance shall be maintained at all times surrounding distribution power lines that operate between 600V and 22kV, including tools, materials, and equipment that a worker may be holding or touching. Contact Avista for minimum working clearances associated with powerlines exceeding 22kV. Minimum working clearance increase to 20 feet for cranes, derricks, and other rigging / lifting equipment

Table 3.3 – Working Clearances

Radial Working Clearances (ft)	
10 Min	20 Min for Cranes

3.4.4 Clearances to Buildings and Appurtenances [13]

All building and structures including permanent and temporary shall comply clearances noted herein. Clearances less than those listed or higher voltages (above 22kV) must be approved by the Avista Utilities Engineering Department.

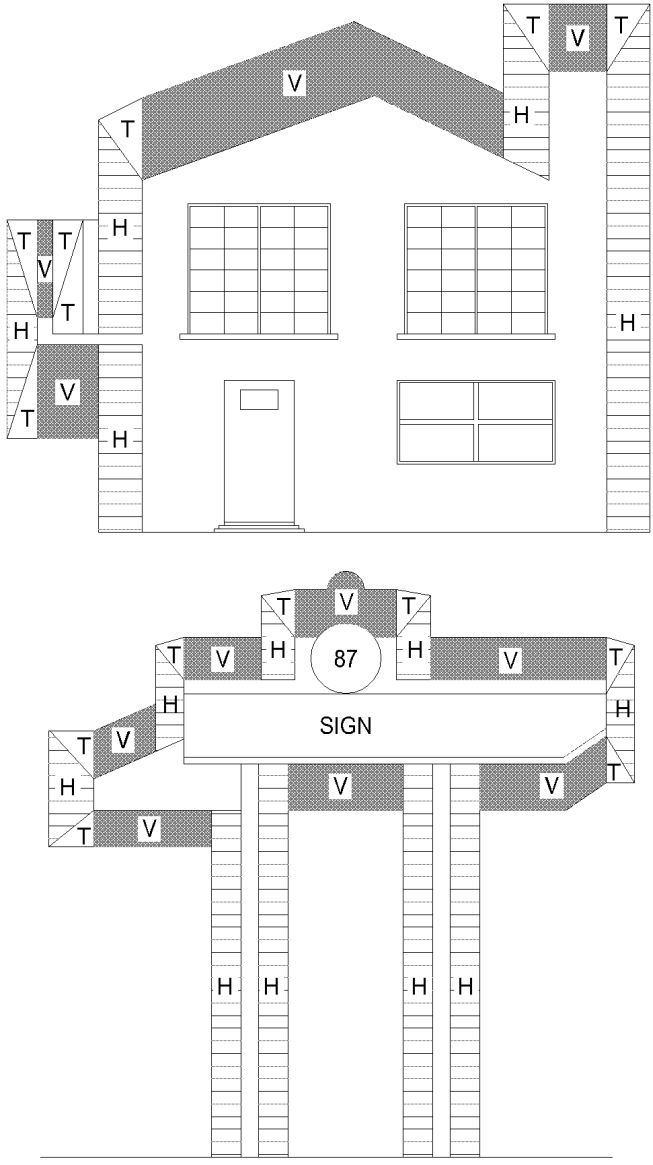
1. Check with local fire departments for ladder space clearances.
2. A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 ft or more from the ground or other permanently installed accessible surface.
3. The transitional areas marked "T" in the drawing should be treated as horizontal clearance area.
4. Buildings and structures shall not be constructed in any way that could cause a person to be in violation of *Human and Machinery Working Clearances* through accessing, maintaining, constructing, or any other conceivable activity surrounding a building or structure. If a human will be able to extend an extremity closer than the noted radial working clearance, then the building or structure is considered in violation. This may necessitate increased clearances beyond minimums noted herein.
5. Customer is responsible for any costs associated with rework necessary to achieve clearance.

Table 3.4 – Clearances to Buildings and Appurtenances

Conductor Clearances	Voltage Phase to Ground or Phase to Phase for Ungrounded Circuits		
	0 to 750 V (ft)		750 - 22 kV (ft) (35 KV requires greater clearances)
	Multiplex, Neutral or Guys on Secondary Poles	Bare, Insulated or Covered Conductor	Bare Conductor, Ungrounded Guys on Primary Poles
Adjacent to Buildings			
Horizontal Clearances to walls, windows, balconies, and areas readily accessible to pedestrians (Note 2)	5	5.5 or 3.5+Blowout (Note 1)	7.5 or 4.5+Blowout (Note 1)
Vertical Over and under roofs or balconies not accessible to pedestrians (Note 2)	3	10	12.5
Over or under roofs or balconies accessible to pedestrians and vehicles under 8ft (Note 2)	12	13	15
Accessible to truck traffic	16	17	20
Adjacent to Signs, Chimneys, or Billboards			
Horizontal Areas not accessible to Pedestrians	3.5	5.5 or 3.5+Blowout (Note 2)	7.5 or 4.5+Blowout (Note 2)
Areas accessible to Pedestrians	5	5.5 or 3.5+Blowout (Note 2)	7.5 or 4.5+Blowout (Note 2)
Vertical Over and under catwalks and other surfaces where people walk	11.0 (for Neutral) or 12*	13	15
Over or under other portions	3.5	6	8
Antennas			
Horizontal Structure below line height	5	5.5 or 3.5+Blowout (Note 2)	7.5 or 4.5+Blowout (Note 2)
Structure above line height	Structure Height+10ft	Structure Height+10ft	Structure Height+10ft
Vertical	5	5.5	7.5

*Multiplex covered conductors

Figure 3.9 – Clearances to Buildings and Appurtenances



T = Transitional Area, treat as horizontal clearances

H = Horizontal

V = Vertical

3.4.5 Clearances Around Swimming Pools and Hot Tubs [15]

Conductors over a pool (including wading pools) or hot tub are not recommended. Wires and conductors shall meet the clearances shown using both final sag and blow out displacement.

Figure 3.10 – Clearances Around Swimming Pools and Hot Tubs

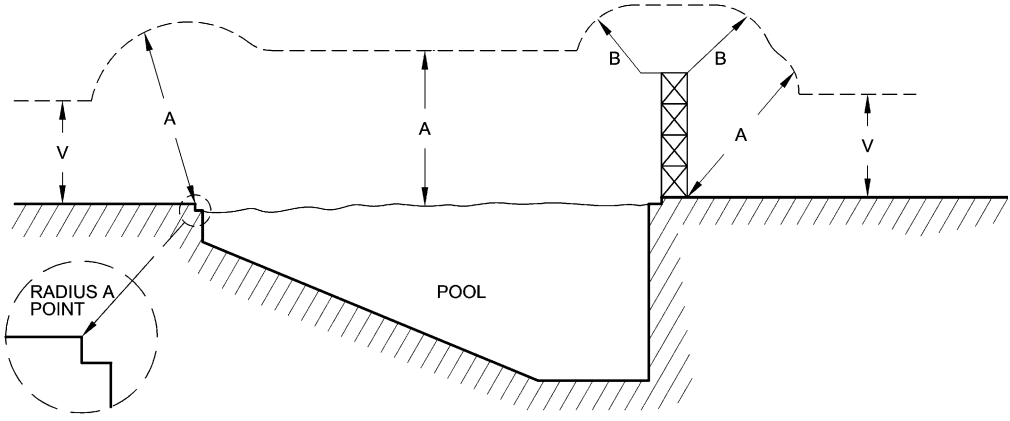


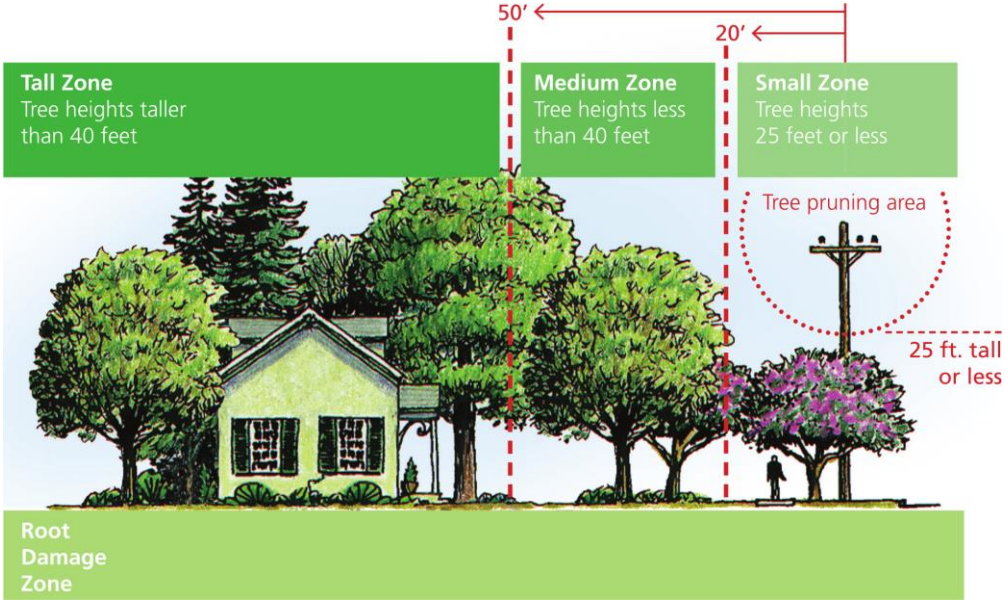
Table 3.5 – Clearances Around Swimming Pools and Hot Tubs

		Phase to Ground Voltage			
		Grounded Guys & Neutrals	Multiplex 0 - 750V	Bare Wire 0 - 15kV	Bare Wire 15 - 50kV
	Horizontal limit for overhead clearances from inside wall of pool	10.0 ft	10.0 ft	10.0 ft	10.0 ft
A	Clearances in any direction from the edge of pool, water level or base of the diving platform	22.0 ft	22.5 ft	25.0 ft	27.0 ft
B	Clearance in any direction from the diving platform or tower	14.0 ft	14.5 ft	17.0 ft	18.0 ft

3.5 Vegetation Near Overhead Powerline

Planting the right tree in the right place can eliminate the need for Avista to trim or remove a tree that is too close to power lines. The right tree in the right place can also help prevent outages and fires from branches or trees coming into contact with power lines and provide space for crews to perform maintenance or make repairs to power equipment. Space requirements for planting near power lines fall into three zones that limit tree heights.

Figure 3.11 – Tree Zones Near Power Lines



3.5.1 Small Zone

This utility-friendly zone is only for trees and shrubs that grow no more than 25 feet tall, like a Pagoda, Kousa or Cornelian Cherry Dogwood. These are called Class I trees.

3.5.2 Medium Zone

This zone is 0 to 50 feet away from a power pole and line. Here, mature trees should be no more than 40 feet tall. The extra space reduces the chance of the tree, branches or roots coming into contact with overhead or underground lines. Look for Class II trees to plant in this zone.

3.5.3 Tall Zone

This zone is a least 50 feet or more away from a power line or pole. It is the only zone where you should plant trees that grow over 40 feet tall. These are Class III trees.

3.5.4 Root Damage Zone

Tree roots will spread out at least as wide as the tree is tall with the critical zone for root damage extending out to the same diameter as the crown of a tree. The same goes for shrubs and other vegetation. Always avoid planting near where underground utilities are located. Roots can entangle, or even break, underground electric, and natural gas utility lines. So be aware of your line-locate marks and never plant trees or shrubs too close by.

3.5.5 Approved Tree Species

For a list of tree species that flourish in our region for the small, medium, and large planting areas, check out the City of Spokane Urban Forestry's *Approved Street Tree List* at my.spokanecity.org/urbanforestry/tree-benefits/ .

Avista has assembled additional information regarding tree trimming and recommended tree species at myavista.com/safety/tree-trimming .

Chapter 4 Underground Services

4.1 Underground Service Customer Requirements [49]

Avista Utilities will provide underground electric service under the following conditions:

1. The location of transformer shall be specified by Avista before the start of site preparation. The transformer must be located to provide clearances described in the *Underground Clearances* section of this chapter.
2. The location of the point of service shall be specified by Avista before the start of site preparation.
3. The customer must provide accurate electric load sizing information as calculated according to the National Electric Code.
4. The customer must indicate the desired number and size of customer service conduits and cables. If the customer specified secondary conductors exceed the limits of the transformer, Avista may be required to install a secondary enclosure at the customer's expense. When provided, a secondary enclosure becomes the point of service, regardless where the meter resides. Increasing conductor size to reduce the number of parallel conductors may help to avoid the need for a secondary enclosure.
5. All conductors on the customer's side of the service point (customer owned) must be sized per the National Electrical Code (NEC) [58] which differs from utility owned conductors which are sized according to the National Electrical Safety Code (NESC) [59].
6. A customer's failure to provide complete and accurate load and/or secondary conductor information prior to Avista's utility construction design and/or contract signing may result in costly changes for the customer. This may include but is not limited to the Customer having to change the quantity and size of Customer installed service conductors.
7. Concrete transformer pads provided by the customer must meet the requirements in the *Padmount Transformers* section of this chapter and conform to the size requirements specified by Avista. Avista will provide a ground sleeve for installation below the window in the pad or may require the customer to provide an acceptable vault under the pad.
8. The direction of entrance of customer conduits shall be specified by Avista to avoid conflict with primary voltage conduits and cables.
9. The customer shall meet the requirements of the company's electric extension tariff, Schedule 51, including payment of costs in advance of construction and the general and special terms of the Electric Service Agreement Avista (Form 1475).

10. Customer-provided ditch and conduit installations must meet Avista standards. Any damage prior to the company's acceptance of the work must be repaired at the customer's expense.

4.2 Point of Delivery

The point of delivery for underground services varies depending on circumstances described below. Contact Avista's Customer Project Coordinator to determine the location in your case.

There shall be no conduit bodies or junction boxes (condulets, LBs, etc.) upstream of the Avista-owned meter equipment.

4.2.1 Single Phase

The point of delivery for single phase underground service is normally at the building. Avista conductors are run to this point and connected to the landing lugs in a self-contained meter socket, CT mounting base or pulling/termination enclosure.

4.2.2 Three Phase

The point of delivery and meter for a service from a dedicated transformer will be at the transformer. A secondary termination enclosure will be required if the number of customer secondary conductors exceeds maximum conductors allowed in the transformer.

For multiple meters on a single building the preferred point of service is the outside of the building. Avista will no longer pull secondary conductor inside a commercial building to the metering point but will stop secondary conductors at a point outside of a building.

4.2.3 Customer Responsibly – Transformer/Secondary Enclosure Delivery Point

Customer shall supply and install the following items when the transformer or secondary enclosure serves as the delivery point:

- Concrete transformer pad using Avista supplied ground sleeve which creates a conduit window in the poured concrete transformer pad.
- Install Avista supplied ground rod in low voltage side of transformer.
- Bollards to protect transformer from being struck by vehicle traffic. Refer to *Vehicle Barriers* section within this chapter.
- Pedestal mounted meter enclosure and conduit.

- Install Avista provided box pad for secondary enclosure. Customer provides enclosure and concrete pad if above 3000A and must get Avista engineering approval on design. (*for secondary enclosure delivery point only*)
- Service conduit and conductor from building to the secondary section of the transformer (*for transformer delivery point*) or secondary enclosure (*for secondary enclosure delivery point*). For secondary enclosure delivery points, conduits and conductors must also be provided between the transformer secondary section and secondary enclosure. Conductors must extend minimum of 6 feet from top of ground sleeve for landing on secondary spades.

4.2.4 Customer Responsibly – Building Delivery Point

Customer shall supply and install the following items when the delivery point is located at the building:

- Contact your local office for conduit and ditch requirements.
- Concrete transformer pads for three phase transformers as detailed in the *Three-Phase Transformer Concrete Pads* section of this chapter. Note: meter enclosure shown in this drawing is not required.
- Required metering equipment. See Chapter 5: Metering Equipment.
- EUSERC rated Pulling/termination enclosure or external Switch board as needed.

4.2.5 Avista Responsibility

Avista will supply and install the following items:

- Transformer
- Current transformers and wiring as required.
- Meter(s)
- *For secondary enclosure delivery point only, a* 3000-amp diversified load rated secondary enclosure and associated box pad.
- Lugs to land customer conductor at the transformer secondary spades or secondary enclosure bus.
- *For building delivery point only*, conductors between transformer and building service delivery point.

4.2.6 Termination Location for Building Delivery Points

Avista will terminate utility service conductors in the following customer supplied metering equipment:

- *Self-Contained Meter Sockets*
- *Current Transformer (CT) Meters*: in the utility side of the point of interconnection. Customer to provide mounting brackets and landing lugs.
- *Instrumented Rated Meters*: within the current transformer cabinet.
- *Self-Contained Meter Modules (2-6 units)*: on the bus of meter modules.
- *Self-Contained Meter Modules (more than 6-units)*: at the main disconnect feeding several multiple meter modules. Avista will terminate at the main disconnect feeding several multiple meter modules.
- *Multi-Meter Combination CT & Self-Contained*: in a wall mounted or free-standing termination/pull box or disconnect supplying individual self-contained or instrument rated meters. See Chapter 5: Metering Equipment.
- *Switch Gear*: in the termination/pull section of switch gear located outside. Customer option to install, own and maintain service conductors from the building to Avista transformer. Switch gear shall meet EUSERC requirements with manufacturing drawings to be preapproved by Avista. See Chapter 5: Metering Equipment.
- *Multiple Transformers*: contact Avista for design requirements when multiple pad mount transformers are used.

4.3 Handholes

Handholes are to be used at the discretion of Avista for maintenance or repair of the utilities existing facilities. Contact Avista's Customer Project Coordinator for approval.

4.4 Service Ditch [55]

The ditch route, width and the need for sand padding and bedding must be pre-approved by the Avista Customer Project Coordinator. All customer ditches must comply with the following requirements and pass Avista Utilities inspection prior to prior to backfilling and crew scheduling.

CALL BEFORE YOU DIG

Figure 4.1 – Service Ditch Detail

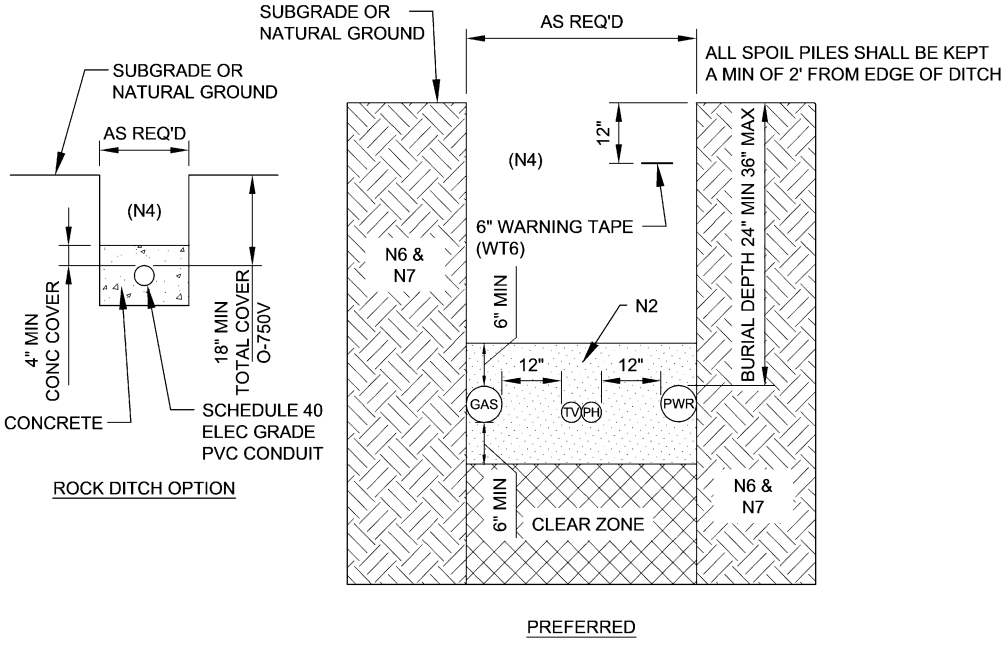


Table 4.1 – Burial Depths for URD Cable in Conduit

Voltage	Min (in)	Max (in)
0 to 600 V	24	36
601 to 35 kV	36	48

4.4.1 Underground Separation

1. Electric conduit shall not be run in the same ditch as water. Avista requires 5-foot separation between water mains and electric cable.
2. Gas services shall be installed with a 5-foot minimum longitudinal separation from sewer utility pipelines or storm drains or at further distances as specified by the appropriate regulating agency.
3. All cables must have at least 12 inches radial separation from URD structures such as natural gas lines, fuel lines, building foundations, other cables not in random lay, etc.
4. Electric and communication cables may be installed with less than 12-inches separation when the general joint use requirements and the requirements of this standard are met. All parties with less than 12 inches separation must agree to random lay [36].

4.4.2 Excavation

1. State law requires all excavators to notify "One-Call" 48 hours in advance so that all utilities may locate, and mark buried facilities before trenching begins. The law requires that the ditch be hand-dug within 2 feet of a locate mark. Extreme caution should be used. All hand-digging must be completed prior to inspection by Avista.
2. Customer dug ditches shall end no closer than 2 feet to an in service, energized padmount transformer or junction enclosure and or no closer than 6 inches to an in service, energized secondary handhole or pedestal. Allow more distance if soil conditions cause ditch to cave in. Extreme caution should be used. The conduit must be installed to the end of the ditch and the sweep left unattached for Avista crews to complete.
3. Ditches for service from an overhead facility shall be dug from the base of the pole to a point designated by the Avista Customer Project Coordinator.
4. Ditch must be in relation to final grade within 2 to 4-inches, including all drainage areas.

4.4.3 Backfill

1. Customer is responsible for backfilling and returning landscape back to required condition, haul-off, and all compaction requirements, including select backfill if required. Customer is also responsible for obtaining all required permits.
2. Bedding and padding for services in conduit shall be classified as select backfill. Select backfill is clean, screened material consisting of 3/4-inch minus rock and sand free of rubbish, cinders, chemical refuse or other materials that could cause damage to the conduit.
3. Approved backfill shall not contain any rock larger than 4 inches.
4. Conductor will not be energized until the ditch has been fully backfilled. All ditches must be in accordance with Avista design requirements. Truck access is desirable. Time and material charges may result from additional trips necessary for energizing or correction of facilities.

4.5 Service Conduit

The following information is intended for the installation of electrical service conductor. This information does not apply to roadway crossings or primary conduit systems.

4.5.1 General Requirements

- Conduit is required in all areas for Avista service conductor.
- Run conduit as straight as possible with the exception of the sweeps required by Avista. The conduit route, distance, sweep angles, size and number of runs must be **pre-approved** by the Avista Customer Project Coordinator.
- Avista must approve conduit installation prior to backfilling. Do not backfill the last 5 feet to the transformer or handhole until Avista crews have completed the connection. (Note: The conductor will not be energized until the backfill has been completed.)
- The customer is responsible to obtain all necessary permits.
- Customers shall not install conduit or excavate any area within 2′ of Avista underground equipment.
- Conduits that are run to the base of a pole must terminate with a sweep at the exact location on the pole designated by Avista.
- Multiple runs must be bundled together. Conduit sweeps entering handholes or transformers must also be bundled together. Service conduits enter the left-hand side of a single-phase transformer as viewed from the front.
- Pull strings are required on all conduit runs and should be approximately 1/8 inch in diameter and must be adequate to pull a 1/2 inch rope the entire distance of the conduit run when required.
- The ends of the conduit must be taped or capped and sealed to keep dirt and water out of the conduit. Customer is responsible for any obstructions within the conduit.

4.5.2 Conduit Type

- All conduits shall be gray electrical PVC. Galvanized rigid metal conduit (RMC) may be substituted for PVC above ground for greater mechanical protection.
- All conduit and fittings shall be a minimum of schedule 80 PVC above ground and schedule 40 PVC below ground. Schedule 40 PVC sweeps must be entirely below grade.
- Any conduit sweep that extends above the ground line must be schedule 80 PVC.
- Any conduit fittings must be a minimum of schedule 40 PVC or schedule 80 PVC if above grade.
- Riser conduits shall be plumb.
- All conduit connections must be glued and fully seated.
- Swedge couplings required on all 2, 3, and 4-inch pipe.
- Factory bell ends are allowed for connections in lieu of swedge couplings.

Note: PVC conduit risers shall have a telescoping coupling (Expansion Coupling) inserted just before the meter as a measure to allow for the settling of the ground and to prevent damage to the customer's meter base.

4.5.3 Conduit Trade Size and Sweeps

- For conduit runs with up to three sweeps (270 degrees or less), including the source and the termination sweeps, and up to 200 feet in length, the diameter of the conduit shall be as specified below. For other designs contact Avista.
- For commercial systems consider future upgrades in service size that might require larger size or additional conduit runs.
- Heated bends are not allowed due to deformation of conduit.
- Exceptions must be pre-approved and may only be granted for bends less than 30 degrees where the contractor can demonstrate that the conduit diameter and consistency of the radius are maintained without any noticeable deformation.

Table 4.2 – Service Conduit Sizing

Cable Size	SIZE OF CONDUIT		
	2-Inch	3-Inch	4-Inch
#2 TXUG	1	2 or 3	
2/0 TXUG	1		2 or 3
4/0 TXUG		1	2
350 TXUG		1	
2/0 QXUG		1	2
4/0 QXUG		1	
350 QXUG		1	
4-750 AL			1
4-250 CU		1	2
4-500 CU			1

Figure 4.2 –Conduit Sweep Sizing

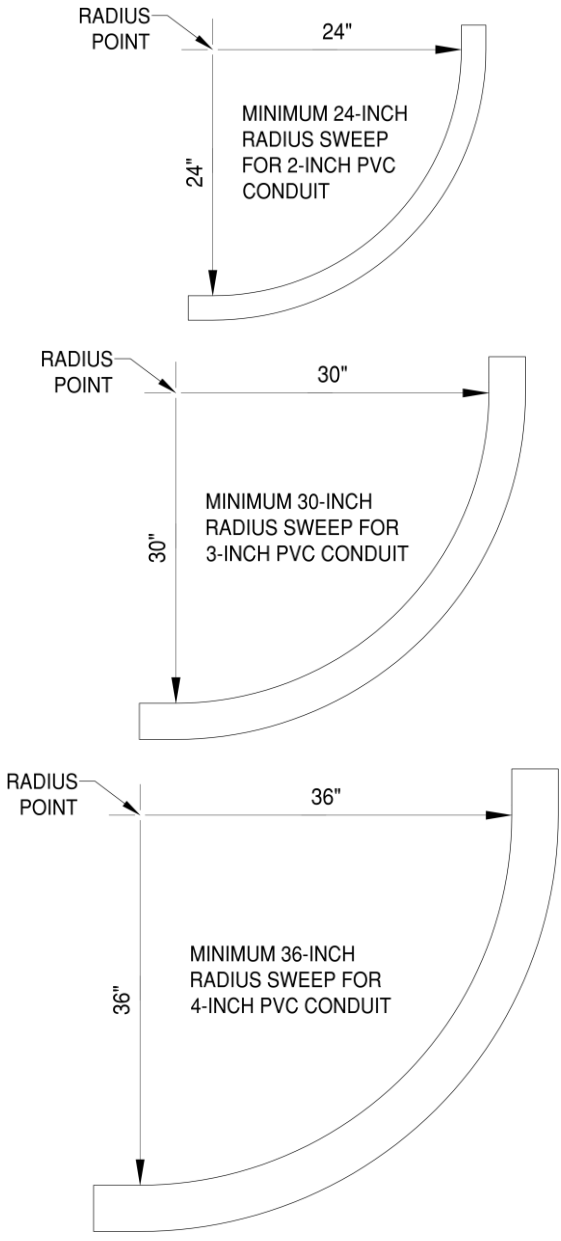
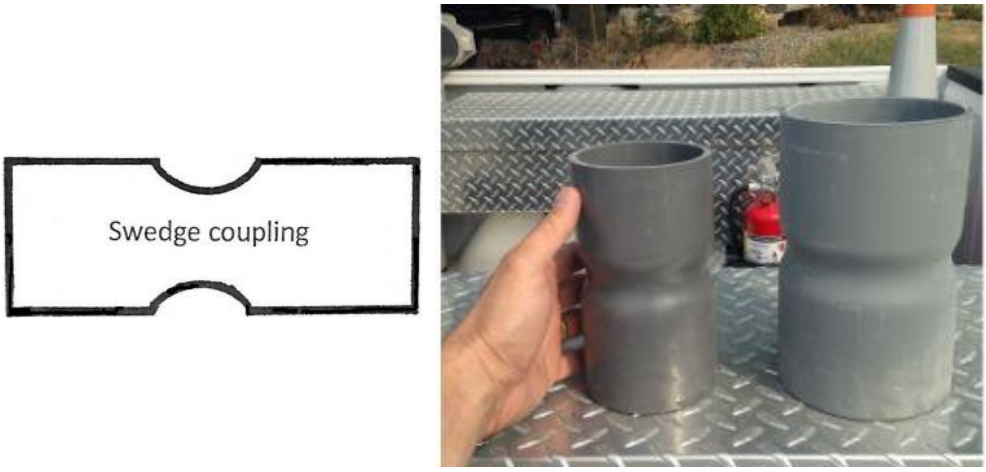


Table 4.3 –Conduit Sweep Sizing

Conduit Size (in)	Minimum Sweep Radius (in)
2	24
3	30
4	36

Figure 4.3 –Swedge Coupling



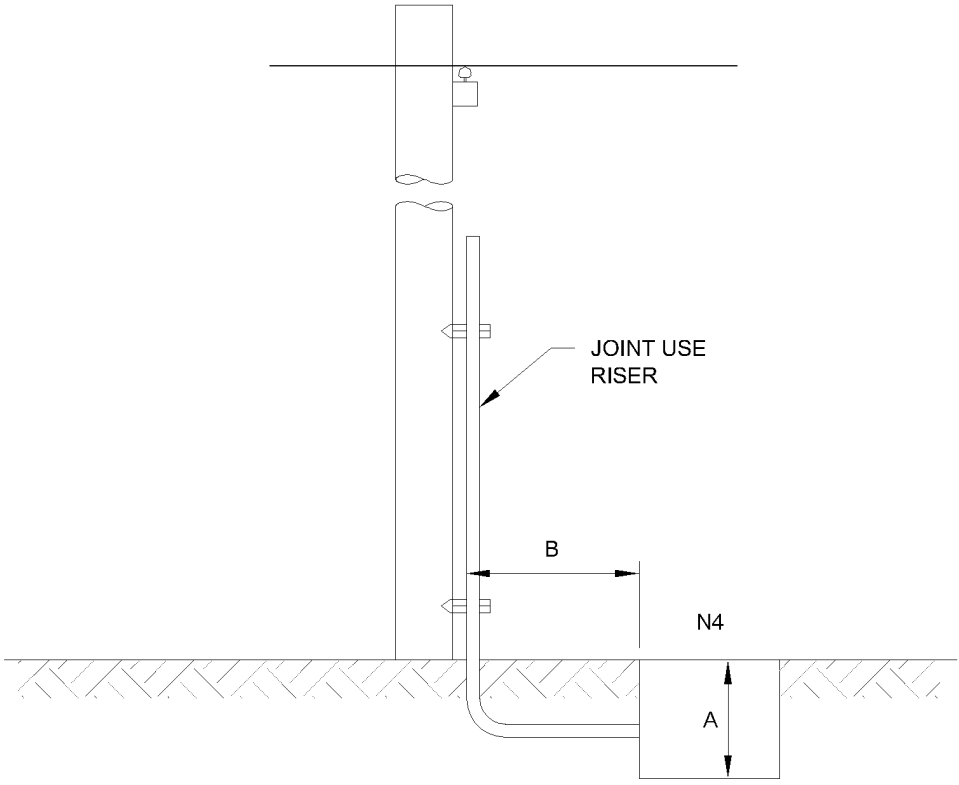
Swedge couplings and Schedule 80 sweeps are available at:

- Consolidated Electric Distributors (CED) 3333 E Main Ave, Spokane (509) 535-8891
- Graybar 4001 E Ferry Ave, Spokane (509) 532-7100
- Stoneway Electric Supply, 2701 E Ferry Ave, Spokane (509) 535-2933
- other electric supply stores

4.6 Conduit Risers

4.6.1 Location of Joint Use Vaults at Avista Poles [5]

Figure 4.4 – Location of Sweeps on Avista Poles



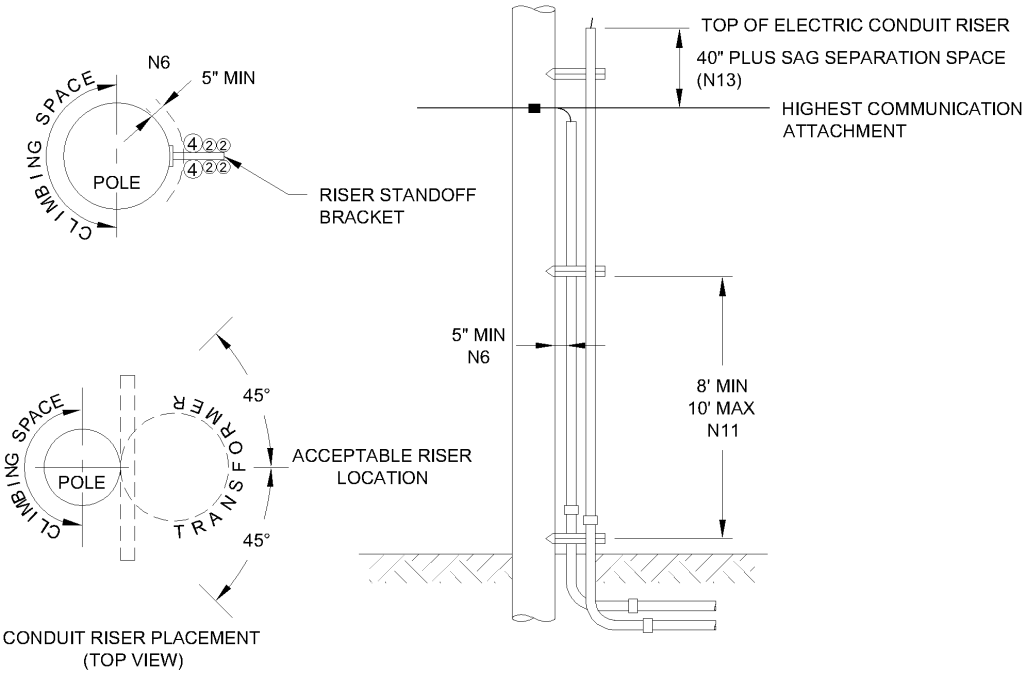
1. Risers are not allowed on Avista Utilities air switch poles.
2. No later than two business days prior to any excavation deeper than 12 inches, the excavator is required by law to mark the area of excavation and contact the local "One Call" office.
3. Minimize the disturbance of soil, at the pole, to prevent loss of treated soil and premature deterioration of the butt of the pole.
4. All excavations for handholes, manholes and vaults must be no closer, to the pole, than five feet or the depth of the excavation (A = B), whichever is greater.
5. Backfill must be tamped or otherwise compacted to prevent settling and must be protected from erosion.
6. The joint user is responsible for the cost of installing risers, conduits, ditches, and manholes which it uses for its communications cables. Risers which connect to communication handholes, manholes or vaults will be owned and maintained by

the communication company. Risers which connect to Avista Utilities handholes, manholes, or vaults will be owned and maintained by Avista Utilities.

7. Equipment such as power supplies must be mounted under the electric crossarm and must not block space for additional communication attachments or climbing space. Large boxes should be installed below the communications space and approved by the Avista Utilities Joint Use Administrator prior to installation.

4.6.2 Joint Use New Riser Installations [6]

Figure 4.5 – Joint Use New Riser Installation



1. Risers are not allowed on air switch poles.
2. Joint use risers are not allowed on substation riser poles.
3. New riser installations will require that all conduit risers on the pole be strapped to one set of standoff brackets, including electric conduits
4. Joint use companies are limited to one (1) 4-inch conduit per pole or two (2) 2-inch conduits per pole, unless otherwise approved by the Avista Utilities Joint Use Administrator.
5. Maximum total number of conduits for all companies, including Avista conduits, is four (4) 4-inch conduits on any pole. Two (2) 2-inch conduits may be counted as one (1) 4-inch conduit. No more than six conduit risers shall be placed on a set of standoff brackets. This is based on 15-inch standoff brackets. Longer standoffs for joint use require the prior approval of the Joint Use Administrator
6. All risers must be mounted to provide a minimum five-inch clearance between the face of the pole and the riser closest to the pole.
7. If standoff brackets have electric conduits and need to be changed to longer brackets to accommodate additional communication conduit risers, then the change out of the brackets shall be done by Avista Utilities at the expense of the

communication company. The electric conduits should be placed outside of the communication conduits whenever possible.

8. Small communication service drops may be secured directly to the pole. When more than two small service drops are involved, those communication service drops are required to be installed in conduit on standoffs and must be located on the equipment side of the pole and not infringe on the pole climbing space.
9. Small service splice boxes are allowed near the bottom of the pole so long as they are located on the equipment side of the pole and do not infringe on the pole climbing space.
10. Locate the standoff brackets and conduit riser on the equipment side of the pole opposite the climbing space. Avoid trapping communication lines between the riser and the pole.
11. Maintain a minimum of eight feet (ten feet maximum) between the ground line or lowest standoff bracket and the next higher bracket.
12. Placement of standoff brackets and conduit risers should avoid vehicular traffic and not enter into a sidewalk or curb area.
13. A minimum clearance of 40-inches shall be maintained for safety space between the top of the electric conduit and the highest communication attachment.
14. When necessary, use split duct covering to wrap each individual conductor (1-inch, stock number 578-0280 and 2-inch, stock number 578-0282) for safety space clearances.
15. An 18-inch standoff bracket should be used if there is joint use on a 600 amp, three-phase primary riser (three (3) four-inch conduits). This may result in the distance between the face of the pole and the riser closest to the pole to be less than the five-inch minimum clearance, which will require prior approval by the Avista Utilities Joint Use Administrator.
16. Innerduct must not extend more than 4 inches beyond the top of the riser.

4.7 Underground Clearances

4.7.1 Clearance to Transformers [44]

The locations of the pad, transformer, and the point of delivery shall be as specified by Avista prior to the start of site preparation and construction in adherence to the following requirements:

Figure 4.6 – Clearance to Transformers

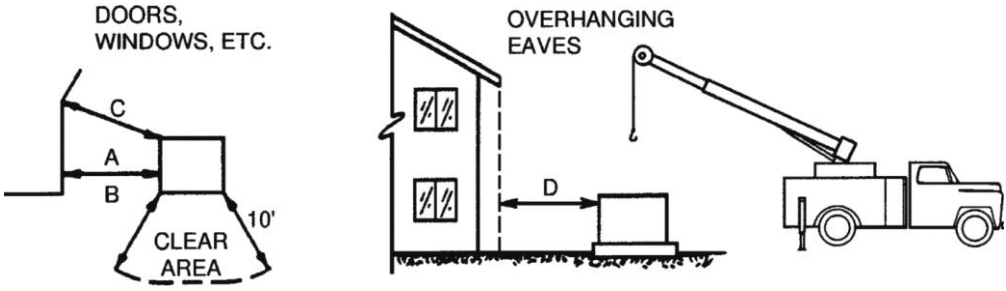


Table 4.4 – Clearance to Transformer

CLEARANCE TO:	SHALL BE NO LESS THAN:
Noncombustible Wall	2 ft
Wall with combustible component	8 ft
Doors, windows, or other openings	8 ft
Combustible eaves, decks, or patio roofs 14 feet or less above grade	8 ft horizontal from eave, deck, or roof
Other vertical obstructions	Boom truck access required
Gas Meter	3 ft
Propane Tank	Refer to *Clearance to Other Equipment Buildings & Swimming Pools* section

1. The transformer shall be located to provide the following clearances. For the purpose of compliance with this standard, FR3 fluid is considered flammable and necessitates the same clearances as conventional oil filled transformers.
2. Boom truck access must be provided.

3. The front of the transformer shall open away from the building. An area clear of all obstructions including landscaping must be provided for a radius of 10 feet from the front of the transformer, to provide personnel access for the operation and maintenance of the transformer. The grade of the ground in the clear area should approximately match that of the transformer. In addition, the grade of the ground at the pad-mounted transformer shall be such that any oil leaking from the transformer will flow away from the building.

4. Transformers shall not be covered, concealed, disguised, or enclosed. Where fences are permitted, they must be at least two (2) feet from the transformer on all sides (or more if required to allow the doors to open fully), must allow unrestricted access to the front, and must meet the clearance requirements listed above.

5. Pedestal and meter cabinets shall not be in front of or obstruct the transformer doors. The minimum distance from the edge of the three-phase transformer pad to the meter is 1 foot.

6. Noncombustible walls shall be constructed with a minimum 3-hour fire resistance rating and comprise of either a minimum of 6-inch-thick reinforced concrete or 8 inch thick Concrete Masonry Unit (CMU) with all cavities filled with reinforced concrete.

7. The pad shall be located and sized to permit the required clearances. To ensure proper clearances are met, Avista strongly advises customers to maintain clearances to the edge of the transformer pad. No part of the transformer shall extend beyond the outer edge of the pad. Refer to *Three-Phase Transformer Concrete Pads* section within this chapter for concrete pad dimensions and construction details). Clearances are strictly enforced. Customers are responsible to chip out concrete and re-pour transformer pads that are too close to buildings!

8. Phone and TV pedestals must not be in front of the transformer and must be at least 2' away from sides and back of transformer.

4.7.2 Clearance to Other Equipment Buildings & Swimming Pools [37]

Underground distribution cables and equipment must maintain the following clearances to buildings and other equipment.

Figure 4.7 – Clearances Between Hydrants and Fuel Oil, Diesel, or Gasoline Tanks

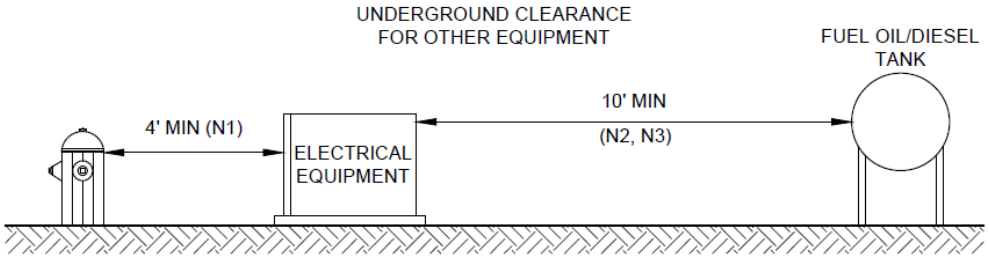


Table 4.5 – Clearance: Propane Storage Tanks and Electrical Equipment

Propane Tank Capacity (gallons of water)	Minimum Distance to Buried Tank (ft)	Minimum Distance to Above-Ground Tank (ft)
< 501	15	15
501 - 2000	15	25
2001 – 30,000	50	50
30,001 or more	50	Contact Engineering

Figure 4.8 – Underground Clearance for Swimming Pools

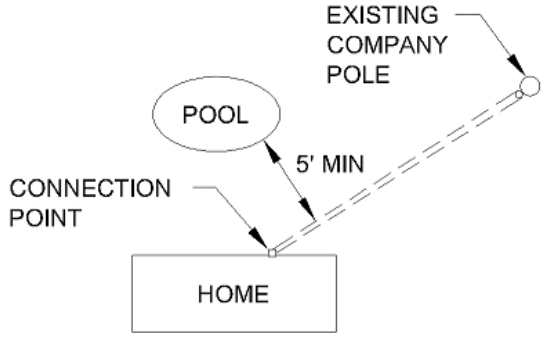
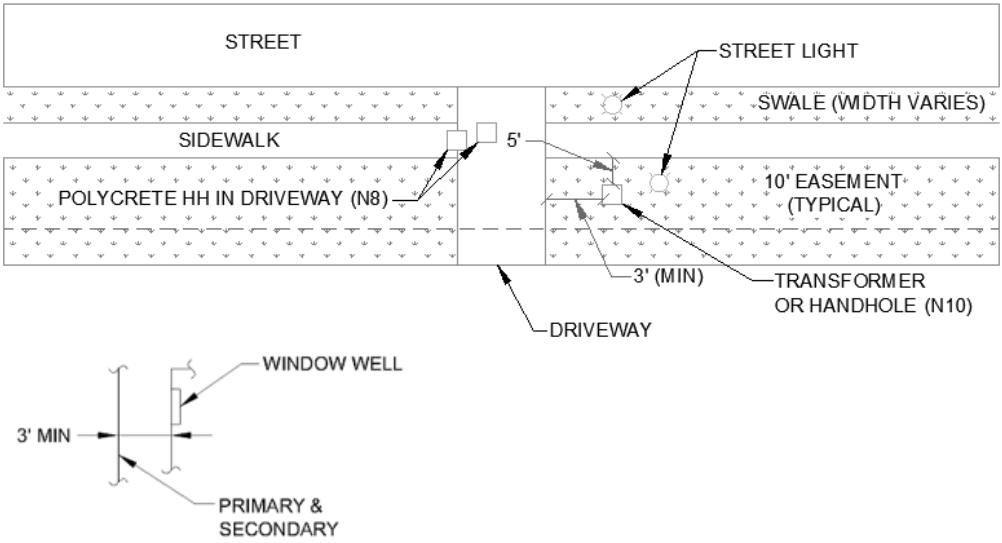


Figure 4.9 – Underground Clearances for New Developments



1. Transformers and secondary pedestals shall have a minimum of 4 ft clearance from fire hydrants to facilitate water maintenance and fire department operations. Secondary handholes may be substituted where 4' minimum clearance is not attainable.
2. Clearance to fuel tanks is ONLY applicable for tanks containing fuel oil, diesel or gasoline.
3. Required clearances to Propane tanks are defined in Table 6; propane tank capacity MUST be confirmed before construction begins.
4. If any Propane handling facility other than a tank is involved, or if the electrical distribution equipment is downhill from the propane equipment, contact Distribution Engineering.
5. Electric Distribution Equipment located within 15 feet of a propane tank must be rated as explosion proof. See Distribution Engineering.
6. Cables may not be installed under above-ground pools.
7. Additional clearances to other underground utilities may apply.
8. Maintain 5 ft minimum distance between water main and electric.
9. Use polycrete handholes for installation in driveways or areas where vehicles may drive over.
10. Avista Utilities will not install underground primary or service wire under any portion of a building.

11. Location of pad mount transformers or junction enclosures near roadways shall be as far behind curbs as practical. Inquire to Avista for prescribed minimums which ranges from 3 to 10-feet depending on location. [11]

4.8 Residential Underground Service [54]

The customer or their electrician must consult the local authority having jurisdiction for additional requirements beyond those contained herein. An electrical inspection permit decal must be displayed on meter can before a service connection can be made.

Figure 4.10 – Residential Underground Exterior Service

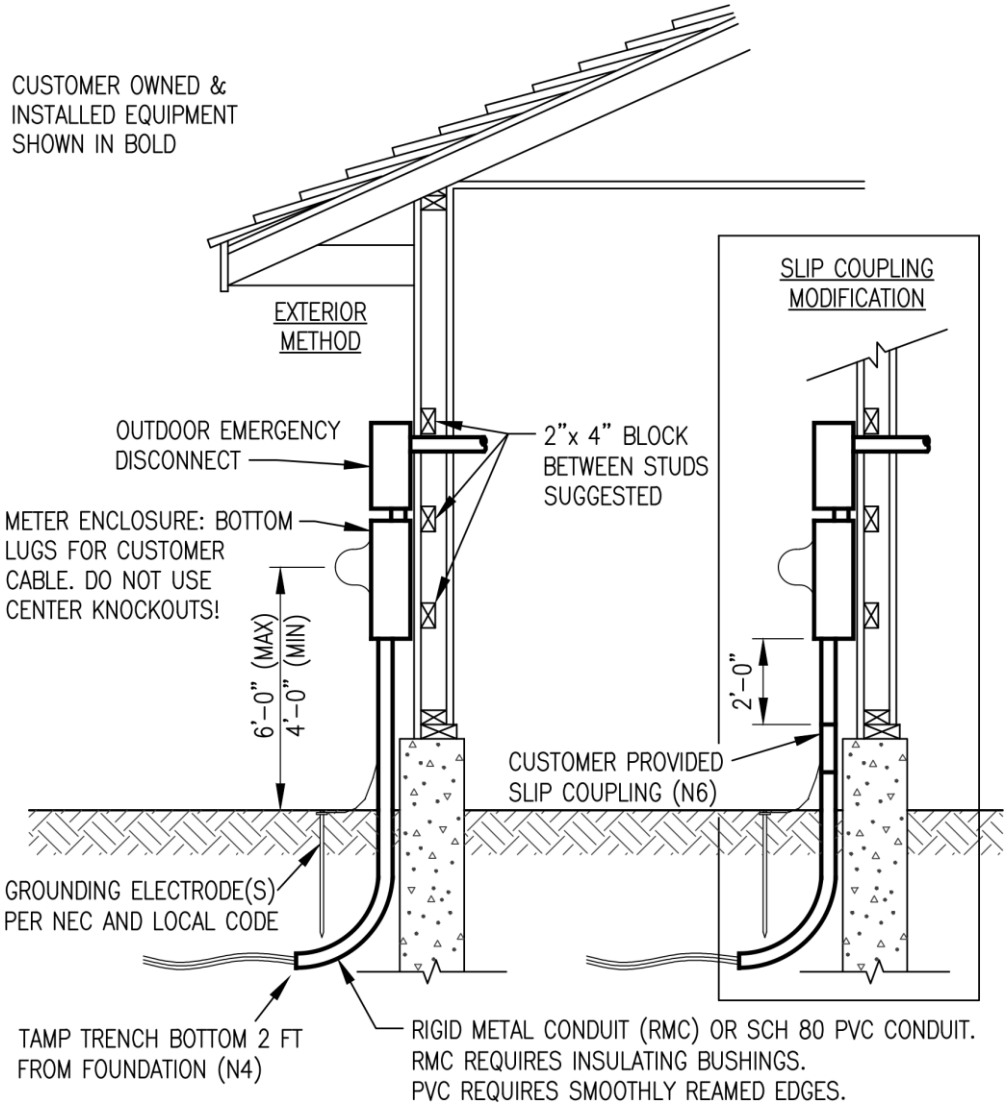
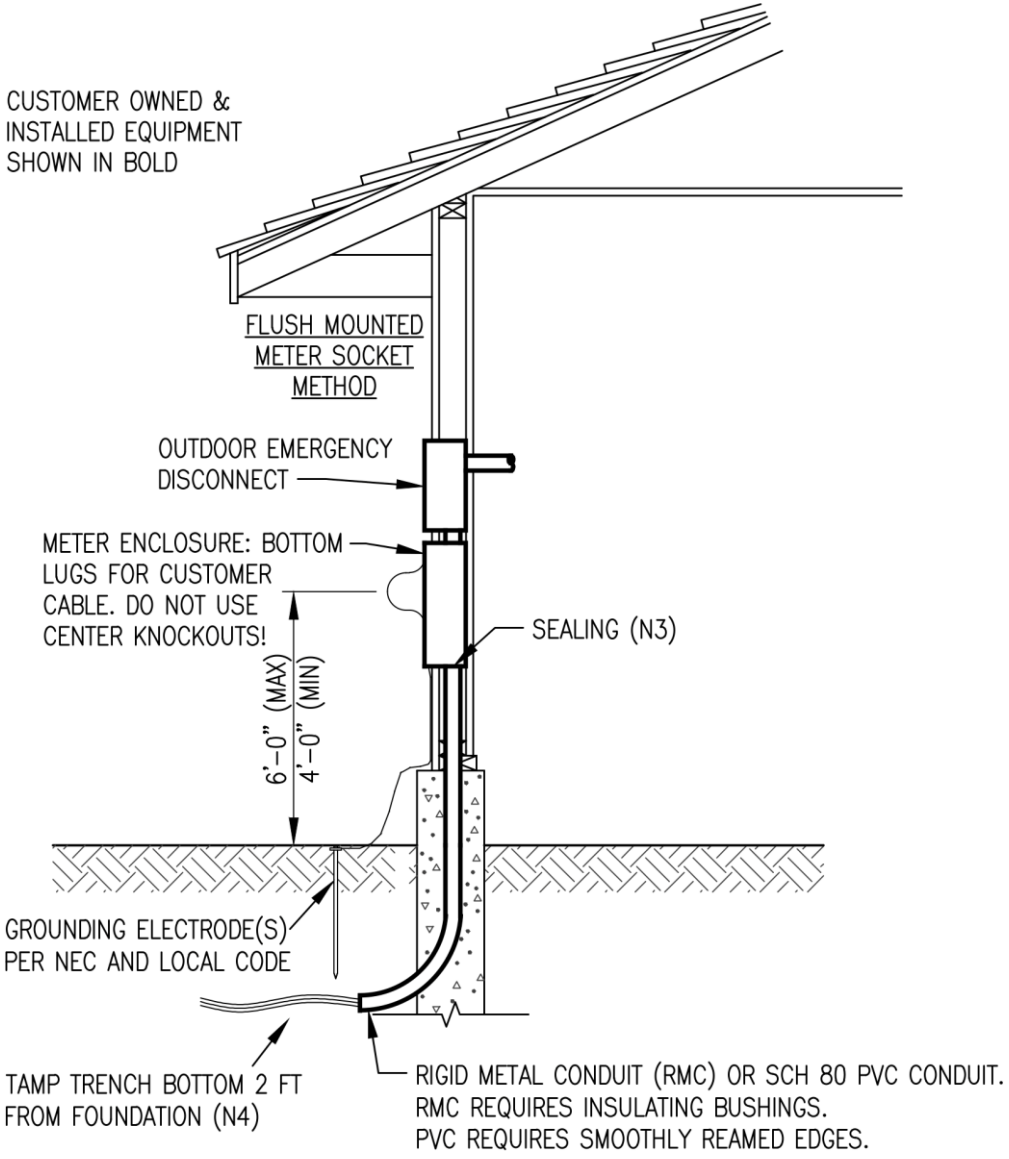


Figure 4.11 – Residential Underground Exterior Service, Recessed



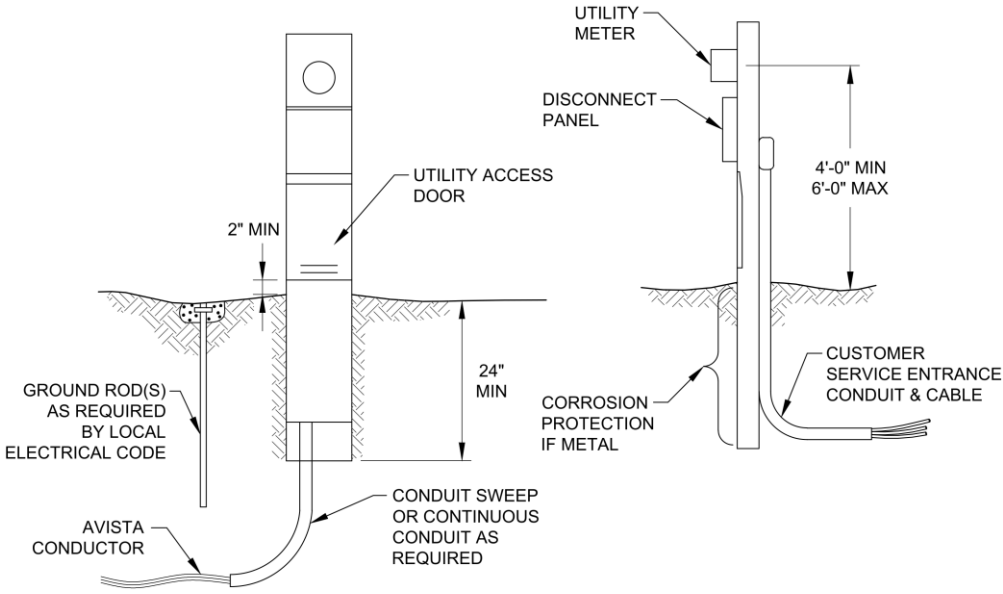
1. Avista will pull service conductor into flush or recessed mounted 200- or 400-amp meter sockets. The socket must be rated for underground services.
2. Use only the off-center knockouts in the bottom of the meter socket. Applies to 200- and 400-amp cans.
3. Avista to seal the source side conduit in recessed mounted meter bases. Use Fire Barrier Watertight Sealant stock number 668-0600 with Fire Barrier Packing Material stock number 668-0601 if needed.

4. Tamping required to prevent the conduit from pulling out of meter base.
5. Meter must be mounted on gable end of home or shop/garage having a metal roof or must have the same protection spelled out in section 3.2.2 of Electric Service Requirements Handbook.
6. Customer to provide expansion coupling as needed and when required by local office. Conductors cannot connect to the bottom of the meter base where expansion couplings are used.
7. Install adequate slack in service conductors to compensate for possible settling or shifts in coupling.
8. Exposed conduit including sweeps must be schedule 80 PVC or rigid metallic conduit (RMC).

4.9 Underground Service Pedestal [55]

The customer or their electrician must consult the local authority having jurisdiction for additional requirements beyond those contained herein. An electrical inspection permit decal must be displayed on meter can before a service connection can be made.

Figure 4.12 – Underground Service Pedestal



4.9.1 Meter Pedestal Requirements:

1. 200-amp rated meter base
2. Corrosion protection on the buried section of metal pedestals
3. Meter sealing ring
4. Ventilation
5. The utility service cable pull and terminating section shall be lockable, and restricted to Avista use only. This area must be kept clear for maintenance access.
6. Unmetered wire between Avista connections and top side of meter base must remain accessible only to Avista.
7. Corrosion inhibitor on aluminum connections
8. Plumb installation with the meter facing away if located within 5 feet of the structure.

9. Pedestal must not be located under drip eave of building or where sliding snow can impact pedestal.

4.9.2 Avista Supplied:

- Meter and utility service wire.

4.9.3 Customer Supplied:

- Direct Burried metal or UV stabilized fiberglass or plastic meter base and pedestal
- Utility service trench, backfill, and conduit as required by Avista
- Ground electrode(s), connectors and bonding wire
- Conduit and wire as necessary to serve the home
- Conduit sweep or continuous conduit as required

4.10 Pipe/Post Type Meter Pedestal [56]

The customer or their electrician must consult the local authority having jurisdiction for additional requirements beyond those contained herein. An electrical inspection permit decal must be displayed on meter can before a service connection can be made

1. Pedestal must not be located under drip eave of building or where sliding snow could impact pedestal.
2. Meter pedestal must be installed so the utility service cable pull and terminating section shall be lockable, and restricted to Avista use only.
3. Meter pedestal must have corrosion inhibitor on aluminum connections.
4. Meter pedestal must be kept clear for maintenance access.
5. Meter pedestal must have plumb installation with the meter facing away if located within 5 feet of the structure.
6. Use only the off-center knockouts in the bottom of the meter socket.

A 200A meter pedestal shall be two 2-inch rigid steel pipes (with threaded steel caps) embedded in concrete with unistrut cross members for attaching the meter and disconnect enclosure. Spacing between rigid steel pipes shall not exceed 3-feet; provide additional pipes as necessary.

Figure 4.13 – 200A Pipe Meter Pedestal Installation

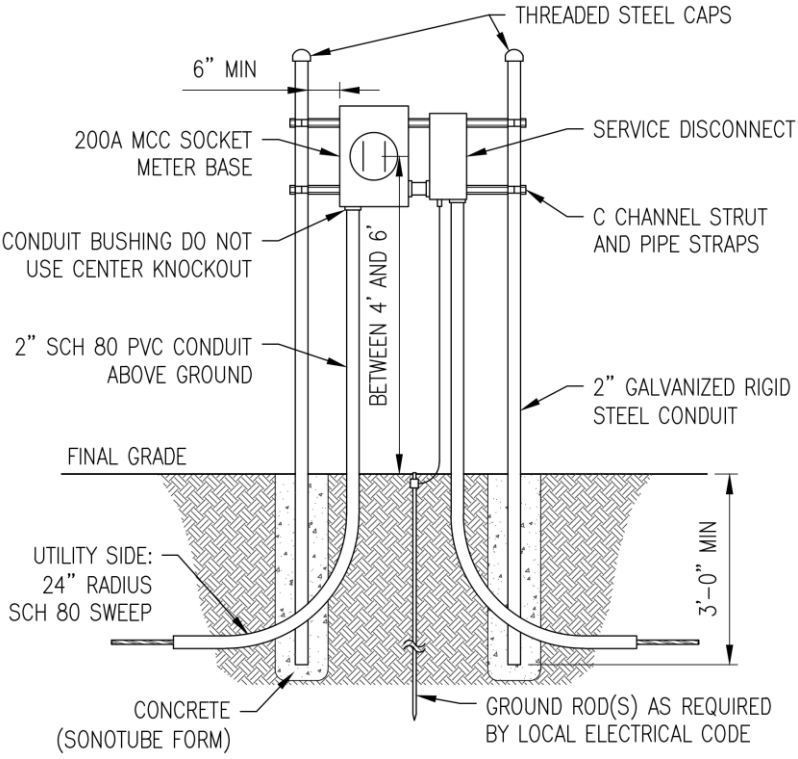
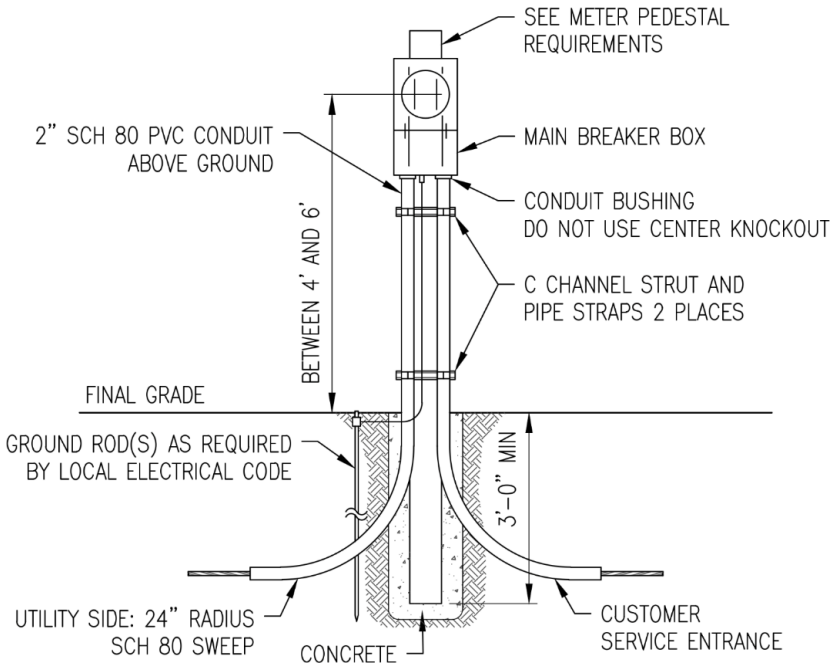


Figure 4.14 – 200A Pipe Meter Pedestal Install Photo

For residential only, a wood post embedded in concrete may be used for 200A meter pedestal in lieu of the rigid steel pipes and unistrut. Wood posts must be either a commercially new 6″ x 6″ treated post or a minimum 8-inch top diameter butt treated cedar or full treated white wood pole as depicted below.

Figure 4.15 – 200A Post Type Meter Pedestal Installation



A 400A residential meter pedestal shall be two 2-inch rigid steel pipes (with threaded steel caps) embedded in concrete with unistrut cross members for attaching the meter and disconnect enclosure. Spacing between rigid steel pipes shall not exceed 3-feet; provide additional pipes as necessary. Wood posts are forbidden.

Figure 4.16 – 400A Pipe Meter Pedestal Installation

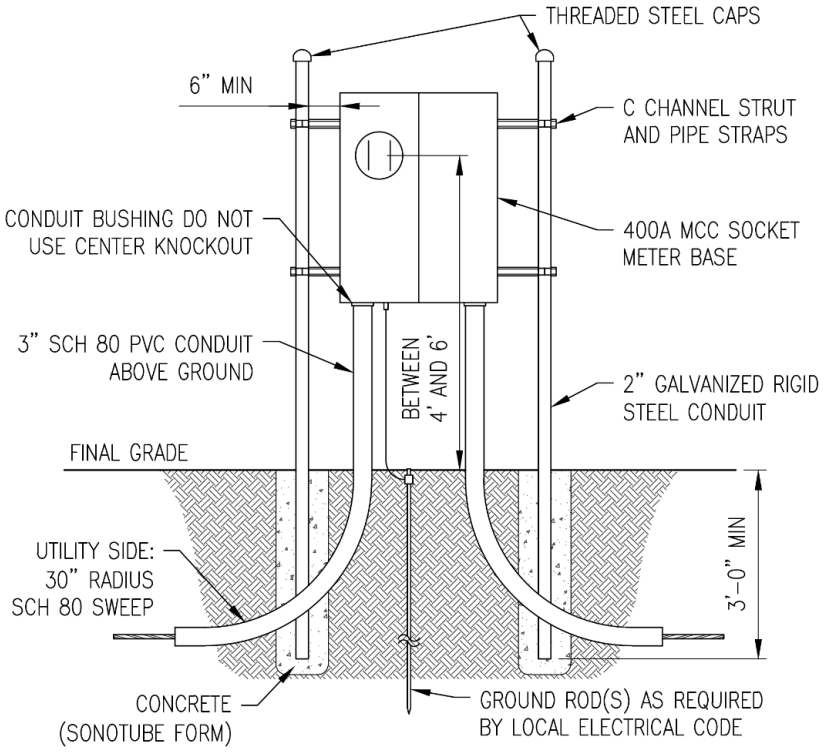
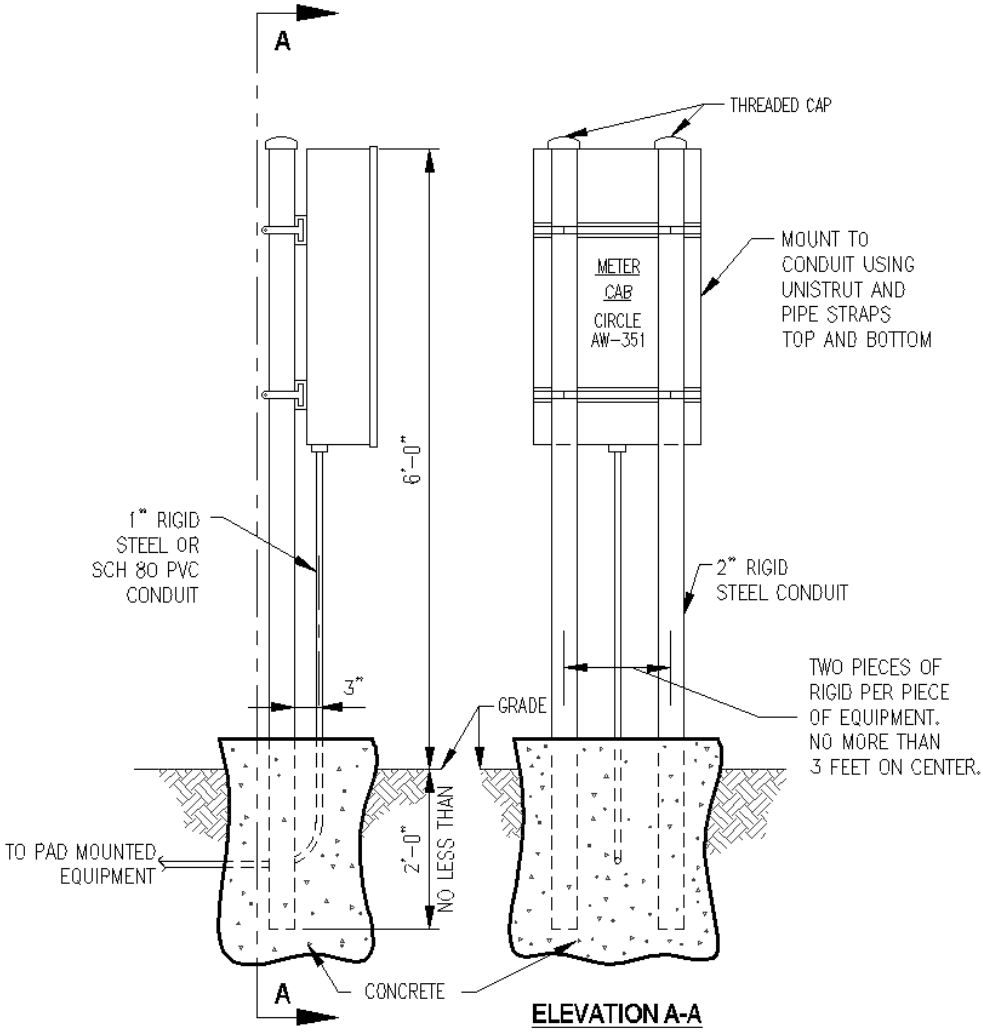


Figure 4.17 – 400A Pipe Meter Pedestal Install Photo

Commercial pedestals greater than 200A and residential pedestals greater than 400A shall comprise of a CT enclosure mounted on two 2-inch rigid steel pipes (with threaded steel caps) embedded in concrete with unistrut cross members. Spacing between rigid steel pipes shall not exceed 3-feet; provide additional pipes as necessary.

Figure 4.18 – Pedestal Mounted Meter Enclosure, Dedicated Transformer



4.10.1 Customer Supplied and Installed

- Approved pedestal embedded in concrete, as described above, upon which the meter and disconnect enclosure are installed.
- Meter and disconnect enclosure and sealing ring. Enclosures shall be securely mounted (minimum 2 points) without flex or wobble.
- Utility service trench, backfill, and conduit.
- Ground electrode(s), connectors, and bonding wire.
- Conduit and wire as necessary to serve the building or structure.
- Between the steel pipes, customer shall install both sets (to building / structure and to Avista transformer) of 90-degree conduit sweeps and risers that connect to the meter base.

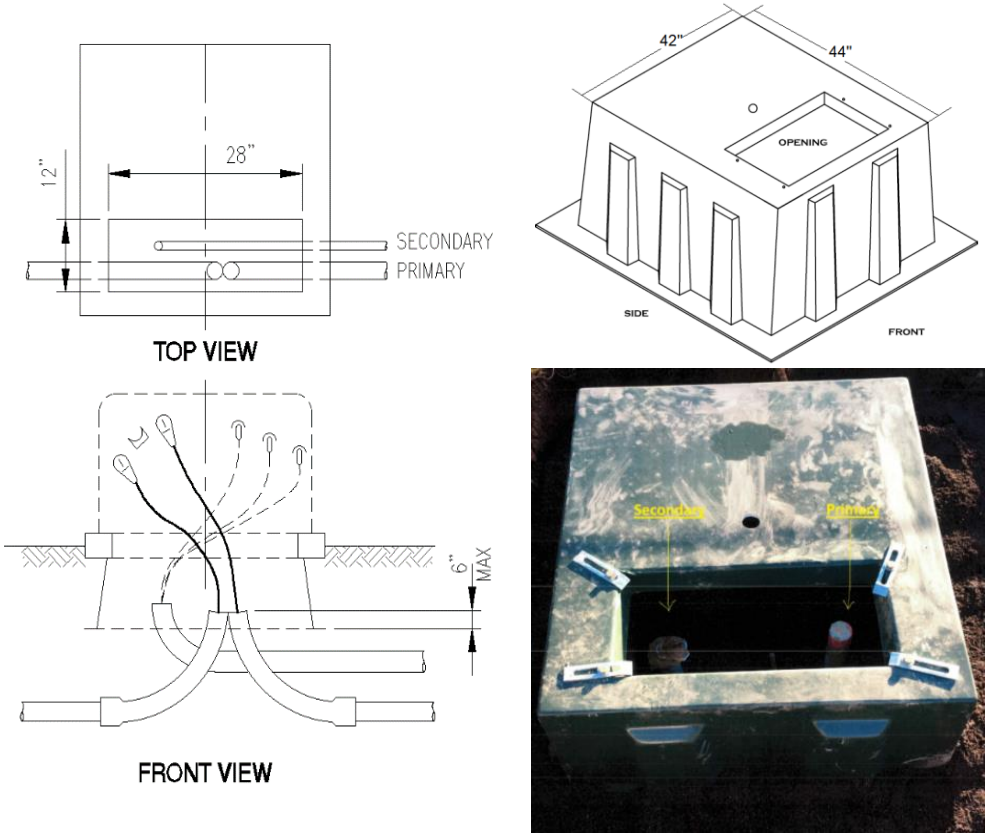
4.10.2 Avista Supplied and Installed

- Meter and utility service wire.

4.11 Padmounted Transformers

4.11.1 Single-Phase Transformer [41]

Figure 4.19 – Conduit Entrance Single-Phase Transform



1. Backfill trench for 8 to 10 feet, one foot deep, on all sides of enclosure to anchor primary conduit.
2. Seal unused conduits with plastic caps.
3. Other conduit arrangements may be required depending on the situation.
4. Spare conduits stubbed into ground sleeve shall be located to the front of the window.
5. Customer will excavate a hole for the transformer ground sleeve that is 3-feet deep and 8-feet by 8-feet square with approved bedding sand and within 3 feet of excavation.

4.11.2 Three-Phase Transformer Concrete Pads [46]

Figure 4.20 – Three Phase Transformer Concrete Pads

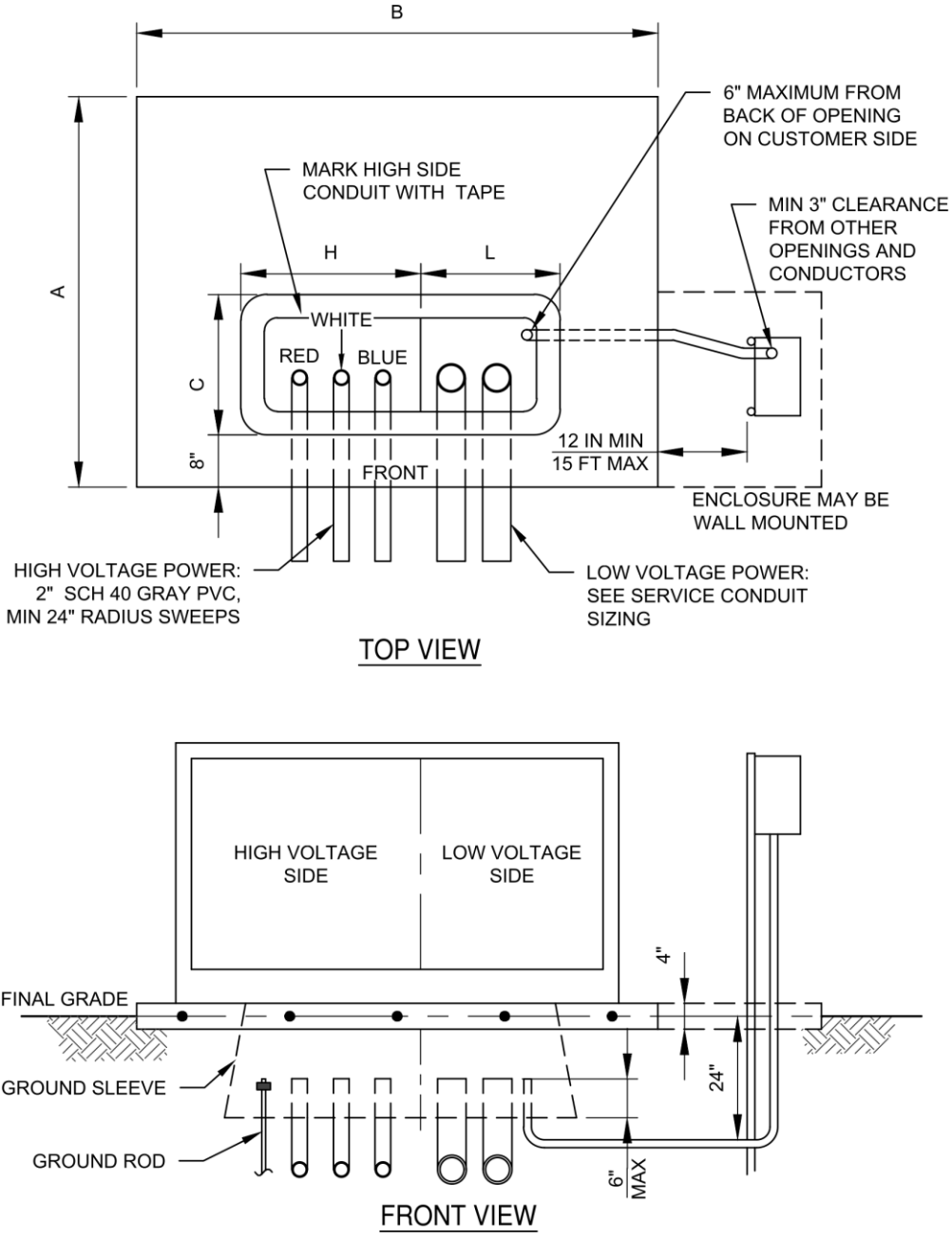


Table 4.6 – Three Phase Transformer Concrete Pad Dimensions

3-Phase KVA	Dimensions (Inches)				
	A	B	C	H	L
45-500	80	90	18	40	25
750-1500	90	132	24	40	25

1. Provide 2-inch, schedule 40 gray PVC conduits sweeps with a minimum 24-inch radius for Avista's high voltage power conductors. Sweeps shall be buried to a 40-inch depth. Direction of entry may vary according to the job requirements; confirm with Avista before installation. High side conduits shall be taped using red, white, and blue colored electrical tape to denote phasing. Provide "mule tape" flat pulling webbing in every conduit.
2. Install Avista provided ground rod on high side of the ground sleeve window.
3. Provide schedule 40 gray PVC for low voltage service conductors. Size as noted in the *Service Conduit Sizing* and *Conduit Sweep Size tables*. Conduit sweeps need to be buried so that their tops rise no more than 6-inches above the bottom of the ground sleeve. Service conduits must be installed prior to forming and pouring the pad to avoid undermining the pad. Service conduits must be confined to the low voltage side of the window.
4. When the number of secondary conductors exceeds Avista's limits, the customer shall make reasonable attempts to accommodate connection to secondary side of transformer (i.e., use copper conductor instead of aluminum, etc.) If the limits in are still exceeded after modifying service conductors, Avista will provide a 3000A secondary enclosure and box pad at the expense of the customer. This additional expense is considered customer requested and is excluded from any allowance.
5. All conduits shall have minimum 6-inches of bedding and padding using select backfill. Select backfill is clean, screened material consisting of 3/4-inch minus rock and sand free of rubbish, cinders, chemical refuse or other materials that could cause damage to the conduit. Do not use sand as it is insulative and will decrease the current carrying capacity of the conductors.
6. Red electrical warning tape shall be buried 12-inches below the surface, directly above the high voltage conduits.
7. A ground sleeve will be supplied by Avista. It shall be centered left to right in the pad.
8. For transformers larger than 500 kVA, the customer will be required to provide a larger concrete pad.

9. The meter pedestal shall be located as specified by Avista Electric Meter Shop. The rigid upright steel conduits for metering enclosure shall be set in concrete and capped with steel cap.
10. Pad shall be located and oriented as specified by Avista.
11. Pad shall be constructed on firm undisturbed or well-compacted earth, shall be bedded on 3-inches of compacted 3/4-inch gravel and shall be level.
12. Concrete shall be 5-bag mix with 3/4-inch maximum size aggregate. Top surface shall be broom finished. Edges shall be rounded.
13. Concrete shall be at least 4 inches thick and shall be reinforced at half the depth with #4 rebar on 12-inch centers each way. Reinforcing extending around window shall consist of a minimum of 2 rebar.
14. 2-inch steel pipe poles should be bonded to transformer ground.
15. Concrete pad installations must be inspected by Avista before pad is poured and again after pad is poured.
16. Install 1-inch conduit for metering 6-inch maximum from back of opening on customer side.

4.12 Secondary Enclosures

4.12.1 Pads for Secondary Enclosures [47]

Figure 4.21 – Secondary Enclosure Fiberglass Box Pad

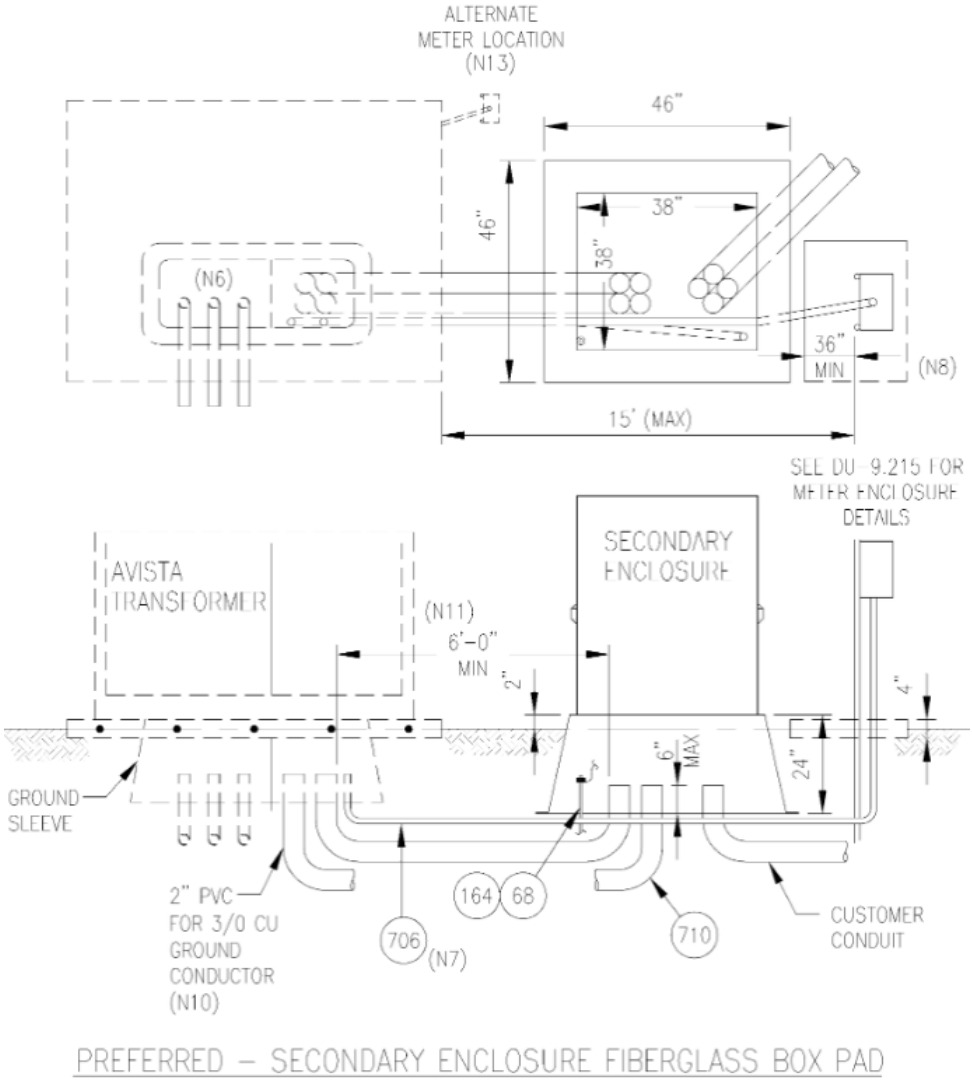
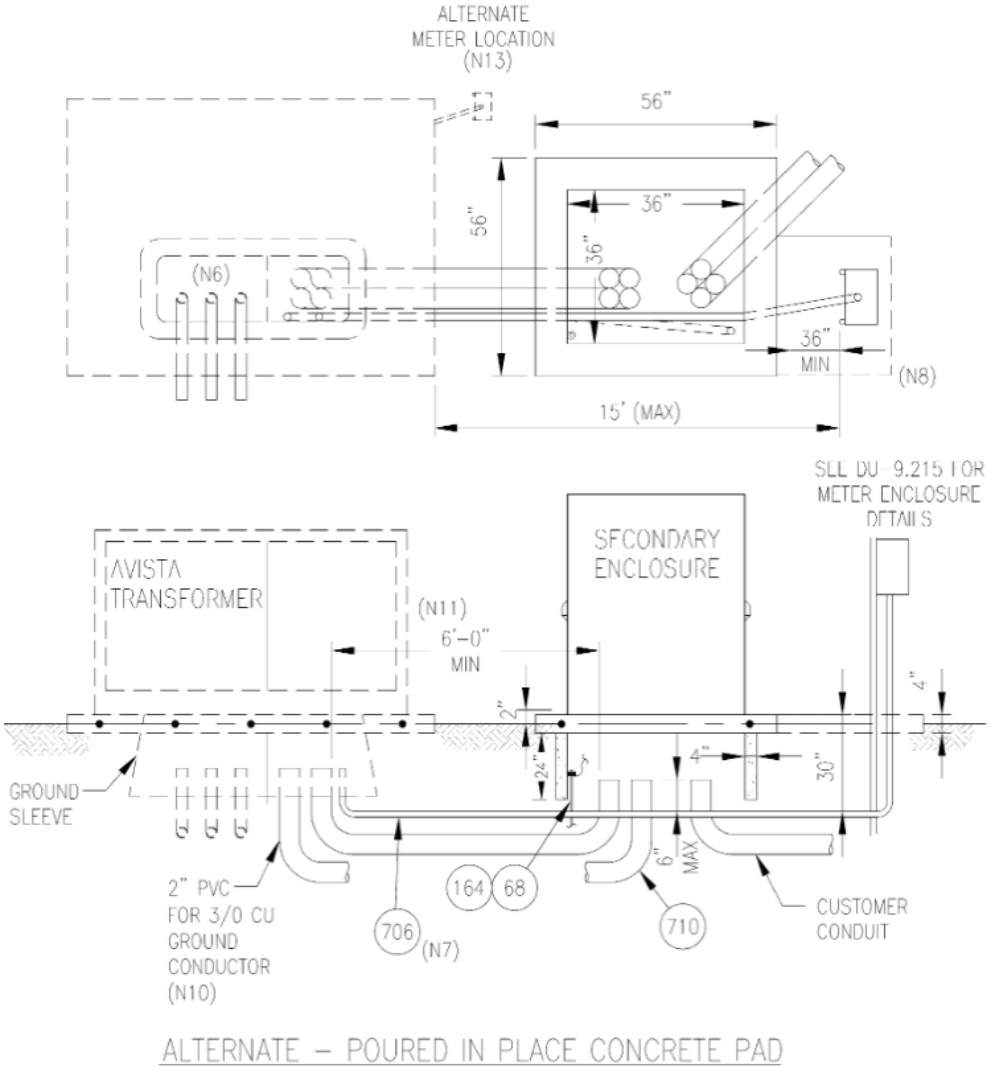


Figure 4.22 – Secondary Enclosure Poured in Place Concrete Pad



1. When the number of secondary conductors exceeds the limits in DU-5.124, the customer shall make reasonable attempts to accommodate connection to secondary side of transformer (i.e., use copper conductor instead of aluminum, etc.) If the limits in DU-5.124 are still exceeded after modifying service conductors, Avista will provide a 3000A secondary enclosure and box pad at the expense of the customer. This additional expense is considered customer requested and is excluded from any allowance.
2. Pad shall be located and oriented as specified by Avista Utilities. The bus in the secondary enclosure will be the point of service as defined in Avista Utilities rates and tariffs.

3. Pad shall be constructed on firm undisturbed or well-compacted earth, shall be bedded on gravel and shall be level.
4. Concrete shall be 5-bag mix with 3/4-inch maximum size aggregate. Top surface shall be broom finished. Edges shall be rounded.
5. Concrete shall be at least 4 inches thick and shall be reinforced at half the depth with #4 rebar on 6-inch centers each way. Reinforcing shall extend around window.
6. Direction of entry of utility conduits may vary according to the job requirements.
7. Conduits must be installed before fiberglass box pad installation or before forming and pouring the pad to avoid undermining the pad.
8. The meter pedestal shall be located as specified by Avista Utilities. The rigid conduits shall be set in concrete. Avista Utilities Meter Shop will determine CT applications. Meter location may vary with specific application. Leave room to open enclosure doors.
9. Conduit between transformer and enclosure may be a gutter in some applications.
10. A separate ground conductor (3/0 copper) must be installed between the transformer neutral bus and the case ground of the secondary enclosure.
11. Area between transformer concrete pad and secondary enclosure box pad or concrete pad can be concrete. Leave enough room for setting transformer.
12. Seal the source side conduit where customer conduits enter a building. Fire barrier water-tight sealant SN 668-0600 with fire barrier packing material SN 668-0601 if needed.
13. Alternate meter location must be approved by Avista before installation.

4.12.2 Padmounted Secondary Enclosure [48]

Figure 4.23 – Padmounted Secondary Enclosure

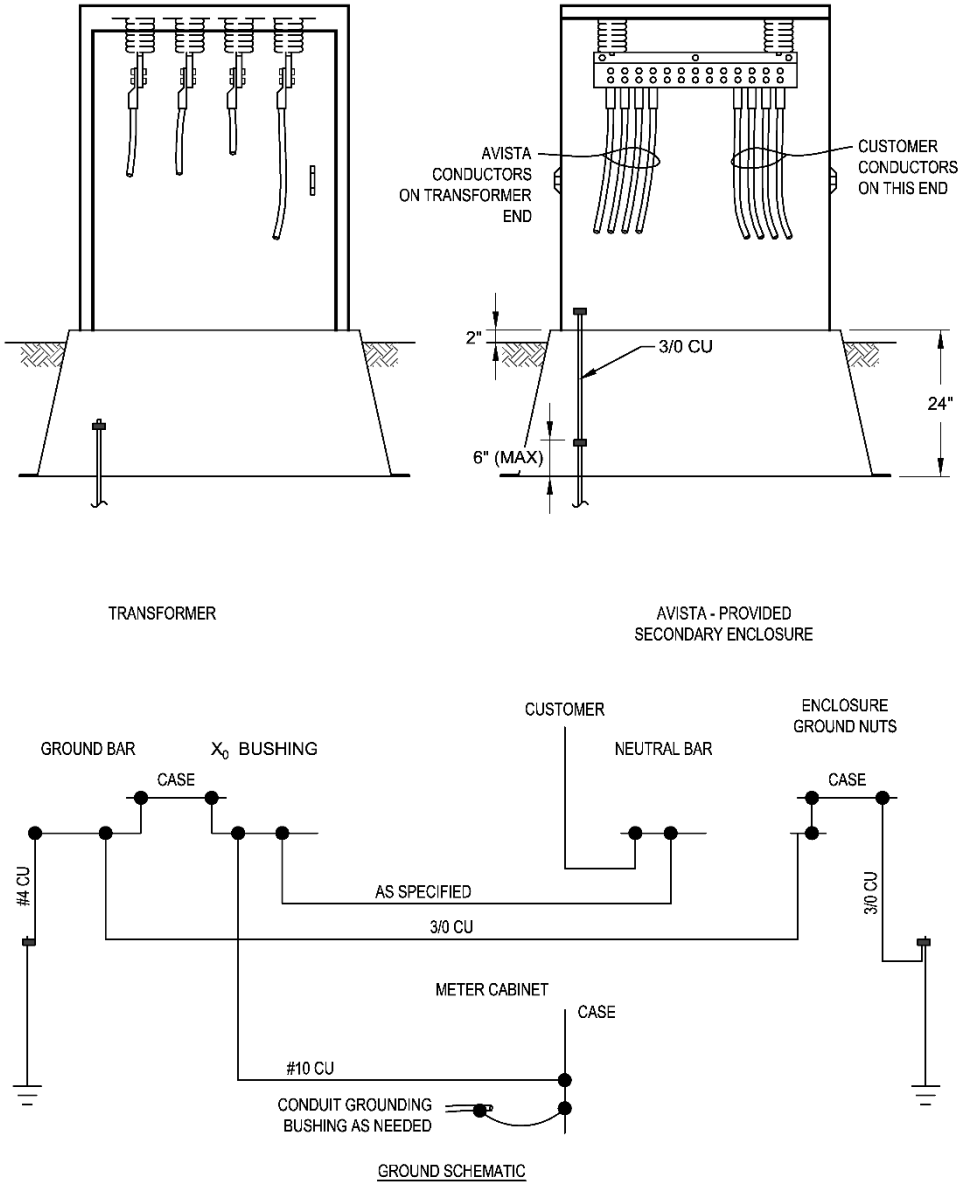


Table 4.7 – Conduits & Conductors from Transformer to Secondary Enclosure

Transformer KVA	Full Load Amps	Max Customer Conductors Per Phase	Conduits from Transformer to Enclosure	Conductors from Transformer to Secondary Enclosure
208Y/120V Secondary				
45	125	3	(2) 3” PVC	1 x 2/0 AL Quadruplex
75	210	3	(2) 3” PVC	1 x 350 AL Quadruplex
112.5	315	3	(2) 4” PVC	1 x 750 AL (500 CU) PH & 1 x 350 Neut.
150	415	3	(3) 4” PVC	2 x 350 AL Quadruplex
225	625	4	(3) 4” PVC	2 x 750 AL (500 CU) PH & 2 x 350 Neut.
300	835	6	(5) 4” PVC	3 x 750 AL (500 CU) PH & 3 x 350 Neut.
500	1390	6	(7) 4” PVC	5 x 750 AL (500 CU) PH & 5 x 350 Neut.
750	2080	8	(9) 4” PVC	7 x 750 AL (500 CU) PH & 7 x 350 Neut.
1000	2775	9	(9) 4” PVC	9 x 750 AL (500 CU) PH & 9 x 350 Neut.
480Y/277V Secondary				
45	54	3	(2) 3” PVC	1 x 2/0 AL Quadruplex
75	90	3	(2) 3” PVC	1 x 2/0 AL Quadruplex
112.5	135	3	(2) 3” PVC	1 x 2/0 AL Quadruplex
150	180	3	(2) 3” PVC	1 x 4/0 AL Quadruplex
225	270	4	(2) 4” PVC	1 x 350 AL Quadruplex
300	360	6	(2) 4” PVC	1 x 750 AL (500 CU) PH & 1 x 350 Neut.
500	600	6	(3) 4” PVC	2 x 750 AL (500 CU) PH & 2 x 350 Neut.
750	900	8	(4) 4” PVC	3 x 750 AL (500 CU) PH & 3 x 350 Neut.
1000	1200	9	(6) 4” PVC	4 x 750 AL (500 CU) PH & 4 x 350 Neut.
1500	1800	9	(6) 4” PVC	6 x 750 AL (500 CU) PH & 6 x 350 Neut.

1. When the customer has more cables to terminate than the recommended number of cables per phase from the transformer, as shown in the table above, a padmount secondary enclosure shall be installed. The Avista provided secondary enclosure should be placed onto a fiberglass box pad where conditions permit. If use of a box pad for the secondary enclosure is not practical, the customer shall provide a concrete pad for the transformer and the secondary enclosure. The customer must provide conduits between the transformer and the secondary enclosure to accommodate the connecting cables.
2. Three-phase conductors and one neutral conductor shall be installed in each conduit.
3. Install cables shown in the table above to obtain full transformer capacity.
4. Bond the enclosure case to the enclosure ground electrode(s) with two - 2/0 conductors.
5. The customer's cables should be no larger than 750 CU or 1000 AL when terminated in the secondary enclosure.
6. Avista will furnish and install lugs on the secondary and service conductors and land those conductors on the secondary enclosure terminals.
7. This column lists the number and size of secondary conductors recommended between the transformer and junction enclosure. It does not apply to longer service runs where voltage drop may be a consideration. These recommendations are based on the ampacities listed in DU-7.102. The secondary conductors are sized to meet both the summer and winter ratings of the transformer, taken as 114% and 138% of the OA rating respectively.
8. The transformer neutral bus and case ground of the secondary enclosure must be bonded together with a 3/0 CU conductor.
9. Table values allow ability to go up one transformer size.
10. Where customer conduits enter a building, the secondary conduits must be sealed below the secondary enclosure and where the conduits enter the building wall. Use fire barrier water-tight sealant SN 668-0600 with fire barrier packing material SN 668-0601.
11. When a secondary enclosure is installed, the point of delivery will generally be the bus bars in the secondary enclosure. Avista will install lugs at point of delivery. No CT's will be installed in secondary enclosures.
12. Secondary enclosure has not been UL approved and is owned by Avista.

4.13 Primary Extension Junction Enclosure Conduits [42] [43]

1. To protect the cables and maintain bending radius greater than allowed minimums, sweeps are required for cable in conduit installations; sweeps are not required for direct buried primary cable installations. Conduit sweeps may need to be cut off to provide additional cable movement; if the conduit is cut off, leave at least 6-inches of conduit above the bottom of the ground sleeve.
2. Backfill trench for 8 to 10 feet, one foot deep, on all sides of enclosure to anchor primary conduit.
3. Seal unused conduits with plastic conduit caps.
4. Other conduit arrangements may be required depending on the situation.

Figure 4.24 – Conduit Entrance for 1 & 2 Phase Padmounted Junction Enclosures

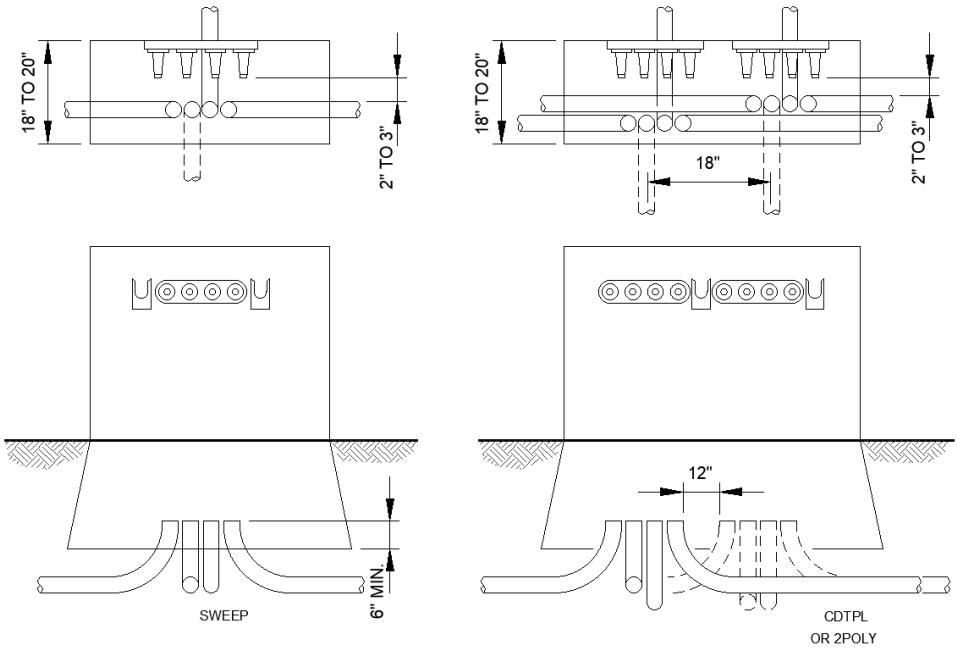
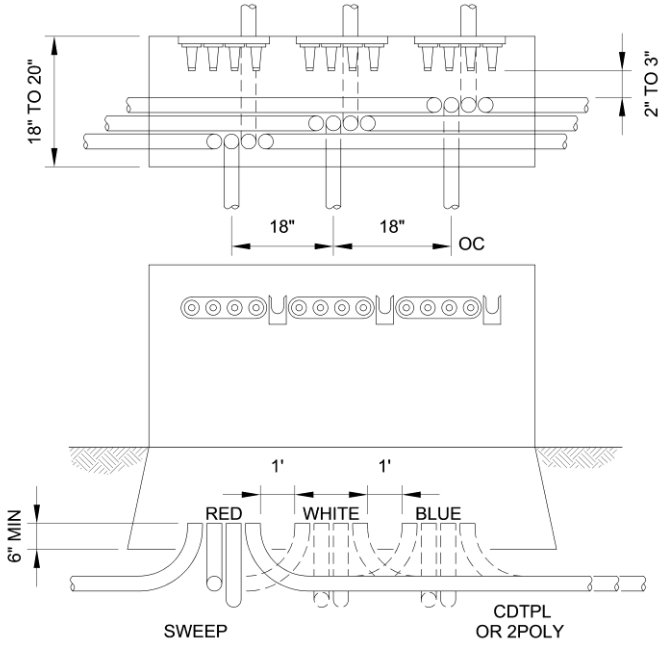
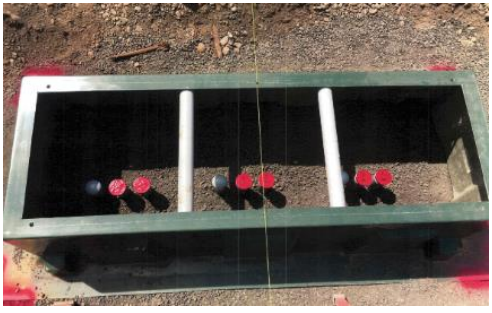


Figure 4.25 – Conduit Entrance for 3- Phase Padmounted Junction Enclosures





4.14 Vehicle Barriers [38]

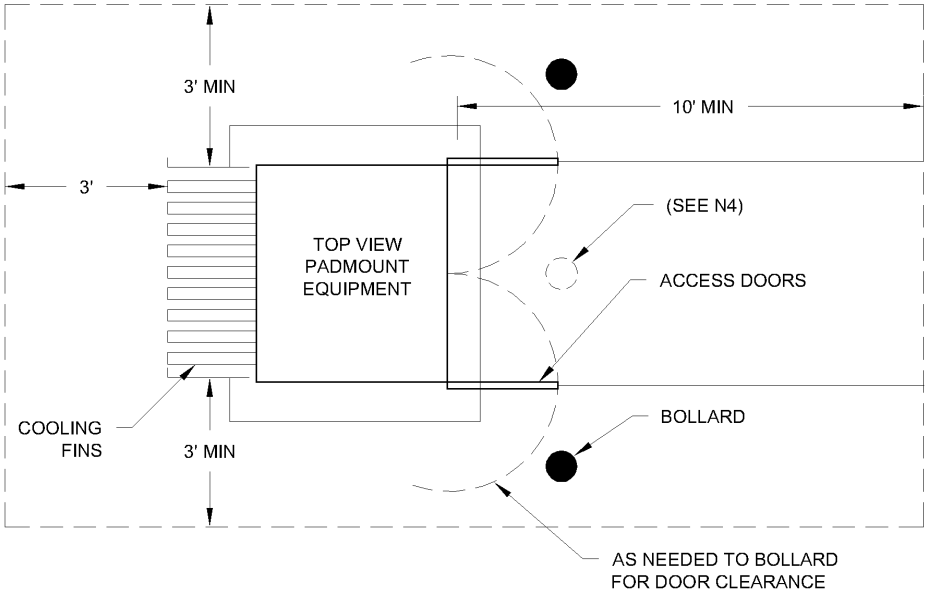
Avista may require customer to install bollards or other vehicle barriers to protect the transformers, meter equipment or other electrical equipment if exposed to vehicular traffic or when minimum clearances around equipment cannot be met. This includes, but is not limited to, when equipment cannot be set 5 feet back from curb. Contact Avista for information regarding bollard placement, spacing.

The top of bollards shall be installed to a minimum 48-inches height above ground. If several bollards are needed, they shall be placed at a maximum of 5 feet on center from each other. Bollards installed in front of Avista equipment must be set a minimum of 6 feet from face of equipment.

If large equipment such as a three-phase transformer or padmount capacitor bank requires bollards for protection, and if the five (5) foot spacing between bollards cannot be obtained while maintaining adequate clearance, a single third bollard may be installed subject to the following provisions:

- There must be a clear possibility of vehicle strikes to the equipment.
- The bollard must be installed in line with the line between the doors on the equipment (three phase transformers doors do not typically meet at the exact center of the equipment but are displaced to the right.
- The bollard must be installed sufficiently far away from the equipment cabinet so as not to interfere with door opening.

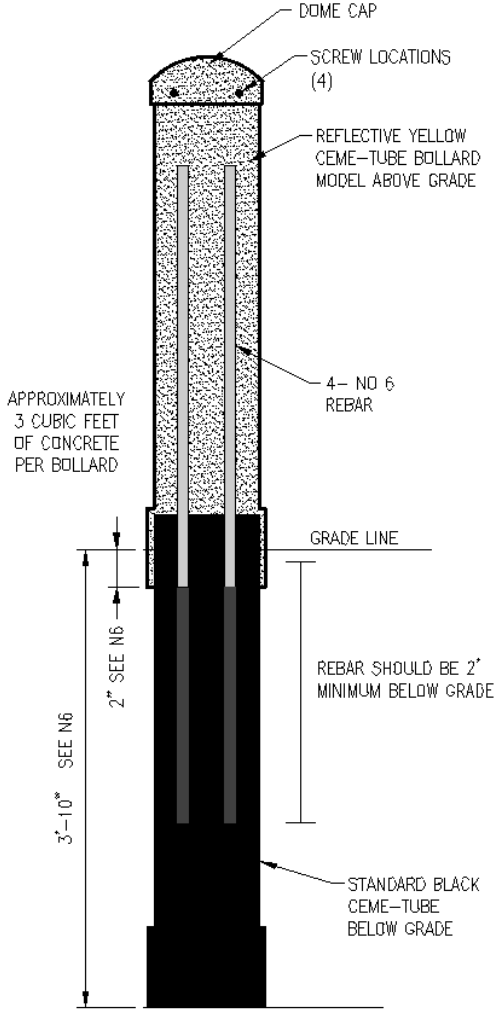
Figure 4.26 – Bollard Clearances



Customer is responsible for supplying and installing bollards, using an approved option listed below. If Avista has available inventory, Avista may be able to supply and install the bollards at the expense of the customer. The customer is responsible for maintaining bollards. Removable bollards are not permitted.

1. Yellow, 8-inch diameter, plastic tube bollards filled with concrete are easy to install, maintenance free, locally available (Graybar, Anixter Power Solutions, White Block or other locations), and do not require bonding to the equipment cabinet. Follow manufacturer's installation instructions. The hole for the bollard should be 3 ft 10 in deep. Setting depth is not critical so long as the bottom of the top section of the bollard is below the ground line.

Figure 4.27 – Cast In-Place Bollard Construction



2. Concrete precast bollard cast within a minimum 7-1/2-inch diameter yellow plastic tube. The bollard shall be placed to a minimum depth of be 3 ft. Precast bollards are available from Inland Northwest Precast.

Figure 4.28 – Precast Bollards

3. Other bollards must be pre-approved by an Avista representative.

Chapter 5 Metering Equipment

5.1 General

1. Only Avista owned metering equipment will be used to provide billing information.
2. The customer must provide Avista with access for meter reading, maintenance, installation, or removal. [62]
3. Consideration shall be given to the safety of Avista employees who must install, test, and read the meters on a regular basis.
4. Workspace shall be provided around the metering equipment and kept clear at all times. Minimum space shall be 15-inches on both sides of the meter down to grade. Minimum frontal clearance is 36-inches per National Electric Code [58].
5. CPC Note: Meter shop shall install 3 or more meters on multi-meter service point.
6. All meters and Avista equipment must be protected from ice and water damage.
7. For all commercial installations, single phase customers over 200 amp must have CT metering.
8. For underground service installation, use side-bottom knockouts of meter enclosure (do not use center-bottom knockouts).
9. Avista strictly prohibits the installation of customer owned meter collars of any kind, including but not limited to meter socket transfer switches (GenerLink, et al.), and surge arrestor/protectors (Leviton 50240-MSA, et al.). Avista's engineers do not feel that such installations meet our high standard for customer safety because Avista does not inspect, test, or maintain customer owned equipment and neither the customer nor the fire department would be able to remove or isolate meter collars in the event that the device fails or catches fire.

5.1.1 Listing

All meter sockets, enclosures shall be listed by a qualified electrical testing laboratory acceptable to the jurisdiction having the authority.

5.1.2 Location

Metering equipment locations are subject to the following. Exceptions must be approved through the Avista Meter Department.

1. The meter must be located as close as practical to the delivery point, generally within 10′ of the front corner of the building or attached to the front of the house. For new construction, please coordinate meter location with CPC.
2. Located on the line side of the service disconnect (Hot sequence).
3. Each customer premise will be supplied through a single meter.
4. At a multi-meter service point, meters will be grouped at one location with all meters located as closely as practical to the service point (within 25 feet of each other).
5. Meters must be grouped together and installed at the service equipment and not separated by walls or partitions.
6. Located outdoors or in approved meter rooms with permission from the Avista Electric Meter Department. No metering equipment shall be installed at a service switch located in an inaccessible place such as a manhole or in a vault.
7. Non-diversified, continuous load, grow operations over 200 continuous amps must have service meters located outside of building.
8. Readily accessible, free from vibration, corrosive atmosphere, abnormal temperatures, and well lighted per WAC-480-100-308
9. Whenever the customer makes additions, or changes that encloses the meter and prevents access they may be required to relocate the metering equipment, at their expense, to meet Avista's specifications.
10. Meters must be protected from ice and water off roofs, damage from doors and materials and vehicular traffic.
11. No Avista meters are allowed downstream of customer equipment such as dry transformers.
12. Meters in backyards (opposite roadway) where address is not visible must have address labelled on meter can with weatherproof decal.

5.1.3 Meter Room Requirements

Meter rooms must meet the following Avista requirements along with all electrical, mechanical, and building code requirements:

1. Meters must be grouped together in the same room. Not separated by walls or partitions.
2. Located on the ground floor with exterior doors opening outward with direct access to meters. Exceptions require prior approval through Avista Electric Meter Shop.
3. The exterior door shall be equipped with a panic bar.

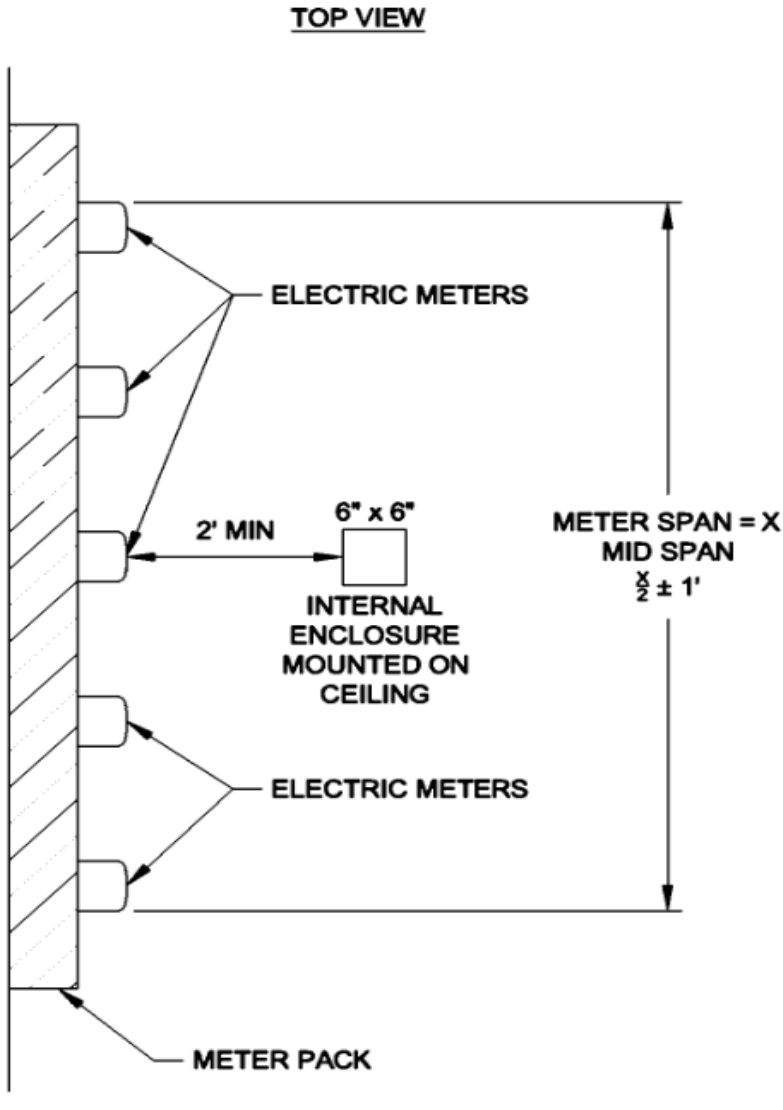
4. If locked, the customer will provide a key for an Avista installed lock box. 24-hour access to room required via lock box key, controller or keypad code. 24-hour call number is not sufficient to meet this requirement of physical access.
5. Area must be well lit and not used for storage.
6. 3 ft. working clearance is required in front of each meter and 15-inches on both sides of meter enclosures.
7. Avista will no longer run secondary conductors into customer's commercial or multi residence building through the wall or up through the slab. Going forward the "Point of Delivery" will be in an outside wall mounted Pulling/termination enclosure or a standalone Pulling/termination enclosure away from the building wall installed on (2) 2-inch rigid steel pipe embedded in concrete with unistrut for attachment points as needed.
8. If direct customer access (tenant) is not available an MCC Bypass is required for all service points not directly accessible.

Additionally, Avista requires the following provisions to facilitate remote meter reads:

- A dedicated 15-amp (circuit) power source in the meter room ceiling to be mounted within 2 feet of the interior enclosure.
- An interior 6" x 6" x 4" deep enclosure, minimum (box) for a signal amplifier and coaxial connection to be provided.
- Signal amplifier (if necessary) will be powered by the 15-amp circuit referenced above.
- Interior enclosure (box) shall be mounted to the meter room ceiling, centrally located midway between meters spread and a minimum of 2' away from the front face of the nearest meter surface.
- Interior enclosure not to exceed 3' higher elevation then highest meter mounting position. For high meter room ceilings this distance can be increased, with an increased in item 4 above with a 1:1 ratio.
- A 1-inch conduit shall be provided that runs from the interior enclose to the exterior enclosure that penetrates the structure to the exterior of the building.
- Total conduit length not to exceed 100 feet.
- A 6" x 6" x 4" deep minimum weatherproof surface mounted enclosure (box) shall be attached to the exterior of the building. The enclosure is to be mounted on the exterior wall, preferably as close to the meter vault as possible to minimize coax length.
- The exterior enclosure is to be mounted between 10 feet and 12 feet above finish grade to allow signal propagation to meter reading equipment.

- A minimum of 6-inch clearance above external enclosure is required to allow for antenna installation.
- The exterior enclosure will be the mounting and make up location for the exterior antenna.

Figure 5.1 – Meter Room



5.1.4 Meter Identification

For multi-unit dwellings with a separate meter for each customer all meter sockets and corresponding main electrical panel must be marked with engraved or embossed lettering. The equipment installer / electrician is responsible to provide a label with the unit number or address at both the meter socket and unit panel. A house meter for common facilities must be marked as "House Meter". Marking must be complete before meters can be installed. If there is no address on building, meter socket must be labeled with address.

Labels shall be of an engraved or embossed type, minimum size 1/2" x 2" engraved plastic with sticky back. Letters or numbers must be a minimum of 5/16-inches. Individual screw on house numbers/letters will not be accepted.

Common gas and electric meters must have the same space designation marking, i.e., numbers or letters.

Avista will not install any meters at multi-metered facilities until each individual meter is properly labeled and each circuit is physically verified jointly by the installing electrician and Avista's meter installer. The building owner must provide Avista's meter installer or Customer Project Coordinator with a floor plan or similar document clearly identifying each unit's physical location and address in order to perform this physical audit prior to meter installation.

Commercial multi-unit with separate meters shall have both meter and panel labeled.

The building owner is responsible for proper identification of electric and gas meters. The building owner could be held responsible for Avista costs associated with correcting billing errors caused by mixing wiring or mislabeled meters.

If two electric services service one building or space, a warning tag must be located at each meter point indicating such per NEC 230.2(E). [58]

Labels, as described above, marked with voltage and phasing information are required if two or more services with different voltages or phasing are supplied to a building.

Phenolic labels can be purchased in the Spokane area at the following locations: Engraver at 3817 N. Monroe, Spokane; Quick Engraving at 1527 E 9th, Spokane; Northwest Business Stamp at 5218 N Market, Spokane; and other locations.

5.1.5 Security

Service conductors shall not be accessible upstream of the meter except by Avista personnel. All removable covers, doors, or other access points in enclosures, raceways, and conduits that contain unmetered conductors must be sealable for locking by Avista. Non-sealable access points upstream of the meter are strictly prohibited. Only rain tight enclosure doors may cover the sealed areas.

- No conduit bodies (i.e., LBs, junction boxes, etc.) are allowed ahead of meter.

- Factory installed carriage bolts may be used to seal panel covers that do not require field removal.
- All removable doors must be sealable using sealable latches, sealing studs with wingnuts (minimum 1/4-20), or sealing screws. Sealing holes shall be a minimum of 0.0635-inches in diameter

5.1.6 Meter Mounting

Meter sockets and/or enclosures must be plumb and level and securely mounted to a rigid surface. Mounting to metal siding only is not acceptable.

If a meter socket is to be mounted to a post or pole, it must be mounted on C-channel securely fastened to the pole/post. Post must be at least 2-inch galvanized steel with threaded caps.

All 480V, 200 amp self-contained and all 400-amp galvanized meter cans that are standalone and not attached to a building must be mounted on unistrut attached to two 2-inch rigid steel pipes (with threaded steel caps) imbedded in concrete.

Meter sockets must be flush-mount or surface-mount and not recessed behind any building material.

Single meters shall be installed between four and six feet to the center of the meter above the floor or finished grade. Meter modules shall be installed no more than six feet to the center of the top meter and not less than 24 inches to the center of the bottom meter.

5.1.7 Lifting Handles

When lifting handles are required on panels and covers of enclosures, each handle shall be sized for full hand grasping, securely attached and designed to support 75 lbs. Chest type handles with a folding bale grasp are not acceptable.

5.1.8 Sprinkler Service

120V/240-volt sprinkler services must be provided instead of 120 voltage single phase**.** UL listed combination meter socket and breaker panel are not available for 120V single phase service. Sprinkler services require MCC sockets.

5.2 Self-Contained Metering

5.2.1 Metering Equipment Ratings and Type [34]

Self-Contained meter sockets shall comply with the following and must be approved by Avista.

1. Three-Wire, three-phase, 480-volt delta is no longer available on new services.
2. One hundred (100) amp, three-phase, four-wire sockets are not allowed because of inadequate clearances.
3. 480V services requires a safety socket bypass meter socket.
4. Meter modules with slide type and horn style bypasses are not approved.
5. Meter sockets not listed must be individually approved by Avista's area meter technician.
6. Avista will not hook up overhead meter sockets being used for underground service, even if they have been approved by the local authority having jurisdiction – (They do not have adequate horizontal space).
7. For 120/240V, three-phase, 4-wire, Delta, identify high leg to ground with orange tape and connect to right side of meter or CT platform.
8. Customer is responsible for selecting the correct meter base top and accessories (e.g., hub, closing plate, or blank).
9. Manual Circuit Closing (MCC) / Bypass meter socket where noted.

Table 5.1 – Approved Three-Phase Self-Contained Meter Sockets

Service	Voltage	Meter Socket	Capacity (Amperes)	Make	Model
Three-Phase, 4-Wire	120/240V Delta	7 Terminal MCC required	200	Eaton	U267 (OH/UG) 127 TB (OH/UG)
	120/208V Wye			Milbank	U7423 (OH/UG) U9701 (OH/UG) U3517 (OH only)
	277/480V Wye	7 Terminal Safety Socket required		Siemens	40407 with ground lugs (OH/UG) MS27TB (OH/UG) 404072-023NU (OH/UG)
	All Voltages	CT Socket	Over 200	See 3-phase instrument transformer metering.	
Switchgear	All Voltages	13 Terminal Panel Mounted	All	Manufacturer supplied 13 terminal panel mounted socket with test switch mounts. Avista supplies flush mounted 13 terminal meter with trim can.	

Table 5.2 – Approved Single-Phase Self-Contained Meter Sockets

Service	Voltage	Meter Socket	Capacity (Amperes)	Make	Model
Single-Phase, 2-Wire	120V	4 Terminal	100 **OH only**	Eaton	121314 (OH only)
				Milbank	U3504 (OH only)
Single-Phase, 3-Wire	120/240V	4 Terminal MCC required for commercial	100 **OH only**	Eaton	121314 (OH only)
				Milbank	U3504 (OH only)
			200	Eaton	U264 (OH/UG) 124 TB (OH/UG) U224 MTB (OH/UG) 224 MTB (OH only)
				Square D	RCM200SL (OH/UG)
				Milbank	U1211 (OH/UG) U3852 (OH/UG) U9801 (OH only) U3514 (OH only)
				Siemens	40404 with ground lugs (OH/UG) 404042-01 (OH/UG)
			400 (320A Cont.) Residential Only	Eaton	UTH430__CH & ARP00429CH (OH only) UTH433__CH & ARP00429CH (OH/UG) U4042MCC (UG Only) U404MCC (UG Only)
				Milbank	U1797-O-K3L-K2L (UG only) U1129-O-K3L-K2L (UG only) U3251-O-200-CB & K4920 (UG only) U3548 (OH/UG) U1079 & K1540 (OH only) U6227-X-400-K3L (OH/UG) U4031-O-2/200 & K1540L (UG Only)
				Siemens	47704 & 60162 (OH only) 44704 & 60162 (UG only)
		CT Socket	201 - 1,000	See 1-phase instrument transformer metering.	
Network Single-Phase, 3-Wire	120/208V Wye (Network)	5 Terminal in 9 o'clock position. MCC required for commercial	100 **OH only**	Eaton	121315 (OH only)
				Milbank	U3504 & 5T8K2 (OH only)
			200	Eaton	U264 & 50365 (OH/UG)
				Milbank	U1211 & K3866 (OH/UG) U3514 & K5T (OH only)
				Siemens	40405 with ground lugs (OH/UG) 404052-023NU (OH/UG)
		CT Socket	201 - 1,000	See 3-phase instrument transformer metering.	

5.2.2 Manual Circuit Closing (MCC) Sockets

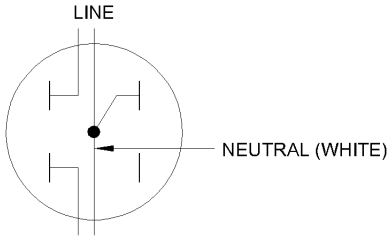
Manual circuit closing, MCC sockets allow the meter to be removed without interruption of the electrical service. When required they must be in working condition. Wiring in the socket must not interfere with the operation of circuit closers. Meter modules with slide type and horn style bypasses are prohibited. The following services require MCC Sockets:

- All commercial services including meter modules.
- All 480V services and pumps require safety socket bypass meter sockets.
- 400 A residential services, optional on 200 permanent or temporary services.
- House meters serving common area in apartment buildings.
- Digital commercial signs.
- Irrigation controls.
- Pumps.
- Interconnected Customer Generators.
- If direct customer access (tenant) is not available MCC bypass is required for all service points.

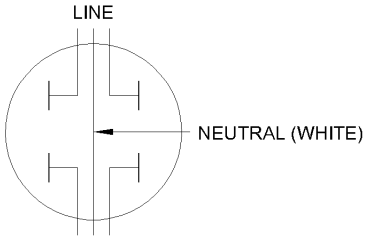
Figure 5.2 – Safety Socket Bypass

5.2.3 In-Line Socket Diagrams [33]

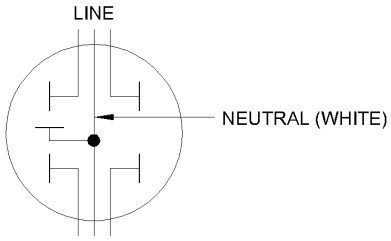
Figure 5.3 – Self-Contained In-Line Meter Socket Diagrams



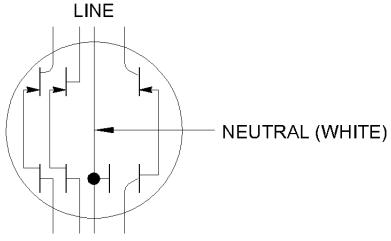
LOAD
2 WIRE 1 PHASE 120V
4 TERMINAL



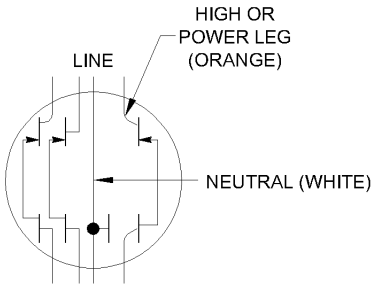
LOAD
3 WIRE 1 PHASE 120 / 240V
4 TERMINAL



LOAD
3 WIRE NETWORK 120 / 208 V
5 TERMINAL
MCC REQUIRED IF COMMERCIAL



LOAD
4 WIRE WYE 120 / 208V
4 WIRE WYE 277 / 480V (N1)
7 TERMINAL
MCC



LOAD
4 WIRE DELTA 120 / 240V
7 TERMINAL
MCC

5.3 Instrument Transformer Metering

Current transformers meter and wiring are provided by Avista. The customer provides solidly mounted approved meter enclosures or sockets, current transformer enclosures, and conduit.

5.3.1 Current Transformer Location

CT's are normally mounted in an enclosure located on the building.

At Avista's option, current transformers may be mounted in a three-phase pad mount transformer that is dedicated to only one customer. In this case the meter enclosure is mounted next to the pad or in an approved location. Refer to *the Pipe/Post Type Meter Pedestal* section within chapter 4 for installation requirements.

CTs will not be mounted in single phase pad transformers.

On overhead transformers larger than 300KVA Avista would prefer to locate CT's at the transformers on the rack.

5.3.2 CT Metering Conduit Requirements

Instrument metering conduit shall comply with the following requirements. Exceptions to said requirements must receive pre-approval from Avista's electric meter shop.

- Conduit length must be such that wire length between meter(s) and current transformer(s) is less than thirty feet.
- 1-inch gray electrical PVC.
- Schedule 80 PVC and fittings, rigid above grade.
- Minimum sweep radius is 9-inches.
- Maximum of two 90-degree sweeps.
- Bushings are required at both ends of the conduit run. The local inspector may require grounding bushings.
- The ends of the conduit must be taped or capped and sealed to keep dirt and water out of the conduit. Customer is responsible for any obstructions within the conduit.
- All conduit connections must be glued and fully seated, and a pull string installed if there is more than 20′ of one inch conduit.

5.3.3 CT Enclosures - General Requirements

- Weatherproof.
- For underground service installation, use side-bottom knockouts of CT enclosure (do not use center-bottom knockouts). Use the knockout opposite of the neutral lug.
- The conduit must enter in the bottom of the enclosure or on the side within 2-inches of the bottom with a rain tight fitting if service is fed from underground.
- Conduit may enter top of enclosure if service is fed from overhead provided rain tight fittings are utilized.
- Enclosures cannot be used as junction boxes or raceways.
- Lockable.
- Each CT metered service requires its own CT enclosure and meter enclosure or socket.
- Avista will no longer allow or hookup new or repaired CT enclosures mounted on plywood. Unistrut type cross struts are the required attachment points for enclosures.
- CT cans must have a hinged door with fixed handles for removing.

5.3.4 Multi-Meter: Combination CT & Self-contained

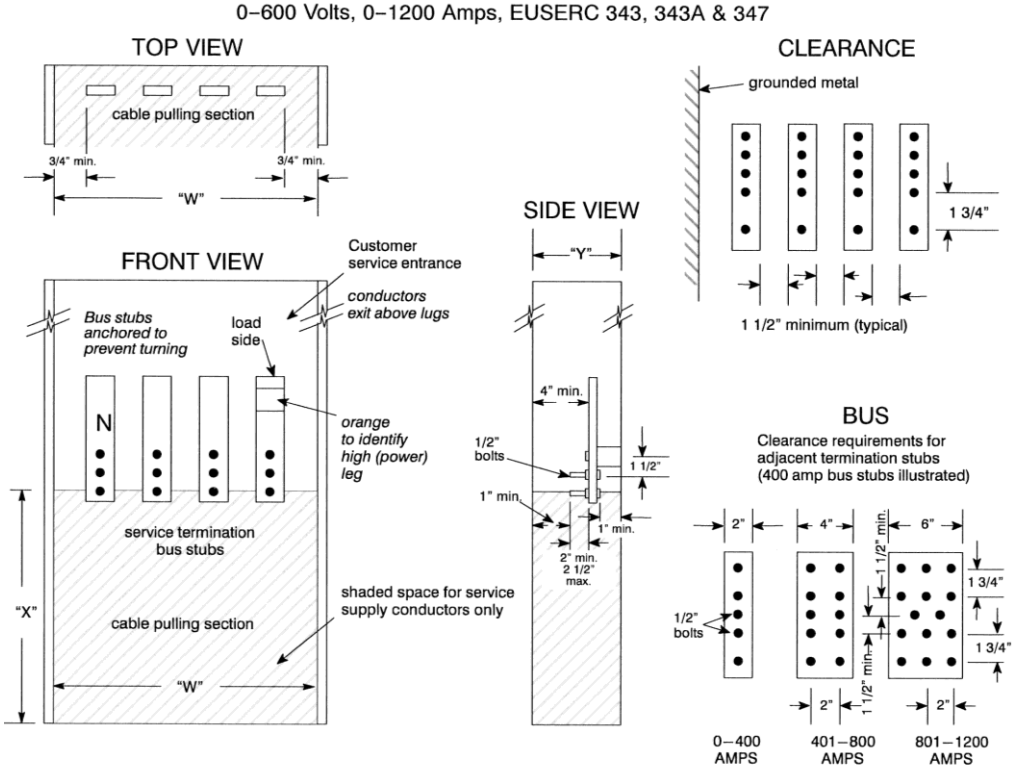
A multi-meter building served using a combination of individually mounted CT rated, self-contained, and/or meter modules requires a pulling/termination enclosure to provide a single point of delivery. Individual meters shall be located as close as physically possible, but no case more than 25 ft. from the point of delivery.

Do not attempt to use the CT enclosure and landing platform part numbers listed herein for multi-meter applications as their interior space and quantity of load-side lugs are only intended to accommodate a single CT meter. Contact Avista's Electric Meter Shop for help selecting an appropriate multi-meter enclosure and landing platform that meets Avista's metering requirements.

5.3.5 Pulling/Termination Enclosure Utility Space

1. The area below the load side lugs is reserved for utility conductors only. Customer conductors cannot pass through the utility's section of the cabinet.
2. Terminating facilities for utility conductors shall be aluminum-bodied mechanical lugs with a range accepting a single #4AWG through 750KCMIL or two #1AWG through 250KCMIL conductors. Number of lugs for each current range is listed above.
3. Avista will supply and install line side lugs.
4. Lugs shall be secured to prevent turning or misalignment.
5. The minimum pull box access opening (W) is measured between the left and right.
6. Enclosure covers shall be removable, sealable, provided with two lifting handles, hinged and limited to the maximum size of 9 sq. ft. Note general sealing requirements above.
7. All customer conduit, sealable conduit, or solid bus bars must exit above utility side connections and all fittings must be weathertight type.
8. Utility conduits shall enter termination enclosure from the bottom.
9. Termination enclosure must be EUSERC rated and approved.

Figure 5.4 – Pulling/Termination Enclosure Utility Space



(Applies to the Power Company portion of the pull box)

Total Service Amps	"W"		"Y" Depth	"X" Lug Height
	3-Wire	4-Wire		
0–200	10 1/2"	14"	6"	11"
201–400	10 1/2"	14"	6"	22"
401–800	16 1/2"	22"	11"	26"
801–1200	22 1/2"	30"	11"	26"

Table 5.3 – Examples of Approved EUSERC Rated Termination Enclosures

Service Amperage	No. of Phases	Buss Type	Manufacturer	Model
201-400	1	Feed Thru	Eaton B-Line	R9000C
201-400	1	Feed Thru	Eaton	1UGPB400R
401-800	1	Feed Thru	Eaton B-Line	R9000E
401-800	1	Feed Thru	Eaton	1UGPB800R
801-1200	1	Feed Thru	Eaton B-Line	R9000F
801-1200	1	Feed Thru	Eaton	1UGPB1200R
1200	1	Feed Thru	Siemens	WT11200PU
201-400	3	Feed Thru	Eaton B-Line	R9000CC
201-400	3	Feed Thru	Eaton	3UGPB400R
401-800	3	Feed Thru	Eaton B-Line	R9000EE
401-800	3	Feed Thru	Eaton	3UGPB800R
801-1200	3	Feed Thru	Eaton B-Line	R9000FF
801-1200	3	Feed Thru	Eaton	3UGPB1200R
1200	3	Feed Thru	Siemens	WT31200PU
1600	3	Feed Thru	Erickson	TB-469N (NON- EUSERC)
201-400	1	Hor. Cross Buss	Siemens	WET1400BU
401-800	1	Hor. Cross Buss	Siemens	WET 1800BU
801-1200	1	Hor. Cross Buss	Siemens	WET11200BU
201-400	3	Hor. Cross Buss	Siemens	WET3400BU
401-800	3	Hor. Cross Buss	Siemens	WET3800BU
801-1200	3	Hor. Cross Buss	Siemens	WET31200BU

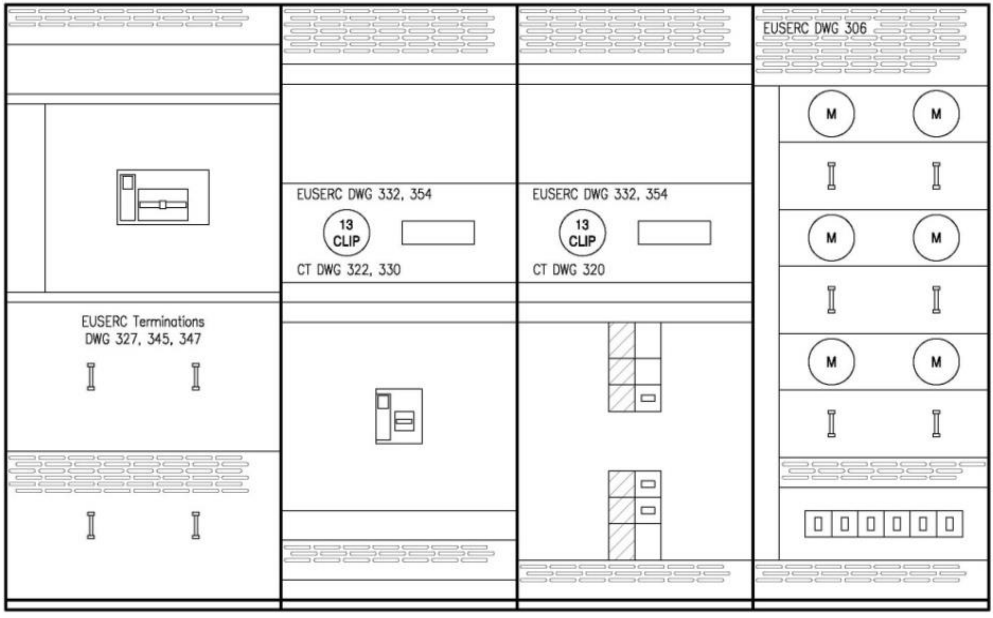
5.3.6 Switchgear Metering

A EUSERC approved switchgear metering section is required for service ratings greater than 800 amperes at building delivery points. They are also normally used for single points of delivery with a combination of self-contained and instrument transformer rated services exceeding 1200 amperes. Unless coordinated with Avista prior to installation, switchgear must be located on the exterior of the building, at ground level.

Prior to manufacture contact Avista Utilities for approval of manufactures drawings and to determine the type of metering, size of current transformers and mounting arrangements.

- Meets EUSERC recommendations.
- All unmetered conductors in separate, sealable, and lockable compartments.
- Must have an accessible instrument transformer mounting section.
- 13 terminal socket and test switch slots if CT metered.
- 7 terminal socket if self-contained.
- Termination section approved for utility connection.
- Mechanical or compression lug.

Figure 5.5 – Typical Switchboard Multi-Meter Layout



5.3.7 Current Transformer Metering [32]

The customer supplies and installs the current transformer enclosure, mounting base, meter enclosure. Avista supplies and installs the current transformers, instrument wiring and meter. Installations shall comply with the following:

1. The conduit connecting the current transformer and meter enclosures shall enter each enclosure either below (preferred) or above cable terminals and bussing for ease of routing conductors between enclosures.
2. Current transformer enclosure must be bonded and grounded per NEC requirements by customer.
3. Avista will supply, install, and connect conductor to the line side only on UNDERGROUND services. The customer supplies, installs and connects conductor on OVERHEAD services.
4. Customer supplies landing lugs for Avista conductors on UNDERGROUND services.
5. CT landing platforms are rated on diversified load.
6. CT enclosures shall have a hinged door with fixed handles for removing. Doors must be equipped with sealing and locking provisions. Enclosures shall be NEMA 3R and ANSI 61 gray.
7. CT landing platforms shall have line and load side mechanical lugs, accommodate Forbar type ANSI C12.11 CT's, and be rated 600V, 50kA AIC.
8. Minimum 15-inch clearance from both sides and 6-inches clearance on hinge side of Eaton B-Line or Hoffman 351 Meter Can to CT Enclosure.
9. Hi leg/wild leg on 3 phase 4 wire delta services must be on the right-hand side CT landing platform.
10. Inside commercial grow operations cannot exceed 800 amps of National Electrical Code calculated load on single-phase service. Above 800 amps, a three-phase 120/208 or 277/480 volt service is required.
11. For alternate enclosure sizing contact Avista Meter Shop at (509)495-4648.

Figure 5.6 – Single Phase Current Transformer Metering 401 to 800 Amps Overhead and Underground CT Enclosure

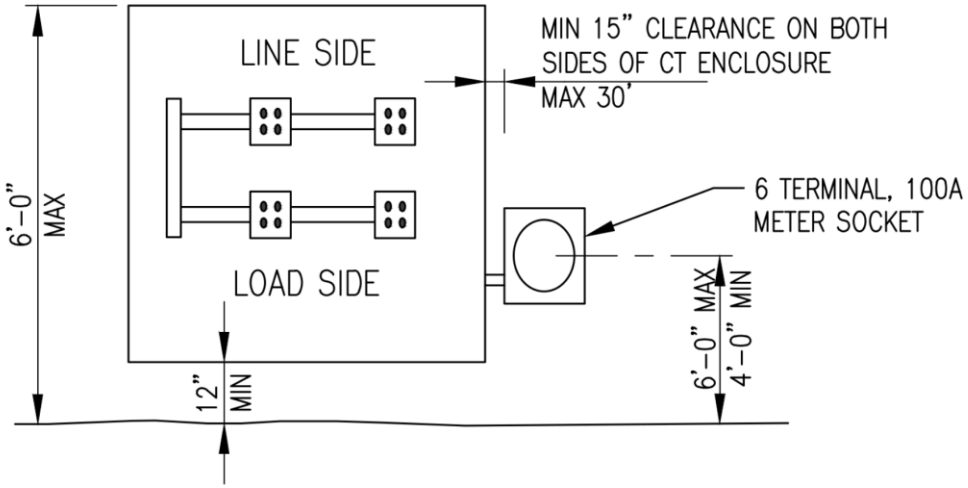


Table 5.4 –Single-Phase CT Enclosures & Landing Platforms

Service Ampacity	Dimensions (W x H x D)	Enclosure / Landing Platform		
		Eaton B-Line	Milbank	Hoffman
201-400 Amp (Residential Only)	36"x36"x11"	363611RTCT 6019 HAL	CT363611SC K4903	A363611CT *
201-800 Amp	36"x48"x11"	364811HRTCT 6019 HEL	CT364811HC K4729	A483611HCT *

* Refer to Eaton or Milbank for landing platform (not included).

Table 5.5 – Approved 6-Terminal, Single-Phase, Meter Socket

Manufacturer	Part Number
Eaton B-Line	U121315-50365
Eaton B-Line	12146
Milbank	U3504XL Plus (2) 5T8K2

Figure 5.7 – Three Phase Current Transformer Metering 201 to 800 Amps Overhead and Underground CT Enclosure

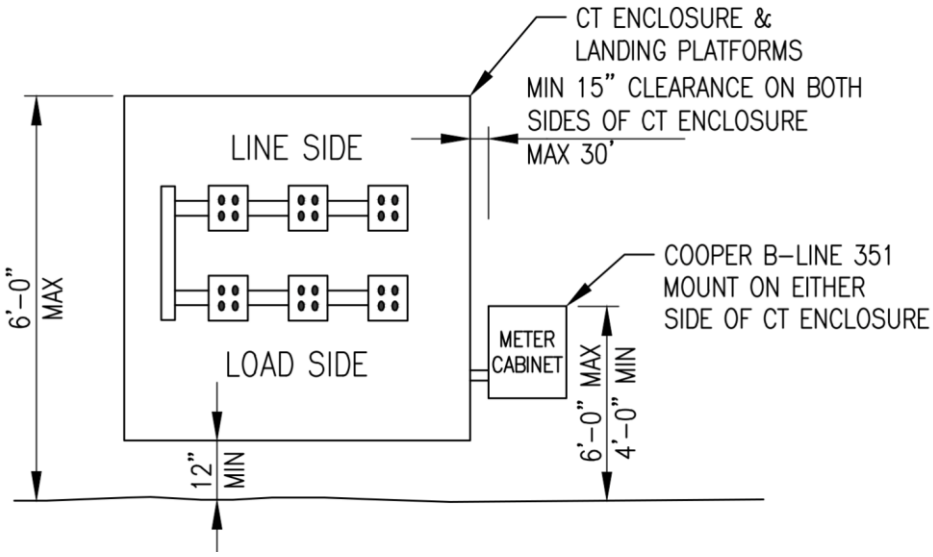


Table 5.6 –Three-Phase CT Enclosures & Landing Platforms

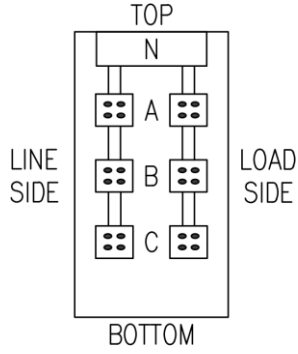
Service Ampacity	Dimensions (W x H x D)	Enclosure / Landing Platform		
		Eaton B-Line	Milbank	Hoffman
201-800 Amp	36"x48"x11"	364811HRTCT 6067 HEEL	CT364811HC K4722	A483611HCT *
400-1200 Amp***	48"x48"x12"	-	-	A1200NECT**

* Refer to Eaton or Milbank for landing platform (not included).

** Includes landing platform

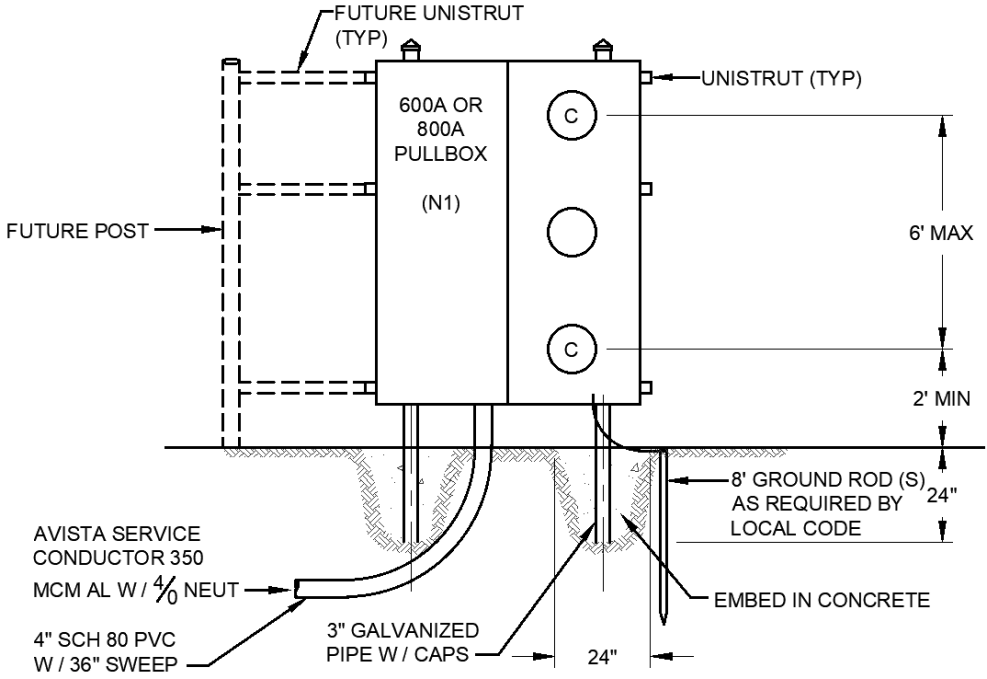
*** 1200A are rotated 90 degrees with lineside on left and load side on right.

Figure 5.8 – 1200A Landing Platform Orientation



5.4 Communication Site and Cell Tower Metering [24]

Figure 5.9 – Communication Site and Cell Tower Metering



All new and modified services must pass an inspection before Avista can energize. Addition of new meters at existing cell sites shall only be completed after Avista approval.

1. 600 AMP pull box with position meter pack for 1 to 3 antenna arrays, 800 AMP pull box with 6 position meter pack for 4 or more antenna arrays.
2. Manual circuit closing sockets required slide type bypasses are unacceptable.
3. Avista will provide and install one set service conductors, lugs and meters.
4. Customer to supply and install all other materials.
5. Meter pack may be mounted on a building if desired.
6. Avista lock is required on the gate to fence areas.
7. Metering must be outside of area of high RF energy so prolonged exposure presents no health risk.

Chapter 6 Customer Generation

6.1 Generation System Types

There are two general forms of Customer generation. The first is interconnected with the utility system to supply energy. The other is an emergency standby system.

6.2 Generation Interconnection

Interconnection requirements and documents differ by system category. Read all information, as **approvals are required from Avista before generation may be interconnected with the utility**. You must contact Avista at solar@avistacorp.com prior to construction.

6.2.1 Incentives

In some cases, Avista might be able to offer a Renewable Generation Incentive (RGI) that provides direct payments to help offset and recover costs of renewable energy systems in Washington State. More information on this incentive can be found at:

myavista.com/energy-savings/green-options/go-solar

6.2.2 Interconnection of Systems 500 kW and Less:

Further information is available at:

myavista.com/energy-savings/green-options/go-solar/getting-connected

6.2.3 Interconnection of Systems Between 500 kW and 20 MW

Further information is available at:

myavista.com/energy-savings/green-options/go-solar/interconnection

6.2.4 Net-Meter Generation 100 kW or smaller [31]

Steps and requirements for net-metering interconnection (Washington and Idaho customers only):

☐ Submit an application at:
myavista.com/energy-savings/green-options/go-solar/getting-connected

☐ Interconnection inverter must be UL1741 listed.

☐ Electrical schematic drawing must be included in application. Load Side Taps are not recommended inside meter can for generation interconnections, contact Avista Utilities for Preapproval before Installation.

☐ Send Payment to:

Solar at Avista, MSC-15
1411 E Mission Ave
Spokane, WA 99202

☐ Obtain written design approval from Avista Utilities.

☐ Obtain electrical permit from government authority having jurisdiction (AHJ). National Electric Code (NEC) adherence is mandatory.

☐ Install a lockable, blade type, visible open generation disconnect switch in the generation circuit adjacent to generation meter base. Disconnect must be labeled with a permanent placard.

☐ Install a separate meter base for generation production measurement within 10-feet and within line of sight of existing Avista revenue meter in a location readily accessible by Avista personnel. Meter base must be Labeled "Generation Production Meter" with permanent placard.

☐ Obtain inspections from electrical inspector.

☐ After final electrical inspection approval, contact Avista for utility inspection, testing, and production meter installation.

☐ Avista will install new bi-directional and generation production meters. Customer must agree to having "smart" meters as there is no opt-out option for Net-Metered customers.

☐ Solar system must pass both Avista's inspection and operational testing before customer will be allowed to generate power.

Figure 6.1 – Generation Production Meter and Disconnect Location

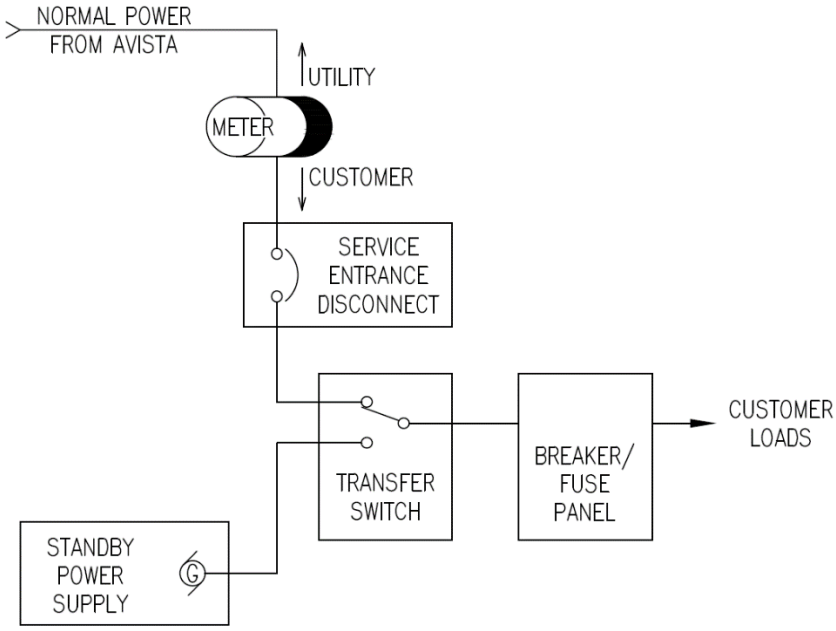
6.3 Emergency / Standby Generation [29]

These are the minimum requirements for connecting standby and emergency power supplies for use when the normal utility electrical supply is interrupted.

Improperly installed standby and emergency power supplies are extremely hazardous to utility workers, the public and the customer. The customer could be held liable for substantial injuries and damages caused by an improperly installed, maintained, or operated system. A proper installation ensures:

- Utility workers are not exposed to electrical shock hazards during service restoration.
- Other customer's appliances are not damaged from operating with inadequate power supplied from a distant source.
- The standby or emergency power supply will avoid damage from operating on a shorted line or with too large of a load.
- Electric meters are not be damaged, and
- Customer wiring is not damaged.

Figure 6.2 – Standby Generation



1. Avista strictly prohibits the installation of customer owned meter collars, including meter socket transfer switches such as GenerLink. Avista's engineers do

not feel that such installations meet our high standard for customer safety because Avista does not inspect, test, or maintain customer owned equipment and neither the customer nor the fire department would be able to remove or isolate meter collars in the event that the device fails or catches fire.

2. The Customer is responsible for all costs associated with changes to the service entrance and service drop.

3. When operating, the standby or emergency power supply must remain isolated from the utility power system at all times so it will not energize the service drop, transformer or primary line.

4. A transfer switch designed to prevent the inadvertent interconnection of normal and standby/emergency power sources shall be installed on the load side of the meter. This switch must disconnect all ungrounded conductors from one power source before connecting them to the other (break before make type).

5. A service entrance rated breaker or fused disconnect shall be provided between the transfer switch and meter. This requirement may be met using either service entrance rated transfer equipment (integrated overcurrent protection, disconnect and transfer switch) or separate units for each function.

6. The grounded service conductor, system neutral, and system ground must be bonded at the normal utility power service entrance.

7. If the standby or emergency power source has a bonded neutral-ground connection (separately derived system), then the transfer switch must switch both the ungrounded conductors, and the grounded system neutral conductor.

8. If the standby or emergency power source has an unbonded, floating neutral (nonseparately derived system), then the transfer switch must switch only the ungrounded conductors. The grounded system neutral conductor must remain solidly bonded through the transfer switch.

9. If a power inlet is used to connect a mobile standby or emergency power source, then a sign located at the power inlet must clearly indicate if the source must be separately derived (bonded neutral generator) or nonseparately derived (floating neutral generator).

10. The customer shall notify the local Avista office before and after modifying the service entrance. Meter removal must be authorized by Avista. Wiring must comply with all state and local electrical codes and must be approved and tagged by an authorized electrical inspector before the meter is replaced and resealed.

11. No customer should work on or permit others to work on his own equipment unless both sources are disconnected, properly tagged and locked out, and the circuit is adequately grounded.

12. **IF THE EMERGENCY POWER SUPPLY IS TO PARALLEL AVISTA'S DISTRIBUTION SYSTEM AT ANY TIME, CONTACT DISTRIBUTION**

ENGINEERING FOR PROPER COMPLIANCE BEFORE EMERGENCY POWER SUPPLY IS OPERATIONAL.

13. The Customer's wiring must comply with all state and local electrical codes.
14. The Customer should contact the local Avista office for additional information.
15. Non-service entrance conductors (including but not limited to feeder conductors, branch conductors, communication cabling, control cables, etc.) are strictly prohibited from passing through any raceway used by service conductors and meter enclosures. This prohibition is intended to prevent service conductor faults from propagating to other conductors and cables as service conductors and metering equipment lack overcurrent protection.

Chapter 7 Network Service (Downtown Spokane)

7.1 Spokane Network Underground Service Policy

Any Customer served from the core area Spokane Underground System shall conform to all the requirements set forth in Avista's filed tariff (including, without limitation, Schedule 51 – Line Extension, and Schedule 70 – Rules and Regulations) and Avista's "Electric Service Requirements" with the following additional and/or modified requirements.

Avista retains the right, in its sole and absolute discretion, to modify this policy to better assist our Customers.

7.2 Point of Delivery

A premise will be served at one voltage and at one point of common coupling (PCC). Avista will work with the Customer to determine whether a spot or grid-connected service is appropriate:

7.2.1 Spot Connected Service

- Customer shall provide an Avista approved vault per Spot Network requirements noted herein.
- Avista is responsible for building and energizing electrical service infrastructure within the vault.

7.2.2 Grid Connected Service

- Customer shall provide a secondary junction enclosure inside their building as specified by Avista.
- Conduit entrance through the building wall/foundation wall will be on side of building nearest existing Avista duct bank or handhole/manhole infrastructure.
- Avista is responsible for a Handhole/Manhole housing the electrical grid connection, outside of the building. If there is not an existing Handhole/Manhole, or there is no room for an additional service in the existing Handhole/Manhole, a new Handhole/Manhole may be required at Avista's expense and may require a long lead time.

7.3 Service Requirements

1. Avista will make the determination, in its sole discretion, of whether a Customer will qualify for network service or whether network service is available.
2. The Customer's main disconnect and secondary junction enclosure must be located inside the building within 15 feet of the conduit entrance through the exterior wall/foundation wall (WAC 296-46B-230-070-11b).
3. A minimum of 6' must be kept clear in front of the secondary junction enclosure both during construction and throughout the life of the building, to allow for installation of cable pulling tools.
4. The Customer's electrician will provide at least 2-inches of clear space around each conduit (including space to adjacent conduit) that terminates in the secondary junction enclosure for use of cable pulling tools.
5. Conductors from the Customer's main disconnect, through metering, and into the secondary junction enclosure (or spot vault) are supplied/installed by the Customer and must be copper. The Customer must use the least number of cables appropriate for the service size as determined by the National Electric Code (NEC) while using cables that are either #2/0 AWG, or 250/500 KCM.
6. The Customer's electrician will provide no less than six feet of conductor length in the junction enclosure for Avista to splice on to (in grid-fed applications). For spot vaults, Customer shall coordinate with Avista to determine appropriate cable length to extend into vault.
7. The Customer's secondary junction enclosure shall be bonded to the building ground system with #4 AWG copper or larger conductor.
8. The Customer's electrical room shall have a completed floor with a smooth surface. If a door is used to exit the room, it shall be equipped with a panic handle.
9. Customer-specific electric service costs, excluding any Avista-required network redundancy costs, will be calculated by Avista. These costs will then be reduced by any available allowance for construction, based on the Customer's added load.
10. The Customer equipment rating shall have an Ampere Interrupting Capacity (AIC) rating of 100,000 amperes or greater. In some cases, greater AIC ratings may be required; this will be studied and communicated to the customer by Avista.

7.4 Service Voltages

A building will be served at one voltage and at one service point.

- Grid connected services must be 208/120Y.
- A spot service voltage can be either 208/120Y volt or 480/277Y based on the following load table. Loads larger than shown in the table will be served on a case-by-case basis.

Table 7.1 – Three-Phase Point of Delivery Available Fault Current

Customer Load (kVA)	Service Type	Vault Type	Number of Transformers / Voltage Allowed
430	Grid	N/A	0 - 208Y
Up to 1000	Spot	2 Bay	2 - 208Y 2 - 480Y
Up to 1500	Spot	3 Bay	3 - 208Y 3 - 480Y
Up to 2000	Spot	3 Bay	3 - 208Y 3 - 480Y
Up to 2500	Spot	3 Bay	3 - 480Y
Up to 3000	Spot	3 Bay	3 - 480Y

Single-phase 120-volt loads, such as parking lot booths, traffic controllers, and lighting will be served with special permission from Avista and shall not exceed an estimated peak demand of 25 amps.

7.4.1 Grid Connected Service, 208/120Y volt

Avista will own and maintain all equipment located outside the building structure.

7.4.2 Spot Networks, 480/277Y volt and 208/120Y volt

Customer shall be responsible for constructing the transformer vault according to Avista's specifications, including but not limited to:

- Must be located within the building footprint
- Grounding, exterior to the vault, as specified by Avista
- Rated for a 3-hour burn
- Blast resistant
- Transformer FR3 Oil containment
- An extraction point for vault Transformers and Protectors that can accommodate a forklift or crane extraction. Must be approved by Avista.
- Forced air cooling as designed by Avista. The Customer will provide the air intake and exhaust. Avista will provide all other forced air equipment and monitoring.
- Must not include any other customer-owned or operated infrastructure (water/sewer piping, electric circuits/conduit, etc.).
- Avista shall have exclusive and unrestricted access to the interior of the vault. Avista will be responsible for maintaining the vault except in cases of Customer caused damage.
- Avista will be responsible for installing transformers, protective devices, primary cable, secondary transformer-to-bus cabling, and interior vault grounding.

7.5 Service Trench & Ductwork

New service conduits shall be 4-inch schedule 40 PVC. The number of conduits required depends on the load plus at least one additional spare. Conduits shall be concrete encased as specified in Avista's Downtown Network Construction Standards [1]. Total degrees of sweep from manhole to customer splice enclosure shall not exceed 235 degrees.

7.5.1 Existing Conduits

Avista shall utilize existing service conduits when available, provided they are 4-inch PVC, structurally sound and contain no other hazards.

7.5.2 Customer Responsibility

The Customer shall be responsible for the following:

- The cost of excavation, backfill, compaction and any associated asphalt patching for the service trench.
- Providing the exterior building/foundation wall penetration according to Avista requirements.
- The cost of excavation, backfill, compaction, any associated asphalt patching, ductwork and cables for temporary services if the temporary service location is different than the permanent service location.
- The cost of excavation, backfill compaction, ductwork and cables for facilities with no permanent building foundations (usually these are services with an outdoor meter pedestal).

7.6 Customer Load Requirements

- Customer load imbalance between phases shall not exceed 10% at any time. Imbalance shall be defined as the maximum variation from average load per phase. (Schedule 70, Rule 19)
- In the case of a grid connected load, or for a spot network that serves more than one Customer account, the Point of Common Coupling (PCC) harmonic current content shall be limited to the requirements of IEEE standard 519-2014. Generally, the requirement shall be no individual harmonic current content greater than 4.0% (10-minute average) of the maximum load seen at the PCC for the given calendar year, and Total Demand Distortion current no greater than 5.0 % (10-minute average) of maximum load seen at the PCC for the given calendar year.
- For new construction, the Customer's technical representative or electrician must provide Avista with final NEC-estimated load calculations, square footage per floor and how each floor will be utilized before equipment is ordered.

7.7 Easements

Avista may require an easement for ductwork and/or structures on Customer property. Any such easement shall be granted by customer, without cost or charge, to Avista upon request.

7.8 Metering

Avista's Meter Department shall specify meter requirements in addition to the summary requirements noted herein.

- Metering equipment shall be located on the Avista side of the main disconnect.
- Meters and current transformers (CT's) cannot have restricted access and cannot be installed in a confined space as defined by WAC 296-809-099. CT's must be located in a 100 kA AIC rated enclosure (CT platforms removed).
- If metering is located in a room separate from the secondary junction enclosure, that room shall have a completed floor with a smooth surface. If a door is used to exit the room, it shall be equipped with a panic handle. Clearance in front of all meters shall meet NEC requirements.
- Sub-metering on the load side of a Customer's dry-type step down transformer is not recommended and will not be supported by Avista.
- Each individual single phase meter position shall be field phase-able so the three-phase service can be balanced.
- All meter bases shall have manual circuit closing sockets.

7.9 Generation

Closed transition transfer switch (make before break) is not permitted in the downtown network for switching Customer's standby or emergency generator.

Any interconnection of a Customer-owned generation facility to the network requires review, studies as necessary, and written pre-approval by Avista. Generation on spot networks is not allowed to exceed three-year historical minimum loading.

7.10 Customer Requested Outages

For non-emergency planned outages the Customer shall provide a minimum of three weeks' notice to Avista. The building owner or the contractor contacting Avista to do the service shutdown is responsible to notify all tenants 48 hours in advance of:

1. The date/time and duration of the outage
2. That this is a building owner/contractor-requested outage
3. That Avista will be on site and may require access to the building electric service room

To cut service Avista must usually physically cut the cables feeding the service. If any three phase Customer equipment is operating it will be single phased during this process. A Customer-requested outage procedure is available upon request.

7.11 Modifications to or Near Existing Services

- The Customer's technical representative or electrician will be responsible for verifying proper phase rotation after a service modification.
- When a new service is installed to replace an existing service to a building, the existing service shall be de-energized as soon as possible from the date of commission.
- Structures (i.e., awnings, building protrusions, overhead walkways, etc.) that are located in a manner that interferes with Avista's ability to access and maintain its facilities in a vault or manhole, shall be removed, relocated, or replaced at the Customer's expense. Any such structure to be located near (including air space above) Avista's facilities shall be discussed with Avista Network personnel prior to installation.

Appendix A Formulas

Fundamental Calculations and Conversions

To Find	Direct Current	Alternating Current		
		1Ø	2Ø, 4-Wire*	3Ø
Amperes (*I*) from Horsepower (*hp*)	$\frac{746\ hp}{V \cdot \%eff}$	$\frac{746\ hp}{V \cdot \%eff \cdot PF}$	$\frac{746\ hp}{2\ V \cdot \%eff \cdot PF}$	$\frac{746\ hp}{\sqrt{3}\ V \cdot \%eff \cdot PF}$
Amperes (*I*) from Kilowatts (*kW*)	$\frac{1000\ kW}{V}$	$\frac{1000\ kW}{V \cdot PF}$	$\frac{1000\ kW}{2\ V \cdot PF}$	$\frac{1000\ kW}{\sqrt{3}\ V \cdot PF}$
Amperes (I) from KVA	$\frac{1000\ KVA}{V}$	$\frac{1000\ KVA}{V}$	$\frac{1000\ KVA}{2\ V}$	$\frac{1000\ KVA}{\sqrt{3}\ V}$
Kilowatts (*kW*)	$\frac{V \cdot I}{1000}$	$\frac{V \cdot I \cdot PF}{1000}$	$\frac{2\ V \cdot I \cdot PF}{1000}$	$\frac{\sqrt{3}\ V \cdot I \cdot PF}{1000}$
KVA	kW	$\frac{V \cdot I}{1000}$	$\frac{2\ V \cdot I}{1000}$	$\frac{\sqrt{3}\ V \cdot I}{1000}$
Horsepower output (*hp*)	$\frac{V \cdot I \cdot \%eff}{746}$	$\frac{V \cdot I \cdot \%eff \cdot PF}{746}$	$\frac{2\ V \cdot I \cdot \%eff \cdot PF}{746}$	$\frac{\sqrt{3}\ V \cdot I \cdot \%eff \cdot PF}{746}$
Power factor (*PF*)	1	$\frac{1000\ kW}{V \cdot I}$	$\frac{1000\ kW}{2\ V \cdot I}$	$\frac{1000\ kW}{\sqrt{3}\ V \cdot I}$

* For 3-Wire, 2Ø circuits the current in the common conductor is 1.41 times that in either of the other conductors.

Voltage Unbalance Calculations

$$\%\ Unbalance = \frac{Max\ Voltage\ Deviation\ from\ Avg\ Phase\ Voltage}{Avg\ Phase\ Voltage} \times 100\ \%$$

Example using phase voltages of 230, 232, and 225:

$$Avg\ Phase\ Voltage = (230 + 232 + 225)/3 = 229$$

$$\%\ Unbalance = \frac{(229 - 225)}{229} \times 100\ \% = 1.75\%$$

Major Changes

This is not intended to be a comprehensive list, but rather a summary of the most significant changes. Older items may be selectively removed from the list for brevity.

August 2022

- Major reorganization and reformatting for improved navigation. Any external references to sections in old editions need to be updated.
- Multi-unit dwellings with separate meters must clearly identify both the meter socket and corresponding main panel with engraved or embossed lettering (Section 5.1.4).
- Updated snow and ice protection requirements for meter equipment (Section 3.2.5)
- Added vegetation near overhead powerline section (Section 3.5).
- Included OSHA mandated human and machinery working clearances to overhead power lines, noted that building and structure location shall not cause a violation to these requirements (Sections 3.4.3 & 3.4.4).
- Included conductor to roof clearances requirements for flat or low sloped roofs (Section 3.2.1).
- Heated bends are not allowed due to deformation of conduit (Section 4.5.3).
- Changed approved CT metering enclosure and landing platform sizes (Section 5.3.7).

August 2020

- Residential services must have properly labeled outdoor emergency disconnect. See residential service requirement checklists.

References

[1] Avista Utilities, "DN-1.700: Concrete Encased Conduit Duct Banks," in *Electric Distribution Downtown Network Construction Standards*.

[2] Avista Utilities, "DO-1.407: Joint Use Vertical Clearance at Supports," in *Electric Distribution Overhead Construction Standards*.

[3] Avista Utilities, "DO-1.410: Joint Use Vertical Clearance at Midspan," in *Electric Distribution Overhead Construction Standards*.

[4] Avista Utilities, "DO-1.431: Joint Use on Air Switch Poles," in *Electric Distribution Overhead Construction Standards*.

[5] Avista Utilities, "DO-1.446: Joint Use Vault Installations," in *Electric Distribution Overhead Construction Standards*.

[6] Avista Utilities, "DO-1.449: Joint Use New Riser Installations," in *Electric Distribution Overhead Construction Standards*.

[7] Avista Utilities, "DO-3.2: Sag," in *Electric Distribution Overhead Construction Standards*.

[8] Avista Utilities, "DO-3.270: Final Vertical Sag 176 Degrees F," in *Electric Distribution Overhead Construction Standards*.

[9] Avista Utilities, "DO-3.3: Clearance," in *Electric Distribution Overhead Construction Standards*.

[10] Avista Utilities, "DO-3.302: Blowout (in Feet)," in *Electric Distribution Overhead Construction Standards*.

[11] Avista Utilities, "DO-3.306: Control Zone Street and Hydrants," in *Electric Distribution Overhead Construction Standards*.

[12] Avista Utilities, "DO-3.314: Vertical Clearance to Ground & Roadway," in *Electric Distribution Overhead Construction Standards*.

[13] Avista Utilities, "DO-3.330: Clearances To Buildings and Appurtenances," in *Electric Distribution Overhead Construction Standards*.

[14] Avista Utilities, "DO-3.334: Vertical Horizontal Clearances to Other Structures," in *Electric Distribution Overhead Construction Standards*.

[15] Avista Utilities, "DO-3.338: Swimming Pool," in *Electric Distribution Overhead Construction Standards*.

[16] Avista Utilities, "DO-7.001: Services General Information," in *Electric Distribution Overhead Construction Standards*.

[17] Avista Utilities, "DO-7.060: Service Voltages," in *Electric Distribution Overhead Construction Standards*.

[18] Avista Utilities, "DO-7.1: Conductors," in *Electric Distribution Overhead Construction Standards*.

[19] Avista Utilities, "DO-7.149: Services And Secondary Final Vertical Sag 176 Degrees F," in *Electric Distribution Overhead Construction Standards*.

[20] Avista Utilities, "DO-7.510: Service Clearance," in *Electric Distribution Overhead Construction Standards*.

[21] Avista Utilities, "DO-7.610: Meter Mounting," in *Electric Distribution Overhead Construction Standards*.

[22] Avista Utilities, "DO-7.612: OH Service Drop Clearance to Attached Structure," in *Electric Distribution Overhead Construction Standards*.

[23] Avista Utilities, "DO-7.620: House Mast," in *Electric Distribution Overhead Construction Standards*.

[24] Avista Utilities, "DO-7.633: Mono Pole/Communication Tower Specifications," in *Electric Distribution Overhead Construction Standards*.

[25] Avista Utilities, "DO-7.634: Meter Enclosure Installation in Flood Zones," in *Electric Distribution Overhead Construction Standards*.

[26] Avista Utilities, "DO-7.660: Overhead to Overhead Service Pole," in *Electric Distribution Overhead Construction Standards*.

[27] Avista Utilities, "DO-7.661: Overhead To Underground Service," in *Electric Distribution Overhead Construction Standards*.

[28] Avista Utilities, "DO-7.671: Temporary Overhead Service," in *Electric Distribution Overhead Construction Standards*.

[29] Avista Utilities, "DO-9.120: Customer-Owned Power Supply (Non-Paralleling)," in *Electric Distribution Overhead Construction Standards*.

[30] Avista Utilities, "DO-9.125: Customer Generation (Paralleling)," in *Electric Distribution Overhead Construction Standards*.

[31] Avista Utilities, "DO-9.127: Customer Owned Net-Metered Generation (Parallelling)," in *Electric Distribution Overhead Construction Standards*.

[32] Avista Utilities, "DO-9.313: CT Metering," in *Electric Distribution Overhead Construction Standards*.

[33] Avista Utilities, "DO-9.314: Self Contained In-Lined Meter Sockets," in *Electric Distribution Overhead Construction Standards*.

[34] Avista Utilities, "DO-9.315: Equipment Ratings and Types," in *Electric Distribution Overhead Construction Standards*.

[35] Avista Utilities, "DU-1.410: Joint Use General Requirements," in *Electric Distribution Underground Construction Standards*.

[36] Avista Utilities, "DU-1.420: Joint Use Random Lay," in *Electric Distribution Underground Construction Standards*.

[37] Avista Utilities, "DU-4.222: Clearances to Other Equipment, Buildings and Swimming Pools," in *Electric Distribution Underground Construction Standards*.

[38] Avista Utilities, "DU-4.234: Bollard, Equipment Protection," in *Electric Distribution Underground Construction Standards*.

[39] Avista Utilities, "DU-4.320: Cable Marking CMT," in *Electric Distribution Underground Construction Standards*.

[40] Avista Utilities, "DU-4.512: Grounding/Bonding of Adjacent Equipment," in *Electric Distribution Underground Construction Standards*.

[41] Avista Utilities, "DU-4.750: Conduit Entrance Single-Phase Transformer," in *Electric Distribution Underground Construction Standards*.

[42] Avista Utilities, "DU-4.751: Conduit Entrance Padmount Junction Enclosure 1-Phase & 2-Phase," in *Electric Distribution Underground Construction Standards*.

[43] Avista Utilities, "DU-4.752: Conduit Entrance Padmount Junction Enclosure 3-Phase," in *Electric Distribution Underground Construction Standards*.

[44] Avista Utilities, "DU-5.020: Transformer Clearances," in *Electric Distribution Underground Construction Standards*.

[45] Avista Utilities, "DU-5.112: Single-Phase Padmounts Banking," in *Electric Distribution Underground Construction Standards*.

[46] Avista Utilities, "DU-5.122: Concrete Pads Three-Phase Transformer," in *Electric Distribution Underground Construction Standards*.

[47] Avista Utilities, "DU-5.123: Fiberglass or Concrete Pads Secondary Enclosure," in *Electric Distribution Underground Construction Standards*.

[48] Avista Utilities, "DU-5.124: Padmount Secondary Enclosure," in *Electric Distribution Underground Construction Standards*.

[49] Avista Utilities, "DU-7.003: Underground Service Customer Requirements," in *Electric Distribution Underground Construction Standards*.

[50] Avista Utilities, "DU-7.120: Secondary and Service Cable Markings," in *Electric Distribution Underground Construction Standards*.

[51] Avista Utilities, "DU-7.325: Traffic Rated Handholes," in *Electric Distribution Underground Construction Standards*.

[52] Avista Utilities, "DU-7.450: Joint Use Service Ditch Detail," in *Electric Distribution Underground Construction Standards*.

[53] Avista Utilities, "DU-7.520: Single-Phase Secondary Service Riser," in *Electric Distribution Underground Construction Standards*.

[54] Avista Utilities, "DU-7.630: Self-Contained Residential Underground Service Entrance," in *Electric Distribution Underground Construction Standards*.

[55] Avista Utilities, "DU-7.631: Direct Buried Meter Pedestal," in *Electric Distribution Underground Construction Standards*.

[56] Avista Utilities, "DU-7.632: Pipe/Post Meter Underground Pedestal," in *Electric Distribution Underground Construction Standards*.

[57] Avista Utilities, "DU-7.670: Temporary Underground Service," in *Electric Distribution Underground Construction Standards*.

[58] NFPA 70: National Electrical Code (NEC), Quincy: National Fire Protection Association, 2020.

[59] IEEE C2: National Electrical Safety Code (NESC), New York: Institute of Electrical and Electronics Engineers, Inc., 2017.

[60] "IEEE C2 Rule 351: Location and routing," in *National Electrical Safety Code (NESC)*, New York, Institute of Electrical and Electronics Engineers, Inc., 2017.

[61] IEEE 519: Recommended Practice and Requirements for Harmonic Control in Electric Power Systems, New York: Institute of Electrical and Electronics Engineers, Inc., 2014.

[62] "WAC 480-100-168: Access to premises; identification.," in *Washington Administrative Code (WAC)*, Olympia, Washington State.