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CHAPTER 2

Electrical Safety and Code Clearances

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CHAPTER 2

Electrical Safety and Code Clearances

2.01 General Safety:

It is the policy of Colorado Springs Utilities to operate the electric transmission and distribution system with the highest degree of care for the safety to the public and Colorado Springs Utilities employees. To ensure the care and safety needed for an electric distribution system, the National Electric Safety Code is used for design, construction, maintenance, and operation of the electric system by Colorado Springs Utilities as well as any associated activity by the public and private industry. The applicable National Electric Safety Code in effect at the time will apply to new installations and extensions. Existing installations may be altered, replaced for maintenance, or additions made to comply with either the current edition or original requirements of the applicable National Electrical Safety Code in effect at the time of original installation as allowed in NESC Rule 013B.

As referenced in City Code, Section 12, Colorado Springs Utilities reserves the right to terminate service when a hazardous condition exists.

Illustrations of pertinent current electrical safety code clearances for low-voltage-service drop conductors are shown in Appendix F, Construction Standards 18-207, 208, 209 & 211. These standards are a guide to commonly used data and are not intended to give all the information that may be needed for specific situations. The current edition of the National Electrical Safety Code should be consulted and will take precedence. A copy can be reviewed at Colorado Springs Utilities offices and at the City Clerk's office. A Code Clearance Manual is also available to assist you.

Appendix F, Construction Standard 18-301 covers the placement of oil-filled equipment adjacent to buildings and the appropriate clearances for fire safety. Guidelines are also furnished for design of fire-resistant barriers when minimum clearances are necessary. Guidelines for an optional aesthetic enclosure around commercial padmount transformers are included.

2.02 Minimum Clearance from Overhead Lines:

- a) For the purpose of this Chapter, the term "clearance" means the shortest distance between any two surfaces.
- b) Minimum clearance between any building or other structure and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provisions of the National Electrical Safety Code.
- c) Minimum clearance between signs, chimneys, radio and television antennas, storage tanks and other structures, and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provisions of the National Electrical Safety Code.
- d) Minimum clearance over streets, alleys, parking lots, rights-of-way, easements, etc., of overhead transmission & distribution facilities, will be maintained in accordance with provisions of the National Electrical Safety Code

- e) Any person who proposes any action that would result in violation of the minimum clearances as set out in paragraph b) and c) above, will give ninety days prior notice of such proposed action to Colorado Springs Utilities by contacting the appropriate Field Engineering Section. Any person who proposes to change the use of land or change the grade of land that would result in conflict with paragraph d) above, will give ninety days prior notice of such action. Upon such a notice, Colorado Springs Utilities will determine the feasibility of relocating such line, distribution facility, and/or electric utility pole, which is in conflict with the proposed action to a suitable and safe location. Should it be determined by Colorado Springs Utilities that such relocation is feasible, Colorado Springs Utilities will perform the necessary relocation at the expense of the person whose proposed action would violate the minimum clearance requirement. This payment must be in compliance with paragraph 11.02. Relocation of such overhead transmission line, distribution facility, and/or electric utility pole may begin on a mutually agreed upon date
- f) Should it be determined by Colorado Springs Utilities that the relocation of a transmission line, distribution facility, and/or electric utility pole is not feasible, Colorado Springs Utilities may require such other action as will prevent a violation of the minimum clearance requirement. Any action which Colorado Springs Utilities may require pursuant to this Chapter will be performed at the expense of the person whose proposed action would violate the minimum clearance requirement.
- g) Minimum clearance between overheight vehicles, including house moving, and any overhead transmission line, overhead distribution facility, or electric utility pole of Colorado Springs Utilities will be maintained in accordance with the provisions of the National Electrical Safety Code (see Appendix F, Construction Standard 18-228).

2.03 Equipment Operation around Energized Facilities:

a) Overhead:

When working near or operating equipment around overhead electrical lines, Federal OSHA standards and Colorado Revised Statutes require that unqualified persons maintain the electrical distances listed in Column B of Table 2.03a between energized lines/parts and themselves, their tools, their equipment, and all conductive materials. Contacting the line can result in severe injury or death. If work must be accomplished near an overhead electrical line, call Colorado Springs Utilities Inspections (QC) (see phone section) for assistance as needed to identify line-operating voltage, to have temporary warning devices installed (see request form; 2.05), or otherwise avoid contact with these energized facilities. If distribution lines must be de-energized and grounded, or if temporary warning devices must be installed to safely conduct the work, a minimum of 10 business days advance notice is requested. Requests for transmission lines will be reviewed on a case by case basis, and require a minimum of 10 business days advance notice (see 2.03a1&2). The Colorado Revised Statutes should be consulted and will take precedence. This law is designed to provide safer working conditions in areas around high voltage overhead lines.

As each case is subject to various and differing circumstances, the advance notification is necessary for Colorado Springs Utilities to perform a site inspection and provide an estimated schedule and costs to provide safe working conditions. This inspection will allow for a determination of electrical voltages present, the subsequent safe working distances, electrical rating of protective equipment and/or the need for possible de-energizing and grounding (or temporary relocation) of the affected utility line or lines.

In many instances, temporary cover may be installed free of charge or at a minimal cost. Larger jobs however, requiring prolonged use and exposure of Colorado Springs Utilities equipment to detrimental weather conditions, may require a contractual agreement and assessment of a flat rate time and materials charge to be coordinated by Field Engineering. These include multiple days of crew time to relocate warning devices, or prolonged use of these devices (over 6 months). Temporary line relocations will be done on a time and material basis at the contractor's expense. In the event your equipment should come in contact with an overhead line or if a broken power line falls on your rig, the best thing to do is to stay put until Colorado Springs Utilities personnel can respond and give you safe clearance to move. If you must vacate an energized rig due to a life-threatening situation such as fire, jump from it, being extremely careful not to touch the rig and the ground at the same time. If you witness such an emergency, contact the Colorado Springs Utilities Customer Service for assistance at 448-4800.

Table 2.03a: Minimum Approach Distance to Any Energized Overhead Line or Part by Unqualified Persons (General Public, General Industry, Construction Equipment) Adapted to Colorado Springs Utilities System from OSHA 1910.333 & 1926.416

A: Voltage Phase to phase (volts)	B: Electrical Distance phase to ground (feet-inches)	C: Electrical Distance With Temporary warning devices Installed phase to ground (feet-inches)
0 to 35,000 (incl. neutrals & secondary)	10'-0"	10'-0"
115,000	10'-8"	10'-8"
230,000	13'-0"	13'-0"

1) Requests for Transmission System Outages

The North American Electric Reliability Council (NERC) and the Western Electricity Coordinating Council (WECC) issue standards by which the electrical transmission system must be planned and operated. These standards address system performance during planned outages including maintenance activities. Colorado Springs Utilities complies with these standards, and requires parties requesting outages on the electric transmission system to ensure that the system complies with the NERC/WECC standards.

Standard TPL-002-0: System Performance Following Loss of a Single BES Element, addresses planned outages. Specifically section R1.3.12 reads "Include the planned (including maintenance) outage of any bulk electric equipment (including protection systems or their components) at those demand levels for which planned (including maintenance) outages are performed.

The Colorado Springs Utilities electric transmission system is designed to serve all load through system peak load levels according to standard TPL-002-0. However, the system is not designed to serve all load during the loss of multiple elements at peak load levels. Accordingly, requests for planned outages may not be granted during times of peak system loading.

Colorado Springs Utilities on a case-by-case basis may allow individual system elements to be removed from service in order to accommodate construction or maintenance activities. Under these circumstances, the outage must be planned far well

in advance, and every effort must be made to minimize the duration of the outage. If at all possible, the construction or maintenance activity should be conducted in such a manner that the facility can be returned to service immediately in the event of a loss of another system element.

Outages lasting longer than one-week may require the construction of a temporary facility to minimize the required outage time. Outages on system elements that will leave a load serving facility vulnerable under a single additional contingency will require plans to mitigate the next contingency. These plans should restore the load serving capability of the system within 48 hours. All time and material necessary to develop the contingency plan will be paid for by the requesting party. In the event the contingency plan is executed, the requesting party will pay all time and materials associated with service restoration. A bond or cash deposit in the full amount of anticipated costs to restore service in an emergency may be required prior to a planned outage. Requesting party shall pay the full amount of the time and materials associated with service restoration within thirty (30) days of invoice.

Underground electric transmission systems present a unique challenge in that outage and restoration times will typically require several weeks. On a case-by-case basis, planned outages for the modification of underground transmission systems may be granted. However, due to the extended nature of these outages, contingency plans for the restoration of load must be in place prior to the planned outage. In some cases, an outage may not be granted, and new facilities may need to be constructed before existing facilities may be abandoned.

2) Requests for Transmission System Modifications

The integrity of the electric transmission system is fundamental to providing reliable electric service. Modifications to the electric transmission infrastructure may be granted on a case-by-case basis. Under no circumstance will modifications be allowed that either compromise the reliability of the system, or decrease the capacity. Any modifications must maintain the overall integrity of the system and minimize the introduction of higher maintenance or increased possibility of failure.

b) Underground:

Grading or excavation work should not be started until an underground facilities location has been completed. Digging into underground power lines can result in severe injury or death to the operator and others, and can cause interruption of service to wide areas. Contact the Utility Notification Center of Colorado (UNCC) at 811 or 1-800-922-1987 at least 2 business days before you dig. Trained personnel will locate electrical facilities at no cost. UNCC often recommends the use of “potholing” (the use of pressurized stream of water to penetrate the ground and expose underground facilities) to aid in the positive determination of the cable location and depth. Care should be taken while using this technique, however, because excessive pressure has been known to puncture the power cable insulation resulting in a possible electrical contact. Any person doing excavation work in a public right-of-way, utility easement, or any other public place must obtain an excavation license and/or permit as required by the jurisdiction. All excavations for electric service installation will be performed in accordance with all applicable City codes, as follows:

1) Excavation and Boring Requirements near Utility Lines

Chapter 19, Article 5 of Part 2 of the City Code governs excavations in the City and applies to any opening in the surface of a “public place” made in any manner whatsoever. “Public place” is defined to include any public right of way, utility easement, drainage structure, street way, place, alley, sidewalk, park, square, plaza, or any similar public property owned or controlled by the City and dedicated to public use, including dedicated, but not improved streets or portions of streets. Even though many references are made to the "Code for the City of Colorado Springs", by inclusion in our service standards, and to ensure the health and well being of the general public, these excavation requirements apply to all excavations around Colorado Springs Utilities' facilities throughout our Dedicated Service Territories.

Any boring operations underneath the surface of a street are considered excavation upon a public place and are covered by City Code. The City’s requirements for excavation are:

- a) The first requirement above is set out in City Code section 3.3.202 EXCAVATION LICENSE REQUIRED, which provides that “No person shall make any excavation or fill any excavation in any public place without first obtaining a license and permit for the excavation except as otherwise provided in this article”. Pursuant to this section of the City Code, the Deputy Licensing Officer may issue cease and desist orders or initiate license suspension or revocation proceedings against any excavator for a violation of the City Code excavation provisions or of the City's General Licensing Code.
- b) The second requirement, obtain locations of the underground utilities, is set out in the City Code at section 19.5.211 and by Colorado statute at CRS 9-1.5-101, et. seq. C.R.S. 9-1.5-101, et seq, governs excavation requirements throughout the State of Colorado. That statute requires notification to utility companies and the marking of underground facilities prior to excavation, and provides for civil penalties. The City Code states that no excavation shall take place until location of the facilities has been requested and obtained not more than five working days prior to the excavation. Colorado Springs Utilities must be notified prior to any construction activities around utility lines and or facilities. The proper way to notify Colorado Springs Utilities is through the statewide “One Call” notification system. The statewide “one call” notification system is the Utility Notification Center of Colorado which can be reached at 1-800-922-1987 or 811. Colorado Springs Utilities will bill for the cost of repair to its underground facilities including the cost of gas, electric, or water lost and will access penalties as allowed under C.R.S. 9-1.5-101, et seq.
- c) The third requirement is that one must obtain an excavation permit. City Code section 3.3.204: PERMIT REQUIRED; INSPECTIONS; FEES provides, “A. In addition to the other requirements of this part, no person shall proceed to make or fill any excavation without first obtaining an excavation permit from the City Engineer.”
- d) The fourth requirement is the requirement that excavators must use the “boring with windows” procedures as required by the City Engineering Division when excavation permits are issued. Because many of the Colorado Springs Utilities

facilities are plastic lines, which can be easily damaged by underground boring operations, or are steel lines, whose cathodic protection may be jeopardized by contact with a boring machine, or high pressure water or air potholing activities, it is imperative that the exact location of those lines be determined and that reasonable precautions be taken to avoid contact with the lines. Once the lines are located, excavators are further required, as they approach the estimated location of such facility to determine the exact location of the line and to take reasonable precautions including hand digging at the estimated locations in order to avoid damage to the facility. Additionally, in order to further protect the lines, we require the use of a reciprocating tip on your hydro - vacuum water wands and not a zero or 30 degree tip, as the zero and 30 degree tips cause excessive damage to our facilities. The nozzle must be kept 12" above utility lines, to prevent damage to the coating, jacket, or material in general. Any damage to the line must be reported immediately to the Quality Control Supervisor to have the line re-coated or repaired. Failure to report damage or numerous damages from negligent work practices will result in charges and penalties as stated above. Backfill and compaction shall meet City Engineering Public Works specifications.

- e) Finally, the National Electric Safety Code require the protection and separation of underground electric supply lines from other structures, including other utilities. See the clearance requirements in Appendix F.
- f) Notify the Colorado Springs Utilities, Energy Construction Operation and Maintenance Department, Quality Control Supervisor at least 24 hours before exposing any underground facility. The standards herein are supplementary to, and are not intended to conflict with, the rules and regulations on file with the City Clerk of the City of Colorado Springs or applicable city ordinances.

2.04 Clearances to Hazardous (Classified) Locations:

Colorado Springs Utilities equipment and conductors are not normally suitable for installation above, below, or within areas defined by the NEC as classified locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or filings. Construction Standard 18-227 (see Appendix F), covers only some of the more common installations encountered outdoors and potentially in the vicinity of Colorado Springs Utilities lines or equipment. For other situations refer to Chapter 5 of the NEC and consult local fire-prevention authorities to help determine the boundaries of classified areas.

Some of the most commonly encountered flammable materials include: gasoline, acetylene, hydrogen, acetone, ammonia, benzene, butane, ethanol, methanol, methane, natural gas, naphtha, propane, turpentine, Compressed Natural Gas (CNG), and Liquefied Natural Gas (LNG). Combustible metal dusts include aluminum, magnesium, and their commercial alloys. Atmospheres containing combustible carbonaceous dusts include carbon, black charcoal, and coal or coke dusts. Atmospheres containing combustible dusts include flour, grains, wood, plastic, and chemicals. Atmospheres containing easily ignitable fibers or filings include some parts of rayon, cotton, and other textile fibers.

2.05 Request for Line Covers (Warning Devices), Outage, or Reroute on Overhead Power Lines:

The following form shall be signed by the builder, contractor, or other person in charge of work performed underneath or in close proximity of overhead power lines. This request shall be made at least 10 business days before work begins.

Line cover devices are not routinely electrically tested and therefore, do not qualify as insulating guards. They are for visual warning only, available only for 0 to 35kV lines, and the clearance as specified in Table 2.03a shall be maintained by unqualified personnel in the process of working under or in close proximity of energized overhead power lines. The requirements of the Colorado Springs Utilities, Electric Line Extension and Service Standards, shall be followed. See section 2.03 "Equipment Operation around Energized Facilities" for more specific information.

Table 2.03a: Minimum Approach Distance to Any Energized Overhead Line or Part by Unqualified Persons (General Public, General Industry, Construction equipment) Adapted to Colorado Springs Utilities System from OSHA 1910.333 & 1926.416

Voltage Phase to phase (volts)	Electrical Distance phase to ground (feet-inches)
0 to 35,000 (incl. neutrals & secondary)	10'-0"
115,000	10'-8"
230,000	13'-0"

Type of Protection Requested (check one):

Line cover: De-energize: Temporary Reroute: Permanent Reroute

Overhead Line Voltage: _____ Circuit: _____

Clearance (feet from line) Required: _____ see Table 2.03a

Proposed Start Date: _____ Proposed Completion Date: _____

Company: _____

Requestor Name: _____

By signing this I understand the above conditions and agree to follow all NEC, NESC & OSHA Safety Standards and Regulations:

Requestor Signature: _____ Date: _____

Estimated Cost: \$ _____

Colorado Springs Utilities Agent Signature: _____ Date: _____

W/O#: _____

Attach map pages with work areas marked, including no. of conductors to cover and length of cover needed.

Original: QC, Copy: requestor