CITY OF LONGMONT
SECTION 700 – LONGMONT POWER & COMMUNICATIONS (LPC)
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700.00 MINIMUM DESIGN CRITERIA

700.1 ABBREVIATIONS

Whenever the following terms or words are used in this chapter, they shall have the following meanings ascribed to them. For abbreviations not defined below reference the Abbreviations Section 101 of these City Standards:

1. ANSI – American National Standards Institute.
2. ASCE – American Society of Civil Engineers
3. ACI – Association of Construction Inspectors
4. CT – Current Transformer.
5. CAT-5E – Category 5 Enhanced
6. CIC – Cable in Conduit
7. ECIF – Electric Community Investment Fee.
8. FNQ-R – type of Advanced Protection Class CC current-limiting, time-delay fuse
9. IBC – International Building Code
10. IEC – International Electro technical Commission.
11. IEEE – Institute of Electrical and Electronics Engineers.
12. KVA – kilo-volt-ampere
13. Kw – kilowatt.
14. Kwh – kilowatt hour.
15. LPC – Longmont Power & Communications.
16. NEMA – National Electrical Manufacturers Association.
17. NEC – National Electrical Code.
18. NESC – National Electrical Safety Code.
19. PT – Potential Transformer
20. TIA – Telecommunications Industry Association
21. UL – Underwriters Laboratory

700.2 DEFINITIONS

Whenever the following terms or words are used in this chapter, they shall have the following meanings ascribed to them. For definitions not defined below reference the Definitions Section 101 of these City Standards:

1. CAT-5E – means network cabling capable of providing performance of up to 100 megahertz and can be used up to a maximum length of 100 meters.
2. CUSTOMER - means the developer/owner, or builder/contractor where appropriate.
3. ELECTRICAL CONNECTION FEE - means meter and connect fee/charge.
4. GOVERNING AGENCY - means that governmental agency, including the City of Longmont or Counties of Boulder or Weld, with authority to inspect and approve an electrical installation.

5. INTERCONNECTION CUSTOMER - means a customer who generates electricity on the customer's side of the meter using self-contained generation equipment, including but not limited to, photovoltaics, fuel cells and micro-turbines, in parallel with the city's electric system.
6. INTERCONNECTION CUSTOMER'S SYSTEM - means the self-contained generation equipment utilized by an interconnection customer.
7. KYZ METERING – means a designation given to a relay used to create pulses for electrical metering applications. The term KYZ refers to the contact designations: K for common, Y for Normally Open, and Z for Normally Closed.
8. K-BASE METERING – means the metering of continuous electrical loads greater than 320 amperes, using self-contained watt-hour meters and no external current transformers.
9. NET METERING - means the net consumption as measured at the service meter on an annual basis for billing purposes.
10. PARALLEL - means capable of being electrically connected to the utility distribution system while, at the same time, generating electricity.
11. POINT OF COMMON COUPLING or PCC - means an interconnection customer's main point of service from LPC's electric system.

700.3 GENERAL

1. Longmont Power & Communications (LPC) is responsible for standards, electrical engineering and design associated with City owned and maintained LPC utility distribution systems. The following sections will outline requirements, charges and fees to initiate a request for electric utility service through the final installation of electric distribution facilities into new developments.
2. City Standards provide direction for LPC distribution facilities installed in previously constructed developments.
3. All LPC distribution systems will comply with the requirements outlined in the City Standards for electric and communication distribution systems and service line construction, and as referenced in Chapter 14.32 Rates and Regulations Governing Electric Service of the City Code. Additional criteria may be outlined by LPC during the development plan review.
4. As outlined in Chapter 14.32 Rates and Regulations Governing Electric Service of the City Code, the City will own and maintain LPC utility distribution systems including primary voltage systems switchgear, circuit vaults, transformers, rights-of-way lighting, etc.
5. Street lighting design and installation shall be the responsibility of LPC and follow standard design guidelines as outlined in the Chapter 13.18 Street Lighting Standards of the City Code. Detail 700-13 Street Light Poles and 700-14 Street Light Base are included in the Section 700 Details for reference.
6. Any deviations to the following guidelines must be approved by LPC and if necessary, Public Works and Natural Resources.

700.4 EASEMENTS

1. Provide easements for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing altering, removing and replacing cable, conduit and equipment in whole or in part, and all necessary subsurface and surface appurtenances; and the right of ingress and egress over and on the easement area that is necessary and appropriate.
2. Identify the width and label all electrical easements as LPC easements.

3. Identify the width and label all combined electrical and water easements as LPC/Water Easement.
4. Architectural features such as porches, overhangs, cantilevers, and window wells are not permitted in easements.
5. Fences, landscaping with plant shrubs, woody plants, nursery stock or other crops may be located within these easements provided they do not interfere with the use of, obstruct the operation of or access to said easement. Any fence, landscaping, or other improvement that obstructs the operation of or access to easements may be removed by grantee without liability for damages arising therefrom.
6. LPC Easements are for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing and replacing cable, conduit, equipment, and all necessary subsurface and surface appurtenances or other uses approved by LPC. Together with a perpetual right of ingress and egress for installation, operation, maintenance, repair and replacement of such.
7. LPC/Water Easements are located on private property immediately adjacent to the rights-of-way. These easements are for the purpose of surveying, locating, installing, constructing, using, operating, maintaining, inspecting, repairing, altering, removing and replacing cable, conduit, equipment, valves, water meters, fire hydrants, and all necessary subsurface and surface appurtenances or other uses approved by the City of Longmont. Together with a perpetual right of ingress and egress for installation, operation, maintenance, repair and/or replacement of such.
8. Utility Easements (UE) are for the purpose of utilities and drainage facilities, including, but not limited to irrigation lines, electric lines, communication lines, gas lines and cable T.V.; together with a perpetual right of ingress and egress for installation, operation maintenance, repair and replacement of such lines. Said easements and rights are to be utilized in a responsible and prudent manner.
9. Single Family Residential shall include a corridor seven (7) feet in width adjacent to the right-of-way. The use of the specific easement will be shared with Water/Wastewater and labeled as "7' LPC/Water Easement".
10. Multi-family Residential:
    a. Shall have a minimum five (5) foot wide easement throughout the site with:
        i. 10 foot pocket easements around each single-phase transformer
        ii. 12-1/2 foot pocket easements around each three-phase transformer.
    b. Once the electrical design has been completed, this easement may be provided by choosing one of the following options:
        i. Provide a specific easement on the Final Plat; or
    c. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or
        i. If a Re-plat or Final Plat is not available then provide an easement by separate document. This option must be completed before Final Approval.
11. Commercial:
    a. Shall have a minimum five (5) foot wide easement throughout the site with:
        i. 10 foot pocket easements around each single-phase transformer
        ii. 12-1/2 foot pocket easements around each three-phase transformer.

b. A 12 foot wide easement will be required along any main feeder network path. Any deviations to this must be approved by LPC.

c. Once the electrical design has been completed, this easement may be provided by choosing one of the following options:

i. Provide a specific easement on the Final Plat; or

ii. Provide an easement over the entire lot or out-lot, exclusive of buildings, for LPC on the Final Plat; or

iii. If a Re-plat or Final Plat is not available then provide an easement by separate document. This option must be completed before Final Approval.

12. Street Lighting

a. LPC will place street lighting along the rights-of-way only.

b. Additional easements may be required for lighting in areas where primary electric facilities are not installed adjacent to the rights-of-way.

13. Vacation of rights of way or easements: Draw and label existing LPC utility facilities that are to be relocated due to vacation that are currently present on the parcel of land requiring the vacation.

700.5 CLEARANCES

1. Electrical equipment serving residential subdivisions will be installed adjacent to the rights-of-way and straddle the property line to provide service to two parcels. Refer to the specific section of City Standards on the spacing requirements for installation of water and sewer service lines and applicable rights-of-way infrastructure, i.e. fire hydrants. The locations and clearances from LPC facilities are established to provide adequate clearances and access for the two utilities sharing an easement.

2. Traffic signs shall not be installed on top of LPC distribution facilities. Maintain clearance requirements as outlined in Section 103 Utility Separation & Crossings of the City Standards and Detail 700.01 Trench Clearances.

3. Electrical equipment requires proper clearances or setbacks on all sides for access and maintenance as well as protection from vehicular traffic. This includes driveways, alleys, parking lots, etc. Protection such as bollards will be installed at the Customer's expense when electrical equipment is located in areas where less than the recommended clearances exists or is at risk to vehicular damage. Reference Details 700-01 Trench Clearances, 700-02 Equipment Clearances and 700-18 Bollard Installation.

a. Three (3) feet along the sides and back from landscape material

b. Three (3) feet along the sides and back from structures

c. Three (3) feet along the sides and back adjacent to residential driveways

d. Three (3) feet minimum from vehicular traffic with use of bollards

e. Five (5) feet or greater from a driving surface behind a curb or protective feature

f. 10 feet from a driving surface where no curb or protective feature is proposed

4. Specific clearances from overhead and underground electric utility facilities are outlined in Section 103 Utility Separation & Crossings of these City Standards and in Details 700-01 Trench Clearances and 700-02 Equipment Clearances.

700.6 STANDARD NOTES FOR PLAN SUBMITTALS

1. Specific notes are to be included on Plats, Site Plans and Public Improvement Plan submittals as applicable and are listed in the Appendix.

700.7 REQUEST FOR SERVICE

1. The following items are to be included with the initial submittal of the construction drawings to the Design Review Committee.
    a. Electronic file submission as outlined in Section 103 Engineering Design Submittals of these City Standards.
    b. Completed electric service request checklist including acknowledgement signature located in the appendix. Additional electrical information required for services is outlined below:
        i. Residential service electrical information shall include:
            - Product types and locations;
            - Square footage of homes;
            - Electric panel rating;
            - Air conditioning number of units and size; and
            - Electric heat if applicable.
        ii. Commercial service electrical information shall include:
            - One-line diagram;
            - Load calculations;
        iii. Irrigation controller loads and private lighting requirements.
        iv. Billing information, including names and mailing addresses of the parties responsible for payment of construction costs and month-to-month billing when meter sets are complete.

700.8 DESIGN

1. LPC will complete a design with the first submittal of Public Improvement Plans or the first submittal of the Site Plan if no Public Improvement Plans are required. Multi-phase developments may require LPC to complete an overall capacity design with the first phase submittal. LPC may request additional information or files and coordinate the design with the Design Engineer. The trench line and equipment locations shall be shown on the second submittal of the master utility plan and landscape plans. As revisions are required, updates will be reflected with each submittal. The Design Engineer and LPC will coordinate this effort.
2. Provide an electric one-line diagram for all commercial and multi-family developments that shows the proposed service size/ampacity and voltage. All unit numbers, as well as house panels must be labeled on the one-line document.

700.9 SLEEVE REQUIREMENTS

1. Crossings for roadways, ditches or other surface features will be shown on the master utility plan as a trench line. The Customer is responsible for coordination and installation of the appropriate quantity and size as directed by LPC. Sleeve locations, sizes and quantities shall be provided by LPC and shown on plan and profile drawings. The Design Engineer, LPC and other City staff will coordinate

conflicts as they arise in the planning stages to mitigate conflicts during the construction effort. See the installation requirements.

700.10 CHARGES

1. Charges for the development review and design effort are billable and collected with charges for the installation of LPC distribution facilities. If the project does not move forward to the construction phase, review and design charges will be invoiced to the Customer and are due upon receipt.
2. The Customer has the option to use a contractor to install the subsurface infrastructure for local LPC distribution facilities, which includes:
    a. PVC and/or cable in conduit (CIC);
    b. Ground vaults; and
    c. Street light poles.

Or,

3. Request the City to complete the excavation and subsurface installation of the local electric distribution facilities.
4. In all cases, LPC will install and connect the electric equipment specific to electrical apparatus.
5. It is the responsibility of the Customer to advise LPC of subsurface installation choices prior to the preparation of the Public Improvement Agreement.
6. The Customer pays all costs associated with the installation of LPC distribution facilities to serve the site. LPC will complete an estimate and invoice of the projectcosts.
7. The Public Improvement Agreement will outline the subsurface infrastructure responsibilities. For Customer installations of the electric conduits, conductors, ground vaults / junction boxes, etc., the Public Improvement Agreement will outline the securities and warranties. The subsurface installation will be organized as all other public improvements including the acceptance process.
8. When the Customer elects to have LPC complete the subsurface installation payment in full is required, separate from the Public Improvement Agreement. This will place the project on a construction schedule pending notification from the Customer of site readiness.
9. Change orders will be issued to the Customer when the site conditions, scope changes, material requirements or initial estimating changes occur. Work identified within the change order will not be completed until signed acceptance by the Customer is received by LPC.
10. Damages that occur to LPC facilities due to development construction activity are invoiced directly to the Customer for payment and are due within 30 days.

700.11 FEES

1. An Electric Community Investment Fee (ECIF) is charged to specific projects requiring a building permit. LPC must expand system facilities if it is to accommodate new development, which includes substations and main feeder networks. The funding for these capital expenditures is collected through the imposition of the ECIF. The fee schedule and policy is outlined in Chapter 14.32 Rates and Regulations Governing Electric Service of the City Code.

700.12 SITE DEVELOPMENT PERMITS

1. The Customer will include LPC as a Contractor installing on behalf of the Customer in the permits required for on-site development. Examples of the permits are listed but not limited as shown.

a.	Stormwater Permit for Construction activities	CDPHE
b.	Stormwater Permit for Construction Activities	City of Longmont
c.	Work in Ditch Right-of Way	Individual Ditch Companies
d.	City Work in Right-of-Way Permit	City of Longmont
e.	County Work in Right-of-Way Permit	Boulder County
f.	State Work in Right-of-Way Permit	Colorado Department of Transportation

701.00 CUSTOMER INSTALLATIONS

701.1 SUBSURFACE INFRASTRUCTURE

701.1.1 SLEEVE INSTALLATION

1. The Customer is responsible for providing crossings of surface features as outlined. Reference Detail 700-03 Customer Installed Sleeve.
2. The Customer will install schedule 40 PVC. All sweeps shall have a 48 inch radius. PVC joints shall be made with long line bell ends and couplings using cold weather glue. The location, size and quantity of sleeves will be outlined on the utility sheets and details of the construction plans or as specified by LPC.
3. The conduit shall be installed so that it lines up with the trench path as identified on the Public Improvement Plans. A minimum of 36 inches of cover over the conduit shall be provided, as measured from final grade, and shall not be installed at a depth greater than 48 inches. Any deviation from these specifications must be approved in advance by LPC. Trench compaction shall be 95% and meet all applicable criteria specified in Section 109 Utility Trenching of these City Standards and Detail 700-04 Trench Detail. The Customer must maintain access to the ends until the crossing is utilized for the LPC distribution system installation. Each crossing location shall be identified using a red tie marker, purchased at the LPC Warehouse. The marker shall have one end wrapped around the conduit(s) at each end of the crossing and extend above grade for a visual reference. Where multiple conduits are installed, use only one marker tie at each crossing end point as referenced in Detail 700-03 Customer Installed Sleeve.
4. Conduit crossings for communication utilities may be placed in the same trench as LPC with approval. The conduit shall be extended beyond the LPC easement for future access by the communications utility Refer to Detail 700-03 Customer Installed Sleeve.
5. In no case shall a crossing for use with a gas line be placed closer than five (5) feet from electric conduits. The conduits shall be extended beyond the LPC easement for future access by the gas utility.
6. It is the responsibility of the Customer to insure the integrity of the crossing until used by LPC. Prior to use, any damage to the crossing must be repaired by the Customer prior to LPCs mobilization.
7. Should the Customer identify a conflict with the proposed depth, location, or other considerations for the conduit crossing, they must immediately contact LPC.
8. When LPC is installing the subsurface infrastructure they will excavate along the tie marker to expose the conduit ends. If the tie marker has been damaged or removed during construction, LPC will excavate within three (3) feet either side of the crossing location, as shown on the plans, up to a depth of 52 inches to attempt to expose the conduit. If the conduit cannot be located or is inaccessible, LPC will inform the Customer's Representative that the conduit cannot be accessed due to surface features, the installation does not meet the criteria in this specification, and/or the conduit appears to be missing. LPC will move to another portion of the job or leave the job site. The Customer is responsible for all work necessary to provide access to the conduit to the satisfaction of LPC, or to make other changes as necessary to correct the problem. The corrections may include but are not limited to installing new conduits using open trench or horizontal boring methods. In the event LPC is required to leave the project and re-mobilize, an additional mobilization charge may occur.
9. Any existing rights-of-way landscaping disturbed during LPC distribution infrastructure installation shall be repaired by the Customer to meet Section 600 of the City Standards. It will be the Customer's responsibility to schedule all necessary inspections for this work with the Public Works & Natural

Resources Division. Any work that does not adhere to current City Standards and/or is without the approved inspection by the Public Works & Natural Resources Division shall be corrected at no cost to the City.

701.1.2 TRENCH

1. The trench alignment is determined by the developments final electric design and or easement location chosen by LPC. As required, the Customer is responsible for surveying property lines, trench alignment, elevations and equipment locations as needed. The minimum trench width is eight (8) inches and must be at a depth that will provide a minimum of 36 inches to a maximum 48 inches of cover over the top of the conduit. The bottom of the trench must be smooth and continuous. Where soil conditions require, the Customer may be required to provide bedding material. The trench must remain open and accessible until inspected. Reference Trench Detail 700-04.

701.1.3 PVC INSTALLATION

1. As required, the Customer will install schedule 40 PVC. All sweeps shall have a 48 inch radius. PVC joints shall be made with long line bell ends and couplings using cold weather glue. The location, size and quantity of conduits will be outlined in the utility sheets and details of the construction plans. Conduits shall enter ground vaults / junction boxes as shown in Details 700-09 Single-Phase Transformer Vault, 700-11 Primary Junction Vault and 700-12 Secondary Junction Box (J-Box).
2. All pipes shall be carefully placed in the trench as level and straight in the bottom as possible. Pipe and accessories shall be inspected for defects prior to being lowered in to the trench. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench. The ends of the pipe shall be plugged or capped when work stops or is directed into equipment locations.
3. At any time, the electrical design may call for multiple conduits in specific trench segments. The Customer is responsible for assuring proper pipes are directed to equipment locations as shown on the plans provided by the City.

701.1.4 TRACER WIRE INSTALLATION

1. Where a PVC conduit is installed for future use and no electrical conductor exists, a tracer wire will be installed along the entire length of the pipe, as directed by LPC. A #14 AWG copper wire with insulation will be taped securely to the top of the pipe and three (3) feet of excess wire coiled in the ground vault / junction box as shown in the Tracer Wire Installation Detail 700-06.

701.1.5 CABLE IN CONDUIT (CIC)

1. Cable in conduit (CIC) is a product that has an electrical conductor pre-installed into a high density, polyethylene resin duct (HDPE). The electrical design may call for multiple conductors or CIC of different sizes in specific trench segments. The Customer is responsible for assuring proper conductors are directed to equipment locations as shown on the plans provided by the City. The CIC shall enter ground vaults / junction boxes as shown in Details 700-09 Single-Phase Transformer Vault, 700-11 Primary Junction Vault and 700-12 Secondary Junction Box (J-Box).
2. Loading and unloading of CIC is the Customers responsibility and must be accomplished without compromising the electric and mechanical integrity of the cable or duct. Under no circumstances shall reels be dropped from the delivering vehicle to the ground. Reels shall be stored on a hard surface in an upright position. Crushing, cutting or kinking of the cable or conduit will result in additional costs to the Customer. Reference Detail 700-07A & B Cable Handling and Storage Procedures.

3. All CIC shall be carefully placed in the trench, as level and straight in the bottom as possible. CIC shall be inspected for defects prior to being lowered in to the trench. All bends or sweeps must be gradual and have a minimum 48 inch radius as shown in Details 700-09 Single-Phase Transformer Vault, 700-11 Primary Junction Vault & 700-12 Secondary Junction Box (J-Box). HDPE that has been placed into a trench that contains a sweep that was formed too tight or kinked will not be accepted. Additional costs for material replacement due to poor workmanship will be paid by the Customer.

4. The CIC will be swept up into equipment locations as outlined on the utility sheets and details of the construction plans or as specified by LPC. Conductors installed in ground vaults / junction boxes shall be cut at lengths shown in Details 700-09 Single-Phase Transformer Vault, 700-11 Primary Junction Vault & 700-12 Secondary Junction Box (J-Box). A cold shrink end cap will be used to seal the cable ends. Refer to Detail 700-08 Cold Shrink Installation.

5. LPC purchases the cable jacket which is permanently and legibly imprinted showing size and type of conductor at approximately two-foot intervals. The Customer is responsible for confirming cable lengths and types.

701.1.6 CONNECTION TO THE EXISTING SYSTEM

1. The Customer shall coordinate all access into existing electrical equipment with LPC. At no time is a Customer to access LPC equipment without approval by LPC and an LPC representative on site. Charges for the standby personnel will be invoiced to the Customer.

701.1.7 GROUND VAULTS

1. Ground vaults / junction boxes are subsurface features that support electrical equipment. They are specific to equipment types and shall be installed as shown on the plans. They shall be installed two (2) inches higher than the proposed sidewalk or finished surface area, and level with the sidewalk. Following excavation for ground vaults / junction boxes, the subgrade shall be compacted and three quarter (3/4) inch washed rock shall be installed below the ground vault / junction box as specified in Details 700-09 Single-Phase Transformer Vault, 700-11 Primary Junction Vault and 700-12 Secondary Junction Box (J-Box).

2. Where electrical equipment is installed on a hill or slope, the Customer shall design a retaining wall that meets the clearance requirements outlined in the City Standards and may be subject to the approval of the Public Works & Natural Resources Division.

3. Transformer

   a. Residential single-phase: Install an eight-foot ground rod. Refer to Detail 700-09

   b. Commercial three-phase: Install an eight-foot ground rod and a Concrete pad. Refer to Detail 700-10 Three-Phase Transformer Pad

   c. Primary junction vault: Install an eight-foot ground rod. Refer to Detail 700-11

   d. Secondary junction box. Refer to Detail 700-12

   e. Street light poles. Refer to Detail 700-13

701.1.8 BACKFILLING

1. Backfilling of LPC trenches and equipment locations in the rights-of-way or adjacent to concrete surface features will be to 95% compaction. This shall be achieved by using Flow-Fill to backfill the trench to a point 12 inches below finished grade. Flow-Fill is required for trenches less than 12 inches wide. For trenches greater than 12 inches wide, where Flow-Fill is not utilized as backfill, the Customer

shall use native backfill material that is free from angular rock as outlined in Section 109 Utility Trenching of these City Standards. Inspection of the trench and native backfill material may dictate the use of six (6) inches of sand as bedding and or backfill material to protect the conduit as approved by LPC. When Flow-Fill is not used compaction tests shall meet the requirements in Section 109 Utility Trenching of these City Standards and shall be completed every one (1) foot of trench depth for every 150 lineal feet of pipe installation, at all road crossings, and street light poles unless otherwise specified by LPC. Compaction around transformer and primary junction ground vaults / junction boxes must use Flow-Fill.

2. The Customer shall install warning ribbon to signal buried LPC facilities. The ribbon is to be placed at a depth of 12 inches below finished grade. The final 12 inches may be backfilled with native material. Compaction under hard surfaces must be compacted to 95% and when adjacent to the surface 90% is acceptable.

3. Any existing rights-of-way landscaping disturbed by the Customer during backfilling or electrical installation shall be prepared to meet Section 600 of the City Standards. It will be the Customer's responsibility to schedule all necessary inspections for this work with the Public Works & Natural Resources Division. Any work that does not adhere to current City Standards and/or without the approved inspection of the Public Works & Natural Resources Division shall be corrected at no cost to the City.

701.1.9 MATERIALS

1. LPC will provide materials specific to the electrical installation. Payment in full by the Customer is required before these materials can be picked up at the City Warehouse by the Customer.

2. Once material payment has been received, a two-week notice is required from the Customer to initiate the staging of materials at the City Warehouse located at 1100 South Sherman Street. The Warehouse will place materials in a staging area where the Customer is responsible for confirming the material type, integrity and quantities by signing a receiving document. The materials are to be transported from the Warehouse to the site by the Customer within 48 hours. The City will not be responsible for materials which are damaged or stolen after the receiving document is signed. If additional materials are needed, the Customer is to request a change order from LPC prior to going to the Warehouse.

3. Cable reels with excess cable of 200 feet or more may be returned to the LPC Warehouse for a credit. Warehouse staff shall inspect cable reels over 200 feet; damaged cable will not be credited to the project.

4. When the subsurface installation is complete, the City and Customer will review all materials used for the project. Material changes and cable retirements will be charged or credited to the project appropriately. Upon completion of the itemized review, the City will review all material and determine if additional charges or credits to the Customer are required.

701.1.10 MATERIAL HANDLING

1. The cable-in-conduit (CIC) is coiled on wooden or steel reels at a maximum of 84 inch diameter and 46 inch outside width. The Customer must be able to handle the cable reels by utilization of a reel trailer, stand or other appropriate device to avoid conduit or cable damage. Reference Sections 106 Control of Materials and 107 Control of Site in these City Standards and Details 700-07A & B Cable Handling and Storage Procedures.

701.1.11 INSPECTION

1. Inspections for trench, conduit, cable, ground vault / junction box installations will occur as outlined in Trench Detail 700-04. At no time shall a trench be closed without the approval of LPC. PVC conduit installed by the Customer is subject to testing by LPC as electric conductor is pulled into the conduit. If LPC is unable to install conductor in a section of pipe or if ground vaults / junction boxes are not level, or to proper elevations, the Customer's representative shall be advised of the situation. It is the responsibility of the Customer to make the repairs. The Customer shall discuss the schedule for repairs with LPC. Job delays may result in additional costs.
2. The facilities installed by the Customer are subject to the acceptance and warranty process as outlined in the Public Improvement Agreement.
3. Charges for inspection will be based on the actual time and equipment required by the project and billed upon completion.

701.2 SERVICE LINE SIZES AND INSTALLATION

701.2.1 RESIDENTIAL SERVICES

1. For single family residential services, 200 amps or less, the Customer installs underground secondary service lines from a specific electric ground vault / junction box to the permanent meter location. The bottom of the trench must be smooth and continuous. The Customer may be required to provide bedding material where poor soil conditions exist. The Customer will install schedule 40 PVC. All sweeps shall have a 24 inch radius. PVC joints shall be made with long line bell ends and couplings using cold weather glue. The installation shall not be placed beneath nor within any hard surface (i.e. concrete/brick) and must meet the National Electric Code. The trench must remain open and accessible until approved by the Building Inspection & Permits Division. A two (2) year warranty on trench compaction, conduit, cable and the meter housing installation shall be provided by the Customer listed on the permit and shall be measured from the date of the approved service lateral inspection.
2. For residential services greater than 200 amps; the installation, ownership and maintenance of conductors and metering equipment beyond LPCs point of delivery are the property owner's responsibility. The point of delivery is dependent upon site conditions and may be defined as:
   a. Electric transformer
   b. Ground vault / junction box
   c. Overhead attachment point on Customer owned structure
3. It is the Customer's responsibility to restore compaction when entering into LPC equipment locations. Prior to the installation of the final meter, LPC will advise the Customer listed on the permit of any required corrections needed. Items deemed a safety issue must be corrected within 10 working days or will be subject to disconnect at LPC's discretion. All other repairs must be corrected prior to the Certificate of Occupancy. Any work completed by LPC to correct any damages, grade issues or compaction deficiencies will be charged to the Customer and are due within 30 days.
4. Prior to the conclusion of the warranty period, LPC will inspect the service installation within the 11th month and the 23rd month. If deficiencies are found in the service equipment originally installed by the Customer, the Customer listed on the permit will be notified. The Customer must correct the deficiencies and contact LPC within 30 days of notification to schedule a re-inspection or request LPC to make the repairs at the Customer's expense. The Customer will own and maintain the underground secondary service line until all deficiencies have been corrected. Following the completion of the

warranty period and an approved inspection, the City will accept ownership and maintenance of the underground secondary service to the line side of the meter housing.

701.2.2 MULTI-FAMILY AND COMMERCIAL DEVELOPMENT SERVICES

1. Multi-family and commercial development service lines are installed, owned and maintained by the customer. They must meet the National Electric Code and be approved by the Building Inspection & Permits division. The Customer will install cable of sufficient length for termination.
2. In multi-family or commercial developments where more than two (2) service lines are installed out of a transformer or junction facility, the use of heat shrink tubing is required to identify the secondary conductors. Each service line requires heat shrink tubing with a color that is unique to the unit it serves at both the meter housing and the electric source. The heat shrink tubing is not provided by the City. Reference Detail 700-15 Service Line Identification.
3. All connections to underground City-owned facilities will be made by City personnel after approval by the Building Inspection & Permits division.

701.3 SECONDARY CABINET INSTALLATION

1. All connections to city-owned facilities will be made by LPC.
2. The total number of connections within a single-phase transformer is limited to four (4) with a max cable size of 500 kcmil.
3. The total number of connections within a 25 kva to a 225 kva, three-phase transformer will be limited to six (6), with a max cable size of 500 kcmil.
4. The total number of connections within a 300 kva to a 2500 kva, three-phase transformer will be limited to 10 with a max cable size of 750 kva
5. The customer will install sufficient length for termination. Refer to detail 700-15 Service Line Identification.
6. In the event that more than the allowed number of conductors are required, a secondary cabinet shall be required. The secondary cabinet shall be supplied, installed, owned and maintained by the Customer and shall be the point of attachment for the service. The Customer shall install 4-inch PVC conduits from the transformer to the secondary cabinet. The total quantity of 4-inch PVC conduits will be determined by the size of the utility transformer. LPC will install, own and maintain the cable(s) from the transformer to the secondary cabinet. LPC will terminate all cables within the utility transformer. The Customer will terminate all cables within the secondary cabinet. The secondary cabinet shall have a minimum clearance of 5 feet from the utility transformer but not exceed 10 feet. For additional information refer to Detail 700-19 Secondary Cabinets.

702.00 INSTALLATIONS

702.1 SUBSURFACE INFRASTRUCTURE

1. LPC will install the site-specific subsurface infrastructure as requested by the Customer. The Customer is responsible for preparation of the site. Additional charges may be incurred when the site is not properly prepared prior to the start of work by LPC. These charges may result from soil conditions, inadequate grading, surveying, road crossings, or construction phasing of other utilities.
2. Project designs and invoicing for the installation of LPC facilities are based on the Customer having met all of the following site readiness requirements:
    a. For All Development Types
        i. Customer installed street and sidewalk crossings shall be located and installed in accordance with City Standards. Reference Detail 700-03 Customer Installed Sleeve
        ii. A 10 foot corridor along LPCs trench path must be graded to within two (2) tenths of final grade at the time of LPCs installation. This path must be sloped relatively flat and smooth to facilitate trencher access and cable installation.
        iii. LPCs trench path shall be free of construction equipment, materials, scrap, concrete, or any object(s) that may inhibit trenching operations.
        iv. The Customer is to coordinate the installation of facilities according to specifications, from deepest to shallowest, (i.e., sewer, water, electric, gas, communications, irrigation, landscaping). Facilities requiring an installation depth less than LPC utilities, which are installed prior to LPC facilities, will require a change order and may result in additional installation charges.
        v. Customer installed facilities shall be placed as shown on the master utility plan, back-filled, and compacted. (i.e., sewer, water, storm drainage, etc.)
        vi. The Customer shall provide utility locates for underground infrastructure installed but not currently owned and maintained by the City, i.e., sewer, water and storm drainage. Additionally, all empty conduits used as sleeves for irrigation and dry utilities must be located and clearly identified. LPC shall not be responsible for repairs to underground utility infrastructure that is not properly located and marked by using standard utility locating materials, paint, stakes, locating flags, per the typical locating procedure. Minimum accuracy of all locate marks must be within 18 inches either side of the underground infrastructure to be considered properly located.
    b. For All Development Types; excluding Single Family Residential
        i. The Customer is responsible for accurate survey information, including elevations, for the center of LPCs trench path and five (5) feet offsets for two corners of each of LPCs equipment locations.
    c. For Single Family Residential (only)
        i. Concrete sidewalks, curbs, gutters and pavement shall be installed.
        ii. Concrete Driveways and landscaping and irrigation shall not be installed prior to LPCs facilities.

iii. Sidewalks shall be free of all debris with front property lines painted on the sidewalk and the rear property lines clearly staked. The Customer shall not place property pins within LPCs prepared path until the installation of LPCs infrastructure has been completed.

702.2 ELECTRICAL APPARATUS

1. Upon completion of the subsurface infrastructure either by the Customer or LPC, LPC will schedule the installation of specific electrical equipment. Construction power will be available when all on-site and off-site electric distribution is installed and energized.

703.00 METERING REQUIREMENTS

703.1 GENERAL

1. Meter housings, service disconnects and associated metering equipment for all types of services shall be located on the outside of the building or structure and accessible to LPC as referenced in Chapter 14.32 Rates and Regulations Governing Electric Service of the City Code. Single meters shall be installed at a height of five feet, six inches above ground or platform to the center of the meter and shall not be fenced in. Meter banks shall be cold sequenced and installed with the lowest meter at least 24 inches above the ground or platform and the highest meter is not to be over 75 inches above the ground or platform.
2. Meter housings for irrigation controllers, site entryways or any other private use may be installed on Customer owned and maintained unistrut or cedar post. The installation shall be cold sequenced and the meter housing shall have a phenolic badge as outlined below.
3. All installations other than single family residential services must be cold sequenced, unless prior written approval is given by LPC meter shop.
4. Current Transformer (CT) and Potential Transformer (PT) requirements: All electrical services over 400 amps, single-phase, three-phase, 120/240 volt & 120/208 volt require CTs. All services over 200 amps, three-phase, 277/480 volt & 240/480 volt will require CTs and PTs. Meter housings, CTs and PTs are required to be obtained from LPC at 1100 South Sherman Street. The Customer will be charged for this material.
5. Labeling of single, commercial and multiple meter sockets are the Customer's responsibility. Each meter of a multiple meter socket and all individual meter sockets will have a permanent phenolic badge showing which apartment, office, or room is metered by each meter. Badge requirements are as follows:
    a. The badge will be a minimum size of one (1) inch by two (2) inch. Letters and numbers must be with text a minimum of three eighths (3/8) inch height.
    b. Electric one-line diagrams must include labeling schemes for each metered service. These labeling schemes should follow this pattern; numeric, alphabetic, numeric. (Example; 1855 Main, Building A, Unit 101) Floor one (1) should consist of units 101,102, 103 etc. Floor two (2) should consist of units 201, 202, 203, etc. Floor three (3) should consist of units 301, 302, 303, etc. and so on. The house panel should be labeled as "House" and trash compactor as "Trash". All metered services must be badged according to the labeling scheme shown on the one-line diagram.
    c. Meters will not be installed until all sockets are tagged correctly with phenolic badges and riveted permanently to the electric equipment. When internal number and/or lettering schemes are changed or incorrect tagging creates inaccurate information in the City records, the Customer will be responsible for actual labor, equipment and material charges incurred by LPC to correct the situation.
6. Bolt in (K-Base) metering equipment is not allowed.
7. Exceptions to the metering specifications must be approved by LPC staff at 303-651-8386.
8. Reference Standards for Metering for additional details.

703.2 METER LOCATION

1. Meter housings, service disconnects and associated metering equipment for all types of services shall be located on the outside of the building or structure and accessible to LPC staff.

2. Meters shall not be fenced in or installed in places difficult to access, such as over open pits, moving machinery, hatchways, in the path of water from at least 36 inches in front of and around the meter. Refer to detail drawing MTR-8. No plants, shrubs, or other obstructions shall be placed within 36 inch clearance area. Customers shall be given seven (7) days to comply after written notice. After the expiration of the seven (7) days, the City, in its discretion, may conform the meter access to this regulation at the Customer's expense or discontinue service.
3. Where the meter is recessed in the wall of the building, a space of not less than twelve inches on each side of the center line of the meter base shall be provided to permit access for City test equipment or meter changes.
4. New service entrance locations shall be approved by LPC prior to installation.
5. Meters currently located on the inside of Customer premises shall be moved to the outside when there is a change of service
6. All meter equipment must be installed in readily accessible locations for LPC personnel.

703.3 CONSTRUCTION POWER

1. Construction power will be available for site trailers and model homes after LPC has completed their construction efforts and the approval for temporary use applications has been completed by the City. All electric services require a building permit and inspection by the Building Inspection & Permits division. The City provides temporary construction power for a period of 12 months or less where electrical service is required.
2. On single family residential the Customer shall post the address on the meter housing that is large enough to be seen from the street.
3. The Customer shall install the construction power within two (2) to three (3) feet of the secondary junction box or transformer. Refer to drawing MTR-1. In locations where the transformer will be the source, the temporary construction power shall not be located in front of the transformer and shall maintain minimum clearance requirements as referenced in Detail 700-02 Equipment Clearances.
4. ALL requirements for permanent wiring found in the latest version of National Electric Code (NEC) apply to temporary installations.
5. All service installations must have an approved meter socket with sealing mechanism. All electric meters shall have a lever-operated bypass, excluding CT rated services.

703.4 RESIDENTIAL - SINGLE SERVICE

1. Meters shall be in direct line of sight with the secondary ground vault /junction box. Reference Detail 700-16 Metering Single Family for additional information.
2. All residential services must have a load side service disconnect sized accordingly and located next to the meter.

703.5 SINGLE-PHASE SERVICES: 201 – 400 AMPS (CLASS 320 METERING)

1. Single-phase three (3)-wire, 120/240 volt or 120/208 volt, 400 amp services utilize a class 320 (CL320) meter and require the installation of an approved CL320 meter socket purchased by the Customer. The CL320 meter socket must include a lever operated bypass that can operate as a 320-amp continuous duty bypass device. (Meter socket combined with the service disconnect). Any single-phase three (3)-wire, 120/240 volt and 120/208 volt service shall have a five-jaw meter socket

installed. The fifth jaw shall be installed in the nine (9) o'clock position and connected to the neutral. All non-residential services must be cold-sequenced.

703.6 THREE-PHASE SERVICES: 201 – 400 AMPS (CLASS 320 METERING)

1. Three-phase 4-wire, 120/208 volt or 120/240 volt, 400 amp services utilize a class 320 meter and require the installation of an approved CL320 meter socket purchased by the Customer. The CL320 meter socket must include a lever operated bypass that can operate as a 320-amp continuous duty bypass device. (Meter socket combined with the service disconnect). Any three-phase, four (4)-wire, 120/208 volt and 120/240 volt service shall have a seven-jaw meter socket installed. The seventh jaw shall be installed to the neutral.
2. All non-residential services must be cold-sequenced.
3. 277/480 volt or 240/480 volt, class 320 metering is not allowed, CTs and PTs will be required.

703.7 COMMERCIAL

1. All commercial services must be cold sequenced with a sealable disconnect on the line side of the meter that will be sealed by LPC. All service installations must have an approved meter socket with sealing mechanism and shall be equipped with a lever-operated bypass. All 200 amp, three-phase, four (4)-wire, 120/208 volt or 277/480 volt self-contained services shall have a seven-jaw meter socket installed. See Detail MTR-16
2. Services rated at 277/480 volt up to 200 Amp will be non-CT Rated. When the load is greater than 200 amps, PTs with CTs are required. A CT cabinet with integral PT mounting provisions is required. PT mounting height must not exceed eight (8) feet. Electrical conductors shall not be placed in front of the PTs.
3. CTs and PTs shall only be installed in approved NEMA Type 3R CT cabinets equipped with a hinged door, lockable hasp and fasteners that cannot be removed from the exterior of the cabinet, which will be supplied and installed by the Customer. Keyed door locks are not allowed. The CT cabinet and meter socket shall be installed such that the meter socket is not obstructed with the cabinet door in the full open position. For Switchgear CT compartments, barriers shall be installed on all 4 sides of compartment. The compartment shall not have any Customer installed equipment behind hinged sealable doors. All panels providing access to unmetered conductors shall have fasteners that cannot be removed from either the exterior or the Customer compartment. No conductors, other than those serving the CT compartment and the ground bus shall be installed in or routed through the compartment. 277/480 volt switchgear shall be manufactured with provisions for unobstructed mounting of PTs inside the same compartment as CTs. If switchgear is to have door fronts, there shall be no other Customer equipment inside the metering section. CT cabinets and meter sockets may not be used as a pull-box or junction box. No connections shall be made in the CT compartment or meter socket to supply another meter, more than one load circuit, or Customer equipment. For multiple loads a switchboard or combination CT/multi-main equipment must be used. Gutters, raceways and conduit after metering point is allowed. Minimum distance from the floor or the ground shall be 24 inches to the bottom of the cabinet. Refer to Detail MTR-13 Commercial Switchgear Specifications
4. Cabinet dimensions are identified in Detail MTR-10:
5. Services at 1000 amp 277/480 volt or 2000 amp 120/208 volt and greater require a dedicated CAT5E or equivalent for remote interrogation of each meter. Provide a conduit a minimum of one half (1/2) inch into the lower portion of the meter housing, as shown in Detail 700-17 Metering Communication Line. For information regarding communication line installation and access, please call 303-651-8386.

6. Meter pulse outputs (KYZ metering) are available at the Customer's request. LPC will coordinate the installation details and applicable fees.

704.00 SMALL CELL FACILITIES

704.01 LPC STREET LIGHT POLES

1. Pole shall be round, straight, galvanized steel with a preferred 12.75 inch outer diameter. Pole shall be galvanized in accordance with AASHTO M 111. Pole shall be dark brown in color and paint shall be powder coated over zinc paint. Other colors may be approved by LPC. Pole shall be designed to withstand a minimum wind velocity of 110 mph per TIA-222 revision G and IBC 2012 with ASCE / SEI 7-10. A minimum 15% of the pole structural capacity shall be reserved for future Longmont Internet-Of-Things installations. Weatherproof grommets shall be integrated into the pole design to allow for cable to exit. A hand hole shall be provided to maintain current and future LPC facilities. An optional hand hole may be provided above the base. Pole shall be architecturally compatible with the equipment cabinet.
2. The luminaire mast arm length shall match that of the existing pole unless otherwise directed by LPC. All luminaires shall be mounted at the same height as surrounding streetlights unless otherwise directed by LPC. All luminaires shall be provided by LPC. Luminaire mast arms shall be galvanized steel and painted to match the pole.
3. Cantenna shall be 16 inch maximum outer diameter with shroud. The height of the cantenna – including all associated equipment and hardware required for installation – from the top of the mast arm connection to the top of the cantenna shall not exceed eight (8) feet. A tapered transition between the upper pole and cantenna shall be included.
4. Antennas located on the side of a pole, along with all other hardware required for complete installation, shall fit within a 38 inch height by 16 inch width by 12 inch depth maximum shroud and securely strapped to the pole. The shroud shall be colored to match the pole.
5. Radio frequency warning labels shall be mounted exterior to the pole. Four (4) inch by six (6) inch maximum plate with Carriers name, location identifying information, and emergency telephone number shall be permanently fixed to the pole.
6. Equipment cabinet shall be round, galvanized steel with a preferred 16 inch diameter (20 inch diameter maximum) and five (5) feet eight (8) inch maximum height. Equipment cabinet shall be galvanized according to AASHTO M 111. Equipment cabinet and pole shall match color. All equipment shall be located internal to the equipment cabinet or recessed as much as possible. 100 A meter housing (with lever bypass) for Carrier electric service shall be recessed into the equipment cabinet. Meter disconnect shall be recessed into the cabinet. Meter shall be properly grounded per current NEC. A hand hole for streetlight electrical service shall be provided. At each equipment cabinet hand hole, provide a submersible, waterproof, in-line fuse holder with a FNQ-R 15A fuse for each hot and a submersible, waterproof connector on neutral (if required). A passive ventilation system shall be provided for temperature control. Pole and equipment shall be grounded to meet applicable NEC sections including (but not limited to) 410.30(B) (5), 250.118, AND 250.122. All hardware attachments shall be hidden.
7. Precast concrete foundations designed to meet ACI 318-14 are preferred and should be installed whenever possible. A minimum of four (4) two (2) inch PVC Schedule 40 conduit sweeps shall be installed. Conduit shall accommodate LPC electrical, Carrier electrical, and fiber. Any additional conduit sweeps are for future LPC use. Anchor bolts shall be hidden from view. Top of foundation shall be four (4) inches above final grade. Foundation depth, embedment depth, dimensions and reinforcement shall be designed by a Professional Engineer.

8. Fiberglass Pull/splice boxes are required for separate electrical and fiber services. Refer to NEC article 314 “Pull and Junction Boxes and Conduit Bodies Minimum Size" for box size requirements based on conduit and wire sizes. Fiberglass pull/splice boxes shall be set one (1) to three (3) feet from the concrete foundation. The wire terminations in this box shall be made using submersible insulated pedestal lug connections. Provide one multi-lug connector for each phase, neutral, and ground connector to be spliced in this in-grade splice box.