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For the latest authorized version, please refer to the company’s website at [http://www.libertyutilities.com/electricalspecifications](http://www.libertyutilities.com/electricalspecifications).
URD Specifications and Installation Guide Acknowledgement (Job Spec/Signoff Forms)
The requirements and specifications outlined in this guide book must be strictly followed. Any requirements not adhered to can pose safety problems, can be detrimental to the installed system and must be corrected before final acceptance. The Customer will bear full cost to make corrections to sub-standard installations.

The Customer is responsible to provide enough lead time for the Company to design job, provide inspections and install Company equipment where applicable.

Typical lead times are shown below.

<table>
<thead>
<tr>
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<th>Lead-Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
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<td>Design and Layout</td>
<td>Eight weeks</td>
<td>Company receives all required plans, load data and easement information</td>
</tr>
<tr>
<td>Trench, Conduit and Equipment Inspection</td>
<td>Three days</td>
<td>Company inspector</td>
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<td>Company Installation</td>
<td>Four weeks</td>
<td>After all inspections are approved and permits/easements are procured</td>
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<td>Material Pick up</td>
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**NOTE: The above times are estimates only.**

Project Title ____________________________________________________________

Location ________________________________________________________________

Owner/Developer _________________________________________________________

Customer’s Representative ______________________________________________ Date ______________

Company Representative ______________________________________________ Date ______________

Company’s Copy

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Location _________________________________________________________________________________

Owner/Developer __________________________________________________________________________

Customer’s Representative _____________________________________ Date _______________________

Company Representative _______________________________________ Date _______________________

Customer’s Copy

For the latest authorized version, please refer to the company’s website at http://www.libertyutilities.com/electricalspecifications.
1.0 Scope
The purpose of this specification is to define, interpret and clarify the scope of work and material dealing with providing service to URD’s and is a Supplement to Electrical System Bulletin (ESB) 750.

It is important that the Specifications for Electrical Installations book (ESB 750) be obtained and referred to in conjunction with this supplement for these installations. Any reference to the Company in this specification shall mean the Liberty Utilities. Any reference to the Customer or Developer in this specification shall mean the property owner or the designee of the property owner of the URD.

2.0 General Requirements
All electrical wiring to be connected to the Company equipment shall be installed in accordance with one or all of the following:

- Local Municipal Inspection Authority
- State’s Electrical Code
- National Electrical Code
- National Electrical Safety Code
- Applicable Distribution Construction Standards of the Company
- Liberty Utilities’ Specifications for Electrical Installations

There shall be no attempt to deviate from either the Distribution Standards of the Company or the Company construction plan without the approval of the Company. Any specifications noted shall supersede the Specifications for Electrical Installations booklet unless otherwise approved by the Company.

It is mandatory that the Customer and all parties involved attend a documented pre-construction meeting with a Company representative to discuss the project and ensure a timely completion. Company representatives will be available throughout the job life cycle to discuss construction problems when requested or during a field visit.

References:
- ESB 750 - Specifications for Electrical Installations
- ESB 759B – UCD Installation and Responsibility Guide

All ESB’s are available at http://www.libertyutilities.com/electricalspecifications

The Customer shall be responsible to have all electrical and physical design documents prepared and updated by a design professional, in accordance with Section 1.7 of ESB 750 for the trenching, conduit, transformer pad, and handhole installations.

3.0 Type of Service
Electric service shall be single phase, three wire, 120/240V supplied from a padmount transformer or handhole to be located on the Customer’s premises. The primary electrical service to the URD will be supplied from a pole or cable system owned by the Company.
4.0 Plans and Other Documents
The total number of house lots proposed to be constructed will be provided in advance to the Company by the Customer, along with a complete copy of the subdivision plans approved by the planning board in the municipality, if such is required by the municipality. The Company will not begin design work prior to receipt of the approved plans.

The Company may require the Customer to provide, in advance and at no cost to the Company, the following:

i. A copy of the approval of the planning board for the subdivision;
ii. Copy of all permits and approvals that have been obtained for constructing the development;
iii. Easements, drafted by the Company, for all facilities required to serve the development;
iv. The name and address of the financial institution providing financing for the development, including a contact person and phone number;
v. A copy of a street light proposal for the development, approved by the municipality, or written notice from the municipality that street lighting will not be required; if installation is requested after construction is complete, additional costs, may be borne by the municipality and/or Customer if the tariff does not collect all costs of construction;
vi. A schedule of Customer’s best estimate for the construction of homes in the development; and
vii. Such other reasonable information that may be requested to confirm the viability of the development.

Conduit Systems in general: will be designed to support a looped primary system with no spare conduit. The Company requires a spare conduit for all Company owned radial duct systems, as shown in Company plans. Other utilities must maintain clearances as outlined in the NESC.

5.0 Permits
In general, all applicable permits necessary to trench and excavate, including street openings and environmental permits, shall be obtained by the Customer and made available upon request of Company prior to design. The Customer shall be responsible for including these padmount and conduit/trench specifications with the wetlands application for developments located in or near wetlands. A copy of the wetlands permit may be requested by the Company prior to acceptance of the conduit/trench system by the Company.

The Customer/Company doing the excavation shall obtain the required DIGSAFE permits before any excavation may take place in a public way. The Customer/Company doing the excavation is urged to obtain copies of the applicable statute and become familiar with its requirements. Similarly, the Customer/Company shall determine if the municipality in which the excavation is to be done requires that water, sewer or other utility, municipal or private, be contacted separately due to the possibility they may not be members of DigSafe® (for New England). The Customer is also responsible to notify the company of all as built changes that may conflict with design).

The Customer shall certify to the Company that areas in which the Company is to perform installation or maintenance work is free of pre-existing contamination by hazardous wastes or materials and to indemnify the Company for any claims, costs, expensed, suits, demands, citations, fines or damages of any kind arising from the presence of any such contamination.

The Company may, at its discretion, construct the underground distribution line in segments, rather than all at once in the proposed development. The Company may, at its option, be exempt from undertaking construction during the period of December 1 to April 1 each year.
6.0 Division of Responsibility
The division of ownership and responsibility shall be as outlined below. Typical installation specifications to reflect installation practices are shown in the back of this guide.

New Hampshire
a. The Company will:
   i. Develop the plan to provide underground electric service,
   ii. Supply a list of approved manufacturers and their part numbers for equipment to be supplied by the customer, (See Pages 32 – 34)
   iii. Designate the location of all Company owned equipment,
   iv. Provide Company owned street light foundations and any cable-in-conduit required for street light applications,
   v. Provide, install, own and maintain all transformers, Company owned street lights, primary and secondary cable, except services,
   vi. Make all connections to Company equipment,
   vii. Inspect the underground conduit system, equipment foundations and ground grids installed by the Customer, prior to backfilling and before Company acceptance of conduit system,
   viii. Determine if oil containment shall be required for padmount transformer installation,

b. The Customer, at no cost to the Company, will:
   i. Provide, prior to the start of the Company’s construction, all applicable documents required for the Company to prepare easements for its facilities to be installed on private property,
   ii. Install foundations and conduit, provided by the Company, for Company owned street lights, which locations have been approved by the local municipality,
   iii. Provide and install all required handholes, boxpads, pull/splice boxes, grounding systems, and conduit including spacers, galvanized conduit and sweeps for riser poles including bonding clamps and neutral tap, glue and pulling tape, etc. as indicated on the Company’s plan and related construction documents,
   iv. Supply copies of all invoices, when requested, indicating manufacturer and part number for all such equipment above; equipment that is not approved shall not be used without the prior written consent of the Company,
   v. Install, own and maintain all secondary services and service conduit from the Company’s equipment to each designated meter location,
   vi. Turn over ownership of the conduit system, excluding the service conduit, to the Company upon inspection and acceptance of the conduit system by the Company,
   vii. Provide and install material for oil containment under padmounted transformers where required.

7.0 Easements
In general, Company-owned equipment shall not be installed on the Customer’s property prior to the execution of suitable easement(s). The Customer will have to provide to the Company (for the purposes of securing an easement) the following items, including but not limited to:

- Copy of property deed showing: owner, date, book number, page number county registry, and survey and/or plan of record, if available.
  Note: When electronic maps are used, the Customer must consult the Company for submittal.
- Copy of mortgages showing: holder, date, book number, page number and county registry.
Copy of any applicable trusts showing: date, book number, page number and county registry, and who is authorized to sign legal documents on behalf of the Trust.

Easement application forms are located on Page 31. Refer to Sections 3.1.3 and 4.1.1 in ESB 750 for further easement requirements applicable to the Applicant or Customer.

### 8.0 Trench Construction Requirements

#### a. Layout and Grading
   i. Final grades shall be established and the binder coat installed, and easement boundaries, street, lot and trench lines staked by the **Customer** before any trenching is started (except for **Company** inspected road crossings).

#### b. Trenching and Backfilling
   i. The **Customer** shall adhere to the construction plan specifying trench locations and depths, with any deviation being subject to approval by the **Company**.

   ii. Minimum burial depths specified for all electrical conduit and direct burial trenches shall be maintained during all phases of construction. Temporary mechanical protection over buried conduit during construction to prevent conduit crushing or damage due to unusually heavy construction equipment shall be the responsibility of the **Customer**.

   iii. Trench detail shown in attached **Company** Standards shall be adhered to. The trench bottom shall be solid, undisturbed earth. Earth showing signs of peat, cinders, rubble or any conditions not suitable for a stable foundation shall be reported to the **Company** Representative for recommendation. Pockets of unsuitable soil shall be replaced with compacted sand.

   iv. For work done by **Customer**, a **Company** representative shall be notified in advance of the backfilling of any electric facility, i.e., conduit, foundation, handhold, pull-box, cable-in-conduit, grounding, cables, etc.

   If any facility is backfilled without the **Company**’s prior approval, the **Company** reserves the right to require re-excavation of the facility.

   aa. Sand for conduit installation - A minimum of three inches of sand shall be placed, under, beside, around and on top of all electric conduits. The sand shall pass through 3/8 inch mesh screen and shall not contain any sharp stones. Sand shall be placed and suitably tamped over installed conduit in reasonably small quantities (not a front end loader bucketful all at once) to avoid conduit damage. Sand shall be evenly distributed between and around all electric conduits.

   v. Remainder of backfill shall not contain stones greater than once inch and shall not contain ashes, cinders, shell, or frozen material,

   vi. Trenches shall be immediately backfilled following cable or conduit system inspection and approval by authorized **Company** representative,

   vii. Backfilling shall be accomplished in a continuous manner from one terminal, i.e., riser pole, foundation, handhold, etc. to the next,

   viii. Backfilling shall not take place over any open-ended (unplugged) conduits,
ix. Company approved red cable “Warning” or “Marking” tape shall be installed in the trench 12 inches below finished grade and directly above the cable or conduit.

9.0 Trench and Conduit System Inspection

In the applicable area, a designated Company inspector shall be responsible for the inspection of the trench and/or conduit system being prepared and installed by the Customer at various stages of installation. The Customer shall provide the Company inspector with a minimum of 24 to 72 hours’ notice.

Inspections shall be conducted:

1) After conduit, ground system are completed; but before concrete is poured
2) After concrete is poured, but before backfilling if applicable
3) After backfilling

The inspection shall include, but not be limited to the following:

- All trenches and excavations
- All material supplied by the Customer
- All backfill and base sand material during or after installation as applicable
- All foundations, pull-boxes, boxpads, handholes, ground grid, and other facilities, after setting in place, but prior to backfilling
- All galvanized steel riser pole and sweep conduit installations, all conduit, including cemented joint, bends, sweeps, bell-ends, and conduit spacers, prior to backfilling, or concrete encasement
- All conduit terminations and supports at boxpads, pull-boxes, handholes, riser poles, streetlight foundations, and at other applicable locations
- The pouring of any required concrete encasement and subsequent backfilling around the conduit runs
- All backfilling operations
- Witnessing mandrelling of all conduits

10.0 Conduit Installation

a. Conduit shall be installed, by Customer, in accordance with the Company Standards and Construction Plans which accompany this specification package.

b. Plastic spacers shall be used to separate all ducts where more than one duct is installed. Spacers shall not exceed eight foot intervals. Spacers shall be placed at each coupling. Spacers are required to maintain proper separation from adjacent conduits and to aid in proper sand placement for thermal reasons.

c. Type DB conduit shall be employed whether duct is direct buried or encased in concrete.

d. All galvanized steel sweeps at risers shall have a minimum radius of 36 inches. 48 inch radius sweeps are required at transformer foundations and secondary handholes. See Page 13 for details.
e. Curves and bends in conduit runs shall be gradual, and the radius of curvature shall not be less than 40 feet. Only five Degree Angled Couplings shall be used to make these gradual bends.

f. Conduit grade shall be such as to cause all ducts to drain toward one or both equipment foundations, primary pull/splice boxes or handholes. Minimum pitch shall be three inches per 100 feet. Pull/splice boxes may be required near riser pole if grade at pole is low compared to the first boxpad to alleviate water buildup in risers.

g. Conduit shall have a maximum penetration inside walls of primary pull/splice boxes, equipment foundations or handholes of three inches. All unused conduits and conduit knockouts shall be sealed with conduit plugs. Bell ends shall be installed at the end of all conduit runs.

h. The minimum separation between electrical conduit and foreign conduit or pipes shall be as follows:

- Communication systems – 12 inches
- Water, Gas and Sewer – 12 inches where the paths of these utilities intersect electrical conduits at approximately right angles. A minimum separation of 24 inches shall be maintained between parallel placement of any of these utilities and electrical conduits.

i. All road crossings shall, when practical, be perpendicular to the sidelines of the road.

j. All road crossings shall have 30 inch minimum burial depth, top of conduit to finished grade, for primary and 24 inch minimum for secondary voltages. (including street lighting cable-in-conduit) Main electric trench shall maintain conduit depths as shown in on Page 28. A primary burial depth could be lessen to 24 inch minimum where supplemental protection is provided (i.e. concrete or steel barrier). Approval of Company representative is required.

k. Where foreign objects threaten to interfere with the installation of conduit in the sidewalk area or other areas, the Company may require concrete encasement of the conduit.

11.0 Transformer Box Pad Installation

- All foundations shall be level and installed in accordance with drawing on Pages 12-13.

- A minimum of four inches base course of crushed stone (3/4 in maximum stone size) shall be placed under all transformer foundation excavations and thoroughly compacted using a vibratory compactor. Certain soil conditions may require removal below normal depth and subsequent additional clean sand or stone added and compacted to insure sound base course for foundation. For direct burial cable installation, cables are to be surrounded by at least 4” of sand at base area crossing from the trench into the box pad.

- Transformer foundation top surfaces shall be four inches above final grade. In no instance shall final grades hamper proper access or operation of equipment.

- A buried ground grid shall be installed in accordance with details shown on Pages 14 and 15. Ground loop around transformer to be buried 12” below finish grade (not at foundation base depth). Telephone Company bond wires shall be tied to the ground grid. Such bonding or connection shall not interfere with connecting Company equipment.
Retaining walls or other devices shall be installed where slopes exist that would undermine or cover equipment, such as transformers due to sharp drop-off or rise.

Upon completing the installation of the transformer foundation, the top opening shall be securely sealed with a suitable matching cover.

Transformer foundation shall be completely backfilled prior to commencing any cable pulling.

In some locations oil containment may be required for box pad installation, Pages 20 and 21 show installation procedure.

12.0 Transformer Secondary

Customer secondary service wires entering the box pad shall be in accordance with the NEC and shall be approved by the wire inspector or AHJ (Authority Having Jurisdiction) of the town or city involved. Maximum size of secondary cable to be physically connected to the Company's pad-mounted transformer is 500 kcmil. No more than five secondary services shall be connected at any Company supply point. Cables shall be left with five feet of slack coiled inside the pad in order to reach to the secondary connection points on the transformer.

13.0 Transformer Grounding and Bonding

The ground grid shall be #2, bare, soft drawn, 7 strand copper wire. The wire shall be installed 12 inches below finished grade and located around the transformer pad as shown on Page 14. Bond to all exposed metallic conduit and leave three feet of wire above pad for grounding transformer.

Two ½ inch diameter, eight feet long copper weld ground rods and approved connectors shall be installed to 12” below finished grade. Leave the ground rods and grid exposed until inspected by the Company. The ground grid is to be complete and backfilled prior to energizing the transformer. Connections to ground grid to be made with compression connectors as shown on Pages 14 and 15. However exothermic welding ("cad weld") shall be an acceptable alternative to a compression connection. Bolted connectors are only acceptable for the ground grid connections to the ground rods. The Company shall install the ground taps onto the transformer.

NOTE: In most instances, the Company shall require that equipment easements on private property be reasonably level. Also, all retaining walls shall fall outside of equipment easements and in no case shall they hamper door openings or placement of such equipment. Retaining wall design shall be approved by the Company.

14.0 Spacing of Boxpads, Pull/Splice boxes, and Handholes

All communication boxes shall be a minimum of 2’ away from any Company boxpad, pullbox or handhole. Also, communication equipment shall not be placed in front of any Company equipment.
15.0 Proper Transformer Pad and Conduit Layout

Figure 15.0-1 Preferred Location of Equipment in Easement Area
Figure 15.0-2 Single Phase Padmount Transformer — Typical Layout

15.0-3 Single Phase Padmount Transformer — Direct Burial Layout
16.0 Transformer Ground Grid Bonding

Figure 16.0-1 Single Phase Padmount Transformer Ground Grid

Notes:
1. Drill 5/8 inch diameter holes as shown in sides of foundation if not provided by foundation manufacturer.
2. Ground loop around foundation to be buried 12 inches below finish grade.
3. Although conduit system is shown, direct buried systems shall incorporate the same ground grid.
Figure 16.0-2 Single Phase Padmount Transformer Ground Grid — Front Elevation

Notes:
1. Drill 5/8 inch diameter holes as shown in sides of foundation if not provided by foundation manufacturer.

2. Ground loop around foundation to be buried 12 inches below finish grade.

3. Although conduit system is shown, direct buried systems shall incorporate the same ground grid.
17.0 Proper Transformer Pad and Conduit Installations

17.0-1 Proper Conduit Bank Installation (Pre-Backfill)

17.0-2 Proper Installation of Conduit with Pullbox used for Drainage (Pre-backfill)
17.0-3 Proper Conduit and Handhole Installation (Pre-backfill)
17.0-4 Properly Completed Transformer Installation (Final Grade)

For the latest authorized version, please refer to the company’s website at http://www.libertyutilities.com/electricalspecifications.
17.0-5 Properly Completed Handhole Installations (Final Grade)
18.0 Transformer Oil Containment

Figure 18.0-1 Single Phase Oil Containment for Cables in Conduit

NOTES:

1. Dig out as least an additional foot on bottom and sides for boxpad area and stub conduits out into the pit.

2. Install geotextile liner in pit along the bottom and sides up to 6” from finished grade.

3. Make vertical cuts in liner to accommodate conduits.

4. Overlap the liner flaps around the conduit and seal both liner seam and in between conduits with expanding foam.

5. Fill in area with 6” of compacted silty sand.

6. Install second layer of geotextile liner by repeating steps 2 and 3.

7. Install 4” minimum of gravel base for boxpad to be at proper grade.

8. Set boxpad and make up conduits into it.

9. Install ground grid and backfill after company inspection.
Figure 19.0-2 Single Phase Oil Containment for Direct Buried Cables

NOTES:

1. Dig out as least an additional foot on bottom and sides for boxpad area and stub conduits out into the pit.

2. Install geotextile liner in pit along the bottom and sides up to 6” from finished grade.

3. Make small holes in the liner, feed liner through holes into pit.

4. Once cable is pulled, seal the liner around the cable with expanding foam.

5. Fill in area with 6” of compacted silty sand.

6. Install second layer of geotextile liner and cut holes for cables as in note 2.

7. Install layer of gravel for cable routing and base for boxpad to be at proper grade.

8. Set boxpad, train cables into boxpad and fill on top of cables with sand.

9. Install ground grid and backfill after company inspection.
Geo-textile Liner
Generic name is: 16 oz. polypropylene geotextile. Also called filter fabric weighing 16 oz./square yard.

Brand names / Suppliers are:

**AME1680 available from**
American Engineering Fabrics (AEF), Inc.
(Emphasize polypropylene not polyester)
New Bedford, MA
1-617-965-0007 / 1-800-770-2666 or from

Vellano Bros, Lancaster, NY
1-716-684-7222
Several other locations in New York, Massachusetts, Rhode Island and New Hampshire
[www.vellano.com](http://www.vellano.com)

**Synthetic Industries ST 160 available from**
Spartan Mills Inc
Spartanburg, NC
1-803-576-2353

**Carthage Mills FX-160HS**
US Construction Fabrics LLC
90 Range Road
Windham, NH 03087
1-603-898-0532
19.0 Riser Pole

The *Company* shall designate conduit riser locations on the pole. All primary risers shall be Galvanized Steel, this includes the 90 degree sweep. Per NESC all steel risers must be bonded 6” from top and the bond must be at least 8’ high from finished grade.

The *Customer* is responsible for providing and installing the bond clamps and the tap. The *Company* will make the bond connection from the riser bond tap to the ground system on the pole. Spare riser sweep shall be bonded also. Approved materials reference is located on Page 32.
Properly Installed Primary Risers

Riser Pole Bonding
Rigid Galvanized Steel. Bond higher than 8’ and at least 6” from top.

Completed Riser Pole
The Company will specify on which quarter of the pole the riser shall be installed, away from traffic.

Spare Riser Sweep
Spare sweep shall be bonded to down ground and capped at riser pole.
20.0 Primary Cable Pull/Splice Box
This primary conduit equipment may be specified in the design for installation in sidewalks or grass plot areas where duct length or design requires extra pulling locations or splices. The splice box is H2O rated and shall be installed in locations not frequently traveled over by vehicles. Pull/splice boxes are supplied and installed by the Customer.
Properly Installed Primary Pullbox
21.0 Trench Requirements
Final grades shall be established; the surface rough graded within 6” of finished grade, and roadway and property boundaries shall be staked or marked by the Customer before any trenching is started.

The Customer shall adhere to the construction plan and specifications regarding trench locations, trench depth, and concrete encasement. Any deviation shall be subject to approval by the Company.

The Company shall be notified in advance of the backfilling of any electric facility. The Company reserves the right to require re-excavation of the conduits and foundations if the Customer fails to have inspection done or backfills before inspection.

For special circumstances that call for concrete encasement, such as crossing a culvert or stream, trenches shall not be backfilled until concrete has set (for at least two hours) and after approval by authorized Company personnel. All backfill shall be sand or gravel containing stones less than 1” in any dimension. Backfilling shall not take place over any open-ended (unplugged) conduits. Company approved red “Warning” tape shall be installed directly above the Company’s cable eight to 12 inches below finished grade. Laying the warning tape directly on the cable, concrete or conduit is not acceptable. Certain installations in the public way may require flowable fill instead in place of normal backfill.

21.1 Trench Depth Concrete Encased Conduit
Burial depths for electrical conduit shall be maintained not less than 30” from the top of the concrete encasement to grade during all phases of construction. The trench bottom shall be solid, undisturbed earth. Earth showing signs of peat, cinders, rubble, or any conditions not suitable for a stable foundation shall be reported to the Company for recommendation. Small pockets of unsuitable soil shall be replaced with compacted gravel (maximum 2” stone). At riser pole, end concrete encasement just before riser sweep.
22.0 Conduit Requirements

The Customer shall be responsible for all trenching, excavation, backfilling, and installation of the primary duct system. The Customer is also responsible to install any necessary pullboxes. Concrete encasement shall be provided and installed by the Customer as specified by the Company when required. Refer to 6.0 Division of Responsibility.

22.1 Pulling Tape

All conduits shall have a pulling tape, also known as “Mule Tape.” This tape is to be rated for 2,500 lbs. of tensile strength. Manufacturers of this tape are listed on Page 34.

22.2 New Hampshire:

The Customer shall ascertain the requirements of the specific municipality in which the development is located. For example, some municipalities may require that the Customer employ a licensed electrician to direct the installation of all conduit intended for electric facilities.
Temporary mechanical protection over buried conduit and encasements is recommended to prevent crushing or damage during construction, and is the Customer’s responsibility.

All road crossings shall, when practical, be perpendicular to the sidelines of the road.

The minimum conduit size shall be 4” for three phase and 3” for single phase cable installations. All sweeps at foundations and risers shall have a minimum radius of 36 inches. The riser sweep shall be galvanized steel. The Customer shall install conduit plugs in all unused conduits and pulling tape. At the riser pole, the galvanized rigid steel sweeps and the PVC/steel adaptors shall not be concrete encased. The Customer shall be responsible to install rigid galvanized steel straight conduit up the pole high enough to meet NESC code referenced on the riser pole requirements on Page 23, including conduit ground straps, up the riser pole (unless directed otherwise by the Company). The Company will specify on which quarter of the pole the riser shall be installed, usually away from oncoming traffic.

Except as noted on construction prints, curves and bends in conduit shall be gradual, and the radius of curvature shall not be less than 40 feet. All curves shall be formed with five-degree couplings. The minimum length between single, five-degree couplings is 42”.

Conduit grade shall be such as to cause all ducts to drain toward one or both equipment foundations or pullboxes. Minimum pitch shall be three inches per 100 feet.

The Customer shall insure that clearances are met and maintained, and that they are inspected by the Company. Unless local jurisdictions require greater clearances, the minimum clearances shall be as follows:

22.3 Communication Systems – Company conduit shall not be directly above or below communication conduit, except when crossing below communication conduit at approximately right angles. Company conduit and communication conduit shall be separated by a minimum of 3” of concrete encasement.

22.4 Non-Company Water, Gas and Sewer – Company conduit shall not be directly above or below any of these foreign utilities, except when crossing above these utilities at approximately right angles. Where the paths of these foreign utilities cross under Company conduits at approximately right angles, the minimum separation is 12”. A minimum separation of 24” shall be maintained between parallel placement of any of these utilities and electrical conduit.

A six-inch clearance shall be between conduit envelopes and major subsurface pipes (e.g. drainage pipes).

The Customer shall rod and mandrel all primary conduits to insure their integrity before the Company shall attempt to pull any primary cable. The Customer shall furnish and install an approved synthetic, 2,500 pound test tape in each primary conduit run including risers. Pulling tape installation and rodding the duct shall be witnessed by the Company.

Company-owned duct shall not share a concrete encasement with foreign utilities (e.g. do not place communication or private electrical duct in the same concrete encasement as Company duct).

At those locations where manholes or above ground switchgear are required, additional specifications will be provided by the Company.

23.0 Metering
Refer to the Company’s Specification for Electrical Installations book for the type of installation. Division of work and material will be performed with the approval and authorization of the Company’s Metering Services department. In most instances, the Company will furnish, install, own, maintain and connect all meters required for billing purposes at the delivery voltage on the customer’s side of the service point.
24.0 Easement Applications Form

LIBERTY UTILITIES EASEMENT APPLICATION FORM

<table>
<thead>
<tr>
<th>FOR LIBERTY UTILITIES’ USE ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application for Easements (check one):</td>
</tr>
<tr>
<td>Padmount transformer only</td>
</tr>
<tr>
<td>Work Request Number</td>
</tr>
<tr>
<td>Utility Engineer’s Name:</td>
</tr>
</tbody>
</table>

Please complete **ALL** of the sections below so that we may prepare an easement for your signature. Do not leave any sections unanswered. If a section does not apply to you simply put “n/a” on that line. Incorrect or incomplete information will delay service installation.

Property Owner(s):

<table>
<thead>
<tr>
<th>Property Owner Mailing Address</th>
<th>Property Address of Easement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Address:</td>
</tr>
<tr>
<td>City:</td>
<td>City:</td>
</tr>
<tr>
<td>State &amp; County</td>
<td>State &amp; County</td>
</tr>
<tr>
<td>Zip</td>
<td>Zip</td>
</tr>
</tbody>
</table>

Customer Contact Person:

Daytime Phone(s):

Re: Subdivision Title:

1. Provide us with a **RECORDED** copy of the present owner’s deed, Book______ Page______
   a) If multiple deeds make up the whole parcel, please include all deeds.
   b) If the Property Owner is a b1) CORPORATION, b2) TRUST, b3) PARTNERSHIP, or b4) LIMITED LIABILITY COMPANY, provide the following which is applicable:

   b1) President Name: _____________________ Treasurer Name: _____________________________
   See Footnote! Below

   Or

   Vice President: _____________________ Asst. Treasurer: _____________________________

Footnote: If neither “Name Combinations” is available, the person(s) signing the easement must have a Corporate vote authorizing them to sign on behalf of the Corporation.
2. a) Provide us with an approved: “Definitive Subdivision Plan”
   Plan Book: __________________ Plan: __________________ Dated: __________________
   b) If there is no recorded subdivision plan please include the following information:
   Assessor’s Map: ___________ Block: ___________ and Lot: ___________

3. Is your property mortgaged (circle one)? YES   NO
   If “YES”, please complete this section:
   a) Name of Bank/Company/Person holding mortgage(s): ______________________________
   b) Address of mortgage holder(s): ______________________________
   c) Date and recording information of mortgage(s):
      Date: __________ County Recorded: __________ Book: __________ Page: __________

Additional Comments:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
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___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Please contact your Account Manager or Service Administrator if you have any questions regarding this form.
### 25.0 Approved Material – Underground Residential Development (URD) Installations

<table>
<thead>
<tr>
<th>Liberty Utilities Item ID</th>
<th>Item Description</th>
<th>Manufacturer 1 Part Number</th>
<th>Manufacturer 2 Part Number</th>
<th>Manufacturer 3 Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8830-2010404</td>
<td>Conduit DB, 4”, PVC</td>
<td>Carlon: 48815</td>
<td>IPEX: 8741</td>
<td>Cantex: A79EA42</td>
</tr>
<tr>
<td>8830-2011024</td>
<td>Conduit, Galvanized, 4”</td>
<td></td>
<td>By Description</td>
<td></td>
</tr>
<tr>
<td>8830-5692158</td>
<td>Conduit DB, 3”, PVC</td>
<td>Carlon: 48815</td>
<td>IPEX: 8731</td>
<td>AMERICAN PIPE TC7215752</td>
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<tr>
<td>8830-5692107</td>
<td>Conduit, Galvanized, 3”</td>
<td>BAYNEJONES 300R</td>
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</tbody>
</table>

### Conduit—Blends

<table>
<thead>
<tr>
<th>Liberty Utilities Item ID</th>
<th>Item Description</th>
<th>Manufacturer 1 Part Number</th>
<th>Manufacturer 2 Part Number</th>
<th>Manufacturer 3 Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8830-5690446</td>
<td>Bend, Galvanized, 4” 36”</td>
<td>BaynesJones 400R9036</td>
<td>Conditmfg TUB490D36RGA LEL</td>
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</tr>
<tr>
<td>8830-5690493</td>
<td>Bend, PVC Sch 40, 4”, 90 Degree, 36” Rad.</td>
<td>Carlon: UA9FNB</td>
<td>Cantex: 5233842</td>
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<tr>
<td>8830-5690436</td>
<td>Bend, Galvanized, 3” 36”</td>
<td>BaynesJones 400R9036</td>
<td>Conditmfg TUB490D36RGA LEL</td>
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</tr>
<tr>
<td>8830-5690419</td>
<td>Bend, PVC DB, 3”, 90 Degree, 36” Rad.</td>
<td>Carlon: PF9FL</td>
<td>Cantex: 5123872</td>
<td>Certisaft 59734</td>
</tr>
</tbody>
</table>

### Spacers

<table>
<thead>
<tr>
<th>Liberty Utilities Item ID</th>
<th>Item Description</th>
<th>Manufacturer 1 Part Number</th>
<th>Manufacturer 2 Part Number</th>
<th>Manufacturer 3 Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8830-5646963</td>
<td>Spacer, 4”, Base</td>
<td>GS Industries: 186-1</td>
<td>IPEX: 29573</td>
<td></td>
</tr>
<tr>
<td>8830-5646960</td>
<td>Spacer, 4”, Inter.</td>
<td>GS Industries: 185-1</td>
<td>IPEX: 29557</td>
<td></td>
</tr>
<tr>
<td>8830-5646958</td>
<td>Spacer, 3”, Base</td>
<td>GS Industries: 157-1</td>
<td>IPEX: 29569</td>
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<tr>
<td>8830-5646956</td>
<td>Spacer, 3”, Inter.</td>
<td>GS Industries: 156-1</td>
<td>IPEX: 29553</td>
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<tr>
<td>Liberty Utilities Item ID</td>
<td>Item Description</td>
<td>Manufacturer 1 Part Number</td>
<td>Manufacturer 2 Part Number</td>
<td>Manufacturer 3 Part Number</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>8830-5641210</td>
<td>Riser Strap, 4”</td>
<td>Electrical Materials: 50-4 USHD</td>
<td>BaynesJones MINRLAC HD-296</td>
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<tr>
<td>8830-5641205</td>
<td>Riser Strap, 3”</td>
<td>Electrical Materials: 50-3 USHD</td>
<td>BaynesJones MINRLAC HD-294</td>
<td></td>
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<tr>
<td>8830-7011830</td>
<td>Lag Screw, ¼” x 2”</td>
<td>Elect. Materials: 106 or 106M</td>
<td>Joslyn J26486.1</td>
<td>PLH LSNW-142</td>
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<tr>
<td>8830-3503074</td>
<td>Pipe Grd. Connector, 4” and 5”</td>
<td>T &amp; B: (0)3905-BU</td>
<td>Burndy GAR3905-BU</td>
<td></td>
</tr>
<tr>
<td>8830-3503075</td>
<td>Pipe Grd. Connector, 2.5” and 3.5”</td>
<td>T &amp; B: (O)3904-BU</td>
<td>Burndy GAR3904-BU</td>
<td></td>
</tr>
<tr>
<td>8830-2010424</td>
<td>Duct Plug, 4” DB</td>
<td>Carlon: P258NT</td>
<td></td>
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<tr>
<td>8830-5645682</td>
<td>Duct Plug, 3” DB</td>
<td>CSNTEX: 5315260</td>
<td>CARLON: P258L</td>
<td>CERTIFSAFT: 59653</td>
</tr>
<tr>
<td>8830-2011254</td>
<td>Duct Plug Galvanized 4”</td>
<td>Crousehind PLG105</td>
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<tr>
<td>8830-9201659</td>
<td>Duct Plug Galvanized 3”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8830-2010434</td>
<td>Adapter, Female, PVC-Steel, 4”</td>
<td>Carlon: E942N</td>
<td>Cantex: 5140052</td>
<td>Scepter FA55</td>
</tr>
<tr>
<td>8830-2010433</td>
<td>Adapter, Female, PVC-Steel, 3”</td>
<td>Carlon: E942N</td>
<td>OZGEDNEY: PLG-300C</td>
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<tr>
<td>8830-5693359</td>
<td>Coupling, 5 Degree, Bell-Spigot, 4”</td>
<td>Carlon: E244N</td>
<td>Cantex: 6151452</td>
<td>Certisaft 59544</td>
</tr>
<tr>
<td>8830-5693356</td>
<td>Coupling, 5 Degree, Bell-Spigot, 3”</td>
<td>Cantex: 6151450</td>
<td>Carlon: E244L</td>
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<tr>
<td>8830-2010444</td>
<td>Coupling, 5 Degree, Bell-Bell, 4”</td>
<td>Ameripipe: FT518</td>
<td>Carlon E2440NF</td>
<td>Scepter 7604360040</td>
</tr>
<tr>
<td>8830-5100696</td>
<td>Coupling, 5 Degree, Bell-Bell, 3”</td>
<td>Ameripipe: NS141</td>
<td>Carlon: 6151458</td>
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<tr>
<td>8830-2010454</td>
<td>Straight Coupling, 4”, EB/DB</td>
<td>Carlon: E240N</td>
<td>Cantex: 6151450</td>
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</tr>
<tr>
<td>8830-2010453</td>
<td>Straight Coupling, 3”, EB/DB</td>
<td>Cantex: 6151450</td>
<td>Carlon: E2544L</td>
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<tr>
<td>Item ID</td>
<td>Item Description</td>
<td>Manufacturer 1</td>
<td>Manufacturer 2</td>
<td>Manufacturer 3</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>8830-961285</td>
<td>Grounding Bushing, 4” and 5”</td>
<td>Burndy GAR3905-BU</td>
<td>T&amp;B: (0)3905-BU</td>
<td></td>
</tr>
<tr>
<td>8830-3500313</td>
<td>Grounding Rod 5/8’ x 8’ Solid Copperweld</td>
<td>Galvin 6258</td>
<td>ERITECH 615880</td>
<td>Joslyn: J8338</td>
</tr>
<tr>
<td>8830-4015032</td>
<td>#2 AWG, 7 strand, soft drawn</td>
<td>South Wire - By description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8830-3503328</td>
<td>Ground Rod Clamp</td>
<td>Burndy: GRC58</td>
<td>Blackburn: JAB58H</td>
<td>Electromotion EM58DBW</td>
</tr>
<tr>
<td>8830-5960412</td>
<td>“C” Connector, 2/0 – 2/0</td>
<td>Burndy: YC26C26TN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grounding Accessories**

**Primary Pull/Splice box, Secondary Handholes and transformer foundations**
Graybar – Manchester, NH

<table>
<thead>
<tr>
<th>Item ID</th>
<th>Description</th>
<th>Manufacturer 1</th>
<th>Manufacturer 2</th>
<th>Manufacturer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>8830-5640808</td>
<td>Primary Pull/Splice Box</td>
<td>Quazite (Hubbell): PA12-3060-37-0271</td>
<td>Highline: CVA306038HEIK</td>
<td></td>
</tr>
<tr>
<td>8830-5643082</td>
<td>Secondary Handhole</td>
<td>Quazite (Hubbell): PA10-1730-30-0319</td>
<td>Highline: CHA173030SE1-NG</td>
<td></td>
</tr>
<tr>
<td>8830-5642500</td>
<td>Transformer Foundation</td>
<td>Quazite (Hubbell): BP10-3843-42-0096</td>
<td>Highline: PBP374342NEPS</td>
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</tr>
</tbody>
</table>

**Other Materials**

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer 1</th>
<th>Manufacturer 2</th>
<th>Manufacturer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Connections</td>
<td>Bundy</td>
<td>Richards</td>
<td></td>
</tr>
<tr>
<td>Pulling Tape</td>
<td>Arnco: DLWP25</td>
<td>Condux: 08096303</td>
<td>Neptco: WP2500P</td>
</tr>
</tbody>
</table>
26.0 Job Checklists

URD CONDUIT INSPECTION CHECKLIST

Do not back fill BEFORE conduit system inspection and approval by the Company have been obtained. Every item below must be inspected and checked off by the Company representative. Any item found unacceptable must be initialed and rectified by Customer by next inspection.

N* Y*

PRE-TRENCH
☐ ☐ Final Grade established
☐ ☐ Surface rough graded
☐ ☐ Roadways staked

TRENCH
☐ ☐ Minimum 30” depth from finishing grade to top of primary conduit
☐ ☐ Minimum 24” depth from finishing grade to top of secondary conduit
☐ ☐ Minimum 12” separation between Electric conduits and Telecommunications conduits
☐ ☐ Min, 24” separation between Electric conduits and water, sewer or gas if placing parallel
☐ ☐ Minimum 12” separation between Electric conduits and water, sewer or gas if placing perpendicular
☐ ☐ Conduit plugs installed
☐ ☐ Plastic spacers properly installed no more than every 8’ and at every junction point
☐ ☐ 4” screened backfill (with less than 1” stones) on-site for backfilling entire trench, (inspector may witness backfilling)
☐ ☐ Warning tape installed 12” below finish grade and directly above electrical conduit system
☐ ☐ All curves properly formed with five degree couplings
☐ ☐ No parallel utilities directly above electrical system

Secondary Handhole
☐ ☐ 4” crushed stone under handhole
☐ ☐ Handhole covers installed and properly secured with pentahead bolts
☐ ☐ Top surface flush with final grade
☐ ☐ Conduit plugs installed from the outside in all unused conduit knockouts
☐ ☐ No more than 3” of extended PVC into handhole

Transformer Foundation
☐ ☐ 4” of crushed stone under transformer foundation
☐ ☐ Top surface 4” above final grade
☐ ☐ No more than 3” extended PVC through foundation
☐ ☐ Pulling eyes properly installed in front and back of box pad (ring part on the inside)
☐ ☐ Conduit plugs installed from the outside in all unused conduit knockouts
☐ ☐ Two ground rods installed at opposite corners of foundation – exposed for inspection
☐ ☐ Ground grid buried 12” below finish grade and placed 12” away from edge of boxpad
☐ ☐ Loop ground grid around and into foundation through two sides of foundation
☐ ☐ Correct orientation to road and lot lines
☐ ☐ All non-Company owned pedestals are a minimum of 2’ away from all sides

Pullbox
☐ ☐ 4” or crushed stone under pullbox foundation
☐ ☐ Pullbox covers installed and properly secured with pentahead bolts
☐ ☐ Top surface flush with final grade
☐ ☐ No more than 3” extended PVC into pullbox
☐ ☐ Conduit plugs installed from the outside in all unused conduit knockouts
☐ ☐ All non-Company owned pedestals are a minimum of 2’ away from all sides

RISER POLE
☐ ☐ 90° bend and 10’ straight riser pipe galvanized steel conduit. (3” for single Phase, 4” for three phase)
☐ ☐ Steel-PVC adapter and steel sweep shall not be encased in concrete
☐ ☐ Ground clamp installed with tap
☐ ☐ Install 2500 lb. Pulling Tape in all conduit after rodding with mandrell

*NOTE Y – Acceptable N – Deficient
27.0 Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev #</th>
<th>Description</th>
<th>Author/Lead Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>07/03/12</td>
<td>0</td>
<td>Initial version of document</td>
<td>Robert J. Johnson</td>
</tr>
<tr>
<td>04/01/14</td>
<td>1.0</td>
<td>Update to reflect new Liberty Utilities Policy 2 Line Extension Policy for Residential Developments (URD)</td>
<td>Robert J. Johnson</td>
</tr>
</tbody>
</table>
Liberty Utilities is an independent water, natural gas, and electric company providing local utility management, service and support to small and mid-sized communities across the United States. Serving over 470,000 customers in ten states, Liberty Utilities is committed to local decision making that directly meets the needs of its customers. This means providing walk-in customer service centers, creating jobs, and providing responsive and reliable service. As a company, Liberty Utilities promotes local conservation and energy efficiency initiatives and programs for businesses and residential customers, including the low-income sector. The company measures its performance on customer experience, public and workplace safety, and service reliability. Liberty Utilities currently operates in Arizona, Arkansas, California, Illinois, Iowa, Georgia, Massachusetts, Missouri, New Hampshire, and Texas. For more information, please visit www.LibertyUtilities.com.

Liberty Utilities
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Londonderry, NH 03053
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www.libertyutilities.com