SPECIFICATIONS FOR THE INSTALLATION OF CONDUIT SYSTEMS IN RESIDENTIAL SUBDIVISIONS

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This document is dedicated to defining the specifications for installation of direct buried conduit systems in residential subdivisions on the Ameren Missouri system as defined in the Schedule No. 5 tariff filed with the Missouri Public Service Commission.

1 Definitions

1.1 Contractor - The owner(s) and or developer(s) or their agents of the tract of land to be served by the underground electric system, and/or the party or parties installing a portion of the system.

1.2 Company - Ameren Missouri.

1.3 Company Representative - Person designated by the Company to coordinate all facets of the project between the Company and the Contractor.

1.4 Work - Labor and material installation as required for the project.

1.5 Drawings - Approved conduit and electrical drawings provided by the Company indicating location and installation details for a specific residential subdivision. Any exceptions to this Specification shall be noted on the Drawings.

1.6 Specification - This specification and any additional Drawings or Standards supplied for a specific residential subdivision.

1.7 Standards - Company approved construction standards specifying material and installation details.

2 Scope of Work

The Contractor Shall:

2.1 Perform all work necessary to construct the conduit system in accordance with Drawings and Specifications furnished by the Company.

2.2 Furnish excavation and backfill for trenches for conduit system.

2.3 Install complete integrated conduit system as required.

2.4 Supply field surveying to locate easements, right of way, and property lines necessary for installation of conduit system as indicated on Drawings.

2.5 Obtain necessary permits for installation of conduit system and pay applicable fees.

2.6 Assume responsibility for all material from time of receipt to time of acceptance of installation by Company.

The Company Shall:

2.7 Furnish Drawings indicating the installation of the conduit system.

2.8 Furnish all materials required for conduit system consisting of conduit, manholes, pulling boxes, transformer pads, switchgear pads, pedestals, and other required subsurface structures.

2.9 Install Ameren Missouri primary, secondary, streetlight cable, transformers, streetlights, and switchgear.

3 Extent of Work

3.1 The detailed information for the work required shall be shown on the approved Drawings. During the progress of work, such additional detail Drawings as the Company may consider necessary for clarification will by furnished to the Contractor, and these additional Drawings shall be made a part of the Specification.

3.2 Where interpretation of Specification or clarification of intent of any Drawing is required, the determination of the Company Representative shall prevail.

3.3 The location of manholes, the conduit route, location, arrangement and number of conduits will be shown on the Drawings.

3.4 Field determination of location and elevation of all foreign lines and obstructions to provide adequate space for duct and manhole construction, as well as establishment of trench grade to insure the installation in accordance with Drawings and Specifications, is the responsibility of the Contractor and subject to the approval of the Company Representative.

4 Inspection and Performance of Work

4.1 Contractor shall notify the Company Representative with at least one full working day advance notice before commencing any item of construction or installation of material to enable proper inspection of materials and workmanship. Materials and/or workmanship failing to meet the requirements of this specification, or installed without prior notice to Company Representative, will

be subject to rejection. Any work rejected shall be immediately corrected at the Contractor's expense. Conduit installations made by Contractor shall be subject to inspections by Company on a daily basis prior to backfilling, embedding in concrete, or otherwise covering or concealing.

5 Trenching

General Requirements

5.1 The route of the ducts shall be maintained as specified on the Drawings. Straight routes shall be maintained unless specified otherwise on the Drawings.

5.2 Turns and bends to avoid surface or hidden obstructions shall be made within the limits specified either on the Drawing or by approval of the Company Representative

5.3 Deviations outside the boundaries of the easement or right-of-way are not allowed. Problems concerning the use of the easement or right-of-way shall be referred to the Company Representative for solution.

5.4 Clearances stated in the National Electric Safety Code shall be observed. The use of a joint trench with other utilities is acceptable and encouraged, provided the joint trench utilities agree to the placements within the trench.

5.5 As a general rule, approximate final grade within 6 inches should be established before trenching is started.

5.6 The bottom of the trench shall be relatively smooth, and consist of well compacted earth at an elevation necessary to establish the standard burial depths.

5.7 The minimum width of the trench shall be a measured two inches larger than the duct size used. If more than one duct size in used at the same elevation, the minimum width shall be two inches larger than the horizontal distance occupied by the ducts.

5.8 Burial Depths
Standard burial depths are 36" of cover from final grade for primary cables and 24" - 36" of cover from final grade for secondary and streetlight cables. Any exceptions to the specified burial depths must be approved by the Company Representative.

5.9 If rock or untrenchable conditions are encountered consult with the Company Representative for alternatives.

5.10 Where ducts are to be installed by boring, the soil and surface conditions must be such that the solid materials encountered do not subject the duct to undue stresses. Burial depths as stated previously shall be maintained.

6 Duct Installation

6.1 Bedding

The duct shall be bedded on firm, well compacted, undisturbed dirt or on well tamped dirt or other backfill supplied for leveling or grading of the trench. Materials as described in Section 7 are acceptable.

6.2 Configurations

6.2.1 Configurations vary with various subdivision designs. The Drawing will specify the configuration of multiple duct installations.

6.2.2 Sweep bends may be made with 5 degree couplings with a minimum radius of 36” subject to Company Representative approval.

6.2.3 Sweep bends must be staked to prevent opening of the couplings during installation. No other operations producing visible stress on the couplings will be allowed. Visible stress exists when there is more than two degrees of offset on the coupling or where significant in-line offset is observed. Care must be taken to prevent deformation of the duct at the stakes.

6.2.4 Bends must be stabilized by concrete encasement as specified on the Drawings according to Company Standards.

6.3 Joining

6.3.1 The ducts shall be joined with company provided couplings and cement to assure a leak free continuous duct of the same internal diameter as the original duct. No internal protrusions or

obstructions are allowed.

6.3.2 The Contractor shall make sure that no foreign material enters the ducts to be joined. The end of the duct shall be plugged with approved end plugs whenever installation work on the duct is stopped.

6.3.3 Joining and repair of ducts shall be done according to Company Standards.

6.4 Protection

6.4.1 Unsupported overhangs will not be permitted. Ducts entering manholes or penetrating other structures shall be placed on well compacted earth or other backfill to prevent shear forces at the point of entry.

6.4.2 Shallower than normal depths shall be protected if approved by Company Representative (see Section 5).

6.4.3 Special design for railroad, pipeline and other crossings may be required. These conditions will be covered on the Drawings. Any permits and fees required for special crossings will be the responsibility of the Contractor.

6.4.4 Problems associated with unstable soil conditions shall be referred to the Company Representatives to obtain proper installation procedures.

6.5 Structures - Placement

The requirements associated with the installations of vaults, pull boxes, manholes, hand holes, transformer pads, pedestals, and other structures used for this system will be detailed on Drawings or Standards covering the installation of these items.

Customer must provide and install bell end couplings for cut primary and secondary conduits entering equipment

6.6 Conduit Sizes

Conduit will be provided by Company as follows: 1.5” Schedule 40 for streetlight cable, 3” Schedule 40 for primary and secondary cable.

6.7 Identification of conduit sections

If noted on Drawing or required by Company Representative, conduit runs will be identified as specified by Company Representative.

7 Backfilling

7.1 General

7.1.1 Local codes or ordinances will govern when these exceed the backfill requirements stated herein. Any permits or fees for street crossings will be the responsibility of the Contractor.

7.1.2 Except as noted on Drawings and Specifications, native spoil free of rock and debris may be used as backfill material unless disqualified by the Company Representative. The spoil should pass through a two inch screen.

7.1.3 Except as noted on Drawings and Specifications, limestone screenings - ¼" minus may be used as an alternate to soil when backfilling. Alternate backfill material for street crossings may be used as allowed by local codes or ordinances.

7.1.4 Voids where water can collect shall be avoided. Any conditions which produce crushing pressures on the duct are unacceptable. Trenches must be kept clear of foreign materials such as grease, hydrocarbons, wood, rotting vegetation, or other debris.

7.1.5 Where shale or rock are encountered, limestone screening must be placed above and below the ducts in a thickness adequate to protect the conduit, but not less than two inches.

7.2 Compaction

7.2.1 In new subdivisions, the backfill shall be compacted to provide a firm fill able to support a man's weight as the trench is walked upon.

7.2.2 In established areas, compaction shall be obtained with hand or mechanical tampers to provide densities in excess of 90 percent of the density of the undisturbed soil.

7.2.3 The soil shall be placed back in the excavation in multiple passes of approximately 18 inch depth and compressed as necessary until final grade is reestablished. No rock shall be placed in the bottom six inches of the backfill.

7.2.4 Hydrotamping is not acceptable.

7.2.5 During backfilling the ducts shall be restrained, if necessary, to prevent movement.

7.2.6 Areas supporting vehicular traffic and other areas may require special backfilling as prescribed by the Company Representative or local codes and ordinances.

7.2.7 Settlement of the backfill material above the ducts is an indicator of improper compaction. When required, the Contractor must re-establish final grade by placing additional backfill or by other methods as appropriate.

7.2.8 Settlement of transformers, pedestals, and other structures is an indication of improper compaction. Charges associated with correcting these conditions are the responsibility of the Contractor. Backfilling with limestone screenings - ¼" minus under transformers, pedestals, and other structures is recommended to prevent settling except as noted otherwise on Drawings and Specifications.

7.3 Resurfacing

7.3.1 Pavements, sod, or other surfaces shall be replaced with materials corresponding to those removed unless permission is granted by Company Representative to substitute other materials. Thickness, strength, and final appearance shall match the original materials as closely as possible.

7.3.2 Asphalt, concrete, or paving blocks shall be set in accordance with construction techniques proper to the placement of these materials.

8 Acceptance

8.1.1 A company supplied pulling tape shall be installed in all completed duct sections. The pulling tape shall be blown into the conduit, or other acceptable method, after duct sections are complete and the conduit cement is dry. A minimum of 10 feet of pulling string shall be left at each duct end. During installation of the pulling tape, the reel of tape should be placed on a payout stand to allow the tape to payout flat into the duct. The pulling tape must be installed in continuous pieces, no knots are permitted.

8.1.2 Contractor shall notify Company Representative in writing when complete conduit sections have been installed and are ready for Company to pull cable. A "Notification of Completed Conduit Sections" form is attached for this purpose. A conduit section is defined as all conduits between, and associated with, adjacent transformers. If Company attempts to pull cable in completed conduit sections within 10 working days of notification of completion and cannot successfully pull cable, Contractor shall be responsible for any repairs necessary to allow Company to complete pulls. After 10 working days, Contractor shall only be responsible for repairs required due to poor workmanship on his part or the part of his subcontractors.

8.2 Records

8.2.1 The Company Representative will maintain an as built set of Drawings showing changes, additions or deletions to the project. Field changes not covered by the original Drawings shall be clearly noted on the as built Drawings. Any field changes require advance approval of the Company Representative.

8.2.2 When the depth of cover exceeds the design value by 50 percent or more, the actual depth shall be provided by the Contractor and noted on the as built Drawings.

8.2.3 When the depth of cover is less than the design value, the actual depth shall provided by the Contractor and noted on the as built Drawings.

8.2.4 When the route or location of equipment varies from the Drawing, the Contractor shall supply dimensions from fixed above grade structures to be noted on the as built Drawings.

8.3 Certification

8.3.1 The Contractor shall certify at the completion of the project that all work has been performed according to the Drawings and Specifications. He shall guarantee the continuity and size of all conduit. He shall certify that all depth requirements have been met and that conduit system has been installed within easements and right of way as shown on Drawings.

8.3.2 Shortfalls in the specified construction practices in any area covered herein shall be reason for withdrawal of acceptance by the Company.

Notification of Completed Conduit Sections

In Residential Subdivisions

Subdivision:		Ameren Missouri W.R. #:	
Contractor Name:		Ameren Missouri District:	
Phone No.:		Address:	
		Fax No.:	
		Ameren Missouri Rep.:	

Contractor Signature: _____

Date: _____

The following sections of conduit are complete and ready for cable installation by Ameren Missouri. (Indicate Pad No., Switchgear #, or pole location.)

FROM:	TO:

NOTE:

A conduit section is defined as all conduits (primary, secondary, and streetlight) between, and associated with, adjacent transformers.

If Ameren Missouri attempts to pull cable in completed conduit sections within 10 working days of notification of completion and cannot successfully pull cable, Contractor shall be responsible for any repairs necessary to allow Ameren Missouri to complete pulls. After 10 working days, Contractor shall only be responsible for repairs required due to poor workmanship on his part or the part of his subcontractors.

Attachment

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APPENDIX

STANDARD SPECIFICATION DRAWINGS

NO.	DESCRIPTION
1	Risers on Standoffs
2	Restraint - Underground Bends
3	Conduit - Direct Buried Drainage Pit
4	Splice Box - 2’ x 4’ x 2’ Deep
5	Vault - Precast 3’ x 5’ x 42” Deep
6	Vault - Precast 4’ x 8’ x 4’ Deep
7	Pad - Single Phase Padmounted Transformers
8	Enclosure Pad - 2, 3, & 4 - Way Cable Junction
9	Secondary Power Pedestal
10	Service Conduit Connection to Pedestal or Transformer
11	Padmounted Primary Switchgear - Fiberglass Box Pad
12	Joint Trenching
14	Fiberglass Box Vault - Single Phase Padmounted Transformers