

1 Standards & Specifications

All construction is to follow design and construction documents approved by the Engineer and marked approved for construction. All construction shall also follow the National Electrical Safety Code, City of Piqua construction standards, and utility best practices. The following provides further details for the construction units.

1.1 Construction Units

1. New Construction Units

- a. Includes the furnishing of all labor and equipment for the installation of new construction units.
- b. In addition to the standards and specifications defined within this section, the plan & profile drawings, staking sheets, unit specification drawings, and addition instructions provided by the Owner and Engineer will apply to this Project.

2. Pole Construction Units

- a. A pole unit consists of the installation of one pole, imported granular backfill, concrete, and rebar (supplied by the Bidder), and the numbering of pole to Owners specifications. The first digits indicate the length of the pole and the second digits indicate the pole class.
- b. Unless otherwise noted within the engineering documentation, the setting depths for poles shall be as follows:

Pole Length (feet)	Setting Depth (feet)
70	9.0
75	9.5
80	10.0
85	10.5

- c. Pole setting depths that deviate from the above table or those shown on the engineering design documents must be approved by the Owner or Engineer and noted on the engineering design documents.
- d. Steel poles shown on the engineering design documents to be set deeper than the above table should be treated in accordance with manufacturer’s specifications in order to prevent excess corrosion at or below the groundline.
- e. Pole locations that deviate from those shown on the engineering design documents and staked in the field must be approved by the Owner or Engineer and noted on the engineering design documents.

- f. On sloping ground, the depth of the hole always shall be measured from the low side of the hole.
- g. Auger holes for poles shall be approximately 8 inches larger than the butt diameter of the pole, and shall be at least as large at the bottom as at the top.
- h. All poles are to be backfilled with imported granular backfill supplied by the Bidder. The rock shall be pneumatically placed and tamped in 6" lifts throughout the entire depth. The top 12" of the hole shall be thoroughly tamped with native soil and excess soil banked around the pole.

Gradation for the imported backfill shall be as follows:

Gradation for Imported Granular Backfill	
Size of Gravel (or) Crushed Stone	Size of Mesh (in)
100% by weight to pass 1" screen	1.00
60% - 90% by weight to pass ½" screen	0.500
40% - 60% by weight to pass no. 4 screen	0.187
25% - 50% by weight to pass no. 8 screen	0.0937
20% - 40% by weight to pass no. 16 screen	0.0469
15% - 30% by weight to pass no. 40 screen	0.0165

- i. All frozen materials shall be carefully excluded from the backfill.
- j. Excess excavated material shall be taken away from the pole location.
- k. Poles shall be in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line.
- l. The Contractor has final responsibility for pole alignment in each straight-line section as indicated on the staking sheets. If the Contractor has any doubts as to correct pole placement, the Engineer or Owner shall be contacted prior to the installation of such poles.

3. Pole Top Construction Units

- a. A pole top construction unit consists of the installation of the hardware, crossarms, brackets and their appurtenances, insulators, etc., except tie wire or clamps, required to support the shield wire, conductors, and ADSS fiber optic cable.
- b. Bolts must be of proper length. Through bolts, when installed, shall extend at least 1/2 inch and not more than 2 inches beyond the nuts.
- c. Locknuts shall be installed with each nut, eyenut, or other fastener on all bolts or threaded hardware.

4. Conductor Construction Units

- a. A conductor construction unit consists of the installation of one thousand (1,000) circuit feet of conductor or cable for primary, secondary, service wires, and communications cable. For example, three conductors making up a three phase circuit for the length of one thousand (1,000) feet will consist of one (1) conductor construction unit.
- b. The contractor shall provide all necessary equipment as required to install new wires, conductors, and cables.
- c. In computing the compensation to the Contractor for conductor construction units, only the horizontal distance between conductor supports or pole stakes shall be used.
- d. Jumper conductors that utilize a guide pin shall be hand tied with the appropriate tie wire and included within the conductor construction unit cost.
- e. All conductors must be handled with care. Conductors shall not be trampled on nor run over by vehicles. Each reel shall be examined and shall be inspected for cuts, kinks, or other damage. Damaged portions shall be cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on the pole or crossarm if necessary to prevent binding while stringing.
- f. The stringing of bare conductor shall be completed by use of a certified dynamometer. All dynamometers shall be tested and calibrated annually. A copy of the testing certification shall be provided to the Engineer or Owner upon request.
- g. A certified thermometer shall determine the ambient temperature at the time and place of stringing. The stringing section (i.e. pole # to pole #), conductor reel I.D. number, temperature, and pounds of force at which the conductor is strung and the spans in which sags are measured shall be recorded on the as-built staking sheets and given to the Engineer or Owner.
- h. All bare conductors shall be strung by controlled-tension method using neoprene lined (or approved equal) double bull-wheel type tension stringing equipment. The equipment shall have groove sizes that will in no way damage the conductor. It shall be of a type capable of maintaining preset tensions and pulling speed. Sufficient continuous tensions shall be maintained to keep the bare conductors clear of ground or obstructions. Sheaves shall be designed and used so that the pulling line does not damage the sheaves or deposit foreign matter in the liner which may damage the bare conductor or cause foreign matter to be deposited on the conductor.
- i. The maximum pulling tensions shall not exceed 110% final tension. The cable pullers, tensioners and pulling machines shall be located preferably as near the midspan as possible, but in no case shall the slope of the bare conductor between the machine and the stringing block at the first structure be steeper than three horizontal to one vertical. The length of bare conductor sagged in one operation shall be limited to the length that can be strung satisfactorily as approved by the Engineer or Owner.

- j. Conductors shall be spliced and deadended as shown on the Construction Drawings. Splices shall be no closer than 1,000' from one another and there shall be no more than 3 splices per mile per conductor. Also, splices shall not be located within 10 feet of any supporting structure. No splices shall be located in Grade B crossing spans or in the adjacent spans.
- k. The labor for splices shall be included in the per 1,000 foot conductor installation unit. Additional overhead conductor and underground cable required to lengthen existing taps and risers will be supplied by the Owner.
- l. All conductors shall be strung according to the stringing charts supplied by the Engineer.
- m. The Contractor shall keep a unique identification number of all wire, conductor and cable reels used on the Project. The unique ID number of each reel shall be noted on the as-built staking sheets to track the location of the installation and this information shall be provided to the Engineer.

5. Guy Construction Units

- a. A guy construction unit consists of the installation of the hardware, wire, and guy insulators where necessary. An overhead guy construction unit does not include the associated pole and down guy, each of which is listed separately.
- b. Guy markers are included as part of the guying construction unit.
- c. Guys shall be installed in locations specified by the Engineer or Owner. Points of attachment to poles will be shown on engineering drawings. All guys shall be installed before wire, conductor, and cables are strung.

6. Anchor Construction Units

- a. An anchor construction unit consists of the installation of an anchor with a complete rod, ready for the attachment of guy wire.
- b. Anchors shall be installed in locations staked by the Engineer or Owner. Anchor rods shall be in line with the strain and so installed that approximately 9 inches remain out of the ground. Under no circumstances shall the eye of the rod be covered. Holes shall be tamped if the soil is significantly disturbed during installation.
- c. Bonding with anchor rod bonding clamps sized appropriately to bond the anchor rod eye is included as part of this construction unit.
- d. The Contractor will notify the Engineer or Owner prior to installing more than five extensions on any TA-2H anchor.
- e. The Contractor will not be paid to install or remove anchors installed temporarily for stringing purposes.

7. Transformer Construction Units

- a. A transformer construction unit shall match the Owner's latest specifications that consists of the installation of the transformer, its protective equipment (fuse cutout) and hardware, leads with their connectors, supporting insulators, animal guards and any material necessary for a complete transformer installation.
- b. All secondary conductor connections to the transformer bushings shall be made with compression terminal pins and installed from the bottom pointing up into the bushing clamps.
- c. If the staking sheet specifies that a new transformer be installed, the Contractor shall request a replacement transformer from the Owner, who will deliver the new transformer to the project site.

8. Secondary and Service Construction Units

- a. A secondary and service construction unit consists of the installation of the hardware, insulators, etc., to support the secondary and service conductor or cable.
- b. Secondary and service drops shall be installed so as not to obstruct climbing space. There shall not be more than one splice per conductor in any span unless approved by the Engineer. Splicing sleeves shall be located at least 10 feet from the conductor attachments. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run.
- c. Overhead secondary deadend attachments shall be made with a wedge clamp or deadend shoe, whichever is applicable.

9. Ground Construction Units

- a. Ground rods shall be driven full length and the top of the ground rod shall be at least 12 inches below the surface of the earth and at least 24 inches away from the pole face in undisturbed earth in accordance with the Construction Drawings.
- b. Grounds on steel poles shall be made with a grounding lug and ground nut. If no ground nut is available, a hole must be tapped in the pole so that a grounding lug can be installed.
- c. The ground wire on wood poles shall be installed in the correct quadrant and attached to the rod with a clamp and secured to the pole with staples. The staple spacing shall follow City of Piqua guidelines.
- d. All neutral conductors should be effectively bonded to the pole ground using only ampact connectors issued by the City of Piqua.
- e. All equipment shall have at least 2 connections from the frame, case, or tank to the pole ground or multi-grounded neutral conductor.

- f. The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.

10. Underground Construction Units

Where primary risers are specified, the unit is to include the preparation of the cable, the installation of the termination, applicable grounding, and associated equipment installation. It shall also include the installation of the bedding, drainable material (when specified), cable slot, and site preparation, backfilling, and tamping as required to install the riser conduit and stand-off brackets.

1.2 Removal Units

1. Removal Units

- a. Includes the furnishing of all labor and equipment for the removal of existing units from existing line, disassembling into material items, and all labor and disposal costs.
- b. The Contractor will be responsible for disposing of all removed material with the exception of transformers, voltage regulators, capacitor, reclosers, sectionalizers and salvage poles which shall be transported to the Owner's warehouse by the Contractor as part of the removal unit price.

2. Pole Removal Units

- a. All poles of the same height, regardless of pole class, are designated by the same unit. Thus a 75-foot pole signifies the removal of a 75-foot pole of any class. The Contractor is not required under this unit to remove the ground wired attached to the pole. This unit includes the refilling and tamping of holes in a workmanlike manner unless they are to be reused.
- b. Some poles may be designated on the staking sheet as "salvage pole". This indicates that the pole shall be retired from its current location and transported to the Owner's warehouse and placed in a location specified by the Owner.

3. Pole Top Removal Units

- a. The unit of removal of pole-top assemblies includes, in addition to the removal of the assembly itself, any necessary handling, resagging, and retying of conductors in those cases where an existing pole-top assembly will be removed and replaced by a new pole-top assembly and where any existing conductor is to be reused.
- b. The Contractor is responsible for transferring any existing conductors that are to be reused in a safe manner that ensures equal tension between deadends.
- c. The unit of removal of pole-top assemblies also includes any holding or handling of mainline or tap conductors at tap lines, angles, and deadends where such is involved, and

the reinstalling of such conductor in accordance with the Specifications; for example, an A5-1 will include the disconnection of the tap conductors, snubbing off the tap line at the nearest practical point and the reconnection and resagging of these tap conductors if necessary to the new tap assembly when installed.

4. Conductor Removal Units

- a. The conductor removal unit covers the removal of one thousand (1,000) circuit feet of conductor or cable (including the messenger) for primary, secondary, and service wires. For example, three cables and one messenger making up a three phase circuit for the length of one thousand (1,000) feet will consist of one (1) conductor removal unit.
- b. The conductor shall be placed on wooden reels in a workmanlike manner in such a way that it can be reused and easily transported. Each reel shall contain only one type of conductor (no mixing of types and/or sizes). The conductor removal unit includes the unclamping or untying of the conductor at attachments as well as the removal of spacer braces throughout the one thousand (1,000) foot unit length.

5. Guy Removal Units

- a. Down guys, regardless of length, type of attachment, or size of guy strand, are specified by the same unit.
- b. Overhead guys, regardless of length, type of attachment, or size of guy strand, are specified by the same unit.

6. Anchor Removal Units

- a. Only anchor rods are required to be removed by the Contractor in anchor removal units. If the rod cannot be unscrewed, the end of the rod shall either be cut off or bent down so that the rod will be at least 18 inches below ground.
- b. The re-use of existing anchors and/or anchor rods is not permitted, unless specified in the engineering documents or approved by the Owner or Engineer.
- c. Anchors supporting communication attachments shall remain in place, and communications guy attachments should be installed as necessary with any transferred communications cables.

7. Transformer Removal Units

- a. A transformer removal unit consists of the removal of the transformer, its protective equipment (fuse cutout) and hardware, leads with their connectors, supporting insulators, animal guards and any material necessary for a complete transformer installation.
- b. Only one unit is specified for each type and all sizes of single-phase transformer from 1 to 25kVA. Single phase transformer sizes greater than 25kVA will be allowed a higher price as shown in the Bid Unit Tally Sheets.

- c. Only one unit is specified for each type and all sizes of three-phase transformer banks from 30kVA to 75kVA. Three-phase transformer bank sizes greater than 75kVA will be allowed a higher price as shown in the Bid Unit Tally Sheets.
- d. Retired transformers are to be delivered to the Owner's Warehouse. The Contractor shall provide at least 48 hour notice before delivering retired transformers. Each transformer shall be tagged with the map location number, work order number and the pole number on the staking sheet from which the transformer was removed from.
- e. Retired reclosers, sectionalizers, regulators, and capacitors are to be handled in the same manner as retired transformers.

8. Secondary Removal Units

- a. The unit for removal of secondary assemblies includes, in addition to the removal of the assembly itself, all necessary handling such as untying, resagging, and retying of secondary conductor or cables where existing secondary conductor or cable is to be reused.
- b. The unit for removal of the secondary assembly includes the handling or holding of any conductor at tap lines where such is involved, and the reinstalling of such tap conductor in accordance with the Specifications.

9. Service Removal Units

- a. The unit for removal of service assemblies includes, in addition to the removal of the assembly itself, all necessary handling such as untying, resagging, and retying of service conductor or cable where existing service conductor or cable is to be reused.

1.3 Transfer Units

1. Transfer Units

- a. Transfer units include all labor to remove the complete transfer unit from an existing pole to a new pole. This includes all necessary conductor handling to complete the transfer including temporary means to maintain an energized system and reconnection to the new pole. All transfer and splice units for underground includes excavation necessary to complete the work.
- b. All transfers requiring an outage must be coordinated with the Owner.

2. Primary and Secondary Tap Transfers

- a. The price of transferring overhead primary and secondary taps shall be included in the unit price of the corresponding new construction transfer unit.
- b. The price of transferring underground primary and secondary taps will have their own transfer unit.
- c. Existing primary risers (including terminations, cutouts, arresters, brackets, etc.) are to be transferred to new poles. If additional cable is required due to a pole height increase, the Contractor will provide the necessary primary underground cable. The Contractor is also to supply the necessary primary splice kit, and additional conduit and stand-off brackets. If required, and when in conduit, primary splices should be done at the closest junction box and slack cable pulled to the riser pole. If required, and when direct buried, primary splices can be installed in the air or at the bottom of the riser pole.
- d. Existing secondary risers are to be transferred to new poles. If additional cable is required due to a pole height increase, the Contractor is to supply the necessary secondary conductor, splices, and additional conduit and stand-off brackets. If required, and when in conduit, secondary splices should be done at the closest junction box and slack cable pulled to the riser pole. If required, and when direct buried, secondary splices can be installed in the air or at the bottom of the riser pole.

3. Transformer Transfer Units

- a. A transformer transfer units will be made up by a transformer removal and transformer construction unit.
- b. The Owner will supply a sufficient number of spare transformers to the Contractor that can be used for the first set of transformer construction units.
- c. Beyond the spare transformers noted above, the Contractor will be responsible for reusing removed transformers for the remainder of transformer construction units.

- d. At the end of the project, the Contractor will be responsible for returning all transformers not used for the Project.

4. Street Light Transfer Units

All security/street lights shall be transferred unless otherwise directed by the Engineer or Owner.

1.4 Miscellaneous

1. Outages

The 69kV circuit will be de-energized during the duration of construction. Any outages required on the 13.2kV circuit should be coordinated with the Owner. Any secondary or service outages required will be coordinated between the Owner, Contractor, and affected customers. A minimum of 48 hours' notice is required for the secondary/service outages unless approved by the Owner. The bid price must include the costs for working on energized distribution lines, working during the evenings or weekends during planned outages, and the cost to arrange for outages.

2. Phasing

Unless directed otherwise by the Owner all phasing must of the transmission and distribution circuit must match the existing phasing. All transformers and taps are to remain on the current phase unless otherwise noted on the staking sheets.

3. Fusing & Sectionalizing

All fusing and sectionalizing information will be provided to the Contractor by the Owner or Engineer. The Contractor shall record and return to the Engineer all fuse and sectionalizing locations, sizes, and settings.

4. Permitting

- a. The Contractor is responsible for all traffic control, road or lane closures, and permits required for closures to complete the projects.
- b. The Contractor is required to contact and coordinate working permits for any work that is in proximity to high voltage transmission lines.

5. Changes

- a. All construction work shall be done in accordance with the staking sheets, plans, and specifications and drawings. The National Electrical Safety Code (NESC) shall be followed except where local regulations are more stringent, in which case, local regulations shall govern.

- b. The Contractor is required to contact the Engineer prior to making changes to the design of the project. If changes are made without Engineer's consent, the costs incurred by the Contractor to modify the as-built construction will not be reimbursed by the Owner or Engineer.

6. Material Clean Up

- a. The Contractor takes full ownership of all retired materials that are not returned to the Owner's warehouse.
- b. The Contractor is responsible for cleaning up the project site and staging area of all retired, discarded, and unused materials and packaging materials.
- c. All efforts shall be made to dispose of recyclable materials in a proper and environmental friendly manner.
- d. Non-recyclable materials shall be properly disposed of at a licensed or permitted landfill classified to receive the type of materials being disposed.
- e. Under no circumstances shall materials be left behind at the project site.
- f. Under no circumstances shall materials be given or sold to individuals who are not licensed or certified to recycle or dispose of them a properly manner.

7. Third Party Attachments

The transfer of third party and City of Piqua communication attachments to the new structures will be the responsibility of the contractor. The Contractor shall exercise reasonable care and caution consistent with good utility practice to avoid any interruption of service provided or supplied by their respective attachments to the new poles and to avoid damaging the facilities of others. Third party attachments shall be transferred to new poles as near as practical to the existing elevation while maintaining proper clearances to ground and to the supply space.

8. Underground Locates

Contractor is responsible for calling and arranging for the locating of underground facilities, both public and private, within the project location. The Owner or Engineer is not responsible for any damage to underground facilities caused by Contractor.