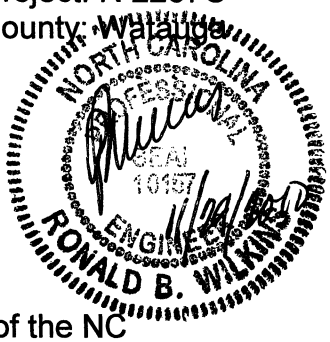


PROJECT SPECIAL PROVISIONS
Utility Construction

All proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated July 2006. Division 15 of the Standard Specifications is revised as follows:

Page 15-1, Paragraph 4

Provide access for Department personnel and the owner's representatives to all phases of construction. Notify Department personnel and the utility owner two weeks prior to commencement of any work and one week prior to service interruption. Keep utility owner's representatives informed of work progress and provide opportunity for inspection of construction and testing. *The water and sewer lines on this project belongs to the Town of Blowing Rock. The contact person for the Town of Blowing Rock is Mr. Scott Hildebran and he can be reached by phone at (828) 295-5200. Any work on these lines must be coordinated through the Engineer and the utility owner before beginning.*

Page 15-9 Section 1515-2

In addition to the water line materials specified under Section 1036, the water line can be High Density Polyethylene (HDPE) pipe conforming to AWWA C906 with an SDR of 9 and a pressure rating of 200 psi.

Interruptions in water service shall be limited to a maximum of 4 hours unless otherwise specifically approved by the Engineer.

All water and sewer lines being relocated or replaced on this project, 4 inches and larger shall be ductile iron PC 350.

COMPENSATION:

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility construction, and all of the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

SUPPLEMENTAL SPECIFICATIONS
AND
SPECIAL PROVISIONS

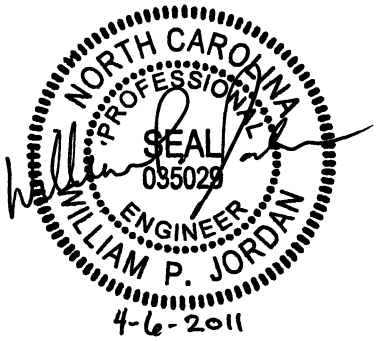
for the

UTILITY CONDUIT SYSTEM

as part of the

U.S. 321 Improvements Project
from Possum Hollow Road (S.R. 1632)
to Green Hill Road (S.R. 1534)

Watauga County
TIP Project R-2237C



Booth & Associates, Inc.
Consulting Engineers
1011 Schaub Drive
Raleigh, North Carolina 27606
Firm License No.: F-0221

Rev. 2	Issue for Construction Revised	03/16/11
Rev. 1	Issue for Construction Revised	01/31/11

UTILITY CONDUIT SYSTEM

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STATEMENT OF WORK

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STATEMENT OF WORK
UTILITY CONDUIT SYSTEM

1.0 DESCRIPTION

1.1 The project consists of furnishing materials, labor, and equipment in performing all operations necessary to install a new underground conduit system (duct bank) to facilitate the relocation, by others, of existing:

- Primary and Secondary Distribution Electric Lines,
- Fiber Optic Lines,
- CATV Lines, and
- Telephone Lines

as part of the North Carolina Department of Transportation (N.C.D.O.T.) Roadway Widening Project (R-2237C). The existing overhead distribution power lines and fiber optic lines are owned and operated by Blue Ridge Electric Membership Corporation (BREMCO) and will be temporarily relocated outside the road construction limits. Existing cable television facilities are owned and operated by Charter Communications. Existing telephone facilities are owned and operated by AT&T.

The work will include the installation of all duct bank facilities, complete in strict accordance with the Specifications and Drawings subject to the approval of N.C.D.O.T. The principal features of work are set forth in paragraph 2.0 of these Specifications. Omissions of particular reference to any such items necessary for complete installation and proper operation thereof shall not relieve the Contractor of responsibility of furnishing same, which they shall include in their cost.

1.2 All materials required for the construction will be furnished by the N.C.D.O.T.'s Contractor, unless otherwise noted. Materials include, but are not limited to:

1.2.1 Box pad type ground-mounting sleeves for pad-mounted equipment.

1.2.2 Six inch (6"), four inch (4"), four inch (4") with innerducts, and two inch (2") PVC conduit (Schedule 40).

1.2.3 Ready-mixed flowable fill (500 PSI with red tint) for duct bank installation.

1.2.4 Precast utility vaults, including ring, covers, chimneys and ground rods. *(Racking brackets and ground-loop furnished and installed by others)*

1.2.5 Conduit spacers, bolsters, chairs, tie-down supports, cable pulling lines, and other materials, as required for duct bank installations.

1.2.6 Gravel, select backfill, concrete, asphalt and other associated materials necessary for the complete installation of the duct bank and box pads as well as for surface restoration in and around the project area.

1.2.7 Equipment and/or materials for shoring of trenches and excavations as required by OSHA or other more stringent safety rules.

1.3 The site of the work is along U.S. Highway 321 through the Town of Blowing Rock, North Carolina, from Possum Hollow Road (S.R. 1632) traveling south to Green Hill Road (S.R. 1534).

2.0 PRINCIPAL FEATURES

As part of the U.S. Highway 321 Improvements Project (N.C.D.O.T. R-2237C), an underground duct bank shall be constructed underneath the north/east proposed sidewalk to facilitate the relocation of existing electric, fiber optic, cable television, and telephone utilities underground within the corporate limits of the Town of Blowing Rock.

The work tasks required to complete the project are briefly described in the following paragraphs. These descriptions are intended only to indicate the scope of the project and are not intended to completely describe the work involved. Attached to the Specifications and Bidding Documents is a Conduit Plan which indicates the locations of the facilities involved with the project. This Conduit Plan is to be used for geographic reference only and is not necessarily electrically complete.

2.1 Underground Vaults and Duct Bank

2.1.1 Underground Duct Bank

The Contractor shall be responsible for the complete installation of underground utility vaults and duct bank as outlined on the Construction Drawings. Underground duct bank shall consist of multiple runs of Schedule 40 PVC conduits encased in 500 PSI ready-mix flowable fill. The duct bank installations will consist of multiple runs of two inch (2"), four inch (4"), and/or six inch (6") PVC conduits, for both electric and telecommunications duct systems. The contractor will be required to provide PVC conduit, elbows, couplers, conduit spacers, forming materials, rebar, and tie-down

brackets for this conduit, and the flowable fill (with red tint) required for encasement. Installations of precast vaults shall include excavation with gravel base, vault with ring, cover and ground rods (interior wall racks and ground-loop by others).

2.1.2 Equipment Pad Installations

The Contractor shall be responsible for the installation and shoring of all concrete/fibercrete/fiberglass box pads and conduit entrances at the locations specified on the Construction Drawings.

BREMCO will supply and install equipment pads for all transformers and 15 kV single-phase primary junction enclosures. The Contractor shall supply and install the conduit to these locations as outline on the Construction Drawings.

2.2 On-Site Inspections

See Section 105-8, "Cooperation With Utility Owners", *Standard Specifications for Roads and Structures, 2006, N.C.D.O.T.*

See Section 105-11, "Inspection Of Work", *Standard Specifications for Roads and Structures, 2006, N.C.D.O.T.*

See Section 1500-2, "Cooperation With The Utility Owner", *Standard Specifications for Roads and Structures, 2006, N.C.D.O.T.*

BREMCO and/or the engineer will have a representative on site during the installation of all duct bank, vaults, pads and other facilities related to the future installation of the underground electric and communication system.

MATERIAL SPECIFICATIONS

MATERIAL SPECIFICATIONS
UTILITY CONDUIT SYSTEM

1.0 STANDARDS

All equipment and materials covered by these Specifications and all tests applied thereto shall, unless otherwise stated herein, be in accordance with the applicable provisions of the latest editions of the Standards of the ASTM, ANSI, NEMA, and IEEE. Where the term "Standards" is used in the Specifications, it shall be understood to refer to the above standards.

2.0 CONDUIT

See Section 1098-4, "Conduit", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Conduit shall be light gray in color and shall be furnished in twenty-foot (20') lengths with a coupler pre-attached to one end, or cast as a part of the conduit. Conduits shall be permanently marked on the outside as to the size, schedule, manufacturer, and U.L. listing.

The PVC innerduct assembly shall be pre-assembled in the factory and factory inserted into the outer conduit with proper spacers and gaskets to maintain alignment and a water-tight seal during installation. Innerducts shall be pre-lubricated at the factory and compatible with the proposed fiber optic cable jacket.

Manufactured elbows/sweeps shall have a radius of no less than forty-eight inches (48").

3.0 CONDUIT SPACERS AND HOLD-DOWN BARS

3.1 Spacers

Conduit spacers shall be made from polyvinyl chloride (PVC), or approved material, to coordinate with PVC conduits utilized in the particular arrangements of duct banks. Conduit spacers shall be sized to accommodate the outside diameter of the particular size of Schedule 40 conduits, and to provide specified separations between conduits and excavation walls. Conduit spacers shall be supplied for three inch (3") separation from trench floor (bottom spacers) and to provide three inch (3") separation between conduits (intermediate spacers). Spacers shall be inter-locking, with provisions for installation of overall hold-down bars.

Conduit spacers shall be installed at a minimum of every five feet (5'-0") along length of duct bank, and at each side of elbows and at manhole or sectionalizing switch entrances.

3.2 Hold-Down Bars

The Contractor will supply and install appropriate hold-down bars to sufficiently anchor all duct bank conduits in the trench to maintain the required conduit depth during encasement pour. These shall use two (2) or more #3 or #4 rebar stakes for each assembly. Rebar stakes shall be long enough to anchor to trench bottom and extend through all levels of duct bank. The Contractor shall supply and install rebar covers if required by N.C.D.O.T.

4.0 TRENCH-WARNING TAPE

The Contractor will supply and install trench-warning tape in all trenches. Tape shall be located six inches (6") below final grade (or below finish asphalt in roadways), as indicated on the Construction Drawings.

Trench-warning tape shall be foil-encased with polyethylene plastic jacket to be detectable with electronic cable locators. Foil is to be 0.35 mils thick with a composite thickness of 4.3 mils with the plastic jacket. Tape shall be six inches (6") wide, "Electric Red" in color, with logo of "Caution – Electric Line Buried Below" repeated every thirty-six inches (36"). Tape shall comply with U. S. Department of Transportation USAS Code B31.8.

5.0 BOX PADS FOR SECTIONALIZING SWITCHES

The Contractor will supply and install a vault-type box pad pre-approved for ground-mounting of each 15 kV sectionalizing switch (PME). These shall be made of fiberglass-reinforced concrete or reinforced fiberglass. Box pads shall be listed as acceptable for use by the USDA Rural Utilities Service (RUS) Electric Programs. Box pads shall be sized for the top opening to match the base of the selected sectionalizing switch, considering room for hold-down clamps. The sidewalls shall be thirty-six inches (36") deep for mounting on various slopes and uneven surfaces. If fiberglass-reinforced concrete box pads are used, the color shall be natural concrete gray. If reinforced fiberglass box pads are used, the outer sidewalls shall be painted Munsell #7GY3.29/1.5 utility green enamel paint with ultra-violet protective additives. The top of the box pad shall extend at least three inches (3") above grade at the highest. Box pads shall be provided with bolted hold-down clamps. There shall be no sharp or rough edges that might be harmful to cables. The Contractor will supply and install an approved cover on each box pad in accordance with OSHA safety regulations. No box pad shall be left unattended upon installation without first being securely covered and made safe to general public. See Construction Details Drawing No. UC-25.

6.0 PRECAST CONCRETE UTILITY VAULTS

See Section 1077, "Precast Concrete Units", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

See Section 1525-2, "Utility Manholes – Materials", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Precast concrete vaults shall be supplied and installed by the Contractor to provide for pull points and splicing points for electric and telephone circuits. Vaults shall be fabricated in a two-piece assembly, with a gasketed waterproof seam mid-way up the vertical walls. Knockouts and personnel entrance openings shall be provided, as per the Construction Drawings. Units shall meet N.C.D.O.T. Standard Specifications and must be pre-approved for installations on N.C.D.O.T. rights-of-way. Units shall be sized as follows:

Description	Width	Length	Height	
Electric Vault	6'-0"	8'-0"	6'-6"	(Interior)
(15 kV Distribution)	7'-0"	9'-0"	7'-6"	(Exterior)

Description	Width	Length	Height	
Electric Vault	8'-0"	18'-0"	6'-6"	(Interior)
(100 kV Transmission)	9'-4"	19'-4"	7'-10"	(Exterior)

Description	Width	Length	Height	
Telephone Vault	6'-0"	12'-0"	7'-0"	(Interior)
	7'-1"	13'-1"	7'-11"	(Exterior)

6.1 Strength Rating

The utility vault as a unit shall conform to AASHTO HS20-44 Specifications. Wheel load (live load) shall consist of 16,000 pounds with a tire contact area of ten inches by twenty inches (10" x 20"). Live loads shall be increased by thirty percent (30%) for impact. Units shall comply to AASHTO Specifications for traffic surcharge loading equivalent to two feet (2') of dry earth pressure. Dead load shall assume vertical earth cover at 100 pcf and concrete 150 pcf. Lateral earth pressure shall be assumed to be 30 psf above water table, 80 psf below. "Fiber Mesh" fiberglass reinforcing will not be permitted for structural reinforcing or in knock-outs.

6.2 Material Specifications

6.2.1 Concrete for Vaults

The concrete ingredients are proportioned and mixed to produce a homogeneous concrete having a minimum compressive strength of 4,000 PSI in twenty-eight (28) days.

6.3 Accessories

Units shall be equipped with pulling irons and inserts for cable racks as per Construction Drawings. Two (2) two inch diameter (2" θ) ground rod holes and twelve inch diameter (12" θ) central sump pit shall be cast in the floor.

7.0 VAULT RING AND COVER

The Contractor will supply vault ring and cover assemblies for precast units. Ring and cover assemblies shall adhere to dimensions and logo as shown on Construction Detail Drawing No.'s. UC-26 and UC-27.

7.1 General

All castings manufactures, sold, or distributed, shall be cast with the manufacturers name and part number.

7.2 Material

Cast iron material shall conform to ASTM A48-83 Class 30, as a minimum. When specified at time of order, foundry will furnish a certified tensile test report for castings produced. The tensile test certificate, by an independent testing laboratory, confirms the minimum of 30,000 PSI tensile strength, and lists the quantities and part numbers certified by that test. All castings certified under that test are identified by the corresponding date or heat number cast on the product.

7.3 Appearance

All castings shall be furnished free from blowholes, shrinkages, or other surface imperfections.

7.4 Proper Fit

All castings shall be manufactured true to manufacturer's Submittal Drawing. All round manhole rings and covers or grates shall be furnished with machined horizontal bearing surfaces unless otherwise stated. All other castings will be furnished with ground seating surfaces. Prior to shipping, manufacturer will fit all components and guarantee that all castings furnished are of proper fit, and all castings have machined bearing surfaces are free from rattle.

7.5 Tolerances

Actual dimensions of all castings shall have a tolerance of one-sixteenth inch (1/16"), and an additional tolerance of one-sixteenth inch (1/16") per foot of dimension. All frames, covers, and grates of the same part number shall be interchangeable.

7.6 Weights

Casting weights are approximate and shall be within five percent (5%) of catalog weight. Manufacturer will furnish a minimum weight certificate of compliance.

7.7 Paint

All castings are to be submerged and thoroughly coated with a quick-dry liquid asphalt paint, unless otherwise specified. This prevents the handling of a corroded metal surface during installation and maintenance procedures.

7.8 Load Requirements

Castings shall be rated heavy duty, so as to support an HS20-44 wheel load of 16,000 pounds on a tire contact area of ten inches by twenty inches (10" x 20"). Heavy-duty castings will also exceed Commercial Item Description (CID) A-A-60005 requirement for proof load strength of 25,000 pounds on a nine inch by nine inch (9" x 9") load contact area.

7.9 Vault Covers

Vault covers shall be supplied with two (2) recessed drop handles on each side of the cover for easy removal. Covers will be supplied with logo lettering, centered across the lid, utilizing three inch (3") letters. Logo shall utilize three-sixteenth inch (3/16") high raised lettering above the lid surface.

8.0 BOX PADS (GROUND SLEEVES) FOR THREE-PHASE PRIMARY JUNCTION ENCLOSURES

The Contractor will supply and install a vault-type box pad (ground sleeve) pre-approved for ground-mounting each 15 kV three-phase primary junction enclosure (PJE). These shall be made of reinforced fiberglass. Box pads (ground sleeves) shall be listed as acceptable for use by the USDA Rural Utilities Service (RUS) Electric Programs. Box pads (ground sleeves) shall be sized for the top opening to match the base of the selected primary junction enclosure, considering room for hold-down clamps. The sidewalls shall be thirty inches (30") deep for mounting on various slopes and uneven surfaces. The top of the box pad (ground sleeve) shall extend at least three inches (3") above grade at the highest. The outer sidewalls shall be painted Munsell #7GY3.29/1.5 utility green enamel paint with ultra-violet protective additives. Box pads (ground sleeves) shall be provided with bolted hold-down clamps. There shall be no sharp or rough edges that might be harmful to cables. The Contractor will supply and install an approved cover on each box pad in accordance with OSHA safety regulations. No box pad shall be left unattended upon installation without first being securely covered and made safe to general public. See Construction Details Drawing No. UC-25.

9.0 PRECAST POLYMER CONCRETE ENCLOSURES

Precast polymer concrete enclosures shall be supplied and installed by the Contractor to provide for pull points and splicing points for electric fiber optic, lighting, and cable television circuits. Enclosures shall conform to all test provisions of the most current ANSI/SCTE77 "Specifications For Underground Enclosures Integrity" for Tier 22 applications. Units shall be sized as shown on Construction Details Drawing No. UC-28. Units shall be UL Listed and clearly labeled on the box and cover. Covers shall be securely installed immediately upon installation of box.

9.1 Covers

All covers are required to have the Tier level rating embossed on the surface. In no assembly can the cover design load exceed the design load of the box.

9.2 Proper Fit

All components in an assembly (box and cover) shall be manufactured using matched surface tooling so to guarantee proper fit free of raffle.

9.3 Test Reports

Independent third party verification or test reports shall be furnished by the Contractor if requested at no cost.

10.0 ENCASED DUCT BANK

See Section 340-2, "Pipe Removal – Materials", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

See Section 1000-7, "Flowable Fill", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

The Contractor shall supply and install suitable flowable fill to form a uniform encased duct bank. The flowable fill ingredients shall be proportioned and mixed to produce a non-excavatable encasement having a minimum compressive strength of 500 PSI in twenty-eight (28) days. The proposed mix design shall conform to N.C.D.O.T. Standard Material Specifications and shall be approved by the Engineer prior to use. Flowable fill is also referred to as "Controlled Low Strength Material" or CLSM and can be referenced under ACI 229R-99.

10.1 Color Tinting

The Contractor shall include a red color tinting to the proposed mix design. The red tint shall be representative of the American Public Works Association (APWA) Utility Color Codes for electric power lines, cables, conduit, and lighting cables. The tinting shall be added in such a manner as

to insure a consistent color throughout the mix and so as not to negatively affect the performance of the mix.

11.0 GROUND RODS

The Contractor shall furnish and install two (2) three-fourths inch by ten feet (3/4" x 10'-0") copper-covered steel ground rods at each concrete vault location as shown on Construction Details Drawing No.'s. UC-26 and UC-27. Ground rods shall be UL listed with a minimum of 13-mil copper plating. Ground rods shall be listed as acceptable for use by the USDA Rural Utilities Service (RUS) Electric Programs.

INSTALLATION SPECIFICATIONS

INSTALLATION SPECIFICATIONS
UTILITY CONDUIT SYSTEM

1.0 GENERAL

These Specifications provide for the installation of concrete-encased duct bank, manholes, and pox pads for an electric and communication system.

All construction work shall be done in a thorough and workmanlike manner in accordance with the Plans and Specifications, and the Construction Drawings.

The latest Edition of the National Electrical Safety Code (ANSI C2-2007) shall be followed, except where State or local regulations are more stringent. Excavations of all types and the backfilling and compaction thereof are subject to North Carolina Department of Transportation (N.C.D.O.T.) regulations.

2.0 TRENCHING

See Section 1505, "Excavation, Trenching, Pipe Laying, Backfilling for Utilities", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

All trenching depths specified are outlined on the Construction Drawings to establish the top surface of duct bank installations. The routing shall be as shown on the Construction Drawings and Specifications, unless conditions encountered are such that changes are necessary to accomplish the work. In such event, the N.C.D.O.T. shall be notified promptly.

Trench shall be tapered up or down gradually, as directed by the Engineer to change elevation for crossing foreign utilities. Elbows will **not** be used to change elevations at these crossings.

3.0 BACKFILLING

See Section 300-7, "Backfilling", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

See Section 1016, "Select Material", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Native soil for backfill shall be free of sharp rock and other hard debris. No solid or frozen material larger than one inch (1") shall be placed onto conduit. Class 1 Select Material may be used and shall cover conduit a minimum of four inches (4") before placing native soil if native soil is unacceptable. Conduit shall be covered a minimum of twelve inches (12") before tamping. Tamp every six inch (6") layer of backfill thereafter.

Prior to backfilling the last six inches (6") of the trench, the Contractor shall install a red, six inch (6") wide detectable trench warning tape as a part of the tamping process. Tape shall be installed with the red "Caution – Electric Lines Buried Below" side facing up.

4.0 ROCK ENCOUNTERED IN EXCAVATIONS

The Contractor shall be responsible for the removal and disposition of solid rock when encountered during excavation as defined and approved by the N.C.D.O.T.

5.0 CONDUIT

See Section 1400, "Roadway Lighting", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

See Section 1409, "Electrical Duct", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Burrs or sharp projections which might injure the cable shall be removed from conduit ends. Conduit shall extend down the pole at least one foot (1') below grade at all riser poles. The size and type of conduit is specified on the Construction Drawings.

Bell end fittings shall be utilized, as called for on the Construction Drawings. All conduits shall be rodded clean to remove debris and insure coupling alignment prior to pull line installation (installation of cable by others).

5.1 Conduit Alignment

The Schedule 40 conduit is sufficiently flexible to allow it to conform to minor and gradual changes in trench direction or elevation without the use of fabricated sweeps or fittings.

Controlled longitudinal bending of conduit shall be in accordance with manufacturer's recommendations and shall not exceed twelve inches (12") every ten feet (10'-0") without prior Engineer's approval. Any shorter radius bends must be accomplished with preformed sweeps. Five degree (5°) bends will not be used in duct bank construction.

5.2 Crossings

Conduits shall be routed beneath the main duct bank where crossings are specified. Conduits shall be positioned to maintain a minimum three inch (3") separation from conduit in the main duct bank.

5.3 Pull Line

See Section 1400-2 (I), "Pull Lines", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Nylon pull line of at least one-eighth inch (1/8") diameter shall be installed in all conduits and tied off for future use, with a minimum ten foot (10') spare line at each end.

5.4 Stubbing and Identifying of Conduit at Termination Points

All exposed ends of conduit shall be terminated/stubbed at specified equipment locations as shown in the Construction Drawings. Unless otherwise specified, conduits shall extend a minimum of one foot (1'-0") above final grade.

As the conduit is laid, the last six inches (6") of conduit ends shall be painted using a spray paint suitable for bonding to PVC without need for sanding or priming. The paint should be weather and UV resistant to provide a minimum of six (6) months visibility without significant degradation.
The conduit ends shall be painted to identify the intended utility occupant using the following colors:

- Red – Electric Power & Lighting
- Purple – Electric Fiber Optic
- Orange Telephone
- Brown – CATV

6.0 INSTALLATION OF DUCT BANK

6.1 Duct Bank

6.1.1 General

Duct bank installations shall include the removal of concrete, asphalt, sub-base and earth required for the placement of conduits to the depths shown on the Construction Drawings. Asphalt shall be saw-cut with appropriate equipment, typically one foot (1') wider than the trench walls in accordance with Construction Drawings and the N.C.D.O.T. Specifications.

Conduits shall be installed in the arrays indicated using appropriate PVC solvent cement at all joints. Joints shall be staggered longitudinally approximately two feet (2').

6.1.2 Encased Duct Bank

Contractor will furnish and Contractor will install approved PVC conduit spacers at least every five feet (5'), complete with tie-downs and other supports necessary to insure uniform encasement of all exterior surfaces of the conduit. Extreme care shall be exercised to ensure conduits are not broken or cracked as a result of standing on sections.

Flowable fill shall be installed (unless otherwise specified) and conduits shall be sufficiently anchored in the trench to maintain the required conduit depth during encasement pour.

6.1.3 Hold-Down Bars

The Contractor will supply and install appropriate hold-down bars to sufficiently anchor all duct bank conduits in the trench to maintain the required conduit depth during encasement pour. These shall use two (2) or more #3 or #4 rebar stakes for each assembly. Rebar stakes shall be long enough to anchor to trench bottom and extend through all levels of duct bank. The Contractor shall supply and install rebar covers if required by N.C.D.O.T.

6.2 Manholes/Vaults

See Section 1525, "Utility Manholes", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

Duct bank entrances shall be accomplished into vaults utilizing cast-in duct terminators.

7.0 CONDUIT TESTING/MANDRELING

After conduit has been installed, a mandrel test shall be performed to ensure that all obstructions are cleared and that conduit continuity and alignment is good. The mandrel size shall be ninety percent (90%) of the inside diameter of the conduit. If the mandrel fails to pass through the conduit being tested, either the conduit is obstructed, misaligned, or the curve has too small a radius. Any problem areas in which the mandrel fails to pass shall be exposed and corrected by the Contractor at no cost.

After conduit continuity and alignment is verified, a conduit swab (or piston) of equal inner conduit diameter shall be used to clean out loose debris and moisture prior to cable installation. Once completed, conduit shall provide proper conditions to safeguard conductor during pulling operation.

Where equipment has been located for installation, conduit shall be routed and turned up above grade and tamped in place as shown in the Construction Drawings. Conduit spacing and box pad installation shall be the responsibility of the Contractor.

8.0 PLACEMENT OF BOX PADS

See Section 1411, "Electrical Junction Boxes – Construction Methods", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

The site for pads shall be on undisturbed earth adjacent to the trench. The site shall be cleared of all debris and excavated to the specified depth. Gravel, sand or other acceptable self-draining material shall be added to the site and thoroughly compacted. The pad shall be installed at the specified elevation. Installation shall follow manufacturer's recommendations. See Construction Details Drawing No. UC-25.

9.0 PLACEMENT OF PRECAST POLYMER CONCRETE ENCLOSERS

The site for precast polymer concrete enclosures shall be brought to finished grade prior to installation. Installation shall follow manufacturer's recommendations. Hole cutting required for conduit installation shall be appropriately sized for the size of conduit. Holes shall be reasonably placed as needed in the lower half of the enclosure wall. The Contractor shall follow manufacturer's recommendations for hole cutting. See Construction Details Drawing No. UC-28.

10.0 PLACEMENT OF PRECAST CONCRETE VAULTS

See Section 1525-3, "Utility Manholes – Construction Requirements", *Standard Specifications For Roads and Structures, 2006, N.C.D.O.T.*

10.1 Grounding

Two (2) copper-clad steel ground rods with minimum dimensions of three-fourths inches by ten feet (3/4" x 10'-0") shall be installed at each precast concrete vault location as shown on Construction Details Drawing No.'s UC-26 and UC-27. Each ground rod shall be tested by the Contractor using an approved two(2)-point ground tester. Each rod shall read 25.0 ohms or less, or instructions shall be issued by the Engineer to possibly drive additional rods. After corrective measures are completed, the rod will be re-tested to verify 25.0 ohms or less.

MEASUREMENT & PAYMENT

MEASUREMENT & PAYMENT
UTILITY CONDUIT SYSTEM

1.0 GENERAL

All proposed utility construction shall meet the applicable requirements of the N.C. Department of Transportation's "Standard Specifications for Roads and Structures" dated July 2006. Division 15 of the Standard Specifications is revised as follows:

Page 15-1, Paragraph 4

Provide access for Department personnel and the owner's representatives to all phases of construction. Notify Department personnel and the utility owner two (2) weeks prior to commencement of any work and one (1) week prior to service interruption. Keep utility owner's representatives informed of work progress and provide opportunity for inspection of construction and testing. The duct bank and associated vaults, pads hand holes and apprutances on this project belong to Blue Ridge EMC. The contact person for Blue Ridge EMC is Mr. Steve Woodring and he can be reached by phone at (828) 773-2261. Any work on these facilities must be coordinated through the Engineer and the utility owner before beginning.

2.0 COMPENSATION

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility construction, and all of the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

3.0 DUCTBANK

Duct bank, constructed in accordance with the Utility Construction plans, will be measured and paid for on a linear foot basis for the appropriate type and size of duct bank installed and accepted. Typical duct bank arrangements/configurations are shown on the utility construction plans. Transition sections of duct bank shall be measured and paid for on a linear foot basis for the larger of the two typical cross sections of duct bank. The acceptable length of transitions between two cross sections of duct shall be approved by the Engineer prior to construction and measurement. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with duct bank construction will be incidental to this pay item. Payment will be made for "Duct bank – Type _____."

4.0 DIRECT BURY CONDUIT

Direct bury conduit, constructed in accordance with the Utility Construction plans, will be measured and paid for on a linear foot basis for the appropriate type and size of conduit installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with conduit construction will be incidental to this pay item. Payment will be made for "Direct Bury Conduit."

5.0 BOX PAD

Box pads, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, foundation preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with box pad construction will be incidental to this pay item. Payment will be made for "Box Pad – PME Type _____" or "Box Pad – PJE Type _____."

6.0 ELECTRIC VAULT

Electric vaults, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with vault construction will be incidental to this pay item. Payment will be made for "Electric Vault (UVE) – Type _____."

7.0 ELECTRIC F.O. VAULT

Electric fiber optic vaults, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with vault construction will be incidental to this pay item. Payment will be made for "Electric F.O. Vault (FV) – Type _____."

8.0 ELECTRIC F.O. HANDHOLE

Electric fiber optic handholes, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with handhole construction will be incidental to this pay item. Payment will be made for "Electric F.O. Handhole (F) – Type _____."

9.0 TELEPHONE VAULT

Telephone vaults, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with vault construction will be incidental to this pay item. Payment will be made for "Telephone Vault (TV) – Type _____."

10.0 CABLE TV VAULT

Cable TV vaults, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with vault construction will be incidental to this pay item. Payment will be made for "Cable TV Vault (CV) – Type _____".

11.0 DUCT BANK FLOWABLE FILL

Duct bank flowable fill shall consist of furnishing and placing ready-mixed or volumetric mixed flowable fill for use in filling the excavated trench and around individual conduits which are part of "Duct Bank" as specified in the plans or as directed by the Engineer.

Duct bank flowable fill shall meet the requirements of Subsections 340-2 and 1000-7 of the Standard Specifications, except that the minimum twenty-eight (28) day compressive strength shall be a minimum of 500 PSI. Red color tinting shall also be provided in the duct bank flowable fill mix in accordance with other sections of these provisions.

The quantity of flowable fill placed and accepted will be measured and paid for at the contract unit price per cubic yard for "Duct Bank Flowable Fill." Such price and payment will be full compensation for all work covered by this special provision including but not limited to the mix design, red color tinting, furnishing, hauling, labor, placing the flowable fill, containing the flowable fill, and incidentals necessary to complete the work as required.

12.0 STREET LIGHT HANDHOLE

Street light handholes, constructed in accordance with the Utility Construction plans, will be measured and paid for on a per each basis for the appropriate type and size installed and accepted. All excavation, trench preparation, foundation conditioning material, rock removal, blasting, compaction and backfilling associated with vault construction will be incidental to this pay item. Payment will be made for "Street Light Handhole (SL) – Type _____".

TYPICAL MATERIAL

TYPICAL MATERIAL
CONTRACTOR FURNISHED
(For Information Only)

Materials listed below are those typical and approved by the Utility Owners. The Contractor shall supply and install materials similar or equal to those listed.

ITEM DESCRIPTION	MANUFACTURER	ITEM NUMBER
Box Pad – PME Type 9	Concast, Inc. (Zumbrota, MN)	FC-74-76-36-6264
	Parking Bumper Co. (Newton Grove, NC)	17028 WF
Box Pad – PME Type 10, 11	Concast, Inc. (Zumbrota, MN)	FC-74-76-36-6264
	Parking Bumper Co. (Newton Grove, NC)	17027 WF
Box Pad – PJE Type 3-Ph, 200A	Nordic Fiberglass, Inc. (Warren, MN)	GS-61-18-30-MG-54x11
Box Pad – PJE Type 3-Ph, 600A	Nordic Fiberglass, Inc. (Warren, MN)	GS-67-23-30-MG-57x18
Fiber Vault – FV Type 30"x48"x36"(w/ Cover)	Quazite (Lenoir City, TN)	PG3048DA36 w/ PG3048HH00P
Fiber Handhole – FV Type 24"x36"x24" (w/ Cover)	Quazite (Lenoir City, TN)	PG2436DA24 w/ PG2436HH00P
Telephone Vault – TV Type 6'x12'x7'	Oldcastle Precast (Pleasanton, CA)	AT&T-38Y-4046
Cable TV Vault – CV Type 24"x36"x24" (w/ Cover)	Quazite (Lenoir City, TN)	PG2436DA24 w/ PG2436HH00P

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TYPICAL MATERIAL
CONTRACTOR FURNISHED *(Continued)*
(For Information Only)

ITEM DESCRIPTION	MANUFACTURER	ITEM NUMBER
Street Light Handhole- SL Type 13"x24"x18" (w/ Cover)	Quazite (Lenoir City, TN)	PG1324BB18 w/ PG1324HH00
4" PVC SCH. 40 w/ (4) 1-1/4" Innerduct	Carlon *Thomas & Betts Corp.* (Memphis, TN)	MFSS4S-020 (Multi-Gard PVC)

ATTACHMENT NO. 1

UTILITY CONSTRUCTION DRAWINGS

- **Conduit Plan**
  (UC-14 to UC-24)

- **Construction Details**
  (UC-25 to UC-30)

November 29, 2010

County: Caldwell-Watauga
Project: R-2237C

PROJECT SPECIAL PROVISIONS
Utility

UTILITIES BY OTHERS

General:

The following utility companies have facilities that will be in conflict with the construction of this project.

A) Blue Ridge EMC – Power (Distribution)
B) Blue Ridge EMC – Power (Transmission)
C) AT&T Communications- Telephone
D) Charter Communications – CATV

The conflicting facilities of these concerns will be adjusted prior to the date of availability, unless otherwise noted and are therefore listed in these special provisions for the benefit of the Contractor. All utility work listed herein will be done by the utility owner. All utilities identified herein are based on the best available information.

The Contractor's attention is directed to Article 105-8 of the Standard Specifications.

Utilities Requiring Adjustment:

A) Blue Ridge EMC - Power (Distribution)

1) See Utilities by Others Plans.
2) BlueRidge EMC will be complete with all temporary relocations of their power distribution facilities from US 321 Business to the end of the Project eight (8) months after the Date of Availability.

B) Blue Ridge EMC – Power (Transmission)

1) See Utilities by Others Plans.
2) BlueRidge EMC will be complete with all temporary relocations of their power transmission facilities from US 321 Business to the end of the Project eight (8) months after the Date of Availability.

C) AT&T Communications - Telephone

1) See Utilities by Others Plans.
2) AT&T Communications will be in joint use with Blue Ridge EMC and will be complete with all temporary relocations of their telephone facilities from US 321 Business to the end of the Project eight (8) months after the Date of Availability.

D) Charter Communications - CATV

1) See Utilities by Others Plans.
2) Charter Communications will be in joint use with Blue Ridge EMC and will be complete with all temporary relocations of their telephone facilities from US 321 Business to the end of the Project eight (8) months after the Date of Availability.

After the R-2237C project has been completed, all companies will be working eighteen (18) Months after that date to install the permanent facilities in the proposed conduit system.

NOTE: All other utilities will remain in place and will be adjusted as necessary.