

SECTION 05000
UTILITY TRENCHES

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05010 EXCAVATION AND PREPARATION

A. PREPARATION

1. General Requirements

- a) Trenching for pipelines (water, sewer, pressure, natural gas, liquid petroleum) lines (power and communication) and pipes (drainage and irrigation) shall be excavated to the required depth to permit the installation of the pipe (inclusive of pipes, wires, cables, ducts, and conduit) along the lines and grades shown on the construction drawings.
- b) Prior to trenching for the construction of any utility mains or connections, the Contractor shall locate all existing utilities within the construction zone. This may include at a minimum contacting the North Carolina One Call Center at 1-800-632-4949. Where critical Town water and sewer utilities cannot be located by traditional means, specialized utility locating, such as vacuum excavation or ground penetrating radar (GPR) may be required to locate existing utilities before excavating.
- c) In all cases where jack and bore methods are planned to cross an existing utility corridor with water, sewer, force main, reclaimed water and/or other Town maintained pipelines, an SUE, (subsurface utility exploration) services firm shall be contracted to verify the depths of existing utilities prior to boring.
- d) The Contractor shall be responsible for implementing all required safety provisions for trenching in compliance with the Occupational Safety and Health Administration (OSHA) regulations and all other applicable safety requirements and procedures.

B. TRENCHING

1. Trench Dimensions

- a) The minimum trench width at the top of the pipe shall be at least 18 inches greater than the outside diameter of the pipe. Rock shall be removed to a depth of at least 6 inches below the bottom of the pipe and the trench backfilled with suitable material.
- b) Open trenches shall not exceed 100-ft.
- c) All trenches shall be confined to the limits of the right-of-way or utility easement. Trenches in paved areas shall not be sloped.

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- d) All trenches along roadways, and otherwise as directed by the Inspector, shall be properly backfilled at the end of each working day.

2. Trench Protection

- a) Wet trenches shall be stabilized with a base layer of #78 M or #57 stone. The bottom of the trench shall be shaped to provide uniform support along the entire length of the pipeline. Severely unstable trench bottoms requiring undercut excavation shall receive a foundation support system for the pipeline designed by a registered Geotechnical Engineer licensed in the State of NC.
- b) A space shall be excavated at each bell to provide ample space to join the pipes with no misalignment.
- c) The Contractor shall take all necessary measures to prevent water from entering the trench.

05020 PIPE LAYING AND BACKFILLING

A. GENERAL REQUIREMENTS

1. Pipe Laying

- a) Open ends of pipe shall be plugged when pipe laying is not in progress to prevent trench water, soil, and debris from entering.
- b) All pipe shall be laid in accordance with the manufacturer's recommendations and all applicable Town standards, specifications and details.
- c) Pipe laying shall be accomplished in a manner and with the required resources to provide a properly aligned and sealed pipeline and joints.
- d) Pipe deflection limits shall not be exceeded in accordance with manufacturer requirements.
- e) All gravity mains shall be installed beginning with the downhill section at the lowest elevation, and advanced upgrade to the terminus of the main. All bell ends shall be oriented facing the uphill direction.

2. Backfill

- a) Backfill material shall be free from construction material, frozen material, organic material, or unstable material. Backfill with a high clay content or high shrink-swell potential that cannot meet compaction requirements shall be deemed unsuitable and replaced.
- b) Backfill materials that have been allowed to become saturated or with moisture contents non-conducive to meeting compaction requirements shall be deemed unsuitable and replaced.
- c) When original excavated materials have been deemed unsuitable, granular material must be imported to the site to backfill utility trenches and meet compaction requirements. The following materials shall be acceptable forms of granular backfill: aggregate base course, soil type base course, select backfill material, sand or screenings in accordance with NCDOT specifications.
- d) In all open utility trenches, backfill shall be compacted to 95% maximum dry density as measured by AASHTO method T99. The Contractor shall be responsible for verifying that compaction requirements have been met or exceeded by providing soils testing data from an approved Geotechnical Firm. The soil test results shall be certified by a licensed Geotechnical Engineer.
- e) Backfill for utility trenches shall be placed in 8-inch lifts or less of uncompacted soil and compacted with a mechanical tamp before placing additional layers.

05030 PAVEMENT REPAIRS

A. OPEN TRENCH PAVEMENT REPAIR

1. General Requirements

- a) All pavement cuts shall be repaired within a maximum of three (3) days from the date the cut is made. If conditions do not permit a permanent repair within the given time limit, permission to make a temporary repair must be obtained from the Inspector.
- b) Pavement repairs shall be made in accordance with the Details.
- c) All asphalt pavement utilized to repair open trenches shall comply with all applicable Town of Cary asphalt pavement material and installation specifications.

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- d) All pavement patches shall be provided in such a manner that a uniform and smooth driving surface free of depressions and/or bumps is obtained. Pavement patches not meeting this standard shall be milled and replaced.

05040 BORING AND JACKING

A. DESIGN

1. General Requirements

- a) All utility crossings within Town streets shall be made by boring and jacking. In cases where utility conflicts, rock, or other obstructions prevent crossing by boring and jacking, the Town may consider approving other methods.
- b) The Town also recommends that all utility crossings of State maintained streets within the Town ETJ be made by boring and jacking.
- c) In addition to meeting or exceeding all Town requirements, all bores shall be approved by and meet the requirements of all controlling legal authorities, such as NCDOT, Norfolk Southern Railway and CSX Corporation.
- d) All bores larger than 6-inches in diameter shall be encased as specified.
- e) Encasement pipe shall be installed with a minimum cover of 4-ft between the pavement subgrade and the top of the casing pipe. Under no circumstances shall the pavement subgrade be disturbed.

B. MATERIALS

1. Encasement Pipe

- a) Encasement pipe shall be manufactured of grade 'B' steel with minimum yield strength of 35,000-psi in accordance with ASTM A139 and A283.
- b) Size and wall thickness of smooth wall or spiral welded steel encasement pipe shall be as follows:

Minimum Wall Thickness of Steel Encasement Pipe

Encasement Pipe Outside Diameter (inches)	Minimum Wall Thickness (inches)
12- ³ / ₄	0.188
14	0.250
16	0.250
18	0.250
20	0.250
24	0.250
26	0.312
28	0.312
30	0.312
36	0.375
42	0.500
48	0.500

- c) Encasement pipe installed for railroad bores shall meet the requirements of the American Railway Engineering Association (AREA) for boring under railroads.
- d) Encasement pipe shall have the following minimum sizes:

Minimum Allowable Steel Encasement Diameter Per Carrier Size

Carrier Pipe Size Ductile Iron w/Slip Joints (inside diameter, inches)	Carrier Pipe Outside Bell Diameter (inches)	Steel Encasement Nominal Diameter (inches)
6	8.90	12- ³ / ₄
8	11.16	16
10	13.25	18
12	15.37	20
14	17.73	24
16	19.86	26
18	22.16	28
20	24.28	30
24	28.50	36
30	34.95	42
36	41.37	48

2. Carrier Pipe and Spacers

- a) All carrier pipe shall be slip joint ductile iron pipe, unless the pipeline is conveying reclaimed water in which restrained PVC C900 or C905 pipe in compliance with Section 6500 may be utilized.

- b) The carrier pipe shall rest on steel “spider” pipe alignment spacers. A minimum of 2 steel spiders per joint of carrier pipe shall be required. The steel spiders shall be spaced evenly along the carrier pipe alignment in such a manner that each spider supports the same unit weight of carrier main. The spacing interval of the steel spiders shall assure the necessary grade, clearance, and support of the carrier main.
- c) In cases where the encasement and carrier pipe are installed in close proximity to facilities with stray current, such as gas lines, high voltage power transmission lines, railroad tracks, etc., the steel spiders shall be provided with composite contacts, such as EPDM, etc. to prevent transmitting the stray current to the carrier pipe.
- d) In cases where PVC carrier pipe is installed in an encasement pipe, steel spiders with soft contact surfaces rated for use with PVC pipe shall be used.
- e) The carrier pipe bells shall not be allowed to contact the interior of the encasement pipe under any circumstances.
- f) No blocks or temporary spacers shall be wedged between the carrier pipe and the top of the encasement pipe.

C. INSTALLATION

1. General Requirements

- a) As the dry boring operation progresses, each new section of encasement pipe shall be butt-welded to the section previously jacked into position.
- b) If voids are encountered while installing encasement pipe thirty (30) inches and larger, grout holes shall be installed at ten (10) foot centers in the top section of the encasement pipe. The grout holes shall be used to fill the void spaces with 1:3 Portland cement grout at sufficient pressure to prevent settlement of the roadway, unless NCDOT approval stipulates otherwise. Other grout mixtures may be submitted for approval.
- c) In the event that an obstruction is encountered during the boring and jacking operations, the boring equipment shall be withdrawn. The pipe shall be cut off, capped, and filled with 1:3 Portland cement grout at a sufficient pressure to fill all voids before moving to another boring site.

- d) See the standard details for further installation requirements.

05050 EXTERNAL CORROSION PROTECTION

A. DESIGN

1. General Requirements

- a) External corrosion can occur at an accelerated rate in metallic pipelines such as steel and ductile iron when they are installed in aggressive soils or when they are installed near other structures or utilities that carry impressed currents. Such facilities that typically utilize impressed current cathodic protection are gas pipelines, such as owned by Colonial Pipeline, Cardinal Pipeline and Dixie Pipeline. Other potential sources that may create stray currents that contribute to accelerated pipeline corrosion are high voltage power transmission lines and railroad crossings.
- b) In cases where metallic steel and ductile iron pipelines or encasement pipes are planned for installation in close proximity to any potential sources of stray current or aggressive soils, a field analysis consisting of stray current evaluation and soil testing shall be conducted by an experienced technician, as certified by the National Association of Corrosion Engineers, (NACE), to determine the potential for external corrosion. In cases where stray current conditions and/or aggressive soils are prevalent, a corrosion specialist certified by the NACE or other applicable certification board shall be consulted regarding the design of pipeline protection measures.
- c) At a minimum, all stray current protection systems should include bonded joints and sacrificial anodes with a 50-year or longer design life and test facilities in lieu of polyethylene encasement, unless otherwise approved by the Town of Cary. The cathodic protection element of the pipeline design package shall be sealed by Professional Engineer licensed in the State of NC.
- d) Full impressed current cathodic protection shall only be utilized when extreme corrosion potential has been proven and/or as otherwise directed by the Town of Cary Engineering Department and the certified corrosion engineer of record.

END OF SECTION 05000