

Brunswick Glynn-County Joint Water Sewer Commission

OAK GROVE SUBDIVISION

FORCE MAIN IMPROVEMENTS

TECHNICAL SPECIFICATIONS



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TECHNICAL SPECIFICATIONS

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SITE WORK
SECTION 02050
EROSION, SEDIMENTATION, AND POLLUTION CONTROL

1.1 SCOPE

The work of this section includes implementation of the Erosion, Sedimentation and Pollution Control plan including but not limited to the installation and maintenance of all structural and vegetative Best Management Practices (BMP's), and all other work and appurtenances required.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 02315	Trenching Excavation, Bedding and Backfill
Section 02430	Sanitary Sewer System

1.3 APPLICABLE STANDARDS

The following standards and/or publications are made a part of this specification by reference. The Contractor shall obtain copies of all referenced standards or publications and keep available on the jobsite at all times during the construction period. In the event of conflicts among the various sources cited below, the most stringent criteria shall take precedence:

"Manual for Erosion and Sediment Control in Georgia", latest edition copies of which are available from the State Soil and Water Conservation Commission.

1.4 QUALIFICATIONS

1.4.1 Installers

Installation of BMP's must be performed by an installer who has completed Erosion, Sedimentation and Pollution Control Plans similar in material, design and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

The Contractor must disclose to JWSC/Engineer of Record, prior to project award, all violations and citations received in the last five (5) years from the Georgia Environmental Protection Division, Army Corps of Engineers, and other City/County/State agencies dealing with erosion and sediment control deficiencies or wetlands deficiencies.

1.4.2 Inspectors

The contractor shall have a Qualified Personnel, as defined by the NPDES Permit on site whenever construction activity occurs. "Qualified Personnel" means a person who has successfully completed an erosion and sediment control short course eligible for continuing education units, or an equivalent course approved by the Georgia Environmental Protection Division and the State Soil and Water Conservation Commission.

1.5 SUBMITTALS

The following information shall be submitted to JWSC/Engineer of Record prior to commencement of the work:

- Copy of Certification with GSWCC number of Qualified Person(s)
- Technical Product Data for Sediment barriers

PART 2 MATERIALS

2.1 MATERIALS

All materials shall conform to these specifications and to the applicable standards listed in Paragraph 1.3 of this Section. BMP's required but not specified below shall be in accordance with the "Manual for Erosion and Sediment Control in Georgia" latest edition.

2.1.1 Ds1 - Disturbed Area Stabilization (Mulching Only)

Ds1 is a temporary cover of plant residues applied to the soil surface for a period of six (6) months or less when seeding is not practical. Materials shall consist of the following:

- Compressed and compacted bound bundles of wheat, oat, rye or other local hays free of weeds

- Wood waste consisting of chips, sawdust or bark Polyethylene film

- Hydro-mulch

- Composed of wood cellulose fiber containing no germination or growth inhibiting factors, colored green to allow visual metering in application and properties, evenly dispersed and suspended when agitated in water.

Add hydro-mulch water slurry in hydraulic seeder after proportionate quantities of seed, fertilizer and other materials have been introduced.

Moisture Content	9.9% (+ or -) 3.0%
Organic Matter	99.2% (+ or -) 0.8%
Ash Content	0.8% (+ or -) 0.2%
Water Holding Capacity (min) grams	1150 grams water per 100 fiber

2.1.2 Ds2 - Disturbed Area Stabilization (Temporary Seeding)

Ds2 is a temporary vegetative cover with fast growing seedings for up to a twelve (12) month period or until permanent vegetated is established. Materials shall consist of the following:

Lime

Lime shall be natural limestone containing minimum 85% total carbonates:

95% or more pass 20 mesh sieve, 55% pass 60 mesh sieve, and 40% pass 100 mesh sieve

Fertilizer

Fertilizer shall be as follows:

Dry or hydro

Commercial grade manufactured in accordance with Georgia Department of Agriculture Specifications and bearing approval label of State of Georgia

Grade containing plant food elements determined by laboratory analysis

Grass Seed

Grass Seed must be planted according to recommendations contained the "Manual for Erosion and Sediment Control in Georgia" or as approved by a Landscape Architect:

Ryegrass, annual (*Lolium Multiflorum*) containing minimum 98% pure seed with 90% minimum germination and maximum 0.5% weed seed

Bermuda 100% hulled common Bermuda grass (*Cynodun Dactylon*) containing minimum 87% pure Bermuda with 85% minimum germination and maximum 1% weed seed

All seed types listed in the "Manual for Erosion and Sediment Control in Georgia".

Hydro-seed shall be applied at the following rates.

Ryegrass	250	Lbs/Acre
Bermuda	175	Lbs/Acre

2.1.3 Ds3 - Disturbed Area Stabilization (Permanent Vegetation)

Ds3 is permanent vegetative cover using grasses, trees, shrubs or legumes on highly erodible or critically eroded lands. Materials shall consist of the following:

Lime

Lime shall be natural limestone containing minimum 85% total carbonates. Dolomitic limestone shall be used in sandy plains and coastal soils. Conventional equipment shall be used to ground limestone.

95% or more pass 20 mesh sieve, 55% pass 60 mesh sieve, and 25% pass 100 mesh sieve

For hydraulic seeding use finely ground limestone.

98% or more pass 20 mesh sieve and 70% pass 100 mesh sieve

Fertilizer

Fertilizer shall be as follows:

Dry or hydro

Commercial grade manufactured in accordance with Georgia Department of Agriculture Specifications and bearing approval label of State of Georgia

Grass Seed

Grade containing plant food elements determined by laboratory analysis

Grass Seed must be planted according to recommendations contained the "Manual for Erosion and Sediment Control in Georgia" or as approved by a Landscape Architect:

Ryegrass, annual (*Lolium Multiflorum*) containing minimum 98% pure seed with 90% minimum germination and maximum 0.5% weed seed

Bermuda 100% hulled common Bermuda grass (*Cynodon Dactylon*) containing minimum 87% pure Bermuda with 85% minimum germination and maximum 1% weed seed

Hydro-seed shall be applied at the following rates.

Ryegrass	250	Lbs/Acre
Bermuda	175	Lbs/Acre

2.1.4 Sd1-Sediment Barrier

A temporary structure made of silt fence supported by steel or wooden posts, sandbags, straw bales or other filtering material:

Sediment Barrier Type 'A' (Sd1-A)

Fabric height	36-inches
Trench Depth	6-inches

Fence Posts:

- 48-inches long
- 1 1/2-inch by 1 1/2-inch Oak
- 3-inch diameter or 2-inch by 4-inch softwood Steel 1.3 Lbs./Ft Minimum

Approved silt fence fabrics:

Amoco CEF 2019
Beltech 755 & 890
Cady bag Company 20-CSF
350/26 LINQ Industrial
Fabrics, Inc. GTF-200S
Geotex 914SC, 915SC
TNS Advanced Technologies
TNSW101 Terratex GASF
Willacoochee Industrial Fabrics, Inc. 1215 Silt Fence

PART 3 EXECUTION

3.1 PERFORMANCE REQUIREMENTS

Erosion control devices shall be installed as shown on the plans (and elsewhere as deemed necessary) and are required for all earth areas disturbed by grading and construction operations. The extent of disturbed areas is shown on the construction plans. Erosion control activities include but are not limited to:

- Initial installation of erosion control devices
- Implementation of Best management Practices (BMP's)
- Application of temporary ground cover
- Maintenance of erosion control devices for the duration of the construction period. Application of permanent ground cover
- Removal of erosion control device

3.1.1 Non-Compliance

Upon notification by the JWSC/Engineer of Record of non-compliance with this specification, the Contractor has seven (7) days to address and install additional erosion control devices or otherwise correct the deficiencies noted.

3.1.2 Temporary Erosion Control Measures

Contractor shall install, maintain, repair and/or replace all temporary erosion control measures including, but not limited to, the following:

- Silt fences
- Dust Control
- Temporary Seeding For Disturbed Areas

The Contractor shall be responsible for providing additional erosion control measures as needed to prevent sediment from leaving the site.

Contractor shall be responsible for all additional costs associated with additional erosion control measures.

3.1.3 Maintenance of Erosion Control Measures

The Contractor is responsible for maintenance, repair and/or replacement of erosion control measures throughout the construction period due to any of the following causes:

- Downed silt fences
- Washed out silt fences and rock
- Vandalism
- When silt overburdens structure Erosion of earth or dam
- Damage due to abnormal weather conditions

3.2 SEQUENCE OF EVENTS

Best Management Practices (BMP's) shall be implemented during construction activities from commencement of construction to completion. Schedule grading operations so as to minimize the time that denuded soils are exposed. Any exposed area left undisturbed for a period of 14 days or longer shall be stabilized with mulch or temporary seeding.

3.3 INSTALLATION AND MAINTENANCE

3.3.1 Ds1 - Disturbed Area Stabilization (Mulching Only)

Install mulch on all building pad area left for more than seven (7) days. Mulch shall re-applied whenever ground cover is less than 90%.

Dry straw or hay shall be applied uniformly at a depth of 2-inches to 4-inches by hand or by mechanical equipment. Straw or hay mulch shall be anchored immediately after application. Mulch can be pressed into the soil with a disk harrow using packer disk. Mulch spread with special blower-type equipment may be anchored with emulsified asphalt, tackifiers and/or binders.

Wood waste shall be applied at a depth of 2-inches to 3-inches.

Cut back asphalt shall be applied at the rate of 1200 gallons per acre.

Polyethylene film shall be secured over banks or stockpiled soil material for temporary protection.

3.3.2 Ds2 - Disturbed Area Stabilization (Temporary Seeding)

All disturbed areas shall be seeded within seven (7) days of the completion of land disturbing activities or when land disturbing activities are to be discontinued for longer than two weeks. Seed areas outside buildings, walks and paving not to immediately receive permanent grass or landscaping with temporary seed producing fast growing cover resistant to erosion.

Maintenance of seeded areas shall include but not be limited to watering, re-fertilization, weeding, mowing and repairing washouts and gullies.

3.3.3 Ds3 - Disturbed Area Stabilization (Permanent Vegetation)

Permanent vegetation and structural control measures must be installed as soon as practicable.

3.3.4 Sd1 - Sediment Barriers

Construct silt fences in accordance with applicable regulations and details. Sediment barriers shall be installed at the toe of all embankments or at the perimeter of all disturbed areas and shall be located to interrupt silt transport conveyed by surface runoff.

Remove, re-distribute and compact sediments which accumulate behind silt fences when such accumulations reach one-half the original height of the barrier and immediately before beginning temporary grassing operations.

Replace fabric whenever it has deteriorated to such extent that the effectiveness of the barrier is compromised or every six months, whichever comes first.

3.4 CONCRETE WASHOUT AREAS

Contractor shall provide at least one 10' by 10' washout area for the disposal of excess concrete, mortar and similar products. Washout areas shall be cleaned as needed. Washout areas shall be completely removed after construction has been completed. Remove all concrete and silt and dispose of materials in an approved landfill. Backfill, grade and stabilize area.

3.5 REMOVAL OF TEMPORARY DEVICES

Temporary erosion control devices shall remain in place and be properly maintained until one of the following has occurred:

A permanent device has been installed to replace the function of the temporary device.

The Contractor has achieved 95% stabilization of disturbed areas and a Notice of Termination has been submitted.

Remove erosion control devices installed under this contract and any erosion control devices left from previous phases of work.

(END OF SECTION)

SITE WORK
SECTION 02225
DEMOLITION

1.1 SCOPE

Under this heading shall be included all operations necessary for demolition of the existing structures, foundations, and utilities as shown on the Drawings.

1.2 PROCEDURES

The procedures proposed for the accomplishment of salvage and demolition work shall be submitted for review. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. Overhanging trees that interfere with the accomplishment of the work shall be trimmed the minimum amount necessary. The submittal shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operation.

1.3 STRUCTURES

Structures indicated for removal on the Drawings including related piping are to be removed.

1.4 EQUIPMENT

All equipment is to be returned to the Owner at a location directed by the Owner's staff.

1.5 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

1.6 DISCONNECTION OF UTILITY SERVICES

Utilities shall be disconnected at the points indicated. Where such disconnection will interrupt the utility services to an area not included in the

Contract, arrangements for such interruption shall be reviewed with the Engineer at least 72 hours in advance of the interruption. Where water and sewer lines are disconnected or removed the remaining utility shall be plugged and left in such a manner that reconnection can be made.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 PROTECTION OF EXISTING WORK

Existing work to remain shall be protected from damage. Work damaged by the Contractor shall be repaired or restored to its original condition or acceptable equivalent.

1.9 EXISTING UTILITIES

1.9.1 Utility Services

Disconnections of utility services shall be coordinated so as not to affect service to other areas outside of the project limits. The owners of all utilities must be contacted prior to proceeding with work.

1.9.2 Utilities

Remove or abandon all existing utilities as indicated. When utility lines are encountered, that are not indicated on the drawings, they shall be removed or abandoned to the extent that they would project into or interfere with the new construction.

1.10 DISPOSITION OF MATERIAL

1.10.1 Title to Materials

Title to all materials and equipment to be demolished is vested in the Contractor upon receipt of notice to proceed. The Owner will not be responsible for the condition, loss or damage to such property after notice to proceed. All existing equipment to be salvaged shall be returned to the Owner.

1.10.2 Material for Contractor's Salvage

Material that is salvageable will be removed from the project site by the Contractor.

1.10.3 Unsalvageable Materials

Concrete, masonry, and other noncombustible materials, other than concrete permitted to remain in place, shall be disposed of by the Contractor off the property.

1.11 CLEANUP

Remove debris and rubbish from the site as soon as practicable. Do not allow debris or rubbish to accumulate in buildings or on site. Remove and transport debris in a manner as to prevent spillage on streets or adjacent areas.

(END OF SECTION)

SITE WORK
SECTION - 02315
TRENCHING EXCAVATION, BEDDING. AND BACKFILL

PART 1 GENERAL

1.1 SCOPE

The work of this section includes trench excavation, dewatering, bedding, backfilling and all other work required for the installation of underground water, and sewer systems as shown on the drawings and/or specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Section 02050	Erosion, Sedimentation and Pollution Control
Section 02225	Demolition
Section 02430	Sanitary Sewer System

1.3 APPLICABLE STANDARDS

All work to be performed in accordance with applicable provisions of the Southern Standard Building Code, OSHA Safety Requirement, State and Local Ordinances and other authorities having jurisdiction.

All construction shall comply with the Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926, subpart P, revised July 1, 1995.

If local authorities have standard specifications for pavement removal and replacement, work shall be done in accordance with such standards.

In the event of conflicts among the various sources cited above, the most stringent criteria shall take precedence.

1.4 PROTECTION

1.4.1 Existing Utilities

Contractor shall contact the Utilities Protection Center at 1-800-282-7411 at least 72 hours in advance of trenching operations. The location of existing underground utilities shown on the plans is based upon the best information available and may not accurate or complete. The Contractor shall verify the location of all underground utilities prior to commencing work and shall be responsible for the protection of same.

Any damage to existing utilities shall be promptly repaired at the Contractor's expense to the full and complete satisfaction of the utility owner.

1.4.2 Existing Structures

Contractor shall protect from damage all existing structures, roads, sidewalks, curbing, etc. against damage from foot or vehicular traffic. Install and maintain adequate barricades, planking, bridging as necessary. Underpin or otherwise support adjacent structures, including service lines and pipe chases, to prevent damage by excavation work.

1.4.3 Excavations

Protect excavations by shoring, sheeting, bracing or other means as required to prevent cave-ins or loose dirt from falling into excavated trenches. Methods and procedures utilized shall conform to, as a minimum, the requirements of OSHA and other governing authorities having jurisdiction.

1.5 QUALITY ASSURANCE

Tests for compaction and density, where required, shall be conducted by an independent testing laboratory selected by JWSC/Engineer of Record and paid for by the Contractor. The Contractor shall make all necessary excavations and provide access to the work by the testing laboratory. The cost of all retests made necessary by the failure of materials to conform to the requirements of these specifications shall be paid for the Contractor.

PART 2 MATERIALS

2.1 BEDDING AND BACKFILL MATERIALS

Pipe bedding and backfill materials shall be as follows:

Class I:

This Class includes angular, 1/4-inch to 1-1/2-inch graded stone including a number of fill materials including coral, slag, crushed stone and crushed shells.

Class II:

This Class includes coarse sands and gravels with maximum particle size of 1-1/2-inches including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW and SP are included in this Class.

Class III:

This Class includes fine sand with clayey gravels including fine sands, clay-sand mixtures, and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this Class.

Class IV:

This Class includes silt, silty clays and clays including organic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this Class.

Class IV materials may only be used with the approval of the Engineer.

Class V:

This Class includes the organic soils OL, OH and PT as well as soil containing frozen earth, debris, rocks larger than 1-1/2-inches in diameter and other foreign materials. ***Class V materials shall not be used.***

PART 3 EXECUTION

3.1 EXCAVATION

The contractor shall examine the work site and inform himself fully as to the nature of all materials to be encountered during excavation for the construction of the various facilities and related appurtenances. The contractor shall perform excavation of all substances encountered to the depth shown on the drawings.

During excavation, pile excavated materials that are suitable for backfilling in an orderly manner and at a sufficient distance from the trench banks to avoid overloading and prevent slides or cave-ins. Remove and dispose of unsuitable material in a manner acceptable to the JWSC/Engineer of Record.

Grade work site as necessary to prevent surface water from flowing into trenches or other excavations and remove any water accumulating therein by pumping or other approved methods.

Excavation shall not be carried below the required level. Where excavation is carried below the grade indicated through error, the contractor shall refill to the proper grade with Class I or Class II material as directed by the JWSC/Engineer of Record to obtain a suitable pipe support.

Where wet or otherwise unsuitable material incapable of properly supporting the pipe, as determined by JWSC/Engineer of Record, is encountered in the trench bottom, the Contractor shall remove such soil or unsuitable material, dewater to the depth required and backfill trench to proper grade with a foundation of Class I or Class II material as directed by the JWSC/Engineer of Record to obtain a suitable pipe support.

3.2 DEWATERING

The contractor shall keep all excavations clear of water while pipe and appurtenances are being installed. All water pumped or bailed from trenches and other excavated areas shall be conveyed to a point of discharge where it will cause no hazard to the safety and protection of the public, to private property or to other work in progress.

Provide all necessary equipment including well points, pumps, piping and temporary drains sufficient to handle both surface and subsurface water. Maintain equipment for the duration of trench exposure to the elements.

3.3 PIPE BEDDING

Pipe bedding shall be Class A, B, C or D as specified below or as shown on the construction plans.

Rigid pipe includes ductile iron (DIP), reinforced concrete (RCP), or steel pipes with or without coatings. Flexible pipe includes PVC and HDPE.

3.3.1 Bedding Classifications

The following bedding classifications shall be used as specified below or where shown on the drawings.

Class A:

This bedding class shall consist of a continuous concrete cradle or a concrete arch with granular bedding. Locations shall be as shown on the drawings.

Class B:

Class B Standard - shall consist of granular Class I material placed a minimum of 4-inches below the pipe and continuing to the spring line of the pipe.

Class B Modified - shall consist of granular Class I material placed a minimum of 4-inches below the pipe and continuing to 6-inches above the top of the pipe.

Class C:

This bedding class shall consist of granular Class I material placed a minimum of 4-inches below the pipe with Class II or Class III material continuing to the spring line of the pipe.

Class D:

This bedding class shall consist of a native undisturbed earth trench bottom with an area excavated for the pipe bell. This bedding class may only be used for dry trench conditions. If the trench becomes wet, Class B bedding shall be used.

3.3.2 Bedding Requirements

Bedding requirements for the various piping systems shall be as shown in the following table.

PIPE SYSTEM	BEDDING
Sanitary & Storm Sewers (Gravity)	
Rigid Pipe	Class C
Flexible Pipe	Class B Modified
Watermains & Forcemains	
Rigid Pipe	Class C
Flexible Pipe	Class B Standard

Bedding material under and around the pipe shall be placed in 6-inch layers and compacted by rodding, spading or with approved vibratory equipment to obtain not less than 98% standard proctor as determined by ASTM Method D698.

3.4 BACKFILLING

If unsuitable materials are encountered, such materials may not be used for backfilling operations and shall be removed from the site. Unsuitable material includes but is not limited to debris, muck, clay, large clods, stones, wood, stumps, and roots. Prior to backfilling, piping and appurtenances shall be observed by the JWSC/Engineer of Record Inspector.

Contractor shall carefully backfill trenches with approved materials. Only Class III (or Class IV if approved by the JWSC/Engineer of Record) materials shall be used. Backfill materials shall be free from large clods of earth or stone and shall be deposited in 6-inch layers and carefully compacted until the following densities are obtained:

LOCATION	DENSITY
Areas Under Structures	100% Standard Proctor (ASTM D698)
Areas Under Walks and Pavements	98% Standard Proctor (ASTM D698)
Areas Under Lawns/Landscaping	95% Standard Proctor (ASTM D698)

Re-open improperly backfilled trenches (trenches where settlement occurs, or where tests indicate non-compliance with the densities specified above) to depth required for proper compaction. Then refill and compact with surface restored to required grade.

3.5 PAVEMENT REMOVAL AND REPLACEMENT

3.5.1 Removal

Where necessary to cut existing pavements, curbs and gutters, walks, driveways, etc. make cut with neat parallel straight lines at least 12" wider than the required trench width on each side.

3.5.2 Replacement

Replace pavements, curbs and gutters, walks and driveways with the same materials and cross section as the original except when otherwise detailed on the construction plans.

Backfill open trenches across roadways, or other areas to be paved as specified on the construction plans.

3.5.2 Temporary Surfaces

Use temporary road surface of gravel or crushed stone as approved. Maintain one-way traffic at all times and street must be fully opened to traffic as quickly as possible. Completely remove temporary materials and dispose of when permanent pavement is placed.

(End of Section)

SITE WORK
SECTION 02430
SANITARY SEWER SYSTEM

PART 1 GENERAL

1.1 WORK INCLUDED

Provide all labor, materials and equipment necessary to install, test, and place into operation the precast concrete wetwell, valve box, gravity sewer mains, pump station discharge piping and valves, effluent flow meter, force main with related fittings and appurtenances as shown on the drawings, as specified herein and as required for a complete and operational system.

1.2 SUBMITTALS

Complete shop drawings and product data in accordance with JWSC shall be submitted on all the following items:

- 1.2.1** Round precast manhole and wetwell bottoms, riser sections and top.
- 1.2.2** Complete product data on wetwell, pumps, and appurtenances.
- 1.2.3** Square and rectangular precast structures (Valve Box and Flow Meter Vault).
- 1.2.4** Complete product data on all piping, valves, flow meter and appurtenances.

1.3 RELATED WORK SPECIFIED ELSEWHERE

PART 2 PRODUCTS

2.1 PIPING

The contractor shall furnish piping systems in accordance with the material specifications detailed below. All references to industry standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless stated otherwise. All materials shall be new. Pipe sizes and applications shall be as indicated on the plans and shall conform to the following table:

**Pipe Size and
Application Table**

Pipe Material	Pipe Size	Joint Types	Applications
Ductile Iron	≥ 4-inch	Mech. Joint – Below Ground Flanged Joint – Above Ground Flanged Joint – Inside Structures	Sewage Forcemains
PVC (AWWA C900 DR-18)	4 to 12-inch	Push-on Joint – Below Ground	Sewage Forcemains
PVC (ASTM D2241 SDR-21)	3/4 to 8-inch	Push-on Joint – Below Ground	Sewage Forcemains
HDPE (DR-11)	≥2-inch	Fused – Below Ground Flanged – Inside Structures	Sewage Forcemains

2.1.1 Polyvinyl Chloride (PVC) Pipe and Fittings

Each length shall be clearly marked with the name of the manufacturer, location of the plant, pressure rating, nominal pipe diameter and length. All PVC sanitary sewer pipe shall be green in color. Storage and handling of PVC pipe shall be in accordance with Chapter 6 of AWWA Manual M23.

2.1.1.1 PVC Gravity Sewer Pipe

Gravity sewer pipe shall be PVC 1120, Class 160, SDR-26 and shall conform to ASTM D3034 for size 4-inch through 15-inch and ASTM F679 for 18-inch through 36-inch.

The pipe material shall be clean, virgin, National Sanitation Foundation approves, Class 12454-B PVC compound conforming to ASTM resin specification D1784 with wall thickness T-1. Pipe shall have a bell type coupling with a thickened wall section integral with the pipe barrel in accordance with ASTM D3212. Elastomeric seals shall meet ASTM F477 or ASTM F913. The pipe shall be designed to pass without failure a sustained pressure test of 340 PSI in conformance with ASTM D1598 and a quick burst test of 400 PSI in conformance with ASTM D1784.

2.1.1.2 PVC Fittings

Fittings shall meet the requirements of ASTM D3034 and ASTM F1336 for sizes 4- inch through 15-inch in diameter

and ASTM F679 and ASTM F1336 for sizes 18- inch through 36-inch in diameter with minimum wall thickness of SDR-26. Fittings shall be gasket joint type meeting the requirements of ASTM D3212. Elastomeric gaskets shall conform to ASTM F477 or ASTM F913. PVC material shall have a cell classification of 12454-B in accordance with ASTM D1784.

2.1.1.3 PVC Pressure Pipe

PVC force main piping shall be green in color and shall be either SDR-21 Class 200 meeting the requirements of ASTM D2241 with elastomeric integral bell gasketed joints meeting the requirements of ASTM D3036; or AWWA C900 and C905 DR-18. Fittings on PVC force mains shall be ductile iron as specified under Section 2.1.2 below.

2.1.2 Ductile Iron Pipe and Fittings

All buried ductile iron pipe shall have mechanical joints or push-on type pipe joints. Buried fittings shall be mechanical joint with mega-lug type joint restraints. Exposed or above ground ductile iron pipe and fittings shall have flanged joints.

2.1.2.1 Pipe

Ductile iron pipe wall thickness and pressure class shall conform to ANSI A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151) with pressure class 350 as a minimum. Pipe shall be clearly marked with the name of the manufacturer, location of the foundry, pressure rating, thickness or pressure class, nominal pipe diameter, weight of pipe without lining, maximum depth of bury and length. All pipe furnished by the approved manufacturer shall be cast and machined at one foundry location to ensure quality control and provide satisfactory test data. All ductile iron pipe for sewer service shall be color coded green by field painting green stripe, three (3) inches wide along the crown of the pipe barrel.

2.1.2.2 Fittings

Ductile iron fittings shall have a minimum working pressure of 350 PSI. Fittings shall conform to ANSI A21.10 (AWWA C110), ANSI A21.11 (AWWA C111), ANSI A21.15 (AWWA C115) and/or ANSI A21.53 (AWWA C153). Compact fittings shall normally be installed. Long body fittings shall be used

where shown on the drawings, where compact fittings are not available, or at the option of the Contractor when the laying length is not controlled by compact fitting patterns. All fittings shall be UL/FM approved and shall conform to NSF Standard 61 as applicable. All fittings furnished by the approved manufacturer shall be cast and machined at one foundry location to ensure quality control and provide satisfactory test data. Fittings shall have cast on them the pressure rating, nominal diameter, manufacturer's name, foundry location, plant code and degrees or fraction of a circle. Cast letters and figures shall be on the outside body of the fitting.

2.1.2.3 Coatings

All buried ductile iron pipe and fittings shall be externally coated with a bituminous coating as specified in ANSI A21.51 and be continuous, smooth, neither brittle when cold or sticky when exposed to the sun and be strongly adherent to the fitting. If pipe is installed in a corrosive soil, all nuts, bolts, studs and other uncoated parts of joints for underground installation shall be coated with asphalt or coal tar prior to backfilling.

All ductile iron pipes and fittings for sewer service applications shall be Sewer Safe internally lined with an approved amine cured novalac epoxy coating containing at least 20% by volume of ceramic quartz pigment.

2.1.3 High Density Polyethylene (HDPE) Pipe and Fittings

All interior wetwell discharge piping shall be IPS DR-11 (160 PSI) flange by flange high density polyethylene (HDPE) pipe with 316 stainless steel backup rings, nuts, bolts and washers. Each discharge leg shall be one continuous pipe joint.

2.1.4 Joint Restraints

Force mains shall have mechanically restrained joints at changes in direction. The restrainer shall be manufactured of ductile iron and shall meet or exceed the requirements of ANSI A21.11 (AWWA C111) and ASTM A536. The restrainer system shall provide anchoring of ductile iron pipe or fittings or bell to spigot PVC pipe joints. The restrainer shall accommodate the full working pressure rating of the pipe plus surge allowance

2.1.5 Detection Tape

Detection tape shall be provided on all gravity sewer and force mains. Detection tape shall be at least two inches wide mylar encased metal marking tape and will bear the printed identification "CAUTION: SEWAGE FORCE MAIN BELOW" or "CAUTION: GRAVITY SEWER MAIN BELOW". Detection tape shall be buried eight to twelve inches below plan finished grades.

2.1.6 Tracer Wire

Tracer wire shall be installed on all buried force mains. Tracer wire shall be continuous or properly spliced single strand No. 10 solid plastic coated (30 mil) copper wire from iron fitting to iron fitting.

PART 3 EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

The contractor shall inspect all materials delivered to the job site for damage. Materials shall be unloaded and stored with a minimum of handling. Materials shall be stored above ground and the interior of pipe and fittings shall be kept free of dirt and debris. Store non-metallic piping and rubber gaskets under cover and protect from exposure to sunlight.

Precast concrete structures and other appurtenances shall be handled to ensure delivery at the point of installation in sound, undamaged condition. If coating or linings of pipe or fittings are damaged, such pipe and fittings shall be removed from the site and new materials furnished. Pipe shall not be dragged.

3.2 INSTALLATION

The contractor shall install all pipe, fittings, valves, wetwells, manholes and appurtenances in accordance with the specifications detailed below. All references to industry standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless stated otherwise.

3.2.1 Pipe and Fittings

The type, class, grade, and alignment of sewer pipe may be changed only at manholes. Sanitary sewer mains crossing under storm drains shall be installed in a casing pipes centered under the storm drain.

3.2.1.1 General

Excavation, cleaning, laying, jointing and backfilling shall follow

as closely as possible during prosecution of the work. In no case shall pipe be left in the trench overnight without completing the jointing. All precautions shall be taken to prevent sand, dirt and debris from entering the pipe during installation. Any time that pipe installation is not in progress, open pipe ends shall be closed by a watertight plug or other method approved by the Engineer.

Plugs shall remain in pipe ends until all water has been removed from the trench and any foreign material that enters the pipe shall be removed immediately. No pipe shall be installed when trench or weather conditions are unsuitable for such work.

Sewer mains shall not be laid closer than ten (10) feet horizontally from a water line unless otherwise indicated on the drawings or directed by the Engineer. Sanitary sewer lines shall pass beneath water lines with the top of the sewer being at least eighteen (18) inches below the bottom of the water line, where sewer lines cross water lines, no joints in the sewer line shall be located closer than ten (10) feet horizontal distance from the water line.

Trench excavation, bedding, backfill and compactions shall be in accordance with Section 02315 of these specifications.

3.2.1.2 Pressure Pipe

All PVC C900/C905 pipe shall be laid in accordance with AWWA C605. All ductile iron pipe and fittings shall be laid in accordance with the manufacturer's recommendations and AWWA C600. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints.

Pipe alignment and gradient shall be straight or shall follow true curves as near as practicable. Curvature in pipelines, where required, shall be well within (no more than 80% of) the manufacturer's allowable joint deflection or laying radius for the pipe supplied. Otherwise fittings shall be required.

Forcemain pipe shall be laid with a minimum cover of forty-two (42) inches in paved areas and thirty six (36) inches in unpaved areas with an allowable maximum of sixty (60) inches. Cover in paved areas shall be measured from crown of pipe to finish grade. Greater depths are permissible when required to clear obstructions, conflicts, etc.

Contractor shall furnish and install locate wiring on all non-metallic pressure mains. Locate wire shall be brought to grade outside a valve box or locating station box, as required, at four hundred and seventy-five (475) foot intervals (maximum). In addition, all pressure mains shall have detection tape installed two (2) feet above the pipe. Tracer wire and detection tape shall be as specified in Paragraph 2.7 of this Section.

Installed locate wiring shall be tested by the contractor as part of the inspection process, using a qualified tester and suitable testing equipment. The contractor shall notify the Engineer of Record /JWSC at least 48 hours in advance of the locate wire field testing schedule.

(END OF SECTION)

SITE WORK
SECTION - 02445
BORING AND JACKING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section includes requirements for boring and jacking casing pipe.
- B. Bored, jacked, or tunneled installations shall have a bore hole essentially the same as the outside diameter of the pipe.

1.2 DEFINITIONS

- A. Carrier Pipe: Sewer pipe.
- B. Casing Pipe: Sleeve through which carrier pipe will be placed.
- C. Boring and Jacking: Method of installing casing pipe by cutting, hand mining, or boring an opening in soils material, simultaneously forcing casing pipe through it with hydraulic jacks.
- D. Casing Spacer: Fabricated item for positioning a carrier pipe inside a casing pipe.

1.3 SUBMITTALS

- A. Submit the following:
 - 1. Shop drawings for casing pipe showing sizes and hold down assemblies or casing spacers for carrier pipe.
 - 2. Design mixes for grout.
 - 3. Working drawings and written procedures describing in detail proposed bore and jack method and entire operation to be used including, but not limited to:
 - a. Working and receiving pits.
 - b. Dewatering.
 - c. Method of removing soils and installation of casing and carrier pipe.
 - d. Size, capacity, and arrangement of equipment.
 - e. Backstop.
 - f. Pit base material.
 - g. Type of cutter head.
 - h. Method of monitoring and controlling line and grade.
 - i. Detection of surface movement.

- j. Procedure for installing pipe supports and anchors between carrier pipe and casing pipe.
 - k. Bulkhead details and proposed positive method of anchoring carrier pipe to prevent flotation.
 - l. Procedure for monitoring line and grade.
 - 4. If modifications to methods are required during construction, submit working drawings delineating modifications, including reasons for them.
- B. Submit Certificate of Compliance before delivery of materials:
- 1. Steel casing pipe.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Unload and handle materials with equipment of adequate capacity:
- 1. Store materials on site in reasonably level, well drained area free from brush.
 - 2. Store individual pieces and bundles with safe walking space between to allow full view for inspection purposes.

1.5 PROJECT CONDITIONS

- A. Bore so as not to interfere with, interrupt, or endanger surface and activity thereon.
- 1. Minimize subsidence of surface, structures, and utilities above and in vicinity of bore.
 - 2. Support ground continuously to prevent loss of ground and keep perimeters stable.
 - 3. Be responsible for settlement resulting from operations.
 - 4. Repair and restore damaged property to its original condition before being disturbed at no cost to the owner.
- B. Follow applicable ordinances, codes, statutes, rules, and regulations of State of Maryland, MSHA, applicable County building codes, affected Railroad Company, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

1.6 ADDITIONAL CRITERIA FOR WORK UNDER RAILROADS

- A. Do not schedule work within and adjacent to railroad property until Engineer, owner, and rail owner approve submittals, including proper railroad insurance:
- 1. Approval does not relieve Contractor of responsibility for adequacy and safety of procedures.
- B. Give railroad advance written notice as described in permit, copied to Engineer & owner before entering and working on railroad property.

- C. Place in effect before work proceeds, safety, precautionary, and protective devices and services required by railroad owner.
- D. Follow AREMA or other applicable railroad owner specification and permit requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Casing Pipe:
 - 1. General: Use casing pipe following Drawings.
 - 2. Steel Pipe.
 - a. Smooth walled with minimum yield strength of 36,000 psi (ASTM A1011 Grade 36).
 - b. Minimum wall thickness: 3/8 inch or as indicated on Drawings.
 - c. Joints: Fully welded around circumference of pipe with complete penetration weld.
 - 1) Weld pipe joints without distortion of pipes.
 - d. Coating: None.
- B. Carrier Pipe: Specified in Section 4 - Sanitary Sewer Lift Stations and Force Mains.
- C. Casing Spacers:
 - 1. Treat stainless steel metal surfaces and welds in order to reduce chemical reactivity of its surface.
 - 2. Bands and Risers:
 - a. Minimum 2 pieces, stainless steel plate: ASTM A666 Type 304.
 - b. Band: Minimum thickness: 14 gage for carrier pipes up to 12 inches diameter and 12 gage for more than 12 inches.
 - 3. Runners:
 - a. High density molecular polyethylene or polymer reinforced fiberglass with DURO Hardness A of 80 and minimum dielectric strength of 500 volts per mil with sufficient compressive and shear strengths.
 - b. Attach to risers with bolts or welded studs.
 - c. Fill bolt holes with silicone caulk.

4. Spacer Band: Line with minimum 0.090 inch thick ribbed PVC liner of DURO Hardness A of 80 and minimum dielectric strength of 50,000 volts per mil.
5. Approved Manufacturers:
 - a. Pipeline Seal and Insulator Inc.
 - b. Cascade Waterworks Manufacturing Company.
 - c. Advanced Products and Systems, Inc. (APS)
 - d. Or equal (Minimum 5 years of fabricating casing spacers in the United States).

D. Casing End Seals:

1. Approved Manufacturers:
 - a. Advance Products & Systems, Model AC or AM
 - b. Pipeline Seal & Insulator, Inc., Model S or C.
 - c. Maloney Technical Products, MULTIFLEX End Seal.
 - d. Or equal.

E. Grout:

1. Cement: ASTM C150, Type I or Type II.
2. Water: Potable.
3. Sand: ASTM C404, Size No. 1.
4. Voids Between Casing and Existing Ground: Minimum compressive strength of 100 psi, attained within 24 hours, and sufficiently fluid to inject through lining and fill voids, with prompt setting to control grout flow.
5. For Carrier Pipe Bedding: 3 parts ASTM C144 sand, to 1 part ASTM C150 cement.

F. Dielectric Material:

1. Thermoplastic; Minimum strength of 400 volts for each mil, and water absorption less than 0.02 percent (24-hour period).

G. Surface Settlement Markers:

1. Within Bituminous Concrete Paved Areas: "p.k." nails.
2. Within nonpaved Areas: Wooden hubs.
3. On Concrete Surfaces: Paint

H. Bulkheads: Follow Drawings or Standard Details.

PART 3 EXECUTION

3.1 GENERAL

- A. Review and interpret available geotechnical reports (as needed) and investigate work site area soil conditions before bidding:
 - 1. Encountering rock or water will not entitle Contractor to additional compensation.
- B. Notify Engineer owner immediately if obstruction stopping forward motion of operation is encountered during installation:
 - 1. Additionally, notify Rail owner immediately, abandon the pipe in place, and immediately fill with grout. A new installation procedure and revised plans must be submitted to, and approved by, Rail owner before work can resume.
- C. Dewatering: When water is encountered, develop and maintain dewatering system of sufficient capacity to remove water continuously, keeping excavations free of water until backfill operation is in progress:
 - 1. Keep removal of soils particles to minimum.
 - 2. Dewater into sediment trap following Section 02050.
 - 3. Observe settlement or displacement of surface facilities due to dewatering.
 - 4. Should settlement or displacement be detected, notify Engineer immediately and act to maintain safe conditions and prevent damage.

3.2 PREPARATION

- A. Excavate pits: Follow Working Drawings and Section 02315.
- B. Perform preliminary work, including constructing backstop, placing guide timbers, and placing boring apparatus.
- C. Excavated areas are to be illuminated (flashing warning lights not permitted), fenced, and otherwise protected as directed by Rail owner.
- D. Settlement markers for crossing State highways and other roads: Locate following Contract Documents, if shown.

3.3 Pit CONSTRUCTION

- A. Design, construct, maintain, and remove pit, including any damage attributed to pit construction.
 - 1. See MOSH for bore and jack pits and ingress and egress to bore and jack.
- B. Design plans and computations for the pits, sealed by a State of Georgia Licensed Professional Engineer, must be submitted by the Owner at time of application or by the contractor prior to start of construction. If the pit design is

to be submitted by the contractor, the project specifications must require the contractor to obtain approval from Rail owner prior to beginning any work on or which may affect Rail owner's property.

- C. Construct pits following working drawings.
- D. Excavate, backfill, and grade following Section 02315 and to requirements specified herein.

3.4 BORING OPERATION

- A. General.
 - 1. Use removable auger and cutting head arrangement.
 - 2. Control line and grade.
 - 3. The use of water or other liquids to facilitate casing emplacement and spoil removal is prohibited.
 - 4. The boring operation shall be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.
- B. Boring and Jacking:
 - 1. Jack casing pipe with auger rotating within pipe to remove spoil.
 - 2. Maintain face of cutting head to preclude free flow of soft or poor soils material.
 - 3. The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that no unsupported excavation is ahead of the pipe.
 - 4. Overcut of Cutting Head:
 - a. Not to exceed outside diameter of casing pipe by more than 1/2 inch.
 - b. For hand mining no overcut will be permitted.
 - 5. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe by more than approximately 1 inch grouting or other methods approved by Rail owner, shall be employed to fill such voids
 - 6. Use positive means for continuous monitoring and controlling grade of casing pipe during boring operation.
 - 7. Weld steel pipe casing as required herein.

3.5 SOIL STABILIZATION

- A. Pressure grouting of the soils before jacking, boring, or tunneling may be required at the direction of Rail owner to stabilize the soils, control water, prevent loss of material, and prevent settlement or displacement of embankment. Grout shall be cement, chemical, or other special injection material selected to accomplish the necessary stabilization.
- B. The materials to be used and the method of injection shall be prepared by a State of Georgia Licensed Professional Soils Engineer and submitted for

approval to Rail Owner before the start of work. Proof of experience and competency shall accompany the submission.

3.6 DEWATERING

- A. When water is known or expected to be encountered all plans and specification must be submitted to the Rail owner for approval before the process begins. Pumps of sufficient capacity to handle the flow shall be maintained at the site, provided the contractor has received approval from Rail owner to operate them. Pumps in operation shall be constantly attended on a 24-hour basis until, in the sole judgment of the Rail owner, the operation can be safely halted. When dewatering, a process for monitoring for any settlement of track or structures must be in place

3.7 SAFETY REQUIREMENTS

- A. Operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of railroad facilities. All work on or near Rail owners property shall be conducted in accordance with Rail owners safety rules and regulations. Specifically, licensee's employees and agents, while on Rail owners property, shall be required to wear an orange hard hat, safety glasses with side shields, 6" lace up boots with a distinct heel, shirts with sleeves, and long pants; additional personal protective equipment may be required for certain operations including abrasive cutting, use of torches, use of chainsaws, etc. The contractor and its employees shall comply with the Rail owners safety rules at all times while occupying Rail owner's property. Operations will be subject to Rail owners inspection at any and all times.
- B. Cranes, lifts, or other equipment that will be operated in the vicinity of the railroad's electrification and power transmission facilities shall be electrically grounded as directed by Rail owners. Use of a crane or other lifting equipment is subject to requirements as stated in the Rail owners Public Projects manual.
- C. Whenever equipment or personnel are working closer than 25 feet from the centerline of an adjacent track, that track shall be considered as being obstructed. Insofar as possible, all operations shall be conducted no less than this distance. All operations shall be conducted only with the permission of, and as directed by, a duly qualified railroad employee present at the site of the work. All costs related to Railroad protection will be passed on to the contractor. The contractor will be responsible for following the railroad permit requirements and submitting the necessary paperwork.
- D. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with and as directed by, Rail owner.

3.8 DETECTION OF MOVEMENT

- A. Surface Settlement Markers.

1. Unless otherwise specified, shown on Drawings or directed by Engineer, locate surface settlement markers according to a grid, spaced 10 feet by 10 feet and extending as shown on Drawings, but not less than 20 feet either side of the tunnel centerline.
2. Establish elevation of settlement markers to bench marks unaffected by tunnel operations.
3. Take readings and permanently record:
 - a. Before start of dewatering operations and/or pit excavation.
 - b. After steel casing has been advanced beyond pavement limits of each roadway.
4. Take elevation measurements to nearest 0.01 foot, and furnish reports to Engineer.
5. In the event of settlement or heave on any marker:
 - a. Immediately cease work and take immediate action to prevent further settlement or heave and concurrently report settlement or movement to Engineer
 - b. Restore surface elevations to that existing before start of tunnel operations at no cost to the owner.

B. Subsurface Indicators.

1. When shown on Drawings, install subsurface settlement indicators following Standard Details before start of dewatering or tunneling.
2. Monitor movements of indicators to accuracy of 0.01 foot following approved schedule.
3. Whenever tunneling occurs within 50 feet of indicator, monitor movements of indicator before and after each advance of tunnel face within 50 feet of indicator.

C. Report settlement or movement immediately to Engineer and take immediate remedial action, at no cost to the owner, except when from dewatering operations.

3.9 FIELD QUALITY CONTROL

- A. Maintain line and grade following Drawings to within 2 inch tolerance.

3.10 INSTALLATION OF CARRIER PIPE: Follow Sections 02315, Standard Details, Drawings, and specified herein.

- A. Use thermoplastic or other dielectric material (except wood) between carrier pipe and steel sleeve to prevent metal to metal contact and damage to pipe and coating during placement.
- B. Hold Down Method in Casing Pipe:
1. Water mains, force mains, and pressure sewer mains: Concrete invert and hold down assembly or casing spacers following Standard Details and

Drawings.

2. Gravity sewer:

- a. Fill annular space between pipe and casing with concrete, grout, or flowable fill following Standard Details and Drawings.
- b. Provide positive means to prevent floatation during placement of fill in casing.

C. Unless shown otherwise on Drawings, install ductile iron water pipes and ductile iron sewer force mains following Standard Details.

(END OF SECTION)

SITE WORK
SECTION - 02446
DIRECTIONAL DRILLING FOR PRESSURE PIPE

PART 1 GENERAL

1.1 Work Plan

Bentonite drilling mud products information (MSDS); special precautions necessary; method of mixing and application; and method of removing spoils.

1.2 QUALITY ASSURANCE

1.2.1 Product Options

Drawings indicate size, profiles, and dimensional requirements of piping and specialties and are based on the specific system indicated.

1.2.2 Regulatory Requirements

Comply with requirements of utility companies who have service in the project work area.

1.2.3 Material Markings

Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.3 DELIVERY, STORAGE & HANDLING

Material shall be unloaded in a manner that will avoid damage and shall be stored where it will be protected and will not be hazardous to traffic. The Contractor shall repair any damage caused by the storage. Pipe and accessories shall be handled so as to ensure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating or lining. If the coating or lining of any pipe or fitting is damaged, the Contractor at his expense shall make the repair in a satisfactory manner. Material shall be examined before installation and no damaged or deteriorated material shall be used in the work.

1.4 PROJECT CONDITIONS

1.2.4 Existing Utilities

All known utility facilities are shown schematically on Drawings, and not necessarily accurate in location as to plan or elevation. Utility such as service lines or unknown facilities not shown on Drawings, will not relieve

the Contractor of his responsibility under this requirement except as noted below. "Existing Utilities Facilities" means any utility that exists on the project in its original, relocated or newly installed position. The Contractor will be held responsible for the cost of repairs to damaged underground facilities; even when such facilities are not shown on the Drawings. The Contractor is to contact all utility companies prior to beginning work and request an accurate location of their respective utility lines.

1.2.5 Surface Interference

Drilling operations must not interfere with, interrupt, or endanger surface activity upon the surface.

1.5 COORDINATION

The Contractor shall furnish the necessary pipe and perform all excavation, dewatering, shoring backfilling, etc., necessary to make the directional drill, install the pipe and plug both ends. The Contractor shall contact the Utility System Owner a minimum of 48 hours in advance of construction. Contractor shall be responsible for coordinating his construction with the Engineer or his representative.

1.6 DAMAGE TO EXISTING UTILITY SYSTEM

Damage to any part of the existing utility systems or to the water or sewer system by the Contractor or utility Subcontractors, shall be repaired at no cost to the Owner.

1.7 RECORD DRAWINGS

Record drawings must be received and approved by the Engineer prior to final acceptance.

PART 2 PRODUCTS

2.1 FUSIBLE PIPE AND FITTINGS

Fusible PVC and HDPE Pipe and fittings shall be used in accordance with the material specifications shown in BGJWSC Section 4 – Sanitary Sewer Lift Stations and Force Mains. All pipe installed by directional drilling will be joined by an approved butt fusion or electro fusion technique according to the manufacturer's specifications. For information only, submit manufacturer's certificate indicating that the pipe and fittings have been inspected and tested at the place of manufacture and meet the requirements on the referenced Standards and these Specifications.

2.2 DRILLING FLUID

Drilling fluid shall be a mixture of water and bentonite clay. The fluid shall be inert. The fluid should remain in the tunnel to ensure the stability of the tunnel, reduce drag on the pulled pipe, and provide backfill within the annulus of the pipe and tunnel.

Disposal of excess drilling fluid and spoils shall be the responsibility of the Contractor who must comply with all relevant regulations, right-of-way, and workspace and permit agreements. Excess drilling fluid and spoils shall be disposed at an approved location. The Contractor is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils will be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils will not be discharged into sanitary or storm drain systems, ditches or waterways.

Drilling fluid returns (caused by fracturing of formations) at locations other than the entry and exit points shall be minimized. The Contractor shall immediately clean up any drilling fluid that surfaces through fracturing.

Mobile spoils removal equipment capable of quickly removing spoils from entry or exit pits and areas with returns caused by fracturing shall be present during drilling operations. The Contractor shall be responsible for making provisions for a clean water supply for the mixing of drilling fluid.

2.3 POTABLE WATER

Potable water will be provided by the Contractor as necessary to complete the project. Temporary connections to the Owner's water system must be coordinated with the Owner and meters obtained from the Owner shall be installed by the contractor. The contractor will be expected to pay for the temporary meter and all associated costs unless otherwise negotiated.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Pits

Excavate required pits in accordance with the working drawings.

3.1.2 Removal of Existing Surfaces or Features

Removal of trees, landscaping, pavement or concrete shall meet the general provisions and specifications.

3.1.3 Existing Utilities

The Contractor shall be responsible for determining the location of all underground utilities to be crossed prior to commencing drilling operations.

3.2 DIRECTIONAL DRILLING OPERATIONS

3.2.1 Equipment

The drilling equipment must be capable of placing the pipe within the limits indicated on the Contract Drawings.

The system shall consist of a surface launched steerable drilling tool controlled from a mobile drilling frame, and include a field power unit, mud mixing system and mobile spoils extraction system.

The number of access pits shall be kept to a minimum and the equipment must be capable of boring the following lengths in a single bore. The directional drilling system shall have the capability of boring and installing a continuous run without intermediate pits.

The guidance system shall have the capability of measuring vertical (depth) position, horizontal position and roll. The guidance system must meet the following specifications in soft homogenous soils:

Accuracy

Vertical position: Plus or minus 1 inch

Horizontal position: Plus or minus 3 inches

The Owner's representative shall be kept informed of the drilling progress and pipe location. Information pertaining to the drilling and pipe location shall not be withheld from the Owner's representative.

Equipment set-up requirements must be determined by the Contractor.

3.2.2 Installation

The actual location of the pipe with respect to the proposed line and grade shall be continuously monitored. A steering head or other suitable method shall be used to control the line and grade of the pipe to within line and grade specifications. A magnetic guidance system shall continually monitor downhole probe location. A locating system shall be established to provide a backup and independent determination of pipeline location.

3.2.3 Drilling Fluids and Excavated Material

Drilling fluids and cuttings shall be contained within designated work/construction areas. Excess fluids, cuttings, and other related materials shall be disposed of in a legal site in accordance with governing regulations. Fluids shall not be allowed to enter any wetland area or river.

The Contractor shall be responsible for furnishing and using, as necessary, all drilling fluids and any additives needed for saltwater or other conditions. The Contractor shall be responsible for the proper clean-up and disposal of drilling fluids. The Contractor shall be responsible to provide a suitable and approved site for the disposal of the drilling mud and cuttings.

3.2.4 Damaged or Improperly Installed Pipe

If the pipe is damaged before installation or does not meet the specifications, it shall be replaced at no expense to the Owner. If the pipe is damaged during installation by the Contractor's operations, is placed at the improper grade or line or cannot be advanced because of an unseen obstruction or any other reason, it shall be abandoned in place, and filled with concrete. After abandoning a pipe, an alternate installation shall be made, as directed by the Engineer. With the exception of pipe that has to be abandoned in place due to unseen obstructions, the cost for abandonment of pipe shall be at the expense of the Contractor. No additional payment shall be made for the pipe, which is abandoned, including dewatering, excavation, drilling, etc. The Contractor shall continue pull back until 10 linear feet (minimum) of pipe is above ground for the purpose of pipe inspection. Contractor to give As-builts of piping when crossing is complete.

3.3 PILOT HOLE BORING

The entry angle of the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radii of the product pipe or inhibit pullback of the pipeline.

3.4 Alignment Adjustments and Restarts

The Contractor shall follow the pipeline alignment as shown on the Drawings, within the specifications stated. If adjustments are required, the Contractor shall notify the Project Engineer for approval prior to making the adjustments. In the event of difficulties at any time during boring operations requiring the complete withdrawal from the hole, the Contractor may be allowed to withdraw and abandon the hole and begin a second attempt at a location approved by the Project Engineer.

3.5 INSTALLING PRODUCT FUSIBLE PIPE

After the pilot hole is completed, the Contractor shall commence pullback operations. Once started, pipeline pullback shall be continuous. Pre-reaming may be necessary and is at the option of the Contractor. The pipe shall be continuously lubricated with bentonite slurry or other suitable techniques.

The pipe being pulled shall be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation. Pullback forces shall not exceed the allowable pulling forces for the pipe. The Contractor shall allow sufficient lengths of product pipe to extend past the termination point to allow connections to adjacent pipe sections or manholes. Pulled pipe will be allowed 24 hours of stabilization prior to making tie-ins.

3.6 PERMITS

The Contractor shall obtain permits necessary for installation of the pipeline at no additional cost to Owner. The pipeline shall be installed in strict compliance with all applicable permits.

3.7 TESTING

The pipeline shall be tested twice, once before insertion into the drilled hole and once after installation. A low-pressure air test shall be conducted prior to installation of the pipe. A hydrostatic test shall be conducted following installation of the pipe. Unless otherwise specified pressure lines installed by horizontal directional drill shall have a low-pressure air test prior to installation. Test pressure is to be conducted at 2 psi to check for joint integrity and pin holes. The test shall be maintained at full pressure for at least two hours. Unless otherwise specified pressure lines shall be hydrostatically tested to the 150% working pressure but not less than 150 PSI or greater than pressure rating of pipe based on the lowest point of the section under pressure. Before applying the test pressure, all air, dirt and foreign material shall be expelled completely from the line through air valves, flushing and other means. The test shall be maintained at full pressure for at least two hours. Pressure gauges on test apparatus shall be a minimum of 4" diameter with a minimum of 1 PSI graduations. All damaged or defective pipe, fittings, joints, valves, hydrants and appurtenances discovered after the pressure test shall be repaired or replaced with sound material, and the pressure test repeated until satisfactory to the ENGINEER:

3.7.1 Pressure lines shall be tested to 150% of the working pressure but not less than 100 psi. for a period of 1 hour. No leakage will be allowed. Pipeline must maintain test pressure for 2 hours.

- 3.7.2** If during the test a pressure drop occurs, the CONTRACTOR shall, at his own expense, locate and repair all defects until there is no leakage or drop in pressure. All visible leaks shall be repaired regardless of the amount of leakage.
- 3.7.3** Water for testing will be furnished by the CONTRACTOR, who shall furnish the test pump, measuring devices and all necessary pipe or hose extensions or transportation to the point of use, and shall exercise care in the use of water.
- 3.7.4** If large amounts of water are needed for flushing, the CONTRACTOR must make arrangements with the Authority having jurisdiction to measure water used.
- 3.7.5** All valves within the test section shall be completely opened and closed several times during the test period.
- 3.7.6** All testing shall be coordinated with JWSC with a minimum of 24hr notice.

3.8 CLEAN-UP

The Contractor is required to maintain the work site in a neat and orderly condition throughout the period of work and after completing the work at each site, remove debris, surplus material and temporary structures erected by the Contractor. The site must be restored to a condition equal to the existing condition prior to being disturbed.

3.9 RECORD DATA

Complete record data information shall be submitted by the Contractor to the Engineer and shall include horizontal and vertical location information of the installed pipeline. Time and temp logs shall be provided by the Contractor of all fusible joints to the Engineer.

(END OF SECTION)

SITE WORK
SECTION 02930
GRASSING AND SODDING

PART 1 - GENERAL

1.1 SUMMARY

This section specifies requirements for includes fertilizer, grassing and sodding.

1.2 GENERAL

All disturbed areas resulting from work under this Contract shall be grassed or sodded as shown on the Drawings. For roads under state jurisdiction, grassing on the right-of-way shall meet the requirements of the Department of Transportation Standard Specifications.

1.3 SUBMITTAL

Manufacturer's data shall be submitted to the Engineer on grass seed, sod and fertilizer before the materials are delivered to the project site.

PART 2 – MATERIALS

2.1 FERTILIZER

Fertilizer shall be 10-10-10, commercial fertilizer conforming to state fertilizer laws.

2.2 LIME

Lime shall be agricultural grade, ground limestone and shall meet the requirements of the Georgia Department of Agriculture. Lime shall be added based on the results of soil test.

2.3 STRAW MULCH

Straw mulch shall consist of straw or hay. The mulch shall be reasonable free of mature seed bearing stalks, roots, or bulblets and shall be free of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Wild Mustard, Crotonaria, Pigweed, Witchweed, and Cocklebur.

2.4 WOOD CELLULOSE FIBER MULCH

Wood cellulose fiber mulch shall be made for wood chip particles manufactured for discharging uniformly on the ground when applied by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogenous slurry. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.

2.5 SEED

- A. Seed shall meet the requirements of the Georgia Seed Laws and Rules and Regulations.
- B. Seed shall be delivered in suitable sealed containers labeled in accordance with applicable laws and regulations and including name and location of the producer. The pure live grass seed mixture shall be as shown on the Drawings.
- C. Mixtures of different types of seed called for in the seeding schedule shall be weighted and mixed in the proper proportions.

2.6 SOD

Sod shall be good quality, densely-rooted centipede grass, free from noxious weeds. The sod shall be obtained from areas where soil is reasonably fertile and contains a high percentage of loamy topsoil. Before cutting, the sod shall be raked free of all debris and the grass cut to two inches. The thickness of the sod shall be such as to contain practically all of the dense root system of the grass and not be less than 1 inch thick. Sod shall be cut into uniform strips not less than 12 inches in width and 24 inches in length.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. Immediately before seeding, the soil shall be properly prepared for seeding. The areas shall be made smooth and uniform and shall conform with the finished grade and cross section shown on the Drawings. Area to be grassed, if not loose, shall be loosened to a minimum depth of 3 inches before lime, fertilizer, seed or sod is applied. Seeded areas shall be free of stones larger than 2 inches and of roots and debris of any size.
- B. Seeded areas shall be moist when seeding and shall be kept moist by sprinkling until a good stand of grass is obtained and until the work is accepted by the Owner. Reseeding shall be done by the Contractor at his own expense as may be necessary to obtain a satisfactory stand of grass.

- C. The Contractor shall use mulch or other additive materials when conditions do not allow an acceptable stand of grass to grow. Mulch and additive materials shall contain no weed seeds.

3.2 SEEDING

- A. Seeding shall be performed during the periods and at the rates specified in the seeding schedule in the Drawings. Seeding shall not be performed when the ground is frozen or excessively wet.
- B. Seeds are to be sown by a mechanical spreader either hand operated or machine operated. Seeding equipment shall be such as will continuously mix the seeds to prevent segregation
- C. Immediately after the seed has been sown, the entire area shall be raked lightly and rolled to pack the soil firmly around the seed. Seeded areas shall be uniformly mulched with a continuous blanket of straw immediately after seeded. Straw shall be applied at a rate of 2 tons per acre.

3.3 SOD

- A. Sod shall be placed between March 1st and December 1st. Sod shall be placed within 48 hours of cutting.
- B. Sod shall be moist when laid and placed on a moist bed. Sod shall be placed within 48 hours of cutting. The sod strips shall be carefully placed by hand, beginning at the toe of slopes and progressing upward, with the length of the strip at right angles to the direction of flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. The sod shall be immediately pressed firmly into contact with bed by tamping or rolling. Screened soil shall be used to fill all joints between strips.
- C. Sod on slopes shall be pegged with sod pegs to prevent displacement. The sod shall be watered, mowed, weeded, repaired or otherwise tended to insure the establishment of a uniform healthy stand of grass.

3.4 HYDROSEEDING (WOOD CELLULOSE FIBER MULCH)

Hydroseeding shall be applied at a rate of 1500 pounds per acre in a slurry mixture of seed, fertilizer, and wood cellulose fiber mulch. The slurry mixture shall be regulated to ensure a uniform application of all materials at the rate specified.

3.5 MAINTENANCE AND RESEEDING

- A. All seeded and sodded areas shall be maintained without payment until acceptance of the Contract and any regrading, refertilizing, reseeding or resodding shall be done at the Contractor's expense. Any areas which fail to show a "catch" or uniform stand, for any reason whatever, shall be reseeded or resodded with the original mixture, and such reseeding or resodding shall be repeated until final acceptance. The Contractor shall properly water, mow, and otherwise maintain all seeded and sodded areas until final acceptance.

- B. Damage resulting from erosion, gulleys, washouts, or other causes shall be repaired by filling with topsoil, tamping, refertilizing, and reseeding or resodding by the Contractor at his expense if such damage occurs prior to acceptance of the Contract.

(END OF SECTION)

SITE WORK
SECTION 03030
Traffic Control

PART 1 - GENERAL

1.1 Summary

The work shall consist of establishing traffic control and maintaining safe, convenient use of public roads and rights-of-way.

1.2 Traffic and access

The contractor's operations shall cause no unnecessary inconvenience to the public. The public rights-of-way shall be maintained at all times unless interruption is authorized by proper local authority. Contractor's authorized closing or detour plans shall be provided to the engineer and owner for approval.

1.3 Storage of equipment and material in public streets

Construction materials and equipment shall not be stored or parked on public streets, roads, or highways. During any material or equipment loading or unloading activities that may temporarily interfere with traffic, an acceptable detour shall be provided for the duration of the activity. Any associated expense for this activity is the responsibility of the contractor.

Excavated material, including suitable material that is intended for adjacent trench backfill or other earth backfill shall not be stored on public streets, roads, or highways that remain in service for the public. Any waiver of this requirement must be obtained from the proper local authority and approved by the engineer. All excess and unsuitable material shall be removed from the site as soon as possible. Any spillage shall be removed from roadways before they are used by the public.

1.4 Street closures, detours, and barricades

The contractor shall comply with the requirements of all applicable responsible units of government for closure of any street, road, or highway. The contractor shall provide the required barriers, guards, lights, signs, temporary bridges, and flaggers together with informing the public of any detours and construction hazards by the most suitable means available, such as local newspapers or radio stations. The contractor is also responsible for compliance with additional public safety requirements that may arise during construction. The contractor shall furnish, install, and, upon completion of the work, promptly remove all signs, warning devices, and other materials used in the performance of this work.

Unless otherwise specified, the contractor shall notify, in writing, the fire chief, police chief, county sheriff, state patrol, schools that operate school buses, or any other government official as may be appropriate no less than 7 days before closing, partly

closing, or reopening any street, road, or highway.

Unless otherwise specified, the contractor shall furnish to the engineer a written plan showing the proposed method of signing, barricading for traffic control, and safety for street detours and closures.

All temporary detours will be maintained to ensure use of public rights-of-way is provided in a safe manner. This may include dust control, grading, and graveling as required.

1.5 General and specific references

All signs, signals, barricades, use of flaggers, and other traffic control and public safety devices shall conform to the general requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD) and the latest edition of *Standard Highway Signs and Standard Alphabets for Highway Signs* and/or OSHA *Construction Industry Standards (29 CFR Part 1926), Subpart G, Signs, Signals, and Barricades* unless otherwise specified in section 7 of this specification.

(END OF SECTION)