# City of Danville, Virginia

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| INVITATION FOR BID | |
|---|---|
| Invitation to Bid No.: | IFB 19-20-065 |
| Title: | "SANDY CREEK SANITARY SEWER REPLACEMENT PROJECT FROM PARKER ROAD TO ROCKY LANE – PHASES I-II " |
| Prebid Conference: | A Pre Bid Conference will be held **June 18, 2020 10:00 a.m**. in the second floor conference room, Municipal Building, 427 Patton St., Danville, VA |
| Last Day For Questions: | The last day for questions shall be **June 26, 2020 by 5:00 p.m.** A final addendum will be issued **June 30, 2020.** |
| Bid Closing Date: | Sealed Bids shall be accepted no later than **2:00 p.m. July 8, 2020 at the Purchasing Department, 427 Patton Street, Room 304, Danville, VA 24541.** |
| Direct Inquiries to: | **J. Gary Via, Director of Purchasing**<br>(434) 799-6528 option 4 Purchasing@danvilleva.gov |
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**CITY OF DANVILLE, VIRGINIA**

**"SANDY CREEK SANITARY SEWER REPLACEMENT PROJECT FROM PARKER ROAD TO ROCKY LANE – PHASES I-II"**

**IFB 19-20-065**

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# SECTION 1 – GENERAL CONDITIONS

PART 1 - COMPLIANCE

1.1 The Contractor shall comply with the provisions of the following:

A. The City of Danville's "Standard Requirements and Instructions for Bidding", Version 2.0, dated April 2, 2015. A copy may be obtained from the Purchasing Department of the City of Danville, Virginia.

B. The applicable sections of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications, current edition.

C. The Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.

D. The Technical Specifications within this bid document.

1.2 Specification Amendments:

A. Amendments for "Standard Requirements and Instructions for Bidding" are as follows:
1. Delete "Builder's Risk insurance"

B. Amendments for "VDOT Road and Bridge Specifications are as follows:
1. Any reference within these specifications to a responsibility or obligation assigned to VDOT, the Engineer, or the "Department", shall, for this contract, be applicable to the City Engineer or his designee for the City of Danville, Virginia.

1.3 Registration and Licensure:

A. State Registration: All contractors working on this project must be appropriately registered with the State Board for Contractors as a Class A, Class B, or Class C contractor. See Section 1.2.5 of the "Standard Requirements & Instructions for Bidding."

B. Business License: The City of Danville requires all contractors to obtain a business license to operate within the city. This license is issued by the Commissioner of Revenue and must be maintained for the life of the contract or project.
1. Class B and Class C registered contractors are required to post a $5,000 bond and pay the applicable fee to obtain a business license.

C. Prior to the issuance of the Notice to Proceed for this project, validation of all contractors' business license and contractor registration will be verified.

D. Responsible Land Disturber (RLD): The contractor shall have and name an individual responsible for supervising inspections and maintenance of all required erosion and sediment control devices approved or prescribed by the Erosion and Sediment Control Program Administrator, Plan Reviewer, or Inspector for the City of Danville throughout the duration of the project until final stabilization is achieved. The contractor shall provide this individual's name & RLD certificate number on the construction plans.

PART 2 - SCOPE OF WORK

2.1 The work in this contract shall consist of clearing & grubbing, erosion control, trench excavation, pipe & manhole installation, traffic control, by-pass pumping, saw cutting pavement, pavement

replacement, and other sanitary sewer construction items to install approximately 1980 lf of 12" ductile iron sanitary sewer pipe and 5422 lf of 12" PVC pipe. Also install 33 manholes on an outfall line. Also included as part of the scope of work is repairing any damages caused to existing remaining features, removal and disposal of existing sewer line and manholes being replaced by this new line and manholes, repair of asphalt surfaces damaged by the sewer installation, and restoring all disturbed areas upon completion.

PART 3 - SCHEDULING

3.1 Pre-Bid Conference:

A. A pre-bid conference will be held on June 18, 2020 at 10:00 a.m. in the second floor conference room of the Municipal Building at 427 Patton Street, Danville, Virginia for the purpose of answering questions relative to his work.

3.2 Construction Schedule:

A. A schedule shall be submitted to the Engineering Division no later than five (5) days after commencement of the work. The schedule shall be in the form of a Gantt Chart or a tabular list which clearly indicates the significant items of work and the expected date of completion of that work.

B. An updated schedule shall be submitted with each monthly pay request as an additional requirement for payment.

3.3 Time of Completion:

A. The time of completion for this work shall be Three hundred and thirty (330) consecutive calendar days after the date of a written "Notice to Proceed."

3.4 Project Site Access:

A. Project site can be accessed via Parker Rd. and Beavers Mill Rd. (see plans). Other site accesses shall be the responsibility of the contractor.

3.5 Required Permits:

A. **City of Danville Land Disturbance Permit:** Contractor will be required to obtain this permit. Fee will be waived.

B. **Army Corps Nationwide Permit:** Has been obtained by City of Danville. Contractor will be required to follow the provisions of this permit.

PART 4 - FINANCIAL OBLIGATIONS

4.1 Liquidated Damages

A. The city has the right to charge liquidated damages in the amount of Three-hundred fifty (350) dollars per day, including Saturdays, Sundays, and Holidays, for each days beyond the stated or amended time of completion.

4.2 Bonds

A. A bid bond is required to be submitted with each bid document in an amount equal to 5 percent (5%) of the bid amount. The successful bidder will be required to provide a performance and payment bond in the amount of one hundred percent (100%) of the contract amount.

PART 5 - PROJECT REPRESENTATIVES

| | |
|---|---|
| Mike Huggins, Chief Engineer | 434-799-5019 ext. 2538 |
| Orey Hill, Project Engineer | 434-799-5019 ext. 2528 |
| Brian L. Dunevant, P.E., City Engineer | 434-799-5019 ext. 2530 |

**END OF SECTION**

# SECTION 2 – CONTRACTOR'S RELATIONSHIP TO THE CITY

PART 1 - CONTRACTUAL REQUIREMENTS

1.1 INDEPENDENT CONTRACTOR

A. It is expressly agreed and understood that the Contractor is in all respects an independent Contractor as to work and is in no respect any agent, servant, or employee of the City. The contract specifies the work to be done by the Contractor, but the method to be employed to accomplish the work shall be the responsibility of the Contractor.

1.2 SUBCONTRACTING

A. Contractor may subcontract services to be performed hereunder with the prior approval of the City, which approval shall not be unreasonably withheld. No such approval will be construed as making the City a part of, or to, such subcontract, or subjecting the City to liability of any kind to any subcontractor. No subcontract shall, under any circumstances, relieve the Contractor of its liability and obligation under this contract; and despite any such subcontracting the City shall deal through the Contractor, and subcontractors will be dealt with as representatives of the Contractor.

B. Payments to Subcontractors:
   1. The contractor shall take one of the two following actions within seven days after receipt of amounts paid to the contractor by the City of Danville for work performed by the subcontractor:
      a. Pay the subcontractor for the proportionate share of the total payment received from the agency attributable to the work performed by the subcontractor under that contract; or
      b. Notify the agency and subcontractor, in writing, of his intention to withhold all or a part of the subcontractor's payment with the reason for nonpayment.
   2. Individual Contractors shall provide their social security numbers and proprietorships, partnerships, and corporations to provide their federal employer identification numbers.
   3. The contractor shall pay interest to the subcontractor on all amounts owed by the contractor that remain unpaid after seven days following receipt by the contractor of payment from the City of Danville for work performed by the subcontractor, except for amounts withheld as allowed in Part 1, Section 1.2.B.1.
   4. Unless otherwise provided under the terms of this contract, interest shall accrue at the rate of one percent per month.
      a. The contractor shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractor.
      b. A contractor's obligation to pay an interest charge to a subcontractor pursuant to the payment clause in this section shall not be construed to be an obligation of the City of Danville. A contract modification shall not be made for the purpose of providing reimbursement for the interest charge. A cost reimbursement claim shall not include any amount for reimbursement for the interest charge.

1.3 NOVATION

A. The Contractor shall not assign or transfer, whether by as Assignment or Novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the City; provided, however, that assignments to banks, trust companies, or other financial institutions for the purpose of securing bond may be made without the consent of the City. Assignment or Novation of this Contract shall not be valid unless the Assignment or Novation expressly provides that the assignment of any of the Contractor's rights or benefits

under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, and equipment.

## PART 2 - CONTRACTOR'S OBLIGATIONS

### 2.1 DRUG-FREE WORK PLACE

A. During the performance of this contract, the contractor agrees to:
   1. Provide a drug-free workplace for the contractor's employees.

   2. Post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition.

   3. State in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace.

   4. Include the provisions of the foregoing clauses in every subcontract or purchase order of or over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

B. "Drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

### 2.2 INDEMNIFICATION

A. The Contractor shall indemnify the City, its agents, officers, and employees, against any damages to property or injuries to or death of any person or persons, including property and employees or agents of the City, and shall defend and indemnify the City, its agents, officers, and employees, from any claims, demands, suits, actions, or proceedings of any kind, including workers' compensation claims, of or by anyone, in any way resulting from or arising out of the operations in connection with the work described in the contract, including operations of subcontractors and acts or omissions of employees or agents of Contractor or Contractor's subcontractors. Contractor shall procure and maintain, at Contractor's own cost and expense, any additional kinds and amount of insurance that, in Contractor's own judgment, may be necessary for Contractor's proper protection in the prosecution of the work.

B. The Contractor shall, at his own expense, appear, defend, and pay all charges of attorney and other expenses arising there from or incurred in connection therewith, and, if any judgment shall be rendered against the City, and/or its officers, agents, and employees, in any such action, the Contractor shall, at his own expense, satisfy and discharge the same. The Contractor expressly understands and agrees that any performance bond or insurance protection required by this contract, or otherwise provided by the Contractor, shall in no way limit the responsibility to indemnify, keep, and save harmless and defend the City, its agents, officers, and employees as herein provided.

C. The Contractor shall assume all risks and responsibilities for casualties of every description in connection with the work, except that he shall not be held liable or responsible for delays or damage to the work caused by acts of God, acts of Public Enemy, acts of Government, quarantine restrictions, general strikes through the trade, or by freight embargoes not caused or participated in by the Contractor. The Contractor shall have charge and control of the entire work until completion and acceptance of the same by the City.

D. The Contractor shall alone be liable and responsible for, and shall pay, any and all loss or damage sustained by any person or party either during the performance or subsequent to the completion of the work under this agreement, by reason of injuries to persons and damage to property, buildings, and adjacent work, that may occur either during the performance of the work covered by this contract or that may be sustained as a result of or in consequence thereof, irrespective of whether or not such injury or damage be due to negligence or the inherent nature of the work.

E. The Contractor, however, will not be obligated to indemnify the City, its officers, agents, or employees against liability for damage arising out of bodily injury to persons or damage to property caused by or resulting solely from the negligence of the City or its officers, agents, and employees.

2.3 INSURANCE

A. The Contractor shall not commence work under any contract until he has obtained all the insurance required hereunder and such insurance has been approved by the City; nor shall the Contractor allow any Subcontractor to commence work on his subcontract until all similar insurance has been so obtained and approved. Approval of the insurance by the City shall not relieve or decrease the liability of the Contractor hereunder.

B. Worker's Compensation including Occupational Disease and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the Contract, Workers' Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under this Contract in an amount no less than the minimum allowed by the State Corporation Commission, and in case any such work is sublet, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation and Employers' Liability Insurance for all of the latter's employees to be engaged in such work.

C. Comprehensive General Liability Insurance: The Contractor shall maintain during the life of the Contract comprehensive general liability insurance as shall protect him and the City of Danville and its officers, agents and employees from claims for damages for personal injury, including death, as well as from claims for property damage, which may arise from operations under the Contract, whether such operations be by himself or by any Subcontractor, or by anyone directly or indirectly employed by either of them. The amount of such insurance shall be not less than a combined single limit of $1,000,000.00 per occurrence on bodily injury and property damage and $1,000,000.00 aggregate on completed operations. The comprehensive general liability insurance shall provide the following coverage:

- Comprehensive
- Premises – Operation
- Products/Completed Operations Hazard
- Contractual Insurance
- Independent Contractor and Subcontractor
- Broad Form Property Damage
- Personal Injury

1. Automobile liability insurance with minimum combined single limits of $500,000.00 per occurrence. This insurance shall include bodily injury and property damage for the following vehicles:
    - Owned Vehicles
    - Non-owned Vehicles
    - Hired Vehicles
2. Umbrella Policy: At the option of the Contractor, primary limits may be less than required, with an umbrella policy providing the additional limits needed. This form of insurance will be acceptable provided that the primary and umbrella policies both provide the insurance coverage herein required. However, any such umbrella policy must have minimum coverage limits of $2,000,000.00.

2.4 EQUAL OPPORTUNITY

A. During the performance of the contract, the contractor agrees as follows:
1. The Contractor will not discriminate against any employee or applicant for employment because of age, disability, race, religion, color, sex, or national origin. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions for this nondiscrimination clause.
2. The Contractor, in solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such contractor is an equal opportunity employer.
3. Notices, advertisements, and solicitations placed in accordance with Federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
4. The Contractor will include the provisions of the foregoing paragraphs in every subcontract or purchase order over $10,000 so that the provisions will be binding upon each subcontractor or vendor.
5. The Contractor will otherwise comply with all other applicable provisions of local, State, and Federal law.
6. The contractor does not, and shall not during the performance of the contract for goods and services in the Commonwealth, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.

B. The City of Danville does not discriminate against faith-based organizations.

2.5 STATE CORPORATION COMMISSION NUMBER

A. Contractors organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Virginia Title 13.1 or Title 50 or as otherwise required by law.

B. A Contractor organized or authorized to transact business in the Commonwealth pursuant to Virginia Title 13.1 or Title 50 shall include in its bid or proposal the identification number issued to it by the State Corporation commission. Any bidder or offeror that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall include in its bid or proposal a statement describing why the bidder or offeror is not required to be so authorized.

**END OF SECTION**

# SECTION 3 – CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

A. Description:

1. This work shall consist of clearing, grubbing, removing, and disposing of vegetation, debris, and other objects within the construction limits except for vegetation and objects that are designated to be preserved, protected, or removed in accordance with the requirements of other provisions of these specifications. Also included is the saw cutting of pavement and the removal and disposal of asphalt pavement in streets.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify any existing vegetation that will remain and confirm clearing limits are marked such that it is protected during construction.

B. Prior to beginning the grubbing operations in the work area, the Contractor shall install the erosion and sediment control measures to protect any streams in the work area. Other erosion and sediment control measures shall be installed as soon as possible or when it is practical.

3.2 PROTECTION

A. Locate, identify, and protect existing utilities that are to remain.

B. Perform clearing & grubbing activities with minimal impact to public or private accesses and/or facilities.

C. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed, Contractor shall contact Engineer so that necessary steps may be taken to record replacement or relocation.

D. Vegetation, structure, or other items outside the construction limits shall not be damaged. Trees and shrubs in ungraded areas shall not be cut without the approval of the Engineer.

3.3 CLEARING

A. Clear areas only necessary for access to site and performance of work.

B. The surface area of earth material exposed by grubbing, stripping topsoil, or excavation shall be limited to that necessary to perform the next operation within a given area.

C. Grubbing of root mat and stumps shall be confined to that area of land which excavation or other land disturbance activities shall be performed by the Contractor within 15 days following grubbing.

D. The Contractor shall remove from the project site and dispose of all material generated by these clearing and grubbing operations.

PART 4 - MEASUREMENT AND PAYMENT

4.1 No measurement of the area to be cleared and grubbed will be made.

4.2 When clearing and grubbing is not a pay item, the cost thereof shall be included in the price for other appropriate pay items.

4.3 Saw cutting pavement shall be measured in linear feet and will be paid for at the contract unit price per linear foot.

4.4 Pavement removal and disposal from trench areas will be measured in square yards and will be paid for at the contract unit price per square yard.

**END OF SECTION**

# SECTION 4 – EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. It shall be the responsibility of the Contractor to install and maintain adequate erosion control measures to satisfactorily control sediment generated by rainfall so that streams, drainage pipes, and structures are not infiltrated and that adjacent properties are not damaged.

B. The City reserves the right to require additional control measures should any erosion issues arise or if the designated measures are ineffective.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials used in the control of erosion and sediment shall conform to Sections 242.02(c), 245.03, and 303.03 of the VDOT Road and Bridge Specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of Erosion and Sediment Control Measures shall conform to the requirements of the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992 and the applicable VDOT standards.

3.2 EROSION AND SEDIMENTATION CONTROL

A. The Contractor shall remove any sediment and/or debris deposited in the project area or adjacent streets by runoff from this project area. Such sediment or debris shall be removed within twelve hours after the end of the rainfall event. The City may, at its discretion, after twelve hours, remove or have removed said sediment or debris from the affected area. Any costs incurred for that removal shall be borne by this Contractor and may be deducted from any monies owed to the Contractor by the City.

B. Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade, but will remain dormant for longer than 30 days, but less than one year. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.

PART 4 - MEASUREMENT AND PAYMENT

4.1 For each type of control measure used, and at the contract unit price or lump sum for that control measure, field measurements shall be made to determine actual quantities used.

4.2 The unit price bid per square yard or lump sum for seeding shall include all costs for lime, seed, fertilizer, mulch and the manipulation to install each.

**END OF SECTION**

# SECTION 5 – EARTHWORK AND EXCAVATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of constructing earthwork in accordance with these specifications and in conformity with the specified tolerances for the lines, grades, typical sections, and cross sections shown on the plans or as established by the Engineer.

B. Earthwork shall include regular, borrow, undercut, and minor structure excavation; trenching & backfilling for utilities; dewatering; boring under crossings; constructing embankments; disposing of surplus and unsuitable material; shaping; compaction; sloping; dressing; and temporary erosion and siltation control work.

1.2 DEFINITIONS

A. Satisfactory Materials:
   1. Soil that is free of rock or gravel larger than allowed for fill or backfill material as specified in the VDOT Road and Bridge Specifications or as shown on the drawings.
   2. Satisfactory soils shall be those of the type GW, GP, GM, SW, SM, SC, ML, and CL as defined by the ASTM D2487 soil classification group and free of rock greater than three inches in any dimension, debris, waste, frozen material, organic, or other deleterious material.
      a. The contractor will be required to determine the theoretical maximum density of any representative sampling of any backfill material using the Standard or Modified Proctor Compaction Test (ASTM D698/ASTM D1557). The contractor will be responsible for determining this utilizing a qualified laboratory or QA/QC firm.

B. Unsatisfactory Materials:
   1. Materials that do not comply with the requirements for satisfactory materials are considered unsatisfactory.
   2. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction unless otherwise approved by the Engineer.
   3. Unsatisfactory materials also include materials not maintained within two percent of optimum moisture content at time of compaction.

C. Rock Excavation:
   1. Removal of igneous, metamorphic, or sedimentary rock or stone, boulders over two cubic yards in volume in open areas and one cubic yard in volume in trenches; and masonry, concrete, or solid frozen soil that cannot be removed by rippers or other mechanical methods and, therefore, requires drilling/blasting.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall conform to the most current edition of the VDOT Road and Bridge Specifications, Section 303.02.

B. Borrow excavation shall conform to the requirements of AASHTO M57 and any additional requirements herein.

PART 3 - EXECUTION

3.1 PROCEDURES

A. Excavation procedures shall conform to Section 303.04 of the VDOT Specifications.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Excavation including regular, borrow, undercut, and minor structure excavation shall be paid for at the contract unit price for each. Quantities for borrow excavation shall be measured by truck count or other acceptable methods including three dimensional measurements or by cross sectioning and surveying.

4.2 When excavation is not a pay item, the cost thereof shall be included in the price item for other appropriate pay items.

**END OF SECTION**

**SECTION 6 – OMIT**

# SECTION 7 – SANITARY SEWER

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of the installation of sanitary sewer piping and specialties for municipal sewer and services outside of building structures. The Contractor shall furnish all necessary materials, equipment, labor, and tools to install the sanitary sewer mains and service connections in accordance with these specifications and in conformity with the dimensions, lines and grades shown on the plans or as designated by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. PIPE
1. Piping for these sewer mains and/or service connections shall be either polyvinyl chloride (PVC), cast iron, or ductile iron as specified on the plans and shall conform to the following standard specifications:
   a. Polyvinyl Chloride: ASTM D3034 and D2321
   b. Cast Iron or Ductile Iron: AWWA C106 or C108, ANSI A21.16, A21.51/C151 and ASTM A746
   c. Repair Couplings: ASTM A240/A240M-07, C 425-04, and C 1173-06
2. Ductile Iron Pipe shall be Class 350, have an interior cement lining and asphaltic seal coating per ANSI/AWWA Specification A21.51/C151, have an exterior asphaltic coating per ANSI/AWWA A21.51/C151, and be centrifugally cast.
3. PVC Pipe shall be SDR 35.

B. JOINT MATERIALS
1. Joint materials for the sanitary sewer piping shall be compression type and shall conform to ASTM D3034 for PVC and AWWA C111 for cast and ductile iron.
2. Joint materials between manhole sections shall be the compression type-Rings for watertight manholes; bituminous mastic material is also acceptable between sections of manholes that are not required to be watertight.
3. Joints between pipe and manholes shall be the rubber boot type as manufactured by the Press Seal Gasket Corporation (PSX), Thunderline (link seal) or an approved equal.
4. Joints between the frame and cover and the concrete manhole shall be XSEAL, as manufactured by SealGuard, Incorporated of Mars, PA, Telephone: 886-625-4550 or bituminous mastic or approved equivalent.
5. Sewer repair couplings of choice shall be the Mission Flex-Seal® ARC or an approved equivalent.

C. MANHOLES
1. Definitions:
   a. Abandon: Remove and dispose of the existing casting and cone section down to full barrel; plug pipes in and out; fill the remainder with soil; and, backfill with soil to grade.
   b. Install: Install a new structure in a new location.
   c. Remove: Completely remove and dispose of an existing manhole with no new structure being replaced.

d. Replace: Completely remove and dispose of the existing manhole and replace a new structure in the same location.

2. Wall Materials
   a. Material for new manhole walls shall be precast concrete conforming to ASTM C478 and Detail Drawing for manholes.
3. Invert Mortar
   a. Where constructed in the field, inverts shall be composed of Portland cement, sand, and water thoroughly mixed together in proportions of one (1) part cement to three (3) parts sand. The cement and sand shall be mixed dry and then gradually wetted and tempered to the proper consistency in such quantity as may be required for immediate use. No mortar mixed for more than one hour, or, that has begun its first set, or becomes hard shall be remixed or used.
4. Sand
   a. All sand used in mortar for this work shall be clean and sharp, free from loam, dirt or vegetation, and the best that is available locally.
5. Cement
   a. Portland cement, freshly delivered, shall be used as needed and shall conform to ASTM C9-36, method C77-37, and ASTM C150.
6. Castings
   a. The manhole frame and cover castings in pavement shall be composed of gray iron, Class 35B and shall conform to the dimensions and design of the applicable Detail Drawing. The combined weight of the frame and cover shall be at least 305 pounds.
   b. Castings for manholes shall be the USF 926 Ring and US Cover by U.S. Foundry & Manufacturing Corporation of Medley, Florida.
7. Steps
   a. Steps in manholes are neither required nor desired and are to be omitted.
8. Aggregate
   a. Foundation stone shall be VDOT No.3 Ballast
   b. Bedding stone for pipe shall be VDOT, No. 25 or 26, unless standing or running water is encountered. Where water is encountered, VDOT No. 57 shall be used.
   c. Trench repair stone and maintenance stone shall be VDOT No. 21A.
9. Specialties
   a. All specialty items shall conform to the detail drawing(s) and the applicable industry standard and/or ASTM standard for that item.
      1) Pipeline Crossings
         a) The pipeline crossing shall be installed in a steel casing pipe of the size and wall thickness shown on the plans. It shall be smooth wall, welded and seamless pipe conforming to ASTM A252, Grade B.

## PART 3 - EXECUTION

### 3.1 PROCEDURES

A. Sanitary sewer mains shall be located to the line and grade as shown on the plans and shall maintain horizontal separation between water lines and these sanitary sewer mains of not less than ten feet (10'). If and when this horizontal separation cannot be maintained, the bottom of the water lines shall be at least 18 inches (18") above the top of the sewer pipe; and, when neither of these separations can be maintained or achieved, all lines shall be constructed of slip-on or mechanical joints of ductile iron pipe and shall be pressure tested prior to backfilling the trenches.

1. Pipeline Crossings
   a. Joint Welding: The joints of the steel casing pipe shall be butt welded to the preceding joint in accordance with the American Welding Society's recommended procedures. The welded joints shall be watertight.
   b. Any casing pipe damaged during the installation operations shall be repaired or replaced at the Contractor's expense.

c. The ends of casing pipe shall be suitably sealed as approved by the Engineer. A casing vent shall be installed on the high end of the pipe and a drain hole shall be installed in the low end.
d. A drain line to a one cubic yard French drain of VDOT #57 aggregate shall be provided on the lowest end.
e. Each casing pipe shall have a carrier pipe. After installing the casing pipe, the carrier pipe shall be installed. The carrier pipe may be either mechanical joints or push-on joints and shall be ductile iron in the size and grade shown on the plans and as specified for sewer pipe.
f. To help prevent movement and provide protection, the carrier pipe shall be supported in the casing pipe. The first choice for the support is the Spider Support and Spacer Assembly by Spider Manufacturing, Inc. and using the three support units per each joint of carrier pipe. As an alternate, and, if approved by the Engineer, the carrier pipe may be supported on two sets of 4"X4"X3' long pressure treated blocks per length of pipe. Additional blocks shall be added as necessary to prevent flotation or movement of the carrier pipe.

2. Underground Crossings
   a. A jacking operation shall be carried on in such a manner the settlement of the ground or roadway above the pipeline will not occur. On earth bores, the use of water or other liquids in connection with the boring and jacking operation shall not be allowed. Excavation shall not precede the jacking operation more than is necessary and shall be made by auger and manual methods at the Contractor's option to suit conditions encountered.
   b. All boring and jacking operations by the contractor shall allow free and unobstructed use of roadways for the passage of traffic without delay or danger to life, property, or equipment. The Contractor shall provide all necessary bracing, bulkheads, shields, barriers, barricades and signs to ensure complete safety at all times.
3. Trenches
   a. All installations of sanitary sewer mains and service connections, when applicable, shall be made by open cut from the surface unless otherwise stated on the plans and shall conform to the following requirements:
      1) Excavation
         a) The banks of all trenches shall be kept vertical to one foot (1') above the top of the sewer pipe. Where the proper execution of the work or the protection of the workers requires it, the trench shall be braced or sheathed by the Contractor. No additional payment will be made for bracing or sheathing except where the Engineer shall deem it essential that said bracing or sheathing be left in place for the safety of the pipe.
         b) The width of the trench shall be not less than twenty-four inches (24") wider (not including space for the trench box/shoring) than the outside diameter of the pipe being installed, divided evenly on each side of the pipe or center line. See Detail Drawing S-01.
         c) The material excavated in trenching shall be banked on one side of the trench except where the Engineer may allow otherwise. It shall be kept trimmed up so as to leave a travel-way of two feet (2') in width between the banks and the trench, and shall be so placed as to be the least inconvenient to the traveling public and adjoining owners. Free access shall be provided to all fire hydrants and gates in the vicinity.
         d) Special care shall be taken not to interfere with the free passage of surface water along the gutters. No material excavated or otherwise shall be placed so as to obstruct the gutters.
         e) In trenches where soft, yielding bottom is encountered, excavation shall be made below the pipe grade to such depth as directed by the Engineer. This undercut area shall be backfilled with suitable material that will provide adequate support to the pipe being installed. Where stone is required, it shall be VDOT No.3 and capped with a layer four inches (4") deep of No.57

stone. This stone base will be paid for by the ton at the contract unit price. Should pilings and/or timber foundation be necessary, they shall be handled as extras or by prior quoted price agreed to and approved by the Engineer.

f) Where rock is encountered in the trench, it shall be removed to a minimum width of twenty-four inches (24"), not including trench box/shoring, greater than the outside diameter of the pipe being installed and at least six inches (6") below the invert grade of the pipe. The trench shall be fully opened at least thirty feet (30') in advance of the pipe laying. Rock shall be removed in sections not less than fifty feet (50') in length for measurement and shall be measured for payment by the Engineer or his designee after the rock is excavated and before backfilling begins.

2) Backfilling

a) The material filled around the sides and above the pipe for two feet (2') in height shall be free from large stones and compacted with care. In filling around the pipe, the material on both sides must be kept at equal height and compacted with the same thoroughness. There shall be enough workers in the trench to spread the material and compact each layer to the desired density.

b) In trenches where rock was excavated, suitable earth material shall be furnished for backfill material except under pavement; no additional payment will be made for this material.

c) Where trenches are cut in pavement and the native material under that pavement is unsuitable for backfill material, that trench shall be backfilled up to the pavement subgrade with VDOT No. 21A aggregate. The City's inspector shall determine the suitability of the backfill material.

d) In all streets the backfilling shall be performed in layers not exceeding eight inches (8"), compacted at 20% of optimum moisture to a minimum density of 95% in accordance with AASHTO T147 using adequate methods to obtain the desires results. ***Note: Should unusually dry soil conditions be encountered, moisture shall be added in sufficient quantity and shall be mixed into the backfill material to provide suitable soil cohesion. The City's Inspector shall determine the "unusually dry soil conditions" and "suitable soil cohesion".***

e) Where sewer trenches are not located in streets or improved property such as yards or outfalls, after the pipe has been properly covered and compacted to a depth of three feet (3'), the backfilling may be completed with loaders, dozers, or other methods without tamping, and the material piled up three inches (3") over the trench. Compaction tests shall not be required on these areas.

f) As the trenches are backfilled and the work is completed, all surplus material shall be removed from the project area to such locations as the Contractor may arrange subject to approval by the City.

g) Compaction testing of backfill in streets shall be provided by and paid for by the City through an independent testing laboratory. Any test section that fails to meet compaction requirements shall be corrected by whatever means necessary to achieve the compaction requirements.

h) A minimum of two (2) field density tests per each 300 linear feet of pipe, or fraction thereof, and for each six feet (6') of trench depth shall be performed by the testing laboratory to assure compliance with the compaction requirements.

i) The Contractor shall be responsible for providing trench boxes or other safety devices as may be required by the testing personnel for them to safely enter the trenches to perform the compaction tests.

j) Horizontal test locations shall be randomly selected by the City's inspector.

k) Vertical test locations shall be determined in accordance with the table 7-1 below or as otherwise specified:

Table 7-1 – Vertical Test Requirements

| Trench Depths | Tests Required | Test Number | Incremental Test Locations* |
|---|---|---|---|
| 0-6' | 2 | 1 | TTD/2 |
| 6-12' | 3 | 1<br>2 | TTD/3<br>TTD/3 |
| 12-18' | 4 | 1<br>2<br>3 | TTD/4<br>TTD/4<br>TTD/4 |
| 18-24' | 5 | 1<br>2<br>3<br>4 | TTD/5<br>TTD/5<br>TTD/5<br>TTD/5 |
| Greater than 24' | As Required by Engineer | | |

TTD (Trench Test Depth) = Overall Depth Minus 1 foot.
*Incremental Tests Locations are measured from the bottom of the trench except the last test which is 1 foot below finish grade.

Pipe Laying

l) All pipe shall be installed to line and grade, with joints close and even, butting all around, and so that a true and even surface or invert is made over the joints and throughout the entire length of the sewer line.

m) The installation of the pipe shall begin at the downstream end and shall proceed upstream. The downstream sections shall be completed, tested and approved prior to any sewage entering the new system being installed.

n) Unless otherwise permitted by the Engineer in special occasions, no pipe or manholes shall be installed until all water has been removed from the trench.

o) Each joint of pipe shall be carefully inspected at the surface before being lowered into the trench. No crooked, broken, or otherwise defective pipe shall be installed. Joints of pipe and fittings shall be lowered carefully into the trench by a suitable means and handled with care at all times to avoid damage. Pipe of imperfect shape or size that a true and tight joint cannot be readily made shall not be permitted. This requirement is intended to apply especially to the amount and uniformity of the annular space between the bells and spigots as required herein under the specifications for pipe. Any pipe found on the site that fails to conform to this specification shall be rejected and shall be removed by and remain the property of the Contractor. Under no circumstances shall the materials be dropped or dumped into the trench.

p) The bed of each pipe joint shall be graded and shaped so that the pipe shall have a uniformly firm bearing throughout its entire length when installed to line and grade. In case an excavation is made too deep, the trench shall be backfilled with suitable material and thoroughly compacted to the proper grade. At each joint a bell hole shall be dug to give ample room for proper jointing.

q) Where field cutting of pipe is necessary, it shall be performed in a neat and workmanlike manner, so as to leave a smooth end at right angles to the

axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an oxyacetylene torch.

r) The Contractor shall exercise every precaution to prevent foreign materials or small animals from entering the pipe once it has been placed in the trench. No tools, clothing, soil, rocks, debris or any other material shall be allowed in the pipe once it is installed in the line. Ends of the pipe shall be plugged or covered at night or during periods of no work.

s) The Contractor shall establish and maintain the horizontal alignment and the vertical elevation and grade of the pipe in accordance with the plans. Horizontal alignment of the pipe shall be maintained by use of a transit or theodolite plumbed over the center of the downstream manhole.

t) Vertical elevation and grade shall be maintained by use of an adjustable laser level mounted in the downstream manhole with the target placed in the bell end of the pipe being installed.

3) Manholes

a) Manholes shall be constructed at such points as may be necessary in accordance with the plans. Manholes shall be installed as soon as the pipe laying workers are out of the way and shall be completed without undue delay. Each manhole shall conform to Detail Drawing. All manholes shall be left clean and in good order until final acceptance of the project.

i.

Bottoms:

A.)

Bottoms of manholes shall be at least six inches (6") thick under the lowest invert and shall extend above the invert a height equal to three-fourths (3/4) of the diameter of the out-flowing pipe. Where there is a change of direction in the manhole, the channel shall follow the center lines of the pipes and shall have a true curve of as large a radius as the manhole will allow. When the line runs straight through the manhole, the sewer pipe may serve as the invert. Inverts may be precast in conformity with the Detail Drawing.

B.)

The inverts or channels shall be precast concrete or masonry formed of select hard brick laid with edges facing the invert and shall have a cross-section of the same shape of the connecting inverts with changes in sizes being made gradually and evenly. No water shall be permitted to flow through the manholes while work on inverts is in progress.

C.)

From the invert or channel, the manhole bottom shall be sloped back to the walls with the slope being not less than one inch (1") vertical to one foot (1') horizontal and shall be smoothly finished with plaster of one to one cement mortar.

ii.

Walls: The walls shall be at least five inches (5") thick and shall be reinforced with wire mesh or steel and O-Rings shall be used on each section of manhole.

iii.

Steps: Steps are neither required nor desired in manholes and shall be omitted. If installed for the contractor's convenience during the construction period, they shall be removed when the manhole construction is completed or project acceptance.

iv.

Frames and Covers: The frames and covers for each manhole shall be provided and set to the proper elevation as shown on the plans and any adjustments that may be necessary shall be the responsibility of the Contractor. No additional costs may be charged for these adjustments. The costs for the frames and covers shall be included in the unit price for manholes in the Bid Proposal.

A.)

The frames shall be sealed with XSEAL or bituminous mastic joint material between the concrete manhole and the iron flange of the frames.

B.)

The frames shall be anchored to the concrete manhole with stainless steel anchor bolts.

v.

Height Adjustments : When an existing manhole must be adjusted up or down more than eight inches (8"), it shall be torn down to the point where the full diameter of the manhole begins and then rebuilt as necessary to meet the new elevations on the plans. For adjustments up to eight inches (8"), adjustments rings under the cast iron frames are acceptable. These adjustments shall also use the joint material under the casting flanges.

vi.

Drop Manholes: Whenever the vertical distance between the incoming and outgoing sewer lines in a manhole exceeds two feet (2'), it shall be deemed to be a "drop manhole". Inside drops are preferred, however, manhole drops may be either on the outside or inside of manholes and will be identified on the plans. An outside drop shall require the installation of a concrete encased 90 degree ell, a tee, and the necessary straight pipe on the outside of the manhole to bring the two elevations together or within two feet (2') of each other. An inside drop shall require the Reliner® by Duran, Inc. of Lyme, CT, 1-800-509-6001, and shall be mounted in accordance with the manufacturer's instructions, otherwise, the construction of a drop manhole is the same as a standard manhole.

vii.

Manhole Encapsulation:

A.)

Description:

1.)

When directed, this work shall consist of sealing joints in manholes to prevent groundwater from entering the sewer collection system using the WrapidSeal Manhole Encapsulation System by CCI Pipeline Systems, LLC. Contact Chuck Rokacy, 2528 Thrush Road, Charlottesville, VA, 22901, telephone 1-800-836-22901. All joints between concrete manhole sections and between castings and concrete sections shall be sealed. Boots in manholes are not required to be sealed.

B.)

Materials:

1.)

WrapidSeal is a heat shrinkable wraparound sleeve system manufactured by Canusa-CPS in Houston and Huntsville, Texas.

2.) Shall be premium grade designed for use on manholes and concrete structures.

3.) Shall consist of a two-piece sleeve (backing + adhesive), with a closure system. The overall thickness of an applied sleeve shall nominally measure 0.100” (2.5 mm).

4.) The backing shall provide resistance against mechanical damage during construction and in service and shall be properly stretched to provide sufficient recovery for all shapes.

5.) The adhesive shall be formulated to become liquid at temperatures achieved during installation.

a) Shall be a mastic type.

b) Shall remain flexible in cold temperatures.

c) Shall form a tough, elastomeric protective layer upon cooling.

6.) The closure system shall employ a seal to allow sealing of the overlap area and effect recovery of the sleeve.

7.) Shall be used with the primer supplied with the WrapidSeal sleeve and shall consist of an irradiated, cross-linked polyolefin sheeting, pre-coated with a layer of mastic adhesive.

C.) Procedures:

1.) The WrapidSeal Sleeve Installation Guide shall be enclosed in the factory manufactured bulk roll carton and shall be used to install these sleeves. The Contractor is urged to request field assistance in demonstrating the proper method of application of the sleeves.

2.) Tools Required: The following tools are needed to install these sleeves: Canusa Pro-Torch propane torch kit, or equivalent; paint brush or roller; medium temperature range gloves; torch lighter; tape measure; roller; knife; wire hand brush; marker; and safety glasses.

3.) Installation Overview

a) Ensure structure to be covered is free of dirt, sharp points, and is preheated to remove any surface moisture.

b) Apply the primer with roller or brush over all areas to be covered and let dry (5-15 minutes, or until the primer surface is tacky to the touch).

c) Determine the circumference of the structure, cut

a length of sleeve with an additional 6-8 inch length for the overlap. Do the same for the joint areas using a minimum 6 inch (150 mm) wide sleeve.

d) Wrap the sleeve around the manhole structure, properly aligning the bottom edge and removing the release liner as the structure is wrapped.

e) Heat the overlap area and pat down with a gloved hand or hand roller to ensure bonding.

f) Pre-heat the closure seal hot melt adhesive, then center closure on the sleeve overlap. Pat down to ensure seal is bonded.

g) Commence recovering the sleeve at the bottom edge, until the entire sleeve has recovered.

h) Smooth out the wrinkles using a hand roller, or a gloved hand.

i) Quench sleeve with water if immediate backfilling is necessary, or allow sleeve to cool prior to backfilling for the adhesive to set.

viii. Testing

A.) The Contractor shall provide all equipment, materials, water, labor, etc. needed to perform tests in accordance with procedures listed below. All equipment and materials used shall be checked and approved by the Engineer or his designee prior to its use. It shall be the responsibility of the Contractor to ensure that the pipe is clean prior to beginning the tests. The cost of this testing shall be included in the contract unit price per linear foot of pipe.

B.) A test for leakage of gravity sewer lines shall be performed. Infiltration and exfiltration tests and /or low pressure air tests may be used.

C.) If the pipe installation fails to meet the testing requirements, the Contractor shall determine, at his own expense, the source or sources of leakage, and shall repair or replace all damaged or defective materials and correct the cause of failure and shall retest the repaired line. Contract time extensions will not be granted to correct deficiencies found during line testing. The Contractor shall employ qualified and skilled personnel for performing the tests and evaluating the results. The Engineer will only observe tests and certify the results. Sewer lines shall successfully pass all testing requirements before being considered acceptable.

D.) Exfiltration and Infiltration Test: The Contractor shall perform water exfiltration and infiltration leakage test in the presence of the Engineer after the lines are completed and backfilled.

E.)

Lines: Where exfiltration is tested for, the lines shall be subjected to a minimum of four feet (4') of head, or head to the top of the manhole, whichever is lesser, above the crown of the pipe at the upstream manhole of the section of line being tested. The leakage shall not exceed 100 gallons per inch of nominal pipe diameter per mile per day for any section of the system, including manholes.

F.)

Manholes: Manholes shall be plugged with inflatable stoppers and shall be filled with water for a 12-hour soak period. After the soak period, the manhole shall be refilled to the top and the test shall begin. Leakage shall not exceed one-quarter (1/4) gallon per hour in the one hour test period following the soak period.

G.)

The infiltration test shall be used only when the hydrostatic head outside the pipe is a minimum of four feet (4') above the crown of the pipe for the entire length of the pipe being tested. Plug the pipe at the lower manhole. Fill the line and the manhole to four feet (4') , or to the top of the straight section if less than four feet. Let the water stand until the pipe has reached maximum absorption and until all trapped air has escaped, four (4) hour minimum. Once maximum absorption is reached, refill the manhole to the original level. After thirty (30) minutes, record the difference in the water level and convert to gallons. Subtract manhole loss to obtain pipe line loss. Manhole loss is found by plugging both the inlet and outlet and filling the manhole with water to four feet (4') or to the top of the straight section, if less than four feet (4'). Let water stand for one (1) hour. Refill manhole to the original level. After thirty (30) minutes, check the difference in the water level and convert to gallons.

H.)

Approved Alternate Leakage Testing Methods:

1.)

In lieu of exfiltration tests, manholes may be tested using a vacuum test, provided the test conforms to the following conditions:

2.)

This test method shall only be used on precast concrete manholes.

3.)

Manholes shall be tested after assembly and prior to backfilling.

4.)

Stub-outs, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn.

5.)

The installation and operation of the vacuum equipment and indication devices shall be in accordance with equipment specifications for which performance information has been provided by the manufacturer and approved by the City of Danville.

6.)

A measured vacuum of ten inches (10") of mercury shall be

established in the manhole. The time for the vacuum to drop to nine inches (9") of mercury shall be recorded.

7.) Acceptance standards for leakage shall be established from the elapsed time for a negative pressure change from ten inches (10") to nine inches (9") of mercury. The maximum allowable leakage rate for a four-foot (4') diameter manhole shall be accordance with Table 7-2 herein.

8.) When a manhole fails a test, necessary repairs shall be made and the vacuum test shall be repeated until the manhole passes the test or the manhole passes a standard exfiltration test with water.

9.) If the joint material is pulled out of a section joint during the vacuum test, the manhole shall be disassembled, the material replaced and the manhole retested.

**Table 7-2 - Acceptable Vacuum Change in 4' Diameter Manholes**

| Manhole Depth | Min. Elapsed Time for a Pressure Change of 1" of Hg |
|---|---|
| ≤ 10' | 60 seconds |
| 10' < Depth ≤ 15' | 75 seconds |
| 15' < Depth ≤ 25' | 90 seconds |

I.) Low Pressure Air Test for Sewer Lines

1.) In lieu of water exfiltration tests, a low pressure air test may be employed on sewer lines. Before the test is made, all wyes, tees, or end of side sewer stubs and connections shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket for making a flexible-jointed lateral connection or extension.

2.) The testing equipment, procedure, and results will all be subject to the approval of the Engineer. Results of the air test will be reviewed for compliance with UNI-B-6-79. The air test is to be conducted between two (2) consecutive manholes at a time. The test equipment shall be Air-Lock, as manufactured by Cherne Industrial, Inc., or an approved equal. All air shall pass through a single control panel. Individual air hoses shall be used from control panel to pneumatic plugs; from control panel to sealed line for introducing low pressure air; and from sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

3.) Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe being tested. The plugs shall resist internal test pressures without requiring external bracing or blocking. Plugs shall be tested prior to installation in the pipe run. A joint of pipe shall be sealed at both ends with the plugs to be used in the sewer test. Air shall be introduced into the plugs at 25 psi. The sealed pipe shall then be pressurized to 9 psi. The plugs shall withstand the pressure without bracing or movement. The tested line segment shall be plugged and pressurized to 4.0 psi greater than the groundwater back pressure but not to exceed 10 psi. The line shall be allowed to stabilize for two minutes after pressurization. After the pressure has stabilized, the air pressure shall be decreased slowly to 3.5 psi (greater than groundwater back pressure) and the timing shall commence. The time for the pressure to drop 1 psi from 3.5 psi shall be recorded. The minimum acceptable time durations are shown in Table 7-3 herein. If the elapsed time to drop 1 psi is less than that shown in Table 7-3, then the air loss shall be considered excessive and the section of pipe has failed the test.

4.) For safety reasons, no person shall remain in a manhole while the pipe is being pressurized or throughout the test period.

**Table 7-3 – Air Test Table**

| Pipe Diameter, in. | Minimum Time, mm:ss | Length for Min. Time, ft. | Time for Longer Length, sec. | Specification Time for Length, mm:ss | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 100' | 150' | 200' | 250' | 300' | 350' | 400' |
| 4 | 03:46 | 597 | 0.380L | 03:46 | 03:46 | 03:46 | 03:46 | 03:46 | 03:46 | 03:46 |
| 6 | 05:40 | 398 | 0.854L | 05:40 | 05:40 | 05:40 | 05:40 | 05:40 | 05:40 | 05:42 |
| 8 | 07:34 | 298 | 1.520L | 07:34 | 07:34 | 07:34 | 07:34 | 07:36 | 08:52 | 10:08 |
| 10 | 09:26 | 239 | 2.374L | 09:26 | 09:26 | 09:26 | 09:53 | 11:52 | 13:51 | 15:49 |
| 12 | 11:20 | 199 | 3.418L | 11:20 | 11:20 | 11:24 | 14:15 | 17:05 | 19:56 | 22:47 |
| 14 | 13:13 | | | 13:13 | 13:13 | 15:40 | 19:35 | 23:33 | 27:25 | 31:20 |
| 15 | 14:10 | 159 | 5.342L | 14:10 | 14:10 | 17:48 | 22:15 | 26:42 | 31:09 | 35:36 |
| 16 | 16:04 | | | 16:04 | 17:32 | 23:01 | 28:47 | 34:34 | 40:18 | 46:03 |
| 18 | 17:00 | 133 | 7.692L | 17:00 | 19:13 | 25:38 | 32:03 | 38:27 | 44:52 | 51:16 |
| 21 | 19:50 | 114 | 10.470L | 19:50 | 26:10 | 34:54 | 43:37 | 52:21 | 61:00 | 69:48 |
| 24 | 22:40 | 99 | 13.674L | 22:47 | 34:11 | 45:34 | 56:58 | 68:22 | 79:46 | 91:10 |
| 27 | 25:30 | 88 | 17.306L | 28:51 | 43:16 | 57:41 | 72:07 | 86:32 | 100:57 | 115:22 |
| 30 | 28:20 | 80 | 21.366L | 35:37 | 53:25 | 71:13 | 89:02 | 106:50 | 124:38 | 142:26 |
| 33 | 31:10 | 72 | 25.852L | 43:05 | 64:38 | 86:10 | 107:43 | 129:16 | 150:43 | 172:21 |
| 36 | 34:00 | 66 | 30.768L | 51:17 | 76:55 | 102:34 | 128:12 | 153:50 | 179:29 | 205:07 |

SPECIFICATION TIME REQUIRED FOR A 1.0 PSI PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015
Note: Times for 14" and 16" derived by interpolation

J.) Deflection Test for PVC Pipe

1.) All plastic sewer pipe, except pipe with a stiffness of 200 psi or greater, shall be subjected to a deflection test. This test shall be administered by the Contractor in the presence of the Engineer no sooner than thirty (30) days after the final full backfill has been placed. Plastic pipe with a stiffness of 200 or greater shall be certified by the manufacturer.

2.) The Contractor shall test the pipe for deflection by means of a "Go/No Go" mandrel to assure that a deflection of 5% has not been exceeded. The mandrel, one for each size of pipe, shall be supplied by the Contractor and shall be a nine arm mandrel, with proving ring, sized at 5% less than the ASTM dimension for the pipe and in accordance with Table 7-4 herein.

**Table 7-4 – Mandrel Sizes**

| Nominal Diameter, in. | L, in. | SDR-35 ASTM D-3034 D, in. |
|---|---|---|
| 8 | 8 | 7.50 |
| 10 | 10 | 9.33 |
| 12 | 12 | 11.16 |
| 15 | 15 | 13.60 |
| 18 | 18 | 16.60 |

L = Mandrel Arm Length
D = I.D. for Proving Ring
Note: The mandrel shall be pulled through the sewer line manually. Any sewer line tested that fails shall be repaired and retested until it passes this deflection test at the Contractor's expense.

ix. Service Connections

A.) Service connection laterals shall be made to the sewer pipe or manholes as shown on the plans or where located in the field by the Engineer. A service connection made into the sewer pipe shall be made with a wye fitting, commercially manufactured and installed in accordance with the recommendations of the manufacturer.

B.) The sewer pipe shall not be cut or tapped for service connections, unless otherwise approved by the City engineer.

C.) All service connections shall be made with four inch diameter pipe as a minimum, unless otherwise directed and shall be installed on a minimum grade of one-quarter inch (1/4") per one foot (1') from the sewer pipe or manhole to the property line or easement line.

D.) Service connections installed for future use shall extend to the property or easement line and shall be properly capped with a watertight fitting to prevent infiltration into the sewerage system. The fitting shall be installed in accordance with the manufacturer's instructions.

E.) Service connections shall be installed in conformity with Detail Drawing SS-7 herein and shall include the clean-out assembly on the end of the connection. The top of the clean-out assembly shall have a cap to seal.

F.) Existing services that are to be connected to a new sewer pipe and are in satisfactory condition, as approved by the Engineer, shall not be replaced to the property or easement line but shall be connected to the first compatible joint of pipe which will ensure a watertight connection.

G.) When conditions are such that service connections cannot be adequately supported on suitable material, it shall be encased in concrete or supported on a suitable bedding material approved by the City's Inspector.

H.) Service connections shall be installed a minimum of eighteen inches (18") under water mains or private water services.

I.) All non-metallic sanitary sewer mains and connections shall be locatable with wire and tape made for that purpose. An insulated copper tracer wire, 12 AWG in size, green in color, and suitable for direct burial shall be utilized. The wire shall be installed in the same trench above and within 12 inches of the horizontal pipe and shall be attached to the vertical cleanout with duct tape and terminating at the top of the cleanout with a set screw. The wire continuity shall be confirmed prior to payment for the service connection.

B. Surveying: The contractor is responsible for providing his own surveying services to assure that pipe and structure elevations are in accordance with these specifications and in conformity with the dimensions, lines and grades shown on the plans or as designated by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Pipe

A. Pipe for mains shall be measured in linear feet actually installed and will be paid for at the contract unit price per linear foot for that size of pipe and depth of trench. Measurement shall be made straight through manholes or fittings and shall include excavation, pipe laying, backfilling, wyes for service connections and the disposition of any surplus material.

B. Pipe for service connections (laterals) shall be measured in linear feet from the centerline of the main or manhole to the centerline of the cleanout on the end of the connections and will be paid for at the contract unit price per linear foot. This price shall include the pipe, excavation, backfilling, equipment, labor, and tools necessary to install these connections.

4.2 Rock Encountered in Trenches

A. Excavated rock in trenches shall be measured in cubic yards and will be paid for at the contract unit price per cubic yard. Rock shall be measured to a width equal to twenty-four inches (24") wider than the outside diameter of the pipe being installed plus any width up to six inches (6") on either side for the trench box/shoring for the distance and depth that the rock is excavated.

4.3 Manholes

A. Standard and Drop Manholes (Install and Replace):
   1. Standard manholes, 0-8' in depth, shall be counted in completed-in-place units in the field and will be paid for at the contract unit price per each. The unit price shall include frames and covers, any specialty fittings, excavation, installing the manhole, backfilling, and the disposition of any surplus material. When replacing a manhole, it shall also include the removal and disposal of the existing manhole.
   2. Manhole "Abandonment" will be counted by each and will be paid for at the contract unit price per each. Payment shall include disposal of the top section and casting, plugging the pipes in and out; soil backfill of the manhole and the resultant excavation where the top was removed. Manhole debris shall not be left on the project site.
   3. Manhole "Removal" will be counted by each and will be paid for at the contract unit price per each and shall include the disposal of the removed manhole. Manhole debris shall not be left on the project site.

B. Extra Depth in Manholes
   1. Additional depth in manholes beyond eight feet (8') shall be measured and paid for at the contract unit price per vertical foot of height when measured from the lowest invert to the top of the casting plus 0.5' added for the manhole bottom.

C. Height Adjustments
   1. Adjustments to existing manholes will be paid for at the contract unit price per vertical foot or the lump sum price, whichever is stated in the Bid Proposal.

D. Encapsulation
   1. Encapsulation shall be counted in units of each and shall be paid for at the contract unit price per each inclusive of all materials, equipment, tools and labor.

4.4 Aggregates

A. Each type of stone will be paid for at the contract unit price per ton and for which a ticket from the supplier verifying the tonnage is provided.
   1. Exception: VDOT # 57 stone used for PVC pipe bedding and encasement shall be included in the price per linear foot of PVC pipe.

4.5 Specialties

A. Wyes installed in the main line for service connections shall be included in the unit price for the sewer main pipe.

B. Tees, ells and pipe required for a drop on a manhole shall be included in each complete-in-place unit and will be paid for at the contract unit price per each unit.

C. When applicable, cleanout assemblies shall be counted in each and paid for at the contract unit price per each.

D. Main and service connection tracer wire and tape shall be measured by the linear foot and will be paid for at the contract unit price per linear foot.

E. A pipeline bore (whether earth or rock) shall be measured by the linear foot of casing pipe installed and shall be paid for at the contract unit price per linear foot. The base bid price for the crossing shall be for a bore in rock. An earth bore shall be computed at sixty percent (60%) of a rock bore.

F. Steel casing pipe shall be measured in linear feet of the size and thickness specified and will be paid for at the contract price per linear foot.

G. The tracer wire and tape for locating the mains and service connections shall be measured in linear feet and will be paid for at the contract unit price per linear foot.

**END OF SECTION**

# SECTION 8 – INCIDENTAL CONCRETE ITEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of constructing curbs, gutters, combination curbs and gutters, sidewalks, pads, driveway entrances, ADA ramps, paved ditches, paved flumes, bridge drainage aprons and chutes, concrete median barriers, median strips, sign islands, or directional island curbs in accordance with these specifications and in conformity to the lines and grades shown on the plans or as established by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All concrete materials including hydraulic cement concrete, asphalt concrete, preformed joint filler, curing materials, reinforcing steel, rubble stone, grout, foundation course, dry filler, seed, and topsoil shall conform to the requirements set forth for incidental concrete items in Section 502.02 of the VDOT Road and Bridge Specifications.

B. Hydraulic cement concrete shall be VDOT Class A-3 General Concrete unless otherwise specified or established by the plans or by the Engineer.

PART 3 - EXECUTION

3.1 PROCEDURES

A. The procedures for installation of these items shall conform to Section 502.03 of the VDOT Road and Bridge Specifications or to the technical criteria contained herein.

B. The sub-grade shall be graded, shaped and thoroughly compacted to provide a uniform and smooth surface. Unsuitable material, if encountered, shall be removed and replaced as directed by the Engineer. The sub-grade shall be moist when the concrete is placed on it.

C. Fixed Form Requirements

1. Fixed forms shall be straight, free from warp, and of such construction that there will be no interference with the inspection of grade and alignment. Forms shall extend the entire depth of the item and shall be braced and secured so that no deflection from alignment or grade will occur during the placement of the concrete. Radial forms shall be sufficiently flexible or otherwise designed to provide a smooth and uniform curved surface of the required radius. Face forms shall be removed as soon as the concrete has attained sufficient set to stand without slumping.
2. Transverse joints for crack control shall be provided at intervals of twenty feet (20'). These joints may be formed by using removable templates, 1/8" in thickness, by scoring or sawing to a depth of at least 1 ½" using an approved leave-in insert, or by other approved methods that will successfully induce and control the location and shape of transverse cracks.
3. The ends of the concrete sidewalk that abut the back of the concrete curb shall have transverse expansion joints of preformed joint filler,1/2" in thickness, that extends from the bottom of the concrete slab to approximately 1/4" below the top of the slab.
4. Exposed concrete surfaces shall be smoothed by using a suitable finishing tool and shall be given a light broom finish.

D. Slipform Requirements

1. The Contractor will be permitted to slipform incidental concrete items provided the following conditions contained herein are met. Approval by the Engineer to allow the Contractor the option of slipforming concrete items is permissive only and in no way relieves the Contractor from his responsibility to comply with the contract requirements and conditions.
2. The requirements set forth in the VDOT Road and Bridge Specifications Section 502.02(b) shall apply to any slipforming operations.

E. Protection

1. Concrete surfaces shall be adequately protected from damage.
2. Protection from traffic shall be provided by flag persons or other watch persons, erecting and maintaining warning signs, lights or barricades, or by erecting temporary bridges or crossovers.
3. Protection from the effects of rainfall before the concrete has attained final set shall be provided by covering the concrete with a protective covering such as burlap, cotton mats, curing paper or plastic sheeting in compliance with VDOT Standards.
4. Protection from the effects of cold weather shall be provided to prevent the temperature of the concrete surface from falling below 40º F during the first seventy-two hours immediately following concrete placement. Protective material shall be left in place for an additional forty-eight hours if freezing air temperatures are expected to continue. Damaged concrete due to the absence of this protective material shall be removed and replaced at the Contractor's expense.
5. Protection from the effects of hot, low-humidity, or windy weather shall be provided by applying the curing medium at the earliest possible time after the finishing operations are completed and after the sheen has disappeared from the surface of the concrete. "Hot" weather shall be deemed to be ambient temperature exceeding 85˚F.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Curb and gutter and paved ditch will be measured in linear feet, complete-in-place, and will be paid for at the contract unit price per linear foot.

4.2 Driveway entrances, tie-ins, and sidewalks will be measured in square yards of surface area, and will be paid for at the contract unit price per square yard.

4.3 ADA ramps shall be counted by each and will be paid for at the contract unit price per each.

**END OF SECTION**

# SECTION 9 – ASPHALT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of constructing one or more courses of asphalt concrete on a prepared foundation in accordance with the requirements of these specifications and within the specified tolerances for the lines, grades, thicknesses, densities, and cross sections shown on the plans or as established by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials utilized in paving operations shall conform to Section 211 of the most current edition of the VDOT Road and Bridge Specifications or to the technical specifications contained herein.

B. Equipment utilized in paving operations shall conform to section 315.03 of the VDOT Road and Bridge Specifications.

PART 3 - EXECUTION

3.1 PLACEMENT AND LIMITATIONS

A. Asphalt concrete mixtures shall not be placed when weather or surface conditions are such that the material cannot be properly handled, finished, or compacted. The surface upon which asphalt mixtures are to be placed shall be free of standing water, dirt, and mud and the base temperature shall conform to the following:

B. When the base temperature is above 80° F, mixture laydown will be permitted at any temperature conforming to the limits specified in Section 211.

C. When the base temperature is between 40° F and 80° F, the Nomograph, Table III–2 located in the VDOT Road and Bridge Specifications, Section 315.05 shall be used to determine the minimum laydown temperature of the asphalt concrete mixes. At no time should the minimum base and laydown temperatures be less than the following:

| Mix Designation | Minimum Base Temperature | Minimum Laydown Temperature |
|---|---|---|
| A | 40°F | 250°F |
| D | 50°F | 270°F |
| E | 50°F | 290°F |
| M | 50°F | 290°F |
| S | 50°F | 290°F |

D. When the laydown temperature is greater than 300° F, Section 315.04(c) of the VDOT Road and Bridge Specifications shall be followed.

3.2 PROCEDURES

A. The procedures set forth in the VDOT Road and Bridge Specifications Section 315.05 shall be followed for all paving operations unless explicitly approved by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Asphalt concrete will be measured in tons and paid for at the contract unit price per ton. Net weight information shall be furnished with each load of material delivered in accordance with the requirements of Section 211 of the VDOT Road and Bridge Specifications.

4.2 Tack Coat shall be included in the price for other appropriate pay items.

4.3 Saw-cut asphalt concrete pavement will be measured in linear feet for the depth specified and will be paid for at the contract unit price per foot, which price shall be full compensation for saw-cutting the asphalt pavement to the depth specified.

4.4 While no separate payment will be made for the liquid binder in the mixes, price adjustments may be made in accordance with the VDOT Method for Liquid Asphalt Adjustment.

**END OF SECTION**

# SECTION 10 – ELECTRIC, TELEPHONE, AND CABLE UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. The City has informed each of these utilities of this work. If a conflict is discovered to exist between these utilities and the proposed work, the Contractor shall give notice to the utility owner at the earliest possible time, but in no case less than five (5) working days prior to proceeding with that work.

B. It shall be the utility owner's responsibility to adjust, protect or relocate their utility, however, nothing shall give the Contractor the right to damage said utility in the performance of his work. Any damages caused by the Contractor in the performance of this work shall be repaired by the utility owner at the Contractor's expense.

**END OF SECTION**

# SECTION 11 – MOBILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of performing preparatory operations, including moving personnel and equipment to the project site; paying bond and insurance premiums; providing sanitary facilities, if required; and, providing a field office when one is required.

PART 2 - MEASUREMENT AND PAYMENT

2.1 Mobilization shall be paid for at the contract lump sum price which shall also include demobilization. Payment will be made in two equal installments, one-half on the first pay request and the remainder on the next pay request following the completion of the mobilization operations.

**END OF SECTION**

# SECTION 12 – RESTORATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of restoration of disturbed areas to the City's satisfaction.

B. Upon completion of sewer line installation and finish grading operations, the contractor shall install a millings path along the length of the sewer line within the sewer easement.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.1 PROCEDURES

A. The Contractor shall restore all areas of the project disturbed in the work.

B. The Contractor shall, at his own expense, clean up all refuse, rubbish, scrap or surplus materials, and debris caused by his or her operations. The site shall not be a source of litter and shall daily be left in a clean and orderly condition.

C. All surplus earth materials generated by the grading and/or pipe installation operations shall be removed and disposed of by the Contractor unless the material is suitable for use as fill in other areas of the project. Where dust is generated, the Contractor shall allay the dust to the satisfaction of the City's inspector. No separate payment will be made for dust control.

D. Finish grading shall be performed as necessary to eliminate low spots and pockets that do not drain.

E. Developed property, such as walks, steps, fences, decorative structures, mailboxes, newspaper boxes, and the like, which are disturbed by this work shall be restored, reconstructed or repaired to original condition or as close as possible. Property owner satisfaction shall be the Contractor's responsibility.

F. All disturbed areas not otherwise covered by pavement or structures shall be stabilized by seeding with the type of seed that produces a stand of grass similar to the existing grass. Any washing or erosion of these surfaces and any areas where seed does not germinate to provide an adequate stand of grass shall be repaired and reseeded by the Contractor at his expense.

G. Once finish grading has been performed, the Contractor shall install a millings path (10' wide x 4" deep) along the length of the sewer line within the sewer easement. Millings shall be picked up from the rock hole at the City's Public Works storage yard. The contractor shall load, haul, spread, and compact the millings on the sewer line. The contractor shall not install millings within swampy areas, creeks, or wetlands.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Measurement and payment of each of the various items of restoration shall be as follows:

A. Replacement of concrete work shall be covered as stated in Section 8.

B. Seeding and matting, when used, will be covered as stated in Section 4.

**END OF SECTION**

# SECTION 13 – MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of maintaining and protecting traffic through areas of construction, maintaining entrances and mailbox turnouts, and protecting the traveling public within the limits of the project in accordance with these specifications and the requirements of the *Manual of Uniform Traffic Control Devices (MUTCD) and the Virginia Work Area Protection Manual.*

PART 2 - PRODUCTS

2.1 MATERIALS

A. Barricades, channelizing devices, and safety devices used in the control of traffic shall conform to the requirements of Division VII of the Virginia Department of Transportation Road and Bridge Specifications, current edition, the *MUTCD, and the Virginia Work Area Protection Manual*.

B. Streets closed to traffic shall be protected by barricades and other warning devices proposed by the Contractor in a plan submitted to and approved by the Engineer at the beginning of the work. The Contractor shall install and maintain all traffic control devices during the construction period and remove them when they are no longer needed as determined by the Engineer.

C. The structural integrity and alignment of the safety devices shall be maintained at all times. They shall be inspected daily for any deficiency and, when discovered, corrected immediately. Reflectorized surfaces and warning lights shall be maintained in a clean and visible condition at all times.

PART 3 - EXECUTION

3.1 PROCEDURES

A. The Contractor shall conduct the work so as to ensure the least possible interference with or obstruction to traffic and shall provide for the safety and convenience of the general public and neighborhood residents. Any material that is spilled or tracked onto the traveled pavement during prosecution of the work shall be promptly removed.

B. Street closures are permitted during daylight work hours only and the trenches must be closed each night and reopened the next morning. Trenches shall be totally backfilled daily with no openings left at night or on weekends.

C. When it becomes necessary to disturb an entrance, the Contractor shall notify the resident or user of that entrance twenty-four (24) hours in advance of the disturbance and the estimated time required for that disturbance. Entrances shall be kept in a reasonably smooth condition at all times and shall not be disturbed until such time as is necessary to accommodate the work. Once an entrance has been disturbed, the Contractor shall maintain that entrance until completion of the work and final acceptance.

D. The Contractor shall accommodate the public and maintain the trenches and roadways from the beginning of construction operations until final acceptance.

E. Maintenance shall constitute continuous and effective work prosecuted daily with adequate equipment, materials, and forces to provide a satisfactory condition as determined by the Engineer or his designee.

F. The Contractor shall keep the portions of the road being used by the public free from irregularities and obstructions that could present a hazard or annoyance to traffic. Any holes in hard surface pavements shall be filled with an approved patching material.

G. If required by the Engineer, the allayment of dust shall be performed by applying water to the dry surface with a truck equipped with a water tank having a capacity of at least 1,000 gallons and pumps for furnishing, loading, and supplying water to the roadway.

H. The contractor shall select haul routes between the project and material source(s) that will minimize disturbance to the community.

I. During any suspension of work before project completion, the contractor shall open the roadways to traffic.

J. If the Contractor fails to remedy unsatisfactory maintenance after receipt of a notice from the Engineer, the Engineer may proceed with adequate private or public forces, material, and equipment to maintain the project. All related costs for this maintenance work, plus 25 percent thereof for supervisory and administrative personnel, will be deducted from monies due the Contractor for the project.

3.2 FLAGGING OPERATIONS

A. Where one-way traffic is provided, certified flaggers shall be provided in sufficient number and locations as necessary for the control and protection of vehicular and pedestrian traffic.

B. Flaggers shall use sign paddles to regulate traffic.

C. Flaggers shall carry their certification card while performing flagging duties. Flaggers found not in possession of their certification card or any flagger found performing their duties improperly shall be immediately removed from the flagging site and any operations requiring flagging shall be suspended until a replacement certified flagger is provided.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Maintaining traffic shall not be paid for separately but should be included in other items in the project.

4.2 Traffic control devices will neither be itemized nor measured and will be paid for at the contract lump sum price stated in the bid proposal and shall include all devices, installation, maintenance, and removal.

4.3 Maintenance stone shall be measured in tons used and for which a load ticket is provided from the supplier and shall be paid for at the contract unit price per ton delivered to the site.

4.4 Flagger service will not be measured or be paid for separately but should be included in with the traffic control devices mentioned above.

**END OF SECTION**

## SECTION 14 – OMIT

# SECTION 15 – GUARDRAIL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of furnishing and constructing guardrail or installing reuse galvanized guardrail in accordance with the plans and these specifications and with the lines, grades, and tolerances shown on the plans or as designated by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials used in the construction of guardrail shall conform to Section 221 and Section 505.02 of the VDOT Road and Bridge Specifications.

PART 3 - EXECUTION

3.1 PROCEDURES

A. The use of more than one type of post on a continuous line of guardrail will not be permitted.

B. Rail and elements shall be erected and aligned in a manner that will result in a smooth, continuous, taut installation. Installation shall not result in the cross section of the rail or other elements being kinked or crimped. Damaged rail or other elements will be rejected and replaced by the Contractor at no additional cost to the City.

C. The Contractor shall have a trained guardrail installer on the project during guardrail installation. For the purpose of this specification, a trained guardrail installer is a person who has a current certificate of training from a Department-approved guardrail installing training course.

D. Posts shall be spaced in accordance with the standard drawings. A longitudinal deviation of 3/4 inch will be allowed providing the bolt holes in the guardrail, blockouts, and posts can be properly aligned without alteration or force. The height of the guardrail shall be as shown in the standard drawings.

E. On guardrail, nuts on bolts shall be tightened to a snug tight fit as defined in Section 407.06 of the VDOT Road and Bridge Specifications to ensure full contact between the beam, blockout, and post.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Guardrail will be measured in linear feet and paid for at the contract unit price per linear foot including hardware.

4.2 The price for reuse guardrail shall include transporting and storing; repairing and installing salvaged guardrail beam; and furnishing and placing guardrail posts, blockouts, and hardware.

**END OF SECTION**

# SECTION 16 – STANDARD SEGMENTAL RETAINING WALL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work includes furnishing and installing segmental retaining wall (SRW) units to the lines and grades designated on the project's final construction drawings or as directed by the Architect/Engineer.

B. Work also includes furnishing and installing appurtenant materials required for construction of the retaining wall as shown on the construction drawings.

1.2 REFERENCE STANDARDS

A. Segmental Retaining Wall Units:
1. ASTM C 1372 – Standard Specification for Segmental Retaining Wall Units
2. ASTM C 140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.

B. Geosynthetic Reinforcement:
1. ASTM D 4595 - Tensile Properties of Geotextiles by the Wide-Width Strip Method.
2. ASTM D 5262 - Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics.
3. GRI:GG1 - Single Rib Geogrid Tensile Strength.
4. GRI:GG5 - Geogrid Pullout

C. Soils:
1. ASTM D 698 - Moisture Density Relationship for Soils, Standard Method
2. ASTM D 422 - Gradation of Soils
3. ASTM D 424 - Atterberg Limits of Soil

D. Drainage Pipe:
1. ASTM D 3034 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe
2. ASTM D 1248 - Specification for Corrugated Plastic Pipe

E. Where specifications and reference documents conflict, the City Engineer shall make the final determination of applicable document.

1.3 SUBMITTALS

A. Material Submittals: The Contractor shall submit manufacturers' certifications two weeks prior to start of work stating that the SRW units and geosynthetic reinforcement meet the requirements of Part 2 of this specification.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Segmental Retaining Wall Units:
1. Contractor shall check materials upon delivery to assure that specified type and grade of materials and proper color and texture of SRW units have been received.
2. Contractor shall prevent excessive mud, wet concrete, epoxies, and like materials that may affix themselves, from coming in contact with materials.
3. Contractor shall store and handle materials in accordance with manufacturer's recommendations.
4. Contractor shall protect materials from damage. Damaged materials shall not be incorporated into the retaining wall.

B. Soil Reinforcement:
   1. Check the soil reinforcement upon delivery to assure the proper grade and type of material has been received. Provide a product certification with each shipment.
   2. Store soil reinforcement material in accordance with manufacturer's recommendations.

C. Drainage materials:
   1. Store plastic pipe in accordance with the manufacturer's recommendations to prevent deleterious materials from becoming affixed or deterioration from sun exposure.
   2. Store drainage aggregate to prevent contamination with other materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Segmental Retaining Wall Units:
   1. SRW units shall be machine formed, Portland Cement concrete blocks specifically designed for retaining wall applications. SRW units currently approved for this project are:
      a. VERSA-LOK Standard Retaining Wall System, as manufactured by Marshall Concrete Products, Danville, VA, 800-366-1734.
   2. Color of SRW units shall be selected by the Owner.
   3. Finish of SRW units shall be split face.
   4. SRW unit faces shall be of straight geometry.
   5. SRW unit heights shall be six inches.
   6. SRW units (not including aggregate fill in unit voids) shall provide a minimum weight of 105 psf wall face area.
   7. SRW units shall be solid through the full depth of the unit.
   8. SRW units shall have a depth (front face to rear) to height ratio of 2:1, minimum.
   9. SRW units shall be interlocked with connection pins, designed with proper setback to provide 8:1 vertical to horizontal batter (a seven degree cant from vertical).
   10. SRW units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.
   11. SRW units shall be capable of providing overlap of units on each successive course so that walls meeting at corners are interlocked and continuous. SRW units that require corners to be mitered shall not be allowed.
   12. SRW units shall be capable of providing a split face, textured surface for all vertical surfaces that will be exposed after completion of wall, including any exposed sides and backs of units.
   13. SRW units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Cracking or excessive chipping may be grounds for rejection. Units showing cracks longer than 1/2" shall not be used within the wall. Units showing chips visible at a distance of 30 feet from the wall shall not be used within the wall.
   14. Concrete used to manufacture SRW units shall have a minimum 28 days compressive strength of 3,000 psi and a maximum moisture absorption rate, by weight, of 8% as determined in accordance with ASTM C140. Compressive strength test specimens shall conform to the saw-cut coupon provisions of ASTM C140.
   15. SRW units' molded dimensions shall not differ more than + 1/8 inch from that specified, in accordance with ASTM C1372.

B. Segmental Retaining Wall Unit Connection Pins:
   1. SRW units shall be interlocked with VERSA-TUFF Pins. The pins shall consist of glass-reinforced nylon made for the expressed use with the SRW units supplied.

C. Geosynthetic Reinforcement:
1. Geosynthetic reinforcement shall consist of geogrids or geotextiles manufactured as a soil reinforcement element. The manufacturers/suppliers of the geosynthetic reinforcement shall have demonstrated construction of similar size and types of segmental retaining walls on previous projects. The geosynthetic type must be approved one week prior to bid opening. Geosynthetic types currently approved for this project are: VERSA-Grid geogrids.
2. The type, strength, and placement location of the reinforcing geosynthetic shall be as determined by the Wall Design Engineer, as shown on the final, P.E. sealed retaining wall plans.

D. Leveling Pad:
1. Material for leveling pad shall consist of compacted sand, gravel, or combination thereof (USCS soil types GP, GW, SP, & SW) and shall be a minimum of 6 inches in depth. Lean concrete with a compressive strength of 200-300 psi and three inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lowermost SRW unit.

E. Drainage Aggregate:
1. Drainage aggregate shall be angular, clean stone or granular fill meeting the following gradation as determined in accordance with ASTM D422:

| **Sieve Size** | **Percent Passing (%)** |
|---|---|
| 1 inch | 100 |
| ¾ inch | 75-100 |
| No. 4 | 0-60 |
| No. 40 | 0-50 |
| No. 200 | 0-5 |

F. Drainage Pipe:
1. The drainage collection pipe shall be a perforated or slotted PVC, or corrugated HDPE pipe. The drainage pipe may be wrapped with a geotextile to function as a filter.
2. Drainage pipe shall be manufactured in accordance with ASTM D 3034 and/or ASTM D 1248.

G. Reinforced (Infill) Soil:
1. The reinforced soil material shall be native soil, free of debris. Unless otherwise noted on the final, P.E. sealed, retaining wall plans prepared by the Wall Design Engineer, the reinforced material shall consist of the inorganic USCS soil types GP, GW, SW, SP, and SM, meeting the following gradation, as determined in accordance with ASTM D422:

| **Sieve Size** | **Percent Passing (%)** |
|---|---|
| 4 inch | 100 |
| No. 4 | 20-100 |
| No. 40 | 0-60 |
| No. 200 | 0-35 |

Note: If the native soil is deemed to be unsuitable, aggregate will be used in place of soil.
2. The maximum particle size of poorly-graded gravels (GP) (no fines) should not exceed 3/4 inch unless expressly approved by the Wall Design Engineer and the long-term design strength (LTDS) of the geosynthetic is reduced to account for additional installation damage from particles larger than this maximum.

2.2 DESIGN PARAMETERS

A. Soil:
1. It is planned that only native soil be used on this project; however, should the native soil be determined to be unsuitable, aggregate will be substituted in place of soil. Any question of unsuitable soil shall be directed to the City Engineer for confirmation prior to using the aggregate material.

B. Wall Design:
1. The design analysis for the final, P.E. sealed retaining wall plans prepared by the Wall Design Engineer shall consider the external stability against sliding and overturning, internal stability, and facial stability of the reinforced soil mass and shall be in accordance with acceptable engineering practice and these specifications. The internal and external stability analysis shall be performed in accordance with the “NCMA Design Manual for Segmental Retaining Walls”, using the recommended minimum factors of safety in this manual.
2. External stability analysis for bearing capacity, global stability, and total and differential settlement shall be the responsibility of the Owner and the Owner's Geotechnical Engineer. Geotechnical Engineer shall perform bearing capacity, settlement estimates, and global stability analysis based on the final wall design provided by the Wall Design Engineer and coordinate any required changes with Wall Design Engineer.
3. While vertical spacing between geogrid layers may vary, it shall not exceed two feet maximum in the wall design.
4. The geosynthetic placement in the wall design shall have 100 percent continuous coverage parallel to the wall face. Gapping between horizontally adjacent layers of geosynthetic (partial coverage) will not be allowed.

PART 3 - EXECUTION

3.1 Inspection:
1. The Owner or Owner's Representative is responsible for verifying that the contractor meets all the requirements of the specification. This includes all submittals for materials and design, qualifications, and proper installation of wall system.
2. Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site.

B. Excavation:
1. Contractor shall excavate to the lines and grades shown on the project grading plans. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Engineer/Architect, at the Contractor's expense.
2. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

C. Foundation Preparation:
1. Following the excavation, the foundation soil shall be examined by the Owner's Engineer to assure actual foundation soil strength meets or exceeds the assumed design bearing strength. Soils not meeting the required strength shall be removed and replaced with infill soils, as directed by the Owner's Engineer.
2. Foundation soil shall be proofrolled and compacted to 95% standard Proctor density and inspected by the Owner's Engineer prior to placement of leveling pad materials.

D. Leveling Pad Construction:
   1. Leveling pad shall be placed as shown on the final, P.E. sealed retaining wall plans with a minimum thickness of 6 inches. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the lower most SRW unit.
   2. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/2 to 1/4 inch of the leveling pad. Compaction will be with mechanical plate compactors to achieve 95% of maximum standard Proctor density (ASTM D 698).

E. SRW Unit Installation:
   1. All SRW units shall be installed at the proper elevation and orientation as shown on the final, P.E. sealed wall plans and details on the construction plans or as directed by the Wall Design Engineer. The SRW units shall be installed in general accordance with the manufacturer's recommendations. The specifications and drawings shall govern in any conflict between the two requirements.
   2. First course of SRW units shall be placed on the leveling pad. The units shall be leveled side-to-side, front-to-rear and with adjacent units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps shall be left between the fronts of adjacent units. Alignment may be done by means of a string line or offset from base line to the back of the units.
   3. All excess debris shall be cleaned from top of units and the next course of units installed on top of the units below.
   4. Each unit shall be pinned to the units below in the following manner: Two VERSA-TUFF pins shall be inserted through the pin holes of each upper course unit into receiving slots in lower course units. Pins shall be fully seated in the pin slot below. Once pinned, the units shall be pushed forward to remove any looseness in the unit-to-unit connection.
   5. Prior to placement of next course of panels, the level and alignment of the units shall be checked and corrected, where needed.
   6. Layout of curves and corners shall be installed in accordance with the wall plan details or in general accordance with SRW manufacturer's installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.
   7. Repeat procedures until reaching top of wall units, just below the height of the cap units. Geosynthetic reinforcement, drainage materials, and reinforced backfill shall be placed in sequence with unit installation as described in the following sections.

F. Geosynthetic Reinforcement Placement:
   1. All geosynthetic reinforcement shall be installed at the proper elevation and orientation as shown on the final, P.E. sealed retaining wall plan profiles and details or as directed by the Wall Design Engineer.
   2. At the elevations shown on the final plans, (after the units, drainage material, and backfill have been placed to this elevation) the geosynthetic reinforcement shall be laid horizontally on compacted infill and on top of the concrete SRW units. It shall be placed to within one inch of the front face of the unit below. Embedment of the geosynthetic in the SRW units shall be consistent with SRW manufacturer's recommendations. Correct orientation of the geosynthetic reinforcement shall be verified by the Contractor to be in accordance with the geosynthetic manufacturer's recommendations. The highest strength direction of the geosynthetic must be perpendicular to the wall face.
   3. Geosynthetic reinforcement layers shall be one continuous piece for their entire embedment length. Splicing of the geosynthetic in the design strength direction (perpendicular to the wall face) shall not be permitted. Along the length of the wall (parallel to the face), horizontally adjacent sections of geosynthetic reinforcement shall be butted in a manner to assure 100 percent coverage parallel to the wall face.
   4. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum of 6 inches of backfill is required prior to operation of tracked vehicles over the geosynthetic. Turning should be kept to a minimum. Rubber-tired

equipment may pass over the geosynthetic reinforcement at slow speeds (less than 5 mph).

5. The geosynthetic reinforcement shall be free of wrinkles prior to placement of soil fill. The nominal tension shall be applied to the reinforcement and secured in place with staples, stakes, or by hand tensioning until reinforcement is covered by six inches of fill.

G. Drainage Materials:

1. Drainage aggregate shall be installed to the line, grades, and sections shown on the final P.E. sealed retaining wall plans. Drainage aggregate shall be placed to the minimum thickness shown on the construction plans between and behind units (a minimum of one cubic foot for each exposed square foot of wall face unless otherwise noted on the final wall plans).
2. Drainage collection pipes shall be installed to maintain gravity flow of water outside the reinforced soil zone. The drainage collection pipe shall daylight into a storm sewer or along a slope at an elevation lower than the lowest point of the pipe within the aggregate drain.

H. Backfill Placement:

1. The reinforced backfill shall be placed as shown in the final wall plans in the maximum compacted lift thickness of 10 inches and shall be compacted to a minimum of 95% of standard Proctor density (ASTM D 698) at a moisture content within 2% of optimum. The backfill shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the SRW units.
2. Only hand-operated compaction equipment shall be allowed within 3 feet of the back of the wall units. Compaction within the 3 feet behind the wall units shall be achieved by at least three (3) passes of a lightweight mechanical tamper, plate, or roller.
3. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing and reinforced backfill to direct water runoff away from the wall face.
4. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping, and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary grading and drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pond behind the wall until final construction adjacent to the wall is completed.

I. SRW Caps:

1. SRW caps shall be properly aligned and glued to underlying units with VERSA-LOK Concrete Adhesive, a flexible, high-strength concrete adhesive. Rigid adhesive or mortar are not acceptable.
2. Caps shall overhang the top course of units by 3/4 to 1 inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.

J. Construction Adjacent to Completed Wall:

1. The Owner or Owner's Representative is responsible for ensuring that construction by others adjacent to the wall does not disturb the wall or place temporary construction loads on the wall that exceed design loads, including loads such as water pressure, temporary grades, or equipment loading. Heavy paving or grading equipment shall be kept a minimum of three feet behind the back of the wall face. Equipment with wheel loads in excess of 150 psf live load shall not be operated within 10 feet of the face of the retaining wall during construction adjacent to the wall. Care should be taken by the General Contractor to ensure water runoff is directed away from the wall structure until final grading and surface drainage collection systems are completed.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Retaining wall will be measured in square feet of wall face, complete in place, within the limiting dimensions shown on the plans, and will be paid for at the contract unit price per square foot. This price shall include all the materials, labor, equipment, testing, etc. outlined in this specification.

**END OF SECTION**

# SECTION 17 – LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. Description:

1. This work shall consist of furnishing and installing all plant materials specified in the plans and information provided, in accordance with accepted horticultural practices as determined by the City's representative.
2. Also included is installation of landscape fabric, hardwood mulch, clean up and restoration of disturbed areas, and maintenance of all work until a written acceptance by the City is issued to the contractor.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL SELECTION

A. All plants and nursery stock shall conform to the plans and the standard specifications of The American Standard for Nursery Stock sponsored by the American Association of Nurserymen, Inc. All plants shall be grown under climatic conditions similar to the job site and substitutions are not permitted, either in kind or grade, without written authorization from the City's representative. Failure to meet the requirements of these specifications may result in rejection of the work. Rejected work shall be removed from the project and replaced by the contractor at their expense.

B. Plants shall be nursery grown and shall have the habit of growth that is normal for the species or cultivars; they shall be sound, healthy, vigorous, free from insects, plant diseases, and injuries or damage of any nature; they shall be of the grades specified, without deviation, unless so authorized in writing by the City's representative; they shall not be pruned, clipped, or trimmed prior to delivery without written authorization from the City's representative; they shall be State inspected and a copy of the "Certificate of Inspections" issued by the State Department of Agriculture at the point of origin must accompany shipments from each source.

2.2 MULCH

A. Mulch selected shall be made of quality hardwood.

2.3 LANDSCAPE FABRIC

A. Landscape fabric shall be a professional grade product of no less than a 3 ounce weight, such as Typar Professional or Polypro.

2.4 TREE STAKING

A. Stakes shall be made of the length and size necessary to restrict excessive movement by the tree. Tie materials shall be designed specifically for staking trees.

PART 3 - EXECUTION

3.1 SCHEDULING

A. The contractor shall coordinate with the City's representative and submit a proposed landscaping work schedule for approval prior to beginning operations. Upon approval of the work schedule, no modifications shall be made thereto without written authorization from the representative. All work shall take place during normal City of Danville weekday working hours.

3.2 PLANTING LAYOUT

A. All planting locations shall conform to the landscaping layout plan unless obstructions are encountered that prohibit it. In the event plants cannot be planted in the locations provided, the contractor shall immediately notify the City's representative to arrange a suitable adjustment and authorize the necessary change.

3.3 DELIVERY, INSPECTION, AND ACCEPTANCE

A. Plants shall be delivered to the site in accordance with the approved work schedule required above. Should circumstances require changes, the contractor shall notify the City's representative at least 48 hours prior to the plants arrival at the job site. The City's representative must be present at the plants' delivery to inspect and approve prior to their planting. Plants shall be under tarp, protected from weather and adequately packed to avoid damage or breakage, sunscald, windburn, desiccation during loading and shipment. Plants damaged in shipment or delivery is the contractor's responsibility and shall be replaced immediately upon discovery.

B. No plants shall be planted until they have been inspected and approved by the City's representative. Legible tags shall be attached to each group. Plants that do not meet the requirements of the specifications will be rejected. Rejected plants shall be removed from the site by the contractor and shall not be planted.

C. Acceptance of the plants will be given only after completion of the inspection at delivery by the City's representative.

3.4 PLANTING

A. Plants shall be protected upon arrival and shall be thoroughly watered and properly maintained until installed. Unless planted within four (4) hours of delivery, unplanted B&B and bare rootstock shall be "healed-in" by the contractor in a bed of material approved by the City's representative. All work shall be performed in the workmanlike methods customary in good horticultural practices.

B. Planting holes shall be excavated in advance of planting operations. Each plant shall be planted in an individual hole and shall be set to ultimate finished grade so that they will bear the same relationship to finished grade as they bore to the natural grade before transplanting.

C. All trees shall be staked and/or supported. Stakes shall be made of the length and size necessary to restrict excessive movement by the tree. Tie materials shall be designed specifically for staking trees.

D. A quality, hardwood mulch shall be applied 3" deep on landscape fabric secured with staples. The fabric shall be installed over the entire area except where annuals, perennials and/or bulbs are proposed.

E. Plants shall be thoroughly watered in after planting.

3.5 ACCEPTANCE

A. When the planting is completed, the contractor shall request an inspection to determine the acceptability of the work. If the work is deemed to be accepted, a written notice shall be provided so stating. If the work is not accepted, an itemized list of deficiencies will be provided to the contractor for correction. The contractor shall make the corrections within ten (10) days and a re-inspection shall be made. This procedure will continue until the work is accepted. Upon acceptance, the contractor will be notified in writing by the City's representative.

3.6 WARRANTY

A. The contractor shall provide a one-year warranty on all plants following the acceptance of the work. The contractor shall replace, according to original specifications, any plants that fail during the warranty period.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Payment for this work will be on a lump sum basis and shall include all materials, equipment, tools and labor necessary to perform this work.

**END OF SECTION**

# SECTION 18 – BYPASS PUMPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of providing all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing wastewater flow around the work area for the duration of the project.

B. The design, installation, and operation of the temporary pumping system shall be the contractor's responsibility.

1.2 SUBMITTALS

A. The contractor shall prepare a detailed description of the proposed pumping system and submit it to the Engineer prior to construction.

B. The Contractor shall submit to the engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flow. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these contract documents. No construction shall begin until all provisions and requirements have been reviewed by the engineer.

1. The plan shall include but not limited to the details of the following:
    a. Staging areas for pumps;
    b. Sewer plugging method and types of plugs;
    c. Number, size, material, location and method of installation of suction piping;
    d. Number, size, material, method of installation and location of installation of discharge piping;
    e. Bypass pump sizes, capacity, number of each size to be on site and power requirements;
    f. Standby power generator size, location;
    g. Downstream discharge plan;
    h. Schedule for installation of and maintenance of bypass pumping lines;
    i. Plan indicating selection location of bypass pumping line locations.

PART 2 - PRODUCTS

2.1 MATERIALS & EQUIPMENT

A. All pumps used shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pump may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows. The pumps shall not be hydraulic submersible type.

B. The Contractor shall provide the necessary stop/start controls for each pump.

C. The Contractor shall include one stand-by pump of each size to be maintained on site.

D. Spare parts for pumps and piping shall be kept on site as required.

E. Adequate hoisting equipment for each pump and accessories shall be maintained on site.

2.2 PUMPING SYSTEM

A. Bypass pumping systems shall have sufficient capacity to pump a peak flow of the line size. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired. Bypass pumping system will be required to be operated 24 hours per day.

B. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown.

C. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performance of work.

D. The Contractor shall make all arrangements for bypass pumping during the time when the main is shut down for any reason. System must overcome any existing force main pressure on discharge.

PART 3 - EXECUTION

3.1 PREPARATION

A. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the City and the engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.

B. During all bypass pumping operation, the Contractor shall protect the pumping station and main and all local sewer lines from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the pumping station and main and all local sewer lines caused by human or mechanical failure.

3.2 PROCEDURES

A. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sewer downstream of his work.

B. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. The Contractor shall provide all necessary means to safely convey the sewage past the work area. The Contractor will not be permitted to stop or impede the main flows under any circumstances.

D. The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.

E. The Contractor shall protect water resources, wetlands and other natural resources.

3.3 INSTALLATION AND REMOVAL

A. The Contractor shall remove manhole sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access location indicated on the drawings and as may be required to provide adequate suction conduit.

B. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

C. When working inside manholes or force mains, the Contractor shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces.

D. The installation of the bypass pipelines is prohibited in all salt marsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulders of the road. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the engineer, the Contractor shall remove all the piping, restore all property to pre-construction condition and restore all pavement. The Contractor is responsible for obtaining any approvals for placement of the temporary pipeline within public ways from the City.

E. The Contractor is required to temporarily reconnect to the existing sewer line at the end of each work day so that bypass pumping is not required when the active work is not in progress.

3.4 FIELD QUALITY CONTROL

A. Testing:
1. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The engineer will be given 24 hours notice prior to testing.

B. Inspection:
1. Contractor shall inspect bypass pumping system every two hours to ensure that the system is working correctly.

C. Maintenance:
1. The Contractor shall ensure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.

PART 4 - MEASUREMENT AND PAYMENT

4.1 The entire bypass pumping system as outlined in this specification shall be paid for at the contract lump sum price.

**END OF SECTION**

# SECTION 19 – CHAIN LINK FENCE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work shall consist of constructing new chain link fencing in accordance with these specifications and the applicable detail drawing and in conformity to the lines and grades shown on the plans or as established by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials for the chain link fence components shall comply with these specifications.
   1. Fence fabric shall be black, vinyl-coated wire conforming to the requirements of AASHTO M181, Type IV, Class A or B, except that vinyl coated may be No.9 gage overall, including the vinyl coating, provided that the core wire has a minimum zinc coat weight of 0.30 ounce per square foot and a minimum breaking strength of 1,290 pounds force.
   2. Posts, rails, and braces shall be vinyl or other conforming organic polymer-coated pipe to the requirements of ASTM F1043, Group 1A, with Type A external and internal coatings or Group 1C, with Type B external coating and Type D internal coating.
   3. Gates, when required, shall be complete with hinges, latches, stops, and other necessary fittings. Gate frames shall be fabricated and coated with the same material as the adjoining fence framework and fabric.
   4. Tension wire shall be vinyl-coated conforming to the requirements of AASHTO M181, Class A or Class B. the core wire shall be 6 or 7 gage, with a tolerance of $\pm$ 0.005 inch. The minimum weight of the zinc coating shall be 0.40 ounce per square foot. The breaking strength of the core wire shall conform to the requirements of AASHTO M181 for tension wire.

PART 3 - EXECUTION

3.1 PROCEDURES

A. If rock is encountered before the specified post depth is reached, posts shall be placed approximately 3 feet in depth or 18 inches into rock, whichever is less. The diameter of holes prepared for setting posts in rock shall be at least 3 inches greater than the larger cross-sectional dimension of the post. Posts in rock shall be set in concrete.
   1. Except where rock is encountered, post and braced post anchor devices may be used in lieu of placing post and braces in concrete. Anchor devices shall be fabricated of steel having a yield strength of at least 30,000 pounds per square inch or of other metal approved by the Engineer; shall have a thickness of not less than that specified for the post or 1/8 inch, whichever is greater; and shall be galvanized in accordance with the requirements of Section 233 of the VDOT Road and Bridge Specifications, current edition.
   2. Post and braced post anchor devices, together with the post, shall develop at least 80 percent of the resistance to horizontal and rotational displacement of individual post and braced post assemblies set in concrete when the load is gradually applied to the fence fabric at midheight. The Contractor shall demonstrate that the performance of post and braced post anchor devices will be comparable to that of concrete when such devices are proposed for use in lieu of concrete and shall bear all expenses for that demonstration.

B. Posts shall be set in Class A3 concrete footings and shall not be disturbed for at least 7 days following the initial set of the concrete and at least 14 days when the average air temperature for the week following placement is below 50 degrees F.

C. Fence fabric shall be attached independently at pull and corner posts. Ends of fabric rolls and other sections to be pulled shall be joined by weaving a single strand of the fabric wire into ends of fabric to create a continuous pattern of mesh. Fabric shall be stretched taut and securely fastened to each post and rail. Fastenings at ends, gates, and pull posts shall be with stretcher bars and metal bands.

PART 4 - MEASEUREMENT AND PAYMENT

4.1 Fences will be measured in linear feet of fence fabric, complete-in-place, along the top of the fence from outside to outside of end posts for each continuous run of fence, exclusive of gates, and will be paid for at the contract unit price per linear foot of fence fabric. This price shall include clearing, and preparing terrain at the fence level; all posts and rails or tension wire; concrete footings for posts; all hardware and labor for attaching the fence fabric to posts; and, disposing of surplus or unsuitable material generated by this installation.

4.2 Gates, when used, will be counted in units of each, complete-in-place, and will be paid for at the contract unit price per each. This price shall include posts and mounting hardware.

**END OF SECTION**

# BID PROPOSAL

## “SANDY CREEK SANITARY SEWER REPLACEMENT PROJECT FROM PARKER ROAD TO ROCKY LANE – PHASES I-II”

## IFB 19-20-065

The undersigned, as Bidder, hereby declares that he or he and his associates are the only person or persons interested in the proposal as principal or principals; that this proposal is made without connection with any other person, company, or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The bidder further declares that he has examined the site of the work and has informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the specifications for the work and contractual documents relative thereto, and has read all special provisions furnished prior to the bid opening; that he has satisfied himself relative to the work to be performed, and materials and equipment to be furnished.

The Bidder proposes and agrees, if this proposal is accepted, to contract with the City of Danville, Virginia in the form of contract specified, to furnish all necessary material, equipment, machinery, tools, apparatus, means of transportation, and labor necessary to perform in full and complete the requirements of the specifications and contract documents, to the full and entire satisfaction of the City of Danville, Virginia with definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents, for the unit prices set opposite the several items that follow:

| ITEM | DESCRIPTION | Qty. | Unit | | Unit Price | Total Price |
|---|---|---|---|---|---|---|
| | **SANDY CREEK SANITARY SEWER REPLACEMENT FROM PARKER RD TO ROCKY LANE – PHASES I-II"** | | | | | |
| 01 | Mobilization | 1 | LS | = | LUMP SUM | $ |
| 02 | Traffic Control | 1 | LS | = | LUMP SUM | $ |
| 03 | Bypass Pumping | 1 | LS | = | LUMP SUM | $ |
| 04 | Clearing & Grubbing (Trees, shrubs, brush) | 1 | LS | = | LUMP SUM | $ |
| 05 | Remove & Dispose Curb & Gutter | 50 | LF | = | $ /LF | $ |
| 06 | Permanent Seeding, Std. 3.32 | 1 | LS | = | LUMP SUM | $ |
| 07 | Saw Cutting Pavement | 1200 | LF | = | $ /LF | $ |
| 08 | BM-25 Base Asphalt for Trench Repair, 5"D | 450 | TNS | = | $ /TN | $ |
| 09 | SM-9.5A Surface Asphalt for Trench Repair,1.5" Deep | 150 | TNS | = | $ /TN | $ |
| 10 | Remove & Dispose Asphalt within Trenching limits | 1450 | SY | = | $ /SY | $ |
| 11 | Connect to existing manholes (#EX. SMH-1 & EX. SMH-35) | 2 | EA | = | $ /EA | $ |
| 12 | Remove existing manholes (outside of proposed alignment requiring additional excavation; to be backfilled & seeded) (EX. SMH-4, EX. SMH-10, EX. SMH-12, EX. SMH-13, EX. SMH-16, and EX. SMH-20) | 7 | EA | = | $ /EA | $ |
| 13 | Remove existing sanitary sewer (outside of proposed alignment, requiring additional excavation; to be backfilled & seeded) (EX. SS-3, EX. SS-4, EX. SS-11, EX. SS-12, EX. SS-13, EX. SS-15, EX. SS-16, EX. SS-20) | 2329 | LF | = | $ /LF | $ |
| 14 | Abandon existing manholes (EX. SMH-23, EX. SMH-22) | 2 | EA | = | $ /EA | $ |
| 15 | Cap/Seal ends of abandoned pipes | 2 | EA | = | $ /EA | $ |
| 16 | Silt Fence, Std. 3.05-2 (as needed) | 7800 | LF | = | $ /LF | $ |
| 17 | Construction Entrance (4 entrances) | 400 | SY | = | $ /SY | $ |
| 18 | Riprap, Class I, 24" thick | 2100 | TNS | = | $ /TN | $ |
| 19 | Std. MH, 4' I.D. 0-8' | 35 | EA | = | $ /EA | $ |
| 20 | Extra Depth Beyond 8' | 32 | VF | = | $ /VF | $ |
| 21 | Bedding Stone for DI Pipe, No. 57 (as needed) | 450 | TNS | = | $ /TN | $ |
| 22 | Foundation Stone, No. 3 (if needed) | 400 | TNS | = | $ /CY | $ |
| 23 | Maintenance Stone, No. 21A | 200 | TNS | = | $ /TN | $ |
| 24 | Rock in Trenches (if needed) | 1000 | CY | = | $ /CY | $ |
| 25 | Undercut/Disposal/Backfill Unsuitable Material | 1000 | CY | = | $ /CY | $ |
| 26 | 12" PVC Pipe, SDR35, 0-10' | 5422 | LF | = | $ /LF | $ |
| 27 | 12" DI Pipe, 0-10' | 1524 | LF | = | $ /LF | $ |
| 28 | 12" DI Pipe, 10-14' | 456 | LF | = | $ /LF | $ |
| 29 | Locator Wire on PVC Pipe | 5500 | LF | = | $ /LF | $ |
| 30 | Warning Tape for PVC Pipe | 5500 | LF | = | $ /LF | $ |

| | | | | | | |
|---|---|---|---|---|---|---|
| 31 | Temp. Remove & Reinstall ex. chain-link/barbed-wire fencing at trench crossings | 25 | LF | = | $ /LF | $ |
| 32 | Temp. Remove & Reinstall ex. guardrail at trench crossings | 50 | LF | = | $ /LF | $ |
| 33 | Millings along maintenance path 2" deep x10' wide (City will provide millings; contractor to pickup, deliver to site & install) | 975 | TNS | | $ /TN | $ |
| 34 | Replace concrete slab with same reinforcement and dimension prior to demo | 1 | EA | | $ /EA | |
| | Total | | | | | |

The Bidder further agrees that:

1. The City, in protecting its best interest, reserves the right to reject any or all bids or waive any defects in favor of the City. Any changes, erasures, deletions in the unit prices above, modifications in the bid form, or alternate proposals not specified in the bid proposal shall make the proposal irregular and subject to rejection;

2. All quantities listed above are estimates only and the City reserves the right to raise, lower, or eliminate any quantity or item and in any case the unit or lump sum prices shall be used in determining partial or final payment;

3. If awarded the contract, they will execute and deliver to the City within ten (10) consecutive calendar days after their receipt of the contract documents, a satisfactory Performance Bond and Payment Bond, as required, in the amount of one hundred percent (100%) of the contract amount along with the signed agreement.

4. In case of failure on their part to execute an agreement within ten (10) consecutive calendar days after written notice being given on the award of the contract, the monies payable by the Security accompanying this bid shall be paid to the City of Danville, Virginia, as ated damages for such failure; otherwise, the Security accompanying this bid shall be returned to the Bidder;

5. That the work under this contract shall commence as soon as possible after the date of a written Notice To Proceed is given by the City to the Contractor and shall be completed within 300 days

6. That the amount of Liquidated Damages stipulated in the specifications is $350.00 for each consecutive day, including Saturdays, Sundays, and holidays.

Enclosed herewith is the following Security offered as evidence that the undersigned will enter into agreement for the execution and completion of the work in accordance with the contract documents.

Bidder's Bond or Certified Check in the amount of
$_____.

If Bond, Name of Surety:

_____

If Check, Name of Bank:

_____

This Bid is subject to acceptance within a period of ninety (90) days from the date of this bid proposal.

The undersigned Bidder acknowledges receipt of the following Addenda, which have been considered in preparation of this Bid:

No. _____ Dated _____

No. _____ Dated _____

CONTRACTOR: _____

DATE:_____

ADDRESS: _____

PHONE: _____

FAX: _____ EMAIL:_____

Signature: _____ (Signed)

Signature: _____ (Printed or Typed)

Title:_____

City of Danville business License # _____

Federal Tax # _____

Registered as a contractor under Chapter 175E, Section 4539(117), Code of Virginia as amended by Chapter 404, Act of Assembly, 1944, Certificate No. _____

Registration Type:_____

Commonwealth of Virginia State Corporation Commission Identification Number:_____

# LIST OF APPENDICES

APPENDIX A. “Agreement from the Standard Requirements & Instructions for Bidding”

APPENDIX B. “Escrow Agreement from Standard Requirements & Instructions for Bidding”

APPENDIX C. “Nationwide Permit Requirements”