



8570 EXECUTIVE PARK AVENUE
FAIRFAX, VIRGINIA 22031

Invitation for Bids NO. 21-004

**PROJECT MANUAL FOR
Project 2377, Division 004
36-Inch Prince William County
Transmission Main, Phase II**

February 2021



SECTION 01000

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SECTION 01110

SUMMARY OF WORK AND MISCELLANOUS REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Work
- B. Contractor Use of Site and Premises
- C. Intent of Contract Documents
- D. Copies of Contract Documents Furnished to Contractor
- E. Supplemental Drawings
- F. Coordination

1.02 DESCRIPTION OF WORK

- A. Work is generally described as furnishing and installing approximately 1,710 linear feet of 36-inch water main. Appurtenant work shall include valves, interconnections, and other miscellaneous work as described in the Contract Documents, Specifications, and Drawings.

1.03 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unfavorable Construction Conditions: During unfavorable weather, wet ground, or other unsuitable construction conditions, the Contractor shall confine his operations to Work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by the Contractor to perform the Work in a proper and satisfactory manner. The Contractor shall, however, maintain suitable all-weather access to all portions of the Work Site.
- B. Site Administration: The Contractor shall be responsible for all areas of the Site used by him and all subcontractors in the performance of the Work. He shall exert full control over the actions of all employees and other persons in the use and preservation of property and existing facilities except such controls as may be specifically reserved for the Owner or others. The Contractor may require all persons on the Site to observe the same regulations as he requires of his employees and representatives. Owner's employees, Authorized Representatives, Consultants, the Engineer and the Engineer's employees will not be subject to the provisions of this paragraph.

1.04 INTENT OF CONTRACT DOCUMENTS

- A. Contract Documents Complementary: All Work called for in the Contract Documents applicable to this Contract, but not shown in the Drawings in their present form, or shown in the Drawings and not specifically called for in the Specifications, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the Work, is required, and shall be performed by the Contractor as though it were specifically delineated or described.
- B. Omission or Silence of Contract Documents: The apparent silence of the Contract Documents as to any detail, or the apparent omission from them of a detailed description concerning any Work to be performed or materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only materials and Workmanship of the best quality are to be used and interpretation of these Specifications shall be made upon that basis.

1.05 DOCUMENTS FURNISHED TO CONTRACTOR

- A. Number of Copies to be Furnished: The Contractor will be furnished, at no cost, up to 10 full size copies of the Contract Documents at the Preconstruction Conference.
 - 1. Additional copies of Contract Documents when requested will be furnished to the Contractor at cost of reproduction.
- B. Copies of Contract Documents for Subcontractors: The Contractor shall, without expense to the Owner, furnish each of the subcontractors, manufacturers, and materialmen such copies of the Contract Documents as may be required for his Work.
- C. Record Copy of Contract Documents: The Contractor shall keep one record copy of all Specifications, Drawings, Addenda, Change Orders, Supplemental Drawings, and Shop Drawings at the Contractor's office at the Site, if applicable, in good order and annotated to show all changes made during the construction process in accordance with Section 01780. The Engineer will inspect the record set of drawings and specifications on a monthly basis prior to preparation of the monthly progress payment; and in the event said drawings and specifications are not up-to-date, the monthly progress payment may be withheld until the record set of drawings and specifications are brought up-to-date. Such Documents shall be made available to the Engineer at all times and shall be delivered to the Owner upon completion of the Work.

1.06 SUPPLEMENTAL DRAWINGS

- A. Supplemental Drawings: When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done, or to illustrate the Work further, or to show any changes which may be required, Drawings known as Supplemental Drawings with specifications pertaining thereto will be prepared by the Engineer and 10 copies thereof will be given to the Contractor.
- B. Clarification Procedure: The Contractor may request a clarification of the Drawings or Specifications from the Engineer through the following procedure:
 - 1. Forms: The standard clarification form shall be used. The upper portion of this form shall be completed and signed by the Contractor. The completed form shall be forwarded to the Engineer for a response. The Contractor should indicate a preferred reply date. The Engineer's clarification review period shall be 14 consecutive calendar days in length and shall commence on the first calendar day immediately following the date of arrival of the clarification at the Engineer's office. In no cases shall the Contractor's preferred reply date be less than the 14 day review period.
 - a. The Contractor will assign the clarification a sequential number.
 - b. The Engineer will review the clarification with the appropriate parties and the Owner.
 - c. The Engineer will complete and sign the lower portion of the clarification.
 - d. A copy of the completed clarification will be returned to the Contractor.
 - e. The completed clarification distribution will be noted on the clarification form.
 - f. A copy of the completed clarification will be sent to the Owner.
 - 2. Clarification Log: A clarification log will be maintained by the Engineer and will be used to review the status of outstanding clarifications during each progress meeting.

1.07 COORDINATION

- A. The Contractor shall verify all dimensions, quantities and details shown on the Drawings and Supplemental Drawings, equipment, material, finishes, and other such listings or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts and discrepancies. This shall not relieve the Contractor of full responsibility for unsatisfactory Work, faulty construction, or improper operation resulting therefrom, or from rectifying such conditions at his own expense. He shall not be allowed to take advantage of any errors or

omissions. All equipment, materials, finishes, and other such listings are given for the convenience of the Engineer and Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in Work to be done under the Contract.

1.08 CLARIFICATION REQUEST FORM

- A. Clarification request form found in Section 00700 shall be used for clarification.

1.09 PIPING ALIGNMENT AND EQUIPMENT LOCATION VERIFICATIONS

- A. The Contractor shall field verify the suitability of pipe alignments and equipment locations with respect to the location of existing facilities. These verifications shall be made on the submitted layout and shop drawings and before pipe and fittings are ordered from suppliers.
- B. The Contractor shall be responsible to make minor adjustments of lengths or elevations in new construction necessary to suit existing facilities at no additional cost to the Owner.

1.10 COORDINATION WITH OTHER CONTRACTORS

- A. The Owner has the right to employ other contractors at the Site of the project. During the progress of the Work other contractors may be engaged in other work on the Project or on other projects at the site. In such event, the contractor shall coordinate the Work to be done hereunder with the work of other Contractors.

1.11 SATISFACTORY COMPLETION OF WORK

- A. All Work, whether it be within a highway right-of-way, neighboring jurisdictions, or private easements, shall be completed to the satisfaction of the Owner. It is hereby understood that the Owner shall be the final approving body as to the acceptability of the Work, regardless of prior approval from other jurisdictions.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01110

NO TEXT THIS PAGE

SECTION 01140

LIMITATIONS ON SEQUENCE OF CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Operation of Existing Facilities
- B. Limitation of Sequence of Construction

1.02 RELATED SECTIONS

- A. Section 01320 - Construction Schedule

1.03 OPERATION OF EXISTING FACILITIES

- A. The work under this project shall be so conducted that the Owner's existing facilities will be maintained in full operation at all times except for operation interruptions provided for under this section.
- B. The Contractor shall keep the Engineer and the Owner fully advised by prior written documentation as to his proposed plans for carrying out the work and obtain the Owner's and Engineer's prior approval for all phases of his operations as hereinafter specified.
- C. Any temporary structures, connections, piping, and other work necessary to maintain service during the construction period shall be made as a part of the work.
- D. All work shall be performed with care to avoid damage to existing structures and equipment. Before starting work on any modifications to existing facilities, the Contractor shall submit a plan to the Engineer for approval, comprising a detailed sequence of operations for these modifications and complete details of temporary facilities which demonstrates that operation of these existing facilities will be maintained. All construction shall be in accordance with the schedule accepted per Section 01320. At no time shall the service performed by any operating pipeline, equipment or structures be interrupted without specific prior approval of the Owner and Engineer.
- E. Temporary facilities and equipment shall be provided as required and directed to maintain pipelines, equipment, systems, processes, auxiliaries, appurtenances and structures in service. Any temporary work not required after completion of the final work shall be promptly removed.
- F. All costs associated with maintaining the existing facilities in operation shall be included in Contract Item No. 1a and no separate payment will be made therefor.
- G. The Contractor shall not operate or adjust the operation of any existing facility except under the specific direction of the Owner or Engineer.
- H. The Contractor shall at all times maintain Owner access to sample stations and areas that must be accessed for facility operations.

1.04 LIMITATIONS ON SEQUENCE OF CONSTRUCTION

- A. In accordance with the requirements of Section 01320 – Construction Schedule, the Contractor shall prepare and submit a comprehensive schedule of his proposed sequence of construction of the various parts of the project for review by the Engineer.

- B. At all times during the Contract Period, the Contractor will, as part of the Work and at no additional cost to the Owner, coordinate its performance of the Work with the activities and operations of the Owner, with Vulcan, and with Virginia Paving; and with those of any separate contractors who are engaged by the Owner, Vulcan, or Virginia Paving to perform construction or construction-related services at the site of the Project (the "Separate Contractors"), in each case to the extent necessary to achieve the timely and satisfactory completion of the Work in accordance with the Contract Documents, and in such a manner as to avoid delaying, interfering with, or otherwise placing undue burden upon the activities and operations of the Owner, Vulcan, Virginia Paving, or any Separate Contractor. Except as expressly authorized in advance by the Owner, the Contractor will not take any action, or omit to take any action, that will: (i) delay, interfere with, or otherwise unduly burden the activities of the Owner, Vulcan, Virginia Paving, or of any Separate Contractor; (ii) obstruct reasonable access by Owner, Vulcan, Virginia Paving, or any Separate Contractor to or from the site of the Owner's or any Separate Contractor's activities and operations.
- C. The work under this contract shall also be accomplished while the existing facility is maintained in operation. Any work which affects the existing facility must be carried out so that operation of the existing facility will not be jeopardized or materially reduced in efficiency as a result of the work.
- D. The Contractor shall submit, for approval by owner, a detailed plan for all facility shutdowns and tie-ins of new work. Contractor shall notify the Owner and Engineer at least 10 days in advance of an approved shutdown and/or tie-in.
- E. Any temporary structures, connections, piping and other work necessary to maintain service during the construction period shall be provided and made as part of the work under Contract Item No. 1a and no separate payment will be made therefor.
- F. Work on this Contract shall be coordinated with the operation of the facility. The Contractor shall notify the Engineer of the Contractor's planned procedures for each specific alteration of existing facilities before the alteration begins. The Contractor shall not begin any alteration until specific permission has been granted by the Owner in each case and shall provide the Engineer and the Owner with sufficient advance notice as not to impact the Contractor's schedule. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment shall be completed within the time frames specified herein.
- G. Authorized Owner personnel will perform all operations for the operational functions of the existing facilities identified as necessary to facilitate the Work of the Contractor and approved by the Owner, upon recommendation of the Engineer.
- H. If it is necessary for proper operation or maintenance of the existing facilities, the Contractor shall reschedule his operations, at no additional cost, so that his work will not conflict with necessary operation or maintenance of the facility. Such rescheduling shall not be cause for a time extension except as provided for in Article 8 of the General Conditions.
- I. The Contractor shall maintain safe passage through all access roads to existing facilities and to all parts of existing facilities.
- J. The Engineer shall be the sole judge of when the Contractor's operations are causing interference with existing facility operations, and his orders and instructions shall be carried out without delay.
- K. The Contractor is required to perform certain functions in an order which will allow the existing facilities to remain in operation and to allow other facilities to be completed on schedule. The requirements specified herein shall be incorporated into the Contractor's sequence of construction and shall apply at all times, except as may be modified in writing by the Engineer.

END OF SECTION

NO TEXT THIS PAGE

SECTION 01200

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Measurement Authority
- B. Unit Quantities Specified
- C. Schedule of Contract Items
- D. Payment
- E. Defect Assessment
- F. Non Payment for Rejected Work

1.02 MEASUREMENT AUTHORITY

- A. Measurement: The Owner will take all measurements and compute quantities accordingly.
- B. Assistance: Assistance to the Owner's Representative in the form of necessary equipment and qualified personnel shall be provided as required for taking measurements.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities: Quantities and measurements indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Owner's Representative and recorded in his daily report shall determine the payment.
- B. Actual Work: If the actual Work requires more or fewer quantities than those quantities indicated, the required quantities shall be provided at the unit prices contracted.
- C. Units of Work: The intention of the unit prices is to provide a complete, functioning unit which may include Work from several Specification Sections. All the Work which is required or which can reasonably be inferred to be required in a unit price item to deliver a complete, functioning unit shall be included.

1.04 DEFINITION OF BID ITEMS

- A. "Lump Sum": The price bid for each Lump Sum Contract Item shall include all costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies and appurtenances; providing all construction plant equipment and tools; and performing all necessary labor and supervision and training to fully complete the Work. All Work not specifically set forth as a Contract item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.
- B. "Bid Allowance": Contract Items in the Bid Form that are designated "Bid Allowance" cover certain items of work that will be paid for separately from other Contract items. Payment will be made to the Contractor by the Owner for actual costs invoiced to the Contractor for services plus allowable contract mark-ups, and other items selected by the Owner as defined herein and under each Bid Allowance item. A change order may be issued for the work associated with each Bid Allowance item to adjust the contract amount based on the difference between the actual costs and the Bid Allowance amount. Contractor shall submit original invoices from suppliers to support requests for payment for all bid allowance items.

- C. "Contingent Contract Item": The purpose of Contract Items in the Bid Form that are designated "Contingent Contract Item" is to establish unit prices for work not included in other bid items that is (a) ordered by the Engineer beyond the lines and grades shown on the Drawings or (b) indicated for payment on a unit price basis. No payment shall be made under any Contingent Contract Item for work performed by the Contractor for his own convenience or due to his negligence in executing the Work. Work under Contingent Contract Items shall be performed only as and when ordered by the Engineer. The Engineer has the right to order that contingent work be provided in smaller or larger quantities than the estimated quantity indicated in the Bid Form. The Contractor shall not have any right to demand payment for, and will not be paid for, any costs associated with the item, including but not limited to overhead and profit, due to the fact that the item was not used in the Work or was used in smaller or larger quantities than those indicated in the Bid Form. The Contract Sum will be subject to adjustment according to final measured quantities and the unit prices in the Bid will apply to such final quantities.

1.05 ALLOWANCE REQUIREMENTS

- A. At the earliest feasible date after Contract Award, advise the Owner of the date when the final selection and purchase of each product or system described by an allowance must be completed in order to avoid delay in performance of the Work.
1. When requested by the Owner, obtain a minimum of three proposals for each allowance for use in making final selections; include recommendations that are relevant to performance of the Work.
 2. Purchase products and systems as selected by the Owner from the designated supplier.
- B. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Order.
- C. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- D. Inspect products covered by an allowance promptly upon delivery for damage or defects.
- E. Coordinate materials and their installation for each allowance with related materials and installation to ensure that each allowance item is completely integrated and interfaced with related construction activities.

1.06 SCHEDULE OF UNIT PRICE ITEMS

- A. Items 1a through 1b: Water Main Installation.
1. Item 1a: 36-Inch Ductile Iron Water Main Installation
 2. Item 1b: 48"/36" Ductile Iron Water Main Interconnection
 3. Water Main Installation includes the following:
 - a. Furnishing pipe and related materials in accordance with Section 02510, and the Drawings, including 36-inch and 48-inch spool pieces and long solid sleeves.
 - b. Survey, layout and measurement in accordance with Section 01720 - Field Engineering.
 - c. Furnish construction facilities and temporary controls in accordance with Section 01500.
 - d. Test holes in accordance with Miss Utility requirements and Section 02510.
 - e. Excavating, backfilling and compacting in accordance with Section 02315 and the Trench details on the Drawings, including bedding and backfill materials, rock

excavation and removal, and disposal of excess and unsuitable materials. No additional payment will be made for select fill, from 6 inches below the pipe up to 6 inches above top of pipe (in non-paved areas), or up to bottom of CTA road areas, or where indicated on the Drawings. These costs shall be considered incidental to the associated water main and interconnection pay items.

- f. Excavation support in accordance with Section 02260 - Excavation Support Systems.
 - g. Unloading, stringing, handling and installing pipe in accordance with technical specifications and the Drawings including:
 - 1) Furnishing and installing restraining glands and concrete thrust anchors, in accordance with Section 02512 - Thrust Restraints.
 - 2) Furnishing and installing fittings including tees, bends, etc. and restrained joint pipe in accordance with the Drawings.
 - 3) Furnishing and installing polyethylene encasement.
 - 5) Furnishing and installing pipe, fittings, in-line valves, and valves from the tees on the proposed mains, including wet taps and connection to existing mains.
 - 6) Furnishing and installing concrete piers and sanitary/storm sewer supports at utility crossings, and concrete pads where indicated on the Drawings.
 - 7) Supporting underground utilities, utility poles, relocation of guy wires, etc.
 - h. Disinfection in accordance with Section 02513 - Disinfection of Water Distribution Systems.
 - i. Testing in accordance with Section 02514 - Leakage Tests.
 - j. Erosion and sediment control, including construction entrances, tree protection, safety fence, and all other measures, in accordance with Section 02370 - Erosion and Sediment Control, and the Drawings. Furnishing and installing erosion control slope stabilization matting where indicated on the Drawings.
 - k. Restoration and grading in accordance with Section 02315.
 - l. Mobilization
 - m. Videotaping and photographs for pre-construction survey and construction activities in accordance with Section 01310.
 - n. Abandonment or removal of existing water mains in accordance with Section 02510 and the Drawings.
 - o. Cutting, handling, disposal and connecting to asbestos cement pipe water main, in accordance with applicable local, state, and federal requirements.
 - p. Collection of pipe coupons in accordance with Section 02510.
 - q. Replacement of all removed or damaged sections of storm drain pipe and underdrain piping in accordance with VDOT standards.
 - r. Restraint of existing or proposed valves for the purpose of testing water mains and for water main tie-ins (connections), are incidental to water main installation.
 - s. Preparation of Project Record Documents in accordance with Section 01780.
 - t. All miscellaneous work not covered under other items.
4. The 48"/36" Ductile Iron Water Main Interconnection shall include one 48-inch and one 36-inch valve, 48" x 36" tee, long solid sleeves, water main, and miscellaneous materials for a complete connection to existing 48-inch and 36-inch water mains as shown on Drawings and in accordance with the requirements above.
5. Unit of Measure:
- a. Items 1a: Linear feet of water main measured in place.
 - b. Item 1b: Lump Sum installation.
- B. Item 2: Cement Treated Aggregate Road Surface Pavement Removal and Replacement
1. Work includes:

- a. Furnish, place, and compact 6-inches of VDOT Cement Treated Aggregate (CTA) pavement thickness in accordance with Section 02700 Paving and Surfacing, trench detail on the Drawings, or where directed in writing by the Engineer.
 - b. Removal and disposal of existing or excess CTA pavement.
 2. Unit of Measure: Square yards of CTA surface course placed.
 3. Payment limits for item 2 shall be in accordance with Section 02700, the Drawings, or as ordered at the time of construction. The CTA quantities depicted in the Bid Form are limited as shown on the trench detail and the notes on the Drawings. Any other areas damaged within the CTA roadway shall be replaced at no cost to the Owner.
 4. No payment will be made for pavement placed beyond the limits defined in Section 02700, shown on the Drawings, or as ordered by the Engineer.
- C. Item 3: Soil Stabilization
1. Work includes: Furnish and place seed, fertilizer and mulch, and other soil stabilization measures in accordance with Section 02920, the Drawings, and in areas designated by the Engineer including:
 - a. Preparation, fertilizer, mulch, watering and other requirements specified in Section 02920.
 - b. Maintenance and watering required until acceptance in accordance with Section 02920.
 - c. Removal of the 4-inch of mixed gravel material within the construction limits, between Station -1+00 and approximately Station 4+00, and replace with 4 inches top soil and seeding. Jute mesh shall be used to stabilize the soil for growth in this area. Assume construction limits of 500 feet long x 100 feet wide.
 - d. Installation of temporary cross-vanes, using Class I Rip Rap, at approximate Stations 1+50 and 2+50, or as directed by the Owner/Engineer. Cross-vanes shall be removed by Contractor once seeding restoration is completed and growth established.
 2. Unit of Measure: Square yard of top soil, seed, and jute mesh placed, within the limits of clearing/construction and grading shown on the Drawings.
 3. No payment will be made for areas seeded or otherwise stabilized beyond the limits defined in Section 02920 and above.
- D. Item 4: (Contingent Contract Item) Additional Excavation.
1. Additional Excavation includes excavation for water mains, and other appurtenances, which is deeper than the water main profile (trench excavation) shown on the Drawings, and in accordance with Section 02315.
 2. Unit of Measure: Cubic Yards.
- E. Item 5: (Contingent Contract Item) Additional Class "D" Concrete.
1. Furnish and place additional Class "D" concrete in accordance with Section 03300, and as directed, in writing, by the Engineer.
 2. Unit of Measure: Cubic Yards of Class "D" concrete placed, to the limits established in writing by the Engineer upon directing such work.
 3. No payment will be made for concrete placed beyond the limits shown on the Drawings to fill unauthorized excavation, or for thrust anchors at fittings, outlets, and plugs.
- F. Item 6: (Contingent Contract Item) Additional Select Fill –Crushed Stone.
1. Furnish, place and compact additional select fill material in accordance with Section 02315 where ordered in writing by the Engineer.

2. Unit of Measure: Cubic yards of additional select fill placed, to the limits established in writing by the Engineer upon directing such work.
3. No payment will be made for select fill placed to fill voids resulting neither from unauthorized excavation nor for pipe bedding derived from additional rock excavation.
4. No payment will be made for Select Fill, from 6 inches below the pipe up to 6 inches above the pipe (in non-paved areas), up to bottom of CTA road areas, stream crossings, or where indicated on the Drawings, under this pay item. Payment for these select fill requirements shall be considered incidental to the associated water main and concrete items.

1.07 PAYMENT

- A. Payment Includes: Full compensation for all required labor, products provided by the contractor, tools, equipment, plant, transportation, services and incidentals; erection or application of an Item of the Work, overhead and profit.
- B. Final Payment: Final Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for the Work which is incorporated in or made necessary by the Work.

1.08 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to the specified requirements.
- B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct that the defective Work may remain or be partially replaced and the Unit Price will be adjusted to a new price at the discretion of the Owner.

1.09 NON-PAYMENT FOR REJECTED WORK

- A. Payment will not be made for any of the following where products are provided by the Contractor:
 1. Products wasted or disposed of in a manner that is not acceptable.
 2. Products determined as unacceptable before or after placement.
 3. Products not completely unloaded from the vehicle.
 4. Products placed beyond the limits required or specified when the additional Work is required due to damage caused by the Contractor's failure to confine his work within those limits.
 5. Products remaining on hand after completion of the Work.
 6. Loading, hauling and disposing of rejected Products.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01200

NO TEXT THIS PAGE

SECTION 01250

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Change Orders
- B. Work Orders

1.02 DEFINITIONS

- A. Change Order: Refer to the definition in the General Conditions.
- B. Work Order: Refer to the definition in the General Conditions.
- C. Overhead: Refer to the definition in the General Conditions.
- D. Extra Work: Refer to the definition in the General Conditions.

1.03 SUBMITTALS

- A. Labor Rates: Submit a listing of employees, in accordance with Section 01330, providing the employee's name, job title or description and the hourly rate of pay including straight and overtime rates, labor burden rate, and the resulting billable rates for straight and overtime work.
 - 1. Provide submittal within 14 days after the issuance of the Notice to Proceed for review and acceptance. Annual updates of labor rates may be submitted for review and acceptance if necessary.
 - 2. Documentation including certified payrolls may be required to validate the rates.
 - 3. Payment for Extra Work will be based on the rates that are validated and approved by the Owner.

1.04 CHANGE ORDERS

- A. Initiation: Change Order Proposal
 - 1. The Owner or the Engineer may issue a Request for Change Order Proposal (RCP). The RCP will contain a description of the intended change with supplementary or revised Drawings and Specifications as applicable and the projected time for accomplishing the change.
 - 2. The Contractor shall submit a Proposed Change Order (PCO) in response to the Owner's RCP as required by contract requirements. The PCO shall include detailed cost breakdown of labor, material, and equipment, and applicable contract mark-ups. The PCO must also include any time extension request with detailed supporting documentation.
 - 3. By submittal of a Proposed Change Order hereunder, the Contractor certifies and agrees as follows:
 - a. He has carefully reviewed and evaluated the proposed change to the Work; and
 - b. The information set forth in the Proposed Change Order is accurate and complete, to the best of his knowledge and belief.
- B. Execution of Change Order:
 - 1. When a Proposal is requested for a change in the Work, the Contractor shall submit his proposal within 14 days following receipt of the Request for Change Order Proposal. The

Proposal shall state the increase or decrease, if any, in Contract Period and Contract Sum.

Failure to submit a bona fide proposal within the time required shall be deemed to constitute the Contractor's agreement to the Engineer's estimated adjustments, if any, to the Contract Sum or Contract Period for the Work pertaining to the Proposal.

2. The Contractor shall explain the proposal in as much detail as requested by the Owner.
 3. Any decrease in Contract Sum on account of omitted Work will include appropriate amounts for profit and overhead.
 4. The Owner and Engineer will review the Proposal and may request additional information and documentation which the Contractor shall provide promptly.
 5. If the Owner decides to proceed with the change, it will issue a change order for signature first by the Contractor and then by the Owner.
 6. The Contractor shall promptly complete the approved change in the Work on receipt of the executed Change Order.
 - a. Failure to sign the Change Order by the Contractor shall not relieve him from performing the Work if the Change Order is signed by the Owner or if a Work Order has been signed by the Owner.
- C. Costs: The cost of both additive and deductive changes in the Work shall be determined as follows:
1. Labor: Applied labor cost, crew foreman or general foreman performing or directly supervising the Work on the Site.
 2. Labor Burden: Net premium for Workman's Compensation Insurance, taxes pursuant to the Federal Social Security Act, payments required under State and Federal unemployment laws.
 3. Additional Materials: Necessary extra materials, delivered at the site including the actual cost of consumable supplies. Consumable supplies shall not be determined by the percentage of cost basis.
 4. Plant and Equipment: Rent for plant and equipment shall be at the cost for rentals from an independent firm (i.e. a firm which is not owned in whole or in part by the Contractor). If the equipment is owned by the Contractor or rented from a firm in which the Contractor has an interest, the rent shall be calculated in accordance with the applicable provisions and terms for contractor owned equipment in the current "Rental Rate Blue Book" service provided by Equipment Watch.
 5. Subcontractor Costs: Subcontractor's costs including subtier contractors shall be determined by items 1 through 4 in the immediately preceding subparagraphs, including a maximum profit and overhead of 20 percent regardless of the number of subtier subcontractors.
 6. Overhead and Profit:
 - a. Plus a maximum of 20 percent, for overhead and profit, of items 1 through 4 above.
Plus a maximum of 10 percent for overhead and profit of item 5.
 7. During periods of unreasonable downtime caused or required by the Owner, the following conditions shall also apply:
 - a. Payment for equipment will be on the basis of an 8-hour day.
 - b. No overtime will be included.
 - c. The rates for overhead and profit will be 10 percent.
 - d. No compensation for equipment overhaul, field repair and fuel expenses shall be included.

1.05 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Revise Schedule of Values and Application for Payment forms to record each change as a separate item of Work and to record the adjusted Contract Price.
- B. Revise the Construction Schedule monthly to reflect each change in Contract Time.
 - 1. Revise subschedules to show changes for other items of work affected by the changes.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

1.06 WORK ORDERS

- A. Initiation: The Owner may issue a Work Order with a Notice to Proceed without a prior Request for a Change Order Proposal or the Contractor's signature.
- B. Method of Compensation: The Owner will designate the method of determining the amount of compensation or credit, if any, based on one of the methods contained in this Section and the General Conditions.
- C. Timing of the Work: The Contractor shall proceed with the change in the Work immediately upon receipt of the Work Order.
- D. Incorporation in Contract Documents: The Work Order will be incorporated into the Contract Documents via a Change Order at a later date.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01250

NO TEXT ON THIS PAGE

SECTION 01260
STANDARD PROJECT FORMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The standard forms listed in this Section shall be utilized by all parties in the administration of this Contract. In an effort to promote more efficient communications between the Contractor and the Owner, the forms identified in paragraphs 3.01 and 3.02 shall be used as applicable for this Contract. Additional standard forms to be used for this project can be found in other Specification Sections. Electronic versions are available upon request but are not to be changed unless authorized in writing by the Owner.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 OWNER TO CONTRACTOR

- A. Request for Change Proposal
- B. Work Order
- C. Record of Minor Change
- D. Change Order
- E. Certificate of Beneficial Use
- F. Certificate of Final Completion

3.02 CONTRACTOR TO OWNER

- A. Payment Breakdown
- B. Application and Certification for Payment
- C. Request for Clarification
- D. Proposed Change Order
- E. Subcontractor Qualification Form
- F. Pre-Approved Contractor Form

- 1. This form will also be used as the updated log transmitted to the Owner on a monthly basis as a pre-requisite to any monthly progress payment.

- G. Contractor's Notice of Beneficial Use
- H. Contractor's Certificate of Final Completion
- I. Consent of Surety to Final Payment

J. Final Payment Affidavit and Release of Claims

END OF SECTION



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.

PROJECT NAME: Prince William County Transmission Main – Phase II

REQUEST FOR CHANGE PROPOSAL (RCP)

TO:

RCP No.:

ATTN:

TO CONTRACTOR: You are hereby directed, pursuant to the Contract Documents, to submit a complete proposal that includes:

- (1) Your estimated cost, with applicable markups, for the performance of the proposed change or deletion of a part of the work described below; and
- (2) If applicable, an increase in the Contract Time or extensions of Milestone Dates supported by scheduling analysis required by the Contract Documents for such requested time extensions.

DESCRIPTION OF CHANGE:

Sketch Attached:

yes no

Fairfax Water Representative (Printed Name and Signature)

DATE

DISTRIBUTION: (Please check)

___ Construction Department
___ [Contractor]

___ Consultant



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.

PROJECT NAME: Prince William County Transmission Main – Phase II

RECORD OF MINOR CHANGE No.

FORM E

Contractor:

Plan Sheet No.:

Description of Minor Change:

Reason:

Requested By:

The above change is for record purposes only and does not alter the Contract requirements, Period or Sum. You are hereby directed to execute this minor change(s) in the work promptly.

CONTRACTOR:

By: _____ Date: _____
(Printed Name and Signature)

FAIRFAX WATER PROJECT ENGINEER

By: _____ Date: _____
(Printed Name and Signature)

Sketch Attached:

yes no

DISTRIBUTION: (Please check)

____ Construction Department
____ [Contractor]

____ Consultant



PLANNING AND ENGINEERING DIVISION
 FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO. _____
 PROJECT NAME: Prince William County Transmission Main – Phase II

CONTRACT CHANGE ORDER NO. ____

TO:

ATTN:

DESCRIPTION OF CHANGE ORDER:

The following changes to the Contract Documents were agreed upon in accordance with Section 01250 Contract Modification Procedures.

ADJUSTMENT OF CONTRACT SUM:

The net change in the Contract Sum by this Change Order is summarized as follows:

Contract Sum as Awarded	\$ _____
Adjustment by Previous Change Orders	\$ _____
Adjusted Contract Sum	\$ _____
Addition by this Change Order No. _____	\$ _____
Total Adjusted Contract Sum	\$ _____

DISTRIBUTION: (Please check)

____ Construction Department
 ____ [Contractor]

____ Consultant

Contract No. _____
Project 2377 Division 004

ADJUSTMENT OF CONTRACT PERIOD:

Commencing _____

Original Contract Period _____

Previous Change Orders _____

Change Order No. _____

Total Days _____

Original Beneficial Use Date _____

Original Final Completion Date _____

Revised completion dates are as follows:

Beneficial Use _____

Final Completion _____

This Change order constitutes full and final compensation for all matters directly or indirectly related to or arising from the changes to the Work ordered hereby (the "Changed Work"), including but not limited to, all direct and indirect costs associated with the Changed Work and any and all adjustments (of whatever nature) to the Contract Sum or to the Contract Period attributable to the Changed Work.

RECOMMENDED:
CONSULTANT

DATE: _____ BY: _____

ACCEPTED:
[CONTRACTOR]

DATE: _____ BY: _____

APPROVED:
FAIRFAX WATER

DATE: _____ BY: _____
Steven T. Edgemon, General Manager

DISTRIBUTION: (Please check)

____ Construction Department
____ [Contractor]

____ Consultant



PLANNING AND ENGINEERING DIVISION
 FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.
 PROJECT NAME: Prince William County Transmission Main – Phase II

CERTIFICATE OF BENEFICIAL USE

FORM F

CONTRACTOR: _____

CONTRACT DATE: _____

THE WORK SHALL INCLUDE:

The designated Work described above has been reviewed and found to be sufficiently complete for beneficial use. The date of Beneficial Use for the designated Work is hereby established as _____.

DEFINITION OF DATE OF BENEFICIAL USE FOR THE WORK

Date of Beneficial Use shall be the date as certified by the Engineer when the construction of the Work or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Work or specified part can be utilized for the purpose for which it was intended.

A list of items to be completed or corrected by the Contractor is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

CONSULTANT _____

 BY (Printed Name and Signature)

 DATE

The Contractor accepts the Beneficial Use Date and agrees to complete the work on the List of items attached hereto as promptly as practical.

CONTRACTOR _____

 BY (Printed Name and Signature)

 DATE

Fairfax Water accepts the Work or designated portion thereof for beneficial use.

FAIRFAX WATER _____

 BY (Printed Name and Signature)

 DATE

The responsibilities of Fairfax Water and the Contractor for security, maintenance, heat utilities, damage to the designated portion of the Work and insurance shall be as attached.

DISTRIBUTION: (Please check)

- FW Construction
- FW Director, P&E
- Consultant

- FW End User (*Director, T&D – water mains, Manager, Security – security, etc*)
- Contractor



PLANNING AND ENGINEERING DIVISION
FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.
PROJECT NAME: Prince William County Transmission Main – Phase II

CERTIFICATE OF FINAL COMPLETION

FORM G

CONTRACTOR: _____

CONTRACT DATE: _____

ENGINEER: CONSULTANT

Fairfax Water has inspected the Work and determined that the Work has been satisfactorily completed in accordance with the intent of the Contract Documents and that all deficient Work (if any) has been completed to the satisfaction of Fairfax Water.

The date of the final Completion of the project is established as _____, which date also identifies the commencement of the warranty period.

Nothing contained herein shall operate to release the Contractor or its sureties from any obligations under the Contract Documents or the Performance and Payment Bonds.

Agreed to by: *(The undersigned certify that they are duly authorized representatives as defined in the Contract Document)*

Contractor (Printed Name and Signature)

Notary

Date: _____

CONSULTANT (Printed Name and Signature)

Date: _____

Fairfax Water, Manager of Construction

Date: _____

DISTRIBUTION: (Please check)

- FW Construction
- CONSULTANT
- CONTRACTOR

OTHER

Fairfax Water

PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.

PROJECT NAME: Prince William County Transmission Main – Phase II

DISTRIBUTION: (Please check)

Manager, Construction
 [Contractor]

Consultant



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO. _____

PROJECT NAME: Prince William County Transmission Main – Phase II

REQUEST FOR CLARIFICATION NO. _____

Transmitted To: _____

Date: _____

Requested By: _____

Drawings No: _____

Spec Section: _____

Questions: (Provide complete description of request with sketches or photos if necessary. Present status of work and suggest a solution, if any)

Response:

By: _____
(Printed Name and Signature)

Date: _____

DISTRIBUTION: (Please check)

____ Manager, Construction
____ [Contractor]

____ Consultant



Planning and Engineering Division

PROPOSED CHANGE ORDER

PROJECT: Prince William County Transmission Main Phase II

PCO NO.: _____ **DATE:** _____

FROM: _____ **CONTRACT NO.:** _____

PROJECT NO.: 2377 , **Division** 004

TO: FAIRFAX WATER **REFERENCES:** _____

CONTRACTOR hereby submits this request for a change in the Contract Sum and/or the Contract Period to perform all Work associated with the above-referenced Work Order or to perform or delete Work in response to the above-referenced Request for Change Order Proposal as follows:

(1) The total direct and indirect costs, with applicable mark-ups for the performance of the proposed change in the work is as follows:

\$ _____ (Detailed Breakdown Attached)

(2) The increase in the Contract period or extensions of Contract Milestone Dates requested for this proposed Change, supported by the scheduling analysis required by the Contract Documents for such requested time extensions, is as follows:

_____ Calendar Days - Contract Period (Details Attached)

_____ Calendar Days - Milestone: _____

The Contractor understands and certifies that the proposal stated herein represents all estimated direct and indirect costs and applicable mark-ups allowed by the Contract Documents and/or additional time of performance of the Work associated with this proposed Change. The Contractor further certifies that to the best of his knowledge and belief the cost and pricing data and scheduling analysis submitted herein regarding the performance of the proposed Change in the Work or the deletion of a part of the Work is complete, accurate and current. The Contractor will perform the proposed Change in the Work as directed by the Owner or Engineer.

CONTRACTOR: _____

BY: _____

DATE: _____



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO. _____PROJECT NAME: Prince William County Transmission Main – Phase II

SUBCONTRACTOR QUALIFICATION FORM

The Contractor must provide all information requested herein with respect to each proposed subcontractor. Duplicates of this form may be used in order to supply the requested information with respect to each such proposed subcontractor. Any doubt on the part of the Contractor with respect to the necessity of disclosing information shall be resolved in favor of disclosure.

Please type or print clearly in black ink. The Contractor may attach additional pages if necessary, and should number any such additional pages consecutively, referencing applicable sections of this form.

PROPRIETARY INFORMATION

The Contractor, at the request of the Proposed Subcontractor, may elect to designate all information contained in this Subcontractor Qualification Form as proprietary by checking the appropriate box.

- The information contained in this Subcontractor Qualification Form is submitted voluntarily and deemed a trade secret or proprietary information pursuant to §11-52 of the Code of Virginia, as amended.
- The information contained in this Subcontractor Qualification Form is submitted voluntarily and is not considered a trade secret or proprietary information.

Subcontractor Name: _____

Subcontractor's Trade or Specialty: _____

Street Address: _____

City, State, Zip Code: _____

Telephone No. _____ Fax No. _____ E-Mail: _____

Primary contact with the firm:

Name: _____ Title: _____

Telephone: _____

Type of Firm:

- Corporation (if a corporation, provide date and state of incorporation in space below)
- Partnership (if a partnership, provide names of all partners, general and limited, and state of organization, as well as date of formation of partnership in space below)
- Individual Owner (if individual owner, provide name of owner and date of commencement of business in space below)
- Joint Venture (if joint venture, provide information for each party to venture and date of formation of joint venture in space below)
- Limited Liability Company (if limited liability company, provide names for all members as well as state of organization in space below)

Federal Employer Identification Number: _____

Virginia Contractor's License Number _____ dated _____.

(If the Subcontractor does not currently hold a Virginia Contractor's License, provide a detailed description of how the Subcontractor will obtain a license prior to its commencement of any Work ((as such term is defined in the Contract Documents.))

In the spaces set forth below, please provide the information requested with regard to three contracts performed by the Subcontractor within the past 4 months which were similar in nature and scope to that proposed to be performed on behalf of the Contractor for the above-referenced Project.

1. (a) Project identification and location: _____

(b) Names, title, addresses and phone numbers of the owner and the general contractor:

Owner: _____

Address: _____

Telephone: _____

Individual to Contact and Title: _____

General Contractor: _____

Address: _____

Telephone: _____

Individual to Contact and Title: _____

(c) Description of specific work performed: _____

(d) Subcontract price:

Original subcontract value: _____

Final subcontract value: _____

2. (a) Project identification and location: _____

(b) Names, titles, addresses and phone numbers of owner and general contractor:

Owner: _____

Address: _____

Telephone: _____

Individual to contact and title: _____

General Contractor: _____

Address: _____

Telephone: _____

Individual to contact and title: _____

(c) Description of specific work performed: _____

(d) Subcontract price:

Original subcontract value: _____

Final subcontract value: _____

3. (a) Project identification and location: _____

(b) Names, titles, addresses and phone numbers of owner and general contractor:

Owner: _____

Address: _____

Telephone: _____

Individual to contact and title: _____

General Contractor: _____

Address: _____

Telephone: _____

Individual to contact and title: _____

(c) Description of specific work performed: _____

(d) Subcontract price:

Original subcontract value: _____

Final subcontract value: _____

DISTRIBUTION: (Please check)

_____ **Manager, Construction**
_____ **Other** _____

FORM CM/12



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO.

PROJECT NAME: Prince William County Transmission Main – Phase II

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

TO:
Fairfax County Water Authority (d/b/a: Fairfax Water)
8560 Arlington Blvd.
Fairfax, Virginia 22031

CONTRACTOR: _____

CONTRACT DATE: _____

In accordance with Article 10.5 of the General Conditions of the Contract between Fairfax Water and the Contractor referenced above, the

_____, SURETY COMPANY,

On bond of

_____, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that no payment, however, final or otherwise, shall operate to release the Contractor or the SURETY COMPANY from any obligations to Fairfax Water under this Contract or the Performance and Payment Bonds.

(SIGNATURES ON FOLLOWING PAGE)

IN WITNESS WHEREOF,

The Surety Company has hereunto set its hand this _____ day of _____, _____

Surety Company

Signature of Authorized Representative

Attest:
(Seal)

Title



PLANNING AND ENGINEERING DIVISION

FCWA PROJECT # 2377 DIVISION 004 CONTRACT NO. _____PROJECT NAME: Prince William County Transmission Main – Phase II

FINAL PAYMENT AFFIDAVIT AND RELEASE OF CLAIMS

TO: Fairfax County Water Authority (d/b/a: Fairfax Water)
 8560 Arlington Blvd.
 Fairfax, Virginia 22031

FROM: _____ (the "Contractor")

Contract Between Fairfax Water and the Contractor dated _____ (the "Contract") for the aforementioned project (the Project and real property upon which it is situated are collectively referred to herein as the "Property")

The Contractor hereby (1) acknowledges receipt of all but \$____, monies being withheld pending release of claims for all labor, materials, services and benefits (collectively, the "Work") provided pursuant to, and any other amounts due under, the Contract; (2) waives and releases any and all mechanics', materialman's and like liens, and all rights to file any such liens, against the Property for any or all of the Work provided by the Contractor pursuant to the Contract (regardless of whether any such lien properly may be filed against Fairfax Water's Property); (3) agrees to pay and release of record promptly all mechanics', materialman's and like liens filed by itself or others in connection with the Work provided under the Contract which may now or in the future affect the Property; (4) represents and warrants that the Contractor has fully paid all laborers, materialmen and subcontractors of the Contractor for all Work provided by them in connection with the Contract; (5) represents that neither the Contractor nor any other person with whom the Contractor has dealt has any right to file a mechanic's, materialman's or like lien against the Property or has any other claims of any nature (whether pending or threatened) on account of any Work provided by or through the Contractor; (6) waives and releases any and all actions, debts, claims and demands against Fairfax Water arising from or in connection with the Work provided by or through the Contractor pursuant to the Contract Documents; and (7) agrees to defend, indemnify and hold harmless Fairfax Water from any and all loss, cost, liability or claim (including, without limitation, court costs and attorneys' fees) arising out of: (a) any misrepresentation or breach of any of the foregoing representations, covenants and warranties, or (b) the filing or enforcement of any lien or claim of lien or any other claim by the Contractor or by any laborer, materialman or subcontractor of the Contractor or in connection with the Work covered by the Contract.

Dated: _____

[Insert name of Contractor as it appears on the Contract]

By: _____

[Signature of officer or authorized agent signing for Contractor]

Name: _____

[Print name of person signing]

Title: _____

[Print title of person signing]

STATE OF _____)

CITY/COUNTY OF _____)

SUBSCRIBED AND SWORN TO before me in the above jurisdiction this _____ day of _____, _____, by the person whose name appears above.

My commission expires: _____.

[Notarial Seal]

Notary Public

SECTION 01290

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Submit Applications for Payment to the Engineer and Owner in accordance with the terms and schedule established by the General Conditions of the Contract and Agreement between Owner and Contractor.
- B. The accepted Schedule of Values (defined under Section 01330) shall be used as the basis for the Contractor's Application for Payment.

1.02 RELATED WORK

- A. Section 00500: Agreement between Owner and Contractor.
- B. Section 00700: General Conditions.
- C. Section 00800: Supplementary Conditions.
- D. Section 01250: Contract Modification Procedures.
- E. Section 01320: Construction Schedule.
- F. Section 01720: Field Engineering and Surveying.
- G. Section 01770: Contract Closeout.
- H. Section 01780: Project Record Documents

1.03 FORMAT AND DATA REQUIRED

- A. Submit applications in automated format using the Application for Payment form provided in Section 01260, Standard Project Forms. Each submittal shall be accompanied by a Compact Disk containing a spreadsheet set up in the same format as the Schedule of Values (Section 01330) providing complete documentation of all items for which payment is requested. Text and tabular data shall be in Microsoft Excel latest version for Windows format. No payment will be made until the Schedule of Values is approved.
- B. Monthly updated progress schedule will be a prerequisite to payment.

1.04 PREPARATION OF APPLICATION FOR PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
 - 3. Execute certification with signature of a responsible officer of Contract firm. An original notarized signature shall appear on each copy submitted.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
 - a. Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission at the end of the continuation sheets. List by Change Order Number, and description, as for an original component item of work.
4. To receive approval for payment on component material stored on site, submit certified true copies of the original paid invoices with the application for payment first made for these materials. Refer to Article 10, Section 00700 for payment on stored materials.
5. For unit price contracts, the pay application must reflect actual quantities of line item installed or verified by the Owner through the Fairfax Water Inspector or Engineer.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When requested, submit substantiating information with a cover letter identifying:

1. Project.
2. Application number and date.
3. Detailed list of enclosures.
4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

C. Maintain an updated set of drawings to be used as record drawings in accordance with Section 01780. As a prerequisite for monthly progress payments, exhibit the updated record drawings for review by Owner and Engineer.

D. The Contractor shall maintain an updated construction schedule in accordance with Section 01320. As a prerequisite for monthly progress payments, contractor shall submit the updated construction schedule with the application for progress payments. If the Contractor fails to submit the required updated schedule within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required updated schedule. Submit as required under Section 01320.

E. The Contractor shall demonstrate, as a prerequisite for monthly progress payments, compliance with all requirements specified in Section 02370 to the Engineer. If the Contractor fails to demonstrate compliance with Section 02370, the Engineer may withhold approval of progress payment estimates until such time as the Contractor demonstrates to the Engineer full compliance with the approved erosion and sedimentation control permit and Section 02370.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01770 – Contract Closeout.
- C. Submit all Project Records Documents in accordance with Sections 01770 and 01780.
- D. Submit required O&M manuals per Section 01782.
- E. Satisfy all other final completion and contract close-out requirements.

1.07 SUBMITTAL PROCEDURES

- A. Submit Applications for Payment to the Engineer or Owner at the times stipulated in the Agreement.
- B. Number: Three copies of each Application
- C. When Application is found to be properly completed and corrected, three originals will be transmitted to Owner and one copy will be returned to Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01290

NO TEXT ON THIS PAGE

SECTION 01310
PROJECT MEETINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Preconstruction Conference
- B. Preconstruction Survey
- C. Progress Meetings

1.02 PRECONSTRUCTION MEETINGS

- A. General: Prior to the commencement of Work at the Site, a preconstruction conference will be held at a predetermined time and place.
- B. Preconstruction Conference:
 - 1. Attendance: The conference shall be attended by the following:
 - a. The Contractor and his Superintendent
 - b. The principal Subcontractors
 - c. The representatives of principal suppliers and manufacturers as appropriate
 - d. The Engineer and his resident project representative(s)
 - e. The Authorized Representatives of the Owner
 - f. Governmental representatives as appropriate
 - g. Others, as requested by the Contractor, the Owner, or the Engineer
 - 2. Purpose: The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed, and procedures for handling such matters, established. The agenda will include the following items:
 - a. Transmittal, review, and distribution of Contractor's submittals
 - b. Processing applications for payment
 - c. Maintaining record documents
 - d. Critical work sequencing
 - e. Field decisions, Change Orders and Work Orders
 - f. Use of premises, office and storage areas, security, housekeeping, and the Owner's needs

- g. Major equipment deliveries and priorities
 - h. Contractor's assignments for safety and first aid
3. Meeting Chairman: The Engineer will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.
- C. Preconstruction Survey: Before any Work is performed at the site by the Contractor, a joint preconstruction survey will be performed. The Contractor, Engineer and Owner will review the existing conditions jointly and record via video and digital photos this review. The Contractor shall be responsible for procuring the services of a professional photographer and for scheduling the preconstruction survey; however, the survey date(s) shall be coordinated with the Owner. When the survey is completed, the Owner shall be provided with the original CD/DVD and photographs. Following completion of the Work, the video and photographs may be used to compare conditions prior to construction to those conditions following construction to ascertain that the Site has been properly restored.

1.03 PROGRESS MEETINGS

- A. Purpose: The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, review safety and quality control activities, and resolve other potential problems.
- B. Scheduling: The Owner and the Contractor will schedule and hold regular progress meetings at least monthly and at other times as requested by the Engineer or required by progress of the Work. The Contractor, the Engineer, and all subcontractors active on the site shall be represented at each meeting. The Contractor may, at his discretion, request attendance by representatives of his suppliers, manufacturers, and other subcontractors.
- C. Meeting Chairman: The Engineer shall preside at the meetings and provide for keeping and distributing the minutes.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01310

SECTION 01320

CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies the general methods and requirements of submissions applicable to the Construction Progress Schedule. Detailed submittal requirements are specified in the technical sections.

1.02 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit the baseline schedule, reflecting major tasks and subtask, within 20 calendar days of Notice to Proceed.
- B. Work shall be scheduled using the Critical Path Method (CPM) type of network analysis. The schedule should be developed and maintained using MS Project, latest Windows version or an approved equal.
- C. The Critical Path Method type construction schedule will be used to monitor job progress. The Contractor shall be responsible for providing all information concerning the sequencing, logic and duration of all activities as well as providing the initial CPM logic network (in electronic and paper form) diagram Gantt Chart and tabular report data. Once the baseline schedule is accepted by the Engineer and the Owner, the Contractor shall be responsible for providing monthly updates of the CPM schedule showing actual progress. The Contractor shall submit the computerized printout of the schedule and highlight major changes, if any, on a monthly basis. Within the first week of each month, three (3) copies of the updated schedules shall be submitted to the Owner. If requested by Owner, within the first week of each month, one CD with the electronic file of the updated schedules shall be submitted to the Owner.
- D. The contractor shall provide 3-week look-ahead reports at each Monthly Progress meeting as specified in Section 01310.
- E. The schedule shall show fabrication and delivery times for all major equipment items.
- F. The schedule must include all required start-up and commissioning activities.
- G. The Contractor shall submit a complete separate and independent schedule and detailed listing of anticipated submittals during the Contract Period. The submittal schedule shall be submitted within 30 days after Notice to Proceed. The submittal schedule shall then be accepted or revised as required by the Engineer and the Owner within 14 days after receipt, and the Contractor shall incorporate the dates and review durations into his complete CPM schedule.
- H. A CPM schedule which shows a completion of any milestone or completion dates prior to the contractual completion date for that milestone or completion date may be accepted, but in no event shall be acceptable as a basis for a claim for additional cost, delay or acceleration against the Owner and Engineer and any of their authorized representatives if the early completion date is not met by the Contractor.
- I. Schedule Revisions. The Contractor shall submit any proposed revisions to the accepted baseline CPM schedule to the Owner for review and acceptance. CPM revisions shall be submitted as a computerized printout of the schedule, three (3) copies, and if requested

one CD with the electronic file. All proposed revisions to activities, logic, activity durations, and critical path shall be justified in written tabular form and shall include the impact of the proposed schedule revisions on the project. The Contractor shall not make any changes in the accepted baseline CPM schedule without the prior written acceptance of the Owner and Engineer.

J. Float

1. Definition of Float. As employed in the Contract Documents, the terms "float" and "float time" shall be used interchangeably to mean the period of time between the early start date and the late start date, or the early finish date and the late finish date of any activities set forth on the Construction Schedule.
2. Ownership of Float. The Owner shall have and retain exclusive ownership of the float.
3. Float Time. The Contractor shall not be entitled to any adjustment in the Contract Period, the Construction Schedule, or the Contract Sum, or to any additional payment of any sort by reason of the loss or use of any float time. The Owner may initiate changes to the Work that absorb float time without obligation to adjust or extend the overall completion date or any intermediate completion dates set forth in the CPM network. Owner-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending (or shortening) the Contract Period. Contractor-initiated changes that encroach on the float time identified in the CPM network may be accomplished with the Owner's prior approval. Such changes, however, shall give way to Owner-initiated changes competing for the same float time. Delays in the critical path that are not associated with proper requests for time extensions in accordance with Article 8 of the General Conditions shall be deemed to be the responsibility of the Contractor.

K. Delays to Critical Path

1. Whenever it becomes apparent from the current monthly CPM schedule update that delays to the critical path have resulted and these delays are through no fault of the Owner or Engineer and hence, that the Contract completion date will not be met, or when so directed by the Engineer, the Contractor shall take some or all of the following actions at no additional cost to the Owner.
 - a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
 - b. Increase the number of working hours per shift, shifts per day, or working days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
 - c. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.
 - d. The Contractor shall submit to the Owner and Engineer for review a written statement of the steps he intends to take to remove or arrest the delay to the schedule. The Contractor shall promptly provide such level of effort to bring the Work back on schedule. Should schedule delays persist, the Contractor's Surety may be asked to attend schedule update meetings.

- e. Failure of the Contractor to comply with the requirements herein shall subject him to, at the Owner's sole discretion, withholding, in partial or in total, payments otherwise due the Contractor for work performed under the Contract. Any withholding of monies is not a penalty for noncompliance, but is an assurance for the Owner that funds will be available to implement these requirements should the Contractor fail to do so, since failure of the Contractor to comply with these requirements shall mean that the Contractor failed to prosecute the Work with such diligence as to ensure its completion within the contractual dates.

- L. The Contractor will not be entitled to any extension of time for the completion of the Project, nor to recover any damages for any delay attributed to the Owner, the Engineer, or their agents, with respect to any delay that is alleged to have occurred during a period of time in which the Contractor has failed to provide or to maintain an approved accepted schedule that meets all requirements of the Contract Documents.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01320

NO TEXT ON THIS PAGE

SECTION 01330

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies the general methods and requirements of submissions applicable to Shop Drawings, Product Data, Samples, Mock Ups, Construction Photographs, and Submittal Schedules. Detailed submittal requirements are specified in the technical sections.
- B. All submittals shall be clearly identified by reference to Section Number, Paragraph, Drawing Number or Detail as applicable. Submittals shall be clear and legible and of sufficient size for presentation of data.

1.02 CONSTRUCTION PROGRESS SCHEDULE

- A. Contractor shall submit to Engineer for review a schedule of the proposed construction operations in accordance with Section 01320.
- B. At least monthly the schedule shall be revised and resubmitted as necessary to reflect changes in the progress of the Work.
- C. Owner may require Contractor, at Contractor's expense, to add to its plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.
- D. If the initial progress schedule or any subsequent revision is not acceptable to Engineer, the schedule shall be revised and resubmitted as many times as necessary until the schedule is acceptable.

1.03 SHOP DRAWING SUBMITTAL SCHEDULE

- A. Contractor shall submit to Engineer a schedule of submittals for the Shop Drawings and Engineering Data that are required by the specifications in accordance with Section 01320.

1.04 PROGRESS REPORTS

- A. A progress report shall be submitted to Engineer each month with the application for partial payment. If the Work falls behind schedule, Contractor shall submit additional progress reports at such intervals as Engineer may request.
- B. Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the progress schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to Engineer, must be substantiated with satisfactory evidence.
- C. Each progress report shall also include three copies of the accepted graphic schedule updated to indicate actual progress.

1.05 SCHEDULE OF VALUES

- A. Schedule of Values shall be submitted to Owner and Engineer for review within 20 days of the Notice To Proceed.
- B. The Contractor shall prepare a bid breakdown for the Lump Sum Contract Items in accordance with Article 10B of the General Conditions. The bid breakdown shall be prepared in such manner as approved by the Engineer to permit apportionment of construction cost to the various facilities, equipment, and structures included in this Contract.
- C. The lump sum bid shall be broken down by reference to the applicable Specification Sections.
- D. In addition to the dollar amount for each item, the bid breakdown shall include the physical quantities of the Work required for each item. Quantities listed shall be in units of number, size, length, area, volume or weight which are customarily used and can be readily verified.
- E. Equipment items requiring appreciable amounts of installation effort shall be broken down into delivery and installation costs. Process systems made up of several items of equipment shall be subdivided into their component parts.
- F. The cost of preparing a bid breakdown to conform to requirements for apportioning construction costs to facilities and structures shall be included in Contract Item 1a and no additional payment will be made therefore.
- G. If, in the opinion of the Owner, the cost data does not meet the requirements for a balanced bid breakdown, the Contractor shall present documentation to the Owner substantiating any cost allocation on the cost data.

1.06 SCHEDULE OF PAYMENT

- A. At the time the schedule of values is submitted, Contractor shall submit to Engineer a schedule of estimated monthly payments. The schedule shall be revised and resubmitted each time an application for partial payment varies more than 10 percent from the estimated payment schedule.

1.07 SHOP DRAWINGS AND ENGINEERING DATA.

- A. General
 - 1. Shop Drawings and engineering data (submittals) covering all equipment and fabricated and building materials which will become a permanent part of the Work under this Contract shall be submitted to Engineer for review. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. When an item consists of components from several sources, Contractor shall submit a complete initial submittal including all components.
 - 2. The Contractor may request access to electronic media files of the Contract Drawings to assist submittal preparation. The Contractor shall enter into an agreement with the Owner and Engineer to use these electronic files, and be subject to constraints under the agreement. The Contractor will be required to sign the Engineers disclaimer if electronic files are requested.

3. Where required, Shop Drawings shall be sealed by a professional engineer registered in the Commonwealth of Virginia including, but not limited to, submittals required by the Fairfax County Special Inspections Program, Fairfax County building permit approvals and VDOT standards and specifications, and where indicated in the specifications.
4. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
5. Contractor shall be solely responsible for the completeness of each submission. Contractor's stamp of approval is a representation to Owner and Engineer that Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.
6. All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.
7. Eight copies of each shop drawing and necessary data shall be submitted to Engineer and two copies submitted to the Owner. Engineer will return two marked copies (or one marked reproducible copy) to Contractor. Contractor shall submit to Engineer three additional copies of all drawings and data necessary to meet the requirements of the Fairfax County Special Inspections Program, as described herein. When requested by the Engineer, the Contractor shall submit 3 additional copies of an approved submittal with all markups and comments incorporated as a record set submittal. Additional review time for a record set submittal shall be for the Owner (unless it is rejected as non-compliance.)
8. Facsimile (fax) copies will not be acceptable. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
9. Electronic Submittals: The Contractor may request approval to transmit submittals electronically in pdf or other acceptable formats. If electronic submittal is approved by the Engineer or Owner, it must contain all information required of hard copy submittals. Reviews will be completed and returned electronically to the website. Once the submittal has been approved by the Engineer and returned electronically to the website, the Contractor shall submit three (3) hard copies to the Owner for their records with all mark-ups and comments incorporated. Resubmission of submittals transmitted electronically shall conform to the requirements of paragraph 1.07.E of this Section. Where submittals are required by the Fairfax County Special Inspections Program; 3 additional hard copies may be required of the approved submittals in accordance with paragraph 1.08.D.
10. Electronic Correspondence: The Contractor may submit electronic pdf format copies of project correspondence via email, followed up with the original copy via US Mail or hand delivery.

11. Submittals shall contain:
 - a. The date of submission and the dates of any previous submissions.
 - b. The Project title and number.
 - c. Contractor identification.
 - d. The names of:
 - 1) Contractor
 - 2) Supplier
 - 3) Manufacturer
 - e. Identification of the product, with the section number, page and paragraph(s).
 - f. Field dimensions, clearly identified as such.
 - g. Relation to adjacent or critical features of the work or materials.
 - h. Applicable standards, such as ASTM or Federal Standards numbers.
 - i. Identification of deviations from Contract Documents.
 - j. Identification of revisions on resubmittals.
 - k. A blank space suitably sized for Contractor and Engineer stamps.
 - l. Where calculations are required to be submitted by the Contractor, the calculations shall have been checked by a qualified individual other than the preparer. The submitted calculations shall clearly show the names of the preparer and of the checker.

B. Engineer's Review of Submittals.

1. Engineer's review of submittals will cover only general conformity to the Drawings and Specifications, external connections, and dimensions which affect the layout. Engineer's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. Engineer's review shall not relieve Contractor of Contractor's sole responsibility for errors, omissions, or deviations in the drawings and data, nor of Contractor's sole responsibility for compliance with the Contract Documents.
2. In general, Engineer's submittal review period will not exceed 28 consecutive calendar days in length and shall commence on the first calendar day immediately following the date of arrival of the submittal or resubmittal in Engineer's office. Submittals requiring complex review and coordination may involve additional review time. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.
3. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest

of the Owner and to be so minor as not to involve a change in Contract Price or Contract Time, the Engineer may return the reviewed drawings without noting an exception.

4. Submittals will be returned to the Contractor under one of the following codes.

Code 1 "APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 "APPROVED AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 "APPROVED AS NOTED/CONFIRM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may, at his own risk, release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 "APPROVED AS NOTED/RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the entire package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 "NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 6 "COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Code 7 "RECEIPT ACKNOWLEDGED" is assigned to acknowledge receipt of submittal that is not subject to the Engineer's review and approval and is being filed for information purposes only.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

5. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall identify all revisions made to the submittals, either in writing on the letter of transmittal or on the shop drawings by use of revision triangles or other similar methods. The resubmittal shall clearly respond to each comment made by the Engineer on the previous submission. Additionally, the Contractor shall direct specific attention to any revisions made other than the corrections requested by the Engineer on previous submissions.

6. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor and will be considered "Not Approved" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.
7. Repetitive Review
 - a. Shop drawings and other submittals will be reviewed no more than twice at the Owner's expense (excluding one record set review cycle). All subsequent reviews will be performed at times convenient to the Engineer and at the Contractor's expense, based on the Engineer's then prevailing rates. The Contractor shall reimburse the Owner for all such fees invoiced to the Owner by the Engineer. Submittals are required until approved.
 - b. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Time.
8. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least 20 working days prior to release for manufacture.
9. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
10. When the drawings and data are returned marked "NOT APPROVED", the corrections shall be made as noted thereon and as instructed by Engineer and six corrected copies (or one corrected reproducible copy) resubmitted. Facsimile (fax) copies will not be acceptable.
11. When the drawings and data are returned marked "APPROVED AS NOTED", "APPROVED", or "RECORD COPY", no additional copies need be furnished unless requested by Engineer at time of review.

C. Contractor's Responsibilities

1. Review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
 - a. Field measurements
 - b. Field construction criteria
 - c. Catalog numbers and similar data
 - d. Conformance with related Sections
2. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I

have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11 in x 17 in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Submittals shall be delivered to the Engineer's site field office.

3. The Contractor shall utilize a 10 character submittal identification numbering system in the following manner:
 - a. The first character shall be a D, S, or M, which represents Shop/Working Drawing and other Product Data (D), Sample (S), or Operating/ Maintenance Manual (M).
 - b. The next five digits shall be the applicable Section Number.
 - c. The next three digits shall be the numbers 001 to 999 to sequentially number each initial separate item or drawing submitted under each specific Section Number.
 - d. The last character shall be a letter, A to Z, indicating the submission, or resubmission of the same Drawing, i.e., "A=1st submission, B=2nd submission, C=3d submission, etc. A typical submittal number would be as follows:

D 03300 008 B

D	=	Shop Drawing
03300	=	Section for Concrete
008	=	The eighth initial submittal under this section
B	=	The second submission (first resubmission) of that particular shop drawing

4. Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.
5. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from the responsibility for the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.
6. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
7. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

D. Submittals Required by Fairfax County or other localities' Special Inspections Program

1. The Contractor shall submit three additional sets of drawings and data for the following items (if applicable) to satisfy the submission and approval requirements of the Fairfax County Special Inspections document:

Structural steel

Cast in place concrete
Precast concrete
Masonry
Soils and foundations
Earth retention systems

2. The Engineer will review, approve, and stamp these submittals in accordance with the Special Inspections Document and return them to the Contractor. After these submittals have been approved by the Engineer, the Contractor shall submit the three copies to the Fairfax County Special Inspections Section of the Commercial Inspections Branch, Division of Inspection Services, Department of Environmental Management. Following County review and approval, the Contractor shall pick up the documents from the County office and deliver one approved copy to the Engineer. The contractor shall keep one approved copy on site with the Record Documents. The Contractor shall be responsible for the submittal and return of all shop drawings required by the Fairfax County or other localities' Special Inspections Program.

E. Resubmittal of Drawings and Data

1. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal.
2. When corrected copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by Engineer on previous submissions.
3. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.
4. If more than one resubmission is required because of failure of Contractor to provide all previously requested corrected data or additional information, Contractor shall reimburse Owner for the charges of Engineer for review of the additional resubmissions. This does not include initial submittal data such as shop tests and field tests which are submitted after initial submittal.
5. Resubmittals shall be made within 30 days of the date of the letter returning the material to be modified or corrected, unless within 14 days Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the resubmittal cannot be completed within that time.
6. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of Engineer to review any submittal within the submittal review period specified herein and to return the submittal to Contractor.

F. Color Selection

1. Any color selections made by the Owner appear in Section 09900. If color selections have not been specified, Contractor shall submit color choices for Owner selection.

1.08 ELECTRICAL AND CONTROL WIRING IDENTIFICATION

- A. Contractor shall verify approved submittals, provided with unique wiring identification, match actual installation of product or equipment. In the event that installation does not match wiring identification on submittal, a resubmittal and approval process shall be required at no expense to the Owner.

1.09 SOURCE (ORIGINAL) ELECTRONIC FORMAT

- A. Shop Drawings and Submittals for equipment, components, and products containing documentation generated or modified specifically for this project shall be provided in their source (original) electronic format (ex. AutoCAD R2013 or lower version).

1.10 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

- A. If specifically required in other related Sections, submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

PART2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01330

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a professional engineer registered in the Commonwealth of Virginia and that he/she has been employed by

_____ to design
(Name of Contractor)

(Insert P.E. Responsibilities)

in accordance with Section _____ for Prince William County Transmission Main – Phase II.

The undersigned further certifies that he/she has performed the design of the _____

_____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.O. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

(Insert Name of Owner)

or Owner's representative within seven days following written request therefore by the Owner.

P.E. Name

Contractor's Name

P.E. Registration Number

Signature

Signature

Address

Title

Address

SECTION 01410

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Partial outline of the major laws, codes and requirements to be followed on the project.

1.02 REFERENCES

- A. Commonwealth of Virginia Department of Health Waterworks Regulations
- B. International Codes/International Code Council
- C. Virginia Uniform Statewide Building Code (VUSBC)
- D. Virginia Department of Transportation Road (VDOT) and Bridge Specifications
- E. Fairfax County Special Inspections Manual
- F. Fairfax County Public Facilities Manual
- G. National Electrical Code (NEC)
- H. Virginia Water Control Board Regulations
- I. Virginia Departments of Environmental Quality (DEQ)

1.03 REGULATORY REQUIREMENTS

- A. Compliance with the Law: Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of all applicable laws, building and construction codes including, but not limited to, the U.S. Department of Labor Occupational Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54), shall be observed. The U.S. Department of Labor Safety and Health Regulations shall be complied with except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act, in which case compliance with state and local standards is required.
- B. Work on State Highways: The Owner will obtain all permits required where Work is to be performed within the right-of-way of highways, roads, or other public areas under the control and jurisdiction of VDOT. The Contractor shall become familiar with the requirements of VDOT, particularly regarding cutting and crossing of roadways, materials, and methods of backfilling, maintenance of roadways, drainage and other structures, protection of the traveling public, final restoration of roadway surfaces, tree clearings, and restrictions on working hours, before commencing work on highways, roads and other public areas under the control and jurisdiction of VDOT. The Contractor shall comply with all the requirements of VDOT pertaining to the Work to be performed under the Contract. The Contractor shall complete all requirements of the VDOT Land Use Permit so that the Owner can obtain written approval and release from VDOT, before final payment will be allowed under this contract.
- C. Contractor shall conform to applicable sections of the Virginia State Board of Health "Waterworks Regulations" and these Specifications during the installation, testing and disinfection of Waterworks facilities.
- D. Applicable Codes: The codes listed under references of this Section are the applicable codes for this project. Other standard codes which apply to the Work are designated in the individual specification Sections.

1.04 PERMITS

- A. The Contractor shall obtain, keep current and pay all fees for any necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract Limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor's operations unless otherwise stated. Record copies of all permits shall be furnished to the Engineer and Owner.
- B. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this Project.
- C. The permits obtained by the Owner shall be considered part of the Contract Documents. Copies of these permits are included in the Appendix to the Contract Documents and are listed below.

Virginia Department of Health Waterworks Construction Permit

- D. The Contractor shall abide by the conditions of permits related to the Work and shall obtain proof of satisfaction of conditions from issuers of permits prior to acceptance of the Work by the Owner.
- E. The Contractor is responsible for providing a Responsible Land Disturber for this Work. This individual shall have successfully completed the Fairfax County requirements and VDOT Erosion & Sediment Control Contractor Certification training and shall comply with the requirements of the VDOT Erosion and Sediment Control Contractor Certification form, included as a Special Provision to the approved VDOT Land Use Permit.
- F. Noise Variance: The Contractor is responsible for obtaining this in accordance with Section 01500.
- G. Trade Permits: The Contractor shall be responsible for obtaining his own trade permits.
- H. The Contractor shall submit all required documentation for permits to be obtained by the Contractor without delay, allowing for adequate review time by approving authorities. Any delay caused by the failure of the Contractor to submit permit applications in a timely fashion or to respond to comments from reviewers, will not entitle the Contractor to an extension of time.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION 01410

SECTION 01420

REFERENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Abbreviations
- B. Reference Standards

1.02 ABBREVIATIONS AND SYMBOLS

- A. Technical Societies, organizations, other bodies: Reference to a technical society, organization, or body may be made in the Specifications by abbreviations in accordance with the following list:

AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AFBMA	Antifriction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
AREA	American Railway Engineering Association
APA	American Plywood Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWPA	American Wood Products Association
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute
FGMA	Flat Glass Marketing Association
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
ISA	International Society of Arboriculture
NAAMM	National Association of Architectural Metals
NACE	National Association of Corrosion Engineers
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association Manufacturers
OSHA	Occupational Safety and Health Administration
PCI	Prestressed Concrete Institute
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry

SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories, Inc.
USACOE	U.S. Army Corps of Engineers
USBS	U.S. Bureau of Standards
USBR	U.S. Bureau of Reclamation
VDH	Virginia Department of Health
VDOT	Virginia Department of Transportation
VSWCB	Virginia State Water Control Board

B. Common Abbreviations:

AWG	American Wire Gauge
CS	Commercial Standard
Fed Spec	Federal Specifications
IPS	Iron Pipe Size
MIL	Military Specification
NEC	National Electrical Code
PS	Product Standard

1.03 REGULATORY REQUIREMENTS

- A. Reference to Standards: Whenever reference is made to furnishing materials or testing thereof to conform to the standards of any technical society, organization, or body, it shall be construed to mean the latest standard, code, or specification, adopted and published at the time of the Bid unless otherwise noted.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01420

SECTION 01450

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Inspection Services
- B. Inspection of Materials
- C. Contractor's Quality Control

1.02 SUBMITTALS

- A. **Certificates of Manufacture:** The Contractor shall furnish the Engineer authoritative evidence in the form of Certificates of Manufacture that the materials and equipment to be used in the Work have been manufactured and tested in conformity with the Contract Documents. These certificates shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

1.03 INSPECTION OF WORK

- A. **Work May Be Rejected at Any Time:** During the progress of the Work and until the Date of Final Completion, the Contractor shall at all times afford the Authorized Representatives every reasonable, safe, and proper facility for inspecting the Work at the Site. The observation and inspection of any Work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory Work as herein specified. If at any time an inspection, test, or analysis of Work reveals faulty design, inferior, or defective materials, poor workmanship, improper installation, excessive wear, or nonconformity with the requirements of the Contract Documents, such Work will be rejected and shall be replaced with satisfactory Work at the Contractor's expense. Finished or unfinished Work found not to be in strict accordance with the Contract shall be replaced as directed, even though such Work may have been previously approved and payment made therefore.
- B. **Removal of Rejected Work and Materials:** The Owner or its Authorized Representatives shall have the right to reject materials and workmanship which are defective or require correction. Rejected Work and materials must be promptly removed from the Site, which must at all times be kept in a reasonably clean and neat condition.
- C. **Failure to Reject Inferior Work and Materials:** Failure or neglect on the part of the Owner or its Authorized Representatives to condemn or reject bad or inferior Work or materials shall not imply an acceptance of such Work or materials. Nor shall it be construed as barring the Owner or its Authorized Representatives at any subsequent time from recovering damages or a sum of money needed to build anew all portions of the Work in which inferior workmanship or improper materials were used.
- D. **Examination of Completed Work:** Should it be considered necessary or advisable by the Owner or its Authorized Representatives at any time before final acceptance of the Work to make examinations of portions already completed, by removing or tearing out all or portions of such Work, the Contractor shall, on request promptly furnish all necessary facilities, labor, and material for that purpose. If such Work is found to be defective in any respect, the Contractor shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such Work is found to meet the requirements of the Contract, the cost of examination and restoration of the Work shall be considered an item of Extra Work to be paid for in accordance with the provisions of these Contract Documents.
- E. **Proper Operation of Equipment during Tests or Training:** The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and

shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner accepts the Work and issues a Certificate of Beneficial Use.

1.04 INSPECTION OF MATERIALS

- A. Inspection During Manufacture, Preparation or Testing: Where required by the Contract Documents, the Contractor shall give notice in writing to the Engineer sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement, and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture or testing as may be necessary to inspect the materials, or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture or testing, or he will notify the Contractor that the inspection will be waived. The Contractor must comply with these provisions before shipping any materials. Such inspection will not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.
- B. Testing Electrical and Mechanical Equipment: Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or IEEE, except as may otherwise be stated herein.

1.05 COSTS OF INSPECTION

- A. Inspection by the Owner or its Authorized Representatives: All inspection and testing of materials furnished under this Contract will be performed by the Owner or its Authorized Representatives or inspection bureaus without cost to the Contractor, unless otherwise expressly specified. The Contractor shall reimburse the Owner for expenditures incurred in making such tests on materials and equipment which were rejected for noncompliance. Costs of inspections required outside of normal working hours will be paid by the Contractor at a rate of \$115/hr for each inspector required. Normal working hours are considered to be a maximum of 10 hours per day, Monday through Saturday.
- B. Shop and Field Tests: The cost of shop and field tests of equipment and certain other tests specifically called for in the Contract Documents shall be borne by the Contractor, and such cost shall be deemed to be included in the Contract Sum.
- C. Tests for Equivalent Materials and Equipment: Materials and equipment submitted by the Contractor as the equivalent to these specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for expenditures incurred in making such tests on materials and equipment which were rejected for noncompliance.

1.06 FAILURE TO COMPLY WITH CONTRACTS

- A. Rejection of Equipment or Material: If it is ascertained by testing or inspection that the material or equipment does not comply with the Contract, the Contractor will be notified and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the Site or from the Work and replace it with acceptable material without cost to the Owner. Failure of the Owner or its Authorized Representatives to ascertain noncompliance or to notify the Contractor of any noncompliance shall not relieve the Contractor from fulfilling his obligations under the terms and conditions of the Contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Equipment and Machinery: The Contractor shall have on hand sufficient proper equipment and machinery of adequate capacity to facilitate the Work and to handle all emergencies normally encountered in Work of this character.

END OF SECTION 01450

NO TEXT THIS PAGE

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General Requirements
- B. Temporary Utilities
- C. Temporary Construction
- D. Barricades and Enclosures
- E. Security
- F. Temporary Controls
- G. Access and Parking
- H. Field Offices and Sheds

1.02 RELATED SECTIONS

- A. Section 02370 Erosion and Sediment Control

1.03 GENERAL REQUIREMENTS

- A. Furnish plant and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the time stipulated in the Bid Form. If at any time such plan appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the plant equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.
- B. Contractor to Furnish Temporary Facilities: All false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the work and which are not herein described or specified in detail, must be furnished, maintained and removed by the Contractor, and he shall be responsible for the safety and efficiency of such works and for any damage that may result from their failure or from their improper construction, maintenance or operation.
- C. First Aid: In addition to any other requirements, the Contractor shall maintain a readily accessible, completely equipped first aid kit at each location where work is in progress.
- D. Safety Responsibility: The Contractor shall be solely responsible for safety and security at the site. The Contractor will indemnify and hold harmless the Owner and its Authorized Representatives for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage at the site during occupancy or partial occupancy of the site by the contractor and while performing any part of the Work. If Owner

determines conditions to be unsafe, a stop work order may be issued until the unsafe conditions are corrected at no additional cost to Owner.

1.04 TEMPORARY UTILITIES

- A. Water: The Owner will supply at no cost to the Contractor a maximum of 110% of the volume of the pipelines and water bearing structures for testing pipelines. Additional water required for testing by the Contractor will be provided at the Owner's standard rates for the additional volume required. The Contractor shall, if necessary, provide and lay water lines to the place of use; secure all necessary permits and pay for all taps to water mains and hydrants.
- B. Light and Power: The Contractor shall provide at his own expense temporary lighting and power facilities required for the proper construction and inspection of the Work. If these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the Work affected thereby. Temporary lighting and power shall be maintained until the Work is accepted.
- C. Heat: The Contractor shall provide temporary heat, whenever required, for work being performed during cold weather and to prevent freezing of water pipes and other damage to the Work or existing facilities.
- D. Sanitary Facilities: The Contractor shall not be allowed to use any of the Owner's existing sanitary facilities or those included in the Work. The Contractor shall furnish and maintain adequate temporary sanitary facilities for his personnel, including all subcontractor personnel, for the duration of the Contract; shall prohibit and prevent nuisances on the site of the Work or on adjoining property; and shall permanently remove from the site any employee who violates this rule. The Contractor shall also abide by all applicable health and environmental regulations and shall obtain all permits required by local code.
- E. Connections to Existing Utilities:
 - 1. Unless otherwise specified or indicated, the Contractor shall make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electricity. In each case, the Contractor shall receive permission from the Owner or the owning utility prior to undertaking connections. The Contractor shall protect facilities against deleterious substances and damage.
 - 2. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

1.05 TEMPORARY CONSTRUCTION

- A. Temporary Bridges: The Contractor will be required to place and design suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic. He shall be responsible for the sufficiency and safety of all such temporary work or bridges and for any damage which may result from their failure or their improper construction, maintenance, or operation and will indemnify and save harmless the Owner from all claims, suits or actions, and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.06 BARRICADES AND ENCLOSURES

- A. Protection of Workmen and Public: During the prosecution of the Work, the Contractor shall put up and maintain at all times barriers and lights to prevent accidents. The Contractor shall provide suitable barricades, lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the Work causes obstructions to the normal traffic or constitutes in any way a hazard to Owner's personnel or the public.
- B. Barricades and Lights:
 - 1. Streets, Roads and Highways: All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades which display acceptable warning signs (meeting VDOT standards). Barricades shall be located at the nearest public highway or street on each side of the blocked section.
 - 2. Excavations and Trenches: All open trenches and other excavations shall have barricades, signs, and lights suitable to provide adequate protection for plant personnel. Obstructions such as material piles and equipment shall be posted with similar warning signs and lights.
 - 3. Statutory Requirements: All barricades, signs, lights, and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, within highway rights-of-way, as required by the authority having jurisdiction there over.

1.07 FENCES

- A. Existing Fences: Existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.
- B. Restoration: On completion of the Work, the Contractor shall restore all fences to their original or better condition and to their original location.

1.08 SECURITY

- A. Preservation of Property:
 - 1. The Contractor shall preserve from damage all property along the line of the Work in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. He shall preserve from damage public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, and public streets. (Normal wear and tear of streets resulting from legitimate use by the Contractor shall not be considered as damage.) Whenever the Contractor damages such property, he shall immediately restore it to its original condition at his own expense.
 - 2. In case of failure on the part of the Contractor to restore such property or make good such damage or injury, the Owner may, upon 24 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any moneys due or which may become due the Contractor under this Contract. If removal, repair or replacement of public or private property is made necessary by alteration of grade or alignment authorized by the Owner and not contemplated by the Contract Documents, the Contractor shall be compensated, in accordance with the General Conditions provided that such property has not been damaged through fault of the Contractor or his employees.
- B. Public Utility Installations and Structures:

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes, and other appurtenances and facilities, whether owned or controlled by public bodies or privately owned individuals, firms or corporations, used to serve the public with transportation, gas, electricity, telephone, storm and sanitary sewers, water, or other public or private utility services. Facilities appurtenant to public or private property which may be affected by the Work shall be deemed included hereunder.
2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. Existing public utility installations and structures are indicated on the Drawings only to the extent such information was made available to, or discovered by, the Engineer in preparing the Drawings. This data is not guaranteed for completeness or accuracy, and the Contractor is responsible for making his own investigations to fully inform himself of the character, condition, and extent of all installations and structures that may be encountered and that may affect the construction operations.
3. Further, the Contractor is responsible for enforcing the requirements of Chapter 63, Fairfax County Code Chapter 63, Excavation and Utility Line Installation. In particular, the Contractor is directed to Section 63-2-2, Demolition or Excavation; Prior Notice. The Contractor shall contact VA811 (Miss Utility of Virginia) sufficiently in advance of the start of construction to comply with this requirement.
4. The Contractor must remove, replace, relocate, repair, rebuild, and secure at his expense any public utility installations and structures. The Contractor shall be responsible and liable for any consequential damages done to or suffered by any public utility installations or structures. The Contractor also shall be responsible for any injury, damage, or loss which may result from or be consequent to interference with, or interruption or discontinuance of, any public utility service.
5. Any water, gas, or other service connection damaged during the Work shall be repaired or replaced by the Contractor at his expense, which shall be deemed included in the Contract Price.
6. The Contractor shall, at all times in performance of the Work, employ proven methods and exercise reasonable care and skill to avoid unnecessary delay, injury, damage, or destruction to public utility installations and structures; and shall avoid unnecessary interference with, or interruption of, public utility services; and cooperate fully with the owners thereof to that end.
7. The Contractor shall give written notice to the owners of all public utility installations and structures affected by his proposed construction operations, sufficiently in advance of breaking ground in any area or on any unit of the Work, to obtain their permission before disturbing the lines and to allow them to take measures necessary to protect their interests. The Contractor must advise the Chiefs of Police and the Fairfax County Fire and Rescue Services of any excavation in public streets or the temporary shut-off of any water main. At least 24 hours notice shall be given by the Contractor to all affected property owners whenever service connections are taken out of service.

C. Work on Private Property:

1. Where installations are to be placed on private property, rights-of-way or easements will be secured by the Owner without cost to the Contractor. Where Work is required on private property in order to construct an installation within the rights-of-way, the Contractor shall be responsible, without cost to the Owner, for securing written permission to work on the

private property. The Contractor shall conduct his operations along rights-of-way and easements through private property to avoid damage to the property and to minimize interference with its ordinary use. The Contractor shall, upon completion of the Work through such property, restore the surface and all fences or other structures disturbed by his operations as nearly as possible to the conditions in which he found them. No material shall be used or removed from private property without the consent of the Owner or responsible party in charge of such property. The Contractor shall save the Owner harmless from any claim or damage arising out of or in connection with the performance of Work across and through private property.

2. If in the opinion of the Engineer, restoration Work is not performed promptly, the Owner, with 7 days notification to the Contractor, may retain the services of another contractor to perform the restoration Work. The cost for the performance of this restoration Work authorized by the Owner and performed by others shall be at the Contractor's expense.
 3. The Contractor shall give a minimum of 24 hours' advance notice (unless noted otherwise on the Drawings) to owners of private property adjacent to the Work to be performed under this Contract of the necessity to remove or obstruct the means of access to such property and, in the event that the removal or obstruction of the regular access shall exceed a period of 4 hours, he shall arrange temporary means of access. All driveways shall be temporarily restored with compacted gravel immediately after completion of pipe laying operations therein. Access to fire stations, hospitals and other essential emergency services facilities shall be maintained at all times.
 4. As a prerequisite to obtaining the final payment for Work performed under this project, Fairfax Water may require the Contractor to obtain a release, on forms to be provided by Fairfax Water, from each owner of private property upon which any portion of the Work was performed at no additional cost to Fairfax Water. Fairfax Water shall be the sole judge as to whether private property has been restored to an acceptable condition.
- D. Miscellaneous Structures: The Contractor shall be held entirely responsible for all injuries or damage to culverts, building foundations and walls, retaining walls, or other structures of any kind met with during the prosecution of the Work, and shall be liable for damages to public or private property resulting there from. All pipes carrying liquid shall be adequately protected against freezing.
- E. Protection of Trees and Lawn Areas:
1. All trees and shrubs, except those ordered to be removed, shall be adequately protected by boxes or otherwise by the Contractor. No excavated material shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by accident or negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season, and at the Contractor's expense.
 2. Lawn areas shall be left in as good condition as before the start of the Work. The areas where sod has been removed shall be restored by seeding or sodding in accordance with the requirements of Section 02920.

1.09 TEMPORARY CONTROLS

A. During Construction:

1. Debris Control:

- a. During construction of the Work, the Contractor shall at all times keep the site of the Work and adjacent premises as free from materials, debris, and rubbish and shall remove such from any portion of the site if, in the Engineer's opinion, such material, debris, or rubbish constitutes a nuisance or is objectionable.
2. Remove Surplus Materials: The Contractor shall remove from the site all these surplus materials and temporary structures when they are no longer needed.
 3. Construction Materials: Construction materials such as concrete forms and scaffolding shall be neatly stacked by the Contractor when not in use. The Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
 4. Volatile Wastes: Volatile wastes shall be properly stored in covered metal containers and removed daily.
 5. Waste Disposal: Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.

B. Smoke Prevention:

1. The Contractor shall strictly observe all air pollution control regulations.
2. No open fires will be permitted on site.

C. Noises:

1. Acceptable Noise Levels: The Contractor shall be responsible for maintaining acceptable noise levels in the vicinity of the Work and compliance with the Code of the County of Fairfax, Chapter 108 during the performance of the Work under this Contract. The Contractor shall limit noise production to acceptable levels by using special mufflers, barriers, enclosures, equipment positioning, and other approved methods.
2. Variance Requirements: The Contractor shall supply written notification to the Owner sufficiently in advance of the start of any Work which violates this provision and shall not proceed until the Contractor obtains all applicable authorizations, including a variance from the County of Fairfax and the Owner's written consent

D. Hours of Operation:

1. Allowable hours for work within the operations area for Vulcan and Virginia Paving shall be between 5:00 p.m. and 5:00 a.m., as noted on the Drawings.
2. The Contractor shall keep the Engineer informed regarding his hours of operation and work activities. The Contractor shall submit his normal working hours to the Engineer prior to starting any work in the field. Whenever the Contractor works outside his normal working hours, adequate advance notice shall be provided to the Engineer.

3. No non-emergency Work, including equipment moves, shall be performed on Sundays without prior authorization by the Owner.

E. Dust Control:

1. The Contractor shall take measures to prevent unnecessary dust. Earth surfaces exposed to dusting shall be kept moist with water or by application of a chemical dust suppressant. Materials in piles or in transit shall be covered to prevent blowing or spreading dust.
2. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected. Machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.
3. Sweep and wash all paved roads daily.
4. Sweep and wash all paved roads used for hauling roads twice daily.
5. Provide wheel wash facility at locations adjacent to paved roads. All vehicles leaving unpaved roads must use the wheel wash facility before using the paved roads.

F. Water Control

1. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site, or adjoining properties. Control fill, grading and ditching to direct water away from excavations, pits, tunnels and other construction areas and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance.
2. Provide, operate and maintain equipment and facilities of adequate size to control surface water.
3. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the Site or to adjoining areas and in conformance with all environmental requirements.

G. Pollution Control

1. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth offsite, and replace with suitable compacted fill and/or topsoil.
3. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
4. Provide systems for control of atmospheric pollutants, prevent toxic concentrations of chemicals, and prevent harmful dispersal of pollutants into the atmosphere.
5. All Contractors' equipment used during construction shall conform to all current federal, state and local laws and regulations.

1.10 ACCESS AND PARKING

A. Access:

1. Access to the site of the work shall be restricted to existing public roads and to roads and easements owned by the Owner.
2. The Contractor shall construct and maintain all access of haul roads, except where noted, necessary for equipment and material movement.
3. The Contractor shall provide and maintain suitable parking areas for the use of all construction workers and others performing Work or furnishing services in connection with the Contract, to avoid any need for parking personal vehicles where they may interfere with public traffic or construction activities.

B. Maintenance of Traffic

1. Maintenance of Traffic: The Contractor shall conduct his work in such a manner as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, parking spaces and walks, whether public or private, the Contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private parking and drives before interfering with them. Such maintenance of traffic will not be required when the Contractor has obtained permission from the owner and tenant of private property, or from the Owner having jurisdiction over the public property involved, to obstruct traffic at the designated point.
2. When required and at no additional cost to the Owner, project message boards shall be furnished by the Contractor from a VDOT-approved supplier and placed in accordance with VDOT requirements.

1.11 USE OF SITE FOR STORAGE AND FIELD OFFICES

A. Requirements:

1. The Contractor shall be responsible for obtaining off- site locations for storage of equipment and materials, at no additional cost to the Owner. No on-site storage will be allowed other than current materials and equipment being utilized immediately.
2. The Contractor is not allowed to store any equipment or material within VDOT right-of-way.
3. Any structures or facilities needed for storage or field office shall be constructed by the Contractor at his own expense and no separate payment will be made therefor.
4. All security requirements for such facilities shall be provided and maintained by the Contractor.
5. Space on the site for storage and materials, spoil, construction offices, and the like, is limited. The Contractor shall submit his requests and proposed layouts for space allocations to the Engineer for review. The Contractor is limited to the area shown as limits of work on the site plan.
6. The Contractor shall confine his use of the site to the areas designated by the Engineer.

7. Whenever the Engineer determines that the use of the site by the Contractor is detrimental to the overall performance of the work under the several Contracts, or interferes with the operation of the facility, and notwithstanding prior allocation or approval by the Engineer, the Engineer may order the Contractor to relocate his materials, equipment, temporary plants, and the like, and the Contractor shall comply with the directive of the Engineer. No additional compensation or extension of Contract time will be allowed for any such relocation of materials, equipment, temporary plant, or the like.
8. Nothing contained herein or shown on the Drawings shall be interpreted as giving any Contractor exclusive occupancy of the areas on the site provided for his operations. Owner personnel, for any purpose, and other contractors of the Owner, for any purpose required by their respective Contracts, may enter upon or occupy portions of it, as directed or permitted by the Engineer. The Contractor shall conduct his work so as to prevent interference with the work of the Owner or other Contractors.
9. Upon completion of the work and as directed by the Engineer, the Contractor shall clean up the areas, remove any temporary facilities, finish grade and return the areas to previous existing conditions as necessary all to the satisfaction of the Engineer.

B. Contractor's Field Offices:

1. The Contractor shall furnish, equip, and maintain a secure location on-site of a size required for his operations. Any structure or facility, if needed, shall be constructed by the Contractor at his own expense and no separate payment will be made therefore. The Contractor shall be responsible for the selection and authorization, in writing, for the field structure or facility site. The size and location of any facility shall require the Owner's approval. The Contractor shall provide at his option his own telephone service. Readily accessible copies of both the Contract Documents and the latest approved shop drawings shall be kept at this location.

1.12 EMERGENCIES

- A. The Contractor shall at all times, before and after regular working hours including weekends and holidays, maintain a telephone number where he or his representative can be reached on an emergency basis. The Contractor or his representative shall be prepared to act to correct conditions on site that are deemed to constitute an emergency by the Owner, his agent, the Engineer, or local authorities and is obligated to act to prevent threatened damage, injury or loss without special instructions from the Owner or Engineer. The Contractor shall give the Engineer prompt written notice of all significant changes in the work or deviations from the Contract Documents caused thereby. If a condition on the site requires attention after hours, either the Owner, his agent, the Engineer, or local Authorities shall call the Contractor or his representative at the emergency telephone number, identify himself and describe the emergency condition. The Contractor is expected to dispatch personnel and equipment to adequately institute corrective measures within 2 hours. If for any reason the Contractor or his agent cannot be reached at the emergency number after a reasonable amount of time (not exceeding 30 minutes), the Owner reserves the right to initiate corrective measures and the costs shall be deducted from payments due to the Contractor.
- B. In the event that the Contractor fails to maintain safe job conditions and traffic conditions, including but not limited to trench settlement and storage of hazardous backfill or construction materials, the Owner, after failure of the Contractor to commence substantial steps at the job site to rectify the situation within 2 hours of the time the Contractor has been notified of the unsafe condition, may hire guards, take such precautions, make such repairs, and take any other steps which the Owner or the Owner's agent in its discretion considers necessary to protect the property, persons or Owner. The costs for such actions shall be deducted from payments due to the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01500

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General Requirements
- B. Manufacturers
- C. Transportation and Handling

1.02 SUBMITTALS

- A. Manufacturers, Materialmen, Suppliers and Dealers: The names of proposed manufacturers, materialmen, suppliers, and dealers who are to furnish materials, fixtures, equipment, appliances, or other fittings shall be submitted to the Engineer for acceptance, in accordance with Section 01330, as early as possible, to afford proper investigation and checking. Such acceptance must be obtained before shop drawings will be reviewed. No manufacturer will be accepted for any materials to be furnished under this Contract unless he is, in the Engineer's opinion, of good reputation and has a plant of ample capacity. He shall, upon the Engineer's request, be required to submit evidence that he has manufactured a product like the one specified that has been previously used for a like purpose and for a sufficient period of time to demonstrate its satisfactory performance.
- B. Samples: Submit samples for approval in accordance with the individual specification sections.

1.03 GENERAL REQUIREMENTS

- A. Conformance with Laws, Ordinances, Codes, and Specifications: All materials and appliances used in construction shall be in accordance with the Contract Documents and shall be a grade sufficient to conform to the requirements of any applicable laws, ordinances, and codes.
- B. Quality Requirements:
 - 1. Materials and Equipment: All materials and equipment incorporated into the Work shall be new, unused, and correctly designed. Materials and equipment shall be of a standard, high-grade quality, produced by expert workmen, and intended for the use for which they are offered. Materials or equipment which in the Engineer's opinion are inferior or of a lower grade than indicated, specified, or required will not be accepted.
 - 2. Workmanship: The quality of workmanship and materials entering into the Work under this Contract shall conform to the requirements of the Contract Documents.
- C. Standards:
 - 1. Equipment and Appurtenances: Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA, AWWA, and any other applicable standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, and the like shall be finished the same in appearance. All exposed welds shall be ground smooth, and the corners of structural shapes shall be ground smooth, and the corners of structural shapes shall be mitered.
 - 2. Electrical Requirements: Electrical devices, motors, equipment, control panels, electrical equipment enclosures, and other electrical equipment appurtenances shall be UL listed. Shop drawings for electrical equipment shall denote that the represented material has the

UL label. Non-listed materials and special equipment devices not normally UL listed and labeled shall equal or exceed the latest UL standards for such types of equipment. The Contractor shall be responsible for providing the services of an electrical inspection firm to certify compliance of all non-listed materials to the UL standards and for providing materials with an inspection label in accordance with local code requirements.

1.04 MANUFACTURERS

A. General:

1. Unless otherwise shown or specified, materials and equipment appearing in Fairfax Water's "Approved Product List" shall be provided by one of the approved manufacturers also listed. Copies of the "Approved Product List" may be obtained via Fairfax Water's internet website <https://www.fairfaxwater.org/developers-engineers>
2. Unless specifically named in the specifications, a manufacturer shall have furnished equipment of the type and size specified in the Contract Documents which has been in successful operation for not less than the five years.
3. All transactions with the manufacturers or subcontractors shall be through the Contractor.
4. Any two or more pieces of material or equipment of the same kind, type, or classification used for identical types of service, shall be made by the same manufacturer.

1.05 TRANSPORTATION AND HANDLING

- A. Delivery: The Contractor shall deliver materials in quantities sufficient to ensure the uninterrupted progress of the Work and its completion within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the Work of any related contractor.
- B. Care and Protection: The Contractor shall be solely responsible for properly storing and protecting all materials, equipment, and Work furnished under this Contract from the time such materials and equipment are delivered at the site of the Work until final acceptance thereon. He shall at all times take necessary precautions to prevent injury or damage to such materials, equipment, and Work by whatever cause, including, without limitation, water, freezing, dust and atmospheric contaminants, or inclemency's of the weather. All injury or damage to materials, equipment, or Work resulting from any causes whatsoever shall be made good by the Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01600

SECTION 01630

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section outlines the policies and procedures for obtaining consideration and acceptance of products other than those specified.

1.02 RELATED SECTIONS

- A. Section 01600 Material and Equipment

1.03 DESIGN REQUIREMENTS

- A. Intention of Contract Documents: It is the intention of the Contract Documents to construct the Work with the specified products. The Contractor shall base his bid price on the products specified. The Owner has the right to reject proposed substitutions for any reason.
- B. Equivalent Materials and Equipment
 - 1. Whenever a material, article or method is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, followed by the phrase "or equal", the specific item mentioned shall be understood as establishing the type, function, dimension, appearance, and quality desired and is to be the basis upon which bids are to be prepared. Other manufacturer's products or methods not named will be considered as substitutions provided required information is submitted in the manner set forth herein and provided substitution will not require design revisions or revisions of the Contract Documents. This applies to specific construction methods when such are required by the Contract Documents.
 - 2. Whenever a material, article, or method is specified or described without the phrase "or equal", no substitutions will be allowed.

1.04 SUBMITTALS

- A. Substitution Requests: For a period of 90 Days after issuance of a Notice to Proceed, the Engineer will consider written requests from the Contractor for substitution or equivalence of products other than those specified. The Contractor shall submit a separate request for each product, supported with complete data, drawings, and samples as appropriate, including but not limited to the following information:
 - 1. A detailed description of the Contractor's proposed substitution with comparison to product specified, including supplementary or revised Drawings and Specifications, as applicable.
 - 2. A statement of the reason for the proposed substitution and an explanation as to why implementation of such substitution would benefit the Project.
 - 3. A statement of the impact of the proposed substitution, if any, on the Contract Period and/or the Contract Sum.
 - 4. Cost data comparing the proposed substitution with the product specified and the amount of credit that the Contractor proposes to issue to the Owner if the proposed substitution is accepted.

5. Any required license fees or royalties.
 6. Availability of maintenance service and source of replacement parts and materials.
 7. Such supporting documentation as may be necessary under the circumstances to permit the Owner to evaluate fully the information set forth in 1 through 6 above.
- B. Contractor to Submit Requests for Substitutions: Requests for review of a substitution or equivalence will not be accepted from anyone except the Contractor. Moreover, such requests will not be considered until after the issuance of the Notice to Proceed.
- C. No substitution will be accepted for any product to be furnished under this Contract unless the manufacturer is, in the Engineer's opinion, of good reputation and has a plant of ample capacity. The manufacturer shall, upon the Engineer's request, be required to submit evidence that he has manufactured a product like the one specified that has been previously used for a like purpose and for a sufficient length of time to demonstrate its satisfactory performance.
- D. In no case shall the Owner's acceptance of a substitution be considered as grounds for a contract time extension or delay claim by the Contractor.

1.05 QUALITY ASSURANCE

- A. Contractor Certification: By the submittal of a substitution request, the Contractor shall represent that:
1. He has investigated the proposed substitute product and determined that it is equal to or superior in all respects to the product specified;
 2. He shall provide the same warranties or bonds for the substitutions as for the specified products;
 3. He shall coordinate the installation of an accepted substitution into the Work and make such other changes as may be required to make the Work complete in all respects;
 4. He shall waive all claims for additional costs due to the substitution which may subsequently become apparent. He also agrees to hold the Owner harmless from claims for extra costs and time incurred by other subcontractors and suppliers, or additional services which may have to be performed by the Engineer, for changes or extra work that may, at some later date, be determined to be necessary in order for the Work to function in the manner intended in the Contract Documents.
- B. Contractor Responsible for Performance: Neither the acceptance by the Engineer of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified shall in any way relieve the Contractor of responsibility for failure of the material or equipment due to faulty design, material, or workmanship, to perform the functions required by the Contract Documents.
- C. After approval of a substitution or an equal product, if it is determined that the Contractor submitted defective information or data regarding the product upon which Owner's approval was based, and that unexpected or un contemplated redesign or rework of the project will be required in order to accommodate the product, or that the item will not perform or function as well as the specified item for which equal product was requested, the Contractor will be required to furnish the originally specified item; the Contractor shall pay all costs, expenses or damages associated with or related to the unacceptability of such an equal product and the resultant utilization of another item and no time extension shall be granted for any delays associated with or related to such an equal product.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01630

NO TEXT ON THIS PAGE

SECTION 01720

FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The requirements related to construction to designated lines, grades and elevations.

1.02 CONSTRUCTION TO LINES AND GRADES

- A. All work under this Contract shall be constructed in accordance with the lines, grades, and elevations shown on the Drawings. The full responsibility for keeping alignment and grade shall rest upon the Contractor. Included shall be preparation of cut sheets.

1.03 SURVEYS

- A. Horizontal and Vertical Controls: Base horizontal and vertical control points will be established or designated by the Engineer. Water main coordinates and curve data also have been provided on the Drawings to assist the Contractor in the layout of the water mains. These points shall be used as datum for the Work. Electronic copy (CAD) of the Drawings will be provided to the Contractor upon request to assist with this effort. All additional survey, layout, preparation of cut sheets, and measurement work shall be performed by a Registered Land Surveyor, licensed in the Commonwealth of Virginia, employed by the Contractor as a part of the Work. Stake-out for all water mains shall be performed at intervals of 50 feet, at all appurtenances, and as otherwise directed by the Owner. Contractor shall submit cut sheets for review and approval by the Engineer prior to beginning water main installations.
- B. Scheduling: The Contractor shall keep the Engineer informed sufficiently in advance of the times and places at which he wishes to do Work, so that base horizontal and vertical control points may be established and any checking deemed necessary by the Engineer may be done with minimum inconvenience to the Engineer and without delay to Contractor in accordance with Section 01320 – Construction Schedule.
- C. Delay of Work: It is the intention not to delay the Work for establishment of control points and checking of lines and grades set by the Contractor but, when necessary, the Work shall be suspended for such reasonable time as the Engineer may require for this purpose. The Owner and the Engineer will not be liable for such delays.
- D. Survey information is based on the 1983 VCS for horizontal datum, and the NGVD 1929 for vertical control. The elevations shown are feet above mean sea level.
- E. Layout of Work: The Contractor shall provide an experienced instrument man, competent assistants, and any instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement performed by the Contractor.

1.04 PROTECTION OF SURVEY DATA

- A. Safeguarding Points: The Contractor shall safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, and replace them if disturbed, and bear the entire expense of checking replaced marks and rectifying Work improperly installed.
- B. Safeguarding Property Corners: The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent but not related to the Work and shall re-establish them if disturbed or destroyed.

1.05 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.

- B. Update the Project Record Drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests. The Engineer will check the Record Drawings monthly. Complete accurate updating is a condition precedent to approving and processing of monthly pay applications.
- C. Maintain an accurate record of all changes, revisions and modifications.
- D. Locate by survey the horizontal and vertical locations of all buried pipe and structures exposed during the work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION 01720

SECTION 01730

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 GENERAL REQUIREMENTS

- A. Coordinating Work: The Contractor shall do all cutting, fitting or patching of the Work that may be required to make several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Contract Documents. The restoration shall be performed by competent workmen skilled in the trade.
- B. Correcting Defective Work: The Contractor shall perform all cutting and patching required for the Work, as may be necessary in connection with uncovering Work for inspection or for correcting defective work.
- C. Improperly Timed Work: The Contractor shall perform all cutting and patching required to install improperly timed Work, to remove samples of installed materials for testing, and to provide for alteration of existing facilities or for the installation of new Work in the existing construction.
- D. Limitations: Except when the cutting or removal of existing construction is specified or indicated, Contractor shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without the Engineer's concurrence.

1.03 SCHEDULING

- A. Connections with Existing Facilities: The Contractor is advised that if any connections, replacement, and other Work requiring the shutdown of an existing facility are necessary, these shutdowns can only be scheduled at times when the impact on the Owner's normal operation is minimal and in accordance with the Drawings and Section 02510. At no additional cost to the owner, the Contractor may be required to work overtime, nights and weekends in making these connections, especially if the connections are made at times other than those specified. When a shutdown of an existing facility is necessary the contractor shall complete the tie-in in as expeditious manner as possible, minimizing the down time of the existing facility. Once an existing facility is shut down, the contractor shall work continuously on the tie-in until the new facility has been placed back into service. No shut downs which result in customers being out of service will be permitted on Mondays, Fridays, Thanksgiving week, or Christmas week.
- B. The Owner and the Engineer must be notified at least 10 days in advance of any shutdown required as a result of the Contractor's Work. A detailed plan for any shut-down and tie-in is required to be submitted under Section 01140 for review at least 28 days in advance of such shut-down and/or tie-in. Shutdowns shall be shown on the project schedule submitted by the Contractor.
- C. All shutdowns shall be incorporated into the Contractor's Schedule in accordance with the provisions of Section 01320 and schedule requirements noted within the Contract Drawings..

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Shoring Bracing: The Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations.
- B. Removal of Existing Materials: Materials shall be cut and removed to the extent indicated on the Drawings or as required to complete the Work at no additional cost. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials which are not salvageable shall be removed from the site by the Contractor.

3.02 RESTORATION

- A. Restoration of Existing Facilities: All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to the Engineer, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

END OF SECTION 01730

SECTION 01770

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section includes the procedures to be followed when closing out the contract.

1.02 FINAL FIELD TESTS

- A. Requirements: Upon completion of the Work and prior to final payment, the Contractor shall furnish all labor, materials, and instruments and shall make field tests of equipment as specified to prove compliance with the Contract Documents. If the field tests disclose that any equipment furnished by the Contractor under this Contract does not comply with the requirements of the Contract Documents, the Contractor shall make all changes, adjustments, and replacements required, and repeat the field tests until compliance with those requirements is demonstrated.

1.03 SUBMITTALS

- A. Manufacturer's Certificates: Manufacturer's certificates confirming that materials and equipment have been properly installed and are ready to be placed in service shall be submitted by the Contractor prior to Beneficial Use. If material stored on site, also refer to Equipment Manufacturer's Certification of Installation Testing and Instruction in Section 01600.
- B. Operation and Maintenance Data: All operation and maintenance manuals and data required for proper operation and maintenance of equipment and all required training of Owner personnel shall be completed prior to Beneficial Use.
- C. Project Record Documents: Project record documents required by the individual specification Sections shall be submitted within 14 days of the date of the Notice of Completion for Beneficial Use.
- D. Paragraphs A, B, and C preceding are considered requirements for Beneficial Use.

1.04 BENEFICIAL USE

- A. Notification: When the Contractor considers the Work ready for Beneficial Use, the Contractor shall so notify the Engineer in writing.
- B. Inspection: After the Contractor's notification, the Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If the Engineer does not consider the Work complete for Beneficial Use, the Engineer shall notify the Contractor in writing giving reasons therefor. If the Engineer considers the Work complete for Beneficial Use, he shall prepare and deliver to the Owner and Contractor a Notice of Completion for Beneficial Use fixing the date of Beneficial Use, and stating the responsibilities between the Owner and Contractor for operation, heating, utilities, and maintenance. The Notice shall include a list of items to be completed or corrected before final acceptance.

1.05 RELEASING COMPLETED WORK FOR USE

- A. Unless otherwise specified, it is the intent of these Specifications that all newly constructed Work be placed in use, when inspected and accepted and placed in service for its intended use. The

Contractor shall arrange his operations to permit access to all such parts of the Work by the Owner and other contractors for the Owner.

- B. Taking over of parts of the Work for operation before completion of the entire Contract shall not relieve the Contractor of any responsibility for proper integrated operations of all parts of the Work, nor shall it act to relieve him of any responsibilities under the Contract except as follows:
 - 1. When parts of the Work are accepted by the Owner or Engineer in advance of the date of Beneficial Use for the entire Project and such Work is taken over for use by the Owner, the starting date for the warranty period shall be the date for that portion of the Work accepted for Beneficial Use by the Owner.
 - 2. The Engineer will issue certificates describing the Work which is taken over for use by the Owner and the Contractor shall furnish all maintenance and warranty information of manufacturers or suppliers that is applicable to the Work being taken over for use.

1.06 FINAL CLEANING

- A. Removal of Contractor's Materials: At the conclusion of the Work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.
- B. Cleaning Materials and Equipment: The Contractor shall thoroughly clean all materials installed by him and existing structures, materials or equipment soiled by the contractor during construction and shall deliver over such materials and equipment undamaged in a bright, clean and polished condition.

1.07 FINAL INSPECTION

- A. When the Work has been completed in accordance with the requirements of the Contract and final cleaning has been performed, the Contractor shall request a final inspection which shall be performed by the Engineer within 10 days after receipt of the request. The Work will be deemed complete as of the date set by the Contractor if, upon inspection, the Engineer determines that no further Work remains to be done at the site. Upon determination that all Work is completed, the Engineer will issue a certificate of final completion.
- B. However, if such inspection, in the opinion of the Engineer, reveals items of Work still to be performed, the Contractor shall promptly perform them and then request a reinspection. In the event the Engineer then determines that the Work is complete, the date of final completion shall be deemed to be the last day of such reinspection.
- C. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.08 REINSPECTION FEES

- A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor, Owner will be reimbursed for such inspection by the contractor.

1.09 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Submit evidence of compliance with requirements of governing authorities, including documentation that all permit conditions and closure requirements have been satisfied.

- B. Submit evidence of payment and release of liens: Requirements of General Conditions.

1.10 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Engineer.
- B. Statement shall reflect all adjustments to the Contract amount:
 - 1. The original Contract amount.
 - 2. Additions and deductions resulting from:
 - a. Change Orders.
 - b. Units installed and unit prices.
 - c. Deductions for uncorrected or incomplete Work.
 - d. Deductions for liquidated damages.
 - e. Deductions for reinspection payments.
 - f. Other adjustments.
 - g. Extended engineering and/or inspection services and inspection overtime.
 - h. Excessive shop drawings review cost by the engineer.
 - 3. Total Contract amount as adjusted.
 - 4. Previous payments.
 - 5. Remaining payment due.
- C. Engineer will prepare a final Change Order reflecting approved adjustments to the Contract amount which were not previously made by Change Orders.

1.11 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment reflecting the above final contract value in accordance with procedures and requirements stated in the General Conditions.

1.12 WARRANTY PERFORMANCE

- A. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Owner will have the work performed by others, and after completion of the work, will charge any remaining contract funds for expenses incurred by the Owner while performing the work, including, but not limited to administrative expenses. In the event sufficient funds are not available to cover the construction warranty work performed by the Owner at the Contractor's expense, the Owner will have the right to recoup expenses from the Contractor's Surety under the performance bond or warranty/maintenance bond.
- B. Following oral or written notification of the required construction warranty repair work, the Contractor shall respond within one working day of his intentions/actions in pursuit of the warranty repair. Failure of the Contractor to respond will be cause for the Owner to proceed

against the Contractor as noted in 1.12.A.

C. Warranty Repair Priority

1. The nature of the warranty issue and its impact on operations will be evaluated by the Owner and a Response Priority assigned to the notice as followings:
 - a. First Priority Code 1 – Contractor to provide on-site inspection to evaluate the situation and determine the course of action within four (4) hours, initiate the work within six (6) hours and work continuously to completion or relief.
 - b. Second Priority Code 2 – Perform on-site inspection to evaluate the situation and determine the course of action within eight (8) hours, initiate the work within 24 hours and work continuously to completion or relief.
 - c. Third Priority Code 3 – Necessary work to be initiated within three working days and work performed during standard work hours each subsequent day to completion or relief.

D. Contractor's Response to Construction Warranty Requirements

1. Following the oral or written notification by the Owner, the Contractor shall respond to construction warranty service requirements in accordance with the assigned Response Priority code. The Contractor shall submit a report within seven (7) calendar days after completion of activities on any warranty item that has been repaired during the warranty period. The report shall include:
 - a. The cause of the problem
 - b. The date/time reported
 - c. The assigned Response Priority Code
 - d. Corrective action taken
 - e. When repairs were completed
- E. If the Contractor does not perform the construction warranty items within the time frames specified above, the Owner retains the right to perform the work and recover all costs from the Contractor or its surety.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01770

SECTION 01780

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, and data necessary to maintain and produce Project Record Documents (drawings and specifications) in accordance with applicable Contract provisions.
- B. Impacts resulting from the Contractor's failure to meet Project Record Documents requirements shall in no part become the subject of a claim for extension of time or for excess costs or damages by the Contractor.
- C. The terms 'drawings', 'contract drawings', 'record documents', 'working as-built', and 'as-built drawings' all refer to contract drawings which are revised and used for final Project Record Documents.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store working drawings, submittals, shop drawings, and samples in field office apart from documents used for construction.
- B. File all documents and samples in accordance with CSI/CSC format.
- C. Maintain all documents in a clean, dry, legible condition and in good order. Do not use the Record Documents for construction purposes.
- D. Make all documents and samples available at all times for inspection by the Engineer.

1.03 SUBMITTAL

- A. Prior to the date of Beneficial Use, submit 2 sets of red-lined final Project Record Documents to the Engineer for review and approval. This submittal is one of the prerequisites to Beneficial Use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 Record Documents Posting During Construction – Working As-Built

- A. The Contractor shall maintain 2 sets of contract drawings and revise by red-line editing to track changes and show the as-built conditions during the execution of the project for each project discipline including, when applicable, Civil, Architectural, Structural, Mechanical, Plumbing, Electrical, Instrumentation / Controls, and special construction. These working as-built documents shall be kept current and updated on a weekly basis and at least one set shall be available for review at the jobsite at all times. Changes from the contract documents which are made in the work, field changes, and additional information uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes on the drawings. The working record documents will be jointly reviewed for accuracy and completeness by the Owner/Engineer and the Contractor prior to submission of each of the Contractor's monthly Applications for Payment.

- B. The Contractor shall maintain 2 sets of contract Technical Specifications and revise by red-line editing to accurately reflect all changes to the specifications that occur during the performance of the contract as the result of Addenda, Request for Clarification, Change Orders, and all other written directives.
- C. The working as-built shall be marked up accurately and legibly.
 - 1. When revisions to drawings are made, make changes to affect related section views, details, legends, profiles, plans and elevation views, schedules, notes and designations. No stapling or taping of source document is allowed.
 - 2. When changes are required on small-scale drawing details, use large-scale inserts with leaders to the applicable location.
 - 3. Use written explanation to describe changes when graphic means are not sufficient to completely depict the change conditions.
- D. Owner/Engineer's review of record documents is for verifying accuracy and conformance to contract requirements. This review is a condition precedent to the approval and processing of each monthly pay application. Accuracy and completeness of all details in record documents such as dimensions, quantities, installation of equipment or systems remain the responsibility of the Contractor.

3.02 CONTENT

- A. The Project Record Document packages shall be submitted as follows:
 - 1. Project Record Documents - Drawings and Specifications
 - a. The Contractor shall submit two paper set of red-lined contract drawings and technical specifications for review and approval of the Engineer. The documents should be marked neatly and accurately to reflect actual civil, architectural, structural, electrical, plumbing, mechanical, instrumentation and controls, fire protection, and special construction final as-built conditions of the project as applicable.
 - b. Label each set of plans and specifications "RECORD DOCUMENTS". Have skilled draftsperson transfer all changes, corrections, and entries.
 - c. Submission and Approval of final Project Record Documents is one of the pre-requisites to final completion of the project.
 - d. Submittal information should include the following as applicable:
 - 1) Changes or modifications as a result of Addenda, Approved Shop Drawings, Request for Clarifications, Record of Minor Changes, Work Orders, Change Orders, and all other written instructions.
 - 2) Field changes of installation, dimensions, and details of all project components
 - 3) Field changes to all water mains, valves, structures, fire hydrants, and related appurtenances, showing horizontal and vertical locations, pipe sizes, material, lengths, and elevations
 - 4) Pipe manufacturer's Laying Schedule and actual field cut dimensions, lay lengths and rotations necessary to tie into existing pipe/facilities.
 - 5) Final location and depth of all underground and aboveground utilities and raceways

- 6) Changes in details of design or additional information obtained from fabrication documents, erection plans, material changes, substitutions, installation plans, and placement details
 - 7) Actual locations of anchors and all joints in concrete
 - 8) Relocations or changes in the orientation of equipment and piping
 - 9) Location of concealed internal utilities and appurtenances referenced to visible and accessible features of structure
 - 10) Layout and schematic drawings of electrical panels, raceways, circuits and wiring complete with field verified labels and numbering
 - 11) Layout and schematic drawings of instrumentation control panels, raceways, and wiring complete with field verified labels and numbering
 - 12) Where contract drawings or specifications present options, only the option selected for construction shall be shown
 - 13) Changes or modifications resulting from the Regulatory and Beneficial Use inspections
2. Site As-Built – Projects with a separate site plan or a site permit issued by the locality require an as-built site plan as outlined below:
- a. The Contractor shall submit a site as-built prepared by a licensed Land Surveyor or licensed Professional Engineer to Owner/Engineer for review and approval prior to the date of Beneficial Use.
 - b. The contractor shall also submit the site as-built to local authorities having jurisdiction for review for conformance with the approved site plan and regulatory approval. The site as-built shall be in accordance with the requirements of the Fairfax County Zoning Ordinance 17-300 or other localities having jurisdiction. The Contractor shall pay any required filing, correction, and resubmission fees at no additional cost to the Owner. The approval of site as-built by local authorities is a prerequisite to Final Completion.
 - c. The site as-built should minimally include the following:
 - 1) Boundary of the site
 - 2) Locations of all utilities, water mains, storm drainage systems, and sanitary sewer pipes with elevations, inverts, and slopes
 - 3) Dimensional locations of all buildings and structures
 - 4) Location and cross-sectional survey of all stormwater or bio-retention facilities
 - 5) Curb and gutter and/or ditch elevations
 - 6) Survey and record topographic elevations for all paving, sidewalks, stairs, ramps, and entrances to verify conformance with contract requirements.
 - 7) Deed book and page number of any dedication and easements
 - 8) Certification by the Contractor's licensed engineer or surveyor indicating that the as-built conforms with the approved site plan except as shown and that it represents the actual conditions on the site, and bearing his seal and signature
 - 9) Any other regulatory requirements and pertinent information as determined by the Owner/Engineer
- B. Engineer's review of project record Documents submittal is not conducted for purpose of determining accuracy and completeness of other details such as dimensions, quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor.

3.03 PAYMENT

- A. There will be no separate payment for Project Record Documents monthly updates and final submissions. The cost for Project Record Documents as outlined in these specifications must be included in the water main installation line items and the contractor's total bid price for the project. In the event that the interim working as-built or the final Project Record Documents submittal are found to be incomplete and rejected by the Engineer due to inaccuracies, incomplete information, or other non-conformance issues, the Owner reserves its right to hire an outside engineering firm to field-verify all as-built information and revise the Project Record Documents as required. All costs associated with this effort will be back-charged to the contractor and deducted from the contract amount at final payment.

END OF SECTION 01780

SECTION 02260

EXCAVATION SUPPORT SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shoring and Bracing
- B. Trench Shields (Boxes)

1.02 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment.

1.03 REFERENCES

- A. ASTM D245 – Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber.
- B. American Wood Preservers Association C2.
- C. Occupational Safety and Health Standards - Excavations; Final Rule 29CFR Part 1926. Occupational Safety and Health Administration (OSHA).

1.04 SUBMITTALS

- A. Submit shop drawings and material certificates of compliance in accordance with Section 01330 – Submittals.
- B. Design Data:
 - 1. Submit design drawings of excavation support system to be used at locations of all water main and vault installations, including but not limited to: locations where the proposed water main and/or casing pipe crosses or is installed adjacent to system interconnections and tie-in locations, and similar structures. Excavation support system shall include provisions to protect and support existing utilities, including but not limited to poles, manholes, water and sewer mains, brick screen walls, underground cables, etc. Drawings must be sealed and signed by a Professional Engineer registered in the Commonwealth of Virginia.
 - 2. Trench Shields: Submit design or approval of trench shields by registered Professional Engineer.
 - a. Refer to OSHA Standard for design requirements.

1.05 REGULATORY REQUIREMENTS

- A. OSHA: Comply with OSHA regulations for excavation safety.
- B. Virginia Department of Labor and Industry: Comply with requirements of Virginia Department of Labor for Excavation Safety.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Timber and Lumber: Timber and lumber shall meet the requirements of ASTM D245 and the following:
 - 1. General: Timber and lumber shall be free from shakes, waness, black and unsound knots and decay.
 - 2. Untreated Lumber: Timber and lumber for shoring and bracing shall be new pine, Douglas fir, or spruce unless otherwise shown or specified.

Timber and lumber for decking and supports shall be hard yellow pine. No secondhand timber or lumber shall be used where strength and appearance are considerations.

3. Treated Lumber: Treated timber and lumber shall be well seasoned No. 1 southern yellow pine or Douglas fir, reasonably free of knots, splits, seasoning checks, pitch pockets and streaks, wormholes and other defects.

- a. Timber and lumber shall be treated with Grade One coal-tar wood preserving oil by the empty cell process, in conformity with the requirements of the American Wood Preservers Association C2.

2.02 EQUIPMENT

- A. Trench Shields: Trench Shields and/or other shoring, bracing, etc. shall meet all applicable OSHA Requirements for such units.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Shore and brace excavations as required by law and all applicable regulations or where conditions dictate to prevent shifting of material or damage to structures or adjacent property, and to avoid delays to the Work.
- B. Bracing: Arrange bracing to avoid placing strain on portions of the completed Work until the shoring and bracing is to be removed.
- C. Trench Shields: Trench Shields shall be installed in accordance with manufacturer's instructions.

3.02 REMOVAL

- A. Shoring and bracing: Remove shoring and bracing as excavation is backfilled in a manner which avoids caving of the bank, damage to the Work, and disturbance to adjacent areas, pipelines, and other under-ground utilities or structures.
 1. Voids: Fill voids left by withdrawal of the shoring by jetting, ramming or as otherwise directed.
- B. Sheeting Left in Place: Sheeting shall be left in place only where indicated on the Drawings or when directed by the Engineer.

END OF SECTION 02260

SECTION 02315

EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating Trenches for Water Mains and Appurtenant Facilities.
- B. Rock Excavation
- C. Backfilling and Compacting

1.02 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment.
- B. All excavation performed under this contract shall be unclassified excavation. No additional payment will be made for splitting, removal, or disposal of rock, nor for furnishing and placing suitable backfill material in its place, within the depth limits shown on the Drawings.

1.03 REFERENCES

- A. Land Use Permit Manual, Virginia Department of Transportation.
- B. Road and Bridge Specifications, Virginia Department of Transportation.
- C. ASTM D698 - Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. Hammer and 12-inch Drop.
- D. Manual of Accident Prevention in Construction. Associated General Contractors of America.
- E. Occupational Safety and Health Standards - Excavation; Final Rule 29 CFR Part 1926, OSHA.
- F. Virginia Work Area Protection Manual
- G. Fairfax County Public Facilities Manual
- H. Virginia Administrative Code - Chapter 309 Rules for Enforcement of the Underground Utility Damage Prevention Act

1.04 SUBMITTALS

- A. Submit shop drawings and material certificates of compliance in accordance with Section 01330 – Submittals.
- B. Materials and Certifications:
 - 1. Select Fill: Submit letter of certification and list of material composition and properties from each supplier of select fill.
 - 2. Compaction Test Reports: Submit reports for each location of field compaction test. Reports shall include results of field density tests, moisture content, and degree of compaction.

1.05 DEFINITIONS

- A. Utility: Buried pipe, conduit, or cable, surface features such as swales and ditches, and overhead wires or cables including their supports.
- B. Earth: The softer materials of the outer surface of the earth. The basic constituents are the products of rock disintegration, glaciation, and erosion, consisting of boulders, cobbles, pebbles, sand, silt, and clay.
- C. Rock Excavation: Rock excavation shall consist of excavation and offsite disposal of materials that cannot be dislodged by excavating equipment defined herein. Excavating

equipment for open excavations shall be equivalent to Caterpillar Model No. D-8N, heavy duty track type tractor, rated at not less than 285 hp flywheel power and equipped with a single shank hydraulic ripper, capable of exerting not less than 45,000 lbs breakout force. Excavation that can be completed using equipment noted herein shall be considered regular excavation.

- D. Heavy Clearing: Clearing areas where the average diameter of the trees measured at the trunk is greater than 4 inches and the average spacing of the trees is less than 8 feet on center. All other clearing shall be incidental and no additional payment shall be made.

1.06 FIELD MEASUREMENTS

- A. Bench Marks: Verify that survey bench marks and intended elevations for the Work are as shown on the Drawings. Refer to Section 01720 for additional requirements.

1.07 TREE CUTTING REQUIREMENTS

- A. Establish Clearing Limits: The clearing limits shall be as defined on the Drawings under Limits of Construction. All trees within the construction limits shall be removed unless denoted to be saved (via tree protection). Prior to tree removal or beginning clearing operations, the Contractor shall identify the clearing limits for the Project using yellow ribbon to designate the boundaries.

1. Specific trees to be saved within the clearing limits shall be flagged.
2. Clearing limits and trees to be saved will be reviewed at the site by the Owner.
3. Trees (up to 30 feet tall) located outside of the designated clearing limits, whose branches overhang within the limits of construction, shall be trimmed back by a qualified landscape contractor approved by the Owner at no additional cost to the Owner.

- B. Authorization for Tree Removal: No tree shall be removed until Contractor has written approval from the Engineer.

- C. Consequences for Unauthorized Tree Removal: At the discretion of the Owner, one of the following measures will be imposed as a remedy for each tree removed without prior approval.

1. At his expense, Contractor shall plant minimum 10 foot tall replacement trees in quantities which equal the number of trees removed.
 - a. The species of replacement trees will be the same as the trees which were removed, or as directed by the Engineer.
2. Contractor shall be required to pay the Owner a penalty fee for each tree removed.
 - a. The penalty fee will be computed using the International Arborists Society, formula, as applied by the Engineer.

1.08 WORK REQUIREMENTS IN FEDERAL, STATE, OR COUNTY RIGHTS-OF-WAY

- A. Permits: Refer to Section 01410 - Regulatory Requirements, for permits obtained by the Owner. All other permits shall be obtained by the Contractor.
 1. The Contractor shall assume all responsibility for fulfilling any and all requirements specified in right-of-way permits.
 2. All applicable provisions for work in the State Right-of-Way are set up in the "Land Use Permit Manual," Maintenance Division, Virginia Department of Transportation, Richmond, Virginia, as can apply to the type of Work covered by this permit, shall apply, including provisions for revocation of permit.
 - a. The Contractor shall obtain a release from the Land Use permit in accordance with the requirements of this Section and Section 01410.

b. The Contractor shall be prohibited from working in the State Right-of-Way on the designated State/Federal Holidays listed in Section 108.02 of the VDOT Road and Bridge Specification, latest edition.

3. Contractor shall employ VDOT certified personnel for clearing and tree trimming operations within the VDOT Right-of-Way.

1.09 ADDITIONAL REGULATORY REQUIREMENTS

A. Naturally Occurring Asbestos: The Contractor shall comply with all applicable regulations of OSHA and the Fairfax County Health Department concerning Working requirements in areas containing naturally occurring asbestos deposits.

1.10 WARRANTY

A. The Contractor shall be responsible for correcting any settlement in backfill or pavement for a period of one year after final completion of the Work.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Select Fill: Select fill shall meet the following requirements:

1. Crushed Stone: Crushed Stone shall consist of 21A crushed stone conforming to VDOT specifications, or an approved substitute. NOTE: No. 57 stone shall be used (in lieu of 21A stone) at creek crossings and in areas containing groundwater.

2. The conversion factor for Select Fill supplied by weight instead of volume will be 3000 pounds per cubic yard.

B. Suitable Fill: Suitable fill material shall conform to the following requirements.

1. Type I: Type I material shall consist of clean earth excavated from the trench containing no stone larger than 3/4 inch across.

2. Type II: Type II suitable material may be substituted for Type I suitable material, in the area from 12 inches above top of pipe to original grade. Type II material shall contain good earth and stone excavated from the trench.

a. Stone material contained in Type II suitable fill shall not exceed 6 inches across and shall be uniformly distributed.

b. Type II suitable material shall not consist of more than 50 percent stone by volume.

2.02 BEDDING MATERIALS

A. Bedding: Pipe bedding shall be Crushed Stone and shall meet the requirements of Paragraph 2.01.A.1 above.

PART 3 EXECUTION

3.01 PREPARATION

A. Identify: Required lines, levels, contours, and datum.

B. Protect Existing Vegetation: Protect plant life, lawns, and other features remaining as a portion of final landscaping.

C. Protect Existing Features: Protect bench marks, existing structures, fences, sidewalks, paving, mailboxes, gas line markers, curbs, and other similar features from excavation equipment and vehicular traffic.

D. Clearing: The site of all open cuts and excavation shall be first cleared of trees, stumps, shrubs, underground and other obstructions prior to excavation.

1. Clearing within easements and rights-of-way shall be limited to the construction limits shown on the Drawings and to less than one acre of land disturbance at any given time.

2. Remove and dispose of cleared materials and debris unless otherwise directed by the Engineer.
3. Remove topsoil and stockpile for use in restoration of excavated areas.

3.02 WORK IN VDOT RIGHT-OF-WAY

- A. Length of Open Trenches: The maximum length of trench at any time, including backfill portion of same not then suitable for traffic, shall not exceed 150 feet. Trenches shall not be left open overnight.
- B. Repair of Damage: When pavement edge or shoulder is damaged due to diversions of traffic away from the pipe laying operation, repairs shall be made as directed.
- C. Open Cut Requirements: Wherever pavement is permitted to be cut, not over one-half of the width shall be disturbed at one time. For crossings, the first opening shall be completely restored to satisfactory travel conditions before the second half is opened. Where the pavement is disturbed, or deemed weakened, it shall be restored or replaced as directed in its entirety, or such portion or portions as deemed necessary.
- D. Stockpiling Excavated Materials: No excavated material shall be placed on the pavement, without written permission. When so permitted, protect pavement with a 1-inch layer of sand or approved substitute material at no additional cost to the Owner. The pavement shall be satisfactorily cleaned by an approved method.
- E. Equipment Restrictions: No cleared equipment shall be used on pavement. Where track equipment must enter paved areas, protect pavement with a sufficient layer of sand or approved substitute material at no additional cost to the Owner.
- F. Traffic Maintenance:
 1. Contractor is responsible for notifying City of Fairfax, City of Falls Church, or VDOT Traffic Operations Center at (703) 877-3401 prior to any lane closure and again after the lane is opened.
 2. Traffic Control: Traffic shall not be blocked or re-routed without special written permission from VDOT. Where one-way traffic is permitted to be maintained, it shall be flagged 24 hours per day. Traffic shall at all times be properly protected by adequate lights, barricades, signs and flagmen when needed. Signs shall be in accordance with the current specifications of the Virginia Manual on Uniform Traffic Control Devices. The signs are to be located as directed by the VDOT Resident Engineer or his representative. Copies of the VDOT signing requirements may be reviewed at the office of the VDOT Resident Engineer.
 3. Entrances: Road and street connections and private entrances shall be kept in a satisfactory condition. Entrances shall not be blocked, and ample provision shall be made for safe ingress and egress to adjacent property at all times.
 4. Pedestrian Traffic: If sidewalk or trail is blocked by construction activities, the pedestrian traffic shall be re-routed around the construction area at no additional cost to the owner. Traffic shall at all times be properly protected by adequate lights, barricades, signs and fencing in accordance with Section 01500.
 5. Night work: If more than one lane must be closed, the work shall be performed at night at no additional cost.
- G. Correction of Hazardous Situations: The Contractor shall immediately correct any situation which may arise which the Engineer deems hazardous to the traveling public.
- H. Drainage Requirement: Maintain all drainage facilities in accordance with Section 01500.
- I. Dust Control: The Contractor shall ensure that dusty conditions are controlled in accordance with Section 01500.
- J. Pavement Restoration: Refer to Section 02700 for pavement restoration requirements.

- K. Construction Entrances: The Contractor shall construct and maintain construction entrances at locations designated on the Drawings, or as approved by the VDOT Inspector, in accordance with the Erosion & Sediment Control notes and details on the Drawings.
- L. Additional Requirements: Refer to Section 01410 Regulatory Requirements, and the VDOT Land Use Permit, for additional VDOT requirements and restrictions.

3.04 EARTH EXCAVATION

- A. Shaping and Trimming: Excavate trenches to the widths and depths specified below, except where indicated otherwise.

- 1. Trench width at bottom of pipe:

Nominal Pipe Diameter (Inches)	Trench Width (Inches) Ductile Iron
3 – 4	24
6 – 16	OD + 18
24 - 36	OD + 24
42-54	OD + 30

- 2. Trench Bottom: Grade and align pipe trench bottoms to provide bearing for the full length of the pipe barrel. Provide bell holes for the proper assembly of pipe joints.

- B. Additional Excavation: If unsuitable bedding materials are encountered at the specified elevation, or if additional depth is required for other reasons, no additional payment will be made unless such further excavation is carried to the depth requested by the Contractor and approved in writing by the Engineer. It is the responsibility in the first instance of the Contractor to evaluate the suitability of bedding materials and to notify the Engineer of any irregularity or unsuitability. Notwithstanding the foregoing, in the event the Engineer determines the bedding materials in any area to be unsuitable, with or without the concurrence of the Contractor, the Contractor shall promptly follow the direction of the Engineer in addressing such condition. Where additional excavation has been ordered and approved, the Contractor shall replace the removed material with Class D concrete, or select fill material as directed by the Engineer.
- C. Unauthorized Excavation: Wherever the excavation is carried beyond or below the lines and grades given by the Engineer, except as specified above, all such excavated space shall be refilled with such material and in such manner as may be directed in order to ensure the stability of the various structures. Beneath all structures, space excavated without authority shall be refilled by the Contractor at his own expense, with Class D concrete or select fill materials, as ordered by the Engineer.
- D. Disposal of Material: Top soil suitable for final grading shall be stored on the site separately from other excavated material. If there is no suitable location at the site for material storage, then the material may be stored offsite at no additional cost to the Owner. Other surplus excavated material unsuitable for backfilling or in excess of that required for constructing fills and embankments as shown on the Drawings shall be removed by the Contractor at no additional expense to the Owner.
- E. Excavation support systems: Refer to the provisions of Section 02260 for requirements.
- F. Removal of Water: Refer to the provisions of Section 01500 for requirements.
- G. Removal and disposal of Petroleum-Contaminated Soil and Groundwater: In areas where petroleum-contaminated soils are encountered along the proposed water main alignment, the contractor, as directed by Fairfax Water, shall remove and dispose of all contaminated soils within the pipeline trench where the Total Petroleum Hydrocarbon (TPH) concentration exceeds 50 mg/kg. The contractor shall remove the subject soils as directed by Fairfax Water in accordance with applicable regulations of the Virginia Department of Environmental Quality (VDEQ), the U.S Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and industry-recognized removal procedures. The contaminated soils

shall be disposed of at a certified land fill site for the concentration levels encountered. Suitable clean fill material will be put in place above newly installed water main, if non-paved area, in accordance with Fairfax Water's standard Trench Details. Additionally, the Contractor shall install trench plugs at each end of the limit of contaminated soils in accordance with Fairfax Water's standards.

The Contractor shall also obtain all necessary permits and inspections as required by local, state, and federal laws, rules, and regulations. The contractor shall make reasonable efforts to excavate only contaminated soil necessary for the implementation of this project, and shall separate it from any other clean soil.

The Contractor shall handle the contaminated soil (from its generation to its disposal) in accordance with the pertinent sections of DEQ Guidance Document# 99-2004 (Storage Tank Program Technical Manual). In summary, the contractor shall characterize the excavated contaminated-soil in accordance with either VAC 20-80-700 or the permit requirements of the facility. Applicable VAC 20-80-700 regulations are referenced. Contaminated soil shall be treated by means of a low temperature thermal desorption or bioremediation process. Remediation shall be performed off-site in accordance with Virginia Department of Environmental Quality regulations, or as directed by the engineer.

After remediation, the contractor shall provide Fairfax Water with copies of the signed transportation manifest, disposal records, and certificate of remediation, or other written documentation indicating that the soil had been adequately treated. Disposal of the treated soil shall be in accordance with applicable Virginia Department of Environmental Quality regulations.

Likewise, the contractor shall follow the engineer instructions and manage the petroleum contaminated groundwater from the generation to its disposal in accordance with Section 6.1 of the VDEQ Guidance Document # 99-2004. According to the referred Guidance Document, the proper handling of the wastewater will be depending on the nature and level of contamination as well as the quantity of the water.

If the contractor chooses onsite treatment, the contractor or his consultant shall submit a VPDES permit application to the VDEQ for approval and consult with the Fairfax County Storm Water Pollution Section/Office. The onsite treatment system may encompass frac tanks for temporary storage, air stripper to remove volatile components, and a carbon filtration system for sediments. If instead, the contractor opts for other treatment method, he may, provided it complies with the federal, state, local, and VDOT specifications.

The contractor is required to comply with all VDEQ applicable regulations including permits, storage time limit, sampling, chemical analyses, and inspections. Moreover, the contractor shall provide the ENGINEER/OWNER with all records of the disposal and testing, and keep copy of these records until the case is closed.

The contractor will be compensated for removal and disposal of contaminated soils based on actual documented costs for treatment and disposal of the contaminated soil and groundwater. The contractor shall provide the Owner with actual subcontractor invoices, hauling and disposal documentation, transportation manifest records, disposal receipts, and all other records associated with each event.

3.05 ROCK EXCAVATION

- A. Limits of Rock Excavation: Excavate rock within the widths and depths specified for earth excavation and specified in this paragraph.
 - 1. Proposed Structures: Excavate only to the bottom of structure.
 - 2. Rock Trench: Remove rock to a minimum of 6 inches below the bottom of pipe and replace with 6 inches of select fill material for pipe bedding.
 - 3. Existing Structures: Excavate rock within 5 feet of existing structures and utilities by wedging, barring or other approved method.

4. Rock excavation may be performed by the use of a rock trenching machine or other approved method. Machine shall be adequate to excavate rock of the type and in the quantities necessary to perform the work required by this project.
 5. When the use of a rock trenching machine is inappropriate (such as at utility crossings), rock shall be excavated by barring, wedging or other approved methods.
- B. Blasting
1. Blasting shall not be permitted.
- C. Protection of Backfill Material
1. Excavated materials from rock excavation operations, that are deemed suitable for use as backfill, shall be placed back in the trench, compacted, and protected from inclement weather prior to re-excavation for, and during new pipeline installation, at no additional cost to the Owner. If the Contractor fails to protect the suitable material, thereby allowing it to become unsuitable, he shall provide select fill at no additional cost to the Owner.
 2. Unsuitable Materials: Refer to the provisions for disposal of materials under the earth excavation requirements of this specification section.

3.06 BACKFILLING

- A. Pipe Trenches: Backfill trenches to original grade or to such other grades as shown or directed.
1. Manual Backfilling: Backfill around pipe manually with select fill, from 6 inches below the pipe up to 6 inches above the pipe in non-paved areas, unless specified otherwise herein. Limits of select fill in paved (roadway) areas, at stream crossings, under asphalt trails, or other designated areas shall be as defined on the Trench details on the Drawings. If rock is encountered, backfill around pipe (with select fill) from below pipe, in accordance with limits of rock excavation defined in paragraph 3.05.A.2 above, up to 6 inches above the pipe. This material shall be placed in layers approximately 6 inches thick, up to the limits indicated (on the trench details) on the Drawings, each layer being thoroughly tamped and compacted in place to a minimum of 95% of maximum dry density in accordance with ASTM D698 and VDOT Road and Bridge specifications. Tamp using tools of approved weight to the following points:

<u>Nominal Pipe Diameter</u>	<u>Top of Manual Backfilling</u>
16 Inches and Under	12 Inches Above Top of Pipe
Greater than 16 Inches	6 Inches Above Top of Pipe
 2. Backfilling by machine in non-paved areas: After backfilling around the pipes as specified above, the remainder of the trench may be backfilled by machine with suitable fill, but the Work shall be done in such a way as to prevent dropping of material directly on top of the pipe or structure. Material shall be deposited in uniform horizontal layers up to 2 feet in depth and compacted to a minimum 85% density in accordance with ASTM D698. If, due to rain or other causes, the material is too wet for satisfactory compaction, it shall be allowed to dry partially before compacting.
 3. Select fill: Where select fill material is ordered by the Engineer to bed and backfill the pipe, this material shall be consolidated to the identical points specified where suitable fill material is used as backfill. The use of select material shall be based upon the actual trench conditions encountered and depth shall be determined by the Engineer.
 4. Prevention of Settlement: Where structures such as pipelines, walks, asphalt trails, driveways and roadways are to be constructed or replaced later, on backfilled areas, the entire backfill in such areas placed in layers, rolled, rammed, or otherwise thoroughly compacted to a minimum of 95% of maximum dry density to prevent settlement.
 5. Use of water for compaction is prohibited.

- B. Backfilling Around Structures: Backfilling around thrust collars, and other structures and conduits shall be performed manually.
 - 1. Removal of foreign matter: Remove lumber, rubbish, braces and refuse from behind walls prior to starting backfill operation.
 - 2. Backfill shall be compacted to a minimum 95% density.
- C. Backfilling in VDOT Right-Of-Way: The following additional requirements apply for work performed in VDOT right-of-ways:
 - 1. Backfill compaction: All backfill shall be placed in layers of not greater thickness than 6 inches, and shall be compacted to at least 95% of maximum dry density in accordance with Virginia Department of Transportation Road and Bridge Specifications. Compact with pneumatic tampers or by other approved methods. Compaction by water shall not be permitted.
 - 2. Rejection of unsuitable materials: The VDOT inspector may, at his discretion, reject backfill material which he determines to be unsuitable.
 - 3. Backfill requirements beneath aggregate surfaces: When the excavation is made beneath aggregate surfaces, the top 10 inches of the trench must be replaced in accordance with the requirements of Section of 02700.
- D. Compaction testing by an independent testing laboratory approved by the Owner, shall be paid for by the Contractor, at no additional cost.
 - 1. One compaction test shall be made for each 250 linear feet of pipeline installed. Test location and depth will be as directed by the Owner or the Engineer. Testing shall be continued along the backfill benching so as not to delay pipe laying activities.

3.07 EARTH EMBANKMENTS

- A. General: Fills and embankments, required for the construction or completion of the Work shall be constructed where shown on the Drawings and to the lines and grades given by the Engineer.
- B. Removal of Vegetation: The entire surface of the ground to be covered with embankment shall be stripped of all grass, vegetation, topsoil, or destructible material of any kind, including rubbish, before any embankment material is placed.
- C. Embankment Materials: Earth embankment shall be made of the best material available from the excavation, so far as this is sufficient and of satisfactory character. No rubbish or other destructible matter shall be used in embankments. Any additional material needed for earth embankment shall be from borrow pits approved by the Engineer, and this material shall be reasonably free from vegetable matter, large boulders, or rocks, greater than 6 inches in diameter, and shall be a material that can be solidly compacted and will remain stable when wet.
- D. Placement and Compaction Requirements: Wherever any structure is to be built upon embankments or fill, the earth for the embankment shall be placed in layers of 8 inches in loose depth, and each layer shall be thoroughly sprinkled and compacted before the next layer is added. If, due to rain or other causes, the material is too wet for satisfactory compaction, it shall be allowed to dry partially before compacting. The layers shall extend entirely across the fill and shall be approximately level. Each layer shall be thoroughly compacted by the travel of trucks, where possible, or other machines. If ordered by the Engineer, the earth shall be compacted by rolling with a sheeps foot or tamping roller having a minimum weight on each tamper of 200 pounds per square inch of cross-sectional tamping area. The earth embankment, as specified above, shall be left to stand for as long a time as possible during the progress of construction and shall not be built upon until approved by the Engineer. The Contractor shall conduct compaction testing in accordance with Paragraph 3.06.D above.

- E. Finish grading: Before leaving the Work or before topsoil is placed, the top and slopes of all embankments shall be carefully trimmed to the slopes, lines and grades established by the Engineer, and any depressions shall be brought to grade with acceptable material. In general, for lawn areas, the embankments shall be fine graded to a true surface 4 inches below the established grade. For other areas, the embankments shall be fine graded to the established grade.
- F. Removal of unsatisfactory material: If any of the material is not sufficiently compacted in and by the methods being used, such material shall be removed from the embankment and replaced with approved material compacted to meet the required density.

3.08 RESTORATION

- A. General: The Contractor shall be responsible for maintenance and careful removal of fences, gas line markers, small trees, shrubs and other similar features. Temporary restoration of these items, if needed, shall be accomplished within 24 hours. All items covered by this section shall be restored or replaced in kind by the Contractor immediately upon completion of pipe installation in the affected area.
- B. Complete finish grading and restoration of excavated areas in accordance with Section 02920 and the Drawings.
- C. Pavement: Refer to the provisions of Section 02700.

END OF SECTION 02315

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SECTION 02370

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Erosion and Sediment Controls: This work consists of temporary methods to control water pollution and erosion, such as berms, dikes, dams, stream crossings, sediment basins, crushed stone, gravel, mulches, grasses, straw bales, silt fence, inlet protection, slope stabilization matting and other erosion control devices as indicated on the Drawings.
- B. Riprap

1.02 RELATED SECTIONS

- A. Section 02920 – Lawns and Grasses
- B. Unit Prices: Refer to Section 01200 – Measurement and Payment

1.03 REFERENCES

- A. Virginia Erosion and Sediment Control Handbook, Latest Edition
- B. Fairfax County Public Facilities Manual, Latest Edition
- C. Riprap – Virginia Department of Transportation Road and Bridge Specifications

1.04 SUBMITTALS

- A. Submit shop drawings and material certificates of compliance in accordance with Section 01330 – Submittals.

1.05 REGULATORY REQUIREMENTS

- A. Erosion and Sediment Controls: Erosion controls shall be as indicated on the Drawings and shall satisfy the governing standards of the Virginia Erosion and Sediment Control Handbook, Virginia Department of Transportation Road and Bridge Specifications, and the Fairfax County Public Facilities Manual, whichever is more stringent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: All products and materials shall comply with the Virginia Erosion and Sediment Control Handbook and the Fairfax County Public Facilities Manual.
- B. Riprap:
 - 1. Riprap shall be in conformance with VDOT Road and Bridge Specifications, Sections 204 and 414, for Dry Riprap Class I.
 - 2. Riprap bedding shall be crushed stone, minimum Grade B conforming to VDOT Road and Bridge Specifications, Section 203, 204, and 414. Stone size shall conform with Drawings.
 - 3. All stone shall be sound, durable and free from seams, cracks or other structural defects.
- C. Filter Fabric (Geotextile): Filter fabric used for silt fence and Geotextile underliner (for asphalt trails) shall be in conformance with Section 245 of the VDOT Road and Bridge Specifications.
- D. Hydraulic Cement Grout: Grout used for cementing riprap, where indicated on the Drawings or as directed by the Engineer, shall be in conformance with the Section 218 of the VDOT Road and Bridge Specifications.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to commencing Work, a joint on-site inspection shall be held to review specific siltation control requirements. Participants should include representatives of the Contractor, the Engineer and the Owner.
- B. The Contractor shall have on staff and assigned to this project, an individual holding a Virginia Responsible Land Disturber Certificate. This individual will be responsible for compliance with all land disturbing activity requirements on the project, which shall include limiting disturbance to less than one acre of land at any given time.
- C. Precautions: Take precautions to prevent the silting of streams or water impoundments during actual construction and periods when the Work may be temporarily suspended.
 - 1. Prevent construction activities from causing erosion to soil on the site and adjacent property. Initiate effective measures prior to the commencement of clearing, grading, excavating, or other operations that will disturb the natural protection.
- D. Work Schedule: Schedule Work to expose areas subject to erosion for the shortest possible time. Preserve natural vegetation to the greatest extent possible. Locate temporary storage and construction buildings and route construction traffic to minimize erosion. Provide temporary fast-growing ground cover or other suitable means as necessary to control runoff.
- E. Riprap:
 - 1. Grade slopes to a smooth and compact surface within a tolerance of 6 inches in accordance with the Drawings or as directed by the Engineer.
 - 2. Contractor shall be responsible for excavating to sufficient depth so that the top of placed riprap will conform to grades and elevations shown on the drawings.
 - 3. Subgrade shall be compacted to a minimum of 95% density in accordance with Section 02315.

3.02 INSTALLATION

- A. Stockpiling Excavated Materials: Stockpile all excavated materials on the uphill side of the pipe trench when this practice is not contrary to safe requirements or equipment working room requirements.
- B. Protect Existing Vegetation: Retain and protect natural vegetation wherever feasible.
- C. Protection of Streams: No material shall be placed in stream beds. Diversion dikes or temporary coffer dams and installation of culvert pipes at all stream crossings shall be approved by the Owner prior to installation. If temporary vehicular stream crossings are installed at all waterways to provide access for construction equipment, they shall be in accordance with the requirements of Standard and Specification 3.24 of the Virginia Erosion & Sediment Control Handbook.
- D. Riprap Installation: Place riprap in the prepared area within 15 days after the backfill of the applicable trench section.
 - 1. Place riprap in such a manner as to produce a well-graded mass of rock with a minimal percentage of voids.
- E. Silt Fence: The Contractor shall install silt fence along each side of limits of clearing/ construction or where indicated otherwise on the Drawings, and where directed by the Engineer.

3.03 PROTECTION

- A. Protection of Stockpiled Material: Any stockpiled material which will remain in place longer than 30 days shall be seeded for temporary vegetation and mulched with straw mulch. Where spoil is placed on the downhill side of the trench, it shall be backslaped to drain

toward the trench. When dewatering the trench is necessary, the discharge hose must outlet in a stabilized area or a sediment basin.

- B. Maintain erosion control measures throughout the life of the contract.

3.04 RESTORATION

- A. Seed, mulch and fully restore all disturbed areas within 14 days after backfill of the applicable trench section. In no case shall a construction area be denuded for more than 7 days unless being actively worked.

END OF SECTION 02370

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SECTION 02510

WATER MAINS AND APPURTENANCES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall furnish all materials and labor, supervision, tools, equipment and incidentals required to furnish, deliver and install ductile iron pipe (DIP), fittings, specials, and accessories for the water pipeline as required by the Contract Documents and required to complete the Work.
2. It is the purpose of the Contract Documents to provide a complete and workable piping system. Miscellaneous fittings, specials, and accessories not specified in the Bid Form or the Contract Documents but necessary to complete the Work shall also be provided as a part of this Contract.

B. Unit Prices: Refer to Section 01200, Measurement and Payment.

1.02 RELATED SECTIONS

- A. Section 02260 – Excavation Support Systems
- B. Section 02315 – Excavating, Backfilling, and Compacting
- C. Section 02370 – Erosion and Sediment Control
- D. Section 02512 – Thrust Restraints
- E. Section 02513 – Disinfection of Water Distribution Systems
- F. Section 02514 – Leakage Tests
- G. Section 02700 – Paving and Surfacing
- H. Section 02920 – Lawns and Grasses
- I. Section 03300 – Cast-In-Place Concrete
- J. Section 13110 – Cathodic Protection

1.03 QUALITY ASSURANCE

- A. Pipe Manufacturer Qualification: The Materials specified herein shall be manufactured by a single pipe manufacturer that has supplied similar size and type of pipe, fittings and specials for at least 5 years
- B. Design Responsibility: The design and layout of Materials to meet the service conditions and the criteria specified in this Section are the responsibility of the Contractor. This work shall be performed by or under the supervision of a Registered Professional Engineer, for the discipline required for the service.
- C. Marking for Identification: The name or trademark of the Pipe Manufacturer and the date and place of manufacture, coating and lining shall be stenciled on the outside of all Materials. Should the coating or lining be applied at another facility, the name or trademark of the applicator shall also be stenciled on the pipe. Pipe shall have the design working pressure and thickness or an accepted letter designation stenciled thereon. A serial number or other identification shall be conspicuously painted on each section of pipe, fitting and special. This serial number shall be used to track the pipe through the manufacturing process and shall appear on all appropriate test reports. As an alternative to stenciling, UPC numbers may be used as an acceptable alternative to stenciling manufacturer's information on the pipe as long as a complete list of the UPC codes with all of the above mentioned data is provided in a spreadsheet to the Owner and the serial numbers are included in the lay schedule. Pipe that has been designed for abnormal load conditions shall have special markings which can be

readily identified together with any special station requirements. Beveled pipe shall be marked to show the long, short and intermediate quadrant points.

- D. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise required by the Contract Documents.
1. AWWA/ANSI C110/A21.10 American National Standard for Ductile-Iron and Gray-Iron Fittings.
 2. AWWA/ANSI C111/A21.11 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 3. AWWA C115/A21.15-American National Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.
 4. ANSI Standard B16.1 Cast Iron Pipe Flanges and Flanged Fittings.
 5. AWWA C600 Installation of Ductile-Iron Water Mains and Appurtenances.
 6. AWWA/ANSI C104/A21.4 American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 7. AWWA/ANSI C151/A21.51 American National Standard for Ductile-Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
 8. ASTM A325 Specification for High Strength Bolts for Structural Steel Joints.
 9. AWWA/ANSI C153/A21.53 Ductile-Iron Compact Fittings for Water Service.
 10. ANSI/AWWA C116/A21.16 - Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings.
 11. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 60-inch, for Water Transmission and Distribution for PVC inserts.
 12. ANSI/AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 65-inch, for Water Waterworks.
 13. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
 14. AWWA C504 Rubber Seated Butterfly Valves.
 15. AWWA C502 Dry-Barrel Fire Hydrants.
 16. AWWA C206 Field Welding of Steel Pipe.
 17. ISO 8179 - Ductile Iron Pipes, External Zinc Coating.
 18. Commonwealth of Virginia/State Board of Health, Waterworks Regulations.
 19. Fairfax Water, Planning and Engineering Division, Approved Products List.
- E. Quality Assurance Inspection and Testing:
1. Pipe and valves shall be manufactured at plants which shall have permanent quality control departments and laboratory facilities capable of performing the inspections and testing required by the Contract Documents. All sampling, testing, inspection procedures and process of manufacture shall be subject to inspection by the Engineer, or Owner at any time.
 2. Pipe Manufacturer shall make available an enclosed, heated, ventilated and air conditioned space with a full size desk, private line telephone, and 2 two drawer file cabinets for use by the Owner's Representative for the duration of the pipe manufacturing process.
 3. Pipe Manufacturer shall perform all tests and inspections required by AWWA C151 (as modified herein) and these Specifications.
 4. Valve Manufacturer shall perform all tests and inspections required by AWWA C504 and these Specifications.

1.04 SUBMITTALS

- A. Shop Drawings: Submit for the following in accordance with Section 01330:
 - 1. Pipe, fittings, valves and valve boxes, and specials
 - 2. Adapters
 - 3. Mechanical couplings
 - 4. Temporary bulkheads
 - 5. Connections to other mains
 - 6. Valve or other water main closures
 - 7. Product Data: as required to completely describe the materials being furnished including, but not limited to:
 - a. Design drawings, calculations, specifications, and product data sheets necessary to fully describe all materials, components, and finished products and to show conformance with the Contract Documents.
 - b. Dimension drawings showing full details of the pipe.
 - 8. Other items required by the Contract documents, or requested by the Engineer.
- B. Letter of Certification from Contractor: Contractor shall submit a letter certifying that valves, pipe, fittings and related items to be supplied by the Contractor shall be from Fairfax Water's "Approved Product List" whenever applicable.
- C. Marking Schedule: Marks to be used on the outside of finished Materials to identify pipes, fittings, specials, and accessories shown on shop drawings and laying schedules.
- D. Laying Schedules: Furnish laying schedules for ductile iron water mains 24-inches in diameter and larger.
 - 1. Contractor shall submit layout drawings and tabulated schedules designating each pipe, fitting, special, and accessory item necessary to complete the Work in sequence of installation. Coordinate identification of each piece with shop drawings, product data, and marking schedule.
 - 2. Include the following information:
 - a. Quantities and laying lengths of each piece.
 - b. Centerline stations and offsets with respect to the Project baseline at each change in horizontal or vertical geometry.
 - c. Centerline grade with respect to horizontal between each change of grade.
 - d. Centerline elevation referenced to Project vertical datum at each change in horizontal geometry and grade.
 - e. Orientation of outlets and bends.
 - f. Joint opening dimensions other than zero for each joint, to nearest 1/8-inch: top or bottom, left or right.
 - g. Laying schedules shall not allow deflection of restrained joints.
 - h. Areas requiring special embedment conditions as shown on the Drawings.
 - 3. Laying schedule joint opening shall not exceed 75 percent of the pipe manufacturers maximum recommended joint opening.
- E. Affidavit of Compliance: Prior to shipment of any pipe, furnish affidavit of compliance certifying that the Materials being furnished comply with all applicable provisions of referenced AWWA Standards and the Contract Documents. Prior to shipment of any butterfly

valve, furnish certification of compliance with ANSI/AWWA C504, Section 5.1.2 (Leakage Tests), including date tested and test pressure.

F. Quality Assurance Reports:

1. Mill certificates and physical property test reports for pipe walls and other fabrications required by the Contract Documents.
2. Hydrostatic test reports for each test on pipe and valves.

G. Proposed Methods and Procedures: Submit for the following in accordance with Section 01330.

1. Equipment, materials, and procedures for handling pipe, fittings and specials at the site.
2. Pipe closure methods and procedures.
3. Wrapping for buried flanges.

H. Manufacturer's Certification: Submit the following in accordance with Section 01330.

1. Copper coupling: Submit records of chemical analysis, certified test reports stating conformance with the specifications.

I. Test Specimens: Furnished from pipe shell and gaskets when requested by the Engineer.

J. Acceptance of any submittal by the Engineer shall not relieve the Contractor of his responsibility to meet the requirements of the Contract Documents.

K. Installation Experience:

1. Experience in the installation of ductile iron pipe is required. The Contractor shall thoroughly familiarize himself with all specific manufacturing and installation requirements of the pipe material bid.
2. The Contractor shall provide the services of a competent foreman, who shall have been in charge of installing at least 5,000 linear feet of 24-inches and larger diameter ductile iron pipe in similar field conditions.
3. Upon request and prior to award, the Contractor shall submit the pipe foreman's experience in installing the pipe material and joint types to be used. Give project titles, pipe diameter and length, locations, reference contacts, addresses, and telephone numbers.

1.05 REGULATORY REQUIREMENTS

- A. Commonwealth of Virginia/State Board of Health: Water main installation shall be in accordance with the Waterworks Regulations of the State Board of Health
- B. Reduction of Lead in Drinking Water Act: All products and materials shall comply with Public Law 111-380.
- C. Other requirements as specified in specification Section 01410, Regulatory Requirements, of the Contract Documents.

1.06 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- A. Ductile Iron Pipe and Polyvinyl Chloride Pipe: Loading, unloading, handling, inspection and storage of ductile iron and gray iron pipe, fittings, accessories, and appurtenances shall be performed in accordance with AWWA C600 and the following:
 1. Store pipe, fittings, valves, and appurtenant materials in a manner which will protect them from becoming dirty or damaged prior to installation.
 2. Pipe, fittings, valves, and appurtenant materials which are visibly dirty shall be cleaned to the Engineer's satisfaction or replaced at the Contractor's expense prior to installation.

- B. Shipments of materials to Contractor or Subcontractor shall be delivered to the site only during regular working hours when the Owner's Representative is present on site. Shipments shall be addressed and consigned to the proper party giving name of Project, location and city. Shipments shall not be delivered to the Owner's storage yard except where otherwise directed. The Owner reserves the right to reject any materials delivered when the Owner's Representative is not present on site.
- C. If it is necessary to move stored materials and equipment during construction, Contractor shall move or cause materials and equipment to be moved without any additional compensation.
- D. Arrange deliveries of products in accordance with construction schedules to facilitate inspection prior to installation.
- E. Coordinate deliveries to avoid conflict with Work and conditions at site.
- F. Do not have products delivered to Project site until related Shop Drawings have been approved by the Engineer.
- G. Use web slings or forklifts to handle the pipe. Metal chains, cable tongs or other equipment likely to cause damage to the coating shall not be used. Hooks shall not be used on the ends of the pipe.
- H. Where forklifts are used, their bearing surfaces must be padded with protective forklift sleeves/pads or suitable material approved by the Engineer.
- I. Web slings shall be of a type and width that will not damage the coating. Slings shall not pass through the pipe.
- J. If cables or chains are used during transportation, they must be properly padded with approved suitable material to protect the coating from damage. Use padded separator strips between pipe and cable or chains.
- K. Pipe, fittings, and specials shall be unloaded opposite to or as close to the place where they are to be laid as is practical to avoid unnecessary handling.
- L. Materials cracked, gouged, chipped, dented or otherwise damaged will not be accepted. Minor defects in the pipe or coatings may be repaired at the site by a method approved by the manufacturer of the materials and by the Engineer. Damaged pipe, fittings, specials and accessories shall be repaired or replaced at Contractor's expense.
- M. The Owner reserves the right to inspect all materials before unloading at the site. Any materials rejected shall not be unloaded and shall be returned to the manufacturer at no additional cost to the Owner.

1.07 SALVAGE

- A. All materials such as hydrants, valves, valve boxes, pipe and fittings, damaged or removed by the Contractor shall be disposed of by the Contractor, at his expense.

PART 2 PRODUCTS

2.01 INCIDENTALS

- A. Concrete, temporary plugs/caps, welding materials, bonding conductors, hardware and all other items as shown on the Drawings, or necessary to complete the Work, accepted and suitable for the service.

2.02 MANUFACTURERS

- A. Fairfax Water publishes an "Approved Products List" which lists, by category, manufacturer's products approved for use in Fairfax Water's system. Manufacturers' products covered by the categories included in this document which are not specifically listed are not approved for use. Copies of this document are available from Fairfax Water's internet website- <https://www.fairfaxwater.org/developers-engineers>.

2.03 PIPE AND FITTINGS

A. Ductile Iron and Polyvinyl Chloride Pipe:

1. Pipe Materials: Ductile iron pipe shall meet the requirements of ANSI/AWWA Standards C151/A21.51. For pipe buried in the ground, the minimum thickness shall be Class 52, unless shown differently on the Drawings. Polyvinyl Chloride pipe shall meet the requirements of AWWA standards C900/C906. Ductile iron pipe installed at a depth greater than 14 feet, and where indicated on the Drawings, shall be thickness Class 53. The minimum nominal pipe wall thickness for 36-inch and 48-inch diameter pipe shall be:

<u>Pipe Class</u>	<u>36-inch</u>	<u>48-inch</u>
Class 52	0.53 inches	0.65 inches
Class 53	0.58 inches	0.72 inches

- a. Gauged Pipe: Gauged pipe shall be circular pipe which has been checked by the Pipe Manufacturer to meet the outside diameter tolerance for joints throughout its length. Pipe meeting these requirements shall be called "gauged full-length pipe" and will be marked with a 4-inch wide green band painted on the pipe barrel.
 - b. If grinding or milling is necessary to meet the requirements for gauged pipe, only pipe having 2 pipe thickness classes greater than those called for in the purchase order shall be machined. In no case will the machined thickness of the pipe be less than the pipe thickness class shown on the Drawings or specified.
2. Pipe joints shall be in accordance with the following:
 - a. Push-on rubber gasket joints shall be of the bell and spigot type meeting the requirements of ANSI/AWWA Standard C111/A21.11 in all respects except details of the joint. The joint shall be of a type which employs a single elongated grooved gasket to affect the joint seal. The joint shall be "Fastite," or "Tyton Joint."
 - b. Flanged joints shall meet the applicable requirements of AWWA Standard C110 and C115 and ANSI Standard B16.1 and shall be faced and drilled to ANSI Class 125 (Ductile) standard template. Ductile iron pipe with threaded flanges shall have a minimum pipe wall thickness of 0.31 inch below the threads of machined section. Flange bolts shall straddle the centerline of the pipe or fitting. Bolts and nuts shall be low-carbon steel in accordance with ASTM A307, Grade B. Bolt-studs and nuts shall be furnished at insulated flanges in accordance with ASTM A193, Grade B7.
 - 1) For flanged pipe, flanges with long hubs shall be silver soldered or screwed on the end of the pipe in the shop and the face of the flange and end of the pipe refaced together. There shall be no leakage through the pipe threads and the flanges which shall be designed to prevent corrosion of the threads from outside.
 - 2) Where tap or stud bolts are required, flanges shall be tapped. Unless otherwise shown on the Drawings or specified, flanges shall meet the applicable requirements of ANSI Standard A21.10 and B16.1. They shall be accurately faced at right angles to the pipe with bolt holes drilled smooth and true, and shall be coated with rust veto immediately after facing and drilling.
 - 3) Gaskets for flanged joints shall be rubber with cloth inserts. Gaskets shall be full-faced, unless directed otherwise by the Engineer.
 - c. Joints with locking features shall have the ability to transmit axial load across the joint without separation or leakage. The appurtenances necessary to achieve these results shall be corrosion resistant and the restraining bolts shall be low alloy steel.
 - d. Beveled joints shall allow greater joint deflections than those shown in the appropriate tables in AWWA C600. The interior surfaces of the bell may be cast or machined to accomplish this increase in deflection; however, in no case will the bell thickness be less than the pipe barrel thickness. Beveled pipe shall have the permissible deflection marked on the pipe barrel.

3. Fittings: All fittings shall conform to the applicable requirements AWWA C110 or C153 and the following:
 - a. Standard pattern fittings shall conform to one of the following:
 - 1) Class 250 cast iron fittings.
 - 2) Class 350 ductile iron fittings (24-inch diameter or smaller).
 - b. Mechanical joint fittings shall conform to one of the following:
 - 1) Compact mechanical joint fittings shall be ductile iron, Class 350, in accordance with the requirements of ANSI/AWWA Standard C153/A21.53.
 - 2) Mechanical joint assemblies, including gaskets, glands, bolts, and nuts shall be in accordance with the requirements of ANSI/AWWA Standard C111/A21.11 and shall be furnished with all fittings. Glands for all fittings larger than 12-inches shall be ductile iron. Bolts and nuts shall be low-alloy steel. Mechanical joint bolt holes shall straddle the centerlines of the fittings.
 - 3) Provide mechanical joint assemblies in unrestrained areas. Mechanical joint pipe is not permitted in restrained areas.
 - c. Push-on rubber gasket joints shall be of the bell and spigot type and shall conform to the applicable requirements of ANSI/AWWA Standard A21.10 and shall be of the lightest class permitted for the class of pipe in which the fitting is used.
 - d. Flanged fittings shall meet the applicable requirements of ANSI Standard A21.10 and ANSI/ASME Standard B16.1, with flanges meeting the requirements of ANSI/AWWA Standard A21.10. ANSI fittings shall be of the lightest class conforming to the pressure ratings of the water mains which they connect.

Flanges, flange facing, drilling and protecting shall be as specified for centrifugally cast pipe. Bolt holes shall straddle the centerlines of the fittings. Bolts and nuts shall be low-carbon steel in accordance with ASTM A307, Grade B. Bolt-studs and nuts shall be furnished at insulated flanges in accordance with ASTM A193, Grade B7.
 - e. Wall castings and make-up pieces, such as bell and bell, bell and spigot, bell and flange, flange and flange, flange and spigot, and flange and flare shall meet the requirements of ANSI Standard A21.10 and shall be of the lightest class which is standard for the class of pipe in which they are used.
 - f. Furnish flange-to-plain end adapters where shown on the Drawings or where otherwise accepted. The plain end joint shall be a mechanically compressed rubber gasket with follower ring. The inside diameter of the adapter shall be greater than the outside diameter of the plain end of the pipe being joined to provide a means of disassembly after installation.
 - g. Where special fittings are required, they shall be of an accepted design and shall have the same diameters and thickness as standard fittings, unless otherwise required. Their laying lengths and other functional dimensions shall be determined by their positions in the water mains and by the particular piping materials to which they connect.
 - h. Provide Flanged Joints and Flange Insulation Kits where shown on the Drawings and in accordance with Section 13110 – Cathodic Protection.
 - i. Furnish and install Vault Wall Seals at all points where pipes must pass through the walls of structures, as shown on the Drawings or specified.
4. All pipe and fittings shall be cement mortar lined in accordance with ANSI/AWWA Standard C104/A21.4 including the bituminous seal coat. Double mortar thickness shall be provided. All ductile iron fittings shall receive field-applied petrolatum tape, in accordance with the requirements of Paragraph 3.04K, and to the limits indicated in

Section 13110-Cathodic Protection. Polyvinyl Chloride/High Density Polyethylene pipe shall not be cement mortar lined.

5. All ductile iron pipe shall have the exterior coated with a layer of arc-sprayed zinc conforming to ISO 8179-1 and all ductile iron fittings shall have the exterior coated with zinc-rich paint conforming to ISO 8179-2. The zinc application rates shall be 200 g/m² of pipe surface area for arc-sprayed zinc and 150 g/m² for zinc-rich paint. A finishing layer topcoat shall be applied to the zinc. Fusion-bonded epoxy coating (6-8 mils thickness) of interior and exterior surfaces of fittings is an acceptable alternative to zinc coating with cement mortar lining.
6. Joint Lubricant: Vegetable type soap of viscous solution consistency. The joint lubricant shall be approved by the National Sanitation Foundation (NSF) for use in potable water. Petroleum-based or other type of lubricants that can damage the gasket shall not be used.
7. All pipe shall be without defects that could impair service. These defects may include, but are not limited to: excessive pitting or voids in the pipe wall or bell; excessive, rough, or missing cement lining; and excess sealcoat (bituminous paint) in the gasket seat or interior of the pipe. Any pipe that is rejected, or deemed by the Owner to potentially impair service, shall be returned and/or replaced at the manufacturer's expense.

2.04 VALVES

- A. Butterfly Valves: Valves 14-inches and larger shall be butterfly valves, unless otherwise specified. The locations of Butterfly Valves are shown on the Drawings
 1. Butterfly valves shall have mechanical joint ends unless otherwise shown or specified. Furnish complete mechanical joint assemblies including glands, gaskets, and high-strength low-alloy steel bolts and nuts in accordance with ANSI/AWWA C111/A21.11.
 2. Butterfly valves with flanged ends may be specified for installation in vaults or for buried service. Gaskets, bolts and nuts shall be provided by the Contractor.

All fasteners exposed on the valve's exterior (bolts, nuts, etc.) shall be AISI Type 304 or 316 Stainless Steel (ASTM A276). Bolt-studs and nuts shall be furnished at insulated flanges in accordance with AISI Type 304.
 3. Butterfly valves shall be class 250B.
 4. Butterfly valves shall conform to AWWA C504.
 5. Butterfly valves shall operate counter-clockwise (left) to open.
- B. Gate Valves: All valves through 12-inches shall be gate valves, unless otherwise specified. Valve locations are shown on the Drawings.
 1. 3-inch and larger valves shall have mechanical joint ends and shall be furnished with complete mechanical joint assemblies including glands, gaskets, low-alloy steel bolts and nuts (ANSI/AWWA C111/A21.11), unless otherwise shown on the Drawings. Anti-rotational bolts shall be required at slotted bolt openings.
 2. 2-inch and smaller valves shall be furnished with threaded ends.
 3. Gate valves shall conform to AWWA C509 or C515.
 4. Valves shall operate counter-clockwise (left) to open.
 5. Valve body shall be ductile iron with bronze or stainless steel non-rising stem.

2.05 PROOF OF DESIGN TESTS

- A. Perform hydrostatic tests of the O-ring gasket joints proposed for use on the Project. Test nonrestrained joints for leakage. Test restrained joints for leakage and tensile strength.
- B. Pipe Manufacturer may submit certified reports of previous joint tests, performed on joints proposed for use, which were witnessed by outside parties. Such reports will be accepted in

lieu of performing new tests if, in Engineer's opinion, the joint is the same as the proposed joint, the test meets the requirements of this Section and the results indicate satisfactory performance of the joint.

- C. Leakage test criteria:
 - 1. Test duration: >1 hour.
 - 2. Internal pressure: 350 psi or the rated pressure of restrained joints.
 - 3. Leakage: <250 ml/hour (Field leakage allowance at the hydrostatic test pressure is equal to 10 gallons/per inch diameter/per mile of pipe/per day).
- D. Tensile Strength Test:
 - 1. Test assembly shall be 2 pipes with closed end joined by a restrained joint.
 - 2. Increase pressure until failure recording all signs of distress and the pressure at which they occurred.

2.06 RESTRAINED JOINT WATER MAIN PIPING IDENTIFICATION TAPE

- A. Tape shall be marked "Caution, Restrained Joint Pipe Below".
- B. All restrained joint piping shall be identified in the field with identification tape to be installed during backfill operations and laid one foot above water main piping.
- C. Payment for restrained joint water main piping identification tape shall be considered incidental to the pipe installation pay item.

2.07 HYDRANTS

- A. Technical Requirements:
 - 1. Fire hydrants shall be 3-way class, with 5-1/4" main valve opening, one 4-1/2" pumper outlet and two 2-1/2" hose outlets, equipped with National Standard fire hose coupling threads.
 - 2. The hydrant shoe shall have at least one all bronze drain outlet.
 - 3. The hydrant shoe and barrel may be made of different material.
 - 4. The complete interior of the shoe shall be epoxy coated if the O-ring is in contact with cast iron.
 - 5. If the bottom O-ring is in contact with brass, no epoxy coating of the interior of the shoe is required.
 - 6. Hydrants shall be furnished with a breakaway feature that will break cleanly on the underside of flange upon impact. This shall consist of a break flange with a breakable stem coupling. Breakable bolts will not be accepted. This break flange shall also permit 360-degree rotation of the upper barrel to position nozzles in any desired position.
 - 7. The hydrant shall be operational opening left.

2.08 RESTRAINING GLANDS

- A. Technical Requirements:
 - 1. Refer to requirements under Section 02512-Thrust Restraints.

2.09 VALVE BOXES

- A. Technical Requirements:
 - 1. All valve boxes shall be cast iron in accordance with ASTM A48 and FCWA Standard Details.
 - 2. Valve boxes shall have outside ledge under top ring. Top, outside slip pipe shall not have flange at bottom.

2.10 POLYETHYLENE ENCASUREMENT

- A. Approved Manufacturers: In accordance with Fairfax Water's "Approved Products List". Copies of this document are available at Fairfax Water's internet website – <http://www.fairfaxwater.org>.
- B. Reference Standards: ANSI/AWWA C105/A21.5, Class B Materials: Seamless 8-mil minimum thickness linear low-density co-extruded V-Bio enhanced polyethylene film. Flat tube form, minimum width based on nominal pipe diameter in accordance with recommendations by Ductile Iron Pipe Research Association.

2.11 FKM GASKET WATER MAIN PIPING IDENTIFICATION TAPE

- A. Tape shall be marked "Caution, FKM (Viton) Gasket Pipe Below," or similar language as approved by Fairfax Water.
- B. All FKM-gasketed water main installation shall be identified in the field with identification tape to be installed during backfill operations and laid one foot above water main piping.
- C. Payment for FKM gasket identification tape shall be considered incidental to the pipe installation pay item.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing field conditions.
- B. Perform test pits at least 100 feet in advance of all utility crossings and interconnection locations and as required on the Drawings. If Contractor fails to perform test pit as noted, any damage or conflict found will be resolved at his expense.
- C. Inspect water main materials for cleanliness and absence of damage.
- D. Verify that excavation base is dry and ready to receive the Work and that excavation, foundations, dimensions and elevations are as indicated on laying schedules or accepted by Engineer.
- E. Verify that rated working pressure of the item to be installed is satisfactory for the service shown on the Drawings.

3.02 GENERAL

- A. Installation of each pipe joint and appurtenance shall be made in the presence of an Owner Representative. The Contractor shall coordinate his construction activities daily with an Owner Representative and shall notify the Owner's Representative 48 hours minimum prior to each installation.
- B. Install materials as shown, specified, or recommended by the manufacturer and in conformance with reference standards and accepted Shop Drawings.
- C. Cover over the pipe shall be as shown on the Drawings, specified or otherwise accepted by the Engineer.
- D. Earthwork shall be as shown on the Drawings and specified in the applicable Sections of these Specifications.
- E. Take field measurements as necessary to ensure proper fitting of Work.
- F. Changes in alignment and grade shall be made by deflecting joints or with beveled or mitered pipe except where bends or similar fittings are shown.
- G. All materials shall be carefully examined for cracks, dents, damage or other defects before installation. Defective materials shall be rejected, removed and replaced. Any material found to be broken or defective after it has been installed shall be rejected, removed and replaced as specified in this Section.

3.03 PREPARATION

- A. Ductile Iron Pipe and Fittings:
 - 1. Push-on Joints
 - a. Thoroughly clean the groove and bell socket and insert the gasket, making sure that it faces the proper direction and is correctly seated.
 - b. After cleaning any dirt or foreign material from the plain end, apply lubricant in accordance with the pipe manufacturer's recommendations.
 - c. When pipe is cut in the field, bevel the plain end with a heavy file to remove all sharp edges.
 - 2. Mechanical Joints: The socket and plain end shall be wiped clean of all sand and dirt and any excess coating in the bell shall be removed. The plain end, bell socket and gasket shall be washed with a soap solution.
 - 3. Flanged Joints: Rust-prevention grease shall be removed from the flanges using a solvent-soaked rag. The flanges and gasket shall then be wiped clean of all dirt and grit.
 - 4. All joints shall be made in the presence of an Owner's Representative.
 - 5. Keep a sufficient quantity of joint lubricant, gaskets, welding rod, joint lining and coating material on hand at all times.

3.04 DUCTILE IRON AND POLYVINYL CHLORIDE PIPE INSTALLATION

- A. Excavating, Trenching and Backfilling: shall be in accordance with Section 02315.
 - 1. All Work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings. Contractor shall assume the full responsibility for establishing and maintaining alignment and grade.
 - 2. The Contractor shall lay all pipes in trenches in accordance with the pipe manufacturer's approved laying schedule, when applicable, and the requirements of Section 02315 and this Section.
- B. Pipe Laying:
 - 1. Proper and suitable tools and appliances for the safe and convenient cutting, handling and laying of the pipe and fittings shall be used. The pipe and fittings shall be thoroughly cleaned by power washing before they are laid and shall be kept clean until they are accepted in the completed Work. Special care shall be exercised to avoid leaving bits of wood, dirt and other foreign particles in the pipe. If any such particles are discovered before final acceptance of the Work, they shall be removed and the pipe, valves and fittings replaced at the Contractor's expense. All mains shall be kept absolutely clean during construction. In matters not covered by these Specifications, laying of ductile iron and polyvinyl chloride pipe shall meet the requirements of AWWA Standards C600, C900, and C906. Exposed ends of uncompleted lines shall be capped or otherwise temporarily sealed with approved watertight bulkheads at all times when pipe laying is not actually in progress.
 - 2. Pipe laid in excavations shall be laid on good foundation, trimmed to shape and, secured against settlement. At joints, enough depth and width shall be provided to permit the making of the joints and the inspection of the bottom half of the joint. All elbows and tees shall be properly backed up and anchored so that there will be no movement of the pipe in the joints due to internal or external pressure. Pipes shall have solid bearing throughout their entire length.
 - 3. The Contractor shall lay all pipes in strict accordance with the manufacturer's recommended procedures. When it is necessary to deflect pipe from a straight line in either the horizontal or vertical direction, or as otherwise directed by the Drawings or the laying schedule for curves, pipe deflections shall have a maximum joint deflection eighty per cent of the value shown in the joint deflection tables in AWWA C600. Under normal laying conditions, the depth of cover shall be 4 feet.

4. Where pipe is laid in rock trenches, a minimum space of 6 inches of the rock shall be removed below the outside bottom of the pipe and shall be filled with select material to the limits of, and in accordance with Section 02315 before the pipe is laid.
5. When special beddings are shown on the Drawings or are ordered by the Engineer, they shall conform to the requirements of Section 02315 of these Specifications.
6. Temporary bulkheads shall be installed at the ends of sections where adjoining water mains have not been completed. All such bulkheads shall be removed when the need for them has passed or when ordered by the Engineer.

C. Joining Pipe and Fittings:

1. When joining pipes and fittings, the Work shall be done in strict accordance with the requirements of AWWA C600, the manufacturer's printed instructions, approved submittals and these Specifications.
2. Push-on joints shall be assembled with general procedure to be as follows:
 - a. Prepare pipe and joint as described in this specification Section.
 - b. Push the plain end into the bell of the pipe. Keep the joint straight while pushing. Make deflection after the joint is assembled.
3. Mechanical joints shall be assembled with general procedure to be as follows:
 - a. Prepare the socket and plain end as described in this specification section.
 - b. Place the gland on the plain end with the lip extension toward the plain end of the pipe, followed by the gasket with the narrow edge of the gasket toward the end of the pipe.
 - c. The pipe shall be pushed into the bell socket and the gasket pressed firmly and evenly around the entire socket. The gland is then pushed up to the bell and centered on the pipe. Glands may require a wedge under the top side to assist in centering the gland lip against the gasket.
 - d. The bolts shall then be inserted and tightened with the fingers until all are even. A ratchet wrench shall be used to complete the tightening of the bolts, care shall be exercised to tighten the opposite nuts to keep the gland square with the socket and the bolt stress evenly distributed. The following torque shall be applied:

<u>BOLT SIZE</u>	<u>TORQUE</u>
5/8-inch	45-60 Ft. lb.
3/4-inch	75-90 Ft. lb.
1-inch	100-120 Ft. lb.
1 1/4-inch	120-150 Ft. lb.

- e. Once the installation of all nuts and bolts has been completed, petrolatum tape and compatible primer shall be applied in accordance with Section 13110 of these specifications.
4. Flanged joints: shall be assembled with general procedure to be as follows:
 - a. Prepare flanges in accordance with the requirements of this specification Section.
 - b. The flanges shall be accurately aligned, using a spirit level, and pipe properly supported before the gasket and bolts are inserted. The rubber gasket shall be carefully placed to ensure full flow and proper sealing of the joint.
 - c. Bolt threads shall be given a light coat of thread lubricant and then inserted and the nuts turned up by hand. Bolts shall then be pulled up with a wrench employing the crossover method. Applied torques shall be in strict accordance with the manufacturer's requirements.

- D. Pipe Cradles, Encasements, and Other Support: Where concrete cradles or encasements are required, they shall be constructed in accordance with Section 03300 of these specifications, and the Drawings.
- E. Thrust Restraints: Thrust Restraints including restraining glands, concrete anchors and thrust collars, strapping, or other approved restraining devices shall be in accordance with Section 02512 of these specifications, and the Drawings.
- F. Corrosion Control: Provide corrosion control measures in accordance with Section 13110 of these specifications, where indicated.
- G. Temporary Bulkheads: At the ends of sections where adjoining pipelines have not been completed and are not ready to be connected, install temporary, externally braced test plugs approved by the Engineer. All such externally braced test plugs shall be removed when the need for them has passed or when ordered by the Engineer.
- H. Pipe Installed within Structures and Concrete Encasements: Where temporary supports are used, they shall be sufficiently rigid to prevent shifting of the pipe. No reinforcing in structure or concrete encasements shall touch the pipe.
- I. Sanitary Sewer Crossings:
 - 1. Maintain required separation between water and sewer facilities in accordance with Virginia State Board of Health "Water Works Regulations".
 - 2. Provide concrete pier supports for existing sanitary sewer pipe crossing over the water main in accordance with Drawings.
- J. Utility Crossings:
 - 1. Separation of 6-inch or less requires expansion material and shall be in accordance with the Fairfax Water Approved Products List.
- K. Cathodic Protection: Provide field-applied petrolatum tape coating per Section 13110 for:
 - 1. Buried mechanical joints, buried bolts, nuts, couplings harness tie rods, saddles, iron and steel anchors, and other connecting hardware.
 - 2. Service clamps, other transition fitting between copper services and ductile iron pipe.
 - 3. Pipe embedded in concrete anchor blocks or otherwise in contact with concrete, extending through the concrete adjacent 6 inches in both directions.
- L. Polyethylene Encasement: Provide and install in accordance with ANSI/AWWA C105/A21.5.
 - 1. Contractor shall install a seamless 8-mil minimum thickness linear low-density co-extruded V-Bio enhanced polyethylene film over all water mains.
 - 2. Overlapping Sections: Provide 2-foot overlap between sections of polyethylene. Completely tape overlapping sections to hold securely in place during backfilling, using compatible polyethylene tape.
 - 3. Repair of Openings in Encasement: Repair holes, slits, or openings of any size, to restore integrity of polyethylene in accordance with manufacturer's recommendation.
 - 4. Installation at Hydrants and Interconnections: Provide opening or other means at base of hydrant riser to avoid water accumulation under encasement because of water relief.
 - 5. Backfill around polyethylene encasement shall be VDOT 21A stone, in accordance with the trench detail on the Drawings.
- M. All work performed by the Contractor shall conform to applicable sections of the Virginia State Board of Health "Waterworks Regulations" and these Specifications during the installation, testing and disinfection of waterworks facilities.

3.05 VALVES AND HYDRANTS

- A. Joints: Joints shall be made up in accordance with the procedures outlined in this specification Section.
- B. Valves:
 1. Butterfly valves shall be tested by Contractor prior to installation, in accordance with Section 02514.
 2. Valves shall be carefully erected in their respective positions free from distortion and strain with operators vertical unless otherwise shown on the Drawings. The valves shall be placed and left in satisfactory operating condition. Restrain valves as required.
 3. Unless otherwise shown or specified, direct burial valves and valves in vaults or manholes shall have 2-inch square operating nuts. If the operating nut is 4-feet or more below grade, it shall be provided with extended shafts and 2-inch operating nuts extending to 3-feet below grade.
 4. Natural rubber seat rings shall be coated with an approved opaque material which shall protect the rubber from attack by ozone and other deleterious materials.
 5. Rubber seated valves, which are to be stored for longer than three months shall be partially opened to prevent damage or permanent deformation to the seat ring.
 6. Valve boxes shall be adjusted with the tops at the proper grade. Valve boxes in unpaved areas shall be installed with concrete in accordance with the Standard Details. The top section of the valve box will overlap the lower section with a minimum lap of 2-inches.
- C. Hydrants: Hydrants shall stand plumb and shall have their hose nozzles parallel to the water main and their pumper nozzles facing the street or as directed by the Engineer. The hydrant shall be turned on its base in order to have the pumper nozzles facing the street. All hydrants shall be painted in accordance with Section 09900.

3.06 CONNECTIONS TO THE WATER SYSTEM

- A. The Contractor shall connect the pipelines to existing water mains and make provisions for the phase connections, as shown on the drawings. When system shutdown is necessary, the Contractor shall provide the Owner a minimum of ten (10) days notice prior to each scheduled tie-in, so that advance notice may be given to the affected customers.
- B. The Contractor shall meet with the Owner's representative and provide a written narrative for review and approval of his proposed scheduling and construction procedures for the connection(s). No additional payment will be made to the Contractor for work which must be performed at night. Approval of the Contractor's connection(s) schedule and construction procedures by the Owner does not relieve the Contractor from his total responsibility to see that the connection(s) is successfully completed within the designated time frame.
- C. The Owner will coordinate closing all valves in making shutdown and open all valves in restoring pressure to the existing main and initiating pressure in the new installation. Connections to water mains shall be made by the Contractor only after complete preparation for such Work has been made.
- D. At each location where a new water main is to be connected to the existing water main, the Contractor shall not order material for the connection until he has dug a test pit and verified the exact location, size, outside diameter, roundness, elevation, material, joint location, type and direction of the existing water main. The Contractor shall dig test pits only in the presence of an authorized representative of the Owner. If the test pit shows there is a conflict with an existing utility or a water main connection has to be modified, the Contractor shall submit test data information to the Engineer for use by the Owner. The Owner will review and modify the drawings as required.
- E. Prior to the commencement of any water main interconnection work, the Contractor shall have all necessary materials, tools and equipment at the work site. Pipe, fittings and valves shall be pre-assembled as much as possible to reduce the time of water service interruption. Also the geometry of the connection shall be verified by the Contractor prior to starting the

connection. Where existing mains are provided with fittings for the purpose of connecting to the new main, the Contractor shall remove the plugs or bulkheads, clean the ends, prepare them for connection to the new pipeline, and make the new joint.

- F. The Contractor shall work continuously and expeditiously around the clock using multiple crews until the connections are successfully installed and water service is restored. Where the new water main is to be connected at more than one point to the existing water system, connections shall proceed simultaneously. All connection work must be successfully completed within the time specified by the Owner and/or the Engineer, unless noted differently in writing by the Engineer or the Owner. The Contractor shall commit the necessary personnel and equipment required to perform the simultaneous connections within the time constraints agreed to by the Owner. Proposed water mains must be in service before the existing water mains can be abandoned.
- G. The water released by cutting or opening existing mains shall be removed and the excavation kept dry until all necessary Work within the excavation has been completed.
- H. The Contractor shall provide all necessary labor and equipment to cut a sample (coupon) from existing ductile iron and cast iron pipe that will be tied into, removed, or abandoned as part of this project. Size, location, and number of coupons shall be as directed by the Owner. Coupons produced as a result of tapping operations shall also be collected. The Contractor shall provide coupons to the Fairfax Water Inspector upon completion of work.

3.07 SERVICE, AIR RELEASE AND BLOW-OFF CONNECTIONS

- A. Service Connections: 1-Inch and 2-Inch service connections shall be installed by the Contractor as required by the Drawings or the Owner.
 - 1. The connections shall be made by tapping the water main with a corporation stop at the top center position on the pipe. An elbow shall be attached thereto and the copper tube connected to the elbow. Allowance for any possible movement of the water main or service piping at the tap shall be accomplished by making a half loop in the copper tube and firmly compacting the backfill under this loop. The tube shall be extended to the concrete curb which the tube shall be passed under and terminated at a curb stop or meter assembly as directed by the Owner. Care shall be used to prevent the tube from crimping, binding or twisting. The concrete curb shall not be removed or damaged. Where required, a curb box shall be placed vertically and aligned over a curb stop for proper access and, where required, a meter box shall be placed around a meter assembly as shown on the Drawings.
 - 2. A minimum of 3 feet of cover shall be placed over the service tube.
- B. Air Release or Blow-Off Connections: Connections for air releases and blow-offs shall be installed in accordance with the details on the Drawings.

3.08 LEAKAGE TESTS

- A. Perform leakage tests in accordance with Section 02514. Make necessary repairs and repeat tests until required results are obtained.

3.09 DISINFECTION

- A. Disinfect finished water mains and appurtenances in accordance with Section 02513. Repeat disinfection and testing until required results are obtained.

3.10 DISPOSAL OF ASBESTOS CEMENT PIPE MATERIALS

- A. The Contractor shall double bag or wrap asbestos contaminated material, seal and mark containers and dispose of material at an authorized disposal site in accordance with federal, state and local requirements. The Contractor shall provide the Owner with signed manifest or other proof that asbestos contaminated material has been disposed of legally.

3.11 ABANDONMENT OF EXISTING WATER MAINS

- A. Upon completion of the installation, acceptance, and placing into service of the proposed 36-inch, and in conjunction with the associated interconnections, the Contractor shall abandon existing water mains within the limits indicated on the Drawings or as directed by the Engineer. Abandonment of existing mains will include, but not be limited to: closing all valves, removing valve boxes, waterline markers, cutting and plugging existing water mains, removing existing water mains (as required), backfilling, compacting, and other associated work, where indicated on the Drawings and where directed by the Engineer. If required by the Drawings and/or directed by the Engineer, the Contractor shall backfill abandoned pipes with flowable fill concrete plant mix at no additional cost.

END OF SECTION 02510

SECTION 02512

THRUST RESTRAINTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Thrust Anchors
- B. Concrete Thrust Collars
- C. Mechanical Joint Restraints

1.02 SUBMITTALS

- A. Submit material lists and calculations for thrust restraints not shown or different from that shown on the Drawings, in accordance with Section 01330 – Submittals.
- B. Submit description and installation instructions for restraining glands.

1.03 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment.

1.04 REFERENCES

- A. ASTM A325 Specification for High Strength Bolts for Structural Steel Joints
- B. ASTM A536 Specification for Ductile Iron Castings.
- C. AWWA C111 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
- D. AWWA C153 Ductile Iron Compact Fittings for Water Service.
- E. AWWA C110 Ductile Iron and Gray Iron Fittings, 3-Inch through 48-Inch, for Water and Other Liquids.

PART 2 PRODUCTS

2.01 DUCTILE IRON AND PVC RESTRAINING GLANDS

- A. Approved Manufacturers: Fairfax Water publishes an “Approved Products List” which lists, by category, manufacturer’s products approved for use in Fairfax Water’s system. Manufacturers’ products covered by the categories included in this document which are not specifically listed are not approved for use. Copies of this document are available from Fairfax Water’s internet website – <http://www.fairfaxwater.org>.

2.02 CONCRETE MIXES

- A. Concrete for Thrust Anchors and Thrust Collars: Provide concrete in accordance with the requirements of Section 03300.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide thrust restraints shown or otherwise necessary to resist movement in new or existing water mains.

3.02 CONCRETE THRUST ANCHORS

- A. Provide concrete thrust anchors at all bends, tees, plugs, caps, and hydrants, and where shown otherwise on the Drawings.
- B. Dimensions: Refer to the Drawings for dimensions of thrust anchors.

- C. Installation: Bearing area for thrust anchors shall be against undisturbed earth. The face of the excavation shall be flat and at the proper angle to the fitting.
 - 1. Install thrust anchors such that pipe and fitting joints are accessible for repair.
 - 2. Brace the bowl of each hydrant against the required area of unexcavated earth at the end of the trench with concrete thrust anchor.
- D. Installation: Provide and place concrete in accordance with requirements of Section 03300.

3.03 CONCRETE THRUST COLLARS

- A. Provide concrete thrust collars at the locations shown on the Drawings.
- B. Dimensions: Refer to the Drawings for dimensions of thrust collars.
- C. Reinforcement: Provide reinforcing steel where shown on the Drawings and in accordance with Section 03300.
- D. Installation: Provide and place concrete in accordance with requirements of Section 03300.

3.04 CONCRETE

- A. Curing: Cure all concrete thrust anchors for a minimum of seven days prior to pressure testing, unless noted otherwise (i.e. locations of high-early strength concrete) on the Drawings or directed by the Owner.
- B. Backfilling: Backfill around concrete thrust anchors according to the requirements of Section 02315 - Excavating, Backfilling and Compacting, and the following:
 - 1. Do not backfill thrust collars or thrust anchors until a minimum of four hours has elapsed.

3.05 RESTRAINING GLANDS

- A. Install mechanical joint restraint in accordance with the manufacturer's instructions.

END OF SECTION 02512

SECTION 02513

DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection: Disinfection of potable water distribution and transmission systems.
- B. Testing: Testing and reporting results.

1.02 UNIT PRICES

- A. Disinfection: No separate payment shall be made for disinfection of water mains and appurtenances.

1.03 REFERENCES

- A. AWWA B300 - Standard for Hypochlorites
- B. AWWA B301 - Standard for Liquid Chlorine
- C. AWWA C651 - Standards for Disinfecting Water Mains
- D. AWWA C655 – Field Dechlorination
- E. Waterworks Regulations - Commonwealth of Virginia/State Board of Health

1.04 SUBMITTALS

- A. Test Reports: Indicate results comparative to specified requirements.
- B. Dechlorination methods and chemicals to be used as specified herein.

1.05 PROJECT RECORD DOCUMENTS

- A. Record Documents: Submit under provisions of Section 01770 – Contract Closeout.
 - 1. Disinfection report; record:
 - a. Type and form of disinfectant used.
 - b. Date and time of disinfectant injection start and time of completion.
 - c. Test locations.
 - d. Initial and 24 hour disinfection.
 - e. Date and time of flushing start and completion.
 - f. Disinfectant residual after flushing in ppm for each outlet tested.
 - g. Method of chlorination

1.06 QUALITY ASSURANCE

- A. Performance Standard: Work shall be performed in accordance with the Virginia State Board of Health "Water Works Regulations," AWWA C651, and as modified herein.
- B. Bacteria Tests will be performed by the Owner's laboratory.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite, or AWWA B301, Liquid Chlorine.

2.02 OTHER PRODUCTS

- A. Corporation Stops: Mueller H-10013 Corporation Stops

PART 3 EXECUTION

3.01 EXAMINATION

- A. Cleaning and Inspection: Verify that the water main has been cleaned and inspected.

3.02 EXECUTION

- A. Disinfection of Water Mains under 24 Inches: Disinfect water mains in accordance with AWWA Standard C651 and the Commonwealth of Virginia/State Board of Health Waterworks Regulations.
- B. Disinfection of Water Mains 24-Inches and Greater: Disinfection of water mains 24-inches and greater in diameter shall be performed using either the Continuous Feed, Slug, or Spray Method in accordance with AWWA Standard C651 and the Commonwealth of Virginia/State Board of Health Waterworks Regulations. In the event AWWA Standards and the Virginia Waterworks Regulations differ, the more restrictive shall control.
- C. The Owner will provide the water for the initial filling of the water main, testing and chlorination, unless otherwise directed by the Engineer. The Contractor shall utilize only the existing taps and hydrants available on existing, adjacent water mains to obtain water for filling the new mains, and shall submit a detailed filling and testing procedure to the Owner for review and approval, in accordance with Section 02514, Paragraph 1.03. The Contractor shall provide all pumps, meters, gauges, hoses, control valves, approved cross-connection control (backflow prevention) devices, sleeves, plugs/caps, and other equipment associated with the filling, leakage testing, sampling and flushing the water main at no additional cost to the Owner. The Contractor will be responsible for all costs associated with providing additional water for subsequent testing operations beyond the initial testing requirements.
- D. Leakage Testing: Pressure test water main in accordance with Section 02514.
- E. Flushing: The water main shall be flushed at locations approved by the Owner, and in the following manner:
 - 1. General: Let water flow at the maximum rate possible, with a minimum velocity of 3.0 ft/sec through the water main being flushed, until it is clear (<1.0 NTU) and a chlorine residual is obtained which is comparable to the source water. The Owner will advise the Contractor on how long to flush.
 - a. The Owner will be present at the start of the flushing process to verify procedures.
 - 2. Flushing from fire hydrants:
 - a. Open fire hydrant valve, street valve and source valve completely for free discharge. Use the diffuser if necessary.
 - b. If a fire hydrant cannot provide for a free discharge even with a diffuser, either install a hand control valve on the 2-1/2-inch hose connection (with fire hose if necessary) or use the fire hydrant street valve to control flow. Do not use the fire hydrant valve to control flow.
 - 3. Flushing from Blow-Offs: For blow-offs, insert the 2-inch connector pipe with adapter and attach hose if required, and open blow-off valve to control flow.

4. Time Requirements: If over a week has elapsed between the pressure test and sampling, there should be a very thorough flushing. If the time period has been in excess of a month or transported water was utilized for pressure testing, special procedures may be required at no additional cost to the Owner.

3.03 QUALITY CONTROL

- A. Water Samples: In accordance with AWWA C651, bacteriological samples shall be collected at regular intervals not to exceed 1,200 feet. Two consecutive negative samples shall be collected at least 16 hours apart for each sample location.
 1. Scheduling: After the water main has been pressure tested, the Owner's representative and the Contractor's representative will schedule collection of the samples. Samples will not be scheduled in advance of the pressure test.
 2. Cancellations: Cancellations or sample failures will be scheduled in turn with original samples.
 3. Unsatisfactory Sample: If the samples fail, the Contractor shall reschedule and repeat the flushing and sampling process.
 4. Additional Disinfection: If the second sets of samples fail, the water main shall be disinfected again, with a chlorine solution and shall be allowed to sit for a minimum of 24 hours. The flushing and sampling process shall then be repeated.
- B. Failure to Meet Quality Standards
 1. Water Quality: Should the initial treatment, as determined by the laboratory tests, fail to result in a water comparable in quality to the water served to the public from the existing water supply system, disinfection and flushing shall be repeated until satisfactory results are obtained.
 2. Cost of Additional Disinfection: Any labor, materials or equipment needed to rechlorinate or reflush water main shall be furnished by the Contractor at no additional cost to the Owner.

3.04 ENVIRONMENTAL PROTECTION

- A. Discharge of Disinfected Water:
 1. Discharge: The Contractor shall assume full responsibility for the discharge of disinfected water. Disinfected water with a free chlorine residual in excess of 2.0 mg/l shall not be discharged into the Owner's distribution system.
 2. Controls: The Contractor shall provide siltation control as required to protect against soil erosion in accordance with Section 02370 - Erosion and Sediment Control.
 3. Responsibilities: The Contractor shall be responsible for any damage to vegetation, trees, streams, ponds, and lakes caused by the discharge of heavily chlorinated water. The Contractor shall perform the necessary measures to dechlorinate the water prior to discharging water into any stormwater system, estuary, or other environmentally sensitive area, in accordance with AWWA Standards C651 and C655. All highly chlorinated water supplemented with chlorine and used for disinfection purposes shall be dechlorinated by the Contractor prior to discharge to the environment or storm sewer network. Contractor shall be required to completely dechlorinate all discharges if required by federal, state, or local regulations at any time during the Contract Period. Damages or injury to customers served by the Owner resulting from discharges of disinfection water into the system shall be the responsibility of the Contractor and shall be remedied at his expense. Acceptable chemicals used for dechlorination are listed in AWWA Standard C655 - "Field Dechlorination." The Contractor's proposed dechlorination agent shall be submitted to the Owner for approval prior to its use.

END OF SECTION 02513

SECTION 02514
LEAKAGE TESTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydrostatic pressure and leakage tests

1.02 UNIT PRICES

- A. No separate payment shall be made for hydrostatic pressure and leakage testing

1.03 SUBMITTALS

- A. Submit detailed description of filling and testing procedures including, but not limited to, the following:
 1. Schedule of test sections and piezometric test elevations in accordance with the requirements of Section 01330.
 2. Type and location of bulkheads; provisions for thrust restraint.
 3. Proposed sources of water and points of introduction into the pipeline.
 4. Proposed equipment and methods for admitting test water and filling and dewatering the pipeline.
 5. Proposed sequence of activities.
 6. Proposed methods and details for testing pipe, joints, closures, etc., installed after completion of hydrostatic tests.

PART 2 PRODUCTS

2.01 MEASURING DEVICES

- A. Owner will provide meters and pressure gauges, calibrated and suitable for use in testing.

PART 3 EXECUTION

3.01 GENERAL

- A. The water mains shall be tested for leakage by the Contractor at his own expense in the presence of the Owner's Representative. All tests shall be conducted in a manner to minimize as much as possible any interference with the Contractor's Work or progress. A maximum of 2,500 linear feet of water main may be tested at one time, unless otherwise approved by the Owner.
- B. Each section of water main between adjacent butterfly valves (assemblies) shall be tested separately. The maximum differential pressure across any butterfly valve during testing shall not exceed the test pressure recommended by the valve manufacturer, or as specified by the Owner. The Contractor shall provide all temporary bulkheads and thrust restraint to isolate the water main test section, and shall provide all long solid sleeves necessary to make the permanent connection to the system at no additional cost.
- C. The Contractor shall notify the Owner when the Work is ready for testing and tests shall be made as soon thereafter as practicable under the direction of the Owner's representative. Personnel for reading meters, gauges or other measuring devices will be furnished by the Owner, but all other labor, equipment and materials shall be furnished by the Contractor, unless otherwise specified.
- D. Testing of the pipelines shall not be made until at least 7 days have elapsed after all concrete thrust blocking has been installed.

- E. The Owner reserves the right to check the completed pipeline for vertical alignment prior to filling with water and testing. The Contractor shall not allow water in any pipelines without the express written permission of the Owner.
- F. All air valves shall be installed as indicated on the Approved Drawings and individually checked for proper operation prior to filling the water main for testing. If for any reason it is necessary to drain the water main, the Contractor shall take all precautions required to ensure the safety of personnel entering and inspecting the water main. When draining the water main, all air valves shall be rechecked for proper operation. Pipelines containing large orifice valves shall be filled at a maximum rate of one foot per second.
- G. Each butterfly valve shall be tested for leakage by Contractor, in the presence of an Owner's Representative who shall observe and confirm that each valve passes the test, prior to installation. Replacement of any defective butterfly valves, including shipping, shall be at no additional cost to Owner. Contractor shall provide a tapped Mechanical Joint plug (of the valve size) and test assembly and Owner will provide meters and pressure gauges along with the water supply. The butterfly valve testing procedure, which does not replace or relieve any of the other testing requirements in Section 02514, is as follows:
 - 1. Install the plug on one side of the valve body and with the valve closed, fill with water and pump it up to the valve's rated pressure. Check visually on the other side of the disk to see if it leaks; no water or air bubbles shall be present. Leave pressurized for ten (10) minutes and then check the gauge to see if it holds pressure.
 - 2. Remove the plug and install on the other side of the valve body. With the valve closed, fill with water and pump it up to the valve's rated pressure. Check visually on the other side of the disk to see if it leaks; no water or air bubbles shall be present. Leave pressurized for ten (10) minutes and then check the gauge to see if it holds pressure.
- H. Perform disinfection and bacteriological sampling in accordance with Section 02513.

3.02 TESTING

- A. The pipeline shall be filled with water in accordance with Section 02513 for a minimum of 24 hours immediately prior to testing for leakage.
- B. The piping shall be tested under the greater of a hydrostatic pressure of 150 psi or 150 per cent of the maximum expected working pressure at the high point of the line unless otherwise shown or directed by the Owner. The piping shall be tested to the target pressure no more than once an hour. Additionally, if required by the Owner, a leakage test at working pressure shall be performed. Air shall be purged from the pipeline through previously-installed appurtenances in the pipe prior to testing. The test pressure shall be applied to the piping by means of a hand pump or other approved method and shall be maintained for minimum of two hours. The test pressure shall not vary by more than plus or minus 5 psi.
- C. The usage as determined by the above test shall not exceed the allowable usage as given by the following formula:

$$L = \frac{SD(P)^{0.5}}{148,000}$$

Where:

L = allowable usage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test, in pounds per square inch (gauge)

Actual usage shall be the amount of water (per hour) used to pump the line back up to the target test pressure. If this amount exceeds the "allowable usage" determined by the formula above, the test has failed.

3.03 REPAIRING LEAKS

- A. When leakage occurs in any test, defective pipe, valves, fittings, appurtenances or joints shall be located and repaired at the expense of the Contractor. If the defective portions cannot be so located, the Contractor, at his own expense, shall remove and reconstruct as much of the original Work as necessary to obtain a water main that does not exceed the allowable leakage upon testing.

END OF SECTION 02514

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SECTION 02700

PAVING AND SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Pavement
- B. Restoration of Paved and Unpaved Surfaces: Includes restoration of pavement structure including surface, base, and subbase courses where applicable, placed on subgrade; and restoration of aggregate surfaces.
 - 1. Roads: Includes travel lanes and shoulders
 - a. VDOT Roads
 - b. Private Roads
 - 2. Driveways and Parking Areas
 - 3. Curb and Gutter
 - 4. Sidewalks
 - 5. Asphalt Trails
 - 6. Pavement Markings

1.02 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment.
- B. Limits for Payment:
 - 1. Permanent Pavement: Payment for hot mix pavement shall be for the amount actually placed within the limits of construction and as directed by the Owner.
 - 2. Payment for Pavement Planing and Overlay shall be for the amount actually placed within the limits of construction, as directed and measured by VDOT and/or the Owner, and in accordance with Section 01200. Project final pavement limits are typically marked by VDOT within 30 days after the installation of the water main is completed for the entire project. No additional compensation will be provided for delays associated with the scheduling of a VDOT inspector to mark final paving limits.
 - 3. Aggregate Surfaces: Payment for 6-inches of VDOT Cement Treated Aggregate shall be for the amount actually placed within the limits of construction in accordance with the trench detail and the notes on the Drawings, and as directed by the Owner.

1.03 REFERENCES

- A. Road and Bridge Specifications, Virginia Department of Transportation.
- B. Fairfax County Public Facilities Manual, Latest Edition.

1.04 DEFINITIONS

- A. Planing: Preparing rigid or flexible pavement for repair or overlay by removal of existing pavement to a depth of 1-1/2 inch. This term shall be considered to have the same meaning as the term "milling".

- B. Pavement Overlay: An asphalt concrete surface course up to 1-1/2 inches in thickness applied over an existing, prepared, paved surface to restore the surface.

1.05 SUBMITTALS

- A. Mix Design Data for Asphalt Concrete, in accordance with the requirements of Section 01330.
- B. Mix Design Data for Hydraulic Cement Concrete, in accordance with the requirements of Section 01330.
- C. Sieve Analysis for Aggregate Materials, in accordance with the requirements of Section 01330.

1.06 REGULATORY REQUIREMENTS

- A. VDOT: Fulfill all provisions of the VDOT Land Use permit and applicable sections of the Road and Bridge Specifications

1.07 WARRANTY

- A. Pavement Settlement: Refer to Section 02315 for Warranty Requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregates: Aggregates include the granular materials used in the base and subbase courses of the pavement structure and the top course on aggregate surfaces.
 - 1. Crusher Run: Crusher run shall conform to the requirements of the VDOT Road and Bridge Specifications.
 - a. Crusher Run shall be size number 25 or 26 stone.
 - 2. Aggregate Surfaces: Aggregate Surfaces shall conform to the requirements of the VDOT Road and Bridge Specifications.
 - a. Aggregate surfaces shall be Cement Treated Aggregate.
- B. Pavement Marking: Provide reflective, thermoplastic pavement marking materials conforming to VDOT Road and Bridge Specifications.
- C. Geotextile underliner (for Asphalt Trails): Refer to the requirement of Section 02370.

2.02 EQUIPMENT

- A. Roller: The roller shall be a self-powered, self-propelled unit with a manufacturer's rating of 7 to 10 tons.
- B. Milling or cold planing machine, as approved by VDOT.

2.03 MIXES

- A. Asphalt Concrete: Asphalt concrete shall conform to the requirements of the type designated in accordance with the VDOT Road and Bridge Specifications.
 - 1. Permanent and Temporary Surface Course shall be Type SM-9.5A - Plant Mix.
 - 2. Base Course: Type BM – 25.0.
 - 3. Surface Course for Asphalt Trails shall be Type SM-2A - Plant Mix.
- B. Pavement Overlay: Provide overlay surface where directed by the Engineer.
 - 1. Prepare existing paved surface by planing and applying a tack coat in accordance with the VDOT Road and Bridge Specifications and as directed by the Engineer.

- C. Hydraulic Cement Concrete: Hydraulic cement concrete shall consist of hydraulic cement, fine aggregate, coarse aggregate, water and admixture(s) mixed in the approved proportions; and, conform to the requirements of the type designated in accordance with the VDOT Road and Bridge Specifications.
 - 1. Class of Concrete shall be A3 – Paving.
- D. Portland Cement Concrete: Refer to Section 03300 for requirements.
- E. Asphalt Tack Coat. Asphalt tack coats shall conform to the requirements of the VDOT Road and Bridge Specifications.

PART 3 EXECUTION

3.01 PREPARATION

- A. Trench Backfill: Backfill trench according to the requirements of Section 02315, and the Trench details for paved and non-paved areas, and Asphalt Trail Replacement detail on the Drawings.
- B. Removal of Temporary Pavement: Remove and dispose of temporary pavement materials in an approved manner, prior to installation of permanent pavement.
- C. Weather Conditions: Refer to VDOT Road and Bridge Specifications for restrictions to paving operations due to unfavorable weather conditions.

3.02 INSTALLATION

- A. Temporary Pavement: Temporary pavement shall consist of a 3-inch or more hot mix asphalt concrete, type IM-19.0A, or approved substitute, surface course placed on the aggregate base and subbase materials required to provide a stable road surface flush with existing pavement.
 - 1. Use of temporary pavement: Provide temporary pavement daily in all travel lanes and as directed by the Engineer or the VDOT inspector, and in accordance with the VDOT Land Use permit.
 - 2. Maintenance of Temporary Pavement: Maintain temporary pavement to the satisfaction of the Engineer and VDOT inspector until permanent pavement restoration is completed.
- B. Permanent Pavement: Permanent restoration of pavement shall be with the same type of material as that removed or damaged during construction unless noted otherwise herein.
 - 1. Patches: Patches shall be a minimum of 1-foot wide and shall conform to the grade of the existing pavement, unless indicated otherwise on the Drawings.
 - a. On VDOT roads, provide a patch which is in accordance with the guidelines on the Land Use permit.
 - b. On private roads, driveways, and sidewalks, provide a patch which consists of layers of material which are equal in thickness to those of the existing pavement.
 - c. Existing asphalt trails that are to be removed and replaced shall consist of 2 inches of SM-9.5A over 4 inches of VDOT 21A stone and Geotextile underliner. Refer to Drawings for width of pavement. The Contractor shall restore all existing trails located within the limits of construction, within 7 days of Water Main Installation. The Contractor may install the Geotextile underliner and VDOT 21A stone (to grade) to maintain the trails until placement of final pavement. No payment will be made for additional stone required to maintain the trail which may be damaged by construction equipment, weather degradation or erosion. These costs shall be incidental to the pavement pay item.
 - d. Replacement Curb and curb gutter shall match that which was removed in style and dimensions.

- 1) Portland cement concrete curb and curb and gutter shall be completely replaced between expansion joints.
 - 2) Asphalt concrete curb and curb and gutter shall be saw cut at the interface between new and existing.
- e. Maintain grades, alignment and configuration of paved ditches.
2. Asphalt Concrete:
- a. The surface course shall consist of a minimum 1 1/2-inch thick layer of SM-9.5A, unless otherwise required to match existing, more stringent conditions. Permanent pavement for asphalt trails shall be 2 inches.
 - b. The base course shall consist of a minimum 6-inch thick layer or matching existing conditions of BM-25.0
 - c. Sub-Base courses shall consist of a minimum 10-inch course of well compacted, stabilized aggregate base materials consisting of VDOT 21A stone. Cap the original width of the aggregate surfaces with a 1-inch layer of crusher run material.
 - d. Provide an asphalt tack coat between each layer of the pavement structure.
 - e. Roll the patch with a self-powered, self-propelled unit as described in this Section.
3. Pavement Overlay: Provide overlay surface in accordance with the Drawings or as directed by the Engineer.
- a. Prepare existing paved surface by planing and applying a tack coat in accordance with the VDOT Road and Bridge Specifications and as directed by the Owner.
4. Hydraulic Cement Concrete: Install pavement according to the requirements of the Virginia Department of Transportation Road and Bridge Standards - Section 200 Curbs, Medians – Commercial Entrance Detail (Standard CG-13, Page 203.08), latest edition, as shown on the Drawings.
5. Replace existing loop detectors in accordance with the Virginia Department of Transportation Road and Bridge Standards - Section 1300 Traffic Control Devices - Loop Detector Installation Details (Standard TD-1A, B, C, Pages 1301.45 and 1301.46), latest edition. Contractor to hire qualified subcontractor to provide all labor, materials, equipment and incidentals required to complete the work as shown on the Drawings and in accordance with the requirements above. These costs shall be considered incidental to the associated water main and pavement pay items.
6. Pavement Markings: Restore pavement line markings in accordance with the requirements of the VDOT Road and Bridge Specifications.
- C. Aggregate Surfaces:
1. Aggregate surfaced roads: Provide a 6-inch well compacted stabilized layer of VDOT Cement Treated Aggregate stone material over the entire width of the trench excavation in accordance with the Drawings.

3.03 SCHEDULE

A. Time of Completion of Restoration:

Permanent pavement restoration of street surfaces and other areas shall be made in accordance with the time requirements of VDOT or other governmental agency having jurisdiction, unless denoted otherwise herein.

END OF SECTION 02700

SECTION 02920

LAWNS AND GRASSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Seeding and Fertilizing
- B. Sodding

1.02 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment and the following:
- B. Limits for Payment: Payment for seeding and fertilizing, or sodding, shall be made to the limits of clearing/construction and grading shown on the Drawings. No additional payment will be made for sodding, in lieu of seeding and fertilizing, beyond the limits shown on the Drawings.

1.03 REFERENCES

- A. Virginia Erosion and Sediment Control Handbook.

1.04 SUBMITTALS

- A. Certified Analysis: Provide a certified analysis of the topsoil, seed mix, and fertilizer proposed for use, in accordance with the requirements of Section 01330.

1.05 REGULATORY REQUIREMENTS

- A. Seeding and Mulching Requirements: Seeding and mulching procedures shall conform to the applicable provisions of the Virginia Erosion and Sediment Control Handbook.

1.06 STORAGE AND PROTECTION

- A. Sod: Store sod in piles of tight rolls or layers laid grass to grass or roots to roots. Sprinkle sod piles with water and cover with straw or moist burlap. Keep sod moist. Sod which is allowed to dry out will be rejected by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Seed: Provide grass seed mixture composed of 70 per cent Kentucky 31 tall Fescue and 30 per cent common Kentucky Blue Grass. Under no circumstances shall rye grass be added to the grass mixture. Seed shall be mixed by the seedman to the satisfaction of the Engineer. Seed analysis shall be marked on the containers. The seed components shall be free of noxious weed seeds and shall have not less than the following purity and germination:

	<u>PERCENT PURITY</u>	<u>PERCENT GERMINATION</u>
Kentucky Blue Grass	85	75
Kentucky Fescue	98	90

- B. Sod: Sod shall be well rooted, healthy, pasture type sod, reasonably free from weeds and shall be selected from areas approved by the Engineer. Cut sod into square or rectangular sections of equal width and of a size that will permit them to be lifted without breaking. Cut to a depth approximately equal to the depth of the roots, but in no case shall the depth be less than 1 inch.

1. Sod may be provided in place of seeding at no additional cost to the Owner.

2. Sod shall be provided on all residential private property, where directed by the Engineer, to an equal or better condition than existing.
- C. Fertilizer: Provide a commercial fertilizer mixture for use on lawn areas which provides a complete plant food and which contains nitrogen, phosphorus and potash in the proportions of 5 percent water soluble nitrogen, 10 percent available phosphorous, and 5 percent water-soluble potash.
- D. Topsoil: Suitable topsoil shall be stripped from excavations and stockpiled for reuse in accordance with Section 02315. The Contractor shall supply any additional material required at no cost to the Owner. This soil shall be friable loam, and shall be obtained from naturally well-drained areas. It shall be free from subsoil, clay lumps, stones, stumps, roots, brush, weeded, litter, trash or other harmful material.

PART 3 EXECUTION

3.01 PREPARATION

- A. Topsoil: Upon completion of construction in the area to be seeded or sodded, spread a uniform layer of topsoil over the compacted subgrade.
 1. Depth of Topsoil: Provide a minimum 4-inch topsoil layer for areas to be seeded and a minimum 3-inch layer of topsoil for areas to be sodded.
 2. Finish grading of topsoil: Compact topsoil with an approved roller weighing between 250 and 750 pounds.
 - a. Provide finished surface without irregularities to the grade shown on the Drawings or, if not shown, the grade which conforms to the existing finished grade.
 - b. In areas to be sodded, loosen soil to a minimum depth of 2-inches, restore to a uniform grade and sprinkle with water.
- B. Fertilizer: Spread fertilizer uniformly, by means of a mechanical spreader, at the rate of 50 pounds per 1000 square feet. Apply fertilizer at least 24 hours prior to seeding or sodding.

3.02 INSTALLATION

- A. Seeding: Grass seed shall be sown by a mechanical spreader operated in two directions. Total application shall be 5 pounds to 1,000 square feet. Rake seed lightly into the surface and roll with a light, hard roller. Sprinkle seeded areas with a fine spray in such a manner as not to wash out the seed.

Use care in raking not to destroy the finished grade or to disturb uniform distribution of seed. Perform seeding on a still day and only with the approval of the Engineer.
- B. Hydroseeding: Application of seed, lime or fertilizer by Hydroseeder will be permitted.
- C. Sodding: Provide sod where shown on the Drawings or directed by the Engineer. Place sod by hand with close joints. Do not overlap. Fill all gaps with sod and after the sections are set, fill all joints with loamy topsoil. Following sodding operation, sprinkle area with water and roll or tamp to incorporate sod and sod bed in order to assure a tight joint between strips.
 1. Sodding on Slopes: Sod placed on slopes steeper than a 2:1 shall be anchored in place by stakes driven flush with the surface after the tamping and rolling have been completed. Stakes shall be at least 8-inches long and have a cross-sectional area not less than 1 square inch and shall be placed in such a manner as to hold the sod securely in place.

3.03 PROTECTION

- A. General: The Contractor shall be responsible for protecting and maintaining sodded and seeded areas until acceptance by the Owner.

- B. Protection against Washouts: The Contractor shall protect seeded areas against washouts by covering the area with burlap or straw or by other approved means. Washouts shall be regraded and reseeded until a good sod is established, to the Engineer's satisfaction.
- C. Watering: The Contractor shall keep the sodded or seeded areas sufficiently moist in order to maintain and promote life and growth of the sod until the Work is accepted.

END OF SECTION 02920

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SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel Reinforcing Bars
- B. Steel Reinforcing Fabric

1.02 UNIT PRICES

- A. Refer to Section 01200 – Measurement and Payment

1.03 REFERENCES

- A. ACI-318 Building Code requirements for reinforced concrete
- B. Concrete Reinforcing Steel Institute (CRSI) Manual of Practice
- C. ASTM A615 Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
- D. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement
- E. ASTM A497 Welded Deformed Steel Wire Fabric for Concrete Reinforcement
- F. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures

1.04 SUBMITTALS

- A. Shop Drawings: Submit completely detailed shop drawings and schedules for steel reinforcing bars in accordance with Section 01330 - Submittals.
- B. Certificates: Submit mill test certificates for the Chemical and Physical properties of steel reinforcing bars and steel welded wire fabric in accordance with the requirements of Section 01330.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Reinforcing steel, as delivered to the Work, shall be in bundles strongly tied. Each group of both bent and straight bars shall be identified with a metal tag giving the identifying number corresponding to the bar schedules and diagrams. All reinforcing shall be properly stored in an orderly manner, at least 12-inches off the ground, and kept clean and protected from the weather.
- B. Protection: Reinforcing steel shall be delivered without rust other than such as may have been accumulated during transportation to the Work. It shall at all times be fully protected from moisture, grease, dirt, mortar or concrete. Before being placed in position, it shall be thoroughly cleaned of all loose mill scale and rust and of any dirt, coatings or other material that might reduce the bond. If there is a delay in depositing concrete, the steel shall be inspected and satisfactorily cleaned immediately before the concrete is placed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Reinforcing Steel: Reinforcing steel shall be in accordance with the provisions of ACI 318 and Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice and the following.
- B. Bars: Bars for concrete reinforcement shall be new steel rolled from open hearth steel billets and shall meet the requirements of ASTM A615, Grade 60. Rerolled materials shall not be

permitted. Bars shall be deformed in conformity with ASTM A615 and shall be free of defects. Spiral reinforcing steel shall be fabricated from cold drawn wire in accordance with ASTM A82 or hot rolled plain or deformed bars conforming to ASTM A615, Grade 60.

- C. Welded Wire Fabric: Fabric shall be of the electrically welded type, with wires arranged in rectangular patterns of the sizes shown or specified.
 - 1. Welded smooth wire fabric shall conform to ASTM A185
 - 2. Welded deformed wire fabric shall conform to ASTM A497

2.02 FABRICATION

- A. Bending Steel Bars: Bars shall be cut to required length and accurately bent by approved methods before placing. Bars shall be bent in the shop unless written approval of field bending is obtained from the Engineer. If field bending is permitted, it shall be done only when the air temperature is above 30 degrees F where the bending operation is performed. Bars shall have a minimum inside radius of bend as specified in the CRSI Manual of Standard Practice.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Bars:
 - 1. Placement: The bars shall be placed in the exact positions and with the spacing shown or required, and shall be securely fastened in position at the intersections to prevent displacement during the placing of the concrete. The bars shall be fastened with black annealed wire of not less than 16 gauge or other approved devices. Spacing chairs of type approved by the Engineer shall be furnished and properly placed to support and hold reinforcing bars in position in all beams and slabs, including slabs poured directly on the subgrade. Except where otherwise shown, splices in tension reinforcement shall be as specified in the latest edition of ACI 318. Bar splices shall be staggered, where possible.
 - a. Refer to Drawings for bar lap splice lengths.
 - b. Maintain minimum 1-1/2" clearance between rebar and pipes, sleeves or anchor rings.
 - 2. Projecting Ends: On any section of the Work where horizontal bars run further than the length of the forms, the form or head against which the work ends shall be perforated at the proper places to allow the bars to project through a distance at least equal to the lap specified. The projecting ends, however, unless otherwise directed by the Engineer, shall be of different lengths so that laps in bars in the same plane do not occur adjacent to each other.
- B. Welded Wire Fabric: Steel reinforcing fabric shall be placed in the positions shown, specified, or required to fit the Work. Suitable spacing chairs or supports shall be furnished and placed to maintain the mesh in correct location. Where flat mesh is required, the mesh shall be rolled or otherwise straightened to make a perfectly flat surface before placing. The length of laps not indicated shall be approved by the Engineer.
 - 1. Extend all slab reinforcement into the floor slab, wall or roof in accordance with the ACI Code. If such extensions are not obtainable, the bars shall terminate with a standard hook.
 - 2. Cut or bend reinforcing steel bars as needed so that they do not continue through openings in slabs and walls.

3.02 PROTECTION

- A. Unless otherwise noted on the Drawings, the following concrete covers shall be provided for reinforcement in cast-in-place concrete:

Concrete cast against and permanently exposed to earth:	3"
Formed concrete exposed to earth, liquid or weather:	
#5 and Smaller:	1-1/2"
#6 and #11:	2"
Formed concrete not exposed to earth, liquid or weather:	1-1/2"

END OF SECTION 03200

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Materials
 - 1. Cement
 - 2. Aggregates
 - a. Sand
 - b. Stone and Gravel
 - 3. Water
 - 4. Admixtures

1.02 UNIT PRICES

- A. Concrete shall be incidental to the contract and included in various bid items as required. No additional payment shall be made for concrete except for additional concrete ordered in writing by the Owner or Engineer.
- B. Payment Limits: Payment for the following items will be for open-cut water main installations, to the limits shown on the Drawings, and/or where directed by the Engineer. Where limits are not shown, payment will be made for the areas replaced within lines equidistant, parallel and to the following distances from the centerline of the water main:
 - 1. Concrete Curb, Curb and Gutter
 - a. 4-inch through 20-inch diameter water main: A total of 48-inches greater than the outside diameter of the water main.
 - b. 24-inch through 42-inch diameter water main: A total of 60-inches greater than the outside diameter of the water main.
 - 2. Concrete Sidewalk/Curb Ramp Replacement: Replacement in its entirety to the limits indicated on the Drawings.

1.03 REFERENCES

- A. ACI 212 Guide for Use of Admixtures in Concrete.
- B. ACI 304 Placing Concrete by Pumping Methods
- C. ACI 229 Controlled Low Strength Materials
- D. ACI 306 Recommended Practice for Cold Water Concreting.
- E. ACI 308 Recommended Practice for Curing Concrete
- F. ACI 318 Building Code Requirements for Reinforced Concrete
- G. ACI 347 Recommended Practice for Concrete Formwork
- H. ACI 614 Recommended Practice for Measuring, Mixing and Placing Concrete
- I. ASTM C33 Specification for Concrete Aggregates
- J. ASTM C39 Compressive Strength of Cylindrical Concrete Specimens
- K. ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

- L. ASTM C94 Specification for Ready Mix Concrete
- M. ASTM C109 Compressive Strength of Hydraulic Cement Mortars
- N. ASTM C136 Sieve Analysis of Fine and Coarse Aggregates
- O. ASTM C138 Test for Unit Weight, Yield and Air Content of Concrete
- P. ASTM C143 Test for Slump of Portland Cement Concrete
- Q. ASTM C150 Specification for Portland Cement
- R. ASTM C171 Sheet Materials for Curing Concrete
- S. ASTM C172 Sampling Fresh Concrete
- T. ASTM C173 Test for Air Content of Freshly Mixed Concrete by Volumetric Method
- U. ASTM C191 Time of Setting of Hydraulic Cement by Vicat Needle
- V. ASTM C192 Making and Curing Concrete Specimens in the Laboratory
- W. ASTM C260 Air-entraining Admixtures for Concrete
- X. ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
- Y. ASTM C494 Chemical Admixtures for Concrete
- Z. ASTM C596 Measuring the Drying of Shrinkage of Mortar Containing Portland Cement
- AA. ASTM C827 Tests for Early Volume Change of Cementitious Mixtures
- BB. ASTM D412 Specification for Concrete Drain Tile
- CC. Federal Specification TT-S227E
- DD. Federal Specification TT-S230C
- EE. Corps of Engineers C572
- FF. VDOT Road and Bridge Specifications, Latest Edition.

1.04 DEFINITIONS

- A. Class A Concrete: Class A concrete is high-strength concrete intended principally for precast concrete units.
- B. Class B Concrete: Class B concrete is designed for high strength and watertightness and is intended for use in reinforced concrete structures such as thrust collars, columns, walls, beams, slabs, and, in general, where forms, other than simple forms, are required.
- C. Class C Concrete: Class C concrete is designed for high strength and watertightness and is intended for use for bottoms of structures, electrical duct encasement, and, in general, where concrete is deposited directly on the bottoms of slopes or excavations and where only simple forms are required.
- D. Class D Concrete: Class D concrete is designed as low-strength, plain or reinforced concrete and is intended for use in workmats beneath structures, soil stabilization, pipe cradles, corrosion control test station pads, guard posts, thrust anchors, filling and other similar purposes.
 - 1. Boulders or Rock Fragments: Clean boulders or rock fragments excavated during construction may be embedded, in quantities approved by the Engineer, in large volumes of concrete to provide added bulk.
 - a. Place boulders or rock fragments carefully so that no voids are left in the concrete.
- E. High-Early Strength Concrete: High-Early strength concrete is designed to achieve Class B through Class D 7-day compressive strengths in as little as 1-day and is intended for use in situations where thrust anchors and collars need to achieve 7-day compressive strength early

in order to minimize out of service water mains. High-Early strength concrete may be used only when shown on the Drawings or approved by the Owner.

- F. Architectural Concrete: Is defined as the ultimately exposed areas of exterior and interiors of buildings, chambers, galleries, vaults, foundations, parapets (including portions to be covered by roofing or flashing material), tanks and basins limited on the interior to a point that is 2 feet below the normal water level.
- G. Mass Concrete: Mass concrete is any cast-in-place concrete with dimensions large enough to require that measures be taken to cope with the generation of heat and attendant volume change to reduce cracking.
- H. Flowable Fill Concrete (Controlled Low Strength Material): Flowable fill concrete shall be liquid enough to flow, be self-leveling, excavatable, and have a minimum 28-day compressive strength of 30 psi but not more than 100 psi. Non-excavatable flowable fill concrete shall have a minimum 28-day compressive strength of 125 psi but no more than 200 psi (to be excavatable by machine equipment). Materials shall comply with the recommendations within chapter 3 of ACI 229, latest revision, which include cement, aggregates, fly ash, water, admixtures, slag and other nonstandard materials.

1.05 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings in accordance with the requirements of Section 01330 for the following:
 - 1. Architectural formwork
 - 2. Steel forms
- B. Samples: Provide representative samples of the following items in accordance with the provisions of Section 01330.
 - 1. Aggregate: Provide a 50-pound sample 15 days prior to the first day concrete is used.
 - 2. Fine Aggregate for Architectural Concrete: Submit a representative color sample for approval 15 days prior to the first day of use.
- C. Concrete Mix Design: Concrete mix designs shall be prepared and submitted to the Engineer for approval for each type required.

1.06 REGULATORY REQUIREMENTS

- A. American Concrete Institute: Perform Work covered by this Section in accordance with the requirements of the American Concrete Institute.
- B. Concrete shall conform to applicable sections of VDOT Road and Bridge Specifications.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Cement:
 - 1. Delivery: Cement delivered to the jobsite shall be in strong, well made bags marked with the brand, name of manufacturer and net weight.
 - 2. Storage: Store cement in weathertight building with a wood floor raised above the ground and protected from dampness.
 - a. Stack and store individual shipment in a manner which permits each shipment to be readily accounted for at all times.
 - b. Provide all facilities necessary to permit sampling and inspection of each shipment.
 - c. Do not use cement which has deteriorated.

- d. Cement remaining in storage prior to shipment for a period exceeding 6-months after testing shall be re-tested and rejected if it fails to meet any requirements of these Specifications.
 - e. Do not use previously accepted cement which has been in storage more than 1 year from the time of original acceptance.
- B. Aggregate: Keep aggregates clean and free from all other materials during transportation and handling. Keep fine and coarse aggregates separated from each other until measured in batches and placed in the mixture.
- 1. Stockpiling: Unless finish screening is provided at the batch plant, stockpile aggregates in a manner to prevent segregation and in accordance with ACI Standard 614.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. W. R. Grace and Co.
- B. Sonneborn-Contech
- C. Sika Chemical Corporation of Lyndhurst, NJ.

2.02 MATERIALS

- A. Cement: Provide standard Portland cement, Type I, Type II, or Type III (High-Early strength) which meets the requirements of ASTM C150:
 - 1. Domestic manufacturers: Provide cement which is produced domestically.
 - 2. Architectural Concrete: Provide cement which is uniform in color and type from one manufacturer for use in architectural concrete.
- B. Fine Aggregate: Fine aggregate shall be natural sharp sand meeting the requirements of ASTM C33 except as modified herein:
 - 1. Limits for deleterious substances: The limits for deleterious substances shall be as set forth in Table 1 of ASTM C33 for concrete subject to abrasion.
 - 2. Color: Fine aggregate for architectural concrete shall be of one type and color.
 - a. Fine aggregate subjected to the test for organic impurities and producing a color darker than standard will be rejected without exceptions.
 - 3. Soundness: Fine aggregate shall meet the requirements of the soundness test set forth in paragraph 7.1 of ASTM C33.
 - 4. Fine aggregate for mortar and grout: Fine aggregate for mortar and grout shall be well graded within the following limits by weight when tested in accordance with ASTM C1126.

<u>SIEVE</u>	<u>PERCENTAGE PASSING</u>
No. 4	100
No. 8	96 to 100
No. 16	40 to 65
No. 30	15 to 35
No. 50	5 to 15

- C. Coarse Aggregate: Coarse aggregate shall consist of gravel or crushed stone and shall meet the requirements of ASTM C33. The limits for deleterious substances and physical property requirements given in Table 3 of ASTM C33 shall apply for each class designation without exception. Coarse aggregate shall be graded according to Sizes 46 and 57 in Table 11 of the Standard.

1. Coarse Aggregate Specification: Size No. 57 shall be used for all thin or closely reinforced concrete work, such as floors and roofs less than 7-inches thick, walls less than 9-inches thick, and all beams. For all other concrete work, Size No. 46 shall be used.
 2. Color: Coarse aggregate for concrete shall be of one type and color.
- D. Admixtures: The use of admixtures shall be limited to the following:
1. Air-entraining: All concrete, except Class D, shall contain an air-entraining admixture conforming to ASTM C260 and sufficient to produce from 4.5 to 6.5 percent entrained air in the concrete.
 2. Water reducing: Water reducing admixtures, conforming to ASTM C494, Type A, shall be used when approved by the Engineer.
 3. Set retarding: Set retarding admixtures, conforming to ASTM C494, Type D, shall be used when approved by the Engineer.
 4. Fly ash: Fly ash, for use in flowable fill, shall conform to Section 241 of the VDOT Road and Bridge Specifications.
- E. Water: Water used in mixing concrete shall be clean and shall not contain deleterious amounts of acids, alkalies or organic materials. All water shall be furnished from sources approved by the Engineer.
- F. Expansion Joint Material: Joint filler shall be closed-cell PVC foam of the thickness shown.
- G. Waterstops: Provide waterstops made of extruded polyvinyl chloride.
1. Requirements for plastic and waterstops: Provide plastic waterstops which meet the requirements of Corps of Engineer Specification ORD-C572, except as modified herein.
 - a. The Shore A durometer hardness shall be between 65 and 75.
 - b. The minimum tensile strength shall be 1850 psi.
 - c. Specific gravity shall not exceed 1.38.
 - d. Waterstops shall have ribbed longitudinal strips.
 2. Dimensions: Unless otherwise shown, provide waterstops which are flat, a minimum of 6-inches wide, not less than 1-1/4-inches thick at the narrowest point, and not less than 3/8-inches thick immediately adjacent to the center.
- H. Membrane Waterproofing: Provide membrane waterproofing which meets the requirements of ASTM C309 and is a semi-flexible material composed of an asphaltic core to which is bonded on independent weather proof coating. The coating is to be bonded during the manufacturing process.
1. Protective coating requirements: Protective coating shall form a continuous layer over the waterproofing core.
 2. Membrane vapor transmission rate: Membrane shall have a constant rate of water vapor transmission not greater than 0.0066 grains per square foot per hour measured in accordance with ASTM E96.
- I. Joint Sealant: Joint sealant materials may be either a single component urethane compound meeting the requirements of Fed. Spec. TT-S-230C or a two-component urethane compound meeting the requirements of Fed. Spec. TT-S-227E, except as modified herein.
1. Urethane sealant: The urethane sealant shall be 100 percent polymer, non-extended, containing no solvent, lime, or coal tar. Color shall be as selected by the Engineer, but shall not be black. Sealant properties shall conform to the following Table:

PROPERTY	VALUE	TEST METHOD
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Maximum Final cure (days)	10	ASTM D412
Tensile strength (psi)	75-50	ASTM D412
Minimum elongation (1%)	400	ASTM D412
Modulus @ 100% elongation (psi)	35-50	Fed. Spec.
Shore A hardness	20-35	Shore Durometer
Solid content (1%)	98-100	
Peel content (1%)		Fed. Spec.

<u>PROPERTY</u>	<u>VALUE</u>	<u>TEST METHOD</u>
Minimum recovery (1%)	90	Fed. Spec.
Initial tack-free cure (hrs.)	24-48	Fed. Spec.

2. Joint sealant for unbonded joints: Where removable concrete slabs are not poured in place, horizontal and vertical joints shall be filled with self-leveling or non-sagging colma joint sealer, respectively, as manufactured by the Sika Chemical Corporation of Lyndhurst, NJ, or approved equal.

J. Sheet Curing Materials:

1. Paper shall consist of only ply of an approved type of fiber reinforced waterproof building paper, consisting of cross fibers embedded in asphalt between two layers of waterproof building paper.
2. Polyethylene film shall be white, opaque sheeting a minimum of 4 mils in thickness. The sheeting shall be manufactured from virgin resins and shall contain no scrap or additives.

2.03 MIXES

- A. Concrete: Concrete to be used in the respective places shown on the Drawings or as specified shall be divided according to compressive strength.
- B. Concrete classifications: Refer to these Specifications and the Drawings to determine which class of concrete to use in a given application.
 1. Class A concrete shall have 7-day test strength of 3400 psi and 28-day test strength of 5000 psi.
 2. Class B concrete shall have 7-day test strength of 2700 psi and 28-day test strength of 4000 psi.
 3. Class C concrete shall have 7-day test strength of 2700 psi and 28-day test strength of 3000 psi.
 4. Class D concrete shall have 7-day test strength of 1300 psi and 28-day test strength of 2000 psi.
 5. High-Early Strength concrete shall have 1-day test strength equal to the applicable Class B, C, or D 7-day test strength requirement above.
- C. Concrete mix design: Prepare mix designs for each type of concrete required in accordance with ACI 613.
 1. Concrete of any class which is to be placed by pumping methods shall require a separate mix design.
- D. Admixtures: Admixtures shall be used as directed in these Specifications and Drawings.
 1. When more than one admixture is to be used, each admixture shall be dispensed separately into the mix, and at separate times during the mixing in accordance with ACI 212.
- E. Cement content: Concrete, except Class D, shall not contain less than 517 pounds of cement per cubic yard.

- F. Water-cement ratio: Concrete mixtures shall be proportioned to give adequate workability for the use intended without exceeding the following prescribed quantities of mixing water:

<u>CONCRETE CLASS</u>	<u>TOTAL WATER – U.S. GALLONS PER 94 LB. SACK OF CEMENT</u>
B	5-1/2
C	5-1/2
D	7-1/4

1. For Class A and High-Early strength concrete, the quantity of mixing water shall be determined on the basis of either laboratory trial batches or field experience in accordance with ACI 318.
2. The quantity of water used in each batch shall be the total quantity, including surface moisture contained in the aggregates.

- G. Ready mixed concrete: Ready mixed concrete shall meet the requirements of ASTM C94 except as modified in these Specifications.

2.04 GROUT

- A. Grout: Grout shall be a flowable, prepackaged, non-shrink and non-stain grout without dependence on gas expansion forces or enlargement of metal particles for its non-shrink characteristics.
- B. Packaging: The grout shall be packed in moisture-proof bags with general instructions for placement printed on the bag.

PART 3 EXECUTION

3.01 PREPARATION

- A. Measurement and Mixing: Measurement and mixing of concrete shall be subject to the review of the Engineer in all respects and shall be performed in accordance with the recommendations of ACI 304, as modified herein.
1. Measuring requirements: Measure cement, fine and coarse aggregates separately by weight by equipment providing accuracy within 1 percent of the net load weighed. Water shall be measured by a suitable device, accurate to within 1 percent of the total amount required for the batch.
 2. Measuring equipment: The accuracy of the weighting equipment shall meet the requirements of the United States Bureau of Standards and standard testing weights and other necessary equipment shall be available at all times for testing the equipment.
 3. Mixing: Concrete shall be mixed in rotary, batch type mixer of adequate design to produce a thorough mix, homogenous in composition and uniform in color. Each batch of 1 cubic yard or less shall be mixed not less than 1-1/2 minutes after the last of the ingredients have been added to the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.
- B. Ready-Mixed Concrete:
1. Rate of delivery: The rate of delivery of the mixed concrete shall be such that the interval between placing of fresh concrete in contact with concrete already placed from previous batches shall not exceed 45 minutes. The elapsed time between the introduction of mixing water to the cement and aggregates and depositing concrete in the Work shall not exceed 60 minutes, including mixing and agitating time.
 2. Delivery equipment: Delivery of concrete in non-agitating equipment shall not be permitted.

3. Addition of water: No water shall be added to the concrete at the site unless accepted by the Engineer for a specific batch. Acceptance of such addition to one batch shall not be construed as acceptance of additions to subsequent deliveries.

3.02 INSTALLATION

A. Forms:

1. General: The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. Forms shall be designed, detailed and constructed in accordance with ACI 347 including all tolerances, except as modified herein. Beam and girder soffits shall be erected with a camber as indicated on the Drawings. Where camber is not given, a minimum camber of 1/4-inch in 10-feet of span shall be provided. The forms shall be sufficiently braced, shored, and wedged to prevent deflection.
 - a. Provide 3/4-inch bevel strips at the external angles of walls, beams, pilasters and columns and girders.
 - b. Provide sufficient forms for repeated uses to ensure the required rate of progress.
 - 1) Thoroughly clean and inspect all forms before use.
 - c. Apply a suitable form oil to the inside surface immediately before, during, or after erection of forms or thoroughly wet form just prior to placing concrete.
 - 1) No form oil shall be permitted on the reinforcing steel.
 - d. The Contractor shall be responsible for remedying any defects resulting from form use, inspection and prior acceptance by the Engineer notwithstanding.
2. Plywood forms: Forms for all interior exposed concrete surfaces and designated areas of exterior exposed concrete surfaces shall be constructed of plywood not less than 5/8-inch thick for straight sections and 3/8-inch thick for curved sections. Plywood shall be Douglas Fir, 5-ply for 5/8-inch or thicker, and 3-ply for 3/8-inch, made with a waterproof glue and manufactured especially for concrete formwork. Edges shall be square in both directions, and adjoining panels shall match in thickness, width, and length. Full-size sheets of plywood shall be used. Forms shall be placed so that marking will be symmetrical. Plywood shall be thoroughly oiled on contact faces and edges with raw linseed oil or other accepted form of lacquer.
3. Steel forms: Construct forms accurately in modular sizes and in such minor multiple widths and lengths as will permit plates and filler to be erected to correct alignment.
 - a. Coat steel forms prior to each use with a light, clear paraffin-base oil or other acceptable commercial preparation which shall not discolor concrete.
 - b. Wire brush plates after each use.

B. Placing Concrete:

1. General: Place concrete only in presence of the Engineer in forms which have been accepted by him. Where procedure is not specified, place concrete in accordance with ACI 304.
2. Continuous Operation: Concreting operations shall be continuous until the section, panel, or scheduled placement is completed. Should the concreting operations be unavoidably interrupted, construction joints shall be formed at proper locations as specified.
3. No Placement after Initial Set: No concrete shall be placed after its initial set has occurred, and no re-tempered concrete shall be used under any conditions.
4. Minimum Handling: Concrete shall be conveyed and placed with minimum handling and by means of buckets, buggies, chutes, pumps, or other approved equipment that will

prevent segregation of the ingredients. The slope and length of chutes shall be subject to the acceptance of the Engineer. Outlets of chutes, hoppers, and conveyor belts shall be provided with suitable baffles to prevent segregation. Apparatus shall be kept clean and flushed with water before and after each run. Concrete shall be deposited in the forms as close as possible to its final position and, in no case, more than 5-feet in a horizontal direction therefrom. Re-handling of concrete will not be permitted.

5. Placement in Layers: Place concrete in layers shallow enough so that the previous layer is still soft when the next layer is added. The two layers can be vibrated together.
 - a. The maximum layer depth shall not exceed 18-inches.
 - b. The elapsed time between placing layers shall not exceed 45 minutes.
 6. Elimination of Voids: Take special care to place concrete against the forms, particularly in angles, and corners in order to prevent voids, pockets and rough areas and to assure continuous contact of the entire surface of the reinforcing steel and inserts with concrete.
 - a. Rod or spade concrete, if needed, to work coarse material away from forms.
 7. Protection: Protect freshly placed concrete against damage from the elements or other sources.
 8. Vibrating: Consolidate all concrete by means of mechanical internal vibrators applied directly into the concrete in a vertical position.
 - a. The intensity and duration of vibration shall be sufficient to cause concrete to flow, to compact thoroughly and to embed reinforcement, pipes, conduits, and similar Work completely. Vibrators shall not, however, be used to cause concrete to move more than a short distance horizontally. Vibrators shall be inserted and withdrawn at points 18- to 30-inches apart, and vibration shall be stopped immediately when sheen of mortar first appears on the surface.
 - b. Vibrators shall operate at a speed of not less than 4500 cycles per minute. Each tool shall weigh approximately 15 pounds and shall be capable of producing a visible effect upon concrete mixture with a 1-inch slump for a distance of at least 18-inches from the vibrator. A sufficient number of vibrators shall be on hand to assure that the incoming concrete can be properly compacted within 15 minutes after placing. Reserve vibrators shall be on hand for the time when others are being serviced. No placement of any concrete shall be made with a single vibrator on hand.
- C. Special Requirements:
1. Hot Weather Requirements: Follow the requirements of ACI 305 and the following for placement of concrete during hot weather.
 - a. Concrete in excess of 90 degrees F. at the time of placement shall not be used.
 - b. A water reducing set retarding admixture may be used in accordance with the provisions of these Specifications when concrete temperature is consistently about 75 degrees F. and a noticeable decrease in slump or an increase in mixing water demands occur.
 2. Cold Weather Requirements: Follow the requirements of ACI 306 and the following for placement of concrete during cold weather.
 - a. Set accelerators shall not be permitted.
 - b. Protect concrete placed in the Fall from the time of the first frost until mean daily temperature at the site falls below 40 degrees F. from freezing for a minimum period of 24 hours after it is placed.
 - c. While mean daily temperatures are below 40 degrees F., the temperature of the concrete shall be not less than 50 degrees F. and shall be maintained at this temperature for at least 72 hours, or, if structural requirements are critical, until such

time as is required to develop the necessary compressive strength. The internal temperature for concrete at the time of placing during this period shall not exceed 60 degrees F.

- d. Protect concrete, placed in the spring after mean daily temperature rises above 40 degrees F. from freezing in a similar manner to that described in the preceding sentences, until danger of freezing is past.

D. High-Early Concrete

1. When use of high-early strength hydraulic cement concrete is required, it shall conform to the requirements specified in Table II-17 in Section 217 of the VDOT Road and Bridge Specification, except that the 28-day strength shall be obtained in 7 days. Up to 800 pounds per cubic yard of Type I or Type II cement may be used to produce high-early strength concrete in lieu of using Type III modified cement.
2. Hydraulic cement concrete shall conform to the requirements of Section 217 for Class A3 paving concrete except that the compressive strength shall be at least 3,000 psi within 24 hours. The accelerated strength gain shall be achieved by the use of 800 +/-50 pounds per cubic yard of Type III cement conforming to the requirements of AASHTO M-85 and approved air-entraining, accelerating, and water-reducing admixtures conforming to the requirements of Section 215. If calcium chloride is permitted as an accelerating admixture, it shall be limited to 2 percent by mass. The air content shall be 6 +/- 2 percent. The water/cement ratio shall be not more than 0.42 by weight. The Contractor shall prepare a sufficient number of trial batches in the presence of the Engineer to verify the strength and workability of the mixture design when required.

E. Curing:

1. General: Follow recommendations of ACI 318 and the following for curing concrete.
 - a. Protect concrete surfaces, which will normally be exposed to the atmosphere, against drying too rapidly for a minimum period of 7 days.
 - 1) Refer to requirements of applicable subparagraphs on hot or cold weather curing.
 - b. Curing procedure shall begin immediately following placing the concrete.
 - 1) If a delay in application of curing procedure occurs, cover concrete with moistened burlap held in complete contact with the surface or kept moist by continuous sprinkling.
 - c. Use one of the following methods, subject to approval of the Engineer, for curing concrete.
2. Water Curing: Use quilted covers, wetted and applied to the concrete surface as soon as forms have been removed or, in the case of slabs, as soon as concrete has set sufficiently to prevent marring of finish.
 - a. Quilted covers shall consist of an outer covering of burlap or cotton, and a needled, punched or sandwiched inner layer of cotton batting, in all weighing a minimum of 20 ounces per square yard.
 - b. Maintain covering materials in a thoroughly saturated condition sufficient to show the presence of free water between mat and concrete surface at all times throughout curing period.
3. Sheet Curing: Sheet curing of concrete slabs is accomplished through use of sheet materials such as waterproof paper or polyethylene film, both meeting the requirements of ASTM C171, applied to the concrete surface as soon as it has set sufficiently to prevent marring.
 - a. Wet concrete surface thoroughly, then place sheet goods in direct contact and anchor in a manner which assures continuous contact during curing period.

- b. Lap sheet materials a minimum of 3-inches, then tape, glue or cement seams.
 - c. Sheeting materials shall not discolor concrete surface.
4. Membrane Curing: Begin membrane curing immediately after removal of forms, or in the case of uniformed surfaces, as soon as water sheen is no longer visible on the concrete surface.
- a. Coat the entire exposed surface with a liquid membrane forming compound containing a temporary color indicator.
 - b. Apply membrane coating by means of an approved pressure spray distributor at the rate of 1 gallon of material per 200 square feet of concrete surface.
 - 1) Do not apply membrane curing to the faces of construction joints or other surfaces against which additional concrete will be placed. Keep those surfaces continuously wet by other means.
 - 2) Do not apply membrane coating to surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, waterproofing, damp-proofing, membrane roofing, floor painting and other coatings and finish materials, unless otherwise specified.
5. Special Requirements:
- a. During hot weather, protect concrete surfaces from drying by continuous moist curing for a period of at least 24 hours.
 - 1) Start curing procedure as soon as concrete surface has hardened sufficiently to withstand surface damage.
 - 2) If moist curing is not carried beyond 24 hours, cover surface, while damp, with a suitable heat-reflecting plastic covering or spray with a white pigmented curing compound.
 - b. During cold weather, protect concrete against freezing in accordance with ACI 306 and the following:
 - 1) When protection against low temperatures is removed at the end of the required period, remove it in a manner such that the resulting temperature drop in any part of the concrete does not exceed 40 degrees F. during the first 24-hour period.
 - 2) Do not permit concrete in heated enclosures to dry out.
- F. Joints and Bonding: Make construction joints where indicated or permitted. Locate joints to assure stability, strength and watertightness.
- 1. Corners: Build all corners monolithically. Concrete on either side of the corners shall be continuous to the points shown on the Drawings or as directed.
 - 2. Placing Concrete in Beams, Girders, or Slabs: Allow a minimum of 2 hours to elapse after concrete in the columns or walls before depositing concrete in beams, girders, or slabs supported thereon.
 - 3. Horizontal Keyways: Build horizontal keyways to facilitate the drainage of flushing water from the keyways.
 - 4. Requirements for Joints: Provide joints with continuous straight and regular keys or grooves.
 - a. Bring exposed concrete surfaces to a true level line at the top of all horizontal construction joints.
 - b. In the case of exposed construction joints, locate a row of form ties in the concrete 4- to 6-inches from the joint to tighten the forms for subsequent sections of construction.

- c. Install waterstops, where required, in accordance with the provision of these Specifications.
 - 5. Continuous Placing between Construction Joints: The placing of concrete shall be carried on continuously between the construction joints shown on the Drawings or as directed by the Engineer.
 - a. If, for any reason, it becomes necessary to stop placing concrete at locations other than those indicated, both the proposed location and method of making the joint shall be subject to the Engineer's approval.
 - 6. Placement against Existing Concrete: Concrete surfaces, against which the new concrete is to be placed, shall be thoroughly cleaned and wetted. Just prior to placing new concrete, horizontal surfaces and joints shall be slushed with at least 2-inches of cement grout of the same mixture as the concrete but with coarse aggregate omitted. Special care shall be used in placing and puddling concrete at vertical joints to ensure a bond with existing concrete. Vertical construction joints shall not be made in watertight construction, unless shown on the Drawings.
- G. Finishing Concrete Surfaces:
- 1. General: Finish exposed exterior concrete surfaces to achieve neat and smooth architectural effects, except where textured surface is indicated.
 - a. Finish top edges of wall within a 1/2-inch radius, unless beveled edges or other details are shown.
 - b. Immediately after stripping the forms, without exception, inspect all concrete surfaces. Remove all fins, offsets, burrs, ridges or other unsightly marks from the concrete surfaces.
 - c. Tie holes, pour joints, voids, stone pockets, or other defective areas shall be patched, in accordance with the recommendations of the manufacturers of the various bonding compounds, before the concrete is thoroughly dry. Defective areas shall be chipped way or bush-hammered to a depth of not less than 1-inch with all edges perpendicular. Obtain a roughened dust-free surface. The areas to be patched, including at least 5-inches of the adjoining surface, shall be wetted continually for a minimum of 1 hour prior to placing the patching mortar. A bonding material or agent consisting of a mixture of cement, water and an additive, the amount as recommended by the manufacturer, such as EUCO liquid, Rhoplex 330 or approved substitute, shall then be scrubbed onto the surface, followed immediately by the patching mortar. The material for patching shall consist of the same material and of approximately the same proportions as used for the concrete, omitting the coarse aggregate and mixing with water and an additive as previously specified. For exposed concrete, white cement shall be substituted for part of the gray cement so that the patch will match the color of the surrounding concrete. The proportion of white and gray cement shall be as determined by the patches made on the sample panels. The amount of water shall be as little as consistent with the requirements of handling and placing. The mortar shall not be re-tempered. The mortar shall be thoroughly compacted and screed off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. The patch shall be finished to match the adjoining surface and shall be cured as specified for the original concrete.
 - 2. Exterior concrete surfaces: Exposed exterior concrete surfaces defined as architectural concrete, except in the case of textured concrete surfaces, shall be given a uniform light rubbed finish.
 - a. After the patching has been completed, the surfaces shall be given a uniform rubbed finish as follows: Mix 1 part Portland cement and 1-1/2 parts fine sand with sufficient water to make a grout having the consistency of thick paint. Wet the concrete

surface, and brush the grout uniformly over the entire area, completely filling air bubbles and holes. Immediately after applying the grout, float the surface with a wood float, scouring the wall vigorously. Allow the cement to set for 1 or 2 hours, depending upon the weather.

If hot and dry, keep the walls damp during this period using a fine fog spray. When the grout has hardened sufficiently so that it can be scraped from the surface with the edge of a steel trowel without removing the grout from the small air holes, cut off all that can be so removed. Allow the surface to dry thoroughly, and then rub it vigorously with burlap to remove completely all dried grout. There should be no visible film of grout remaining after this rubbing, and no grout shall be left on the surface overnight. Sufficient time shall be allowed for grout to dry after it has been cut with the trowel, so that it can be wiped off clean with the burlap. The finished surfaces shall have a uniform, fine sand finish.

- H. Expansion Joints: Provide joint filler for all expansion joints; finish expansion joints with a joint sealant where shown or specified.
1. Placing joint filler: Place joint filler against the completed portion of the Work before concrete for next section is placed.
 - a. Fasten filler to hardened concrete with a compatible adhesive in accordance with the manufacturer's instructions.
 - b. Extend filler through the thickness of the wall or slab.
 - 1) Joint filler shall be flush with the finished surface, except where a joint sealant is shown.
 - c. In joints having a waterstop, fit filler accurately on each side of the waterstop to prevent intrusion of concrete.
 2. Joint prime and sealant application: Prepare joint surfaces by removing all foreign matter and concrete laitance so that concrete surfaces are free of all oil, grease, wax, waterproofing compounds or form release materials prior to application of primer and sealant.
 - a. Prime all concrete joint surfaces without exceptions.
 - b. Priming of other surfaces shall be according to the sealant manufacturer's recommendations and subject to Engineer's approval.
 - c. Apply primer by brushing or spraying on joint surfaces.
 - d. Apply sealant within 2- to 24-hours after application of the primer.
 - e. For horizontal joints, apply sealant by pouring directly from a suitably shaped container or by flowing from a bulk-loading gun.
 - f. Fill vertical joints from a gun, beginning at the bottom to avoid bulging and the formation of air voids.
 - g. Fill overhead joints from a gun, by laying a bead along each side of the joint and then filling the middle.
 - h. Immediately after application, tool sealant in accordance with manual instructions in order to establish contact with joint surfaces and to provide a smooth sealant face.
 3. Joint Depth: Control joint depth with the use of joint fillers and backup materials.
 - a. Fillers and backup material in contact with sealant shall be non-impregnated and free from asphalt, creosote, oil or extractable plasticizer.
 - b. Backup material shall be closed cell polyethylene foam, such as Sealtight Backer Rod or Sonofoam Backer Rod with a diameter 1/4-inch larger than the joint width.

- c. Joint widths and sealant depths shall be as shown, except that sealant depth shall not exceed 1/2-inch.
- I. Waterstops: Waterstops for corners and intersections shall be prefabricated so that only butt joints need to be made in the field.
 - 1. Corners and Intersections: Field fabrication of corners and intersections requires the Engineer's approval. Miter and assemble corners and intersections with approved equipment as described for field joints.
 - 2. Field Joints: Make field joints by cutting the ends of the sections to be spliced so they will form a smooth, even butt joint.
 - a. Heat the cut ends with splicing tool until plastic melts. Press ends together until the plastic cools.
 - b. Splicing shall cause as little damage to the continuity of the ribbed strips as possible.
- J. Unbonded Joints: Where removable concrete slabs are poured in place, slab must be prevented from bonding to walls or other rigid parts of the structure.
 - 1. Preventing bonding: Prevent bonding by the use of membrane waterproofing material
 - a. Place material over the bearing surface of the wall or other supporting part of the structure in order to isolate it from the new concrete being placed.
 - b. Install material in layers as required to produce a total thickness of at least 1/8-inch.
 - 2. Filling unbonded joints: Where removable concrete slabs are not poured in place, fill horizontal and vertical joints with self-leveling or non-sagging Colma joint sealer
- K. Mass Concrete: Any concrete placement of 100 or more cubic yards with a minimum dimension of 3 feet will be considered mass concrete.
 - 1. Provisions during Placement: Make special provision to lower the temperature of the concrete as it is placed and to limit the maximum temperature rise in the concrete during hydration.
 - a. The provisions may include pre-cooling the mix, reduction in cement content and substitution of pozzolan or blast furnace slag cement for part of the Portland cement, as approved by the Engineer.
 - 2. Provisions after Placement: Make provisions to avoid thermal shock due to too rapid cooling of the concrete after the initial curing period.

3.03 FIELD TESTS

- A. Slump Tests: Conduct slump tests in accordance with ASTM C143 and the following
 - 1. Allowable Slump: Provide a concrete mixture which has a slump of 5-inches or less if placement is to be done by pumping and 4-inches or less if placement is to be accomplished by methods other than pumping.
 - 2. Tolerances: A tolerance of up to 1-inch greater than these amounts shall be allowed for individual batches provided the average to all batches or the 10 most recent batches, whichever is fewer, does not exceed the maximum allowable slump.
 - 3. Excessive Slump: Concrete with excessive slump shall be rejected and no additional concrete shall be delivered until the cause of the deficiency is determined and corrected.
- B. Air Content Tests: Tests to determine air content of fresh concrete shall be taken twice daily, at least 4 hours apart and shall be performed in accordance with the applicable ASTM Standards.

- C. Number of tests required. Unless otherwise required, a minimum of one strength test shall be made for each 50 cubic yards or fraction thereof for each mix design of concrete placed in any one day.
- D. Sample collection and storage: Sampling of fresh concrete shall be in accordance with ASTM C172. Laboratory and field test cylinders shall be made and, for the first 24 hours, cured and stored in a tightly constructed, firmly braced wooden box, constructed to maintain the temperature immediately adjacent to the specimens in range of 60 degrees F. to 80 degrees F. and prevent loss of moisture from the specimens. The storage temperature shall be thermostatically controlled when necessary.
 - 1. Loss of moisture shall be prevented by covering cylinders with wet burlap, damp sand or other approved means. Test cylinders cast in cardboard molds shall not be stored in contact with wet burlap, damp sand or any other material that will allow the outside surfaces of the mold to absorb water for the first 24 hours. Cylinders shall be removed from storage after 24 hours, and after removal of molds, the laboratory-cured cylinders shall be stored in a moist condition in the laboratory at a temperature of 65 degrees F. to 75 degrees F. until the time of the test. The field-cured cylinders shall be removed from storage after 24 hours and stored in the structure as near the point of sampling as practicable, with the same protection on all surfaces as the structure which they represent.
- E. Testing: Cylinders shall be tested in accordance with ASTM C39. Each strength test will consist of 3 laboratory-cured and 1 field-cured cylinders. One laboratory-cured cylinder shall be tested at 7 days. Normally 2 laboratory-cured cylinders and 1 field cured cylinder shall be tested at 28 days. If the 7-day laboratory cured-cylinder is not satisfactory, one of the remaining laboratory-cured cylinders shall be tested at 7 days instead of 28 days. Testing requirements for High-Early strength concrete will be as directed by the Owner.
- F. Testing Laboratory: The concrete testing laboratory will be employed directly by the Owner, which will pay all fees associated with concrete testing work. The Contractor shall assist the testing laboratory whenever necessary to accomplish the required tests.
- G. Strength Requirements: The average strength of the test cylinders for any portion of a structure shall be equal to or greater than the strength specified, and at least 90 percent of all tests shall indicate a strength equal to or greater than the strength specified. In cases where the average strength of the test specimens for any portion of the structure falls below the specified requirements, the Engineer shall order a change in the mix proportions or water content for the remaining portion of the Work and shall require the Contractor to secure test specimens of the hardened concrete represented by these cylinders. The number of test cylinders for each concrete placement shall be as directed by the Engineer. Specimens shall be secured and tested in accordance with ASTM C42.
- H. Failure to achieve required strength: If the specimen tests further substantiate that the concrete represented by the cylinders and specimens is below the specified strength requirements, the concrete shall be removed and replaced at the expense of the Contractor.

3.04 CLEANING

- A. Removal of Forms: Forms shall not be removed until the concrete has hardened sufficiently to support its own load plus any superimposed loads which may be placed thereon. Forms, form ties and bracing shall not be removed without the specific permission of the Contractor's registered professional engineer.
 - 1. Minimum shoring times: Leave forms in place at least the minimum length of time specified below. Removal can proceed only if the minimum specified strength for the given period of time has been achieved.

	MIN. TIME	MIN. STRENGTH (PSI)
Columns and Walls	2 days	1500
Side forms for girders		

and beams	2 days	1500
<u>Bottom forms of slabs:</u>		
Under 10-foot clear span	4 days	2300
10- to 20-foot clear span	7 days	2700
Over 30-foot clear span	10 days	2900
<u>Bottom forms of beams & girders:</u>		
Under 10-foot clear span	7 days	2700
10- to 20-foot clear span	14 days	3200
Over 20-foot clear span	21 days	3600

- a. The preceding times may be decreased if field concrete strengths, determined from test cylinders made in accordance with the provisions of these Specifications, equal or exceed the strengths listed previously.
 - b. Increase the minimum times if concrete temperature following placement is permitted to drop below 50 degrees F.
2. Re-shoring: The Contractor may elect to use re-shoring techniques where form panels are stripped in a pattern or sequence such that part of the original shores remain or re-shoring is simultaneously provided so that the partially cured concrete is not overstressed. Re-shoring shall not commence until the Contractor's registered professional engineer has reviewed the re-shoring system and examined the concrete to satisfy himself that it has properly hardened and will not be damaged by re-shoring in any way.
 3. Form ties: Withdraw the removable portion of the form ties from the concrete immediately after forms are removed.
 - a. Fill holes with grout from a grout gun.
 - b. Finish the surface with a steel spatula or by rubbing with sackcloth.
 - c. On architectural concrete and on exposed interior surfaces of buildings where appearance is important, add white cement to patching grout.
 4. Concrete finishing: Take care in removing forms, wales, shorings, supports and form ties to avoid spalling or marring the concrete. Start patching rubbed finish as required immediately following form removal without exception. Concrete placements shall be sequenced to minimize shrinkage cracks.

END OF SECTION 03300

APPENDIX A

VDH WATERWORKS CONSTRUCTION PERMIT

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COMMONWEALTH of VIRGINIA

DEPARTMENT OF HEALTH

OFFICE OF DRINKING WATER

Culpeper Field Office

M. Norman Oliver, MD, MA
State Health Commissioner

400 S. Main Street, 2nd Floor
Culpeper, VA 22701
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WATERWORKS CONSTRUCTION PERMIT

Permit No.:	600121	Subject:	Fairfax County
Effective Date:	January 25, 2021	Water:	Fairfax Water
Expiration Date:	January 25, 2026	PWSID:	6059501

JAN 25 2021

Issued to:

Fairfax County Water Authority
8570 Executive Park Avenue
Fairfax, VA 22031

ATTN: Mr. Robert C. Cotten IV

Plans and specifications for the construction of modifications to the Fairfax Water community waterworks located in Fairfax County, prepared by Michael Baker International, have been reviewed by this Office. The plans titled "Project 2377, Division 003, 36" Prince William County Transmission Main, Phase II, Invitation for Bids No. XX-XXX, Tax Map Nos. 112-2, 106-4" are dated November 2020 and include sheets 1 of 10 through 10 of 10 and a cover sheet. The specifications titled "Invitation for Bids No. 20-XX, Project Manual for Project 2377, Division 003, 36" Prince William County Transmission Main, Phase II" are dated November 2020.

The project consists of approximately 1,700 feet of 36-inch ductile iron pipe to serve as a redundant transmission main from the Griffith Water Treatment Plant to an interconnection with the Prince William County Service Authority.

The plans and specifications are technically adequate and are approved by this Office, in accordance with 12VAC5-590 of the Commonwealth of Virginia *Waterworks Regulations*. A copy of these documents is on file in the Culpeper Field Office.

This approval does not suspend, minimize, or otherwise alter the waterworks obligation to comply with federal, state, or local laws and regulations or permits.

Mr. Robert C. Cotten, IV
Waterworks Construction Permit No. 600121
January 25, 2021
Page 2

This Waterworks Construction Permit is issued in accordance with Title 32.1 of the *Code of Virginia*, and 12VAC5-590 *et seq.* of the *Waterworks Regulations*. This is your authorization from the State Health Commissioner to construct modifications to the subject waterworks in accordance with the approved documents. Any deviations from the approved documents affecting capacity, hydraulic conditions, operating units, the functioning of the treatment processes, or the water quality delivered, must be approved by this Office before any such changes are made. Revised plans and specifications shall be submitted to the Culpeper Field Office in time to permit review and approval before construction.

Upon completion of construction, the owner shall submit a statement signed by a professional engineer licensed in Virginia certifying that the work was completed in accordance with the approved documents.

Upon receipt of this statement, and satisfactory results of the bacteriological analysis, the project may be put into service.

If we can be of additional assistance, please contact Kyle McCammon, District Engineer, at (540) 829-7340.

Sincerely,

A handwritten signature in blue ink, appearing to read "J. Hull", is written over the typed name.

Jeremy D. Hull, PE
Engineering Field Director

KAM

cc: R. Scott Quast, PE (Michael Baker International)
Fairfax County Health Department, attn: Gloria Addo-Ayensu, MD, MPH
Fairfax County Administrator
Fairfax County Building Official

ec: VDH – ODW, Central Office

APPENDIX B

Test Hole Data Forms

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ACCUMARK

Subsurface Utility Services

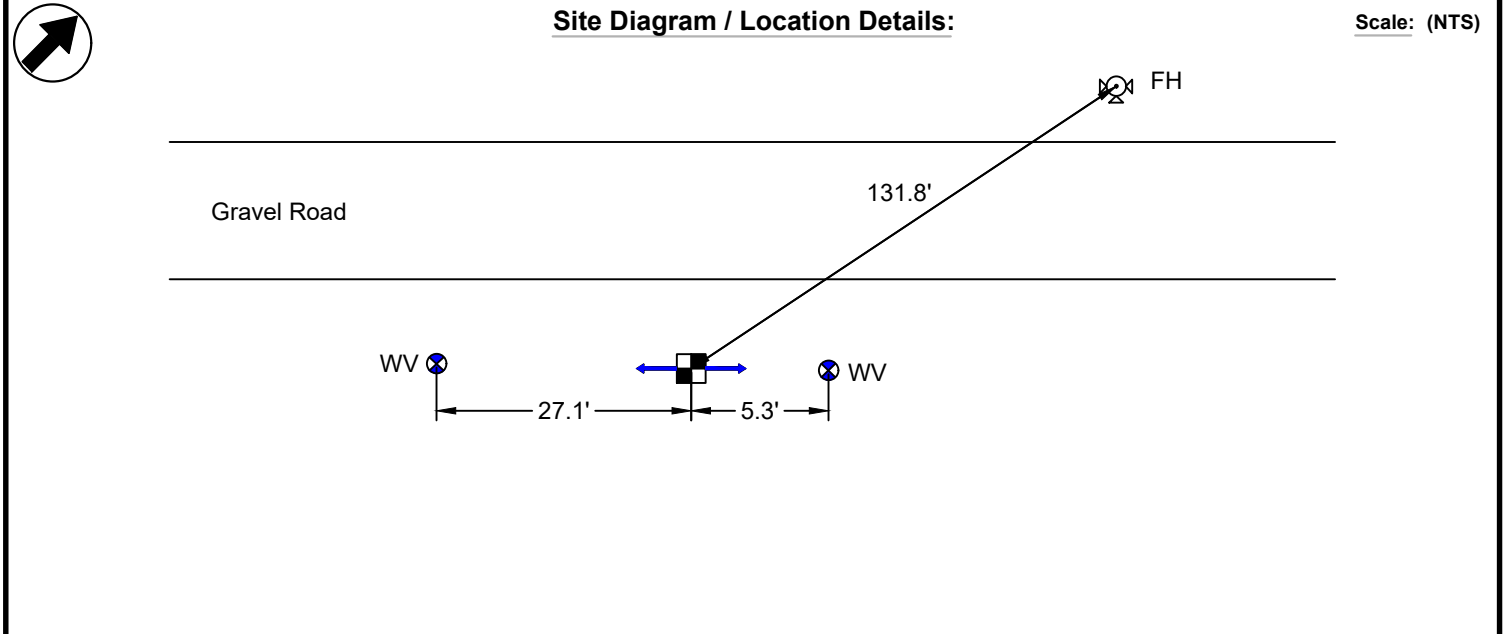
Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	1	Accumark Job#:	NV20-057
Project Name:	Prince William County 36" Transmission Main	Client Reference#:	N/A
Requested By:	Michael Baker Manassas, Virginia	Test Hole Date:	11/05/20
Point of Contact:	Kathryn Smedley (703) 334-4933	Project Location:	9600 Ox Road Lorton, Virginia
Utility Requested:	Water	Soil Conditions:	Soft Rocky Clay, Gravel
		Pavement Condition:	Grass N/A

<p style="text-align: center;">Test Hole Cross Section</p> <p>Existing Grade</p> <p style="text-align: center;">"A"</p> <p style="text-align: right;">Overall Utility Width: See Notes</p>	<p style="text-align: center;">Elevation / Survey Information:</p> <p>Located By: <u>Accumark, Inc.</u> Vertical Datum: <u>NAVD88</u></p> <p>Benchmarks Used:</p> <p>BM#1 Elev: <u>233.330'</u> Description: <u>Pt. #2</u></p> <p>BM#2 Elev: <u>231.374'</u> Description: <u>Pt. #1</u></p> <p>Test Hole Reference Mark</p> <p>Northing: <u>6936450.72</u> Easting: <u>11836491.85</u> Elevation: <u>184.00</u></p>
Drawn Facing: North	

General Notes:
Target utility found. Hub & tac set over the approximate crown of the target utility. Crew unable to expose utility due to gravel in the test hole.

Exposed Utility Information									
Utility	Utility Found	Utility Size	Material Type	Depth @ Top of Utility	Elevation @ Top	Duct Bank		Utility Owner	Condition
						Bottom Depth	Elevation		
A	Water	See Notes	Wrapped Iron	5.61	178.39	N/A	N/A	Fairfax Water	Fair



Note: This report depicts and describes the conduits or cables that were visible to our crew upon excavating the test hole. There may be additional conduits or cables located below this configuration which were not visible to the test hole crew.

LMB 11/19/20

ACCUMARK

Subsurface Utility Services

Proud - Professional - Precise

Utility Test Hole Report - Quality Level "A"

Test Hole #:	<u>1</u>	Project Numbers:	<u>NV20-057</u>
Project Name:	<u>Prince William County 36" Transmission Main</u>		
Client:	<u>Michael Baker</u>	Project Location:	<u>Lorton, Virginia</u>



LMB 11/19/20

ACCUMARK

Subsurface Utility Services

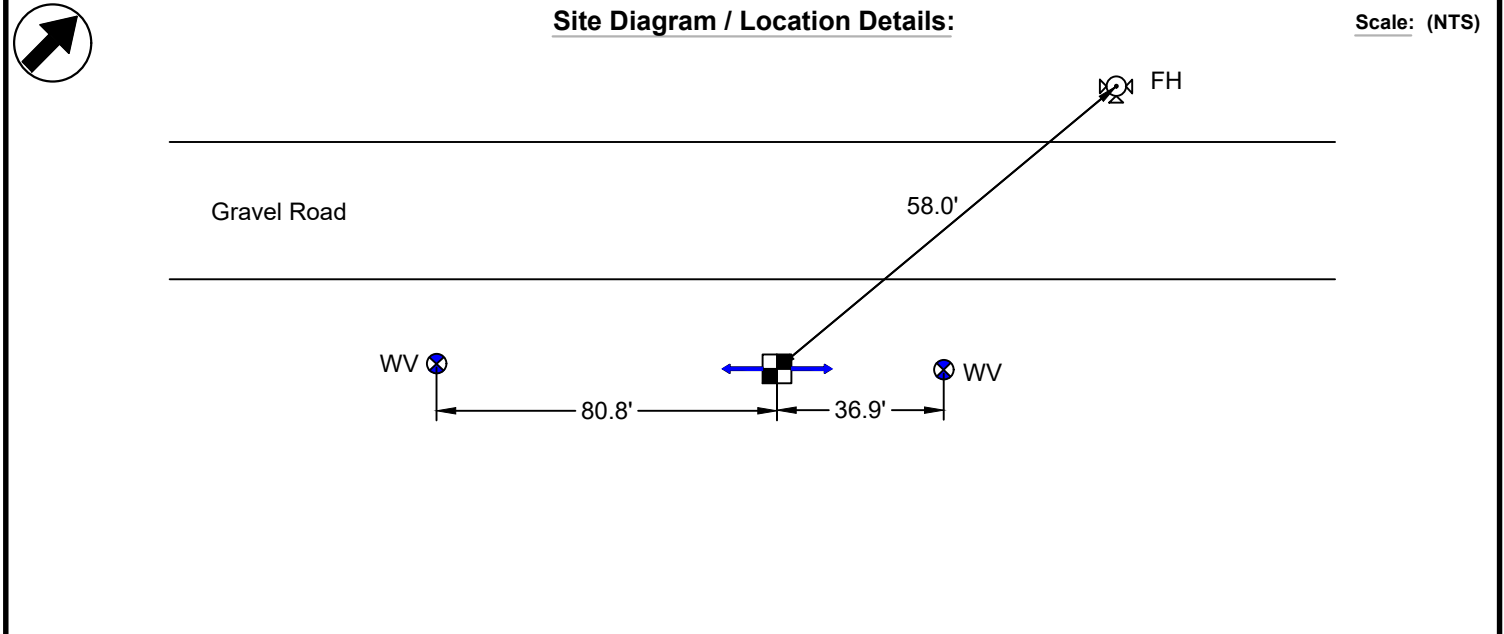
Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	2	Accumark Job#:	NV20-057
Project Name:	Prince William County 36" Transmission Main	Client Reference#:	N/A
Requested By:	Michael Baker Manassas, Virginia	Test Hole Date:	11/05/20
Point of Contact:	Kathryn Smedley (703) 334-4933	Project Location:	9600 Ox Road Lorton, Virginia
Utility Requested:	Water	Soil Conditions:	Soft Dry Rocky Clay, Gravel
		Pavement Condition:	Grass N/A

<p style="text-align: center;">Test Hole Cross Section</p> <p>Existing Grade</p> <p style="text-align: center;">"A"</p> <p>Overall Utility Width: See Notes</p> <p>Drawn Facing: North</p>	<p style="text-align: center;">Elevation / Survey Information:</p> <p>Located By: Accumark, Inc. Vertical Datum: NAVD88</p> <p>Benchmarks Used:</p> <p>BM#1 Elev: 233.330' Description: Pt. #2</p> <p>BM#2 Elev: 231.374' Description: Pt. #1</p> <p>Test Hole Reference Mark</p> <p>Northing: 6936505.37 Easting: 11836557.50 Elevation: 197.68</p>
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General Notes:
Target utility found. Hub & tac set over the approximate crown of the target utility. Crew unable to expose utility due to gravel in the test hole.

Exposed Utility Information									
Utility	Utility Found	Utility Size	Material Type	Depth @ Top of Utility	Elevation @ Top	Duct Bank		Utility Owner	Condition
						Bottom Depth	Elevation		
A	Water	See Notes	Wrapped Iron	13.25	184.43	N/A	N/A	Fairfax Water	Fair



Note: This report depicts and describes the conduits or cables that were visible to our crew upon excavating the test hole. There may be additional conduits or cables located below this configuration which were not visible to the test hole crew.

LMB 11/19/20

ACCUMARK

Subsurface Utility Services

Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	<u>2</u>	Project Numbers:	<u>NV20-057</u>
Project Name:	<u>Prince William County 36" Transmission Main</u>		
Client:	<u>Michael Baker</u>	Project Location:	<u>Lorton, Virginia</u>



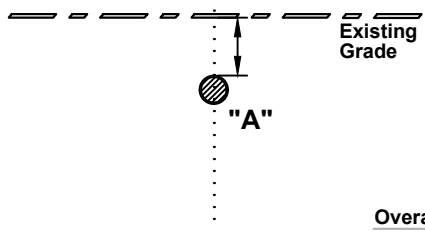
LMB 11/19/20

ACCUMARK

Subsurface Utility Services

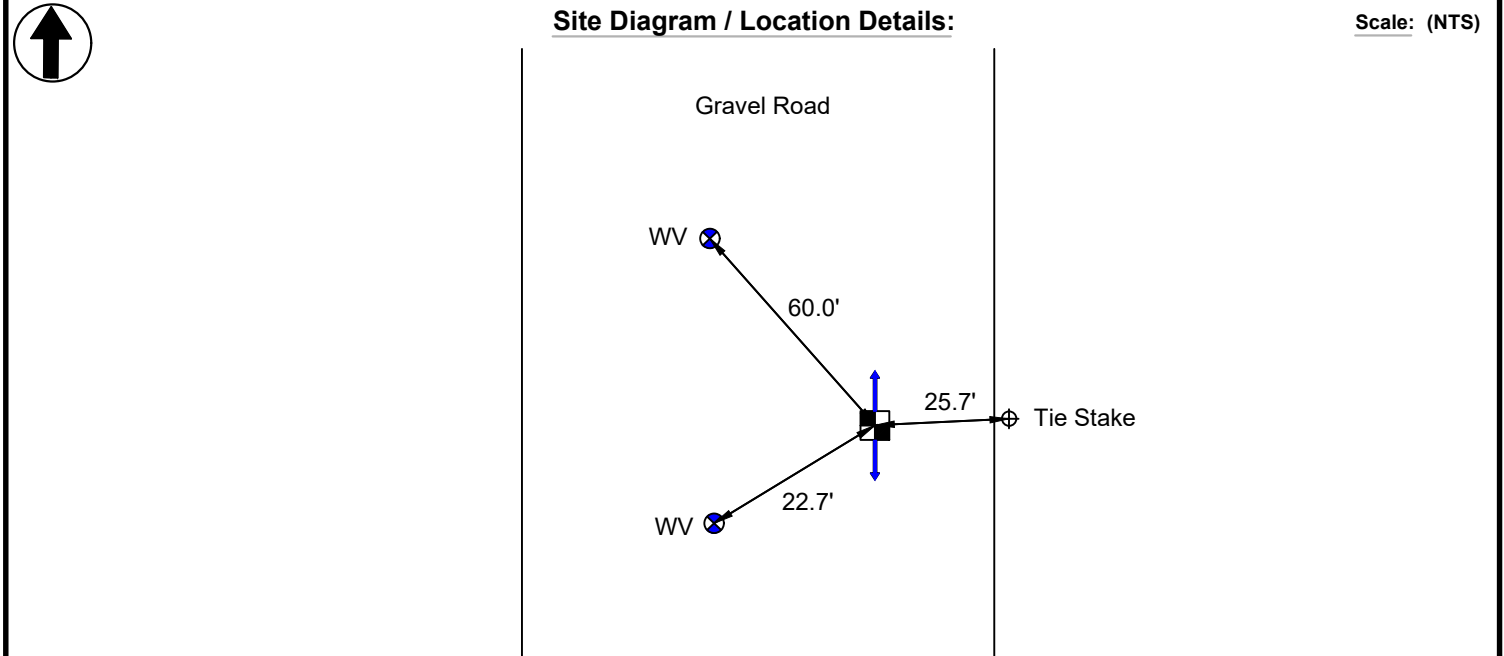
Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	5	Accumark Job#:	NV20-057
Project Name:	Prince William County 36" Transmission Main	Client Reference#:	N/A
Requested By:	Michael Baker Manassas, Virginia	Test Hole Date:	11/17/20
Point of Contact:	Kathryn Smedley (703) 334-4933	Project Location:	9600 Ox Road Lorton, Virginia
Utility Requested:	Water	Soil Conditions:	Soft Dry Rocky Clay, Gravel
		Pavement Condition:	Fair 0.8' Gravel

<p style="text-align: center;">Test Hole Cross Section</p>  <p>Existing Grade</p> <p style="text-align: center;">"A"</p> <p>Overall Utility Width: See Notes</p>	<p style="text-align: center;">Elevation / Survey Information:</p> <p>Located By: Accumark, Inc. Vertical Datum: NAVD88</p> <p>Benchmarks Used:</p> <p>BM#1 Elev: 233.330' Description: Pt. #2</p> <p>BM#2 Elev: 231.374' Description: Pt. #1</p> <p>Test Hole Reference Mark</p> <p>Northing: 6937626.64 Easting: 11837550.20 Elevation: 235.80</p>
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General Notes:
Target utility found. Nail set over the approximate crown of the target utility. Crew unable to expose utility due to gravel in the test hole.

Exposed Utility Information									
Utility	Utility Found	Utility Size	Material Type	Depth @ Top of Utility	Elevation @ Top	Duct Bank		Utility Owner	Condition
						Bottom Depth	Elevation		
A	Water	See Notes	Wrapped Iron	5.85	229.95	N/A	N/A	Fairfax Water	Fair



Note: This report depicts and describes the conduits or cables that were visible to our crew upon excavating the test hole. There may be additional conduits or cables located below this configuration which were not visible to the test hole crew.

ACCUMARK

Subsurface Utility Services

Proud - Professional - Precise

Utility Test Hole Report - Quality Level "A"

Test Hole #:	<u>5</u>	Project Numbers:	<u>NV20-057</u>
Project Name:	<u>Prince William County 36" Transmission Main</u>		
Client:	<u>Michael Baker</u>	Project Location:	<u>Lorton, Virginia</u>



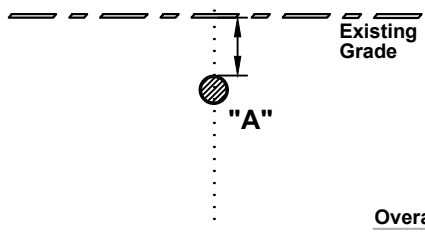
LMB 11/19/20

ACCUMARK

Subsurface Utility Services

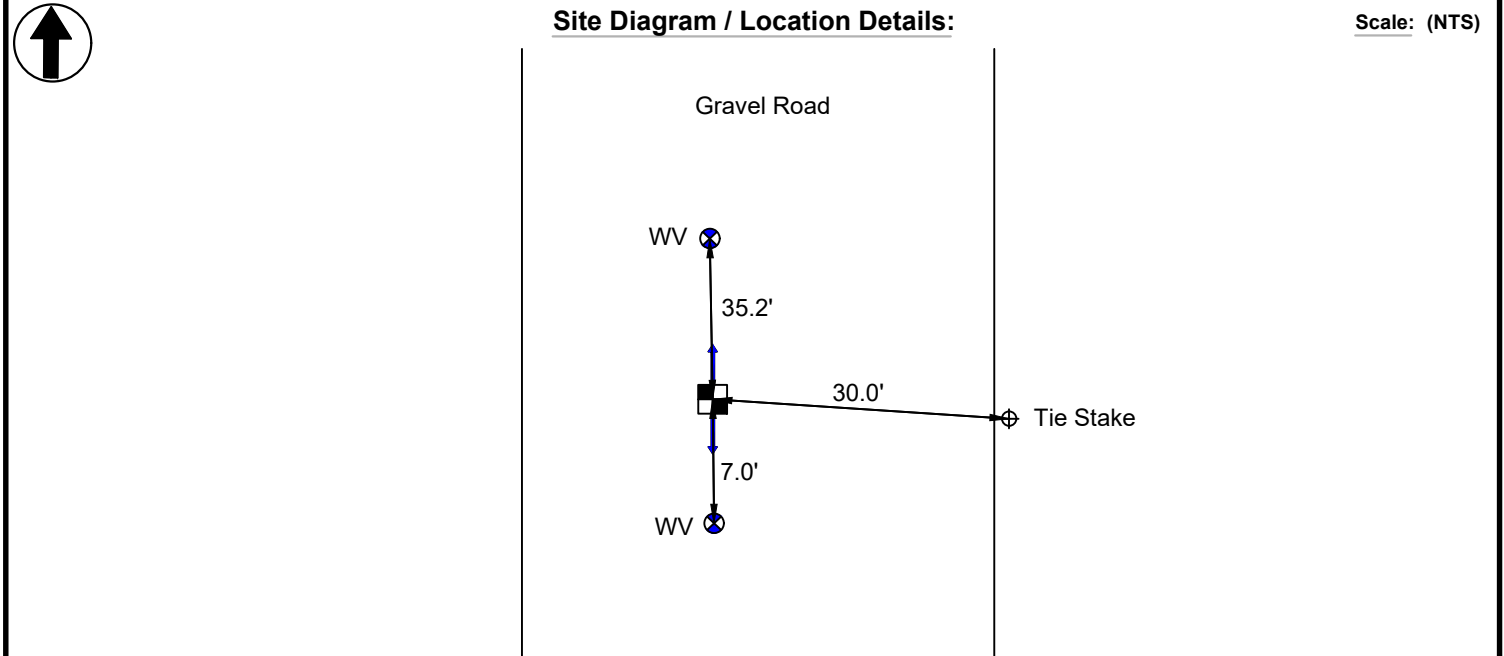
Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	6	Accumark Job#:	NV20-057
Project Name:	Prince William County 36" Transmission Main	Client Reference#:	N/A
Requested By:	Michael Baker Manassas, Virginia	Test Hole Date:	11/17/20
Point of Contact:	Kathryn Smedley (703) 334-4933	Project Location:	9600 Ox Road Lorton, Virginia
Utility Requested:	Water	Soil Conditions:	Soft Dry Rocky Clay
		Pavement Condition:	Fair 0.8' Gravel

<p style="text-align: center;">Test Hole Cross Section</p>  <p>Existing Grade</p> <p style="text-align: center;">"A"</p> <p>Overall Utility Width: See Notes</p>	<p style="text-align: center;">Elevation / Survey Information:</p> <p>Located By: Accumark, Inc. Vertical Datum: NAVD88</p> <p>Benchmarks Used:</p> <p>BM#1 Elev: 233.330' Description: Pt. #2</p> <p>BM#2 Elev: 231.374' Description: Pt. #1</p> <p>Test Hole Reference Mark</p> <p>Northing: 6937648.96 Easting: 11837533.27 Elevation: 235.63</p>
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General Notes:
Target utility found. Nail set over the approximate crown of the target utility. Crew unable to expose utility due to gravel in the test hole.

Exposed Utility Information									
Utility	Utility Found	Utility Size	Material Type	Depth @ Top of Utility	Elevation @ Top	Duct Bank		Utility Owner	Condition
						Bottom Depth	Elevation		
A	Water	See Notes	Wrapped Iron	5.59	230.04	N/A	N/A	Fairfax Water	Fair



Note: This report depicts and describes the conduits or cables that were visible to our crew upon excavating the test hole. There may be additional conduits or cables located below this configuration which were not visible to the test hole crew.

ACCUMARK

Subsurface Utility Services

Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	<u>6</u>	Project Numbers:	<u>NV20-057</u>
Project Name:	<u>Prince William County 36" Transmission Main</u>		
Client:	<u>Michael Baker</u>	Project Location:	<u>Lorton, Virginia</u>



LMB 11/19/20

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Subsurface Utility Services

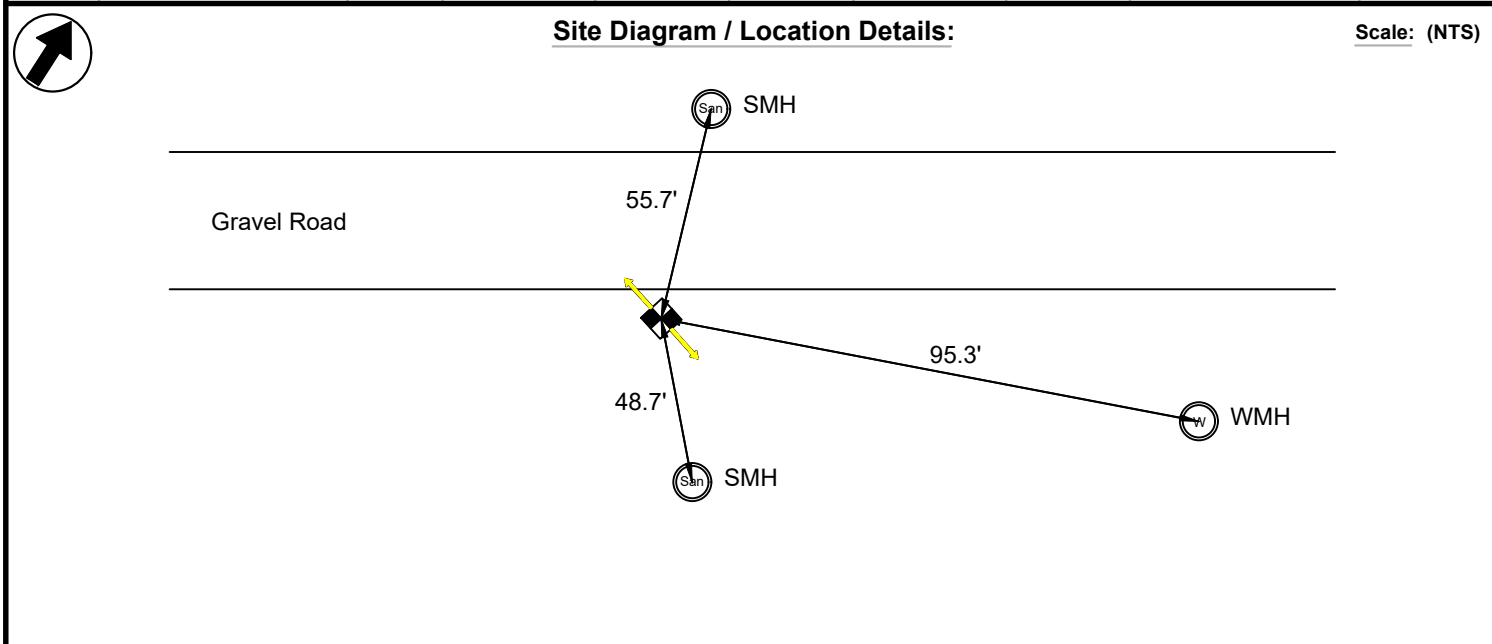
Proud - Professional - Precise
Utility Test Hole Report - Quality Level "A"

Test Hole #:	7	Accumark Job#:	NV20-057
Project Name:	Prince William County 36" Transmission Main	Client Reference#:	N/A
Requested By:	Michael Baker Manassas, Virginia	Test Hole Date:	11/05/20
Point of Contact:	Kathryn Smedley (703) 334-4933	Project Location:	9600 Ox Road Lorton, Virginia
Utility Requested:	Gas	Soil Conditions:	Soft Dry Rocky Clay
		Pavement Condition:	Grass N/A

<p style="text-align: center;">Test Hole Cross Section</p> <p>Existing Grade</p> <p style="text-align: center;">"A"</p> <p>Overall Utility Width: 8.5" +/-</p> <p>Drawn Facing: East</p>	<p style="text-align: center;">Elevation / Survey Information:</p> <p>Located By: Accumark, Inc. Vertical Datum: NAVD88</p> <p>Benchmarks Used:</p> <p>BM#1 Elev: 233.330' Description: Pt. #2</p> <p>BM#2 Elev: 231.374' Description: Pt. #1</p> <p>Test Hole Reference Mark</p> <p>Northing: 6936655.42 Easting: 11836737.78 Elevation: 221.49</p>
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General Notes:
Target utility found. Hub & tac set over the crown of the target utility.

Exposed Utility Information									
Utility	Utility Found	Utility Size	Material Type	Depth @ Top of Utility	Elevation @ Top	Duct Bank		Utility Owner	Condition
						Bottom Depth	Elevation		
A	Gas	8"	Plastic	3.69	217.80	N/A	N/A	Washington Gas	Good



Note: This report depicts and describes the conduits or cables that were visible to our crew upon excavating the test hole. There may be additional conduits or cables located below this configuration which were not visible to the test hole crew.

ACCUMARK

Subsurface Utility Services

Proud - Professional - Precise

Utility Test Hole Report - Quality Level "A"

Test Hole #:	<u>7</u>	Project Numbers:	<u>NV20-057</u>
Project Name:	<u>Prince William County 36" Transmission Main</u>		
Client:	<u>Michael Baker</u>	Project Location:	<u>Lorton, Virginia</u>



LMB 11/19/20