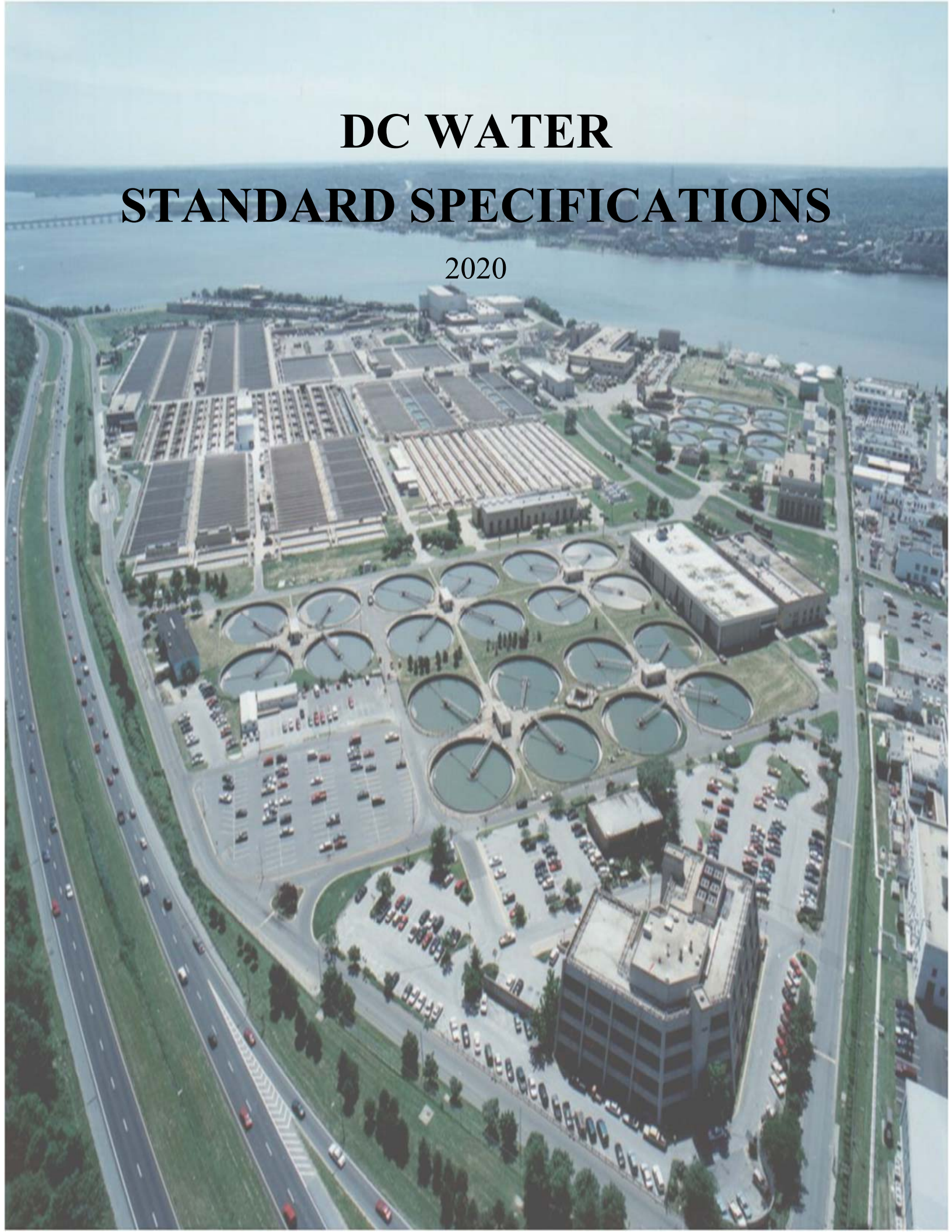


DC WATER STANDARD SPECIFICATIONS

2020



DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
STANDARD SPECIFICATIONS
(2020)



Leonard Benson
SVP, CIP Project Delivery

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DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
STANDARD SPECIFICATIONS
(2020)

PURPOSE

The District of Columbia Water and Sewer Authority Standard Specifications dated 2020, also referred to as “Standard Specs,” contains construction specification sections, which have been developed and approved for use, as written, to construct infrastructure operated and maintained by the District of Columbia Water and Sewer Authority (DC Water). Use of the Standard Specs will provide a consistent approach to designing and constructing water and sewer assets operated and maintained by DC Water.

The Standard Specification Sections are “Opt-In Only,” meaning the requirements in the Standard Specs are only included in the construction requirements when specifically part of the construction specifications and/or permit requirements for the project. The Standard Specs can be included in project specifications via physical inclusion or reference.

ACCEPTANCE OF THE STANDARD SPECIFICATIONS DATED 2020

The Standard Specification Sections included in the STANDARD SPECIFICATIONS dated 2020 have been reviewed and approved for design and construction of infrastructure operated and maintained by DC Water.

APPROVED BY:



Leonard R. Benson
SVP, CIP Project Delivery
DC Water

DATE:

2.10.20

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HOW TO USE THE STANDARD SPECS IN PROJECT SPECIFICATIONS

Project Specifications include:

- Standard Specifications,
- Supplemental Standard Specifications, and
- Project Specific Specifications.

The following describes how these three types of specifications interface with each other during the design, bidding, and construction phases of a project. The first description, for design, is targeted at project design engineers and how to use the Standard Specs when preparing project specifications. The second description, for bidding and construction, is targeted at construction contractors so they know the requirements of a construction project.

1. Design

The Professional Design Engineer (PDE) develops Project Specifications as follows:

- *Standard Specs*: Review the Standard Specs for applicability to the Project Work. Select the applicable Standard Spec Sections to be included in the Project Specifications.
 - The Standard Specs are “Opt-In Only” and careful consideration must be given to determine which Sections are applicable to the project.
 - Standard Specs are not changed or modified by the PDE.
 - When printed, print the appropriate Sections from the Standard Specs on blue paper and insert them in the Project Specifications based on Section numbering.
 - Indicate on the Project Specification Table of Contents which Sections are Standard Specs.
- *Supplemental Standard Specifications*: Select the Supplemental Standard Specifications for any Standard Specification being used and include them in the Project Specifications.
 - Supplemental Standard Specifications Section numbers include “SUP” after the Section Number.
 - Supplemental Standard Specifications consist of previously approved revisions to the Standard Specs. They are not changed or modified by the PDE.
 - Print the appropriate Supplemental Standard Specifications on green paper and insert them into the Project Specifications immediately following the Standard Specification Section with the identical Section number. E.G., Supplemental Standard Specification Section 31 23 10 SUP immediately follows Standard Specs Section 31 23 10.
 - Indicate on the Project Specification Table of Contents which Sections use Supplemental Standard Specifications.
- *Project Specific Specifications*: Determine what additional specifications are necessary to complete the Project Work or if modifications are required to be made to the Standard Specs and Supplemental Standard Specifications. If additional specifications or modifications are required:
 - Develop Project Specific Specifications using the DC Water Guide Specifications.
 - If a Guide Specification does not exist, create a new Project Specific Specification following the DC Water specification template guidelines.
 - If modifications to a Standard Spec Section or Supplemental Standard Specification is required due to a unique project requirement, contact the Specifications and Standards Group to determine if the Standard Specification should be modified or replaced in its entirety with a Project Specific Specification.

If the Standard Specification is replaced in its entirety, the new Project Specific Specification Section will be numbered and treated as if a Standard Specification does not exist.

- Print the Project Specific Specifications on white paper and insert them into the Project Specifications at the appropriate location based on Section numbering. Project Specific Specifications that modify Standard Spec Sections will be inserted immediately following the Standard Specification and the Supplemental Standard Specification, if applicable, with the identical Section number.
- Indicate in the Project Specification Table of Contents which Sections are Project Specific Specifications and Project Specific Specifications that modify the Standard Specs.

2. Bidding and Construction

Three types of Specifications can be included in the Project Specifications book: Standard Specs, Supplemental Standard Specifications, and Project Specific Specifications. Each type of specification may be printed per the following format:

- Standard Specification – Print on Blue Paper.
- Supplemental Standard Specifications – Print on Green Paper.
- Project Specific Specifications – Print on White Paper.

Printing the specifications on color paper as noted above is only for convenience of the users to help them easily identify the location of the different types of specs in the Project Specifications book. Failure to print the Standard Specifications or Supplemental Standard Specs on color paper does not change the specification category type. There are two (2) additional methods used to identify the type of specification:

- The Table of Contents in the front of the Project Specifications book lists the specifications and indicates the type of specification.
- The footer will identify the specification as a Standard Specification, Supplemental Standard Specification, or Project Specific Specification. Project Specific Specifications will show the project number and title.

During construction, the order of precedence used for resolving conflicts between the specifications, from highest to lowest, is identified in the Contract.

REVISIONS TO STANDARD SPECIFICATIONS

The Standard Specifications dated 2020 supersede all previous versions of DC Water Standard Spec Sections. Significant revisions from the most recent version are denoted with a vertical black line in the margin next to the text that was revised. The date found in the footer identifies the month and year that each Standard Spec Section was last revised.

Periodically, DC Water will approve and adopt new Standard Spec Sections with publication of a new Standard Specs Book. When this is done, the Table of Contents will be updated with the new titles and effective dates of the Standard Spec Sections that have been added or modified. Additionally, the Cover and Signature Page for the Standard Specs Book will be revised with a new date and approval signature; superseding the previous revision of the Standard Specs Book.

When DC Water chooses to modify a Standard Spec Section prior to the scheduled publication of the next Standard Specifications, the approved revision(s) will be added to the Supplemental Standard Specifications. The text of the Supplemental Standard Specification Section will indicate the location of revision(s) as well as the exact language of the revision being made.

SUMMARY OF REVISIONS IN THE STANDARD SPECIFICATIONS DATED 2020

The following summarizes the revisions made and incorporated into the “Standard Specifications” dated 2020.

Significant revisions that add, remove, or revise requirements are indicated by a vertical black line in the margin at the location where the revisions are made.

The following types of revisions were made without being marked:

- Revisions made to the footer.
- Revisions to formatting.
- Spelling corrections.
- Adding and removing the page containing “This Page is Intentionally Left Blank”
- Page Count.

Some notable revisions include, but are not limited to:

- Removed Part 4 from all Standard Specifications. Measurement and Payment will be addressed in its own Project Specific Specification Section.
- Updated the Standard Specifications with revisions previously issued as Supplemental Standard Specifications.
- Added 16 new standard Sections, including Section 00 70 00 – General Conditions.
- Removed one (1) Section; Section 33 13 00 – Disinfecting Water Mains.

The status of the specification Sections in the column labeled “Status” in the Table of Contents describe how the specification has revised from the most recent version and have the following definitions:

- New – The specification was not previously included in the Standard Specification Book.
- Updated – The specification has been modified and revisions to the previous version are shown with a sidebar as discussed above.
- No Change – There are no notable revisions to the specification. Specifications may include formatting, spelling corrections and other minor revisions that do not affect the technical aspects of the specification Section.

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SECTION 00 01 11
STANDARD SPECIFICATIONS
TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
00 01 11	Table of Contents	4	January 2020	Updated
00 70 00	General Conditions	iv plus 64	January 2020	New

DIVISION 01 – GENERAL REQUIREMENTS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
01 29 00	Progress Payment Procedures	4	January 2020	Updated
01 32 16	Construction Schedule	14	January 2020	New
01 33 00	Submittals	14	January 2020	New
01 33 10	Document Management	4	January 2020	New
01 57 30	Dust Control	4	January 2020	Updated
01 71 16	Substantial Completion	2	January 2020	New
01 78 42	As-Built Drawings	4	January 2020	Updated
01 79 26	Warranties	4	January 2020	New

DIVISION 02 – EXISTING CONDITIONS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
02 01 20	Protecting Existing Utilities	4	January 2020	Updated
02 41 00	Demolition	4	January 2020	Updated

DIVISION 21 - FIRE SUPPRESSION				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
21 11 10	Fire Hydrants	4	January 2020	Updated
21 11 17	Remove Fire Hydrants and Hydrant Control Valves	2	January 2020	Updated

DIVISION 31 – EARTHWORK				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
31 05 19	Geotextiles	6	January 2020	Updated

DIVISION 31 – EARTHWORK				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
31 11 00	Clearing, Grubbing, and Stripping	4	January 2020	Updated
31 23 10	Trench Excavation and Backfill	14	January 2020	Updated
31 23 19	Dewatering-Groundwater	6	January 2020	Updated
31 23 23	Controlled Low-Strength Material (Flowable Fill)	4	January 2020	Updated
31 23 32	Aggregate Materials	4	January 2020	Updated
31 23 37	Test Pits	2	January 2020	Updated
31 25 00	Erosion and Sediment Control	4	January 2020	Updated
31 41 00	Shoring, Sheeting, and Bracing	4	January 2020	Updated

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SECTION	SECTION TITLE	PAGES	DATE	STATUS
32 12 16	Flexible Pavement	8	January 2020	Updated
32 12 18	Pavement Milling	4	January 2020	Updated
32 13 78	PCC Pavement Repair	2	January 2020	Updated
32 16 00	Portland Cement Curb and Gutter	2	January 2020	Updated
32 16 01	Stone Curb	2	January 2020	Updated
32 16 04	Brick Gutter	2	January 2020	Updated
32 16 25	Driveways, Sidewalks, and Alleyways	2	January 2020	Updated
32 92 23	Sodding	4	January 2020	Updated

DIVISION 33 – UTILITIES				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
33 01 20	Abandonment of Underground Utilities	4	January 2020	Updated
33 01 25	Sewer Lining CIPP	12	January 2020	New
33 01 28	Inspection of Sewers for Cleaning, Repairs Lining, and New Pipe Installations	10	January 2020	New
33 01 38	CCTV Inspection of Sewers	10	January 2020	New
33 01 39	Sonar Inspection of Sewers	8	January 2020	New
33 01 40	Laser Inspection of Sewers	4	January 2020	New
33 01 43	Hydrogen Sulfide Gas and Temperature Inspection of Sewers	4	January 2020	New
33 01 44	Multi-Sensor Inspection of Sewers	2	January 2020	New
33 05 02	Water Utility Distribution Piping – Ductile Iron Pipe	8	January 2020	Updated

DIVISION 33 – UTILITIES				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
33 06 20	Concrete Valve Casings	4	January 2020	Updated
33 11 20	Concrete Thrust Restraints	2	January 2020	Updated
33 12 13	Water Service Lines	12	January 2020	Updated
33 12 14	Backflow Preventers	4	January 2020	Updated
33 12 16	Tapping Sleeves and Valves	6	January 2020	Updated
33 12 17	Service Saddles	4	January 2020	Updated
33 14 00	Gate Valves	4	January 2020	Updated
33 14 05	Butterfly Valves	6	January 2020	New
33 19 00	PVC Sanitary Sewer Piping – Gravity	6	January 2020	New
33 19 05	Pressure and Leakage Testing – Pressure Pipe	4	January 2020	Updated
33 23 20	Dewatering – Treated Water	4	January 2020	Updated
33 29 50	Temporary Water Piping	6	January 2020	Updated

DIVISION 40 – PROCESS INTEGRATION				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
40 96 01	Witnessed Combined Loop Test (WCLT)	4	January 2020	New

~ END OF SECTION 00 01 11 ~

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GENERAL CONDITIONS

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

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SECTION 00 70 00

GENERAL CONDITIONS

ARTICLE 1 DEFINITIONS AND TERMINOLOGY

1.1 *Defined Terms*

- A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.
1. *Addenda* -- Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.
 2. *Allowance* -- A Bid item that may be included on projects. The allowance, or any part thereof, may only be obligated as part of the Contract by DC Water.
 3. *Application for Payment* -- The form acceptable to DC Water which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos* -- Any material that contains more than one percent asbestos.
 5. *As-Built* -- Actual conditions of the Work as-constructed, regardless of whether that Work is identical to the Work shown on the Contract Drawings or whether that Work is different than that which is shown on the Contract Drawings. This includes all additions, deletions, and deviations to the new Work.
 6. *As-Built Drawings* -- A record of the As-Built Work performed by the Contractor that is documented on a set of Contract Drawings. See also Final As-Built Drawings and Partial As-Built Drawings.
 7. *Award* -- The formal acceptance of the Bid by the Contracting Officer, subject to the execution of a satisfactory Contract therefor and such other conditions as may be specified or required by law.
 8. *Beneficial Occupancy* -- The formal acceptance by the jurisdiction having authority to grant permission to occupy and/or utilize a facility or portion of a facility and is documented by the jurisdiction having authority issuing a certificate of Beneficial Occupancy.
 9. *Bid* -- The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 10. *Bidder*--The individual or entity who submits a Bid directly to DC Water, as distinct from a sub-bidder who submits a bid directly to a Bidder.
 11. *Bidding Documents* -- The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
 12. *Bidding Requirements* -- The Sections of the Contract Documents in Division 00 between Section 00 00 00 and Section 00 49 99 including, but not limited to the Advertisement or Invitation to Bid, Instructions to Bidders, bid security, if any, and the Bid form with any supplements.

13. *Bonds* -- Performance Bond and Payment Bond and other instruments of security.
14. *Change Order* -- A document signed by both the Contracting Officer and the Contractor that authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times or both, issued on or after the Effective Date of the Contract.
15. *Claim* -- A disputed demand or assertion by the Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
16. *Contract* -- The written Contract between DC Water and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
17. *Contract Documents* -- The Contract Documents shall include the documents set forth in Section 00 50 00 – Contract.
18. *Contract Drawings* -- See Drawings.
19. *Contract Price* -- The moneys payable by DC Water to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Contract (subject to the provisions of Paragraph 10.3 in the case of Unit Price Work).
20. *Contract Times* -- The number of calendar days or the dates stated in the Contract to: (i) achieve Milestones, if any; (ii) Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by DC Water’s written recommendation of final payment.
21. *Contracting Officer* -- The Chief Executive Officer (CEO) and General Manager of DC Water or his or her designated representative, authorized to enter into a contract on behalf of DC Water.
22. *Contractor* -- The individual or entity with whom DC Water has entered into the Contract.
23. *Cost of the Work* -- See Paragraph 10.1A for definition.
24. *DC Water* -- The District of Columbia Water and Sewer Authority with whom Contractor has entered into a Contract and for whom the Work is to be performed.
25. *DC Water’s Consultant* -- An individual or entity having a separate contract with DC Water to furnish services with respect to the Project as an independent professional associate or consultant and who is identified in the Contract Documents.
26. *DC Water’s Safety Representative* -- The person designated as safety representative by DC Water to oversee DC Water’s safety interests on the Project.
27. *Division* -- A standard category of construction specifications that forms the framework of a project specification.
28. *Drawings* -- That part of the Contract Documents prepared or approved by DC Water which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

29. *Effective Date of the Contract* -- The date indicated in the Contract on which it becomes effective, but if no such date is indicated, it means the date on which the Contract is signed and delivered by the last of the two parties to sign and deliver.
30. *Electronic Transmission* -- Any process of communication that does not directly involve the physical transfer of paper and that is suitable for the retention, retrieval and reproduction of information by the recipient.
31. *Estimated Quantity* -- See Paragraph 10.3A for definition.
32. *Federal Requirements and Contract Provisions* -- those requirements incorporated into the Contract Documents as a result of actual or potential grant funding from the U.S. Environmental Protection Agency.
33. *Field Order* -- A written order issued by DC Water which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
34. *Final As-Built Drawings* -- As-Built Drawings that are certified and submitted to DC Water after all Work is complete and which contain all As-Built Work performed during construction. See also As-Built Drawings.
35. *Final Completion* -- The time when, in the opinion of DC Water, all Work required by the Contract is completed satisfactorily and ready for final payment.
36. *General Requirements* -- Sections of Division 01 of the Specifications.
37. *Good Industry Practice* -- The methods, techniques, standards and practices, which at the time they are to be employed and considering the circumstances known or reasonably believed to exist at such time, are generally recognized and accepted as good industry practice in the Mid-Atlantic Region of the United States.
38. *Governmental Unit* -- Any national, state or local government, any political subdivision thereof, or any governmental, quasi-governmental, judicial, public or statutory instrumentality, administrative agency, authority, body or other entity having jurisdiction over the performance of the Work, the Project or the parties.
39. *Hazardous Environmental Condition* -- The presence at the Site of Asbestos, PCBs, Petroleum, Lead Paint, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
40. *Hazardous Waste* -- Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
41. *Laws and Regulations; Laws or Regulations* -- Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
42. *Lead Paint* -- Any paint or surface coating that contains lead.
43. *Liens* -- Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
44. *Lump Sum* -- A single dollar amount for which the Contractor agrees to perform a specific scope of work. A Lump Sum can be used to determine the total price of the entire Work using a single bid item in the Schedule of Prices or to determine a

total price for a specific portion of the Work for which a unit of one (1) is assigned as the quantity to a specific bid item in Unit Price Work.

45. *Milestone* -- A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
46. *Notice to Proceed (NTP)* -- Written documentation from DC Water to the Contractor stating the date on which Work may begin and identifies the beginning of the Contract Times.
47. *Other Project Contractors* -- Those parties defined in Paragraph 8.1A.
48. *Owner* -- The terms Owner and DC Water shall be synonymous.
49. *Partial As-Built Drawings* -- As-Built Drawings that are certified and submitted to DC Water each month and which show all As-Built Work for the period of time for which a request for payment is being submitted. See also As-Built Drawings.
50. *Partial Utilization* -- Use by DC Water of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
51. *Payment Bond* -- The security in the form approved by DC Water and executed by the Contractor and its surety, and paid for by the Contractor, as a guarantee that the Contractor will pay in full all its bills and accounts for materials and labor used in the prosecution and construction of the Work.
52. *PCBs* -- Polychlorinated biphenyls.
53. *Performance Bond* -- The security in the form approved by DC Water and executed by the Contractor and its surety, and paid for by the Contractor, as a guarantee for the benefit of DC Water complete performance of the Contract in accordance with the terms.
54. *Petroleum* -- Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
55. *Progress Schedule* -- The schedule, prepared and submitted by Contractor and approved by DC Water, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
56. *Project* -- The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.
57. *Project Representative* -- The authorized representative of DC Water who may be assigned to the Site or any part thereof.
58. *Radioactive Material* -- Source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

59. *Safety Data Sheet* -- The data sheet from the chemical manufacturer, distributor, or importer that provides the hazardous chemical information to the users of the chemical and is compliant with 29 CFR 1910.1200(g).
60. *Samples* -- Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
61. *Schedule of Prices* -- The list of prices that defines the price structure for payment of Work performed on a Project.
62. *Section* -- A portion of the specifications covering one or more segments of the total project. Sections are included in the Contract as needed to meet project requirements and are a portion of a Division. Section may also refer to one or more segments of a regulation, code, or standard.
63. *Site* -- Lands or areas indicated in the Contract Documents as being furnished by DC Water upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by DC Water which are designated for the use of Contractor.
64. *Specifications* -- That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details pertinent thereto (Divisions 00 through 49).
65. *Standard Details* -- Detailed drawings of DC Water standard design applications.
66. *Stop Work Order* -- An order issued by DC Water, the District of Columbia Department of Transportation (DDOT), or other District of Columbia agency to the Contractor requiring the Contractor to stop the portion of the Work identified in the order.
67. *Subcontractor* -- An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
68. *Submittal* -- All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
69. *Substantial Completion* -- The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of DC Water, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “*substantially complete*” and “*substantially completed*” as applied to all or part of the Work refer to Substantial Completion thereof.
70. *Supplementary Conditions* -- That part of the Contract Documents which amends or supplements these General Conditions.
71. *Supplier* -- A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

72. *Underground Facilities* -- All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
73. *Unilateral Change Order* -- A document signed by the Contracting Officer that authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times or both, issued on or after the Effective Date of the Contract. A Unilateral Change Order, when executed by Contractor, becomes a Change Order.
74. *Unit Price Work* -- Work to be paid for on the basis of unit prices.
75. *Utility* -- Any public or private fixed works for the furnishing or transportation of fluids, gases, electricity, signals, or communications.
76. *Without Exception* -- The term "without exception", when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or "or-equal" item or no substitution will be permitted.
77. *Work* -- The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
78. *Work Change Directive* -- A written statement to Contractor issued on or after the Effective Date of the Contract and signed by DC Water ordering an addition, deletion, or revision in the Work as the result of an emergency, differing or unforeseen site conditions, or any other reason that DC Water may, in its sole discretion, determine.
79. *Written Amendment* -- A written statement modifying the Contract Documents, signed by the Contracting Officer and Contractor on or after the Effective Date of the Contract and normally dealing with the non-engineering or non-technical rather than strictly construction-related aspects of the Contract Documents.

1.2 Terminology

A. Intent of Certain Terms or Adjectives:

1. Whenever in the Contract Documents the terms "as allowed", "as approved", or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of DC Water as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to DC Water any duty or DC Water to supervise or direct the performance of the Work or any duty or DC

Water to undertake responsibility contrary to the provisions of Paragraph 7.6 or any other provision of the Contract Documents.

- B. Day:
 - 1. The word day shall constitute a calendar day of 24 hours measured from midnight to the next midnight.
- C. Defective:
 - 1. The word “defective”, when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any one or more inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by DC Water at Substantial Completion in accordance with Paragraph 13.5 or 13.6).
- D. Furnish, Install, Perform, Provide:
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 PRELIMINARY MATTERS

2.1 *Delivery of Bonds*

- A. When Contractor delivers the executed Contract to DC Water, Contractor shall also deliver to DC Water such Bonds as Contractor may be required to furnish.

2.2 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the date specified in the Notice to Proceed.

2.3 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to compliance with Paragraph 2.4.

2.4 *Before Starting Construction*

- A. Evidence of Insurance: Before any Work at the Site is started, Contractor and DC Water shall each deliver to the other, with copies to each additional insured identified in the Project Insurance Section of the Contract Documents, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and DC Water respectively are required to purchase and maintain in accordance with ARTICLE 5.
- B. Prior to beginning any work at the Site, submit to and obtain DC Water's approval for the following:
 - 1. Safety and Health Plan.
 - 2. Quality Control Plan.
 - 3. ROCIP Enrollment and/or Certificates of Insurance, as applicable.
 - 4. Initial Submittal Register.
 - 5. Preliminary Schedule.
 - 6. Additional documentation listed in Section 00 73 00 – Supplementary Conditions.
- C. At the times identified below, submit and obtain DC Water's approval for the following:
 - 1. Permits that are the Contractors responsibility – Prior to performing work for elements of work requiring a permit.
 - 2. Subcontracting Approval Requests – Prior to the subcontractor responsible for specific elements of the work beginning any work associated with their assigned responsibilities. This does not preclude the Contractor from beginning work that is self-performed.
 - 3. Preconstruction Survey – Prior to beginning work at the Site. When the Site is in multiple locations, or when the Site consists of multiple properties, beginning work at the Site is specific to the individual location or property.

2.5 *Preconstruction Conference*

- A. Within ten (10) days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by Contractor, DC Water, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.5B, procedures for handling submittals, processing Applications for Payment, maintaining required records and other Contract activities.
- B. Schedules: At the Preconstruction Conference, Contractor shall submit to DC Water for review:
 - 1. a schedule prepared in accordance with the Construction Schedule Section;
 - 2. a schedule of cash flow projections for estimated partial payments during the performance of the Work;
 - 3. a preliminary schedule of values for all of the Work not covered under unit price items that includes quantities and prices of items that when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. When required, a cost-loaded CPM schedule may be used in lieu of a schedule of

values. Overhead and profit shall be proportionally distributed over all items in the schedule of values or all cost-loaded activities in the CPM schedules;

4. any other document(s) relevant to developing a working understanding of the scope of the Work requested by the Contracting Officer at least seven days prior to the Preconstruction Conference

2.6 *Initial Acceptance of Schedules*

- A. Unless otherwise provided in the Contract Documents, DC Water will review for approval the schedules submitted in accordance with Paragraph 2.5B and the Construction Schedules Section. No Work at the Site shall start and no progress payment shall be made to Contractor until acceptable schedules are approved by DC Water.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 *Intent*

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) ready for continual operation to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result shall be provided whether or not specifically called for at no additional cost to DC Water.
- C. Clarifications and interpretations of the Contract Documents shall be issued by DC Water as provided in ARTICLE 7.
- D. If any provision of this Contract is held by a court or board of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force without being impaired or invalidated in any way.
- E. The titles or headings of the paragraphs and subparagraphs in the Contract Documents are intended for convenience of reference and shall not be considered as having a bearing on their interpretation.

3.2 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations:
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of DC Water, DC Water's Consultants, Contractor, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to DC Water, or any of DC Water's Consultants, agents, or employees any duty or DC Water to supervise or direct the performance of the Work or any duty or DC Water to

undertake responsibility inconsistent with the provisions of the Contract Documents.

3.3 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

1. Contractor's Review of Contract Documents before Starting Work: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to DC Water any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from DC Water before proceeding with any Work affected thereby.
2. Contractor's Review of Contract Documents during Performance of Work: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any pertinent Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to DC Water in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.18) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.4.
3. Contractor shall not be liable to DC Water for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, code, or instruction of any Subcontractor or Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations pertinent to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.4 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) DC Water's approval of a Submittal or Sample (subject to the notification provisions of Section 01 33 00 – Submittals); or (iii) DC Water's written interpretation or clarification.

3.5 *Reuse of Documents*

- A. Contractor and any Subcontractor, Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with Contractor, any Subcontractor or Supplier: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of DC Water or DC Water's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of DC Water and specific written verification or adaptation by DC Water. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.6 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by DC Water to Contractor, or by Contractor to DC Water, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

3.7 *Electronic Signatures*

- A. Signed versions of this Contract, the Contract Documents, any Addenda, attachments, exhibits, amendments, Change Orders, submittals and all other related documents signed in connection with this Contract that a party has transmitted to the other by facsimile, email, or other electronic medium shall be intended as and constitute an original and deemed to contain a valid signature of the party for all purposes acknowledging, consenting to, authorizing and approving the terms of the document, this Contract or any subject matter applicable thereto. Each party intends to be bound by its electronically transmitted signature and each is aware that the other will rely on the electronically transmitted signature, and each acknowledges such reliance and waives any defenses to the enforcement of the documents effecting the transaction contemplated by this Contract based on a faxed or electronically transmitted signature.

ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 *Availability of Lands*

- A. DC Water shall furnish the Site. DC Water shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with

which Contractor must comply in performing the Work. DC Water will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and DC Water are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in DC Water's furnishing the Site, Contractor may make a Claim therefore as provided in ARTICLE 15.

- B. The Contractor shall be responsible for having taken steps reasonably necessary to investigate and ascertain the nature and location of the Work, and the general and local conditions which can affect the Work or the cost thereof, including, but not limited to, those conditions bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, river stages, tides or similar physical conditions at the Site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to, and during, the prosecution of the Work. The Contractor acknowledges that it has satisfied itself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the Site, including all exploratory work done by DC Water, as well as from information presented by the Drawings and Specifications of the Contract. Any failure by the Contractor to do so will not relieve Contractor from responsibility for: (i) estimating properly the difficulty or cost of successfully performing the Work; and (ii) successfully performing the Work without additional expense to DC Water.
- C. DC Water assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by DC Water. DC Water is not responsible for any representation or purported agreement concerning conditions or contract requirements made by any employee, agent or representative of DC Water prior to the execution of the Contract, unless such representation or understanding is expressly stated in the Contract.
- D. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* Section 00 30 00 - Available Project Information includes:
 - 1. Reports of explorations and tests of subsurface conditions at or contiguous to the Site that DC Water has used in preparing the Contract Documents; and
 - 2. Drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site, (except Underground Facilities) DC Water has used in preparing the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the technical data contained in the reports and drawings identified in Paragraph A above, but such reports and drawings are not Contract Documents. Notwithstanding the above, Contractor may not rely upon or make any Claim against DC Water or any of DC Water's Consultants with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any such technical data or any such other data, interpretations, opinions, or information.

4.3 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or latent physical condition at or contiguous to the Site that is uncovered or revealed either:
 1. is of such a nature as to establish that any technical data on which Contractor is entitled to rely as provided in Paragraph 4.2 is materially inaccurate; or
 2. is of such a nature as to require a change in the Contract Documents; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly (but in no event later than seven days) after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.18), notify DC Water or designated representative in writing about such conditions. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so. Then Contractor shall, promptly (but in no event later than seven days) after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.18), notify DC Water or designated representative in writing about such conditions. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.
- B. *DC Water's Review:* After receipt of written notice as required by Paragraph 4.3A, DC Water will promptly investigate the pertinent conditions, determine the necessity of DC Water's obtaining additional exploration or tests with respect thereto, and advise Contractor in writing of DC Water's findings and conclusions.
- C. *Possible Price and Times Adjustments:*
 1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost or time required to perform any part of the Work, whether or not changed as a result of such conditions; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.3A; and
 - b. with respect to Work that is paid for as Unit Price Work, any adjustment in Contract Price will be subject to the provisions of Paragraph 10.3.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to DC Water with respect to the Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

- b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice within the time and as required by Paragraph 4.3A; or
 - d. Contractor received final payment under the Contract.
3. If DC Water and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in ARTICLE 15. However, DC Water, and DC Water's Consultants shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.4 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to DC Water by the owners of such Underground Facilities, including DC Water, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. DC Water shall not be responsible for the accuracy or completeness of any such information or data; and
2. the cost of all of the following shall be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data,
 - b. locating all Underground Facilities shown or indicated in the Contract Documents,
 - c. coordination of the Work with the owners of such Underground Facilities, including DC Water, during construction, and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.
3. In accordance with Paragraph 4.4A.2, it is understood and agreed that the Contractor has considered in its Bid all of the permanent and temporary Underground Facilities in their present or relocated positions, and that no additional compensation will be allowed for normal delays, inconvenience, or damage sustained by Contractor due to any interference from said Underground Facilities, the operation of moving the Underground Facilities, the making of new connections thereto if required by the Contract Documents, or by any other requirements of the owner(s) of the Underground Facilities.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions

affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.18), identify the owner of such Underground Facility and give written notice to that owner and to DC Water. DC Water will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If DC Water concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated in the Contract Documents and that Contractor did not know of, and could not reasonably have been expected to be aware of, or to have anticipated. Contractor's right to an equitable adjustment is conditioned upon Contractor having furnished written notice as required by Paragraph 4.4B.1 above. If DC Water and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, the Contractor may make a Claim therefor as provided in ARTICLE 15.

4.5 *Reference Points*

- A. DC Water shall provide engineering surveys to establish reference points for construction which in DC Water's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of DC Water. Contractor shall report to DC Water whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.6 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to Hazardous Environmental Conditions identified at the Site, if any, that have been utilized by DC Water in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the technical data contained in the reports and drawings identified in Paragraph A above, but such reports and drawings are not Contract Documents. Notwithstanding the above, Contractor may not rely upon or make any Claim against DC Water or any of DC Water's Consultants with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any such technical data or any such other data, interpretations, opinions or information.
- C. Where Hazardous Environmental Conditions are shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, Contractor shall take such action as is necessary, in accordance with applicable Laws and Regulations, to plan for and to remediate and render harmless all such Hazardous Environmental Conditions. Remediation plans for such known Hazardous Environmental Conditions shall be provided to DC Water for approval prior to undertaking the remediation.
- D. If Contractor encounters any unknown Hazardous Environmental Conditions at the Site, it shall stop Work immediately in the affected part of the Work to the extent required to avoid any such safety or health hazard until it has taken such action as is necessary, in accordance with pertinent Laws and Regulations, to protect the interests of any affected party. Contractor shall, immediately upon encountering any Hazardous Environmental Conditions at the Site, notify DC Water and, if required by Laws and Regulations, all Governmental Units with jurisdiction over the Project or Site.
- E. Contractor shall take all necessary measures required to ensure that Hazardous Environmental Conditions are remediated or rendered harmless in accordance with pertinent Laws and Regulations. Contractor shall, prior to proceeding with any such work: (a) obtain all environmental site assessments of the affected property and submit copies of such assessments to DC Water for its approval; (b) develop remediation plans for the Hazardous Environmental Conditions, subject to DC Water's approval; and (c) obtain all pertinent permits to implement such plans. During the period of any investigation and remediation efforts, Contractor shall take all necessary measures to isolate and contain such Hazardous Environmental Conditions from the unaffected parts of the Work, and shall continue the Work to the maximum extent possible on unaffected parts of the Work.
- F. Except for those Hazardous Environmental Conditions set forth in Paragraph G below, Contractor will be entitled to submit a request for an adjustment to the Contract Price and/or Contract Time(s) to the extent Contractor's cost and/or time of performance have been adversely impacted by the presence, removal or remediation of unknown Hazardous Environmental Conditions. To the fullest extent permitted by Laws and Regulations, DC Water shall indemnify and hold harmless Contractor from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from such unknown Hazardous Environmental Conditions. Notwithstanding anything to the contrary in the Contract Documents, DC Water shall not be obligated to indemnify or hold harmless Contractor from and against the consequences of the negligence, recklessness or willful misconduct of Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- G. Notwithstanding anything to the contrary in the Contract Documents, Contractor shall bear full responsibility for the handling, treatment, storage, removal, remediation, avoidance, or other appropriate action (if any), with respect to: (a) any Hazardous Environmental Conditions present at, on, in or under, or migrating and/or emanating to or from the Site, that were generated by or brought or caused to be brought on the Site by any act or omission of Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible; (b) those Hazardous Environmental Conditions identified in paragraph C above; and (c) the creation or exacerbation of any Hazardous Environmental Condition due to the negligence, recklessness or willful misconduct of Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless

DC Water and all of its representatives, appointed officials, officers, employees, and agents from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from (a), (b) and/or (c) above.

- H. The provisions of Paragraphs 4.2, 4.3, and 4.4 do not apply to any Hazardous Environmental Condition uncovered or revealed at the Site.

4.7 *Historical Artifacts.*

- A. All articles of historical or scientific value, including but not limited to coins, fossils, and articles of antiquity, which may be uncovered by Contractor during the progress of the Work shall become DC Water's property. Such findings shall be reported immediately to DC Water, who will determine the method of removal, where necessary, and the final disposition thereof. If Contractor establishes that such discoveries have directly and materially impacted Contractor's cost or time of performance, then Contractor shall be entitled to request an appropriate Change Order, provided Contractor satisfies the requirements of ARTICLE 9 through ARTICLE 11 herein, as applicable.

ARTICLE 5 BONDS AND INSURANCE

5.1 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other Bonds as are required by the Contract Documents.
- B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of Companies Holding Certificates of DC Water as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.
- C. If the surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.1B, Contractor shall notify DC Water within five days of the date Contractor knew, or should have known, of the bankruptcy, insolvency, termination, or cessation, and shall within 20 days of the bankruptcy, insolvency, termination, or cessation substitute another Bond and surety, both of which shall comply with the requirements of Paragraphs 5.1B and 5.2.

5.2 *Licensed Sureties and Insurers*

- A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by DC Water or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the District of Columbia to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Project Insurance Section of the Contract Documents.

5.3 *Certificates of Insurance*

- A. Contractor shall deliver to DC Water, with copies to each additional insured identified in the Project Insurance Section of the Contract Documents, certificates of insurance (and other evidence of insurance requested by DC Water or any other additional insured) which Contractor is required to purchase and maintain.
- B. DC Water shall deliver to Contractor, with copies to each additional insured identified in the Project Insurance Section of the Contract Documents, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which DC Water is required to purchase and maintain.

5.4 *Contractor's Liability Insurance*

- A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or (ii) by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom;
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle; and
 - 7. claims that would be covered as part of the required insurance as otherwise outlined in the Project Insurance Section of the Contract Documents.
- B. The policies of insurance so required by this Paragraph 5.4 to be purchased and maintained shall:
 - 1. with respect to insurance required by Paragraphs 5.4A.3 through 5.4A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) DC Water, DC Water's Consultants, and any other individuals or entities identified in the Project Insurance Section of the Contract Documents, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits provided in the Project Insurance Section of the Contract Documents or required by Laws or Regulations, whichever is greater;
3. include completed operations insurance;
4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.9, 6.13, and 6.21;
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 12.9; and
6. with respect to completed operations liability insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least three years after final payment (and Contractor shall furnish DC Water and each other additional insured identified in the Project Insurance Section of the Contract Documents, to whom a certificate of insurance has been issued, evidence satisfactory to DC Water and any such additional insured of continuation of such insurance at final payment and at one year thereafter).

C. **Obligation of the Contractor:**

Contractor shall ensure that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to DC Water and to each other additional insured identified in the Project Insurance Section of the Contract Documents to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.3 will so provide);

5.5 DC Water's Liability Insurance

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.4, DC Water, at DC Water's option, may purchase and maintain at DC Water's expense DC Water's own liability insurance as will protect DC Water against claims which may arise from operations under the Contract Documents.

5.6 Property Insurance

- A. Unless otherwise provided in the Project Insurance Section of the Contract Documents, the Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
1. include the interests of DC Water, Contractor, Subcontractors, DC Water's Consultants, and any other individuals or entities identified in the Project Insurance Section of the Contract Documents, and the public officials, officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;
 2. be written on a Builder's Risk (or Installation Floater for construction statements or equipment installations for which Builder's Risk Insurance may not be pertinent or for which an Installation Floater is more pertinent by definition), all-risk or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, flood (unless the Project Insurance Section of the Contract Documents otherwise states that flood insurance is not required or

establish amounts less than full replacement value), collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Project Insurance Section of the Contract Documents;

3. include reasonable and customary deductibles, subject to any maximum deductible amounts as may be provided in the Project Insurance Section of the Contract Documents or required by Laws and Regulations. The risk of loss within any deductible amount shall be borne solely by the Contractor without recourse against DC Water;
 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 5. cover materials and equipment stored at the Site or at another location that was agreed to in writing by DC Water prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by DC Water;
 6. allow for partial utilization of the Work by DC Water;
 7. include testing and startup; and
 8. a separate Equipment/Machinery Breakdown policy shall be purchased and maintained, if this type of insurance is not included in the Builder's Risk (or installation floater, if applicable) with a limit equal to the full replacement cost of the machinery and equipment.
 9. be maintained in effect until final payment is made unless otherwise agreed to in writing by DC Water and Contractor with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. The Contractor shall be solely responsible for any loss or damage to their personal property including, without limitation, their tools and equipment, mobile construction equipment, scaffolding, temporary structures, whether owned, borrowed, used, leased or rented by the Contractor and/or subcontractor. Contractor and/or Subcontractor may at their sole discretion, purchase and maintain insurance (separately or as part of the Builder's Risk/Installation Floater Policy required in 5.6A) or self-insure such equipment and property, and any deductible or self-insured amount in relation thereto shall be Contractor's sole responsibility without recourse against DC Water.
- C. All the policies of insurance required to be purchased and maintained in accordance with Paragraph 5.6A shall contain a provision or endorsement that the coverage afforded will not be canceled until at least 30 days prior written notice has been given to DC Water and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.7.

5.7 *Waiver of Rights*

- A. DC Water and Contractor intend that all policies purchased in accordance with Paragraph 5.6A will provide primary coverage to all insureds for all losses and damage caused by the perils or causes of loss covered thereby. All such policies shall permit the waiver of rights herein or otherwise contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery, by subrogation or otherwise, against any of the insureds thereunder or against any Other Project Contractor. DC Water and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of

them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss required to be covered by such policies and any other property insurance pertinent to the Work; or any loss subject to deductibles in such policies or otherwise self-insured; and, in addition, waive all such rights against Subcontractors, DC Water's Consultants, and all other individuals or entities identified in the Project Insurance Section of the Contract Documents to be listed as insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by DC Water or other party as trustee or otherwise payable under any policy so issued.

- B. Contractor and Subcontractors of every tier are responsible for their own tools and equipment, construction trailers and their contents and temporary scaffolding whether owned, leased, rented or borrowed and will hold harmless DC Water and Other Project Contractors for loss or damage to their tools and equipment. If insured, the insurance policy covering such tools and equipment will permit such waiver or otherwise include a waiver of subrogation and any other rights of recovery in favor of DC Water and the Other Project Contractors. Contractor and Subcontractors of every tier shall require all of their Subcontractors to similarly hold DC Water and Other Project Contractors harmless for any loss or damage to their tools and equipment and require their insurer to permit such waiver or include a specific waiver of subrogation provision in any of their insurance policies covering such tools and equipment
- C. DC Water waives all rights against Contractor, Subcontractors, DC Water's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to DC Water's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by DC Water; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by DC Water during partial utilization pursuant to Paragraph 13.6, after Substantial Completion pursuant to Paragraph 13.5, or after final payment pursuant to Paragraph 13.8.
- D. Any insurance policy maintained by DC Water covering any loss, damage or consequential loss referred to in Paragraph 5.7C shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or DC Water's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.8 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.6A will be adjusted jointly by Contractor and DC Water, provided, however, that DC Water shall have the right to approve any portion of a proposed adjustment that relates solely to DC Water's insured loss. Each party agrees to assist the other in the adjustment of any losses. To the extent proceeds are made payable to Contractor, Contractor shall hold such proceeds as fiduciary for the insureds, as their interests may appear, subject to the requirements of any pertinent mortgage clause and of Paragraph 5.8B. Contractor shall deposit in a separate

account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced by Contractor in accordance with the Contract Documents.

- B. Contractor and DC Water, as fiduciaries, shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to their exercise of this power. If such objection be made, Contractor and DC Water, as fiduciaries, shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor and DC Water, as fiduciaries, shall adjust and settle the loss with the insurers.

5.9 *Acceptance of Insurance; Option to Replace*

- A. If either DC Water or Contractor has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by the other party in accordance with ARTICLE 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing. DC Water and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the insurance required of such party by the Contract Documents, such party shall promptly notify the other party in writing of such failure. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If DC Water finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 13.5, the property insurance required in 5.6A. shall not be canceled or permitted to lapse on account of any such partial use or occupancy. The contractor shall notify the insurers providing the property insurance pursuant to Paragraph 5.6A and secure their acknowledgement of such notice and written confirmation that such occupancy or use will not impact the property insurance coverage in place. The insurers providing the property insurance shall consent by endorsement on the policy or policies.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

6.1 *General*

- A. Contractor shall be responsible for performing the Work in a manner consistent with the Contract Documents, applicable Laws and Regulations and Good Industry Practice.
- B. Contractor shall perform all Work efficiently and with the requisite expertise, skill and competence to satisfy the requirements of this Contract.

6.2 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of DC Water. If required by DC Water, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the pertinent Supplier, except as otherwise may be provided in the Contract Documents. Materials shall be stored so as to assure the preservation of their quality and acceptability for the Work. Stored materials, even though approved before storage, may again be inspected prior to their use in the Work.

6.3 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.6 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to DC Water for acceptance (to the extent indicated in Paragraph 2.6 and the Construction Schedules Section) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will conform generally to the Progress Schedule then in effect and additionally shall comply with any provisions of the General Requirements pertinent thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of ARTICLE 11.
 3. If, in the opinion of DC Water, Contractor falls behind the most current Progress Schedule for any reason other than those under Paragraph 11.3A, Contractor shall take steps, including, but not limited to, increasing the number of personnel, shifts, and/or overtime operations, days of work, and/or amount of construction equipment until such time as the Work is back on schedule. Contractor shall also submit for review, not later than the time of submittal of the next request for partial payment, such supplementary schedule or schedules as may be necessary to demonstrate the manner in which the acceptable rate of progress will be regained, all without additional cost to DC Water.
 4. During any adverse weather, including unusually heavy rain, unusual wind conditions, unusually high or low temperature, etc., Contractor shall, at its own expense, take necessary precautions, including protect of the Site, adjustment of work hours, use of alternative materials, etc., so that the Work may progress properly and is satisfactory in all respects.
 5. Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the Work, or any separable part of it, in accordance with the default terms of this Contract.

6.4 *Supervision and Superintendence*

- A. Contractor shall supervise, coordinate, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Unless

otherwise specified in the Contract Documents, Contractor shall be solely responsible for the means, methods, techniques, sequences, procedures of construction. Contractor shall not be responsible for the negligence of DC Water in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. Contractor shall be responsible to see that the completed Work complies accurately with the terms, provisions, conditions, lines, grades, typical cross-sections, dimensions, and other aspects of the Contract Documents. Contractor shall furnish all materials, services, implements, machinery, equipment, tools, supplies, transportation, labor, and all other items necessary for the satisfactory completion of the Project and shall pursue the Work aggressively and diligently to complete the Work within the Contract Times.

- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent thereto that is acceptable to DC Water and who shall not be replaced without written notice to DC Water except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor. DC Water shall have the right, at its discretion, to require Contractor to replace any of Contractor's management personnel if replacement of such personnel would be in the interest of DC Water.

6.5 *Progress Meetings*

- A. The Contractor and his major Subcontractors shall hold and attend progress meetings with DC Water (unless DC Water's absence is excused by DC Water) at the Site at least monthly. DC Water may require progress meetings to be held more frequently at no additional cost to DC Water. Minutes of progress meetings shall be prepared, maintained and circulated by DC Water.

6.6 *Labor; Working Hours; Operation of Existing Facilities*

- A. Contractor shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and Contractor shall not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without DC Water's written consent (which will not be unreasonably withheld) given after prior written notice to DC Water.
- C. No Work shall be done between 7:00 p.m. and 7:00 a.m. without permission from DC Water. However, emergency work may be done without prior permission. Additionally, working hours may be prescribed, reduced, limited, or adjusted based on restrictions established by permitting agencies or as defined elsewhere in the Contract Documents.
- D. Night Work may be undertaken as a regular procedure with the permission of DC Water. Such permission, however, may be revoked at any time by DC Water if Contractor fails to maintain adequate equipment and supervision for the proper prosecution and control of the Work at night.
- E. The continuous operation of all existing facilities of DC Water is required and shall in no way be affected by Contractor's operations unless DC Water gives written permission to do so.

6.7 *Substitutes and Or-Equals*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains words reading that no like, equivalent, or-equal item, or substitution is permitted, or is followed by “Without Exception,” other items of material or equipment, or material or equipment of other Suppliers may be submitted to DC Water for review under the circumstances described below. Requests for review of equivalency will not be accepted by DC Water from anyone except Contractor, and such requests will not be considered until after the Contract has been awarded.
1. *Or-Equal Items:* If in DC Water’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by DC Water as an or-equal item, in which case review and approval of the proposed item may, in DC Water’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.7A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment DC Water determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole, and (iii) it has a proven record of performance and availability of responsive service;
 - b. Contractor certifies that: (i) there is no increase in cost to DC Water; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.
 2. *Substitute Items:*
 - a. If in DC Water’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an or-equal item under Paragraph 6.7A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow DC Water to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by DC Water from anyone other than Contractor.
 - c. The procedure for review by DC Water will be as set forth in Paragraph 6.7A.2.d, as supplemented in the Supplementary Conditions and as DC Water may decide is appropriate under the circumstances.
 - d. Contractor shall first make written application to DC Water for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application shall state the extent, if any, to which the use of the proposed substitute item will prejudice Contractor’s achievement of Substantial Completion on time,

whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with DC Water for work on the Project) to adapt the design to the proposed substitute item, and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by DC Water in evaluating the proposed substitute item. DC Water may require Contractor to furnish additional data about the proposed substitute item.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by DC Water. Contractor shall submit sufficient information to allow DC Water, in DC Water's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by DC Water will be similar to that provided in Paragraph 6.7A.2.
- C. *DC Water's Evaluation:* DC Water will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.7A and 6.7B. DC Water will be the sole judge of acceptability. No or-equal or substitute will be ordered, installed or utilized until DC Water's review is complete, which will be evidenced by either a Change Order or an approved Submittal for an or-equal or substitute. DC Water will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* DC Water may require Contractor to furnish, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute.
- E. *DC Water's Cost Reimbursement:* DC Water will record time required by DC Water and DC Water's Consultants in evaluating substitute items proposed or submitted by Contractor pursuant to Paragraphs 6.7A.2 and 6.7C and in making changes in the Contract Documents (or in the provisions of any other direct contract with DC Water for work on the Project) occasioned thereby. Whether or not DC Water approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse DC Water for the actual costs of DC Water and DC Water's Consultants for evaluating each such proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or or-equal at Contractor's expense. The cost of any changes in the Work made necessary by the use of "or-equal" or substitute items proposed by Contractor and accepted by DC Water shall be borne solely by Contractor.

6.8 Concerning Subcontractors, Suppliers, and Others

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to DC Water as indicated in Paragraph 6.8B), whether initially or as a replacement, against whom DC Water may have reasonable objection.

- B. If the Bidding Documents or the Contract Documents require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to DC Water in advance for acceptance by DC Water by a specified date prior to the Effective Date of the Contract, and if Contractor has submitted a list thereof in accordance with the Bidding Documents or the Contract Documents, DC Water's acceptance, which shall be in writing, of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity. No acceptance by DC Water of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of DC Water to reject defective Work.
- C. Contractor shall be fully responsible to DC Water for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between DC Water and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of DC Water to pay or to see to the payment of any monies due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with DC Water through Contractor.
- F. The Divisions and Sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the pertinent terms and conditions of the Contract Documents for the benefit of DC Water. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.6, the agreement between the Contractor and the Subcontractor or Supplier shall contain provisions whereby the Subcontractor or Supplier waives all rights against DC Water, Contractor, DC Water's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance pertinent to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor shall obtain the same.

6.9 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of DC Water its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by DC Water in the Contract Documents. Contractor shall indemnify and hold harmless DC Water, DC Water's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.10 *Permits and Utility Charges*

- A. DC Water will provide the Contractor with those permits specifically noted in the Contract Documents as being furnished by DC Water. Unless otherwise provided in the Contract Documents as being the responsibility of DC Water, Contractor shall obtain and pay for all construction, trade and other permits and licenses required for the Work. DC Water shall reasonably assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are in effect at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Contract.
- B. Unless otherwise provided in the Contract Documents, DC Water shall pay all charges of utility owners for connections to the Work, either directly or by reimbursing Contractor through an allowance so designated in the Contract Documents. Notwithstanding the preceding sentence, Contractor shall have the responsibility to schedule and coordinate with such utility owners connections to the Work.

6.11 *Laws and Regulations*

- A. Contractor shall give all notices, comply with, and keep fully informed at all times with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, DC Water shall not be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing, or having reason to know, that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) arising out of or relating to such Work.
- C. Changes in Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Contract if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an equitable adjustment in Contract Price or Contract Times. If DC Water and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of, any such equitable adjustment, a Claim may be made therefor as provided in ARTICLE 15.
- D. *Safety and Health Regulations:* OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR Part 1926, shall apply to Work under this Contract. The U.S. Department of Labor will be responsible for compliance review and enforcement of the regulations.

- E. *Employment Requirements:* Specific employment requirements, in addition to those that are imposed by Laws or Regulations, shall be as specified herein and in Section 00 76 00 – Labor Provisions.
- F. *Nondiscrimination in Employment:* Contractor and Subcontractors shall not discriminate in any manner against any employee or applicant for employment in violation of Section 211 of the District of Columbia Human Rights Act (D.C. Law 2-38; D.C. Code Anno. Section 2-1401.01, as amended); shall include a similar clause in every Subcontract, except Subcontracts for standard commercial supplies or raw materials; and shall post in a conspicuous place, available to employees and applicants for employment, a notice setting forth the provisions of anti-discrimination clause set out in Section 251 of the District of Columbia Human Rights Act (D.C. Code Anno. Section 2-1402.51, as amended).

6.12 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the District of Columbia which are applicable during the performance of the Work.
- B. *Federal Excise Tax:* Materials, supplies, and equipment are not subject to the Federal Manufacturer’s Excise Tax, as set forth in the applicable Laws and Regulations, if they are furnished or used in connection with the Contract, provided that title to such materials, supplies, and equipment passes to DC Water under the Contract. The Contractor shall in such cases furnish his Subcontractors and Suppliers with a purchaser’s certificate in the form prescribed by the U.S. Internal Revenue Service.
- C. *Sales and Use Taxes:* Materials which are physically incorporated as a permanent part of real property are not subject to District of Columbia Sales and Use Tax, as set forth in the applicable Laws and Regulations. The Contractor shall, when purchasing such materials, furnish his suppliers with a Contractor’s Exempt Purchase Certificate in the form prescribed in the Sales and Use Tax Regulations of the District of Columbia. Where the Contractor, Subcontractor or Supplier has already paid the Sales and Use Tax on material, as prescribed above, the Sales and Use Tax Regulations of the District of Columbia permit the Contractor, Subcontractor or Supplier to deduct the sales or use tax on the purchase price of the same of his next monthly return as an adjustment. However, the Contractor, Subcontractor or Suppliers must satisfy DC Water that no sum in reimbursement of such tax was included in the Contract or else that DC Water has received a credit under the Contract in an amount equal to such tax.
- D. District of Columbia Sales and Use Tax shall be paid on any material and supplies, including equipment rentals, which do not become a physical part of the finished project (See District of Columbia Sales and Use Tax Administration Ruling No. 6.).

6.13 Use of Site and Other Areas

- A. Limitation on Use of Site and Other Areas:
 - 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. Damages described above shall include but are not limited to damages to any structures, equipment, vegetation, utilities, or other improvements thereof. For avoidance of doubt when it is necessary to cross curbs,

sidewalks, parking lots, public or private roads, etc., the Contractor shall protect those areas from damage and repair or pay for the repair of any damages.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. If the Contractor fails to resolve the claim with the third-party or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless DC Water, DC Water's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against DC Water, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work, Contractor shall clean the Site and make it ready for utilization by DC Water. At the completion of the Work, Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.14 *As-Built Documents*

- A. Contractor shall maintain in a safe place at the Site one As-Built copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These As-Built Documents together with all approved Samples and a counterpart of all approved Submittals shall be available to DC Water for reference. Upon completion of the Work and before final payment, these As-Built Documents, Samples, and Submittals shall be delivered to DC Water, provided, however, that if the Contract Documents require such As-Built Documents, Samples, and Submittals to be submitted to DC Water at an earlier time, Contractor shall be obligated to do so.

6.15 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all pertinent Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in Paragraph 6.15A.2 or 6.15A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of DC Water or DC Water's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and DC Water has issued a notice to the Contractor in accordance with Paragraph 13.7 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- C. Contractor shall maintain an accurate record of all accidents resulting in death, injury, occupational disease, and/or damage to property, materials, supplies, and equipment incident to work performed under the Contract. Copies of these reports shall be furnished to DC Water within two working days after occurrence.
- D. DC Water will notify Contractor of any noncompliance with the foregoing provisions or any condition, which DC Water has become aware of, that poses a serious or imminent danger to the health or safety of anyone in the vicinity of the Site and such notification shall include the action to be taken by the Contractor. Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to Contractor or Contractor's representative at the Site, shall be deemed sufficient for the purpose. If Contractor fails or refuses to comply promptly, DC Water may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to any such Stop Work Orders shall be the subject of a Claim by Contractor for extension of time or for excess costs or damages.
- E. These provisions shall be pertinent to all Subcontractors, and compliance with these provisions by Subcontractors shall be the responsibility of Contractor.
- F. Prior to commencement of the Work, the Contractor shall:
1. Submit in writing to DC Water for review of their program for complying with this Article for accident prevention.
 2. Meet with DC Water's Safety Representative after submission of the above program to develop a mutual understanding relative to the administration of the overall safety program.

6.16 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.17 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of the Safety Data Sheet (SDS) or other hazard communication information required to be made available to, or exchanged between or among, employers at the Site in accordance with Laws or Regulations.

6.18 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give DC Water prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If DC Water determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.19 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with DC Water. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 14.5 or as DC Water and Contractor may otherwise agree in writing.

6.20 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to DC Water that all Work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- B. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by DC Water;
 - 2. recommendation by DC Water or payment by DC Water of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by DC Water or any payment related thereto by DC Water;
 - 4. use or occupancy of the Work or any part thereof by DC Water;
 - 5. any acceptance by DC Water or any failure to do so;

6. any review and approval of a Submittal or Sample submittal or the issuance of a notice of acceptability by DC Water;
7. any inspection, test, or approval by others; or
8. any correction of defective Work by DC Water.

6.21 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless DC Water, DC Water's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:
 1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and
 2. is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described herein.
- B. In any and all claims against DC Water or any of its consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.21A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.21A shall not extend to the liability of DC Water and DC Water's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:
 1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Work Change Directives, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.22 *Access to Certain Agencies*

- A. Contractor shall provide access to the Work whenever it is in preparation or in progress to representatives of the District, federal government, U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers, U.S. Occupational Safety and Health Administration (OSHA), and any other persons or entities designated by DC Water. Contractor shall provide all necessary and proper facilities for such access and inspection.
- B. Contractor shall provide the Grants Officer, the Comptroller General of the United States, or any authorized representative access to any books, documents, papers, and records of Contractor which are pertinent to the Work for the purpose of making audit, examination, excerpts, and transcriptions thereof.

ARTICLE 7 DC WATER'S ROLE DURING CONSTRUCTION

7.1 *General*

- A. The duties and responsibilities and the limitations of authority of DC Water and DC Water's Consultants used on the Project during construction are set forth in the Contract Documents and will not be changed without written consent of DC Water.
- B. DC Water shall have the authority to stop the Work whenever such action may be needed, in their sole discretion, to prevent improper execution of the Work or to otherwise protect the interests of DC Water.

7.2 *Project Representative*

- A. DC Water may furnish a Project Representative to assist DC Water in providing more extensive observation of the Work. The authority, responsibilities and limitations thereon of any such Project Representative and assistants will be as provided in the Supplementary Conditions and as stated in Paragraph 7.6. If DC Water designates another representative or agent to represent DC Water at the Site who is not DC Water's Consultant, agent or employee; the authority, responsibilities and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

7.3 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, DC Water shall issue all communications to Contractor through DC Water and, if so designated in the Contract Documents, DC Water's Project Representative or DC Water's Consultant.

7.4 *Clarifications and Interpretations*

- A. DC Water will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as DC Water may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations shall be binding on the Contractor.

7.5 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. DC Water will determine the requirements of the Contract Documents and acceptability of the Work thereunder, subject to the Contractor's right to file a Claim pursuant to the terms of these General Conditions

7.6 *Limitations on DC Water's Responsibilities*

- A. DC Water will not supervise, direct, control, or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions

and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations pertinent to the performance of the Work. DC Water will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- B. DC Water will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- C. The limitations upon DC Water and responsibility set forth in this Paragraph 7.6 shall also apply to DC Water's Consultants, Project Representative, and assistants.

ARTICLE 8 OTHER WORK

8.1 *Related Work at Site*

- A. DC Water may perform other work related to the Project at the Site by DC Water's employees, or let other direct contracts therefor, or have other work performed by utility owners (such other contractors and utility owners referred to as "Other Project Contractors"). If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if DC Water and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefore as provided in ARTICLE 15.
- B. Contractor shall afford each Other Project Contractor (and DC Water, if DC Water is performing the other work with DC Water's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of DC Water and the Other Project Contractors whose work will be affected. The duties and responsibilities of Contractor under this paragraph are for the benefit of such Other Project Contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between DC Water and such Other Project Contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by Other Project Contractors, Contractor shall inspect such other work and promptly report to DC Water in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- D. If the Contractor causes damage to the work or property of any Other Project Contractor, or to other work on the Site, or delay or interfere with DC Water's work on ongoing operations, facilities, or adjacent facilities, or said Other Project Contractor's work, the Contractor shall be liable for the same; and, in the case of an Other Project Contractor, the Contractor shall attempt to resolve the claim with such Other Project Contractor. If such

Other Project Contract sues DC Water on account of any damage, delay, or interference caused by the Contractor, Contractor agrees to indemnify and defend DC Water.

- E. If an Other Project Contractor causes damage to the Work or to the property of the Contractor, or causes delay of interference with the Contractor's performance of the Work, the Contractor shall present directly to said Other Project Contractor any claim it may have as a result of such damage, delay, or interference (with an information copy to DC Water), and shall attempt to resolve its claim such Other Project Contractor.

ARTICLE 9 CHANGES IN THE WORK

9.1 *Authorized Variations in Work*

- A. DC Water may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and shall be binding on the Contractor, who shall perform the Work involved promptly. If the Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of such adjustment, a Claim may be made therefore as provided in ARTICLE 15.

9.2 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, DC Water may, at any time, or from time-to-time, by written order to Contractor, make any change in the Work within the general scope of the Contract, including but not limited to changes: (i) in the Drawings and Specifications; (ii) in the time, method, or manner of performance of the Work; (iii) in DC Water-furnished facilities, equipment, materials, services or site; or (iv) directing acceleration in the performance of the Work.
- B. If Contractor believes that: (i) it has received from DC Water any order, statement, direction, instruction, interpretation, or determination that constitutes a change; or (ii) any conduct of DC Water should be treated as a change under this Article or entitles the Contractor to an equitable adjustment hereunder, then Contractor shall furnish DC Water written notice within seven days of such order, statement, direction, instruction, interpretation, determination or conduct.
- C. Subject to the overall provisions of ARTICLE 9, if any change causes an increase or decrease in the Contractor's cost or the time required to perform any part of the Work under this Contract, whether or not changed by any order, an equitable adjustment shall be made and the Contract modified in writing accordingly by either a Unilateral Change Order, Work Change Directive, or Change Order; provided, however, that except for claims based on defective specifications, no claim for any change shall be allowed for any costs incurred more than 20 days before the Contractor gives written notice as required under Paragraph 9.2B above unless this 20 day requirement is extended in writing by DC Water. In the case of defective specifications for which DC Water is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with those defective specifications.
- D. If the Contractor intends to assert a claim for an equitable adjustment under this Paragraph 9.2, it must, within 30 days after receipt of a written order under Paragraph 9.2A or the furnishing of a written notice under Paragraph 9.2C, submit to DC Water a written statement setting forth the general nature and monetary extent of such claim. DC Water may extend the 30-day period. The statement of claim may be included in the notice

furnished under Paragraph 9.2D. No claim by the Contractor for an equitable adjustment shall be allowed if made after final payment under this Contract.

- E. DC Water may, at any time, or from time-to-time, make a change pursuant to Paragraph A above, by issuing a Unilateral Change Order or Work Change Directive on DC Water's terms (including a promise to pay the Contractor a "not-to-exceed" amount). If the Contractor agrees with the Unilateral Change Order or Work Change Directive, it shall duly execute such document. If the Contractor disputes any aspect of such Unilateral Change Order or Work Change Directive, it shall have the right to proceed in accordance with Paragraph 9.2F below.
- F. In the event of a dispute between DC Water and the Contractor as to: (i) whether any Work is included in the scope of the Contract such that the Contractor would be obligated to provide that Work at no additional cost to DC Water; or (ii) any Unilateral Change Order or Work Change Directive, DC Water may direct the Contractor to perform the Work as DC Water deems appropriate. If the Contractor considers such direction to be a change in the scope of the Contract entitling the Contractor to a change in the Contract Price, Contract Times, or other relief, the Contractor must provide the notice required by Paragraph 9.2C; provided, however, that Contractor shall continue proceeding with the Work and shall comply with DC Water's directions and maintain the Progress Schedule. If DC Water and Contractor are unable to resolve the disputes set forth in this Paragraph, the Contractor may make a Claim therefor as provided in ARTICLE 15.
- G. Failure of the Contractor to strictly comply with the notice and other submission requirements of this Paragraph 9.2 shall constitute a waiver of Contractor's right to seek relief hereunder.

9.3 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.4, except in the case of an emergency as provided in Paragraph 6.18, or in the case of uncovering Work as provided in Paragraph 12.4B.

9.4 *Execution of Change Orders and Work Change Directives*

- A. DC Water and Contractor shall execute appropriate Change Orders covering:
 - 1. changes in the Work which are: (i) ordered by DC Water pursuant to Paragraph 9.2A, (ii) required because of acceptance of defective Work under Paragraph 12.10A or DC Water's correction of defective Work under Paragraph 12.8, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by DC Water pursuant to ARTICLE 15; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and pertinent Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.19A.
- B. The Contract Price and Contract Times can only be adjusted by a duly executed Change Order.

- C. DC Water shall have the right, in its sole discretion, to make changes in the Work through the issuance of a Work Change Directive and make payment for such Work Change Directive either: (a) through the Work Change Directive Allowance, if such allowance is included in the Contract Documents; or (b) a subsequently issued Change Order.

9.5 *Notification to Surety*

- A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice shall be Contractor's responsibility. The amount of each pertinent Bond will be adjusted to reflect the effect of any such change.

ARTICLE 10 COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

10.1 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded by Paragraph 10.1B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order, Work Change Directive, or a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 10.1B, and shall include only the following items.
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by DC Water and Contractor. Such employees shall include without limitation, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include salaries and wages plus the cost of fringe benefits, which may include but are not limited to social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay pertinent thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by DC Water.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith.
 - 3. Equipment Charges:
 - a. *Rented Equipment:* Payment for required equipment rented from an outside company that is neither an affiliate of, nor a subsidiary of, the Contractor will be based on receipted invoices which shall not exceed rates given in the current edition of the Associated Equipment Distributors' manual: "National Averaged Rental Rates and Model References Data for Construction Equipment." If actual rental rates exceed manual rates, written justification shall be furnished to DC Water for consideration. No additional allowance will be made for overhead and profit. The Contractor shall submit written certification to DC Water that any required rented

equipment is neither owned by nor rented from the Contractor or an affiliate of or subsidiary of the Contractor.

- b. *Contractor's Equipment:* Payment for required equipment owned by the Contractor or an affiliate of the Contractor will be based solely on an hourly rate derived by dividing the current appropriate monthly rate from the Associated Equipment Distributor's manual by 176 hours. No payment will be made under any circumstances for repair costs, freight and transportation charges, fuel, lubricants, insurance, any other costs and expenses, or overhead and profit. Payment for such equipment made idle by delays attributable to DC Water will be based on one-half the derived hourly rate under this subsection.
4. All cash discounts shall accrue to Contractor unless DC Water deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to DC Water. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to DC Water, and Contractor shall make provisions so that they may be obtained.
5. *Payments made by Contractor to Subcontractors for Work performed by Subcontractors:* If required by DC Water, Contractor shall obtain competitive bids from subcontractors acceptable to DC Water and Contractor and shall deliver such bids to DC Water, who will then determine which bids, if any, will be acceptable. If any Subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 10.1.
6. Costs of engineers, architects, testing laboratories, surveyors, and others employed for services specifically related to the Work, but excluding costs of those consultants identified in Paragraph 10.1B.6.
7. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by DC Water, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
 - e. Deposits lost for reasons caused by DC Water.
 - f. The cost of utilities, fuel, and sanitary facilities at the Site.

- g. Minor expenses such as long-distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.
 - h. When the Cost of the Work is used to determine the value of a Change Order, or a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.
 - i. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.
- B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, project managers, project superintendents, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 10.1A.1 or specifically covered by Paragraph 10.1A.6, all of which are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 10.1A.
 - 6. Costs of attorneys, claim consultants, accountants, and other consultants of any kind related to the preparation or prosecution of any Claim or dispute, regardless of whether DC Water or Contractor prevails in the Claim or dispute.
- C. *Contractor's Fee:* When the value of any Work covered by a Change Order, Work Change Directive, or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.1C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 10.1A and 10.1B, Contractor shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to DC Water an itemized cost breakdown together with supporting data. If verification is not possible, up to 18 percent of direct labor costs may be allowed.
- E. *Reasonableness of Costs:* All prices used in calculating the Cost of the Work must be reasonable and may not exceed that which would be incurred by a prudent person in the conduct of competitive business

10.2 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to DC Water. Contractor agrees that:
 - 1. the allowances include the cost to Contractor (less any pertinent trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- B. If the Contract Documents contain a Work Change Directive Allowance, such allowance is for the sole use of DC Water to use for the payment of Work Change Directives.
- C. Prior to final payment, if the actual amount due the Contractor on account of Work covered by allowances exceed the Work Change Directive amount, an appropriate Change Order will be issued to cover the excess amounts due Contractor, and the Contract Price shall be correspondingly adjusted.

10.3 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the Estimated Quantity of each item as indicated in the Schedule of Prices. The Estimated Quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by DC Water.
- B. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- C. Unless otherwise indicated herein, the unit price of an item of Unit Price Work may be subject to reevaluation and adjustment by Change Order or Work Change Directive if the variation in the actual quantity of an item of Unit Price Work performed by Contractor differs by more than 25 percent from the Estimated Quantity of that item indicated in the Bid. Unless otherwise agreed to in writing by DC Water, when the actual quantity of an item of Unit Price Work is more than 25 percent above the Estimated Quantity of that item, Contractor shall only be entitled its Cost of Work plus a 10 percent fee for each additional item of Unit Price Work above 125 percent of the Estimated Quantity of that item; provided however, if the Cost of Work plus a 10 percent fee exceeds original bid price for each additional item of Unit Price Work above 125 percent of the Estimated Quantity for that item, then Contractor will only be entitled to its original bid price for the respective item for such additional Unit Price Work. When the final actual quantity of an item of Unit Price Work is less than 75 percent of the Estimated Quantity for that item, Contractor shall be entitled to additional compensation in the amount set forth below:
 - 1. $(75 \text{ percent of the Estimated Quantity of the item} - \text{the actual quantity of the item}) * \text{the unit price for the respective bid item} * 5\% = \text{Additional Compensation.}$

ARTICLE 11 CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

11.1 *Change of Contract Price*

- A. The Contract Price may only be changed by a Unilateral Change Order, Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by Contractor to DC Water in accordance with the provisions of ARTICLE 15.
- B. The value of any Work covered by a Change Order, Work Change Directive, or any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 10.3); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.1C); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 11.1B.2, by the Cost of the Work (determined as provided in Paragraph 10.1) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.1C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 10.1A.1 and 10.1A.2, the Contractor's fee shall be fifteen percent;
 - b. where one or more tiers of Subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 11.1C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 10.1A.1 and 10.1A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - c. no fee shall be payable on the basis of costs itemized under Paragraphs 10.1A.3, 10.1A.4, 10.1A.5, 10.1A.6, 10.1A.7, and 10.1B;
 - d. the amount of credit to be allowed by Contractor to DC Water for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - e. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.1C.2.a through 11.1C.2.d, inclusive.

- D. No allowance shall be made to the Contractor for loss of anticipated profits or unabsorbed home office overhead on account of any actual or claimed changes in the Work.
- E. Execution of a Unilateral Change Order, Change Order or Written Amendment by Contractor shall be binding and conclusive and shall operate as an accord and satisfaction as to all relief associated with such Unilateral Change Order, Change Order or Written Amendment. Contractor may not execute or accept a Change Order or Written Amendment subject to any conditions or reservation of rights or Claims which have not been disputed in accordance with Paragraph 15.1A. Any attempt by the Contractor to impose such conditions or reservations shall not be binding on DC Water. If the Contractor will not execute or accept the change, the Contractor shall proceed to perform the change order work required to complete the project satisfactorily and file a claim under ARTICLE 15.
- F. For change order requests that exceed or are expected to exceed \$100,000, Contractor shall submit a completed EPA Form 5700-41 as part of Contractor's pricing data. In addition, whenever any Subcontractor's Work under a change order request exceeds \$10,000, the Subcontractor shall submit a completed EPA Form 5700-41 as part of the cost proposal for said Work.

11.2 *Change of Contract Times*

- A. The Contract Times may only be changed by a Unilateral Change Order, Change Order or by a Written Amendment. Any disputed adjustment in the Contract Times shall be based on written notice submitted by the Contractor in accordance with the provisions of ARTICLE 15.
- B. A request or Claim by the Contractor for an adjustment to the Contract Times caused by any event must be accompanied by: (i) a reasonably detailed description of the effect of the impact on the critical path to the most current Progress Schedule; and (ii) supporting documentation. The mere existence of an event, including but not limited to orders, actions or inactions by DC Water, does not entitle Contractor to an increase in the Contract Times. Contractor's entitlement shall be dependent upon a demonstration that the event has impacted the critical path of the most current Progress Schedule (even if the Progress Schedule is not based on the critical path method). In addition to the above, Contractor shall comply with the Construction Schedules Section in the General Requirements.

11.3 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 11.2A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by DC Water, acts or neglect of utility owners or other contractors performing other work as contemplated by ARTICLE 8, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of DC Water, or other causes not the fault of and beyond control of DC Water and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times and, in the case of abnormal weather conditions, the Contractor has taken precautions as require by Paragraph 6.3A.4. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 11.3B.

- C. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 12 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

12.1 Notice of Defects

- A. Prompt notice of all defective Work of which DC Water has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this ARTICLE 12.

12.2 Access to Work

- A. DC Water, DC Water's Consultants, other representatives and personnel of DC Water, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

12.3 Tests and Inspections

- A. Contractor shall give DC Water timely notice of readiness of the Work for all required inspections, tests, or approvals.
- B. Unless otherwise required, Contractor shall employ and pay for the services of an independent testing laboratory acceptable to DC Water to perform all inspections, tests, or approvals required by the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish DC Water the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for DC Water's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to DC Water.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of DC Water, it must, if requested by DC Water, be uncovered for observation.
- F. Uncovering Work as provided in Paragraph 12.3E shall be at Contractor's expense unless Contractor has given DC Water timely notice of Contractor's intention to cover the same and DC Water has not acted with reasonable promptness in response to such notice.
- G. Tests and inspections are for the sole benefit of DC Water. As such, the presence or absence of an inspector on behalf of DC Water at any inspection, or the failure of DC Water to report any deviation by the Contractor from the requirements of the Contract Documents shall not (1) relieve the Contractor of responsibility for adequate quality control measures, compliance with the Contract Documents, or damage to or loss of material, (2) constitute

or imply acceptance of any Work, or (3) affect the continuing rights of DC Water to hold Contractor responsible for failure to meet the requirements of the Contract Documents.

12.4 *Uncovering Work*

- A. If any Work is covered before DC Water has inspected such Work in accordance with the Contract Documents, it must, if requested by DC Water, be uncovered for DC Water's observation and replaced at Contractor's expense.
- B. If DC Water considers it necessary or advisable that covered Work be observed by DC Water or inspected or tested by others, Contractor, at DC Water's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as DC Water may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and DC Water shall be entitled to an appropriate decrease in the Contract Price.
- C. If uncovered Work, which has been previously inspected, tested and approved by DC Water per the terms herein, is found to meet Contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the Work was thereby delayed, an adjustment to the Contract Times.

12.5 *DC Water May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, DC Water may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of DC Water to stop the Work shall not give rise to any duty on the part of DC Water to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

12.6 *Rejecting Defective Work*

- A. DC Water shall have authority to disapprove or reject Work which DC Water believes to be defective, or that DC Water believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. DC Water shall also have authority to require special inspection or testing of the Work whether or not the Work is fabricated, installed, or completed.

12.7 *Correction or Removal of Defective Work*

- A. Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by DC Water, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration, or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

12.8 *DC Water May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from DC Water to correct defective Work or to remove and replace rejected Work as required by DC Water in accordance with Paragraph 12.7A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, DC Water may, after seven days written notice to Contractor (unless a shorter period of time is deemed necessary by DC Water for any emergency), correct and remedy any such deficiency and at DC Water's election may terminate for cause the Contractor's right to proceed.
- B. In exercising the rights and remedies under this paragraph, DC Water shall proceed expeditiously. In connection with such corrective and remedial action, DC Water may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which DC Water has paid Contractor but which are stored elsewhere. Contractor shall allow DC Water, DC Water's representatives, agents and employees, DC Water's other contractors, and DC Water's Consultants access to the Site to enable DC Water to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) incurred or sustained by DC Water in exercising the rights and remedies under this Paragraph 12.8 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and DC Water shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, DC Water may issue a Unilateral Change Order adjusting the Contract Price accordingly and the Contractor may make a Claim therefor as provided in ARTICLE 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by DC Water of DC Water's rights and remedies under this Paragraph 12.8.

12.9 *Correction Period*

- A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any pertinent special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by DC Water or permitted by Laws and Regulations as contemplated in Paragraph 6.13A is found to be defective, Contractor shall promptly, without cost to DC Water and in accordance with DC Water's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by DC Water, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, DC Water may have the defective Work corrected or repaired or may have the rejected Work removed and

replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration, or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) shall be paid by Contractor.

- B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.
- C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 12.9, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed. In addition, the warranty period for any equipment installed, work performed, or services provided to correct or replace such defective Work shall comply with any warranty periods established in the Contract Documents for such Work and new warranty periods for the corrected or replaced Work shall begin from the date the correction or removal and replacement of the defective Work has been satisfactorily completed.
- D. Contractor's obligations under this Paragraph 12.9 are in addition to any other obligation or warranty. The provisions of this Paragraph 12.9 shall not be construed as a substitute for or a waiver of the provisions of any pertinent statute of limitation or repose.

12.10 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, DC Water prefers to accept it, DC Water may do so. Contractor shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration, or other dispute resolution costs) attributable to DC Water's evaluation of and determination to accept such defective Work and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and DC Water shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the acceptance occurs after final payment, an appropriate amount shall be paid by Contractor to DC Water.

ARTICLE 13 PAYMENTS TO CONTRACTOR AND COMPLETION

13.1 *Cost-Loaded CPM Schedule*

- A. The cost-loaded CPM schedule (or a schedule of values where a cost-loaded CPM is not required) established as provided in Paragraph 2.6A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to DC Water. Progress payments on account of Unit Price Work will be based on the number of units completed.

13.2 *Payment Procedures*

- A. *Submittal and Processing of Payments:* Contractor shall submit Applications for Payment in accordance with this ARTICLE 13, Section 00 50 00 – Contract, and Section 01 29 00 – Progress Payment Procedures. Applications for Payment will be processed by DC Water as provided herein.

- B. *Progress Payments and Retention:* DC Water shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as specified herein and in Section 00 50 00 – Contract and Section 01 29 00 – Progress Payment Procedures .
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated in Section 00 50 00 – Contract..
 2. Upon Substantial Completion, if DC Water considers the amount retained to be in excess of the amount adequate for the protection of DC Water, it may, at its discretion, release to the Contractor all or portion of such excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the Contract, on which the price is stated separately in the Contract, payment may be made therefor without retention of a percentage, less authorized deductions.
- C. *Final Payment:* Upon Final Completion and acceptance of all of the Work in accordance with Paragraph 13.7, DC Water shall pay the remainder of the Contract Price as provided in said Paragraph 13.8.

13.3 *Progress Payments*

- A. Applications for Payments:
1. At least ten (10) days before the date established for each progress payment request (but not more often than once a month), Contractor shall submit to DC Water for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. Unless otherwise specified or agreed to in writing by DC Water, no payment will be made for stored materials and equipment not yet incorporated into the Work.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
- B. During the progress of the Work, each Application for Payment shall be accompanied by Contractor's updated Progress Schedule, progress report, with such shop drawings schedules, value of material on hand included in application, and other data specified in Division 1 or reasonably required by DC Water.
- C. Review of Applications:
1. DC Water will, within ten (10) days after receipt of each Application for Payment, either notify Contractor that the Application for Payment has been approved or notify Contractor that DC Water will object to payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. By approving payment requested in an Application for Payment, DC Water will have relied upon the representations of Contractor that:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent

- tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 10.3, and to any other qualifications stated in the recommendation); and
- c. the conditions precedent to Contractor's being entitled to such payment have been fulfilled.
3. DC Water's review of Contractor's Work for the purposes of making payments shall not be deemed to impose responsibility on DC Water to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for Contractor's failure to comply with Laws and Regulations pertinent to Contractor's performance of the Work. Additionally, said review will not impose responsibility on DC Water to make any examination to ascertain how or for what purposes Contractor has used the monies paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to DC Water free and clear of any Liens.
 4. DC Water may refuse to approve the whole or any part of any Application for Payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in DC Water's opinion to protect DC Water from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Written Amendment, Unilateral Change Orders, or Change Orders;
 - c. DC Water has been required to correct defective Work or complete Work in accordance with Paragraph 12.8;
 - d. DC Water has actual knowledge of the occurrence of any of the events enumerated in Paragraph 14.2A;
 - e. claims filed or likely to be filed against DC Water for which the Contractor may be liable to DC Water;
 - f. failure of the Contractor to make payments properly to Subcontractors, Suppliers or its own laborers for materials and/or labor or amounts claimed by the Contractor's surety or insurer under any rights of subrogation;
 - g. a reasonable doubt that the Contract can be completed for then unpaid balance of the Contract Price;
 - h. damage to another contractor;
 - i. liquidated damages or other damages or compensation due DC Water for claims of DC Water against the Contractor;
 - j. any claim of DC Water or debt owed to DC Water arising from any other cause;
 - k. any retention(s) as specified in Section 00 50 00 – Contract. ;
 - l. failure to maintain As-Built Documents in accordance with Paragraph 6.14;
 - m. failure to update schedules properly in accordance with Paragraph 6.3; or

n. the cost of completing unfinished punch list or warranty work.

D. Payment Becomes Due

1. Thirty (30) days after DC Water's approval of an Application for Payment, the amount approved will become due subject to the provisions of Paragraph 13.3E, and when due will be paid by DC Water to Contractor.

E. Reduction in Payment

1. DC Water may refuse to make payment because:

- a. Claims have been made against DC Water on account of Contractor's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific Bond satisfactory to DC Water to secure the satisfaction and discharge of such Liens;
- c. there are other items entitling DC Water to a set-off against the amount recommended; or
- d. DC Water has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 13.3C.4.a through 13.3C.4.n, or Paragraph 14.2A.

2. If DC Water refuses to make payment of the full amount requested by Contractor in the Application for Payment, DC Water must give Contractor immediate written notice stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. DC Water shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by DC Water and Contractor, when Contractor corrects to DC Water's satisfaction the reasons for such action.

3. If it is subsequently determined that DC Water's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 13.3D.1.

13.4 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to DC Water no later than the time of payment free and clear of all Liens. The transfer of title pursuant to this Article shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work or waiving the right of DC Water to require the fulfillment of all of the terms of the Contract.

13.5 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use, Contractor shall notify DC Water in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that DC Water issue a certificate of Substantial Completion. Promptly thereafter, the Contractor and DC Water shall make an inspection of the Work to determine the status of completion. If DC Water does not consider the Work substantially complete, DC Water will notify Contractor in writing giving the reasons therefor. If DC Water considers the Work substantially complete, DC Water will prepare and deliver to the Contractor a certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to

the certificate a tentative list of items to be completed or corrected before final payment. At the time of delivery of the certificate of Substantial Completion, DC Water will deliver to the Contractor a written determination as to division of responsibilities pending final payment between DC Water and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees.

- B. DC Water shall have the right to exclude Contractor from the Site after the date of Substantial Completion, but DC Water shall allow Contractor reasonable access to complete or correct items on the tentative list.
- C. When the jurisdiction having authority requires a facility or any portion of a facility to be certified for Beneficial Occupancy, issuance of the certificate of Beneficial Occupancy is required prior to receiving Substantial Completion.

13.6 *Partial Utilization*

- A. Prior to Substantial Completion of all of the Work, DC Water may use or occupy, at DC Water's option, any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which DC Water and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by DC Water for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
 - 1. DC Water at any time may request Contractor in writing to permit DC Water to use or occupy any such part of the Work which DC Water believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor will certify to DC Water that such part of the Work is substantially complete and request DC Water to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after such request, the Contractor and DC Water shall make an inspection of that part of the Work to determine its status of completion. If DC Water considers that part of the Work to be substantially complete, the provisions of Paragraph 13.5 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 2. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.
 - 3. DC Water has no obligation to accept partial Substantial Completion of any Work, and DC Water's use or occupancy of any part of the Project pursuant to this Paragraph 13.6 shall in no way relieve the Contractor of any other responsibilities under the Contract Documents. If DC Water's use or occupancy delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.
- B. If DC Water's ability to use or occupy portions of the Project pursuant to Paragraph 13.5A above is dependent upon Substantial Completion of any other portion of the Project, then: (1) warranties on the portions of the Project used or occupied by DC Water, including the provisions set forth in Paragraph 12.8 above, do not begin to run until Substantial Completion of all portions of the Work upon which such portions are dependent, and (2) Substantial Completion of the whole Project shall not be deemed to be achieved until the entire Project is substantially complete.

13.7 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, DC Water will promptly make a final inspection with the Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

13.8 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of DC Water, satisfactorily completed all corrections identified during the final inspection for the entire Work or an agreed portion thereof and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up As-Built Documents (as provided in Paragraph 6.14), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to, the evidence of insurance required by Paragraph 5.4B.6; (ii) consent of the surety, if any, to final payment; (iii) complete and legally effective releases or waivers (satisfactory to DC Water) of all Lien rights arising out of or Liens filed in connection with the Work; and (iv) a general release executed by the Contractor waiving, upon receipt of final payment by the Contractor, all Claims, except those claims specifically identified and listed in the general release that remain unsettled at the time of final payment. Consent of the surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the surety.
3. In lieu of the releases or waivers of Liens specified in Paragraph 13.8A.2 and as approved by DC Water, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which DC Water or DC Water's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to DC Water to indemnify DC Water against any Lien.

B. Review of Application and Acceptance:

1. If, on the basis of DC Water's observation of the Work during construction and final inspection, and DC Water's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, DC Water is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled for the entire Work or an agreed portion thereof, DC Water will approve the Application for Payment. Otherwise, DC Water will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

2. DC Water's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 13.8A will only be to determine generally that the content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

C. Payment Becomes Due:

1. Sixty (60) days after the presentation to DC Water of the Application for Payment and accompanying documentation, the amount approved by DC Water will become due and, when due, will be paid by DC Water to Contractor.

13.9 *Waiver of Claims*

- A. The making and/or acceptance of final payment will constitute a waiver of all Claims by Contractor against DC Water other than those specifically set forth in the general release required by Paragraph 13.8A.2 (iv), which Claims shall have been previously made in writing in accordance with this Contract and which are still unsettled.

ARTICLE 14 SUSPENSION OF WORK AND TERMINATION

14.1 *DC Water May Suspend Work*

- A. At any time and without cause, DC Water may order in writing the Contractor to suspend, delay, or interrupt all or any part of the Work for such period of time as DC Water may determine to be appropriate for the convenience of DC Water. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension by seeking relief therefor in accordance with Paragraph 14.1C below.
- B. If the performance of all or any part of the Work is suspended, delayed, or interrupted for an unreasonable period of time by an act of DC Water in the administration of this Contract, or by DC Water's failure to act within the time specified in this Contract (or if no time is specified, within a reasonable period of time), an adjustment shall be made for any increase in the cost of performance of this Contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the Contract modified in writing, provided, however, that no adjustment shall be allowed for any costs incurred more than 20 days before the Contractor notified DC Water in writing of the act or failure to act involved.
- C. No adjustment or claim under this Paragraph 14.1 shall be allowed unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension, delay or interruption, but not later than the date of final payment under this Contract. Furthermore, no adjustment shall be made under this Paragraph 14.1 for any suspension, delay, or interruption to the extent: (i) that performance would have been so suspended, delayed or interrupted by any other cause, including the fault or negligence of the Contractor; or (ii) for which an equitable adjustment is provided for or excluded by any other provision of this Contract.

14.2 *DC Water May Terminate For Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.6 as adjusted from time to time pursuant to Paragraph 6.3);
 2. Contractor's failure to comply with Laws or Regulations of any public body having jurisdiction;
 3. Contractor's failure to follow direction from DC Water or DC Water's Consultants; or
 4. Contractor's substantial failure to fulfill its obligations under the Contract Documents, including any material violation occurring after Substantial Completion, such as for failure in a timely manner: (a) to complete one or more punch lists; (b) to render operation and maintenance manuals or other required documentation; or (c) to perform warranty Work.
- B. If one or more of the events identified in Paragraph 14.2A occur, DC Water may give Contractor (and the surety, if any) ten (10) days written notice (delivered by certified mail, return receipt requested) of its intention to terminate for default, an opportunity for consultation, and an opportunity to cure the default. If Contractor has failed to so cure the default after such notice and consultation, then DC Water may, by giving Contractor (and the surety, if any) seven days written notice (delivered by certified mail, return receipt requested), declare the Contract terminated. In such event, DC Water may exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which DC Water has paid Contractor but which are stored elsewhere, and finish the Work as DC Water may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all claim, court or arbitration or other dispute resolution costs) sustained by DC Water arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to DC Water. No amount shall be allowed for anticipated profit on unperformed services or other work. Such claims, costs, losses, and damages incurred by DC Water will be incorporated in, as pertinent a Unilateral Change Order or a Change Order. When exercising any rights or remedies under this paragraph DC Water shall not be required to obtain the lowest price for the Work performed.
- C. Where Contractor's services have been so terminated by DC Water, the termination will not affect any rights or remedies of DC Water against Contractor then existing or which may thereafter accrue. Any retention or payment of monies due Contractor by DC Water will not release Contractor from liability.
- D. If liquidated damages are provided in the Special Provisions or elsewhere in the Contract Documents, and DC Water so terminates the Contractor's right to proceed, DC Water shall be entitled to recover liquidated damages until a reasonable time as may be required for completion of the Work together with any increased costs incurred by DC Water to complete the Work.

- E. If at any time, a termination for cause is deemed to be wrongful, it will automatically become a termination for convenience as provided in Paragraph 14.3.
- F. Upon receipt of a termination pursuant to this Article, the Contractor shall: (i) promptly discontinue all services affected (unless directed by DC Water to the contrary); and (ii) deliver or otherwise make available to DC Water all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Contractor in performing the Work, whether completed or in progress.

14.3 *DC Water May Terminate For Convenience*

- A. Upon ten (10) days written notice to Contractor (delivered by certified mail, return receipt requested), DC Water may, without cause and without prejudice to any other right or remedy of DC Water, elect for its convenience to terminate the Contract in whole or in part. Prior to the termination, DC Water shall give the Contractor an opportunity for consultation to discuss, among other things, DC Water's requirements associated with the termination.
- B. In the event of a termination for convenience, Contractor shall:
 - 1. Stop work as specified in the notice;
 - 2. Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete the continued portion of the contract;
 - 3. Terminate all subcontracts to the extent they relate to the work terminated;
 - 4. Assign to DC Water, as directed by the Contracting Officer, all rights, title, and interest of the Contractor under the subcontracts terminated, in which case DC Water shall have the right to settle or to pay any termination settlement proposal arising out of those terminations; With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this clause;
 - 5. As directed by the Contracting Officer, transfer title and deliver to DC Water — (i) The fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated; and (ii) The completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to DC Water;
 - 6. Complete performance of the work not terminated;
 - 7. Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which DC Water has or may acquire an interest; and
 - 8. Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in Paragraph 14.3B.5; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by DC Water under this contract, credited to the

price or Cost of the Work, or paid in any other manner directed by the Contracting Officer.

- C. In the event of a termination for convenience, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount to be paid or remaining to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount may not exceed the total contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The contract shall be modified, and the Contractor paid the agreed amount. Should the Contractor and Contracting Officer be unable to agree on the whole amount to be paid the Contractor because of the termination of work the Contractor shall be paid (without duplication of any items):
1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including a sum determined by the Contracting Officer to be fair and reasonable for overhead and profit on such Work; provided however, that if it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, no profit shall be included or allowed under this subparagraph and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss;
 2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. for the costs of settling and paying claims incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; as provided in 14.3B.5 above; and
 4. for reasonable expenses directly attributable to termination.
- D. Contractor shall not be paid on account of loss of anticipated profits or revenue, unabsorbed home office overhead, or other economic loss arising out of or resulting from such termination.
- E. If the termination is partial, the Contractor may file a proposal with the Contracting Officer for an equitable adjustment of the price(s) of the continued portion of the contract. The Contracting Officer shall make any equitable adjustment agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within 90 days from the effective date of termination unless extended in writing by the Contracting Officer.

14.4 *DC Water May Terminate for Lack of Funding*

- A. Notwithstanding any other provisions of this Contract, at the end of each DC Water fiscal year, this Contract is subject to cancellation if funding for the succeeding fiscal year is not provided. If funds to pay any amount payable hereunder are not appropriated and not otherwise made available for that purpose, this Contract shall be deemed terminated at the end of the then current fiscal year. DC Water shall notify the Contractor in writing of any such non-allocation of funds at the earliest possible date. Cancellation of the Contract under the terms of this Section will not be interpreted to be "Termination for Convenience" per Paragraph 14.3.

14.5 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, the Work is suspended for more than 90 consecutive days by DC Water or under an order of court or other public authority, then Contractor may, upon seven (7) days written notice to DC Water and provided DC Water does not remedy such suspension or failure within that time, terminate the Contract.
- B. Contractor shall have the right to terminate the Contract in whole or in part in the event of a substantial failure by DC Water to fulfill its obligations under this Contract. No such termination may be effected unless the Contractor gives DC Water ten (10) days written notice (delivered by certified mail, return receipt requested) of its intention to terminate for default and an opportunity for consultation. If DC Water has failed to cure the substantial failure after such notice and consultation within a reasonable period of time, then the Contractor may declare the Contract terminated by giving DC Water seven days written notice (delivered by certified mail, return receipt requested).
- C. For terminations under this Paragraph 14.5, Contractor may recover from DC Water payment on the same terms as provided in Paragraph 14.3.

14.6 *Contractor Responsibility under Any Termination by DC Water*

- A. Upon receipt of a termination pursuant to Paragraphs 14.2 or 14.3, the Contractor shall: (i) promptly discontinue all services effected (unless directed by DC Water to the contrary); and (ii) deliver or otherwise make available to DC Water all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Contractor in performing the Work, whether completed or in progress.

ARTICLE 15 DISPUTE RESOLUTION

15.1 *Notice to DC Water*

- A. Unless an earlier time is required under the Contract Documents, written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the Contractor to DC Water promptly (but in no event later than 30 days) after the Contractor knew or had reason to know of the start of the event giving rise to the Claim, dispute, or other matter. A detailed description of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to DC Water within 60 days after the Contractor knew or had reason to know of the start of such event (unless DC Water allows additional time for the Contractor to submit additional or more accurate data in support of such Claim, dispute, or other matter). Claims for adjustment in Contract Price and Contract Times shall be prepared in accordance with the pertinent provisions of ARTICLE 11. Each Claim shall be accompanied by the Contractor's written statement that the adjustment claimed is the entire adjustment to which the Contractor believes it is entitled as a result of said event.
- B. The provisions of this Paragraph 15.1 shall be held and taken to constitute a condition precedent to the right of the Contractor to recover. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 15.1.

15.2 *Resolution of Claims*

- A. *DC Water's Response to Claim:* DC Water will endeavor to provide a written response to Contractor within 30 days after DC Water's receipt of the detailed description of the amount or extent of the Claim and supporting data required under Paragraph 15.1A. If DC Water disagrees with Contractor's contentions, the parties shall make good faith efforts to resolve such disagreements. Notwithstanding anything to the contrary in the Contract

Documents, at all times Contractor shall continue with the Work as directed, in a diligent manner and without delay, shall conform to DC Water's decisions or orders, and shall be governed by all pertinent provisions of the Contract Documents.

- B. *Contracting Officer's Final Decision.* If a Claim has not been resolved through direct, informal negotiations, then, upon a written request from Contractor, DC Water's Contracting Officer, or his/her designee (other than personnel assigned to the Project), shall review the Claim and issue his/her determination of the Claim ("Contracting Officer's Final Decision"), in accordance with the following:
1. Contractor's Claim shall be in writing, shall be delivered in person or mailed by certified mail, return receipt requested to the Contracting Officer, and shall contain at least the following:
 - a. A description of the Claim and the amount in dispute.
 - b. Any data or other information in support of the Claim.
 - c. Contractor's request for relief. A description of the Claim and the amount in dispute.
 - d. The certification(s) required by Paragraph 15.3 below.
 2. An informal hearing may be conducted on the Claim, in accordance with processes established by the Contracting Officer. The Contracting Officer, or his/her designee, may conduct the informal hearing. If the Contracting Officer determines that an informal hearing is necessary, the informal hearing shall be conducted as soon as practicable after the Claim has been received.
 3. The Contracting Officer's Final Decision shall be issued in writing within sixty (60) days of the date of the request for review, or if an informal hearing is held, within sixty (60) days of the informal hearing.
 4. If Contractor disagrees with the Contracting Officer's Final Decision, or if the Contracting Officer fails to issue a Contracting Officer's Final Decision within the 60-day period, then Contractor shall have the right to proceed in accordance with Paragraph 15.2C below. If Contractor fails to exercise its right to proceed in accordance with Paragraph 15.2C below within thirty (30) days after the Contracting Officer's Final Decision, then it shall be deemed to have accepted such Contracting Officer's Final Decision and shall have waived its rights for any further relief for the matters covered by such Contracting Officer's Final Decision.
 5. A Contracting Officer's Final Decision is a condition precedent to the initiation of litigation under Paragraph 15.2C below.
- C. *Appeal of the Final Decision of Contracting Officer.* The Contracting Officer's Final Decision shall be final and binding upon the Contractor unless Contractor initiates litigation against DC Water in the courts of the District of Columbia within thirty (30) days of the final decision.
- D. *Exclusive Jurisdiction.* Except as otherwise provided by applicable law, and notwithstanding any other provision contained in the Contract Documents to the contrary, the District of Columbia courts will have exclusive jurisdiction over any Claim, dispute, or other matter between DC Water and Contractor arising out of or related to this Contract or Project.

15.3 *Certifications*

- A. *Obligation to Certify.* Contractor, under penalty of perjury, shall furnish, contemporaneously with each submission under Paragraph 15.2B.1, a certification by Contractor and its Subcontractor(s), as pertinent with the following:
1. The submission is made in good faith;
 2. Supporting data are accurate and complete to the best of Contractor's and Subcontractors' knowledge and belief; and
 3. The adjustment to Contract Price and/or Contract Times requested accurately reflects the adjustment for which Contractor believes DC Water is liable.
- B. *Execution of Certification.* An individual or officer who is authorized to act on Contractor's behalf shall execute the certification.
- C. *Review of Subcontractor Submissions.* In regard to a submission by a Subcontractor, Contractor shall fully review the Subcontractor's submission and shall certify such submission, or such relevant portion(s) of such submission, under penalty of perjury, in the same manner the Contractor would certify its own submission. DC Water will not consider a direct claim by any Subcontractor.
- D. *Failure to Furnish Certifications.* Contractor hereby agrees that failure to furnish certifications as required in this Paragraph 15.3 shall constitute a waiver by the Contractor as to the subject matter of the requested relief.
- E. *False Claims.* Contractor further acknowledges and agrees that if it submits a false claim, on behalf of itself or a Subcontractor, Contractor, in addition to any sanctions contained in these General Conditions, may be subject to civil penalties, damages, debarment, and criminal prosecution in accordance with pertinent Laws and Regulations. Contractor shall be liable to DC Water and shall pay it for the actual costs incurred by DC Water in investigating, analyzing, negotiating or resolving any claim, or unsupported part of claim, for costs or damages submitted by the Contractor which is determined to be false or to have no basis in law or in fact.

15.4 *Miscellaneous*

- A. DC Water shall have no liability to the Contractor for any claim of a Subcontractor or Supplier against the Contractor if the Contractor has no liability therefor to the Subcontractor or Supplier or if the Contractor has a valid defense against the claim of the Subcontractor or Supplier. Any agreement between the Contractor and the Subcontractor or Supplier making liability on the part of the Contractor to the Subcontractor or Supplier contingent upon a determination of liability on the part of DC Water to the Contractor shall not make DC Water liable to the Contractor for the claim of the Subcontractor or Supplier if the Contractor would not otherwise be liable therefor. The purpose of this paragraph is to adopt the *Severin Doctrine* (*Severin v. United States Court of Claims*, 99 Cl. 435 (1943)), without exception, as a matter of contract between DC Water and the Contractor.
- B. Notwithstanding any other provision of the Contract Documents, if Contractor contends that any directive, Unilateral Change Order, Change Order, Written Amendment, or any other action, inaction or event will or may cause an increase in the Contract Price, Contract Times, or damages or costs to the Contractor or its Subcontractors or Suppliers at any tier, Contractor must include the additional time and compensation claimed to be due in accordance with ARTICLE 11 and Paragraph 15.1. Contractor may not unilaterally "reserve its rights" to file any claims or any requests for an increase in the Contract Times or Contract Price.

ARTICLE 16 MISCELLANEOUS

16.1 *Giving Notice*

- A. Written notice shall be deemed to have been duly served on the Contractor if delivered in person to the individual or to a member of the firm or to an office of the corporation to whom it is directed, or if delivered or sent by regular or certified mail, facsimile transmission or Electronic Transmission with notice of receipt to the last business address, facsimile number, or email known to DC Water. Written notice shall be deemed to have been given to DC Water upon actual receipt of written notice by DC Water.

16.2 *Information Technology*

- A. The Contractor and its Subcontractors or Suppliers at any tier shall, in their use of DC Water information systems, conform to DC Water's Information Technology Policies and Procedures. These policies define the rules of behavior and procedures that apply to users of DC Water information systems and resources.
- B. The Contractor shall not use proprietary software unless its planned use has been disclosed to and approved by DC Water before execution of this Contract. The Contractor shall provide DC Water with license(s) to use the approved proprietary software, if any.

16.3 *Data Use & Privacy*

- A. The Contractor shall use and access data shared or collected under the Contract for no purpose other than for the Work described herein. Nothing in the Contract shall be construed to authorize Contractor to have access to DC Water data beyond that included in the scope of the Contract, or to permit access to such data by entities other than the Contractor. Contractor agrees to immediately notify DC Water if it becomes aware that data shared under this Contract has been used for a purpose outside the scope of this Contract. Contractor understands that the Contract does not convey ownership of DC Water data to Contractor.
- B. Contractor will not disclose data produced to them or collected under the Contract in any manner that could identify any individual to any entity other than DC Water, or the Contractor's authorized employees, contractors, and agents affiliated with Contractor and who have legitimate interests (i.e. to those who are performing the Work and need the information for that purpose).
- C. Contractor will put procedures in place to safeguard the confidentiality and integrity of personal data disclosed or collected, to place limitations on its use and to maintain compliance with applicable privacy laws, including storing, maintaining, and transferring the data only as described in the Contract Documents. Contractor shall employ good industry practices, both technically and procedurally, to protect all data shared or collected under this Contract from unauthorized physical and electronic access.
- D. Contractor shall require all affiliated employees, contractors, subcontractors and agents of any kind participating in the Work to comply with the Contract and all applicable laws with respect to the data and information shared under the Contract.
- E. Upon completion of the Work, the Contractor shall return to DC Water any data shared, collected or produced under this Contract and shall destroy all other copies of such data.

16.4 *Publication and Dissemination of Work*

- A. The Contractor shall obtain written consent from DC Water before it publishes or disseminates any work performed under this Contract or publishes or disseminates any communications, documents or data utilized in the work performed under this Contract.

This consent shall not be required for routine, unpublished communication of work descriptions and experience for commercial purposes.

16.5 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the pertinent jurisdiction, the deadline shall be extended to the next working day.

16.6 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.
- B. DC Water shall not be precluded or stopped by any measurement, estimate, Unilateral Change Order, Change Order, Work Change Directive, Written Amendment, Contract modification, certificate of payment, or payment from showing the true amount and character of the Work furnished by the Contractor, or from showing that any measurement, estimate, Unilateral Change Order, Change Order, Work Change Directive, Written Amendment, Contract modification, certificate of payment, or payment is untrue or was incorrectly made, or from showing that the Work does not in fact conform to the Contract Documents. DC Water may recover from the Contractor or any surety, or both, such damages, loss, or additional expense incurred as a result of any such error in measurement, estimate, Unilateral Change Order, Change Order, Work Change Directive, Written Amendment, Contract modification, certificate of payment, or payment as a result of such failure to conform to the Contract Documents. DC Water's rights in this respect shall not be waived or barred by any test, inspection, acceptance or approval of the Work, or by payment therefor, or by granting an extension of time, or by taking possession, or by execution of a Change Order or Written Amendment based on the erroneous measurement, estimate, Unilateral Change Order, Change Order, Work Change Directive, Written Amendment, Contract modification, certificate of payment, or payment.
- C. The waiver by DC Water of any breach of any provision of the Contract Documents shall not operate as a waiver of any other subsequent breach.
- D. DC Water and Contractor agree to waive all claims against each other for any consequential damages that may arise out of or relate to the Contract Documents or the Project. DC Water's waiver includes, but is not limited to, DC Water's loss of use of the Project, loss of income, profit or financing related to the Project, as well as the loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to the Project, or loss of reputation. Contractor's waiver includes, but is not limited to, loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of bonding capacity or loss of reputation. The provisions of this Paragraph 16.6D shall also apply in the event of termination of this Contract and shall survive such termination. The provisions of this Paragraph 16.6D shall not be deemed to affect the imposition of liquidated damages in accordance with the Contract Documents, which by their nature may be deemed to compensate DC Water for damages that might be considered consequential. Notwithstanding the above, the waivers contained in this Paragraph 16.6D

shall not apply in the event Contractor has violated any Federal Requirements and Contract Provisions and is, as a result, liable for consequential damages pursuant to the terms of such Federal Requirements and Contract Provisions.

- E. The making of final payment by DC Water shall not be construed to affect, or constitute a waiver, of any rights or claims that DC Water may have against the Contractor or any surety arising out of or related to this Contract or any Bond.

16.7 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract.

16.8 *Controlling Law*

- A. This Contract is to be governed by the law of the District of Columbia.

16.9 *Retention of Records*

- A. Unless otherwise provided in the Contract or by applicable statute, Contractor and its Subcontractors and Suppliers at any tier, from the effective date of Contract completion and for a period of three years after final settlement under the Contract (including the final resolution of any outstanding Claim), or by the applicable statute of limitations, whichever is longer, shall preserve and make available to DC Water at all reasonable times at the office of Contractor, but without direct charge to DC Water, all books, records, documents, and other evidence bearing on the costs and expenses of Contractor and its Subcontractors and Suppliers under the Contract.
- B. If Contractor or its Subcontractors or Suppliers at any tier fail to retain for the period of time required by Paragraph 16.9A original documents used, made, or relating to the preparation or calculation of Contractor's Bid to DC Water or of bids, quotes or estimates of subcontractors or suppliers at any tier, Contractor shall be entitled to no damages, compensation, or equitable adjustments (including extensions of the Contract Times) for any Claims based on calculations, assumptions, understandings, or beliefs allegedly made at the time of preparation of such bids, quotes, or estimates.

16.10 *Contract Issues*

- A. Terms used in the Contract, which are defined in ARTICLE 1 of these General Conditions, will have the meanings indicated in these General Conditions.
- B. No assignment by a party here to of any rights under or interests in the Contract shall be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- C. DC Water and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.
- D. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall

continue to be valid and binding upon DC Water and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

16.11 *Anti -Deficiency Acts*

- A. The obligations of DC Water to fulfill financial obligations pursuant to this Contract (including any indemnity obligation) are and shall remain subject to the provisions of (i) the federal Anti-Deficiency Act, 31 U.S.C. §§ 1341, 1342, 1349-1351, 1511-1519 (2004), and, to the extent applicable, D.C. Official Code §§ 1-206.03(e) and 47-105 (2001); (ii) the District of Columbia Anti-Deficiency Act, D.C. Official Code §§ 47-355.01-355.08 (2006 Repl.) ((i) and (ii) collectively, as amended from time to time, the “Anti-Deficiency Acts”); and (iii) Section 446 of the District of Columbia Home Rule Act, D.C. Official Code §§ 1-204.46 (2001). Pursuant to the Anti-Deficiency Acts, nothing in this Contract shall create an obligation of DC Water in anticipation of an appropriation by Congress for such purpose, and DC Water legal liability for the payment of any amounts under this Contract shall not arise or obtain in advance of the lawful availability of funds for such purpose. No DC Water official or employee is authorized to obligate or expend any amount under this Contract unless such amount has been appropriated by act of Congress or is otherwise lawfully available. This Contract is subject to termination by DC Water at any time if sufficient appropriations are not made available by act of Congress; provided, however, that the determination of whether sufficient appropriations are available shall be made by DC Water in its sole discretion.

~ END OF SECTION 00 70 00 ~

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SECTION 01 29 00

PROGRESS PAYMENT PROCEDURES

PART 1. GENERAL

1.1 SUMMARY:

- A. Furnish all labor, equipment, and materials necessary to prepare and submit Applications for Payments.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 70 00: General Conditions.

1.4 FORMAT:

- A. Prepare and submit payment Applications on forms provided by DC Water at the Pre-Construction Conference.

1.5 APPLICATION FOR PAYMENT DUE DATE:

- A. The date of the month for each progress Application for Payment shall be decided at the Pre-Construction Conference. Applications for Payments shall be based on Work performed during a calendar month.

1.6 APPLICATION FOR PAYMENT PACKAGES:

- A. General:
 - 1. Comply with the requirements for Progress Payments listed in Section 00 70 00 – General Conditions as well as the requirements of this Section.
 - 2. Provide required information in typewritten or Excel Spreadsheet format.
 - 3. Complete every entry in the Application for Payment package including notarization and execution of the Contractor's Certificate statement by a person authorized to sign legal documents on behalf of the Contractor. Incomplete application packages will be returned without action.
- B. The Application for Payment package template will be provided to the Contractor at the Pre-Construction Conference and includes but is not limited to the following:
 - 1. Summary Spreadsheet of the Original Contract.
 - 2. Accounting Code Summary by Purchase Order.
 - 3. Funding Code Summary sheet.
 - 4. Detail Information and Description of the Base Contract for Partial Payment Request.
 - 5. Detail Information and Description of approved Change Orders form.
 - 6. Detailed Schedule of Values or Schedule of Prices worksheet.

7. Subcontractor/Subconsultant Participation form.
- C. Lump Sum Pay Items:
1. For Lump Sum Pay Items, submit the Application for Payment in the same format as the Construction Schedule and/or Schedule of Values and match entries to the cost value data therein. Use updated schedules if revisions have been made.
 2. For Lump Sum Pay Items that are not 100 percent complete, Contractor may request partial payment based on the percent of Work complete times the amount shown on the approved schedule and schedule of values.
- D. Unit Price Pay Items:
1. For Unit Price Pay Items, submit the Application for Payment in the same format as the Schedule of Prices and payment will be based on the unit of work complete times the unit price shown for the Bid Item.

1.7 SUBMITTAL PROCEDURES:

- A. Submit Applications for Payments in accordance with Section 00 70 00 – General Conditions and the requirements of this Section.
- B. Submit the Application for Payment with a transmittal letter.
- C. Submit three (3) draft copies of each Application for Payment to the PM for DC Water’s review ten (10) days prior to submitting the Application for Payment.
- D. Submit three (3) copies of each Application for Payment after incorporating comments from DC Water on the draft Application for Payment.
- E. Pay items values and balances shown on the Application for Payment shall be based on the previous Payment Application as certified by the Contractor and paid by DC Water.
- F. Detailed Schedule of Values or Schedule of Prices shall include all Pay Items including approved Change Orders.
- G. Applications for Payment requesting payment for work performed by Minority and Women Business Enterprises shall be compliant with the Minority and Women Business Enterprise requirements of the Contract Documents and include the amount paid and the cumulative total paid to each Minority and Women Business Enterprise.

1.8 SUBSTANTIATING DATA:

- A. Submit data substantiating line item amounts in the Application for Payment, when requested by DC Water.
- B. Provide three (3) copies of the substantiating data and three (3) copies of the cover letter. Include a cover letter indicating the Application for Payment number and date, the pay item number for the item which substantiating data has been requested, the title of the pay item, and a description of the substantiating data that is being submitted.

1.9 PREREQUISITES FOR INITIAL APPLICATION FOR PAYMENT:

- A. Information required to be submitted and approved by DC Water prior to submitting the first Application for Payment includes but is not limited to the following:
 1. Schedule of Values.
 2. Contractor's Construction Schedule.
 3. Schedule of principal products.
 4. Submittal Schedule.
 5. Quality Control Plan
 6. Pre-Construction Survey
 7. List of Contractor's staff assignments.

8. Copies of filed permit applications.
9. Copies of authorizations and licenses from governing authorities for performance of the Work.

1.10 PREREQUISITES FOR APPLICATIONS FOR PAYMENT:

- A. The following documentation shall be updated monthly, accurate in content and detail, and submitted not more than ten (10) days prior to each Application for Payment.
 1. Contractors and Subcontractors' updated Certified Payroll Reports.
 2. Compliance Reports for MBE/WBE Utilization.
 3. As-Built Drawings.
 4. Monthly Construction Progress Photographs and Videos.
 5. Updated CPM Schedule, Schedule of Values, and Progress Report.
 6. Health and Safety Report.
 7. Quality Control Report.
 8. Quality Control documentation for Work performed.
 9. Subcontractor approval requests for new subcontractors that were added to the Project during the period of time for which the Application of Payment is being made.
 10. Rolling Owner Controlled Insurance Program (ROCIP) enrollment documentation for new subcontractors that were added to the Project during the period of time for which the Application of Payment is being made.
- B. Failure to provide the prerequisite information or failure to provide accurate and up-to-date information will be grounds for DC Water to delay making the Progress Payment until all prerequisite information is provided and the information is corrected and current.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Applications for Payments will not be approved for payment until prerequisite information has been reviewed and approved by DC Water.

3.2 TRANSMITTAL OF APPLICATION FOR PAYMENT:

- A. Include on the transmittal letter, in a manner acceptable to the DC Water, a list of all attachments and appropriate information supporting the cost data in the Application for Payment.

3.3 APPLICATION FOR PAYMENT:

- A. Include the following with each Application for Payment:
 1. Transmittal Letter.
 2. Completed Application for Payment Package as described above.
 3. Copy of Paid Invoices for materials stored on-site and/or off-site.
 4. Letter from DC Water approving the Reduction in Retainage (only when retainage is reduced).

5. American Iron and Steel (AIS) certification letters, if the Project is subject to the AIS Act.
6. Affidavit of Contractor affirming Contractor has applied past payments towards Contractor's legitimate obligations associated with prior Applications for Payment as required by Section 00 70 00 – General Conditions.

3.4 APPLICATION FOR FINAL PAYMENT:

- A. Prepare Application for Final Payment as required in Section 00 70 00 – General Conditions.
- B. Submit Application for Final Payment with releases and supporting documentation for payment.
- C. Submit the following documents in addition to the documents required by the Prerequisite for Application for Payment as described above:
 1. Final As-Built Drawings as accepted by DC Water.
 2. Maintenance and Operation Manuals and Instructions as accepted by DC Water.
 3. American Iron and Steel (AIS) Final Certification Statement, if the Project is subject to the AIS Act.
- D. Include the Final Release Form with the Application for Final Payment in addition to the documents required for Application for Payment as described above:

~ END OF SECTION 01 29 00 ~

SECTION 01 32 16

CONSTRUCTION SCHEDULE

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to prepare, maintain, monitor, and update the Construction Schedule for the duration of the performance of the Work.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 70 00: General Conditions.
 - 2. Section 01 29 00: Progress Payment Procedures.
 - 3. Section 01 33 00: Submittals.

1.4 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the following:
 - 1. Proposed activity numbering system for the Construction Schedule.
 - 2. Qualifications of the Scheduler at the Preconstruction Conference.
 - 3. Preliminary Schedule and associated reports at the Preconstruction Conference.
 - 4. Preliminary Schedule baseline after the Preliminary Schedule is approved.
 - 5. Construction Schedule.
 - 6. Construction Schedule approved baseline.
 - 7. Marked up Contract Drawings showing Construction Schedule activity designations for reservoir, tank, and pipeline projects.
 - 8. Weekly and monthly reports.
 - 9. Requests for revisions to the schedule network logic that cannot be agreed to during a progress meeting.
 - 10. Original and monthly cash flow analysis.
 - 11. Detailed list of all proposed schedule changes made after approval of the Construction Schedule.
 - 12. Time Impact Analysis for all potential changes to the Work.
 - 13. As-Built Schedule.

1.5 SOFTWARE AND SCHEDULER REQUIREMENTS:

- A. Scheduling software shall be Primavera P6. Version will be stipulated by DC Water at the time of Notice of Award.
- B. The Scheduler qualifications shall include:
 - 1. A minimum of three (3) years of experience scheduling public and industrial construction work using Primavera P6.
 - 2. Performing scheduling activities on a minimum of two (2) projects with a duration of not less than one (1) year using Primavera P6.
 - 3. Scheduling two (2) projects with total project costs of at least 50 percent the cost of this project.
- C. Submit a statement of scheduler qualifications that includes:
 - 1. Name of scheduler.
 - 2. Scheduler qualifications meeting the qualification requirements listed above.
 - 3. Project descriptions including duration and cost for at least two (2) projects.
 - 4. References and owner contact information for the two (2) projects described.

1.6 FAILURE TO OBTAIN AN APPROVED SCHEDULE:

- A. DC Water may terminate the Contract in accordance with Section 00 70 00 – General Conditions if the Contractor fails to obtain an approved schedule that is compliant with the requirements of this Section within 90 calendar days of notice to proceed.
- B. DC Water maintains the right to withhold payment for all work until a baseline has been approved and incorporated into the Construction Schedule. Failure to agree upon a baseline however has no bearing on Contractor responsibility to execute and progress the work of this Contract.
- C. Contractor shall not be entitled to adjustments to the schedule or changes to the Work for reason of delay for any event that occurs prior to coming to an agreement between contractor and DC Water on an approved Construction Schedule.
- D. If Contractor performs work prior to receiving approval of the Construction Schedule, DC Water may stop work, terminate for cause, or withhold payment until the Construction Schedule is approved.

1.7 REMEDY FOR DELAY:

- A. When the updated schedule shows the Contractor with negative float on any activity, Contractor shall take steps to bring the Work back on schedule and revise the schedule as required by Section 00 70 00 – General Conditions.

1.8 PRELIMINARY SCHEDULE:

- A. The Preliminary Schedule shall include, but not be limited to:
 - 1. All activities the Contractor intends to perform during the first 120 calendar days after Notice to Proceed with all supporting elements required by the Construction Schedule (listed below).
 - 2. Cost and resource loading for all activities planned to be performed during the first 120 calendar days.
 - 3. Activities such as submittals, approvals, fabrication, and delivery of all critical path procurements and long lead (eight (8) weeks or longer) procurements for the duration of the Project.
 - 4. The primary activities and general scheduling approach for work performed after the first 120 calendar days showing completion within the Contract time.

5. Milestones and Contract deliverables for the duration of the Project.

1.9 CONSTRUCTION SCHEDULE:

- A. The Construction Schedule shall:
 - 1. Represent a realistic approach to the Work.
 - 2. Be based on calendar days.
 - 3. Show progress using the Retained Logic setting.
- B. The Construction Schedule start date shall be the date of the Notice to Proceed and the finish date shall not exceed the Contract duration.
- C. Near-critical paths are defined as those paths having 14 calendar days or less of total float.
- D. Float or slack time is not for the exclusive use or benefit of either DC Water or the Contractor, but is a resource available to both parties, as needed, to meet Contract milestones and the Contract completion date.
- E. Determine seasonal weather conditions by assessing the average historical climatic conditions based upon the preceding ten (10) year records published for the District of Columbia by the National Ocean and Atmospheric Administration (NOAA).
- F. The Construction Schedule shall include, but not be limited to the following:
 - 1. Administrative and procurement activities including, but not limited to:
 - a. Preparation and approval of submittals.
 - b. Obtaining and renewing licenses, certificates, permits and approvals.
 - c. Procurement, fabrication, delivery, and assembly of equipment and materials.
 - d. Warranties and spare parts delivery and turnover.
 - e. Substantial Completion.
 - f. Project Closeout.
 - 2. Construction activities, including any phases or sub phases.
 - 3. Milestones and partial and full completion dates.
 - 4. Activity network logic with sequence, dependents, and critical path(s).
 - 5. Activity duration, early and late finish, and float.
 - 6. Activities performed by DC Water.
 - 7. Application of seasonal weather conditions embedded in activity durations.
 - 8. Activities dependent on seasonal weather conditions (e.g. dates bypass water piping is allowed, etc.) expected to influence Work.
 - 9. Activity cost loads.
 - 10. Activity resource loads.
 - 11. All additional information necessary to fully develop the reports required by the Contract Documents.

1.10 REVISIONS TO APPROVED CONSTRUCTION SCHEDULE:

- A. Make revisions or additions to the Construction Schedule only when approved by DC Water.
- B. Make revisions to the Construction Schedule to address corrections, inadequacies, incompatibilities, inadequate activity breakdowns, and status data updates as required by DC Water.

1. Make revisions at no additional cost to DC Water.
 2. In the event the Contractor disagrees with schedule updates or logic revisions required by DC Water, Contractor shall incorporate the revisions as requested and make a claim as described in Section 00 70 00 – General Conditions.
- C. Requests for Revisions:
1. Submit, in writing, all revisions to the schedule network logic that cannot be agreed to during a progress meeting to DC Water for approval prior to inserting revisions into the network.
 2. Include a letter of transmittal with documentation supporting the requested revisions which may include marked-up network logic dependencies and/or illustrations.
- D. Revisions to activities that have float shall not justify an adjustment to the Contract duration, except when the sum of revisions to multiple activities exceeds the total float and affects the Critical Path.

1.11 ACTIVITIES:

- A. Meet with DC Water to determine what attributes are to be used for the activity numbering system.
- B. Activity number attributes may include, but are not limited to:
1. Phase.
 2. Sub phase.
 3. Discipline.
 4. Subcontractor.
 5. Work item.
 6. Area.
 7. Drawing number.
 8. Specification section.
 9. Sequential number representing each item shown on Contract Drawings.
 10. Transmittal number.
 11. Potential revision numbers.
- C. Assign a unique number to each activity that will:
1. Be distinct and differentiate each activity by phase, sub phase, discipline, subcontractor, and area.
 2. Differentiate between construction, non-construction, and potential revision activities.
- D. Define activities using descriptions that are brief but clearly convey the scope of the activity.
- E. Create activities that are discrete items of work that, when complete, produce definable and recognizable parts of the project.
- F. Submit the proposed activity numbering system to DC Water prior to developing the Construction Schedule.
- G. Activity durations shall:
1. Have a maximum duration for any construction activity on site of 28 calendar days unless otherwise approved by DC Water.

2. Comply with established time periods required by the Contract Documents (e.g., DC Water review period for submittals is 30 calendar days).
3. Be based on the planned labor and equipment resource loading required to perform the activity.

1.12 COST LOADING AND CASH FLOW ANALYSIS:

A. Cost Loading:

1. Cost load the schedule as follows:
 - a. Assign a cost to perform each work activity that is included in the Construction Schedule except that no activity costs shall be assigned to administrative and procurement activities such as submittal activities.
 - b. Activities that represent delivery of equipment and major material items may be cost loaded with DC Water's approval.
 - c. The sum of the costs assigned shall equal the Contract value.
2. Under no circumstance shall the approved cost loaded schedule be changed without written approval from DC Water.

B. Cash Flow:

1. Develop a cash flow analysis based on the cost assigned to each work activity as follows:
 - a. Develop the cash flow analysis in tabular and graphic form.
 - b. Depict the estimated cash draw down by month over the life of the job.
 - c. Show cash flow for both early finish and late finish of activities.
2. Monthly Cash Flow Analysis:
 - a. Update the cash flow projection monthly to show the actual payments to date and forecast the remaining payments.
 - b. Show amount requested per month and the cumulative payment to date after deducting retainage.
 - c. Show a subtotal for payments made to-date on completed activities.
 - d. Show a subtotal for the monetary value of incomplete work activities, regardless of whether or not any work has begun.
 - e. Show the sum of the subtotals of payments made to-date plus the monetary value of incomplete work activities. This must equal the Contract value.

C. Change Orders:

1. Cost load and perform cash flow analysis for change orders independent of the original approved Construction Schedule.
2. Requirements for cost loading work activities and developing cash flow analysis for change orders shall be the same as for the original scope of Work.

1.13 RESOURCE LOADING:

- A. Resource load the Construction Schedule with an estimate of labor that will be required to complete each work activity as follows:
 1. Assign individual or crew labor, including subcontractor labor, to work activities by craft and equipment designation.
- B. Resource load the Construction Schedule with an estimate of equipment that will be required to complete each work activity as follows:

1. List construction equipment, including equipment used by subcontractors, that has a replacement cost equal to or greater than fifteen thousand Dollars (\$15,000.00).
- C. Labor and equipment restraints may be used to optimize and level labor and equipment requirements.
1. When this leveling technique is used in establishing the working schedule, it shall be reflected in the logic.
 2. Document, in text, restraints used to level labor.
 3. Individual activities may be sequenced within the limits of total float.
 4. Minimize the use of labor or equipment restraints to develop critical or near-critical paths.

1.14 CONSTRUCTION SCHEDULE PRESENTATION FORMATS:

- A. The Gantt Chart and Tracking Gantt Chart printouts shall:
1. Have a calendar along the entire length of each sheet with each activity plotted so that the beginning and completion dates of each activity are shown in proper calendar scale.
 2. Have a time scale that clearly conveys the activities, logic, durations, and activity data in an easily readable manner.
 3. Show all activities and activity numbers.
 4. Show the sequence and interdependence of activities.
 5. Show critical paths and near critical paths, including those for interim completion dates.
 6. Show lag, lead, and float times,
 7. Show milestones and partial and full completion dates.
 8. Show assigned equipment.
 9. Show assigned labor.

1.15 REPORTS:

- A. Weekly Progress Report:
1. Submit a progress schedule listing the activities completed and in progress for the previous week and activities scheduled for the succeeding two weeks.
 2. The weekly report shall be complete and accurate, revealing the Contractor's plan of executing the work to meet all Contract stipulated milestones.
 3. Review the weekly progress report with DC Water.
- B. Monthly Progress Report:
1. Describe the activities performed during the previous month and the activities scheduled to be performed during the next month in the Monthly Progress Report.
 2. Progress Report Narrative:
 - a. Submit a narrative for the monthly progress report that includes at a minimum:
 - 1) Contractor's transmittal letter.
 - 2) Contract completion date(s) status and the number of days ahead or behind schedule.
 - 3) Revised cost loading and cash flow information.
 - 4) Approved changes in construction sequence.

- 5) Pending items and their status for:
 - a) Permits.
 - b) Potential Revisions.
 - c) Change Orders.
 - d) Time extensions.
 - e) Process interfaces and shutdowns.
 - f) Other.
 - 6) An updated resource loading histogram showing planned vs actual resources used.
 - 7) Revised labor information.
 - 8) Revised labor and equipment information.
 - 9) Description of problem areas.
 - 10) Current and anticipated Contractor caused delays:
 - a) Cause of delay.
 - b) Corrective action and schedule adjustments necessary to correct the delay and maintain original milestone completion dates.
 - c) Impact of the delay on other activities, milestones, and completion dates.
 - 11) Current and anticipated non-Contractor caused delays:
 - a) Cause of delay.
 - b) Proposed corrective action and schedule adjustments necessary to correct the delay and maintain milestone completion dates.
 - c) Anticipated costs and time for which the Contractor considers DC Water is liable.
 - d) Impact of the delay on other activities, milestones, and completion dates.
 - 12) Other project or scheduling concerns.
3. Updated Construction Schedule:
- a. Submit an updated Construction Schedule with one (1) electronic native file format and two (2) 11 x 17 color hard copies and 1 pdf file of the Tracking Gantt Chart. Include progress and status of activities as follows:
 - 1) For activities started and/or completed during the previous period:
 - a) Actual start and actual completion dates.
 - b) Number of work days.
 - c) Number of shifts.
 - d) Crew sizes by craft.
 - e) Construction equipment used to accomplish the activity.
 - 2) For activities begun but not yet completed:
 - a) Actual start date.
 - b) Physical percentage complete to date.
 - c) Number of shifts.

- d) Crew sizes by craft.
 - e) Construction equipment required.
 - f) Remaining duration of the activity.
 - g) Estimated completion date.
- 3) For activities not yet started:
- a) Estimated start dates.
 - b) Number of shifts.
 - c) Crew sizes by craft.
 - d) Construction equipment required.
 - e) Revised duration of the activity.
 - f) Revised estimated completion dates if estimated start dates vary from current schedule.
 - g) Explanation of and effects of revised completion dates.
- 4) For authorized Contract changes:
- a) Revised activities.
 - b) Number of shifts.
 - c) Crew sizes by craft.
 - d) Construction equipment required.
 - e) Durations of activities.
4. Activity Reports:
- a. Submit activity reports sorted in each of the following methods:
 - 1) Activity number.
 - 2) Float time, then in order of preceding event number.
 - 3) Early start for next 90 calendar days, then in order of preceding event number.
 - 4) Late finish for next 90 calendar days, then in order of preceding event number,
 - 5) Milestones status report with current status of each milestone event.
 - 6) Early-start and float with activity responsibility segregated into separate sub listings as follows:
 - a) Administrative work activities for the Contractor and each subcontractor.
 - b) Work activities for the Contractor and each subcontractor. Each activity shall list the number of shifts, crew size of each craft, and construction equipment to accomplish the activity.
 - c) Submittals to DC Water for all major items of material and equipment.
 - b. Each activity report submitted shall include the following information for each activity:
 - 1) Number and description.
 - 2) Location and responsibility.

- 3) Precedent and successor relationship.
 - 4) Early/late start/finish dates.
 - 5) Total float.
 - 6) Free float.
 - 7) Lead and lag time.
 - 8) Total activity duration.
 - 9) Status.
 - 10) Critical/non-critical path.
5. Resource Reports:
- a. Submit a Labor Resource Report each month with the following information:
 - 1) Actual labor for each month work has been performed.
 - 2) Required labor for each month necessary to complete all remaining activities on the early finish date.
 - 3) Labor resources in histogram format using data from the resource loaded Construction Schedule. Histogram shall depict:
 - a) Labor in person-days.
 - b) Craft labor for each subcontractor.
 - c) Monthly craft labor.
 - d) Total craft labor.
 - b. Submit an Equipment Resource Report each month that with the following information:
 - 1) Equipment resources, whether owned or rented, using data from the resource loaded Construction Schedule. Data shall be in tabular format and include:
 - a) Actual equipment, including subcontractor equipment, used each month work has been performed.
 - b) A forecast of each piece of equipment, including subcontractor equipment, planned to be used during each remaining month of the project.
6. List of Materials and Equipment:
- a. Submit an updated list of materials and equipment each month, sorted by Specification number, with the following information:
 - 1) Scheduled/actual submittal date to DC Water;
 - 2) DC Water review period.
 - 3) Fabrication and/or delivery date for material and/or equipment,

1.16 AS-BUILT SCHEDULE:

- A. Identify all as-built project critical paths in the As-Built Schedule and include the following:
 1. All Contract activities.
 2. Actual activity duration for each activity.
 3. Total number of person-days required to complete each activity.
 4. The actual start and finish date of each activity.

5. Actual completion dates for each milestone and final completion.
- B. Show the As-Built Schedule in a Tracking Gantt Chart and submit to DC Water as part of close-out.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Perform the Work in accordance with the approved Construction Schedule.
- B. Make no changes to the approved Construction Schedule without DC Water's approval.

3.2 PRELIMINARY SCHEDULE SUBMITTAL PROCESS:

- A. Submit the following at the Preconstruction Conference:
 1. One (1) electronic copy in its native file format and two (2) 11 x 17 color hard copies and one (1) pdf file of the Preliminary Schedule in Gantt Chart format showing all data inputs as required in this Section.
 2. A summary of activities that occur after the period covered by the Preliminary Schedule. The summary shall show:
 - a. The approach to scheduling the remaining work activities represented by at least one summary activity for each primary activity work group or phase so that the work cumulatively shows the entire project schedule;
 - b. The approximate cost and duration for each summary activity, which is the Contractor's best estimate for all the work represented by that summary activity.
 - c. Realistic delivery dates for all procurement activities required by the Contract Documents.
 3. A narrative report describing the general approach that will be used to meet milestones and completion dates.
 4. A tabulation report showing the estimated cumulative payments for progress payments for the first 120 calendar days following the Notice to Proceed. The tabulation report shall include the following information:
 - a. The activity, activity number, description, scheduled start date, scheduled completion date, and the monetary value.
 - b. The total of the monetary values of all activities scheduled to be completed during each 30-day period.
 - c. The cumulative total of the monetary values of all activities scheduled to be completed from the Notice to Proceed to the end of each 30-day period.
- B. DC Water will review and comment on the Preliminary Schedule submittal within 21 calendar days of receiving it.
- C. Address DC Water's comments, make necessary changes, and resubmit the Preliminary Schedule within ten (10) calendar days of receiving DC Water's comments.
- D. After the Preliminary Schedule is approved, save the schedule as a baseline and submit one (1) electronic copy in its native file format and two (2) 11 x 17 color hard copies and one (1) pdf file of the Construction Schedule in Tracking Gantt Chart format showing all data inputs as required in this Section.
- E. Use the Preliminary Schedule baseline to compare planned work against actual work performed until the Construction Schedule is approved.

3.3 CONSTRUCTION SCHEDULE SUBMITTAL PROCESS:

- A. Submit the Construction Schedule not more than 30 calendar days after the Preliminary Schedule is approved.
- B. Submit two (2) 11 x 17 color hard copies, one (1) electronic copy in its native file format, and one (1) pdf file of the Construction Schedule in Gantt Chart format showing all data inputs as required in this Section.
- C. For reservoir, tank, and pipeline (sewer, water, and storm) projects, submit one (1) original and four (4) copies of marked-up Contract Drawings showing:
 - 1. The Construction Schedule activity number assigned to each activity shown on the Contract Drawings.
 - 2. The full extent of the work included in each Construction Schedule activity number.
- D. DC Water will review the initial Construction Schedule within 30 calendar days of receiving the submittal and subsequent reviews within 15 calendar days of receiving the submittal.
- E. Contractor shall revise the Construction Schedule and resubmit it to DC Water within 15 calendar days after receiving comments from DC Water.
- F. Each Construction Schedule submittal shall include, one (1) electronic copy in its native file format, and two (2) 11 x 17 color hard copies and one (1) pdf file of the Gantt Chart.
- G. Contractor shall participate in review meetings to discuss the Construction Schedule submittals as requested by DC Water.
- H. After the Construction Schedule is approved, save the Construction Schedule as the approved baseline and submit one (1) electronic copy in its native file format, and two (2) 11 x 17 color hard copies and one (1) pdf file of the Construction Schedule in Tracking Gantt Chart format showing all data inputs as required in this Section.

3.4 CONSTRUCTION SCHEDULE UPDATE PROCESS:

- A. Do not make changes to the baseline unless DC Water issues a change notice that affects the schedule, in which case, apply the changes to the baseline activities affected by the change. The baseline for all other activities shall not be revised.
- B. Use the baseline to compare planned work against the actual work performed for each schedule update and progress report.
- C. Review an updated Construction Schedule, with DC Water, at least monthly at the Progress Meetings as follows:
 - 1. Prior to the review meeting, obtain from subcontractors, consultants, and suppliers the necessary information required to update the Construction Schedule.
 - 2. Update all data required for Progress Reports in the Construction Schedule to show actual progress to the end of the most current 30 calendar day progress period (pay period).
 - 3. Actual data shall represent actual Work performed, equipment used, labor supplied, etc. and not percent time of activity.
 - 4. Show on the Construction Schedule how the Contractor plans to continue the Work to meet all Contract milestones and completion dates.
 - 5. Review the updated Construction Schedule at the Progress Meeting using Tracking Gantt Chart format.
 - 6. Submit a detailed list of all proposed schedule changes with the updated Construction Schedule.
- D. After the Progress Meeting and prior to being paid in accordance with Section 01 29 00 – Progress Payment Procedures:

1. Update the Construction Schedule to reflect comments received from DC Water.
2. Submit Progress Reports as required by the Contract Documents.

3.5 AS-BUILT SCHEDULE:

- A. Upon completion of the project, submit an As-Built Schedule incorporating all additions, deletions, and change orders made to the Construction Schedule during performance of the Work.
- B. Show actual final data required to complete the Work including but not limited to final costs, equipment usage, labor hours, etc.

3.6 TIME IMPACT ANALYSIS FOR POTENTIAL CHANGES:

- A. Submit a Time Impact Analysis for all potential changes to the Work. The Time Impact Analysis shall:
 1. Be submitted within 20 calendar days of a request for proposal from DC Water or identification by Contractor as a potential change. Failure to submit a Time Impact Analysis within the 20 calendar days shall be an acknowledgement by the Contractor that there is no schedule impact.
 2. Include change order pricing for all schedule impacts by listing all critical path and near critical path activities which would be impacted by the proposed change, including any requests for additional time due to the change order work scope.
 3. Show how the Contractor proposes to incorporate the changes into the schedule based on:
 - a. A listing of activities required to execute the changed work that are cost loaded and resource loaded.
 - b. The most current approved progress schedule update being completed not more than 30 calendar days prior to the time of analysis.
 - c. The date that work on the change was authorized to proceed or authorization to proceed is anticipated to be received.
 - d. Actual status of construction on the date the change was authorized to proceed or authorization to proceed is anticipated to be received.
 - e. Activity durations for the activities associated with the change and their relationship to the existing schedule activities.
 4. For claims of delay submitted in accordance with Section 00 70 00 – General Conditions, the analysis shall also demonstrate the time impact based on the date that the delay began.
 5. Show the effect of performing the proposed changes on the current construction schedule milestones and completion date.
 6. Show time, cost, and resources that match change proposal.
 7. Include a Tracking Gantt Chart showing the impact on the project.
- B. Contract time extensions shall only be granted to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the path of activities at the time of actual delay or at the time the Contractor was notified that the change was authorized.
- C. Upon approval of the change order, update the Construction Schedule to reflect the agreed upon changes and issue a new Tracking Gantt Chart showing the new schedule.

3.7 DELAYS AND TIME EXTENSIONS:

- A. Submit claims for delays and time extensions in accordance with Section 00 70 00 – General Conditions.

- B. Submit a Time Impact Analysis in accordance with this Section for any delay claimed.
- C. Adjustments to Contract Time for Delays:
1. If Contractor is granted a delay in accordance with Section 00 70 00 – General Conditions, the number of calendar days permitted for the delay will be determined by:
 - a. Delay due to a single delay to which the Contractor is entitled to schedule compensation will be the number of calendar days from the start of the delay until the end of the delay
 - b. Delay due to multiple concurrent delays to which the Contractor is entitled to schedule compensation will be the number of calendar days from the commencement of the first delay to the cessation of the delay which ends last.
 - c. Delay due to concurrent delays to which the Contractor is entitled to schedule compensation for one (1) or more delays and to which the Contractor is not entitled to compensation for one (1) or more delays will be the number of calendar days attributed to each delay to which the Contractor is entitled schedule compensation except that if the delays occur at the same time, only one (1) calendar day will be permitted for the overlapping days.

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SECTION 01 33 00

SUBMITTALS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to submit the submittals specified and perform all administrative and procedural activities associated with the submittal process in accordance with this Section.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 29 00: Progress Payment Procedures.
 - 2. Section 01 32 16: Construction Schedule.
 - 3. Section 01 32 17: Construction Schedule – Small Projects.
 - 4. Section 01 32 33: Construction Photographs.
 - 5. Section 01 33 10: Document Management.
 - 6. Section 01 43 00: Quality Requirements.
 - 7. Section 01 54 50: Construction Safety.
 - 8. Section 01 75 20: Service Manuals.
 - 9. Section 01 78 40: Record Drawings.
 - 10. Section 01 78 42: As-Built Drawings.
 - 11. Section 01 78 90: Asset Classification.
 - 12. Section 01 91 00: Equipment and System Commissioning.
 - 13. Section 31 25 00: Erosion and Sediment Control.

1.4 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with this Section.
- B. Submit the Submittal Register.

1.5 COORDINATION OF SUBMITTALS:

- A. Submittals which are not complete, or do not have appropriate content, or are not in compliance with the Contract documents will be returned to the Contractor without full review. Such submittals, at the discretion of DC Water, will be assigned action code “X” or returned without assigning an action code as if the submittal was never received.
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequencing.

- C. Coordinate with DC Water while developing the Submittal Register to determine which submittal items need to be grouped together to form a complete submittal.
- D. Submit submittals for information under separate transmittals from submittals submitted for approval.
- E. Coordinate and submit submittals that depend on data from one submittal to substantiate compliance of another submittal simultaneously with each other.
- F. Review all submittals, including submittals generated by subcontractors, for completeness, content, and compliance with the Contract documents prior to submitting to DC Water.

1.6 SUBMITTAL REGISTER:

- A. Prepare a Submittal Register on the DC Water Submittal Register Form showing all submittals to be submitted and, after approval of the Submittal Register by DC Water, import the data directly into DC Water’s Contract Management System in accordance with Section 01 33 10 – Document Management. At DC Water’s sole discretion, data may be uploaded to CM using data sheets approved by DC Water.
- B. Submittals required to perform the Work are specified in each applicable Section of the of the Contract Documents. Develop the Submittal Register from the requirements specified in all specification Sections.
- C. Coordinate the Submittal Register with the Contractor's Construction Schedule.
- D. Submit the initial Submittal Register no more than 10 days after the Preconstruction Conference. List all submittals and complete all data fields for submittals required for work which will commence or be performed within the first 120 days.
- E. Meet with DC Water to review the initial Submittal Register no more than 14 days after submitting the initial Submittal Register. The review will be used to coordinate the submittals that DC Water expects to receive against the submittals the Contractor plans to submit. If submittals are found to be missing, revise the Submittal Register to include all required submittals.
- F. Each line item of the Submittal Register shall identify and describe one specific submittal item (e.g., Product data for fire hydrant). Line items referring only to submittal type (e.g., Product data, Certifications, etc.) will not be accepted.
- G. When multiple items are required to be grouped together to form a complete submittal, indicate on the Submittal Register items that will be submitted in the grouped submittal.
- H. Submit the final Submittal Register no more than 10 days after meeting to review the initial Submittal Register. Complete the final Submittal Register with all data entered into the data fields for all submittals. The review process for the final Submittal Register will be in accordance with this Section.
- I. Use the Submittal Register as the basis for developing the submit/approve/procure activities in the Construction Schedule.

1.7 SUBMITTAL TYPES:

- A. Affidavits:
 - 1. Written sworn statements of compliance signed by the manufacturer, Contractor, supplier, or other appropriate entity stating under the penalty of perjury, fine, or imprisonment, that the subject activities of the affidavit have been performed and that all components of the product comply in all respects with the requirements of the Contract documents.
 - 2. Prepare Affidavits as “stand alone” documents on the letterhead of the certifying entity.
- B. As-Built Drawings:
 - 1. As-Built Drawings are as defined in Section 01 78 42 – As-Built Drawings.

- C. Asset Classification Data:
1. Data sheets that allow DC Water to properly classify new electrical and mechanical system assets that are provided or installed as part of the Work. DC Water provides the data sheets, typically located in Section 01 78 90 – Asset Classification, to the Contractor and Contractor enters the data into the appropriate data fields.
- D. Calculations:
1. Calculations include quantifiable documentation supporting the product or activity used in the Work.
 2. Calculations shall be complete and legible and contain the name of the primary author and reviewer, the date of the calculation and review, and all information necessary to allow an independent reviewer to follow the calculation.
- E. Certifications:
1. Certifications are written statements of compliance signed by the manufacturer, Contractor, supplier, installer, or other responsible entity certifying that the materials, testing, installation, operation, or other required work or work product complies with the specified standards, regulations, codes, and Contract documents.
 2. Prepare Certifications as “stand alone” documents on the letterhead of the entity making the certification, with signature, title, and date of the person attesting certification.
- F. Data for Equipment Instrumentation:
1. Data for equipment instrumentation includes:
 - a. System block diagrams showing in schematic form, the interconnections between major hardware components such as; control centers, panels, power supplies, consoles, computer and peripheral devices, telemetry equipment, local digital processors and like equipment. The block diagram reflects the total integration of all digital devices in the system.
 - b. Data sheets for hardware components that list all model numbers, optional, auxiliary and ancillary devices being provided.
 - c. Equipment specification sheets that fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Data sheet have appropriate cross references to loop or equipment identification tags.
 - d. Detailed drawings covering control consoles and/or enclosures.
- G. Dimensional Drawings:
1. Dimensional drawings show dimensions for systems to confirm the size of pumps, motors, drives and specified appurtenances; piping connections; construction details and layout diagrams of equipment; wiring details and weight of equipment.
- H. Field Inspection Data:
1. Field inspection data includes data obtained through examining, measuring, or testing equipment and materials used in the Work to verify or validate the material or equipment conforms to the Contract documents.
- I. Installation Instructions And Details:
1. Installation instructions and details include manufacturer’s recommendations for installing materials or equipment which enable the Contractor to achieve a fully functioning system that is warrantied by the Contractor and manufacturer upon completion of the installation.
 2. Installation instructions and details shall include, but not be limited to, an overview of the product, installation instructions, details showing dimensions, wiring

schematics, programming instructions, warnings, restrictions, and all other instructions and details necessary to install a fully functioning product or system.

J. Mix Design:

1. Mix designs include the ingredients and proportioning of ingredients necessary to obtain the strength, durability, and workability of the final product.
2. Mix design submittals shall be Certified and demonstrate conformance to meet the Contract requirements by the organization designing the mix.

K. Mockups:

1. Models or replicas of a final product or system shall be of sufficient size and representation to provide a true representation of the final product. Appearance and texture of the final product or system shall not deviate from the mockup.

L. Plans:

1. Plans describe the Contractor's method and means to complete the Work. Plans include but are not limited to written text, details, drawings, sketches, and any other documentation methods that clearly describe the processes and methods proposed to perform specific Work activities.

M. Product Data Sheets:

1. Documents that provide details of the performance and technical characteristics of a product, component, equipment, or material to be used in the Work. Product data sheets shall include but not be limited to dimensions, assembly and/or construction details, codes, standards, regulations, safety data sheets, characteristics, tolerances, manufacturer's name, product name, properties, operating conditions, and other data necessary to demonstrate compliance with the Contract documents.
2. Technical bulletins, technical data sheets, standard equipment operations and maintenance (O&M) manuals, and descriptive literature or catalog information shall be clearly marked or annotated to identify the specific equipment items and selected options the Contractor proposes to provide for each individual equipment component.

N. Record Drawings:

1. The official record of the completed Work as defined in Section 01 78 40 – Record Drawings.

O. Samples:

1. General:
 - a. Samples shall be representative of the products proposed for the Work. Products installed in the Work that are determined by DC Water to be inconsistent with approved samples shall be removed and replaced at no additional cost to DC Water.
 - b. Samples submitted for selection of colors and textures shall be from the manufacturer's standard colors, material, products, or equipment lines unless specified otherwise.
 - c. Mark or tag samples with the name of the Contractor, project name, project number, product name, product number, manufacturer name, supplier, and location where the product will be used.
2. Additional Requirements for Samples for Testing:
 - a. Provide samples for testing as required by the Contract Documents. Additionally, DC Water may request the Contractor to provide additional samples to confirm the quality of Work performed or installed by the Contractor.

- b. In addition to the markings specified above, labels for samples for testing shall include the location where the sample was collected, the date and time the sample was collected, and the name of the person(s) who collected the samples.
 - c. Unless authorized otherwise by DC Water, samples submitted to DC Water or an approved DC Water test facility shall be collected, packaged, labeled, and shipped or delivered to the authorized location in the presence of a DC Water representative.
 - d. When DC Water authorizes collection of samples for testing without a DC Water representative present, Submit a letter notifying DC Water when samples have been shipped, describing the samples, and include an affidavit that the samples are representative of the materials used or proposed for the Work.
- P. Shop Drawings:
- 1. Specific Use of the Term Shop Drawings:
 - a. Drawings prepared by the fabricator, manufacturer, supplier, or other entity that show the layout and details of components fabricated in a shop for inclusion in the permanent facility (e.g., structural steel, reinforcing steel, railings, etc.).
 - b. Shop drawings shall be created in dwg format and show the principal dimensions, weight, structural features, clearances, types and/or brand of finish or shop coat, grease fittings, etc. to establish the intent of drawings and specifications. Include indication of the grade, class or strength of materials.
 - 2. Generic Use of the Term Shop Drawings:
 - a. Some specification sections may use the term Shop Drawing as a general term for submittals. When used generically, the term Shop Drawing shall be as defined in, Section 00 70 00 – General Conditions.
 - b. When the generic term for Shop Drawings is used, provide all documentation types necessary to demonstrate compliance with the Contract Documents. Documentation shall demonstrate that the requirements of the Contract Documents are understood by the Contractor and the requirements are being satisfied.
- Q. Service Manuals:
- 1. Service manuals include all information necessary to effectively deploy, operate, and maintain the equipment, process, or system installed in the Work. Requirements for service manuals are included in Section 01 75 20 – Service Manuals.
- R. Software Maintenance Documentation:
- 1. Software mainenance documentation describes software maintenance and modification processes and includes:
 - a. Manufacturer’s user manuals.
 - b. Software user manuals for the applicatoin software.
 - c. Custom software manuals for custom programs developed specifically for the system and containing software maintenance information similar to that found in manufacturer’s standard manuals including but not limited to table of contents, overview of the program, narrative describing how the program works, calculations with references to process I/O points and operator inputs, flowcharts, and variables used by the program including the function of each.

- d. Software listings containing well annotated program listing and listing any changes made after the factory acceptance test for all software.
- S. Statistical Data:
- 1. Statistical data includes:
 - a. Performance data such as pump curves, flow charts, total dynamic head, rpm, horsepower or size.
 - b. Instrument data such as range, set points, input/output characteristics, calibration, configuration parameters, size and graduations in DC Water units.
 - c. Insulation resistance, calibration, or test data sheets to use as documentation for acceptance testing.
- T. System Descriptions:
- 1. System descriptions describe the equipment and how it functions, identifies the installation location, number of units furnished; the equipment tag number or unit ID, and a list of principal components that includes the equipment name, model number, manufacturer, size, performance data, operating conditions and design requirements.
- U. Test Results:
- 1. Data obtained by a testing agency that demonstrates compliance of a material, equipment, or system with the Contract Documents. Test results are obtained through Manufacturer and Contractor quality testing as well as independent testing agency.
- V. Working (Layout) Drawings:
- 1. Drawings submitted by the Contractor showing the layout and details of construction, temporary construction, procedures and methods of construction, and data for construction equipment which are to be employed in the construction of the facility (e.g., form drawings, erection drawings, pipe lay drawings, etc.).
 - 2. Create Working Drawings in dwg format. Use electronic files of the Contract Drawings as the basis or foundation for the Working Drawings unless directed otherwise by DC Water. Annotations and sketches made to paper copies of the Contract Drawings are not acceptable means of creating working drawings.
 - 3. Working drawings for sheeting, shoring, concrete forms for structures, staging, cofferdams, underpinning and temporary structures shall be submitted, accompanied by a description of the design basis, pertinent codes and loads, and calculations for all stress carrying members.
 - 4. Working Drawings for structural systems shall be prepared under the direction and bear the seal of a Professional Engineer licensed in the jurisdiction where the project is located.
 - 5. Working Drawings for equipment and systems which interface or interconnect with or are immediately adjacent to other equipment or systems shall clearly indicate coordination details of specific locations, pertinent sequencing, minimum clearances for maintenance access, and all piping, electrical, and instrumentation connections. Working Drawings shall include, but not be limited to the following:
 - a. Equipment, piping, valves and valve operators, ductwork, conduit, junction boxes, cable tray, lighting fixtures, sleeves, inserts, supports, hangers and other appurtenances at a scale not less than 3/16-inch.
 - b. Pipe and conduit proposed to be field routed with proposed routing.
 - c. Show sleeve locations for wall, floor, and ceiling penetrations and coordinate conduit, piping, or ductwork to the termination point to resolve potential conflicts.

- d. Beams, columns, ceiling heights, walls, floors, partitions, window and door openings and all other major architectural and structural features as shown on the Contract Drawings.
 - e. Large-scale details as well as cross and longitudinal sections as required to fully delineate all conditions including, but not limited to, the location, size, and clearance dimensions of equipment items, shafts, operators, and necessary maintenance access.
 - f. Complete dimensions of all locations, elevations, and clearances.
 - g. Authorized signature of the Contractor and all Subcontractors with a statement attesting that all work shown on the Working Drawings have been coordinated with all associated vendors and subcontractors and that all conflicts have been resolved.
6. During installation, make minor deviations as required that do not affect the intended function of the equipment or material being installed. Obtain approval from DC Water for deviations that require resizing or relocating materials and equipment. Obtain approval from DC Water for changes that affect the function or aesthetic effect of buildings and structures including, but not limited to, wall locations, ceiling heights, door swings, door locations, windows, or other penetrations or features.
 7. Unless specified or directed otherwise by DC Water, update Working Drawings after installation, including field routed pipe and conduit, to reflect As-Built conditions and submit as part of the As-Built Drawings in accordance with Section 01 78 42 - As-Built Drawings.
- W. Other Submittals Types:
1. Other Submittal Types apply to any submittal listed within the Contract Documents that are not listed in this Section.
 2. Include in the submittal all data and information required by the Section or Drawing(s) in which the submittal is specified.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 SUBMITTAL CONTENT AND FORMAT:

- A. General:
1. Prior to submitting, verify all submittals are complete in accordance with the submittal content requirements herein. Partial submissions will not be accepted.
 2. Before submitting each Submittal, determine and verify:
 - a. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. All information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and
 - d. Each submittal is reviewed and coordinated with other submittals and with the requirements of the Work and the Contract Documents.

- B. Transmittal Form:
1. Transmit submittals using DC Water’s Submittal Transmittal Form with all data fields complete. Forms that are not complete may result in rejection of submittal and may be returned to the Contractor without being reviewed.
- C. Content:
1. Submittals shall contain sufficient data relating to proposed materials and equipment to enable DC Water to identify and evaluate the particular submittal against the Contract requirements.
 2. Submittals shall be clear, thoroughly detailed, and list all Contract references, drawing number(s), specification section number(s), plus shop drawing numbers of related work by subcontractors, if applicable.
 3. Submittals shall list the codes and standards governing the materials, design, and manufacture of the items covered by the submittal. Indicate the year or date of issue of each code or standard utilized by the manufacturer or Supplier in the production and testing of the items in the Submittal.
 4. Drawings shall include sufficient detail to show the kind, size, arrangements, 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.
 5. Drawings shall show field dimensions in relation to adjacent or critical features as well as other work and products.
 6. Submittals, regardless of being prepared by Contractor or Contractor’s Subcontractor, shall include a statement by the Contractor approving the Submittal for transmittal and identify the Project name and Contract number.
 - a. At a minimum, the statement shall say, “This submittal has been reviewed and coordinated with the requirements of the Work and the Contract Documents and is approved for submittal. Additionally, the submittal conforms to the requirements of the Contract Documents and all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data have been determined and verified by Contractor to be accurate and in compliance with the Contract Documents.”
 7. Submittals shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and non-relevant data crossed out.
 8. Submittals shall be assembled into a complete submittal with a single indexed file incorporating submittal requirements from a single Specification Section and transmittal form.
 9. Submittals shall be consecutively numbered in direct sequence of submittal per specification section and without division by subcontracts or trades.

3.2 SUBMITTAL REVIEW PROCESS:

- A. General:
1. No materials or equipment to be used in the Work shall be purchased, fabricated, or installed until the submittals have been approved and returned to the Contractor.
 2. Procurement, fabrication, or installation of materials and equipment prior to DC Water’s review and approval will be at Contractor’s own risk and will not be paid for by DC Water if the materials or equipment are not approved.
 3. Any related Work performed prior to DC Water’s review and approval of the pertinent submittals required by the Contract Documents, shall be at the sole expense and responsibility of Contractor.

B. Deviations to Contract Documents:

1. Clearly mark all deviations from the Contract Documents on the submittal for review and approval by DC Water of each variation. Failure to identify deviations is grounds for immediate rejection of the submittal.
2. At the time of each submittal, provide written notice to DC Water of any deviations from the requirements of the Contract Documents with a detailed description of the variation. Notice shall be in a written communication separate from the submittal.
3. DC Water's review and approval of submittals will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called DC Water's attention to each such variation at the time of each submittal and DC Water has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the submittal approval; nor will any approval by DC Water relieve Contractor from responsibility for complying with the content of the submittal as required herein.
4. DC Water's review of submittals and approval of deviations will not relieve the Contractor from the responsibility of ensuring that the deviations are fully compatible with the Work and will provide a fully functioning end product as required by the Contract documents.
5. DC Water will not be responsible for the cost of errors, omissions, materials, equipment, and correcting other problems resulting from the Contractor's deviations.

C. DC Water's Review:

1. DC Water's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents.
2. DC Water's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.
3. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

D. Submittal Review Schedule:

1. Unless specific submittal review periods are indicated in the technical specifications, DC Water's submittal review period for initial and resubmittals will be as follows:
 - a. Not more than 45 calendar days for electrical and instrumentation submittals, complex process system submittals, and slurry wall and tie-back anchor submittals. Complex process systems include, but not limited to, systems comprising of one or more multiple sub-systems, multiple piping and electrical connections, multiple instrumentation and control loops, automated operation and process control monitoring, etc.
 - b. Not more than 30 calendar days in length for all other submittals.
 - c. The review period will commence on the first business day immediately following the date that both the paper copy submittal arrives in DC Water's office and the electronic file is uploaded by the Contractor into the DC Water Contract Management System. DC Water reserves the right to withhold review on a submittal that requires coordination with other submittals until all related submittals are received.

- 1) If a submittal is held, DC Water will notify contractor that a submittal is being held and which related submittals are due concurrently to allow review to commence.
 - 2) The review period will not begin until all related submittals are received.
- d. The review period concludes on the date that the submittal is returned to the Contractor.
 - e. If paper copies of the reviewed submittals are mailed or shipped to the Contractor, the time required to deliver mailed submittal back to the Contractor is not part of the submittal review period.
2. Review periods for resubmittals are the same as for initial submittals.
 3. Contractors shall provide sufficient time between the scheduled date of submittals and the date the Products are needed for the Work to allow for additional submittal reviews to be performed due to the iterative nature of the submittal review and approval process
 4. Any and all schedule impacts due to submittals being rejected for any reason are the responsibility of the contractor to resolve and manage at contractor cost.
 5. Failure to submit submittals with sufficient lead time for review and Contractor's procurement process does not entitle the Contractor to an extension of the Contract schedule.

E. Review Comments and Disposition:

1. Submittals reviewed by DC Water will be annotated with the following status codes upon completion of the review:

CODE	DESCRIPTION	ACTION
A	Approved as Submitted.	Proceed with Work. No resubmittal is required.
B	Approved as Noted. Make Corrections Shown.	Proceed with work after making corrections noted. Resubmit final submittal showing corrections and an annotation stating that the corrections have been incorporated into the submittal and work as required by comments on the original submittal.
C	Corrections Necessary. Resubmit After Correcting.	Do not proceed with work. Revise documents to address review comments and resubmit revised submittal for review.
I	Information Only.	No resubmittal is required. Submittal documents information that satisfies requirements of the Contract Documents.
X	Rejected.	Do not proceed with work. Submittal does not satisfy the requirements of the Contract documents or the submittal is incomplete and cannot be reviewed. Prepare a new submittal that complies with the Contract documents and/or is complete.

2. Should the Contractor consider any rejection or notation by DC Water on a submittal, or any other action or inaction of DC Water to cause an increase or

decrease in the scope of the Work from that required by the Contract Documents, then the Contractor shall desist from further action relative to the questioned item and shall:

- a. Immediately notify DC Water in writing.
 - b. Furnish, within five days, a statement of the increased or decreased cost involved.
3. No Work relative to a questioned item that the Contractor believes causes an increase or decrease in the scope of the Work from that required by the Contract Documents shall be executed until the entire matter is clarified and the Contractor is ordered by DC Water to proceed. The failure of the Contractor to serve the written notice and statement required herein shall constitute a waiver of any claim in relation thereto.

F. Resubmittals:

1. Number resubmittals using the original submittal number followed by a letter (“A”, “B”, etc.) to differentiate between each submittal revision.
2. Make corrections required by DC Water, verify that all corrected data and additional information requested by DC Water on the previous submittal are included in the resubmittal, and return the required number of corrected submittals to DC Water for review and approval.
3. Identify in writing all revisions made to the submittal and list separately any revisions other than the corrections called for by DC Water on the previous submittal.
4. In the event that Contractor must provide more than one resubmission because of Contractor’s failure to provide all previously requested corrected data or additional information; DC Water may require reimbursement for its costs to review the additional resubmissions. This does not include initial submittal data such as shop tests and field tests which are submitted after initial submittal.
5. Any need for more than one (1) resubmission, or any other delay in obtaining DC Water’s review of more than one (1) resubmission, will not entitle Contractor to extension of the Contract Time unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or other reason beyond the control of the Contractor.
6. Make resubmittals within 30 days of the date submittals are returned to the Contractor. The Contractor may request additional days by submitting, in writing, a request for extension. DC Water will determine if the request warrants granting an extension, however, granting an extension will not constitute grounds for an extension to the Contract schedule. The request shall:
 - a. Explain why an extension is required.
 - b. Be received by DC Water within 14 days of the submittal being returned.

3.3 ELECTRONIC SUBMITTALS:

A. General:

1. Submit electronic copies to DC Water following the requirements of Section 01 33 10 – Document Management.
2. Submit documents in the format specified in the specific Specification Section. If no format is specified, submit electronic files in both the format the document was created in and pdf format.
3. Create documents in approved formats as specified in Section 01 33 10 – Document Management.
4. Provide documents in a searchable format unless the format is not capable of searchable format.

5. Prior to submission, review all electronic documents and files to verify they are legible, positioned upright, searchable, and have pages and documents copied in full.
 6. Title electronic drawings using the naming convention given in Section 01 33 10 – Document Management.
- B. Electronic submittals on flashdrive (FD) or Disc:
1. Disc is defined as CD, DVD, hard drive or sets of any of the aforementioned media.
 2. When submitting multiple copies of an electronic submittal, each copy shall be on a separate FD or Disc and Discs shall be submitted in a case.
 3. Include a digital index of file contents on each FD or Disc. The digital index shall include links to facilitate quick access to each section, chapter, topic, document file, etc. and be fully indexed and searchable.
 4. FD's or Discs containing numerous files shall include a printed Table of Contents page identifying location and nature of all major files. Printed index shall match the digital index contained on the FD or Disc.
 5. Attach a printed label to the FD or Disc with the following information:
 - a. Contractor name.
 - b. Contract title, number, and date.
 - c. Job number.
 - d. Contents of FD or Disc.
 - e. Manufacturer, vendor, or originator of the files.
 - f. Submittal number and revision.
 - g. Specification Section(s) and/or drawings number(s).
 - h. Date FD or Disc was created.
 6. Obtain the template for disc labels from DC Water.
- C. Electronic Submittals Through DC Water's Contract Management System:
1. Upload submittals into DC Water's Contract Management System in accordance with Section 01 33 10 – Document Management.

3.4 SUBMITTAL COPIES:

- A. All submittals shall consist of one (1) paper copy and one (1) electronic file submitted through DC Water's Contract Management System unless:
1. The number of submittals is specified otherwise in the Contract Documents.
 2. The submittal is listed in the following table, in which case the number of submittals shall include one (1) electronic copy submitted through DC Water's Contract Management System as well as the number of paper copies and FD/DISC copies shown in the table below.

SPECIAL COPY REQUIREMENTS		
Submittal Item	Submittal Copies Required	
	Paper	FD/Disc
a. Preconstruction Photos (Section 01 32 33).	2	1 FD/Disc
b. Preliminary Schedule (Sections 01 32 16 or 01 32 17).	4	0

SPECIAL COPY REQUIREMENTS		
Submittal Item	Submittal Copies Required	
	Paper	FD/Disc
c. Schedule Baseline and Construction Schedule (Sections 01 32 16 or 01 32 17).	4	0
d. Preliminary Site Safety and Health Plan (Section 01 54 50).	4	0
e. Final Site Safety and Health Plan (Section 01 54 50).	4	0
f. Quality Control Plan (Section 01 43 00).	4	0
g. Erosion and Sediment Control Plan (Section 31 25 00).	4	0
h. Construction Photos (Section 01 32 33).	0	1 FD/Disc
i. Progress Payment and Prerequisite Documentation (Section 01 29 00).	3	0
j. Construction Schedule Updates and Reports (01 32 16 or 01 32 17).	4	0
k. Shop Drawings (all applicable sections).	4	0
l. Samples (all applicable sections).	2	0
m. Commissioning Documents (Section 01 91 00).	2	1 FD
n. Samples (all applicable sections).	2	0
o. Working Drawings (all applicable sections).	4	0
p. Final As-Built Drawings (Section 01 78 42).	1	2 Discs
q. Final Record Drawings (Section 01 78 40).	1	2 Discs
r. Commissioning Data (Section 01 91 00).	2	1 FD 1 Disc
s. Reports (all applicable sections).	2	1 FD

- B. Whenever specifically requested by DC Water, provide four (4) paper copies of submittals that contain more than 100 pages or that contain large format pages 11 x 17 inches or larger.
- C. Upload electronic files to DC Water's Contract Management System.
- D. Provide additional electronic copies on FD or Disc when required by the Contract Documents.
- E. For mockups and samples, the mockup or sample and the transmittal shall be considered the paper copy. Electronic submittal for these items shall be a copy of the transmittal.

~ END OF SECTION 01 33 00 ~

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SECTION 01 33 10

DOCUMENT MANAGEMENT

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to procure software licenses and import data and upload documents into DC Water's Contract Management System (CMS). Documents and data include, but are not limited to, letters, submittals, meeting minutes, daily reports, drawings, specifications, memorandums, payment requisitions, change order requests, testing reports, warranties, guarantees, requests for information, and correspondence.

1.2 RELATED DOCUMENTS

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 DEFINITIONS:

- A. Contract Management System (CMS): The electronic software used by DC Water to receive and manage documents and data during the performance of the Work for the purpose of:
 - 1. Facilitating electronic exchange of information.
 - 2. Expediting the review process for submitted documents.
 - 3. Centralizing project information.

1.4 CMS AND CMS SITE:

- A. The CMS site is owned and operated by DC Water and used to track and process all Project documentation including but not limited to, those documents identified in Article 1.1A above
- B. DC Water's acceptance of documents uploaded and data imported into the CMS does not relieve the Contractor of responsibility for any variation from the requirements of the Contract Documents.
- C. In the event of a discrepancy between the electronic version of a document uploaded or data imported into the CMS versus the paper version submitted to DC Water, the version in the CMS will govern.

1.5 USER ACCESS LIMITATIONS:

- A. Contractor user access and access rights to the CMS site will be established, assigned, and managed by DC Water.
- B. Contractor's subcontractors and suppliers will not have direct access to the CMS unless specified or approved otherwise by DC Water. Entry of documents and data from the Contractor's subcontractors and suppliers shall be performed by the Contractor's users which are approved by DC Water.
- C. Access to modules of the CMS is managed by permission levels configured by DC Water. Request permission levels and changes to permission levels to DC Water.

1.6 DC WATER OWNERSHIP OF DATA:

- A. All Data entered into the CMS shall be the sole property of DC Water.

1.7 COMPUTER REQUIREMENTS:

- A. The CMS is accessed via the internet through a web browser. Contractor's computer hardware and software shall meet the requirements established by DC Water and the CMS software provider.
- B. DC Water staff will not operate, install, or troubleshoot any of the Contractor's hardware or software. The Contractor is solely responsible for the functionality of their systems.
- C. If the version of the CMS is upgraded during the Contract Time, the Contractor shall continue to use the version originally authorized by DC Water for the duration of the Contract unless directed otherwise by DC Water. Upgrading the CMS version, if directed, shall not be justification for a time modification to the Contract.
- D. DC Water accepts no liabilities arising from the Contractor's use of the CMS.

1.8 TRAINING:

- A. Ensure personnel using the application are properly trained and experienced in using the CMS.
- B. Provide comprehensive training for all personnel using the CMS. Comprehensive training is in addition to the overview training for setup and submittal processes provided by DC Water.
- C. Meet with DC Water within fifteen (15) days of Notice to Proceed to receive overview training on how to use the CMS in accordance with DC Water standards.
- D. Prior to receiving access to the CMS, all users shall participate in an overview of the system at DC Water. The overview will include, but not be limited to:
 - 1. The CMS site location (URL) and log on process.
 - 2. Navigation through the CMS.
 - 3. Importing data into CMS.
 - 4. Uploading documents; including but not limited to:
 - a. Reports.
 - b. Change Orders.
 - c. Work Change Directives.
 - d. Submittal Register.
 - 5. Submittal Review process.
 - 6. RFI Review process.
 - 7. Correspondence requirements.
 - 8. Submittal of Payment Requisitions.
 - 9. Close-out documents submittals.
 - 10. User Access Requirements.

1.9 INTERNET CONNECTIVITY:

- A. The Contractor is responsible for connectivity to the internet outside of DC Water's network and acknowledges the following:
 - 1. DC Water's CMS is a web-based environment and therefore subject to the inherent speed and connectivity issues of the Contractor's internet service provider.

2. The response time of the CMS is dependent on the user's equipment, including processor speed, network interface equipment, internet service provider access speed, current traffic on the internet, etc.
- B. DC Water will not be liable for any delays associated from using the CMS including, but not limited to, slow response time, down time periods, connectivity problems, and/or loss of information on the Contractor's equipment.
- C. Under no circumstances shall the lack of access to the CMS caused by internet connectivity be grounds for a time extension or cost adjustment to the contract.

1.10 RECEIPT OF DOCUMENTS AND DATA:

- A. Documents uploaded and data imported into the CMS will be recorded as received the day that they are imported or uploaded except that documents and data imported or uploaded after 3:00 p.m., Eastern Time, will be recorded as being received the following business day.
- B. Unless stated otherwise in the Contract Documents, review times will be based on the date documents are received as stated above.

PART 2. PRODUCTS

2.1 LICENSES:

- A. DC Water will advise the Contractor of the software and edition to be used at the Pre-Construction Meeting.

PART 3. EXECUTION

3.1 LICENSING:

- A. Procure a sufficient number of licenses of the CMS software to allow Project documentation to be imported and uploaded into the CMS without causing delays to the project schedule.
- B. Provide the CMS software licenses to DC Water for management as part of the CMS.
- C. Maintain and renew the licenses on a renewal schedule approved by DC Water for the duration of the Contract.

3.2 USER ACCESS:

- A. Complete and sign a new user account request form for each person using the CMS and submit the form to DC Water to receive access to the CMS.
- B. Maintain a list of authorized DC Water network and CMS accounts that reflects the current authorized users.
- C. Notify DC Water immediately of any users who no longer require access to the CMS. Their user account will be de-activated by DC Water and the license will be available to the Contractor for reassignment.
- D. Protect the security of the CMS by limiting access to authorized users and do not allow sharing of usernames.

3.3 DOCUMENT UPLOADS AND DATA IMPORTS:

- A. Submit all documents in the format required by the Contract Documents. If no document format is specified, then submit the document in Portable Document Format (PDF) and, if requested by DC Water, submit a copy of the document in the original software format in which it was created.
- B. Import and upload into the CMS all data and documents that are required by the Contract Documents to be provided to DC Water.

- C. When documents and data are specified by the Contract Documents to be transmitted, submitted, responded to, or distributed only in paper copy, upload a copy of the transmittal form into the CMS.
- D. Upload a copy of the submittal transmittal form into the CMS when submitting samples.
- E. Unless specified otherwise, enter Requests for Information, Submittal Register data, and other data required by DC Water directly into the CMS or import data into the CMS using a comma-separated value (CSV) format. In these cases, the final document will be generated by the CMS application.
- F. Validate all information entered into the CMS.
- G. Do not enter, attach, or store sensitive personal information, such as Social Security numbers, in the CMS.
- H. Name files that are uploaded as follows:
 1. *CONTRACT/JOB#_TITLE/CONTENT DESCRIPTION_VERSION/DOC#_DATE.EXTENSION*
 2. *CONTRACT/JOB#* – The contract, agreement, or job number for the project, e.g., IFB number, other.
 3. *TITLE/CONTENT DESCRIPTION* – Title of the project or brief description of the work if a title does not exist. Title/Description may be written using:
 - a. The project acronym assigned to the project by DC Water (e.g., SDWM-12A)
 - b. Typical and logical abbreviations to keep the file length manageable.
 4. *VERSION/DOC#* – The document identifier including:
 - a. A description of the type of file (e.g., Dwg, Cert, Spec, etc.).
 - b. Document identifier (e.g., drawings will have the drawing number such as G-1, E-3, etc.).
 - c. Revision number or another version identifier.
 5. *DATE* – 2-digit month followed by 2-digit day followed by 4-digit year with no spaces (i.e., mmddyyyy).
 6. *EXTENSION* – Type of file (e.g., pdf, jpg, tiff, dwg, etc.).
 7. Use underscores to separate each element of the file name except the extension

3.4 CMS DOWNTIME:

- A. Notify DC Water by telephone and email when the CMS is not functional.

~ END OF SECTION 01 33 10 ~

SECTION 01 57 30

DUST CONTROL

PART 1. GENERAL

1.1 SUMMARY:

- A. Contractor shall furnish all labor, equipment, materials and means required, and carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance to persons, and to prevent damage by dust originating from operations to vehicles, building, existing vegetation or any other properties.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdiction Department of Transportation (JDOT) for the location where the Work is performed:
 - 1. Guidelines and regulations governing dust control.
- B. United States Environmental Protection Agency (USEPA):
 - 1. Clean Air Act (CAA).
- C. District of Columbia (DC) Department of Energy (DOEE):
 - 1. State Implementation Plan (SIP).

1.5 DEFINITIONS:

- A. Dust: shall mean airborne particulate matter that is associated with or results from the Contractor's activities. Dust includes but is not limited to small, dry solid particles projected into the air by natural, mechanical, or man-made processes such as wind, crushing, grinding, milling, drilling, demolition, shoveling, conveying, screening, bagging, sweeping, or other activities performed by the Contractor.

1.6 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the "Product Data Sheets" of each product used.
- C. Submit "Plan" for controlling dust.

1.7 DUST CONTROL PLAN:

- A. Contractor shall prepare a dust control plan. The Plan shall include but not be limited to:
 - 1. Identification of all dust sources.

2. A schedule, rate of application, calculation or some other means of identifying how often, how much or when the control method is to be used.
3. How operations will be handled/suspended when dust cannot be controlled due to windy conditions.
4. How and when water or palliative material will be applied to surfaces that can create airborne dust.
5. A description of dust control methods that will be used including but not be limited to:
 - a. Wind breaks and barriers.
 - b. Frequent water applications.
 - c. Control of vehicle access, designated travel routes, and speed restrictions.
 - d. Maintaining stockpiles including reducing drop distance and covering or enclosing.
 - e. Covering open body vehicles transporting materials likely to become airborne in accordance with the JDOT.
 - f. Cleaning of equipment.

PART 2. PRODUCTS

2.1 WATER:

- A. Water used shall be non-polluted water obtained from sources approved by the DC Water.

2.2 DUST PALLIATIVE:

- A. Dust Palliatives shall meet the requirements of the regulatory agency for the location where the Work is performed.

PART 3. EXECUTION

3.1 GENERAL:

- A. Perform Work in compliance with all Federal, State and local laws and regulations concerning the prevention and control of dust pollution.
- B. Perform all Work in accordance with the CAA and DC's SIP.
- C. Contractor shall implement the dust control plan at all times during the Work to prevent the formation and migration of dust. If the procedures outlined in the dust control plan do not prevent dust from becoming visible, the Contractor shall revise the dust control plan and implement new procedures that will prevent dust from becoming visible.
- D. Failure by the Contractor to adequately control dust may result in DC Water directing the Contractor to suspend operations or for DC Water to perform dust control measures and deducting the cost from payment due to the Contractor.

3.2 DUST CONTROL EQUIPMENT AVAILABILITY:

- A. The Contractor shall have, available and operable at all times, sufficient equipment to apply water for dust control. Watering equipment shall be capable of applying a uniform spread of water over the surface. The equipment shall have a positive shut-off and ability to regulate the flow of water that is located so as to permit positive operator controls.
- B. The Contractor shall have available and maintain in operable condition equipment that is capable of sweeping up earth and/or other materials from paved surfaces.
- C. Street sweepers shall include the capability to apply water ahead of the sweeping brooms and the capability to pick up, internally store and remove sweepings.

3.3 APPLICATION OF DUST PALLIATIVE:

- A. Apply dust palliative in accordance with the requirements of the regulatory agency for the location where the Work is performed.
- B. Do not apply a dust palliative when the weather is foggy, or when rain is anticipated within 24 hours of application, or apply when the ground is frozen.
- C. Protect the surfaces of structures, trees and shrubs from splatter or marring during application of dust palliative.

3.4 SITE CONSTRUCTION CONTROLS:

- A. Protect inlets to prevent mud, silt and debris from entering the stormwater collection system due to application of water.
- B. Minimize drip heights while loading transportation vehicles.
- C. Cover all trucks and transport vehicles hauling materials that may become airborne.
- D. Sweep streets twice daily, or more frequently if needed, with a street sweeper if visible soil material is carried onto public streets.
- E. Clean up spills of transported material onto public roads immediately.
- F. Use water mist, temporary enclosures and other suitable methods to limit the spread of dust during demolition activities.
- G. Dampen the area being demolished with water prior to starting demolition activities. During the demolition process use a water spray to minimize dust.

~ END OF SECTION 01 57 30~

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SECTION 01 71 16

SUBSTANTIAL COMPLETION

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to deliver a complete Project in full operating order including, but not limited to, demonstrating and verifying compliance with the Contract Documents, starting systems, operating equipment, training of operators and mechanics, furnishing all service manuals, delivery of spare parts, completion of all training, and commissioning as determined by DC Water, and testing to ensure correct operation and function.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly Pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections Specified elsewhere may include but are not limited to:
 - 1. Section 00 70 00: General Conditions.
 - 2. Section 01 75 00: Operational Demonstration.
 - 3. Section 01 91 00: Equipment and System Commissioning

1.4 ELEMENTS NECESSARY TO OBTAIN SUBSTANTIAL COMPLETION:

- A. To obtain Substantial Completion, the Project, or an agreed portion thereof, shall be sufficiently complete, with all the parts and system operable as required by the Contract Documents to allow DC Water to fully occupy and utilize the Work or designated portion thereof for the use for which it is intended and meeting the requirements defined in Section 00 70 00 – General Conditions.
- B. Specific elements of the Work necessary for Substantial Completion will be determined solely by DC Water and may vary depending on the scope and type of project being constructed. Elements required to be complete will be determined by DC Water and may include, but are not limited to:
 - 1. Pavement, curbs, other paved areas and sidewalks, walkways, stairs, ladders, elevators, and platforms required for access to the facility.
 - 2. Final cleanup access to the facility.
 - 3. Training of DC Water's personnel in proper operation and maintenance of systems and equipment.
 - 4. Operations and maintenance manuals for all equipment and systems.
 - 5. Operational demonstrations for in accordance with Section 01 75 00 – Operational Demonstration.
 - 6. Equipment and system commissioning in accordance with Section 01 91 00 – Equipment and System Commissioning.
- C. Documentation, materials, and equipment necessary for Substantial Completion include, but are not limited to:

1. Manufacturers/suppliers Certifications that the equipment is ready for start-up.
2. Operation and Maintenance data and all Service Manuals.
3. Warranties and Bonds.
4. Evidence of payment and release of liens of suppliers and subcontractors.
5. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
6. Certificates of Insurance for products and completed operations.
7. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
 - a. Certificates of Inspection.
 - b. Certificates of Beneficial Occupancy.
8. Keys and Keying Schedule.
9. Spare parts and extra materials.
10. Insurance certificates for Contractor provided insurance that replaces ROCIP insurance and covers all remaining Work to be completed, unless otherwise directed by DC Water.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 SUBSTANTIAL COMPLETION PROCESS:

- A. Verify all elements necessary to obtain Substantial Completion have been performed, all documentation is submitted and approved, and notify DC Water in writing in accordance with Section 00 70 00 – General Conditions
- B. Determine Work is Substantially Complete in accordance with Section 00 70 00 – General Conditions.
- C. Upon issuance of Substantial Completion, the Contractor is released from the responsibility of providing maintenance and security of the Site or portion of the Site for which Substantial Completion is issued in accordance with the requirements of Section 00 70 00 – General Conditions or as otherwise agreed to as part of the punch list.

~ END OF SECTION 01 71 16 ~

SECTION 01 78 42

AS-BUILT DRAWINGS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to document the As-Built condition of the Work, prepare As-Built Drawings, and submit certified As-Built Drawings.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 DEFINITIONS:

- A. As-Built: Actual conditions of the Work as-constructed, regardless of whether that Work is identical to the Work shown on the Contract Drawings or whether that Work is different than that which is shown on the Contract Drawings. This includes all additions, deletions, and deviations to the new Work.
- B. As-Built Drawings: A record of the As-Built Work performed by the Contractor that is documented on a set of Contract Drawings.
- C. Final As-Built Drawings: As-Built Drawings that are certified and submitted to DC Water after all Work is complete and which contain all As-Built Work performed during construction.
- D. Partial As-Built Drawings: As-Built Drawings that are certified and submitted to DC Water each month and which show all As-Built Work for the period of time for which a request for payment is being submitted.

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit Partial As-Built Drawings monthly.
- C. Submit Final As-Built Drawings.

1.6 CERTIFICATION:

- A. Partial As-Built Drawings Certification: Certify that the partial as-built drawings are current at the time of review.
- B. Final As-Built Drawings Certification: Include the following certification, signed by an Officer of the Contractor, on the cover sheet of the Final As-Built Drawings.
 - 1. "I certify that these As-Built Drawings, dated _____, are accurate and that all information provided is field-verified As-Built information and within the tolerances specified and in substantial conformity with the Contract Documents.

Date: _____ Name: _____

Title: _____

Signed: _____

- C. A failure to provide current As-Built Drawings as required by the Contract Documents constitutes a material breach of this Contract. DC Water therefore reserves all rights and remedies available to it upon the Contractor's failure to submit Partial As-Built Drawings including, but not limited to, default termination, a stop work order (at no cost to DC Water), and/or a withholding of partial progress payment. A decision by DC Water to permit work to proceed shall not be constructed as a waiver by DC Water of any or all of its rights and remedies.

1.7 QUALITY CONTROL:

- A. Tolerances for the accuracy of As-Built information shall be plus or minus the dimension, coordinate, or measurement shown on the Contract Drawings. For example, if the invert of a manhole is given to 1/100 of a foot, the tolerance shall be plus or minus 1/100 of a foot from the invert given.
- B. When dimensions, coordinates, or measurements are not shown on the Contract Drawings, record the As-Built information with a plus or minus tolerance as follows:

Item	Tolerance	Item	Tolerance
Manhole Rim	0.10 ft	Offsets	0.50 ft
Manhole Invert	0.05 ft	Wye Location	1.00 ft
Inlet Rim	0.10 ft	Wye Depth	0.50 ft
Inlet Invert	0.05 ft	Corporation Stop Location	1.00 ft
Gravity Sewer Slope	0.02 %	Corporation Stop Depth	0.50 ft
Gravity Pipe Location	1.00 ft	Meter	1.00 ft
Manhole Location	0.50 ft	Blow Off Assembly	1.00 ft
Inlet Location	1.00 ft	PRV	1.00 ft
Fire Hydrant	1.00 ft	Air Release Pit	1.00 ft
Valve	1.00 ft	Pressure Pipe Location	1.00 ft
Valve Depth	0.10 ft	Pressure Pipe Depth	0.50 ft
Fittings Location	0.50 ft	Structures – Elevations	0.10 ft
Fittings Depth	0.10 ft	Structures – Dimensions	0.10 ft

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Submit Partial As-Built Drawings to DC Water Monthly.
- B. Submit Final As-Built Drawings to DC Water at the time the request for Substantial Completion Inspection is made.

3.2 MAINTENANCE OF DOCUMENTS:

- A. Maintain one (1) set of As-Built Drawings at the site for documenting As-Built conditions.
- B. Each month, create Partial As-Built Drawings and submit to DC Water.
- C. As-built Drawings shall be available for inspection by DC Water at all times.
- D. Store As-Built Drawings in a clean, dry, legible condition and in good order.
- E. Do not use As-Built Drawings for any other purpose than recording As-Built Conditions.
- F. Stamp As-Built Drawings in large red letters with an "AS-BUILT" label in the upper right hand corner of each drawing. Hand written is not acceptable.

3.3 DOCUMENTING AS-BUILT INFORMATION:

- A. Update As-Built Drawings daily to reflect the Work performed each day.
- B. Document As-Built conditions prior to burying or covering Work. If As-Built conditions are not documented, uncover and expose the Work and document the As-Built conditions at no additional cost to DC Water.
- C. Clearly convey As-Built conditions on the As-Built Drawings so that they can be interpreted without the assistance of the Contractor. Provide assistance to DC Water and/or the Design Professional to interpret As-Built Drawings, including performing additional field work, as required, to obtain missing information or to correct poorly documented markups to correctly interpret the As-Built information. Provide assistance as required at no additional cost to DC Water.
- D. Provide As-Built documentation at the same level of detail and accuracy as shown on the Contract Drawings except as specified in this Section.
- E. Document dimensions and measurements on the As-Built Drawings using the same method as used for dimensions and measurements on the Contract Drawings.
- F. Unless noted otherwise on the Contract Drawings, record all As-Built Datum information in NAD 83 (Horizontal) and NAVD 88 (Vertical).

3.4 REQUIRED AS-BUILT INFORMATION:

- A. Document formal or informal changes made under the direction from DC Water on the As-Built drawings including but not limited to changes made by field order or change order. Include such documentation as the addenda, field order and change order number.
- B. In addition to As-Built information, document the following information on the As-Built drawings regardless of whether or not the information is shown on the Contract Drawings:
 - 1. The locations and dimensions of property lines and corners.
 - 2. Actual locations of anchors, construction and control joints, and embedded items in concrete.
 - 3. Unusual or undocumented obstructions that are encountered during construction.
 - 4. GPS location coordinates, and distances between all pipeline fittings.
 - 5. Types and sizes of all existing underground utilities and appurtenances encountered during performance of the Work regardless of whether or not they are shown on the Contract Drawings.
 - 6. Horizontal and vertical locations of all known or found existing underground utilities and appurtenances, regardless of whether or not they are shown on the Contract Drawings.
 - 7. Horizontal and vertical locations for the change in direction for all existing or new underground utilities and all surface or underground components such as valves, bends, manholes, drop inlets, clean outs, wyes, corporation stops, curb stops, inlets, thrust blocks, hydrants, PRVs, pipe slope and distances, pressure relief valves,

air release valves, fittings, etc. regardless of whether or not they are shown on the Contract Drawings.

8. Harnessing details and limits by stationing.
 9. Existing conditions found to be different than what is shown on the Contract Drawings.
- C. Document all changes to the Contract Drawings necessitated by approved shop or working drawings on the As-Built Drawings.
- D. Field changes for constructed Work, including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc. shown on shop or working drawings shall be documented with As-Built information. Include a note on the As-Built Drawings referencing the change to the shop or working drawings.
- E. Details not on Contract Drawings.
1. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 2. Layout and schematic drawings of electrical circuits and piping.

3.5 ADDITIONAL INFORMATION FOR OPERATIONS AND MAINTENANCE:

- A. Collect additional information as is needed or useful for operations and maintenance purposes and document it on the As-Built Drawings, including but not limited to:
1. Locations of utilities and appurtenances concealed in structures, located with measurements referenced to visible and accessible features of the structure.
 2. Locations, types, sizes, and thicknesses of all casing pipes.
 3. Stationing for each Water tap and sewer wye branch.
 4. Valve data including the date set, size, kind, manufacturer, purpose, position, cover (MH or BB), stem direction, depth, direction to close, number of turns, property of (Owner), key nut type, and joint types.
 5. Fire hydrant data including date set, key nut elevation, pressure, hydrostatic head, fire hydrant number, manufacturer, model, depth of bury, distances between main and valve, distance between valve and hydrant and face of curb.
 6. Show the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

~ END OF SECTION 01 78 42 ~

SECTION 01 79 26

WARRANTIES

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to deliver all warranties for Work required by the Contract Documents and complete repairs, replacements, and/or adjustments to the Work as necessary to satisfy all warranty conditions required by the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 70 00: General Conditions.
 - 2. Section 01 33 00: Submittals.

1.4 DISCLAIMERS AND LIMITATIONS:

- A. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products.
- B. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.5 DEFINITIONS:

- A. Standard Warranties: Preprinted written warranties published by individual manufacturers for products that are specifically endorsed by the manufacturer to DC Water.
- B. Special Warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for DC Water.

1.6 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit warranties to DC Water 15 days prior to Partial Utilization or Substantial Completion of the Work.
- C. Submit draft copies of Special Warranties prior to execution.

1.7 WARRANTIES:

- A. Effective Date of Warranty and Correction Period:
 - 1. The effective date for the start of warranties and the correction period shall be as specified in Section 00 70 00 – General Conditions, except for Special Warranties which shall have an effective date for the start of warranty and the correction period

as specified in the Contract Documents for that portion of the Work having a special warranty.

- B. Expressed Warranties:
 - 1. Expressed warranties made to DC Water are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law.
 - 2. Expressed warranty periods shall not be interpreted as limitations on the time in which DC Water can enforce such other duties, obligations, rights, or remedies.
- C. Special Warranties:
 - 1. When the Contract Documents require a special warranty:
 - a. Prepare a written warranty containing appropriate terms and identifications as required by the Contract Documents for the special warranty.
 - b. DC Water reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.
 - 2. Submit a draft of special warranties, ready for execution by the required parties, to DC Water for approval prior to final execution.
- D. Rejection of Warranties:
 - 1. DC Water reserves the right to reject warranties and to limit selection to products with warranties not in conflict with the requirements of the Contract Documents.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 RELATED DAMAGES AND LOSSES:

- A. When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

3.2 RESPONSE TIME AND SUSPENDED WARRANTY PERIOD:

- A. Contractor shall:
 - 1. Respond to the site within three (3) working days of being notified (verbally or written) of a warranty claim.
 - 2. Start rectification of items under warranty within seven (7) working days of being notified of a warranty claim.
 - 3. Make every reasonable effort to progress warranty work on a continuous basis until work is satisfactorily completed and accepted by DC Water.
- B. If Contractor is unable to respond or initiate correction within the time frame noted above and progress work on a continuous basis, DC Water reserves the right to initiate repairs and charge the Contractor for the entire cost of repair effort.
- C. Reinstatement of Warranty:
 - 1. When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
 - 2. The warranty period shall be extended day for day for the entire period the equipment does not provide design function starting with the day the contractor

was notified and extending to the day the equipment was repaired, function restored, and tested in the presence of DC Water.

3.3 REPLACEMENT COST:

- A. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether DC Water has benefited from use of the Work through a portion of its anticipated useful service life.

~ END OF SECTION 01 79 26 ~

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SECTION 02 01 20

PROTECTING EXISTING UTILITIES

PART 1. GENERAL

1.1 SUMMARY:

- A. Section includes specification for maintaining, supporting and protecting existing underground utilities.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 32 33: Construction Photographs.
 - 2. Section 01 33 00: Submittals.
 - 3. Section 31 23 10 Trench Excavation and Backfill.
 - 4. Section 33 11 20: Concrete Thrust Restraints.

1.4 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit Miss Utility clearance authorization.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Contractor shall comply with all requirements of the Miss Utility codes.
- B. Except as indicated below or as specifically authorized by the Utility Owner or by DC Water, reconstruction of utilities damaged by the Contractor shall be with new material of the same size, type, and quality as that which is removed.
- C. Photos taken to document project conditions shall comply with Section 01 32 33 – Construction Photographs.
- D. In addition to the pre-construction photos and periodic photos taken per Section 01 32 33 – Construction Photographs, the Contractor shall document the excavation zones where underground utilities are known to exist by taking photos prior to beginning excavation activities. Photos shall cover the entire excavation zone and clearly show markings placed by Miss Utility.
- E. Contractor shall complete and submit a Utility Strike Incident Report to DC Water if a utility is damaged while performing the work. Supplement the report with photos taken before and after the incident.

- F. Existing utilities shall be protected and kept in service during the life of the Contract unless relocation, reconstruction, abandonment, or outage is specifically permitted by the Utility Owner or by DC Water.
- G. Do not disconnect or shut down any part of the existing utilities and services without permission from the Utility Owner.
- H. Where utilities are parallel to or cross the construction and are not designated for removal or demolition, follow the requirements given below.
 - 1. Locate utilities in the areas to be excavated using a third party subsurface utility locating company. This requirement is in addition to and separate from MISS Utility services.
 - 2. The third party subsurface utility locating company shall utilize appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities by performing surface evaluation analysis over the entire excavation area. The analysis shall be performed in a grid pattern or other equivalent process.
 - 3. Locate manholes, valve boxes, service lines and other utility appurtenances in the area near the excavation zone. Correlate them with the excavation work to determine if utilities not shown on the contract drawings are present.
 - 4. Determine possible alignment and elevation of existing utilities by extrapolating alignment between surface features and taking depth measurements to the utility where possible (i.e., top of valve in casing, sewer invert, etc.)
 - 5. Verify utility locations by hand digging, pot holing, or hydro excavating immediately prior to performing excavation using heavy equipment. Document the depth of the utilities from the ground surface to the top of utility. For duct banks, the Contractor shall document the depth and width of the duct bank.
 - 6. Hand excavation is required within 18 inches of any buried utility.
 - 7. Location markings shall remain visible at all times during excavation activities. The Contractor shall restore location markings if they are damaged, dislodged, or no longer visible before continuing with excavation activities. Photos of markings must be taken. See Specification Section 01 32 33 – Construction Photographs.
- I. Provide shoring, underpinning, and structural support for existing utilities and structures that become suspended or otherwise unsupported because of adjacent excavation operations.
- J. Protect active utilities from damage. If utilities are damaged in any way, Contractor shall notify DC Water and the affected utilities immediately for corrective action.
- K. If the underground utility is damaged, under no circumstance shall the Contractor backfill the utility without first receiving permission from the Utility Owner and/or DC Water.
- L. Any damage sustained to utilities shall be repaired at the Contractor's expense and at no additional costs to DC Water.
- M. Utilities to be removed shall not be removed until shut-down time can be kept to a minimum. Do not remove an existing utility line or service until the replacement line, crossover, or capping is ready to be performed.

3.2 REQUIRED NOTIFICATIONS:

- A. The Contractor shall notify Miss Utility of impending excavation for each location at least 48 hours (excluding Saturdays, Sundays, and holidays) prior to excavation. Note that Miss Utility typically will not issue a blanket ticket for excavation at multiple sites.
- B. The Contractor shall notify all utility owners, by telephone, of the impending excavation or demolition and the location thereof, at least 48 hours (excluding Saturdays, Sundays, and holidays), but not more than ten (10) days (excluding Saturdays, Sundays, and

holidays) in advance of proceeding with excavation or demolition work necessitated by the Contract.

- C. In the event of damage to any utility encountered during the performance of the Work, Contractor shall report the damage with complete details to DC Water no later than 24 hours after the incident occurs using DC Water's Utility Strike Incident Report form.

3.3 EXISTING UTILITIES AND UTILITY STRUCTURES:

- A. All known utilities have been shown on the drawings according to the best information available. The Contractor shall contact all Owners of utilities and utility structures above ground, on the ground, or below the ground, within the Project area so that the Owners may locate, mark and/or protect their structures and utilities.
- B. Contractor shall protect all utility structures, utilities, surface features, or above ground material and equipment against trenching, dewatering, or any other activity connected with the Work throughout the entire Project.
- C. When structures and utilities which are shown on the Contract Drawings and/or marked in the field, are disturbed or damaged in the execution of the Work, Contractor shall repair immediately in conformance with best practice and as approved by the Owner of the damaged utility or structure and DC Water. Repairs and associated cost shall be the responsible of the Contractor with no additional cost to the Contract Price or additional time to the Contract Time.
- D. When structures and utilities have not been shown or located as outlined above and are disturbed or damaged in the execution of the Work, the Contractor shall take whatever steps are necessary for safety and notify immediately DC Water and the Utility Owner and avoid any actions which might cause further damage to the structure or utility.
- E. When the pipe bedding for existing water and sewer piping is disturbed during excavation activities or the pipe is exposed such that, in the opinion of DC Water, the pipe is no longer properly supported, excavate, backfill, and compact soils beneath and around the pipe in accordance with Section 31 23 10 – Trench Excavation and Backfill, and the following requirements:
 - 1. Support the pipe as necessary to maintain existing pipe grade and protect the pipe from damage.
 - 2. Excavate beneath and around the pipe, if necessary, to remove loose soils that do not provide proper support for the pipe.
 - 3. Begin placing CLSM at a depth of 1 foot below the pipe or an elevation at which the Contractor can no longer properly perform compaction activities, whichever is lower.
 - 4. Install CLSM to an elevation of at least the top of the bedding but not higher than the springline of the pipe, ensuring that the pipe does not begin to float.
 - 5. Allow the CLSM to cure sufficiently to prevent mixing backfill materials with CLSM before resuming backfilling activities with approved soils in accordance with Section 31 23 10 – Trench Excavation and Backfill.

3.4 THRUST BLOCKS ON PRESSURE PIPE:

- A. Protect existing thrust blocks in place or shore existing pipe to resist the thrust by a means acceptable to DC Water.
- B. If existing thrust blocks are exposed or, in the opinion of DC Water, rendered to be ineffective, Contractor shall, at no additional cost to DC Water, reconstruct them to bear against unexcavated soils within the trench to firmly support the utility. Installation shall be in accordance with Section 33 11 20 – Concrete Thrust Restraints.
 - 1. Provide firm support by backfilling that portion of the trench for a minimum distance of two (2) feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade with approved material by DC Water.

2. Then excavate the backfill material for construction of the Concrete Thrust Blocks.
3. Test compaction of the backfill material before pouring any Concrete Thrust Blocks.

3.5 SPECIAL CONSTRUCTION:

- A. Reinforced concrete beams, concrete support walls, or other special construction required for protecting existing utilities and structures and preventing settlement, whether shown on the drawings or not, shall be considered part of this specification and shall be installed by the Contractor at no additional cost to DC Water.

~ END OF SECTION 02 01 20

SECTION 02 41 00

DEMOLITION

PART 1. GENERAL

1.1 SUMMARY:

- A. Furnish all labor, materials, tools and equipment necessary for demolition and performance of the Work required by the contract documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 40 10: Schedule of Prices.
 - 2. Section 00 89 00: Project Permits and Approval.
 - 3. Section 01 33 00: Submittals.
 - 4. Section 01 54 50: Construction Safety.
 - 5. Section 01 57 30: Dust Control.
 - 6. Section 01 74 19: Waste Management.

1.4 DEFINITIONS:

- A. Incidental Demolition: Demolition activities that are necessary to complete the Work required by the Contract Documents, whether shown on the Contractor Drawings or not, and does not have a price specified in Section 00 40 10 – Schedule of Prices.
- B. Itemized Demolition: Demolition activities that are specifically called out on the Contract Drawings and have a price specified in Section 00 40 10 – Schedule of Prices.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit the “Plans” for demolition.
- C. Submit “Permits” for demolition work.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 WORK:

- A. Perform all demolition as Incidental Demolition unless a price is stated for itemized demolition in Section 00 40 10 – Schedule of Prices.

- B. Contractor shall submit a demolition plan for review and approval by DC Water. Plan shall indicate methods to be employed, sequence, equipment, procedures, disposal sites, and proposed haul routes. Plan shall indicate safety measures in accordance with applicable codes, including signs, barriers and temporary walkways, etc.
- C. Prior to beginning any demolition work, disconnect all existing utilities and ensure that the Work area is safe for demolition activities.
- D. Obtain approval from DC Water and Utility Owner before temporarily shutting down or disconnecting utilities.
- E. Contractor shall obtain all special permits and licenses and give all notices required for performance and completion of the demolition and removal work, hauling and legal disposal of debris.
- F. If applicable, obtain Raze permit from DCRA in accordance with Section 00 89 00 – Project Permits and Approval.
- G. Demolish and remove portions of the buildings and structures including equipment and systems necessary to accommodate new construction.
- H. Remove and dispose of debris at an appropriate facility approved for that purpose.
 - 1. As part of the Demolition Plan, provide DC Water with a copy of permission or agreement regarding the hauling and disposal of materials.
- I. If unforeseen obstructions are encountered, notify DC Water immediately for additional instructions before proceeding with the work.
- J. Unless otherwise indicated, demolition waste becomes property of Contractor and shall be removed from Project Site.
- K. All fees and transportation costs are the responsibility of the Contractor. The Contractor shall bear full responsibility for any and all fines against the project resulting from the improper handling and disposal of the demolition waste material.
- L. Storage of demolition waste materials at the Project Site is not permitted.

3.2 PROTECTION:

- A. Perform demolition in such manner as to eliminate hazards to persons and property.
- B. Inspect existing conditions and note dimensions, clearance, access, utilities, shoring and protection required.
- C. Minimize interference with areas adjacent to the Work.
- D. Protect structures not being demolished and utilities or operational systems to remain in service.
- E. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. For additional information see Specification Section 01 54 50 – Construction Safety.
- F. Prevent spread of flying particles and dust. Spray rubbish and debris with water to keep dust to a minimum. For additional information, see Specification Section 01 57 30 – Dust Control.
- G. No complete wall or large part of wall or structure shall be permitted to fall unrestrained to the ground during demolition.
- H. All active hydrants, temporary and permanent, shall be accessible at all times. No debris shall be permitted to accumulate within a radius of 15 feet of fire hydrants.

3.3 REMOVAL OF EXISTING PAVEMENT:

- A. Saw-cut existing pavement to neat lines as shown on the Contract Drawings and/or Standard Detail in advance of excavating.

- B. After the pavement has been cut, the Contractor shall be careful not to break and/or damage the existing adjacent pavement while performing the work. If pavement is damaged, Contractor shall repair pavement at no additional cost to DC Water.

3.4 CLEAN-UP:

- A. On completion of work for this Section, site shall be cleaned of all demolition debris to the satisfaction of DC Water. Clean up shall include disposal offsite of all items and materials not required to remain at the work site as well as all debris and rubbish resulting from demolition operations.
- B. For additional information, see Specification Section 01 74 19 – Waste Management.

~ END OF SECTION 02 41 00 ~

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SECTION 21 11 10

FIRE HYDRANTS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to furnish and install new fire hydrants, (boot with ductile iron retainer gland, standpipe and hydrant complete) plus constructing dry wells complete, at locations shown on the Contract Drawings and/or as directed by DC Water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 05 19: Geotextiles.
 - 3. Section 31 23 32: Aggregate Materials.
 - 4. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.
 - 5. Section 33 13 00: Disinfecting Water Mains.

1.4 REFERENCED CODES AND STANDARDS

- A. American Water Works Association (AWWA):
 - 1. AWWA C502: “Dry-Barrel Fire Hydrants”.
 - 2. AWWA C600: “Installation of Ductile Iron Water Mains and Their Appurtenances”.
 - 3. AWWA M17: “Fire Hydrants: Installation, Field Testing, and Maintenance”.

1.5 QUALITY ASSURANCE:

- A. Compliance Requirements:
 - 1. Hydrants shall be UL listed and FM approved.
 - 2. Hydrants shall comply with AWWA C502.
 - 3. All fire hydrants furnished shall be factory tested to a pressure of 300 psig.

1.6 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Certifications” for each of the materials specified herein, which will be used on the project, with the manufacturer’s Certificate of Compliance stating “Fire Hydrants” materials meet or exceed the specified requirements.
- C. Submit the “Product Data Sheets” for each product used.

- D. Submit the “Test Results” for fire hydrants.
- E. Submit Color Cards for fire hydrant color selection.

PART 2. PRODUCTS

2.1 MATERIALS:

A. Hydrants:

1. Fire hydrants shall be compression type, hand operated, for fire protection service under operating pressure of 200 psig and manufactured per AWWA C502.
2. Hydrant Models:
 - a. Mueller Super Centurion 250 - Model No. A-423, made by Mueller Company, Decatur, Illinois,
 - b. Kennedy Guardian - Model No. K-81-D, made by Kennedy Valve, Elmira, New York.
 - c. No other hydrant models or ‘or-equals’ shall be used.
3. AWWA C502 is modified or supplemented as follows:
 - a. Size - 5-1/4 inch minimum, nominal I.D. main valve opening.
 - b. Bury Length - 4-1/2 feet or as directed by DC Water.
 - c. Barrel Sections - Hydrants shall be "traffic" type fire hydrants complete with breakable safety flange and 8 bolts and nuts, located near the ground line and designed to break on vehicle impact. Design shall allow top section to rotate a full 360°.
 - d. Hydrant Top - Hydrants shall be permanently lubricated and require one man maintenance, no special tools.
 - e. Outlet Nozzles - Two 2-1/2 inch nominal I.D. hose nozzles; one 4-1/2 inch nominal I.D. pumper connection.
 - 1) Threads for 2-1/2-inch nozzles per National Fire Standard Hose Coupling Screw Threads; threads for 4-1/2 inch pumper connection will be per National Standard Threaded Connections.
 - f. Operating Stem and Mechanism - Operating and outlet nozzle cap nuts shall be pentagonal in shape.
 - 1) The pentagon shall measure 1-51/64 inch from point to flat at the base of the nut and 1-47/64 inch at the top. The height of the nut shall not be less than 1-inch.
 - 2) Direction of operating nut rotation to open:
 - a) Left (counterclockwise).
 - g. O-Ring Seals - O-ring seals shall be used in lieu of stuffing box.
 - h. Gaskets - Material shall be rubber composition; asbestos prohibited.
 - i. Hydrant Inlet - Boot side inlet shall be 6-inch diameter with retainer gland mechanical joint per Section 33 05 02 – Water Utility Distribution Piping – Ductile Iron Pipe.
 - j. Cap chains - hose cap chains and steamer cap chains are required with all hydrants; chain links (zinc plated steel) shall be fabricated not less than 1/8-inch in diameter and with S hook device (zinc plated steel) attached.

- k. Coatings - Above grade line, inside and outside of hydrant shall be coated per one of the following schemes:
 - 1) System 1:
 - a) Primer – One (1) coat PPG Amercoat 370, product code AT370, or approved equal, 4-6 mils dry film thickness.
 - b) Finish Coat – One (1) coat Sherwin-Williams Polane SP, product code F63RXG9621, or approved equal, 1.2-2 mils dry film thickness.
 - 2) System 2:
 - a) Top Coat – One (1) coat Ken-Guard TGIC Polyester Coating, fusion bonded, or approved equal, 4-6 mils dry film thickness.
- l. Coatings – Lower Barrel and Shoe, inside and outside, shall be painted per one of the following schemes, or equal:
 - 1) System 1:
 - a) Primer – One (1) coat PPG Amercoat 370, product code AT370, 4-6 mils dry film thickness.
 - 2) System 2:
 - a) Primer for Barrel – One (1) coat Asphalt Emulsion for Ductile Iron Pipe and Fittings, or equal, 4-6 mils dry film thickness.
 - b) Top Coat for Shoe – One (1) coat IVC Industrial Coatings Inc. – Red Oxide Epoxy, fusion bonded, or equal, 8-10 mils dry film.
- m. Hydrant colors will be selected by DC Water with input from the local fire department and/or DC Water maintenance group.
- n. Coatings shall be NSF 61 approved and AWWA C550 compliant.
- o. Operating nut – The operating nut shall be drilled and tapped with a 27/64 drill hole, 1-1/8” deep with a 1/2”-13 thread tap to the bottom of the drill hole. The operating nut shall be custodian ready for Hydra-Shield Custodian Lock Assembly as manufactured by Hydra-Shield or approved equal.
- 4. Bolts and nuts shall be a high strength, low alloy; corrosion resistant steel, known as Cor-Ten, Usalloy, Durabolt or stainless steel 304, or approved equal.
- 5. Fire hydrants shall be furnished with a breakaway traffic flange of the type which allows both barrel and stem to break clean upon impact from any angle. Traffic flange design must be such that repair and replacement can be accomplished above ground.
- 6. Locking system for fire hydrants in high security areas shall be Custodian Hydrant Lock Manufactured by Hydra-Shield Manufacturing, Inc. or equal and be compatible with all other fire hydrant requirements specified in this Section.
- B. Gravel for Dry Well:
 - 1. Washed gravel used in construction of the Dry Well shall comply with Section 31 23 32 – Aggregate Materials.
- C. Filter Fabric:
 - 1. Filter fabric shall be for subsurface drainage as specified in Section 31 05 19 – Geotextiles.

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS:

- A. All related work on hydrant water line including tests and disinfection shall be pertinent to provisions of Section 33 13 00 – Disinfecting Water Mains.
- B. Hydrants shall be set plumb with 4-1/2 inch nozzle normal to the curb line.
 - 1. When a hydrant is delivered with the nozzle facing in the incorrect direction, the hydrant shall be rotated to the correct orientation prior to placing the hydrant into service.
 - 2. When barrel of hydrant passes through concrete slab, place 1/2-inch thick piece of standard sidewalk expansion joint material around section of barrel passing through concrete.
 - 3. Do not cover drain ports when installing concrete thrust blocks if thrust blocks are required by the Contract Documents.
- C. Joint and joint restraint between boot and the connection pipe to the main shall be per Section 33 05 02 – Water Utility Distribution Piping – Ductile Iron Pipe.
- D. Filter fabric shall be placed in the excavated dry wells' interior bottom, interior side walls and placed on the top of the excavation and secured around the hydrant's fittings before completing backfill.
- E. Fire Hydrants in High Security Areas:
 - 1. Install custodian security locking system on fire hydrants located in high security areas.
 - 2. Fire Hydrant shall be fully operational with the use of a DC Water hydrant operating wrench after removing the custodian security lock.
- F. Restoration:
 - 1. Any items disturbed during construction, including shrubs and lawns, shall be replaced in kind by the Contractor upon completion of work. Grassed areas shall be restored using sod.
 - 2. Restoration shall be considered incidental to the Work and payment for restoration shall be included under the bid item of which it is a part of in the SOPs.

3.2 FIELD QUALITY CONTROL:

- A. Each assembled hydrant shall be operated through a full open-close cycle when not under pressure. The torque required for performing this operation shall not exceed 20 lbf-ft.
- B. Record fire hydrant data on the As-Built Drawings.
- C. Perform field inspection and testing of the fire hydrant and piping in accordance with:
 - 1. Section 33 05 02 - Water Utility Distribution Piping – Ductile Iron Pipe.
 - 2. AWWA C600.
 - 3. AWWA M17.

~ END OF SECTION 21 11 10 ~

SECTION 21 11 17

REMOVE FIRE HYDRANTS AND HYDRANT CONTROL VALVES

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of removing fire hydrants and hydrant control valves shown on the Contract Drawings and/or as directed by DC Water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 31 23 10: Trench Excavation and Backfill.
 - 2. Section 33 01 20: Abandonment of Underground Utilities.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 PREPARATORY WORK:

- A. Shut off water main.
- B. All valves will be operated by DC Water.

3.2 REMOVE FIRE HYDRANT AND HYDRANT CONTROL VALVE:

- A. Excavation and backfill shall comply with Section 31 23 10 – Trench Excavation and Backfill.
- B. Excavate to uncover fire hydrant and hydrant control valve.
- C. Remove fire hydrant and hydrant control valve, cutting pipe or breaking joints as required.
- D. The components of the existing fire hydrant assemblies shall be carefully removed. Damage to the fire hydrant, hydrant control valve, valve box or barrel impairing re-use shall be determined by DC Water. Damaged components shall be replaced by the Contractor using factory-supplied parts from the same manufacturer and shall be at no additional cost to DC Water.
- E. DC Water may inspect the fire hydrants and hydrant control valves to determine the usefulness of the removed fire hydrant assembly components. If DC Water determines they are reusable, the fire hydrants and hydrant control valves shall be turned over to DC Water at one of the maintenance shops. If DC Water determines that they are not reusable, the Contractor shall remove them from the site and dispose of the material at a licensed disposal facility.
- F. Plug or cap abandoned water pipe at location shown on drawings. If no location is shown the abandoned pipe shall be removed and plugged at the Tee. Install thrust restraint.

- G. Tees with lead joints shall be replaced as required per Section 33 01 20 – Abandonment of Underground Utilities.
- H. Backfill excavation and restore area.

3.3 RESTORATION:

- A. Any items disturbed during construction, including shrubs and lawns, shall be replaced in kind by the Contractor upon completion of work. Grassed areas shall be restored using sod.
- B. Restoration shall be considered incidental to the Work and payment for restoration shall be included under the bid item of which it is a part of in the SOPs.

~ END OF SECTION 21 11 17 ~

SECTION 31 05 19

GEOTEXTILES

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide geotextile for separation, subsurface drainage, paving, permanent erosion control, and temporary silt fence as indicated on the Contract Drawings and specified herein.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M288: "Standard Specification for Geotextile Specification for Highway Applications".
- B. ASTM International (ASTM):
 - 1. ASTM D1683: "Standard Test Method for Failure in Sewn Seams of Woven Fabrics".
- C. Jurisdictional Erosion and Sediment Control Agencies:
 - 1. DC DOEE: Standards and Specifications for Soil Erosion and Sediment Control.
 - 2. Maryland Department of the Environment Water Management Administration (MD EWMA): Standards and Specifications for Soil Erosion and Sediment Control.
 - 3. Virginia Department of Environmental Quality (VDEQ): Erosion and Sediment Control Handbook.

1.5 DEFINITIONS:

- A. Geotextile Fabric: Permeable textile material used with soil, rock, or other geotechnical engineering related materials as integral part of a project, structure or system. Fabric shall allow the passage of water while retaining in-situ soil without clogging.
 - 1. Permanent Erosion Control Geotextile – Shall be used when the erosion control measure will not be removed, such as erosion of slopes and channels when placed under a rock blanket, rock ditch, etc.
 - 2. Separation Geotextile – Shall be used as a separation material to prevent mixing of dissimilar material, and to control migration of backfill material through joints in structural elements.
 - 3. Subsurface Drainage Geotextile – For installation in subsurface drains, protection of pipe bedding and backfilling material or other pipeline drainage applications. Shall be used in subsurface drainage as a filter to protect drainage media from

clogging with fines from adjacent soils.

4. Temporary Silt Fence Geotextile – Shall be used in supported or unsupported sediment control fencing.
- B. Minimum Average Roll Value (MARV): All property values, with the exception of apparent opening size (AOS), represent minimum average roll values in the weakest principal direction. MARV listings for AOS represent the maximum average roll value.
- C. Nonwoven Geotextile: A textile produced by bonding and/or interlocking of fibers by mechanical, heat or chemical means.
- D. Roll: Unit of continuous geotextile without transverse seams as furnished by the manufacturer.
- E. Woven Geotextile: A textile comprising two or more sets of filaments or yarns interlaced in such a way that they result in a uniform pattern.

1.6 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit Certifications for each of the materials specified herein, which will be used on the project, with the manufacturer’s Certificate of Compliance stating “Geotextile” materials meet or exceed the specified requirements.
- C. Submit the “Installation Instructions and Details” describing and showing how the Geotextile will be installed.
- D. Submit the “Product Data Sheets” for each product used.

1.7 QUALITY ASSURANCE:

- A. Manufacturer Testing Certificates: Provide mill certificate signed by a legally authorized official from the company manufacturing the fabric. The mill certificate shall attest that the fabric meets the chemical, physical, and manufacturing requirements stated in this specification.
- B. Manufacturer Installation Instructions and Details: Submit to DC Water for review.
- C. Manufacturer’s Qualifications: shall have at least five (5) years experience in the manufacture of geotextiles the type specified.

1.8 PRODUCT DELIVERY STORAGE AND HANDLING REQUIREMENTS:

- A. Label each roll of geotextile fabric with the manufacturer’s name, date of manufacture, batch number and name or product number.
- B. Wrap fabric in a heavy-duty protective covering to protect against moisture and ultraviolet light until it is ready for installation. Re-cover torn, ripped, or previously opened rolls with a waterproof and ultraviolet light cover.
- C. Protect the fabric from direct sunlight, ultraviolet rays, and temperatures greater than 140 degrees °F, mud, dirt, dust, and debris at all times during shipment and storage.
- D. Store fabric on clean, dry surfaces, free of foreign substances such as grease, oil, paint, epoxy, cement, or any other substances which would have a deleterious effect on the fabric.
- E. Elevate fabric a minimum of 12 inches above ground level when stored outside.
- F. Do not use hooks, tongs, or other sharp tools and instruments when handling fabric.
- G. Unload or handle fabric in one of the following ways:
 1. By placing slings under the rolls.
 2. By using a pole inserted through a hollow core, provided the pole extends one (1) foot minimum beyond each end of the core and lifting and handling devices are attached to only that portion of the pole located outside the ends of the core.

3. By hand.

PART 2. PRODUCTS

2.1 PERFORMANCE/DESIGN CRITERIA:

- A. The average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the MARV.

2.2 MATERIALS:

- A. Permanent Erosion Control, Separation, and Subsurface Drainage Geotextile properties shall be as stated in AASHTO M 288 for the appropriate application. Unless shown on Contract Drawings or specified elsewhere, the type and minimum classification shall be as follows:
 1. Permanent Erosion Control Geotextile:
 - a. Type: Woven, except slit film geotextiles are not allowed.
 - b. Class:
 - 1) Woven monofilament – Class 1.
 - 2) All other geotextiles – Class 2.
 - c. Percent In Situ Soil Passing 0.075 mm: 15 to 50.
 2. Separation Geotextile:
 - a. Type: Woven or Nonwoven.
 - b. Class: Class 1.
 3. Subsurface Drainage Geotextile:
 - a. Type: Nonwoven.
 - b. Class: Class 2.
 - c. Percent In Situ Soil Passing 0.075 mm: 15 to 50.
- B. Temporary Silt Fence Geotextile shall comply with the erosion and sediment control manual for the Jurisdictional Erosion and Sediment Control Agency (DC DOEE, MD EWMA, or VDEQ) for the location where the Work is performed.
- C. Metal Geotextile Pins:
 1. Diameter: 3/16 inch, minimum.
 2. Length: 18 inches, minimum.
 3. Shape: Pointed at one end with head on other end for retaining washer.
 4. Washer: Steel, with minimum outside diameter of 1-1/2 inches.
- D. Wire Staples: Eight (8) gage minimum.
- E. Seaming Thread: High strength polypropylene or polyester material that is resistant to ultraviolet radiation. Thread shall be of contracting color to match geotextile.

PART 3. EXECUTION

3.1 PREPARATION:

- A. Prepare the surface to receive fabric to a smooth condition free of sharp objects, obstructions, depressions, debris, and soft or low-density pockets of material.
- B. Prepare subgrade as specified in applicable sections and in accordance with the Contract Drawings.

3.2 INSTALLATION - GENERAL:

- A. Install geotextile fabric in accordance with manufacturer's printed instructions at locations required by the Contract Drawings and Specifications.
- B. Place geotextile fabric on the prepared foundation or subgrade prior to placing aggregate material.
- C. Joints:
 - 1. Unsewn: Overlap fabric 18 inches, minimum.
 - 2. Sewn: Overlap fabric six (6) inches, minimum.
- D. Prevent tearing and puncturing when placing geotextile fabric. Replace fabric with defects, rips, holes, flaws, deterioration, or damage of any nature.
- E. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.
- F. Along structural foundation perimeter, extend geotextile fabric and wrap around aggregate.

3.3 INSTALLATION: PERMANENT EROSION CONTROL GEOTEXTILE:

- A. Install in accordance with AASHTO M288 as amended by this Section.
- B. Insert securing pins with washers through both strips of overlapped fabric at intervals not greater than two (2) feet, along a line through the midpoint of the overlap.
- C. Install additional pins regardless of location to prevent any slippage of the geotextile fabric. Place the fabric so that the upslope strip of fabric will overlap the downslope strip. Push each securing pin through the fabric until the washer bears against the fabric and secures it firmly to the foundation.
- D. Test sewn seams in accordance with method ASTM D1683, using one (1) inch square jaws and 12-inches per minute constant rate of traverse. The strengths shall be not less than 90 percent of the required tensile strength of the un-aged fabric in any principal direction.

3.4 INSTALLATION (SEPARATION GEOTEXTILE):

- A. Install in accordance with AASHTO M288 as amended by this Section.

3.5 INSTALLATION (SUBSURFACE DRAINAGE GEOTEXTILE):

- A. Install in accordance with AASHTO M288 as amended by this Section.
- B. Wrap the aggregate surrounding perforated pipe, subsurface drains, pipe bedding and backfilling material or other pipeline drainage applications with geotextile fabric.
- C. Geotextile shall not be placed unless drain material or other material can be used to provide cover with the same working day.

3.6 INSTALLATION (TEMPORARY SILT FENCE GEOTEXTILE):

- A. Install in accordance with the erosion and control manual for the Jurisdiction over the location where the Work is performed at locations shown on the Contract Drawings and/or Standard Details.
- B. The geotextile at the bottom of the fence shall be buried as shown on the Standard Details.
- C. Geotextile shall be spliced together with a sewn seam only at a support post, or two sections of fence may be overlapped instead.
- D. Contractor shall inspect all temporary silt fences immediately after each rainfall and at least daily during prolonged rainfall. Contractor shall immediately correct any deficiencies.
- E. Damaged or otherwise ineffective silt fences shall be repaired or replaced promptly.

- F. Sediment deposits shall be removed when the deposit reaches half the height of the fence.
- G. Silt fence shall remain in place until DC Water directs that it be removed. Upon removal, Contractor shall remove and dispose of any excess sediment accumulations, dress the area to give it a pleasing appearance, and cover with vegetation all bare areas with contract requirements.

3.7 PROTECTION:

- A. Prohibit construction equipment and traffic from traveling directly on geotextile fabric.
- B. Protect the fabric at all times during installation from contamination by surface runoff.
- C. Protect the geotextile during installation from clogging, tears, and other damage. Provide ballast (e.g., sand bags) to prevent uplift by wind.
- D. Protect the geotextile at all times from ultraviolet (UV) rays, contamination by surface runoff and construction activities.
- E. When placed for construction, cover the geotextile with specified cover material as soon as possible. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured or shifted.
- F. Do not leave the geotextile uncovered for more than three (3) days after installation (excluding silt fence).
- G. Protection from Riprap: Protect the geotextile fabric from damage due to the placement of riprap or other materials by limiting the height of drop of the material and by placing a six (6) inch cushioning layer of screened gravel on top of the fabric before placing the riprap. Before placement of riprap, demonstrate to DC Water that the placement technique will prevent damage to the fabric.
- H. Place cover soil or sand in a manner that prevents soil or sand from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves.
- I. On side slopes, place soil or sand backfill on the geotextile from the bottom of the slope upward.
- J. Do not drop cover soil or sand onto the geotextile from a height greater than three (3) feet.
- K. Do not operate equipment directly on top of the geotextile. Use equipment with ground pressures less than seven (7) psi to place the first lift over the geotextile. Maintain a minimum of 18 inches of soil between construction equipment and the geotextile.
- L. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding five (5) mph.

3.8 REPAIR AND RESTORATION:

- A. Remove and replace fabric contaminated by surface runoff or other means with uncontaminated fabric. Repair any damage to the fabric during its installation or during placement of fill materials and aggregate.
- B. Patch tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of three (3) feet overlap.
- C. Repair damaged sections of fabric used in underdrain piping by cutting out the damaged section over the full width of the spiral section and stitching a new fabric section in place for a minimum length of three (3) feet.
- D. Replace all fabric that has become damaged from vehicular traffic, equipment, or repetitive operations.
- E. All repairs and restorations shall be at no additional cost to DC Water.

~END OF SECTION 31 05 19~

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SECTION 31 11 00

CLEARING, GRUBBING, AND STRIPPING

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of clearing, grubbing, and stripping the land within the construction limits and appurtenant designated work areas which are a part of the Work. The Contractor shall clear and grub the work area of all material including but not be limited to trees, bushes, building debris, brush piles, wood piles, bituminous and concrete debris and rubbish.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Divisions 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 40 10: Schedule of Prices.
 - 2. Section 00 89 00: Project Permits and Approvals.
 - 3. Section 31 13 12: Tree Protection and Trimming.
 - 4. Section 31 22 00: Earthwork.
 - 5. Section 31 25 00: Erosion and Sediment Control.

1.4 REFERENCED CODES AND STANDARDS:

- A. DC Water:
 - 1. Construction Safety & Health Manual for Contractors.

1.5 DEFINITIONS:

- A. Clearing: The removal of trees, stumps, brush, shrubs, limbs, other vegetation, rubbish, debris fences, signs, incidental structures, and deleterious material and all evidence of their presence from above the surface of the ground.
- B. Grubbing: The removal of all wood, stumps, trunks, root systems buried logs, bituminous, concrete, and other objectionable debris, and incidental structures, and deleterious material to a depth of 12 inches below the existing grade.
- C. Stripping: The Removal of all sod, topsoil, grass, grass roots and other organic material.
- D. Incidental Clearing, Grubbing, and Stripping: Clearing, grubbing, and stripping activities necessary to perform the Work required by the Contract Documents, whether shown on the Contract Drawings or not, and does not have a price specified in Section 00 40 10 – Schedule of Prices.
- E. Non-Incidental Clearing, Grubbing, and Stripping: Clearing, grubbing, and stripping activities necessary to perform the Work, are specifically designated on the Contract Drawings with the clearing, grubbing, and stripping areas defined, and has a price specified in Section 00 40 10 – Schedule of Prices.

1.6 QUALITY ASSURANCE:

- A. Visual inspection of the area being cleared, grubbed, and stripped to verify removal of all materials from above and below the ground surface as specified herein and shown on the Contract Drawings.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Locate, identify, and mark all utilities above and below the ground in accordance with DC Water's Construction Safety & Health Manual for Contractors prior to performing any clearing, grubbing, and stripping activities.
- B. For non-incident clearing, grubbing, and stripping, the Contractor shall employ a Land Surveyor registered in the jurisdiction where the project is located to survey the construction limits prior to commencing clearing, grubbing, and stripping operations.
- C. No clearing, grubbing, or stripping shall be started until the Contractor has marked the area to be cleared, grubbed, and stripped and the area has been approved by DC Water.
- D. The Contractor shall provide an Erosion and Sediment Control Plan as required by Section 31 25 00 – Erosion and Sediment Control and acquire the permits applicable to clearing, grubbing, and stripping as required in Section 00 89 00 – Project Permits and Approvals. All efforts and costs associated with the acquisition of permits necessary for clearing, grubbing, and stripping are incidental to the Contract.
- E. Prior to commencing clearing, grubbing and stripping activities, the Contractor shall walk the job with DC Water in-order to determine and mark the extent of clearing, grubbing, and stripping to determine what specific trees are to be preserved.
- F. Trees required to be protected and trimmed to perform clearing, grubbing, and stripping operations shall be in accordance to Section 31 13 12 – Tree Protection and Trimming.
- G. Install erosion and sediment control as required by the erosion and sediment control plan and permit.
- H. Unless material is to be reused on the Project, materials generated from clearing, grubbing, and stripping activities shall not be stockpiled, stored or salvaged on site but shall be transported and disposed of at a landfill licensed to handle the types of materials removed during the clearing, grubbing, and stripping activities.
- I. Protect property adjacent to the area being cleared, grubbed, and stripped from damage. Damage to areas outside the designated clearing, grubbing, and stripping area shall be restored in kind at no additional cost to DC Water.
- J. Route hauling equipment around or away from areas of soft or yielding subgrade.
- K. Burning of material cleared, grubbed, and stripped material is prohibited.

3.2 LIMITS OF WORK AREAS:

- A. DC Water will establish the limits of areas to be cleared, grubbed, and/or stripped, and identify objects and/or features that are designated to remain undisturbed.
- B. DC Water will designate fences, structures, debris, trees and brush to be cleared where grubbing is not required.

3.3 MARKINGS:

- A. The limits of the area(s) to be cleared and grubbed shall be marked by stakes, flags, tree markings or other suitable methods.
- B. No clearing, grubbing or stripping activities shall be performed until Miss Utility has marked the Work area.

3.4 CLEARING:

- A. Clear all Work areas to the limits shown on the Contract Drawings or as determined necessary by DC Water to enable the Work to be performed.
- B. Where trees or existing stumps are cleared and grubbing is not required, the tree trunk or existing stump shall be cut off not more than six (6) inches above the existing grade unless otherwise approved.

3.5 GRUBBING:

- A. Grub all Work areas to the limits shown on the Contract Drawings or as determined necessary by DC Water to enable the Work to be performed.
- B. All depressions made due to grubbing operations shall be backfilled with suitable material in accordance with Section 31 22 00 – Earthwork.
- C. Grubbing depth shall be minimum 12-inches except that areas to be excavated, areas receiving less than three (3) feet of fill, and areas upon which structures will be constructed shall be grubbed to a depth of not less than 18-inches below the subgrade surface.
- D. Fill all depressions made by grubbing activities with material suitable for backfill and topsoil as required for the Work to be performed.

3.6 STRIPPING:

- A. Perform stripping on areas shown on the Contract Drawings or as determined necessary by DC Water to enable the Work to be performed.
- B. Topsoil to be reused may be stockpiled at locations shown on the Contract Drawings or at a location on the project site that is approved by DC Water.
- C. Topsoil that is stockpiled for reuse shall be protected using erosion and sediment controls prescribed in the erosion and sediment control permit, the Contractor's erosion control plan, and as directed by DC Water.

3.7 DISPOSAL:

- A. Remove and dispose of all material from clearing, grubbing, and stripping activities in an offsite repository or as directed by DC Water.
- B. All materials shall be disposed of in accordance with state laws and regulations.
- C. Contractor shall comply with all local rules and regulations and be responsible for the payment of any, and all fees that may result from disposal at locations away from the project site.

~ END OF SECTION 31 11 00 ~

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SECTION 31 23 10

TRENCH EXCAVATION AND BACKFILL

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes excavation, shoring, supporting utilities and backfilling of open trenches for the construction of utility pipeline systems and utility service connections, including disposal of unsuitable and excess materials.

1.2 RELATED DOCUMENTS:

- A. Drawing, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Divisions 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 45 29: Testing Laboratory Services.
 - 3. Section 01 54 50: Construction Safety.
 - 4. Section 02 01 20: Protecting Existing Utilities.
 - 5. Section 31 05 19: Geotextiles.
 - 6. Section 31 13 12: Tree Protection and Trimming.
 - 7. Section 31 23 19: Dewatering – Groundwater.
 - 8. Section 31 23 23: Controlled Low-Strength Material (Flowable Fill).
 - 9. Section 31 23 32: Aggregate Materials.
 - 10. Section 31 25 00: Erosion and Sediment Control.
 - 11. Section 31 41 00: Shoring, Sheeting and Bracing.
 - 12. Section 33 01 20: Abandonment of Underground Utilities.
 - 13. Section 33 02 00: Boring and Jacking.
 - 14. Section 33 12 13: Water Service Lines.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T27: "Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates".
 - 2. AASHTO R58: "Standard Practice for Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test".
 - 3. AASHTO T88: "Standard Method of Test for Particle Size Analysis of Soils".
 - 4. AASHTO T89: "Standard Method of Test for Determining the Liquid Limit of Soils".

5. AASHTO T90: "Standard Method of Test for Determining the Plastic Limit and Plasticity Index of Soils".
 6. AASHTO T180: "Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10 Lb) Rammer and a 457-mm (18 in) Drop".
 7. AASHTO T191: "Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method".
 8. AASHTO T193: "Standard Method of Test for The California Bearing Ratio".
- B. ASTM International (ASTM):
1. ASTM C33: "Standard Specification for Concrete Aggregates".
 2. ASTM C131: "Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine".
 3. ASTM D75: "Standard Practice for Sampling Aggregates".
 4. ASTM D698: "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort".
 5. ASTM D1556: "Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method".
 6. ASTM D1557: "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort".
 7. ASTM D2487: "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)".
 8. ASTM D2940: "Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports".
 9. ASTM D3740: "Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction".
 10. ASTM D4318: "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils".
 11. ASTM D6938: "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)".
 12. ASTM E329: "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection".
- C. District of Columbia Department of Transportation (DDOT):
1. Standard Specifications for Highways and Structures.
 2. Urban Forestry Division (UFD).
- D. DC Water
1. Construction Safety & Health Manual for Contractors.
- E. Jurisdiction Department of Transportation (JDOT):
1. JDOT: Standard Specifications for Highways and Structures and/or Standard Details for the JDOT where the Work is performed.
- F. United States Federal Regulations:
1. 29 CFR 1926 – Safety and Health Regulations for Construction.

1.5 DEFINITIONS:

- A. Backfill Material:
1. Trench Backfill: Native or Borrow Material placed in trench excavation and

- meeting Specifications as stated herein.
2. Native Material: Suitable material used for Trench Backfill provided from the limits of trench excavation and meeting Specifications requirements as stated herein.
 3. Borrow Backfill Material: Suitable material used for Trench Backfill provided from locations outside limits of trench excavation and meeting Specifications requirements as stated herein.
- B. Trench Foundation: The material on the bottom of the trench on which the pipe bedding is placed and provides structural support for the pipeline. Also referred to as subgrade.
- C. Trench Zones:
1. Embedment Zone: Area surrounding pipe in trench, consisting of:
 - a. Bedding Zone: Area from the pipe bottom to firm trench foundation, extending full width of the trench and providing pipe support.
 - b. Haunching Zone: Area from pipe bottom up to the spring-line and extending full width of the trench.
 - c. Encasement Zone: For Flexible pipe, the Encasement Zone is the area from the top of the Haunching Zone to the minimum required depth of cover as shown on the drawings or standard details.
 - d. Initial Backfill Zone:
 - 1) Rigid Pipe: Area from top of the Haunching Zone to 12-inches above the top of the pipe and extending to full width of trench.
 - 2) Flexible Pipe: Area from the top of the Encasement Zone to 12-inches above the top of the pipe and extending to full width of the trench.
 2. Trench Backfill Zone: Area from top of the Pipe Embedment Zone to the bottom of the sub-base and extending full width of the trench.
- D. Pipe Bedding: The material placed on top of the trench foundation that provides a uniform support for the barrel of the pipe.
- E. Trench Undercut Excavation: Excavation below trench foundation to remove unsuitable material when DC Water determines that the material is unsuitable for supporting the pipe.

1.6 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Certifications” for each of the materials specified herein, that are used on the project, with the manufacturer’s Certificate of Compliance stating “Trench Backfill” materials meet or exceed the specified requirements.
- C. Submit a proposed list of sources of all material to be used on the Project. Sources shall be approved by the jurisdiction DOT where the project is being performed and shall include a copy of their certification of each source.
 1. If a change in source of materials is made during construction, submit a new certification from the new source prior to the material being delivered to the job site.
- D. Submit “Plans” for Trenching and Excavation.
- E. Submit the “Product Data Sheets” for each product used.
- F. Submit the “Test Results” of each product used.
- G. Submit the “Field Inspection Data” of each product used.
- H. Submit “Samples” to testing lab for each material used.

- I. Compaction Equipment List: Submit a list of all equipment to be utilized for compacting, including the equipment manufacturer's lift thickness limitation.

1.7 QUALITY ASSURANCE:

- A. Testing Agency Qualification:
 - 1. An independent testing agency qualified according to ASTM E329 and ASTM D3740 to conduct soil materials and rock-definition testing.
 - 2. Testing Lab shall be AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL) certified.
 - 3. The Testing Laboratory shall be acceptable to DC Water and will be responsible for conducting and interpreting tests.
 - 4. The Testing Laboratory shall state in each report whether or not the test specimen(s) conform to all requirements of the Contract Documents and specifically note any deviation.
- B. Testing services shall be performed in accordance with Section 01 45 29 – Testing Laboratory Services.

1.8 PLANS:

- A. Develop and submit an excavation and trenching plan that, at a minimum, complies with DC Water's Construction Safety & Health Manual for Contractors.

1.9 SAFETY PRECAUTIONS:

- A. Observe safety precautions in all phases of the work including but not limited to trench shoring, bracing, lighting, and barricades in accordance with Section 01 54 50 – Construction Safety, 29 CFR 1926, and the Jurisdiction in which the Work is performed.

1.10 OBSTRUCTIONS:

- A. Obstructions to the construction of the trench such as but not limited to stumps, abandoned piling, abandoned structures, logs, rubbish, and debris of all types, excluding rock and existing steel sheeting left in place, shall be removed and disposed of by the Contractor at no additional cost to DC Water.
- B. The Contractor shall protect and preserve all pipe and other underground improvements that are shown on the Contract Drawings and/or marked in the field.
 - 1. Expose such improvements in advance of the pipeline construction to allow for changes in the alignment as necessary.
 - 2. Notify DC Water immediately if alignment changes are required due to existing improvements.
 - 3. Underground improvements shown or marked and that are disturbed or damaged by the Contractor during the execution of the Work shall be repaired immediately in conformance with best practice and approval of the Owner of the damaged underground improvement and DC Water. Repairs and associated cost shall be performed at no additional cost to the Contract Price or additional time to the Contract Time.
 - 4. The Owner of the Underground Improvement will determine if the Contractor can make the repair and/or replacement or if the Owner's designee will perform the work.
 - 5. Underground Improvements shall not be removed from service (temporarily or permanently) unless specifically required or approved by DC Water.
- C. When underground improvements are not shown or marked and are disturbed or damaged during performance of the Work, the Contractor shall take whatever steps are necessary for safety, immediately notify DC Water, the Utility Owner, and Miss Utility of the

underground improvement, and avoid any actions which might further damage the improvement.

PART 2. PRODUCTS

2.1 UNSUITABLE MATERIALS:

- A. Unsuitable soil materials for trench excavation and backfill are the following:
 - 1. Materials that are classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D 2487.
 - 2. Materials that cannot be compacted to required density due to gradation, plasticity or moisture content.
 - 3. Materials that contain large clods, aggregates, stone greater than four (4)-inches in any dimension, man-made substances, debris, vegetation, waste or any other deleterious materials.
 - 4. Crushed concrete and crushed brick shall not be used unless allowed by the JDOT for the location where the Work is performed and it shall not be placed within 12-inches of any metallic materials.
 - 5. Materials that are contaminated with hydrocarbons or other chemical contaminants.

2.2 TRENCH FOUNDATION MATERIAL:

- A. The trench foundation shall be undisturbed native material..

2.3 EMBEDMENT ZONE MATERIALS:

- A. Embedment zone material shall consist of one (1) of the following material options:
 - 1. Embedment Zone Option 1:
 - a. Bedding Zone, Haunching Zone, Encasement Zone, and Initial Backfill Zone materials shall be Trench Backfill in accordance to Section 31 23 32 – Aggregate Materials.
 - 2. Embedment Zone Option 2:
 - a. Bedding Zone, Haunching Zone, and Encasement Zone materials shall be No. 57 Crushed Stone in accordance with Section 31 23 32 – Aggregate Materials, wrapped in a geotextile fabric.
 - b. Initial Backfill Zone material shall be Trench Backfill in accordance with Section 31 23 32 – Aggregate Materials.
 - 3. Embedment Zone Option 3:
 - a. Bedding Zone material shall be Trench Backfill in accordance with Section 31 23 32 – Aggregate Materials.
 - b. Haunching Zone and Encasement Zone material shall be General Purpose Backfill CLSM in accordance with Section 31 23 23 – Controlled Low-Strength Material (Flowable Fill).
 - c. Initial Backfill Zone shall be General Purpose Backfill CLSM in accordance with Section 31 23 23 – Controlled Low-Strength Material (Flowable Fill) or Trench Backfill in accordance with Section 31 23 32 – Aggregate Materials.
- B. Use Embedment Zone Options 2 and 3 only when directed or approved by DC Water.

2.4 TRENCH BACKFILL ZONE MATERIALS:

- A. Trench Backfill materials, native or borrowed, shall be in accordance to Section 31 23 32

– Aggregate Materials.

2.5 GRADED AGGREGATE BASE:

- A. Graded Aggregate base shall be in accordance to Section 31 23 32 – Aggregate Materials.

2.6 TRENCH UNDERCUT BACKFILL MATERIALS:

- A. Trench undercut backfill material shall be No. 57 crushed stone per Section 31 23 32 – Aggregate Materials, wrapped in a geotextile fabric.

2.7 GEOTEXTILE FABRIC:

- A. Geotextile fabric shall be as specified in Section 31 05 19 – Geotextiles.

2.8 DETECTABLE WARNING TAPE:

- A. Detectable warning tape shall be six (6) inches wide, composed of polyethylene and an integral metallic wire, a description of the utility buried below it, and color as specified below:
1. Use blue detectable warning tape for water mainline.
 2. Use green detectable warning tape for gravity sewer mainline, gravity sewer service connections, and pressure sewer piping.

PART 3. EXECUTION

3.1 GENERAL:

- A. All trench work performed in properties owned by a Department of Transportation shall be performed in accordance with the JDOT for the location where the Work is performed.
- B. Protect existing utilities in conformance with Section 02 01 20 - Protecting Existing Utilities.
- C. Surface materials of whatever nature shall be removed, including pavement, base, curb and gutter, sidewalk, and topsoil within trench limits. The Contractor shall properly separate and store materials that will be reinstalled.
- D. Blasting is prohibited.
- E. All work performed near trees shall be done in accordance with JDOT for the location where the Work is performed. If the JDOT does not have requirements, the DDOT UFD requirements and Contractor shall be responsible for all permits and associated fees. For additional information, refer to Section 31 13 12 – Tree Protection and Trimming.
- F. The Contractor shall adequately support underground pipes or conduits exposed as a result of excavations; adequate support shall be provided along their entire exposed length by using timber or steel in such manner that backfilling may be performed without dislodging such pipes or conduits. No additional payment will be made for supporting materials left-in place, nor for installing and maintaining supports.
- G. With prior approval from DC Water, portions of trenches may be excavated as a tunnel at the Contract unit price for Trench Excavation and Backfill measured as if performed as an open cut excavation. All tunneling will be performed in accordance with Section 33 02 00 – Boring and Jacking.
- H. Maintenance of traffic shall be in accordance with the Contractors approved Traffic Control Plan. Unless otherwise approved by DC Water and the JDOT for the location where the Work is performed. All streets and roadways shall be kept open to at least one-way traffic.
- I. Provide ingress and egress to buildings and property at all times.
- J. Do not place or store excavated material on private property without a written agreement

signed by the property Owner. Contractor shall provide DC Water with a copy of the agreement prior to placing excavated material on private property.

- K. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes and other utility controls.
- L. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, driveways, gutters, storm drains, etc.
- M. The Contractor's erosion and sediment control plan submitted under Section 31 25 00 – Erosion and Sediment Control shall address the methods of erosion and sediment control protection for trench work including but not limited to excavation, backfill, and stockpiling of soils.

3.2 TRENCH EXCAVATION:

- A. Excavate to the bottom of the trench per the lines and grades shown on the Contract Drawings with proper allowance for pipe thickness and for bedding.
- B. Trench excavation shall include removal of all materials and objects of whatever nature encountered in excavation, excluding rock and existing steel sheeting left in place.
- C. Materials encountered during trench excavation shall be considered rock if one of the following conditions exist:
 - 1. Boulders measuring 1/3 of a cubic yard or more in volume and which cannot be broken using equipment with an operating weight of at least 60,000 pounds and a bucket force of at least 40,000 pounds.
 - 2. Rock material in ledges, bedding deposits, and un-stratified masses that cannot be removed using equipment with an operating weight of at least 60,000 pounds and a bucket force of at least 40,000 pounds;
 - 3. Conglomerate deposits that are firmly cemented and poses the characteristics of solid rock and cannot be removed using equipment with an operating weight of at least 60,000 pounds and a bucket force of at least 40,000 pounds.
 - 4. Steel sheeting encountered during trench excavation.
- D. Trench excavation shall be coordinated with other utility work and scheduled to meet maintenance of traffic provisions. Utility service connections and appurtenances to individual premises may not be shown in the Contract documents and the Contractor shall determine the exact location of the connections and protect these services.
- E. When trenching through lawn, park or other tillable areas, sod and topsoil may be removed with care and salvaged if suitable for reuse in restoring disturbed surfaces. Salvaged material shall be considered incidental and the cost shall be included in the payment for the item of which it is a part of in the SOPs.
- F. When approaching existing underground construction which may be in proximity to work under this Contract, the trench shall be opened a sufficient distance ahead of the work, test pits made, or other approved exploratory methods employed to allow for authorized changes in line and grade. Changes in line and grade plus excavation and pipe removal caused by failure to take such precautions shall be made at no additional cost to DC Water.
- G. Trench excavation shall be completed at least 25 feet in advance of pipe laying at end of a work day or at the discontinuance of work, the pipe laying shall be completed to within five (5) feet of the end of the open trench. Open trench at the end of the day shall not exceed 50 feet or as allowed by JDOT permit.
- H. When work requires excavation to an elevation below or to a width wider than trench width required for a proposed pipe utility, proper backfill and its compaction shall be first completed to a point at least one (1) foot above outside top of proposed utility; utility trench in the backfill may then be excavated. Pipe utilities shall not be placed in such backfill as the fill is brought to utility subgrade.
- I. Trench foundation shall be excavated approximately flat and square with trench walls

protected and maintained free from water. If not maintained, extra excavation and disposal, furnishing and placing undercut gravel to trench grade elevation, and dewatering to remove water shall be performed at no additional cost to DC Water.

- J. All trench excavation material suitable for backfill shall be stockpiled, protected, and maintained either on-site within the limits of construction if space is available or at an off-site location, acceptable to DC Water.
 - 1. Excavated materials shall be neither deposited nor stockpiled so as to endanger in any manner the project, new or existing structures or utilities, nor interfere with project construction sequence and work by others.
 - 2. If excavated material is to be reused it shall be kept free from debris and covered by tarp(s), if necessary, to prevent excessive drying and/or saturation.
- K. Unauthorized Excavation: Where excavation are made below indicated elevations under slabs, footings, pipes, structures, or outside maximum trench pay widths, restore to authorized excavation limits with materials specified herein and approved by DC Water at no additional cost to DC Water.
- L. Keep the ground surface within three (3) feet of both sides of the excavation free of excavated material.

3.3 TRENCH FOUNDATION STABILIZATION:

- A. The trench foundation shall be native material in all areas except where ground water or other conditions exist, and in the opinion of DC Water, the native material will not support the pipe.
- B. If material found at the trench foundation is unsuitable for structural support of the pipe, the Contractor shall notify DC Water immediately. The unsuitable material shall be removed by the Contractor to the depth and width directed by DC Water. If directed by DC Water, the Contractor shall place separation geotextile fabric in the trench bottom and backfill with material as approved by DC Water.
- C. If native soil is unacceptable for foundation material, the trench shall be over excavated until acceptable material is reached or a depth of three (3) feet, whichever is less.

3.4 TRENCH SHORING, SHEETING AND BRACING:

- A. Trench shoring, sheeting and bracing shall be in accordance to Section 31 41 00 – Shoring, Sheeting and Bracing.

3.5 TRENCH WIDTH:

- A. Trench width shall be as shown on the pertinent Standard Details or Contract Drawings.
 - 1. If the value of W_s or W_u is exceeded below a horizontal plane 1'-0" above top of pipe, the Contractor shall submit to DC Water pipe design reevaluation computations certified by a professional engineer licensed in the jurisdiction where the work is being performed to assure that the allowable load on the pipe will not be exceeded.
 - 2. Computations shall reflect any additional work required such as concrete bedding, concrete encasement of pipe, higher class of pipe or any other proposed work to solve the problem.
 - 3. The Contractor shall perform all necessary work due to excavating trenches wider than shown in the Contract Documents at no additional cost to DC Water.
- B. At the Contractor's option, actual trench width more than one foot above the top of the pipe may exceed the trench pay width if site conditions permit and the proposed width is acceptable to DC Water.
 - 1. No additional payment will be allowed for additional excavation, backfill, temporary paving, permanent paving, restoration of landscaping, or support of

underground pipes or conduits, and other impacted underground improvements which may be required as a result of the Contractor exceeding trench pay widths.

2. Should the Contractor elect this option, notify DC Water prior to performing work so that an estimate of the cost of permanent paving beyond the boundaries of the pay limits can be made. DC Water will withhold money from payments made to the Contractor to cover temporary and permanent paving repairs required due to excavating beyond the trench pay widths.

3.6 ABANDONMENT OF UTILITIES:

- A. Work includes removal of utilities to be abandoned within limits of trench excavation or infringing on trench limits.
- B. Requirements for abandoning utilities shall be in accordance to Section 33 01 20 – Abandonment of Underground Utilities.

3.7 DEWATERING:

- A. Dewatering shall conform to the requirements as stated in Section 31 23 19 – Dewatering–Groundwater.
- B. The Contractor shall assume responsibility for site surface and subsurface drainage and shall maintain such drainage in an acceptable manner during the life of the Contract.
- C. Intercept and divert surface drainage away from excavation.
- D. Keep excavation dry and free of water. Dispose of precipitation and groundwater clear of the work area.
- E. Prevent trench water from entering pipelines under construction.
- F. The costs for dewatering and drainage, including pumping and well points, when needed, shall be included as part of trench excavation.

3.8 TEMPORARY PLATING OVER TRENCHES:

- A. Cover all excavations where work is not actively being performed in or around the excavation.
- B. Plating shall be as required by the steel plate permit issued by the JDOT. If excavation is not in an area required to be permitted, install steel plating of the same standard required by the JDOT wherever vehicular or pedestrian traffic is possible. Cover excavations outside of vehicular or pedestrian traffic areas with minimum 3/4-inch plywood and secured in a manner that prevents movement
- C. Contractor shall inspect and adjust plating over trenches during non-work hours, weekends, and holidays in addition to working hours.
- D. Contractor shall obtain all steel plate permits, install all steel plate warning signs, and pay for all fees associated with plating.
- E. Installation of steel plates in traffic areas shall be in accordance with the JDOT for the location where the work is performed. If the JDOT does not have requirements for the installation of steel plates, the specifications and drawings specified by DDOT shall be followed.
- F. Notify DC Water in writing 48 hours in advance of placing plates.

3.9 TRENCH BACKFILL:

- A. General:
 1. Backfill material zones shall be as shown on the Standard Details.
 2. Backfill shall be free from snow, ice, frozen materials and any other foreign matter. Any fill placed on frozen trench soils shall be removed at no additional cost to DC Water.

3. When pipes, connections and bedding are complete and approved, trenches shall be backfilled using excavated materials meeting backfill requirements and as shown on pertinent Standard Details and/or Contract Drawings.
 4. Trench backfill material shall be stockpiled outside the trench near the project excavation and not end-dumped directly into the trench.
 5. Remove and replace any trenching and backfilling material which does not meet the specification requirements, shall be at the Contractor's expense.
 6. Soils shall be classified per ASTM D2487.
 7. Backfilling activities shall not displace grade and alignment of the pipeline and its appurtenances. If displacement or alignment of the pipeline occurs, Contractor shall re-grade and realign the pipeline by removing and re-compacting material at no additional cost to DC Water.
 8. Backfill in the embedment zone shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe such that when compacted the pipe zone backfill will provide uniform bearing and side support.
 9. All material displaced by slides, settlement, and trench cave-in shall be removed and replaced with specified soils at no additional cost to DC Water.
 10. DC Water reserves the right to limit the amount of pipe laid in advance of backfilling, but in no case shall these amounts exceed 100 feet for sewer work and 50 feet for water main work.
 11. DC Water may require trench backfilling over completed pipelines if traffic conditions warrant such action. Extra compensation will not be allowed for such trench backfilling.
- B. Backfill Using Trench Backfill Material:
1. Place backfill in uniform horizontal lifts with thickness not to exceed eight (8) inches loose depth for full trench width. Determine actual depth based on the compaction equipment and its capacity to achieve the densities specified. If densities are not achieved, reduce lift thickness as necessary to achieve required density.
- C. Backfill Using No. 57 Stone:
1. Prior to placing No. 57 Stone, install a separation geotextile in the trench around the No. 57 stone in accordance with Section 31 05 19 – Geotextiles.
 2. Install groundwater cutoff walls every 400 feet unless shown otherwise on the Contract Drawings. Groundwater cutoff walls shall consist of Trench Backfill material or General Purpose Backfill CLSM and be minimum four (4) feet wide at the top, have a one (1) to one (1) slope, and be full width of Trench unless shown otherwise on the Contract Drawings.
 3. Install backfill in lifts not to exceed eight (8) inches except in the Haunching zone.
 4. Maximum lift depth in the Haunching Zone shall be eight (8) inches or ½ the pipe diameter, whichever is less.
- D. Backfill Using CLSM:
1. Prevent pipe from floating when backfilling using CLSM by anchoring, weighting, or other means. If pipe floats, CLSM shall be removed and pipe restored to proper elevation at no additional cost to DC Water.
 2. Cure CLSM for a minimum of 24 hours before backfilling with Trench Backfill material.
- E. Compaction:
1. Compaction around and over pipelines to a depth of two (2) feet above the pipe shall be performed using light, hand-operated compactors and rollers that do not

damage pipe.

2. Continue compaction efforts until acceptable passing tests are received.
3. Compactible Material: Density requirements for compactible material shall be as follows:
 - a. Each lift shall be compacted to density requirements herein before next lift is placed.
 - b. If the in-place density sample contains material larger than 3/4-inch, the field density shall be adjusted for the material retained on the 3/4-inch sieve before direct comparison with the Standard Density.
 - c. Passing Test: An average of three (3) test results meeting the minimum density requirements shall not be less than three (3) percent of the optimum moisture content unless otherwise specified and approved by DC Water.
 - d. The use of "Hydra-Hammer" for compacting backfill in trenches is not permitted.
 - e. Puddling and jetting is not permitted.
4. No. 57 Stone: Vibrate each lift of No. 57 Stone using flat plate vibrators or other approved vibratory compaction devices to achieve optimum orientation, stone is locked in position, and movement in the stone being vibrated is no longer visible.

Density							
Zone	Material	Laboratory Test Method		In Place Test Method		Location	In Place Density
		ASTM	AASHTO	ASTM	AASHTO		
Sub-Base	Graded Aggregate Base	D1557	T180 Method D	D1556 D6938	T191 T310	Curb, gutter, sidewalk, driveway, ally entrances, PCC pavement, and sidewalk	93
							95
						Bituminous concrete pavement	100
Trench Backfill	Trench Backfill	D1557	T180 Method D	D1556 D6938	T191 T310	Up to 6" below subgrade in Curb, gutter, sidewalk, driveway, ally entrances, and PCC pavement	93
						6" layer below subgrade in Curb, gutter, sidewalk, driveway, ally entrances, and PCC pavement	95
						Vegetation	85
						Other areas	90
Initial Backfill	Trench Backfill	D1557	T180 Method D	D1556 D6938	T191 T310	All	90
	CLSM	NA	NA	NA	NA	All	NA

Density							
Zone	Material	Laboratory Test Method		In Place Test Method		Location	In Place Density
		ASTM	AASHTO	ASTM	AASHTO		
Encasement	No. 57 Stone	NA	NA	Visual	Visual	All	No Movement
	Trench Backfill	D1557	T180 Method D	D1556 D6938	T191 T310	All	90
	CLSM	NA	NA	NA	NA	All	NA
Haunching	No. 57 Stone	NA	NA	Visual	Visual	All	No Movement
	Trench Backfill	D1557	T180 Method D	D1556 D6938	T191 T310	All	90
	CLSM	NA	NA	NA	NA	All	NA
Bedding	No. 57 Stone	NA	NA	Visual	Visual	All	No Movement
	Trench Backfill	D1557	T180 Method D	D1556 D6938	T191 T310	All	90
Trench Foundation	Native	D1557	T180 Method D	D1556 D6938	T191 T310	Disturbed Foundation	90
Trench Undercut	No. 57 Stone	NA	NA	Visual	Visual	All	No Movement

3.10 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS:

- A. The Contractor shall remove and dispose of all excess and unsuitable materials at no additional cost to DC Water.
- B. All unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state and local laws and regulations.
- C. All excess and unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust. The Contractor shall use sealed trucks or containers when hauling wet materials.
- D. The Contractor shall obtain written permission from owner or operator of disposal areas before disposing of excess and unsuitable materials.
- E. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to DC Water and/or the Owner(s) of the disposal site(s).

3.11 TRENCH UNDERCUT EXCAVATION AND BACKFILL:

- A. When material at trench foundation grade is unsuitable, trench foundation shall be undercut to depth, length and width as directed by DC Water. Work includes any required additional shoring and disposal of excavated material.
- B. Install Stabilization Geotextile prior to placing backfill. Geotextile shall fully enclose undercut material except that if Embedment Zone Option 2 is used, the geotextile shall fully be extended upward to enclose the Embedment Zone as shown on the Contract Drawings.
- C. Undercut volume shall be backfilled with trench undercut backfill material and compacted accordingly.

3.12 BORROW TRENCH BACKFILL:

- A. When trench excavation soils fail to meet requirements and when the quantity of approved trench excavation soils is insufficient, borrow trench backfill shall be used. Borrow trench backfill material shall be used only when approved by DC Water.
- B. Delivery tickets for each load of borrow material shipped to the project site shall have an inspection certification affixed at the source by the inspector. Any material delivered which has not been inspected prior to delivery may be rejected. The Contractor shall give prior notification of at least 12 hours as to source and quantity to be shipped, but acceptance of the material from any location shall not be construed as approval of the entire location, but only insofar as the material continues to meet specifications.
- C. Material may be rejected on visual examination pending tests of representative samples.
- D. Work includes Borrow Soils Base to the same depth as, and to replace, soils base removed during trench excavation.
- E. Borrow trench backfill shall not contain any unsuitable materials.

3.13 DETECTABLE WARNING TAPE:

- A. Place tape directly over centerline of pipe for the full length with a minimal number of splices at 24 inches below finished grade.
- B. Overlap tape a minimum 12 inches at splices and intersections.

3.14 SAMPLING AND TESTS:

- A. Samples of excavated material shall be representative of the soil encountered during excavation. Soils shall be free from snow, ice, frozen materials, organic matter and foreign matter.
- B. The Contractor shall also submit a sample of backfill material from all suppliers which the Contractor purposes to supply backfill material during the Contract.
- C. The Contractor shall at no additional cost to DC Water, have a testing laboratory which is approved by DC Water, take samples per ASTM D75 prepare each sample per AASHTO R58, perform sieve analysis per AASHTO T27 and T88, determine percentage of wear per ASTM C131, determine the liquid limit per AASHTO T89, determine the plasticity index per AASHTO T90, provide a modified proctor test per AASHTO T180/D per each backfill material used.
- D. The number of laboratory tests for backfill materials shall be as required by the JDOT for the location where the Work is performed but shall not be less than one (1) set of laboratory tests for each type of material or change of material properties regardless of whether the material is excavated or borrowed.
- E. Field density tests shall be performed for every lift at the following locations:
 - 1. Each end of each trench and a minimum of every 100 linear feet or fraction thereof, to include service line trenches.
 - 2. The location of each structure including but not limited to manholes and valve boxes.
- F. Contractor shall re-excavate and re-compact failed test areas.
- G. The Contractor shall have the testing laboratory provide copies of the reports to DC Water within seven (7) calendar days of when the samples were taken. The Contractor shall not install permanent fill using material which has not been approved by DC Water.

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SECTION 31 23 19

DEWATERING-GROUNDWATER

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of all necessary provisions for designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of observation wells; and instrumentation for control of the system.
- B. Dewatering includes lowering the water table and intersecting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; and preventing rupture or heaving of the bottom of an excavation.
- C. Instrumentation for control of the dewatering system includes furnishing, installing and operating piezometers as well as reading and logging of water levels in the observation wells.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 25 00: Erosion and Sediment Control.

1.4 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit design "Calculations" proving adequacy of system and selected equipment.
- C. Submit a Dewatering "Plan" as required by this Section.
- D. Submit "Working Drawings" of the dewatering system.
- E. Submit "Records" of the dewatering system operation.

1.5 QUALITY ASSURANCE:

- A. DC Water will periodically perform visual inspections of the dewatering system and the excavation zones being dewatered to verify the Contractor is following the dewatering plan.
- B. DC Water may request samples of the water being discharged from the dewatering system to verify the water quality meets that proposed by the Contractor in the dewatering plan.
- C. Dewatering system failing to meet the quality control and assurance requirements of this Section shall immediately be brought into compliance.

1.6 PLANS:

- A. Contractor shall develop a dewatering plan including drawings and data showing the method to be employed in dewatering the excavated area. The plan shall include but not be limited to:
1. Detailed description of dewatering methods and maintenance method to be employed to convey the water from site to disposal.
 2. Location, types, and depths of dewatering system and monitors.
 3. The type of dewatering system, including relief of hydrostatic head and maintenance of the excavation in a dewatered and in a hydrostatically relieved condition.
 4. Location and size of berms, dikes, observation wells, sumps, headers, and discharge lines, including their relation to water disposal ditches.
 5. Types and sizes of filters.
 6. Type of filtration and chemical treatment of contaminated water, as applicable, and the method of water quality monitoring.
 7. Capacities of pumps and standby units.
 8. Emergency Power source.
 9. Erosion Control measures.

1.7 PRE-INSTALLATION CONFERENCE:

- A. The Contractor shall hold Pre-Installation Conference at the Project Site to review and discuss the dewatering plan, methods, and procedures. The review shall include but not be limited to:
1. Geotechnical Report.
 2. Inspection and discussion of condition of site to be dewatered.
 3. Coordination with temporary erosion control measures.
 4. Proposed site clearing and excavation.
 5. Existing utilities.
 6. Subsurface conditions.
 7. Coordination for interruption, shutoff, capping and continuation of utility services.
 8. Construction schedule.
 9. Verify availability of installer's personnel, equipment and facilities necessary to make progress and avoid delays.
 10. Testing and monitoring of dewatering system.
 11. Settlement monitoring.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. The requirements of this Section are minimal requirements for designing, installing, and operating the groundwater removal system.

- B. The Contractor shall be solely responsible to identify groundwater conditions, design, install, operate, monitor and remove the dewatering system, including, but not limited to, providing any and all labor, material, equipment, techniques and methods to lower, control and handle the groundwater as necessary for the construction methods and to monitor the effectiveness of the installed system and its effect on adjacent facilities.
- C. The Contractor shall be solely responsible for the dewatering system and for all loss or damage resulting from partial or complete failure of protection measures and any settlement or resultant damage caused by dewatering activities.
- D. Modify dewatering procedures, which cause, or threaten to cause, damage to new or existing facilities. The Contractor shall determine the modifications required to prevent damage or further damage and make the necessary changes at no additional expense to the DC Water.
- E. Immediately repair damages to adjacent facilities caused by dewatering operations at no additional costs to DC Water. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of subgrade soils.
- F. Locate standby equipment on site, installed, and ready for immediate operation to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.
- G. Contractor shall control surface and subsurface water so that:
 - 1. Surface water drains away from excavation, is prevented from entering the excavation, and excavations are dry before work is undertaken.
 - 2. Flooding of excavation or damage to structures does not occur.
 - 3. Erosion of the excavation area is prevented.
 - 4. Stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.

3.2 DESIGN:

- A. The Contractor shall design a dewatering system using accepted and professional methods of design and engineering consistent with the best modern practice. Calculations shall be sealed by a Professional Engineer who is licensed in the jurisdiction of the project location.
- B. Dewatering methods may include sump pumping, single or multiple stage well point systems, ejector type systems, deep wells, and combinations thereof.
- C. Locate dewatering facilities within the limits of construction and where they will not interfere with utilities, construction work performed by Other(s), or public access.
- D. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation below the excavation depth in a reasonably dry condition.
- E. Design shall include erosion and sediment control systems and procedures. Include these systems and procedures in the erosion and sedimentation control plan submitted under Section 31 25 00 - Erosion and Sediment Control.

3.3 CONTRACTOR'S QUALITY CONTROL:

- A. The Contractor's dewatering system shall:
 - 1. Effectively reduce the hydrostatic pressure and lower the groundwater levels below excavation.
 - 2. Develop a dry and stable subgrade for the prosecution of the Work.
 - 3. Prevent damage to adjacent properties, buildings, structures, utilities and other work in the vicinity.

4. Assure that no soil particles will be present in the discharge after initial pumping.
- B. Contractor shall observe, document, and submit the following records to DC Water during the period that the dewatering system is in operation. Observations shall be made daily. After dewatering operations have stabilized, DC Water may allow the interval between observations to increase.
 1. The average flow rate and time of operation of each pump used in the dewatering system using appropriate devices, such as flow meters.
 2. The elevation of the water level in each observation well daily until the wells are removed.
 3. Sound the depth to the bottom of each piezometer and observation well on a monthly basis to assure that fine soil particles are not penetrating the screen to build up in the standpipe. Submit observation records within 24 hours of reading.
 4. Log of the soils encountered while drilling the observation wells.

3.4 DEWATERING OPERATIONS:

- A. Place the dewatering system into operation prior to excavating below the ground water table. Operate and monitor the system continuously 24 hours a day, seven (7) days a week until utilities and structures have been constructed and backfill work is complete or other buoyance conditions specified herein have been satisfied.
- B. Provide, install, operate, and maintain all ditches, basins, sumps, culverts, site grading, and pumping facilities to divert, collect, and remove all water from the work area(s).
- C. Install and operate dewatering system in accordance with the working drawings. Advise DC Water of all changes made to the approved design to accommodate field conditions and, upon completion of the dewatering system installation; revise and resubmit "as-built" working drawings.
- D. Maintain the water level two (2) feet or lower below the utility, facility, or structure subgrade, as required, to prevent damage to the utility, facility, or structure.
- E. If included in the system designed by the Professional Engineer and approved by DC Water, dewatering may be reduced for units designed to withstand uplift pressure provided that the water level is maintained a minimum of five (5) feet below the prevailing level of backfill as it is being placed and provided such water level does not result in uplift pressures in excess of 80 percent of the downward pressure produced by the weight of the structure and backfill in place.
- F. Dewatering activities and disposal of groundwater shall be performed in a manner that protects public health, property, and portions of work under construction or completed.
- G. Remove dewatering system from project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 60 inches below overlying construction.
- H. Provide controls to prevent stormwater runoff from entering work areas being dewatered.

3.5 OBSERVATION WELLS:

- A. Install a sufficient number of monitoring wells, but not less than that shown on the working drawings developed by the Contractor's design Professional Engineer, to confirm the following:
 1. The dewatering system is performing as intended and is achieving the specified reduction in groundwater levels.
 2. Construction site groundwater levels inside and outside dewatered excavations to determine the acceptability of removing the dewatering system from operation.
- B. Install observation wells of the types and locations shown on the working drawings to the depths required to effectively monitor the groundwater.

- C. Case observation wells with temporary casing. Use water as the drilling fluid and log the soils encountered during drilling.
- D. Flush all cased holes with clean water through an approved bit. Flush until the discharge water is free of soil particles.
- E. Maintain observation wells in a fully functioning condition.
- F. Replace damaged or destroyed observation wells within 48 hours, unless otherwise approved by the DC Water, at no additional cost to DC Water.
- G. Expose and cut off observation wells within the excavation area as excavation proceeds, but continue to maintain them as specified.
- H. Removal of Observation Wells:
 - 1. Remove observation wells only when authorized by DC Water.
 - 2. Remove observation wells outside the excavation area to an elevation five feet below finished grade. Backfill voids and restore the surface to a condition consistent with or better than that which existed prior to installation.
 - 3. Remove observation wells inside the excavation area to the subgrade and seal the hole with grout.

3.6 DISPOSAL OF WATER

- A. Groundwater disposal shall comply with approved permits.
- B. Groundwater shall be disposed of sediment free and remove sediment in a manner that avoids inconvenience to others and complies with project Erosion and Sediment Control plan submitted under in Section 31 25 00 – Erosion and Sediment Control.
- C. When groundwater is diverted into a storm drain, provide settling basins or other approved apparatus as required to reduce the amount of fine particles, which may be, carried into the drain. If a storm drain becomes blocked or its capacity restricted due to dewatering operations, make arrangements with the jurisdictional agency and clean the drain at no additional expense to DC Water
- D. Discharge of groundwater to existing water courses shall not cause erosion to existing banks.
- E. If necessary to reduce sediment discharge, provide siltation ponds or similar, sized to allow sufficient detention time for groundwater to meet discharge regulations. Maintain method for duration of dewatering activities and remove silt buildup from time to time to keep siltation method functional.

~ END OF SECTION 31 23 19 ~

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SECTION 31 23 23

CONTROLLED LOW-STRENGTH MATERIAL (FLOWABLE FILL)

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to place Controlled Low-Strength Material (CLSM) for backfill, abandonment of utilities and structures, and other applications as shown or specified on the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 03 30 00: Cast In-Place Concrete.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Concrete Institute (ACI)
 - 1. ACI 229R: "Report on Controlled Low-Strength Materials".
- B. ASTM International (ASTM):
 - 1. ASTM C143: "Standard Test Method for Slump of Hydraulic-Cement Concrete".
 - 2. ASTM C150: "Standard Specification for Portland Cement".
 - 3. ASTM C260: "Standard Specification for Air-Entraining Admixtures for Concrete".
 - 4. ASTM C403: "Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance".
 - 5. ASTM C494: "Standard Specification for Chemical Admixtures for Concrete".
 - 6. ASTM C618: "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete".
 - 7. ASTM C869: "Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete".
 - 8. ASTM C937: "Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete".
 - 9. ASTM D4832: "Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders".
 - 10. ASTM D5971: "Standard Practice for Sampling Freshly Mixed Controlled Low-Strength Material".
 - 11. ASTM D6023: "Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)".

12. ASTM D6024: “Standard Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Calculations” for lift heights of CLSM greater than three (3) feet.
- C. Submit “Certifications” for the CLSM batch facility.
- D. Submit the “Design Mix” for CLSM.
- E. Submit a proposed list of sources of all material to be used on the Project. Sources shall be approved by the jurisdiction DOT where the project is being performed and shall include a copy of their certification of each source.
 1. If a change in source of materials is made during construction, submit a new certification from the new source prior to the material being delivered to the job site.
- F. Submit the “Product Data Sheets” for CLSM materials.
- G. Submit the “Test Results” for CLSM used as Structural Backfill.
- H. Submit Batch Records from each truck of CLSM delivered to the site.

1.6 QUALITY ASSURANCE:

- A. Ready mixed concrete batch facilities shall be certified by the National ready Mixed Concrete Association. A copy of the “Certificate of Conformance for Concrete Batch Facilities” shall be submitted to the DC Water prior to batching any concrete materials.
- B. Verification that CLSM materials were batched in accordance with the design mix.
- C. Verification that CLSM Test Results meet those required by the design.

1.7 DELIVERY:

- A. Each batch of CLSM delivered to the site shall have a batch ticket from the batch facility. The batch ticket shall include but not be limited to the date and time the batch was dispatched, the volume of each material in the batch, and the plant from where the batch was produced.

PART 2. PRODUCTS

2.1 GENERAL:

- A. CLSM shall consist of an engineered mix of Portland cement, fine aggregate, water, and admixtures from an approved batching facility.
- B. All ingredients, including admixtures, shall be batched at a central batch plant, unless authorized otherwise by DC Water.

2.2 MATERIALS:

- A. Materials used in the CLSM shall be as follows:
 1. Cement: ASTM C150 Type I or II.
 2. Fly Ash: ASTM C618, Class C or F. Fly ash shall not be used in CLSM that is placed adjacent to or around metallic objects.
 3. Aggregate Gradation: 100 percent passing 3/8-inch sieve and not more than ten (10) percent passing No. 200 sieve. Aggregate shall consist of natural or manufactured siliceous sand and be clean and free from deleterious substances.

4. Admixtures: Meeting ASTM C494 as needed to improve pump ability, to control time of set and to reduce bleeding. Admixtures shall be Rheocell-Rheofill by BASF Construction Chemicals or Darafill by Grace Construction Products.
5. Fluidifier: Meeting ASTM C937 as necessary to hold solid constituents in suspension. Add shrinkage compensator if necessary.

2.3 DESIGN MIX:

- A. CLSM shall comply with the guidelines of ACI 229R and the requirements stated herein.
- B. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03 30 00 – Cast-In-Place Concrete and experienced in the design and testing of CLSM materials and mixes to perform material evaluation tests and develop CLSM design mixes.
- C. A trial mix shall be made and tested to verify the CLSM mix design. The trial mix testing shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.
- D. Mixes developed previously by the batch facility may be used provided that the date of testing for the materials and mixes is within 12 months of the date of use of the CLSM and all data specified above is included on the trial mix test reports.
- E. Design strength for the controlled backfill shall be as shown on the Contract Drawings. If not shown on the Contract Drawings, then design strength shall be as determined by the application and use of the CLSM as follows:
 1. General Purpose Backfill: CLSM used as general purpose backfill, including backfill used to abandon pipes and embedment zone material, shall have a high degree of flowability, shall be excavatable, and a 28-day unconfined compressive strength of between 50 and 150 psi.
 2. Structural Backfill: CLSM used as structural backfill shall have a good flowability and a 28-day unconfined compressive strength between 300 to 1200 psi, as specified on the Contract Drawings or as directed by DC Water.
 3. Minimum Wet Density: 90 pounds per cubic foot.
- F. CLSM shall include air entrainment of at least five (5) percent created by an air entrained admixture per ASTM C260 and/or a cellular concrete system containing a foaming agent per ASTM C869.
- G. The minimum slump shall be seven (7) inches and the maximum slump shall be ten (10) inches when tested in accordance with ASTM D6103.
- H. Placement Characteristics: Self-leveling.
- I. Shrinkage Characteristics: Non-shrink.

PART 3. EXECUTION

3.1 PLACEMENT OF FLOWABLE FILL:

- A. CLSM shall be placed as specified in the Contract Documents or as directed by DC Water. Placement of CLSM shall be scheduled to minimize disruptions to operations.
- B. Temperature of flowable backfill shall be at least 50 degrees Fahrenheit at time of placement. Material shall be protected from freezing for 48 hours after placement.
- C. CLSM shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment.
- D. CLSM shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing the air to escape shall be provided where necessary.

- E. When CLSM is placed against, around and inside existing structures, lift heights shall be limited to three (3) feet unless the Contractor engages the services of a Professional Engineer to provide calculations showing the structure can accommodate the loading from additional heights. Calculations shall be submitted to DC Water for information.
- F. Where CLSM is placed around piping and other elements subject to floating within the fill space, the pipe or element subject to floating shall be braced or anchored down to prevent uplift or fill lift heights shall be limited to a height that will not cause the pipe or element to float. In no case shall the CLSM lift exceed four (4) inches above the top of pipe or element until the CLSM has dried.
- G. Application of loads or placement of other fill materials or concrete on top of CLSM shall not occur until the CLSM surface is determined to be suitable for loading per ASTM D6024 and subject to the approval of DC Water.
- H. CLSM shall not be placed on frozen ground and the air temperature shall be 35 degrees Fahrenheit or more and rising at the time of placement.

3.2 SAMPLING/TESTING:

- A. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03 30 00 – Cast-In-Place Concrete and experienced in the testing of CLSM to perform tests on CLSM used as:
 - 1. Structural backfill.
 - 2. General purpose backfill when shown on Drawings.
- B. The number of tests performed shall be the greater of one (1) sample per application per day or one (1) sample for every 100 cubic yard or portion thereof per application per day. If CLSM fails to meet required test results, DC Water may increase the number of tests required at no additional expense to DC Water.
- C. The CLSM used to make the molded specimens shall be sampled after all on-site adjustments have been made to the mixture proportions, including the addition of mix water and any admixtures.
- D. Testing of field samples shall demonstrate the compliance of the CLSM with the accepted design mix. Tests shall comply with the following:
 - 1. Retrieval of samples for testing shall comply with ASTM D5971.
 - 2. Preparation, curing, transporting and testing of CLSM test cylinders for the determination of compressive strength shall comply with ASTM D4832.
 - 3. Unit weight and air content shall be tested in accordance with ASTM D6023.
 - 4. Testing for slump for CLSM shall be in accordance with ASTM C143.
 - 5. Perform penetration resistance tests on CLSM used structural backfill following ASTM C403 or D6024. A penetration number of 650 shall be achieved before placing any pavement surface over the CLSM using ASTM D403. The maximum ball drop indentation diameter for CLSM shall be three (3) inches using ASTM D6024. The number of tests shall be not less than one (1) test per 100 feet of CLSM placed or portion thereof.

~ END OF SECTION 31 23 23 ~

SECTION 31 23 32

AGGREGATE MATERIALS

PART 1. GENERAL

1.1 SUMMARY:

- A. The Contractor shall furnish all labor, equipment and materials required to complete all work associated with the installation of aggregate materials beneath structures and foundations, as backfill and fill material, as roadway subgrades, and at other related and incidental work as required to complete the work shown on the Contract Drawings and specified herein.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM C33: "Standard Specification for Concrete Aggregates".
 - 2. ASTM D2940: "Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports".
 - 3. ASTM D4318: "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils".
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T193: "Standard Method for Test for the California Bearing Ratio".
- C. Jurisdiction Department of Transportation for the location where the Work is performed (JDOT):
 - 1. Standard Specifications for Highways and Structures and Standard Details for the JDOT.

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit Certifications for each of the materials specified herein, which will be used on the project, with the manufacturer's Certificate of Compliance stating "Aggregate" materials meet or exceed the specified requirements.
- C. Submit the "Product Data Sheets" for each product used.
- D. Submit the "Test Results" of each product used.
- E. Submit the "Field Inspection Data" of each product used.

PART 2. PRODUCTS

2.1 UNACCEPTABLE MATERIALS:

- A. Materials consisting of crushed concrete, crushed brick, or similar man-made materials such as recycled crushed concrete shall not be used except when the JDOT for the location where the Work is performed allows such material to be used. In which case, these materials shall not be used within 12-inches of any metallic materials.

2.2 CRUSHED STONE OR SCREENED GRAVEL:

- A. Crushed stone or screened gravel shall be as defined by the Department of Transportation's Standard Specifications for the location where the Project is locate. If crushed stone or screened gravel are not specified, then the material shall meet the requirements of ASTM C33 Grading Size No. 57 or No. 67.

2.3 WASHED GRAVEL:

- A. Washed gravel shall consist of clean, tough, durable fragments of crushed stone of aggregate standard Grading Size No. 57 per ASTM C33 or as defined by the JDOT Standard Specifications for the location where the Work is performed.
- B. Washed gravel shall be double washed.

2.4 GRADED AGGREGATE BASE:

- A. Graded aggregate base shall meet the requirements of graded aggregate base course as defined by the JDOT Standard Specifications for the location where the Work is performed. If the JDOT does not specify a graded aggregate base material, then the material shall comply with the following:
1. Graded aggregate base shall consist of crushed stone having hard, strong, durable particles per requirements of ASTM D2940 and a CBR of 75 in accordance with AASHTO T193.
 2. Additional fine aggregate shall consist of material of the same type and quality as specified for coarse aggregate by the JDOT for the location where the Work is performed.
 3. Use of soil fines or natural sands is prohibited.
 4. Graded aggregate base shall meet the following gradations:

Sieve Designation	Percent Passing By Weight	Job Mix Tolerance Weight Percent Passing
2 – in.	100	-2
1 ½ - in.	95 - 100	± 5
¾ - in.	70 - 92	± 8
3/8 – in.	50 - 70	± 8
No. 4	35 - 55	± 8
No. 30	12 - 25	± 5
No. 200	0 - 8	± 3

2.5 TRENCH BACKFILL:

- A. Material used in trench backfill shall be a well-graded soil-aggregate mixture with ten (10) percent, but no more than 35 percent, by weight, passing the No. 200 sieve. The soil shall have a liquid limit not greater than 40 and a maximum plasticity index of ten (10), both per ASTM D4318.

- B. Within one (1) foot of the pipe, no gravel or stone shall be larger than 1-1/2 inches in any dimension.
- C. For remainder of trench, no gravel or stone shall be larger than 2-1/2 inches in any dimension, and not larger than one (1) inch within two (2) feet of finished grade.
- D. Backfill shall be free from snow, ice, frozen materials, trash, brick, clay lumps, broken concrete, tree roots, sod, ashes, cinders, glass, plaster, organic matter and any other foreign matter.
- E. Backfill shall have a minimum dry weight density of 100 pounds per cubic foot.
- F. Backfill shall have uniform moisture content suitable for compaction to the specified density. The Contractor shall moisten or dry soils materials to obtain suitable, uniform moisture content.
- G. If the materials are of such nature that heaving, pumping, rutting, or shearing occurs in the compacted backfill under the action of construction equipment, even though soil meets density requirements, affected material shall be replaced to limits as directed.

2.6 SELECT SAND:

- A. Sand size used shall be Standard as defined by the JDOT Standard Specifications for the location where the Work is performed.

2.7 COARSE AGGREGATE FOR BITUMINOUS CONCRETE:

- A. Coarse aggregate for bituminous concrete shall be as specified by the JDOT Standard Specifications for the location where the Work is performed.

2.8 FINE AGGREGATE FOR BITUMINOUS CONCRETE:

- A. Fine aggregate for bituminous concrete shall be as specified by the JDOT Standard Specifications for the location where the Work is performed.

PART 3. EXECUTION

3.1 GENERAL

- A. Installation of aggregates shall be in accordance with this Section.

3.2 CRUSHED STONE, SCREENED GRAVEL AND GRADED AGGREGATE BASE:

- A. Contractor shall install crushed stone, screened gravel and graded aggregate base course in accordance with the JDOT Standard Specifications for the location where the Work is performed and as shown on the Contract Drawings and as indicated in the Contract Documents.
 - 1. Unless otherwise stated herein or shown on the Contract Drawings, all mat foundations (bottom slabs) for the proposed structures shall have a blanket of crushed stone or graded aggregate base course six (6) inches thick minimum placed directly beneath the proposed mat. The blanket shall extend a minimum of 12 inches beyond the extremities of the mat.
 - 2. For subgrade preparation at structures and structural fill, the foundation material shall be graded aggregate base course where specifically specified on Drawings, otherwise, crushed stone or screened gravel shall be used.
 - 3. When used for ground under drains, pipe bedding, and drainage layers beneath structures, the coarse aggregate shall meet the requirements of aggregate standard Size No. 57 or No. 67, or as defined by the project JDOT Standard Specifications for the location where the Work is performed.

3.3 SELECT SAND:

- A. Contractor shall install select sand in accordance with the JDOT Standard Specifications for the location where the Work is performed and as shown on the Contract Drawings and indicated in the Contract Documents.

3.4 WASHED GRAVEL:

- A. Prior to any work, the Contractor shall provide a written certification from their suppliers that washed gravel has been double washed, and all fines have been removed from the material that would impede drainage.
- B. Trucks used for hauling the material shall also be thoroughly washed to remove fine material and other deleterious materials.
- C. Washed Gravel with visible fines shall not be installed and shall be removed from the Work.

~ END OF SECTION 31 23 32 ~

SECTION 31 23 37

TEST PITS

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes excavation, backfill, compaction and restoration as required to construct the test pits necessary to locate or determine type and/or condition of materials of underground utilities or other obstacles that may be encountered during excavation activities.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 78 42: As-Built Drawings.
 - 3. Section 02 01 20: Protecting Existing Utilities.
 - 4. Section 31 23 10: Trench Excavation and Backfill.
 - 5. Section 31 13 12: Tree Protection and Trimming.
 - 6. Section 33 12 13: Water Service Lines.

1.4 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “As-Built” drawings showing the elevation and location of the utilities uncovered by the test pits.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Construct test pits to determine the condition, material, location, etc. of existing utilities, water services and other below grade obstacles. The test pit shall be excavated in a manner to allow an effective and safe visual examination of the utilities, structures, and other obstructions exposed.
- B. When test pits located in greenspace are located within the tree space. Provide tree protection as required by Section 31 13 12 – Tree Protection and Trimming.
- C. Sod, bushes, and other vegetation removed for constructing the test pits may be reinstalled if maintained in acceptable condition and approved by DC Water. If salvaged items are not maintained in a condition that will result in an acceptable restored condition, the Contractor shall provide like materials in new condition for final restoration.

- D. Protect existing utilities during test pit construction in accordance with Section 02 01 20 – Protecting Existing Utilities.
- E. Test pits shall be backfilled with borrow fill meeting the JDOT requirements shall be used and thoroughly compacted in accordance with Section 31 23 10 – Trench Excavation and Backfill.
- F. Test Pits shall be performed at the locations shown on the Contract Drawings or as required to verify existing utilities prior to performing earthwork or trench excavation.
- G. Contractor shall schedule test pits so that backfilling and compaction can be completed within a single workday.
- H. Contractor shall survey and document the elevation and location of the utilities uncovered by the test pits. Data shall be recorded on the Contract Drawings as as-built information in accordance with Section 01 78 42 – As-Built Drawings.

3.2 INCIDENTAL TEST PITS:

- A. Test pits used to determine the location of existing utilities, structures, and other obstructions and are included in the SOPs as part of the work required by the Contract Documents will be considered incidental.

3.3 TEST PITS FOR WATER SERVICES:

- A. Perform test pits in accordance with Section 33 12 13 – Water Service Lines to determine the location, size, and material type of existing water services.

3.4 NON-INCIDENTAL TEST PITS:

- A. Test pits that do not fall into the categories of incidental or for water services as described above are considered non-incidental. Construct test pits, that are non-incidental when required and approved by DC Water.

~ END OF SECTION 31 23 37 ~

SECTION 31 25 00

EROSION AND SEDIMENT CONTROL

PART 1. GENERAL

1.1 SUMMARY:

- A. The work under this section consists of providing all erosion and sediment control measures, as required by the District of Columbia (DC) Department of Energy and Environment (DOEE) necessary to prevent water pollution and soil erosion using berms, dikes, dams, sediment basins, sediment traps, temporary seeding, erosion control mats, gravel, mulches, grasses, slope drains, ditches, channels, riprap, silt fences, straw bales, geotextiles, grading and other erosion control devices and methods to control surface runoff during construction as well as after completion of the Work.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 57 30: Dust Control.
 - 3. Section 31 05 19: Geotextiles.
 - 4. Section 32 92 19: Seeding.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdictional Responsible for Erosion and Sediment Control:
 - 1. County Erosion and Control Requirements for the location where Work is performed.
 - 2. DC DOEE: "Erosion and Sediment Control Field Handbook".
 - 3. Maryland Department of the Environment Water Management Administration (MD EWMA): "Maryland Standards and Specifications for Soil Erosion and Sediment Control".
 - 4. Virginia Department of Environmental Quality (VDEQ): "Virginia Erosion and Sediment Control Handbook".
- B. United States Department of Agriculture (USDA) and the Composting Council Research and Education Foundation (CCREF):
 - 1. USDA and CCREF: "Test Methods for the Examination of Composting and Compost (TMECC)".
- C. United States Environmental Protection Agency (USEPA):
 - 1. Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES).

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit Certifications for each of the materials specified herein, which are used on the project, with the manufacturer’s Certificate of Compliance stating that the materials meet or exceed the specified requirements.
- C. Submit the “Installation Instructions and Details” describing and showing how the Erosion and Sediment Control materials will be installed.
- D. Submit the “Product Data Sheets” of each product used.

PART 2. PRODUCTS

2.1 MATERIALS:

- A. Materials shall comply with the materials specified in the Erosion and Sediment Control Manuals for the Jurisdiction where the Work is performed.

PART 3. EXECUTION

3.1 GENERAL:

- A. Provide, install, and maintain measures to prevent and control soil erosion, sedimentation buildup, dust transportation, and water pollution as required by the CWA NPDES, the Jurisdiction Responsible for Erosion and Sediment Control where the Work is performed, and the sediment control permit. Coordinate measures with permanent project features and incorporate permanent features into the project at the earliest possible time.
- B. Install erosion and sediment control details and comply with specification requirements defined in the erosion and sediment control manuals identified in Article 1.4 above.
- C. No Work, including clearing, grubbing, or stripping, shall begin until erosion and sediment controls have been installed by the Contractor and inspected and accepted by the Jurisdiction Responsible for Erosion and Sediment Control where the Work is being performed.
- D. Protect adjacent properties and water resources from erosion and sediment damage throughout the life of the Contract.
- E. Contractor shall install temporary erosion and sediment control measures for construction activities to correct conditions that may contribute to erosion and sediment migration even if the conditions were not identified in the Contract Documents or Erosion and Sedimentation Control Permit.
- F. The Contractor shall prevent straw, wood chips, or other materials used in erosion and sediment control features from entering any reservoirs or watercourses.
- G. All stormwater conveyance channels used by the Contractor for temporary erosion control purposes shall be designed and constructed with adequate capacity and protection to prevent erosion during storm and runoff events.
- H. Protect all storm sewer inlets which drain stormwater runoff from the construction site from sediment deposition.
- I. Operate all equipment and perform all construction operations so as to minimize erosion.
- J. In the event of rain, cease any activity which increases erosion during rain storms.

3.2 MAINTENANCE AND REPAIR OF CONTROL FEATURES:

- A. The Contractor shall inspect erosion and sedimentation control features each day and after each rainstorm to verify the controls are still functioning as intended. The Contractor shall immediately repair any control features that are found to be damaged, defective, or at risk of failing.

- B. Remove sediment from all sediment traps and sediment basins as required by permit conditions and the Jurisdiction where the work is located.
- C. The Contractor shall maintain all erosion and sediment control features for the duration of the Work and/or until the site is 100% stabilized and the Jurisdiction where the Work is performed has signed off on the removal of all sediment control devices, including perimeter control. If the Jurisdiction where the Work is performed or DC Water identifies control features that are in need of maintenance, the Contractor shall perform required maintenance within 24 hours of being notified.

3.3 TEMPORARY SEEDING:

- A. Temporary seeding shall be applied in accordance with Section 32 92 19 – Seeding. All soil areas that will be exposed to the elements for more than 20 days but less than 12 months shall be stabilized using temporary seeding and mulching or as required by the permit, whichever is more restrictive.
- B. Install temporary seed at locations that are to receive permanent seed if work is completed before or after the preferred seeding periods as defined by the Jurisdiction where the Work is performed. Return and install permanent seed during the preferred seeding periods.

3.4 PERMANENT SEEDING:

- A. Permanent seed shall be installed in accordance with Section 32 92 19 – Seeding.
- B. The Contractor shall install permanent seed on all soil areas that were disturbed during construction except those areas that are required to be sodded as shown on the Contract Drawings or specified elsewhere in the specifications.
- C. If permanent seeding cannot be performed due to weather conditions or it is outside the preferred seeding period as defined by the Jurisdiction where the Project is performed, the Contractor shall install temporary seed as required by this Section.

3.5 ACCESS TO SEDIMENTATION BASINS:

- A. The Contractor shall provide and maintain access to sedimentation basins for maintenance, cleaning, protection, and repair until the sedimentation basin is no longer required, removed from service, or otherwise directed by DC Water.

3.6 SLOPE STABILIZATION:

- A. All slopes of stockpile material and other disturbed areas shall be stabilized and protected by surrounding the areas with silt fencing, mulching, seeding, or other protection as the Work progresses to comply with the intent of this specification and the erosion and sediment control permit requirements. All damaged areas shall be repaired as soon as possible. DC Water shall limit the surface area of each material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.
- B. The Contractor shall at all times have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measurements to damaged slopes.

3.7 CHANNELS, DITCHES AND OUTFALLS:

- A. Construct channels, ditches and out-falls using methods and materials shown on the drawings, designated in the Contractor's erosion and sediment control plan, and in compliance with the authorized methods and materials allowed by the Jurisdiction where the Project is constructed.

3.8 SILT FENCES:

- A. Install silt fences as shown on drawings, required by erosion and sediment control permits, or as needed to prevent migration of soils outside of the area where work is being performed.

- B. The installation and maintenance of silt fence shall prevent the migration of soils and be in accordance with Section 31 05 19 – Geotextiles.

3.9 EROSION CONTROL SOCKS:

- A. Erosion control socks shall be placed at locations indicated on the Contract Drawings and as directed by DC Water. Socks shall be installed parallel to the base of the slopes or other affected areas. In areas where slopes are 2:1 greater, a second sock shall be constructed at the top of the slope.
- B. Erosion control socks shall not be used in direct flow situations or in runoff channels.

3.10 DUST CONTROL:

- A. Dust control shall be in accordance with the Jurisdiction for the location where the Work is performed and Section 01 57 30 – Dust Control.

3.11 WASHING AREAS:

- A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the wash water cannot be contained.
- B. If the location for washing areas are not shown on the plans, the Contractor shall designate areas away from watercourses and storm water conveyance systems. Washing areas shall be constructed as required by the Jurisdiction where the Work is performed.

3.12 REMOVAL OF CONTROL FEATURES:

- A. Upon completion of work and approved stabilization of the site, erosion and sedimentation control features shall be removed by filling in excavated areas and removing dams, embankments, silt fences, riser pipe assemblies, corrugated metal pipe, and anti-seep collars, channels, ditches, outfalls, and all other temporary control features.
- B. Erosion and sediment controls shall be completely removed from the project after the Jurisdiction where the Work is performed and DC Water have approved removal of the controls.
- C. Areas disturbed by erosion control features shall be restored to equal or better condition than that which existed prior to being disturbed.

3.13 STREET CLEANING AND MAINTENANCE:

- A. Keep streets clean of construction debris and soils. Remove soils and other construction debris. Water hosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.
- B. When sediment is transported onto a public road surface, the roads shall be cleaned thoroughly at the end of each day or more often if required by the Jurisdiction where the Work is performed or by DC Water.

3.14 CONSTRUCTION ENTRANCE:

- A. When required by the Jurisdiction where the Work is performed or shown on the Contract Drawings, the contractor shall utilize a stabilized construction entrance at construction, staging, storage, disposal areas, etc.
- B. Vehicle and equipment wash areas, stabilized with coarse aggregate, and installed adjacent to the stabilized construction exit shall include erosion and sediment control measures that prevent soils from migrating off site.

~ END OF SECTION 31 25 00 ~

SECTION 31 41 00

SHORING, SHEETING, AND BRACING

PART 1. GENERAL

1.1 SUMMARY:

- A. The Contractor shall provide all labor, materials, and equipment necessary to design, install, maintain, and remove support systems for excavations to protect personnel, existing buildings, walkways, utilities, roadway and other improvements.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 32 33: Construction Photographs.
 - 2. Section 01 33 00: Submittals.
 - 3. Section 01 54 50: Construction Safety.

1.4 REFERENCED CODES AND STANDARDS:

- A. Code of Federal Regulations (CFR) Occupational Safety and Health (OSHA):
 - 1. 29 CFR 1910: "Occupational Safety and Health Standards".
 - 2. 29 CFR 1926: "Safety and Health Regulations for Construction".

1.5 DEFINITIONS:

- A. Lagging: A temporary or permanent excavation support structure consisting of heavy timber boards, planking or sheathing secured in place by steel H-piles.
- B. Sheeting: Steel sheet piling or a line of timber or planks, plain or tongue-and-grooved on sides, driven endwise into the ground to protect subgrade operations.
- C. Shoring: Props or posts of timber or other material in compression or bending, used for temporary support of excavation, formwork or unsafe structures. Shoring includes pre-fabricated or site constructed trench boxes.
- D. Support: Facilities required to prevent movement of existing structures until the completion of the underpinning.
- E. Underpinning: Permanent construction which directly transmits existing structure foundation loads to a lower bearing elevation or strata and preserves the structures being underpinned.

1.6 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit complete design "Calculations" for Shoring, Sheeting, and Bracing systems which will be used on the project.

- C. Submit the “Installation Instructions and Details” describing and showing how the Shoring, Sheeting, and Bracing will be installed.
- D. Submit certified “Working Drawings” showing the proposed layout and the dimensional details for Shoring, Sheeting, and Bracing, which will be used on the project. Working Drawings shall be signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in governmental jurisdiction of the project.
- E. Submit jacking gage calibration data for the pressure gage and jack combination certified by an accepted testing laboratory not earlier than 30 days prior to start of use for underpinning. Calibration shall be completed not more than 60 days prior to the first day of use on the Project.
- F. Submit “Qualifications” of the Licensed Professional Engineer performing supervision services of the shoring, sheeting, and bracing systems.
- G. Submit photographs and list of damages of pre-work conditions to document existing settlement and cracking of structures, pavements, and other improvements.
- H. Submit survey data for surveys performed by a licensed professional surveyor to establish and monitor the elevations and locations of adjacent structures and improvements.

1.7 QUALITY ASSURANCE:

- A. Licensed Professional Engineer Qualifications: A professional engineer legally authorized to practice in jurisdiction where Project is located, and experienced in providing successful engineering services for excavation support systems similar in extent to those required for this Project.
- B. Supervision: Engage and assign supervision of excavation support system to a qualified professional engineer foundation consultant. Submit name of engaged consultant and qualifying technical experience.
- C. Regulations: Comply with all Federal, State and Local codes, laws and regulations applying to the design and construction of shoring, sheeting, and bracing.

1.8 DESIGN

- A. Design of shoring, sheeting, and bracing systems shall be performed by a Licensed Professional Engineer. Design analyses and calculations, to support Working Drawings, shall be signed and sealed by a Licensed Professional Engineer experienced in Structural Engineering and registered in governmental jurisdiction of the project.
- B. The requirements of this Section are minimal requirements for designing, installing, maintaining, and removing shoring, sheeting, and bracing systems. Each excavation shall be evaluated by the Contractor’s Licensed Professional Engineer and additional requirements applied as necessary to provide systems that protect personnel, existing buildings, walkways, utilities, roadway and other improvements from movement and excavation failure.

PART 2. PRODUCTS

2.1 GENERAL:

- A. Provide adequate shoring and bracing materials, which will support loads imposed.
- B. Materials shall be as designed by the Licensed Professional Engineer and in accordance with OSHA.
- C. Materials need not be new but shall be in serviceable condition.

PART 3. EXECUTION

3.1 GENERAL:

- A. Before starting work, verify governing dimensions and elevations. Verify the condition of the adjoining properties. Take photographs per Section 01 32 33 – Construction Photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare and submit to DC Water a list of such damages, verified by dating photographs, and signed by Contractor and others conducting the investigation.
- B. Provide shoring, sheeting, and/or bracing as shown on the Contract Drawings and requirements by OSHA.
- C. Provide safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, to avoid delay to the work, all in accordance with pertinent safety and health regulations.
- D. Comply with the Safety requirements of Section 01 54 50 – Construction Safety, OSHA and the general trenching requirements of the pertinent safety and health regulations for the minimum shoring, sheeting, and bracing for trench excavations.
- E. Install shoring, sheeting, and bracing to prevent placing any loads on portions of the Work until authorized by DC Water and the completed Work is of sufficient strength to accept the load without causing damage to the Work.
- F. Repair or replace, as acceptable to DC Water, adjacent work damaged or displaced through installation or removal of shoring, sheeting, or bracing work.

3.2 SHORING:

- A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces, installation of pipe, or performance of any work being performed in accordance with the Contract Documents.
- B. Shoring systems shall be anchored and braced to resist earth and hydrostatic pressures.
- C. Shoring systems retaining earth on which the support or stability of existing construction is dependent shall be left in place at completion of the Work as shown on Contract Drawings.

3.3 SHEETING:

- A. Extend sheeting three (3) feet minimum above the top of the excavation or the toe of the approved cutback for sloped surfaces unless traffic has to be maintained, in which case, sheeting shall be cut even with the surface.
- B. Drive or install sheeting to the depth designed by the Contractor's Professional Engineer unless a greater depth is required to obtain a dry excavation or other satisfactory working conditions.

3.4 BRACING:

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent concrete work.
- C. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
- D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 REMOVAL:

- A. Remove shoring, sheeting, and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities and utilities.
- B. Unless specified or shown otherwise, remove shoring, sheeting, and bracing during backfill operations.

- C. Provide additional backfill compaction around the area of the pipe or structure to fill voids left behind when the shoring or sheeting is removed.
- D. When withdrawing sheeting, backfill all voids or holes left by planks as they are withdrawn by thoroughly ramming with thin rammers provided especially for this purpose.
- E. Voids caused and left by sheeting and shoring removal shall be backfilled with pervious fill or other approved material and compacted at no additional cost to DC Water.
- F. Remove sheeting and bracing above the top of the pipe or foundation as the excavation is backfilled in a manner that prevents caving in of the bank or disturbing adjacent areas or structures. Remove sheeting as backfilling progresses so that the sides are always supported or when removal would not endanger the construction of adjacent structures.
 - 1. For sheeting that extends below the spring line of the pipe or bottom of the structure foundation, cut the sheeting at the spring line of the pipe or bottom of the foundation, remove the upper portion, and leave the remaining sheeting in place.

~ END OF SECTION 31 41 00 ~

SECTION 32 12 16

FLEXIBLE PAVEMENT

PART 1. GENERAL

1.1 SUMMARY:

- A. This Section includes requirements for removing, repairing and replacing paving in roads, driveways, parking areas, leadways and other flexible pavement areas within the limits required by the work. Paving includes installation and removal of temporary patching and installing new paving and permanent restoration.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 02 41 00: Demolition.
 - 3. Section 31 23 10: Trench Excavation and Backfill.
 - 4. Section 32 12 18: Pavement Milling.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M29: "Standard Specification for Fine Aggregate for Bituminous Paving Mixtures".
- B. ASTM International (ASTM):
 - 1. ASTM D1188: "Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples".
 - 2. ASTM D2041: "Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures".
 - 3. ASTM D2726: "Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures".
 - 4. ASTM D2950: "Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods".
- C. District of Columbia Department of Transportation (DDOT):
 - 1. DDOT Specifications: "Standard Specifications for Highways and Structures".
 - 2. DDOT Details: "Standard Details".
- D. Jurisdiction Department of Transportation (JDOT):
 - 1. JDOT: "Standard Specifications for Highways and Structures and/or Standard Details for the JDOT where the Work is performed".

1.5 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: A paving-mix manufacturer approved by JDOT for the location where the Work is performed.

1.6 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit certified “Design Mix”. Design Mix shall be approved by the jurisdiction DOT where the project is being performed. Include a copy of the approved Design Mix Certification.
- C. Submit the “Product Data Sheets” for each product used.
- D. Submit a proposed list of sources of all material. Sources shall be approved by the jurisdiction DOT where the project is being performed and shall include a copy of their certification of each source.
- E. Submit plant batch tickets for hot and cold bituminous mix before placing. Batch tickets shall include type of mix, date mixed and graduation of mineral aggregate.
- F. Submit the “Test Results” for Flexible Paving & Surfacing.
- G. Submit the “Field Inspection Data” for documenting the pre-installation and inspection activities.
- H. Submit manufacturer “Qualifications” showing they are approved to perform Work for the JDOT in the location where the Work is performed.

1.7 WEATHER AND SEASONAL RESTRICTIONS:

- A. Weather and seasonal restrictions for flexible paving and surfacing shall as specified by the JDOT for the location where the Work is performed.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS:

- A. Hauling equipment shall be loaded in a manner to minimize segregation of the mix.
- B. Transportation of bituminous paving materials from the paving plant to the site shall be in trucks having tight, clean and smooth beds. Each load shall be covered with canvas or other suitable material of ample size to protect it from the weather and to prevent the loss of heat. The mixture shall be delivered to the area to be paved in such a manner that the temperature at the time of dumping into the spreader will not be less than 225°F.
- C. Any loads wet excessively by rain will be rejected.

1.9 WARRANTY:

- A. Provide a two (2) year warranty or period of time as stated in Permit, whichever is longer, on material and workmanship for flexible paving and surfacing and related Work.

PART 2. PRODUCTS

2.1 GENERAL:

- A. Materials for flexible paving and surfacing shall be in accordance with the JDOT for the location where the Work is performed. In the event the JDOT does not specify a material, the material shall be as specified in the DDOT Specifications.

PART 3. EXECUTION

3.1 GENERAL:

- A. Paving and surfacing shall be in accordance with the specifications and details of the JDOT for the location where the Work is performed. In the absence of JDOT specifications and

details, flexible paving and surfacing shall be performed in accordance with DDOT specifications and details and this Section.

- B. Contractor shall replace pavement as shown on the Contract Drawings or as directed by DC Water. Pavement removed or damaged outside the pavement limits shown shall be replaced at no additional cost to DC Water.
- C. Immediately make repairs to temporary patches if settlement occurs or deterioration of adjacent paved surfaces are affected by construction activities or creates unsafe or inconvenient conditions for vehicular or pedestrian traffic. If the condition persists or conditions are deemed to be a danger to the public, DC Water may repair such areas, and the cost thereof will be chargeable to the Contractor.
- D. All new paved areas shall have positive drainage to eliminate ponding. Where new paved areas join existing, measures shall be taken to incorporate positive drainage to eliminate ponding.
- E. In-place compacted thickness shall not be less than thickness specified in the Contract Documents and/or Contract Drawings. Areas of deficient paving thickness shall receive tack coat and minimum one (1)-inch overlay; or shall be removed and replaced to proper thickness, at the discretion of DC Water until specified thickness of course is met or exceeded at no additional expense to DC Water.
- F. Ingress and egress shall be maintained to the abutting properties. Provide temporary walkways, etc. at the locations as shown on the Contract Drawings.
- G. Pavement base shall not be placed on muddy or frozen subgrade or sub-base and pavement overlay shall not be placed on frozen or contaminated base course.

3.2 PRE-INSTALLATION AND INSPECTION:

- A. Coordination with the JDOT: Contractor shall participate in coordination activities with the JDOT for the location in which the Work is performed to define the limits of the areas to be paved and the permit requirements.
- B. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- C. Verify that subgrade is dry and in suitable condition to begin paving.
- D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed prior to beginning installation of pavement.
- E. Verify surface casting such as utility boxes, manholes, grates, cleanouts, etc. are set to grade and all castings are adjusted within tolerances of 1/8 inch below or flush with the asphalt finished elevation.
- F. Proceed with paving only after unsatisfactory conditions have been corrected and approved by DC Water.

3.3 REMOVAL OF EXISTING PAVEMENT:

- A. Remove asphalt in accordance with Section 32 12 18 – Pavement Milling or Section 02 41 00 – Demolition.

3.4 PREPARATION FOR PAVEMENT REPLACEMENT:

- A. The Contractor shall compact the backfill as specified in Section 31 23 10 – Trench Excavation and Backfill.
- B. Provide required subgrade and sub-base for asphalt base course in accordance with the Contract Documents.
- C. Proof-roll subgrade below pavements with heavy pneumatic tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- D. Provide temporary or permanent pavement immediately upon completing subgrade installation.

3.5 TEMPORARY PAVEMENT:

- A. When used, temporary pavement shall be in accordance with the JDOT for the location where the Work is performed.
- B. Temporary pavement shall be installed wherever pedestrian or vehicle (including bikes) traffic is present.
- C. Maintain temporary pavement in a condition acceptable to DC Water until permanent pavement is placed.
- D. Commence repair to rectify defective or unsafe temporary pavement within one (1) hour after notification by DC Water.

3.6 PERMANENT PAVING REPAIRS:

- A. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.
- B. Provide protection for existing manhole frames and covers, utility boxes, and other inset items.
- C. Provide replacement striping and other pavement markings which were disturbed.
- D. Promptly correct surface irregularities in paving course.

3.7 PLACEMENT OF PAVEMENT:

- A. Prior to delivery of surface or overlay course material, the base course shall be completed for receiving the surface course material and shall be kept from traffic except for mixture vehicles and those other vehicles necessary for the placement of asphalt.
- B. During construction, if it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other permanent blemishes in the pavement, that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and other satisfactory spreading and finishing equipment shall be provided by the Contractor at no additional cost to DC Water.

3.8 FLEXIBLE PAVEMENT OVERLAY:

- A. Prior to beginning paving operations, the existing areas to be resurfaced shall be thoroughly cleaned by the Contractor to the satisfaction of DC Water and the JDOT for the location where the Work is performed. Cleaning shall include sweeping with a power operated broom, washing with a water truck and hand cleaning any debris left over after the mechanical cleaning is completed.
- B. When the surface of the existing pavement or base is irregular, Contractor shall bring it to a uniform grade and cross section. The surface on which the pavement is to be applied

shall be prepared in accordance with the requirements of the JDOT for the location where the Work is performed.

- C. Prior to placement of bituminous concrete, longitudinal, and transverse joints, and cracks shall be sealed by the application of an approved joint sealing compound.
- D. Tack coat shall be applied in accordance with the JDOT for the location where the Work is performed. If the JDOT does not have requirements for tack coat, the tack coat shall be applied in accordance with DDOT.

3.9 JOINTS:

- A. Joints shall be constructed as required by the JDOT for the location where the Work is performed.
- B. Construct joints to ensure a continuous bond between adjoining paving sections.
- C. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
- D. Clean contact surfaces and apply tack coat to joints.

3.10 COMPACTION:

- A. Compaction shall be in accordance with the JDOT for the location where the Work is performed.
- B. Begin compaction as soon as flexible pavement is placed, struck off, surface irregularities are corrected, and the pavement will bear roller weight without excessive displacement.
- C. Compact flexible pavement in areas inaccessible to rollers by using hand tampers or vibratory plate compactors.
- D. Rolling shall not cause undue displacement, cracking, or shoving of pavement.
- E. Rolling shall be a continuous process, insofar as practicable, and all parts of the pavement shall receive uniform compaction. In the event, that the rolling operation is not able to properly keep up with the placement of the mixture, the finishing machine shall be stopped and no mixture shall be laid until the rolling has been caught up.
- F. The roller shall pass over the unprotected end of the freshly laid mixture only when the laying of the course is to be discontinued or when delivery of the mixture is interrupted to the extent that the unrolled material may become cold or when a construction joint is to be formed.
- G. Skin patching of areas where rolling has been completed will not be permitted.
- H. The densities of the completed pavement shall be as specified by the JDOT for the location where the work is performed.
- I. Complete compaction before mix temperature cools to 185 °F.
- J. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

3.11 PROTECTION OF ASPHALTIC SURFACE COURSE:

- A. Sections of newly placed and compacted asphalt surface shall be barricaded and protected from all defects until the course has become properly hardened by cooling.
- B. Contractor shall protect asphalt from petroleum products during and following placement of surface course.

3.12 PAVEMENT MARKINGS:

- A. When cuts are made through any paved surface and the cuts extend through the pavement markings, the replaced pavement shall be marked to match the existing and as required by the JDOT for the location where the Work is performed.

- B. Temporary pavement markings shall be installed within 48 hours of placing temporary pavement unless the JDOT for the location where the Work is performed requires the markings to be installed sooner.
- C. Permanent markings shall be made immediately upon the completion of a permanent pavement repair.

3.13 TRAFFIC SIGNAL LOOP DETECTOR INSTALLATION:

- A. Contractor shall repair or replace all traffic signalization devices and traffic loops damaged during performance of the Work.
- B. The traffic signal loop detector installation limits shall be repaired and installed in accordance with the specifications and details of the JDOT for the location where the Work is performed.

3.14 ASSOCIATED WORK ITEMS:

- A. Provide signage required by the JDOT for the location where the Work will be performed.

3.15 PAVING REPAIR BEYOND CONTRACT LIMITS:

- A. Any paving, sidewalk, curbing, gutter, or other highway structure outside the pay limits prescribed, which may be marred, altered, damaged, or destroyed by the Contractor due, but not limited, to his methods of construction, mobility or equipment, and handling and storage of materials will be replaced in kind by the Contractor at no additional cost to DC Water.

3.16 FIELD QUALITY CONTROL:

- A. Testing Agency: Contractor shall engage an independent qualified testing agency that is approved by the JDOT for the location where the Work is performed.
- B. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances established by the JDOT for the location where the Work is performed.
- C. In-Place Density: Testing agency shall take samples of un-compacted paving mixtures and compacted pavement in accordance with ASTM D2726.
 - 1. Reference maximum theoretical density will be determined by averaging results from four (4) samples of each hot-mix asphalt-paving mixture delivered daily to site, prepared accordance to ASTM D2041, and compacted accordance to job-mix specification.
 - 2. In-place density of compacted pavement will be determined by testing core samples in accordance with ASTM D 1188 or ASTM D 2726 or as determined by nuclear method in accordance with ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726 provided, that the JDOT for the location where the Work is performed will accept the nuclear method.
 - a. One core sample will be taken for every 1000 square yard or less of installed pavement, with no fewer than three (3) cores taken. Location of the cores shall be as directed by DC Water.
 - b. Core drill shall be perpendicular to the asphalt concrete surface at the specified sampling location.
 - c. Each core will be representative of the lift from which it was taken. Trimming the sides of the cores is not permitted. Saw cutting the tops of cores is not permitted.
 - d. Each core shall be identified by a sample number. Immediately after cores are removed from the road surface and they have been marked for sample number, they shall be placed in an insulated container which is equipped

to maintain the temperature of the cores at 10 °C or colder until delivered to the approved laboratory for testing.

- e. Any section in which the depth is ½ inch or more deficient in specified depth, shall be corrected.
3. Flexible Pavement Core Sample Data; Data to be submitted with each core sample includes but not limited to the following:
 - a. Date Sampled.
 - b. Time Sampled.
 - c. Name of Person who did Sampling.
 - d. Core collected using air cooled or water-cooled core barrels, Contract Number.
 - e. Site Location (station and offset).
 4. Flexible Pavement Core Report: Core information shall be reported on the standard laboratory forms and shall include but not limited to the following information:
 - a. Date Cores were obtained.
 - b. Paving Date.
 - c. Contract Number.
 - d. Project Title.
 - e. Location of test.
 - f. Type of material being evaluated.
 - g. Mix Design Lab Number.
 - h. Average thickness of each core (to the nearest 0.01' or 1/8").
 - i. Average Theoretical Maximum Density.
 5. Provide DC Water with copies of the testing laboratory's reports within seven (7) calendar days of when the samples were taken.
 6. Contractor shall apply a prime and tack coat prior to backfilling with bituminous material. Contractor shall apply joint sealer to core joint crack.
 7. All core holes shall be backfilled with similar material and satisfactorily compacted by and at the expense of the Contractor. Core holes shall be dry and clean prior to backfilling. Compaction shall be with hand held Marshall Compaction hammer or approved equal.
- D. Perform additional testing as required by the JDOT for the location where the Work is performed.

~ END OF SECTION 32 12 16 ~

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SECTION 32 12 18
PAVEMENT MILLING

PART 1. GENERAL

1.1 SUMMARY:

- A. The work under this section consists of the satisfactory removal of bituminous concrete pavement by pavement milling equipment to the required depth necessary to permit bituminous overlaying or matching to the proposed grades and dimensions.
- B. Also included is the scarifying and loosening of existing paving where indicated on the plans to the required depth or to sub-base.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 57 30 Dust Control.
 - 3. Section 31 23 10: Trench Excavation and Backfill.
 - 4. Section 32 12 16: Flexible Pavement.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdiction Department of Transportation (JDOT):
 - 1. Standard Specifications of the JDOT for the location where the Work is performed.

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit "Product Data Sheets" on equipment proposed to be used for milling operations.

PART 2. PRODUCTS

2.1 EQUIPMENT:

- A. Milling equipment shall be self-propelled units capable of removing the asphalt pavement to the depths, widths, and typical sections as shown or described in the Contract Documents.
- B. Milling equipment shall have an effective automatic grade and slope control system with the capability to mill concrete patches. Automatic controls on the milling machine shall provide accurately established profile grades at each edge of the machine by referencing from the existing pavement or an independent grade reference, where required, or be capable of automatically maintaining a designated cross slope from a single reference.
- C. The ground speed of the milling machine shall be independent of the cutting equipment.
- D. The miller shall have a self-contained water system for control of dust and fine particles.

- E. All equipment shall meet the current standards set by the Air Quality Act of noise and air pollution as well as any additional local, state, district or federal pollution laws and regulations.

PART 3. EXECUTION

3.1 GENERAL:

- A. Milling depth shall be two (2) inches unless shown otherwise on the Contract Drawings.
- B. Milling shall not be performed when there is snow or ice on the pavement surface.
- C. Final milling shall not be performed until all curbs, gutters, driveway entrances and other concrete items have been completed on the particular street.
- D. Contractor shall plan and prosecute a schedule of operations so that milled roadways will be overlaid with bituminous concrete asphalt as soon as possible, and, in no instance, shall the time lapse exceed 48 hours after the milling operations, unless specified otherwise.
- E. Locate visible and buried utility appurtenances and protect gate valve casings, catch basins, manholes and other appurtenances in the roadway prior to milling.
- F. Protect curbs, sidewalks, ramps, utilities, and other appurtenances from damage during milling activities. Any damage to curbs, sidewalks, ramps, utilities, and other appurtenances in or near pavements caused by milling operations shall be repaired or replaced by the Contractor at no additional cost to DC Water.
- G. Cover catch basin tops prior to milling operations to prevent milled material from entering catch basin grates.
- H. Protect pavement outside the defined milling and removal zone to prevent damage to of adjacent pavement.
- I. No sections or pieces of pavement shall be used for trench backfill and all such materials shall be kept separate from excavated materials.
- J. The milled areas shall be kept free of irregularities and obstructions that may create a hazard or annoyance to traffic.
- K. Asphalt concrete that cannot be removed by cold planer equipment because of physical or geometrical restraints should be removed by other methods that are acceptable to the JDOT where the Work is performed and DC Water.
- L. Contractor shall plan and perform milling operations to prevent trapping of water on the roadway.

3.2 PRE-INSTALLATION AND INSPECTION:

- A. Perform pre-installation and inspection activities as require by Section 32 12 16 – Flexible Pavement.

3.3 SURFACE PREPARATION:

- A. Clean the pavement surface of excessive soil, mud, or other foreign material immediately prior to milling operations.
- B. Where the milling area terminates and abuts the existing adjacent pavement, a neat straight line shall be cut with suitable power-driven equipment before commencing the pavement removal with a milling machine.

3.4 MILLING:

- A. Milling shall proceed in a longitudinal direction along the roadway.
- B. Milling shall leave a finished surface that is free from gouges, grooves and ridges and is in accordance with the surface tolerances requirements of the JDOT where the Work is performed or as directed by DC Water.

- C. Contractor shall control the rate of milling to avoid tearing the mat, resulting in chunky and non-uniformly milled material.
- D. Keep the milled pavement surface free from all loose materials and dust.
- E. Contractor is responsible for providing water for milling operation.
- F. The milling depth shall be two (2) inches unless shown otherwise on the Contract Drawings.
- G. Any un-milled or partly milled areas within the area to be milled shall be re-milled in order to affect a uniformly milled surface suitable for receiving a bituminous overlay.
- H. Implement dust control methods in accordance with Section 01 57 30 – Dust Control.

3.5 CLEANING AND SWEEPING:

- A. Contractor shall sweep and remove loose cutting, dust or other objectionable material from the roadway by the end of each working day using power brooms, power vacuums and whatever ancillary equipment, tools, and labor are necessary to properly prepare the pavement surface for subsequent tack coat and paving.
- B. The pavement removal and cleaning operations shall effectively minimize the amount of dust being emitted.
- C. Dry Power Broom application is prohibited.

3.6 PATCHING:

- A. Areas of base exposure caused by the milling operation as a direct result of adjusting profiling equipment, overcut beyond specified depths, use of jackhammer around structures, or utilizing equipment not specifically designed to cold plane pavements shall be repaired at no additional cost to DC Water.
- B. These areas of base exposure shall be repaired by processed aggregate fine grading, partial depth patching, full depth patching, base patch repair, or as otherwise directed by DC Water.
- C. Any patching required shall be repaired before the end of the working day and in a manner satisfactory to the JDOT where the Work is performed and DC Water.

3.7 DISPOSAL:

- A. The Contractor shall remove the milled pavement from the site and dispose of it as unsuitable material as specified in Section 31 23 10 – Trench Excavation and Backfill, at no additional cost to DC Water.

~ END OF SECTION 32 12 18 ~

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SECTION 32 13 78

PCC PAVEMENT REPAIR

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of replacing Portland Cement Concrete (PCC) Pavement removed from existing roadways, PCC Base, and bus stops including the cutting, removal, and disposal of old material.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 03 20 00: Reinforcing Steel Rebars.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdiction Department of Transportation (JDOT):
 - 1. JDOT: Standard Specifications for Highways and Structures and/or Standard Details for the JDOT where the Work is performed.
- B. District of Columbia Department of Transportation (DDOT):
 - 1. DDOT Specifications: "Standard Specifications for Highways and Structures".
 - 2. DDOT Details: "Standard Details".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the JDOT "Certifications" for each source of material used in the PCC Pavement.
- C. Submit certified "Design Mix" that is approved by the JDOT where the Work is being performed. Include a copy of the approved Design Mix Certification.
- D. Submit the "Product Data Sheets" for PCC Pavement Repair products.
- E. Submit manufacturer's "Installation Instructions and Details" for preparation of joints, joint profiles dimensions, and installation directions.
- F. Submit "Field Inspection Data" for PCC Pavement Repair including plant batch tickets for concrete. Batch tickets shall include type of mix, date mixed and gradation of mineral aggregate.
- G. Submit "Test Results" for PCC Pavement.

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Environmental conditions for installation of materials shall be in accordance with the JDOT where the Work is performed.

PART 2. PRODUCTS

2.1 MATERIALS:

- A. Material sources shall be approved by the JDOT for the area where the Work is performed.
- B. Materials shall comply with the specifications of the JDOT for the area where the Work is performed.

PART 3. EXECUTION

3.1 GENERAL:

- A. PCC pavement repairs and PCC pavement joint repairs shall be performed in accordance with the specifications and details of the JDOT where the Work is performed. If the JDOT where the Work is performed does not have specifications and details, the Contractor shall perform PCC pavement repairs in accordance with DDOT Specifications and Details except as modified within the Section.
- B. Rebar shall be installed in accordance with the standard details of the JDOT where the Work is performed for the type of pavement being repaired. Rebar shall be installed in accordance with Section 03 20 00 – Reinforcing Steel Rebars.

~ **END OF SECTION 32 13 78** ~

SECTION 32 16 00

PORTLAND CEMENT CURB AND GUTTER

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to install Portland cement concrete curb and gutter on a prepared base course to the grades and cross-sections specified in the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdiction Department of Transportation (JDOT):
 - 1. JDOT: "Standard Specifications for Highways and Structures and/or Standard Details for the JDOT where the Work is performed".
- B. District of Columbia Department of Transportation (DDOT):
 - 1. DDOT Specifications: "Standard Specifications for Highways and Structures".
 - 2. DDOT Details: "Standard Details".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit certified "Design Mix" that is approved by the JDOT where the Work is being performed. Include a copy of the approved Design Mix Certification.
- C. Submit the "Field Inspection Data" for Portland cement curb and gutter.
- D. Submit the "Product Data Sheets" for each product used.
- E. Submit the JDOT "Certifications" for each source of material used in concrete.
- F. Submit the "Test Results" for Portland Cement Curb and Gutter including plant batch tickets for Portland Cement Curb and Gutter before placing. Batch tickets shall include type of mix, date mixed and graduation of mineral aggregate.

PART 2. PRODUCTS

2.1 MATERIAL:

- A. Material sources shall be approved by the JDOT for the area where the Work is performed.
- B. Materials shall comply with the specifications of the JDOT for the area where the Work is performed.

PART 3. EXECUTION

3.1 GENERAL:

- A. Portland cement curb and gutter shall be constructed in accordance with the specifications and details of the JDOT where the Work is performed. If the JDOT where the Work is performed does not have specifications and details, the Contractor shall construct curb and gutter in accordance with DDOT Specifications and Details except as modified within this Section.

~ END OF SECTION 32 16 00 ~

SECTION 32 16 01

STONE CURB

PART 1. GENERAL

1.1 SUMMARY:

- A. Work shall consist of all labor, materials, and equipment to furnish and set new stone curbing and reset or adjust existing stone curbing, both straight and circular, as shown in the Contract documents. Work shall include PCC foundation, backfilling, and other incidentals necessary for complete curb installation.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM C615: "Standard Specification for Granite Dimension Stone".
 - 2. ASTM C616: "Standard Specification for Quartz-Based Dimension Stone".
- B. District of Columbia Department of Transportation (DDOT):
 - 1. Standard Specifications for Highways and Structures.
- C. Jurisdiction Department of Transportation where the Work is performed (JDOT):
 - 1. Standard Specifications and Details for Highways and Structures of the JDOT.

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit "Product Data Sheets" for the stone used showing the physical properties.
- C. Submit "Samples" of stone to be used in curbing.

PART 2. PRODUCTS

2.1 GENERAL:

- A. Stone Curbs shall be made of granite stone unless shown otherwise on the drawings or existing stone is bluestone, in which case stone curbs shall be bluestone.
- B. Stone shall be clean and show no evidence of any iron rust or iron particles.
- C. Color and grain of stone for new curbs shall be as selected by DC Water from samples provided by the Contractor.

- D. Color and grain of stone for existing curbs shall match existing stone. Contractor shall submit samples to DC Water for approval.
- E. Stone installed in curbs shall be consistent with the color and grain in the existing stone and the samples selected. Stone that varies from that shown shall be removed and replaced at no additional cost to DC Water.

2.2 GRANITE STONE:

- A. Granite stone shall have the physical properties listed in ASTM C615.
- B. Granite stone shall be new, first quality granite, hard and durable, with Mohs scale of mineral hardness shall be between six (6) and seven (7), of a uniformly light color from one deposit or quarry, free from seams, cracks, or other imperfections, and have a smooth splitting character.

2.3 BLUESTONE:

- A. Bluestone shall have the physical properties listed in ASTM C616; Classification: Type III Quartzite.
- B. Bluestone shall be new, first quality quartz-based stone, sound, durable and free of spalls, cracks, open seams, pits, or other defects that are likely to impair structural integrity.

2.4 DIMENSIONS:

- A. Dimensions for stone curb shall be as specified by JDOT for the location where the Work is performed. In the absence of standards by JDOT, the dimensions shall be in accordance with DDOT Standard Specifications for Highways and Structures.

2.5 FINISH:

- A. Stone curb shall be finished as specified in DDOT Standard Specifications for Highways and Structures.

PART 3. EXECUTION

3.1 GENERAL:

- A. PCC foundation shall be prepared in accordance with the JDOT for the location where the Work is performed. In the absence of standards by the JDOT, the PCC Foundation requirements for stone curbs shall be as specified in the DDOT Standard Specifications for Highways and Structures.
- B. Stone curbs shall be constructed in accordance with the JDOT for the location where the Work is performed. In the absence of standards by the JDOT, the construction requirements for stone curbs shall be as specified in the DDOT Standard Specifications for Highways and Structures.

~ END OF SECTION 32 16 01 ~

SECTION 32 16 04

BRICK GUTTER

PART 1. GENERAL

1.1 SUMMARY:

- A. This work shall consist of furnishing all labor, materials, and equipment to construct brick gutters and prepare the surface course to the dimensions and at the locations shown on the Contract documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. District of Columbia Department of Transportation (DDOT):
 - 1. Standard Specifications for Highways and Structures.
- B. Jurisdiction Department of Transportation where the Work is performed (JDOT):
 - 1. Standard Specifications and Details for Highways and Structures of the JDOT.

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the "Product Data Sheets" of each product used.
- C. Submit installer experience.
- D. Submit a proposed list of sources of all material. Sources shall be approved by the jurisdiction DOT where the project is being performed and shall include a copy of their certification of each source.

1.6 QUALITY ASSURANCE:

- A. Installer shall have not less than three (3) years of experience with at least 2,500 linear feet of brick gutter installation experience.

PART 2. PRODUCTS

2.1 MATERIALS:

- A. Materials shall be as specified for brick gutters in accordance with the JDOT for the location where the Work is performed. In the absence of JDOT standards, the materials shall comply with DDOT Standard Specifications for Highways and Structures.

PART 3. EXECUTION

3.1 GENERAL:

- A. Brick gutter shall be constructed as shown in the Contract Drawings.
- B. Brick gutter shall be set and placed prior to the start of paving.
- C. Concrete base shall be prepared in accordance with the preparation requirements for concrete base for brick gutters as specified by the JDOT for the location where the Work is performed. In the absence of JDOT standards, the preparation will be in accordance with the DDOT Standard Specifications for Highways and Structures.
- D. Brick gutters shall be constructed in accordance with the construction requirements for brick gutters as specified by the JDOT for the location where the Work is performed. In the absence of JDOT standards, the preparation will be in accordance with the DDOT Standard Specifications for Highways and Structures.

~ END OF SECTION 32 16 04 ~

SECTION 32 16 25

DRIVEWAYS, SIDEWALKS, AND ALLEYWAYS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to construct driveways, sidewalks (including crosswalks), and alleyways including new and replacement installations.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. Americans with Disability Act (ADA).
- B. District of Columbia Department of Transportation (DDOT):
 - 1. Standard Specifications for Highways and Structures (SSHS).
- C. Jurisdiction Department of Transportation (JDOT):
 - 1. Standard Specifications for the JDOT where the work is performed.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Product Data Sheets” for all products used.

PART 2. PRODUCTS

2.1 GENERAL:

- A. All products shall be as specified by the JDOT for the location where the Work is performed except as modified in this Section.
- B. If the JDOT for the location where the Work is to be performed does not specify products to be used, then the products shall be as specified by DDOT SSHS.

2.2 PRODUCTS:

- A. Products covered by this specification and specified by the JDOT for the location where the Work is performed include:
 - 1. Concrete and all materials necessary to achieve a final concrete work product.
 - 2. Masonry units and all materials necessary to achieve a final masonry work product.
 - 3. Stone and all materials necessary to achieve a final stone work product.
 - 4. Asphalt and all materials necessary to achieve a final flexible pavement product.

PART 3. EXECUTION

3.1 GENERAL:

- A. Driveway, sidewalk, and alleyway shall match existing and construction shall comply with the JDOT for the location where the Work is performed.
- B. If the JDOT does not have construction requirements, then construction shall be performed in accordance with the DDOT SSHS.
- C. Construct accessible features per the ADA regulations.

~ END OF SECTION 32 16 25 ~

SECTION 32 92 23

SODDING

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of furnishing and installing permanent sod as specified within this Section and/or as shown on the Contract Drawings.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 66 10: Product Delivery, Storage, and Handling Requirements.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M146: "Standard Specification for Terms Relating to Subgrade, Soil-Aggregate, and Fill Materials".
- B. ASTM International (ASTM):
 - 1. ASTM C51: "Standard Terminology Relating to Lime and Limestone (as used by the Industry)".

1.5 QUALITY ASSURANCE:

- A. Grower's Qualifications: Sod shall be commercially grown by a producer specializing in sod production and harvesting with a minimum of five (5) years of experience.

1.6 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit "Certifications" for each of the materials specified herein which will be used on the project but not be limited to the following:
 - 1. Topsoil: Certified analysis report from an approved laboratory showing analysis was made not more than 60 days prior to report submission, Contract number, topsoil source, pH, texture and percent organic matter.
 - 2. Fertilizer/Lime: Certificates shall be furnished by the Contractor certifying such products to have a guaranteed analysis per Specifications.
 - 3. Sod: Shall be furnished by the Contractor that is representative of sod to be used, prior to delivery of sod to the site. Sod strip shall be accompanied by certificate from approved source stating sod meets Specifications.
- C. Submit the "Product Data Sheets" for each product used.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS:

- A. Requirements for "Product Delivery, Storage and Handling Requirements" shall be in accordance with Section 01 66 10.
- B. Tag sod with common name of each grass species.
- C. Protect root system from exposure to wind or sun.
- D. Protect sod against dehydration, contamination, and heating during transportation and delivery.
- E. Do not deliver more sod, than can be installed within 24 hours.
- F. Store sod in a moistened condition under shade and/or cover with wet burlap.

PART 2. PRODUCTS

2.1 TOPSOIL:

- A. Topsoil shall be natural, surface soil, of a sandy loam texture with a mechanical analysis of 60-65 percent sand, 15-25 percent silt and 10-15 percent clay as defined by AASHTO M146.
- B. Soil shall contain at least two percent (2%) but not more than five percent (5%) organic matter.
- C. Topsoil shall have a pH between 5.5 and 6.6.
- D. Topsoil shall be free of stones, roots, rubbish, and other objectionable materials such as Bermuda grass, poison ivy, and kindred roots. Topsoil shall not contain any material toxic to plant growth.

2.2 FERTILIZER:

- A. Fertilizer shall be a standard commercial grade containing the equivalent of ten (10) percent nitrogen, six (6) percent phosphoric acid, and four (4) percent potash, all by weight.
- B. Fertilizer shall be furnished in new, clean, sealed, and properly labeled bags with manufacturer's guaranteed statement of analysis on each bag.

2.3 LIME:

- A. Lime for sodding shall consist of agricultural calcitic or dolomitic ground limestone containing at least 85 percent of total calcium and magnesium carbonates.
- B. Limestone shall be per and ASTM C51.
- C. At least 40 percent shall pass the No. 100 sieve, and at least 95 percent shall pass the No. eight (8) sieve.

2.4 SOD:

- A. Sod shall be well rooted Kentucky Blue Grass (*Poa pratensis*) containing a growth of not more than 30 percent of other grasses, nor more than five percent (5%) clovers and free from noxious weeds, dandelion, Bermuda grass, wild mustard, and crab grass.
- B. Soil adhering to roots shall be not less than one (1) inch thick and as uniform as practicable.
- C. Sod shall be mowed in the field to a height of not more than three (3) inches within five (5) days of lifting, and cut into Sections not less than 4-1/2 feet nor more than six (6) feet in length and of uniform 12-inch width.

2.5 BIOSOLIDS:

- A. Biosolids may be mixed with top soil to achieve the required properties specified in Article 2.1 above.

- B. Biosolid shall have the following properties:
 - 1. Classification – Class A EQ.
 - 2. Minimum plant available nitrogen – 6 lbs per wet ton.
 - 3. pH Range – 6.5 to 8.5.
 - 4. Organic Matter Range – 50 to 65 percent by dry weight.
- C. Approved biosolids:
 - 1. Bloom by DC Water.
 - 2. Or equal.

PART 3. EXECUTION

3.1 GENERAL:

- A. Do not install sod when temperature is below 32°F.
- B. Do not install sod on saturated or frozen soil or dried out soil.
- C. Protect newly installed sod against vehicular traffic.

3.2 SOIL PREPARATION:

- A. Areas to be sodded shall be boarded or bladed as needed to eliminate irregularities resulting from soil erosion and to establish an even uniform grade as required.
- B. All areas to be sodded shall be cultivated to a depth of four (4) inches to provide a reasonably firm but friable sod bed.
- C. Areas to be sodded shall be free of any plant growth, stones larger than two (2) inches in any dimension or other debris.
- D. Lime and fertilizer shall be applied uniformly and incorporated into the ground to a depth of four inches either during or following sod bed preparation at the following rates:
 - 1. Lime - 3,000 pounds/acre.
 - 2. Fertilizer - 1,000 pounds/acre.

3.3 TOPSOIL INSTALLATION:

- A. Topsoil shall not be handled when frozen or so wet that it will become puddled or the soil structure destroyed.
- B. Topsoil shall be placed over prepared areas and compacted with a roller weighing not more than 120-pounds per foot of roller width to provide three (3) inches compacted depth.
- C. The finished surface shall be smooth, even, and true to line, grade, and cross section specified.

3.4 SOD PLACEMENT:

- A. Sod shall be mowed in the field to a height of not more than three (3) inches within five (5) days prior to lifting.
- B. All sod shall be in place within 36 hours after lifting from the source.
- C. Sod shall be placed in successive strips neatly matched with staggered joints tightly butted.
- D. Gaps or openings, which occur at paved or wall areas shall be plugged tight with sod.
- E. Sod which is small, irregular, broken, torn or has lost any soil will be rejected.
- F. Do not stretch or overlap sod.
- G. Stagger joints.

- H. Sod shall be watered thoroughly and rolled with approved equipment promptly after placement.
- I. On slope areas, sod shall be placed parallel to the contour, starting at the bottom of the slope.

3.5 ESTABLISHMENT PERIOD:

- A. The Contractor shall maintain, protect and care for sodded areas for at least six (6) weeks after sod is in place or until the end of the Contract, whichever is the longer period.
- B. The sod shall be watered as needed to keep the sod thoroughly wet to a depth of four (4) to six (6) inches, during the first two (2) weeks after laying. Transition the amount of watering during weeks three (3) and four (4) such that the sod does not dry out.
- C. Mow sod to a height of four (4) inches whenever height of grass reaches six (6) inches. Sod shall be allowed to dry for mowing.
- D. The Contractor shall replace or repair dried out or damaged sod at his own expense. Contractor must obtain written permission from DC Water to use DC Water's water for the sod watering requirements.

~ END OF SECTION 32 92 23 ~

SECTION 33 01 20

ABANDONMENT OF UNDERGROUND UTILITIES

PART 1. GENERAL

1.1 SUMMARY:

- A. Contractor shall furnish all materials, equipment and labor necessary to abandon underground utilities in-place as specified herein or indicated on the Drawings. Work specified in this Section includes but is not limited to the abandonment of water mains, valve boxes, valve casings, meter boxes, sanitary sewers, storm sewers, manholes, drainage structures, valve and meter vaults, cleanouts, force mains, sewer laterals, and water service lines in accordance with the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 05 19: Geotextiles.
 - 3. Section 31 23 10: Trench Excavation and Backfill.
 - 4. Section 31 23 23: Controlled Low-Strength Material (Flowable Fill).
 - 5. Section 32 92 23: Sodding.
 - 6. Section 33 14 00: Gate Valves.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM C33: "Standard Specification for Concrete Aggregates".
 - 2. ASTM C1107: "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)".
- B. District of Columbia Department of Transportation: "Standard Specifications for Highways and Structures".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the "Product Data Sheets" of each product used.
- C. Submit Video of pipelines to be abandoned with CLSM.

PART 2. PRODUCTS

2.1 NON-SHRINK GROUT:

- A. Non-shrink grout shall be Cement-based dry-pack grout conforming to ASTM C1107.

2.2 MANUFACTURED PLUG:

- A. Commercially available plug or cap specifically designed and manufactured to be used with the pipe being abandoned.

2.3 FLOWABLE FILL:

- A. Flowable fill shall be general purpose backfill controlled low-strength material (CLSM) as specified in Section 31 23 23 – Controlled Low-Strength Material (Flowable Fill).

PART 3. EXECUTION

3.1 GENERAL:

- A. Manholes, valve casings, catch basin connecting pipes, and storm inlets that are located in the roadway and at a depth less than three (3) feet below approved roadway subgrade shall be removed. Portions more than three (3) feet below subgrade shall be abandoned in place in accordance with this Section unless noted otherwise on the Contract Drawings.
- B. When a utility pipeline is to be abandoned, Contractor shall ensure that all existing mains and service connections are properly plugged or transferred to the new utility pipeline prior to decommissioning the existing pipeline.
- C. Where indicated on the Contract Drawings, existing utility pipelines, conduits, and/or appurtenances shall be removed by the Contractor. Removed materials shall be the property of the Contractor, unless otherwise noted on the Contract Drawings.
- D. Existing utilities within the limits of the trench excavation where new utilities are being placed shall not be abandoned in-place. In this situation, the existing utilities shall be removed to the limits of the trench and disposed of by the Contractor. The ends of existing utilities that extend beyond the trench limits will be abandoned as specified herein.
- E. Existing utilities outside the limits of the trench excavation and shown on the Contract Drawings to be abandoned in-place shall be abandoned in-place in accordance with this Section.
- F. During placement of flowable fill in piping being abandoned, protect the open ends of nearby piping that will remain in operation to prevent flowable fill from getting into it.

3.2 WATER SERVICE LINE ABANDONMENT:

- A. Water service line abandonment includes water service lines up to and including two (2) inches in diameter.
- B. Cut and cap water service lines five (5) feet from the building envelope.
- C. Cut and cap water service lines immediately adjacent to the existing main line when the existing main line will remain active.
- D. Remove the corporation stop, meter box, and curb stop box and install a solid threaded brass plug in place of the removed corporation stop when main line will remain active.
- E. Remove and dispose of any lead materials that are displaced during the installation of the new service line.

3.3 PIPELINE ABANDONMENT:

- A. Pipelines 16 inches in diameter and smaller shall be abandoned in-place. Except as noted otherwise in this Section and on the Contract Drawings each end shall be cut and plugged or capped.
- B. Plugs made of non-shrink grout shall extend into the pipe a minimum of 24 inches and form a solid waterproof plug completely bonded to the pipe.
- C. When manufactured plugs are used to plug pipe, install concrete around plug and over pipe to ensure a waterproof plug.

- D. Pipelines greater than 16 inches in diameter shall be abandoned in-place and completely filled with flowable fill, unless noted otherwise on the Contract Drawing.
- E. All pipes, regardless of size, under structures, waterways, railroad tracks, rail right-of-way shall be abandoned in-place and completely filled with flowable fill, unless noted otherwise on the Contract Drawings.
- F. Where plugs or caps are not used, install bulkheads made of nine (9) inch thick brick masonry or concrete on open ends of pipe to be abandoned.
- G. If a utility line to be abandoned terminates in a manhole/vault that will remain in service, the existing main to be decommissioned shall be plugged from within the manhole and clearly marked on the as-built plans.
- H. Installation of flowable fill shall be performed by experienced crews with equipment to monitor the density of flowable fill and control pressure.
- I. Prior to filling any pipeline with CLSM, inspect the pipe using CCTV to verify all connections have been accounted for and capped. Provide a copy of inspection video to DC Water.
- J. When the main line is to remain active and the branch connection is to be abandoned:
 - 1. Plug or cap tee unless the tee has lead joints.
 - 2. Remove lead joint tees and replace with new pipe and sleeve to keep the main line active.
- K.

3.4 CONCRETE OR MASONRY STRUCTURE ABANDONMENT:

- A. Concrete or masonry structures include, but are not limited to manholes, catch basins, junction boxes, Vaults, etc.
- B. The top of each structure shall be removed to the depth shown on the drawings, a minimum of three (3) feet below approved subgrade, or 12 inches below any crossing utility, whichever is greater.
- C. The depth of structures removed shall not be deeper than 18 inches above the crown of an abandoned pipeline.
- D. Piping or conduit entering a structure shall be plugged.
- E. Break and perforate the bottom of the structure to allow water to drain through after installation of backfill material.
- F. Backfill, using well-draining gravel, all structures greater than three (3) feet in depth.

3.5 VALVE CASINGS AND VALVE BOXES ABANDONMENT:

- A. Remove existing valve casings and valve boxes to be abandoned to a depth of three (3) feet below approved subgrade. The remaining portion of the structure shall be filled with No. 57 stone per ASTM C33.
- B. For valves that are abandoned in-place on lines that are to remain active, remove all internal valve parts and install a blank on the valve, when shown on drawings and prior to testing and backfilling.

3.6 METER BOXES AND CURB STOP BOXES ABANDONMENT:

- A. Remove meter boxes and curb stop boxes in their entirety.

3.7 LATERAL AND CLEANOUT ABANDONMENT:

- A. Remove lateral between sewer line and property line. Laterals to be abandoned on a sewer line that is to remain active shall be plugged at the property line and at the connection to the main with approved plugs.

- B. Abandonment of laterals and cleanouts shall include removing and disposing of castings and at least three (3) feet of the riser pipe.

3.8 BACKFILL, COMPACTION AND RESTORATION:

- A. Backfill and compaction for utilities and all appurtenances abandoned in-place, shall be in accordance with the requirements of Section 31 23 10 – Trench Excavation and Backfill.
- B. Structures remaining in the ground shall be completely filled with flowable fill, crushed stone, or trench backfill unless otherwise specified or shown on the Contract Drawings.
Install a geotextile fabric, complying with Section 31 05 19 – Geotextiles, between crushed stone and any other backfill material containing soil particles passing a number four (4) sieve.
- C. Excavated areas shall be backfilled and the finished grade shall be restored to match the surrounding area unless shown otherwise on the Contract Drawings. If the surface is grass, the restoration shall be completed with sod in accordance with Section 32 92 23 – Sodding.

~ END OF SECTION 33 01 20 ~

SECTION 33 01 25

SEWER LINING CIPP

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, tools, materials, equipment, and supervision necessary to install Cured-in-Place Pipe (CIPP) including, but not limited to installing CIPP system, trimming protruding Laterals, reconnecting Laterals, preliners, grouting, performing quality control, taking samples and testing product, and reinstating existing connections.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Contract Documents are directly pertinent to the Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 06 50: Public Notification - (Sewer).
 - 2. Section 01 33 00: Submittals.
 - 3. Section 33 01 28: Inspection of Sewers for Cleaning, Repairs, Lining, and New Pipe installations.
 - 4. Section 33 01 29: Cleaning of Sewer Mains.
 - 5. Section 33 29 60: Sewer Bypass Pumping.
 - 6. Section 33 39 18: Sewer Manhole Rehabilitation – (General).
 - 7. Section 33 90 51: Structural Lateral Reconstruction Injection Sealing.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM C581: “Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service”.
 - 2. ASTM D543: “Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents”.
 - 3. ASTM D790: “Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials”.
 - 4. ASTM D3567: “Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings”.
 - 5. ASTM D5813: “Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems”.
 - 6. ASTM F1216: “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube”.

7. ASTM F1743: “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)”.
8. ASTM F2019: “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)”.

1.5 DEFINITIONS:

- A. CIPP: Cured-in-Place Pipe (CIPP) is a resin-impregnated flexible tube that is either inverted or pulled into a pipeline/conduit and expanded to fit tightly against said pipeline by using water or air pressure. The resin system is cured to create a continuous and tight fitting pipeline by either:
 1. Elevating the temperature of the fluid (water/air), used to inflate the pipe, to a sufficient level for the initiators in the resin to create a thermosetting reaction, or
 2. Using ultraviolet (UV) light to create a thermosetting resin.
- B. CIPP Installer: The firm who installs the CIPP system. The CIPP Installer could be the Contractor.
- C. Lateral: Service pipe from property line to sewer main, excluding the Lateral Connection.
- D. Lateral Connection: The junction connecting the Lateral to the sewer main.
- E. Lateral Connection Seal: Watertight seal between Lateral and the sewer main.
- F. Manufacturer: Manufacturer of the CIPP System, which includes the fabric tube, the resin system, and other components as needed for CIPP installation.
- G. Reach: A length of pipe between two points containing a specified feature; usually manholes.

1.6 WARRANTY:

- A. The Contractor shall provide a Warranty for all Work for a period of one (1) year from the date of Substantial Completion.
- B. During the Warranty period, DC Water may inspect the installed CIPP at DC Water’s expense. The Contractor will be notified a minimum of fourteen (14) days prior to the inspection and is invited to attend.
- C. At any point prior to the end of the Warranty, if the CIPP has defects as defined in the Table in Paragraph 3.9, the defects shall be remedied by the Contractor in accordance with Section 00 70 00 – General Conditions and Section 01 79 26 – Warranties.

1.7 SUBMITTALS:

- A. Requirements for ‘Submittals’ shall be in accordance with Section 01 33 00.
- B. Submit qualification documentation for:
 1. Manufacturer.
 2. CIPP Installer.
 3. Field Superintendent for the CIPP Installer.
- C. Submit the following Manufacturer’s information:
 1. Certification that the materials to be used meet the requirements of ASTM F1216 and/or ASTM D5813.
 2. Recommendations for shipping, storage and handling of all components of the CIPP System.
 3. Recommended pressures, temperatures, and durations for insertion, heat up, curing, and cool down phases.

4. Product data and instructions for resin and catalyst system, including:
 - a. Short-term (Initial) Flexural Modulus, Long-term (50-year) Flexural Modulus, and Flexural Strength Testing Data in accordance with the appropriate ASTM Standard.
 - b. Safety Data Sheets.
5. Product data and instructions for felt and/or fiberglass tube and sealing materials.
- D. Submit the following:
 1. Work Plan.
 2. Design calculations.
 3. Quality Control Plan
 4. Styrene Management Plan.
- E. Submit the following documentation the same day as the CIPP installation:
 1. Wet-out report when wet-out is performed on site.
 2. Curing logs.
- F. Submit the pre-construction and post-construction CCTV inspection documentation within 14 days of the CIPP Installation.

1.8 QUALITY ASSURANCE:

- A. Qualifications and Experience:
 1. Provide evidence and documentation demonstrating the minimum qualifications for the Manufacturer, CIPP Installer, and CIPP Installer Field Superintendent as follows:
 - a. Manufacturer shall have:
 - 1) At least eight years active experience in the commercial application of CIPP.
 - 2) A CIPP System with a minimum of 500,000 linear feet and 1000 CIPP Reaches successfully installed.
 - b. CIPP Installer shall have:
 - 1) At least three years active experience in the commercial installation of the CIPP product bid.
 - 2) At least 100,000 linear feet and 500 Reaches of successful installations.
 - 3) A minimum of five (5) projects of comparable length, diameter (circular and other shapes) and/or complexity. Provide a list of projects with:
 - a) Project names.
 - b) Years' work was performed
 - c) Owner contact names and current phone numbers.
 - d) Diameter(s) and length(s) of lined pipes.
 - e) Construction start and completion dates.
 - 4) A license or certificate from the Manufacturer stating the CIPP Installer is approved and/or qualified to install the Manufacturer's CIPP system.
 - c. CIPP Installer Field Superintendent shall have:

- 1) Been the Superintendent on a minimum of 25,000 linear feet of installation.
 - 2) At least three (3) years' experience with CIPP. Provide a list of similar projects managed by the Superintendent. The list shall include:
 - a) Project names.
 - b) Years' work was performed.
 - c) Owner contacts and current phone numbers.
 - 3) Strong communicating skills, both written and oral, to ensure that the work proceeds in a proper and efficient manner.
- d. If the Field Superintendent changes at any time during the performance of the work, submit documentation of compliance for the proposed Field Superintendent prior to the replacement Field Superintendent arriving on site.
- B. Quality Control Plan:
1. A checklist for documenting critical steps in the CIPP process.
 2. Defined responsibilities of the personnel assuring all quality requirements are met.

1.9 DELIVERY, STORAGE AND HANDLING:

- A. Protect, store, and handle materials during transportation and delivery, while stored on-site, and during installation following manufacturer's recommendations.
- B. Maintain CIPP at proper temperature in refrigerated facilities and/or sunlight protected facilities to prevent premature curing prior to installation.
- C. Immediately remove from site any CIPP showing evidence of premature curing.
- D. Repair or replace any CIPP material that becomes damaged before or during insertion. Repair or replacement will be at the Contractor's sole expense.

1.10 WORK PLAN:

- A. The Work Plan for each Reach shall include:
 1. CIPP installation site plan and layout. Redline markups on design plans are sufficient.
 2. Critical steps in the CIPP process.
 3. Access and termination points. Redline markups on design plans are sufficient.
 4. Field verified pipe diameter and Reach lengths. Redline tables on design plans is acceptable.
 5. Equipment to be used.
 6. Method of CIPP insertion (e.g., air inversion, water inversion, pulled-in-place, etc.), cure method (e.g., water, hot air/steam, UV, etc.).
- B. Submit Work Plan for each pipe Reach a minimum of 14 days in advance of wet out.
 1. Multiple Work Plans for different Reaches may be submitted.
 2. Do not begin work on any Reach until the Work Plan has been approved.

1.11 STYRENE MANAGEMENT PLAN:

- A. Prepare and submit Styrene Management Plan which shall include the following:
 1. Styrene SDS.

2. Manufacturer's recommendations to mitigate odors from area around job site and Contractor's plan to comply with those recommendations.
3. Plan to prevent water with styrene from entering storm drains, outfalls, open waterways, and other similar waterways.
4. Plan to discharge water with styrene to sanitary sewer. Note that discharge to a combined sewer is only allowed when combined sewer overflows are not likely.
5. Description of PPE for workers on job site.
6. Sample of signs to be posted around job site to inform public of health issues and mitigation strategies associated with styrene.
7. Location of signs described in preceding bullet (redline markup on Contract Drawings are sufficient).

1.12 SCHEDULING:

- A. Submit proposed work schedules a minimum of seven (7) days prior to all planned work.
- B. Provide 48 hours advance verbal notice prior to pre- and post-installation CCTV inspection.
- C. Identify in the work schedules and verbal notices any shifts that may take longer than eight (8) hours or require work to be performed outside the approved working hours.

PART 2. PRODUCTS

2.1 GENERAL:

- A. All components of the CIPP shall be new and free of defects and shall be:
 1. Continuous and of sufficient length to extend between consecutive Reaches.
 2. Homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layer.
 3. Void of material in the tube that may cause delamination in the cured product.
 4. Fully wetted with no dry or unsaturated layers evident.
 5. Capable of conforming to offset joints, bells, and disfigured pipe sections.
 6. Able to stretch to fit irregular pipe sections and negotiate bends.
 7. Have an interior pipe surface wall color after installation that is a light reflective color.

2.2 FABRIC TUBE:

- A. The tube shall consist of one or more layers of a flexible needled felt or an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials, capable of carrying resin and withstanding the installation pressures and curing temperatures, and in accordance with ASTM F1216, F1743, D5813, and F2019, as applicable.
- B. The tube shall be:
 1. Compatible with the resin system to be used on this project.
 2. Fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit. Make allowances for the longitudinal and circumferential stretching that occurs during placement of the tube.
 3. Uniform in thickness and when subjected to the installation pressures will meet the designed finish wall thickness within negative five percent (-5%) to plus ten percent (+10%).

4. Marked for distance at regular intervals along its entire length, not to exceed five (5) feet. Such markings shall also include the manufacturer's name or identifying symbol.
- C. Inversion Fabric Tube: the outside layer of fabric tube shall be plastic coated with a material that is compatible with the resin system and curing technique. This layer shall have an allowance for circumferential stretching during inversion.
- D. Pulled-In-Place Fabric Tube: The outside layer of fabric tube shall have an impermeable plastic coating to contain the resin during and after fabric tube impregnation. The tube shall have an allowance for circumferential and longitudinal stretching during installation.
- E. Any plastic film applied to the tube on what will become the interior wall of the finished CIPP shall be compatible with the resin system used, translucent enough that the resin is clearly visible, and shall be firmly bonded to the felt material.

2.3 RESIN SYSTEM:

- A. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured meets the minimum requirements given herein.
- B. Thixotropic agents that do not interfere with visual inspection may be added for viscosity control.
- C. Resins may contain pigments, dyes, or colors that do not interfere with visual inspection of the resin-impregnated CIPP or its required properties.
- D. Resin Enhancer: Resin enhancer may be used. Maximum amount of enhancer allowed is 35 pounds enhancer per 100 pounds resin.
- E. Bond Enhancer: If using resin enhancer (e.g., aluminum trihydride) or fiberglass reinforced felt, use a suitable bond-enhancing compound (i.e., Silane or equal) to increase the bond between the resin and other material.
- F. The chemical corrosion resistance of the actual resin system proposed and used by the Contractor shall be tested by the resin manufacturer, in accordance with ASTM F1216, ASTM D543, ASTM D5813, or ASTM C581 as applicable.
- G. For UV-light cured systems a photo initiator shall be added to the resin prior to impregnation.
 1. The photo-initiator shall be appropriate to the UV-curing system intended for use.
 2. Ultraviolet curing is not allowed for CIPP lining that is more than eight (8) mm design thickness.

2.4 HYDROPHILIC END SEALS:

- A. Sealing material shall be as recommended by the CIPP manufacturer and is compatible with the CIPP resin system.
- B. Acceptable materials shall not crack, dry up, or shrink.
- C. Hydraulic cements and quick-set cement products are not acceptable.

2.5 PRELINERS:

- A. Preliners used to obtain proper cure of CIPP shall be:
 1. Reinforced plastic sheet formed into a tube sized to fit the host pipe being lined, and
 2. Continuous with the proposed CIPP in length of the Reach.

2.6 CIPP DESIGN CRITERIA:

- A. Perform design in accordance with ASTM F1216, Appendix X1 or ASTM D3567 and submit to DC Water.

- B. Prior to design and ordering the CIPP, verify the internal dimensions of the existing sewer main to insure the CIPP will be the appropriate dimension.
- C. Identify all physical properties and parameters of the CIPP in the design submittal.
- D. The design parameters for CIPP thickness calculation shall be the following unless noted otherwise on Contract Drawings:
 - 1. A minimum service life of 50 years under continuous service.
 - 2. All pipes shall be considered fully deteriorated.
 - 3. A minimum overall safety factor of 2.0.
 - 4. A fully saturated surrounding soil, with groundwater levels at ground surface, unless shown otherwise on the Contract Drawings.
 - 5. AASHTO HS-20 Live Load.
 - 6. A soil modulus of elasticity of 700 psi, unless shown otherwise on the Contract Drawings.
 - 7. Dry soil Density of 120 lbs/ft³.
 - 8. The depth of cover for a specific Reach shall be the deepest of the following: adjacent upstream manhole, adjacent downstream manhole, or deepest point between manholes; all as shown on the Contract Drawings.
 - 9. A minimum ovality of 2.0% and maximum long-term deflection of 5%.
 - 10. Enhancement Factor (K) of 7.0.
 - 11. A Poisson's ration of 0.3.
 - 12. A minimum short-term flexural modulus of elasticity (ASTM D790) at 73°F:
 - 13. Polyester System: 250,000 psi
 - 14. Enhanced Polyester System: 400,000 psi
 - 15. Vinyl Ester System: 300,000 psi
 - 16. The materials used shall provide a minimum long-term (50 yr) flexural modulus of elasticity of 125,000 psi (ASTM D790).
 - 17. A minimum flexural strength for gravity lines of 4,500 psi (ASTM D790).
 - 18. Assume no bonding to original pipe wall.

PART 3. EXECUTION

3.1 GENERAL:

- A. Field verify lengths and inside diameters of pipe to be lined prior to designing and ordering CIPP.
- B. DC Water will perform water shutoffs to individual properties during installation of the CIPP.

3.2 CUSTOMER OUTREACH:

- A. Make every effort to maintain service usage throughout the duration of the project.
- B. In the event that a Lateral will be temporarily out of service, the maximum amount of time of no service shall be 16 hours for any property served by the sewer.
- C. Follow requirements as specified in Section 01 06 50 - Public Notification (Sewer).

3.3 PRE-INSTALLATION:

- A. Clean all debris, grease, roots, and other foreign matter from inside of sewers to be rehabilitated in accordance with Section 33 01 29 - Cleaning of Sewer Mains”.
 - 1. The sewer shall have no debris prior to CIPP installation.
 - 2. Clear the sewer of obstructions, solids, protruding service lines, collapsed pipe, or any other obstruction that might prevent proper insertion of the CIPP assembly.
 - 3. Cut all protruding services with a remote robotic cutter to allow proper installation of the CIPP.
 - 4. Notify DC Water of any obstruction or protruding service that cannot be removed and will prevent successful installation of the CIPP.
 - 5. Obtain written approval from DC Water to perform a point repair excavation to uncover and remove or repair the obstruction prior to the commencing point repair work.
- B. Manhole Access and Modifications:
 - 1. Remove manhole frame and cover, chimney and/or cone as needed to achieve minimum access opening as required for the liner inversion process.
- C. Bypassing Sewage:
 - 1. Establish sewage bypass operations around the sections of the line that are to be rehabilitated in accordance with Section 33 29 60 - Sewer Bypass Pumping.
 - 2. Maintain sewage bypass operations until installation is complete and inspection of the installed liner has been performed.
- D. Temporary Control of Infiltration:
 - 1. Chemical grout may be used to temporarily control infiltration.
- E. Before starting lining operations:
 - 1. Thoroughly inspect each Reach of sewer being rehabilitated using CCTV immediately before lining the pipe in accordance with Section 33 01 28 – Inspection of Sewers for Cleaning, Repairs, Lining, and New Pipe Installations.
 - 2. Determine the exact location of all sewer service connections by CCTV inspection.
 - 3. Pre-lining CCTV inspection is considered incidental to the CIPP lining work unless shown otherwise on the Contract Drawings.
- F. Preliner:
 - 1. Use preliner when infiltration is sufficient to cause resin migration.
 - 2. Damage to the preliner tube shall be repaired in accordance with the manufacturer’s recommendations.

3.4 INSTALLATION:

- A. Install CIPP in accordance with the practices given in ASTM F1216 for direct inversion installations, ASTM F1743 for pulled-in-place installations, and ASTM F2019 for UV cured fiberglass installations.
- B. Hydrophilic End Seals:
 - 1. Prior to the installation of the CIPP, insert continuous or properly trimmed hydrophilic end seals to the interior circumference of the existing sewer at the inlet and outlet of each manhole.
 - 2. Ensure trimmed end seal edges are butted up against each wall per the Manufacturer’s recommendation.
 - 3. End seals shall have no gap between the trimmed edges.

- C. Tube Impregnation:
1. The quantity of resin used for the tube's impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances being made for polymerization shrinkage and the anticipated loss of any resin through cracks and irregularities in the original pipe wall.
 2. Impregnate the tube using a vacuum or pressure impregnation process in conjunction with a roller system to achieve a uniform distribution of the resin throughout the tube.
- D. Curing:
1. Follow the Manufacturer's recommendations to cure the resin including, but not limited to:
 - a. The curing temperatures.
 - b. The duration of holding the pressurized fluid at curing temperatures.
 2. Temperature Monitoring for CIPP in pipes less than 36 inches in diameter using steam or water cure:
 - a. Place temperature gauges at the upstream and downstream ends of the Reach being lined to monitor the pressurized fluid's (air or water) temperature.
 - b. Document the following curing readings in curing logs every 30 minutes:
 - 1) Temperature at the upstream and downstream manhole as indicated by external thermocouples.
 - 2) Pressure inside the CIPP liner.
 3. Temperature Monitoring System for CIPP in pipes 36 inches in diameter and larger using steam or water cure:
 - a. Install a Temperature Monitoring System in all pipes 36 inches and larger being lined with CIPP.
 - b. The system shall monitor the curing process over the entire length of the CIPP.
 - c. The monitoring system and related software shall be capable of monitoring curing temperature continuously during installation along the full length of the CIPP liner.
 - d. Prior to installing the CIPP in the host pipe, confirm the temperature monitoring system's proper function.
 - e. Monitor the sensors using a device that can record the temperatures throughout the entire curing period utilizing a tamper-proof database.
 - f. If the monitoring system fails, record temperature gauges near each manhole with manual temperature readings every 30 minutes.
 - g. Document curing temperatures from the temperature monitoring system in curing logs.
 4. Curing Monitoring System for CIPP using UV Cure shall include the following:
 - a. A built-in process that monitors the curing as the light train travels through the CIPP.
 - b. An automated computer control system that adjusts light temperature, intensity, wavelength and speed of light train.
 5. Submit curing logs the same day as the installation of the CIPP
- E. Lateral Reinstatement:

1. Reinststate all Lateral connections unless the Lateral is visibly capped or unless instructed otherwise by DC Water.
 2. Open each connection using a remote cutting tool that can cut a hole matching the service connection diameter.
 - a. A fully restored service connection shall be free from burrs or projections and have a smooth and crack-free edge.
 - b. The hole shall be 90% minimum and 100% maximum of the original service connection inside diameter.
 - c. The invert of the service connection shall match the invert of the reinstalled service opening.
 3. Prevent coupons from passing through the sewer system by collecting them at the next manhole downstream of the pipe rehabilitation operation.
- F. Lateral Connection:
1. Where shown on Contract Documents, install one of the following:
 - a. Lateral connection reconstruction seals in accordance with Section 33 90 51 - Structural Lateral Reconstruction Injection Sealant at Main.
 - b. A one (1) piece homogenous main and lateral CIPP connection liner formed as a structural cylinder that renews 18 inches and 360 degrees of the main line and extends up the lateral piece as a continuous lining six (6) inches.
- G. CIPP Joint at Manholes:
1. Seal ends of CIPP at manhole to achieve watertight pipe seals.
 2. For CIPP passing through manholes,
 - a. Build up the invert to remove any flow restrictions and to form a continuous invert through the manhole.
 - b. Cut and remove CIPP material above the top of the existing channel.
 - c. Grout and shape the bench of the manhole as necessary to support the CIPP.

3.5 ENVIRONMENTAL CONTROLS:

- A. Styrene and Temperature Control:
1. Take precautions to minimize the release of styrene and mitigate styrene odors generated during the setup and CIPP lining process, and prevent such odors from entering structures, businesses, or other types of establishments, through service connections or other plumbing fixtures.
 2. For CIPP installations in separate storm sewers, at no time will water, condensate, or any other material be allowed to discharge into downstream outfalls or water bodies. Any water, condensate, or other materials shall be contained and pumped to the sanitary sewer system.
 3. For CIPP installations in separate storm sewers, upon completion of cool down process, flush fully-cured and cooled-down CIPP. Flushing shall consist of jetting entire surface of CIPP twice with clean water.
 4. Styrene air emissions shall comply with Federal and District requirements.

3.6 POST-INSTALLATION VIDEO INSPECTION:

- A. After lining work is complete and service connections are reinstated and reactivated, perform a post-installation inspection of the CIPP in accordance with Section 33 01 28 – Inspection of Sewers for Cleaning, Repairs, Lining, and New Pipe Installations .

- B. Post lining CCTV inspection is considered incidental to the CIPP lining work unless shown otherwise on the Contract Drawings.

3.7 SITE RESTORATION:

- A. Restore the project area affected by the Work to a condition at least equal to that existing prior to the work.
- B. If manhole frame and cover, chimney and/or cone are removed to facilitate CIPP installation, rebuild manhole per specification Section 33 39 18 – Sewer Manhole Rehabilitation – (General).
- C. Site restoration is considered incidental to the CIPP lining work unless shown otherwise on the Contract Drawings.

3.8 FIELD QUALITY CONTROL AND TESTING:

- A. DC Water will verify the physical properties of the installed CIPP using an independent third-party laboratory, at DC Water's expense, selected by DC Water.
- B. Prepare and provide field samples to DC Water for testing as follows:
 - 1. Provide the number of samples for the linear feet (LF) of CIPP installed as follows:
 - a. Less than 1500 LF – one (1) set of three (3) samples from a single location.
 - b. 1500 to 3000 LF – one (1) set of three (3) samples from 2 different locations.
 - c. Greater than 3000 LF – one (1) set of three (3) samples from each 3000 LF or portion thereof.
 - d. The number of samples sets taken are independent of the number of different Reaches lined.
 - e. Locations will be determined by DC Water.
 - 2. The samples shall be restrained samples for diameters of CIPP less than 18 inches; and flat plate samples for diameters of CIPP 18 inches and larger.
 - 3. Flat plate samples shall be taken directly from the wet-out tube, clamped between flat plates, and cured in the downtube.
 - 4. Samples for UV cured CIPP shall be restrained bag samples.
 - 5. Label all samples with the date of installation, manhole number, and street address where the sample was taken.
- C. All tests will be in accordance with applicable ASTM test methods to confirm compliance with the requirements specified in this Section as follows:
 - 1. Thickness.
 - 2. Short term flexural (bending) strength.
 - 3. Short-term flexural modulus of elasticity.
 - 4. Tests will be completed for only one (1) of the three (3) samples collected for a given Reach.
 - 5. The other two (2) samples will be stored by DC Water for additional testing if any samples fail to meet requirements of this Specification or the applicable ASTM.
- D. The Contractor may, at its discretion and cost, conduct additional testing using additional samples.

3.9 ACCEPTANCE:

- A. Acceptance of the CIPP shall be based on compliance with this Section as demonstrated by curing logs, post-installation inspection CCTV, and laboratory test results.

1. The layers of the finished CIPP shall be uniformly bonded such that:
 - a. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly, or
 - b. That the knife blade moves freely between the layers.
 - c. All layers, after cure, form one homogeneous structural pipe wall with no part of tube left unsaturated by resin.
2. The CIPP fits tightly to the internal circumference of the existing pipe, and a membrane integrally bonded to the internal circumference of the felt, thus forming a smooth, chemically inert internal flow surface.
3. Inspection results showing defects that exceed accepted tolerance levels as defined in the table below shall be remedied by the Contractor.
4. The repair method chosen by the Contractor may be the Acceptable Remedy listed in the Table below.
5. The Contractor may also submit an alternative remedy for approval by DC Water and, if DC Water approves the alternative remedy, the Contractor shall install the approved remedy.

Defects	Accepted Tolerance levels	Acceptable Remedy
Visible leaking through CIPP wall / Pinholes	None	<ul style="list-style-type: none"> • Install internal CIPP spot repair.
Wrinkles / Fins / Folds below the springline	Five (5%) of host Pipe Diameter or less	<ul style="list-style-type: none"> • Remove where recommended by the Manufacturer.
Bubbles / Blistering / Dimples / Lumps / Hot Dogs (Longitudinal Lump) / Foreign Inclusions / Dry Spots	Five (5%) of host Pipe Diameter or less assuming such does not impede flow	<ul style="list-style-type: none"> • Remove defective portion of CIPP and install internal CIPP spot repair following recommendations from the Manufacturer.
Lateral Overcut	< ½ inch	<ul style="list-style-type: none"> • A one (1) piece homogenous main and lateral CIPP connection liner, or • Lateral connection reconstruction seals in accordance with Section 33 90 51 - Structural Lateral Reconstruction Injection Sealant at Main, or • Structural grouting.
Cracks	None	<ul style="list-style-type: none"> • Install internal CIPP spot repair.
Delamination	None	<ul style="list-style-type: none"> • Remove defective portion of CIPP and install internal CIPP spot repair.
Bursts / Collapse / Unravel / Lifts	None	<ul style="list-style-type: none"> • Remove defective portion of CIPP and install internal CIPP spot repair.
Seals at Termination Points not Water Tight	None	<ul style="list-style-type: none"> • Repair and/or replace.

~END OF SECTION 33 01 25~

SECTION 33 01 28

INSPECTION OF SEWERS FOR CLEANING, REPAIRS, LINING, AND NEW PIPE INSTALLATIONS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to perform inspections on sewers to verify the conditions of the pipe and acceptance criteria of Work performed:
 - 1. Prior to, during, or after cleaning pipe.
 - 2. Prior to and after repairing pipe.
 - 3. Prior to and after lining a pipeline.
 - 4. After installation of a new pipe.

1.2 RELATED DOCUMENTS:

- A. Drawing, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. National Association of Sewer Service Companies (NASSCO).
 - 1. Pipeline Assessment and Certification Program (PACP) Reference Manual.

1.5 SUBMITTALS:

- A. Provide submittals in accordance with Section 01 33 00 – Submittals.
- B. Submit the following:
 - 1. Qualifications for the contractor performing inspections.
 - 2. Qualifications for the equipment operator.
 - 3. Inspection logs.
 - 4. Inspection reports.
 - 5. Electronic NASSCO PACP database of the inspections.
 - 6. CCTV Video and/or Sonar recordings.
 - 7. Certification and acceptance by lining installer.

1.6 QUALIFICATIONS:

- A. Contractor Qualifications:

1. Perform inspections using a company that is engaged in performing inspections using the type of equipment that will be used to perform the inspections and has inspected no less than 100,000 LF of sewers.
- B. Operator Qualification Requirements:
1. Certified as a NASSCO PACP certified operator with a minimum of three (3) years' experience performing inspections as a NASSCO PACP certified operator.
 2. A minimum of three (3) years of experience inspecting, processing, and interpreting data.
 3. Submit copies of PACP certification and experience history for each operator prior to beginning work.

1.7 REPORTS:

- A. Inspection Logs:
1. Submit inspection logs containing the following information for all inspections:
 - a. Inspection log for all inspections including, but not limited to:
 - 1) Job and/or work assignment number.
 - 2) Date and time of inspection.
 - 3) Location and identification of pipeline section televised.
 - 4) Upstream and downstream manholes.
 - 5) Direction of inspection.
 - 6) Size and type of pipe.
 - 7) Length of pipeline section televised.
 - 8) Locations of all service connections.
 - 9) Traffic Control, if used.
 - 10) Name of Subcontractors performing work during the inspection, if any.
 - 11) Location of all observed structural deficiencies, Operation and Maintenance deficiencies, construction features, and miscellaneous features in accordance with the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP).
 2. Pre-Cleaning:
 - a. Include the following data in the inspection logs when documenting pre-cleaning inspections:
 - 1) The amount of cleaning required.
 - 2) Location of service laterals.
 - 3) Sags, breaks, offsets, open joints, and other structural conditions that may warrant immediate attention to repairs.
 3. Post Cleaning:
 - a. Include the following data in the inspection logs when documenting post cleaning inspections:
 - 1) Locations where additional cleaning is required.
 - 2) Location of service laterals.
 - 3) Sags, breaks, offsets, open joints, and other structural conditions that may warrant immediate attention to repairs.

4. Pre-Lining:
 - a. Include the following data in the inspection logs when documenting post pre-lining inspections:
 - 1) Locations where additional cleaning is required prior to lining.
 - 2) Sags, breaks, offsets, open joints, protruding service connections, and other structural conditions that will prevent proper installation of liner.
 - 3) Verification that necessary repairs are performed prior to lining the pipe.
 5. Post Lining:
 - a. Include the following data in the inspection logs when documenting post lining inspections:
 - 1) Existence and location of imperfections that do not meet the quality requirements of the specification under which the liner was installed.
 6. New Pipe:
 - a. Include the following data in the inspection logs when documenting the inspections performed on new pipe installations:
 - 1) Condition of the pipe at joints, fittings, and points of concern.
 - 2) Data required to verify visual inspection and grade tolerance for new pipe installation as defined by the Contract Documents.
- B. Inspection Reports:
1. Submit a summary report describing the conditions of the pipe during the inspections including:
 - a. A NASSCO PACP certified worksheet.
 2. When the pipe is to be lined, include in the inspection report the following:
 - a. The general condition of the pipe after cleaning and prior to lining.
 - b. Certification and acceptance by the lining installer acknowledging the pipe is ready to be lined and that the conditions within the pipe will permit installation of the lining in accordance with the requirements of the specification to which the lining is being installed.
 - c. Recommendations, from the lining installer, regarding additional repairs, cleaning, etc. that need to be made prior to installing the lining.

1.8 ELECTRONIC DATA:

- A. Submit digital copies of the certified NASSCO PACP database of each inspection to DC Water on flash drive or hard drive that is USB 3.0 compatible.
- B. Provide inspection logs and summary reports with the digital copies.

PART 2. PRODUCTS

2.1 CABLE DRUM AND CABLE:

- A. Cable Drum Requirements:
 1. Motorize with variable speed.
 2. Include serial communications for all speed and direction controls.

3. Capable of being controlled from the computer keyboard and through mouse click commands or a variable speed "joy stick" controller.
 4. Sufficient capacity to support the length of cable necessary to inspect the pipe without performing a reverse inspection but not less than 2000 linear feet, unless specified otherwise on the Contract.
- B. Cable Requirements:
1. Dual jacketed with polyurethane and waterproof for constant underwater operations.
 2. Sufficient length to inspect the longest length of pipe in a single direction but not less than 2000 linear feet unless noted otherwise on the Contract.

2.2 CCTV SYSTEM:

- A. Television Inspection Equipment Requirements:
1. Pipe inspection Camera with the following properties:
 - a. Camera operating temperature range of 32°F to 122°F.
 - b. Imager sensor of ¼" color CCD with minimum 0.4 megapixel or better resolution.
 - c. Producing a video recording using a pan-and-tilt, radial viewing, pipe inspection camera that pans \pm 285 degrees and rotates 360 degrees with a variable pan speed not to exceed 25 degrees per second.
 - d. Camera height adjustment so that the camera lens is always centered at one-half (1-1/2) the inside diameter, or higher, in the pipe being televised.
 - e. Full, true color, sharp image video bandwidths with no sacrifice or visible streaking of low frequency response.
 - f. 525 scanning lines, 60 fields, 30 frames, interlaces 2:1 - NTSC Color Standard, with geometrical image distortion not exceeding two percent (2%) (picture transmission systems requiring use of R.F. suppressors and subject to local transmitter interference not acceptable).
 - g. Equipped with an f/1.4 wide angle lens with optical viewing angle to 70 degrees, auto iris type to control the illumination range for an acceptable picture between ten (10) and 100,000 Lux, with manual override remotely controlled from the viewing station.
 - h. Equipped with high output strobe lighting system capable to illuminate six (6) to 60 inch sewer pipes without externally-mounted lighting.
 - i. A 40:1 zoom length capable of ten times (10X) optical and four times (4X) digital, with auto and manual remote focus capability.
 - j. Video capture equipment that is capable of continuously capturing digital video from first generation recordings with no frame loss, regardless of the progression of the inspection.
 2. CD/DVD recorder with the following properties:
 - a. Slow motion playback without noise bars.
 - b. Capability to document the inspection with 90 minute duration maximum, with "data view" indicating project address identification, date, and voice description of the inspection during video recording.
 3. On board television viewing monitor with the following properties:
 - a. High resolution industrial grade color unit providing 3.1 megapixels of resolution or greater.
 - b. Minimum 12 inch diagonally screen.

- c. Voltage compensation circuits to reduce picture distortion to less than one percent (1%) under voltage conditions varying from 105V to 120V.
 - d. Housed in a steel cabinet which acts as shield to minimize effects of local magnetic fields such as transformers, coils, wraps of cable, etc. (monitors having inadequate or no protection from local magnetic fields, thereby contributing to loss of color picture purity, not acceptable).
 - e. Speaker to allow for audio playback from CD/DVD recording.
- B. Document Recordings:
- 1. Provide in digital format.
 - 2. Store image capture in JPEG formats.
 - 3. Video capture file requirements:
 - a. Be stored in industry standard Windows Media or MPEG-4 format on a USB 3.0 compatible external hard drive and viewable on a personal computer that utilizes MicroSoft Media Player.
 - b. Have a minimum resolution of 640 pixels (x) by 480 pixels (y) and an encoded frame rate of 29.97 frames per second.
- C. Lighting Equipment Requirements:
- 1. A halogen lighting system comprised of controlled-beam, reflector-sealed lamps with an automatic light compensator.
 - 2. Capable of supplying dimmable 40-LED array illumination.

2.3 SONAR SYSTEM:

- A. Sonar Equipment Requirements:
- 1. Be digital and capable of operating in pipelines with diameter sizes shown on the drawings.
 - 2. Specifically designed for municipal wastewater environments and operable in fully submerged conditions.
 - 3. Have a Sonar head capable of being mounted on either a crawler or floatation equipment if necessary
 - 4. Capable of making 400 measurements per minute with an accuracy of plus or minus (\pm) 0.5 percent.
 - 5. Have a maximum beam width of the Sonar energy pulse no greater than two (2) degrees from the center of the transducer.
 - 6. Have a high-speed scanning capability of 1.3 seconds per 360 degree revolution.
 - 7. Be a programmable multi- frequency profiling Sonar which supports a range of frequencies from 600 kHz to 3.0 MHz, and an acoustic beam width of less than 1.1 degrees in order to produce accurate clear cross sections of the pipe being scanned.
 - 8. Able to be operated as required to perform the work shown, but not less than 1,000 feet, remotely from the surface equipment.
 - 9. Have a minimum of 0.9 degree angular resolution with at least 400 sectors per revolution.
 - 10. Record full revolution scans with a density of one (1) complete Sonar scan per second.
 - 11. Have pitch and roll tilt sensors (inclinometer) with 0.1 degree resolution showing the numerical attitude of the scanner on the screen both pictorially and numerically in analog and digital form.

- B. Sonar Software Requirements:
 - 1. Able to capture still frame screen images and save the images as JPEG files.
 - 2. Readable in all major software programs used for report generation.
 - 3. Have real-time measurement capabilities including point-to-point measurement, diameter measurement using a circle overlay.
 - 4. Come with Sonar viewing software at no cost to DC Water.
- C. Surface equipment to support the analog Sonar and provide a continuous NTSC composite video output so that the entire survey can be recorded on DVD and viewed on video monitors.
- D. Range Resolution Measurement Error Requirements:
 - 1. Be no greater than 0.08 inches from a distance of three (3) to 12 feet.
 - 2. Be no greater than 0.4 inches from distances of beyond 15 feet.
 - 3. Have a minimum detectable range of six (6) inches.
- E. Error Tolerance Accuracy for Volume Calculation of Sediment Quantification:
 - 1. A minimum 92% for pipelines up to and including 54 inches diameter.
 - 2. A minimum of 95% accuracy for pipelines greater than 54 inches in diameter.

2.4 TRANSPORT/PLATFORM:

- A. Transport/Platform Requirements:
 - 1. Portable, manual winches or motorized mechanical equipment of indirect drive type.
 - 2. Have sufficient cable or rods to permit inspection of all sewer main sections specified.
 - 3. Capable of moving camera through the pipeline in either direction at a uniform, slow rate.
 - 4. Capable of zero (0) degree turning radius.
 - 5. Fit through a manhole with a minimum inside diameter of 24 inch without modifications to the access structure.
 - 6. If transport is tracked, have multiple wheel set or sufficient torque to maximize traction in large diameter pipe or in adverse pipe conditions including high flow, deep mud, sand and large amount of debris commonly found in storm and sanitary sewers.
 - 7. Be stable in high-velocity flows of up to eight (8) ft/ sec.
 - 8. Support simultaneous use of multiple sensors when appropriate.

2.5 METERING DEVICE:

- A. Metering Device Requirements:
 - 1. Display the equipment location at ground level on the monitor screen.
 - 2. Enable the distance recorder to be set at zero (0) from the inspection vehicle.
 - 3. Have an accuracy of plus or minus one (1) percent.
 - 4. Display the distance moved through the pipe on the monitor screen and be logged along with the saved images for accurate determination of where defects exist in the pipe relative to the deployment location.

2.6 MONITORING VEHICLE:

- A. Monitoring Vehicle Requirements:
 - 1. Separate viewing and working areas.
 - 2. A means to control internal and external sources of light to ensure that the monitor screen display is clearly visible.
 - 3. Seating for two (2) people in addition to the operator, with clear view of the inspection monitor.
 - 4. The ability to print inspection images with text annotations highlighting specific points in the image and the current control settings.

2.7 REMOTE VISIBILITY:

- A. Provide capability to stream CCTV and Sonar video wirelessly for remote viewing by personnel at a remote location.

PART 3. EXECUTION

3.1 CCTV/SONAR PRIME POSITION:

- A. Position the CCTV/Sonar camera to minimize picture distortion.
- B. In circular sewers, position the CCTV/Sonar camera lens in the center of the pipe.
- C. In non-circular sewers, position the CCTV/Sonar lens at mid-height, unless otherwise agreed, and centered horizontally.
- D. In all instances, position the camera lens parallel with the axis of the sewer. A positioning tolerance of plus or minus ten percent ($\pm 10\%$) of the vertical sewer dimension will be allowed.

3.2 INSPECTIONS – GENERAL:

- A. Perform inspections using CCTV and/or Sonar as required by the Contract documents or as necessitated by the flows in the pipe.
- B. Perform all inspections in accordance with NASSCO PACP guidelines.
- C. Provide DC Water with access to the television monitor and all other operations at all times.
- D. Set the zero (0) point for the metering device at the center of the manhole or access box.
- E. Move the camera through the pipe at a moderate rate, stopping when necessary to permit proper documentation of the condition of the pipeline.
- F. Maximum camera speed of not greater than 30 feet per minute
- G. Stop inspection equipment at each service lateral, defect, and point of interest for not less than ten (10) seconds while recording the condition of the lateral and defect.
- H. Rotate and move the camera as necessary to fully inspect and document each service lateral, defect, and point of interest from multiple angles to clearly show the extent and nature of the item.
- I. Record audio designations to the video for each service lateral, defect, and point of interest.
- J. If the camera becomes stuck in the pipeline, perform all actions necessary to remove the camera at no additional cost to DC Water.
- K. Record and document all inspections and provide paper and electronic copies of inspection reports as well as digital copies of the inspection recordings to DC Water.

3.3 REPAIR AND LINING INSPECTIONS:

- A. Perform lining inspections using CCTV unless specified otherwise.

- B. Pre-Lining Inspection:
 - 1. Perform pre-lining inspection immediately prior to installing a repair or lining system.
 - 2. Inspect the interior of each segment of pipe to verify the pipe is properly prepared for the repair or installation of the liner and that the pipe complies with the requirements of the repair or lining specification.
 - 3. Certify to DC Water that the pipe is suitable for repair and lining and that no conditions exist that will damage the repair or liner during installation activities.
- C. Post Lining Inspection:
 - 1. Perform post lining inspections after the repair or liner is installed and before opening the service connections.
 - 2. Inspect the installation condition of the newly installed repair or liner to verify the installation complies with the requirements of the repair or lining specification.
 - 3. If no service laterals are connected to the pipe segment, then this inspection can be used as the Final Lining Installation Inspection.
- D. Final Lining Installation Inspection:
 - 1. Perform final lining installation inspection after all service laterals are reinstated.
 - 2. Inspect the installation of the liner at the laterals and show that reinstatement of each lateral complies with the requirements of the lining specification.

3.4 CLEANING INSPECTIONS:

- A. General:
 - 1. Unless specified otherwise, perform cleaning inspection using the following type of equipment:
 - a. CCTV when:
 - 1) The pipe size is 24 inches or less in diameter, or
 - 2) The pipe size is greater than 24 inches and the depth of flow is less than or equal to 25% of sewer diameter at both starting and ending manholes
 - b. Sonar when the depth of flow exceeds 75% of sewer diameter.
 - c. CCTV and Sonar when:
 - 1) The pipe diameter is greater than 24 inches in diameter, and
 - 2) The depth of flow is greater than 25% but not greater than 75% of sewer diameter at both starting and ending manholes for sewers greater than 24 inches in diameter.
- B. Pre-Cleaning Inspection:
 - 1. Perform pre-cleaning inspection immediately prior to cleaning the sewer.
 - 2. Inspect the pipe to determine the level (low, medium, or high) of cleaning that will be required to clean the pipe to allow follow-on work to be performed.
 - 3. If the inspection cannot be fully performed from a single direction, attempt to complete the inspection from the other direction.
 - 4. Pre-cleaning inspection will be paid at the unit rate stated in the SOP.
- C. Post Cleaning Inspection:
 - 1. Perform post cleaning inspection immediately after the sewer is cleaned.

2. Inspect the pipe to determine if cleaning complies with the requirements of the cleaning specification.
3. Post cleaning inspection is considered incidental to the cleaning and will not be paid.

3.5 NEW PIPE INSTALLATION INSPECTIONS:

- A. Inspect New Pipe When:
 1. Pipe has been installed and backfill has been placed and compacted around and over the pipe to finished elevation.
 2. DC Water believes the pipe was installed improperly and the integrity of the pipe is compromised.
 3. The pipe was subjected to construction activities that may have compromised the integrity of the pipe.
- B. Inspect the pipe to determine if the pipe installation complies with the specification's requirements for the installed pipe.

~ END OF SECTION 33 01 28 ~

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SECTION 33 01 38

CCTV INSPECTION OF SEWERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, tools, and equipment, necessary to perform inspections of sewers using Closed Circuit Television (CCTV) on combined, sanitary, and storm sewers.
- B. Unless shown otherwise on Contract Documents or directed otherwise by DC Water, perform CCTV inspections when:
 - 1. The pipe size is 24 inches or less in diameter and the camera head is above the water level when positioned at the center of the pipe, or
 - 2. The pipe size is greater than 24 inches and the depth of flow is less than or equal to 25% of sewer diameter at both starting and ending manholes, or
- C. Unless shown otherwise on Contract Documents or directed otherwise by DC Water, combine CCTV inspections with Sonar inspections in accordance with Section 33 01 39 – Sonar Inspection of Sewers and Section 33 01 44 – Multi-Sensor Inspection of Sewers when:
 - 1. The pipe size is greater than 24 inches and the depth of flow is greater than or equal to 25% of the sewer pipe diameter at both starting and ending manholes, and
 - 2. The depth of flow is less than 75% of sewer pipe diameter.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Divisions 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 01 29: Cleaning of Sewer Mains.
 - 3. Section 33 01 39: Sonar Inspection of Sewers.
 - 4. Section 33 01 44: Multi-Sensor Inspection of Sewers.
 - 5. Section 33 29 60: Sewer Bypass Pumping.

1.4 SUBMITTALS AND DELIVERABLES:

- A. Provide submittals in accordance with Section 01 33 00 – Submittals.
- B. Submit:
 - 1. Data on the equipment to be used for the inspection.
 - 2. Contractor's qualifications.
 - 3. PACP certificate for operators.
 - 4. Operator's experience.
 - 5. Field reports.

6. Written and electric inspection reports.
7. CCTV Inspection Recordings.
8. Bi-weekly schedule and maps showing access to sewer manhole or structure.

1.5 REFERENCED DOCUMENTS:

- A. National Association of Sewer Service Companies (NASSCO):
 1. Pipeline Assessment and Certification Program (PACP) Reference Manual.

1.6 QUALIFICATIONS:

- A. Contractor Qualifications:
 1. Perform inspections using a company whose business is regularly engaged in performing CCTV operations.
 2. Submit Contractor qualifications documenting a minimum of three (3) projects of similar size and scope performed by Contractor during the previous five (5) years. Include:
 - a. A list of projects.
 - b. Type of inspection equipment.
 - c. Client names.
 - d. Client contact information including telephone numbers and email.
- B. Operator Qualifications Requirements:
 1. Certified as a NASSCO PACP certified operator with a minimum of three (3) years' experience performing inspections as a NASSCO PACP certified operator.
 2. A minimum of three (3) years of experience inspecting, processing and interpreting data in accordance with NASSCO PACP standards.
 3. Submit qualifications for operators prior to the operator performing work on the inspection.

1.7 QUALITY CONTROL:

- A. CCTV Quality Control:
 1. Camera distortions do not prevent clear inspection of the pipe.
 2. Camera lighting provides clear inspection of the pipe and does not have glare, spots, or insufficient lighting.
 3. Lenses are maintained clean and do not distort the video or prevent clear inspection of the pipe.
 4. Pictures are clear and not blurred or hazy.
 5. Camera is stopped and defects are panned to clearly show the level and extent of defect.
- B. Repeat inspections that do not meet quality items listed above for the full extent of the pipe at no additional cost to DC Water.
- C. Ensure coding and reporting standards and guidelines comply with PACP.
- D. Calibrate CCTV systems in accordance with manufacturer's recommendations.
- E. Synchronize and calibrate camera and monitor image in accordance with the manufacturer's recommendations at the beginning of each workday, anytime the picture becomes distorted, or as directed by DC Water.

- F. Provide audio recording that are free of background and electrical noise to achieve a clear and discernible oral report.

1.8 SCHEDULE:

- A. Prepare and submit bi-weekly schedules showing locations where work is planned. Include maps of each area showing the manhole locations and entrances.

1.9 FIELD REPORTS:

- A. Daily reports summarizing work performed including, but not limited to:
 - 1. Total number of segments inspected.
 - 2. Total length of segments inspected during the week.
 - 3. Line segments and length of each line segment inspected.
 - 4. Manholes that were unable to be opened, located or otherwise accessed.
 - 5. Line segments requiring immediate attention due to structural failure or threat to the health and safety of the public or environment.
 - 6. Resident interactions or incidents.
 - 7. Delays.
- B. Pipe Inspection Summary Report, Pipe Inspection Logs, and Inspection Recordings.
- C. Include in each report the name of all parties, including Contractor and Subcontractors, performing work.

1.10 INSPECTION REPORTS:

- A. Submit inspection reports for each inspection performed.
- B. Obtain approval of the format of the inspection reports, log sheets, and/or graphs from DC Water prior to commencing work.
- C. Written Inspection Reports:
 - 1. Pipe Inspection Summary Report Requirements:
 - a. Date of inspection.
 - b. Pipe segment numbers.
 - c. Size and type of pipe.
 - d. Upstream and downstream manhole asset numbers.
 - e. Reference to the observation report page number.
 - f. The NASSCO PACP pipe score for each pipe segment with zero (0) being a perfect pipe and 100 the worst pipe.
 - 2. Pipe Inspection Log Requirements:
 - a. Document the minimum amount of data required by PACP for each pipe segment including but not limited to:
 - 1) The same data provided on the Inspection Summary Report.
 - 2) Date of inspection.
 - 3) Length of pipeline section inspected.
 - 4) A figure showing the location of each defect and lateral connection.

- 5) Relationship of defects and lateral connections to the manholes with station zero (0) being the manhole from which the inspection began.
- 6) The direction of the inspection, i.e., upstream or downstream.
- 7) Color still shot images of each defect encountered.

D. Electronic Inspection Reports:

1. Submit a NASSCO PACP certified digital database listing all PACP required data fields for each pipe segment.
2. Inspection record requirements:
 - a. Include the digital video file of the inspection on a USB 3.0 compatible hard drive or thumb drive.
 - b. Provide unedited inspection recordings.
 - c. A digital file that allows snap scrolling to for easy and quick access of the entire recording.

E. Electronic File Management:

1. File name format for each inspection is as follows:

USID-DSID_ID_DATE.

Where:

USID = Upstream manhole identification number.

DSID = Downstream manhole identification number.

ID = Inspection direction (i.e., Upstream or Downstream).

DATE = Time and date the inspection is performed in hour, minutes, month, day, and year (hhmmmmddyyyy).

2. Provide one (1) set of photos for each inspection with a file name format as follows:

USID-DSID_ID_DATEa_VF_SEQ.

Where:

DATEa = The date and time the photo is taken formatted the same as for video files.

VF = The footage of the snapshot video to the nearest tenth of a foot.

SEQ = The photo sequence number.

3. Label each hard drive with the following information:

a. Submittal Number.

b. Project Name.

c. Contractor's Name.

d. Contract Number.

e. Drawing Number.

f. Inspection Type: Post Cleaning, Repair, etc.

PART 2. PRODUCTS

2.1 EQUIPMENT – GENERAL:

- A. Provide Equipment as Follows:

1. Inspection units that contain a means of transporting the inspection equipment in a stable condition through the sewer under inspection.
2. Equipment that is equal to or better quality than the equipment proposed for use during the bidding process.
3. Ensures the location of the CCTV camera equipment is positioned at or near to the central axis of the sewer.
4. Inspection equipment that is towed by winch and bond through the sewer shall have lockable or ratcheted drums as follows:
 - a. Bonds made of steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment.
 - b. Winches that are inherently stable under loaded conditions.

2.2 CABLE DRUM AND CABLE:

A. Cable Drum Requirements:

1. Motorize with variable speed.
2. Include serial communications for all speed and direction controls.
3. Capable of being controlled from the computer keyboard and through mouse click commands or a variable speed "joy stick" controller.
4. Have sufficient capacity to support the length of cable necessary to inspect the pipe without performing a reverse inspection but not less than 2000 linear feet, unless specified otherwise on the Contract.

B. Cable Requirements:

1. Dual jacketed with polyurethane and waterproof for constant underwater operations.
2. Be of sufficient length to inspect the longest length of pipe in a single direction but not less than 2000 linear feet unless noted otherwise on the Contract.

2.3 CAMERA TRANSPORT:

A. Camera Transport Requirements:

1. Portable with manual winches or motorized mechanical equipment of indirect drive type.
2. Have sufficient cable or rods to permit inspection of all sewer main sections specified.
3. Capable of moving camera through the pipeline in either direction at a uniform, slow rate.
4. Capable of zero (0) degree turning radius.
5. Fit through a manhole with a minimum inside diameter of 24 inch without modifications to the access structure.
6. Have multiple wheel set or sufficient torque to maximize traction in large diameter pipe or in adverse pipe conditions including high flow, deep mud, sand and large amount of debris commonly found in storm and sanitary sewers.
7. Be stable in high-velocity flows of up to eight (8) ft/ sec.

2.4 METERING DEVICE:

A. Metering Device Requirements:

1. Display the equipment location at ground level on the monitor screen.

2. Enable the distance recorder to be set at zero (0) from the inspection vehicle.
3. Have an accuracy of plus or minus one percent ($\pm 1\%$).
4. Display the distance moved through the pipe on the monitor screen and be logged along with the saved images for accurate determination of where flaws exist in the pipe relative to the deployment location.

2.5 MONITORING VEHICLE:

- A. Monitoring Vehicle Requirements:
 1. Separate viewing and working areas.
 2. A means to control internal and external sources of light to ensure that the monitor screen display is clearly visible.
 3. Seating for two (2) people in addition to the operator, with clear view of the inspection monitor.
 4. The ability to print inspection images with text annotations highlighting specific points in the image and the current control settings.

2.6 CCTV SYSTEM:

- A. Television Inspection Equipment Requirements:
 1. Pipe inspection Camera with the following properties:
 - a. Camera operating temperature range of 32°F to 122°F.
 - b. Imager sensor of ¼" color CCD with minimum 0.4 MP or better resolution.
 - c. Producing a video recording using a pan-and-tilt, radial viewing, pipe inspection camera that pans ± 285 degrees and rotates 360 degrees with a variable pan speed not to exceed 25 degrees per second.
 - d. Camera height adjustment so that the camera lens is always centered at one-half (1-1/2) the inside diameter, or higher, in the pipe being televised.
 - e. Full, true color, sharp image video bandwidths with no sacrifice or visible streaking of low frequency response.
 - f. Solid-state image pickup device containing more than 250,000 picture elements (pixels).
 - g. 525 scanning lines, 60 fields, 30 frames, interlaces 2:1 - NTSC Color Standard, with geometrical image distortion not exceeding two percent (2%) (picture transmission systems requiring use of R.F. suppressors and subject to local transmitter interference not acceptable).
 - h. Equipped with an f/1.4 wide angle lens with optical viewing angle to 70 degrees, auto iris type to control the illumination range for an acceptable picture between ten (10) and 100,000 Lux, with manual override remotely controlled from the viewing station.
 - i. Equipped with high output strobe lighting system capable to illuminate six (6) inch to 60 inch sewer pipes without externally-mounted lighting.
 - j. A 40:1 zoom length capable of ten times (10X) optical and four times (4X) digital, with auto and manual remote focus capability.
 - k. Video capture equipment capable of continuously capturing digital video from first generation recordings with no frame loss, regardless of the progression of the inspection.
 2. CD/DVD recorder with the following properties:
 - a. Slow motion playback without noise bars.

- b. Capability to document the inspection with 90 minute duration maximum, with "data view" indicating project address identification, date, and voice description of the inspection during video recording.
 - 3. On board television viewing monitor with the following properties:
 - a. High resolution industrial grade color unit providing 3.1 megapixels of resolution or greater.
 - b. Minimum 12 inch diagonally screen.
 - c. Voltage compensation circuits to reduce picture distortion to less than one percent under voltage conditions varying from 105V to 120V.
 - d. Housed in a steel cabinet which acts as shield to minimize effects of local magnetic fields such as transformers, coils, wraps of cable, etc. (monitors having inadequate or no protection from local magnetic fields, thereby contributing to loss of color picture purity, not acceptable).
 - e. Speaker to allow for audio playback from CD/DVD recording.
- B. Lighting Equipment Requirements:
 - 1. Include a halogen lighting system comprised of controlled-beam, reflector-sealed lamps with an automatic light compensator.
 - 2. Capable of supplying dimmable 40-LED array illumination.

2.7 REMOTE VISIBILITY:

- A. Provide capability to stream CCTV video wirelessly for remote viewing by personnel from a remote location.

PART 3. EXECUTION

3.1 INSPECTION - GENERAL:

- A. Control and monitor the inspection equipment to prevent becoming stuck or breaking loose. All costs associated with recovering equipment are the responsibility of the Contractor.
- B. Provide access to the television monitor and all other operations to DC Water representatives.
- C. Submit CCTV inspection recordings concurrently with the pipe inspection logs.
- D. If due to debris, roots, or other obstructions, the inspection cannot be completed from manhole to manhole request authorization from DC Water to clean the sewer line.
 - 1. If authorized, clean sewer in accordance with Section 33 01 29 - Cleaning of Sewer Mains.
 - 2. If the obstruction cannot be eliminated by cleaning methods, then perform a reverse inspection beginning at the other manhole and terminating at the obstruction point.
 - 3. Label and document the video and inspection as a reverse inspection.
- E. Repair any damage and/or claims arising from the Contractor's operations to the complete satisfaction of DC Water and at no additional cost to DC Water.

3.2 CCTV INSPECTION:

- A. Perform the CCTV Inspection as Follows:
 - 1. Place the camera at the center of the manhole and begin videotaping walls and the pipe.

2. Move the camera through the line at a rate that allows proper inspection under the conditions found in the pipe and at a rate not to exceed 30 feet per minute, or at a rate as directed by DC Water.
 3. Stop at all defects and lateral connections to document the sewers condition.
 4. To move the camera through the pipe, use manual winches, power winches, CCTV cable, powered rewinds and other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions.
 5. Whenever non-remote powered and controlled winches are used to pull the camera through the pipe, provide full communications at both manholes to insure good communications between members of the inspection crew.
 6. When pulling the camera through the sewer line by a hydraulic cleaning unit hose, locate the cleaning nozzle a minimum of eight (8) feet away from the camera to allow a clear, unobstructed view.
 7. Spray the pipe with a jet nozzle in front of the camera when televising through dips to draft out water.
 8. Maintain the camera in clear focus at all times.
 - a. If focus is lost, stop camera, correct focus, retract camera to the point where focus was lost, and continue the video.
 - b. If the quality of the picture fails to provide a clear view of the entire sewer, adjust the monitoring equipment until an acceptable picture is obtained.
 9. Stop the camera at all points of interest including all obstructions, broken pipe, inactive or active service connections, other suspected defects, and point sources of infiltration and/or inflow as follows:
 - a. A minimum of ten (10) seconds.
 - b. Until the severity and leakage rate from each infiltration and/or inflow source is quantified by using pan and tilt camera.
 10. Describe all points of interest verbally on the video recording.
 11. Inspect all service connections using a pan and tilt camera.
- B. Provide all recordings in digital format as follows.
1. Image capture stored in JPEG formats.
 2. Video capture files:
 - a. Be stored in industry standard Windows Media or MPEG-4 format on a USB 3.0 compatible external hard drive and viewable on a personal computer that utilizes MicroSoft Media Player.
 - b. Have a minimum resolution of 640 pixels (x) by 480 pixels (y) and an encoded frame rate of 30 frames per second.

3.3 CCTV CAMERA PRIME POSITION:

- A. Position the CCTV camera to minimize picture distortion.
- B. In circular sewers, position the CCTV camera lens in the center of the pipe.
- C. In non-circular sewers, position the CCTV camera lens at mid-height, unless otherwise agreed, and centered horizontally.
- D. In all instances, position the camera lens parallel with the axis of the sewer. A positioning tolerance of plus or minus ten percent ($\pm 10\%$) of the vertical sewer dimension will be allowed.

3.4 FLOW CONTROL:

- A. Perform flow control operations when the flow depth is outside the permissible flow conditions for CCTV inspections as specified in Part 1 of this Section.
- B. Perform flow control operations without damaging the sewer system or causing backups or overflows.
- C. Prior to performing flow control, propose to DC Water the method to be used and request authorization to perform the flow control. Adjust the proposed method as required by DC Water.
- D. Use one or more of the following methods to maintain flow within the depths allowed for the type of inspection being performed:
 - 1. Plugging or Blocking:
 - a. Use plugs that are designed to allow all or any portion of the sewage flow to be passed through it.
 - b. Use plugs, sandbags, or other approved means to adjust flow.
 - c. Stop Logs, Gates, or Valves:
 - 1) Structures with stop logs, gates or valves are not guaranteed to be operational.
 - 2) If Contractor desires to use stop logs, gates, or valves, request and obtain permission from DC Water to verify that they are operational.
 - 3) If stop logs, gates, or valves are not operational, use plugs, sandbags or other approved means to block flows.
 - d. Reduced Flow:
 - 1) Block the flow, using approved devices, at the upstream manhole of the section in which the inspection is to be performed or one (1) manhole prior to the upstream access manhole.
 - 2) Adjust flow through the plug to obtain the flow required to perform the inspection.
 - 2. Pumping and Bypassing:
 - a. Supply pumps, piping, and other equipment to divert the flow of sewage around the section in which work is to be performed in accordance with Section 33 29 60 - Sewer Bypass Pumping.
 - b. At large sewer outfalls exposed to tidal backflows, install sandbag dams and/or request assistance from DC Water to close tide gates in order to pump out the sewer to acceptable levels for the inspection.
 - 1) Notify DC Water that tide gates will need to be operated at least seven (7) days in advance of the day the tide gates need to be closed
 - 2) Confirm with DC Water the schedule for closing tide gates 48 hours prior to needing the gates closed.
 - 3) The schedule for closing the tide gates is subject to operating conditions at the facility and the dates requested for closure may need to be adjusted to accommodate facility operations.

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SECTION 33 01 39

SONAR INSPECTION OF SEWERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, tools, and equipment, necessary to perform inspections of sewers using Sonar on combined, sanitary, and storm sewers.
- B. Perform Sonar inspections for inspections when:
 - 1. The depth of flow exceeds 75% of sewer diameter.
 - 2. When required by DC Water or the Contract Documents.
- C. Combine Sonar inspections with CCTV inspections in accordance with Section 33 01 38 – CCTV Inspection of Sewers and Section 33 01 44 – Multi-Sensor Inspection of Sewers when:
 - 1. The pipe size is greater than 24 inches and the depth of flow is greater than or equal to 25% of the sewer pipe diameter at both starting and ending manholes, and
 - 2. The depth of flow is less than 75% of sewer pipe diameter.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Divisions 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 01 29: Cleaning of Sewer Mains.
 - 3. Section 33 01 38: CCTV Inspection of Sewers.
 - 4. Section 33 01 44: Multi-Sensor Inspection of Sewers.

1.4 SUBMITTALS AND DELIVERABLES:

- A. Provide submittals in accordance with Section 01 33 00 - Submittals.
- B. Submit the Following:
 - 1. Data on the equipment to be used for the inspection.
 - 2. Contractor's qualifications.
 - 3. PACP certificate for operators.
 - 4. Operator's experience.
 - 5. Weekly reports.
 - 6. Written and electric inspection reports.
 - 7. Sonar Inspection Recordings.

1.5 REFERENCED DOCUMENTS:

- A. National Association of Sewer Service Companies (NASSCO):
 - 1. Pipeline Assessment and Certification Program (PACP) Reference Manual.

1.6 QUALIFICATIONS:

- A. Contractor Qualifications:
 - 1. Perform inspections using a company whose business is regularly engaged in performing Sonar inspections.
 - 2. Submit Contractor qualifications documenting a minimum of three (3) projects of similar size and scope performed by Contractor during the previous five (5) years. Include:
 - a. A list of projects.
 - b. Type of inspection equipment.
 - c. Client names.
 - d. Client contact information including telephone numbers and email.
- B. Operator Qualifications:
 - 1. Certified as a NASSCO PACP certified operator.
 - 2. A minimum of three (3) years of experience operating Sonar inspection equipment.
 - 3. A minimum of three (3) years of experience inspecting, processing and interpreting data gathered while operating Sonar equipment.
 - 4. Submit qualifications for Operators prior the Operator performing work on the inspection.

1.7 QUALITY CONTROL:

- A. Provide coding and reporting standards and guidelines in accordance with PACP.
- B. Calibrate Sonar systems in accordance with manufacturer's recommendations.
- C. Synchronize and calibrate camera and monitor image in accordance with the manufacturer's recommendations at the beginning of each workday, anytime the picture becomes distorted, or as directed by DC Water.
- D. Provide an audio recording that is free of background and electrical noise as to produce an oral report that is clear and discernible.

1.8 TRAINING:

- A. Provide a minimum of eight (8) hours training to DC Water on installation and utilization of the Sonar viewing software and interpretation of Sonar images.

1.9 WEEKLY REPORTS:

- A. Provide daily reports that include a summary of work performed during the previous week including, but not limited to:
 - 1. Total number of segments inspected during the week.
 - 2. Total length of segments inspected during the week.
 - 3. Line segments and length of each line segment inspected.
 - 4. Manholes that were unable to be opened, located or otherwise accessed.
 - 5. Line segments requiring immediate attention due to structural failure or threat to the health and safety of the public or environment.

6. Resident interactions or incidents.
7. Pipe Inspection Summary Report, Pipe Inspection Logs, and Inspection Recordings for the previous week.
8. Revisions to weekly schedules.
9. Delays.

1.10 INSPECTION REPORTS:

- A. Submit inspection reports for each inspection performed.
- B. Obtain approval of the format of the inspection reports, log sheets, and/or graphs from DC Water prior to commencing work.
- C. Written Inspection Reports:
 1. Pipe Inspection Summary Report Requirements:
 - a. Date of inspection.
 - b. Pipe segment numbers.
 - c. Size and type of pipe.
 - d. Upstream and downstream manholes.
 - e. Reference to the observation report page number.
 - f. The NASSCO PACP pipe score for each pipe segment with zero (0) being a perfect pipe and 100 the worst pipe.
 2. Pipe Inspection Log Requirements:
 - a. Document the minimum amount of data required by PACP for each pipe segment including but not limited to:
 - 1) The same data provided on the Inspection Summary Report.
 - 2) Date of inspection.
 - 3) Length of pipeline section inspected.
 - 4) A figure showing the location of each defect and lateral connection.
 - 5) Relationship of defects and lateral connections to the manholes with station zero (0) being the manhole from which the inspection began.
 - 6) The direction of the inspection, i.e., upstream or downstream.
 - 7) Color still shot images of each defect encountered.
 3. Sonar Inspection Report Requirements:
 - a. A table showing minimum, maximum and average sediment depth in feet and percent of pipe.
 - b. A graph showing sediment depth in feet and percent of pipe blockage.
 - c. An estimate of sediment volume over total length of pipe in cubic feet;
 - d. A color Sonar image and a mark of the location of the Sonar sensor on a single page.
- D. Electronic Inspection Reports:
 1. Submit a NASSCO PACP certified digital database listing all PACP required data fields for each pipe segment.

2. Inspection Record Requirements:
 - a. Include the digital video file of the inspection on a hard drive or thumb drive that is USB 3.0 compatible.
 - b. Provide unedited inspection recordings.
 - c. A digital file that allows snap scrolling to for easy and quick access of the entire recording.
 3. Submit Sonar inspection recordings concurrently with the pipe inspection logs.
- E. Electronic File Management:
1. File name format for each inspection is as follows:
USID-DSID_ID_DATE.
- Where:
- USID = Upstream manhole identification number.
 DSID = Downstream manhole identification number.
 ID = Inspection direction (i.e., Upstream or Downstream).
 DATE = Time and date the inspection is performed in hour, minutes, month, day, and year (hhmmmmddyyyy).
2. Provide one (1) set of photos for each inspection with a file name format as follows:
USID-DSID_ID_DATEa_VF_SEQ.
- Where:
- DATEa = The date and time the photo is taken formatted the same as for video files.
 VF = The footage of the snapshot video.
 SEQ = The photo sequence number.
3. Label each hard drive with the following information:
 - a. Submittal Number.
 - b. Project Name.
 - c. Contractor's Name.
 - d. Contract Number.
 - e. Drawing Number.
 - f. Inspection Type: Post Cleaning, Repair, etc.

PART 2. PRODUCTS

2.1 EQUIPMENT – GENERAL:

- A. Provide Equipment as Follows:
 1. Inspection unit that contains a means of transporting the inspection equipment in a stable condition through the sewer under inspection.
 2. Equipment that is equal to or better quality than the equipment proposed for use during the bidding process
 3. Ensures the location of the Sonar equipment is maintained under water.
 4. Inspection equipment that is towed by winch and bond through the sewer shall have lockable or ratcheted drums as follows:

- a. Bonds made of steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment.
- b. Winches that are inherently stable under loaded conditions.

2.2 CABLE DRUM AND CABLE:

A. Cable Drum Requirements:

1. Motorize with variable speed.
2. Include serial communications for all speed and direction controls.
3. Capable of being controlled from the computer keyboard and through mouse click commands or a variable speed "joy stick" controller.
4. Sufficient capacity to support the length of cable necessary to inspect the pipe without performing a reverse inspection but not less than 2000 linear feet, unless specified otherwise on the Contract.

B. Cable Requirements:

1. Dual jacketed with polyurethane and waterproof for constant underwater operations.
2. Capable of inspecting continuous lengths of pipe up to 2000 feet in length or inspecting the length of pipe require by the Contract Drawings in a single direction, whichever is greater

2.3 SONAR TRANSPORT:

A. Sonar Transport Requirements:

1. Portable with manual winches or motorized mechanical equipment of indirect drive type.
2. Have sufficient cable or rods to permit inspection of all sewer main sections specified.
3. Capable of moving camera through the pipeline in either direction at a uniform, slow rate.
4. Maneuverable to ensure that the unit is capable of zero degree turning radius.
5. Fit through a manhole with a minimum inside diameter of 24 inch without modifications to the access structure.
6. Have multiple wheel set or sufficient torque to maximize traction in large diameter pipe or in adverse pipe conditions including high flow, deep mud, sand and large amount of debris commonly found in storm and sanitary sewers.
7. Stable in high-velocity flows of up to eight (8) ft/ sec.
8. Capable to operate with high ground clearance.

2.4 METERING DEVICE:

A. Metering Device Requirements:

1. Display the equipment location at ground level on the monitor screen.
2. Enable the distance recorder to be set at zero (0) from the inspection vehicle.
3. Have an accuracy of plus or minus one percent ($\pm 1\%$).
4. Display the distance moved through the pipe on the monitor screen and be logged along with the saved images for accurate determination of where flaws exist in the pipe relative to the deployment location.

2.5 MONITORING VEHICLE:

A. Monitoring Vehicle Requirements:

1. Separate viewing and working areas.
2. A means to control internal and external sources of light to ensure that the monitor screen display is clearly visible.
3. Seating for two (2) people in addition to the operator, with clear view of the inspection monitor.
4. The ability to print inspection images with text annotations highlighting specific points in the image and the current control settings.

2.6 SONAR SYSTEM:

A. Sonar Equipment Requirements:

1. Digital and capable of operating in pipelines with diameter sizes shown on the drawings.
2. Specifically designed for municipal wastewater environments and operable in fully submerged conditions.
3. Have a Sonar head capable of being mounted on either a crawler or floatation equipment if necessary
4. Capable of making 400 measurements per minute with an accuracy of $\pm 0.5\%$.
5. Have a maximum beam width of the Sonar energy pulse no greater than two (2) degrees from the center of the transducer.
6. Have a high-speed scanning capability of 1.3 seconds per 360 degree revolution.
7. Programmable multi- frequency profiling Sonar which supports a range of frequencies from 600 kHz to 3.0 MHz, and an acoustic beam width of less than 1.1 degrees in order to produce accurate clear cross sections of the pipe being scanned.
8. Ability to operate as required to perform the work shown, but not less than 1,000 feet, remotely from the surface equipment.
9. Have a minimum of 0.9 degree angular resolution with at least 400 sectors per revolution.
10. Record full revolution scans with a density of one (1) complete Sonar scan per second.
11. Have pitch and roll tilt sensors (inclinometer) with 0.1 degree resolution showing the numerical attitude of the scanner on the screen both pictorially and numerically in analog and digital form.

B. Sonar Software Requirements:

1. Able to capture still frame screen images and save the images as JPEG files.
2. Be readable in all major software programs used for report generation.
3. Have real-time measurement capabilities including point-to-point measurement, diameter measurement using a circle overlay.
4. Come with Sonar viewing software at no cost to DC Water.

C. Provide a continuous NTSC composite video output to surface equipment so that the entire survey can be recorded on DVD and viewed on video monitors.

D. Range Resolution Measurement Error Requirements:

1. Be no greater than 0.08 inches from a distance of three (3) to 12 feet.
2. Be no greater than 0.4 inches from distances beyond 15 feet.

3. Have a minimum detectable range of six (6) inches.
- E. Error Tolerances Accuracy for Calculating Sediment Quantification:
 1. A minimum 92% for pipelines up to and including 54 inches diameter.
 2. A minimum of 95% accuracy for pipelines greater than 54 inches in diameter.

2.7 REMOTE VISIBILITY:

- A. Provide capability to stream Sonar video wirelessly for remote viewing by personnel from a remote location.

PART 3. EXECUTION

3.1 INSPECTION - GENERAL:

- A. Control and monitor inspection equipment to prevent becoming stuck or breaking loose. All costs associated with recovering equipment are the responsibility of the Contractor.
- B. Provide access to the Sonar monitor and all other operations to DC Water representatives.
- C. Repair any damage and/or claims arising from the Contractor's operations to the complete satisfaction of DC Water and at no additional cost to DC Water.
- D. If due to debris, roots, or other obstructions, the inspection cannot be completed from manhole to manhole request authorization from DC Water to clean the sewer line.
 1. If authorized, clean sewer in accordance with Section 33 01 29 - Cleaning of Sewer Mains.
 2. If the obstruction cannot be eliminated by cleaning methods, then perform a reverse inspection beginning at the other manhole and terminating at the obstruction point.
 3. Label and document the video and inspection as a reverse inspection.

3.2 SONAR INSPECTION:

- A. Plug, block or use other techniques to increase the flow to as close to full depth as is practical when directed by DC Water.
- B. Perform Sonar Inspection as Follows:
 1. String tow lines between access inlet and outlet structures.
 2. Move the Sonar scanner through the pipe in either direction at a rate that allows measurement of flow and silt depth.
 3. Position the beam from the transducer to scan perpendicularly to the longitudinal axis of the pipe.
 4. Slow, stop or back up the scanner as necessary to capture detailed inspection of significant features and evaluation of defects.
 5. Provide communications between access points for coordination of inspection activities.
 6. Make digital recordings with audio descriptions of Sonar inspections that continuously display the following:
 - a. Date.
 - b. Distance in feet and tenths of feet from access point.
 - c. Manhole identification.
 7. Provide recordings that show all points of interest with audio descriptions including:

- a. Obstructions.
 - b. Broken pipe.
 - c. Siltation.
 - d. Laterals.
 - e. Other defects.
- C. Provide Sonar Inspection Recordings as Follows:
- 1. Color with high resolution still image of Sonar cross-sections.
 - 2. Taken every 20 feet or more frequently if the sediment/debris deposition of the pipe changes by ten percent (10%).
 - 3. Taken at every defect.
 - 4. Referenced in the PACP database with audio comments.
 - 5. Recorded in the final inspection report.
 - 6. Include data in Microsoft Excel data tables.

3.3 SONAR HEAD PRIME POSITION:

- A. Position the Sonar head to minimize picture distortion.
- B. In circular sewers, position the Sonar head in the center of the sewer.
- C. In non-circular sewers, position the Sonar head at mid-height, unless otherwise agreed, and centered horizontally.

3.4 FLOW CONTROL:

- A. Perform flow control operations without damaging the sewer system or causing backups or overflows.
- B. Prior to performing flow control, propose to DC Water the method to be used and request authorization to perform the flow control. Adjust the proposed method as required by DC Water
- C. Use one (1) or more of the following methods to maintain flow within the depths allowed for the type of inspection being performed:
 - 1. Plugging or Blocking:
 - a. Use plugs designed to allow all or any portion of the sewage flow to be passed through it.
 - b. Use plugs, sandbags, or other approved means to adjust flow.
 - c. Stop Logs, Gates, or Valves:
 - 1) Structures with stop logs, gates or valves are not guaranteed to be operational.
 - 2) If Contractor desires to use stop logs, gates, or valves, request and obtain permission from DC Water to verify that they are operational.
 - 3) If stop logs, gates, or valves are not operational, use plugs, sandbags or other approved means to block flows.
 - d. Increased Water Level:
 - 1) Block the flow, using approved devices, at the outlet sewer at the downstream manhole or one (1) manhole after the access manhole.

~ END OF SECTION 33 01 39 ~

SECTION 33 01 40

LASER INSPECTION OF SEWERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, tools, and equipment, necessary to perform an inspection above the fluid level on combined, sanitary, and storm sewers using 3D laser inspections to determine pipe alignment and geometry for use in quantifying internal pipe wall material loss or gain, pipe deformation, and pipe capacity.
- B. When performing 3D laser inspections in conjunction with other assessment methods, the 3D laser assessment will also be performed in accordance with Section 33 01 44 – Multi-Sensor Inspection of Sewers.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Divisions 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 01 38: CCTV Inspection of Sewers.
 - 3. Section 33 01 44: Multi-Sensor Inspection of Sewers.
 - 4. Section 33 29 60: Sewer Bypass Pumping.

1.4 SUBMITTALS AND DELIVERABLES:

- A. Provide submittals in accordance with Section 01 33 00 - Submittals.
- B. Submit:
 - 1. Data for 3D laser equipment.
 - 2. Calibration certificate.
 - 3. Contractor's qualifications.
 - 4. Operator's qualifications.
 - 5. Inspection reports.

1.5 QUALIFICATIONS:

- A. Submit supporting documentation for qualifications prior to performing inspection work.
- B. Contractor Qualifications:
 - 1. Perform inspections using a company whose business is regularly engaged in performing 3D laser inspections and inspections on pipe.
 - 2. Submit Contractor qualifications documenting a minimum of three (3) projects of similar size and scope performed by Contractor during the previous five (5) years. Include:

- a. A list of projects.
 - b. Type of inspection equipment.
 - c. Client names.
 - d. Client contact information including telephone numbers and email
- C. Operator Qualification Requirements:
- 1. A minimum of three (3) years of experience operating 3D laser equipment.
 - 2. A minimum of three (3) years of experience inspecting, processing, and interpreting data from the 3D laser equipment.

1.6 QUALITY CONTROL:

- A. Calibrate 3D laser system in accordance with manufacturer's recommendations.
- B. Submit a copy of the calibration certificate from an accredited third-party laboratory specifying the technology used, the device used and the certificate's validity date for this device.
- C. Provide an accuracy of plus or minus one percent ($\pm 1\%$) for ovality scans including but not limited to sensor error, axis alignment error, and processing errors.

1.7 INSPECTION REPORTS:

- A. Submit inspection reports for each inspection performed.
- B. Obtain approval of the format of the inspection reports, log sheets, and/or graphs from DC Water prior to commencing work.
- C. Provide written inspection reports that include, but are not limited to:
 - 1. Table of Contents.
 - 2. Results Summary page.
 - 3. Results Summary Table listing:
 - a. Manhole numbers.
 - b. Payout location.
 - c. Scan number.
 - d. Vertical diameter.
 - e. Horizontal diameter.
 - f. Ovality.
 - g. Eccentricity.
 - 4. Deployment summary and project site photos images.
 - 5. Scans and data side by side showing:
 - a. Color coded crown view for the dry portion of the pipe.
 - b. 2D cross section view for the dry portion of the pipe.
 - c. Table listing of the vertical diameter, horizontal diameter, ovality, and eccentricity.
 - 6. Ovality scans including:
 - a. Sensor error.
 - b. Axis error.
 - c. Collection error.

- d. Pose.
 - e. Other relevant data.
 - 7. Pipe material loss and gain estimates.
- D. Submit electronic inspection reports on a solid-state hard drive with USB 3.0 or newer and include:
 - 1. A searchable PDF copy of the written inspection reports.
 - 2. High resolution scans in a 3D point cloud format.
 - 3. Software for viewing 3D point cloud format on a PC.
- E. Electronic File Management:
 - 1. Use a file name format for each inspection as follows:
USID-DSID_ID_DATE.

Where:

 - USID = Upstream manhole identification number.
 - DSID = Downstream manhole identification number.
 - ID = Inspection direction (i.e., Upstream or Downstream).
 - DATE = Time and date the inspection is performed in hour, minutes, month, day, and year (hhmmmmddyyyy).
 - 2. Label each hard drive with the following information:
 - a. Submittal Number.
 - b. Project Name.
 - c. Contractor's Name.
 - d. Contract Number.
 - e. Drawing Number.
 - f. Inspection Type: Post Cleaning, Repair, etc.

PART 2. PRODUCTS

2.1 TRANSPORT SYSTEM:

- A. Transport System Requirements:
 - 1. A tracked or floating system depending on the flow conditions within the pipe.
 - 2. Enable maneuvering upstream or downstream in empty or partially full flow conditions.
 - 3. Provides the necessary stability to obtain quality data from the sensors.
 - 4. Capable of being inserted through a standard circular manhole opening of 24 inches in diameter without having to modify the manhole or frame.
 - 5. Ability to inspect continuous lengths of pipe up to 2000 feet in length or inspecting the length of pipe required by the Contract Drawings in a single direction, whichever is greater.
- B. Tracked Platform Requirements:
 - 1. Capable of performing inspections in the upstream or downstream directions at the velocities required to obtain quality inspection when inspecting in no flow or partial flow conditions with flowrates up to eight (8) feet per second.
 - 2. Have a measurement system that enables real-time monitoring of the position,

speed, and orientation of the transport system by measuring three (3) axis of rotation and acceleration.

3. Provide real-time measurement of pitch and roll measurements with accuracy of plus or minus one percent ($\pm 1\%$).
4. Capable of forward, stop, and reverse motions.

C. Floating Platform Requirements:

1. Have speed control reels and winches to pull the platform in both upstream and downstream directions at the specified speeds necessary to obtain quality data.
2. Be stable in flows up to five (5) feet per second.
3. Have a skid base that enables the platform to be pulled through the pipe while riding along the pipe surface or sediment in low flow conditions.
4. Have a measurement system that enables real-time monitoring of the position, speed, and orientation of the transport system.

2.2 3D LASER SYSTEM:

A. 3D Laser System Requirements:

1. Be built for use in the inspection of wastewater system pipelines and operative in 100% humidity conditions.
2. Support 75 Hz scan rates or higher.
3. Be class 1, eye-safe for operator safety.
4. Have a 3D laser sensor resolution of at least one (1) mm.
5. Use forward-looking methodology to capture data above the fluid level in a three (3) dimensional geometry model.
6. Collect a minimum of 800,000 independent range measurement per.
7. Have a continuous adjustable spinning motion of 360 degrees for maximum data acquisition and collection.
8. Be capable of measuring the distances to objects and surfaces of pipes of the size required to be inspected by the Contract Drawings.
9. Be capable of imaging pipes of the size required by the Contract Drawings.

PART 3. EXECUTION

3.1 INSPECTION:

- A. Control and monitor 3D laser to prevent becoming stuck or breaking loose. All costs associated with recovering equipment are the responsibility of the Contractor.
- B. Perform 3D laser scanning continuously for the entire length of the pipeline.
- C. When performed with other inspection technology, perform scanning simultaneously with the other inspection technology.
- D. Position the 3D laser head to be above water level at all times.

3.2 FLOW CONTROL:

- A. When required to reduce the flow in the pipe, perform bypass pumping in accordance with Section 33 29 60 - Sewer Bypass Pumping.
- B. When required to detain flow entering the pipe, plug the pipe as required in Section 33 01 38 – CCTV Inspection of Sewers.”

~ END OF SECTION 33 01 40 ~

SECTION 33 01 43

HYDROGEN SULFIDE GAS AND TEMPERATURE INSPECTION OF SEWERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, tools, equipment, and incidentals necessary to perform Hydrogen Sulfide (H₂S) gas and temperature inspections on combined, sanitary, and storm sewers.
- B. When performing gas and temperature inspections in conjunction with other assessment methods, the gas and temperature inspection will also be performed in accordance with Section 33 01 44 – Multi-Sensor Inspection of Sewers.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Divisions 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 01 38: CCTV Inspection of Sewers.
 - 3. Section 33 01 44: Multi-Sensor Inspection of Sewers.
 - 4. Section 33 29 60: Sewer Bypass Pumping.

1.4 SUBMITTALS AND DELIVERABLES:

- A. Provide submittals in accordance with Section 01 33 00 – Submittals.
- B. Submit:
 - 1. Data for the equipment to be used in the inspection.
 - 2. Qualifications for the Contractor.
 - 3. Qualifications for the operator.
 - 4. Field Data Reports.
 - 5. Inspection Reports.
 - 6. Equipment certifications.
 - 7. Biweekly schedule with maps.
 - 8. Emergency Response and Contingency Plan with the Safety and Health Plan.

1.5 QUALITY ASSURANCE:

- A. Contractor Qualifications:
 - 1. Perform inspections using a company whose business is regularly engaged in performing inspections using the type of equipment required by this Section.

2. Submit Contractor qualifications documenting a minimum of three (3) projects of similar size and scope performed by Contractor during the previous five (5) years. Include:
 - a. A list of projects.
 - b. Type of inspection equipment.
 - c. Client names.
 - d. Client contact information including telephone numbers and email addresses.
- B. Operator Qualifications:
 1. A minimum of three (3) years of experience operating the type of inspection equipment being used to perform the inspection.
 2. A minimum of three (3) years of experience inspecting, processing and interpreting data gathered while operating the type of equipment that is used to perform the inspection.
- C. Equipment Certifications:
 1. Provide equipment calibration certifications that show the equipment was calibrated within the past 12 months.

1.6 BIWEEKLY SCHEDULE WITH MAPS:

- A. Provide a Biweekly Schedule that Shows:
 1. Upcoming work activities.
 2. Planned begin and end dates for segments that will inspected within the next three (3) week period.
 3. Access maps.

1.7 FIELD DATA REPORTS:

- A. Field Data Reports Requirements:
 1. Personnel performing the work.
 2. Notable field conditions that may influence the results of the inspection.
 3. Weather conditions.
 4. Date and time of inspection.
 5. Field notes of inspection.
 6. Deployment summary and project site photo images.

1.8 INSPECTION REPORTS:

- A. Submit inspection reports for each inspection performed.
- B. Obtain approval of the format of the inspection reports, log sheets, and/or graphs from DC Water prior to commencing work.
- C. Gas and Temperature Report:
 1. Provide written reports that include, but not be limited to:
 - a. Table of contents.
 - b. Graph showing minimum, maximum, and average H₂S gas concentration (ppm) and temperature (Degrees) versus footage.
 - c. Table showing the minimum, maximum, and average concentration of H₂S gas in ppm and temperature in 0.5 degree increments versus footage.

- d. Discussion of the use of H₂S sensors in pipeline inspection, technical details including sensor dynamic range, measurement resolution, measurement accuracy, and sources of error specific to this inspection.
 - e. Recommendations for further analysis.
- D. Gas and Temperature Comparison Report:
 - 1. Provide gas and temperature comparison report as follows:
 - a. If no previous reports are available, show data in a format that can be used as a baseline to compare data collected from future inspections by compiling the data in a format that will support future analysis of calculation changes in H₂S levels and temperature.
 - b. If previous reports exist, show data in a format consistent with previous reports.
 - 1) DC Water will provide previous reports to Contractor.
 - 2) Compare the data collected during the inspection to the previous data.
 - 3) Identify locations where gas and temperature data has changed by more than ten percent (10%).
 - 4) Identify locations where gas levels exceed 2.0 ppm but previously did not.
 - 5) Identify trends showing increasing/decreasing gas and temperature readings.
- E. Emergency Response and Contingency Plan:
 - 1. As part of the Safety and Health Plan required by Section 01 54 50 – Construction Safety, provide an H₂S emergency response and contingency plan that includes, but is not limited to, the following:
 - a. Personnel responsible for implementing safe practices and emergency procedures.
 - b. Person in charge of the inspection, lead operator, and superintendent for the H₂S inspection.
 - c. Procedures for addressing H₂S events and documenting all actions.

PART 2. PRODUCTS

2.1 TRANSPORTER:

- A. Transporter Requirements:
 - 1. Capable of keeping the gas sensor above the water surface continuously.
 - 2. Capable of transporting the gas sensor through the pipe in a stable condition.
 - 3. Capable of inspecting continuous lengths of pipe up to 2000 feet in length or inspecting the length of pipe required by the Contract Drawings in a single direction, whichever is greater.
- B. Inspection equipment that is towed by winch and bond through the sewer shall have lockable or ratcheted drums as follows:
 - 1. Bonds made of steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment.
 - 2. Winches that are inherently stable under loaded conditions.

2.2 GAS AND TEMPERATURE SENSOR:

A. Gas Sensor Requirements:

1. Measure H₂S in temperatures range of -50F to 104F at pressures that vary from atmospheric by plus or minus ten percent (10%)
2. Perform in 15-90 percent non-condensing humidity with a 90% response time of less than 60 seconds.
3. Have a sensor dynamic range from zero (0) ppm to 200 ppm with a maximum theoretical range from zero (0) ppm to 999.9 ppm.
4. Have a sensor measurement resolution of 0.1 ppm with an accuracy of plus or minus 1.0 ppm at standard temperature and pressure.

B. Temperature Sensor Requirements:

1. Measure temperature in range from 32°F to 120°F minimum.
2. Perform in humid conditions.
3. Accuracy of plus or minus two (±2) degrees Fahrenheit.

PART 3. EXECUTION

3.1 INSPECTION:

- A. Control and monitor gas and temperature sensor to prevent becoming stuck or breaking loose. All costs associated with recovering equipment are the responsibility of the Contractor.
- B. Ensure sensors remain above the surface of the water.
- C. Perform gas and temperature sampling continuously for the entire length of the pipeline.
- D. When performed with other inspection technology, collect gas data simultaneously with the other inspection technology.

3.2 FLOW CONTROL:

- A. When required to reduce the flow in the pipe, perform bypass pumping in accordance with Section 33 29 60 – Sewer Bypass Pumping.
- B. When required to detain flow entering the pipe, plug the pipe as required in Section 33 01 38 – CCTV Inspection of Sewers.

~ END OF SECTION 33 01 43 ~

SECTION 33 01 44

MULTI-SENSOR INSPECTION OF SEWERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, tools, and equipment, necessary to perform inspections on combined, sanitary, and storm sewers using multiple sensors simultaneously.
- B. Perform multi-sensor inspections using two (2) or more inspection techniques (CCTV, Sonar, Laser, H₂S, and/or PPR) as specified by the Contract Documents,

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Divisions 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 33 01 38: CCTV Inspection of Sewers.
 - 2. Section 33 01 39: Sonar Inspection of Sewers.
 - 3. Section 33 01 40: Laser Inspection of Sewers.
 - 4. Section 33 01 43: Hydrogen Sulfide Gas and Temperature Inspection of Sewers.

1.4 INSPECTION REPORTS:

- A. Unless directed otherwise, provide a single combined report that includes data collected from each inspection.
- B. Include all reports required by the individual inspections in accordance with:
 - 1. Section 33 01 38: CCTV Inspection of Sewers.
 - 2. Section 33 01 39: Sonar Inspection of Sewers.
 - 3. Section 33 01 40: Laser Inspection of Sewers.
 - 4. Section 33 01 43: Hydrogen Sulfide Gas and Temperature Inspection of Sewers.
- C. Correlate the data collected from each type of inspection and present all data collected from each inspection (CCTV, gas, laser, and/or Sonar) at a specific reference point within the pipeline together within the report. (E.G., if high gas readings are present at location XX feet into the pipe, the report will show the gas, temperature, CCTV, laser, and/or Sonar data together for that location.)
- D. When combined TV and Sonar imagery is obtained, display TV and Sonar images of the sewer as a combined image.
 - 1. Superimpose the Sonar image on the real TV image and continuously record the inspection as a combined operation.

PART 2. PRODUCTS

2.1 EQUIPMENT:

- A. Comply with Equipment Requirements as Follows:
 - 1. Section 33 01 38 – CCTV Inspection of Sewers.
 - 2. Section 33 01 39 – Sonar Inspection of Sewers.
 - 3. Section 33 01 40 – Lasor Inspection of Sewers.
 - 4. Section 33 01 43 – Hydrogen Sulfide Gas and Temperature Inspection of Sewers.
- B. Ensure the transport system used to perform a multi-sensor inspection allows all required inspections to be performed simultaneously.

PART 3. EXECUTION

3.1 INSPECTION:

- A. Perform multi-sensor inspections in accordance with this Section and the appropriate Section for each type of inspection being performed:
 - 1. Section 33 01 38 – CCTV Inspection of Sewers.
 - 2. Section 33 01 39 – Sonar Inspection of Sewers.
 - 3. Section 33 01 40 – Lasor Inspection of Sewers.
 - 4. Section 33 01 43 – Hydrogen Sulfide Gas and Temperature Inspection of Sewers.
- B. In addition, do the following when CCTV and Sonar inspections are performed, regardless of whether laser and/or H₂S inspections are also performed.
 - 1. Superimpose the Sonar image onto the CCTV picture using a “mixer” or picture-in-picture that enables the operator to see both above and below the water line on one (1) monitor.
 - 2. Set the rig moving speed and Sonar scan rate to allow:
 - a. A complete structure and service assessment equivalent to the similar standard obtained through conventional CCTV inspection imagery.
 - b. Measurement of flow depth and silt depth.
- C. If the depth of flow causes any inspection equipment to drag along the top or bottom of the piping, re-scheduled the inspection for a period of lower flow during approved working hours or install flow controls to increase or reduce the depth of water in the pipe.

~ END OF SECTION 33 01 44 ~

SECTION 33 05 02

WATER UTILITY DISTRIBUTION PIPING – DUCTILE IRON PIPE

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes furnishing all labor, materials, and equipment necessary to install water utility distribution piping greater than two (2)-inch diameter, complete and ready for continuous service. Installation includes pipe, fittings, and specials including providing fittings not shown on the Contract Drawings but are required for a functional water distribution system.
- B. Work includes but is not limited to pipe for blow-offs, air/vacuum relief vents, and pipe leads to fire hydrants; jointing, harnessing cutting, and connecting new pipe to existing pipe; retainer glands; reconnecting existing mains; testing; disinfection; and all incidental work necessary for a complete installation.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Divisions 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 06 20: Concrete Valve Casings.
 - 3. Section 33 11 20: Concrete Thrust Restraints.
 - 4. Section 33 13 01: Disinfecting Water Mains.
 - 5. Section 33 14 00: Gate Valves.
 - 6. Section 33 19 05: Pressure and Leakage Testing – Pressure Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A307: “Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI tensile Strength”.
 - 2. ASTM A536: “Specification for Ductile Iron Castings”.
 - 3. ASTM A563: “Specification for Carbon and Alloy Steel Nuts”.
- B. American Water Works Association (AWWA):
 - 1. AWWA C104: “Cement-Mortar Lining for Ductile Iron-Pipe and Fittings”.
 - 2. AWWA C110: “Ductile-Iron and Gray-Iron Fittings”.
 - 3. AWWA C111: “Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings”.
 - 4. AWWA C116: “Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings”.
 - 5. AWWA C150: “Thickness Design of Ductile-Iron Pipe”.

6. AWWA C151: “Ductile-Iron Pipe, Centrifugally Cast”.
7. AWWA C153: “Ductile-Iron Compact Fittings”.
8. AWWA C210: “Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings”.
9. AWWA C213: “Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings”.
10. AWWA C219: “Bolted, Sleeve-Type Couplings for Plain-End Pipe”.
11. AWWA C600: “Installation of Ductile Iron Water Mains and Their Appurtenances”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Affidavits” for products stating that they comply with the requirements of this Section and the applicable AWWA standards.
- C. Submit “Certifications” for each of the materials specified herein, which are used on the project, with the manufacturer’s Certificate of Compliance stating that the materials meet or exceed the specified requirements.
- D. Submit the “Product Data Sheets” for each product used.
- E. Submit “Test” results for proof of hydraulic tests on sleeve type couplings.
- F. Submit the manufacturer’s “Installation Instructions and Details” for installing pipe, fittings, restrained joints, retaining glands, and sleeve type couplings.
- G. Submit “Working Drawings” showing the layout and installation of the piping to be installed. Working drawings shall include but not be limited to pipe laying schedule, closure pieces, and fittings, extra mainline fittings, joint details, restraint and harnessing and special designs.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS:

- A. Delivery, storage, and handling shall be in accordance with AWWA C600.
- B. Coordinate delivery and distribution shall of pipe with installation and scheduled to provide minimum interference with traffic.
- C. Distribute pipe along line of work and outside trench as near as practicable to point of placement, facing in proper direction and properly wedged secure.
- D. Pipe shall not be rolled or dragged on the ground. No pipe shall be placed against trees or shrubs or in a manner that may damage private and other property.
- E. Protect pipe, pipe ends, pipe coating and lining, fittings and appurtenances from damage at all-times.
- F. Keep interior pipe surfaces clean at all times. Protect pipe ends by installing and maintaining, in good condition, approved plugs and caps.
- G. No material shall be deposited on or against pipe.

1.7 QUALITY ASSURANCE:

- A. Prior to placing pipe and fittings in trench, the interior and exterior of pipe and fittings will be inspected by DC Water. Pipe or fittings that are damaged shall be repaired or removed and replaced as directed by DC Water at no additional cost to DC Water.

PART 2. PRODUCTS

2.1 NUTS AND BOLTS

- A. Nuts shall comply with ASTM A563 unless noted otherwise in the Contract Documents.
- B. Bolts shall comply with ASTM A307 unless noted otherwise in the Contract Documents.

2.2 DUCTILE-IRON PIPE:

- A. Pipe shall be ductile-iron meeting the requirements of AWWA C151 with mechanical or push-on joints.
- B. Coat exterior of pipe with shop applied coating per AWWA C151 and cement lined with double thickness and seal coated in accordance with AWWA C104.
- C. Pipe shall be furnished in lengths of 18 to 20 feet and shall include all joining materials.
- D. Unless specified otherwise on Contract Drawings, Pipe class shall be:
 - 1. 12 inch diameter and smaller: Thickness Class 56.
 - 2. Greater than 12 inch up to 30 inch: Thickness Class 54.
 - 3. Greater than 30 inch: Pressure Class 350.

2.3 FITTINGS:

- A. Fittings shall be mechanical and push-on joints for ductile-iron pipe and fittings in accordance with AWWA C111.
- B. Fittings 48 inches and smaller in diameter shall be mechanical joint bell, ductile-iron in accordance with AWWA C110.
- C. Fittings 54 inches and larger in diameter shall be push-on bell, ductile-iron in accordance with AWWA C153.
- D. Coatings for Fittings:
 - 1. Provide exterior asphaltic coating per AWWA C110 and interior cement-mortar lining per AWWA C104; or
 - 2. Provide interior and exterior fusion bonded epoxy coating, 6-8 mills in thickness, conforming to AWWA C116.
- E. All fittings shall be complete with all joint accessories, rubber gaskets, bolts and nuts.

2.4 JOINT RESTRAINT:

- A. Unless otherwise noted, pressure ratings for pipe harnessing components shall not be less than the pipe working pressures of the installed pipe.
- B. Push-on joint ductile-iron pipe with proprietary restraint shall be as follows:
 - 1. TR-Flex by U.S. Pipe and Foundry Company for four (4) inch to 36 inch diameter pipe.
 - 2. HP LOK by U.S. Pipe and Foundry Company for 48-inch diameter and larger pipe.
 - 3. Flex-Ring Joint Pipe by American Cast Iron Pipe Company for four (4) inch to 54 inch diameter pipe.
 - 4. Lok-Ring Joint Pipe by American Cast Iron Pipe Company for 60 inch and larger pipe.
 - 5. Pipe produced by a manufacturer under a patent or other agreement with the approved manufacturers listed above is acceptable provided all requirements of the specifications are satisfied.

- C. Retainer glands for restraint of mechanical joint fittings to ductile-iron pipe 24 inches in diameter and smaller shall be designed to fit standard mechanical joint bells conforming to AWWA C111. Glands shall be manufactured of ductile-iron conforming to ASTM A536 with a restraining mechanism of size and arrangement per manufacturer's recommendations, of the following type:
 - 1. Ductile-iron wedges in combination with extra mainline fittings, heat-treated set screws with or without twist-off nuts, torqued per manufacturer's recommendation or hardened steel set screws with knurled and cupped points, with or without twist-off nuts.
 - 2. Megalug Series 1100 by EBAA Iron Sales, Inc., or Uni-Flange Series 1400 by Ford Meter Box Co. are considered acceptable.
 - 3. Retainer glands shall meet working pressure ratings for installed pipe.

2.5 SLEEVE TYPE COUPLINGS:

- A. Couplings shall be designed, manufactured and installed in accordance with AWWA C219 except as modified below:
 - 1. The Manufacturer shall provide an affidavit certifying compliance with the above standard.
 - 2. Couplings shall be designed for 150 psi operating pressure unless shown otherwise on the Contract Drawings. Provide manufacturer certification for proof of design tests per AWWA C219.
 - 3. The Contractor shall verify the outside diameters of the pipes to be connected, and shall select the correct diameter sleeve-type coupling to ensure a proper fit without utilizing pipe stops.
- B. The entire sleeve assembly shall be lined and coated with one of the factory-applied coating systems as follows:
 - 1. Fusion bonded epoxy per AWWA C213 with eight (8)-12 mils minimum exterior coating thickness and eight (8)-12 mils minimum interior coating thickness.
 - 2. Liquid epoxy per AWWA C210 with 16 mils minimum and 25 mils maximum coating thickness.
 - 3. Other coating system as approved by the DC Water.
- C. Bolts, nuts and harness tie rods shall be stainless steel as specified in AWWA C219.
- D. The Contractor may use mechanical joint sleeve at no additional cost to DC Water.

2.6 FIELD APPLIED COATING AND LINING SYSTEMS:

- A. Field applied coating system for repairs of pipe coatings and linings shall be a two (2) component, quick setting, 100 percent polyurethane product – Corropipe II by Valspar Industrial, or equal.
- B. Lining system shall be NSF 61 compliant.
- C. Touch-up pipe coating that is oxidized by using shop coat paint and following the manufacturers recommendations.

PART 3. EXECUTION

3.1 GENERAL:

- A. Pipe, fittings, and specials shall be new materials.
- B. DC Water reserves the right to limit the amount of pipe laid in advance of backfilling. However, in no case shall the amount exceed 50 linear feet.

- C. Straight pipe shall be furnished in standard uniform lengths. Approved short pipe lengths shall be used where necessary to meet line and grade or as closure pieces.

3.2 MAINTAINING WATER SERVICE:

- A. Existing water service or by-pass piping shall remain in service until new water mains are complete, temporarily capped, tested, disinfected, and charged except when disconnecting or connecting new Work.
- B. Where existing pipe is cut and connected to a new pipe, Work shall be scheduled as directed by DC Water to minimize service interruption.
- C. The Contractor shall submit a shutdown request to DC Water at least five (5) days prior to cutting or abandoning water piping.
 - 1. Prior to submitting the shutdown request all work necessary to prepare for the shutdown shall be complete, including but not limited to excavation, determining existing pipe measurements, having pipe laying sketches and work plan complete and approved, and all materials are procured and on site.
 - 2. Upon receiving the shutdown request DC Water will verify the Contractor is ready to perform the connection and, if all preparatory work is complete, DC Water will schedule the date of the outage and notify the Contractor of the approved outage date. Contractor shall make the connection on the date and time approved by DC Water.

3.3 INSTALLATION:

- A. Interior pipe surfaces shall be kept clean throughout construction by use of carefully fitted stoppers.
- B. Trench excavation and suitable bedding shall be complete to proper grade before pipe is placed. Any adjustment due to improper trench grade or settlement shall be accomplished at Contractor's expense.
- C. Pipe and fittings shall be lowered into trench so ends nearly abutt each other. Pipe shall be moved longitudinally in trench in an approved manner.
- D. Pipe shall be laid to the horizontal and vertical alignment as shown on the Project Drawings. Entire length of pipe and fittings shall be bedded solidly on trench bottom to required line and grade. Under no condition shall pipe be subjected to a blow or shock to bring it to required line and grade.
- E. As part of work, bell holes shall be excavated to adequate size where necessary to accommodate proper joints.
- F. When straight pipe requires cutting, the Contractor shall take field measurements for making, closing, and connecting pieces of correct dimensions. Cutting shall leave a smooth end. The cut shall be made by abrasive saw or by a special DIP pipe cutter. All pipe ends shall be square with the longitudinal axis of the pipe and shall be reamed and smoothed to assure a good connection.

3.4 MAKING CONNECTIONS:

- A. Unless otherwise indicated, the Contractor shall cut existing water mains and remove pipe, fittings, and appurtenances to connect new water mains, reconnect existing water mains, and perform all work necessary or incidental thereto.
- B. Transferring water connections, completing connections, and abandoning pipe shall be performed continuously until complete. The Contractor shall provide necessary labor, equipment, and materials, including but not limited to overtime pay, lights, and generators, to complete the work on a 24 hour basis at no additional cost to DC Water.

3.5 JOINTS AND FITTINGS:

- A. Joints shall be assembled per AWWA C600 and manufacturer's recommendations.

- B. Springing of joints is prohibited.
- C. Unless otherwise specified, the diameter of ductile-iron plain ends shall be the same as for mechanical-joint cast or ductile-iron pipe.
- D. The inside of the pipe socket and the outside of the plain end shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter.
- E. A retainer gland shall not be used on any pipe joint connecting ductile-iron pipe to existing cast-iron pipe.
- F. Pipe installation of proprietary restrained joint pipe systems shall be in accordance with the manufacturer's printed recommendations.
- G. Pipe Deflections:
 - 1. Under no circumstances shall pipe deflections, either horizontal or vertical, exceed the manufacturer's printed recommendations. Where deflections will exceed the manufacturer's recommendations, fittings shall be used.
 - 2. Keep the pipe straight while pushing the pipe home. The joint deflection shall only be completed after the pipe is homed.
 - 3. Changes in alignment or grade greater than the manufacturer's allowable deflection shall be made using fittings.
- H. Installing Mechanical Joint Fittings:
 - 1. Install mechanical joint fittings in accordance with the fitting manufacturer's instructions and AWWA C600.
 - 2. Torque range for retainer gland set screws shall be in accordance with fitting manufacturer's recommendations or AWWA C600 if manufacturer does not make recommendations.
 - 3. T-bolts, harness tie rods, coupling bolts, flanged joint bolts, etc. shall be installed to provide at least one complete thread projecting beyond the nut when properly tightened.
 - 4. If effective seal is not obtained at maximum specified torque, the joint shall be disassembled, cleaned and reassembled at no additional cost to DC Water.
 - 5. Bolts that are overstressing shall be removed and replaced at no additional cost to DC Water.
- I. After each ductile-iron pipe, fitting, and valve is jointed, each joint area including restraint elements shall be cleaned, inspected and approved before next section is installed.
- J. Carbon steel bolts, clamps, and connecting parts including thread areas, etc., shall receive one prime coat and one finish coat of field-applied coating system applied in accordance with AWWA C210. Field coatings shall be complete prior to line tests.

3.6 SLEEVE TYPE COUPLINGS:

- A. General:
 - 1. Use sleeve-type couplings only when indicated on the Contract Drawings.
- B. Pipe end condition:
 - 1. Pipe for use with sleeve type couplings shall have plain ends, cast or machined at right angles to pipe axis.
 - 2. Ductile-iron and cast-iron pipe shall be smooth and round for a distance of eight inches from end of the pipe up through 24 inch diameter, and for 12 inches from the end of the pipe for pipe larger than 24 inch diameter.
 - 3. Maximum actual O.D. of pipe end shall be such as to permit the passing of a ring gauge having an internal bore not greater than 0.01 inch larger than the nominal O.D. plus the maximum variation indicated in AWWA C110.

4. Steel pipe larger than 10-3/4 inches O.D. shall be free from indentations, projections or roll marks for a distance of eight inches from the end of the pipe and, within this distance, the actual O.D. shall be not more than 1/32 inch smaller than nominal O.D. Maximum actual O.D. of pipe end shall be such as to permit the passing of a ring gauge having an internal bore not greater than 3/32 inch larger than pipe nominal O.D.
5. For each type pipe, minimum actual O.D. shall be determined by use of a steel tape, calibrated to 100th of an inch, applied circumferentially to pipe.

C. Assembly:

1. Couplings shall be assembled in accordance with the manufacturer's printed installation instructions and provide a leak free connection when the pipe is tested at required test pressure.
2. Laying deflection per coupling shall not exceed manufacturer's recommendations.
3. Harness all couplings using stainless steel tie rods.
4. The Contractor may use mechanical joint sleeve at no additional cost to DC Water.

3.7 BLOW-OFFS:

- A. Piping for air and drain blow-offs shall be included as part of the water utility distribution piping installation.
- B. Blow-off valves and casings shall be supplied as specified in Section 33 06 20 – Concrete Valve Casings and Section 33 14 00 – Gate Valves.

3.8 THRUST RESTRAINT:

- A. Pipe shall be restrained at all joints, fitting, valves, appurtenances, and specials using the joint restraining systems specified in this Section.
- B. Concrete thrust restraints shall be used when shown on the Contract Drawings, as required by Section 33 11 20 – Concrete Thrust Restraints or when approved by DC Water and shall be in accordance with Section 33 11 20 – Concrete Thrust Restraints.
- C. All push-on joints shall be restrained using an approved proprietary harnessing system installed in accordance with manufacturer's printed instructions.
- D. Mechanical joint and retainer glands shall be used to restrain fittings. Restraint of mechanical joint ductile-iron pipe shall be accomplished by using approved ductile-iron retainer glands in lieu of follower glands, installed in accordance with manufacturer's printed instructions.
- E. After each restrained joint is complete, the joint restraint elements shall be cleaned and inspected.

3.9 DISINFECTING WATER PIPING:

- A. Piping for water systems shall be disinfected in accordance to Section 33 13 01 – Disinfecting Water Mains.

3.10 PRESSURE AND LEAKAGE TESTING:

- A. Pressure pipe shall be tested in accordance with Section 33 19 05 - Pressure and Leakage Testing – Pressure Pipe.

3.11 EXTRA MAINLINE FITTINGS:

- A. Contractor shall identify to DC Water extra mainline fittings necessary for closure sections or unanticipated interferences. If DC Water agrees that extra mainline fittings are necessary, the Contractor shall:

1. Verify the size of existing pipe in service and provide fittings in accordance with this section to complete a closure or navigate around an unanticipated interference.
2. Contractor shall provide working drawings showing the proposed modifications to the design and the limits of pipe and fittings that will be needed for closure or navigating around the unanticipated interference.
3. Upon review and approval of the proposed modifications by DC Water, the Contractor shall install the modifications as shown on the working drawings.
4. Fittings, not shown on the Contract Drawings shall be paid as part of the measurement and payment item for Extra Mainline Fittings - DIP.

~ END OF SECTION 33 05 02 ~

SECTION 33 06 20

CONCRETE VALVE CASINGS

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes excavation, backfill and compaction beyond pipe trench excavation limits; disposal of excess material; furnishing and placing of valve casings complete with concrete base, piers, grade rings, and casing frames and covers at locations shown or as directed by DC Water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 03 20 00: Reinforcing Steel Rebars.
 - 3. Section 03 30 00: Cast-In-Place Concrete.
 - 4. Section 03 40 00: Precast Concrete Products.
 - 5. Section 31 23 10: Trench Excavation and Backfill.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A48: "Standard Specification for Gray Iron Castings".
 - 2. ASTM A615: "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
 - 3. ASTM C32: "Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)".
 - 4. ASTM C150: "Standard Specification for Portland Cement".
 - 5. ASTM C270: "Standard Specification for Mortar for Unit Masonry".
 - 6. ASTM C478: "Standard Specification for Circular Precast Reinforced Concrete Manhole Sections".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the "Product Data Sheets" for each product used.
- C. Submit a proposed list of sources for all material. Sources shall be approved by the jurisdiction DOT for the location where the Work is performed and shall include a copy of their certification of each source.
- D. Submit plant batch tickets for Concrete Valve Casings work before placing. Batch tickets shall include type of mix, date mixed and graduation of mineral aggregate.

- E. Submit the “Test Results” for Concrete Valve Casings work.
- F. Submit the “Field Inspection Data” for Concrete Valve Casings work.

PART 2. PRODUCTS

2.1 PRECAST REINFORCED CONCRETE SECTIONS:

- A. Precast reinforced concrete sections shall be in accordance to ASTM C478 and Section 03 40 00 – Precast Concrete Products.
- B. Cones, risers, grade rings and piers shall be precast reinforced concrete. Casing base may also be constructed of precast reinforced concrete.

2.2 CAST-IN-PLACE CONCRETE:

- A. Casing base may be constructed of 4000 psi cast-in-place concrete and shall be in accordance with Section 03 30 00 – Cast-in-Place Concrete.

2.3 PRECAST GRADE RINGS:

- A. Concrete grade rings shall meet requirements of ASTM C478
- B. Split rings shall not be used.
- C. Factory cast grade rings shall have hold down bolt holes matching the location of hold down holes in manhole frame.
- D. Grade rings shall be capable of providing the full bearing of manhole frame.

2.4 REINFORCING STEEL:

- A. Reinforcing steel shall be in accordance with Section 03 20 00 – Reinforcing Steel Rebars and ASTM A615.

2.5 FRAMES AND COVERS:

- A. Frame and cover fabrication shall be as shown on the Standard Detail Drawings.
- B. Casing frames and covers shall be gray iron castings and shall be per ASTM A48, Class 30A or 35A.
- C. Iron castings shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow-holes and other defects affecting their strength and value for the service intended.
- D. Castings shall be boldly filleted at the angles and arises shall be sharp and perfect.
- E. All castings shall be sandblasted or otherwise effectively cleaned of scale and sand so as to present a smooth, clean and uniform surface.
- F. The word “WATER” shall be cast in one (1) inch high letters flush with surface of cover.

2.6 BRICK:

- A. Brick shall meet physical requirements of ASTM C32, Grade MS for casings and shall be 2-1/4 x 3-3/4 x 8 inches in size.

2.7 MORTAR:

- A. Mortar shall meet ASTM C270, Type M with waterproofing admixture included.
- B. Joint mortar for valve casing brickwork shall consist of one (1) part Type II Portland cement complying with ASTM C150 and 2-1/4 parts fine aggregate by volume and sufficient water to make a stiff mix.
- C. Lime in mortar is prohibited.

PART 3. EXECUTION

3.1 GENERAL:

- A. Excavation and backfill for Concrete Valve Casings shall be per Section 31 23 10 – Trench Excavation and Backfill.
- B. Concrete Valve Casings shall be furnished and constructed over gate valves, suction and dead end air/drain blow-offs, two-inch air valves, six (6) inch drain blow-offs and six (6) inch air blow-offs per the Standard Details.
- C. Casings shall be constructed of precast concrete rings per the Standard Details.
- D. Carefully center valve casing, frame and cover, if applicable, over the operating nuts of the valves so as to permit a valve wrench or key to be fitted easily to the operating nut.
- E. The valve casing shall not transmit surface loads to the pipe or valve.
- F. Contractor shall exercise care to prevent earth and other material from entering the valve casing.
- G. Valve extension stems or risers shall not be used.
- H. Valve casing, frame and cover shall be set to conform to the level of the finished surface and held in position by a ring of concrete placed under the support flange. Any valve casing, frame and cover which is out of alignment or whose top does not conform to the finished ground surface shall be dug and reset.

3.2 CONES, RISERS, PIERS, GRADE RINGS, AND BASE:

- A. Cones, risers, piers, grade rings, and base shall be constructed from precast concrete products unless shown otherwise on the Contract Drawings. At Contractor's option, cast-in-place concrete may be used to construct the base.
- B. Grade rings made of brick shall only be used if approved by DC Water.

3.3 GRADE RING INSTALLATION:

- A. Grade rings shall be pre-cast concrete unless approved otherwise by DC Water, in which case, grade rings shall be brick.
- B. A single grade ring shall be used where possible. The height of the grade rings shall be such as is necessary to bring the manhole frame to the proper grade. If more than three (3) adjustment grade rings are required, a separate riser section shall be used.
- C. Grade rings shall be stacked in two (2) or three (3) inch increments to a maximum of nine (9) inches in height constructed on the cone section on which the manhole frame and cover shall be placed.
- D. When brick is used for grade rings, prepare mortar in quantities needed for immediate use. Mortar mixed for more than 30 minutes, re-tempered, or previously set will not be allowed.

3.4 FRAMES AND COVER INSTALLATION:

- A. Align the bottom flange of the casing frame so that the two 3/4-inch diameter holes corresponding directly over the minimum of two (2) inch deep holes that are drilled into the precast concrete ring or brick masonry upon which the frame sits.
- B. Insert steel dowels through and into these holes to prevent lateral movement of frame and cover. Dowels shall be #5 rebar, three (3) inches minimum length.

~ END OF SECTION 33 06 20 ~

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SECTION 33 11 20

CONCRETE THRUST RESTRAINTS

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes excavation, backfill, and compaction of soils beyond pipe trench excavation limits, disposal of excess material, furnishing and constructing concrete thrust restraints complete, in place. Concrete thrust restraints include thrust blocks for change in pipe direction, in-line thrust blocks, and collars installed on piping for watertight connections. H-pile thrust blocks are not covered by this Section.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Divisions 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 03 20 00: Reinforcing Steel Rebars.
 - 3. Section 03 30 00: Cast-in-Place Concrete.
 - 4. Section 31 23 10: Trench Excavation and Backfill.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A615: "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".
 - 2. ASTM C94: "Standard Specification for Ready-Mixed Concrete".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit certified "Shop Drawings" showing the concrete thrust restraint dimensions and rebar size, spacing, and locations.
- C. Submit "Working Drawings" showing proposed locations for concrete thrust restraint.

PART 2. PRODUCTS

2.1 CONCRETE:

- A. Concrete for thrust restraints shall be minimum class 3000 in accordance with Section 03 30 00 – Cast-in-Place Concrete.
- B. ASTM C94 specification for transit mixed concrete shall control the concrete quality.

2.2 REBAR:

- A. Rebar shall be made from Grade 60 steel per ASTM A615 and in accordance with Section 03 20 00 – Reinforcing Steel Rebars.
- B. Tie wire shall be 16-gage minimum, black, soft annealed.

PART 3. EXECUTION

3.1 GENERAL:

- A. Concrete thrust restraints shall be installed at locations shown on the Contract Drawings as designed by the Professional Design Engineer, at connections to existing cast iron piping, or where manufactured restrained pipe systems cannot be used. Proposed locations shall be submitted to DC Water for approval.
- B. Concrete placement shall be in accordance with Section 03 30 00 – Cast-in-Place Concrete and rebar installation shall be in accordance with 03 20 00 – Reinforcing Steel Rebars.

3.2 INSTALLATION:

- A. Thrust restraints for pressurized piping 12 inch in diameter and smaller shall be constructed per DC Water's Standard Details.
- B. Piled thrust restraints and thrust restraints for pressure piping larger than 12 inch in diameter shall be constructed as shown on the Contract Drawings and as designed by the Professional Design Engineer.
- C. Concrete thrust restraints shall be placed against wetted, undisturbed soil in accordance with the Standard Details and/or Contract Drawings.
- D. The thrust blocks shall be centered on the fitting so that the bearing area is exactly opposite the resultant direction of the thrust.
- E. The concrete shall be placed so that fittings and valves will be accessible for repairs or replacement.
- F. Concrete shall cure for a minimum of four (4) days or reach 50% specified strength prior to backfilling and subjecting the restraint to thrust pressure. Backfill shall be per Section 31 23 10 – Trench Excavation and Backfill.
- G. If necessary to return the water main to service prior to concrete being cured, provide temporary restraint as required to prevent loading the thrust restraint.

~ END OF SECTION 33 11 20 ~

SECTION 33 12 13

WATER SERVICE LINES

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, materials, and equipment necessary to install water service lines, two (2) inches and smaller, and remove and replace lead water service lines to properties including but not limited to excavating test pits, water service trench excavation and backfill, installation of meter box, curb stop, curb stop box, service saddles, corporation stops, and temporary surface restoration. Includes replacing galvanized iron and brass water service if directed by DC Water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 00 89 00: Project Permits and Approval.
 - 2. Section 01 06 50: Public Notification – Water.
 - 3. Section 01 33 00: Submittals.
 - 4. Section 33 01 20: Abandonment of Underground Utilities.
 - 5. Section 33 12 17: Service Saddles.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM B88: “Standard Specification for Seamless Copper Water Tube”.
 - 2. ASTM C33: “Standard Specification for Concrete Aggregate”.
 - 3. ASTM C534: “Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form”.
 - 4. ASTM C552: “Standard Specification for Cellular Glass Thermal Insulation”.
 - 5. ASTM C564: “Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings”.
 - 6. ASTM C920: “Standard Specification for Elastomeric Joint Sealants”.
 - 7. ASTM D746: “Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact”.
 - 8. ASTM D1248: “Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable”.
 - 9. ASTM D1505: “Standard Test Method for Density of Plastics by the Density-Gradient Technique”.
 - 10. ASTM D1785: “Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80, and 120”.

11. ASTM D2665: “Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings”.
 12. ASTM E84: “Standard Test Method for Surface Burning Characteristics of Building Materials”.
- B. American Water Works Association (AWWA)
1. AWWA C810: “Replacement and Flushing of Lead Service Lines”.
- C. Code of Federal Regulations:
1. 40 CFR 261: “Identification and Listing of Hazardous Waste”.
 2. 40 CFR 262: “Standards Applicable to Generators of Hazardous Waste”.
 3. 40 CFR 263: “Standards Applicable to Transporters of Hazardous Waste”.
 4. 40 CFR 264: “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities”.
 5. 40 CFR 265: “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities”.
 6. 40 CFR 268: “Land Disposal Restrictions”.
- D. District of Columbia Department of Consumer and Regulatory Affairs (DCRA):
1. District of Columbia Plumbing Code.
- E. Safe Drinking Water Act (SDWA):
1. Reduction of Lead in Drinking Water Act.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit the “Product Data Sheets” for each product used.
- C. Submit “Field Data” for work performed including but not limited to permits, invoices, tap cards, and daily and weekly reporting sheets, customer outreach logs, completed and cancelled services orders.
- D. Submit written evidence that the receiving lead waste treatment, storage, or disposal facility is approved to accept lead waste by the federal and district or local regulatory agencies.
- E. Submit Private Property Side Agreement Documentation.
- F. Submit proposed method of installation for service lines.

1.6 PERMITS:

- A. Contractor shall obtain permits required by Section 00 89 00 – Project Permits and Approvals.

1.7 NOTIFICATIONS:

- A. Notifications shall be made in accordance to Section 01 06 50 – Public Notification - Water.
- B. Contractor shall notify DC Water a minimum of two (2) weeks prior to performing water service work, meter relocation, and/or new meter installation.

PART 2. PRODUCTS

2.1 GENERAL:

- A. All service brass shall comply with the 2011 Reduction of Lead in Drinking Water Act which went into effect January 1, 2014. Products shall be marked “lead-free” or “Low Lead” to signify compliance.
- B. The following materials shall comply with the District of Columbia Plumbing Code.
 - 1. Shut-off valves.
 - 2. Pressure reducing valves.
 - 3. Copper-to-Copper Couplings.
 - 4. Copper-to-Non-Copper Couplings.
 - 5. Meter Yokes.
 - 6. Reducers.
 - 7. Meter Stops.
 - 8. Meter Valves.
 - 9. Seamless Copper Water Tube shall be ASTM B88, Type K.

2.2 CORPORATION STOPS:

- A. Corporation Stops shall be per the District of Columbia Plumbing Code.
- B. Acceptable manufacturers and models for one (1) inch corporation stop include Mueller Corporation Valve Model B25000N, A.Y. McDonald Model 74701B, or approved equal.
- C. Acceptable manufacturers and models for one half (1-1/2) inch corporation stop include Mueller Corporation Valve Models B20003N and H10096N, A.Y. McDonald Models 73121 and 74000, or approved equal.
- D. Acceptable manufacturers and models for two (2) inch corporation stop include Mueller Corporation Valve Models B20003N and H10096N, A.Y. McDonald Models 73121 and 74000, or approved equal.

2.3 CURB STOPS AND EXTENSION RODS:

- A. Curb stops shall be an optimized design by combining a strong and reliable ball/stem connection with other designed features, including a blow-out-proof stem, double O-rings and a 300 psig working pressure rating. The design shall offer true bi-directional (two way) flow.
- B. Extension rods shall be stainless steel. Rods shall be half (1/2) inch diameter for two (2) feet long and shorter 5/8-inch diameter for greater than two (2) feet. Rods shall be supplied with optional rod rings and stainless steel cotter pins. Acceptable models are A.Y. McDonald Model 5660SS, Bingham & Taylor Model Type ROD SS, or approved equal for the appropriate size required.
- C. Acceptable manufacturers and models for one (1) inch curb stops include Mueller 300 Ball Corporation Valve Model B25204N, A.Y. McDonald Model 76100, or approved equal.
- D. Acceptable manufacturers and models for one half (1-1/2) inch curb stops include Mueller 300 Ball Corporation Valve Model B25204N, A.Y. McDonald Model 76100, or approved equal.
- E. Acceptable manufacturers and models for two (2) inch curb stops include Mueller 300 Ball Corporation Valve Model B25204N, A.Y. McDonald Model 76100, or approved equal.

2.4 CURB STOP BOXES:

- A. Curb stop boxes shall be telescoping, two (2) piece, screw style. Lower section shall consist of full externally threaded shaft over a Buffalo style bell that is arched and flanged. Upper section shall consist of full internally threaded shaft that fits over lower section with cast iron rim on top of shaft to accommodate a cast iron cover (lid) with "WATER" imprinted on it.

- B. Both the lower section and the upper section of the curb stop box shall be rigid acrylonitrile-butadiene-styrene (ABS.) plastic, either injection molded or extruded.
- C. The cast iron lid and rim shall be of standard Buffalo new style design with standard pentagon head bolt and shall be interchangeable with the cast iron Buffalo old style boxes already in use.
- D. Acceptable manufacturer and model includes Bingham & Taylor Model Series 250 for use outside the roadway or series 4901, Sliding Type P-94-E, for use within the roadway – Screw curb stop box, or approved equal.

2.5 METERS:

- A. Meters will be furnished by DC Water.

2.6 METER BOXES:

- A. Meter boxes shall be of durable, high-density polyethylene, molded with solid walls (containing no foam or corrugations) and shall have flanged bottom not only for added strength but also to retard settling or sinking into the ground. The nominal wall thickness of the box shall not be less than 0.55 inch and the box shall have nominal dimensions of 20 inch diameter (O.D.) by 30 inch depth. Other sizes may be used, if necessary, for larger settings.
- B. The polyethylene (PE) plastic material specified for the box shall be Type III or Type IV High Density polyethylene per ASTM D1248, with densities of 0.95 g/c.c. and above, as determined by ASTM D1505 test method. The interior color of the box shall be white (natural) to aid in meter reading, but the exterior shall be black, compounded to improve strength and to protect against deterioration below ground. The low temperature brittleness shall be a maximum of 76 degrees Fahrenheit per ASTM D746.
- C. Acceptable manufacturer and model includes Oldcastle Enclosure Solutions, Inc. Carson Plastics Model 0020-B 30 inch, or approved equal.

2.7 METER BOX FRAMES AND COVERS:

- A. Meter box frame and cover to be used in conjunction with the meter boxes above.
- B. Covers shall be Type A, 12-1/4-inch O.D. for one (1) inch meters and 21-1/4-inch O.D. for one half (1-1/2) inch and two (2) inch meters, and shall be constructed of polyolefin resin or similar material that is UV stabilized and RF transparent. Mountings for AMI devices shall be compatible with Hexagram meter transmission units. Each cover shall be fitted with one standard size bronze pentagon nut swaged to a cast iron locking worm gear and shall be labeled with “DC Water” in one-inch high letters.
- C. Meter box frame castings for non-traffic areas shall be iron melted by any process following ASTM A48, Class 35 minimum. Surfaces shall be sandblast clean or other approved process. Paint clean and rust free surface with one (1) coat of asphalt.
- D. Meter box frames for traffic areas shall be cast iron sized to suit cover and meter box furnished. Meter box frames and cover shall be tested to withstand AASHTO H20 loading and shall be approved by DC Water.
- E. Acceptable manufacturers and models for meter box frame and cover for one (1) inch meter setting includes Bingham and Taylor frame Model 180-20-AWEH-TR for 20 inch diameter housing or approved equal.
- F. 20 inch single recess meter box frame for 30 inch diameter housing for one half (1-1/2) inch and two (2) inch meter setting shall be assembly consisting of 20 inch diameter monitor ring and 20 inch x 30 inch extension ring. Extension ring shall be manufactured by Bingham and Taylor Model No. 4F-000, East Jordan Iron Works model No. 32320300, or Meter Box Covers, Inc. (Division of A.Y. McDonald Manufacturing Co.) Model No. 74MF1010 or approved equal.

2.8 METER SETTINGS:

- A. Meter settings for one (1) inch meters:
 - 1. Single meter setter shall be one (1)-piece factory assembled, including, ball valves, dual check valves, elbows and all connections as shown on standard details. All joints within the meter pit must be flared, brazed or threaded fittings.
 - 2. Acceptable manufacturers and models for one (1) inch meter settings include Mueller Model 330B2489-6A-N, A.Y. McDonald Model 737412WDCC44, or approved equal.
- B. Meter settings for one half (1-1/2) and two (2) inch meters:
 - 1. Single meter setter shall be one (1) piece factory assembled, including high by-pass, ball valves, dual check valves, elbows and all connections as shown on standard details. All joints within the meter pit must be flared, brazed or threaded fittings.
 - 2. Acceptable manufacturers and models for one half (1-1/2) inch meter setter includes Ford Meter Box Company Model VBHC76-27HBHC-11-66-NL, A.Y. McDonald Manufacturing Company Model 720R627WD-FF-66X427, Mueller Co. Model 096B2423-2-39N dated 1/5/16, or approved equal.
 - 3. Acceptable manufacturers and models for two (2) inch meter setter includes Ford Meter Box Company Meter Model VBHC77-27HBHC-11-77-NL A.Y. McDonald Manufacturing Company Model 720-R727WD-FF-775.04X427, Mueller Co. Model 1096B2423-2-39N dated 1/5/16, or approved equal.

2.9 SERVICE SADDLES:

- A. Service Saddles shall be in accordance with Section 33 12 17 – Service Saddles.

2.10 PIPE PENETRATION MATERIALS:

- A. Sealant:
 - 1. Pipe penetration sealant used with grout filler shall be one (1) component polyurethane, elastomeric non-sag sealant meeting ASTM C920, Type S, Grade NS, Class 35. Sikaflex 1a as manufactured by Sika Corporation, Lyndhurst, NJ or approved equal.
 - 2. Pipe penetration sealant for full depth penetration (no grout filler) shall be two (2) component, polyurethane-based, elastomeric non-sag sealant with chemical cure meeting ASTM C920, Type M, Grade NS, Class 25. Sikaflex 2c NS as manufactured by Sika Corporation, Lyndhurst, NJ or approved equal.
- B. Grout: Non-Shrink.
- C. Sleeve: Schedule 40 PVC pipe sleeve shall conform to ASTM D1785 and ASTM D2665.
- D. Transition Coupling: Transition couplings shall be rubber and conform to ASTM C564.
- E. Stainless Steel Clamps: Stainless steel clamps with screw.

2.11 INSULATION:

- A. Cellular-Glass Insulation:
 - 1. Cellular-Glass Insulation shall be Foamglas One as manufactured by Pittsburgh Corning Corp. or approved equal.
 - 2. Preformed pipe insulation shall comply with ASTM C552, Type II, Grade 6.
 - 3. Insulation thickness shall be a minimum of 0.75-inches.
 - 4. Insulation jacket shall be 50 mil thick self-sealing modified bituminous membrane, glass fabric with aluminum top film for direct bury conditions. Jacket shall be as recommend by the manufacturer of the insulation and may be field or factory applied.

- B. Flexible Closed-Cell Elastomeric Insulation:
 - 1. Flexible closed-cell elastomeric insulation shall be AP/Armaflex as manufactured by Armacell, or approved equal.
 - 2. Preformed pipe insulation shall comply with ASTM C534, Type 1 – Grade 1.
 - 3. Insulation materials shall have a flame spread index of less than 25 and a smoke-developed index of less than 50 when tested in accordance with ASTM E84.
 - 4. Insulation wall thickness shall be minimum of 0.75-inches.
 - 5. Insulation jacket shall be PVC in tubular or sheet form that is formaldehyde free, low VOC's, fiber free, dust free and resists mold and mildew. Jacket shall be as recommend by the manufacturer of the insulation and may be field or factory applied.

2.12 GRAVEL:

- A. Gravel shall be size No. 57 or 67 Gravel per ASTM C33.

PART 3. EXECUTION

3.1 GENERAL:

- A. Installation of water services shall be performed by Master Plumbers licensed in the District of Columbia or the Jurisdiction where the Work is performed if Work is performed outside of the District of Columbia. Journeyman and Apprentices working directly for and under the direct supervision of a licensed plumber may perform work provided the Master Plumber obtains the permit, inspects all work, and provides a certification for each service to DC Water that the work was performed in accordance with all codes.
- B. Meters will be supplied by DC Water and shall be installed by the Contractor. The Contractor shall furnish and install pipe, yoke, couplings, shunt, meter valves, meter housing, meter housing gravel foundation, meter box frame and cover.
- C. Water service components and/or lead water service line replacement to properties shall be removed, replaced, adjusted and/or maintained for water service line piping two (2) inch diameter and smaller as follows:
 - 1. Public Space: Replace non-copper service lines, service lines that are copper and less than one (1) inch diameter, and services lines that are copper and one (1) inch or greater and cannot be adjusted.
 - 2. Private Property: Lead water service lines on Private Property shall be replaced by the Contractor per valid Customer Agreements as directed by DC Water. Galvanized iron and brass water service lines shall be replaced if directed by DC Water, in which case, replacement and documentation requirements shall be the same as for lead water service.
 - 3. Lead service replacement shall be completed in one shutoff. No partial replacements will be permitted.

3.2 PRECONSTRUCTION PHOTOS:

- A. Photos shall be taken immediately before starting Work.

3.3 WORK PERFORMED BY DC WATER:

- A. DC Water will retrieve the existing meters (removed and stored in the meter box by the Contractor), attach, and activate the MTU on the new cover (lid). Any existing meters found to be not automatic meter reading (AMR) type will be reviewed for replacement on a case-by-case basis by DC Water.

3.4 WORK ON PRIVATE PROPERTY:

A. DC Water Responsibility:

1. DC Water will contact all affected Property Owners to obtain a signed agreement that authorizes replacing lead services on Private Property.
2. After the Agreement is signed, DC Water will provide the Contractor with a list of addresses where the Property Owners have authorized lead service line replacement on Private Property and the corresponding Service Orders issued by DC Water.
3. If work scheduled on Private Property is subsequently cancelled by the Property Owner or DC Water, DC Water will notify the Contractor of the cancellation and that no work on the Private Property is authorized.

B. Contractor Responsibility:

1. Where no service order has been issued for work on Private Property, the Contractor shall provide a curb stop in Public Space as per DC Water's Standard Details.
2. The Contractor shall not begin work on Private Property until after receipt of a valid service order from DC Water. The Contractor shall make no claim for any time delay associated with obtaining permission to work on Private Property.
3. If a service order is cancelled directly with the Contractor by the Property Owner, the Contractor shall note the cancellation of service order in the outreach log and return the service order to DC Water with a status of "Cancelled by Homeowner."
4. Work on Private Property is subject to approval by the Property Owner. No compensation will be made to the Contractor if the Property Owner does not authorize any portion of the work on Private Property.
5. Contractor shall honor all Private Property service orders generated until final surface restoration has been completed.
6. Where the material on the Private Property segment of the water service line is determined to not be lead, the Contractor shall notify the Property Owner/Tenant that the scheduled appointment for water service line replacement on Private Property is not necessary unless directed otherwise by DC Water. Return the service order to DC Water with a status of "Closed – No Replacement Done."
7. Work performed by Contractor under Private Property side agreements made directly between the Contractor and the Property Owner shall be reported daily to DC Water. All pertinent information that is similar to that which is included on the Tap Card shall be documented.
8. For each address for which the Contractor has entered into a side agreement with the Property Owner, the Contractor shall provide to DC Water a copy of each permit procured to execute the work, a copy of the invoice, and a copy of a completed Tap Card for recording the relevant information on the work performed.
9. Contractor shall perform all work using appropriate methods to minimize the disturbance of Private Property including the existing interior wall finish and exterior foundation wall. The existing pipe penetration shall be removed and the opening sealed watertight. The Contractor shall restore the existing interior wall finish and/or exterior foundation wall when damaged by the Contractor at no additional cost to DC Water.
10. Upon completion of water service line work, the Contractor shall verify water service has been restored to each property by meeting with the owner or occupant of the property, visibly inspecting each water service line, verifying flow to the fixtures, and obtaining a written signature from the owner or occupant with a statement confirming that water service is restored. If required, the Contractor shall verify restoration of water service after normal working hours when the property is occupied. Submit copies of the signed statement verifying water

service is restored to DC Water. Return the service order to DC Water with a status of "Complete."

C. Pipe Penetrations:

1. Water Service line passing through concrete or cinder block walls and floors or other corrosive material shall be protected against external corrosion by a protective PVC pipe sleeve meeting the requirements of the DC Plumbing Code. The pipe sleeve shall allow for expansion and contraction of the water service line.
2. Pipe sleeves shall extend beyond the concrete or cinder walls and floors and a rubber transition coupling shall be installed at each end of the sleeve to provide a water tight seal.
3. The rubber transition couplings shall be secured to pipe sleeve, and also secured to the water service line using stainless steel clamps that are tightened to approximately 60 inch-lbs.
4. Sleeves shall be sealed to wall or floor with non-shrink grout and sealants as required for a watertight seal.

D. Pressure Reducing Valves:

1. Install pressure reducing valves if incoming pressure is greater than or equal to 80 psi.
2. Pressure reducing valves shall be preset to 80 psi and field adjusted by the Contractor if requested by the Property Owner and/or Tenant to reduce the pressure.

3.5 MAINTAINING WATER SERVICE:

- A. Existing water service shall be kept in service until transfer connections are made. Where the water service line is replaced to the water main, the Contractor shall use a wet tapping machine to install a new corporation stop prior to disconnecting the old water service line. The new water service line shall be connected to the new corporation stop and installed within the time limits specified herein. The existing corporation stop shall be removed and a solid threaded brass plug installed in place of the removed corporation stop.
- B. No more than three separate shutoffs will be permitted for any single water service line, and the duration of each shutoff shall not exceed two (2) hours, except in an emergency when DC Water will grant a time extension. The Contractor shall give sufficient, advance written notice to DC Water of the starting time and duration of proposed shutoff in-order to provide for emergency water supply.
- C. If the proposed shutoff time conflicts with essential consumer use, it shall be rescheduled to alleviate interference. DC Water will determine action to be taken for essential consumer use requests. No additional payments will be made to the Contractor for working outside normal hours to accommodate essential service.
- D. Overtime, weekend and holiday work may be ordered by DC Water to promptly complete temporary and/or permanent water service. The Contractor shall respond to emergency work within two (2) hours of notification.

3.6 SERVICE TAPS:

- A. DC Water will install all service taps requested by organizations that are not performing work as part of a construction contract issued by DC Water. Contractors performing work as part of a construction contract issued by DC water shall install service taps in accordance with Section 33 12 17 – Service Saddles.
- B. Install all new water service line taps at the water main and remove and plug all existing corporation stops.
- C. Confirm the water service line tap is made to a pressurized water main.

3.7 METER, METER BOX, FRAME AND COVER INSTALLATION:

- A. Contractor shall schedule all meter pickups with DC Water at least five (5) business days in advance of any proposed meter work.
- B. Protection of Meters:
 - 1. The Contractors shall provide safe transport and care of the meters to and from the point of installation. Replacement of any meter damaged, lost, or stolen while in the possession of the Contractor shall be at the Contractor's expense.
- C. Installation:
 - 1. Meters shall be reinstalled at their existing location unless specifically directed by DC Water or as follows:
 - a. Wherever an existing meter is located on Private Property or inside a building, the Contractor shall install a new meter setter with jumper, meter box, frame and cover in Public Space and leave the existing meter in place. Contractor shall also notify DC Water that a meter needs relocation or abandonment.
 - b. Where any unmetered water service is encountered, the piping, yoke, fittings, meter box, shunt, frame and cover will be installed in Public Space.
 - 2. If the existing meter is an AMR type meter greater than or equal to one (1) inch diameter, the Contractor shall reinstall the existing meter. Otherwise, the Contractor shall:
 - a. Request, coordinate, and pick-up a new water meter from DC Water;
 - b. Remove existing meter, protect existing meter and place in a 42 gallon capacity, three (3) mil plastic bag with twist tie or other device to seal the bag, all provided by the Contractor. Place the bag containing the meter in the bottom of new meter box.
 - c. Connect the new meter to the meter yoke.
 - 3. If a new meter is not available, a temporary meter jumper line shall be furnished and installed by the Contractor until a new meter is available. When the new meter becomes available, Contractor shall remove the jumper line and install the new meter at no additional cost to DC Water.

3.8 ADJUSTING WATER SERVICE LINE:

- A. Work consists of adjusting water service line pipe due to new water main work that affects water service.
 - 1. If the existing water service piping is copper, is not less than one (1) inch diameter and enough slack exists in the piping to make the connection as determined by DC Water, the existing piping shall be connected to the new main without replacing any piping.
 - 2. If insufficient slack is available or pipe cannot be bent by approved means to meet new corporation stop, adjustment under this subsection will not be feasible and a section of pipe shall be replaced as specified herein.
- B. Work consists of trench excavation within the street including excavation, backfill and compaction. The Contractor shall abandon the old tap and install a new tap, adjust the existing one (1) inch through two (2) inch diameter copper service pipe to bring pipe to the connection point at the new corporation stop and, making the connection.
- C. Install and maintain temporary asphalt patching until permanent restoration is performed.

3.9 REPLACE WATER SERVICE LINE:

- A. Work consists of replacing water service line pipe in accordance with DC Water's Standard Details.
 - 1. If existing water service piping is not copper, or is copper pipe less than one (1) inch diameter, the Contractor shall replace the water service piping with a single section of copper pipe not less than one (1) inch diameter with no joints, couplings or fittings from the new main to the new meter housing and from the meter to:
 - a. The property line, along with a curb stop and curb stop box at the property line when there are no obstructions present in Public Space.
 - b. The face of building projection, along with a curb stop and curb stop box close to the face of projection, when projection occupies Public Space.
 - 2. Replacement piping shall be the same size as piping replaced except that all existing piping in public space smaller than one (1) inch shall be replaced with one (1) inch copper piping and all non-copper pipe shall be replaced with copper.
 - 3. When the new copper pipe between the water main and meter will be one (1) inch diameter but existing service between meter and dwelling is non-copper pipe, DC Water will provide a new one (1) inch meter and the Contractor shall install one (1) inch copper pipe between the meter and property line or building projection, a curb stop, curb stop box, and appurtenances at the property line. All materials shall comply with the DC Plumbing Code.
- B. Provide service Saddles as required by Section 33 12 17 – Service Saddles.
- C. Install a curb stop box and set plumb over the curb stop so that the stop is centered within box. Top section of box shall be rotated so that box cover will be flush with finished ground surface. Backfill shall be carefully placed to avoid disturbance of curb stop or curb stop box.
- D. Install extension rod for each curb stop. Extension rods shall extend as close to the curb box cover as possible using a manufacturer's standard length extension rod.
- E. Install water services lines using trenchless or conventional excavation methods. Submit proposed method of installation to DC Water for review and approval. Installation shall include temporary and permanent restoration (except overlay) including seeding, sodding, curb and gutter, sidewalk, flexible pavement, PCC base, PCC pavement, excavation, backfill, compaction, and all other costs associated with the installation regardless of whether trenchless or conventional excavation methods are used.
- F. If DC Water determines that a meter requires relocation or a new meter is necessary, the Contractor shall cut service line using a pipe cutter or shearing device (abrasive cutting methods are not permitted) at a location as directed by DC Water and provide and install new pipe, meter yoke and couplings, meter box, and frame and cover. Install the new meter provided by DC Water. If meter and housing adjustment in-place is necessary, the Contractor shall furnish and install new pipe and couplings.
- G. Following installation of the water service line and prior to backfilling the areas of connections and joints, the new connection shall be activated and visually inspected to insure that all connections are leak free. Any leakage found shall be immediately corrected by the Contractor to the satisfaction of DC Water at no additional cost to DC Water.
- H. Immediately following the replacement of the water service line, flush the service in accordance with AWWA C810 except that flushing at the external hose bib of the connected building shall be for at least 60 minutes, or as long as necessary as determined by DC Water. The Contractor shall also flush for at least one (1) minute at the meter and at least one (1) minute at the curb stop. Any damage to Private Property shall be restored to DC Water's satisfaction at the Contractor's expense.
 - 1. If the Contractor is able to perform the flushing from the external hose bib, the Contractor shall provide the customer with the appropriate notification.

2. If the Contractor is unable to perform the flushing from an external hose bib, the Contractor shall inform DC Water of such and provide the customer with the appropriate notification. DC Water will provide the appropriate language to include in the notification.
3. Use a garden hose and other means to direct flows away from the building and dissipate flows to a velocity that will not erode property or discharge directly to curb and storm gutters.

3.10 PIPING INSULATION WITHIN CRAWL SPACES:

- A. Contractor shall apply insulation materials, accessories, and finishes in accordance with the manufacturer's written instructions. Insulation shall be installed with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves and specialties and equipment.
- B. Insulation jacketing may be factory or field installed.
- C. The insulation and jacketing shall extend for a depth of 42 inches into the ground for freeze protection.
- D. Contractor shall apply insulation to straight pipes and tubes as follows:
 1. Secure each layer of insulation to pipe with wire, tape, or bands without deforming insulation materials.
 2. Seal longitudinal seams and end joints with vapor-retarder mastic.
 3. For insulation with factory-applied jackets, secure laps with outward clinched staples at six (6) inches o.c.
 4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation manufacturer and seal with vapor-retarder mastic.
- E. Contractor shall apply insulation to fittings and elbows as follows:
 1. Apply pre-molded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When pre-molded sections of insulation are not available, apply mitered sections of insulation. Secure insulation materials with wire, tape or bands. Cover fittings with standard PVC fittings covers. Overlap PVC covers on pipe insulation jackets at least one (1) inch at each end. Secure fittings cover with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
- F. Contractor shall apply insulation to valves and specialties as follows:
 1. Apply pre-molded segments of insulation to valve body.
 2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Use preformed standard PVC fitting covers for valve sizes where available.
 4. Secure fitting covers with manufacturer's attachments and accessories.
 5. Seal seams with tape and vapor-retarder mastic.

3.11 LEAD PIPE DISPOSAL:

- A. Disposal of lead pipes shall be at a site approved by the U.S. Environmental Protection Agency (and the State) to accept lead waste. Handle, label, store, transport, and dispose of lead or lead-contaminated waste in accordance with the following Code of Federal Regulations: 40 CFR 261, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

- B. Submit written evidence that the receiving lead waste treatment, storage, or disposal facility is approved to accept lead waste by the federal and district or local regulatory agencies. Submit, within ten (10) days, one (1) copy of complete manifests, signed and dated by the transporter in accordance with 40 CFR 262.
- C. Lead pipe (piping, fittings, etc.) removed as part of the work shall be recycled at a certified recycling facility in accordance with the required regulations.
- D. No lead pipe shall be disposed of in excavated material.
- E. Lead pipe abandoned in place shall have the ends sealed before backfilling.

3.12 ABANDONMENT OF EXISTING WATER SERVICE LINES:

- A. Abandonment of existing water service lines shall be in accordance with Section 33 01 20 – Abandonment of Underground Utilities.

3.13 FIELD DATA:

- A. Contractor shall complete and submit a DC Water Tap Card for each new installation within 48 hours of making the installation.
- B. For each premise where service work, test pit, or service line replacement/adjustment is performed, the Contractor shall collect the necessary data to populate the daily and weekly reporting spreadsheets. The daily reporting sheet shall be completed and submitted to the DC Water Construction Project Manager each day no later than 2:00 p.m. that a full or partial lead service replacement (LSR) is performed.
- C. The weekly reporting sheet shall be completed and submitted to DC Water Construction Project Manager every Monday. The weekly reporting sheet shall detail all of the week's prior work including replacements (lead and non-lead), adjustments, and test pits.

~ END OF SECTION 33 12 13 ~

SECTION 33 12 14

BACKFLOW PREVENTERS

PART 1. GENERAL

1.1 SUMMARY:

- A. Furnish all labor, materials, equipment and install, complete in place, backflow preventers at locations indicated in the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME A112.1.2: "Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)".
- B. American Society of Sanitary Engineers (ASSE):
 - 1. ASSE 1001: "Performance Requirements for Atmospheric Type Vacuum Breakers".
 - 2. ASSE 1011: "Performance Requirements for Hose Connection Vacuum Breakers".
 - 3. ASSE 1012: "Performance Requirements for Backflow Preventer with Intermediate Atmospheric Vent".
 - 4. ASSE 1013: "Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers".
 - 5. ASSE 1015: "Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies".
 - 6. ASSE 1020: "Performance Requirements for Pressure Vacuum Breaker Assembly".
 - 7. ASSE 1047: "Performance Requirements for Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies".
 - 8. ASSE 1048: "Performance Requirements for Double Check Detector Fire Protection Backflow Prevention Assemblies".
 - 9. ASSE 1056: "Performance Requirements for Spill Resistant Vacuum Breaker Assemblies".
- C. American Water Works Association (AWWA):
 - 1. AWWA C510: "Double Check Valve Backflow Prevention Assembly".

2. AWWA C511: “Reduced-Pressure Principle Backflow Prevention Assembly”.
- D. District of Columbia Department of Consumer and Regulatory Affairs (DCRA):
 1. District of Columbia Plumbing Code.
- E. DC Water:
 1. Cross-Connection Control Manual of Practice.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit copies of the Backflow Prevention Assembly Inspection Report showing “Test” results for assemblies installed in permanent installations.
- C. Submit the “Product Data Sheets” for each make and model of backflow preventer installed.

1.6 NOTIFICATIONS:

- A. Notify all entities affected by a water outage if Contractor is required to interrupt water service to install a backflow preventer. Notice shall be given two (2) weeks in advance of the desired interruption date and again 48 hours prior to the scheduled interruption.

PART 2. PRODUCTS

2.1 GENERAL:

- A. All backflow preventers shall comply with standards established by the District of Columbia Plumbing Code and the standards listed in this Section.
- B. Backflow prevention assemblies shall include all parts necessary to isolate the assembly and perform testing. This includes but is not limited to isolation valves, test ports, test port adaptors, and test cocks.
- C. Backflow prevention assemblies three (3) inches and larger in size shall have flanged joints.

2.2 DUAL CHECK BACKFLOW PREVENTER:

- A. Dual check backflow preventer shall be ASSE listed 1012.

2.3 DUAL CHECK BACKFLOW PREVENTER WITH ATMOSPHERIC VENT:

- A. Dual check backflow preventer with atmospheric vent shall be ASSE listed 1012.

2.4 HOSE CONNECTION VACUUM BREAKERS:

- A. Hose connection vacuum breakers shall be ASSE listed 1011.

2.5 ATMOSPHERIC VACUUM BREAKERS:

- A. Atmospheric vacuum breakers shall be ASSE listed 1001.

2.6 PRESSURE VACUUM BREAKER ASSEMBLIES:

- A. Pressure vacuum breakers shall be ASSE listed 1020.
- B. Spill resistant vacuum breakers shall be ASSE listed 1056.

2.7 DOUBLE CHECK BACKFLOW PREVENTER ASSEMBLIES:

- A. Double check backflow preventer assemblies shall be ASSE listed 1015 and AWWA C510 compliant.

- B. Double check backflow preventer detector assemblies shall be ASSE listed 1048.
- C. Double check backflow preventer assemblies and double check backflow preventer detector assemblies used on fire protection service shall also be FM Approved and UL Classified.

2.8 REDUCED-PRESSURE BACKFLOW PREVENTER ASSEMBLIES:

- A. Reduced-pressure backflow preventer assemblies shall be ASSE listed 1013 and AWWA C511 compliant.
- B. Reduced-pressure backflow preventer assemblies and reduced-pressure backflow preventer detector assemblies used for fire protection service shall also be FM Approved and UL Classified.
- C. Reduced-pressure backflow preventer detector assemblies shall be ASSE listed 1047.
- D. When installed inside buildings or shown on the Contract Drawings, reduced-pressure backflow preventer assemblies and reduced-pressure backflow preventer detector assemblies shall include a manufactured air gap from the assembly manufacturer.

2.9 TEST PORT ADAPTORS AND TEST COCKS:

- A. Each backflow assembly shall be provided with all test cocks installed in each test port or test port adaptor. Test port adaptors and test cocks shall be from the manufacturer of the assembly.

PART 3. EXECUTION:

3.1 GENERAL:

- A. Backflow preventers shall be installed as a complete entity with and only with manufacturer approved parts including but not limited to valves, strainers, and check valves. Intermixing parts from other backflow preventer models, removing parts from the approved systems, switching pre-isolation and post-isolation valves, or using parts that are not approved by the manufacturer will not be allowed.
- B. All backflow preventers shall be installed with all parts necessary for testing the preventer without removing it from the piping system it is installed on.

3.2 INSTALLATION OF BACKFLOW PREVENTERS:

- A. Install backflow preventers in accordance with the District of Columbia Plumbing Code, DC Water's Cross-Connection Control Manual of Practice, and the manufacturer's installation requirements.
- B. Install backflow preventers at locations shown on Contract Documents.
- C. Installation (clearance, locations, alignment, etc.) of each type of backflow preventer shall be as required by the District of Columbia Plumbing Code, the manufacturer's recommendations, and DC Water Standard Details.
- D. The air gaps for reduced-pressure principle backflow preventer assembly discharge ports shall comply with ASME A112.1.2. When installed in buildings or shown on drawings, the discharge to the air gap shall be piped to a drain.
- E. Backflow preventers installed for temporary water connections shall be reduced-pressure backflow preventer assemblies.

3.3 BACKFLOW PREVENTION ASSEMBLY FIELD TESTING:

- A. All backflow prevention assemblies, other than assemblies temporarily installed on connections to fire hydrants, shall be tested by a DC Water Certified Inspector immediately after installation and water service is established.

- B. Each backflow prevention assembly, temporarily installed on a fire hydrant, shall pass a differential pressure test performed by a DC Water Certified Inspector. The test shall be performed not more than six (6) months prior to the date the backflow prevention assembly is installed on the fire hydrant.
- C. All backflow prevention assemblies shall have a DC Water approved inspection tag attached to the assembly. The tag shall be completed and attached by the DC Water Certified Inspector that performed the test.
- D. If it is necessary to bypass a backflow prevention assembly to maintain water service to a building or structure during the testing of a backflow assembly, the bypass system shall have a backflow assembly of the same type as the backflow assembly being tested.

~ END OF SECTION 33 12 14 ~

SECTION 33 12 16

TAPPING SLEEVES AND VALVES

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to install and test tapping sleeves and valves and accessories necessary to complete the work as specified on the Contract Documents.
- B. Tapping sleeves and valves shall only be installed when shown on Contract Drawings and authorized by DC Water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 23 10: Trench Excavation and Backfill.
 - 3. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.
 - 4. Section 33 11 20: Concrete Thrust Restraints
 - 5. Section 33 14 00: Gate Valves.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M 306: “Standard Specification for Drainage, Sewer, Utility, and Related Castings”.
- B. American National Standards Institute (ANSI):
 - 1. ANSI B18.2: “Square and Hexagon Bolts and Nuts”.
- C. ASTM International (ASTM):
 - 1. ASTM A193: “Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications”.
 - 2. ASTM A194: “Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both”.
 - 3. ASTM A240: “Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications”.
 - 4. ASTM A536: “Standard Specification for Ductile Iron Castings”.
 - 5. ASTM D2000: “Standard Classification System for Rubber Products in Automotive Applications”.

- D. American Water Works Association (AWWA):
 - 1. AWWA C111: “Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings”.
 - 2. AWWA C220: “Stainless-Steel Pipe, ½ In. (13 mm) and Larger”.
 - 3. AWWA C223: “Fabricated Steel and Stainless-Steel Tapping Sleeves”.
 - 4. AWWA C224: “Nylon-11-Based Polyamide Coatings and Linings for Steel Water Pipe and Fittings”.
 - 5. AWWA C509: “Resilient-Seated Gate Valves for Water Supply Service”.
 - 6. AWWA C515: “Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service”.
 - 7. AWWA C651: “Disinfecting Water Mains”.
- E. Manufacturers Standardization Society (MSS):
 - 1. MSS SP60: “Connecting Flange Joints Between Tapping Sleeves and Tapping Valves”.
 - 2. MSS SP111: “Gray-Iron and Ductile-Iron Tapping Sleeves.”
- F. National Sanitation Foundation (NFS):
 - 1. NFS 61: “Drinking Water System Components – Health Effects”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit the following:
 - 1. Installation Instructions and Details describing and showing how the Tapping Sleeves and Valve materials will be installed.
 - 2. Product Data Sheets for each product used.
 - 3. Technical Manuals for the products containing the assembly drawings, assembled weight of the tapping sleeve and valve, principal dimensions, construction details, and all parts of the tapping sleeve and valve system.
 - 4. Manufacturer’s Certification for materials.
 - 5. Manufacturer’s Certified Test Reports.
 - 6. Qualifications of Field Supervisor and Tapping Equipment Operator.
 - 7. Training Certificates for the Field Supervisor and Tapping Equipment Operator from the manufacturer.
 - 8. Hydrostatic test documentation for the installation of the tapping sleeve.
 - 9. Coupon removed from the pipe being tapped.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Field Supervisor: Supervisor on projects with a minimum of at least 20 tapping events in the last five (5) years.
 - 2. Tapping Equipment Operator: Performed a minimum of at least ten (10) tapping events on the type of pipe being tapped and similar sized pipe within the last three (3) years.
 - 3. Submit resumes for the Field Supervisor and Tapping Equipment Operator with the following information:

- a. Project name in which the tap was made.
 - b. Water agency name.
 - c. Contact information for the water agency project manager.
 - d. Sizes and types of pipe on which taps were made.
 - e. Type of tapping sleeve and valve installed.
- B. Manufacture Certifications:
- 1. Provide manufacturer's certification that the materials provided complies with applicable requirements of this Section.
 - 2. Provide manufacture's Certified Test Report showing that the tapping sleeve has been successfully hydrostatically tested in accordance with AWWA C223.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Ship and store gaskets in protective containers separate from tapping valve and sleeve.
- B. Protect gaskets from exposure to petroleum products.
- C. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage.
- D. Lay materials flat, supported by risers on a flat platform.

PART 2. PRODUCTS

2.1 GENERAL:

- A. All tapping sleeves shall be designed for a minimum working pressure of 200 psig for 12-inch and smaller and 150 psig for pipe larger than 12 inches.
- B. Sleeves and valves used on water systems shall comply with the requirements of NSF 61.
- C. Tapping materials, equipment, and services shall be provided from the same manufacturer.

2.2 TAPPING SLEEVES:

- A. General:
 - 1. Unless shown otherwise on drawings, tapping sleeves shall:
 - a. Be fabricated in two full length halves .
 - b. Be assembled using bolts and gaskets to form a watertight joint.
 - c. Have a 3/4-in NPT test plug.
 - d. Be flanged or mechanical joint on the outlet side.
- B. Sleeves and accessories shall comply with the following:
 - 1. Stainless Steel Sleeve:
 - a. Comply with AWWA C223.
 - b. Body: AWWA C220 stainless steel, type 304.
 - c. Outlet: ASTM A240 stainless steel, type 304.
 - 2. Ductile Iron Sleeve:
 - a. ASTM A536 Grade 65-45-12 min.
 - 3. Flange:
 - a. 150 pound drilling with recess per MSS SP60 to accept standard tapping valves.

4. Gaskets:
 - a. Rubber, ASTM D2000.
 - b. Sleeve Gasket – full gasket.
5. Markings:
 - a. Manufacturer’s model number or type.
 - b. Pipe outside diameter.
 - c. Outlet size and type.

2.3 TAPPING VALVES:

- A. Tapping valves shall be resilient seated gate valves suitable for buried service in conformance with AWWA C509 or C515 and the requirements of Section 33 14 00 – Gate Valves.
- B. Unless shown otherwise on the Contract Drawings, valves shall have:
 1. Ductile iron body.
 2. Nut-operated, non-rising stem.
 3. Waterway opening clearance for tapping operations and proper alignment and positioning with the tapping sleeve and tapping machine.
 4. Inlet flange per MSS SP60 or mechanical joint per AWWA C111 to match tapping sleeve outlet.
 5. Mechanical joint outlets.
- C. Minimum design pressure unless shown otherwise on the Drawings:
 1. Differential pressure of 150 psi.
 2. Internal test pressure of 250 psi.

2.4 BOLTS:

- A. All bolts shall:
 1. Have American Standard heavy unfinished hexagonal head and nut dimensions as specified in ANSI B18.2.
 2. Be factory coated with fluorocarbon, or other anti-seize compound approved by DC Water, to prevent galling
- B. Bolts and nuts shall comply with the following standards:
 1. Bolts: ASTM A193 Stainless Steel, Type 304.
 2. Nuts: ASTM A194 Stainless Steel, Type 304.

2.5 VALVE BOX:

- A. Ductile or cast iron closed bell bottom with locking round head cover.
- B. Three (3)-Piece adjustable screw type.
- C. Shaft 5-1/4 inch.
- D. Valve box cover marked “WATER”.
- E. H20 traffic rating.
- F. Satisfy AASHTO M 306.

PART 3. EXECUTION

3.1 GENERAL:

- A. Approval from DC Water is required to install a tap the same size as the main pipe diameter.
- B. Perform trenching and backfill in accordance with Section 31 23 10 – Trench Excavation and Backfill.
- C. After exposing the existing pipe, inspect the pipe to determine if the pipe materials can sustain the installation of a tapping sleeve and valve and notify DC Water of Contractor's recommendation.
- D. DC Water will review Contractor's recommendation and inspect the pipe.
 - 1. If DC Water believes the pipe materials are an appropriate material and in good condition, the Contractor will be allowed to use a tapping sleeve and valve.
 - 2. If DC Water determines that pipe materials are inappropriate or in poor condition, the tapping sleeve and valve will not be used to make the connection.
- E. Verify outside diameter of the pipe to be tapped and check for roundness prior to ordering sleeve.
- F. Restrain all joints, including joints between the sleeve and valve and on the main pipe, using an approved restrained jointing system in accordance with Section 33 05 02 – Water Utility Distribution Piping – Ductile Iron Pipe and/or concrete thrust restraints in accordance with Section 33 11 20 – Concrete Thrust Restraints.

3.2 TAPPING SLEEVE AND VALVE INSTALLATION:

- A. Follow manufacturer's installation instructions and the requirements of this Section.
- B. Locate the centerline of a tapping sleeve and valve a minimum of three (3) feet from an existing pipe joint for 16 inch and smaller pipe and five (5) feet for pipe larger than 16 inch in diameter.
- C. Clean and disinfect tapping sleeve, tapping valve, and pipe prior to installation and in accordance with manufacturer's instructions and AWWA C651.
- D. Install sleeve so that valve is in horizontal level position with operator in the vertical position unless shown otherwise on Contract Drawings.
- E. Install the tapping sleeve and tapping valve in accordance with the manufacturer's instructions and ensure the tapping valve and machine are fully supported from beneath to prevent stress loading on the pipe.
- F. Prior to tapping the pipe, hydrostatically test the installed tapping sleeve and valve in the presence of DC Water, unless authorized by DC Water to test without witnessing. Document the test and submit a copy of the test results to DC Water.
 - 1. Test pressure: 200 psi or the pressure shown on the Contract Drawings.
 - 2. Duration: 15 minutes' minimum.
 - 3. Acceptance: No visible leakage and no pressure drop.
 - 4. If test fails, remedy leaks and retest for 15 minutes as described above.
- G. Perform the tapping procedure using a tapping machine acceptable to the tapping sleeve and valve manufacturer and in accordance with the tapping machine manufacturer's instructions.
- H. Measure and calculate the appropriate shaft length of the tapping machine to ensure that the cutter will fully cut the pipe without contacting the other side of the pipe and allowing the coupon to be retrieved and removed from the pipe.
- I. Retrieve the coupon and submit it to DC Water.

J. Allow DC Water to inspect the installation prior to backfilling.

3.3 PROTECTION:

A. Wrap the entire sleeve and valve assembly in polyethylene encasement prior to backfilling. Install the polyethylene encasement up to the operating nut leaving the operating nut of the tapping valve exposed and free to be operated.

3.4 VALVE BOX

A. Use valve box only when approved by DC Water.

B. Install valve box as shown on Drawings and as follows:

1. Center base over operating nut.
2. Brace valve box to ensure it remains in vertical position and centered on operating nut during backfill and compaction activities.
3. Adjust valve box to match finished elevation when cover is installed.

3.5 MANUFACTURERS REPRESENTATIVE:

A. Provide the services of the tapping sleeve and valve manufacturers' representative as necessary to obtain correct installation of tapping sleeves, valves, and appurtenances. Services shall be provided at no additional cost to DC Water.

~END OF SECTION 33 12 16~

SECTION 33 12 17

SERVICE SADDLES

PART 1. GENERAL

1.1 SUMMARY:

- A. Furnish, install and test all service saddles installed on pipelines, including all labor, material, and equipment necessary to complete the work as specified on the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 23 10: Trench Excavation and Backfill.
 - 3. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A193: “Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications”.
 - 2. ASTM A194: “Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both”.
 - 3. ASTM A240: “Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications”.
 - 4. ASTM A395: “Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures”.
 - 5. ASTM A536: “Standard Specification for Ductile Iron Castings”.
 - 6. ASTM D2000: “Standard Classification System for Rubber Products in Automotive Applications”.
- B. American Water Works Association (AWWA):
 - 1. AWWA C213: “Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines”.
 - 2. AWWA C800: “Underground Service Line Valves and Fittings”.
- C. National Sanitation Foundation (NSS):
 - 1. NSS 61: “Drinking Water System Components – Health Effects”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit the “Installation Instructions and Details” showing the manufacturer’s installation procedures.
- C. Submit the “Product Data Sheets” for each product used.
- D. Submit Tap Cards.

PART 2. PRODUCTS

2.1 SERVICE SADDLES:

- A. Service saddles shall comply with the following:
 - 1. Rated for minimum service of 150 psi.
 - 2. Provide full support around the circumference of pipe.
 - 3. Contains thick tapping boss, which has been precision-machined with full-length threads for connections that resist pullout.
 - 4. Threads: AWWA C800; with standard corporation stop thread.
 - 5. Ductile Iron: ASTM A536 with epoxy coating.
 - 6. Stainless Steel: ASTM A240, type 304.
 - a. Saddle body meeting ASTM A395 or A536 and AWWA C800.
 - b. Uniform quality, true pattern, of even grain, sound and smooth, and without cold shuts, swells, scales, blisters, sand holes, cracks or other defects.
 - c. Surfaces: Smooth with no burnt-on sand.
 - d. Finish: Minimum 12 mils fusion bonded epoxy coating meeting AWWA C213.
 - e. Isolation Boot: Prevents metal band contact with the pipe to prevent corrosion.
 - 7. Double straps or full width single panel: Type 304 Stainless Steel.
 - 8. Nuts, washers and studs: ASTM A193 and ASTM A194, Type 304 Stainless Steel.
 - 9. Watertight gaskets: Buna-N rubber meeting NSF 61 certified and ASTM D2000 or Nitrile around tap hole.

2.2 MANUFACTURERS:

- A. Approved manufacturers and models are:
 - 1. Ford Meter Box Co, Inc., Style No. FC202.
 - 2. JCM Industries, Inc., Model No. 406.
 - 3. Mueller Company, Catalog No. DR 2S.
 - 4. Smith Blair Inc., Models Nos. 317.
 - 5. PowerSeal Pipeline Products Corporation, Model 3417DI.
 - 6. A.Y. McDonald Manufacturing Company Catalog No. 4855A.
 - 7. TPS, Type T3.
 - 8. Or equal.

PART 3. EXECUTION

3.1 GENERAL:

- A. Service saddles shall only be used for two (2) inch and smaller connections made to water mains.
- B. Provide a service saddle for each corporation stop installed in an eight (8) inch or smaller diameter water main.
- C. Provide a service saddle for each corporation stop larger than 1-1/2-inch in diameter if the corporation stop is installed on a ductile iron water main greater than eight (8) inches in diameter.
- D. Provide a service saddle whenever the corporation stop is installed on PVC pipe.
- E. Trenching and backfill shall be in accordance with Section 31 23 10 – Trench Excavation and Backfill.
- F. Complete and submit a DC Water Tap Card for each new installation within 48 hours of making the installation.
- G. Notify DC Water 48 hours prior to installing a tap.

3.2 TESTING:

- A. Preliminary testing of service saddles shall include a hydrostatic test in accordance with AWWA Standard C800.
- B. After installation, perform a visual leak test under line pressure on the service saddles for 15 minutes.
- C. No leakage is acceptable.

3.3 INSTALLATION:

- A. DC Water will install all service taps requested by organizations that are not performing work as part of a construction contract issued by DC Water. Contractors performing work as part of a construction contract issued by DC water shall install the service taps.
- B. Install service saddles in accordance with the manufacturer's installation instructions.
- C. Install service saddles at ten (10) and two (2) o'clock positions.
- D. Install taps a minimum of 18 inches horizontally away from any other tap and a minimum distance of 24 inches away from the pipe joint and PVC pipe bell.
- E. When tapping adjacent to another tap that is separated by less than 36 inches horizontal distance, stagger the taps by a minimum of 30 degrees (one hour) off the horizontal centerline of the existing tap.
- F. Service saddles shall be installed so that they do not distort, scratch, or damage pipe when tightened.
- G. After installing saddle, field coat saddle, straps, and associated hardware following field Applied Coating System requirements per Section 33 05 02 – Water Utility Distribution Piping – Ductile Iron Pipe.

~END OF SECTION 33 12 17~

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SECTION 33 14 00

GATE VALVES

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of furnishing all labor, materials, and equipment necessary to install gate valves and appurtenances complete, in place, and operable in accordance with the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.
 - 3. Section 33 19 05: Pressure and Leakage Testing – Pressure Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A153: “Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware”.
 - 2. ASTM B584: “Standard Specification for Copper Alloy Sand Castings for General Applications”.
- B. American Water Works Association (AWWA):
 - 1. AWWA C500: “Metal-Seated Gate Valves for Water Supply Service”.
 - 2. AWWA C509: “Resilient-Seated Gate Valves for Water Supply Service”.
 - 3. AWWA C515: “Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service”.
 - 4. AWWA C550: “Protective Interior Coatings for Valves and Hydrants”.
- C. NSF International Standard/American National Standard (NSF/ANSI):
 - 1. NSF/ANSI 61: “Drinking Water System Components – Health Effects”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Certifications” for each valve used on the project with the manufacturer’s Certificate of Compliance stating “Gate Valve” materials meet or exceed the specified requirements.
- C. Submit the “Product Data Sheets” for each product used including certified assembly drawings. Assembly drawings shall show part nomenclature, materials, dimensions, weights, and relationships of valve handles, etc.

- D. Submit “Shop Drawings” for valve and joint details.
- E. Submit a spare parts list for each valve assembly.
- F. Submit the manufacturer’s maintenance procedure for each valve assembly.
- G. Submit “Test Results” for each product used including records of physical and chemical properties, operating tests, and hydrostatic tests.

PART 2. PRODUCTS

2.1 GENERAL (12 INCH DIAMETER AND SMALLER):

- A. All gate valves 12 inch diameter and smaller shall be resilient-seated gate valves unless shown otherwise on the Contract Drawings and approved by DC Water.
- B. Valves shall be of the size, type and capacity as indicated on the Contract Drawings.
- C. All valve manufacturers shall have a successful record of not less than five (5) years in the manufacture of the valves indicated.
- D. Valves installed on potable water systems shall be NSF/ANSI 61 compliant.
- E. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- F. Waterway shall be smooth and shall have no depressions or cavities in seat area.
- G. The interior of the valve body shall be free of pockets or ledges where sediments or debris can collect.
- H. The valve shall be designed with wedge covers or other means so that during operation, or cycling of the valve, there is no friction or abrasion or rubbing together that could wear away any coating material and expose bare metal.
- I. Valve shall be capable of operating through 500 full cycles with zero leakage and without regard to direction of valve discharge or operating pressures.
- J. Type of Valve Ends: Valves shall be furnished with mechanical-joint ends complete with bolts, nuts, retainer glands and gaskets.
- K. Valves shall be installed in line in a vertical position.
- L. Gears and gear cases are not permitted on valves unless shown otherwise on the Contract Drawings
- M. The number of turns for valves shall be three (3) times the diameter of the valve plus two (2).
- N. Valve Stem and Seal:
 - 1. Minimum Diameter of Stem and Minimum Thickness of Body and Bonnet shall be as specified by the applicable AWWA standard.
 - 2. Valves shall be non-rising stem inside screw type except for exposed valves at the Wastewater Treatment Plant (WTP) which shall be rising stem, outside screw and yoke type.
 - 3. Stem seal shall be minimum double O-ring seals shall be furnished on all gate valves (stuffing boxes prohibited). O-ring seal plates shall be cast-iron; seal plate bolts and nuts shall be zinc coated per ASTM A153.
 - 4. Valve stem material shall be per ASTM B584, alloy UNS No. 86700, or equivalent alloy with minimum 30,000 psi yield and approved Wrench Nuts.
- O. Wrench Nuts:
 - 1. Special pentagonal operating nut shall be furnished for two (2), four (4), six (6), and eight (8) inch diameter valves. Square operating nut furnished for ten (10) and 12 inch valves.

2. Direction of Wrench Nut Rotation to Open: Right (clockwise) except for exposed valves at the WTP, which shall open, left (counter-clockwise). Direction shall be shown on the nut.
- P. Markings:
1. Insofar as practicable, markings shall be readable by an observer looking down on the valve in line position.
 2. The manufacturer's name, pressure rating, AWWA Standard, and size shall be cast on valve body.
- Q. Shop Coatings:
1. Ferrous surfaces of valves and appurtenances shall receive an interior coating of epoxy, 9-10 mils thick, in accordance with AWWA Standard C550. Interior coatings for valves installed on potable water systems shall meet the requirements of NSF/ANSI 61.
 2. Valve body exterior shall be coated with an appropriate coating of bonded epoxy, 8 – 10 mils thick, to insure corrosion prevention. Exposed valves shall be shop coated.

2.2 RESILIENT-SEATED GATE VALVES (12-INCH DIAMETER AND SMALLER):

- A. Resilient-seated gate valves shall be ductile iron per AWWA C509 except as modified or supplemented within this Section:
1. AWWA C515 may be used when shown on the Contract Drawings and approved by DC Water.
 2. Gate shall seat against seating surfaces arranged symmetrically about centerline of the valve stem.
 3. If bonnet is two (2) piece, parts shall be bolted through. Tapped holes with stud bolts are prohibited.
 4. All valves shall be tested and approved in strict accordance with AWWA C509 or C515 for the type of valve provided.
 5. Each valve shall be tested to 400 psi hydrostatic pressure.

2.3 METAL-SEATED GATE VALVES (12-INCH DIAMETER AND SMALLER):

- A. Metal-seated gate valves shall only be used when shown on the Contract Drawings.
- B. Metal-seated gate valves shall be ductile iron per AWWA C500 except as modified or supplemented within this Section:
1. Valves shall be iron-body, bronze-mounted, gate valves with double-disc gates having parallel seats and side wedges intended for ordinary water service with an operating pressure of 150 psi.
 2. Each valve shall have 1/2-inch diameter pipe plug in the bonnet for testing.
 3. Disc and Disc Seat Rings: Cast-iron discs in valves two (2) inch through 12 inch diameter shall be accurately machined to receive bronze disc seat rings. The disc seat ring surfaces in contact with the iron disc and the dovetail projections shall be fully machined and the disc rings rolled, peened, or pressed into the machined grooves on the iron disc and, when secured in place, a rough and finish cut shall be taken over the disc seat bearing surface.
 4. Solid-Bronze Disc Gates: Not required.
 5. Valve Wedges: Valve wedges for two (2), four (4), six (6) and eight (8) inch valves shall be bronze; wedges for ten (10) and 12 inch valves shall be cast-iron.
 6. Method of Fastening Gate Rings: Manufacturer's option.

7. Orientation of Bolt holes in Flanges of Mechanical Joint: Manufacturer's option.
8. All valves shall be tested and approved in strict accordance with AWWA C500.

2.4 MULTI-STEM VALVES:

- A. New multi-stem valves shall not be used, unless shown otherwise on the Contract Drawings and approved by DC Water.

PART 3. EXECUTION

3.1 INSPECTION PRIOR TO INSTALLATION:

- A. Valves shall be inspected at the time of receipt for damage in shipment, compliance with specifications, direction of opening, size and shape of operating nut, number of turns, and type of end connections.
- B. A visual inspection of the bronze gate rings and body rings shall be performed to detect any damage in shipment or scoring of the seating surfaces. Any foreign material in the interior portion of the valve shall be removed.
- C. The valve shall be cycled through one complete opening and closing cycle.

3.2 INSTALLATION:

- A. Install all valves and appurtenances in accordance with manufacturer's instructions and in the locations as shown, true to alignment and rigidly supported.
- B. Unless shown otherwise on Contract Drawings, valves on water mains shall be installed vertically and level above the centerline of the water main by means of standard mechanical joints per Section 33 05 02 – Water Utility Distribution Piping – Ductile Iron Pipe.
- C. Unless shown otherwise on Contract Drawings, valves shall be installed in the closed position.
- D. Flanged joints shall only be used when specified on Contract Drawings and shall be made with Series 300, stainless steel bolts. All exposed bolts shall be made with Series 300 stainless steel bolts.

3.3 INSPECTION AFTER INSTALLATION:

- A. After installation and before pressurization of the valve, all pressure-containing bolting (bonnet, seal plate, bypass, and end connections) shall be inspected for adequate tightness of all tapped and plug openings to the valve interior. The Contractor shall make any adjustments or alterations as directed.
- B. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat.

3.4 TESTS:

- A. Pressure test shall be conducted as part of water main test per Section 33 19 05 – Pressure and Leakage Testing – Pressure Pipe.

3.5 REPLACING MULTI-STEM VALVES:

- A. Contractor shall replace existing multi-stem valves with the same number of valves as stems.
- B. If Contractor replaces and/or removes an original multi-stem valve they shall replace it with a tee, cross, or other configuration as directed by DC Water, to reestablish the distribution connection.

~ END OF SECTION 33 14 00 ~

SECTION 33 14 05

BUTTERFLY VALVES

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to install butterfly valves into the Project as required by the Contract Documents.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specifications Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to the Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 05 02: Water Utility Distribution Piping – DIP.

1.4 REFERENCED CODES AND STANDARDS:

- A. ASTM International (ASTM):
 - 1. ASTM A536: “Standard Specification for Ductile Iron Castings”.
- B. American Water Works Association (AWWA):
 - 1. AWWA C104: “Cement-Mortar Lining for Ductile-Iron Pipe and Fittings”.
 - 2. AWWA C200: “Steel Water Pipe, 6 In. (150 mm) and Larger”.
 - 3. AWWA C504: “Rubber-Seated Butterfly Valves”.
 - 4. AWWA C550: “Protective Interior Coatings for Valves and Hydrants”.
- C. National Sanitation Foundation/American National Standards Institute (NSF/ANSI):
 - 1. NSF/ANSI 61: “Drinking Water System Components – Health Effects”.

1.5 SUBMITTALS:

- A. Provide submittals in accordance with Section 01 33 00 – Submittals.
- B. Submit:
 - 1. Shop Drawings for valve and joint details.
 - 2. Product Data sheets demonstrating compliance with all product data requirements.
 - 3. Certified test reports for holiday, performance, leakage, hydrostatic, and proof-of-design tests.
 - 4. Manufacturer's certified drawings of the valves including valve operators, gear ratios, electrical schematics (where electrical operators are furnished), and parts lists.
 - 5. An affidavit from the manufacturer stating that valves furnished comply with all pertinent provisions of this specification.

6. A statement shall be submitted by the Contractor giving required number of turns of the operating nut to move the disc from fully open to fully closed (or vice versa) position.
7. NSF/ANSI 61 certification.
8. Manufacturer's installation and maintenance instructions.

1.6 QUALITY ASSURANCE:

- A. NSF/ANSI 61 certification for butterfly valves used on the water system.
- B. Performance, leakage, hydrostatic, and proof-of-design tests in accordance with AWWA C504.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Inspect valves at the time of receipt for in accordance with AWWA C504 and the following:
 1. Damage in shipment.
 2. Compliance with specifications.
 3. Direction of opening.
 4. Size and shape of operating nut.
 5. Number of turns.
 6. Type of end connections.
- B. Visually inspect seats to detect any damage or scoring of the seating surfaces.
- C. Remove any foreign material in the interior portion of the valve.
- D. Cycle the valve through one complete opening and closing cycle.

PART 2. PRODUCTS

2.1 MANUFACTURER:

- A. The manufacturer shall have a successful record of not less than five (5) years in the manufacture of the valves supplied.
- B. The manufacturer shall furnish satisfactory evidence of adequate facilities for furnishing repair parts and for maintenance of valves furnished.

2.2 VALVE DESIGN:

- A. General design criteria are as follows:
 1. During operation, or cycling of the valve, there is no friction or abrasion or rubbing together that could wear away any coating material and expose metal.
 2. The interior of the valve body shall be free of pockets or ledges where sediment or debris can collect.
 3. Can operate through 500 full cycles with zero (0) leakage and without regard to direction of valve discharge or operating pressures.
 4. Comply with NSF/ANSI 61 unless specified otherwise in the Contract Documents.
- B. Valve design shall be in accordance with AWWA C504 and the following:
 1. Operating conditions, unless shown or noted otherwise in the Contract Documents:
 - a. Water with average pH of 7.5 unless noted otherwise in the Contract Documents.
 - b. Max velocity ten (10) ft/sec.

- c. Max operating pressure 150 psi.
- 2. Valve Bodies shall be as follows:
 - a. 16 inches through 48 inches in diameter:
 - 1) Mechanical joint ends complete with bolts, nuts, retainer glands and gaskets.
 - b. Butterfly valves 54 inches diameter and larger:
 - 1) Flanged joint ends with accompanying flanged by plain end pieces assembled to the valve's flanged ends with bolts, nuts and gaskets.
 - 2) Coat flange by plain end pieces with double cement-lining per AWWA C104.
 - 3) Each flanged end piece shall have an overall laying length in accordance with AWWA C504.
 - c. Wafer type butterfly valves are not acceptable.
- 3. Class:
 - a. 150B unless noted otherwise on Contract Drawings.
- 4. Valve Shafts:
 - a. Type 316 or Type 304 wrought stainless steel.
 - b. One-piece unit extending completely through the valve disc or be of the "stub shaft" type.
- 5. Valve Discs:
 - a. Ductile iron per ASTM A536, Grade 65-45-12.
- 6. Valve Seats:
 - a. Seats shall be mechanically retained either in the valve disc or in the body:
 - 1) 360-degree rubber seat edge on disc:
 - a) Retained by corrosion resistant disc retainer ring and Type 304 or 316 stainless cap screws.
 - b) Mating seat in valve body shall consist of a Type 304 or 316 stainless steel separate ring, set integral with body.
 - 2) 360-degree rubber seat in valve body:
 - a) Retained by:
 - i. Corrosion resistant disc retainer ring segments and Type 304 stainless cap screws, or
 - ii. Epoxy injection process which moves the seat against the disc to conform to the exact radius of the disc with uniform contract pressure.
 - b) Mating seat on valve disc shall consist of either Type 316 stainless steel or Monel disc edge on the cast or ductile-iron disc.
- 7. Valve Bearings:
 - a. Per AWWA C504.
- 8. Shaft seals:
 - a. Standard O-ring seals, or
 - b. V-type chevron packing, self-adjusting type.

9. Type of Installation:
 - a. Buried unless noted or shown otherwise in the Contract Documents.
10. Direction of Operating Stem Rotation:
 - a. Open Valve: Right (clockwise) except for exposed valves at the WTP, which shall open, left (counter-clockwise).
11. Valve Operators:
 - a. Provide manual operators conforming to AWWA C504 unless noted otherwise in the Contract Documents with:
 - 1) Two (2) inch square operating nut.
 - 2) Totally enclosed worm gear or link lever design.
 - 3) Operators on valves 42 inch and smaller diameter may be of the traveling nut design, but in either case, the valve operator shall require a minimum of 35 turns from closed to open position.
 - 4) Adjustable stop limiting devices, for open and closed positions, which must withstand an input torque as specified by AWWA C504.
 - 5) Stop limiting devices that are factory set at time of valve testing.
 - b. Valves with operators located in manhole, valve vault, or casing:
 - 1) Provide extended bonnet to position the nut below the center of the opening.
12. Valve Position Indicators:
 - a. Totally enclosed with no exposed moving parts.
 - b. Highly visible and corrosive resistant valve position indicator.
 - c. The valve position indicator shall be such that the position of the valve (open-closed) may be determined from above at the operating level.
 - d. The valve-operating stem shall always be in the vertical position.
 - e. Indicators shall be Beacon type manufactured by Westlock Controls Corporation, 280 Midland Avenue, Saddle Brook, New Jersey or approved equal.
13. Markings:
 - a. Provide all identifying or data plates or markings on the valve body or operator so they are readable from above.
 - b. Marking information shall be in accordance with AWWA C504.
 - c. Include serial number with the marking information.
14. Coatings:
 - a. Apply two (2) part epoxy coating in accordance with AWWA C550 and NSF 61 to all ferrous surfaces.
 - b. Exposed valves shall be shop painted as directed.
 - c. Perform holiday testing in accordance with AWWA C550 to show interior and exterior surfaces are holiday free.

PART 3. EXECUTION

3.1 INSTALLATION:

- A. Install valves in accordance with the Manufacturer's installation instructions and AWWA C504 and the following:
 - 1. Valves with flanged joint ends shall be bolted to accompanying flanged pieces such that the plain-ends will accommodate flexible rubber-packed mechanical sleeve couplings and shall meet requirements for tolerance of ends of steel pipe to be coupled in a similar manner as described in AWWA C200.
 - 2. Valves shall be installed in the closed position.

3.2 AFTER INSTALLATION INSPECTION:

- A. Inspect all pressure-containing bolting (bonnet, seal plate, bypass, and end connections) for adequate tightness of all tapped and plug openings to the valve interior after installation and before pressurization of the valve.
- B. Make any adjustments or alterations as directed by DC Water.

3.3 TESTS:

- A. Conduct pressure test as part of water main test.
- B. Test valve in the open position.

~END OF SECTION 33 14 05~

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SECTION 33 19 00

PVC SANITARY SEWER PIPING - GRAVITY

PART 1. GENERAL

1.1 SCOPE:

- A. Provide all labor, material, and equipment necessary to install Polyvinyl Chloride (PVC) gravity sewer pipe and perform all work required to achieve a fully functioning gravity sewer.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specifications Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere include but are not limited to:
 - 1. Section 01 33 00: Submittals
 - 2. Section 31 23 10: Trench Excavation and Backfill
 - 3. Section 31 23 32: Aggregate Materials
 - 4. Section 33 01 28: Inspection of Sewers for Cleaning, Repairs, Lining, and New Pipe Installations

1.4 REFERENCE CODES AND SPECIFICATIONS:

- A. ASTM International (ASTM):
 - 1. ASTM D2321: "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications".
 - 2. ASTM D3034: "Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings".
 - 3. ASTM D3212: "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals".
 - 4. ASTM F477: "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe".
 - 5. ASTM F679: "Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings".
 - 6. ASTM F794: "Standard Specification for Poly(Vinyl Chloride) (PVC) Profiled Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter".
 - 7. ASTM F1336: "Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings".
 - 8. ASTM F1417: "Standard Practice for Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air".

1.5 SUBMITTALS:

- A. Requirements for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit the following:

1. Manufacturer's Data for all materials.
2. Layout drawings.
3. Manufacturer's certification and test result reports.
4. Field inspection data for deflection, visual, and leakage acceptance tests.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Delivery and Storage:

1. Upon receipt of each product, inspect for damage and conformance to the Contract Documents.
2. Verify manufacturer's certification accompanies pipe at delivery.
3. Store products in accordance with the manufacturer's recommendations
4. Prevent exposure to sources of heat or hot objects such as heaters, boilers, steam lines, and engine exhaust.
5. Protect gaskets from exposure to heat, direct sunlight, ozone, oil and grease, dust and grit, and solvents.
6. Do not store gaskets close to electrical equipment that produces ozone.

B. Handling:

1. Handle and store products in accordance with the manufacturer's recommendations and the following requirements:
 - a. Handle pipe carefully and prevent severe impact blows, abrasion damage, gouging, and cutting of pipe.
 - b. Never handle pipe with individual chain or single cable, even if padded.

C. Remove defective or damaged products from the Project Site and replace with acceptable products, at Contractor's expense.

1.7 LAYOUT DRAWINGS:

A. Submit layout drawings showing:

1. Direction of lay.
2. Starting and finish points.
3. Lay lengths.
4. Bending, bending radius and offsets, and deflection angles.
5. Locations and lengths of cut segments of pipe.
6. Fittings and fitting locations.
7. Manholes and other appurtenances.

1.8 QUALITY ASSURANCE:

- A. Submit manufacturer's certifications and reports showing test results per ASTM D3034 and ASTM F679.

PART 2. PRODUCTS

2.1 PVC PIPE AND FITTINGS:

- A. Unless shown otherwise on Drawings, PVC Pipe and Fittings shall be as follows:
 1. Pipe and fittings equal to or less than 15-inch diameter:

- a. ASTM D3034.
 - b. Standard Dimension Ratio (SDR) rating: Minimum 35.
 - c. Joining System: Elastomeric Gasket Joints.
 - d. Gaskets: ASTM F477 elastomeric, factory assembled and secured.
 - e. Fittings: ASTM F1336.
- 2. Pipe and fittings greater than 15-inch diameter:
 - a. ASTM F679.
 - b. Pipe stiffness (PS): Minimum 46.
 - c. Joining System: Integral Bell Gasketed Joint.
 - d. Gaskets: ASTM F477 elastomeric, factory assembled and secured.
 - 3. Saddle wye-branches are not permitted.

2.2 PIPE BEDDING:

- A. Crushed Stone or Screened Gravel Size No. 57 per Section 31 23 32 – Aggregate Materials.

PART 3. EXECUTION

3.1 GENERAL:

- 1. Perform trench excavation and backfill in accordance with Section 31 23 10 – Trench Excavation and Backfill.

3.2 MAINTAINING SEWER SERVICE:

- 1. Maintain existing sewer service at all times by conducting operations in a manner that maintains flows or uses bypass pumping in existing sewers.
- 2. Perform bypass pumping in accordance with Section 33 29 60 – Sewer Bypass Pumping.

3.3 BACKFILL AND COMPACTION:

- A. Install Embedment Zone materials in accordance with Section 31 23 10 – Trench Excavation and Backfill, except as noted below:
 - 1. Bedding Zone for Embedment Zone Option 1 (Base Bid) shall be Crushed Stone wrapped in Geotextile Fabric.
 - 2. Provide a minimum depth of cover of 36 inches or one (1) pipe diameter, whichever is larger, before allowing vehicles or construction equipment to traffic the trench surface.
- B. Prior to installing pipe, verify bedding accurately reflects final slope of pipe with uniform bearing for the pipe which will prevent sags, high points, and pressure points in the pipe alignment.

3.4 INSTALLATION:

- A. General:
 - 1. Comply with manufacturer's recommendations for pipe installation, joint components, lubrication, and making joints.
 - 2. Secure pipe against movement and seal open ends to prevent the entrance of water, mud, or foreign material when pipe laying is interrupted.
- B. Laying and alignment:

1. Lay pipe from the lowest invert elevation to the highest invert elevation with the bells facing upstream.
2. Place pipe and fittings on bedding with the invert conforming to the required elevations, slopes, and alignment.
3. Provide bell holes in pipe bedding, no larger than necessary to ensure uniform pipe support.
4. Fill all voids under the bell by working in bedding material.
5. When Drawings show pipe to be installed to a curved alignment, obtain curvature as follows:
 - a. For SDR 35 and PS 26 pipe with diameter less than or equal to 12-inches use longitudinal bending as follows:

SRR 35/PS 26		Equiv. Linear Offset (Inches)	
Nominal Size (Inches)	Min. Radius (Feet)	20 ft length	14 ft length
4	100	24.0	11.7
6	150	16.0	7.8
8	200	12.0	5.9
10	250	9.6	4.7
12	300	8.0	3.9

- b. For 12-inch and smaller diameter pipe with other SDR and PS ratings, utilize manufacturer's recommendation for the minimum radius or the radius listed above, whichever is greater.
- c. For pipe with diameter 15-inch diameter and greater use joint deflection not to exceed one (1) degree per joint, manufacturer's recommendation, or deflection shown on Drawings, whichever is less. Longitudinal bending is not permitted.

C. Jointing:

1. Mark or verify that pipe ends are marked with insertion stop position.
2. Clean all joint surfaces immediately before joining.
3. Lubricate joint with a lubricant approved by the manufacturer.
4. Align the spigot to the bell and insert the spigot into the bell, keeping true to the line and grade, until it contacts the gasket uniformly. Do not swing spigot into bell.
5. Push spigot into bell using methods recommended by the manufacturer, keeping pipe true to line and grade.
6. Protect the end of the pipe while inserting the spigot into the bell and do not use excessive force that may result in over-assembled joints or dislodged gaskets.
7. If undue resistance to insertion of the end is encountered or the insertion depth is not properly reached, disassemble the joint, verify the position and condition of the gasket, repair or replace damaged items, clean joint, and reassemble as defined above.
8. Adjust curvature, not to exceed limits listed above, to maintain alignment shown on Drawings.

D. Field Cut Pipe:

1. Use field cut pipe only when approved by DC Water.
2. Mark pipe around entire circumference.
3. Cut pipe on mark ensuring a square cut.

4. Bevel the end with a beveling tool, wood rasp, or power sander to the same angle and length as provided on the factory-finished pipe.
5. Round off any sharp edges on the leading edge of the bevel.
6. Redraw the insertion line on the spigot using a factory-marked spigot as guide.
7. Install and pipe as defined above.

3.5 ACCEPTANCE TESTING:

- A. Perform the acceptance testing listed in this Article in the presence of DC Water.
- B. Visual Inspection and Grade Tolerance:
 1. Visually inspect pipe in accordance with Section 33 01 28 – Inspection of Sewers for Cleaning, Repairs, Lining, and New Pipe Installations, to verify accuracy of alignment, joint construction, and freedom from debris and obstructions. Visual inspection and grade tolerance is considered acceptable if:
 - a. After flowing water through the pipe and terminating water flow, the pipe shows no visible signs of puddling, or
 - b. The total variation from the flow line (plus or minus) over the length of the pipe segment (14 or 20 foot) does not exceed:
 - 1) 4-inch and smaller pipe: 1/4 inch.
 - 2) 6-inch to 12-inch pipe: 3/4 inch.
 - 3) 15-inch to 36-inch pipe: 1 inch
 - 4) Larger than 36-inch pipe: 1.5 inches.
- C. Leakage Testing:
 1. Perform low-pressure air testing in accordance with ASTM F1417. Leakage test is considered acceptable if the pressure drop in the pipe:
 - a. Is less than 1.0 psig for the duration designated in Table 1 of ASTM F1417, or
 - b. Has no recordable leakage (zero psig drop) after 1 hour of testing.
 2. At DC Water's discretion, pipe with a size and length requiring the minimum time of test for a 1.0 psig pressure drop to be tested for a duration that exceeds two (2) hours may be tested and accepted based on a 0.5 psig pressure drop in accordance with Table 2 of ASTM F1417.
 3. At DC Water's discretion, when groundwater is below the pipe invert, a hydrostatic test may be performed on short lengths of pipe and building sewer connections as follows:
 - a. Plug the pipe at points of connection and fill with water to provide a minimum of ten (10) feet of head.
 - b. Hold the water in the system for at least 15 minutes before beginning the leakage test.
 - c. Allowable leakage rate of 0.0316 gallon per hour per ten feet of building sewer connection pipe for a test duration of not less than two (2) hours.
- D. Deflection Testing:
 1. DC Water reserves the right to require deflection testing to be performed and will notify the Contractor within 30 days of completing installation and other acceptance testing if it is to be performed.
 - a. Perform deflection testing not less than 30 days following completion of installation and other acceptance testing using a mandrel, sized in accordance with ASTM D3034 and F679

- b. Pipe with an internal diameter of the barrel that is not reduced by more than 7.5 percent of its base inside diameter is acceptable.

~ END OF SECTION 33 19 00 ~

SECTION 33 19 05

PRESSURE AND LEAKAGE TESTING – PRESSURE PIPE

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes providing all labor, materials, and equipment necessary to perform hydrostatic testing on pressure pipe and associated appurtenances. Pipe subject to testing per this Section includes ductile iron pipe (DIP), polyvinyl chloride pipe (PVC), and steel pipe.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 12 14: Backflow Preventers.
 - 3. Section 33 13 00: Disinfecting Water Mains.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Water Works Association (AWWA):
 - 1. AWWA C600: “Installation of Ductile-Iron Mains and Their Appurtenances”.
 - 2. AWWA M11: “Steel Pipe – A Guide for Design and Installation”.
 - 3. AWWA M23: “PVC Pipe – Design and Installation”.

1.5 SUBMITTALS:

- A. Requirement for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit “Test Results” for hydrostatic testing.
- C. Submit hydrostatic test “Plan” describing how testing shall be performed. Pressure and leak test plan may be combined with the disinfection plan submitted under Section 33 13 00 – Disinfecting Water Mains.

1.6 TEST PLAN:

- A. Prepare a hydrostatic test plan for performing hydrostatic tests. The plan shall include but not be limited to:
 - 1. Location of gauges, taps, caps, etc.
 - 2. Water sources for filling the pipe.
 - 3. Connection type and method for filling and draining water as well as evacuating air.
 - 4. Segments that shall be tested.
 - 5. Blocking and restraining requirements.

6. Backflow Preventer certification.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL

- A. Contractor shall plan, coordinate and execute hydrostatic testing of pipelines prior to placing them in service. The hydrostatic test shall be conducted in accordance with AWWA C600 for DIP, AWWA M23 and AWWA C605 for PVC, and AWWA M11 for steel pipe except as modified within this Section.
- B. Contractor shall not begin testing until a representative of DC Water is present.
- C. DC Water personnel will operate valves and appurtenances that are a part of any existing utility service except that the Contractor shall operate fire hydrants if they have permissions and a fire hydrant use permit.
- D. Hydrostatic testing shall not be performed against closed valves.
- E. All pipe segments shall be tested unless otherwise approved by DC Water.
- F. Hydrostatic testing shall be performed on all new pipe segments prior to connecting new pipe segments to existing pipe except for segments that cannot be isolated from existing pipe.
- G. The maximum length of pipeline tested at any one (1) time shall not exceed 2,000 feet unless otherwise approved by DC Water.

3.2 EQUIPMENT REQUIREMENTS:

- A. Furnish and install all labor, materials, and equipment including but not limited to temporary piping, corporation and curb stops, plugs, pipe end caps, valves, fittings, meters, pumps, backflow preventers, gauges and other appurtenances necessary to perform the test.
- B. Test gauges shall have pressure scale increments of no more than two (2) psi and the gauges shall have been calibrated within one (1) year of the date of the test.

3.3 TEST PREPARATION AND SETUP:

- A. All piping, valves, fire hydrants, services and related appurtenances shall be installed prior to testing.
- B. The pipe trench shall be backfilled and compacted with a minimum of 2.5 feet of material over the pipe. If circumstances require tests to be conducted prior to backfilling, provide and install temporary blocking to properly restrain pipe. Temporary blocking shall be approved by DC Water prior to testing.
- C. All concrete anchor and thrust blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi before testing.
- D. Pressure tests on exposed and above ground piping shall be conducted only after the entire piping system has been installed and attached to pipe supports, hangers or anchors as shown on the Contract Drawings.
- E. Contractor shall provide and install caps and plugs in segments to be tested. Openings in pipe and fittings shall be closed tight to prevent leakage. All temporary plugged and capped ends shall be properly blocked to prevent displacement and leakage.
- F. Provide and install corporation stops and couplings for taps. Installation shall use a service clamp or saddle.

- G. The Contractor shall install a water source connection to the pipe segment being tested. All pipeline taps shall be furnished and installed by the Contractor.
- H. All connections to the existing water system shall include an approved backflow preventer in accordance with Section 33 12 14 - Backflow Preventers.
- I. Contractor shall install a meter on the water supply used for testing and measure and pay for the cost of water usage.

3.4 HYDROSTATIC TEST REQUIREMENTS:

- A. Each segment of pipe shall be hydrostatically tested for two (2) hours.
- B. Starting test pressure shall be at least 200 psi when measured from the low point of the pipe except when the test pressure is specified on the Contract Drawings. When the test pressure is specified on the drawings, the minimum starting test pressure shall be as indicated thereon.
- C. Maintain required test pressure within five (5) psi of the starting test pressure for the duration of the test.
- D. If test pressure falls to a pressure of five (5) psi below starting pressure before the duration of the test:
 - 1. Pump water into the pipe from a makeup reservoir, as necessary, to maintain test pressure within five (5) psi of the starting test pressure.
 - 2. Measure the volume of makeup water pumped into the pipe and record as leakage.
- E. Cumulative leakage in DIP shall not exceed the allowable leakage as defined by AWWA C600 for the duration of the test.
- F. Cumulative leakage in PVC shall not exceed the allowable leakage as defined by AWWA C605 for the duration of the test.
- G. Cumulative leakage in Steel pipe shall not exceed the allowable leakage as defined by AWWA M11 for the duration of the test.
- H. If the pipeline under test contains segments of various diameters, the allowable leakage will be the sum of the computed leakage for each pipe size.
- I. Any pipe that fails the hydrostatic test shall be repaired by the Contractor. The Contractor shall then retest the segment at no additional cost to DC Water until the hydrostatic test has been completed successfully and approved.

3.5 HYDROSTATIC TEST PROCEDURE:

- A. Pressurization:
 - 1. The pipe being tested shall be slowly filled with water. After the pipe has been completely filled, it shall be allowed to stand under slight pressure for sufficient time to allow air to be evacuated from the pipe as described in this Section.
 - 2. After all the air has been evacuated from the pipe, the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to DC Water.
 - 3. The system shall be allowed to stabilize at the test pressure before conducting the test.
 - 4. Pipe with porous lining (cement mortar, etc.) shall be filled with water and placed under a slight pressure for a minimum of 24 hours prior to performing the test.
- B. Air Removal:
 - 1. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves and hydrants. If permanent air valves are not located at all high points the Contractor shall expose the entire pipe circumference at those points and install corporation cocks at such points so that trapped air can be expelled as the

line is filled with water. Corporation stops and couplings shall be installed using service clamps or saddles.

2. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied.

C. Examination, Acceptance, and Repairs:

1. Prior to or during the hydrostatic test, all accessible appurtenances shall be inspected for visual signs of leakage. All visual leaks shall be corrected immediately, regardless of the amount of leakage and the test shall be run again for its full duration.
2. If pressure variation exceeds the allowable tolerance and/or leakage exceeds the allowable loss, the Contractor shall investigate all areas of suspected leakage and make all repairs necessary to make the pipe water tight including replacing all defective pipe, fittings, valves and other appurtenances.
3. All repair methods shall be subject to DC Water's approval.
4. Any damaged or defective pipe, fittings, valves or hydrants that are discovered following the hydrostatic test shall be replaced by the Contractor and the test shall be repeated until successful hydrostatic tests are obtained.

D. Test Completion:

1. Upon completing successful tests, Contractor shall remove temporary caps, plugs and other appurtenances used during testing.
2. If flushing, disinfection, and/or bacteriological testing is to be performed after hydrostatic testing, the temporary caps, plugs, and other appurtenances may be left in place until the bacteriological testing is complete.
3. At conclusion of hydrostatic tests, the Contractor shall remove the corporation cocks and plug the tapped holes with brass plugs.
4. All materials and equipment furnished by the Contractor for water testing, including, closure caps, plugs and other temporarily required accessories shall remain the property of the Contractor upon completion of testing.

3.6 CONNECTIONS:

- A. All joints assembled for connection to existing pipe that are not tested shall not be backfilled before pipe line is brought to system pressure and visually inspected for leaks for a duration of at least one (1) hour.
- B. Repair all leaks and, after repairs are approved by DC Water, restore the pipe to system pressure and visually inspect for leaks for a duration of at least one (1) hour.

~END OF SECTION 33 19 05~

SECTION 33 23 20

DEWATERING – TREATED WATER

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of all necessary provisions for designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to remove treated water due to leakage thru valves and appurtenances during construction shutdowns, draining existing or new water piping, and disposing of the treated water.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 31 25 00: Erosion and Sediment Control.

1.4 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit design “Calculations” proving adequacy of system and selected equipment.
- C. Submit a Dewatering “Plan” as required by this Section.
- D. Submit “Working Drawings” for the treated water dewatering system.
- E. Submit “Records” of the Dewatering – Treated Water system operation.
- F. Submit “Tests” for the water quality being discharged.

1.5 QUALITY ASSURANCE:

- A. Codes and regulations of the jurisdiction for the area where the Work is being performed.
- B. DC Water will periodically perform visual inspections of the dewatering system and the excavation zones being dewatered.
- C. DC Water may request samples of the water being discharged from the dewatering system at the discharge point to verify the water quality meets that proposed by the Contractor in the dewatering plan.
- D. Dewatering system failing to meet the quality control and assurance requirements of this Section shall immediately be brought into compliance.

1.6 DEWATERING PLAN:

- A. The dewatering plan shall include the following:
 - 1. The proposed type of dewatering system.
 - 2. A complete description of equipment to be used, with installation, operation, and maintenance procedures.

3. Treatment calculations of the neutralizing chemical, if applicable.
4. Treatment calculations by aeration with detention time, if applicable.
5. Working drawings showing the dewatering system layout.
6. Standby equipment and power supply.
7. Method of dechlorinating treated water prior to disposal.
8. Method of disposal of treated water.
9. Method of testing of the treated water.

PART 2. PRODUCTS

2.1 DECHLORINATION PRODUCTS:

- A. Sodium Sulfite: Sodium Sulfite shall be provided in tablet form and shall be a minimum of 80 percent Sodium Sulfite. Acceptable product is LPD-Chlor by Severn Trent Services, Inc. or equal.
- B. Ascorbic Acid: Ascorbic Acid shall be provided in tablet form and shall be a minimum of 75 percent Ascorbic Acid based. Acceptable product is Vita-D-Chlor by Integra Chemical Co. or equal.

PART 3. EXECUTION

3.1 GENERAL:

- A. Contractor shall not rely on existing valves to provide a watertight isolation during shut down of the water system and shall provide the equipment and facilities necessary to dewater and dispose of the treated water from the site.
- B. Maintain operating records of the dewatering system. Records shall include but not be limited to pump start and stop times, volume of water discharged, inspections of area being dewatered, dechlorination applications, dechlorination tests.
- C. Drainage shall take place away from the construction or work area.

3.2 DEWATERING:

- A. Contractor shall implement dewatering activities in accordance with the working drawings and dewatering plan.
- B. Contractor shall keep DC Water advised of any changes made to the dewatering system to accommodate field conditions and shall update the dewatering plan and working drawings to show the revisions. Revised plan and working drawings shall be submitted to DC Water upon completion of the dewatering system installation revisions.
- C. Comply with Federal, State and District requirements for dewatering to any watercourse, prevent stream degradation, and provide erosion and sediment controls in accordance with Section 31 25 00 – Erosion and Sediment Control.
- D. Contractor shall test for chlorine residual throughout the disposal process to be sure that the chlorine has been neutralized prior to discharge into DC Water’s sanitary sewers.
- E. Contractor shall not dispose treated water into the groundwater nor allow it to come in contact with the groundwater, nor use the subsurface as a dechlorination treatment vessel.

3.3 WATER DISPOSAL:

- A. Disposal of treated water shall not:
 1. Endanger portions of work under construction or completed.
 2. Cause an inconvenience to DC Water or others near site.

- B. All water shall be removed from the immediate work areas and shall be disposed of in accordance with the required permits and, if the permit allows, the following discharge systems:
1. Sanitary sewer system or combined sanitary overflow system provided the water meets DC Water pretreatment requirements.
 2. Stormwater system provided the water meets the discharge requirements established by the jurisdictional agency for the location where the Work is performed or the District of Columbia Department of Energy and Environmental if the Work is performed in the District of Columbia.
- C. Contractor shall perform all necessary tests to ensure that the water meets the quality requirements of the jurisdiction where the work is performed and the requirements of the Owner of the system that the water is being discharged to.
- D. Indiscriminate onsite disposal or discharge to sewer systems, storms drains, drainage courses, French drains, or surface waters of chlorinated water is prohibited.

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SECTION 33 29 50

TEMPORARY WATER PIPING

PART 1. GENERAL

1.1 SUMMARY:

- A. Contractor shall furnish all plans, labor, equipment, materials and incidentals necessary to implement a temporary water piping system for the purpose of diverting existing water flow around a work area for the duration of the project.
- B. Contractor shall construct and maintain all temporary water piping, to allow inspection, rehabilitation, testing, replacement and reconnection to existing water mains.
- C. Temporary water piping shall be used to maintain a continuous and reliable water flow during various phases of the Work including but not limited to:
 - 1. New water connections to existing water systems.
 - 2. Trenchless rehabilitation of existing water mains.
 - 3. Pipeline rehabilitation and inspection.
 - 4. Placing an upstream pump station out of service.

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 33 12 14: Backflow Preventers.
 - 3. Section 33 13 00: Disinfecting Water Mains.

1.4 REFERENCED CODES AND STANDARDS:

- A. National Sanitation Foundation / American National Standard Institute (NSF / ANSI):
 - 1. NSF/ANSI 61: "Drinking Water System Components – Health Effects".

1.5 SUBMITTALS:

- A. Requirement for "Submittals" shall be in accordance with Section 01 33 00.
- B. Submit a schedule showing how the work will be performed.
- C. Submit a temporary water piping "Plan" describing the design, installation, and operation of the temporary water piping system.
- D. Submit the official DC Water Backflow Preventer Inspection Report as required in the DC Plumbing Code Section 608. The inspection report must be completed by a DC Water recognized certified backflow preventer inspector and submitted with the fire hydrant usage permit application or prior to tapping an existing main to supply the temporary water system.
- E. Submit "Field Data" including valve operation logs and notification logs.

1.6 TEMPORARY WATER PIPING PLAN (TWPP):

- A. Contractor shall prepare a specific, detailed TWPP describing the temporary water piping system. The TWPP shall be accepted by DC Water prior to the mobilization of any equipment included in the TWPP. The plan shall include but not limited to the following:
1. Layout with pipe diameters.
 2. Locations and methods of connection to the existing system.
 3. Water service connections by location and size.
 4. Locations and elevations of temporary water piping.
 5. Location of temporary hydrants.
 6. Temporary pipe supports and anchoring requirements.
 7. Thrust restraint methods, locations, and block sizes.
 8. Materials to be used.
 9. Coordination activities with DCFEMS. Temporary hydrant nozzles shall comply with the DCFEMS standard to ensure proper thread count and size.
 10. Detailed location map showing location of all temporary hydrants and all hydrants that are to be taken out of service.
 11. A traffic control plan that pertains solely to the temporary water piping operations including methods to accommodate vehicular and pedestrian traffic, protective devices, and signage. This plan may differ from the traffic control plan developed for the overall scope of the Work. The plan shall address ADA regulations for access to all residential and commercial property unless written approval stating that ADA compliance is not required is obtained from the property Owner.
 12. Designated access locations.
 13. Schedule for the temporary water piping activities including but not limited to:
 - a. Sequencing and coordination of connecting to existing water mains.
 - b. Pipeline inspections.
 - c. Coordination activities with trenchless rehabilitation activities.
 - d. Disinfecting the temporary water piping system.
 - e. Activities required for handling water flow during construction.
 14. Emergency plans for maintaining temporary water piping systems during adverse weather and flooding.
 15. A detailed sketch of the hydrant that the Contractor proposes to use.
 16. Equipment capacities.
 17. Staging areas for pumps (if required).
 18. Water plugging method and types of plugs (if required).

PART 2. PRODUCTS

2.1 MATERIALS:

- A. Material and equipment used in the temporary water piping system shall withstand, without leakage, 150 psi operating pressure plus 33 percent pressure for testing. Temporary water pipe and fittings shall not impart objectionable color, taste or odor to the water being supplied and shall meet NSF/ANSI 61 requirements for potable water systems.
- B. Materials and equipment used for temporary water service connections at individual property shall be one (1) inch minimum, designed for a working pressure of 150 psi and be

free from defects in material and workmanship. The pipe, hose and all other materials used in the temporary service connections shall be approved by DC Water, and shall conform to ANSI/NSF 61 and be made of materials that do not impart objectionable color, taste or odor to the water being supplied to the service.

PART 3. EXECUTION

3.1 GENERAL:

- A. A registered plumber in the District of Columbia is required to perform work on service connection repair, or service tap replacements.
- B. Ten days prior to temporary water piping work, the Contractor shall deliver “door hanger” notices, supplied by DC Water, to each affected residence and business.
- C. Contractor shall not operate hydrants or valves without express written permission of DC Water.
- D. Temporary water piping crossing driveways and sidewalks shall be protected against traffic by mounding asphalt material, installing access ramps, or burying the pipe. Minimum depth of cover over mounded or buried pipe shall be maintained at 12 inches. The use of a polyethylene sheet shall be used as a barrier on concrete and/or interlocking driveways.
- E. Temporary water pipe crossing streets and sidewalk access ramps shall be installed in a trench and shall not block or otherwise impede access to any sidewalk access ramp. The existing pavement shall be saw cut and excavated to a depth sufficient to contain the temporary water pipe. Cover temporary water piping with steel plates.
- F. Contractor shall maintain uninterrupted accessibility to sidewalk access ramps at all times.
- G. Contractor shall protect all components of the temporary water piping system from vandalism and vehicular damage.
- H. Flashers and barricades shall be installed at locations shown on the TWPP. Flashers and barricades shall be maintained in proper operating condition.
- I. Temporary water pumps (if required) shall be critically silenced when used in residential settings or areas where excessive noise levels will create a disturbance.
- J. Contractor shall field verify temporary water piping flow and sizing requirements prior to submission of shop drawings.

3.2 WEATHER RESTRICTIONS:

- A. No temporary water piping system or temporary service connections shall be installed during freezing or inclement weather and temporary water systems and temporary service connections already in use shall be drained and/or removed from service and permanent services restored.
- B. During freezing, stormy or inclement weather, no work shall be done except that which is incidental to the project, unless otherwise approved by DC Water.

3.3 TEMPORARY WATER PIPING SYSTEM:

- A. The Contractor shall supply, install and maintain temporary water piping for water mains removed from service for the project’s operations. The work shall include but not be limited to:
 - 1. Installing temporary water piping materials including but not limited to pipe, valves, check valves, and backflow preventers.
 - 2. Connecting and disinfecting the temporary water piping system to the existing water main.
 - 3. Protecting the temporary water piping system from damage,

4. Temporary shut-off of private services by operation of curb-stops or such other means as required,
 5. Removal of temporary service connections and by-pass line and restoration of the site upon completion of the work,
 6. Disconnecting and Re-installing all water meters, if applicable.
- B. Connect the temporary water piping to the water main at locations that support performing the Work. When connections are made in different pressure districts, a check valve shall be installed to maintain separation of pressure districts. Valves shall be installed in the temporary water pipeline near each connection to the water main and in the vicinity of any existing main line valves. The existing water main shall not be removed from service until DC Water has approved the installed temporary water piping system.
 - C. Pressure test the temporary water piping system to 1.3 times the system pressure.
 - D. Supply and install, at locations where protection of the water system is required, a certified backflow preventer per Section 33 12 14 – Backflow Preventers.

3.4 TEMPORARY SERVICE CONNECTION:

- A. The Contractor shall supply, install, and maintain temporary water services to properties affected by the Work.
- B. Make all connections to the customer's water service line on a day and at a time that is convenient to the customer.
- C. Each home shall have its own temporary water service connection to the temporary water pipe and a connection to the private plumbing via a wye at an outside tap. The branching of wyes from a single spigot shall not be permitted; nor will connecting homes in series.
- D. If an outside tap is not available, the connection to the water service line shall be made in a suitable area not directly in the street. The Contractor shall excavate, expose and cut the water service line, and connect the temporary water piping system. Contractor shall either backfill excavated area or install orange construction security fencing with flashers around the excavated area.
- E. The installation of pipes and fittings shall be watertight and under the required pressure system. Care shall be exercised throughout the installation of any temporary pipe and service fittings to prevent polluting of any water line, or causing property damage, or contaminating any temporary service pipe system.
- F. Install a valve on the service connection near the point of connection to the temporary water piping and near the private plumbing system so that the temporary water piping and service connection can be disinfected separately.
- G. Flush each building at an exterior hose-bib after connecting the temporary service.
- H. Ensure an adequate water supply at all times. Restore a customer's water supply within two (2) hours of being notified that service has been disrupted.
- I. During any stage of the work, if the Contractor determines that it is necessary to use water from a service, or run a house-to-house connection, DC Water shall be contacted and must approve the proposed plan. DC Water will arrange to have the meters replaced with straight pipe. Caution shall be used to prevent meters from being switched and meter settings from being damaged. The Contractor shall coordinate with DC Water and notify residents a minimum of 48 hours prior to connection and removal of temporary connection.

3.5 DISINFECTION:

- A. Flush and disinfect the temporary water piping system and temporary service connections prior to being placed in service.
- B. Disinfect the temporary water piping system and temporary service connections in accordance with Section 33 13 00 – Disinfecting Water Mains. Disinfection tests for the temporary water piping system and temporary serviced connections shall be performed by

and paid for by the Contractor.

3.6 TEMPORARY FIRE HYDRANTS:

- A. The Contractor shall supply, install, and maintain temporary fire hydrants with the necessary valves and fittings. Temporary hydrants shall be connected to the temporary water pipe and installed in locations shown in the TWPP.
- B. The hydrants shall be located so that the DCFEMS can easily access the hydrant to connect a fire hose, where they will not obstruct vehicular and pedestrian traffic, and will be least likely to be damaged. Temporary fabricated fire hydrants are acceptable.
- C. Temporary hydrants, valves, fittings, service pipe and all other material shall be capable of withstanding the pressures and conditions of use and shall be water tight. Before permanently shutting down the water main that is to be bypassed, the Contractor shall test all temporary hydrants and valves to be sure that they are in proper working order.
- D. All temporary hydrants shall have reflective tape on the barrel for increased visibility. The temporary hydrants shall stand in an upright position at all times. Once put into use, the temporary hydrants shall be maintained until the existing hydrants are restored to service.
- E. Notify DC Water prior to taking a hydrant out of service or placing it into service. This includes the initial installation of a hydrant. DC Water will install and remove the "HYDRANT OUT OF SERVICE" ring and make appropriate notifications.
- F. All connections made to fire hydrants shall include an approved backflow prevention device per Section 33 12 14 – Backflow Preventers and shall be made in such a manner that it can be easily removed for firefighting purposes.

3.7 OPERATIONS AND SYSTEM MONITORING:

- A. During temporary water piping activities, the Contractor shall maintain vehicular and pedestrian access, prevent damage to public and private property, prevent leakage from the temporary water piping system and, if pumps are required, minimize noise from pumps.
- B. Repair any damage to public or private property caused by temporary water piping activities at no additional cost to DC Water.
- C. Repair any damage to existing water systems caused by temporary water piping activities at no additional cost to DC Water.
- D. Contractor shall not discharge water to any land, street, storm drain or water course without DC Water's approval.
- E. Provide system safeguards and maintain temporary water piping in a safe operating condition at all times to prevent injury to persons and damage to property.
- F. Provide on-site manual oversight of temporary water piping system 24 hours per day, seven (7) days per week when the temporary water piping system is in operation. Personnel monitoring the temporary water piping system shall be trained, experienced, and mechanically qualified to respond quickly and effectively to address any potential emergency and non-emergency situations associated with the temporary water piping.
- G. The Contractor shall be on-call 24 hours per day, seven (7) days per week and respond to and begin remedial action within 2 hours of being notified of a temporary water piping system leak or problem. The cost for repair of any portion of the temporary water piping system by DC Water as a result of the Contractor not responding within a two (2) hour period and the projected cost of water lost as a result of any leak will be deducted from the Contractor's progress payment.
- H. Maintain continuous water flow in service connections and in case of freezing, breaks, vandalism, low flow, no-flow, etc., the Contractor's qualified person shall respond to complaints and assess and correct the problem.
- I. Contractor shall cease temporary water piping operations and return flows to the new and/or existing water service after completing all Work requiring the water to be bypassed

and after receiving authorization to terminate temporary water piping from DC Water.

- J. When temporary water piping operations are complete, all temporary water piping shall be flushed with fresh water and drained into the wastewater system prior to disassembly.

3.8 OPERATION OF VALVES AND HYDRANTS:

- A. In the event that in service water main valves require operations during the course of construction, DC Water staff shall be notified. The operation of all live valves and hydrants will be done by a DC Water crew member or under the direct supervision of a representative of DC Water.
- B. The Contractor shall keep, and maintain on site, a real-time log book containing a record of the operation of any system valves and hydrants (main line and temporary water) within the limits of the Work. The log book shall be presented daily to DC Water for signature and copy.
- C. The log book layout and format shall be determined at the pre-construction meeting and shall include but not be limited to the system the valve is on; the location of the valve; the date and time of operation; the reason for operation; the final position of the valve after operation (i.e., open or closed); and the name of the individual operating the valve.

3.9 NOTIFICATION AND FOLLOW-UP LOG:

- A. The Contractor shall make and maintain a log of notifications and follow-up work. The Contractor shall record in the log the address and date of delivery of each notification as well as any other information relevant to the notifications, such as follow-up telephone calls or property visits.
- B. The log shall also record date and description of any work performed at a property including but not limited to installation of shut-off valves disconnection of water meters, installation of hose bibs (or other devices) for temporary water service to the property, and activation and deactivation of temporary water service. The log shall be maintained in a common electronic format, such as an MS Excel document and submitted to DC Water upon request and at project closeout.

3.10 PROTECTION OF PUBLIC:

- A. Install temporary water piping and temporary service pipe in locations where it will minimize the obstruction and be least likely to get damaged.
- B. When mounding is used to provide access over temporary water piping crossing driveways and sidewalks it shall be constructed so that it does not hinder traffic. If the work performed and/or the material used is not to the satisfaction of DC Water, the Contractor shall rectify the problem to ensure the safety of the public. All costs incurred in in rectifying the problem shall be deducted from the Contractor's payment.
- C. Safety flashers and barricades shall be furnished and maintained by the Contractor.

3.11 RESTORED EXCAVATED AND/OR DISTURBED AREA:

- A. Restore excavated and/or disturbed areas to new condition.
- B. Backfill and compact material to match existing grade.
- C. Install topsoil and sod in disturbed grass areas.
- D. All Associated costs for restoration shall be no additional cost to DC Water.

3.12 CLEAN-UP:

- A. Clean up the entire project area after the work is complete and all testing accepted. Remove and dispose of all excess material and debris not incorporated into the permanent installation.

~ END OF SECTION 33 29 50 ~

SECTION 40 96 01

WITNESSED COMBINED LOOP TEST (WCLT)

PART 1. GENERAL

1.1 SUMMARY:

- A. Provide all labor, material, and equipment necessary to perform witnessed combined loop testing (WCLT) of all Input/output points, including but not limited to all systems/devices associated with process, input/output hardware, power monitoring/control, uninterruptable power supplies and applications software to control and monitor processes by an Automatic Control System (ACS).

1.2 RELATED DOCUMENTS:

- A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 REFERENCED SECTIONS:

- A. Sections specified elsewhere may include but are not limited to:
 - 1. Section 01 33 00: Submittals.
 - 2. Section 01 75 00: Operational Demonstration.
 - 3. Section 01 78 39: Project Record Documents.
 - 4. Section 01 91 00: Equipment and System Commissioning.

1.4 DEFINITIONS:

- A. ACS: Automatic Control System (PCS or SCADA).
- B. WCLT: Witnessed Combined Loop Testing.
- C. PCS: Process Control System.
- D. DCU: Distributed Control Unit.
- E. SCADA: Supervisory Control and Data Acquisition.
- F. PLC: Programmable Logic Controller.
- G. OIT: Operator Interface Terminal.
- H. OWS: Operator Work Station.

1.5 SUBMITTALS:

- A. Requirements for ‘Submittals’ shall be in accordance with Section 01 33 00.
- B. Submit Test Plan for all WCLT to be performed.
- C. Submit Form 40 96 01-01 - Notice of System Readiness for Witnessed Combined Loop Test (WCLT).
- D. Submit Pre-Test Readiness documentation as required in Part 3 of this Section.
- E. Submit Calibration reports on Form 40 96 01-02 - Instrument Calibration Sheet.
- F. Submit test results for all WCLTs on Form 40 96 01-03 - WCLT Summary Results.

1.6 TEST PLAN:

- A. Prepare and submit a test plan that complies with the following:
 - 1. A test procedure that utilizes a cause and effect test formatted as follows:
 - a. Cause - The person conducting test initiates input.
 - b. Effect - Specific test requirement is satisfied if correct results occur.
 - 2. Is completed on a unit operation and loop basis that is designed to coordinate with the unit process testing and startup.
 - 3. Includes all testing required by this Section.
 - 4. Includes all testing forms and checklists for all I/Os from the field to PCS or PLC databases and HMI (Ovation or Wonderware).
 - 5. Includes a space after each test item description for sign off after satisfactory completion of the test.
 - 6. A breakdown of all related work required to provide commissioning and operational demonstration of all inputs and outputs, graphics, alarms and run time logging.

1.7 NOTICE OF SYSTEM READINESS FOR WCLT:

- A. Confirm the following prior to submitting the notice of system readiness for WCLT request:
 - 1. All equipment is installed properly.
 - 2. All instruments are calibrated per manufacturer's recommendation and field requirements.
 - 3. Database and graphics are loaded and configured.
 - 4. Pre-loop check for all points has been performed successfully.
- B. Submit the following to DC Water at least one (1) week in advance of the planned date of the WCLT.
 - 1. Form 40 96 01-01 - Notice of System Readiness for Witnessed Combined Loop Test (WCLT).
 - 2. The pre-loop check results indicating points tested, date tested, and test results.
 - 3. ACS supplier readiness certificate confirming installation and configuration of IO database and graphics/control sheets.
 - 4. List of all points to be tested.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.1 GENERAL:

- A. Prior to performing the WCLT, verify that all instruments and systems are installed per manufacture's recommendations and submit all factory and field calibration reports to DC Water using Form 40 96 01-02 titled, Instrument Calibration Sheets.
- B. Coordinate all testing with Specification Sections 01 91 00 - Equipment and System Commissioning and 01 75 00 - Operational Demonstration.
- C. Perform WCLT for complete systems unless approved otherwise by DC Water.

3.2 PRE-TEST READINESS:

- A. Complete and submit to DC Water tests and documentation for the following prior to performing the WCLT:
 1. **ACS Factory Acceptance Test:** Perform the ACS factory acceptance test at the ACS supplier facility or systems integrator facility before the software is loaded on the ACS.
 2. **Other Control Panels:** Test other controls/panels that are part of the WCLT prior to conducting the WCLT.
 3. **Communication Tests:** Test communications between the ACS and other systems. Communication test shall confirm proper communication and data transfer to correct registers between ACS, PLCs, PMTs and other electronic devices.
 4. **Network Test:** Test all new ACS equipment including Servers, Switches, DCUs, PLCs, RIOS, OWSs/OITs and UPS etc. for proper functioning and networking with existing systems and verify seamless communication is established.
 5. **Navigation Test:** Verify all the display navigation controls function as designed.
 6. **Loop-Specific Functions:** Demonstrate functions specified in the control descriptions.
 7. **Calibration reports:** Perform calibration for all equipment to be tested prior to conducting the WCLT.
 8. **Field Testing:** Inspect, test, and document the entire instrumentation and control system that is to be tested is ready for operation.

3.3 RESPONSIBILITIES DURING THE WCLT:

- A. System Integrator and or Contractor shall lead the WCLT and document results for all points tested.
- B. Contractor shall operate all new equipment.
- C. DC Water operators will operate existing DC Water equipment.
- D. DC Water representative will witness the WCLT and provide summary report.

3.4 PERFORMING THE WCLT:

- A. Testing Requirements:
 1. Perform end to end testing of all I/O points. (from the field to HMI graphics)
 2. Test all hardwired Interlock/Permissive Points.
 3. Perform all local and manual tests for each loop before proceeding to remote and automatic modes.
 4. Operate equipment as required so that actual signal transmission to ACS database and Graphics can be monitored.
 5. Where possible, verify test results using visual confirmation of process equipment and actual process variable.
 6. Exercise and observe devices to verify correct signals to and from each device and confirm overall system functionality.
 7. Test all digital input signals as follows:
 - a. Transmit both open and close conditions to the ACS monitor by operating the equipment.
 - b. Verify the monitor displays the operation on graphics.

- c. Verify all alarms show correct operation.
- 8. Analog Input Signals:
 - a. Monitor signal levels at zero percent (0%), 25%, 50%, 75% and 100% range.
 - b. Confirm that the linear transmission of signal transmits to the ACS.
- 9. Digital Output Points:
 - a. Transmit both open and close commands from the ACS.
 - b. Confirm that the system responds in the field to the commands from ACS as designed.
- 10. Analog Output Signals:
 - a. Transmit signal at levels zero percent (0%), 25%, 50%, 75% and 100% by the ACS.
 - b. Confirm that the system responds in the field to the commands from ACS as designed.
- 11. Interlock Test:
 - a. Test all electrical interlocks for the system being tested.
 - b. Verify proper operation of safety interlocks of the equipment are as designed and required.
- B. Test verification by means of disconnecting wires or measuring/simulating signal levels is acceptable only where direct operation of plant equipment is not possible. The decision to permit this method of testing will be made in the field by DC Water after considering all the factors.

3.5 TEST RESULTS:

- A. Test Documentation shall be signed by the System Integrator, Contractor, and DC Water representative after the WCLT is complete. Signatures shall represent that the test was performed and the results accurately recorded on the test form.
- B. DC Water representative will review the test documentation and provide a summary of the test results within five (5) working days of the test. The summary will indicate but not be limited to:
 - 1. Test actions that achieved acceptable results.
 - 2. Test actions that did not achieve unacceptable results.
 - 3. Tests actions that failed and need to be repeated.
- C. Perform the following actions after receiving notice from DC Water that test results failed:
 - 1. Within five (5) days of being notified that test(s) failed, provide DC Water with a schedule for performing corrective actions and retesting.
 - 2. Identify and complete corrective actions that resolve the issues which caused the test to fail.
 - 3. Retest all failed points or perform a complete retest as required by the DC Water.
 - 4. If any part of the test fails and requires rewiring or replacing parts, perform a complete retest.
- D. Manage and retain copies of all tests in accordance with Section 01 78 39 - Project Record Documents.

~ END OF SECTION 40 96 01 ~