



DC Water Standard Specifications (2018)

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
STANDARD SPECIFICATIONS
(2018)



Leonard Benson, Chief Engineer

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PURPOSE

The District of Columbia Water and Sewer Authority Standard Specifications dated 2018, 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 2018

The Standard Specification Sections included in the STANDARD SPECIFICATIONS dated 2018 have been reviewed and approved for design and construction of infrastructure operated and maintained by DC Water.

APPROVED BY:



Leonard R. Benson
Chief Engineer
DC Water

DATE: 11-17-17

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 changes 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 is printed according to the following format:

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

A Table of Contents listing the specifications and the type of specification is included in the front of the Project Specifications book.

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

REVISIONS TO STANDARD SPECIFICATIONS

The Standard Specifications dated 2018 supersede all previous versions of DC Water Standard Spec Sections. Changes from the most previous version are denoted with a vertical black line in the margin next to the portion of the specification that was changed. 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 change(s) will be added to the Supplemental Standard Specifications. The text of the Supplemental Standard Specification Section will indicate the location of change(s) as well as the exact language of the change being made.

SUMMARY OF CHANGES IN THE STANDARD SPECIFICATIONS DATED 2018

These “Standard Specifications” dated 2018 include revisions made to the “2017 SDWM Specifications.” These Standard Specifications supersede all previous versions, including the 2017 SDWM Specifications issued in August 2017. Revisions made in this version include responses to contractor comments from recent bid packages. The following summarizes the changes made and incorporated into the “Standard Specifications” dated 2018. All changes are marked with a side bar except as noted below.

- Change of Title to Standard Specifications.
- Title in Section footers revised to “Standard Specifications”.
- Date in Section footers revised to November 2017.
- Responses to contractor comments on recently bid projects (the changes were also issued in addendums to SD13A and SD12B2).
- Formatting changes such as font, font size, paragraph spacing, etc. (not marked).
- Miscellaneous spelling, grammar, and text corrections.
- Added 4 new Sections, including the Standard Specifications TOC (Identified as “New” in TOC).
- Revised measurement method for Flexible Pavement.
- Clarified responsibility for taking tests and paying for disinfection.
- Added requirement for third party subsurface analysis prior to excavation in Protecting Existing Utilities Section.

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DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
STANDARD SPECIFICATIONS
(2018)

TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
00 01 11	Table of Contents	2	November 2017	New

DIVISION 01 – GENERAL REQUIREMENTS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
01 29 00	Progress Payment Procedures	4	November 2017	New
01 57 30	Dust Control	4	November 2017	New
01 78 42	As-Built Drawings	4	November 2017	New

DIVISION 02 – EXISTING CONDITIONS				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
02 01 20	Protecting Existing Utilities	4	November 2017	Updated
02 41 00	Demolition	4	November 2017	Updated

DIVISION 21 - FIRE SUPPRESSION				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
21 11 10	Fire Hydrants	6	November 2017	Updated
21 11 17	Remove Fire Hydrants and Hydrant Control Valves	2	November 2017	Updated

DIVISION 31 - EARTHWORK				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
31 05 19	Geotextiles	6	November 2017	Updated
31 11 00	Clearing, Grubbing, and Stripping	4	November 2017	Updated
31 23 10	Trench Excavation and Backfill	18	November 2017	Updated
31 23 19	Dewatering-Groundwater	6	November 2017	Updated
31 23 23	Controlled Low-Strength Material (Flowable Fill)	6	November 2017	Updated
31 23 32	Aggregate Materials	4	November 2017	Updated

DIVISION 31 - EARTHWORK				
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31 23 37	Test Pits	4	November 2017	Updated
31 25 00	Erosion and Sediment Control	6	November 2017	Updated
31 41 00	Shoring, Sheeting, and Bracing	4	November 2017	Updated

DIVISION 32 – EXTERIOR IMPROVEMENTS				
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32 12 16	Flexible Pavement	10	November 2017	Updated
32 12 18	Pavement Milling	4	November 2017	Updated
32 13 78	PCC Pavement Repair	4	November 2017	Updated
32 16 00	Portland Cement Curb and Gutter	2	November 2017	Updated
32 16 01	Stone Curb	4	November 2017	Updated
32 16 04	Brick Gutter	2	November 2017	Updated
32 16 25	Driveways, Sidewalks, and Alleyways	4	November 2017	Updated
32 92 23	Sodding	4	November 2017	Updated

DIVISION 33 - UTILITIES				
SECTION	SECTION TITLE	PAGES	DATE	STATUS
33 01 20	Abandonment of Underground Utilities	6	November 2017	Updated
33 05 02	Water Utility Distribution Piping – Ductile Iron Pipe	10	November 2017	Updated
33 06 20	Concrete Valve Casings	4	November 2017	Updated
33 11 20	Concrete Thrust Restraints	2	November 2017	Updated
33 12 13	Water Service Lines	14	November 2017	Updated
33 12 14	Backflow Preventers	4	November 2017	Updated
33 12 16	Tapping Sleeves and Valves	4	November 2017	Updated
33 12 17	Service Saddles	4	November 2017	Updated
33 13 00	Disinfecting Water Mains	8	November 2017	Updated
33 14 00	Gate Valves	6	November 2017	Updated
33 19 05	Pressure and Leakage Testing – Pressure Pipe	4	November 2017	Updated
33 23 20	Dewatering – Treated Water	4	November 2017	Updated
33 29 50	Temporary Water Piping	8	November 2017	Updated

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: Sections specified elsewhere may include but are not limited to:

- A. 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 titled, "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 titled, "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. List of Contractor's staff assignments.
 6. Copies of filed permit applications.

7. 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. Partial Waiver of Lien from all Subcontractors and Vendors.
 10. 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.
 11. 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).

3.4 APPLICATION FOR FINAL PAYMENT:

- A. Prepare Application for Final Payment as required in Section 00 70 00 titled, "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.
- 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:

PART 4. MEASUREMENT AND PAYMENT

4.1 PROGRESS PAYMENTS:

- A. Measurement:
 - 1. Work for Progress Payments will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for Progress Payments. The cost thereof shall be distributed among the appropriate items specified in the technical sections of the specifications.

~ END OF SECTION 01 29 00 ~

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: Specified elsewhere may include but are not limited to:

- A. 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 DUST CONTROL:

- A. Measurement:
 - 1. Work for Dust Control will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Dust Control will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs; which price and payment shall include but not be limited to any associated minor complications and/or delays, traffic maintenance and protection, disposal of collected material, street sweeping and all labor, materials, tools, fees, and equipment necessary to complete the work as specified within the Contract.

~ END OF SECTION 01 57 30~

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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: Specified elsewhere may include but are not limited to:

- A. 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 Beneficial Occupancy or Substantial Completion Inspection request 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 AS-BUILT DRAWINGS:

- A. Measurement:
 - 1. Work for As-Built Drawings will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for As-Built Drawings shall be distributed among the appropriate items specified in the technical sections of the specifications.

~ END OF SECTION 01 78 42 ~

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: Specified elsewhere may include but are not limited to:

- A. Section 01 32 33: Construction Photographs.
- B. Section 31 23 10 Trench Excavation and Backfill.
- C. 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 titled, "Construction Photographs".
- D. In addition to the pre-construction photos and periodic photos taken per Section 01 32 33 titled, "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 31 32 titled, "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.

3.4 COMPACTION:

- A. Utilities Protected in Place: Utilities that are exposed during construction shall receive backfill and be compacted under and around the utility so that no voids are left. Backfill and compaction shall be in accordance with Section 31 23 10 titled "Trench Excavation and Backfill".

3.5 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 titled, "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.

3.6 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 PROTECTING EXISTING UTILITIES:

A. Measurement:

1. Work for Protecting Existing Underground Utilities will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Protecting Existing Underground Utilities will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, fees and equipment necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 00 40 10: Schedule of Prices.
- B. Section 00 89 00: Project Permits and Approval.
- C. Section 01 33 00: Submittals.
- D. Section 01 54 50: Construction Safety.
- E. Section 01 57 30: Dust Control.
- F. 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 titled, "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 titled, "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 titled, "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 titled, "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 titled, "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 titled, "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 titled, "Waste Management".

PART 4. MEASUREMENT AND PAYMENT

4.1 INCIDENTAL DEMOLITION:

- A. Measurement:
 - 1. Work for Incidental Demolition will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for Incidental Demolition. Payment for Incidental Demolition shall be included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 ITEMIZED DEMOLITION:

- A. Measurement:
 - 1. Work for Itemized Demolition will be measured per lump sum for payment.
- B. Payment:
 - 1. Payment for Itemized Demolition will be made at the Contract unit price per lump sum as stated in the SOPs, which price shall constitute full compensation for completing all Work associated with the Itemized Demolition and shall include but not be limited to demolition, transportation, disposal, cleanup, minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ END OF SECTION 02 41 00 ~

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SECTION 21 11 10

FIRE HYDRANTS

PART 1. GENERAL

1.1 SUMMARY:

- A. Work consists of furnishing and installing 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.
- B. Any work that is excavated or disturbed beyond the construction pay limits shall be the Contractor's sole responsibility to replace in kind at no additional cost to 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: Specified Sections elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 31 05 19: Geotextiles.
- C. Section 31 23 32: Aggregate Materials.
- D. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.
- E. 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 titled, “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 titled “Aggregate Materials”.
- C. Filter Fabric:
 - 1. Filter fabric shall be for subsurface drainage as specified in Section 31 05 19 titled, “Geotextiles”.

PART 3. EXECUTION

3.1 CONSTRUCTION REQUIREMENTS:

- A. Costs for fire hydrant and dry well material, excavation, installation and backfill shall be included in this Section. Costs for fire hydrant connection pipe excavation and backfill shall be included as part of trench excavation.
- B. All related work on hydrant water line including tests and disinfection shall be pertinent to provisions of Section 33 13 00 titled “Disinfecting Water Mains”.
- C. 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.
- D. Joint and joint restraint between boot and the connection pipe to the main shall be per Section 33 05 02 titled “Water Utility Distribution Piping – Ductile Iron Pipe”.
- E. 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.
- F. 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.
- G. 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: “Installation of Ductile Iron Water Mains and Their Appurtenances”.
 - 3. AWWA M17: “Fire Hydrants: Installation, Field Testing, and Maintenance”.

PART 4. MEASUREMENT AND PAYMENT

4.1 FIRE HYDRANTS:

- A. Measurement:

1. Work for Fire Hydrants will be measured per each for payment

B. Payment:

1. Payment for the installation of Fire Hydrants will be made at the Contract unit price per each as stated in the SOPs, complete in place, which price and payment shall include but not be limited to trench & dry well excavation, backfill and compaction, washed gravel, filter fabric, concrete collar, traffic maintenance and protection, minor complications and/or delays, temporary pavement restoration, and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 FIRE HYDRANTS IN HIGH SECURITY AREA:

A. Measurement:

1. Work for Fire Hydrants in High Security Area will be measured per each for payment

B. Payment:

1. Payment for the installation of Fire Hydrants in High Security Area will be made at the Contract unit price per each as stated in the SOPs, complete in place, which price and payment shall include but not be limited to trench & dry well excavation, backfill and compaction, washed gravel, filter fabric, concrete collar, locking system, traffic maintenance and protection, minor complications and/or delays, temporary pavement restoration, and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 31 23 10: Trench Excavation and Backfill.
- B. 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 titled, "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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 REMOVE FIRE HYDRANTS AND HYDRANT CONTROL VALVES:

- A. Measurement:
 - 1. Work for Remove Fire Hydrants and Hydrant Control Valves will be measured as a single unit for each pair of valves and hydrants for payment.
- B. Payment:
 - 1. Payment for Remove Fire Hydrants and Hydrant Control Valves will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include but not be limited to removal of hydrant, hydrant control valve, piping, and fittings, traffic maintenance and protection, minor complications and/or delays, excavation, backfill and compaction beyond trench excavation pay limits, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. 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. American Society for Testing and Materials (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 titled, “Submittals”.
- 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 GEOTEXTILES:

- A. Measurement:
 - 1. Work for Geotextiles will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Geotextiles will be considered incidental and included under the bid item(s) of

which it is a part of in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, overlap of geotextile material, minor complications and/or delays, maintenance, traffic maintenance & protection, temporary pavement, seeding and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~END OF SECTION 31 05 19~

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: Specified elsewhere may include but are not limited to:

- A. Section 00 40 10: Schedule of Prices.
- B. Section 00 89 00: Project Permits and Approvals.
- C. Section 31 13 12: Tree Protection and Trimming.
- D. Section 31 22 00: Earthwork.
- E. 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 titled, "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 titled, "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 titled, "Erosion and Sediment Control" and acquire the permits applicable to clearing, grubbing, and stripping as required in Section 00 89 00 titled, "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 titled, "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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 INCIDENTAL CLEARING, GRUBBING, AND STRIPPING:

- A. Measurement:
 - 1. Work for Incidental Clearing, Grubbing, and Stripping will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Incidental Clearing, Grubbing, and Stripping shall be included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, disposal, traffic maintenance and protection and all labor, materials, tools, permits, fees and equipment necessary to complete the work as specified within the Contract.

4.2 NON-INCIDENTAL CLEARING, GRUBBING, AND STRIPPING:

A. Measurement:

1. Work for Non-Incidental Clearing, Grubbing, and Stripping will be measured per lump sum for payment.

B. Payment:

1. Payment for Non-Incidental Clearing, Grubbing, and Stripping will be made at the Contract unit price per lump sum as stated in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, disposal, traffic maintenance and protection and all labor, materials, tools, permits, fees and equipment necessary to complete the work as specified within the Contract.

~ END OF SECTION 31 11 00 ~

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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 01 45 29: Testing Laboratory Services.
- C. Section 01 54 50: Construction Safety.
- D. Section 02 01 20: Protecting Existing Utilities.
- E. Section 31 13 12: Tree Protection and Trimming.
- F. Section 31 23 19: Dewatering – Groundwater.
- G. Section 31 23 32: Aggregate Materials.
- H. Section 31 25 00: Erosion and Sediment Control.
- I. Section 31 41 00: Shoring, Sheet piling and Bracing.
- J. Section 31 71 01: Utility Tunnels.
- K. Section 33 01 20: Abandonment of Underground Utilities.
- L. Section 33 02 00: Boring and Jacking.
- M. 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. American Society for Testing and Materials (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, titled "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 titled, "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 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 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 (Base Bid):
 - a. Bedding Zone, Haunching Zone, Encasement Zone, and Initial Backfill Zone materials shall be Trench Backfill in accordance to Section 31 23 32 titled, "Aggregate Materials".
 - 2. Embedment Zone Option 2 (Contingent Item):
 - a. Bedding Zone, Haunching Zone, and Encasement Zone materials shall be No. 57 Crushed Stone in accordance with Section 31 23 32 titled, "Aggregate Materials", wrapped in a geotextile fabric.
 - b. Initial Backfill Zone material shall be Trench Backfill in accordance to Section 31 23 32 titled, "Aggregate Materials".
 - 3. Embedment Zone Option 3 (Contingent Item):
 - a. Bedding Zone material shall be Trench Backfill in accordance with Section 31 23 32 titled, "Aggregate Materials".
 - b. Haunching Zone and Encasement Zone material shall be General Purpose Backfill CLSM in accordance with Section 31 23 23 titled, "Controlled Low-Strength Material (Flowable Fill)".
 - c. Initial Backfill Zone shall be General Purpose Backfill CLSM in accordance with Section 31 23 23 titled, "Controlled Low-Strength Material (Flowable Fill)" or Trench Backfill in accordance with Section 31 23 32 titled, "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 titled, "Aggregate Materials".

2.5 GRADED AGGREGATE BASE:

- A. Graded Aggregate base shall be in accordance to Section 31 23 32 titled, “Aggregate Materials”.

2.6 TRENCH UNDERCUT BACKFILL MATERIALS (CONTINGENT ITEM):

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

2.7 GEOTEXTILE FABRIC:

- A. Geotextile fabric shall be as specified in Section 31 05 19 titled, “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 titled, “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, titled “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 titled, “Boring and Jacking” or Section 31 71 01 titled, “Utility Tunnels”.
- 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 titled, "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 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 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 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 titled, "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 titled, "Abandonment of Underground Utilities".

3.7 DEWATERING:

- A. Dewatering shall conform to the requirements as stated in Section 31 23 19 titled, "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 (Contingent Item):
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 titled, "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 (Contingent Item):
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 (CONTINGENT ITEM):

- 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 (CONTINGENT ITEM):

- 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 GENERAL:

- A. Payment for Trench Excavation and Backfill for water utility service connections will be included in Section 33 12 13 titled, "Water Service Lines" and for sewer laterals, payment will be included in 33 01 34 titled, "Building Sewer Connections and Cleanouts".
- B. Payment for Trench Excavation and Backfill for abandonment of utilities will be included in Section 33 01 20 titled, "Abandonment of Underground Utilities".
- C. If excavated material is unsuitable, Contractor will replace with Borrow Trench Backfill. Measurement and payment for Borrow Trench Backfill will be as stated herein.

4.2 MEASUREMENT AND VOLUME:

- A. Volumes will be determined using the following measurements:
 - 1. Width: Measurement for all trench cross sections will be based on trench pay widths shown on Standard Details and/or Contract Drawings.
 - 2. Depth:
 - a. When measuring trench depth, the depth will be measured at station intervals of approximately 100 feet, or fraction thereof, between the bottom elevation of the trench and the elevation of the finished surface.
 - b. When measuring for Borrow Trench Backfill, the depth of Borrow Trench Backfill material will be measured at station intervals of approximately 100 feet, or fraction thereof, and at changes in grade between the bottom elevation of the Borrow Trench Backfill material and the elevation of the actual elevation of the top of the Borrow Trench Backfill material.
 - 3. Length: Length will be measured by the horizontal projection of the completed utility pipeline or, in the case of using Borrow Trench Material, the horizontal projection of the Borrow Trench Material installed.
 - 4. Area: Area will be determined by the average end area method using the depths measured times the width.
 - 5. Volume: Volume will be calculated by multiplying the area times the length.

4.3 TRENCH EXCAVATION AND BACKFILL (LESS THAN OR EQUAL TO 8-FEET DEEP):

- A. Measurement:
 - 1. Work for Trench Excavation and Backfill (Less Than or Equal to 8-Foot in Depth) will be measured per cubic yard for payment.
- B. Payment:
 - 1. Payment for Trench Excavation and Backfill (Less Than or Equal to 8-Foot in Depth) will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material, dewatering, shoring, sheeting and bracing, trench plating as required, minor complications and/or delays, traffic maintenance & protection, maintain and supporting utilities and structures, excavation for various sizes of gate valves, valve casings, joint fittings, extra fittings, reducers, harnessing, abandonment of valves and casings, structures, removal and disposal of existing water main sections and fire hydrants, installation of detectable warning tape, temporary pavement restoration, sample/testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

- 4.4 TRENCH EXCAVATION AND BACKFILL (GREATER THAN 8 FEET DEEP AND LESS THAN OR EQUAL TO 12 FEET DEEP) (CONTINGENT ITEM):
- A. Measurement:
 - 1. Work for Trench Excavation and Backfill (Greater Than 8-Foot Deep and Less Than or Equal to 12-foot Deep) will be measured per cubic yard for payment.
 - B. Payment:
 - 1. Payment for Trench Excavation and Backfill (Greater Than 8-Foot Deep and Less Than or Equal to 12-Foot Deep) will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material, dewatering, shoring, sheeting and bracing, trench plating as required, minor complications and/or delays, traffic maintenance & protection, maintain and supporting utilities and structures, excavation for various sizes of gate valves, valve casings, joint fittings, extra fittings, reducers, harnessing, abandonment of valves and casings, structures, removal and disposal of existing water main sections and fire hydrants, temporary pavement restoration, samples/testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.
 - 2. Payment for this pay item is in addition to the pay item established under Trench Excavation and Backfill (Less Than or Equal to 8-Foot in Depth).
- 4.5 TRENCH EXCAVATION AND BACKFILL (GREATER THAN 12 FEET DEEP AND LESS THAN OR EQUAL TO 16 FEET DEEP) (CONTINGENT ITEM):
- A. Measurement:
 - 1. Work for Trench Excavation and Backfill (Greater Than 12-Foot Deep and Less Than or Equal to 16-Foot Deep) will be measured per cubic yard for payment.
 - B. Payment:
 - 1. Payment for Trench Excavation and Backfill (Greater Than 12-Foot Deep and Less Than or Equal to 16-Foot Deep) will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material, dewatering, shoring, sheeting and bracing, trench plating as required, minor complications and/or delays, traffic maintenance & protection, maintain and supporting utilities and structures, excavation for various sizes of gate valves, valve casings, joint fittings, extra fittings, reducers, harnessing, abandonment of valves and casings, structures, removal and disposal of existing water main sections and fire hydrants, temporary pavement restoration, samples/testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.
 - 2. Payment for this pay item is in addition to the pay items established under Trench Excavation and Backfill (Less Than or Equal to 8-Foot in Depth) and Trench Excavation and Backfill (Greater Than 8-Foot Deep and Less Than or Equal to 12-Foot Deep).
- 4.6 TRENCH EXCAVATION AND BACKFILL (GREATER THAN 16 FEET DEEP AND LESS THAN OR EQUAL TO 20 FEET DEEP) (CONTINGENT ITEM):
- A. Measurement:
 - 1. Work for Trench Excavation and Backfill (Greater Than 16-Foot Deep and Less Than or Equal to 20-Foot Deep) will be measured per cubic yard for payment.
 - B. Payment:
 - 1. Payment for Trench Excavation and Backfill (Greater Than 16-Foot Deep and Less Than or Equal to 20-Foot Deep) will be made at the Contract unit price per cubic

yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material, dewatering, shoring, sheeting and bracing, trench plating as required, minor complications and/or delays, traffic maintenance & protection, maintain and supporting utilities and structures, excavation for various sizes of gate valves, valve casings, joint fittings, extra fittings, reducers, harnessing, abandonment of valves and casings, structures, removal and disposal of existing water main sections and fire hydrants, temporary pavement restoration, samples/testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

2. Payment for this pay item is in addition to the pay items established under Trench Excavation and Backfill (Less Than or Equal to 8-Feet in Depth), Trench Excavation and Backfill (Greater Than 8-Feet Deep and Less Than or Equal to 12-Foot Deep), and Trench Excavation and Backfill (Greater Than 12-Feet Deep and Less Than or Equal to 16-Foot Deep).

4.7 TRENCH EXCAVATION AND BACKFILL (GREATER THAN 20 FEET DEEP) (CONTINGENT ITEM):

A. Measurement:

1. Work for Trench Excavation and Backfill (Greater Than 20 Feet Deep) will be measured per cubic yard for payment.

B. Payment:

1. Payment for Trench Excavation and Backfill (Greater Than 20 Feet Deep) will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material, dewatering, shoring, sheeting and bracing, trench plating as required, minor complications and/or delays, traffic maintenance & protection, maintain and supporting utilities and structures, excavation for various sizes of gate valves, valve casings, joint fittings, extra fittings, reducers, harnessing, abandonment of valves and casings, structures, removal and disposal of existing water main sections and fire hydrants, temporary pavement restoration, samples/testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.
2. Payment for this pay item is in addition to the pay items established under Trench Excavation and Backfill (Less Than or Equal to 8-Feet in Depth), Trench Excavation and Backfill (Greater Than 8-Feet Deep and Less Than or Equal to 12-Foot Deep), Trench Excavation and Backfill (Greater Than 12-Foot Deep and Less Than or Equal to 16-Foot Deep), and Trench Excavation and Backfill (Greater Than 16-Foot Deep and Less Than or Equal to 20-Foot Deep).

4.8 TRENCH UNDERCUT EXCAVATION AND BACKFILL (CONTINGENT ITEM):

A. Measurement:

1. Unit of measure for Trench Undercut Excavation and Backfill will be per cubic yard, with volumes computed by the depth of the bottom of the undercut to the invert of the Bedding Zone. Volume is determined by the depth of the undercut times the length of the undercut times the trench approved width.

B. Payment:

1. Payment for Trench Undercut Excavation and Backfill will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, excavated material backfill and compaction, disposal of unsuitable excavated material as well as placement and compaction of borrow trench fill, dewatering, shoring, sheeting and bracing, erosion and sediment control, trench plating as needed, minor complication and/or delays, traffic maintenance & protection, maintain and

supporting utilities and structures, temporary paving, sample/testing soils and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.9 BORROW TRENCH BACKFILL (CONTINGENT ITEM):

A. Measurement:

1. The Unit of measure for Borrow Trench Backfill will be per cubic yard, with volumes computed by the average end area method minus the volume of the pipe. Measurement will be limited to the trench pay width although trench width beyond these limits, due to Contractor's over excavation, may be required to properly backfill the trench as excavated.

B. Payment:

1. Payment for Borrow Trench Backfill will be made at the Contract unit price per cubic yard as stated in the SOPs, complete in place, which price and payment shall include but not be limited to soil base layers and all labor, tools, materials, equipment and incidentals necessary for hauling and furnishing the material to the work site.
2. Placement and compaction of Borrow Trench Backfill will be included in the cost of Trench Excavation and Backfill.

4.10 EMBEDMENT ZONE OPTION 2 (CONTINGENT ITEM):

A. Measurement:

1. The Unit of measure for Embedment Zone Option 2 will be per cubic yard, with volumes computed by the average end area method minus the volume of the pipe. Measurement will be limited to the trench pay width although trench width beyond these limits, due to contractor's over excavation, may be required to properly backfill the trench as excavated.

B. Payment:

1. Payment for Embedment Zone Option 2 will be made at the Contract unit price per cubic yard as stated in the SOPs, complete in place, which price and payment shall include but not be limited to soil base layers and all labor, tools, materials, equipment and incidentals necessary for hauling and furnishing the material to the work site.
2. The price for Embedment Zone Option 2 material will be in addition to the cost of Trench Excavation and Backfill.

4.11 EMBEDMENT ZONE OPTION 3 (CONTINGENT ITEM):

A. Measurement:

1. The Unit of measure for Embedment Zone Option 3 will be per cubic yard, with volumes computed by the average end area method minus the volume of the pipe. Measurement will be limited to the trench pay width although trench width beyond these limits, due to contractor's over excavation, may be required to properly backfill the trench as excavated.

B. Payment:

1. Payment for Embedment Zone Option 3 will be made at the Contract unit price per cubic yard as stated in the SOPs, complete in place, which price and payment shall include but not be limited to soil base layers and all labor, tools, materials, equipment and incidentals necessary for hauling and furnishing the material to the work site.
2. The price for Embedment Zone Option 3 material will be in addition to the cost of Trench Excavation and Backfill.

4.12 ROCK DEMOLITION (CONTINGENT ITEM):

A. Measurement:

1. The Unit of measure for Rock Demolition will be per cubic yard, with rock volumes computed from the average length times the average width times the average depth of the boulder or the void space created when rock is required to be broken up for removal.

B. Payment:

1. Payment for Rock Demolition will be made at the Contract unit price per cubic yard as stated in the SOPs, which price and payment shall include but not be limited to demolition of the rock within the trench, including drilling and any other method approved by DC Water used for fracturing, and all labor, tools, materials, equipment and incidentals necessary to prepare the rock to be excavated.
2. Excavation of the demolished rock will be paid under the SOPs for which they are a part of.

4.13 SUB-BASE OF GRADED AGGREGATE BASE:

A. Measurement:

1. Work associated with Sub-Base of Graded Aggregate Base will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Sub-Base of Graded Aggregate Base shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to all labor, materials, tools, equipment and incidentals necessary to complete the work specified within the Contract.

4.14 SAMPLING AND TESTING:

A. Measurement:

1. Work associated with the Sampling and Testing will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Sampling and Testing will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to all labor, materials, tools, equipment and incidentals necessary to complete the work specified within the Contract.

4.15 REMOVAL OF SHEETING ENCOUNTERED IN PLACE (CONTINGENT ITEM)

A. Measurement:

1. Work for Removal of Sheeting Encountered in Place will be per square foot of sheet face for payment.

B. Payment:

1. Payment for Removal of Sheeting Encountered in Place will be made at the Contract unit price per square foot as stated in the SOPs, which price and payment shall include but not be limited to cutting, removing, hauling, disposing of all sheeting encountered, and all labor, tools, materials, equipment and incidentals necessary to remove the sheeting.

~ END OF SECTION 31 23 10 ~

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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. 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 titled, "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 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 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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 DEWATERING-GROUNDWATER:

- A. Measurement:
 - 1. Work for Dewatering-Groundwater will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Work for Dewatering-Groundwater shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, complete in place, which price and payment shall include but not be limited to design, installation, maintenance, and removal of the dewatering systems including pumping, monitoring, observation wells, piezometers, siltation ponds or chambers, water treatment, minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 03 30 00: Cast In-Place Concrete.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (ASTM):
 1. ASTM C143: "Standard Test Method for Slump of Hydraulic-Cement Concrete".
 2. ASTM C150: "Standard Specification for Portland Cement".
 3. ASTM C403: "Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance".
 4. ASTM C494: "Standard Specification for Chemical Admixtures for Concrete".
 5. ASTM C618: "Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete".
 6. ASTM C937: "Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete".
 7. ASTM D4832: "Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders".
 8. ASTM D5971: "Standard Practice for Sampling Freshly Mixed Controlled Low-Strength Material".
 9. ASTM D6023: "Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)".
 10. 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. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03 30 00 titled, “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.

- B. 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.
- C. 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.
- D. 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 than 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.
- E. CLSM shall be air entrained to a total air content of approximately five (5) percent.
- F. The minimum slump shall be seven (7) inches and the maximum slump shall be ten (10) inches when tested in accordance with ASTM D6103.
- G. Placement Characteristics: Self-leveling.
- H. 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 titled, "Cast-In-Place Concrete" and experienced in the testing of CLSM to perform tests on CLSM used as structural backfill.
- 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.

PART 4. MEASUREMENTS AND PAYMENTS

4.1 CLSM – GENERAL PURPOSE BACKFILL:

- A. Measurement:
 - 1. Work for CLSM – General Purpose Backfill will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for CLSM – General Purpose Backfill shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to the design, testing, batching, delivery, installation, minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 CLSM – STRUCTURAL BACKFILL:

- A. Measurement:
 - 1. Work for CLSM – Structural Backfill will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for CLSM – Structural Backfill shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include

but not be limited to the design, testing, batching, delivery, installation, minor complications and/or delays, traffic maintenance and protection and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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.

PART 4. MEASUREMENT AND PAYMENT

4.1 AGGREGATE MATERIALS:

- A. Measurement:
 - 1. Work for Aggregate Material will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Aggregate Materials shall be considered incidental and included under the bid item(s) of which it is a part in the SOPs, which price and payment shall include but not be limited to excavation, disposal of unsuitable excavated material, replacement of unsuitable material and compaction, shoring, sheeting and bracing, minor complications and/or delays, traffic maintenance and protection, dewatering and the removal of the dewatering system and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

- 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 01 78 42: As-Built Drawings.
- C. Section 02 01 20: Protecting Existing Utilities.
- D. Section 31 23 10: Trench Excavation and Backfill.
- E. Section 31 13 12: Tree Protection and Trimming.
- F. 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 titled, "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 titled, "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 titled, "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 titled, "As-Built Drawings".

3.2 TEST PITS – INCIDENTAL:

- 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 titled, "Water Service Lines" to determine the location, size, and material type of existing water services.

3.4 TEST PITS (CONTINGENT):

- A. Construct test pits, that are not incidental or for water services, when required and approved by DC Water.

PART 4. MEASUREMENT AND PAYMENT

4.1 TEST PITS – INCIDENTAL:

- A. Measurement:
 - 1. Work for Test Pits – Incidental will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Test Pits – Incidental will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to locating, identifying and protecting utilities for all other construction (mains, valves, hydrants, ...etc.), excavation as needed, temporary and/or permanent backfill including borrow fill (if applicable), removal and disposal of excess or unsuitable excavated material, implementation of applicable safety procedures, temporary surface restoration including seeding and topsoil as needed, soil compaction and all labor, materials, tools equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 TEST PITS FOR WATER SERVICES:

- A. Measurement:
 - 1. Work for Test Pits for Water Services will be per each test pit excavated when the water service connection is not installed except that payment for test pits will not be made if any portion of the water service is replaced even if the connection is not replaced.

B. Payment:

1. Payment for Test Pits for Water Services will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include but not be limited to excavation as needed, temporary and/or permanent backfill including borrow fill (if applicable), removal and disposal of excess or unsuitable excavated material, implementation of applicable safety procedures, temporary surface restoration including seeding and topsoil as needed, soil compaction and all labor, materials, tools equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 TEST PITS (CONTINGENT ITEM):

A. Measurement:

1. Work for Test Pits (Contingent) will be measured per each for payment.

B. Payment:

1. Payment for Test Pits (Contingent) will be made at the Contract unit price per each test pit completed as stated in the SOPs, which price and payment shall include but not be limited to excavation as needed, temporary and/or permanent backfill including borrow fill (if applicable), removal and disposal of excess or unsuitable excavated material, implementation of applicable safety procedures, temporary surface restoration including seeding and topsoil as needed, soil compaction and all labor, materials, tools equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 00 89 00: Project Permits and Approvals.
- B. Section 01 33 00: Submittals.
- C. Section 01 57 30: Dust Control.
- D. Section 31 05 19: Geotextiles.
- E. Section 32 92 19: Seeding.
- F. Section 32 92 23: Sodding.

1.4 REFERENCED CODES AND STANDARDS:

- A. Jurisdictional Erosion and Sediment Control Agency:
 - 1. County Erosion and Control Requirements for the location where Work is performed.
 - 2. DC DOEE: Standards and Specifications for Soil Erosion and Sediment Control.
 - 3. Maryland Department of the Environment Water Management Administration (MD EWMA): Standards and Specifications for Soil Erosion and Sediment Control.
 - 4. Virginia Department of Environmental Quality (VDEQ): 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 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. 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 where the Work is being performed.
- C. Protect adjacent properties and water resources from erosion and sediment damage throughout the life of the Contract.
- D. 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.
- E. The Contractor shall prevent straw, wood chips, or other materials used in erosion and sediment control features from entering any reservoirs or watercourses.
- F. 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.
- G. Protect all storm sewer inlets which drain stormwater runoff from the construction site from sediment deposition.
- H. Operate all equipment and perform all construction operations so as to minimize erosion.
- I. 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 titled, "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 titled, "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 titled, "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.
- A. 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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 EROSION AND SEDIMENT CONTROL:

A. Measurement:

1. Measurement for Erosion and Sediment Control will be measured as a percentage of a lump sum in accordance with the following:
 - a. 80 percent of the SOP paid at the time of successful completion of installation of erosion and sediment control features.
 - b. 20 percent of the SOP divided by the number of months in the duration of the project paid monthly.
2. Measurement for Erosion and Sediment Control due to extending the duration of the Contract will be measured as follows:
 - a. Contract extensions due to delays caused by the Contractor will not be measured.
 - b. Contract extensions due to delays caused by DC Water or field changes authorized by DC Water will be measured by the number of actual days in excess of the original duration of the Contract. Measurement will only be made for days occurring after the date of the original Contract completion date.

B. Payment:

1. Payment for Erosion and Sediment Control will be made at the Contract unit price lump sum as stated in the SOPs, which price and payment shall include but not be limited to all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.
2. Payment for Erosion and Sediment Control due to extending the duration of the Contract will be made at a daily rate that is determined using 25 percent of the Contract unit price lump sum as stated in the SOPs prorated over the original Contract duration, which price and payment shall include but not be limited to all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 32 33: Construction Photographs.
- B. Section 01 33 00: Submittals.
- C. 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 titled, “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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 SHORING, SHEETING, AND BRACING:

- A. Measurement:
 - 1. Work for Shoring, Sheeting, and Bracing will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Shoring, Sheeting, and Bracing shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to all labor, materials, tools, fees, equipment and incidentals necessary to complete the installation, maintenance, and removal of shoring, sheeting, and bracing required for the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 02 41 00: Demolition.
- C. Section 31 23 10: Trench Excavation and Backfill.
- D. 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. American Society for Testing and Materials (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 1-in 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 titled, "Pavement Milling" or Section 02 41 00 titled, "Demolition".

3.4 PREPARATION FOR PAVEMENT REPLACEMENT:

- A. The Contractor shall compact the backfill as specified in Section 31 23 10 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 TEMPORARY FLEXIBLE PAVEMENT:

- A. Measurement:
 1. Work for Temporary Flexible Pavement will not be measured separately for payment.
- B. Payment:
 1. No separate payment will be made for work under this Section. Payment for Temporary Flexible Pavement will include maintenance until permanent paving replacement is complete, and shall be considered incidental and included under the item(s) of which it is a part of in the SOPs, which price and payment shall include

but not be limited to excavation, backfill and compaction, temporary pavement markings, minor complications and/or delays, traffic maintenance & protection and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 ASPHALT BASE COURSE – OVER PIPELINES:

A. Measurement:

1. Work for Asphalt Base Course – Over Pipelines will be measured per square yard for payment, with measurement of length being made along the centerline of the pipeline and measurement of width shall be the trench limits as shown on the DC Water Standard Details and/or Contract Drawings.

B. Payment:

1. Payment for Asphalt Base Course – Over Pipelines will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, traffic maintenance & protection, surface preparation and conditioning, compaction, aggregate base course, temporary pavement, pavement repair, testing and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 ASPHALT SURFACE COURSE

A. Measurement:

1. Work for Asphalt Surface Course will be measured per square yard for payment, with measurements based on the actual length and width of the surface course, as approved by DC Water.

B. Payment:

1. Payment for Asphalt Surface Course will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, traffic maintenance & protection, surface preparation and conditioning, compaction, surface course, temporary pavement, pavement repair, pavement markings, testing and all labor, materials, equipment and incidentals necessary to complete the work as specified with the Contract.

4.4 MILLING AND OVERLAY:

A. Measurement:

1. Work for Milling and Overlay will be measured per square yard for payment, with measurement based on the actual length and width of the milling and overlay, as approved by DC Water.

B. Payment:

1. Payment for Milling and Overlay will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, minor complications and/or delays, traffic maintenance & protection, surface preparation and conditions, compaction, testing, temporary pavement, pavement markings, and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.5 MILLING AND OVERLAY (CONTINGENT ITEM):

A. Measurement:

1. Work for Milling and Overlay (Contingent Item) will be measured per square yard for payment, with measurement based on the actual length and width of the overlay.

B. Payment:

1. Payment for Milling and Overlay (Contingent Item) will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, minor complications and/or delays, traffic maintenance & protection, surface preparation and conditions, compaction, testing, temporary pavement, pavement markings, and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.6 ASPHALT BASE COURSE – GENERAL:

A. Measurement:

1. Work for Asphalt Base Course – General will be measured per square yard for payment, with measurement based on the actual length and width of the base course, as approved by DC Water.

B. Payment:

1. Payment for Asphalt Base Course – General will be made at the Contract unit price per square yard under the item of which it is a part of in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, traffic maintenance & protection, excavation, removal of existing pavement, joint sealant, subgrade preparation, surface preparation and conditioning, compaction, aggregate base course, bituminous material placement, temporary pavement, testing and all labor, materials, equipment and incidentals necessary to complete the work as specified within this the Contract.

4.7 TRAFFIC SIGNAL LOOP DETECTOR INSTALLATION:

A. Measurement:

1. Work for Traffic Signal Loop Detector Installation will be measured per linear foot for payment.

B. Payment:

1. Payment for Traffic Signal Loop Detector Installation will be made at the Contract unit price per linear foot as stated in the SOPs, complete in place, which price and payment shall include but not be limited to traffic maintenance and protection, minor complication and/or delays, temporary pavement and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 01 57 30 Dust Control.
- C. Section 31 23 10: Trench Excavation and Backfill.
- D. 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 titled, "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 titled, "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 titled, "Trench Excavation and Backfill", at no additional cost to DC Water.

PART 4. MEASUREMENT AND PAYMENT

4.1 PAVEMENT MILLING:

- A. Measurement:
 - 1. Work for Pavement Milling will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Pavement Milling shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays, traffic maintenance & protection, temporary paving repairs including maintenance until permanent pavement replacement is complete and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 33 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 33 20 00 titled, "Reinforcing Steel Rebars".

PART 4. MEASUREMENT AND PAYMENT

4.1 PCC PAVEMENT:

- A. Measurement:
 - 1. Work for PCC Pavement will be measured per square yard for payment. Depth of PCC Pavement will be 10-inches.
- B. Payment:
 - 1. Payment for PCC Pavement will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, PCC pavement joint repair, reinforcement, load transfer devices, welded wire fabric, PCC finish work including curing and protection, demolition and disposal of existing PCC pavement, minor complications and/or delays, traffic maintenance & protection, temporary pavement and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 ADDITION/REDUCTION OF PCC PAVEMENT THICKNESS PER EACH INCH OF DEPTH (CONTINGENT ITEM):

- A. Measurement:
 - 1. Additional thickness of PCC Pavement will be measured when the depth of PCC Pavement is greater than 10-inches and the installation of additional PCC Pavement depth is approved in advance by DC Water. Measurement for Addition of PCC Pavement Thickness Per Each Inch of Depth will be measured per square yard.
 - 2. Reduction of thickness of PCC Pavement will be measured when the depth of PCC Pavement is less than 10-inches and the reduction in depth of PCC Pavement is approved by DC Water. Measurement of Reduction of PCC Pavement Thickness Per Each Inch of Depth will be measured per square yard.
- B. Payment:
 - 1. Payment for Addition of PCC Pavement Thickness Per Each Inch of Depth in excess of the PCC Pavement requirement of 10-inches will be as stated in the SOPs, which payment shall include all work necessary to construct PCC Pavement

to the additional depth required. Payment will be in addition to the Contract unit price per square yard of PCC Pavement stated in the SOPs.

2. Payment for Reduction of PCC Pavement Thickness Per Each Inch of Depth less than the 10-inch depth required for PCC Pavement will be as stated in the SOPs, which reduction in payment shall include all work necessary to construct PCC Pavement to a depth less than the required 10-inches. Payment will be a reduction to the Contract unit price per square yard of PCC Pavement Stated in the SOPs.

4.3 PCC BASE:

A. Measurement:

1. Work for PCC Base will be measured per square yard for payment. Depth of PCC Pavement Base will be 10-inches.

B. Payment:

1. Payment for PCC Base shall be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, PCC pavement joint repair, reinforcement, load transfer devices, welded wire fabric, PCC finish work including curing and protection, demolition and disposal of existing PCC pavement base, minor complications and/or delays, traffic maintenance & protection, temporary pavement and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.4 ADDITION/REDUCTION OF PCC BASE THICKNESS PER EACH INCH OF DEPTH (CONTINGENT ITEM):

A. Measurement:

1. Additional thickness of PCC Base will be measured when the depth of PCC Base is greater than 10-inches and the installation of additional PCC Base depth is approved in advance by DC Water. Measurement of Addition of PCC Base Thickness Per Each Inch of Depth will be measured per square yard.
2. Reduction of thickness of PCC Pavement will be measured when the depth of PCC Base is less than 10-inches and the reduction in PCC Base depth is approved in advance by DC Water. Measurement of Reduction of PCC Pavement Thickness Per Each Inch of Depth will be measured per square yard.

B. Payment:

1. Payment for Addition of PCC Base Thickness Per Each Inch of Depth in excess of the PCC Base requirement of 10-inches will be as stated in the SOPs, which payment shall include all work necessary to construct PCC Base to the additional depth required. Payment will be in addition to the Contract unit price per square yard of PCC Base stated in the SOPs.
2. Payment for Reduction of PCC Base Thickness Per Each Inch of Depth less than the 10-inch depth required for PCC Base will be as stated in the SOPs, which reduction in payment shall include all work necessary to construct PCC Base to a depth less than the required 10-inches. Payment will be a reduction to the Contract unit price per square yard of PCC Pavement Stated in the SOPs.

4.5 BUS PAD REPLACEMENT:

A. Measurement:

1. Work for Bus Pad Replacement will be measured per square yard for payment and determined by the actual number of square yards of the depth specified in the Contract Documents.

B. Payment:

1. Payment for Bus Pad Replacement will be made at the Contract unit price per square yard as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, sub-base, sub-grade, PCC pavement joint repair, reinforcement, load transfer devices, welded wire fabric, PCC finish work including curing and protection, traffic maintenance and protection, demolition and disposal of existing bus pad, minor complication and/or delays, temporary pavement and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. 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 titled, "Submittals".
- 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 PORTLAND CEMENT CURB AND GUTTER:

- A. Measurement:
 - 1. Work for Portland Cement Curb and Gutter will be measured per linear foot for payment.
- B. Payment:
 - 1. Payment for Portland Cement Curb and Gutter will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to installing concrete curb and gutter, excavation and backfill, removal and disposal of existing curb and gutter, Portland cement concrete, aggregate base, hauling, curing, finishing, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 PORTLAND CEMENT CURB:

- A. Measurement:
 - 1. Work for Portland Cement Curb will be measured per linear foot for payment.
- B. Payment:
 - 1. Payment for Portland Cement Curb will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to installing concrete curb and gutter, excavation and backfill, removal and disposal of existing curb and gutter, Portland cement concrete, aggregate base, hauling, curing, finishing, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 PORTLAND CEMENT GUTTER:

- A. Measurement:
 - 1. Work for Portland Cement Gutter will be measured per linear foot for payment.
- B. Payment:
 - 1. Payment for Portland Cement Gutter will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to installing concrete curb and gutter, excavation and backfill, removal and disposal of existing curb and gutter, Portland cement concrete, aggregate base, hauling, curing, finishing, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C615: "Standard Specification for Granite Dimension Stone".
 - 2. ASTM C629: "Standard Specification for Slate 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 its 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 RESET AND ADJUST EXISTING GRANITE STONE CURB:

- A. Measurement:
 - 1. Work for Reset and Adjust Existing Granite Stone Curb will be measured per linear foot for payment.
- B. Payment:
 - 1. Payment for Reset and Adjust Existing Granite Stone Curb will be made at the Contract unit price per linear foot as stated in the SOPs, which price shall include but not be limited to excavation and backfilling trench bottom and back of curb, resetting, adjusting, salvaging straight and circular stone curb, gutter, drilling weep holes and adjusting drain pipes and extending drain pipes to back of curb, removal and disposal of existing stone curb, salvaging stone curb, Portland cement concrete, graded aggregate base, loading, hauling, joint reinforcement, dressing,

rounding off ends, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration, and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 INSTALL NEW GRANITE STONE CURB:

A. Measurement:

1. Work for Install New Granite Stone Curb will be measured per linear foot for payment.

B. Payment:

1. Payment for Install New Granite Stone Curb will be made at the Contract unit price per linear foot as stated in the SOPs, which price shall include but not be limited to excavation and backfilling trench bottom and back of curb, furnishing and setting new stone curb, straight and circular stone curb, gutter, resetting, adjusting, salvaging stone curb, drilling weep holes and adjusting drain pipes and extending drain pipes to back of curb, removal and disposal of existing stone curb, salvaging stone curb, Portland cement concrete, graded aggregate base, loading, hauling, joint reinforcement, dressing, rounding off ends, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration, and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 RESET AND ADJUST EXISTING BLUESTONE CURB:

A. Measurement:

1. Work for Reset and Adjust Existing Bluestone Curb will be measured per linear foot for payment.

B. Payment:

1. Payment for Reset and Adjust Existing Bluestone Curb will be made at the Contract unit price per linear foot as stated in the SOPs, which price shall include but not be limited to excavation and backfilling trench bottom and back of curb, resetting, adjusting, salvaging straight and circular stone curb, gutter, drilling weep holes and adjusting drain pipes and extending drain pipes to back of curb, removal and disposal of existing stone curb, salvaging stone curb, Portland cement concrete, graded aggregate base, loading, hauling, joint reinforcement, dressing, rounding off ends, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration, and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.4 INSTALL NEW BLUESTONE CURB:

A. Measurement:

1. Work for Install New Bluestone Curb will be measured per linear foot for payment.

B. Payment:

1. Payment for Install New Bluestone Curb will be made at the Contract unit price per linear foot as stated in the SOPs, which price shall include but not be limited to excavation and backfilling trench bottom and back of curb, furnishing and setting new stone curb, straight and circular stone curb, gutter (if applicable), resetting, adjusting, salvaging stone curb, drilling weep holes and adjusting drain pipes and extending drain pipes to back of curb, removal and disposal of existing stone curb, salvaging stone curb, Portland cement concrete, graded aggregate base, loading, hauling, joint reinforcement, dressing, rounding off ends, minor complications and/or delays, traffic maintenance & protection, temporary

pavement restoration, and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 902: "Standard Specification for Pedestrian and Light Paving Brick".
 - 2. ASTM C1272: "Standard Specification for Heavy Vehicular Paving Brick".
- 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 titled, "Submittals".
- 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 BRICK GUTTER:

- A. Measurement:
 - 1. Work for Brick Gutter will be measured per linear foot for payment.
- B. Payment:
 - 1. Payment for Brick Gutter will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to furnishing, installing and preparation of concrete base, mortar setting bed and joint filler, graded aggregate base, disposal of excess materials, hauling minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 GENERAL:

- A. Driveways, sidewalks, or alleyways damaged or removed beyond the required trench cut limits or limits shown on the Contract Drawings shall be replaced in kind at no additional cost to DC Water.

4.2 CONCRETE SIDEWALKS:

- A. Measurement:
 - 1. Work for Concrete Sidewalks will be the actual quantity measured per square yard of area based on the construction limits of all partial and complete concrete sections within DC Water's standard trench width which is contained in the appropriate Standard Detail plus an additional distance to the nearest sidewalk joint outside the trench width zone, unless directed otherwise by DC Water.
- B. Payment:
 - 1. Payment for Concrete Sidewalks will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, graded aggregate base, PCC, sand, reinforcement, admixtures, sealants, surface treatments, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 BRICK AND BLOCK SIDEWALKS:

- A. Measurement:
 - 1. Work for Brick and Block Sidewalks will be the actual quantity measured per square yard of area based on the complete replacement of all brick and block sidewalks within DC Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional six (6) inches on each side, unless directed otherwise by DC Water.
- B. Payment:
 - 1. Payment for Brick and Block Sidewalks will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, concrete base, graded aggregate base, brick and block, sand, mortar bed, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.4 ASPHALT SIDEWALKS:

- A. Measurement:
 - 1. Work for Asphalt Sidewalks will be the actual quantity measured per square yard of area based on the complete replacement of all asphalt sidewalks within DC

Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional six (6) inches on each side, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Asphalt Sidewalks will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, concrete base, graded aggregate base, asphalt, sand, mortar bed, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.5 STONE AND COBBLE STONE SIDEWALKS:

A. Measurement:

1. Work for Stone and Cobble Stone Sidewalks will be the actual quantity measured per square yard of area based on the complete replacement of all stone and cobble stone sidewalks within DC Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional six (6) inches on each side, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Stone and Cobble Stone Sidewalks will be made at the Contract unit price per square yard under as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, concrete base, graded aggregate base, stone and cobble stone, sand, mortar bed, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.6 CONCRETE DRIVEWAY OR ALLEYWAY PAVEMENTS:

A. Measurement:

1. Work for Concrete Driveway or Alleyway Pavements will be measured per square yard of area on the construction limits of all partial and complete concrete sections within DC Water's standard trench width which is contained in the appropriate Standard Detail plus an additional distance to the nearest joint outside the trench width zone, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Concrete Driveway or Alleyway Pavements will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, PCC, joint repair, reinforcement, admixtures, sealants, surface treatments, minor complications and/or delays, traffic maintenance & protection, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.7 BRICK AND BLOCK DRIVEWAY OR ALLEYWAY PAVEMENTS:

A. Measurement:

1. Work for Brick and Block Driveway or Alleyway Pavements will be actual quantity measured per square yard of area based on the complete replacement of all brick and block driveways or alleyways within DC Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional 6 inches on each side, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Brick and Block Driveway or Alleyway Pavements will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, brick and block, minor complications and/or delays, traffic maintenance & protection, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.8 STONE AND COBBLE STONE DRIVEWAY OR ALLEYWAY PAVEMENTS:

A. Measurement:

1. Work for Stone and Cobble Stone Driveway or Alleyway Pavements will be the actual quantity measured per square yard of area based on the complete replacement of all stone and cobble stone driveways or alleyways within DC Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional six (6) inches on each side, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Stone and Cobble Stone Driveway or Alleyway Pavements will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, stone and cobblestone, minor complications and/or delays, traffic maintenance & protection, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

4.9 ASPHALT DRIVEWAY OR ALLEYWAY PAVEMENTS:

A. Measurement:

1. Work for Asphalt Driveway or Alleyway Pavements will be actual quantity measured per square yard of area based on the complete replacement of all asphalt driveways or alleyways within DC Water's standard trench width, which is contained in the appropriate Standard Detail plus an additional 6 inches on each side, unless directed otherwise by DC Water.

B. Payment:

1. Payment for Asphalt Driveway or Alleyway Pavements will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, sub-base, sub-grade, asphalt base course, asphalt surface course, minor complications and/or delays, traffic maintenance & protection, temporary pavement, ADA features and all labor, materials, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. 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. American Society for Testing and Materials (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 be contain least 2 percent but not more than 5 percent 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 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 inch thick and as uniform as practicable.
- C. Sod shall be mowed in the field to a height of not more than three 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.

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.

PART 4. MEASUREMENT AND PAYMENT

4.1 SODDING:

A. Measurement:

- 1. Work for sodding will be measured per square yard for payment with measurement taken of completed and accepted sodded areas.

B. Payment:

- 1. Payment for sodding will be made at the Contract unit price per square yard as stated in the SOPs, which price and payment shall include but not be limited to topsoil, fertilizer, lime, soil preparation and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 31 05 19: Geotextiles.
- C. Section 31 23 10: Trench Excavation & Backfill.
- D. Section 31 23 23: Controlled Low-Strength Material (Flowable Fill).
- E. Section 32 92 23: Sodding.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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 titled, "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 and box and install a solid threaded brass plug in place of the removed corporation stop when main line will remain active.

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.
- 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 to verify all connections have been accounted for and capped. Inspection shall be performed using CCTV or other video recording device acceptable to DC Water. Provide a copy of inspection video to DC Water.

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.

3.5 TEES, VALVES, AND VALVE CASINGS AND BOXES ABANDONMENT:

- A. When main line is to remain active and branch connection is to be abandoned, plug mechanical joint tees and remove lead joint tees. Replace lead joint tees with new pipe and sleeve to keep main line active.
- B. Remove existing valve casings and 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.
- C. For valves that are abandoned in-place on lines that are to remain active, the Contractor shall remove all internal valve parts and install a blank on the valve prior to testing and backfilling.
- D. Install plug or cap on abandoned valves when shown on Contract Drawings.
- E. Valves abandoned in-place on lines to be abandoned shall be fully opened.
- F. When valves are shown on drawings to be removed, Contractor shall cut and remove valve from the pipe and the pipeline shall be abandoned as specified in this Section.
- G. If the valve or old pipe has lead joints, is connected to a main line tee, and the main line will remain active, the Contractor shall cut, remove and dispose of the tee and install a straight pipe segment in its place.

3.6 METER BOXES ABANDONMENT:

- A. Water meter boxes shall be removed 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 titled, "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.
- C. Install a geotextile fabric, complying with Section 31 05 19 titled, "Geotextiles", between crushed stone and any other backfill material containing soil particles passing a number four (4) sieve.
- D. 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 titled, "Sodding".

PART 4. MEASUREMENT AND PAYMENT

4.1 ABANDONMENT OF WATER SERVICE LINES:

- A. Measurement:
 - 1. Measurement for Abandonment of Water Service Lines will not be measured for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Abandonment of Water Service Lines will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, traffic maintenance and protection, minor complications and/or delays, abandoning existing non-functional water service lines, removal and disposal of the meter boxes, temporary pavement restoration, topsoil, delivery of materials, hauling and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 ABANDONMENT OF LATERALS AND CLEANOUTS:

- A. Measurement:
 - 1. Measurement for Abandonment of Laterals and Cleanouts will not be measured for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Abandonment of Laterals and Cleanouts will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, traffic maintenance and protection, minor complications and/or delays, abandoning existing non-functional lines, temporary pavement restoration, topsoil, delivery of materials, hauling and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 ABANDONMENT OF UTILITIES 16 INCHES IN DIAMETER AND SMALLER:

A. Measurement:

1. Measurement for Abandonment of Utilities 16 Inches in Diameter and Smaller will be per each plug and cap for each diameter size of pipe as stated in the SOPs for payment.
2. Measurement for water service connections, laterals, and cleanouts will be measured under the separate SOPs of this Section.

B. Payment:

1. Payment for Abandonment of Utilities 16 Inches in Diameter and Smaller will be made at the Contract unit price per each for each plug for each diameter size of pipe as stated in the SOPs, which price and payment shall include but not be limited to excavation, backfill and compaction, traffic maintenance and protection, minor complications and/or delays, abandoning pipelines, removal and disposal of meter boxes, plugs, plugging of incoming pipeline, temporary pavement restoration, topsoil, delivery of materials, hauling and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.4 ABANDONMENT OF UTILITIES 16-INCHES IN DIAMETER AND SMALLER UNDER STRUCTURES, WATERWAYS, RAILROAD TRACKS, AND RAIL RIGHT-OF-WAYS:

A. Measurement:

1. Measurement for Abandonment of Utilities 16-Inches in Diameter and Smaller Under Structures, Waterways, Railroad Tracks, and Rail Right-of-Ways will be measured per linear foot for each diameter size of pipe as stated in the SOPs. Measurement will be along the centerline of pipeline and as noted on the Contract Drawings.

B. Payment:

1. Payment for Abandonment of Utilities 16-Inches in Diameter and Smaller Under Structures, Waterways, Railroad Tracks, and Rail Right-of-Ways will be made at the Contract unit price per linear foot for each diameter size of pipe as stated in the SOPs, which price and payment will include but not be limited to excavation, backfill and compaction, flowable fill, CCTV, traffic maintenance and protection, minor complications and/or delays, abandoning pipelines, removal and disposal of meter boxes, plugs, plugging of incoming pipeline, including opening the pipe at sufficient intervals to install flowable fill and to release air, temporary pavement restoration, topsoil, delivery of materials, hauling and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.5 ABANDONMENT OF UTILITIES GREATER THAN 16 INCHES IN DIAMETER:

A. Measurement:

1. Measurement for Abandonment of Utilities Greater Than 16 Inches in Diameter will be measured per linear foot for each diameter size of pipe as stated in the SOPs. Measurement will be along the centerline of pipeline and as noted on the Contract Drawings.

B. Payment:

1. Payment for Abandonment of Utilities Greater Than 16 Inches in Diameter will be made at the Contract unit price per linear foot for each diameter size of pipe as stated in the SOPs, which price and payment will include but not be limited to excavation, backfill and compaction, flowable fill, CCTV, traffic maintenance and protection, minor complications and/or delays, abandoning pipelines, removal and disposal of meter boxes, plugs, plugging of incoming pipeline, including opening

the pipe at sufficient intervals to install flowable fill and to release air, temporary pavement restoration, topsoil, delivery of materials, hauling and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.6 TEES, VALVES, AND VALVE CASINGS AND BOXES ABANDONMENT

A. Measurement:

1. Work for Tees, Valves, and Valve Casings and Boxes Abandonment will be measured per each for payment.

B. Payment:

1. Payment for Tee, Valves, and Valve Casings and Boxes Abandonment will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include but not be limited to traffic maintenance and protection, minor complications and/or delays, excavation, backfill and compaction beyond trench excavation pay limits, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.7 CONCRETE OR MASONRY STRUCTURE ABANDONMENT

A. Measurement:

1. Work for Concrete and Masonry Structure Abandonment will be measured per each for payment.

B. Payment:

1. Payment for Concrete and Masonry Structure Abandonment will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include but not be limited abandonment, removal, and disposal of masonry and concrete structures, backfill and compaction in structures more than three (3) feet below finished grade, traffic maintenance and protection, minor complications and/or delays, excavation, backfill and compaction beyond trench excavation pay limits, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ END OF SECTION 33 01 20 ~

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. 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 33 06 20: Concrete Valve Casings.
- C. Section 33 11 20: Concrete Thrust Restraints.
- D. Section 33 13 01: Disinfecting Water Mains.
- E. Section 33 14 00: Gate Valves.
- F. Section 33 19 05: Pressure and Leakage Testing – Pressure Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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 C230: “Stainless-Steel Full-Encirclement Repair and Service Connection Clamps for 2 in. through 12 in. (50 mm through 300 mm) Pipe.
12. 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 titled, “Submittals”.
- 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 C230.
 - 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 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 with shop coat paint using the following process:

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. Field cut pipe lengths shall be filed or ground to resemble the plain end of pipe as manufactured.
 - 2. Contact surfaces shall be cleaned and coated with an approved lubricant just prior to slipping gasket over plain end and into socket. The plain end shall be centrally placed in the socket.
 - 3. The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the socket. A thin film of approved gasket lubricant supplied by the pipe manufacturer shall be applied to either the inside surface of the gasket or to the plain end or both.
 - 4. The plain end of the pipe shall be entered into the socket with care to keep lubricated surfaces from contacting the ground. The joint shall then be completed by forcing the plain end to the bottom of the socket with an approved forked tool, jack-type tool or other device. Pipe that is not furnished with a depth mark shall be marked before assembly to assure that plain end is inserted to full depth.
 - 5. When tightening tee-head bolts, the gland shall be brought up toward the pipe flange evenly, maintaining equal distance between gland and flange face at all points around the socket. This may be achieved by partially tightening bottom bolt first, then top bolt, then side bolts, then remaining bolts. Cycle shall be repeated until all bolts are within required torque range. The Contractor shall use torque measuring or indicating wrenches to apply the torque loads recommended by the manufacturer. If no torque loads are provided the following torque loads shall be applied:

Bolt Size <u>(Inches)</u>	Torque Range* <u>(Foot-Pounds)</u>
5/8	45-60.
3/4	75-90.
1	100-120.
1-1/4	120-150.

- 6. Torque range for retainer gland set screws shall be in accordance with manufacturer's recommendations.

7. 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.
 8. 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.
 9. 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 titled, "Concrete Valve Casings" and Section 33 14 00 titled, "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 titled “Concrete Thrust Restraints” or when approved by DC Water and shall be in accordance with Section 33 11 20 titled “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’ 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 titled, “Disinfecting Water Mains”.

3.10 PRESSURE AND LEAKAGE TESTING:

- A. Pressure pipe shall be tested in accordance with Section 33 19 05 titled, “Pressure and Leakage Testing – Pressure Pipe”.

3.11 EXTRA MAINLINE FITTINGS (CONTINGENT ITEM):

- 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. Piping shall be measured for length and paid as part of the measurement and payment item for Water Utility Distribution Piping - DIP.
 - 5. Fittings, not shown on the Contract Drawings shall be paid as part of the measurement and payment item for Extra Mainline Fittings - DIP.

PART 4. MEASUREMENT AND PAYMENT

4.1 WATER UTILITY DISTRIBUTION PIPING – DIP:

- A. Measurement:
 - 1. Work for Water Utility Distribution Piping – DIP will be measured per linear foot installed, per pipe diameter for payment. Reducers shall be measured as pipe equivalent to the larger end size.
- B. Payment:
 - 1. Payment for Water Utility Distribution Piping – DIP will be made at the Contract unit price per linear foot for each diameter size of pipeline as stated in the SOPs, complete in place, which price and payment shall include but not be limited to

traffic maintenance & protection, minor complication and/or delays, connection pipes, fittings, reducers, joint restraint harnessing, blow-offs, and appurtenances; gaskets, retainer glands, closure pieces, lining and coating of pipe; removal and disposal of existing water main sections, adjusting water service line, temporary pavement restoration, flushing pipelines, disinfection tests, chlorination, dechlorination and dewatering treated water, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 EXTRA MAINLINE FITTINGS – DIP (CONTINGENT ITEM):

A. Measurement:

1. Work for Extra Mainline Fittings – DIP will be measured by the pound, as determined from the nominal tabulated weight of the fitting per AWWA C110 or AWWA C 153 before the application of any lining or coating other than standard coatings. Weight of retainer glands, bolts, nuts, and gaskets, included as part of the work, will not be measured.

B. Payment:

1. Payment for Extra Mainline Fittings – DIP including the retainer glands, bolts, nuts and gaskets will be made at the Contract unit price per pound as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, disposal of unsuitable excavated material, shoring, sheeting and bracing, trench plating as needed, traffic maintenance & protection, minor complication and/or delays, connection pipes, fittings, reducers, joint restraint harnessing and appurtenances, gaskets, retainer glands, lining and coating of pipe; pipe bedding, removal and disposal of existing water main sections, temporary pavement restoration, flushing pipelines, disinfection tests, chlorination, dechlorination and dewatering treated water, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 03 20 00: Reinforcing Steel Rebars.
- C. Section 03 30 00: Cast-In-Place Concrete.
- D. Section 03 40 00: Precast Concrete Products.
- E. Section 31 23 10: Trench Excavation and Backfill.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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 titled, “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 titled, “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 to Section 03 20 00 titled, “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 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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 CONCRETE VALVE CASINGS:

A. Measurement:

1. Work for Concrete Valve Casings will be measured per each for payment.

B. Payment:

1. Payment for Concrete Valve Casings will be made at the Contract unit price per each as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, disposal of unsuitable excavated material, shoring, sheeting and bracing, trench plating as needed, traffic maintenance & protection, minor complication and/or delays including excavation beyond the pipe trench excavation pay limits; forming, furnishing and placing reinforcing steel rebars, concrete base and piers, risers, grade rings, frames, covers, placing and curing concrete, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ END OF SECTION 33 06 20 ~

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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 03 20 00: Reinforcing Steel Rebars.
- C. Section 03 30 00: Cast-in-Place Concrete.
- D. Section 31 23 10: Trench Excavation and Backfill.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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 titled, "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 titled, "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 titled, "Cast-in-Place Concrete" and rebar installation shall be in accordance with 03 20 00 titled, "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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 CONCRETE THRUST RESTRAINTS:

- A. Measurement:
 - 1. Work for Concrete Thrust Restraints will be measured per each for each diameter size of pipe stated in the SOPs for payment.
- B. Payment:
 - 1. Payment for Concrete Thrust Restraints will be made at the Contract unit price per each for each diameter size of pipe as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, disposal of unsuitable excavated material, shoring, sheeting and bracing, trench plating as needed, traffic maintenance & protection, minor complication and/or delays including excavation beyond the trench excavation limits; forming, furnishing and placing reinforcing steel rebars, furnishing, placing and curing concrete, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. Section 00 89 00: Project Permits and Approval.
- B. Section 01 06 50: Public Notification – Water.
- C. Section 01 33 00: Submittals.
- D. Section 33 12 17: Service Saddles.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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. 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".
- C. District of Columbia Department of Consumer and Regulatory Affairs (DCRA):
 - 1. District of Columbia Plumbing Code.
- D. 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 titled, "Submittals".
- 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 titled, "Project Permits and Approvals".

1.7 NOTIFICATIONS:

- A. Notifications shall be made in accordance to Section 01 06 50 titled, "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 per ASTM D1788, with test specimens molded by the injection process in accordance with ASTM D1897.
- 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-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 bypass, 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 titled, "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 and offer lead service replacement on Private Property per the standard fee structure Title 21 DCMR, Chapter 1 Water Supply, Section 112.7. To obtain authorization for the Contractor to work on Private Property the Property Owner shall sign an Agreement for lead service line replacement 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 contingent upon 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 titled, "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 titled, "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 including seeding, sodding, curb and gutter, sidewalk, flexible pavement (except overlay), 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, the Contractor shall flush the service at an external hose bib of the connected building for at least 60 minutes, or for 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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 GENERAL:

- A. Compensation for test pits will be made as part of the SOPs that the test pits are part of except that the Contractor shall be reimbursed for the cost of the test pits if the water service does not require replacement; in which case, reimbursement will be made under the SOPs for test pits in accordance with Section 31 23 37 titled, "Test Pits".

4.2 INSTALLATION OF METER BOXES, FRAMES AND COVERS:

A. Measurement:

- 1. Unit of measure for Installation of Water Meter Boxes, Frames and Covers will be per each unit installed for payment.

B. Payment:

- 1. Payment for Installation of Water Meter Boxes, Frames and Covers will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, traffic maintenance and protection, minor complications and/or delays, furnishing and placing meter pit foundation gravel, furnishing and installing water meter boxes, frames, and covers, removing and protecting the existing meter, box and appurtenances by disposing them in bags and twist ties in coordination with DC Water, and if meters are not available for installation meter jumpers will be required, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 ADJUSTING WATER SERVICE LINE:

A. Measurement:

- 1. Work for Adjusting Water Service line will not be measured separately for payment.

B. Payment:

- 1. No separate payment will be made for work under this Section. Payment for Adjusting Water Service line will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to, excavation or tunneling as needed, including excavation to abandon old tap, installing a new corporation stop with new tap, adjusting service piping and connecting to new corporation stop in new main, backfill and compaction, traffic maintenance and protection, minor complication and/or delays, shoring, sheeting and bracing, trench plating as needed, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.4 REPLACE WATER SERVICE LINE IN PUBLIC SPACE:

A. Measurement:

- 1. Unit of measure for Replace Water Service line in Public Space will be based on linear feet of pipe installed for payment.

B. Payment:

1. Payment for Replace Water Service line in Public Space will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to the removal of existing non-copper service lines, locating existing utilities, acquiring and transportation of materials, hauling, safety, security, traffic maintenance and protection, minor complications and/or delays, shoring, sheeting and bracing, trench plating, photographs, excavation or tunneling in Public Space to all depths, excavation to abandon old tap, excavation in Public Space to any depth below grade, disposal of unsuitable excavated materials and debris, dewatering, trench excavation, backfill and compaction, topsoil, permanent restoration as require in Part 3 of this Section, replacing service piping, installing a service saddles and corporation stop, removing and plugging the existing corporation stop tap, providing tap information, connections at corporation stop in main, at water meter, at curb stop and at connection and reducer as needed to connect to existing service line at property line, steel plate permit and fees, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.5 REPLACE WATER SERVICE LINE ON PRIVATE PROPERTY:

A. Measurement:

1. Unit of measure for Replace Water Service line on Private Property will be based on linear feet of pipe installed for payment.

B. Payment:

1. Payment for Replace Water Service line on Private Property will be made at the Contract unit price per linear foot as stated in the SOPs, which price and payment shall include but not be limited to the removal of existing non-copper service lines, locating existing utilities, acquiring and transportation of materials, hauling, safety, security, traffic maintenance and protection, minor complications and/or delays, shoring, sheeting and bracing, trench plating as needed, photographs, excavation or tunneling in Private Property to all depths, excavation to abandon old tap, excavation on Private Property to any depth below grade, disposal of unsuitable excavated materials and debris, dewatering, trench excavation, backfill and compaction for meter pits and curb stop boxes, topsoil, permanent restoration as require in Part 3 of this Section, replacing service piping, installing a service saddle and corporation stop, removing and plugging the existing corporation stop tap, providing tap information, connections at corporation stop in main, at water meter, at curb stop and at connection and reducer as needed to connect to existing service line at property line, steel plate permit and fees, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.6 PENETRATE WALL AND CONNECT TO FIRST FITTING INSIDE BUILDING:

A. Measurement:

1. Unit of measure for Penetrate Wall and Connect to First Fitting Inside Building shall be per each penetration through the exterior wall and connection to the first fitting inside the building.
2. Measurement includes installation of pipe inside the external face of the approved projection, a shut-off valve and pressure reducing valve (if required) in the building. Only one per service replacement will be measured.

B. Payment:

1. Payment for Penetrate Wall and Connect to First Fitting Inside Building will be made at the Contract unit price per each completed penetration as stated in the SOPs, which price and payment shall include but not be limited to drilling through the exterior wall, replacing up to five (5) feet of service piping, furnishing and installing PVC sleeve and rubber transition couplings, connection to the first fitting inside the building, installation of a shut-off valve and pressure reducing valve in

the building, excavation, backfill and compaction, removing the existing pipe penetration and sealing the opening watertight, waterproofing the new penetration, building restoration if required, temporary pavement restoration, traffic maintenance and protection, minor complications and/or delays, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

2. If replacement of service piping in addition to the five (5) feet specified herein is required to make the connection, the additional length shall be paid at the Contract unit price for Replace Water Service line on Private Property as directed by DC Water for that property.

4.7 INSTALLATION OF CURB STOP AND CURB STOP BOX:

A. Measurement:

1. Unit of measure for Installation of Curb Stop and Curb Stop Box will be per combined unit installed complete for payment.

B. Payment:

1. Payment for Installation of Curb Stop and Curb Stop Box will be made at the Contract unit price per each as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, traffic maintenance and protection, minor complications and/or delays, curb stop, extension rod, curb stop box and its adjustment, insulation, securing cover, leakage test, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract. Trench excavation and backfill will be included in Replace Water Service line work.

4.8 PRIVATE PROPERTY SIDE AGREEMENTS DOCUMENTATION:

A. Measurement:

1. Work for Private Property Side Agreements Documentation will be measured per each for payment.

B. Payment:

1. Payment for Private Property Side Agreements Documentation will be made at the Contract unit price per each as stated in the SOPs, which price and payment shall include collecting and providing DC Water with a copy of the permit and documentation required within this Section for performing work directly between the Contractor and the Property Owner and all labor, materials, tools, equipment and incidentals necessary to complete the work specified within the Contract.

~ 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: Specified elsewhere may include but are not limited to:

- A. 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 preventer assembly temporarily installed on a fire hydrant shall be tested by a DC Water Certified Inspector and pass the test within the previous six (6) months of the date of use to installing the backflow prevention assembly to 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 BACKFLOW PREVENTERS:

- A. Measurement:
 - 1. Work for Backflow Preventer will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Backflow Preventers shall be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to minor complications and/or delays and all labor, materials, tools, fees and equipment necessary to complete the work as specified within the Contract.

~ END OF SECTION 33 12 14 ~

SECTION 33 12 16

TAPPING SLEEVES AND VALVES

PART 1. GENERAL

1.1 SUMMARY:

- A. Contractor shall furnish, install and test all tapping sleeves and valves including all labor, material and equipment necessary to complete the work as specified on the Contract Documents. 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: specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 31 23 10: Trench Excavation & Backfill.
- C. Section 33 11 20 Concrete Thrust Restraints.
- D. Section 33 14 00: Gate Valves.

1.4 REFERENCED CODES AND STANDARDS:

- A. Comply with District of Columbia International Plumbing Code.
- B. American National Standards Institute (ANSI):
 - 1. ANSI B18.2: "Square and Hexagon Bolts and Nuts".
- C. American Society for Testing and Materials (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 D2000: "Standard Classification System for Rubber Products in Automotive Applications".
- D. American Water Works Association (AWWA):
 - 1. AWWA C110: "Ductile-Iron and Gray-Iron Fittings".
 - 2. AWWA C228: "Stainless-Steel Pipe Flanges for Water Service – Sizes 2 In. Through 72 In. (50 mm through 1,800 mm).
 - 3. AWWA C509: "Resilient-Seated Gate Valves for Water Supply Service".
 - 4. AWWA C515: "Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service".

5. AWWA C550: "Protective Interior Coatings for Valves and Hydrants".
 6. AWWA C651: "Disinfecting Water Mains".
- E. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
1. MSS SP60: "Connecting Flange Joints Between Tapping Sleeves and Tapping Valves".
- 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 "Installation Instructions and Details" describing and showing how the Tapping Sleeves and Valve materials will be installed.
- C. Submit the "Product Data Sheets" for each product used.
- D. Submit "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.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING REQUIREMENTS:

- A. Gaskets shall not come in contact with petroleum products.
- B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Lay materials flat and supported on 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. All joints shall be restrained using a restrained joint system acceptable to DC Water.

2.2 TAPPING SLEEVES:

- A. Tapping sleeves shall be fabricated in two halves for assembly around the pressure pipeline by means of bolts and gaskets to form a watertight mechanical joint.
- B. The outlet side of the tapping sleeve shall be flanged or mechanical joint for attachment to the tapping valve.
- C. Tapping sleeve bodies and flanges shall be stainless steel and shall meet the following requirements:
 1. Body: ASTM A240 stainless steel, type 304.
 2. Sleeve Gasket: Full circumferential, affixed around recess of tap opening to prevent rolling or binding during installation, compounded for water and sewer service.
 3. Branch Outlet: Heavy gauge 304 Stainless Steel.
 4. Flanged Outlet: ASTM A240 stainless steel, type 304, 150 pound drilling with recess per MSS SP60 to accept standard tapping valves.
 5. Mechanical Joint Outlet: ASTM 240 stainless steel, type 304 with gasket that meets ASTM D2000.

2.3 TAPPING VALVES:

- A. Tapping valves shall be designed for a minimum differential pressure of 150 psi and a minimum internal test pressure of 250 psi unless otherwise noted on the Contract Drawings.
- B. Tapping valves shall be ductile iron body, resilient-seated, nut-operated, non-rising stem gate valves suitable for buried service in conformance with AWWA C509 or C515 and the requirements of Section 33 14 00 titled, "Gate Valves".
- C. The horizontal tapping valve shall provide a waterway opening clearance for tapping operations and proper alignment and positioning with the tapping sleeve and tapping machine.
- D. The tapping valves shall have inlets to match tapping sleeve outlet with mechanical joint outlets, enclosed bevel gears, bypass valve, rollers, tracks and scrapers.

2.4 BOLTS:

- A. All bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions as specified in ANSI B18.2. 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.

PART 3. EXECUTION

3.1 GENERAL:

- A. In no case shall tapping sleeves and valves be used when the tap opening is greater than 75 percent of the diameter of the pipe being tapped.
- B. Trenching and backfill shall be in accordance with Section 31 23 10, titled "Trench Excavation & Backfill".

3.2 TAPPING SLEEVE AND VALVE INSTALLATION:

- A. Verify outside diameter of the pipe to be tapped prior to ordering sleeve and check for roundness.
- B. Clean and disinfect tapping sleeve, tapping valve, and pipe prior to installation and in accordance with manufacturer's instructions and AWWA C651.
- C. Install the tapping sleeves and tapping valves in accordance with the manufacturer's instructions and tighten the bolts in a sequence that uniformly creates equal pressure on the pipe across the sleeve length.
- D. Perform the tapping procedure in accordance with the tapping machine manufacturer's instructions.
- E. The centerline of a tapping sleeve and valve shall be located a minimum of three (3) feet from an existing pipe joint for 16 inch and smaller and five (5) feet for pipe larger than 16 inch in diameter.
- F. Install concrete thrust block behind tapping sleeve (not over tapping sleeve and valve). Installation shall be in accordance with Section 33 11 20 titled, "Concrete Thrust Restraints".
- G. Test each tapping sleeve and valve assembly to a pressure of 150 psi prior to making the tap; the test shall be performed in the presence of DC Water and pressure shall be maintained for a one (1) hour period without evidence of leakage to be accepted.
- H. Contractor shall allow DC Water to inspect the installation prior to backfilling.

3.3 PROTECTION:

- A. Apply a layer of tape coating or approved rubberized-bitumen based spray-on undercoating to all external bolts (except operating nut) after completing installation and prior to backfilling.
- B. If polyethylene is applied to the pipe, the entire sleeve and valve assembly shall be encased in polyethylene encasement prior to backfilling. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut of the tapping valve exposed and free to be operated.

3.4 MANUFACTURERS REPRESENTATIVE:

- A. Provide the services of the tapping sleeves and valves 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 TAPPING SLEEVES AND VALVES:

- A. Measurement:
 - 1. Work for Tapping Sleeves and Valves will be per each for each diameter size of pipe as stated in the SOPs for payment.
- B. Payment:
 - 1. Payment for Tapping Sleeves and Valves will be made at the Contract unit price per each for each diameter size of pipe as stated in the SOPs, complete in place, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, sheeting and shoring, test plugs, concrete, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~END OF SECTION 33 12 16~

SECTION 33 12 17

SERVICE SADDLES

PART 1. GENERAL

1.1 SUMMARY:

- A. Contractor shall furnish, install and test all service saddles installed on pipelines, and 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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 31 23 10: Trench Excavation & Backfill.
- C. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. Comply with District of Columbia International Plumbing Code.
- B. American Society for Testing and Materials (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”.
- C. 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”.
- D. 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.
 - 7. Double straps: 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. 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 water main greater than eight (8) inches in diameter.
- D. Install service saddles no closer than 18-inches from pipe joints and at 10 and 2 o'clock positions. Stagger installation position when there is 12 inches or less separation between service taps.
- E. Trenching and backfill shall be in accordance with Section 31 23 10, titled "Trench Excavation & 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. New Taps shall be installed a minimum of 18 inches horizontally away from any existing tap or pipe joint and minimum 24 inches clear of PVC pipe bells.
- D. When tapping adjacent to an existing tap that is located less than 18 inches horizontally, the new tap shall be staggered by a minimum of 30 degrees (one hour) off the horizontal centerline of the existing tap.
- E. Service saddles shall be installed so that they do not distort, scratch, or damage pipe when tightened.
- F. After installing saddle, field coat saddle, straps, and associated hardware following field Applied Coating System requirements per Section 33 05 02 titled, "Water Utility Distribution Piping – Ductile Iron Pipe".

PART 4. MEASUREMENT AND PAYMENT

4.1 SERVICE SADDLES:

- A. Measurement:
 - 1. Measurement for Service Saddles will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Service Saddles will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, complete in place which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, sheeting, shoring and bracing, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~END OF SECTION 33 12 17~

SECTION 33 13 00

DISINFECTING WATER MAINS

PART 1. GENERAL

1.1 SUMMARY:

- A. Work includes providing disinfection and all incidental work necessary to sanitize the interior surfaces of the water distribution system, temporary water piping, and service lines prior to placing them into service. Work includes providing all labor, materials, and equipment necessary to complete the Work and includes but is not limited to disinfecting the following:
 - 1. Newly constructed water mains and water services.
 - 2. Relined water mains.
 - 3. Temporary water mains and water services.
 - 4. Existing water mains requiring extensive shuts.

1.2 RELATED DOCUMENTS: specified elsewhere may include but are not limited to:

- 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. Section 01 33 00: Submittals.
- B. Section 33 12 14: Backflow Preventers.
- C. Section 33 19 05: Pressure and Leakage Testing – Pressure Pipe.
- D. Section 33 23 20: Dewatering – Treated Water.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Water Works Association (AWWA):
 - 1. AWWA B300: “Hypochlorites”.
 - 2. AWWA B301: “Liquid Chlorine”.
 - 3. AWWA C651: “Disinfecting Water Mains”.
 - 4. AWWA C652: “Disinfection of Water Storage Facilities”.
- B. National Sanitation Foundation / American National Standard Institute (NSF / ANSI):
 - 1. NSF/ANSI 60: “Drinking Water Treatment Chemicals – Health Effects”.

1.5 SUBMITTALS:

- A. Requirements for “Submittals” shall be in accordance with Section 01 33 00.
- B. Submit Affidavits of compliance from the manufacturer or supplier stating that the liquid chlorine provided complies with all applicable requirements of AWWA 301.
- C. Submit Affidavits of compliance from the manufacturer stating that the Hypochlorites provided comply with all applicable requirements of AWWA B300.

- D. Submit a Disinfection “Plan” for all disinfection activities. The plan may be combined with the pressure and leakage test plan submitted under Section 33 19 05 titled, “Pressure and Leakage Testing – Pressure Pipe”.
- E. Submit the “Product Data Sheets” of each product used.
- F. Submit “Records” of the summary reports for bacteriological testing.
- G. Submit certified “Test Results” of the chlorination tests.

1.6 PROTECTION:

- A. Disinfection activities shall be under the direct supervision of someone familiar with the physiological, chemical, and physical properties of the form of chlorine used. They shall be trained and equipped to handle any emergency that may arise. All personnel involved shall observe appropriate safety practices to protect working personnel and the public.
- B. The forewords of AWWA Standards B300 and B301 contain information and additional reference material regarding the handling of hypochlorites and liquid chlorine. The Contractor shall be familiar with this information prior to performing any disinfection work.

1.7 DISINFECTION PLAN:

- A. The disinfection plan shall include but not be limited to:
 - 1. The method of disinfection, the type and quantity of chemicals to be introduced into the system, the locations where the disinfectant is to be introduced, the target residual concentration, and contact period.
 - 2. Description of the storage and handling procedures.
 - 3. Specific information regarding the method of de-chlorination, the locations where flushing is to be accomplished, rates of flushing, and locations of drainage facilities to be utilized.
 - 4. The location of sample taps for bacteriological testing and a description of the sample apparatus to be used.
 - 5. Calculations showing the duration and velocity required for flushing the system to achieve one turnover.
 - 6. Safety procedures and precautions for transporting, handling, and storing disinfection products.
 - 7. Backflow Preventer certification.

1.8 PRODUCT DELIVERY STORAGE AND HANDLING REQUIREMENTS:

- A. Packaging and shipping of all products shall conform to current federal, state and local regulations.
- B. All containers shall be appropriately marked showing the hazards associated with product contained within the packaging.
- C. Hypochlorites shall be stored in a cool, dry, and dark environment.
- D. Sodium Hypochlorite solutions may be shipped in glass carboys; approved plastic containers; or in suitably lined, thoroughly clean tank trucks of approximately 5,000 gallons.
- E. Calcium Hypochlorite may be shipped in approved corrosion resistant containers or in metal drums. Sealing compounds shall not be used at the seams of metal drums.

PART 2. PRODUCTS

2.1 PRODUCTS:

- A. Sodium Hypochlorite shall be NSF/ANSI 60 approved. The supplied Sodium Hypochlorite shall conform to the requirements of AWWA B300. The Contractor shall supply an affidavit from the manufacturer attesting that the supplied Sodium Hypochlorite complies with all applicable requirements of AWWA B300.
- B. Calcium Hypochlorite shall be NSF/ANSI 60 approved. The supplied Calcium Hypochlorite shall conform to the requirements of AWWA B300. The Contractor shall supply an affidavit from the manufacturer attesting that the supplied Calcium Hypochlorite complies with all applicable requirements of AWWA B300.
- C. Calcium hypochlorite intended for swimming pool disinfection containing trichloroisocyanuric acid shall not be used.
- D. All chemicals used for chlorination shall be in accordance with NSF/ANSI 60.

PART 3. EXECUTION

3.1 GENERAL:

- A. New Water Mains:
 - 1. New water main work shall remain separated from the existing active water system until disinfection and flushing is complete, and the water from the new pipeline work is free of coliforms as demonstrated by bacteriological testing.
 - 2. At the end of the contact period, the line shall be thoroughly flushed of highly chlorinated water from the main fittings, valves and branches. The main is considered flushed when the chlorine residual is equivalent to the supply water, ensuring all added chlorine has been flushed out.
- B. Existing Water Mains:
 - 1. The existing water mains shall have a physical separation (e.g., plug or cut-and-cap) from the active water system. If a physical separation is not possible, DC Water may approve an alternate plan where existing pressure and valves ensure the super-chlorinated water cannot enter the active water system.
 - 2. Single valve isolation between the section to be disinfected and the live distribution system will only be permitted when pressures that ensure no high chlorinated water can enter into the live distribution system can be maintained.
 - 3. Sections requiring disinfection shall include all portions that were partially or fully drained of water plus any section that was isolated from flow for more than four continuous weeks or sections otherwise deemed necessary to disinfect by DC Water.
- C. The injection pump used to inject chlorine solution into the pipe shall have sufficient capacity to inject the chlorine solution at a uniform rate for the entire duration required to disinfect the pipe.
- D. The Contractor shall reimburse DC Water for all water used for testing, flushing and disinfecting the water mains.
- E. During the disinfection, a DC Water operator shall be on site to operate hydrants and valves on the active distribution system. If no DC Water operator is available, the Contractor shall notify DC Water at least 48 hours in advance to make arrangements for a DC Water operator.

3.2 PREPARATION:

- A. All water mains shall be pressure and leak tested, flushed, and cleaned of debris and dirt prior to application of the disinfectant. Drainage shall be in accordance with Section 33 23 20 titled, "Dewatering – Treated Water".
- B. Contractor shall inspect for cleanliness and disinfect all equipment to be used for disinfection activities prior to beginning disinfection.
- C. Water systems shall be flushed prior to disinfection.
 - 1. The flushing velocity shall not be less than three (3) feet per second which can be achieved with the following minimum flows:
 - a. 4 inch diameter pipe = 120 gpm,
 - b. 6 inch diameter pipe = 260 gpm,
 - c. 8 inch diameter = 470 gpm,
 - d. 12 inch diameter = 1060 gpm.
 - 2. For pipe with diameter greater than 12 inches where flushing velocity/flow cannot be achieved, the Contractor, with the approval of the DC Water, may provide an external pump to achieve the velocity. The external pump must be disinfected prior to use.
 - 3. Pigging or other pipe cleaning method approved by DC Water can be used if three (3) feet per second cannot be achieved.

3.3 METHODS OF CHLORINATION:

- A. Water mains shall be disinfected in accordance with AWWA C651 except as modified or supplemented by this Section.
- B. Water mains shall be disinfected using one of the following methods:
 - 1. Continuous-Feed Method: The continuous-feed shall be used for disinfecting small diameter piping less than 16 inches in diameter and may be used for all larger piping.
 - 2. Slug Method: The slug method may be used instead of the continuous-feed method for piping equal to or greater than 16 inches in diameter.
 - 3. Swabbing or Spraying: Swabbing or spraying may be used for pipe, fittings, and valves required for connection to the distribution system if the total length of the connection from the end of a new main to the existing main is 20 feet or less.

3.4 CONTINUOUS-FEED METHOD:

- A. Disinfecting the water main using the continuous-feed method shall be in accordance with AWWA C651 and the following:
 - 1. Make up chlorine solution.
 - 2. Connect the chlorine solution pump to the water main. Use a corporation cock for this purpose and make connection at or ahead of the inlet end of the line. The chlorine shall be added at a point not more than ten (10) feet downstream from the beginning of the main.
 - 3. Open hydrant or blowoff at outlet and adjust flow.
 - 4. When the flow is adjusted to the desired rate, start pumping concentrated chlorine solution into the line.
 - 5. Continue pumping until tests on a sample taken from the discharge end of line being treated shows that the concentration of chlorine is not less than 25 mg/L free chlorine.

6. After finishing the application of chlorine, close valve or blow-off and disconnect the chlorine solution pump.
7. Keep the chlorinated water in the main for at least 24 hours. During this time, operate all valves and hydrants in the treated water main section to disinfect the appurtenances.
8. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than ten (10) mg/L free chlorine.
9. If the minimum residual is not maintained, the procedure shall be repeated.

3.5 SLUG METHOD:

- A. Disinfecting the water main using the slug method shall be in accordance with AWWA C651 and the following:
 1. Connect the chlorine solution pump to the water main. Use a corporation cock for this purpose and make connection at or ahead of the inlet end of the line. The chlorine shall be added at a point not more than ten (10) feet downstream from the beginning of the main.
 2. Measure the concentration at regular time intervals sufficient to guide the completion of successful loading of the target chlorine concentration and as established in the disinfection plan.
 3. The pipeline shall have direct contact with a concentrated dose of chlorine fed at a constant rate not less than 100 mg/L free chlorine.
 4. Apply the chlorine continuously and for a sufficient period to develop a solid column, or slug, of chlorinated water that will expose all interior surfaces to a concentration of approximately 100 mg/L for at least three (3) hours.
 5. The free chlorine residual shall be measured in the slug as it moves through the pipe. If, at any time, it drops below 50 mg/L, the flow shall be stopped; chlorination equipment shall be relocated at the head of the slug; and, as flow resumes, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.
 6. As the chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches. The amount of solution, the length of time for the injection, and the rate of flow in the pipeline to carry the concentrated chlorine solution its entire length shall be submitted as part of the disinfection plan.

3.6 SWABBING OR SPRAYING:

- A. Pipe, fittings, and valves required for connection to the distribution system may be spray disinfected or swabbed with a minimum one (1) percent free chlorine solution immediately before being installed.
- B. For larger transmission mains, where personnel and equipment may safely enter the pipe, the spray disinfection method may be used as specified in AWWA C652, Chlorination Method 2.

3.7 BACKFLOW PROTECTION:

- A. A backflow preventer shall be installed at any connection to an active water system in accordance to Section 33 12 14 titled, "Backflow Preventers".

3.8 DISINFECTION OF TEMPORARY WATER PIPING AND SERVICE LINES:

- A. Disinfection testing for temporary water piping and service lines shall be performed and paid for by the Contractor.
- B. No physical connections to hose bibs shall be made until after successfully disinfecting the lines and receiving confirmatory test results.

- C. All water sampling equipment for field-testing shall be properly maintained and checked annually for chlorine measurement accuracy.
- D. Samples shall be taken by and tested by a certified laboratory.
- E. Each water sample taken shall be properly labeled, sealed, and transported for testing.

3.9 DISPOSAL OF HEAVILY CHLORINATED WATER:

- A. Disposal of heavily chlorinated water shall be in accordance with Section 33 23 20, titled "Dewatering-Treated Water".
- B. Heavily chlorinated water shall be flushed with water immediately after testing. The pipe shall remain filled with water that has a chlorine concentration measurement consistent with that which is in the distribution system or is acceptable for domestic use. If water line is not activated within 28 days of bacteria sampling and acceptance, the line shall be disinfected and tested for two consecutive passing bacteria samples.

3.10 BACTERIOLOGICAL TESTING:

- A. DC Water will collect the bacteriological samples and perform bacteriological testing for water mains.
- B. Bacteriological testing shall be performed after final flushing and before the water main, temporary water piping, or service connections are placed in service.
- C. Samples for bacteriological tests shall be taken using sterile bottles with dechlorinating reagent added.
- D. The following procedures in addition to the bacteriological test method described in AWWA C651 shall be performed:
 - 1. After final flushing, the main shall remain full for a minimum of 16 hours without any water loss.
 - 2. Collect, two (2) sets of samples for bacteriological testing a minimum of 15 minutes apart, or appropriate time interval determined by DC Water. Sampling taps shall remain open during this time frame. Both sets of samples shall be free of coliform for the water main, temporary water piping, and service connection to be approved for use.
- E. If site conditions do not allow the above sampling option to be performed then DC Water may use the following two (2) day sample collection procedure:
 - 1. After final flushing, the main shall remain full for a minimum of 16 hours without any water loss.
 - 2. Collect one set of samples from each sample tap. Without any additional flushing, allow the water to sit in the piping a minimum of another 24 hours and collect a second set of samples from each sample tap.
- F. For new mains, samples shall be collected at locations no further than 500 feet apart from each other along the length of the new water main, plus one set shall be collected from the end of the line and at least one (1) from each branch greater than one (1) pipe length. The Contractor shall provide temporary sample taps along the water main to accommodate sampling.
- G. Disinfection operations shall be considered successful if test results show the water main segment to be free of coliform contamination. Should the tests fail, the flushing and disinfection process shall be repeated. All costs for repeating disinfection and testing shall be the responsibility of the Contractor.

3.11 SUMMARY REPORT:

- A. Contractor shall submit a summary report on each disinfection operation within ten (10) calendar days of the acceptance of the pipe for service. The report shall outline the limits

of the main disinfected, the method of disinfection used, dosage of disinfectant applied, and results of bacteriological sample analysis provided by DC Water.

PART 4. MEASUREMENT AND PAYMENT

4.1 DISINFECTING WATER MAINS:

A. Measurement:

1. Work for Disinfecting Pipelines will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Disinfecting Pipelines will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to traffic maintenance and protection, minor complication and/or delays and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 33 05 02: Water Utility Distribution Piping – Ductile Iron Pipe.
- C. Section 33 19 05: Pressure and Leakage Testing – Pressure Pipe.

1.4 REFERENCED CODES AND STANDARDS:

- A. American Society for Testing and Materials (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 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 titled, "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 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 RESILIENT-SEATED GATE VALVES (12 INCH DIAMETER AND SMALLER):

A. Measurement:

1. Work for Resilient-Seated Gate Valves (12 Inch Diameter and Smaller) will be measured per each per diameter size of valve for payment.

B. Payment:

1. Payment for Resilient-Seated Valves will be made at the Contract unit price per each for each diameter size of valve as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, traffic maintenance & protection, minor complications and/or delays, flanged and mechanical joint ends, flanged and plain-end pieces where necessary along with sleeve couplings, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 METAL-SEATED GATE VALVES (12 INCH DIAMETER AND SMALLER):

A. Measurement:

1. Work for Metal-Seated Gate Valves (12 Inch Diameter and Smaller) will be measured per each per diameter size of valve for payment.

B. Payment:

1. Payment for Metal-Seated Gate Valves (12 Inch Diameter and Smaller) will be made at the Contract unit price per each for each diameter size of valve as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, traffic maintenance & protection, minor complications and/or delays, flanged and mechanical joint ends, flanged and plain-end pieces where necessary along with sleeve couplings, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

4.3 REPLACING MULTI-STEM VALVES:

A. Measurement:

1. Work for Replacing Multi-stem Valves will be measured per each for each diameter size of valve as stated in the SOPs for payment.

B. Payment:

1. Payment for Replacing Multi-stem Valves will be made at the Contract unit price per each for each diameter size of valve as stated in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, traffic maintenance & protection, minor complications and/or delays, flanged and mechanical joint ends, flanged and plain-end pieces where necessary along with sleeve couplings, temporary pavement restoration, testing and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 33 12 14: Backflow Preventers.
- C. 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 titled, “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 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 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 titled, "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 placed under pressure and visually inspected for leaks. All leaks shall be repaired and the repairs approved by DC Water prior to backfilling the trench.

PART 4. MEASUREMENT AND PAYMENT

4.1 HYDROSTATIC TESTING - PRESSURE PIPE:

- A. Measurement:
1. Work for Hydrostatic Testing – Pressure Pipe will not be measured separately for payment.
- B. Payment:
1. No separate payment will be made for work under this Section. Payment for Hydrostatic Testing – Pressure Pipe will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to hydrostatic testing, test plan preparation, test procedures, combined hydrostatic tests, air removal, examination/inspection, minor complications and/or delays, traffic maintenance & protection, temporary pavement restoration and all labor, materials, tools, equipment and incidentals necessary to complete the work as specified within the Contract.

~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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 31 25 00: Erosion and Sediment Control.
- C. Section 33 13 00: Disinfecting Water Mains.

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 to Section 31 25 00 titled, "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.

PART 4. MEASUREMENT AND PAYMENT

4.1 DEWATERING – TREATED WATER:

- A. Measurement:
 - 1. Work for Dewatering-Treated Water will not be measured separately for payment.
- B. Payment:
 - 1. No separate payment will be made for work under this Section. Payment for Dewatering-Treated Water will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to traffic maintenance and protection, minor complications and/or delays, temporary pavement restoration, testing and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

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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: Specified elsewhere may include but are not limited to:

- A. Section 01 33 00: Submittals.
- B. Section 33 12 14: Backflow Preventers.
- C. 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 titled, "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 titled, "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. Permanent or temporary hydrants which are out of service during shall be bagged and clearly marked with a "HYDRANT OUT OF SERVICE" tag.
- F. All connections made to fire hydrants shall include an approved backflow prevention device per Section 33 12 14 titled, "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 if 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.

PART 4. MEASUREMENT AND PAYMENT

4.1 TEMPORARY WATER PIPING:

A. Measurement:

1. Work for Temporary Water Piping will be measured per lump sum for payment.

B. Payment:

1. Payment for Temporary Water Piping will be made at the Contract unit price per lump sum as stated in the SOPs, which price and payment shall constitute full compensation for all work associated with Temporary Water Piping including but not limited to test pits, trench excavation, backfill and compaction, temporary water for roadways, driveways, aprons, sidewalks, crosswalks and ADA ramps, temporary fire hydrants, disinfection, traffic maintenance and protection, minor complication and/or delays, temporary pavement, testing and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

4.2 TEMPORARY SERVICE CONNECTIONS:

A. Measurement:

1. Work for Temporary Service Connection will not be measured separately for payment.

B. Payment:

1. No separate payment will be made for work under this Section. Payment for Temporary Service Connection will be considered incidental and included under the bid item(s) of which it is a part of in the SOPs, which price and payment shall include but not be limited to test pits, trench excavation, backfill and compaction, disinfection traffic maintenance and protection, minor complication and/or delays, temporary pavement, seeding, testing and all labor, materials, tools, fees, equipment and incidentals necessary to complete the work as specified within the Contract.

~ END OF SECTION 33 29 50 ~

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