

CONTRACT T201451603

FEDERAL AID PROJECT NO. DE-79-001

**NEWARK REGIONAL TRANSPORTATION CENTER,
PARKING LOT AND ACCESS ROAD**

APPENDIX A

City of Newark Technical Specifications for Waterline Work

Item – 614508 Water Main and Accessories



PUBLIC WORKS & WATER RESOURCES
CITY OF NEWARK

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CITY OF NEWARK
Delaware
PUBLIC WORKS AND WATER RESOURCES DEPARTMENT

SUMMARY OF SPECIFICATIONS

July 27, 2016

WATER MAINS & FITTINGS:

1. All water mains shall be Ductile Iron push on, cement lined Class 52 ductile iron pipe, with locking gaskets, unless otherwise specified by Public Works and Water Resources Department (PWWR).
2. All water mains shall be Ductile Iron push on, Class 52, with locking gaskets, unless otherwise specified.
3. Minimum cover of forty-two inches (42") shall be provided over all water mains as measured from finished grade to the top of the pipe.
4. All water mains shall be wrapped in V-Bio Enhanced Polyethylene Encasement manufactured by McWane Ductile or approved equal as determined by the PWWR Department. Information on the V-Bio product can be found here: <http://mcwaneductile.com/upl/downloads/library/mcwane-ductile-v-bio.pdf>
5. Tapping sleeves shall be Mueller H-615, Mueller Stainless H-304.
6. Tapping valves shall be Mueller T-2360-19, open left.
7. Main gate valves shall be Mueller A-2360 or H-2370-20, open left.
8. Valve boxes shall be Mueller H-10360, or approved equal as determined by the PWWR Department. Valve boxes shall be screw type adjustable to final grade.
9. All bends shall be buttressed with 3500 psi concrete and wrapped with plastic.
10. All brass fittings shall conform to the Federal "Reduction of Lead in Drinking Water Act" signed into law in 2011 and effective January 1, 2014.

WATER SYSTEM DESIGN AND MAIN SIZING:

1. All water mains are to be designed and constructed to meet the minimum standards as set by the State of Delaware Office of Drinking Water.
2. All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow (including fire flows). The normal working pressure in the distribution system shall not be less than 35 psi (240 kPa).
3. Minimum main line diameter of 8" within the public right of way where providing fire protection. Water velocity within the main at the design fire flow rate shall not exceed 10 ft/sec nor shall headloss exceed 5' per 1000' of main for the maximum daily flow plus fire flow condition.
4. Individual building services are not subject to the minimum main diameter requirement and shall instead be designed based off of the design flow rate for the building. At no time shall the velocity within the building service exceed 10 ft/sec.

5. Where the manufacturer's recommended pipe joint deflection is exceeded, mechanical joint bends shall be required and installed to the satisfaction of the PWWR inspector.
6. Gate valves shall be provided at an interval not to exceed 500' in commercial districts and one block or 800' (whichever is less) in residential districts. The PWWR Department can increase the minimum distance requirement where unit density is low and future development is not expected.
7. A minimum of two valves shall be provided at all three way intersections and three valves at any four way intersections, as determined by the PWWR Department.
8. A gate valves shall be provided at the right of way line on all building services. Valves associated with the tapping sleeve are not sufficient to meet this requirement.
9. Dead ends shall be minimized to the maximum extent practicable in order to provide increased reliability of service and reduce head loss.
10. A blow off shall be installed on all dead-end water mains; blow off shall be sized to provide flows which will result in a velocity of at least 2.5 feet per second in the water main being flushed. A fire hydrant can be substituted for a blow off if flow and pressure are sufficient. No flushing device shall be directly connected to any sewer.
11. Fire hydrants should be provided at each street intersection and at intermediate points between intersections as required to meet State and local fire code requirements.
12. Air relief valves shall be provided at high points in the system where air can accumulate. Air relief valves shall be sized appropriately for the diameter of the main served. Air relief valves shall be located within a manhole meeting the City of Newark minimum sanitary sewer manhole requirements and shall have a solid, watertight lid labeled "Water". Automatic air relief valves shall not be used in situations where flooding of the manhole may occur. Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer.
13. A minimum ten feet (10') horizontal and eighteen-inch (18") vertical separation, as measured from the outside of each pipe, shall be provided for all water mains from sanitary sewer (gravity lines and force mains). This shall be the case whether the water main is above or below the sewer. Wherever possible the sewer shall be beneath the water main. Crossings shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
14. A minimum eighteen-inch (18") vertical separation, as measured from the outside of each pipe, shall be provided for all water mains from storm sewer. Due to the limited width of some streets, the horizontal separation between all water mains and storm sewer shall be provided to the maximum extent practicable. When feasible, a minimum ten feet (10') horizontal separation, as measured from the outside of each pipe, shall be provided for all water mains from storm sewers in accordance with Ten States Standards.
15. Water mains shall have a minimum of eighteen-inch (18") clearance from electric lines, gas mains, and all other utilities.
16. No water line (mains, services, etc.) shall pass through or come in contact with any part of a sewer manhole.
17. Publicly maintained water mains located outside of the right of way shall be centered within a minimum 20' wide public maintenance and access easement, dedicated to the City. No plantings or structures are permitted to be constructed within this easement.
18. Privately maintained water mains shall be centered within a minimum 20' wide, private maintenance and access easement. No plantings or structures are permitted to be constructed within this easement.

FIRE HYDRANTS:

1. The minimum size for all fire hydrant leads shall be six-inches (6").
2. Hydrant laterals shall be restraining tee, 6 inch resilient gate valve and box with 6 inch Ductile Iron Pipe.

3. Hydrants shall be Mueller A-423, buttressed and rodded.
4. Size Valve Opening – 5 ¼ inch, open left.
5. Fire hydrants shall be set to stand plumb with the nozzles parallel with or at right angles to the curb. The steamer nozzle shall face the curb. Ground safety flange should be kept close to the surrounding final grade.
6. Nozzle Arrangement – 2 – 2 ½ inch Hose Connections, National Standard Thread.
1 – 4 ½ inch Pumper Connections, National Standard Thread.
7. Lateral Connection – 6 inch Mechanical Joint.
8. Operating Nuts – All 1 ½ inch Pentagon.

INDIVIDUAL RESIDENTIAL WATER SERVICES:

1. Corporation stops shall be ¾ inch Mueller H-15031N, tapped on upper 1/3 (45 degree).
2. Saddle taps shall be Mueller BR2B Bronze.
3. Curb stops shall be Mueller H-15201 or B25209N.
4. Curb boxes shall be Mueller H-10350, or equal.
5. House services shall be ¾ inch soft copper tubing type “K”.
6. Minimum depth of cover is 42 inches.
7. Meter yokes shall be Mueller H-1412N.
8. Water meters shall be located in pits located 2’ behind the right of way line unless directed otherwise by the Public Works and Water Resources Department.
9. Meter pits for meters 1” and under shall be Mueller Thermal-Coil, 42” depth, with integral dual check valve. Lid type will depend on pit location and must be approved by the Public Works and Water Resources Department. All water meter pits must be installed on a 6” thick stone bed and per manufacturer’s recommendations.
Meter Pit Sizing:
5/8” Meter = (Catalog # 200-CS-15-42-F-S-A-S-N)
5/8”x3/4” Meter = (Catalog # 203-CS-15-42-F-S-A-S-N)
3/4” Meter = (Catalog # 250-CS-15-42-F-S-A-S-N)
1” Meter = (Catalog # 330-CS-15-42-F-S-A-S-N)
10. Meter pits for meters larger than 1” shall be designed on a case by case basis per the approval of the Public Works and Water Resources Department.
11. Water meters and transmitters for all services shall be purchased from the Public Works and Water Resources Department.
12. The developer will be responsible for all repeaters necessary to reliably read the water meters in their installed location from our existing AMI mesh.

SANITARY SEWER MAINS:

1. Minimum main size is an 8 inch.
2. All sanitary sewer mains and fittings shall be shall be minimum O-ring SDR-26. Maximum depth is 20 feet and minimum depth is 5 feet. Mains where the depth is less than 5 feet or greater than 20 feet at any point along its length shall be Class 50 D.I.P. and must be specifically approved by the PWWR Department.
3. Six (6) Inch minimum thickness 3500 psi concrete encasement shall be required whenever a sewer main passes within 18 inches under or over another utility.
4. Sewer mains and materials shall be installed on a 4 inch bed of Delaware #57 stone to grade and backfilled with stone to approximately 4 inches over pipe.

SANITARY FORCE MAINS:

1. Minimum cover of forty-two inches (42") shall be provided over all force mains as measured from finished grade to the top of the pipe.
2. Force mains shall have a minimum of eighteen-inch (18") clearance from drains, electric lines, gas mains, and all other utilities.
3. All force mains shall be appropriately sized based upon the design requirements for the pump station or grinder pump. All force mains four-inches (4") and larger shall be ductile iron pipe. Nonmetallic force main shall be AWWA C-900, minimum SDR18, or HDPE DR11 (directional drilling applications) when warranted by the application and approved by PWWR.
4. Force mains shall be pressure rated, buttressed at bends and marked with 12 gauge tracer wire. Place metallic sewer tape on first lift of material over pipe.
5. The minimum velocity shall not be less than two feet per second (2 fps) for force main design. In general force main velocities shall not exceed five and one-half feet per second (5-1/2 fps) for force main design.
6. If the total dynamic head at the pump discharge exceeds 100 feet, a larger diameter force main will be used, provided that a velocity of two feet per second (2 fps) can be maintained.
7. Air release valves shall be provided on lines at all local high points along the force main profile and shall be located in an open bottom manhole.

SANITARY SEWER MANHOLES:

1. All manholes shall be precast and all channels inside manholes shall be poured concrete, 4,000 # mix.
2. Use concrete riser rings and poured concrete collar around outside between the manhole frame and the precast manhole. All off site frame and collars to be bolted down to the manhole with sealant at each interface with bolt down lids.
3. All manhole frames and covers shall be watertight, as per City of Newark Water and Waste Water specifications. An approved bituminous seal coating shall be applied to the exterior of all manholes.
4. When a contractor ties into an existing manhole, he shall be responsible to bring that manhole up to present codes and specifications.
5. A six inch bed of Stone (Delaware #57) shall be laid under the manhole base prior to installation, including stone around and over the inlet and discharge pipes. Wet or unstable ground conditions will require undercutting and additional stone depth.

SANITARY SEWER LATERALS:

1. All sanitary sewer laterals shall be minimum O-ring SDR-35. Maximum depth is 20 foot and minimum depth 5 feet. Laterals where the depth is less than 5 foot or greater than 20 foot at any point along its length shall be Class 50 D.I.P.
2. Minimum lateral size is 4 inches.
3. Cleanout screw caps shall be set flush to 1 inch below finished grade in grass areas.
4. All combination cleanouts shall be of the John Manville or Harco type (consisting of 45 degree wye and 45 degree bend) are to be installed on the property line. **Tee-Wyes will not be accepted.** If the cleanout is in the driveway or the sidewalk a genco or equal screw cap with brass lid must be flush with concrete or hot mix (see clean out detail).
5. Back water valve/check to be installed as per international plumbing code #715. This valve shall be clean/check inc. #EBV-401B or approved equal.

6. Prior to re-using an existing lateral a visual inspection shall be performed and provided to the PWWR Department for approval. Inspection shall be performed at a speed appropriate to allow for proper assessment of the pipe and connections.

BACKFILL FOR WATER & SEWER TRENCHES:

Backfill for all pipe trenches, unless otherwise specified, shall be as follows:

1. **CITY OF NEWARK STREETS:**

Sewer Pipe: As stated in item #4 under sanitary sewer mains.

Water Pipe: Select borrow from the bottom of the trench to one foot above the top of pipe.

The balance of the trench for both water and sewer shall be backfilled with crusher run compacted in 6 inch layers. The trench shall be cut back one foot on each side and capped with 6 inches of 3500# A/E concrete to 1 ½ inch below existing surface. A 1 ½ inch mat of "TYPE C" hot mix shall be placed on the concrete flush with existing roadway.

2. **STATE MAINTAINED STREETS:**

Backfill for pipe trenches, Delaware State Highway specifications, call for a 10 inch concrete base, with a 2 inch over-lay of hot-mix to finished grade, above the stone base.

TESTING WATER MAINS:

1. Water mains shall be tested with services installed and curb stops in place.
2. Test shall be for four (4) hours of 150 psi hydrostatic pressure.
3. Allowable leakage is AWWA Standards and CIPRA recommendations.
4. Fire hydrants shall be included in all tests.

TESTING SANITARY SEWER MAINS:

1. Sanitary mains shall be tested with all laterals tied in and complete cleanouts in place.
2. Test shall be 5 pounds for 15 minutes with no allowable leakage.
3. Forced main tests shall be 50 pounds for 5 minutes. All bends in forced main system shall be buttressed and treated as a water line.

FIRE SUPPRESSION SYSTEM SHUT OFF:

1. All fire suppression systems shall have a shut-off valve installed on the supply line located on the exterior of the building with large valve box with fire on lid.
2. Should the fire system be supplied from the existing domestic water lateral, or vice versa, the valves for each system shall be positioned so that either valve can be opened or closed without terminating the water supply to the opposite service.
3. The valve boxes shall be installed with lids reading "FIRE" for the fire suppression system and "WATER" for the domestic system.

WATER RENT TO BE PAID BY BUILDERS:

Builders shall pay water rent from time the tap is made until the building is completed. Upon application for a building permit, the applicant shall pay a fee for the use of water during construction at the current rate as reflected on the building permit.

Specifications

SECTION 5 **GENERAL CONDITIONS**

PART 1 - GENERAL

1.1 These Specifications consist of the General Conditions, Materials Specifications and the Installation Specifications. These Specifications, together with the Plans, will apply to the procurement and installation of all Water Main Facilities.

1.2 DEFINITIONS

The following definitions are given to provide specific meaning and clarification:

- A. COMPANY** - SUEZ Water Delaware Inc. (SWDE).
- B. MANAGER** - The Company Engineering Manager, or their authorized representative.
- C. DEVELOPER** - An individual, corporation, association or entity who desires water service at a proposed Development, consisting of service(s) under their control.
- D. CONTRACTOR** - The Contractor who is contracted with the Developer for the purpose of extending Water Main Facilities.
- E. ENGINEER** - The Company Engineer, or their authorized representative.
- F. PROJECT COORDINATOR** - The Company Project Coordinator, or their authorized representative.
- G. FIELD INSPECTION TEAM** - Manager, Engineer and Project Coordinator.
- H. SPECIFICATIONS** - The requirements contained herein pertaining to the work of extending the Water Main Facilities, including the General Conditions, Materials Specifications and Installation Specifications.
- I. PLANS** - Company Approved drawings and standards (including any approved supplemental drawings/sketches) that show the locations, dimensions and details of the Water Main Facilities work to be accomplished.

1.3 REFERENCES

The following references are common capitalized abbreviations and refer to specifications, standards, or methods of the respective national association:

SWDE	SUEZ Water Delaware Inc
OSHA	Occupational Safety & Health Administration
AWWA	American Water Works Association
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ULFM	Underwriter's Laboratory for Manufacturers

The numbers and letters following the abbreviations denote the association's serial designation for the specification or standard to which reference is made. Unless a particular issue is designated, all references to the above specifications, standards, or methods shall, in each instance, be understood to refer to the issue in effect (including all amendments).

PART 2 - EXECUTION OF WORK

2.1 WORK SCOPE

The Contractor shall perform all work as described on the Plans and in accordance with these Specifications. The Contractor shall furnish all materials, including pipe, valves, fittings, fire hydrants and other pipeline appurtenances as may be required under the Contract. All materials for these Water Main Facilities shall meet the requirements of "Section 2 - Materials Specifications." All Water Main Facilities shall be installed in accordance with the requirements of "Section 3 - Installation Specifications."

2.2 PLANS & SPECIFICATIONS

The intent of the Plans and Specifications is to describe a complete project, from connection(s) to the existing Water System and extending to the proposed Development (and extending within the proposed Development), as defined by the Plans which have been approved by the Company. Plans and Specifications are intended to be complementary, what is called for by one is as binding as if called for by both. Anything shown on the Plans and not described in the Specifications, or vice versa, shall be considered as if shown on the Plans and described in the Specifications. If the Contractor finds a conflict, error or discrepancy in the

Plans or Specifications, he will call it to the attention of the Company and Developer (in writing) before proceeding with the affected work. The Contractor assumes full responsibility for having familiarized himself with the nature and extent of the Plans and Specifications and for having a thorough understanding of the work scope, locality, and local conditions that may in any manner affect the completion of these Water Main Facilities.

2.3 VERIFICATION AND WARRANTY

The Contractor shall make his own determination of the nature of the work, the general and local conditions which can be encountered and all other matters which can in any way affect the work proposed for these Water Main Facilities. It shall also be the responsibility of the Contractor to be thoroughly familiar with the Plans and Specifications.

2.4 CONSTRUCTION STEPS

A. PRE-CONSTRUCTION CONFERENCE

Before starting the work, a conference will be held to review scheduling of the work and to establish a working understanding between the parties involved as to the work included for these Water Main Facilities. Present at the conference will be the Project Coordinator, the Developer (or designated representative) and the Contractor. The Contractor's representative attending this meeting must be the individual who will be responsible for overseeing all construction activities.

B. WORK PROGRESS

1. The Contractor shall arrange his work and disposal of materials so as to insure the least possible interference and inconvenience to the landowners on or beside whose property the Water Main Facilities are being constructed, or to the public where these Facilities lie in or near a public thoroughfare. The Contractor shall employ only such number of construction crews as are reasonably necessary to construct said pipelines.
2. Normal holidays observed by the Water Company include; New Year's Day, Martin Luther King Day, Good Friday, Memorial Day, Independence Day (July 4th), Labor Day, Thanksgiving Day, Thanksgiving Friday, Christmas Day and one variable Christmas Day. These holidays are for reference only and subject to change. Company will notify Contractor of any changes. No work shall be performed on those days without consent of the Project Coordinator. Any work performed on holidays without such consent shall not be accorded premium or overtime rates but shall be paid at normal straight-time rates.
3. A normal construction work week for Contractor will be Monday through Friday; 40 hours.

4. It is the intention of these Plans and Specifications that the progress of the work shall proceed in a systematic manner such that a minimum of inconvenience will result to the public in the course of construction. The Contractor shall confine their operations to as small a length of work as is feasible. Backfilling of the trench shall be accomplished such that sections of approved installation shall not be left open longer than twenty-four (24) hours (except by permission of the Project Coordinator). Complete backfill and clean up shall be accomplished after each section of the project has been inspected and approved.
5. Clean-up of all construction debris, excess excavation, excess materials, and complete restoration of all fences, mailboxes, ditches, culverts, signposts, and similar items shall be completed immediately following the final backfilling of the line and testing of the main. The Contractor shall stockpile the excavated trench material so as to do the least damage to adjacent areas or fences, regardless of whether these are on private property or public right-of-way. All excavated materials shall be removed from adjacent areas, and these surfaces shall be left in a condition equivalent to their original surface and free from all rocks, gravel, boulders or other foreign material.
6. It is the intent of these Plans and Specifications that the Contractor provide all labor and equipment necessary to grade and maintain in a reasonable condition all streets on which water main construction has been accomplished until surface repair has been completed.

C. CHANGES IN THE WORK

If unforeseen items of work are found to be necessary, it may be deemed as Extra Work. Approval for Extra Work will be made through the Developer and the Company, as per the Specifications and provisions.

D. USE OF COMPLETED PORTIONS

The Company shall have the right to take possession of and use any completed or partially completed portions of the work. Such use shall not be considered as final acceptance of any portion of the work.

2.5 OBSERVANCE OF LAWS

The Contractor shall keep himself fully informed of all local and county ordinances, State, and Federal laws in any manner affecting the work herein specified. The Contractor shall at all times comply with said ordinances, laws, and regulations, and protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violation of any such laws, ordinances, or regulations.

2.6 RESPONSIBILITY OF COMPANY

A. AUTHORITY, DUTIES AND RESPONSIBILITIES OF THE FIELD INSPECTION TEAM

The Field Inspection Team shall consist of the Manager, Engineer and Project Coordinator, or their designated representative. Their primary focus will be towards decisions regarding quality and acceptability of any materials furnished, the work performed and the rate of progress of work.

1. Any member of the Field Inspection Team, individually or conjointly, may make periodic visits to the sites of the various projects to observe the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the intent of the Plans and Specifications. The Field Inspection Team shall not be required to make comprehensive or continuous inspections to check the quality of the work and shall not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the work. Visits and observations made by the Field Inspection Team shall not relieve the Contractor of his obligation to conduct comprehensive inspections of the work, to perform acceptable work, and to provide adequate safety precautions in conformance with the intent of the Plans and Specifications.
2. The Project Coordinator will observe and inspect the work. Such inspection shall not relieve the Contractor of his obligations to conduct comprehensive inspections of the work (on their own), to perform acceptable work, and to provide adequate safety precautions, in conformance with the intent of the Plans and Specifications.

B. SHUT DOWN OF EXISTING MAINS AND SERVICES

1. The Contractor shall make every effort to maintain water service to all SWDE's customers at all times. The scope of this project may require temporary shut down of existing mains and services throughout the project. Any anticipated "shut-downs" shall be scheduled with SWDE's Project Coordinator as described within this section of the Specifications.
2. Only SWDE personnel shall shut down existing water mains and services, whether temporarily or permanently.
3. The Contractor shall make **all** requests for shutting down water mains or services (whether temporary for tie-ins to new installations or cutting and capping for abandonment) to the Project Coordinator a minimum of five (5)-working days in advance of the desired shut down time.

C. "EMERGENCY" SHUT DOWN OF EXISTING MAINS AND SERVICES

1. Should an emergency occur requiring immediate shut down of the water main or service, a representative of the Contractor shall immediately contact the Project Coordinator.
2. Should an emergency occur after UWDE's scheduled work hours, the Contractor shall call (302) 633-5900 to request emergency assistance.
3. The Contractor's representative shall provide the Company employee or answering service with his name, nature and location of the emergency, and a manner to contact him back regarding the problem.

D. NOTIFICATION TO CUSTOMERS

1. Only SWDE personnel shall provide SWDE customers with notification of planned service interruptions. The Contractor shall not inform any customer of a planned service interruption, unless so authorized by a SWDE employee as in the event of an emergency.

E. INSPECTIONS

1. SWDE reserves the right to inspect any and all Contractor installed facilities for compliance with the Plans and Specifications. All water mains, valves, hydrants, fittings and other appurtenances shall remain uncovered until such time that Inspection by the SWDE's Project Coordinator has been completed and has made written documentation that the work has been accepted. The Contractor shall provide no less than one (1) working day prior notice to SWDE for the purposes of requesting said inspection of installed water facilities. Suez Water Delaware reserves the right to demand water facilities be uncovered by the Contractor at his expense, should proper notification not occur.

F. METERS

1. All water meters serving existing or future customers of SWDE shall be installed and/or removed by SWDE personnel as result of proper notification by the Contractor to SWDE.

2.7 SUSPENSION OF WORK

The Project Coordinator shall have the authority to suspend the work for such period of time that they deem necessary, due to unsuitable weather or such other conditions as are considered unfavorable for progression of the work, or failure on the part of the Contractor to carry out the provisions of the Plans and Specifications. The Contractor shall not resume operations without the Project Coordinator's permission.

2.8 EXAMINATION OF COMPLETED WORK

Should any work be performed without giving notice of plan of work, thereby eliminating an opportunity of Inspection by the Project Coordinator, the Contractor may be required to uncover such work (at the their own expense) for examination. After examination, the Contractor shall restore this portion of the work to the standards required by the Specifications, as necessary. The work shall also be subject to Inspection by appropriate governmental inspectors at all times.

2.9 CONTRACTOR'S SUPERINTENDENT

A qualified superintendent, acceptable to the Company, shall be maintained on the work and give efficient supervision to the work until its completion. The superintendent shall have full authority to act in behalf of the Contractor, and all directions given to the superintendent shall be considered given to the Contractor. In general, the Project Coordinator's instructions shall be confirmed in writing and always upon written request from the Contractor.

2.10 INFORMATION REGARDING EXISTING STRUCTURES AND UTILITIES

Any information relative to the location of other utilities' facilities shall be the sole responsibility of the Contractor.

2.11 INTERFERENCE WITH STRUCTURES AND UTILITIES

- A.** The Contractor shall exercise all possible caution to prevent damage to existing structures and utilities, whether above ground or underground. Whenever possible, the Company will attempt to locate its water main facilities so as to provide a minimum of conflict with existing structures and utilities when existing structure and/or utility is adjacent to, or in conflict with, water main facilities. While the location of existing structures and utilities will be based upon the best information available, the completeness and accuracy of said information cannot be guaranteed, and it is provided simply as a guide to possible difficulties. The Contractor shall be required to notify all "Miss Utility" and "New Castle County Sewer Special Services", 2-working days in advance of construction. When working within a dedicated State Highway right-of-way the Contractor shall notify the "State Utility Inspector".
- B.** It shall be the responsibility of the Contractor to locate and expose all existing underground structures and utilities in advance of the trench excavation. Any structures and utilities damaged by the work shall be repaired or replaced in condition equal to or better than the condition prior to the damage. Such repair or replacement shall be accomplished at the Contractor's expense.
- C.** The Contractor shall remove and replace such small miscellaneous structures as fences, catch basins, drain pipe, culverts, mailboxes, and signposts at his own expense. The Contractor shall replace these structures in a condition as good as or better than their original condition.

- D. If interfering power poles, telephone poles, guy wires, or anchors are encountered, the Contractor shall notify the appropriate utility company at least seven (7)-working days in advance of construction to permit arrangements with the utility company for protection or relocation of the structures.
- E. The Contractor shall remove, protect, and replace all drainage ways, drainage structures, or other improvements and similar items located along the proposed water main routing at his own expense. Replacement shall be in a manner and a condition at least equivalent to the original condition.
- F. If the Contractor encounters existing structures, which will prevent the construction of water main facilities, he shall notify the Project Coordinator before continuing with the construction in order that they may make such field revisions as necessary to avoid conflict with the existing structures. The cost of waiting for “down time” during such field revision shall be borne by the Contractor. If the Contractor fails to so notify the Project Coordinator when an existing structure is encountered, but proceeds with the construction despite this interference, it shall be at their own risk. In particular, when the location of the proposed construction, as shown on the Plans, will prohibit the restoration of existing structures to their original conditions, he shall notify the Project Coordinator (for a field adjustment in order to avoid the conflict).

2.12 LAND MONUMENTS

The Contractor shall preserve existing City, County, State and Federal land monuments where possible. If it is necessary to disturb a monument, the Contractor shall notify the appropriate City, County, State, or Federal organization (to whom the monument belongs), at least forty-eight (48) hours in advance of the proposed construction.

2.13 FIELD RELOCATION

During the progress of construction, it is possible that minor relocations may be necessary. Such relocations shall be made only by direction of the Project Coordinator. Unforeseen obstructions encountered, as a result of such relocations, will not be subjects for claims for additional compensation by the Contractor (unless substantiated in writing and approved by the Company and Developer).

2.14 PRIVATE PROPERTY

- A. The Contractor shall not enter upon private property for any purpose without obtaining permission. The Contractor shall be responsible for the preservation of all public property, trees, monuments, etc., along and adjacent to the street and/or right-of-way, and shall use every precaution necessary to prevent damage to pipes, conduits, and other underground structures. The Contractor also shall protect carefully from disturbance or damage all monuments and property marks until an authorized agent has

witnessed or otherwise referenced their location and shall not remove them until directed.

- B.** The Contractor will be required to confine construction operations within the dedicated right-of ways or easement areas, unless he has made special arrangements with the affected property owners in advance. The Contractor will be required to protect stored materials, cultivated crops and trees, and other items located adjacent to the route. During all construction operations, the Contractor shall construct and maintain facilities required for access by all property owners to their property. No person shall be cut off from access to their property for a period exceeding eight (8)-hours. The Contractor shall provide for control at all times for livestock through farm areas by whatever means necessary, including temporary fencing.

2.15 UNFORESEEN DIFFICULTIES

The Contractor shall protect his work and materials from damage due to the nature of the work, the elements, carelessness of other Contractors, or from any cause whatever until the completion and acceptance of the work. All loss or damages arising out of the nature of the work to be done under the Plans and Specifications, or from any unseen obstruction or defects which may be encountered in the prosecution of the work or from the action of the elements shall be sustained by the Contractor.

2.16 CONSTRUCTION MEANS, METHODS, TECHNIQUES, AND PROCEDURES

The Contractor shall have the full power and authority to select the means, methods, techniques, and procedures necessary to perform the work covered in the Plans and Specifications. All Contractor operations shall be in strict compliance with the requirements of all local, state and federal authorities, these Specifications, and the recommended installation practices of the manufacturers supplying the Contractor's materials. The construction means, methods, techniques, and the procedures utilized shall produce a satisfactory quality of workmanship and shall be adequate to maintain the schedule of progress as required under the provisions of these Specifications.

2.17 CONTRACTOR'S TOOLS AND EQUIPMENT

The Contractor's tools and equipment used on the work covered under the Plans and Specifications shall be furnished in sufficient quantity and of a capacity and type that will safely perform the work specified. Such tools and equipment shall be maintained and used in a manner that will not create a hazard to persons or property or cause a delay in the progress of the work. The Project Coordinator shall have the right to require the removal and/or replacement of any equipment that he deems incapable of satisfactory performance.

2.18 REJECTED MATERIALS AND WORK

Any materials supplied by the Contractor which are condemned or rejected by the Project Coordinator because of nonconformity with the Plans and Specifications, shall be removed at once from the vicinity of the work by the Contractor at his own expense. These materials shall not be used further on the work. Any defective work whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause shall be removed within ten (10) days after written notice is given by the Project Coordinator, and the work shall be re-executed by the Contractor at his own expense.

2.19 UNNOTICED DEFECTS

Any defective work (or materials) furnished by the Contractor during construction and noted up through the end of the **Developer's guarantee period**, shall be removed and replaced by work (and materials) which shall conform to these Specifications. **Failure on the part of the Company to reject bad or inferior work or materials shall not be construed to imply acceptance of such work or materials.**

2.20 CUTTING AND PATCHING

The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonable implied by the Plans. Any defective work or material, performed or furnished by the Contractor, as identified by the Project Coordinator, shall be removed and replaced/patched in a manner acceptable to the Project Coordinator, at the expense of the Contractor.

2.21 RESTORATION AND CLEAN UP

- A. The Contractor shall restore or replace all removed or damaged paving, curbing, sidewalks, gutters, shrubbery, fences, sod, or other disturbed surfaces or structures in a condition equal to, or better than, that before the work began to the satisfaction of the Company and/or State Utility Inspector. The Contractor shall furnish all labor and material incidental thereof for such restoration.
- B. Contractor shall remove from Company property and from all public and private property, all temporary structures, rubbish, and waste materials resulting from his operation or caused by his employees, and shall remove all surplus materials leaving the site smooth, clean and true to line and grade.

2.22 "AS-BUILTS"

- A. Prior to Final Acceptance of all work, the Developer will be required to furnish to the Company, for its approval, a complete set of "as-built" drawings in AUTO CAD for all water main and water service work, indicating the exact location of all facilities installed

under a main extension project. Once the Company approves the “as-built” drawings, the Company shall inform the Developer of such approval.

- B.** As defined in these General Conditions of the Specifications, the Developer must submit a complete set of “as-built” drawings in AUTO CAD to the Company prior to Final Acceptance of all work.

The following information is provided for identification of water main and water service facilities and special conditions related to the construction. It is recognized that not all of the following may apply to a given specific project and/or subdivision:

Developer shall furnish the Company with accurate “as-built” drawings in AUTO CAD, acceptable to the Company, for all water main and service work simultaneously with submission of the Final (Actual) Cost Form (Section 4.2) for said project. Developer shall submit separate drawings for water main work and water service installation work, as specified below:

1. Size, Material, and Depth (if not standard) of Pipe
2. Street Names and Addresses, and Lot Numbers
3. Project and/or Subdivision Name, Phase of Construction (if applicable) and Date of Installation
4. North Arrow

Water Main drawings shall show mains, valve boxes, hydrants, and fittings. Valve boxes shall be referenced from two (2) permanent, visible objects (e.g., manhole, catch basin, fire hydrant, house foundation, transformer, etc.). Fittings and hydrants need not be referenced. Mains are to show installed footage between valves and or fittings.

Water Service drawings shall show curb boxes, lot numbers and street addresses. Curb boxes shall be referenced from two (2) permanent, visible objects (e.g., manhole, catch basin, fire hydrant, house foundation, transformer, etc.), however, curb box to curb box references are permitted, only if every other box is referenced off of at least one (1) permanent, visible object as mentioned above.

PART 3 - SAFETY AND SECURITY

3.1 RESPONSIBILITY

The Contractor will be solely and completely responsible for conditions of the job sites, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable state, county, and local laws, ordinances and codes.

3.2 COMPLIANCE

The Contractor shall comply with U.S. Department of Labor, Occupational Safety and Health Act (OSHA), the Construction Safety Act administered by the U.S. Department of Labor and the Manual of Accident Prevention in Construction published by the Associated General Contractors of America. Should the requirements of the above be in conflict with State Laws, the more stringent requirement shall be followed.

3.3 COMPETENT PERSON

The Contractor shall provide onsite a “Competent Person” responsible for worker’s safety during underground excavation in accordance with current OSHA regulations. OSHA defines a “Competent Person” as one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

3.4 FIRST AID

The Contractor shall maintain at the job site all articles necessary for giving first-aid to the injured, and shall establish the procedures for the immediate removal to a hospital or a doctor’s care of persons (including employees) who may be injured on the job site.

3.5 RESPONSIBILITY OF THE COMPANY

The duty of the Company in any review of the Contractors performance is not intended to include review of the adequacy of the Contractor’s safety measures in, on, or near the construction sites.

3.6 REPORT OF INJURIES

A. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Project Coordinator. In addition, the Contractor must promptly report in writing to the Company, all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the sites, giving full details and statements of witnesses.

- B. If any claim is made by anyone against the Contractor or any Subcontractors on account of any accident, the Contractor shall promptly report the facts to the Company, giving full details of the claim.

3.7 PUBLIC SAFETY AND CONVENIENCE

The Contractor shall comply with all rules and regulations of the City, County and State authorities regarding the closing of public streets or highways to the use of public traffic. The Contractor shall use every reasonable precaution to safeguard the persons and property of the traveling public. Whenever the Contractor's operations create a hazardous condition, he shall furnish flagmen and guards, as necessary by the Roadway Authority, to give adequate warning to the public of any dangerous conditions to be encountered.

3.8 WARNING SIGNS AND BARRICADES

The Contractor shall provide adequate signs, barricades, lights, and take all necessary precautions for the protection of the work and safety of the public. All warning signs, flashers and barricades shall conform to the provisions of the applicable Roadway Authority.

3.9 PROTECTION OF WORK AND OWNER'S PROPERTY

The Contractor shall at all times safely guard the Company's property and equipment from injury or loss. He shall, at all times, safely guard and protect his own work and that of adjacent property (as provided by law) from damage. The Contractor shall be responsible for any damage to Company property and equipment, which is a result of the Contractor's negligence.

3.10 SANITARY PROVISIONS

The Contractor shall provide and maintain such sanitary accommodations for the use of his employees and those of his Subcontractors as may be necessary to comply with the requirements and regulations of the local and State Departments of Health and as directed by the Project Coordinator.

PART 4 - SEQUENCE AND EXECUTION

4.1 PERMITS

- A. The Company shall apply for and obtain a Construction Permit from; the State of Delaware, Department of Transportation, Utility Section (DELDOT). The Developer shall be responsible for obtaining all other Permits in conjunction with rights-of-way, easements, and such other permits pertaining to occupancy and use of facilities to be constructed as required. The Contractor shall comply with all specifications or requirements as stipulated in Permits granted to the Company.

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- B.** Contractor shall apply for and obtain at his expense any special permits, including those for burning, blasting, safety, bonds, construction access, rights-of-way, material storage, and waste material disposal and all other permits and licenses necessary for construction of the facilities within the scope of this project as required by appropriate local, county, state, or federal laws and/or ordinances.

4.2 EXCAVATED MATERIAL AND BACKFILL

- A.** All clean excavated material, excluding concrete, rubble, debris, or other unsuitable, as determined by the Project Coordinator, fill material in excess of that suitable and required for backfill of the pipeline shall become the property of the Contractor. Removal and disposal of such materials shall become the responsibility of the Contractor at an off-site area. The cost of hauling excess excavated material, as herein specified, shall be included in the various applicable bid items and no separate payment will be made therefor. All unsuitable excavated material and demolition debris shall become the property of the Contractor and shall be removed from the site. The cost for removal and disposal of unsuitable material and demolition debris shall be included in the various applicable bid items and no separate payment will be made therefore.
- B.** No warranty is made as to the sufficiency of space on the site for temporary storage of backfill during construction. The Contractor shall include the cost of all required transport and offsite storage of backfill, if any, in the various applicable items. No separate payment will be made for transport or offsite storage of backfill.

4.3 DE-WATERING

- A.** The Contractor shall furnish all labor, materials, equipment, and power to remove water from the excavations for structures, sewers, and pipelines. All equipment shall be installed, operated, and maintained until all work subject to damage by the water has been completed.
- B.** All costs associated with the de-watering work shall be absorbed in the various bid items. No separate payment will be made for de-watering.

4.4 HEATING

The Contractor shall provide temporary heat whenever required, on account of work being carried on during cold weather and to prevent freezing of water pipes and other damage to work. Heat shall be furnished when and as directed by the Project Coordinator. The temporary heating facilities shall be sized to maintain a minimum temperature of 50°F without creating fire or accidental hazard, for all permanent structures before their final acceptance. The Contractor shall be responsible for all damage resulting from failure to supply temporary heat.

PART 5 - DEMOLITION & ABANDONMENT OF EXISTING UTILITIES

5.1 WATER MAINS

- A. No existing water mains shall be abandoned until the new water mains have been tested and approved as per Section 3 of these Specifications, and all service lines have been tied-in to the new water mains.
- B. The Contractor shall cap all existing water mains to be abandoned with mechanical joint end caps. Each location where an open end occurs shall be capped.

5.2 SERVICE LINES

No existing service lines shall be tied-over to new water mains until new water mains have been tested and approved as per Section 3 of these Specifications.

5.3 FIRE HYDRANTS

- A. No existing fire hydrants shall be removed until the corresponding new fire hydrant has been placed in service. No new fire hydrant shall be placed in service until the new water main to which said new hydrant is attached has been tested and approved as per Section 3 of these Specifications.
- B. Until such time as a new fire hydrant can be placed in service, the fire hydrant shall have black plastic secured about it to signify to public authorities and the Company that the subject hydrant is not-in-service.
- C. All fire hydrants to be abandoned shall require the removal of the complete fire hydrant assembly up to the existing tee off the existing water main, as a minimum. An MJ Plug shall be installed into the existing MJ Tee with proper concrete blocking.

PART 6 - INSURANCE REQUIREMENTS

6.1 INSURANCE

SCHEDULE A

The Contractor shall purchase and maintain such insurance as will protect the Contractor and the Company from claims which may arise out of or result from the Contractor's operations under this Contract, or by anyone for whose acts any of the may be liable. Such insurance shall be written for not less than the coverage and any limits of liability specified below, or as required by law, whichever is greater. By requiring insurance specified herein, the Company does not represent that such coverage and limits will necessarily be adequate to protect the

Contractor, and such coverage and limits shall not be deemed as a limitation on Contractor's liability under the indemnities or warranties granted to the Company in this Contract/Agreement.

Certificates of Insurance acceptable to the Company shall state that they are Primary Insurance and shall be filed with the Company prior to the commencement of the Work. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled until at least sixty (60) days prior written notice has been given to the Company, except ten (10) days notice for non-payment of premium. The Company shall be named as an additional insured on all policies except workers' compensation.

The Contractor shall furnish the Company with notice of all claims it receives and shall keep the Company informed as to the status of each claim.

1. Worker's Compensation:
 - (a) State: Statutory
 - (b) Applicable Federal (e.g., Longshoremen's): Statutory
 - (c) Employer's Liability: \$100,000

2. Commercial General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage; Blanket Contractual Liability, Personal Injury with Employment Exclusion deleted):
 - (a) Bodily Injury and Property Damage: Single Limit \$1,000,000
 - (b) Products and Completed Operations to be maintained for two (2) year(s) after final payment.
 - (c) Property Damage Liability Insurance shall provide X, C and U coverage as applicable.

3. Comprehensive Automobile Liability:

Bodily Injury and Property Damage: Single Limit \$1,000,000

4. Umbrella Excess Liability:

\$5,000,000 over primary insurance

5. Environmental Impairment/Pollution Liability or Contractor's Pollution Liability:

\$5,000,000

The Contractor shall pay the premiums thereon and maintain such insurance in effect until the completion of the work hereunder. Notice of expiration of any such insurance must be forwarded to SUEZ Water Delaware Inc ten (10)-days before expiration.

6.2 INDEMNITY

- A.** The Contractor shall agree to indemnify, hold harmless and defend the Company from and against any and all liability for loss, damage or expense which the Company may suffer or for which the Company may be held liable by reason of injury (including death) to any person or damage to any property arising out of or in any manner connected with the work) whether or not due in whole or in any part to any act, omission or negligence of the Company or any of its representatives or employees together with any and all attorney's fees incurred by the Company on account thereof.
- B.** The Contractor will hold harmless, indemnify and defend the Company, the Field Inspection Team, and each of their officers, employees and agents, from any and all liability claims, losses or damages arising or alleged to arise from or during the performance of the work described herein, by reason of any act or omission of the Contractor, any Subcontractor or suppliers, or any agent, employee or representative of any of them whether or not such claims, losses or damages are caused in part by a party indemnified hereunder. This indemnity applies to both active and passive acts or other conduct of the parties indemnified hereunder.

Specifications

SECTION 5 **MATERIALS**

PART 1 - GENERAL

1.1 ABBREVIATIONS

A. The following are industry abbreviations for water main and service line materials:

1. AC Asbestos Cement
2. CI Cast Iron
3. CTS Copper Tubing Size
4. DI Ductile Iron
5. IPS Iron Pipe Size
6. PE Polyethylene
7. PVC Polyvinyl Chloride

B. The following are industry abbreviations for fitting connection types:

1. Threaded and Flare Connections:
 - a. AWWA/CC AWWA Standards Thread, has steeper taper than Iron Pipe Threads
 - b. COP THRD Copper Thread on Flare Copper Connections
 - c. FIP Female Iron Pipe Thread
 - d. FL COP Flare Copper Connection
 - e. IP Iron Pipe (not threaded) for Pack Joint Connections or Female Iron Pipe Thread for Saddle Taps
 - f. MIP Male Iron Pipe Thread

2. Plastic Pipe and Tubing Connections:

- a. CTS Flexible plastic water service tubing in what is referred to as “copper tube size”; outside diameter is the same as on corresponding sizes of copper tubing.
- b. PEP Polyethylene pipe; flexible plastic water service pipe in what is referred to as “pipe size”; inside diameter is the same as on corresponding sizes of standard iron pipe.

3. Miscellaneous:

- a. DR Dimension Ratio
- b. IDR Inside Dimension Ratio
- c. PJ Pack Joint
- d. MJ Mechanical Joint
- e. FLG Flange Joint

1.2 STANDARDS

- A. All materials to be furnished for the water main relocation work shall meet the designations, as stated herein, for each component.
- B. In general, all of the materials described herein shall meet, as a minimum, the corresponding AWWA Standards, latest edition.

1.3 FURNISHING, DELIVERY, AND STORAGE

The Contractor shall furnish all materials necessary to complete this water main extension work and shall be solely responsible for their delivery and on-site storage until final acceptance of the project by the Company. The Contractor, at his expense, shall provide suitable storage for all materials, as required.

1.4 MANUFACTURERS

- A. With the exception of fire hydrants, materials may be supplied from whichever manufacturer the Contractor deems appropriate, provided all requirements of these specifications are met with the material equivalent to that particular make and model which is designated.

- B.** Should the Contractor choose to use material equivalent to that designated here, but of a different manufacturer or model, the Company reserves the right to require the Contractor to supply a letter of certification from the manufacturer supplying the material in question stating that the material is in compliance with the specifications designated herein for approval.
- C.** Designated manufacturers referred to within these specifications may be contacted as follows:
1. Ford Meter Box Company, Inc.
775 Manchester Avenue, PO Box 443
Wabash, Indiana 46992-0443
Phone (219) 563-3171
Fax (800) 826-3487

 2. Clow Valve Company (a division of McWane, Inc.)
902 South Second Street
Oskaloosa, Iowa 52577
Phone (800) 829-2569
Fax (515) 673-8269
E-mail clow@mail.kdsi.net

 3. Tyler Pipe (also known as Union/Tyler)
PO Box 2027
Tyler, Texas 75710
Phone (903) 882-5511
Fax (903) 882-2637

PART 2 - WATER PIPE

2.1 POLYVINYL CHLORIDE (PVC) PIPE

- A.** All Polyvinyl Chloride (PVC) pipe shall conform to the latest edition of ANSI/AWWA C900 and C905 with cast iron pipe O.D., for PVC Pipe. Materials from which the pipe is manufactured shall have been tested and approved for conveying potable water by the National Sanitation Foundation and the Underwriter's Laboratories, and shall be marked with the UL logo.
- B.** Pipe wall thickness shall be as required to provided a minimum wall thickness with a DR of eighteen (18) for pressure class one-hundred fifty (150) as defined in ANSI/AWWA C900.

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- C. All joints for PVC pipe shall be push-on type with integral bell and spigot pipe meeting the requirements of ASTM D-3139, except flexible elastomeric gaskets meeting the requirements of ASTM F 477.

2.2 DUCTILE IRON (DI) PIPE

- A. All Ductile Iron (DI) pipe shall conform to the latest edition of ANSI A21.51, AWWA C151, Class 350 psi.
- B. All DI pipe shall be cement mortar lined, conforming to ANSI/AWWA C104/A21.4, and shall be coated outside with a bituminous coating.
- C. All joints for DI pipe shall be push-on type conforming to ANSI/AWWA C111/A21.11.

2.3 POLYETHYLENE (PE) PIPE

- A. Polyethylene (PE) pipe, three-quarter (3/4)-inch and one (1)-inch, shall conform to AWWA C901, latest edition, providing a minimum wall thickness to meet an IDR value of seven (7) for Iron Pipe Size (IPS).
- B. Polyethylene (PE) tubing, one and 1-half (1 ½)-inch and two (2)-inch, shall conform to AWWA C901, latest edition, providing a minimum wall thickness to meet an DR value of nine (9) (Class 200 psi) for Copper Tubing Size (CTS).

2.4 STEEL CASING PIPE

- A. Steel Casing Pipe shall conform to American Society for Testing Materials (ASTM) A36 with a minimum yield stress of thirty-six thousand (36,000) psi. Steel Casing Pipe shall be sized, at a minimum, according to the water main size which it shall encase, as follows:
1. Installation of **12-inch water main** will require installation of **twenty (20)-inch diameter Steel Casing Pipe**.
 2. Installation of **eight (8)-inch water main** will require installation of **sixteen (16)-inch diameter Steel Casing Pipe**.
 3. Installation of **six (6)-inch water main** will require installation of **twelve (12)-inch diameter Steel Casing Pipe**.
 4. Installation of **four (4)-inch water main** will require installation of **ten (10)-inch diameter Steel Casing Pipe**.
- B. All Steel Casing Pipe shall have a minimum wall thickness of one-quarter (¼) of an inch.

PART 3 - VALVES

3.1 GATE AND TAPPING VALVES

- A. All Gate and Tapping Valves shall be mechanical joint resilient wedge gate valves, conforming to AWWA C509 Standards and approved by ULFM.
- B. All Gate Valves and Tapping Valves shall be **manufactured by Clow Valve Company, Models #F6100 and #F6114 respectively**, or equivalent, provided the valves meet the following specifications:
1. All Gate and Tapping Valves shall be specified, supplied, and installed with non-rotating gland pack accessories.
 2. All Gate and Tapping Valves shall have an open left non-rising stem with a two (2)-inch square operating nut with the word "Open" and an arrow cast in the metal to indicate left open. Stems shall be of cast bronze with integral collars in full compliance with AWWA. The non-rising stem stuffing box shall be the o-ring seal type with two (2) rings located above the thrust collar. The two (2) rings shall be replaceable with valve fully open and subjected to full rated working pressure.
 3. All Gate and Tapping Valves shall have a wedge of cast iron completely encapsulated with rubber. This sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429.
 4. All Gate and Tapping Valves shall have a body and bonnet coated with fusion bonded epoxy on both the interior and exterior, complying with AWWA C550 and approved by NSF 61.
 5. All Gate and Tapping Valves shall have the manufacture's name, pressure rating, and year in which it was manufactured cast on the body.
 6. Prior to shipment from factory each valve shall be tested by hydrostatic pressure equal to AWWA's requirement of twice the standards working pressure and UL/FM's requirement of four-hundred (400) psi.

3.2 BALL VALVES/CURB STOPS

- A. All Ball Valves, also known as Curb Stops, shall conform to AWWA C800 Standards.
- B. All Ball Valves shall be manufactured by Ford Meter Box Company, or equivalent, provided the valves meet the following specifications:

1. All brass components in contact with potable water shall be made from alloys with a maximum lead content of 0.25% by weight.
2. All Ball Valves shall be designed to withstand working pressures up to three-hundred (300) psi.
3. All Ball Valves shall be water tight.
4. All Ball Valves shall have a body made of heavy cast bronze.
5. All Ball Valves shall have a solid one-piece tee-head and stem with sturdy checks. Such checks shall allow for ninety (90) degree motion and be enclosed and protected.
6. All Ball Valves shall have Buna-N o-rings in the stem, which assure permanent watertight seal at top.
7. All Ball Valves shall have a spherical fluorocarbon-coated brass ball.
8. All Ball Valves shall have molded Buna-N rubber seats that support the ball.
9. All Ball Valves shall have Pack Joint (PJ) inlet and outlets (conforming to section 7.2B 1-5).

3.3 CORPORATION STOPS

- A. All Corporation Stops, also known as Corp Stops, shall conform to AWWA C800 Standards.
- B. All Corporation Stops shall be **manufactured by Ford Meter Box Company**, or equivalent, provided the Corp Stops meet the following specifications:
 1. All brass components in contact with potable water shall be made from alloys with a maximum lead content of 0.25% by weight.
 2. All Corporation Stops shall be designed to withstand working pressures up to three-hundred (300) psi.
 3. All Corporation Stops shall have a large wrench hex on the outlet.
 4. All Corporation Stops shall have Pack Joint (PJ) outlets (conforming to section 7.2B 1-5).
 5. All Corporation Stops shall have AWWA/CC Taper Thread inlets.

3.4 VALVE BOXES

- A. All Valve Boxes shall be **manufactured by Tyler Pipe, also known as Union/Tyler**, or equivalent, provided the boxes meet the following specifications:
1. All Valve Boxes shall be cast iron manufactured of clean, even grain, gray cast iron with a minimum tensile strength of twenty-one thousand (21,000) psi.
 2. All Valve Boxes shall be specified and installed complete with three pieces: a bottom section, a top section, and a lid.
 3. The bottom and top sections shall be adjustable to fit the depth of the earth cover over the valve.
 4. The Valve Box shall have a nineteen (19)-inch to twenty-two (22)-inch minimum extension, a minimum five and a quarter (5 $\frac{1}{4}$)-inch shaft, a weight of at least sixty (60) pounds, and a wall thickness of at least one-quarter ($\frac{1}{4}$) of an inch.
 5. The seating surface of both the lid cover and the top section shall be cast so that the cover will not rock after it has been seated and will fit tightly with little or no play in the fit.
 6. All Valve Boxes shall be designed so as to prevent the transmission of surface loads directly to the valve or piping.
 7. All Valve Boxes shall be smooth, true to pattern, and free from blow holes, sand holes, projections, and other harmful defects.
 8. All Valve Boxes shall have the word "WATER" cast on the lid.

3.5 CURB BOXES AND ENLARGED BASES

- A. All Curb Boxes shall be **manufactured by Tyler Pipe, also known as Union/Tyler**, or equivalent, provided the boxes meet the following specifications:
1. All Curb Boxes shall be cast iron manufactured of clean, even grain, gray cast iron with a minimum tensile strength of twenty-one thousand (21,000) psi.
 2. All Curb Boxes shall be specified and installed complete with three pieces: a bottom section, a top section, and a lid. The lid shall be supplied with a brass pentagon shaped locking bolt.
 3. The bottom and top sections shall be adjustable to fit the depth of the earth cover over the Ball Valve or Corporation Stop.

4. The Curb Box shall have a minimum two and three quarter ($2\frac{3}{4}$)-inch shaft, a weight of at least forty-one (41) pounds, and a wall thickness of at least one-quarter ($\frac{1}{4}$) of an inch.
 5. The seating surface of both the lid cover and the top section shall be cast so that the cover will not rock after it has been seated and will fit tightly with little or no play in the fit.
 6. All Curb Boxes shall be designed so as to prevent the transmission of surface loads directly to the valve or piping.
 7. All Curb Boxes shall be smooth, true to pattern, and free from blow holes, sand holes, projections, and other harmful defects.
 8. All Curb Boxes shall have the word "WATER" cast on the lid.
- B.** All Enlarged Bases for Curb Boxes shall be **manufactured by Ford Meter Box Company, model CB-7**, or equivalent, provided the enlarged bases meet the following specifications:
1. Enlarged Bases for Curb Boxes shall be cast iron manufactured of clean, even grain, gray cast iron with a minimum tensile strength of twenty-one thousand (21,000) psi.
 2. All Enlarged Bases shall be heavily coated with Asphalt-based paint.

PART 4 - FIRE HYDRANTS

4.1 FIRE HYDRANT ASSEMBLY

- A.** A Standard Fire Hydrant Assembly shall consist of, but is not limited to, the following components:
1. Distribution Main Size by six (6)-inch MJ Tee (with Retaining Gland) **See 6.1**
 2. Six (6)-inch MJ Gate Valve (with Retaining Glands) **See 3.1**
 3. Complete Valve Box **See 3.4**
 4. Minimum of three (3)-feet of six (6)-inch DI Pipe **See 2.2**
 5. Fire Hydrant (with Retaining Gland) **See 4.2**

4.2 FIRE HYDRANT

- A. All Fire Hydrants shall be dry-barrel, conforming to AWWA C502 Standards and approved by both UL and Factory Mutual Research, if available.
- B. All Fire Hydrants shall be the **Pacer Traffic Model as manufactured by Waterous Company.**
1. All Fire Hydrants to be located in New Castle County, Delaware to include; **White Clay Creek Hundred, Pencader Hundred, Red Lion Hundred, New Castle Hundred and City of Newark** service areas (i.e. Newark, New Castle, St. Georges and Delaware City) shall be specified, supplied and installed with the following:
 - a. Five and one-quarter (5¼)-inch main valve opening.
 - b. Two (2), two and one-half (2½)-inch mechanically attached hose nozzles with National Standard Threads, hose cap with one and one-half (1 ½)-inch (#5) pentagon nut.
 - c. One (1), four and one-half (4½)-inch mechanically attached steamer nozzle, also called a pumper nozzle, with National Standard Threads, hose cap with one and one-half (1 ½)-inch (#5) pentagon nut.
 - d. Six (6)-inch MJ inlet connection.
 - e. One and one-half (1 ½)-inch (#5) pentagon operating nut, open left (UL/FM Approved).
 - f. Painted yellow.
 - g. Appropriate bury to insure proper installation relative to final grade at specific point of installation. (Center of 4 ½ -inch Pumper Nozzle at 18" to 24" above finished grade)
 2. All Fire Hydrants to be located in New Castle County, Delaware to include; **Brandywine Hundred** service areas (i.e. Town of Arden, Ardencroff, Ardentown, Bellefonte, Claymont and Newport) shall be specified, supplied, and installed with the following:
 - a. Five and one-quarter (5¼)-inch main valve opening.
 - b. Two (2), two and one-half (2½)-inch mechanically attached hose nozzles with National Standard Threads, hose cap with one and one-eighth (1 1/8)-inch (#2) pentagon nut. Waterous Template # TP-7532.

- c. One (1), four and one-half (4½)-inch mechanically attached steamer nozzle, also called a pumper nozzle, with non-standard threads (five and one-quarter (5 1/4)-inch outside diameter, five (5) threads per inch, and hose cap with one and one-eighth (1 1/8)-inch (#2) pentagon nut. Waterous Template # TP-50508.
- d. Six (6)-inch MJ inlet connection.
- e. One and one-eighth (1 1/8)-inch (#2) pentagon operating nut, open right (Not UL/FM Approved).
- f. Painted yellow.
- g. Appropriate bury to insure proper installation relative to final grade at specific point of installation.(Center of 4 ½ -inch Pumper Nozzle at 18” to 24” above finished grade)

PART 5 - TAPPING SLEEVES AND SADDLES

5.1 TAPPING SLEEVES

- A. All Tapping Sleeves shall be the **FAST model as manufactured by Ford Meter Box Company**, or equivalent, provided the sleeves meet the following specifications:
 - 1. All Tapping Sleeves shall be rated for a working pressure of one-hundred fifty (150) psi.
 - 2. All Tapping Sleeves shall have a gridded virgin SBR compounded gasket that meets ASTM D2000-80M 4AA607 standards. Gasket shall be fully within sleeve to provide three-hundred sixty (360) degree pipe coverage.
 - 4. All Tapping Sleeves shall have a body made of eighteen to eight (18-8) Stainless Steel with all welds fully passivated.
 - 5. All Tapping Sleeves shall have a Carbon Steel Flange that meets AWWA C207 Class D ANSI one-hundred fifty (150) drilling and ASTM A36 standards. Bolt holes shall straddle pipe centerline.
 - 6. All Tapping Sleeves shall have an outlet of eighteen to eight (18-8) Stainless Steel, Schedule ten (10) for four (4)-inch outlets or Schedule 5 for outlets larger than four (4)-inches. Outlet shall have a gasket of Buna-N.
 - 7. All Tapping Sleeves shall have a three-quarter (¾)-inch water works brass test plug with standard square head.

8. All Tapping Sleeves shall have bolts with eighteen to eight (18-8) Stainless Steel NC threads and heavy hex nuts and washers with fluorocarbon coatings.
9. All Tapping Sleeves shall have a lifter bar of eighteen to eight (18-8) Stainless Steel.
10. All Tapping Sleeves shall have heavy gauge eighteen to eight (18-8) Type 304 Stainless Steel Armors bonded to gasket in order to bridge the gap between lugs.
11. All Tapping Sleeves shall be sized according to the O. D. range of the water main to be tapped and for the size of tapping valve to be installed.

5.2 TAPPING SADDLES

All Tapping Saddles shall be the **FS202 model as manufactured by Ford Meter Box Company**, or equivalent, provided the saddles meet the following specifications:

1. All Tapping Saddles shall have closed lugs on one (1) side of the saddle to allow pre-assembly of the saddle straps to facilitate installation.
2. All Tapping Saddles shall have eighteen to eight (18-8) Stainless Steel banding with a total width of at least three and one-quarter (3¼) inches.
3. All Tapping Saddle welds shall be fully passivated for corrosion resistance.
4. All Tapping Saddles shall have a heavy duty gasket that maintains a positive seal in excess of the pipe rating.
5. All Tapping Saddles shall have AWWA/CC taper threads.
6. All Tapping Saddles shall have five-eighths ($\frac{5}{8}$)-inch bolts with eighteen to eight (18-8) Stainless Steel NC threads and five-eighths ($\frac{5}{8}$)-inch fluorocarbon coated heavy hex nuts and eighteen to eight (18-8) type 304 Stainless Steel washers.
7. All Tapping Saddles shall be sized according to the O. D. range of the water main to be tapped and for the size of corporation stop to be installed, as follows.

PART 6 - FITTINGS

6.1 MECHANICAL JOINT (MJ) FITTINGS

- A. All Fittings shall be Mechanical Joint (MJ) unless otherwise indicated by the Plans and Specifications.

B. Mechanical Joint (MJ) Fittings shall include, but are not limited to, the following items:

1. Quarter (90 degree) Bends
2. Eighth (45 degree) Bends
3. Sixteenth (22½ degree) Bends
4. Thirty-Second (11¼ degree) Bends
5. Crosses
6. End Caps
7. End Caps tapped two (2)-inches
8. Plugs
9. Plugs tapped two (2)-inches
10. Sleeves
11. Reducers
12. Tees

C. All Mechanical Joint Fittings shall be **manufactured by Tyler Pipe, also known as Union/Tyler**, or equivalent, provided the fittings meet the following specifications:

1. All Mechanical Joint Fittings shall be compact body cast ductile iron.
2. All Mechanical Joint Fittings shall conform to ANSI/AWWA Standards C153/A21.53 (current revision).
3. All Mechanical Joint Fittings shall be cast and machined allowing the bolt holes to straddle the vertical centerline.
4. All Mechanical Joint Fittings shall be furnished with high strength low alloy Cor-ten T-bolts and hex nuts or high strength ductile-iron T-head bolts and hex nuts with composition, dimensions, and threading in accordance with ANSI/AWWA C111/A21.11 (current revision).
5. All mechanical joint gaskets shall be made of SBR material in accordance with ANSI/AWWA C111/a21.11.

6. All Mechanical Joint Fittings shall be cement-lined in accordance with ANSI/AWWA C104/A21.4 (current revision).
7. All Mechanical Joint Fittings shall be pressure rated at three-hundred fifty (350) psi minimum.
8. All Mechanical Joint Fittings shall be capable of withstanding, without bursting, hydrostatic tests of three (3) times the rated working pressure.
9. All Mechanical Joint Fittings shall have wall dimensions no smaller than those shown in ANSI/AWWA C153 (current revisions).
10. All Mechanical Joint Fittings shall have distinctly cast on them the pressure rating, the nominal diameter of openings, the manufacturer's identification, the country where cast, the number of degrees or fraction of the circle, as applicable for bends, and either "Ductile-Iron" or "DI". Cast letters and figures shall be on the outside of the fitting's body.
11. All Mechanical Joint Fittings shall be specified, supplied, and installed with joint accessories as applicable.

PART 7 - COUPLINGS AND RESTRAINERS

7.1 BOLTED FLEX / TRANSITION COUPLINGS

- A. All Bolted Flex Couplings, also known as Transition Couplings, shall conform to AWWA C219-91 Standards.
- B. All Bolted Flex Couplings shall be **manufactured by Ford Meter Box Company**, or equivalent, provided the Bolted Flex Couplings meet the following specifications:
 1. All Bolted Flex Couplings shall be pressure rated up to three-hundred (300) psi.
 2. All Bolted Flex Couplings shall have a center sleeve made from Ductile Iron per ASTM A536 80.
 3. All Bolted Flex Couplings shall have two (2) end rings cast from Ductile Iron as per ASTM A536 80-65-45-12. End rings shall be color coded to correspond with the appropriate gasket range for the water main O. D.

4. All Bolted Flex Couplings shall have gaskets made of SBR rubber per ASTM D2000 80M 4AA 809. All gaskets shall have size and end ring color code embossed for coordination with coupling's end rings.
5. All Bolted Flex Couplings shall have bolts and heavy hex nuts made of high strength low alloy per ASTM A242 and AWWA C111.
6. All Bolted Flex Couplings shall be supplied with a shop coat finish.

7.2 PACK JOINT COUPLINGS

- A. All Pack Joint (PJ) Couplings shall conform to AWWA C800 Standards.
- B. All Pack Joint (PJ) Couplings shall be **manufactured by Ford Meter Box Company**, or equivalent, provided the couplings meet the following specifications:
 1. All brass components in contact with potable water shall be made from alloys with a maximum lead content of 0.25% by weight.
 2. All Pack Joint (PJ) connections shall have compression nuts with Buna-N beveled and plastic anti-friction gaskets for a watertight seal.
 3. All Pack Joint (PJ) connections shall have a grooved, split clamp with a stainless steel set screw on the end of the compression nut.
 4. All Pack Joint (PJ) connections shall be installed with a stainless steel insert stiffener.
 5. All Pack Joint (PJ) connections for copper or plastic tubing (CTS) shall have a compression nut marked "CTS".
 6. All Pack Joint (PJ) connections for plastic pipe (PEP) shall have a compression nut marked "PEP".

7.3 BRASS NIPPLES

- A. All Brass Nipples shall be American-made of standard weight brass, a length of six (6)-inches, MIP threads on both ends, and shall be made from alloys with a maximum lead content of 0.25% by weight.

7.4 RESTRAINERS

JOINT RESTRAINERS

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- A. All Joint Restrainers, also known as Retainer Glands, shall be **manufactured by Ford Meter Box Company Uni-Flange 1500 model**, or equivalent, provided the restrainers meet the following specifications:
 - B. All Joint Restrainers shall be incorporated in the MJ follower gland according to applicable AWWA C111 Standards, and shall provide full circle contact and support of the pipe wall.
 - C. All Joint Restrainers shall incorporate a series of ring segments mechanically retained inside the gland housing and designed to grip the pipe wall in an even and uniform manner.
 - D. All Joint Restrainers shall have ring segments actuated by bolts with twist off heads to ensure proper installation torque is applied.
 - E. All Joint Restrainers shall incorporate the use of a safety stop on the bolts to prevent over tightening.
 - F. All parts of the Joint Restrainers shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12.
 - G. All Joint Restrainers shall have ring segments heat-treated to a minimum hardness of three-hundred seventy (370) BHN.
 - H. All Joint Restrainers shall have a water working pressure rating equivalent to the full rated pressure of the PVC pipe on which they are installed with a minimum 2:1 safety factor in any nominal pipe size.
 - I. All Joint Restrainers shall be UL Listed / FM Approved on AWWA C-900 PVC pipe.
 - J. All Joint Restrainers shall be sized for Ductile Iron Pipe O. D.

PIPE RESTRAINERS

- A. All Pipe Restrainers shall be **manufactured by Ford Meter Box Company Uni-Flange 1390 model**, or equivalent, provided the restrainers meet the following specifications:
- B. All Restrainers shall be manufactured as a split ring design with side clamping bolts and nuts.
- C. All Restrainers shall incorporate a series of machined serrations, not “as cast”, on the inside diameter to provide positive restraint, exact fit, three-hundred sixty (360) degree contact, and support of the pipe wall.

- D. All Restrainers shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12.
- E. All bolts and connecting hardware for Restrainers shall be of high strength, low alloy material in accordance with ANSI/AWWA C111/A21.11.
- F. All Restrainers shall have a water working pressure rating equivalent to the full rated pressure of the PVC pipe on which they are installed with a minimum 2:1 safety factor in any nominal pipe size.
- G. All Restrainers shall meet or exceed the requirements of Uni-B-13-94, "Recommended Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride (PVC) Pipe".
- H. All Restrainers shall be sized for PVC pipe with Ductile Iron Pipe O. D.

PART 8 – SERVICE MATERIALS

8.1 METER PITS/TILES

- A. The following Meter Pits/Tiles specifications shall apply to Non-Traffic area installations only. Installations subject to traffic loading shall be designed on a case by case basis.
- B. All Meter Pits, also known as Tiles, shall be **manufactured by ADS, Inc. or DFW Plastics, Inc.**, (in Saginaw, Texas, Ph. 817-439-3600, Fax: 817-439-3700, www.dfwplasticsinc.com), or equivalent, provided they meet the following specifications:
 - 1. All Tiles shall be manufactured of heavy-constructed plastic with a light interior color and horizontal corrugated or vertical ribbed exterior design.
 - 2. All tile bases shall have an integral 2" wide footer lip or horizontal corrugation that will prevent tile from settling.
 - 3. All Tiles shall have two (2) notches of sufficient size on their bottom edge so that tile does not rest on pipe.
 - 4. All Tiles shall be sized according to the size of meter being installed, as follows:
 - a. To install a **three-quarter (¾) or one (1)-inch meter**, Tile shall be **eighteen (18)-inch diameter by thirty-six (36)-inch minimum height**.

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- b. To install a **one and one-half (1 ½) or two (2)-inch meter**, Tile shall be **thirty-six (36)-inch diameter by thirty-six (36)-inch minimum height**.

8.2 CONCRETE METER VAULTS/CHAMBERS

- A. All Concrete Meter Vaults, if required, shall be designed on a case-by-case basis and approved by the Water Company.

8.3 METER PIT COVERS

- A. The following Meter Pit Cover specifications shall apply to Non-Traffic area installations only. Installations subject to traffic loading shall be designed on a case by case basis.
- B. All Meter Pit Covers shall be of cast iron and shall be **manufactured by Ford Meter Box Company with models as per the noted designation**, or equivalent, provided the covers meet the following specifications:
 - 1. All Meter Pit Covers shall have Locking Lids with a locking forged silicon bronze pentagon bolt in the small size, known as the standard waterworks pentagon, and with a Lifter Worm Lock.
 - 2. Meter Pit Covers shall have the manufacturer's name and the word "WATER" cast on the lid.
- C. Meter Pit Covers shall be styled and sized according to the meter size being installed, as follows:
 - 1. To install a **three-quarter (¾) or one (1)-inch meter** with an eighteen (18)-inch Pit, a Meter Pit Cover shall be as follows:
 - a. Meter Pit Cover shall consist of a top lid and a frame.
 - b. Meter Pit Cover shall be designed with an overlapping fifteen (15)-inch lid and a four (4)-inch deep frame.
 - c. Meter Pit Cover shall correspond to **Ford Meter Box Company Type "C" model number C52**.
 - 2. To install a **one and one-half (1 ½) or two (2)-inch meter** with a thirty-six (36)-inch Pit, a Meter Pit Cover shall be as follows:
 - a. Cover shall consist of a flange casting to fit on the pit, an eight (8)-inch deep ring centered in place on the flange by a circular bead, and a twenty (20)-inch top lid.

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- b. Cover shall correspond to **Ford Meter Box Company “Monitor” model number MC-36.**

8.4 ELECTRONIC READ METERS, ELECTRONIC READ METER MODULES, AND METER ADAPTERS

- A. All Electronic Read Meters, Electronic Read Meter Modules, and Meter Adapters shall be supplied and installed by Suez Water.

8.5 METER SETTING MATERIALS

COPPERSETTERS

- A. All Coppersettters shall be **manufactured by Ford Meter Box Company with models as per the noted designation**, or equivalent, provided the materials meet the following specifications:
1. All Coppersettters shall be constructed according to AWWA Standards C800 (current revision) with copper tubing.
 2. All Coppersettters shall be manufactured using lead-free solder. All brass components in contact with potable water shall be made from alloys with a maximum lead content of 0.25% by weight.
 3. All one and one-half (1 ½) and two (2)-inch Coppersettters shall have two (2) brace pipe eyelets. Upon installation, one (1), eighteen (18)-inch length of conduit pipe shall be inserted through each eyelet for stability.
 4. All three-quarter (¾) and one (1)-inch Coppersettters shall have an Angle Ball Valve Meter Inlet, with saddle nuts and threads lined up to receive meter spuds.
 5. All one and one-half (1 ½) and two (2)-inch Coppersettters shall have a Flanged Valve Meter Inlet and Outlet, with flanges lined up to receive meter spuds.
 6. All Coppersettters shall be designed without a by-pass configuration.
 7. All five-eighth by three-quarter (5/8 by ¾)-inch Coppersettters shall have Pack Joint (PJ) for plastic pipe (PEP) Inlet and Outlet, and shall correspond to **Ford Meter Box Company model number V82-W-66-33-NL.**
 8. All three-quarter (¾)-inch Coppersettters shall have Pack Joint (PJ) for plastic pipe (PEP) Inlet and Outlet, and shall correspond to **Ford Meter Box Company model number V83-W-66-33-NL.**

9. All one (1)-inch Coppersettors shall have Pack Joint (PJ) for plastic pipe (PEP) Inlet and Outlet, and shall correspond to **Ford Meter Box Company model number V84-W-66-44-NL**.
10. All one and one-half (1 ½)-inch Coppersettors shall have FIP Inlet and Outlet, and shall correspond to **Ford Meter Box Company model number VV76-18-11-66-NL**.
11. All two (2)-inch Coppersettors shall have FIP Inlet and Outlet, and shall correspond to **Ford Meter Box Company model number VV77-18-11-77-NL**.

PART 9 - BLOW-OFF ASSEMBLIES

9.1 GENERAL

- A. The following materials listings are provided as a general description of each type of Blow-Off Assembly.

9.2 TWO (2)-INCH BLOW-OFF ASSEMBLY OFF MECHANICAL JOINT (MJ) END CAP TAPPED TWO (2) INCHES

- A. Distribution Main Size Restrainer. **See 7.4**
- B. Distribution Main Size MJ End Cap tapped two (2)-inches. **See 6.1**
- C. One two (2)-inch AWWA/CC Taper Thread by CTS Ball Corporation Stop, Ford Model No. FB1000-7-NL. **See 3.3**
- D. One two (2)-inch CTS Pack Joint by CTS Pack Joint Ball Valve. Ford Model No. B44-777-NL. **See 3.2**
- E. **One two(2)-inch Ell, CTS Pack Joint by CTS Pack Joint, Ford Model No. L44-77-NL.**
- F. Two (2) Complete Valve Boxes. **See 3.4**
- G. Two (2)-inch Copper Tubing Size (CTS) Polyethylene (PE). **See 2.3**
- H. One two (2)-inch MIP by CTS Pack Joint Straight Coupling. Ford Model No. C84-77-NL. **See 7.2**

9.3 TWO (2)-INCH BLOW-OFF ASSEMBLY OFF MECHANICAL JOINT (MJ) PLUG TAPPED TWO (2) INCHES

- A. Distribution Main Size Restrainer. **See 7.4**

- B. Distribution Main Size MJ Plug tapped two (2)-inches. **See 6.1**
- C. One two (2)-inch AWWA/CC Taper Thread by CTS
Ball Corporation Stop, Ford Model No.FB1000-7-NL. **See 3.3**
- D. One two (2)-inch CTS Pack Joint by CTS Pack Joint Ball Valve.
Ford Model No. B44-777-NL. **See 3.2**
- E. **One two(2)-inch Ell, CTS Pack Joint by CTS Pack Joint,
Ford Model No. L44-77-NL.**
- F. Two (2) Complete Valve Boxes. **See 3.4**
- G. Two (2)-inch Copper Tubing Size (CTS) Polyethylene (PE). **See 2.3**
- H. One two (2)-inch MIP by CTS Pack Joint Straight Coupling.
Ford Model No. C84-77-NL. **See 7.2**

9.4 TWO (2)-INCH BLOW-OFF ASSEMBLY TAPPED OFF OF POLYVINYL CHLORIDE (PVC) OR DUCTILE IRON (DI) WATER MAIN

- A. One two (2)-inch Tapping Saddle for appropriate main size. **See 5.2**
- B. One two (2)-inch AWWA/CC Taper Thread by CTS
Ball Corporation Stop, Ford Model No.FB1000-7-NL. **See 3.3**
- C. Two (2)-inch Copper Tubing Size (CTS) Polyethylene (PE). **See 2.3**
- D. One two (2)-inch CTS Pack Joint by CTS Pack Joint Ball Valve.
Ford Model No. B44-777-NL. **See 3.2**
- E. **One two(2)-inch Ell, CTS Pack Joint by CTS Pack Joint,
Ford Model No. L44-77-NL.**
- F. Two (2) Complete Valve Boxes. **See 3.4**
- G. One two (2)-inch MIP by CTS Pack Joint Straight Coupling.
Ford Model No. C84-77-NL. **See 7.2**

Specifications

SECTION 5 INSTALLATION

PART 1 - GENERAL

1.1 PERFORMANCE OF WORK

- A. All work shall be performed in the best practices of the water utility industry and the American Water Works Association, and in accordance with all applicable Federal, State, local codes and regulations, and these Specifications along with their corresponding Plans.
- B. All preparation and inspection work shall be performed in accordance with the requirements described in these Specifications.
- C. All pipe, fittings, and accessories, including Fire Hydrant Assemblies and Blow-Off Assemblies, shall conform to the “Materials Specifications”.

1.2 MATERIAL HANDLING

- A. All materials furnished by the Contractor, including pipe, fittings, valves, hydrants, and other accessories shall at all times be handled with care to avoid damage.
- B. In loading and unloading, materials shall be lifted by hoist in such a manner as to avoid shock. Under no circumstances shall they be dropped.
- C. No damaged materials shall be installed.
- D. The Contractor shall supply proper and suitable tools and appliances for the safe and convenient cutting, handling, and laying of the pipe and fittings shall be used.
- E. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench for installation piece by piece by means of derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to the materials. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- F. All pipe delivered to jobsite shall be protected with exhaust tarps during transportation.

1.3 MATERIAL INSPECTION

- A. Before lowering any materials into the trench, all materials shall be thoroughly inspected in an appropriate manner so as to determine any defects, damage, or unsoundness of the material. Any defective, damaged, or unsound material shall be rejected.

PART 2 - EXECUTION

2.1 ALIGNMENT AND GRADE

- A. Piping shall be laid to the lines and grades of thirty-six to forty-two (36 - 42) inches of cover over the top of the pipe barrel to finished grade.
- B. Sufficient fittings shall be used where shown, primarily at connections or where grade or alignment changes require offsets greater than as recommended and approved by the pipe manufacturer.
- C. The Contractor shall use surveying instruments to maintain alignment and grade.

2.2 PROTECTION OF UNDERGROUND AND SURFACE STRUCTURES

- A. Temporary support, adequate protection, and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work shall be the responsibility of the Contractor.

2.3 EXCAVATION AND PREPARATION OF TRENCH

- A. The trench shall be dug to the alignment and depth required, but only so far in advance of pipe laying as the work permits. The trench shall be so braced and drained such that workers may perform their duties therein to avoid contamination. It is essential that the discharge from pumps be led to natural drainage channels or to drains.

B. WIDTH

1. The trench width may vary with and depend upon the depth of trench and nature of the excavated material encountered. In any case, the trench shall be of ample width to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted properly.
2. The trench width will be such that a minimum of six (6) inches will remain on either side of the pipe barrel.

C. DEPTH

1. The trench shall be excavated a minimum of three (3) inches below the grade of the bottom of the OD of the couplings, and high spots between couplings shall be leveled so as to maintain a minimum of two (2) inches under the pipe barrel.

D. SUPPORT

1. The trench shall be excavated to provide a uniform and continuous bearing and support for the pipe barrel on solid and undisturbed ground at every point between joints.

E. MAINTENANCE OF FLOWS FOR DRAINS AND SEWERS

1. Adequate provision shall be made for the flow of sewers, drains, and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored to avoid contamination.

PART 3 - LAYING OF POLYVINYL CHLORIDE (PVC) AND DUCTILE IRON (DI) WATER MAINS**3.1 PROTECTION OF PIPE**

- A. Each piece of pipe shall be thoroughly cleaned, inspected, and examined for defects before it is installed. Any lumps or projections on the face of the spigot or tongue end or the shoulder shall be cut away. Any cracked, broken, or defective piece discovered after installation shall be removed and replaced with a sound piece in a satisfactory condition at the expense of the Contractor.
- B. The interior and the ends of all pipes shall be kept free from dirt and foreign matter at all times.
- C. Pipe shall be thoroughly cleaned before it is laid and kept clean until it is accepted in the completed work.
- D. At times when pipe laying is not in progress, the open ends of the pipe or exposed fitting shall be closed off with bulkheads, and at no times shall trench water be permitted to enter the pipe or fitting.

3.2 PIPE BEDDING

- A. Pipe shall be laid on a bed of granular material equivalent to Select Material, or material approved by the Company.
- B. Bedding shall be a minimum of three (3)-inches thick below the grade of the bottom of the OD of the couplings, and shall be wide enough such that a minimum of six (6)-inches will be on either side of the pipe barrel.
- C. Where the bottom of the trench is found to be unstable, the Contractor shall excavate and remove such unstable material to the width and depth ordered by the Project Coordinator. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in layers and tamped according to the Project Coordinator's direction.

3.3 DIRECTION OF PIPE

- A. Pipe shall be laid with bell ends facing in the direction of pipe laying.

3.4 JOINTING OF PIPES

A. POLYVINYL CHLORIDE (PVC) PIPE

1. Before laying the pipes, all lumps, blisters, and foreign material shall be removed from the bell and spigot ends of each pipe.
2. The pipe ends shall then be wiped until clean and dry.
3. CONNECTING PIPE TO PIPE WITH SLIP JOINTS
 - a. After placing a length of PVC Pipe in the trench, the gasket shall be inserted in the bell or on the spigot, as appropriate. Then the spigot end of the pipe shall be properly lubricated in accordance with the manufacturer's requirements.
 - b. The spigot end shall then be centered in the bell, the pipe forced to the marks on the pipe and brought into true alignment.
4. CONNECTING PIPE TO MECHANICAL JOINT FITTINGS
 - a. After placing a length of PVC Pipe in the trench and preparing the end for a mechanical joint, the gasket shall be inserted in the bell by drawing the gland toward the bell.

- b. The bolts shall be drawn up uniformly on opposite sides of the pipe according to manufacturer's specifications.

B. DUCTILE IRON (DI) PIPE

1. Before laying the pipes, all lumps, blisters, excess coal-tar coating, and foreign material shall be removed from the bell and spigot ends of each pipe.
2. The pipe ends shall then be wire brushed and wiped until clean and dry.
3. CONNECTING PIPE TO PIPE WITH SLIP JOINTS
 - a. After placing a length of DI Pipe in the trench, the gasket shall be inserted in the bell or on the spigot, as appropriate. Then both the bell and spigot ends of the pipe, as well as the gasket, shall be properly lubricated in accordance with the manufacturer's requirements.
 - b. The spigot end shall then be centered in the bell, the pipe pushed or jacked "home" and brought into true alignment.
4. CONNECTING PIPE TO MECHANICAL JOINT FITTINGS
 - a. After placing a length of DI Pipe in the trench and preparing the end for a mechanical joint, the gasket shall be inserted in the bell by drawing the gland toward the bell.
 - b. The bolts shall be drawn up uniformly on opposite sides of the pipe according to manufacturer's specifications.

3.5 DEFLECTION OF JOINTS

- A.** Whenever necessary to deflect pipe from a straight line, either in the vertical or horizontal plane to avoid obstructions, to plumb stems, or for other reasons, the degree of deflection shall not exceed the maximum allowable deflection as per the manufacturer's specifications and as approved by SWDE.
- B.** Wherever the change in alignment exceeds the amount achievable by deflecting the pipe in accordance with the manufacturer's specifications, DI Bends of smallest degree possible and applicable shall be installed. See "Materials Specifications," Part 6.1, for further description of these fittings.

3.6 DISINFECTION OF PIPE

A. CONSTRUCTION OF NEW MAINS

The “Tablet Method” from AWWA C651-92, Standard for Watermain Disinfection, imparts an average chlorine dose of 25 mg/l. Procedures for this method shall be utilized for the disinfection of new watermains as follows.

1. During construction, calcium hypochlorite granules are to be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at five-hundred (500)-foot intervals. The quantity of granules to be placed is based upon pipe diameter as shown in Table 1.

TABLE 1 – Calcium Hypochlorite Granule Dosage

<u>Pipe Diameter</u>	<u>Calcium Hypochlorite Granules</u>	
	<u>(oz)</u>	<u>(g)</u>
2"	0.1	3.5
4"	0.5	14.0
6"	1.0	28.0
8"	2.0	57.0
12"	4.0	113.0
>12"	8.0	227.0

2. During construction, five (5) gram calcium hypochlorite tablets are to be placed in each section of pipe. Also a tablet shall be placed in each hydrant branch, hydrant, and appurtenance. The number of tablets to be placed in each section of pipe is based upon the pipe length and diameter as shown in Table 2. Divide the tablets so there is an approximate equal number of tablets at each end of pipe. The tablets are to be attached to the top of the pipe or appurtenance with a food grade adhesive. Adhesive is to be applied only to the broadside of the tablet where it will be attached to the pipe.

TABLE 2 – Calcium Hypochlorite Tablet Quantity

<u>Pipe Diameter</u>	<u>Pipe Length</u>		
	<u>18'</u>	<u>20'</u>	<u>100'</u>
2"	-	-	1
4"	1	1	-
6"	1	1	-
8"	2	2	-
12"	4	4	-
16"	6	7	-

3.7 BACKFILL

A. INITIAL BACKFILL

1. Pipe shall be initially backfilled with Select Material, or material approved by the Project Coordinator.
2. Initial Backfill shall continue up to a grade of no less than twelve (12)-inches above the top of the OD of the couplings and hand tamped as directed by the Project Coordinator.

B. PAVED AREAS

1. TRENCH BACKFILL
 - a. Trench Backfill shall be Select Material, or other material as directed by the Project Coordinator.
 - b. Trench Backfill shall completely fill the remaining excavation up to the bottom grade of the Pavement Section as per Plans.
 - c. Backfill material must be compacted in lifts not to exceed eight (8)-inches.
2. PAVEMENT SECTION
 - a. Pavement Section shall be as per Plans.

C. GRASS AREAS

1. TRENCH BACKFILL
 - a. Trench Backfill shall be original excavated material, unless soil is unsuitable as determined by Project Coordinator.

- b. Trench Backfill shall completely fill the remaining excavation up to the bottom grade of the Topsoil Section as per Plans.

2. TOPSOIL SECTION

- a. Topsoil Section shall be as per Plans.

3.8 INSTALLATION OF TRACING WIRES

- A. Due to the insulating properties of PVC Pipe, it can not be located with electronic sensing devices. Therefore, #12 gauge, Blue Insulated Solid Wire shall be installed along with all PVC Pipe installations.

B. TRACING WIRES

1. The #12 Blue Insulated Solid Wire must be laid directly over the PVC water main. To insure that it is directly over the main and remains so during backfilling, the Wire must be attached to the PVC Pipe at regular intervals.
2. Wherever a length of Wire stops and another begins, the two ends shall be mechanically joined together by weatherproof Wire nuts.
3. At each Valve Box, a Wire lead shall be brought up to within four (4)-inches of final grade along the outside of the Valve Box. To insure that the Wire remains at this level, the Wire must be attached to the Valve Box Riser at regular intervals. Wire must be inserted into top section of the Valve Box, secured at this insertion point and extended to the top of the Valve Box.
4. Wire leads shall be brought to final grade by using Valve Boxes or Test Stations at no more than five-hundred (500)-foot intervals.

3.9 CUTTING OF NEW PIPE BEING INSTALLED

- A. Cutting of new Polyvinyl Chloride (PVC) or Ductile Iron (DI) pipe being installed, for the purpose of installing a valve, fitting, or end cap, shall be done in a neat and workmanlike manner without damage to the pipe.
- B. Wherever it is necessary to cut PVC or DI pipe, the cut end of the pipe shall be adequately beveled so as to prevent the edge of the pipe from cutting or tearing the gasket as the spigot end is inserted into the bell of the adjoining pipe or fitting.

3.10 CUTTING, CAPPING AND ABANDONING EXISTING PIPE

A. SHUT DOWN OF EXISTING MAINS

1. No existing water mains shall be abandoned until the new water mains have been tested and approved as further described within these Specifications, and all service lines have been tied-over to the new water mains.
2. All existing water mains shall be shut down, for the purpose of cutting, capping, and abandoning, by **SWDE Personnel ONLY**, in accordance with these Specifications.
3. The Contractor shall make all requests for shutting down water mains temporarily, for the purpose of cutting, capping, and abandoning, in writing to The Company a minimum of three (3) working days in advance of the desired shut down time.

B. CUTTING EXISTING WATER MAIN

1. Cutting of existing pipe, for the purpose of capping an existing water main, shall be done in a neat and workmanlike manner without damage to the pipe.
2. POLYVINYL CHLORIDE (PVC) OR DUCTILE IRON (DI) PIPE
 - a. Wherever it is necessary to cut PVC or DI Pipe, the cut end of the pipe shall be adequately beveled so as to prevent the edge of the pipe from cutting or tearing the gasket as the spigot end is inserted into the bell of the adjoining pipe or fitting.
3. ASBESTOS CEMENT (AC) PIPE
 - a. Safety shall be maintained at all times when working with and around AC water main, in accordance with OSHA regulations.
 - b. Wherever it is necessary to cut AC Pipe, the cut end of the pipe shall be adequately beveled so as to prevent the edge of the pipe from cutting or tearing the gasket as the spigot end is inserted into the bell of the adjoining pipe or fitting.
 - c. Certified Contractor shall be used for proper removal and disposal of AC Pipe, in accordance with OSHA regulations.

C. CAPPING EXISTING WATER MAIN

1. The Contractor shall cap all existing water mains to be abandoned with Mechanical Joint (MJ) End Caps. See “Materials Specifications,” Part 6.1, for further description of this fitting.
2. Where necessary, Ductile Iron (DI) / Bolted Flex Couplings, as described in the “Materials Specifications,” Part 7.1, may be used to transition the existing pipe material for accommodation of the MJ End Cap.
3. Wherever the abandoned water main is to remain in place, only a small section of the existing water main shall be cut out and removed. One (1) MJ End Cap of the same diameter as the cut pipe shall be installed on each pipe end. A piece of DI Pipe of smaller diameter than the existing water main shall be tightly wedged between the End Caps, and concrete shall be poured between the end caps. Upon hardening of the concrete, the excavation shall be properly backfilled.
4. Wherever the abandoned water main is to be removed, only one (1) MJ End Cap of the same diameter as the cut pipe shall be installed on the cut pipe end of the “live” water main. This End Cap shall be properly restrained with Thrust Blocking, as further described within these Specifications.

PART 4 – POLYETHYLENE (PE) PIPE

- 4.1 Prior to installation, all Polyethylene shall be thoroughly inspected for compliance with the “Materials Specifications”, Part 2.3, and for damage. Each length of Polyethylene shall be thoroughly cleaned, inspected, and examined for defects before it is installed. Any split or defective piece discovered after installation shall be removed and replaced with a sound piece in a satisfactory condition.
- 4.2 The interior and the ends of all Polyethylene shall be kept free from dirt and foreign matter at all times.
- 4.3 All Polyethylene shall be thoroughly cleaned before it is laid and kept clean until it is accepted in the completed work.
- 4.4 At times when installation is not in progress, any open ends of Polyethylene shall be closed off, and at no times shall trench water be permitted to enter the Polyethylene.

4.5 BEDDING, BACKFILL, TRACING WIRES, AND IDENTIFICATION RIBBON

- A. Installation of Bedding and Backfill shall be handled in the same manner as for PVC and DI Pipe as found in Parts 3.2 and 3.7, respectively, of these Specifications.
- B. Installation of Tracing Wires shall be handled in the same manner as for PVC Pipe as found in Part 3.8 of these Specifications, except that Tracing Wires shall be brought to grade along side Curb Boxes, Meter Pits and Valve Boxes.

PART 5 – INSTALLATION OF VALVES

5.1 TAPPING AND GATE VALVES

- A. Prior to installation, all MJ Tapping and Gate Valves shall be thoroughly inspected for direction of opening, number of turns to open, freedom of operation, tightness of test plugs, cleanliness of valve ports and seating surfaces, handling damage, and cracks. All valves shall open left and meet the requirements of the “Materials Specifications,” Part 3.1. Defective valves shall not be installed. Any broken or defective valve discovered after installation shall be removed and replaced with a valve in satisfactory condition at the expense of the Contractor.
- B. The interior and the openings of all MJ Tapping and Gate Valves shall be kept free from dirt and foreign matter at all times.
- C. All valves shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
- D. At times when pipe laying is not in progress, the open ends of any installed valves shall be closed off with bulkheads, and at no times shall trench water be permitted to enter the valves.
- E. All valves shall be installed above a special support, such as crushed stone, concrete pads or concrete blocks, to support the valves in such a manner that settling does not affect the pipe and valve joints.
- F. All valves shall be set truly vertical.
- G. As possible, valves shall be installed outside of paved streets, behind curb, in either grass or sidewalk.

H. TAPPING VALVES

1. Tapping Valves shall be sized in accordance with the Plans provided that the Tapping Valve does not exceed the size of the existing water main to be tapped. Should the Plans designate a Tapping Valve larger than the existing main being tapped, the Tapping Valve installed shall be of the same size as the existing main. In addition, either a second, appropriately sized, MJ Reducer shall be installed or the MJ Reducer or MJ Tee previously designated on the Plans shall be sized accordingly to fit this Tapping Valve. See "Materials Specifications," Parts 3.1 and 6.1, for further descriptions of Tapping Valves and MJ Ductile Iron Fittings, respectively.
2. All Tapping Valves shall remain in the closed position, except as necessary for flushing the water main, until such time as the corresponding water main has been accepted by the Company. At that point, the valve shall be fully opened.

I. GATE VALVES

1. All Gate Valves shall remain in the closed position, except as necessary for flushing the water main, until such time as the corresponding water main has been accepted by the Owner. At that point, the valve shall be fully opened, unless being used to separate two (2) phases of the complete water main relocation project. Once both sections are complete and have been accepted by the Company, the Gate Valve shall be opened.

5.2 BALL VALVES

- A. Prior to installation, all Ball Valves shall be thoroughly inspected for compliance with "Materials Specifications," Part 3.2, and for damage. Defective Ball Valves shall not be installed. Any broken or defective Ball Valve discovered after installation shall be removed and replaced with a Ball Valve in satisfactory condition at the expense of the Contractor.
- B. The interior and the openings of all Ball Valves shall be kept free from dirt and foreign matter at all times.
- C. All Ball Valves shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
- D. All Ball Valves shall be installed outside of pavement, in either grass or sidewalk.
- E. Ball Valves shall be sized in accordance with the Plans.

5.3 CORPORATION STOPS

- A. Prior to installation, all Corporation Stops shall be thoroughly inspected for compliance with the “Materials Specifications,” Part 3.3, and for damage. Defective Corporation Stops shall not be installed. Any broken or defective Corporation Stop discovered after installation shall be removed and replaced with a Corporation Stop in satisfactory condition at the expense of the Contractor.
- B. The interior and the openings of all Corporation Stops shall be kept free from dirt and foreign matter at all times.
- C. All Corporation Stops shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
- D. Corporation Stops shall be sized in accordance with the Plans and Details.

5.4 VALVE BOXES

- A. Prior to installation, all Complete Valve Boxes shall be thoroughly inspected to insure that all pieces fit together well and that risers extend easily. Valve Boxes shall have no blow holes, sand holes, or projections. Valve Boxes shall be inspected for their compliance with the “Materials Specifications,” Part 3.4, and for damage. Damaged Valve Boxes shall not be installed. Any broken or defective Valve Box discovered after installation shall be removed and replaced with a Valve Box in satisfactory condition at the expense of the Contractor.
- B. A Complete Valve Box shall be installed for each Tapping and Gate Valve as well as for the outlet end of each Blow-Off Assembly.
- C. Valve Box Risers shall be extended as necessary to bring the Valve Box Lid flush with final grade, whether in pavement, grass, or sidewalk.
- D. When Valve Box Risers cannot be raised high enough to meet final grade, Valve Box Extensions shall be used to bring the Valve Box Lid flush with final grade, whether in pavement, grass, or sidewalk.
- E. When installing over valves, Valve Boxes must not transmit shock or stress to the valve.
- F. When installing over valves, Valve Boxes shall be centered over the operating nut of the valve.
- G. When installing in conjunction with Blow-Off Assemblies, see Part 10.6 of these Specifications for further information.

5.5 CURB BOXES AND ENLARGED BASES

A. CURB BOXES

1. Prior to installation, all Curb Boxes shall be thoroughly inspected to insure that all pieces fit together well and that risers extend easily. Curb Boxes shall have no blow holes, sand holes, or projections. Curb Boxes shall be inspected for their compliance with the "Materials Specifications," Part 3.5, and for damage. Damaged Curb Boxes shall not be installed. Any broken or defective Curb Box discovered after installation shall be removed and replaced with a Curb Box in satisfactory condition at the expense of the Contractor.
2. A Curb Box shall be installed for each Ball Valve installed.
3. Curb Box Risers shall be extended as necessary to bring the Curb Box Lid flush with final grade, whether in grass or sidewalk.
4. Curb Boxes must not transmit shock or stress to the valve.
5. Curb Boxes shall be centered over the operating nut of the valve.

B. ENLARGED BASES

1. Enlarged Bases shall be installed with Curb Boxes when Ball Valves are greater than one (1)-inch in size.
2. When installing an Enlarged Base, base pieces of standard Curb Boxes shall have the legs cut off prior to installation so as to prevent sand or other materials from entering the Curb Box making operation of the valve difficult.

PART 6 – FIRE HYDRANT ASSEMBLIES

6.1 Fire Hydrant Assemblies are composed of several different materials which, together, make up a Fire Hydrant Assembly. For a complete listing of those other parts of a Fire Hydrant Assembly, refer to the "Materials Specifications", Part 4.1.

6.2 MECHANICAL JOINT (MJ) TEES

- A.** Fire Hydrant Assemblies shall use one (1) Mechanical Joint (MJ) Tee, located in line with the water main.

- B. All MJ Tees connected to the water main at the start of the fire hydrant lateral shall be sized to fit the main line along which the Tee will be installed and shall have a six (6)-inch outlet size.
- C. All MJ Tees shall be provided as per Part 6.1 of the “Materials Specifications.”
- D. All MJ Tees shall be installed as per Part 8 of these Specifications.

6.3 GATE VALVES AND VALVE BOXES

- A. Fire Hydrant Assemblies shall use one (1), six (6)-inch Gate Valve and one (1) complete Valve Box.
- B. All Gate Valves shall be provided as per Part 3.1 of the “Materials Specifications” and shall be installed as per Part 5.1 of these Specifications.
- C. All Valve Boxes shall be provided as per Part 3.4 of the “Materials Specifications” and installed as per Part 5.4 of these Specifications.

6.4 DUCTILE IRON (DI) PIPE

- A. Fire Hydrant Assemblies shall use a minimum of three (3)-feet of Ductile Iron (DI) Pipe. Length of pipe installed shall separate the Gate Valve from the Fire Hydrant sufficiently so as to allow easy operation of the Gate Valve using a standard valve key.
- B. All DI Pipe shall be provided as per Part 2.2 of the “Materials Specifications” and installed as per Part 3 of these Specifications.

C. BEDDING, BACKFILL AND TRACING WIRES

1. Installation of Bedding and Backfill shall be handled in the same manner as for PVC and DI Pipe as found in Parts 3.2 and 3.7, respectively, of these Specifications.
2. Installation of Tracing Wires shall be handled in the same manner as for PVC Pipe as found in Part 3.8 of these Specifications.

6.5 FIRE HYDRANTS

- A. Upon delivery to the job site, all Fire Hydrants shall be thoroughly inspected to verify compliance with Part 4.2 of the “Materials Specifications” and to check for damage. All hydrants shall be cycled to full open and closed positions to insure that no internal damage or breakage has occurred during shipment and handling.

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- All external bolts shall be checked for tightness. Damaged hydrants shall not be installed. Any broken or defective hydrant discovered after installation shall be removed and replaced with a hydrant in satisfactory condition at the expense of the Contractor.
- B.** After inspection, the hydrant shall be closed, and the outlet nozzle caps shall be replaced to prevent entry of foreign matter.
 - C.** Until installation, hydrants shall be stored with inlets facing down.
 - D.** All hydrants shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
 - E.** All hydrants shall be installed as plumb as possible.
 - F.** All hydrants shall be installed a minimum of eighteen (18)-inches and a maximum of twenty-four (24)-inches behind curb.
 - G.** The pumper outlet nozzle of the hydrant shall face the street, and shall be at a height of no less than eighteen (18)-inches and no more than twenty-four (24)-inches above final grade.
 - H.** There shall be no obstructions adjacent to the fire hydrant that prevent or retard hydrant operation or hinder removal of outlet nozzle caps.
 - I.** All hydrants shall be installed with barrel drains in the open position.
 - J.** Fire Hydrant Drainage – Fire hydrants shall be set with a drainage pit two (2)-feet in diameter and two (2)-feet deep below each hydrant. The pit shall be filled compactly with 2B stone under and around the bowl of the hydrant to a level of six (6)-inches above the waste opening.
 - K.** Fire Hydrant Foundation – Fire hydrants shall be set upon a stable foundation consisting of a stone or solid concrete block. The solid concrete block shall be at least twelve (12)-inches square by four (4)-inches thick.
 - L.** All hydrants shall have thrust blocking poured behind the boot of the hydrant, opposite the inlet opening, unless otherwise approved by the Project Coordinator. Care shall be taken to insure that the drain holes of all hydrants is not plugged or blocked by Thrust Blocking. See Plans and these Specifications for further information on Thrust Blocking for fire hydrants.
 - M.** Until such time as a new fire hydrant can be placed in service, hydrant shall have black plastic secured around it, to signify to public authorities and the Company that said hydrant is not in service.

- N. After acceptance of the corresponding water main by the Company, the fire hydrant shall be left closed and any remaining black plastic covering shall be removed. All outlet nozzle caps shall be tightened, then backed off slightly so as not to be excessively tight while still preventing their removal by hand.
- O. All dirt accumulated during installation on the exterior of the fire hydrant shall be removed.

PART 7 – TAPPING SLEEVES AND SADDLES

7.1 TAPPING SLEEVES

- A. Tapping Sleeves to be used in conjunction with Tapping Valves to tap an existing water main that is in service and under pressure without interrupting service.
- B. Care shall be taken in selecting properly sized Tapping Sleeves and corresponding gaskets to fit the size, type, and class of pipe to be tapped. As such, all water main to be tapped shall be excavated and field verified for size, type, and class where designated on the Plans prior to determining the appropriate Tapping Sleeve and gasket to be used. See Part 5.1 of the “Materials Specifications” for further description of Tapping Sleeves.
- C. Tapping Sleeves shall also be sized according to the size of Tapping Valve to be used.
- D. Prior to installation, all Tapping Sleeves shall be thoroughly inspected for compliance with Part 5.1 of the “Materials Specifications” and for damage. Defective Tapping Sleeves shall not be installed. Any damaged or defective Tapping Sleeve discovered after installation shall be removed and replaced with a Tapping Sleeve in satisfactory condition at the expense of the Contractor.
- E. The interior and the openings of all Tapping Sleeves shall be kept free from dirt and foreign matter at all times.
- F. All Tapping Sleeves shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
- G. Tapping Sleeves shall have thrust blocking poured behind the sleeve opposite the Tapping Valve to prevent possible damage to the main. See Plans and these Specifications for further information on Thrust Blocking.

7.2 TAPPING SADDLES

- A.** Tapping Saddles are to be used in conjunction with Corporation Stops to tap a water main in order to install all lines two (2)-inches and under in size.
- B.** Care shall be taken in selecting properly sized Tapping Saddles to fit the size, type, and class of pipe to be tapped. See Part 5.2 of the “Materials Specifications” for further description of Tapping Saddles.
- C.** Tapping Saddles shall also be sized according to the size of hole, or tap, desired corresponding to the size of Corporation Stop to be used.
- D.** Prior to installation, all Tapping Saddles shall be thoroughly inspected for compliance with Part 5.2 of the “Materials Specifications” and for damage. Defective Tapping Saddles shall not be installed. Any damaged or defective Tapping Saddle discovered after installation shall be removed and replaced with a Tapping Saddle in satisfactory condition at the expense of the Contractor.
- E.** The interior and the openings of all Tapping Saddles shall be kept free from dirt and foreign matter at all times.
- F.** All Tapping Saddles shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.

PART 8 - FITTINGS

8.1 FITTINGS

- A.** Prior to installation, all Fittings shall be thoroughly inspected for compliance with Part 6 of the “Materials Specifications” and for damage. Defective Fittings shall not be installed. Any damaged or defective Fitting discovered after installation shall be removed and replaced with the same type of Fitting in satisfactory condition at the expense of the Contractor.
- B.** The interior and the openings of all Fittings shall be kept free from dirt and foreign matter at all times.
- C.** All Fittings shall be thoroughly cleaned before they are installed and kept clean until they are accepted in the completed work.
- D.** At times when pipe laying is not in progress, the open ends of any installed Fittings shall be closed off with bulkheads, and at no times shall trench water be permitted to enter the Fittings.

- E. Some Fittings shall require Thrust Blocking. These Fittings are listed in Part 11.1 of these Specifications. See Plans and Part 11 of these Specifications for further information on Thrust Blocking.

PART 9 – INSTALLATION OF SERVICE ASSEMBLIES

9.1 Service Assemblies are composed of several different items which, together, make up a Service Assembly. For a complete listing of all parts of a Service Assembly, please see Part 8 of the “Materials Specifications”.

9.2 All Electronic Read Meters, Electronic Meter Read Modules, and necessary Meter Adapters for all Meter Pit Settings shall be supplied by Suez Water.

9.3 SERVICE ASSEMBLIES TWO (2) INCHES AND SMALLER

A. TAPPING SADDLES AND CORPORATION STOPS

1. Tapping Saddles are to be used in conjunction with Corporation Stops to tap a water main in order to install all service lines two (2)-inches and under in size.
2. All Tapping Saddles and Corporation Stops shall be provided in accordance with Parts 5.2 and 3.3, respectively, of the “Materials Specifications.”
3. All Tapping Saddles and Corporation Stops shall be installed in accordance with Parts 7.2 and 5.3, respectively, of these Specifications.

B. BALL VALVES, CURB BOXES, AND ENLARGED BASES

1. Ball Valves, Curb Boxes, and, as necessary, Enlarged Bases shall be installed on service lines just inside the highway right-of-way line or edge of the utility easement.
2. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 3.2 and 3.5, respectively, of the “Materials Specifications.”
3. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 5.2 and 5.5, respectively, of these Specifications.

C. POLYETHYLENE (PE) PIPE

1. All Polyethylene shall be provided in accordance with Part 2.3 of the “Materials Specifications” and installed in accordance with Part 4 of these Specifications.
2. BEDDING, BACKFILL AND TRACING WIRES.
 - a. Installation of Bedding and Backfill for Polyethylene shall be handled in the same manner as for PVC and DI Pipe as found in Parts 3.2 and 3.7, respectively, of these Specifications.
 - b. Installation of Tracing Wires for Polyethylene shall be handled in the same manner as for PVC Pipe as found in Part 3.8, of these Specifications.

D. METER PIT MATERIAL

1. Prior to installation, all Meter Pit Material, also called Tiles, shall be thoroughly inspected for compliance with Part 8.1 of the “Materials Specifications” and for damage. Each Tile shall be thoroughly cleaned, inspected, and examined for defects before it is installed. Any defective Tile discovered after installation shall be removed and replaced with a sound Tile in a satisfactory condition at the expense of the Contractor.
2. A Tile shall be installed for each service, unless otherwise designated on the Plans.
3. All Tiles shall be installed on customer’s private property just outside the highway right-of-way or utility easement area.
4. Tiles shall be centered over the Yoke or Coppersetter of the service assembly.
5. Tiles shall be thirty-six (36)-inches in height and shall be installed as necessary to bring the corresponding Meter Pit Cover flush with final grade, whether in grass or sidewalk.
6. The Inside Diameter (I.D.) of all Tiles shall be determined based on the size of meter to be installed as designated in Part 8.1.A.2 of the “Materials Specifications.”

E. METER PIT COVERS AND EXTENSION RINGS

1. Prior to installation, all Meter Pit Covers and Extension Rings shall be thoroughly inspected for compliance with Part 8.3 of the “Materials Specifications” and for damage. Any defective Cover or Ring discovered after installation shall be removed and replaced with a sound Cover or Ring in a satisfactory condition at the expense of the Contractor.
2. All Meter Pit Covers and Extension Rings shall be sized according to the size of Tile to be installed as designated in Part 8.3.B of the “Materials Specifications”.

F. METER SETTING MATERIALS

1. Prior to installation, all Meter Setting Materials shall be thoroughly inspected for compliance with the appropriate portion of Part 8.5 of the “Materials Specifications” and for damage. Any defective Meter Setting Material discovered after installation shall be removed and replaced with a sound fitting in a satisfactory condition at the expense of the Contractor.
2. All Meter Setting Materials shall be sized according to the size of meter as designated in the corresponding portion of Part 8.5 of the “Materials Specifications.”

G. COUPLINGS

1. Pack Joint Straight Couplings shall be used to tie existing service line materials to newly installed service lines.
2. Prior to installation, all Pack Joint Straight Couplings shall be thoroughly inspected for compliance with the appropriate portion of Part 7.2 of the “Materials Specifications” and for damage. Any defective Coupling discovered after installation shall be removed and replaced with a sound Coupling in a satisfactory condition at the expense of the Contractor.
3. All Couplings shall be sized according to the size and type of both the existing and the new service lines as designated in Part 7.2 of the “Materials Specifications.”

9.4 SERVICE ASSEMBLIES LARGER THAN TWO (2) INCHES

A. MECHANICAL JOINT (MJ) TEES

1. All MJ Tees connected to the water main at the start of the service shall be sized to fit the main line along which the Tee will be installed with the appropriate outlet size corresponding to the size of service line being installed.
2. All MJ Tees shall be provided as per Part 6.1 of the "Materials Specifications" and installed as per Part 8 of these Specifications.

B. GATE VALVES AND VALVE BOXES

1. Gate Valves, Valve Boxes, and, as necessary, Enlarged Bases shall be installed on service lines just inside the highway right-of-way line or edge of the utility easement.
2. All Gate Valves shall be sized according to the size of service line being installed. See Part 3.1 and Part 3.4 of the "Materials Specifications" for further description of Gate Valves and Valve Boxes.
3. Gate Valves and Valve Boxes shall be installed as per Part 5.1 and Part 5.4, of these Specifications.

C. POLYVINYL CHLORIDE (PVC) AND DUCTILE IRON (DI) PIPE

1. Services, larger than two (2)-inches, shall use either Polyvinyl Chloride (PVC) or Ductile Iron (DI) Pipe.
2. All PVC and DI Pipe shall be provided as per Parts 2.1 and 2.2, respectively, of the "Materials Specifications" and installed as per Part 3 of these Specifications.
3. BEDDING, BACKFILL AND TRACING WIRES
 - a. Installation of Bedding and Backfill shall be handled in the same manner as for PVC and DI Pipe as found in Parts 3.2 and 3.7, respectively, of these Specifications.
 - b. Installation of Tracing Wires shall be handled in the same manner as for PVC and DI Pipe as found in Part 3.8, of these Specifications.

D. CONCRETE METER VAULTS

1. All concrete Meter Vaults shall be designed and installed according to the requirements shown in the detail drawings (if required).

PART 10 - INSTALLATION OF BLOW-OFF ASSEMBLIES

10.1 Blow-Off Assemblies are composed of several different items which, together, make up a Blow-Off Assembly. For a complete listing of all parts for the Blow-Off and the initial Fitting at the beginning of the Blow-Off, please see Part 9 of the “Materials Specifications”.

10.2 2-INCH BLOW-OFF ASSEMBLIES

A. All two (2)-inch Blow-Off Assemblies may be installed off either a MJ End Cap or a MJ Plug tapped two (2)-inches or may be tapped directly off a water main using a Tapping Saddle and Corporation Stop.

B. 2-INCH BLOW-OFF ASSEMBLIES OFF TAPPED END CAPS AND PLUGS

1. All MJ End Caps or Plugs tapped two (2)-inches shall be provided as per Part 6.1 of the “Materials Specifications”, and installed as per Part 8 of these Specifications.

2. BRASS NIPPLES

- a. All two (2)-inch Blow-Off Assemblies installed off tapped End Caps and Plugs shall use a two (2)-inch Brass Nipple, six (6) inches in length.
- b. All two (2)-inch by six (6)-inch Brass Nipples shall be provided in accordance with Part 7.4 of the “Materials Specifications”.

3. BALL VALVES, CURB BOXES, AND ENLARGED BASES

- a. All two (2)-inch Blow-Off Assemblies installed off tapped End Caps and Plugs shall use a two (2)-inch FIP by Pack Joint (PJ) CTS Ball Valve with a Curb Box and Enlarged Base.
- b. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 3.2 and 3.5, respectively, of the “Materials Specifications”.

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- c. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 5.2 and 5.5, respectively, of these Specifications.

C. TWO (2)-INCH BLOW-OFF ASSEMBLIES TAPPED OFF WATER MAINS

1. All Tapping Saddles and Corporation Stops shall be provided as per Parts 5.2 and 3.3, respectively, of the “Materials Specifications”, and installed in accordance with Parts 7.2 and 5.3, respectively, of these Specifications.
2. BALL VALVES, CURB BOXES AND ENLARGED BASES
 - a. All two (2)-inch Blow-Off Assemblies installed off tapped End Caps and Plugs shall use a two (2)-inch CTS by CTS Ball Valve with a Curb Box and Enlarged Base.
 - b. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 3.2 and 3.5, respectively, of the “Materials Specifications”.
 - c. All Ball Valves, Curb Boxes, and Enlarged Bases shall be installed in accordance with Parts 5.2 and 5.5, respectively, of these Specifications.

10.3 POLYETHYLENE (PE) PIPE

- A. All Blow-Off Assemblies shall use CTS Polyethylene.
- B. All CTS Polyethylene shall be provided in accordance with Part 2.3 of the “Materials Specifications” and installed in accordance with Part 4 of these Specifications.
- C. For Blow-Off Assemblies, all Polyethylene shall be installed such that the end is within the grassy area of the right-of-way, as possible. Where the Blow-Off Assembly can not be installed in the grassy area, the Polyethylene end shall be installed in sidewalk. Blow-Off Assemblies shall not end in pavement, including driveways.
- D. For Blow-Off Assemblies, a weep hole shall be made in the bottom of the Polyethylene after the Ball Valve and prior to turning the CTS up towards final grade. Weep hole shall be made with a 16-penny nail, or like tool providing the same diameter hole as a 16-penny nail does.

E. BEDDING AND BACKFILL

1. Installation of Bedding and Backfill for Polyethylene shall be handled in the same manner as for PVC and DI Pipe as found in Parts 3.2 and 3.7, respectively, of these Specifications.
2. For all Blow-Off Assemblies, 2B stone (or equivalent) shall be installed in the area about the weep hole.

F. TRACING WIRES

1. Installation of Tracing Wires for Polyethylene shall be handled in the same manner as for PVC and DI Pipe as found in Part 3.8 of these Specifications.

10.4 COUPLINGS

- A. All Blow-Off Assemblies shall use CTS by MIP Pack Joint Straight Couplings on the ends of the CTS Polyethylene to enable SWDE to install fittings necessary to redirect the flow of water as necessary.
- B. Prior to installation, all Pack Joint Straight Couplings shall be thoroughly inspected for compliance with the appropriate portion of Part 7.2 of the “Materials Specifications” and for damage. Any defective Coupling discovered after installation shall be removed and replaced with a sound Coupling in a satisfactory condition at the expense of the Contractor.
- C. All Couplings shall be installed a maximum of three (3)-inches below the top of the Valve Box, while being low enough to allow the Valve Box Lid, at finished grade level, to seat snugly in the Valve Box Top Riser.

10.5 VALVE BOXES

- A. All Blow-Off Assemblies shall use complete Valve Boxes installed over the ends of the CTS Polyethylene to enable SWDE to access the Blow-Off while obscuring it from view and protecting it from damage.
- B. Prior to installation, all Valve Boxes shall be thoroughly inspected for compliance with Part 3.4 of the “Materials Specifications” and for damage. Any defective Valve Box discovered after installation shall be removed and replaced with a sound Valve Box in a satisfactory condition at the expense of the Contractor.
- C. All Valve Box Risers shall be extended as necessary to bring the Valve Box Lid flush with final grade, whether in grass or sidewalk.

- D. When Valve Box Risers cannot be raised high enough to meet final grade, Valve Box Extensions shall be used to bring the Valve Box Lid flush with final grade, whether in grass or sidewalk.

PART 11 – THRUST BLOCKING

11.1 LOCATIONS

- A. Thrust blocks shall be placed at Bends, Crosses, End Caps, Tapped End Caps, Plugs, Tapped Plugs, Tees, and Hydrants.
- B. Thrust Blocking shall be placed between the undisturbed ground and the fitting to be anchored, such that all bearing surfaces are carried to undisturbed soil.
- C. Thrust Blocking shall be so placed that the pipe and fitting joints will be accessible to repairs.

11.2 CONCRETE

- A. Reaction or thrust blocks shall consist of concrete having a minimum twenty-eight (28) day compressive strength of not less than twenty-five hundred (2,500) pounds per square inch, which shall be supplied by the Contractor.

11.3 PLASTIC SHEETING

- A. Ten (10) mil Plastic Sheeting shall be wrapped about the fitting prior to pouring the concrete to insure that all joints and bolts can be accessed by SWDE for repair as necessary.

11.4 DIMENSIONS

- A. All Thrust Blocking shall be of minimum dimensions as shown in the Details of the Plan Sheets, when in A1 through A3, clean sand and gravel soils. Larger Thrust Blocks shall be used where poor soils, such as A4 through A8, silt, clay, muck, and peat.

11.5 ALTERNATIVES

- A. Where Thrust Blocking is not possible, joints shall be tied with two (2) three-quarter ($\frac{3}{4}$) inch rods to a restrainer on straight pipe.

PART 12 - TESTING AND ACCEPTANCE OF MAINS & APPURTENANCES

12.1 When installation has been completed, filling and flushing of mains shall be conducted by SWDE personnel.

12.2 HYDROSTATIC PRESSURE TESTING

A. Upon completion of the water main installation, the Contractor shall conduct a hydrostatic pressure test at 150 psi for two (2) hours.

B. The test shall follow applicable AWWA test procedures.

C. The pump, pipe connection and all necessary apparatus except gauges shall be furnished by Contractor. All joints of testing apparatus shall be free from leaks. The Water Company will furnish all gauges for the test and Contractor will do all tapping and will furnish all necessary assistance for conducting the tests.

D. Project Coordinator must witness the test.

E. The maximum allowable leakage shall be calculated as the following formula: $L = (ND \sqrt{P}) \div 7400$, where L is the Maximum Allowable Leakage in gallons per hour, N is the Number of Joints in the Testing Line, D is the Pipe Diameter in inches, and P is the Testing Pressure in pounds per square inch (psi).

F. Each leak discovered by SWDE within two (2) years after final acceptance of the work shall be repaired by, and at the expense of, the Contractor.

12.3 FILLING AND FLUSHING OF MAINS

A. When construction is complete, the main shall be charged slowly (velocities <1 ft./sec.) to avoid dislodging and clumping the tablets at one end of the main. After the main is fully charged, the control valve is to be re-closed to isolate the new main from the active distribution system. The heavily chlorinated charge up water is to remain in the new main for twenty-four (24) hours (Forty-eight (48) hours when the water temperature is less than 41 deg. F.).

B. After the appropriate retention period, the new main is to be flushed until its chlorine concentration is no higher than that generally prevailing in the distribution system. Following bacteriological testing as described in the following section, the control valve is then to be re-closed to isolate the new main from the active distribution system.

12.4 BACTERIOLOGICAL TESTING

- A. Acceptable (negative) bacteriological sample results are to be obtained from the new main before it is permanently connected with the active distribution system. At least one (1) set of samples are to be collected from every twelve-hundred (1200)-feet of main, plus one (1) set from the end of the line, and at least one (1) set from each branch. If excessive quantities of contaminating material entered the new main, or if it was flooded by storm or accident during construction, two consecutive sets of acceptable bacteriological samples will be required where the first set of samples are from water that has stood in the new main for at least 16 hours after final flushing. The samples shall be taken at intervals of approximately two-hundred (200)-feet.

PART 13 - REMOVAL AND ABANDONMENT OF WATER MAINS, SERVICES, AND FIRE HYDRANT ASSEMBLIES

13.1 ABANDONING WATER MAINS IN PLACE

- A. No existing water mains shall be abandoned until the corresponding replacement water mains have been installed in accordance with Parts 1 through 11 and tested in accordance with Part 12 of these Specifications, **and accepted by SWDE.**
- B. No existing water mains shall be abandoned until all corresponding replacement service lines have been tied-over to the replacement water mains in accordance with Part 10 of these Specifications, with replacement water meters installed by SWDE.
- C. Existing water mains to be abandoned in place shall be cut and capped in accordance with Part 3.10 (Part 3.11, as necessary) of these Specifications.

13.2 REMOVING WATER MAINS

- A. No existing water mains shall be removed until the corresponding replacement water mains have been installed in accordance with Parts 1 through 11 and tested in accordance with Part 12 of these Specifications, **and accepted by SWDE.**
- B. No existing water mains shall be removed until all corresponding replacement service lines have been tied-over to the replacement water mains in accordance with Part 10 of these Specifications, with replacement water meters installed by SWDE.

- C. Existing water mains to be removed shall be cut in accordance with Part 3.10 (Part 3.11, as necessary) of these Specifications, with caps installed on the ends of pipe to remain in place.

13.3 REMOVAL OF EXISTING FIRE HYDRANT ASSEMBLIES

- A. No existing Fire Hydrant Assemblies shall be removed until the corresponding replacement water mains and Fire Hydrant Assemblies have been installed in accordance with Parts 1 through 11 and tested in accordance with Parts 6 and 12 of these Specifications, **and accepted by SWDE.**
- B. Existing Fire Hydrant Assemblies to be removed shall be removed up to the existing MJ Tee installed in line with the existing main being abandoned in place. When the existing connected water main is being removed, this MJ Tee shall also be removed.
- C. A MJ Plug is to be provided as per Part 6.1 of the “Materials Specifications” and installed within the existing MJ Tee according to Part 8 of these Specifications.

13.4 REMOVAL OF EXISTING SERVICE ASSEMBLIES

- A. No existing Service Assemblies shall be removed until corresponding replacement service lines have been tied-over to the replacement water mains in accordance with Part 10 of these Specifications, with replacement water meters installed by SWDE.
- B. Existing Service Assemblies to be removed shall be removed up to the existing Corporation Stop and Tapping Saddle or the existing MJ Tee at the existing main being abandoned in place.
- C. Wherever a MJ Tee from an existing service remains, a MJ Plug is to be provided as per Part 6.1 of the “Materials Specifications” and installed within the existing MJ Tee according to Part 8 of these Specifications.