



STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. Box 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

VIA WEBSITE POSTING

October 19, 2017

Contract No. T200411901.01
Federal Aid Project No. ESTP-N018(10)
US 40 / SR 72 Intersection Improvements
New Castle County

Ladies and Gentlemen:

Enclosed is Addendum No. 1 for the referenced contract consisting of the following:

1. The Bid Proposal Cover, revised, to be substituted for the same page in the Proposal.
2. The following Special Provisions have been deleted and replaced:
 - 602738 - Pages 75-78 deleted and replaced
 - 614508 - Pages 80-83 deleted and replaced with pages 80-83E
 - 617515 - Page 84 deleted and replaced
 - 708538 - Pages 89-90 deleted and replaced with pages 89-90C
3. The attached three (3) Breakout Sheets have been added to the Proposal. Breakout sheet(s) must be submitted either with your bid documents; or within seven (7) calendar days following the bid due date by the lowest Apparent bidder.

Please note the revisions listed above and submit your bid based upon this information.

Sincerely,

~signature on file~

Robert A. Kovacs
Competitively Bid Contracts Coordinator
Delaware Department of Transportation

STATE OF DELAWARE



DEPARTMENT OF TRANSPORTATION

BID PROPOSAL

for

CONTRACT T200411901.01

FEDERAL AID PROJECT NO. ESTP-N018(10)

CFDA NO. 20.205

US 40 / SR 72 Intersection Improvements

NEW CASTLE COUNTY

ADVERTISEMENT DATE: October 2, 2017

COMPLETION TIME: 1,047 Calendar Days

SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
DELAWARE DEPARTMENT OF TRANSPORTATION
AUGUST 2001

Bids will be received in the Bidder's Room at the Delaware Department of Transportation's Administration Building, 800 Bay Road, Dover, Delaware until 2:00 P.M. local time October 31, 2017

602738 - PRECAST CONCRETE RETAINING WALL

Description:

This work consists of furnishing, fabricating, and constructing complete in place the precast reinforced concrete retaining wall(s) and other associated precast structures as specified on the Plans, as described herein and as directed by the Engineer.

Materials:

1. Concrete

Concrete shall conform to Section 812 of the Standard Specifications except as amended herein. Minimum 28 days strength for precast concrete shall be 5000 psi (35 MPa). The Contractor shall develop his own concrete mix design, according to ACI 211.1-81, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, which shall be submitted to the Engineer for approval. The cement content shall not be less than 26 lb per cubic foot (415 kg per cubic meter). Portland Cement shall be Type I or Type II (ASTM C 150). In a salt water environmental Type II Cement shall be used.

2. Reinforcing Steel

Reinforcing steel shall meet the requirements of AASHTO M 31/M 31M, Grade 60 (Grade 400) (AASHTO M 31); and shall be protected with fusion bonded epoxy meeting the requirements of Section 604 of the Standard Specifications.

3. Hardware

All connection hardware shall be hot-dipped galvanized.

4. Closed-Cell Neoprene Sponge

Use elastomer conforming to ASTM D1056, Type 2, Class C.

5. Post-Tensioning Strands

Use ½" (12.7 mm) diameter, 7 wire, uncoated, low-relaxation strands for unbonded post-tensioning, conforming to AASHTO M203, Grade 270 (Grade 1860). Encase strands in polymer sheathing. Use corrosion inhibitor recommended by the manufacture between the strand and sheathing. Provide anchorages, bearing devices, fittings and couplings as shown on the plans and specified by the tendon manufacturer.

6. Joint Wrap

The external wrap shall be as per ASTM C-877.

Design:

The precast concrete retaining wall shall be constructed in accordance with the notes and details in the plans. The allowable soil bearing pressure shall be as shown on the Plans.

If structural dimensions or reinforcement differ from the Plans, the Contractor shall submit design calculations and load ratings for the changed design; and shop drawings showing all pertinent dimensions or reinforcement, reinforcement size and location to the Engineer for approval. The Precast Concrete Retaining Wall design shall be in accordance with the Delaware Department of Transportation "Bridge Design Manual", latest edition, and the AASHTO LRFD Bridge Design Specifications, latest edition. All calculations shall be certified by a registered Professional Engineer in the State of Delaware.

Fabrication Plant:

The fabrication plant for precast concrete retaining wall shall be a National Precast Concrete Association (NPCA) certified plant and pre-approved from the Department.

Fabrication:

1. General

All materials, equipment, processes of manufacture, and the finished sections, including handling, storage, and transportation, shall be subject to inspection and approval. Any defective construction, which may adversely affect the strength or performance of a section, shall be cause for rejection. Rejected sections shall be replaced at no expense to the Department.

2. Forms

The forms used shall be sufficiently rigid and accurate to maintain the retaining wall dimensions within the tolerances hereinafter specified. The retaining wall forms shall be matched so that the internal dimensions from one precast section to the next adjacent section shall not vary by more than ½" (13 mm). They shall be well constructed, carefully aligned, substantial and firm, securely braced and fastened together, sufficiently tight to prevent leakage of mortar, and strong enough to withstand the action of mechanical vibrators. All the casting surfaces shall be of a smooth material unless Plans require textured surfaces.

Form ties shall be either the threaded type or the snap-off type, so that no form wires or metal pieces will be left at the surface of the finished concrete. Corners and angles shall be mitered or rounded.

Joints between panel forms shall be made smooth and tight.

3. Curing

The retaining wall shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used for retaining wall sections:

Steam Curing - The wall sections may be low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - The wall sections may be water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used, provided moisture loss from exposed surfaces is minimized.

The maximum temperature increase or decrease shall be 40° F (22° C) per hour. The initial application of the heat shall be two hours after the final placement of concrete to allow the initial set to take place.

4. Testing Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders. Acceptance of the concrete wall sections with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of wall sections representing 10 wall sections or a single day's production, whichever is less.

During the production of the wall sections, the manufacturer shall randomly sample the concrete in accordance with AASHTO T 141. A single compressive strength sample shall consist of a minimum of 4 cylinders randomly selected for every production lot. Cylinders for compressive strength tests shall be 4" x 8" or as specified by the Engineer prepared and tested in accordance with AASHTO T 23 and T 22, respectively. For every compressive strength sample, a minimum of 2 cylinders shall be cured in the same manner as the wall sections and tested at approximately 7 days. The average

compressive strength of these cylinders will determine the initial strength of the concrete. In addition, 2 cylinders shall be cured in accordance with AASHTO T 23 and tested at 28 days. The average compressive strength of these two cylinders will determine the compressive strength of the production lot.

Acceptability by Cylinder Tests - The compressive strength of the concrete for each production lot as previously defined is acceptable when the compressive strength is equal to or greater than the design concrete strength.

When the compressive strength of any production lot is less than the design concrete strength, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his/her own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the wall sections of the production lot are acceptable. If the evidence consists of tests made on cores taken from the wall sections within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. The core holes shall be plugged and sealed by the manufacturer in a manner such that the wall section will meet all of the test requirements of this Special Provision. Wall sections so sealed shall be considered satisfactory for use.

5. Tolerances

Wall Thickness - Wall thickness shall not be less than the design dimensions by more than 5 percent. A thickness more than that required shall not be cause for rejection.

Length of Section - The under run in length shall not be more than 12"/ft (10 mm/m) of length with a maximum of 1/2" (13 mm) in any box section.

Position of Reinforcement - Clear cover shall be 2" minimum except as noted or detailed on the plans. The maximum variation in the position of the reinforcement shall be $\pm 3/8"$ (± 10 mm), except the cover over the reinforcement for the external surface of the wall shall not be less than 2" (50 mm).

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear meter. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Construction Methods:

The foundation on which the retaining wall sections are to be placed shall be a layer of the type of coarse aggregate as specified on the Plans. The bedding areas on which the coarse aggregate will be placed shall be approved by the Engineer. Coarse aggregate shall be carefully placed and tamped to form a solid, unyielding mass with the exposed surface conforming to the form and dimensions shown on the Plans.

Precast sections shall be assembled in accordance with the Plans and approved shop drawings. The wall sections shall be so formed that when they are laid together they will make a continuous line with a smooth face free of appreciable irregularities, and compatible with the permissible tolerances of this Special Provision.

Care shall be exercised to insure proper matching and aligning of joints of adjacent sections. The joints shall consist of mortar filled shear keyways. The keyway surfaces shall be given a medium abrasive grit blast, 2000 psi (14 MPa) waterblast or a thorough wire brushing at the plant within four days prior to leaving the plant. Mortar for the keyway shall be a non-shrinking, non-metallic mortar having a minimum compressive strength at 28 days of 5000 psi (35 MPa). Before applying the mortar, the surfaces shall be clean of all dirt, dust, and other foreign matter. The surfaces shall be wetted, but no free water shall be allowed to remain in the keyway. The mortar shall be prepared, placed, and cured in accordance with the manufacturer's recommendations.

The fill side of the joint shall be covered with a minimum of a 9" (225 mm) wide wrap centered on the joint unless noted otherwise on the Plans. Care shall be exercised to keep the joint wrap in its proper location during backfilling.

The wall section length shall not exceed that which permits lifting, moving, and placing of the section without any bending, distortion, or stress being induced therein. Devices or holes shall be permitted in each wall section for the purpose of handling. However, not more than four holes may be cast or drilled in each section. The holes shall be tapered unless drilled, and before backfilling, the tapered holes shall be filled with portland cement mortar, or with precast concrete plugs which shall be secured with portland cement mortar or other approved adhesive. Drilled holes shall be filled with portland cement mortar. Holes shall be covered on the fill side with the joint wrap material previously specified. This wrap shall have a minimum length and width of 9" (225 mm) or 2" beyond any edge, whichever is greater.

Method of Measurement:

The quantity of item 602738 - Precast Concrete Retaining Wall will be measured as the number of cubic yards (cubic meters) of concrete placed and accepted. The volume will be computed using the dimensions shown on the plans with no allowance for form deflection. No deduction in the computed volume of precast concrete will be made for conduits, anchors, bolts, handling devices, post-tensioning ducts, etc.

The quantity of reinforcing bar will not be measured.

Basis of Payment:

The quantity of Precast Concrete Retaining Wall will be paid for at the Contract unit price per cubic yard (cubic meter) for item 602738. Price and payment will constitute full compensation for furnishing all materials, including reinforcing bar, related to the precast retaining wall units; designing, fabricating and installing the units on site; for all labor, tools, equipment and necessary incidentals to complete the work. Price and payment will also constitute full compensation for all materials, labor, tools, equipment and incidentals necessary to construct structures associated with the retaining wall as specified on the Plans. Excavation, backfill, backfilling, and coarse aggregate will be paid separately under their respective bid items of this Contract.

1/12/15

602738 - PRECAST CONCRETE RETAINING WALL**Description:**

This work consists of furnishing all materials, fabricating, delivering, and constructing complete in place the precast reinforced concrete retaining wall(s) as shown on the Plans, as directed by the Engineer, and as required by these Special Provisions. These Special Provisions were prepared as part of Contract T200411901.01.

Materials:

1. Concrete

Concrete shall conform to Section 812 of the Standard Specifications except as amended herein. Minimum 28 days strength for precast concrete shall be 5000 psi (35 MPa). The Contractor shall develop his own concrete mix design, according to ACI 211.1-81, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, which shall be submitted to the Engineer for approval. The cement content shall not be less than 26 lb per cubic foot (415 kg per cubic meter). Portland Cement shall be Type I or Type II (ASTM C 150). In a salt water environmental Type II Cement shall be used.

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6. Joint Wrap

The external wrap shall be as per ASTM C-877.

Design:

The precast concrete retaining wall shall be constructed in accordance with the notes and details in the plans. The allowable soil bearing pressure shall be as shown on the Plans. If structural dimensions or reinforcement differ from the Plans, the Contractor shall submit design calculations and load ratings for the changed design; and shop drawings showing all pertinent dimensions or reinforcement, reinforcement size and location to the Engineer for approval.

The Precast Concrete Retaining Wall design shall be in accordance with the Delaware Department of Transportation "Bridge Design Manual", latest edition, and the AASHTO LRFD Bridge Design Specifications, latest edition. All calculations shall be certified by a registered Professional Engineer in the State of Delaware.

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The fabrication plant for precast concrete retaining wall shall be a National Precast Concrete Association (NPCA) certified plant and pre-approved from the Department.

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The forms used shall be sufficiently rigid and accurate to maintain the retaining wall dimensions within the tolerances hereinafter specified. The retaining wall forms shall be matched so that the internal dimensions from one precast section to the next adjacent section shall not vary by more than 1/2" (13 mm). They shall be well constructed, carefully aligned, substantial and firm, securely braced and fastened together, sufficiently tight to prevent leakage of mortar, and strong enough to withstand the action of mechanical vibrators. All the casting surfaces shall be of a smooth material unless Plans require textured surfaces.

Form ties shall be either the threaded type or the snap-off type, so that no form wires or metal pieces will be left at the surface of the finished concrete. Corners and angles shall be mitered or rounded.

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The retaining wall shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used for retaining wall sections:

Steam Curing - The wall sections may be low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - The wall sections may be water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used, provided moisture loss from exposed surfaces is minimized.

The maximum temperature increase or decrease shall be 40° F (22° C) per hour. The initial application of the heat shall be two hours after the final placement of concrete to allow the initial set to take place.

4. Testing Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders. Acceptance of the concrete wall sections with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of wall sections representing 10 wall sections or a single day's production, whichever is less.

During the production of the wall sections, the manufacturer shall randomly sample the concrete in accordance with AASHTO T 141. A single compressive strength sample shall consist of a minimum of 4 cylinders randomly selected for every production lot. Cylinders for compressive strength tests shall be 4" x 8" or as specified by the Engineer prepared and tested in accordance with AASHTO T 23 and T 22, respectively. For every compressive strength sample, a minimum of 2 cylinders shall be cured in the same manner as the wall sections and tested at approximately 7 days. The average compressive strength of these cylinders will determine the initial strength of the concrete. In addition, 2 cylinders shall be cured in accordance with AASHTO T 23 and tested at 28 days. The average compressive strength of these two cylinders will determine the compressive strength of the production lot.

Acceptability by Cylinder Tests - The compressive strength of the concrete for each production lot as previously defined is acceptable when the compressive strength is equal to or greater than the design concrete strength.

When the compressive strength of any production lot is less than the design concrete strength, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his/her own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the wall sections of the production lot are acceptable. If the evidence consists of tests made on cores taken from the wall sections within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. The core holes shall be plugged and sealed by the manufacturer in a manner such that the wall section will meet all of the test requirements of this Special Provision. Wall sections so sealed shall be considered satisfactory for use.

5. Tolerances

Wall Thickness - Wall thickness shall not be less than the design dimensions by more than 5 percent. A thickness more than that required shall not be cause for rejection.

Length of Section - The under run in length shall not be more than 120/ft (10 mm/m) of length with a maximum of 1/20 (13 mm) in any box section.

Position of Reinforcement - Clear cover shall be 2" minimum except as noted or detailed on the plans. The maximum variation in the position of the reinforcement shall be $\pm 3/8"$ (± 10 mm), except the cover over the reinforcement for the external surface of the wall shall not be less than 2" (50 mm).

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear meter. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Construction Methods:

The foundation on which the retaining wall sections are to be placed shall be a layer of the type of coarse aggregate as specified on the Plans. The bedding areas on which the coarse aggregate will be placed shall be approved by the Engineer. Coarse aggregate shall be carefully placed and tamped to form a solid, unyielding mass with the exposed surface conforming to the form and dimensions shown on the Plans.

Precast sections shall be assembled in accordance with the Plans and approved shop drawings. The wall sections shall be so formed that when they are laid together they will make a continuous line with a smooth face free of appreciable irregularities, and compatible with the permissible tolerances of this Special Provision.

Care shall be exercised to insure proper matching and aligning of joints of adjacent sections. The joints shall consist of mortar filled shear keyways. The keyway surfaces shall be given a medium abrasive grit blast, 2000 psi (14 MPa) waterblast or a thorough wire brushing at the plant within four days prior to leaving the plant. Mortar for the keyway shall be a non-shrinking, non-metallic mortar having a minimum compressive strength at 28 days of 5000 psi (35 MPa). Before applying the mortar, the surfaces shall be clean of all dirt, dust, and other foreign matter. The surfaces shall be wetted, but no free water shall be allowed to remain in the keyway. The mortar shall be prepared, placed, and cured in accordance with the manufacturer's recommendations.

The fill side of the joint shall be covered with a minimum of a 9" (225 mm) wide wrap centered on the joint unless noted otherwise on the Plans. Care shall be exercised to keep the joint wrap in its proper location during backfilling.

The wall section length shall not exceed that which permits lifting, moving, and placing of the section without any bending, distortion, or stress being induced therein. Devices or holes shall be permitted in each wall section for the purpose of handling. However, not more than four holes may be cast or drilled in each section. The holes shall be tapered unless drilled, and before backfilling, the tapered holes shall be filled with portland cement mortar, or with precast concrete plugs which shall be secured with portland cement mortar or other approved adhesive. Drilled holes shall be filled with portland cement mortar. Holes shall be covered on the fill side with the joint wrap material previously specified. This wrap shall have a minimum length and width of 9" (225 mm) or 2" beyond any edge, whichever is greater.

Method of Measurement:

The quantity of item 602738 - Precast Concrete Retaining Wall will be measured as the number of cubic yards (cubic meters) of concrete placed and accepted. The volume will be computed using the dimensions shown on the plans with no allowance for form deflection. No deduction in the computed volume of precast concrete will be made for conduits, anchors, bolts, handling devices, post-tensioning ducts, etc.

The quantity of reinforcing bar will not be measured.

Basis of Payment:

The quantity of Precast Concrete Retaining Wall will be paid for at the Contract unit price per cubic yard (cubic meter) for item 602738. Price and payment will constitute full compensation for furnishing all materials, including reinforcing bar, related to the precast retaining wall units; designing, fabricating and installing the units on site; for all labor, tools, equipment and necessary incidentals to complete the work. Price and payment will also constitute full compensation for all materials, labor, tools, equipment and incidentals necessary to construct structures associated with the retaining wall as specified on the Plans. Excavation, backfill, backfilling, and coarse aggregate will be paid separately under their respective bid items of this Contract.

10/17/17

614508 - WATER MAIN AND ACCESSORIES

Description:

The items shall consist of furnishing, transporting and installing the City of Wilmington water main and accessories in accordance with the locations, details and notes on the Plans, and as directed by the Engineer. The work shall be performed in accordance with these Special Provisions, Delaware Standard Specifications, and the requirements of the Standards and Specifications of the City of Wilmington. In case of conflict between these Special Provisions, Delaware Standard Specifications, and the Standards and Specifications of the City of Wilmington, the Standards and Specifications and all other requirements of the City of Wilmington shall prevail. The City of Wilmington from hereafter shall be addressed as the Owner. The existing water mains shall be abandoned or salvaged as specified on the Plans.

Materials:

All the materials including pipe, fittings, and all other accessories as listed under this Special Provisions, shall conform to the material and quality requirements of the Standards and Specifications of the Owner of the utility. The Owner shall have right to inspect and reject the materials, if his specifications requirements are not met. It is recommended that the Contractor should contact the Owner of the utility and get himself familiarized with the applicable requirements of the materials required under this contract before submitting his bid.

The contractor shall be responsible for providing materials including pipe, fittings, and all other appurtenances necessary to make permanent connections to existing utility facilities of whatever material type encountered.

Portland Cement Concrete required for the job shall be Class B, and shall conform to Section 812 of the Delaware Standard Specifications.

Special Requirements:

The Contractor's attention is directed to the following special requirements.

The owner shall have the sole right of determining at what times and in what order the Contractor shall undertake work, of making connections and modifications to the existing water system. Prior notice, a minimum of forty-eight (48) hours shall be given to the owner for inspection and supervision by the Contractor of his intention to begin work involving the water line relocations. No work shall be started by the Contractor until he has received permission from both the Engineer and the owner to proceed. The Contractor shall immediately notify both the Engineer and the owner of all delays. It is of prime importance that the Contractor, in the performance of his work, does not disrupt the operation of the existing water facilities in any manner or at any time, without the express prior approval of the owner. The Contractor shall construct, disinfect, maintain and remove, following construction, such temporary water bypasses as may be required during construction to maintain water mains in service. No separate payment shall be made for such temporary water bypasses.

The Contractor will be permitted to close down specific water mains and services for a period of time not exceeding four (4) hours after obtaining approval from the owner in order to make connections as shown on the Plans. The schedule for making connections will be so arranged that the water users will be out-of-service for a minimum period of time. The Contractor will receive no additional compensation for working during off-peak hours, including premium time charges.

Before any shutdown, as specified above, the Contractor must give the utility owner and local 911 Center and Fire Department forty-eight (48) hours notice; and the Contractor must also furnish written notice to all water users in the area, a minimum of forty-eight (48) hours in advance of the closing of any water valves which may interrupt customer water service.

Shutdowns shall not be permitted if tapping sleeves and valves are specified for making the connections.

Any and all emergency repairs required during the period of this contract shall be the responsibility of the Contractor. The owner will notify the Contractor by telecommunication and the Contractor shall be required to attend the repair immediately. In the event the owner is unable to contact the Contractor for immediate emergency repair work in length of time as determined by the owner, the owner reserves the right to attend to any or all emergency repair work, and to submit the costs of repair directly to the Contractor for complete payment.

All materials and work, or parts thereof, which are unsatisfactory as to any or all requirements of the owner or the Engineer, and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the contract, shall be in strict accordance with the Drawings, Specifications, and other Contract Documents. This guarantee shall be for a period of two years from and after the date of completion and acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee, or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the contract during such two-year period.

Construction Methods:

All work in connection with construction of water mains and water service connections shall conform to the applicable requirements of the Standard Specifications of the owner of the utility, except as modified by the Plans and these Special Provisions. In case of conflict, the Specifications of the owner of the utility shall prevail.

Excavation and Trenching - Excavation shall be performed in accordance with Section 208 - Excavation and Backfill for Pipe Trenches, except as amended herein. The bottom of the trench shall be cut true and even, so that the barrel of the pipe will have a bearing for the full length. The trenches for water mains shall be excavated to such depth as will provide pipe elevations as indicated on the Water Main Relocation Profiles. The trenches for water service connections shall be excavated to the minimum standard depth or to such depth as required to connect to existing mains or service pipes.

Payment for excavation and backfill shall be in accordance with Section 208 of the Standard Specifications.

The Engineer and the owner shall have the right to limit the amount of trench opened in advance of pipe laid, and the amount of pipe laid in advance of backfilling. They shall be empowered at any time to require the refilling of open trenches over completed pipelines, if in their judgment, such action is necessary and the Contractor shall therefore have no claims for extra compensation, even though to accomplish such refilling, he is compelled to temporarily stop excavation or other work at any place.

If work is stopped on any trench or excavation for any reason and the excavation is left open for an unreasonable length of time (in the opinion of the Engineer) in advance of construction, the Contractor shall, if so directed, refill such trench or excavation at his own expense and shall not again open said trench until he is ready to complete the work therein.

Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Subsection 107.11 of the Standard Specifications and as modified; and the trench shall be excavated an additional six inches (6") below grade. After the excavation is completed, a bed six inches (6") in depth of Borrow Type C shall be placed in the bottom of the trench, leveled off and thoroughly tamped. In absence of item for Rock Excavation under this contract, a fixed price of \$135.00 per cubic yard shall be paid for rock excavation.

Installation of Pipe and Fittings - The laying and jointing of water pipe shall be in accordance with the requirements of the owner's Specifications. All pipe and fittings shall be thoroughly cleaned before laying, and shall be kept clean until acceptance of the work. No pipe may be installed except under the supervision of the owner's inspector.

At the close of the work each day, the end of the pipe shall be tightly closed to prevent dirt, foreign substances, or small animals from entering the line until laying is again resumed.

Pipe and fittings shall be carefully handled and lowered into the trench. Special care shall be taken to make sure all pipes are well bedded on solid foundation. Any defects due to settlement shall be made good by the Contractor at his expense.

Where the manufacturer's recommended pipe joint deflection is exceeded, mechanical joint bends shall be required and installed to the satisfaction of the owner and the Engineer at no extra expense.

Thrust blocks of Portland Cement Concrete Class B of adequate size and weight shall be used on all pressure piping for all fittings and all bends including and in excess of 11 - 1/4 degrees unless specifically called for otherwise on the Plans. Thrust blocks (buttresses) shall conform to the details shown on the Plans and/or the owner's Standard Specifications. No separate payment shall be made for thrust blocks, couplings, service saddles and other required incidentals; and payments for these shall be included in water main pipes.

No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the owner or the Engineer shall deem that there is danger of frost penetration at the bottom of the excavation, unless all requirements as to the minimum length of open trench and promptness of refilling are observed.

The Contractor shall keep all excavation free from water or other liquids during the progress of the work; and backfilling of trenches shall meet the applicable requirements of Sections 208 and 210 of the Standard Specifications.

Pressure Testing - Water main relocations shall be pressure-tested by the Contractor and approved by the Engineer and the owner of the utility. All equipment and labor required to perform the tests shall be furnished by the Contractor. Testing shall be conducted as specified and as required by the owner.

Upon completion of the relocation and before connecting into the existing water main, the ends of the relocated line shall be adequately plugged and the system shall be tested at a hydrostatic pressure equal to 25% in excess of the average static head and proved tight at this pressure. Under this pressure, leakage shall be held to a maximum of seventy (70) gallons per twenty-four (24) hours per inch of diameter per mile of pipe. The Contractor shall install any taps required at all high points on the line to expel trapped air prior to the actual tests. Following the tests, all such taps shall be tightly plugged with suitable threaded brass plugs. All costs of tapping and plugging the line for this purpose shall be borne by the Contractor.

Water for testing purposes shall be furnished by the owner at the Contractor's expense. The Contractor shall furnish and install adequate pumping and gauging equipment to develop the required hydrostatic pressure and to measure the pressure and amount of water lost by leakage. Duration of the pressure test shall not be less than two (2) hours. All visible leaks shall be repaired regardless of total leakage as shown by test.

If inspection or test shows defects, including visible leaks, such defective work or material shall be replaced at the expense of the Contractor, and inspection and tests shall be repeated. All repairs shall be made with new material; failure to meet the tests specified above will be sufficient cause to reject the work until the defects are satisfactorily repaired. All expenses and costs incurred in carrying out the specified tests shall be borne by the Contractor at no extra cost to the owner or to the State and shall be included in the contract unit price per linear foot bid for the various sizes of installing water main.

Sterilization of Main - Prior to the final connection of the newly installed pipe into the existing water main, and with the plugs used in the pressure test still in place on the installed pipe, the entire installed system shall be sterilized, using one of the procedures as specified in AWWA Standard C601-54 and as required by the owner of the utility.

The Contractor shall provide an adequate blowoff for use in flushing of the main. Before the water is turned on for use by the consumer from the relocated mains, the owner will conduct bacteriological tests on water samples taken from the blowoff. All expenses incurred in the making of these tests by the owner will be borne by the Contractor. No water shall be turned on for use by the consumer from the newly installed water main until the owner gives final sanitary approval.

Before the final connection is made, all surfaces of the relocated line, and the existing water main that are to become part of the closing joint, including all gaskets and glands, shall be thoroughly cleaned, and shall be treated with a 5% solution of Sodium Hypochlorite. Extreme care is to be exercised in order to prevent the entrance of any contaminants into the main.

All expenses and cost incurred in carrying out the specified sterilization work shall be borne by the Contractor at no extra cost to the owner or the State and shall be included in the contract unit price per linear foot bid for the item Installing Water Main for the various sizes.

Abandoning and/or Removing Existing Water Mains - All existing water mains which are to be abandoned and are located within the limits of excavation shall be removed and become the property of the Contractor. Adjacent pipe openings shall be plugged as required in accordance with the Subsection 202.04 of the Standard Specifications.

Final Location Drawings - Within thirty (30) days after completion of required work, the Contractor shall submit an accurate print or prints showing the horizontal and vertical location of mains, bends and other appurtenances to the Engineer and the owner.

Method of Measurement:

The measurement of payment shall be for the installation of the materials listed in the breakout sheet in accordance with the units indicated as Each and the number of Linear Feet of pipe(s) of specified diameter(s) excluding the portion of pipe inserted inside the accessories installed in place, complete and accepted.

Basis of Payment:

The quantity of mains and accessories will be paid for at the Contract lump sum. Price and payment shall constitute full compensation for furnishing, transporting and installing the materials, concrete buttresses, pressure testing, sterilizing the water mains and connecting to the existing water main, maintaining service as required and for all labor, equipment, tools and necessary incidentals to achieve and accept operational water main.

No separate payment shall be made for salvaging or abandoning or removing and disposing of existing water mains and cost for such required work shall be incidental to the respective sizes for installing water main.

A breakout sheet attached to the Proposal lists the different elements of work or materials involved in completing this item. The Contractor shall fill in a unit price for each item and the cost (unit price times the proposed quantity). The Lump Sum cost for Item 614508, shall be derived from the total sum of the cost of all items listed. The breakout sheet shall be attached to the Bid Proposal. Failure to submit the breakout sheet with the Bid Proposal will result in the bid being declared non-responsive and rejected.

The Department reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities.

614508 WATER MAIN AND ACCESSORIES**Description:**

This work consists of furnishing, transporting, installing, and testing the proposed water service pipe, water meter vaults, and accessories in accordance with the locations, details and notes on the Plans, and as directed by the Engineer. The work shall be performed in accordance with these Special Provisions and DelDOT Standard Specifications. This work will include the supply and installation of three (3) new prefabricated concrete water meter vaults and proposed pipe connections to the existing water service. The proposed water meter and couplings will be supplied by Artesian Water Company and the Contractor shall be responsible for installing the water meter.

All coordination and requests for information shall be directed to DelDOT's Area Engineer or his/her designated representative.

A "Breakout Sheet" is included in the contract to establish unit prices for the items listed below. The total of these unit prices multiplied by the estimated quantities will establish the total Lump Sum price to be submitted with the bid. Each listed item will be measured as a unit price item in the field. The final Lump Sum payment for Item 614508 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to complete and submit the Breakout Sheet with the bid will cause the bid to be considered unresponsive.

General Requirements:

All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of DelDOT and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the contract, shall be in strict accordance with the Drawings, Specifications, and other Contract Documents. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee, or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such one year period. In addition to the one-year warranty a Maintenance Bond representing 15% of the total price bid for Item 614508 shall be furnished to the Owner upon successful completion of the item and shall be in effect for three (3) Calendar Years. All costs to provide the warranty and furnish the Bond shall be included in the Lump Sum price bid for item 614508.

Submittals:

The Contractor shall submit sources of supply and catalog cuts to DelDOT for all materials furnished as part of Item 614508 as required by DelDOT Standard Specifications, Section 106.

The Contractor shall provide DelDOT with a set of as-built drawings for the on-site water distribution system including the following:

- Manufacturer's literature on the materials installed, including piping, fittings, valves, and hydrants
- A set of drawings showing the horizontal and vertical locations of the water main, service pipes, and valves. The drawings shall be delivered to the DelDOT Area Engineer with two (2) hard copies and two (2) CDs with a Microstation (.dgn) drawing format. The Contractor shall be responsible for marking the construction drawings showing coordinates in accordance with the Delaware State Plane Coordinate System.
- A summary sheet listing the length and size of DIP water pipe installed, fittings, valves and additional items listed on the breakout sheet.

All as-built documentation shall be submitted to DelDOT within thirty (30) days after completion of the required work performed as applied for payment under this contract. If as-built documentation is not submitted to the satisfaction of the DelDOT Area Engineer within this time frame, the work will be performed by DelDOT and 10% of the cost for Item 614508 will be deducted from payments to the Contractor to cover the cost of the additional work.

Materials:

All the materials including pipe, fittings, and all other accessories as listed under this Special Provision, shall conform to the material and quality requirements of the DelDOT Standard Specifications. The Contractor shall furnish all materials and equipment necessary for the complete and satisfactory construction of the water service pipe, including but not limited to the concrete water meter vault, fire hydrant, pipe, steel casing, concrete encasement, fittings, valves, and appurtenances. The Contractor shall be responsible for verifying dimensions for all materials (valves, fittings, pipe, etc.) necessary to make permanent connections to existing utility facilities of whatever material type encountered.

The Contractor shall transport, handle, and store pipe and fittings as recommended by the manufacturer.

New pipe and fittings that are damaged before or during installation shall be repaired or replaced, as recommended by the manufacturer or required by DelDOT. The costs of such repair or replacement shall be borne by the Contractor and be accomplished prior to proceeding with the project.

The Contractor shall deliver, store and handle other materials as required to prevent damage. Materials that are damaged or lost shall be repaired or replaced by the Contractor at no additional expense to DelDOT.

A. WATER PIPE MATERIALS

All water pipe, hydrants, valves, fittings and all appurtenances shall be new materials and shall be of the type, size, strength, and quality as shown on the plans and as specified herein and/or as indicated in the Special Provisions. The contractor may be required to secure and deliver to the Engineer a written statement from the manufacturer assuring the quality and compliance to the applicable specification of all materials furnished and installed under this improvement project. This shall in no way relieve the Contractor of any responsibility as to the quality of materials furnished and installed.

For the purposes of this project all pipe and fitting material shall be ductile iron as specified herein or shown on the construction plans. All fittings and associated connections shall be furnished and installed as such, unless otherwise noted.

1. DUCTILE IRON WATER PIPE - All underground pipe shall be restrained ductile iron manufactured in accordance with the requirements of AWWA C151 and conforming to AWWA C150, minimum thickness of Class 52. The ductile iron pipe shall be centrifugally cast in lengths not less than 12 feet and no more than 20 feet, conforming to ANSI/AWWA C151/A21.51-81. The Contractor shall provide a minimum cover depth of 42 inches between finished grade and the top of the proposed pipe. All joint gaskets shall conform to the latest edition of AWWA C111 and shall be provided by the pipe manufacturer. Below grade restrained joint pipe fittings shall be TR Flex, as manufactured by United States Pipe and Foundry Company, Flex-Ring, as manufactured by American Cast Iron Pipe Company, or approved equal. All below grade mechanical joint pipe and fittings shall be restrained with ductile iron retainer glands as manufactured by EBBA Iron Inc., Tyler Union, or approved equal. All fittings shall be manufactured in accordance with the requirements of AWWA C110. Fittings shall be designed to withstand a minimum working pressure rating of 150 psi.

All pipe in the proposed concrete water meter vault, shall be flanged ductile iron and shall be furnished in accordance with ANSI A21.15 and AWWA C115. The pipe in the concrete water meter vault shall have a minimum wall thickness of Class 53, as shown in table 50.15 of ANSI/AWWA C150 A21.50-91. All joint gaskets shall conform to the latest edition of AWWA C111 and shall be provided by the pipe manufacturer. Flanged joints, spool pieces, and fittings shall be ductile iron in accordance with the latest edition of AWWA C115. Flanges shall be drilled and faced for Class 125 in accordance with ANSI B16.1. All flanged joint systems (bolts, nuts, gaskets, etc.) and installation are to be suitable for the intended service and have a minimum pressure rating of 250 psi. Flanged fittings shall be furnished in accordance with ANSI A21.10, AWWA C110, and rated for a working pressure of 150 psi.

The interior of all ductile iron pipe and fittings shall be double cement mortar lined in accordance with the requirements of ANSI/AWWA C104/121.4-80, double thickness. A bituminous seal coating shall be applied to the exterior of all pipe and fittings in accordance with AWWA C151 and shall meet EPA approval.

Where required, the Contractor shall provide ductile iron specials, which may consist of spool pieces, closures, non-standard lengths of flanged mechanical joint, spigot end, or bell end pipe, or a combination of ends and non-standard fittings. The specials shall conform in material, thickness, and finish to the pipe in which they are installed. Tapped reinforced bosses shall be provided as an integral part of pipe or pipe fittings, if required.

Each pipe delivered to the construction site shall have clearly marked the weight, class designation, and sampling period. In addition, each pipe shall have cast on the face of the bell the manufacturer's mark and the year the pipe was produced.

The Contractor shall install pipe made of virgin materials. The new pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

All standards and specifications referenced shall be the latest edition and version thereof. This includes AWWA, ASTM, ANSI, NSF and Federal specifications and standards. All construction work related to the installation of potable water pipe shall be performed by a licensed and bonded Contractor. Permits and licenses must be obtained prior to construction.

2. PIPE BEDDING MATERIAL - The pipe bedding material shall be Del. No. 57 stone in accordance with Section 813 of the DelDOT Standard Specifications with a minimum depth of six (6") inches as shown in the pipe trench details. The pipe bedding shall be installed and compacted prior to placing the proposed pipe.
3. GATE VALVES - The proposed gate valves shall be ductile iron in accordance with AWWA C509 for Resilient Wedge Gate Valves. The valves shall have a ductile iron body, bonnet, and O-ring plate and the wedge shall be completed encapsulated with resilient material. The resilient sealing material shall be permanently bonded to the wedge in accordance with ASTM D429. All internal parts shall be accessible without removing the body from the line and the waterway shall be smooth, unobstructed, and free of pockets, cavities and depressions in the seat area.

The valve body, bonnet, and O-ring shall be coated internally and externally with fusion bonded thermosetting plastic in accordance with AWWA C550 and NSF 61. Each valve shall be suitable for water working pressures of 250 psig and shall pass a hydrostatic pressure factory test for 500 psig, in accordance with AWWA C509.

The non-rising stem (NRS) assembly shall be cast bronze with integral collars with two O-ring seals above the thrust collar and one O-ring below the thrust collar. Stem O-rings shall be replaceable with valve fully opened and subjected to full operating pressure. The operation nut shall be a 2-inch square wrench nut with an arrow showing the direction of opening and the word "OPEN" cast on the flange of the opening nut.

Each valve shall have the manufacturer's name, pressure rating, and year in which it was manufactured cast in the body. The gate valves shall be Mueller A-2360-20, American 2500 series, or approved equal.

4. SLIP JOINT VALVE BOXES - Each buried gate valve shall be provided with a cast iron, two piece, adjustable, slip-type valve box. Valve boxes shall be 5 ¼-inch shaft with a round base and shall be provided with extra deep covers with the word "WATER" cast on and an arrow indicating direction of opening. The length of valve boxes and size of base shall be adjusted to suit each particular installation and shall have approximately eight (8") inches of adjustment available after setting final grade. Valve boxes shall be Mueller H-10360, Tyler Union 6855 series, or approved equal.

5. BOLTS, NUTS & RODDING - All underground installed bolts, T-bolts, nuts and any rodding required shall be stainless steel, Type 316, meeting the requirement of ASTM A-536 for all water pipe fittings including mechanical joints, hydrants, valves, tees, bends, taps, etc. No other type of bolts, nuts or rodding will be allowed unless approved in writing by the Engineer. Bolt end protection shall be provided for all exposed bolt ends both inside and outside structures. Plastic caps for all bolt end protectors shall be shop or field filled with anticorrosion compound or lubricant. Approved manufacturers shall be Sap-Seal Products, Inc., Advanced Product & Systems, Inc., or approved equal.
6. STEEL CASING PIPE - Casing pipe shall be A-53 Grade B black steel pipe with 1/2" wall thickness and shall conform to the requirements of API-5L, Grade B. Casing pipe shall be bituminous coated inside and outside and joints shall be welded in accordance with requirements of AWWA C-206. After welding or cutting the pipe, the welded and cut section shall be recoated with bituminous material to the satisfaction of the Engineer.

The carrier pipe being installed inside steel casing pipe shall be supported by casing spacers sitting on the bottom of the casing pipe or as directed by the Engineer. Casing spacer's risers and runners shall be placed in position to properly support and prevent uplift or sag of the carrier pipe within the casing and maintain a minimum clearance of 3/4-inch between the casing inside diameter and the spacer outside diameter. The spacer shall be constructed of circular, 8-inch or 12 inch wide, 14-gauge stainless steel bands, which bolt together forming a shell around the carrier pipe. All hardware shall be 304 stainless steel. The runners shall be of high pressure molded glass reinforced polymer, 2-inches wide and beveled on the ends. Casing spacers shall have excellent dielectric resistance and low moisture absorption. Casing spacers shall be injected-molded polyethylene spacers. Casing spacers shall be manufactured by Advance Products and Systems Inc., BWM Company, or approved equal.

Each end of the casing pipe shall be closed with end seals. End seals shall be 1/8" synthetic rubber tightly secured to casing and carrier pipe with type 304 stainless steel bands. End seals shall be "Model AC" manufactured by Advance Products and Systems Inc., "Pipe Seal" manufactured by BWM Company, or approved equal.

7. WATER METER VAULT - The proposed water meter vaults shall be precast reinforced Portland cement concrete (PCC), Class A (4,500 psi) in accordance with the Section 812 of the DelDOT Standard Specifications. The concrete vault shall be manufactured in accordance with the construction details and details by A.C. Miller Concrete Products, Inc., Gillespie Precast, or approved equal. The top slab, walls, and bottom slab shall be steel reinforced in accordance with manufacturer's recommendations. The exterior of the vault shall receive one heavy coat of bituminous seal coating: Koppers, Bitumastic C4-SP, Carboline, Bitumastic 300M; Tnemec 46H-413 Hi-Build; or approved equal. Minimum thickness and application shall be per the manufacturer's specifications. Coating may be shop applied to pre-cast units. If the shop applied coating is damaged during construction, a field touch-up coat shall be applied and allowed to dry prior to backfilling. The Contractor will be required to provide concrete pipe supports or pipe stands below the proposed water meter and associated appurtenances within the proposed water meter vault. Any proposed concrete pipe supports shall be Class B concrete (3,000 psi) in accordance with 812 of the Standard Specifications. The water meter vault is not required to satisfy the requirements of H-20 loading.

The top slab of the water meter vault shall be constructed with an opening to accommodate a 42"x42" aluminum dual panel access door. The dual panel access door shall be fabricated with 1/4" aluminum diamond plate that is reinforced to support a minimum live load of 300 psf and a maximum deflection that is equal to 1/150th of the span. The door and all its components shall be corrosion resistant and the operation of the door shall be unaffected by temperature. The frame shall be six (6") inches deep extruded aluminum channel-type with bend down anchor tabs around the perimeter. The hinges shall be heavy forged Type 316 stainless steel with a minimum 1/4-inch diameter Type 316 stainless steel pin. The hinges shall be designed for horizontal installation and shall be bolted to covers with tamperproof Type 316 stainless steel lock bolts and shall be bolted through the frame with Type 316 stainless steel bolts and locknuts. The door shall have a 1 1/2-inch drain coupling in the corner of the channel frame. The door shall open 90 degrees and be equipped with a hold open arm that automatically locks each cover in the open position. The door shall be constructed with the required number and size of compression spring operators enclosed in telescopic tubes to provide a smooth and controlled operation throughout the entire arc of opening and closing. All springs and spring tubes shall be Type 316 stainless steel.

A removable exterior turn/lift handle with a spring latch release shall be protected by a flush, gasketed, removable screw plug. The door shall be milled finish aluminum with bituminous coating applied to the exterior of the frame to prevent hydrolysis with the concrete vault. The access door shall be equipped with a Type 316 stainless steel slam lock with a removable key wrench and cover plug. The dual panel access door shall be a Pennsylvania Insert Corporation "Just Set", Bilco JD-AL, or an approved equal. The contractor shall comply with the manufacturer's specifications and installation instructions.

The water meter vault shall be equipped with an aluminum access ladder as shown on the construction details. The ladder shall be bolted to the concrete walls of the water meter vault with Type 316 stainless steel anchor bolts. The ladder shall be centered on the access opening and free from obstacles that will interfere with the placement of feet or hands.

Artesian Water Company (AWC) shall be responsible for supplying the proposed water meter and accessories as shown on the construction details. The Contractor shall be responsible for installing these items in the water meter vault and shall coordinate with AWC to schedule delivery to the construction site. The Contractor is responsible for supplying all necessary spool pieces (Class 53 DIP), closures, and appurtenances for successful installation.

8. TEMPORARY BYPASS PIPE, HOSE, FITTINGS AND VALVES - Any temporary bypass piping required to complete the proposed water line construction and connections to existing water service facilities shall conform to NSF 61 and withstand a minimum working pressure of 150 psi.

Special Requirements:

The Contractor's attention is directed to the following special requirements:

A. DISRUPTION OF WATER SERVICE

If temporary water service is required by the Contractor, a detailed plan with sketches shall be provided to DelDOT accounting for the means by which the Contractor proposes a temporary by-pass. This submittal must be approved prior to commencement of the temporary by-pass installation. DelDOT will permit minor interruptions to the water service to accommodate setting up of the temporary by-pass system. A minimum of forty eight (48) hours prior notice shall be given to DelDOT for inspection and supervision by the Contractor of his/her intention to begin work involving the water line relocations. No work shall be started by the Contractor until he has received permission from DelDOT to proceed. The Contractor shall immediately notify DelDOT of any delays.

The Contractor, in the performance of his/her work, shall not disrupt the operation of the existing water facilities in any manner or at any time, without the expressed prior approval of DelDOT.

The schedule for making water service connections will be arranged so that the water users will be out of service for a minimum period of time. The Contractor will receive no additional compensation for working during off peak hours, including premium time charges. The Contractor shall coordinate with the Engineer, DelDOT, and the property owners to determine the most convenient time to shut down water services if necessary.

Before any shutdown, as specified above, the Contractor must give DelDOT and the local 911 Center and Fire Department forty eight (48) hours notice.

Shutdowns shall not be permitted if tapping sleeves and valves are specified for making the connections. Artesian Water Company (AWC) will supply and install all tapping sleeves and valves for connections to the existing water main owned by AWC.

Any and all emergency repairs required during the period of this Contract shall be the responsibility of the Contractor. DelDOT will notify the Contractor by telecommunication and the Contractor shall be required to attend to the repair immediately. In the event DelDOT is unable to contact the Contractor for immediate emergency repair work in length of time as determined by DelDOT, DelDOT reserves the right to attend to any or all emergency repair work, and to submit the costs of repair directly to the Contractor for complete payment.

All materials and work, or part thereof, which are unsatisfactory as to any or all requirements of DelDOT, and/or as specified herein, shall be removed and replaced or repaired in an acceptable manner by the Contractor at his/her own expense.

The Contractor shall guarantee that all workmanship, materials, and work performed under the Contract, shall be in strict accordance with the Drawings, Specifications, Special Provisions, and other Contract Documents. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the work. The Contractor shall repair, correct or replace as required, promptly and without charge, all work, equipment and material, or parts thereof, which fail to meet the above guarantee, or which in any way fail to comply with or fail to be in strict accordance with the terms and provisions and requirements of the Contract during such two year period.

Construction Methods:

The construction of the water main shall be completed using open cut excavation.

A. WATER PIPE INSTALLATION

1. **WORKING HOURS** - DelDOT shall be notified at least 48 hours prior to commencing any work. The Contractor is subject to being shut down and or having work rejected if proper notification is not given to DelDOT. A schedule of work shall be submitted to DelDOT prior to construction defining what portions of the contract will occur at night or during the day. Changes to this schedule should be made throughout the construction and reported immediately to DelDOT. The definition of "Work" also includes the starting of equipment and the delivery of materials to the job site.
2. **INSTALLATION OF PIPE AND FITTINGS** - Water service pipe shall be placed with a minimum of 42 inches of ground cover from the top of pipe to finished grade. The laying and jointing of water pipe shall be in accordance with the requirements of DelDOT Standard Specifications and as stated herein. All pipe and fittings shall be thoroughly cleaned before laying, in accordance with AWWA Standard C601-81 or the now current standard, and shall be kept clean until acceptance of the work. No pipe may be installed except under the supervision of DelDOT's inspector.

At the close of the work each day, the end of the pipe shall be tightly closed to prevent dirt, foreign substances, or small animals from entering the line until installation is again resumed.

Pipe and fittings shall be carefully handled and lowered into the trench. Special care shall be taken to make sure all pipes are well bedded on solid foundation. Any defects due to settlement shall be made good by the Contractor at his/her expense.

Where the manufacturer's recommended pipe joint deflection is exceeded, mechanical joint bends shall be required and installed to the satisfaction of DelDOT at no extra expense.

No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when DelDOT shall deem that there is danger of frost penetration at the bottom of the excavation, unless all requirements as to the minimum length of open trench and promptness of refilling are observed. The Contractor shall keep all excavation free from water or other liquids during the progress of the work; and backfilling of trenches shall meet the applicable requirements of Sections 208 and 210 of the Standard Specifications.

Installation of ductile iron water pipe (DIP) and its appurtenances shall conform to the requirements of AWWA C600 Specifications, the Plans, Specifications and Special Provisions.

3. **PIPE LAYING AND JOINTING** - Trench excavation and bedding preparations shall proceed ahead of pipe placement so as to permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean by approved means during and after laying. The water main materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or dumped into the trench. At the time of pipe placement, the bedding conditions

shall be such as to provide uniform and continuous support for the pipe between bell holes. Bell holes shall be excavated as necessary to make the joint connections, but they shall be no larger than would be adequate to support the pipe throughout its length. No pipe material shall be laid in water or when the trench or bedding conditions are otherwise unsuitable or improper. When placement or handling precautions prove inadequate, in the Engineer's opinion, the Contractor shall provide and install suitable plugs or caps effectively closing the open ends of each pipe section before it is lowered into laying position, and they shall remain so covered until removal is necessary for connection of an adjoining unit.

Pipe jointing and installation shall be completed in accordance with manufacturer's recommendations. Cutting of pipe, where required, shall be done in a neat and workmanlike manner using an abrasive cutting wheel or other means that will produce a smooth end normal to the pipe axis with the cement lining undamaged. Cut ends shall be beveled to avoid damage to the gasket. All pipe ends shall be thoroughly cleaned prior to jointing and only approved lubricants shall be used. As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material, which shall be thoroughly compacted by tamping around the pipe to a height of at least 12 inches above its top. Any damage to the lining or exterior coating that occurs during the pipe cutting shall be repaired in the field per manufacturer's recommendations at the Contractor's expense.

The Contractor shall mechanically compact trenches in accordance with DelDOT standards. At all times when pipe laying is not in progress, including noon hour and overnight periods, all open ends of the pipe line shall be closed by watertight plugs or other means approved by the Engineer. If water is present in the trench, the seals shall remain in place until the trench is pumped completely dry. When connecting to existing stubs, the Contractor shall take every precaution necessary to prevent dirt or debris from entering the existing lines. All necessary work to make the connection shall be done at no additional compensation, except where noted otherwise.

4. EXCAVATION AND TRENCHING - Excavation shall be performed in accordance with Section 208 Excavation and Backfill for Pipe Trenches, except as amended herein. The bottom of the trench shall be carefully graded, cut true and even, so that the barrel of the pipe will have a bearing for the full length. The trenches for water mains shall be excavated to such depth as will provide pipe elevations as indicated on the water service pipe profile in the construction plans. The Contractor shall provide a bed of Del. No. 57 stone to be installed across the full width of the trench from the bottom of the pipe to a depth six (6) inches below the bottom of the pipe. Additional excavation shall be made under joints to allow for proper jointing. The trenches for water service connections shall be excavated to the minimum standard depth or to such depth as required to connect to existing mains or service pipes. Wherever the existing material at the bottom of the trench is unsuitable, as determined by the Engineer, the Contractor shall excavate and remove all unsuitable material, backfill and compact the trench bottom to the proposed grade using Del. No. 57 stone. All unsuitable excavated material shall be disposed of properly at an off-site location by the Contractor and at the Contractor's expense.

All excavation and backfill for installation of the proposed 8-inch DIP and removal of the existing water service facilities shall be completed in accordance with Section 208 and 210 of the Standard Specifications and the cost will be incidental to Item 614508.

DelDOT shall have the right to limit the amount of trench opened in advance of pipe laid, and the amount of pipe laid in advance of backfilling. They shall be empowered at any time to require the refilling of open trenches over completed pipelines, if in their judgment such action is necessary and the Contractor shall therefore have no claims for extra compensation even though to accomplish such refilling, he/she is compelled to temporarily stop excavation or other work at any place. If work is stopped on any trench or excavation for any reason and the excavation is left open for an unreasonable length of time, in the opinion of the Engineer, the Contractor shall, if so directed, refill such trench or excavation at his/her own expense and shall not again open said trench until he/she is ready to complete the work therein.

Where rock is encountered and blasting is required for trenching, all rock excavation work shall be performed in accordance with Subsection 107.08 and Section 206 of the Standard Specifications, and as modified, and the trench shall be excavated an additional six inches (6") below grade. After the excavation is completed, a bed six inches (6") in depth of Borrow Type C shall be placed in the bottom of the trench, leveled off and thoroughly tamped. In absence of an item for Rock Excavation under this contract, a fixed price of \$135.00 per cubic yard shall be paid for rock excavation.

5. CONNECTIONS TO EXISTING PIPE -Artesian Water Company (AWC) or its designated contractor shall supply and install the proposed tapping sleeve and valve for the service connection to the existing water main. The Contractor shall make the final connection to the existing on-site water service. The Contractor shall install and test the proposed D.I.P. prior to completing the final pipe connection and removing the existing water service. All closures, including connections to existing pipes, shall be mechanical joint solid sleeve with spacers in accordance with AWWA C-110. All couplings and sleeves shall be restrained manufactured by Romac Industries, Inc., American Cast Iron Pipe Company, or equal. The Contractor shall not shut off the water or operate the fire hydrants or gate valves of the existing distribution system without the expressed permission of DelDOT. In case it becomes necessary to delay the cut-off, such instructions shall be given and obeyed without recourse. In making connections to the old distribution system, valves shall be set as shown on the plan, or at such designated place as the Engineer may direct. If due to unforeseen conditions, these locations have to be changed or additional valves or fittings added, the Contractor shall install the valves or fittings at the new locations.
6. WATER TESTING - In order to assure quality materials and workmanship, the following tests shall be required. The Engineer or designee shall be present for all tests and shall be notified at least 48 hours in advance of the specific test. Testing shall be completed after all the utility pipes have been installed in the area to be tested and prior to commencement of the street construction. All tests shall be in accordance with AWWA standards or what is stated within this specification. Individuals qualified to perform and evaluate such tests shall do all testing. The Contractor shall pay for all tests required in these guidelines. Copies of the results shall be submitted to DelDOT. If inspection or test shows defects, including visible leaks, such defective work or material shall be replaced at the expense of the Contractor, and inspection and tests shall be repeated. All repairs shall be made with new material. Failure to meet the tests specified above will be sufficient cause to reject the work until the defects are satisfactorily repaired. All expenses and costs incurred in carrying out the specified tests shall be the Contractor's responsibility at no extra cost to DelDOT and shall be included in the lump sum contract price for the water service installation.
7. PRESSURE TESTING - Hydrostatic pressure testing shall conform with AWWA C600, latest revision. Pressure testing shall be performed on all pipe, valves, hydrants, and fittings. The test shall be conducted on pipe segments from shut valve to shut valve or shut valve to capped end in segments not exceeding 1,000 linear feet. The Contractor shall provide a suitable pump for applying pressure and an accurate gauge for measuring the pressure. The pipe shall be tested by applying one hundred fifty (150) pounds per square inch hydrostatic pressure for a period of four (4) hours with the DelDOT's inspector present and to the full satisfaction of the Engineer. Leakage shall not exceed 10 gallons per inch of pipe diameter per mile of pipe per 24 hours. Successful pressure testing shall be performed prior to the installation of the water meter and the Contractor shall test against blind flanges installed in the water meter vault. All defects revealed by the tests shall be corrected at the Contractor's expense. Additional tests and repairs shall be continued by the Contractor until test requirements are met. Repairs to the system shall be made with new materials. No caulking of threaded joints, cracks, or holes will be acceptable. When it is necessary to replace pieces of pipe, the replacement pipe shall be of the same material and thickness as the defective piece. All piping shall be adequately braced and supported during tests so that no movement, displacement or damage will result from the application of the test pressure. All equipment used in the testing shall be provided by the contractor.
8. DISINFECTION - The Contractor shall completely disinfect all new water service piping prior to connection to the existing system. Disinfection of the water system shall be performed in accordance with the latest edition of AWWA C601 and C651. The Contractor shall submit their selected form of chlorine and method of chlorination, in conformance with the latest edition of AWWA C651, to the Engineer for his/her record. The Contractor shall provide an adequate blow off for use in flushing system. Bacteria tests will be completed on water samples taken from the blow off.

Before the final connection is made, all surfaces of the new water service pipe and existing water service pipe that will be part of the closing joint, including all gaskets and glands, shall be thoroughly cleaned and treated with a 5% solution of sodium hypochlorite. Extreme care is to be exercised in order to prevent the entrance of any contaminants into the main. All expenses and cost incurred in carrying out the specified sterilization work shall be borne by the Contractor at no extra cost to DelDOT and shall be included in the lump sum contract price for the water service installation.

9. BACTERIA TESTING - The water service pipe shall be flushed of its concentrated chlorine from the initial filling and then shall sit for 24 hours prior to sampling for bacteria. The contractor shall have water samples taken in the presence of DelDOT and analyzed by a certified laboratory. The laboratory's field technician shall collect the samples. A copy of the tests results must be sent to the Engineer for his/her records. The report must contain the project name and the location where the sample was taken, the parts per million (PPM) of chlorine for each sample, as well as whether they pass or fail. City crews will perform a final flush of the mains and place them in service after successful testing of the system.
10. REMOVING EXISTING WATER PIPE - The existing water service pipe and meter vaults shall be removed as identified on the utility relocation plan upon completion of the new water service pipe. The Contractor shall coordinate with DelDOT to determine if any of the existing facilities, including gate valves, fire hydrants, and pipe fittings, should be salvaged and returned to DelDOT. The Contractor is responsible for removal and proper disposal of all of the existing facilities not salvaged by DelDOT. All adjacent pipe openings that remain shall be plugged in accordance with subsection 202.04 of the DelDOT Standard Specifications.

Method of Measurement:

A breakout sheet attached to the Proposal lists the different elements of work or materials involved in completing this item. The Contractor shall fill in a unit price for each item and the cost (unit price times the proposed quantity). The Lump Sum cost for Item 614508 shall be derived from the total sum of the cost of all items listed. The breakout sheet shall be attached to the Bid Proposal. Each item will be measured as a unit price item in the field. The final Lump Sum payment for Item 614508 will be adjusted by change order, either plus or minus, to match the final totals of all unit price items established in the Breakout Sheet. Failure to submit the breakout sheet with the Bid Proposal will result in the bid being declared non-responsive and rejected. The prices bid for construction of all water main and accessory related items shall include but not limited to the excavation of all materials encountered in the trenches, excavation of hot-mix pavement and base course, pipe, valves, valve boxes, fire hydrant, restraining all pipe, excavation and concrete thrust blocks for bends, fittings, or other appurtenances that may be shown or required, concrete encasement, steel casing pipe, precast concrete water meter vault, any excavation that may be necessary for sheeting or bracing the trench; the placing and removal or cutting off of sheeting or bracing; pumping, dewatering, or other disposal of water; furnishing and placing pipe bedding material; furnishing the backfill (including Type C borrow), backfilling, and removal of surplus material, required testing of all lines, protection of any existing Utilities if necessary, furnishing and placing detectable warning tape. No separate payment shall be made for salvaging or abandoning or removing and disposing of existing water service facilities and cost for such required work shall be incidental to Item 614508.

The measurement of payment for the "Water Main System" shall be for the supply and installation of the materials listed in the breakout sheet in accordance with the units indicated. Payment for this item shall consist of all labor, materials and equipment required to furnish and install the complete "Water Main System" to the respective size(s) and depth(s) as required and shown on the Contract Drawings. A percentage of the total Lump Sum bid price will be paid based on the work performed in each pay period. The percentage will be calculated by multiplying the total units of each completed Breakout Item times the appropriate unit price; then adding the total dollars of completed work, divided by the total Lump Sum bid price for item 614518, Water Main and Accessories. Final payment may result in less than 100% of the total Lump Sum based on actual work performed. Should the Lump Sum total be exceeded, additional funds will be added by Change Order based on the best available estimate at the time. DelDOT reserves the right to delete from the Contract one or more items listed and the right to add or subtract from the quantity of each item. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities. DelDOT reserves the right to delete from the Contract one or more items listed in the breakout sheet and the right to add or subtract from the quantity of each item. The total price to be paid will be adjusted in accordance with the Contractor's unit prices as required above. There will be no extra compensation or increase in unit prices in the breakout sheet if such additions and/or deletions are made to the quantities.

Contract No. T200411901.01

617515 - HEADWALL

Description:

This work consists of furnishing and placing a concrete drainage headwall as shown on the Plans.

Materials:

Materials shall conform to the requirements of Section 612, 812 and 824 of the Standard Specifications.

Construction Methods:

Concrete headwalls shall be placed in conformance with the details, dimensions, and notes as shown in the details found in the Plans and at the location shown on the Plans.

Method of Measurement and Basis of Payment:

The quantity of headwalls will be measured and paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing, hauling, and installing materials, including concrete and bar reinforcement; for excavating, backfilling, and compacting; for cribbing, shoring, and sheeting; and for all labor, equipment, tools, and incidentals required to complete the work.

617515 - HEADWALL**Description:**

This work consists of furnishing and placing a concrete drainage headwall as shown on the Plans.

Materials:

Materials shall conform to the requirements of Section 612, 812 and 824 of the Standard Specifications.

Waterproofing Membranes

1. Install the membrane in accordance with the manufacturer's recommendations.
2. If the existing deck was overlaid with hot mix or asphaltic concrete, remove the overlay in its entirety by milling or by the recommended method. Payment for removal will be made under the respective pay Item.
3. Patch all holes or voids in the concrete deck with an approved non-shrink grout, and remove all sharp protrusions. Broom and thoroughly clean the deck surface such that there is no presence of dirt, loose concrete, nor other contaminants. The cleanliness may require lightly shot-blasting and vacuuming.
4. Prior to installing the membrane, apply primer to the cleaned deck and up the curb face to the height required for the membrane. Apply the primer as thin as possible by brush, squeegee, or roller. Brush out any puddles and allow the primer to dry to touch as per the manufacturer's recommendation.
5. Install the membrane at an ambient temperature of 50 degrees Fahrenheit or higher as per the manufacturer's requirement.
6. Apply the membrane by hand-rolling the laminates onto the primed surface or by using approved mechanical aids. In either case, remove the release paper as the installation of the membrane proceeds. The membrane must cover the deck with the sticky side down.
7. Roll the membrane into close contact with the deck surface with a segmented rubber-tired roller or a lawn roller. Roll the membrane into close contact with the vertical concrete surfaces using a carpetpadded wooden float.
8. Overlap the membrane sheets by at least 3 inches or as specified by the manufacturer. Stagger membrane overlaps in the transverse direction.
9. Seal the overlaps at the end of each roll and bond the membrane to the curb by heating with a propane torch. Eliminate all entrapped air bubbles by puncturing the membrane and patching.
10. Place a tack coat on the membrane prior to application of the overlay.
11. Place the bituminous overlay when the temperature is between 290 degrees Fahrenheit and 340 degrees Fahrenheit or as per the manufacturer's recommendation.

Construction Methods:

Concrete headwalls shall be placed in conformance with the details, dimensions, and notes as shown in the details found in the Plans and at the location shown on the Plans.

Method of Measurement and Basis of Payment:

The quantity of headwalls will be measured and paid for at the Contract unit price per each. Price and payment will constitute full compensation for furnishing, hauling, and installing materials, including concrete and bar reinforcement; for excavating, backfilling, and compacting; for cribbing, shoring, and sheeting; and for all labor, equipment, tools, and incidentals required to complete the work.

708538 - SAND FILTER

Description:

This item consists of furnishing all materials and installing precast Portland cement concrete masonry units with reinforcement, including the installation of metal frames and solid covers, the installation of drain with geotextile fabric sock and the outfall pipe system, the installation of a cast-in-place slotted curb and gutter, and the placement of sand and stone, in reasonably close conformity with the details shown on the plans and in accordance with these specifications. The sand filters shall be constructed to the dimensions specified, and carried to the proper elevation to permit the connection of the outfall pipe to the sand filter and the specified inlet as shown on the plans, or as directed.

Materials:

Precast Portland cement concrete masonry units as shown on the plans shall meet the requirements of Standard Specifications Section 602 as pertains to precast concrete.

Frame and solid covers shall meet the standard specifications met by Neenah Foundry Company, frame and solid covers R-4991-FX with Perma Grip Surface ; East Jordan Iron Works, Inc., Frame and Solid Cover Catalog No. 6909; or approved equal. The solid covers must have a non-slip surface similar to the Neenah Foundry Company Perma Grip surface. The solid covers must be compliant with all guidelines under the Americans with Disabilities Act (ADA).

Drain pipe shall be 6" PVC pipe perforated with 7 rows of 3/4" holes @ 1 1/2" on center from the capped end. The holes to be circumferentially offset 3/4" per row. The pipe shall be placed as shown on the plans.

Outfall pipe shall be 8" PVC pipe.

The geotextile fabric sock or tube shall be nonwoven geotextile fabric and conform to the following minimum criteria:

Unit Weight:	8 oz/sq yd
Filtration Rate:	0.08 in/sec
Puncture Strength:	ASTM D-751 125 lbs
Mullen Burst Strength:	ASTM D-751 400 psi
Tensile Strength:	ASTM D-1682 300 lbs
Equiv Opening Size:	US Standard Sieve No. 80

Curb with weir slots shall be cast-in-place with Portland cement concrete masonry with all pertinent dimensions conforming to standard Integral PCC Curb and Gutter Type 3 and the plans. The weir openings shall be 9" wide by 6" high as per plan.

The sand shall conform to the specifications in Section 804.

The stone shall conform to grading requirements specified in Section 813 for Del No. 8 stone.

Construction Methods:

Excavation: Excavation shall be made to the required depth. The foundation upon which the sand filter is to be set shall be compacted to a firm, even surface. The grade of the surface shall reflect the grade of the road/sidewalk surface.

Under Bedding: Sand filter units to be placed over 6" layer of Delaware #57 Stone over compacted subgrade.

Sand Filter Units: The appropriate number of sand filter units shall be placed in the excavated area. Units shall be placed so that the endwalls abut.

Outfall Pipe: The outfall pipe shall be grouted into the sand filter at the outfall drain locations shown on the plans. The pipe shall be connected to the inlet at the down grade side.

Drain Pipe: The geotextile fabric sock or tube shall be placed over the end of the 6" PVC perforated pipe as shown on the plans. The open end of the sock or tube shall be attached to the pipe securely with water resistant tape that could be removed at a later date for maintenance.

Sand and stone: The sand filter shall be filled first with the specified sand to a depth of 12" and smoothed and leveled without compacting the sand. A 2" layer of the specified stone shall be placed on the sand and leveled.

Solid covers and frames: The frames are to be installed according to the specifications supplied by the manufacturer and the solid covers set in place.

Backfill: The excavated areas which are not occupied by the sand filter and the outfall pipe will be backfilled to the required elevation with suitable material which shall be tamped in layers of not more than 6" and shall be compacted to 95% or more maximum density of the modified standard Proctor Test. No backfill shall be made prior to approval.

Method of Measurement:

The number of Sand Filters to be paid for under this section shall be the actual number of sand filter units called for on the plan, installed according to these specifications complete and in place and accepted, including the required outfall pipes.

Basis of Payment:

The number of Sand Filters as determined above shall be paid for at the contract unit price bid per Each, complete in place, which price and payment shall constitute full compensation for furnishing and placing all material, excavation, under bedding, masonry units with reinforcement, outfall pipes, connecting outfall pipes to the storm drain system, drain pipes, geotextile fabric, sand, stone, cast-in-place slotted curb and gutter, frames and solid covers, and backfilling around the structure, the disposal of surplus materials, and for all labor, equipment, tools, and incidentals necessary to complete this section.

11/23/10

708538 - SAND FILTER**Description:**

This work consists of furnishing all materials, fabricating, delivering, and constructing complete in place the precast reinforced concrete sand filters as shown on the Plans, as directed by the Engineer, and as required by these Special Provisions. These Special Provisions were prepared as part of Contract T200411901.01.

Materials:

1. Concrete

Precast concrete for the sand filters shall conform to Section 812 of the Standard Specifications except as amended herein. Minimum 28 days strength for precast concrete shall be 5000 psi. The Contractor shall develop his own concrete mix design, according to ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, which shall be submitted to the Engineer for approval. The cement content shall not be less than 700 lb. per cubic yard. Portland Cement shall be Type I or Type II (ASTM C 150).

Cast-in-place concrete for the Type 3-4 Integral P.C.C. Curb and Gutter shall conform to Section 701 of the Standard Specifications.
2. Reinforcing Steel

Reinforcing steel shall meet the requirements of AASHTO M 31, Grade 60 (ASTM A 615, Grade 60) and shall be protected with fusion bonded epoxy meeting the requirements of Section 604 of the Standard Specifications.
3. Frame and Solid Covers

Frame and solid covers shall meet the specifications met by Neenah Foundry Company, frame and solid covers R-4991-FX with Perma Grip Surface; East Jordan Iron Works, Inc., Frame and Solid Cover Catalog No. 6909; or approved equal. The solid covers must have a non-slip surface similar to the Neenah Foundry Company Perma Grip surface. The solid covers must be compliant with all guidelines under the Americans with Disabilities Act (ADA).
4. Drain and Outfall Pipes

Drain and outfall pipes shall meet the requirements of Section 718.02. All pipes shall be schedule 40 PVC pipe.
5. Geotextile Fabric

The geotextile fabric sock or tube shall be nonwoven geotextile fabric and conform to the following minimum criteria:

Unit Weight:	8 oz/sq yd
Filtration Rate:	0.08 in/sec
Puncture Strength:	ASTM D-751 125 lbs
Mullen Burst Strength:	ASTM D-751 400 psi
Tensile Strength:	ASTM D-1682 300 lbs
Equivalent Opening Size:	US Standard Sieve No. 80

6. Sand

The sand shall conform to Section 804 of the Standard Specifications.

7. Stone

The stone shall conform to the grading requirements for Delaware No. 8 Stone as specified in Section 813 of the Standard Specifications.

Design:

The precast concrete sand filters shall be constructed in conformance with the notes and details in the Plans. The bearing resistance for strength and service design is as shown on the Plans.

The Contractor shall submit design calculations and shop drawings for the sand filter to the Department for approval by the Engineer. Drawings shall show all pertinent dimensions and reinforcement. The design shall be in accordance with the Delaware Department of Transportation Bridge Design Manual, latest edition, and the AASHTO LRFD Bridge Design Specifications, latest edition. The loading shall be AASHTO HL-93. All calculations shall be stamped and signed by a registered Professional Engineer in the State of Delaware.

Fabrication Plant:

The fabrication plant for precast sand filters shall be a National Precast Concrete Association (NPCA) certified plant and pre-approved by the Department.

Fabrication:

1. General

All materials, equipment, processes of manufacture, and the finished sections, including handling, storage, and transportation, shall be subject to inspection and approval. Any defective construction, which may adversely affect the strength or performance of a section, shall be cause for rejection. Rejected sections shall be replaced at no additional cost to the Department.

2. Forms

The forms used shall be sufficiently rigid and accurate to maintain the structure dimensions within the tolerances hereinafter specified. The forms shall be well constructed, carefully aligned, substantial and firm, securely braced and fastened together, sufficiently tight to prevent leakage of mortar, and strong enough to withstand the action of mechanical vibrators. All the casting surfaces shall be of a smooth material.

Form ties shall be either the threaded type or the snap-off type, so that no form wires or metal pieces will be left at the surface of the finished concrete. Corners and angles shall be mitered or rounded.

Joints between panel forms shall be made smooth and tight.

3. Curing

The sand filters shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used for the precast sections:

Steam Curing - Low pressure, steam-cured by a system that will maintain a moist atmosphere.

Water Curing - Water cured by any method that will keep the sections moist.

Forms Left in Place - An accelerated overnight cure accomplished through the use of an external heat source may be used, provided moisture loss from exposed surfaces is minimized.

The maximum temperature increase or decrease shall be 40 degrees F per hour. The initial application of the heat shall be two (2) hours after the final placement of concrete to allow the initial set to take place.

4. Testing Requirements

Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders. Acceptance of the precast concrete sections with respect to compressive strength will be determined on a basis of production lots. A production lot is defined as a group of sand filter units representing ten (10) units or a single day's production, whichever is less.

During the production of the precast sections, the manufacturer shall randomly sample the concrete in accordance with AASHTO T 141. A single compressive strength sample shall consist of a minimum of four (4) cylinders randomly selected for every production lot. Cylinders for compressive strength tests shall be 4" x 8" or as specified by the Engineer and prepared and tested in accordance with AASHTO T 23 and T 22, respectively. For every compressive strength sample, a minimum of two (2) cylinders shall be cured in the same manner as the sand filter sections and tested at approximately seven (7) days. The average compressive strength of these cylinders will determine the initial strength of the concrete. In addition, two (2) cylinders shall be cured in accordance with AASHTO T 23 and tested at 28 days. The average compressive strength of these two (2) cylinders will determine the compressive strength of the production lot.

Acceptability by Cylinder Tests - The compressive strength of the concrete for each production lot as previously defined is acceptable when the compressive strength is equal to or greater than the design concrete strength.

When the compressive strength of any production lot is less than the design concrete strength, the production lot shall be rejected. The rejection shall prevail unless the manufacturer, at his/her own expense, obtains and submits evidence of a type acceptable to the Engineer that the strength and quality of the concrete placed within the sand filter sections of the production lot are acceptable. If the evidence consists of tests made on cores taken from the sand filter sections within the production lot, the cores shall be obtained and tested in accordance with the requirements of AASHTO T 24. The core holes shall be plugged and sealed by the manufacturer in a manner such that the precast section will meet all of the test requirements of this Special Provision. Precast sections so sealed shall be considered satisfactory for use.

5. Tolerances

Internal Dimensions - The internal dimension shall vary not more than $-0"/+1/4"$ from the design dimensions.

Top Slab and Wall Thickness - The top slab and wall thickness shall not be less than the design dimensions by more than five percent (5%). A thickness more than that required shall not be cause for rejection.

Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of the precast sections shall not be more than $1/8"/\text{foot}$ of internal span, with a maximum of $5/8"$ for all sizes through $7'-0"$ internal span, and a maximum of $3/4"$ for internal spans greater than $7'-0"$.

Length of Section - The under run in length shall not be more than 1/8"/foot of length with a maximum of 1/2" in any precast section.

Position of Reinforcement - Reinforcement cover and spacing shall be in accordance with the Delaware Department of Transportation Bridge Design Manual, latest edition, and the AASHTO LRFD Bridge Design Specifications, latest edition. The maximum variation in the position of the reinforcement shall be $\pm 3/8$ ".

Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas per linear foot. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM specification for that type of reinforcement.

Construction Methods:

1. Excavation

Excavation shall be made to the required depth. The foundation upon which the sand filter is to be set shall be compacted to a firm, even surface. The grade of the surface shall be flat and level.

2. Under Bedding

Sand filter units to be placed over 6" layer of Delaware No. 57 Stone over compacted subgrade.

3. Sand Filter Units

The appropriate number of sand filter units shall be placed in the excavated area. Units shall be placed so that the endwalls abut and connected with a 6" PVC Interconnection Pipe as shown on the Plans. The 6" opening at the end units shall be capped as shown on the Plans.

4. Outfall Pipe

The 8" PVC outfall pipe shall be connected to the 6" PVC sand filter drain pipes as shown on the Plans.

5. Drain Pipe

The geotextile fabric sock or tube shall be placed over the end of the 6" PVC drain pipes. The open end of the sock or tube shall be attached to the pipe securely with water resistant tape that could be removed at a later date for maintenance.

6. Sand and Stone

The sand filter shall be filled first with the specified sand to a depth of 12" and smoothed and leveled without compacting the sand. A 2" layer of the specified stone shall be placed on the sand and leveled.

7. Solid Covers, Grates, and Frames

The frames are to be installed according to the specifications supplied by the manufacturer and the solid covers set in place. The top of the covers and grates shall match proposed grade using cast-in-place concrete poured with the P.C.C. curb and gutter (see below).

8. P.C.C. Curb and Gutter

P.C.C. curb and gutter shall be cast-in-place with all pertinent dimensions conforming to standard Type 3-4 Integral P.C.C. Curb and Gutter and the details shown on the Plans.

9. Backfill

The excavated areas which are not occupied by the sand filter and the outfall pipe will be backfilled to the required elevation with suitable material which shall be tamped in layers of not more than 6" and shall be compacted to 95% or more maximum density of the modified standard Proctor Test. No backfill shall be made prior to approval by the engineer by the engineer.

Method of Measurement:

The quantity of Sand Filters to be paid for under this Item shall be the actual number of sand filter units called for on the Plans and installed according to the Plans and these special provisions.

Basis of Payment:

The quantity of Sand Filters will be paid for at the contract unit price bid per Each. Price and payment will constitute full compensation for furnishing all materials, excavation, under bedding, precast units including reinforcing, drain pipes, outfall pipes including the length required to connect to the storm drain system, connecting outfall pipes to the storm drain system, geotextile fabric, sand, stone, solid covers and frames, and backfilling around the structure, the disposal of surplus materials, and for all labor, equipment, tools, and incidentals necessary to complete this section. Payment for the cast-in-place concrete to meet sidewalk grade and the PCC curb and gutter will be paid for by the pertinent curb and gutter item in the Contract

10/17/17

"ATTENTION"

TO BIDDERS

BREAKOUT SHEET(S) MUST BE SUBMITTED EITHER WITH YOUR BID DOCUMENTS; OR WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE BID DUE DATE BY THE LOWEST APPARENT BIDDER.

BREAKOUT SHEETS ARE TO BE SUBMITTED TO DELDOT'S CONTRACT ADMINISTRATION AS SHOWN BELOW. BREAKOUT SHEETS CANNOT BE CHANGED AFTER AWARD. THE DEPARTMENT WILL REVIEW THE FIGURES SUBMITTED ON THE BREAKOUT SHEET(S) TO ENSURE THEY MATCH THE RESPECTIVE LUMP SUM BID AMOUNT(S). MATHEMATICALLY INCORRECT BREAKOUT SHEETS WILL BE RETURNED FOR IMMEDIATE CORRECTION.

BREAKOUT SHEETS MAY BE SUBMITTED;

VIA E-MAIL TO: DOT-ASK@STATE.DE.US
SUBJECT: **T200411901.01** Breakout Sheet

OR MAILED TO: DELDOT
CONTRACT ADMINISTRATION
PO BOX 778, DOVER, DE 19903

'BREAKOUT SHEET' AND THE PROJECT NUMBER
MUST APPEAR ON THE ENVELOPE.

BREAKOUT SHEET - 1		CONTRACT NO. T200411901.01			
Item 614508 - WATER MAIN AND ACCESSORIES					
FOX RUN SHOPPING CENTER 8-INCH WATER MAIN (PARCEL 4-R)					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
W-1	202	LF	DUCTILE IRON PIPE CLASS 52, 8" (PUSH-ON OR RESTRAINED JOINT)	\$	\$
W-2	6	LF	DUCTILE IRON PIPE CLASS 52, 12" (PUSH-ON OR RESTRAINED JOINT)	\$	\$
W-3	1	EA	PRE-PIPED METER VAULT (ARTESIAN 8-INCH)*	\$	\$
W-4	2	EA	DUCTILE IRON GATE VALVE W/CAST IRON BOX AND COVER, 8"	\$	\$
W-5	1	EA	M.J. TAPPING SLEEVE W/VALVE, 8" D.I.P.	\$	\$
W-6	1	EA	90° M.J. HORIZONTAL BENDS, 8" D.I.P.	\$	\$
W-7	1	EA	M.J. REDUCER, 12"X8" D.I.P.	\$	\$
W-8	184	CY	EXCAVATION AND EMBANKMENT	\$	\$
W-9	53	TON	NO. 57 STONE BEDDING	\$	\$
W-10	173	CY	FURNISHING BORROW TYPE "C"	\$	\$
TOTAL ITEM 614508 - WATER MAIN AND ACCESSORIES \$ (LUMP SUM BID PRICE FOR ITEM 614508 - WATER MAIN AND ACCESSORIES)					

*Cost includes all class 53 D.I.P., fittings, ladder, and all items required for vault and water meter installation

BREAKOUT SHEET - 2		CONTRACT NO. T200411901.01			
Item 614508 - WATER MAIN AND ACCESSORIES					
RITE AID 6-INCH WATER MAIN A (PARCEL 5-R)					
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
W-1	43	LF	DUCTILE IRON PIPE CLASS 52, 6" (PUSH-ON JOINT)	\$	\$
W-2	1	EA	PRE-PIPED METER VAULT (ARTESIAN 6-INCH)*	\$	\$
W-3	2	EA	DUCTILE IRON GATE VALVE W/CAST IRON BOX AND COVER, 6"	\$	\$
W-4	1	EA	M.J. TAPPING SLEEVE W/VALVE, 6" D.I.P.	\$	\$
W-5	1	EA	90° M.J. HORIZONTAL BEND, 6" D.I.P.	\$	\$
W-6	98	CY	EXCAVATION AND EMBANKMENT	\$	\$
W-7	13	TON	NO. 57 STONE BEDDING	\$	\$
W-8	64	CY	FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH AND STRUCTURE BACKFILL	\$	\$
TOTAL ITEM 614508 - WATER MAIN AND ACCESSORIES \$ _____ (LUMP SUM BID PRICE FOR ITEM 614508 - WATER MAIN AND ACCESSORIES)					

*Cost includes all class 53 D.I.P., fittings, ladder, and all items required for vault and water meter installation

BREAKOUT SHEET - 3						CONTRACT NO. T200411901.01	
Item 614508 - WATER MAIN AND ACCESSORIES							
MATTRESS FIRM 6-INCH WATER MAIN B (PARCEL 5-R)							
ITEM NO.	APPROX. QTY.	UOM	DESCRIPTION	UNIT PRICE	AMOUNT		
W-1	49	LF	DUCTILE IRON PIPE CLASS 52, 6" (PUSH-ON JOINT)	\$	\$		
W-2	1	EA	PRE-PIPED METER VAULT (ARTESIAN 6-INCH)*	\$	\$		
W-3	2	EA	DUCTILE IRON GATE VALVE W/CAST IRON BOX AND COVER, 6"	\$	\$		
W-4	1	EA	M.J. TAPPING SLEEVE W/VALVE, 6" D.I.P.	\$	\$		
W-5	1	EA	90° M.J. HORIZONTAL BEND, 6" D.I.P.	\$	\$		
W-6	101	CY	EXCAVATION AND EMBANKMENT	\$	\$		
W-7	14	TON	NO. 57 STONE BEDDING	\$	\$		
W-8	66	CY	FURNISHING BORROW TYPE "C" FOR PIPE, UTILITY TRENCH AND STRUCTURE BACKFILL	\$	\$		
TOTAL ITEM 614508 - WATER MAIN AND ACCESSORIES \$ _____ (LUMP SUM BID PRICE FOR ITEM 614508 - WATER MAIN AND ACCESSORIES)							

*Cost includes all class 53 D.I.P., fittings, ladder, and all items required for vault and water meter installation